



DDP24/94

Quad speed multichannel Dolby Digital (plus) encoder
with Dolby E decoder (DDP94 only)

Installation and Operation manual





Synapse

TECHNICAL MANUAL

DDP24/94



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- ALWAYS disconnect your entire system from the AC mains before cleaning any component. The product frame (SFR18 or SFR04) must be terminated with three-conductor AC mains power cord that includes an earth ground connection. To prevent shock hazard, all three connections must always be used.
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- NEVER operate this product if any cover is removed.
- NEVER wet the inside of this product with any liquid.
- NEVER pour or spill liquids directly onto this unit.
- NEVER block airflow through ventilation slots.
- NEVER bypass any fuse.
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	EN60950 Safety EN55103-1: 1996 Emission EN55103-2: 1996 Immunity
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Axon Digital Design DDP24/94 Tested To Comply With FCC Standards	This device complies with part 15 of the FCC Rules Operation is subject to the following two conditions: (1) This device may cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.
FOR HOME OR OFFICE USE	

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1 Introduction to Synapse

An Introduction to Synapse

Synapse is a modular system designed for the broadcast industry. High density, intuitive operation and high quality processing are key features of this system. Synapse offers a full range of converters and processing modules. Please visit the AXON Digital Design Website at www.axon.tv to obtain the latest information on our new products and updates.

Local Control Panel

The local control panel gives access to all adjustable parameters and provides status information for any of the cards in the Synapse frame, including the Synapse rack controller. The local control panel is also used to back-up and restore card settings. Please refer to the RRC18, RRC10, RRC04, RRS18 and RRS04 manuals for a detailed description of the local control panel, the way to set-up remote control over IP and for frame related settings and status information.

Remote Control Capabilities

The remote control options are explained in the rack controller (RRC18/RRC10/RRC04/RRS18/RRS04) manual. The method of connection to a computer using Ethernet is described in the RRC/RRS manual.



CHECK-OUT: “AXON CORTEX” SOFTWARE WILL INCREASE SYSTEM FLEXIBILITY OF ONE OR MORE SYNAPSE FRAMES

Although not required to use Cortex with a Synapse frame, you are strongly advised to use a remote personal computer or laptop PC with Synapse Cortex installed, as this increases the ease of use and understanding of the modules.

2 Unpacking and Placement

Unpacking

The Axon Synapse card must be unpacked in an anti-static environment. Care must be taken NOT to touch components on the card – always handle the card carefully by the edges. The card must be stored and shipped in anti-static packaging. Ensuring that these precautions are followed will prevent premature failure from components mounted on the board.

Placing the card

The Synapse card can be placed vertically in an SFR18 frame or horizontally in an SFR04 and SFR08 frame. Locate the two guide slots to be used, slide in the mounted circuit board, and push it firmly to locate the connectors.

Correct insertion of card is essential as a card that is not located properly may show valid indicators, but does not function correctly.

NOTE: On power up all LED's will light for a few seconds, this is the time it takes to initialise the card.

Note: When at start-up the Dolby version number does not match the expected version number the card will reprogram the Dolby board automatically. In the identity of the card (see Cortex classic view, or front panel) the item `feature set` will be set to `PROG`. In this case all LEDs are blinking except the input and reference LEDs, these will indicate the file-number which is uploading (as a sort of progress bar). Please in this case do NOT turn off the power or pull out the card but wait for the card to return in normal mode (no more blinking LEDs).

3 A Quick Start

When Powering-up

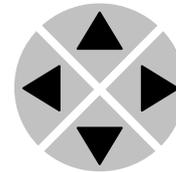
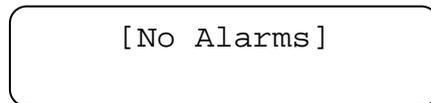
On powering up the Synapse frame, the card set will use basic data and default initialisation settings. All LED's will light during this process. After initialisation, several LED's will remain lit – the exact number and configuration is dependant upon the number of inputs connected and the status of the inputs.

Changing settings and parameters

The front panel controls or the Axon Cortex can be used to change settings. An overview of the settings can be found in chapter 5, 6 and 7 of this manual.

Front Panel Control

Front Panel Display and Cursor



Settings are displayed and changed as follows;

Use the cursor 'arrows' on the front panel to select the menu and parameter to be displayed and/or changed.

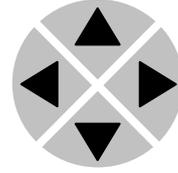
- Press ► To go forward through the menu structure.
- Press ◀ To go back through the menu structure.
- Press ▲ To move up within a menu or increase the value of a parameter.
- Press ▼ To move down through a menu or decrease the value of a parameter.

NOTE: Whilst editing a setting, pressing ► twice will reset the value to its default.

**Example of
changing
parameters using
front panel control**

With the display as shown below

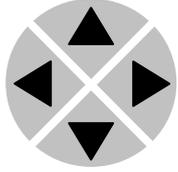
```
RRC18 [Select Card]  
>S01=SFS10
```



Pressing the ► selects the SFS10 in frame slot 01.

The display changes to indicate that the SFS10 has been selected. In this example the Settings menu item is indicated.

```
SFS10 [Select Menu]  
>Settings
```

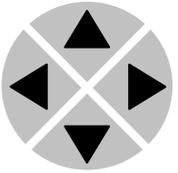


Pressing the ► selects the menu item shown, in this example Settings.

(Pressing ▲ or ▼ will change to a different menu eg Status , Events).

The display changes to indicate that the SFS10 Settings menu item SDI-Format has been selected and shows that its current setting is Auto.

```
SFS10 [Settings]  
>SDI-Format=Auto
```

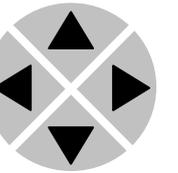


Pressing the ► selects the settings item shown, in this example SDI-Format .

(Pressing ▲ or ▼ will change to a different setting, eg Mode , H-Delay).

The display changes to indicate that the SFS10 Edit Setting menu item SDI-Format has been selected.

```
SFS10 Edit Setting]  
SDI-Format>Auto
```



To edit the setting of the menu item press ▲ or ▼ .

All menu items can be monitored and/or changed in this way. Changing a setting has an immediate effect.



Axon Cortex Software

Axon Cortex can be used to change the settings of Synapse modules from a PC, either locally or remotely. The software enables communication based on TCP/IP between the Setup PC and Synapse frames/modules.

Each Synapse frame is addressed through its rack controller's unique IP address, giving access to each module, its menus and adjustment items. Axon Cortex has access to data contained within the Synapse module and displays it on a GUI. The software has an intuitive structure following that of the module that it is controlling.

For operation of Axon Cortex, please refer to the Cortex help files.

Menu Structure Example

Slot	Module	Item	Parameter	Setting
▲				
▲				
S02		Identity		
▲		▲		
S01	SFS10	▶ Set-tings	▶ Standard_dig	▶ Auto
▼		▼	▼	▼
S00	RRC18	Status	Mode	625
		▼	▼	▼
		Events	Ref-Input	525
			▼	
			H-Delay	
			▼	
			▼	

NOTE: Further information about Front Panel Control and Axon Cortex can be obtained from the RRC and RRS operational manuals and the Cortex help files.

4 The DDP24/94 card

Introduction

The DDP24 and DDP94 are quad speed ADD-ON Multi channel Dolby Digital (plus) encoders. The DDP94 adds Dolby E decoding to the Dolby Digital (plus) encoding. The card is designed for the use with the Synapse high efficient quad speed multiplexing audio bus. The quad speed bus enables ADD-ON cards to be connected with a master card and have both input and output signals connected to this card for convenient routing and integration. The Card can be configured as a 4in/4out or 6in/2out module.

The **DDP24** receives the discrete audio in PCM from one of the 4 physical AES/EBU inputs or any of the 16 stereo pairs that can enter the card via the Quad speed Audio bus. The **DDP94** receives the Dolby E from one of the 4 physical AES/EBU inputs or any of the 16 stereo pairs that can enter the card via the Quad speed Audio bus. The four (decoded) stereo AES/EBU signals are available on its local I/O connectors or via the Internal Synapse bus directly to the master card or to the looping quad speed bus outputs. The same accounts for the bitstream outputs that can be routed to the physical outputs, the quad-speed bus return path outputs or the quad speed bus looping outputs. The latter will make it possible to route the decoded Dolby E (PCM) streams to an adjacent ADD-ON card for further processing.

An additional level activated Voice Over processor is included. This processor detects a user defined signal level and then ducks the predefined channels that are used to mix the VO with. The VO can be applied to 8 stereo channels (user selectable).

A new feature is the provision for Receiver Mixed associated audio services (eg. audio description). This can be achieved by using multiple Dolby Digital Plus encoders within the DDP24/94. The control of the receiver mixing can be achieved using the automatic generation of mixing metadata, and the Dolby Digital Plus output can be configured for downstream transport stream multiplexing into either single or dual PID.

The DDP24/94 gets its processing clock from the Master card and will operate fully clock synchronous with this master card. You can use the DDP94 stand alone by locking on AES1 to 4 or ref 1 and 2 *For stand alone or original ADD-ON bus applications the DDP14/84 is still an alternative with slightly different I/O*

Features

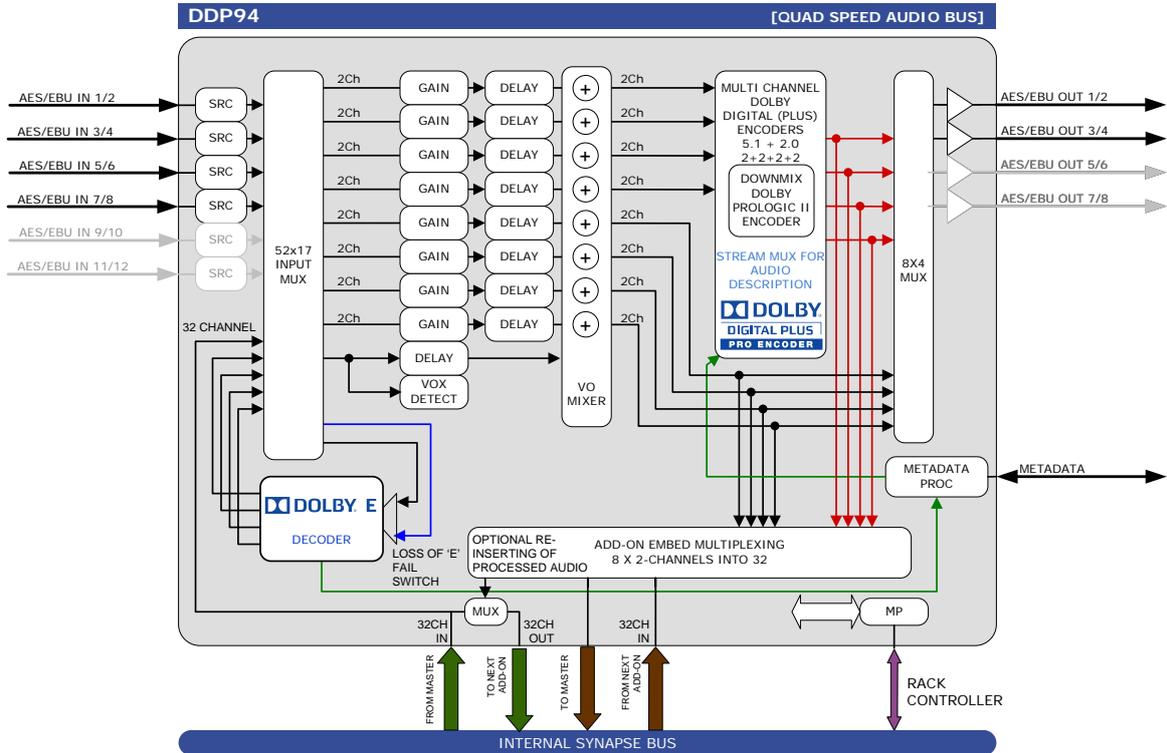
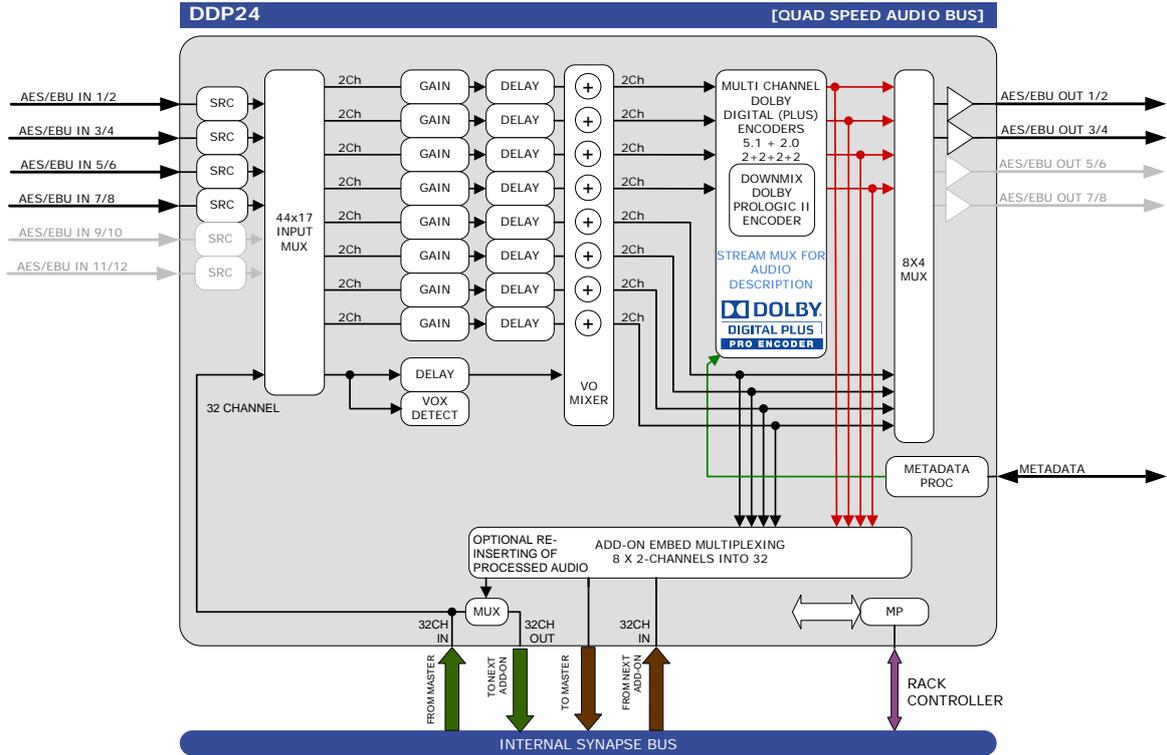
- Quad speed audio bus for convenient routing of ADD-ON channels
- Optional re-inserting of processed audio for downstream post-processing (DLAxx)
- 4 or 6 physical stereo AES/EBU inputs and 16 stereo bus inputs.
- 4 or 2 physical stereo AES/EBU (can contain Dolby Bit streams) outputs and 8 stereo (into 16 stereo) bus outputs
- I/O mode can be set to 6 in and 2 out (12 mono in 2 bitstream out) or to 4 in and 4 out.
- Dolby E decoding with automatic source selection on loss of Dolby E (DDP94)
- Up to 4 times 2.0 Dolby Digital (Plus) outputs.
- 5.1 Dolby Digital (Plus)+ 2.0 Dolby Digital (Plus)
- Dolby Digital Plus receiver mixed audio description encoding (single and dual PID)
- Dolby Pro Logic II encoding from downmixed discrete 5.1 or Dolby E source
- Physical metadata output and input
- Individual offset delay per input
- Individual gain control per input (except bitstream input)
- Able to handle all AES/EBU input formats
- Full audio channel shuffling

Caution: The Dolby E decoding latency is 3,5 frames

Applications

- Efficient Dolby processing to Quad Speed audio Master Cards.

Block schematics



5 Settings Menu

Introduction The settings menu displays the current state of each DDP24/94 setting and allows you to change or adjust it. Settings can be changed using the front panel of the Synapse frame (SFR18, SFR08 or SFR04) or with Cortex. Also the SCP08 control can be used. Please refer to chapter 3 for information on the Synapse front panel control and Cortex.

SYSTEM CONTROL

SRC This item switches on the Sample Rate Converter (SRC), or sets it to transparent (Trans), in which case the sample rate of the input is used. Trans mode is default.

Note: When using Transparent mode, make sure that the sample rate matches the lock-mode (next setting). The rates have to be the same.

Lock-Mode The DDP24/94 can be used as an ADD_ON card (in combination with an embedder/de-embedder card). In this case you are referred to the setting MasterCard, which will extract the reference from the master card. It is also possible to use an external signal to lock to. In that case you are referred to the setting:

- AES1 = Locks to the AES/EBU signal on input 1 (default)
- AES4 = Locks to the AES/EBU signal on input 4
- Ref1 = The B&B reference input of the rackcontroller
- Ref2 = The second B&B reference input of the rack controller (if available)
- Mastercard = Locks to the ADD-ON bus input (always use this setting when using quad speed add-on bus functionality).

Decoderinput (DDP94 only) With this setting you decide what the input of the Dolby E decoder should be. It can be set to the assigned Dolby E_input (set with Dolby_E_in setting), or to Auto.

In auto mode (default) the decoder automatically selects the Dolby E input set with Dolby_E_in. If that input fails (so when no Dolby E is detected), it will automatically switch to the input set with Dolby_PCM_backup. This input will set to decoder outputs 1 and 2.

In_Out In the block schematic you can see 2 of the 6 AES inputs and 2 of the 4 AES outputs are colored grey. With this setting you decide which inputs and outputs are active. There's two possible settings:

- 4In_4Out: 4 AES inputs and 4 AES outputs (default).
- 6In_2Out: 6 AES inputs and 2 AES outputs.

INPUT CONTROL	
<p>Dolby_E_in (DDP94 only)</p>	<p>Here you select where the Dolby E comes from: from the local AES/EBU inputs, or from the master card via the add-on bus. Default is local.</p>
<p>Ch_E_in (DDP94 only)</p>	<p>With this setting you appoint specific channels within the input source set with <code>Dolby_E_in</code>, which should contain Dolby E. Dependant on the source, you can choose any of the following audio pairs:</p> <ul style="list-style-type: none"> ■ 1/2 AES/EBU input 1 when source is local, Add-on bus channels 1/2 when source is master ■ 3/4 AES/EBU input 2 when source is local, Add-on bus channels 3/4 when source is master ■ 5/6 AES/EBU input 3 when source is local, Add-on bus channels 5/6 when source is master ■ 7/8 AES/EBU input 4 when source is local, Add-on bus channels 7/8 when source is master ■ 9/10 AES/EBU input 5 when source is local (only when <code>In_Out</code> is set to <code>6In_2Out</code>), Add-on bus channels 7/8 when source is master ■ 11/12 AES/EBU input 6 when source is local (only when <code>In_Out</code> is set to <code>6In_2Out</code>), Add-on bus channels 7/8 when source is master ■ 13/14 only available when source is master ■ 15/16 only available when source is master ■ 17/18 only available when source is master ■ 19/20 only available when source is master ■ 21/22 only available when source is master ■ 23/24 only available when source is master ■ 25/26 only available when source is master ■ 27/28 only available when source is master ■ 29/30 only available when source is master ■ 31/32 only available when source is master
<p>Dolby_PCM_backup (DDP94 only)</p>	<p>With <code>Dolby_PCM_backup</code> you select which source is your backup input for the Dolby E decoder (only used when <code>Decoderinput</code> is set to <code>auto</code>). Can be set to <code>local</code> (the physical AES/EBU inputs) or to <code>master</code> (audio coming form master card, via add-on bus). Default is <code>local</code>.</p>
<p>Ch_backup (DDP94 only)</p>	<p>With this setting you appoint specific channels within the input source set with <code>Dolby_PCM_backup</code>, which should contain Dolby E. Dependant on the source, you can choose any of the audio pairs listed under <code>Ch_E_in</code>.</p>

Sel_Ch1 ~ Sel_Ch16

With these settings you set a source for the corresponding output channel. You can set each individual channel to source Local (physical AES/EBU inputs), Master (audio coming from master card via add-on) or Decoded_E (audio coming from the Dolby decoder, can only be selected when using DDP94).

Channels 1 till 8 are the physical AES/EBU outputs (dependant on the In_Out setting) as well as outputs towards the add-on bus and are by default set to Local. Channel 9 till 16 are add-on bus only and by default set to Master.

Ch_1 ~ Ch_16

With these settings you select a specific channel within the above selected source to put on the corresponding output channel. Dependant on the source setting, you can select any of up to 32 channels within the source. Be default Ch_1 till Ch_16 are set to respectively 1 till 16.

PROCESS CONTROL

Gain-CH_1 ~ Gain-CH_16

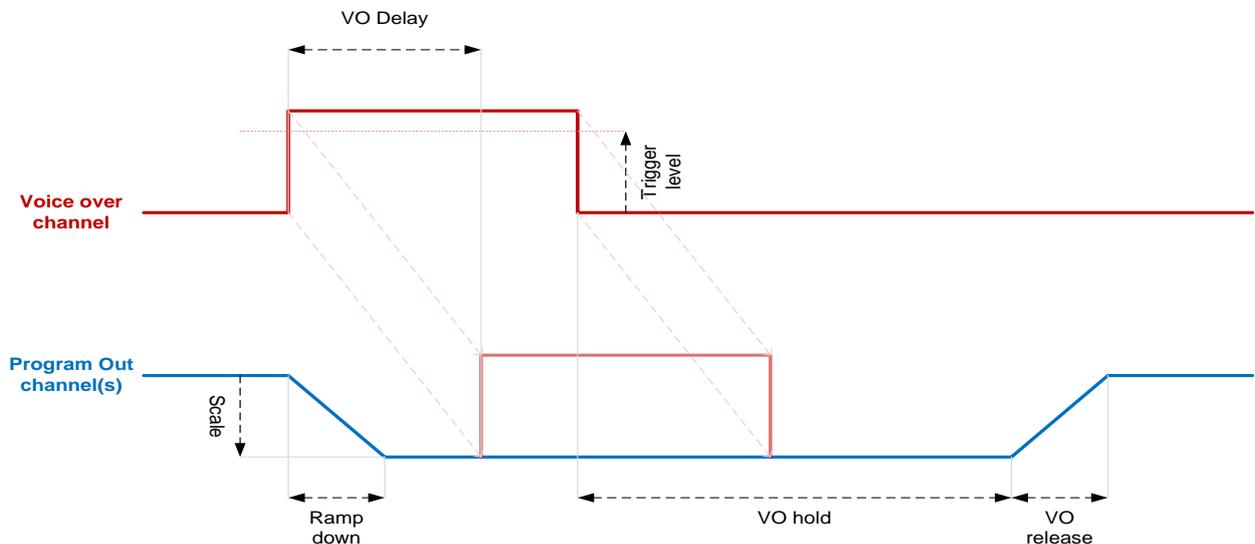
With these settings you can gain (or attenuate) the individual output channels between -60dB and +12dB. Everything below -60dB is muted (displayed as -999dB). Default is 0dB.

Delay-CH_1/2 ~ Delay-CH_15/16

Here you can delay each audio pair between 0ms and 1300ms. Default is 0ms.

VO CONTROL

The DDP handles Voice Over channels. With the following settings you can set how the involved program out channels should react to a voice over signal and how everything is triggered. The following graphic gives a visualisation of the settings.



VO_Trigger	With this setting you set how a voice over trigger is generated. Can be set to off (in which case a voice over is never triggered), GPI_0 (voice over processing is triggered by GPI contact 0) or Auto (voice over processing is triggered when the voice over channels reaches the trigger level volume set with VO_Trgrlvl). Default is Off.
VO_Sel	Here you set a source which contains the voice over channel. Can be set to Local (physical AES/EBU inputs), Master (audio coming from master card via add-on) or Decoded_E (audio coming from the Dolby decoder, can only be selected when using DDP94). Default is Local.
VO_Ch	Here you select which channel in the above selected source contains the voice over content. Default is channel 7.
VO_Scale	With this setting you set a scale in dB with which the program out channels should be decreased in volume when a voice over is triggered. Can be between -95dB and 0dB. Default is -60dB.
VO_Trgrlvl	This setting is used when VO_Trigger is set to auto. You set a threshold in dBFS between -95 and 0dBFS. When the voice over channel reaches this threshold, voice over processing is triggered.
VO_Delay	This is the delay in ms (up to 1000 ms) with which the voice over channel is delayed. This is the time between the trigger and the actual insertion (see graphic in VO control header). Default is 256ms.
VO_Hold	This is the time between the end of the voice over (audio goes below the VO_Trgrlvl threshold or GPI_0 is released, depending on what is set in VO_Trigger) and the start of the voice over release (see graphic in VO control header). Default is 256ms.
VO_Release	This is the “release” time. The time between the end of the VO hold and the point where the program out channels are at their full volume level again (see graphic in VO control header). Default is 256ms.
VO_Rampdown	This is the “ramp down” time. The time between the VO trigger and the point where the program out channels have reached the volume level set with VO_scal (see graphic in VO control header). Default is 256ms.
VO_Ch_1 ~ VO_Ch_16	With these settings you set which program out channels should be affected by the above settings. You can set output channel to on or off.

ENCODER CONTROL

Config

With this setting you configure the encoder. The DDP24/94 supports multiple output formats. This always sets the maximum amount of channels (so metadata could change 5.1 to 2.0). Default setting is 5.1+2/0.

Normal encoder settings:

The following Enc_config settings are the normal settings. In the following table you see which settings have what outputs. **Note** that DD(+) means that the output is either Dolby Digital or Dolby Digital Plus, depending on what settings have been done at the Enc_mode settings which are next in the menu.

Setting	Encoder out 1	Encoder out 2	Encoder out 3	Encoder out 4
2/0	DD(+) 2.0	- or DD(+) 2.0	- or DD(+) 2.0	- or DD(+) 2.0
5.1+2/0	DD(+) 5.1	- or DD(+) 2.0	-	-
5.1+1+1	DD(+)5.1	DD(+).1.0	DD(+).1.0	-
5.1+2 or 5.1+1+1	DD(+)5.1	DD(+).2.0 or DD(+).1.0	- or DD(+).1.0	-
7.1	DD(+).7.1	-	-	-

Transcode settings: The following Enc_config settings are special settings when using a Dolby Digital input. This signal is converted to Dolby Digital Plus when using these settings. For example: when the setting 2/0 or TC is applied, the Dolby Digital input is transcoded to Dolby Digital Plus, but when the Dolby Digital input signal is lost, then the designated PCM inputs will be converted to a 2x 2.0 DD(+) output automatically.

Setting	Encoder out 1	Encoder out 2	Encoder out 3	Encoder out 4
2/0 or TC	DD+ 2.0	- or DD+ 2.0	-	-
5.1 or TC	DD+ 5.1	-	-	-
TC	DD+	-	-	-

7.1 up setting: The DDP is capable of “up-converting” 5.1 signals to 7.1. In this process a normal 5.1 Dolby Digital (+) input is processed into a 7.1 signal. Only one setting is possible for this mode.

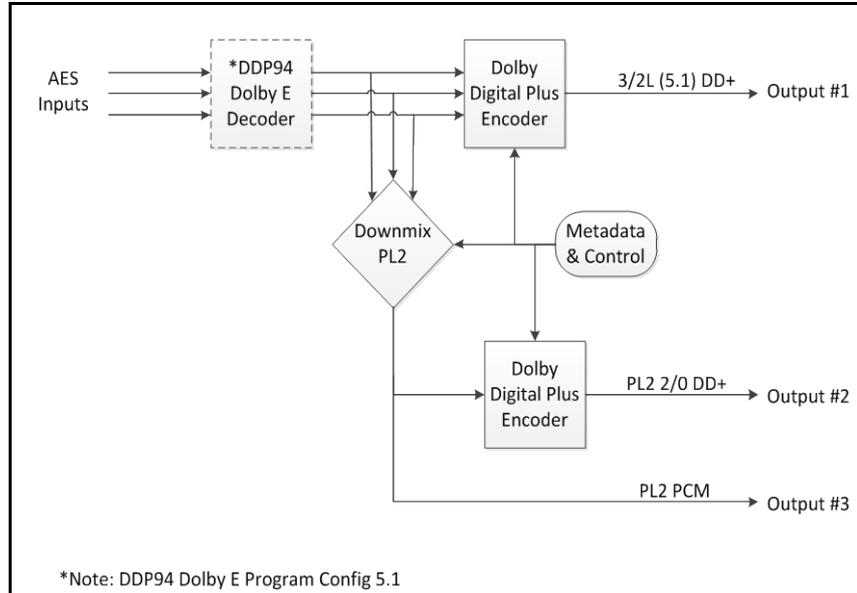
Setting	Encoder out 1	Encoder out 2	Encoder out 3	Encoder out 4
7.1 up	DD(+) 7.1	-	-	-

Pro Logic II settings: The DDP is capable of encoding Pro Logic II signals. Pro Logic II is a multichannel sound source down mixed to a single stereo channel. The table and schematics on the following page display and explain the 2 possible Pro Logic II settings.

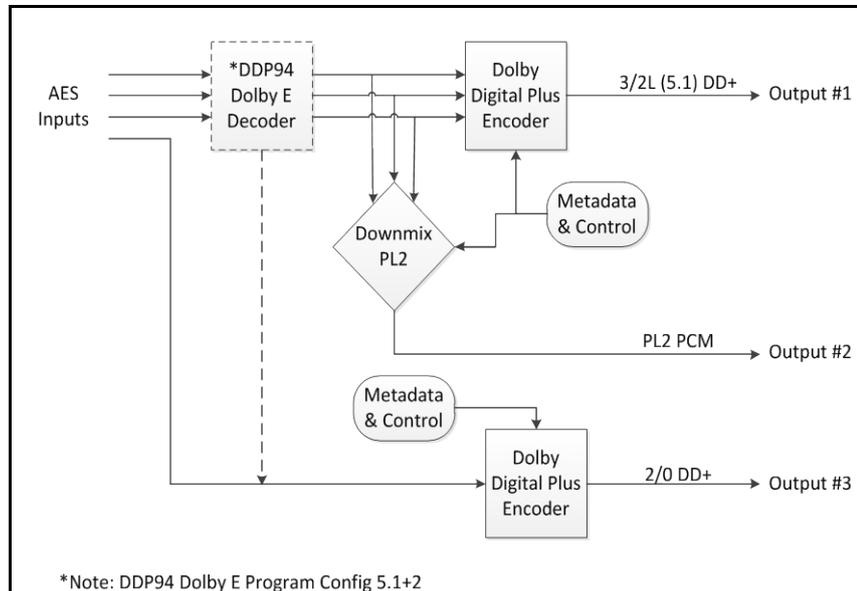
Setting	Encoder out 1	Encoder out 2	Encoder out 3	Encoder out 4
5.1+2+PL.0 ^(a)	DD(+) 5.1	PLII DD(+) 2.0	PL II PCM	-
5.1+2+PL.1 ^(b)	DD(+) 5.1	PL II PCM	DD(+) 2.0	-

(a) = It is possible to embed a Pro Logic II encoded signal into a Dolby Digital (Plus) stream. This means that, out of a multichannel environment a Pro Logic II downmix stereo signal is created. That

stereo Pro Logic II downmix signal is then passed on to the Dolby Digital (Plus) encoder to be embedded into a Dolby Digital (Plus) audio stream. With this setting you create 1x Pro Logic II DD(+) output #2 and one PCM stereo Pro Logic II output #3. Schematically, this looks as follows:



(b) = This settings creates one downmix stereo Pro Logic II output #2 and one independent 2.0 DD(+) encode on output #3. This independent 2.0 DD(+) stream is encoded out of the respective AES input and is not from the Pro Logic II downmix audio stream. Schematically this looks as follows:



Audio Description settings: The DDP94/24 is capable of encoding Receiver Mixed associated audio services (eg. audio description) and ONLY possible with Dolby Digital Plus encodes. This can be achieved by using multiple Dolby Digital Plus encoders within the DDP24/94. The control of the receiver mixing can be achieved using the automatic generation of mixing metadata, and the Dolby Digital Plus output can be configured for downstream transport stream multiplexing into either single or dual PID.

There are 4 possible AD settings and the signal on each encoder output depends on the AD_output_PID setting. The table below shows the encoder outputs when AD_output_PID is set to Dual PID.

Setting	Encoder out 1	Encoder out 2	Encoder out 3	Encoder out 4
5.1+2_AD	DD+ 5.1	DD+ 2.0 AD	-	-
5.1+1+1AD	DD+ 5.1	DD+ 1.0 AD	DD+ 1.0 AD	-
2+2_AD	DD+ 2.0	DD+ 2.0 AD		
2+1+1_AD	DD + 2.0	DD+ 1.0 AD	DD+ 1.0 AD	-

AD_output_PID

This setting is only used when encoder Config setting is set to one of the Audio Description settings (*_AD). When this is set to Single PID, all encoded bitstream outputs are multiplexed on encoder output 1 as multiple independent Dolby Digital Plus substreams, contained in a single bitsream. When set to Dual PID the Dolby Digital Plus streams are output from separate encoders for downstream multiplexing into dual PID transport stream mechanism, with the respective encoder outputs displayed in the above table. Default is Dual PID.

Enc_mode

With this setting you select what type of Dolby you want to encode into. Can be normal Dolby Digital (DD), Dolby Digital Plus (DD+), AAC or HE-AAC (V1). Default is DD.

Enc1_DD_Autorate ~ Enc4_DD_Autorate

With these setting you select the bitrate of the encoded Dolby signal per encoder when Enc_mode is set to DD (Dolby Digital). Following settings are possible:

- Manual = a manually set bitrate (refer to Enc1-DD_Man ~ Enc4-DD_Man to set the bitrate)
- Auto384 = Normal Dolby Digital mode, automatically set to a bitrate of 384 kbps.
- Auto448 = Normal Dolby Digital mode, automatically set to a bitrate of 448kbps.

These autorate settings automatically adjust the audio bitrate to the active audio channel mode. The table below shows which bitrates are used at which audio channel mode.



Enc1-DDp_Autorate
~
Enc4-DDp_Autorate

With these setting you select the bitrate of the encoded Dolby signal per encoder when Enc_mode is set to DD+ (Dolby Digital Plus). Following settings are possible:

- Manual = Dolby Digital Plus mode with a manually set bitrate (refer to Enc1-DDp_Man ~ Enc4-DDp_Man to set the bitrate)
- Auto192 = Dolby Digital Plus mode, automatically set to a bitrate of 192 kbps.
- Auto200 = Dolby Digital Plus mode, automatically set to a bitrate of 200 kbps.
- Auto224 = Dolby Digital Plus mode, automatically set to a bitrate of 224 kbps.
- Auto256 = Dolby Digital Plus mode, automatically set to a bitrate of 256 kbps.

These autorate settings automatically adjust the audio bitrate to the active audio channel mode. The table below shows which bitrates are used at which audio channel mode.

Audio channel mode	Dolby Digital		Dolby Digital Plus			
	Auto 384	Auto 448	Auto 192	Auto 200	Auto 224	Auto 256
1/0	96 kbps	96 kbps	80 kbps	80 kbps	96 kbps	96 kbps
2/0	192 kbps	256 kbps	96 kbps	96 kbps	122 kbps	128 kbps
2/1	256 kbps	256 kbps	144 kbps	144 kbps	144 kbps	144 kbps
2/2	320 kbps	320 kbps	192 kbps	192 kbps	192 kbps	192 kbps
3/0	256 kbps	256 kbps	144 kbps	144 kbps	144 kbps	144 kbps
3/1	320 kbps	320 kbps	192 kbps	192 kbps	192 kbps	192 kbps
3/2	384 kbps	448 kbps	192 kbps	200 kbps	224 kbps	256 kbps

Enc1-AAC_Autorate
~
Enc4-AAC_Autorate

With these setting you select the bitrate of the encoded Dolby signal per encoder when Enc_mode is set to AAC. Following settings are possible:

- Manual = AAC mode with a manually set bitrate (refer to Enc1-AAC_Man ~ Enc4-AAC_Man to set the bitrate)
- Auto256/96 = AAC automatically set to a bitrate of 256 kbps.
- Auto320/128 = AAC automatically set to a bitrate of 320 kbps.
- Auto384/192 = AAC automatically set to a bitrate of 384 kbps.
- Auto384/256 = AAC automatically set to a bitrate of 384 kbps.
- Auto512/256 = AAC automatically set to a bitrate of 512 kbps.

These autorate settings automatically adjust the audio bitrate to the active audio channel mode. The table below shows which bitrates are used at which audio channel mode.



Enc1_HEAAC_Arate
~
Enc4_HEAAC_Arate

With these setting you select the bitrate of the encoded Dolby signal per encoder when Enc_mode is set to HEAAC (HE-AAC v1). Following settings are possible:

- Manual = HEAAC mode with a manually set bitrate (refer to Enc1-AAC_Man ~ Enc4-AAC_Man to set the bitrate)
- Auto128/48 = HEAAC automatically set to a bitrate of 128 kbps.
- Auto160/64 = HEAAC automatically set to a bitrate of 160 kbps.
- Auto192/96 = HEAAC automatically set to a bitrate of 192 kbps.
- Auto256/128 = HEAAC auto set to a bitrate of 256 kbps.
- Auto320/128 = HEAAC auto set to a bitrate of 320 kbps.

These autorate settings automatically adjust the audio bitrate to the active audio channel mode. The table below shows which bitrates are used at which audio channel mode.

Encoding auto rate setting	Audio Channel mode						
	1/0	2/0	3/0	2/1	3/1	2/2	3/2
AAC 256/96	56	96	156	156	200	200	256
AAC 320/128	64	128	192	192	256	256	320
AAC 384/192	128	192	256	256	320	320	384
AAC 384/256	128	256	256	256	320	320	384
AAC 512/256	128	256	320	320	448	448	512
HE-AAC 128/48	36	48	96	96	128	128	128
HE-AAC 160/64	48	64	96	96	128	128	160
HE-AAC 192/96	64	96	128	128	160	160	192
HE-AAC 256/128	64	128	192	192	192	192	256
HE-AAC 320/128	64	128	192	192	192	192	320

Enc1_DD_Man ~ Enc4_DD_Man

This item manually sets the used audio bitrate of the Dolby Digital mode when the corresponding autorate setting is set to Manual. Can be between 32kbps and 640kbps. The following table displays all the possible steps in between. Lowest bitrates cannot be selected in 3/2 (in other words: 5.1).

32 kbps	192 kbps
40 kbps	224 kbps
48 kbps	256 kbps
56 kbps	320 kbps
64 kbps	384 kbps
80 kbps	448 kbps
96 kbps	512 kbps
112 kbps	576 kbps
128 kbps	640 kbps
160 kbps	

Default is 384kbps.



**Enc1_DD+_Man ~
Enc4_DD+_Man**

This item manually sets the used audio bitrate of the Dolby Digital Plus mode when the corresponding autorate is set to Manual. Can be between 32kbps and 1532kbps. The following table displays all the possible steps in between. Lowest bitrates cannot be selected in 3/2 (in other words: 5.1). Default is 256kbps.

32 kbps	208 kbps	576 kbps
40 kbps	216 kbps	640 kbps
48 kbps	224 kbps	704 kbps
56 kbps	232 kbps	768 kbps
64 kbps	240 kbps	832 kbps
72 kbps	248 kbps	896 kbps
80 kbps	256 kbps	960 kbps
88 kbps	272 kbps	1024 kbps
96 kbps	288 kbps	1088 kbps
104 kbps	304 kbps	1152 kbps
112 kbps	320 kbps	1216 kbps
120 kbps	336 kbps	1280 kbps
128 kbps	352 kbps	1344 kbps
144 kbps	368 kbps	1408 kbps
160 kbps	384 kbps	1472 kbps
176 kbps	400 kbps	1532 kbps
192 kbps	448 kbps	
200 kbps	512 kbps	

**Enc1_AAC_Man ~
Enc4_AAC_Man**

This item manually sets the used audio bitrate of the AAC modes when the corresponding autorate is set to Manual. Can be between 28kbps and 800kbps. The following table displays all the possible steps in between. Lowest bitrates cannot be selected in 3/2 (in other words: 5.1). Default is 224kbps.

28 kbps	72 kbps	176 kbps	272 kbps	640 kbps
30 kbps	80 kbps	192 kbps	288 kbps	704 kbps
32 kbps	88 kbps	200 kbps	304 kbps	768 kbps
36 kbps	96 kbps	208 kbps	320 kbps	800 kbps
44 kbps	100 kbps	216 kbps	352 kbps	
48 kbps	112 kbps	224 kbps	384 kbps	
52 kbps	128 kbps	232 kbps	400 kbps	
56 kbps	144 kbps	240 kbps	448 kbps	
60 kbps	156 kbps	248 kbps	512 kbps	
64 kbps	160 kbps	256 kbps	576 kbps	

PROLOGIC CONTROL

PL2_Meta_source

This item lets you select which metadata source you want to use for pro logic encoding, automatic selection (Auto(enc1)) or Manual. When set to manual you can define the values of each metadata parameter yourself with the following settings.

For more information about Dolby Metadata, please read the metadata guide which you can find on the website of Dolby (www.Dolby.com Document Library: [Metadata](#)).



PL2_Center_mix	<p>Only active when; Config = 'PL2 mode' and PL2_Meta_source = Manual. This setting indicates the level shift applied to the center channel when adding to the left and right outputs.</p> <p>+3dB, +1.5dB, 0dB, -1.5dB, -3.0dB, -4.5dB, -6.0dB and - inf dB (meaning muted). Default is -3dB.</p>
PL2_Surround_mix	<p>Only active when; Config = 'PL2 mode' and PL2_Meta_source = Manual. This setting indicates the level shift applied to the surround channels when adding to the left and right outputs.</p> <p>+3dB, +1.5dB, 0dB, -1.5dB, -3.0dB, -4.5dB, -6.0dB and - inf dB (meaning muted). Default is -3dB.</p>
PL2_LFE	<p>The status of the LFE Channel parameter indicates whether an LFE Channel (Low Frequency Effects channel) is present within the bitstream. Options; (On, Auto, Disabled).</p> <p>When in Auto mode PL2_LFE will enable or disable LFE content in the PL2 downmix based upon the value of metadata (ac3_lfeon_enc_1) when PL2_Meta_source = Auto(enc1). Note, LFE content can only be included in the downmix when PL2_downmix_type = PLII. Default is Auto.</p>
PL2_LFE_MixLevel	<p>Only active when; Config = 'PL2 mode' and PL2_Meta_source = Manual. This setting indicates the level shift applied to the LFE channel when adding to the left and right outputs. Possible settings are any value between -20dB and 0dB.</p>
PL2_delay	<p>Sets the Pro Logic delay between 0smpls and 3072smpls. Default is 0smpls.</p>
PL2_AutoDelay	<p>This parameter sets the latency of the Pro Logic II encode process to be the minimum value, or to match the encode latency of encoder 1 (matched_to_Enc1). Default is matched_to_Enc1.</p>

PL2_downmix_type

This control determines the type of two-channel downmix performed by the Dolby Pro Logic II encoder stage: Optoins (Lo/Ro, Lt/Rt, PLII, Auto).

When PL2_Meta_source is set to Auto(enc1) and the PL2_downmix_type = Auto, the value of metadata (ac3_xbsi_dmixmap) presented to encoder 1 determines the downmix type performed, see table below.

ac3_xbsi_dmixmap	Downmix Performed
Not Indicated	Dolby Pro Logic II
Lt/Rt	Lt/Rt Dolby Pro Logic
Lo/Ro	Lo/Ro stereo
Reserved / Pro Logic II	Dolby Pro Logic II

When PL2_Meta_source is set to Manual and the PL2_downmix_type = Auto, then Dolby Pro Logic II downmix will be performed

Default is Auto.

PL2_Emulation

This control determines the type of device to emulate while performing the Dolby Pro Logic II encoding. The following values apply:
 Professional: Standard Pro Logic II encoding (default).
 Consumer: Consumer decoder device emulation.

Note: Consumer emulation would typically be used only to monitor what the Dolby Pro Logic II downmix would sound like using a consumer set-top box or digital TV.

PL2_Limiter

This control determines the status of the Dolby Pro Logic II limiter stage. The following values apply:
 Off: Limiter is disabled.
 On: Limiter is active (default).

PL_Output_Lev

This control determines the scaling level applied to the downmix. This level adjustment is applied before the output limiter stage. Any value between -20dB and 0dB can be set. Default is 0dB.

PL2_LFE_Limiter

This control determines the status of the LFE limiter stage. The following values apply:
 Off: Limiter is disabled.
 On: Limiter is active (default).

PL2_Dialnorm

This control enables the effects of dialnorm scaling applied to the Dolby Pro Logic II downmix.

When set to on and PL2_Meta_source is set to Auto(enc1), the dialnorm value used by encoder 1 is applied to the Dolby Pro Logic II Downmix signal. The gain must be scaled by the following formula:
 gain change = 31 – (dialnorm).

No dialnorm gain scaling will occur if:

- PL2_Dialnorm = off
- or
- PL2_Meta_source = Manual

META CONTROL

MD_enc1 ~ MD_enc4

These items let you select a program inside the external Metadata source or the incoming Dolby E signal to use with encoders 1 till 4. Depending on the incoming Metadata signal on the D-sub of the backpanel, or the metadata which is present in the incoming Dolby E signal, you can choose either of the maximum of 8 external programs (Ex1 till Ex8 for the metadata coming in on the D-sub and E1 till E8 for the metadata as it is present in the incoming Dolby E signal) or use the internal parameter sets A to H, which can be user defined.

You can also use a mix of both the external metadata programs and parameter sets A to H (named MxA ~ MxH). When set to, for instance, MxA then external program 1 is mixed with metadata set A (in case of MxB then metadata set B can use values from external program 2, etc.). You can now set the metadata parameters of set A to use the specific parameter setting as they are in external program 1 as well as overwrite others with a custom set value. This cannot be done when this setting is set to just A to H (then you cannot use external program streams) so when MxA till MxH are not used, **do not** set any Metadata setting to use External MD.

Defaults for encoders 1 till 4 are respectively Ex1 till Ex4.

The content of a program is dependent on what kind of signal is coming in. If for instance the incoming metadata stream is coming from a 5.1 + 2 Dolby E stream, then there are 2 metadata programs: 1 program for the 5.1 signal, and one for the stereo signal. If the incoming signal is coming from a 2 + 2 + 2 + 2 Dolby E stream, then there are 4 metadata programs: one for each stereo pair. With this setting you can choose one of these metadata programs to be passed on to the corresponding encoder output. (or choose an internal parameter set A to H, so you can set your own metadata parameters).

For more information about Dolby Metadata, please read the metadata guide which you can find on the website of Dolby (www.Dolby.com Document Library: [Metadata](#)).

**MD_rev1 ~
MD_rev4**

When the external metadata is lost, these menu items select what metadata will be used by encoder 1 till 4. You can set it to switch to internal parameter sets A to H or use the last valid parameter set (Last-valid). Default is Last_valid.

Mix_MD_enc1

The DDP24/94 allows adding additional Dolby Digital Plus metadata which tells a decoder how to mix the Dolby content with an external program (refer to settings category 'Mix Metadata' further down this chapter). With this setting you select which mixing metadata preset you want to use for encoder 1.

DOLBY D METADATA

Metadata_set

With this item you can select which metadata set you want to adjust parameter setting of. Possible are A till H. Default is set to parameter set A. All following items preceded with '#' are slaves of this set.

Note: Unless this setting is set to a currently in use metadata set, changing metadata settings will not have a direct effect on the output.

#Dialogue-Level

This item lets you select which metadata source to use to set the dialogue level. Choices are between external program (Ext_Meta, only usable when the MD-enc1 till MD-enc4 are set to MxA till MxH) or a manual set dialogue level via the card's own metadata settings (Int_Meta)

#Dialogue-Lev

Dialogue level sets the average loudness of a dialogue in a presentation. The range is from -31dB to -1dB. This item will only influence the output if #Dialogue_level is set to internal_MD.

The default setting is -27dB

#Chan-Mode

This parameter instructs the encoder as to which inputs to use for this particular program: it tells the decoder what channels are present in this program so the decoder can deliver the audio to the correct speakers.

The setting is described as X/Y, where X is the number of front channels (left, Center, Right) and Y the number of rear (surround) channels.

Channel mode setting	Description
1/0 (C)	Centre
2/0 (LR)	Left, Right

3/0 (LCR)	Left, Centre, Right
2/1 (LRS)	Left Right Surround
3/1 (LCRS)	Left Center Right Surround
2/2 (LRS1Sr)	Left Right Surround_Left Surround_right
3/2 (LCRS1Sr)	Left Center Right Surround_Left Surround_right
Ext_meta	Use the Channel mode metadata setting of the external program (Ext_meta, only usable when the MD_enc1 till MD_enc4 are set to MxA till MxH).

Default is 3/2 (LCRS1Sr)

#LFE

The status of the LFE Channel parameter indicates to a Dolby Digital encoder whether an LFE Channel is present within the bitstream. Channel mode determines whether the LFE Channel parameter can be set. You must have at least three channels in order to be able to add an LFE channel. Can be either enable or disable. You can also choose to use the metadata settings in the external program (Ext_meta). Default setting is enable.

#Bitstrm

Bitstream describes the audio service contained within the Dolby Digital. A complete audio program may consist of a main audio service (a complete mix of all program audio), an associated audio service comprising a complete mix, or one main service combined with an associated service. To form a complete audio program, it may be (but rarely is) necessary to decode both main service and an associated service using a maximum total bit rate of 512 kbps, Refer to the guide to use of the ATSC digital television standard, documentA/54 for further information. Although a detailed descriptions follows.

Bitsteam	Description
Complete	CM flags the bitstream as the Main Audio service for the program and all elements are present to form a complete audio program. Currently, this is the most common setting. The service may contain one (mono) to six (5.1) channels.
M&E	The bitstream is the main audio service for the program, minus a dialogue channel. The dialogue channel, if any, is intended to be carried by an associated dialogue service. Different dialogue services can be associated with a single ME service to support multiple channels.
Visual	This is typically a single channel program intended to provide a narrative description of the picture content to be decoded along with the main audio service. The visual service may also be a complete mix of all program channels, comprising up to six channels.

Hearing	This is typically a single channel program intended to convey audio that has been processed for increased intelligibility and decode along with the main audio service. The Hearing service may also be a complete mix of all program channels.
Dialogue	This is typically a single program intended to provide a dialogue channel for a Main service. If the main service contains more than two channels, the dialogue is limited to only one channel. If the ME service is two channels, the Dialogue can be a stereo pair: the appreciate channels of each service are mixed tighter (requires special decoders)
Commentary	This is typically a single channel program intended to convey additional commentary that can be optionally decoded along with the main audio service. This service differs from dialogue services because it contains an optional, rather than required, dialogue channel. The service may also be complete mix of all program channels, comprising up to six channels.
Emergency	This is a single channel service that is given priority in reproduction. When the E-service appears in the bitstream, it is given priority in the decoder and the main service is muted.
VO_Karaoke	This is a single channel service intended to be decoded and mixed to the center channel. (requires special decoders)
Ext_meta	Use the Bitstream metadata settings from an external program. Only usable when the MD_enc1 till MD_enc4 are set to MxA till MxH)

#Line Line sets the Dynamic range metadata of presets.

- NONE, no dynamic range compression is applied unless downmixing could cause overload, in which case protection dynamic range is automatically applied.
- Film std, Applies more compression to a subjectively loud film that requires dynamic range restriction.
- Film Light, Applies light compression to a subjectively quiet film that does not require dynamic range restriction.
- Music Std, Applies more compression to music that is not compressed and requires dynamic range restriction.
- Music light, Applies light compression to music that is already compressed and does not require excessive dynamic range restriction.
- Speech, Appropriate for programs with predominantly dialogue.

You can also choose to use the metadata settings in the external program (Ext_meta). Default is Ext_meta.

#RfMode RfMode has the same options as Line, but each option is 11 dB more sensitive to avoid overloading the RF input of a television. None, Film stnd, Film light, Music stnd, Music light and speech

You can also choose to use the metadata settings in the external program (Ext_meta). Default is Ext_meta.

#D Srnd Dolby Surround. Determines when a Dolby Digital decoding product also contains a Dolby Pro Logic decoder, whether the two-channel encoded bistream contains a Dolby Surround (Lt/Rt) program that requires Pro Logic decoding. Decoders can use this flag to automatically switch on Pro-logic decoding as required.

- Not indic, Not Indicated
- Not Srnd, Not Dolby surround; the bitstream contains information that was not Dolby Surround encoded.
- Dolby Srnd, Dolby Surround; the bitstream contains information that was Dolby Surround encoded. After Dolby Digital decoding, the bitstream is pro logic decoded.

You can also choose to use the metadata settings in the external program (Ext_meta, only usable when the MD_enc1 till MD_enc4 are set to MxA till MxH). Default is Not Srnd.

#Pref dwnmx Preferred Down mix. This parameter allows the user to select either Lt/Rt or the Lo/Ro downmix in a consumer decoder that has stereo outputs. Consumer receivers are able to override this selection, but this parameter provides the opportunity for a 5.1 channel soundtrack to play in Lo/Ro mode without user intervention. This is especially useful on music material. NOT indicated, Lt/Rt and Lo/Ro are the possible mix types. You can also choose to use the metadata settings in the external program (Ext_meta, only usable when the MD_enc1 till MD_enc4 are set to MxA till MxH). Default is Lt/Rt.

#Lt/Rt C dwnmx Lr/Rt Center Mix Level. This setting indicates the level shift applied to the center channel when adding to the left and right outputs when downmixing to an Lt/rt output. Its operation is similar to the surround downmix level in the Universal metadata. 0dB, -1.5dB, -3.0dB, -4.5dB, -6.0dB and -999dB. You can also choose to use the metadata settings in the external program (Ext_meta, only usable when the MD_enc1 till MD_enc4 are set to MxA till MxH). Default is -3dB.

#Lt/Rt S dwnmx	LtRt Surround Mix level. This setting indicates the level shift applied to the surround channels when downmixing to an Lt/Rt output. Its operation is similar to the surround downmix level in the universal metadata. -1.5dB, -3.0dB, -4.5dB, -6.0dB and -999dB. You can also choose to use the metadata settings in the external program (Ext_meta, only usable when the MD_enc1 till MD_enc4 are set to MxA till MxH). Default is -3dB.
#Lo/Ro C dwnmx	Lo/Ro Center mix level. This setting indicates the level shift applied to the center channel when adding to the left and right outputs when downmixing to a Lo/Ro output. When Extended BSI parameters are active, this parameter is used and the Center Mix Level parameter in the universal parameters is not. +3dB, +1.5dB, 0dB, -1.5dB, -3.0dB, -4.5dB, -6.0dB and -999dB. You can also choose to use the metadata settings in the external program (Ext_meta, only usable when the MD_enc1 till MD_enc4 are set to MxA till MxH). Default is -3dB.
#Lo/Ro S dwnmx	Lo/Ro Surround Mix level. This setting indicates the level shift applied to the surround channels when downmixing to a Lo/Ro output. When extended BSI parameters are active, this parameter is used, and the surround mix level parameter in the universal parameters is not. -1.5dB, -3.0dB, -4.5dB, -6.0dB and -999dB. You can also choose to use the metadata settings in the external program (Ext_meta, only usable when the MD_enc1 till MD_enc4 are set to MxA till MxH). Default is -3dB.
#Dolby Srnd EX	Surround EX. This setting is used to identify the encoded audio as surround EX encoded material. This parameter is only used if the encoded audio has two surround channels. An amplifier or receiver with Dolby Digital EX decoding can use this parameter as a flag to switch the decoding on or off automatically. The behavior is similar to the Dolby Surround Mode parameter. Not Indic., NotDolbySrnd, DolbySrnd. You can also choose to use the metadata settings in the external program (Ext_meta, only usable when the MD_enc1 till MD_enc4 are set to MxA till MxH). Default is Not Srnd.
#DC filter	DC filter. This setting determines whether a DC blocking 3Hz highpass filter is applied to the main inputs channels of a Dolby Digital encoder prior encoding. This parameter is not carried to the consumer decoder. It is used to remove DC offsets in the program audio and would only be switched off in exceptional circumstances. On this function is active, OFF this function is not active. You can also choose to use the metadata settings in the external program (Ext_meta, only usable when the MD_enc1 till MD_enc4 are set to MxA till MxH).

#LFE filter LFE lowpass filter. This setting determines whether a 120Hz 8 order lowpass filter is applied to the LFEE channel input of a Dolby Digital encoder prior to encoding. It is ignored if the LFE channel is disabled. This parameter is not sent to the consumer decoder. The filter removes frequencies above 120Hz that would aliasing when decoded. This filter should only be switched off if the audio to be encoded is known to have no signal above 120 Hz. On this function is active, OFF this function is not active. You can also choose to use the metadata settings in the external program (`Ext_meta`, only usable when the `MD_enc1` till `MD_enc4` are set to `MxA` till `MxH`). Default is ON.

#Lowpass Filter Lowpass Filter. This setting determines whether a lowpass filter is applied to the main input channels of a Dolby Digital encoder to encode. This filter removes high frequent signals that are not encoded. At the suitable data rates this filter operates above 20 kHz. In all cases it prevents aliasing on decoding and is normally switched on. This parameter is not passed to the consumer decoder. On this function is active, OFF this function is not active. You can also choose to use the metadata settings in the external program (`Ext_meta`, only usable when the `MD_enc1` till `MD_enc4` are set to `MxA` till `MxH`). Default is ON.

#Srnd 3dB atten Surround 3dB attenuation. This setting determines whether the surround channels are attenuated 3 dB before encoding. The attenuation actually takes place inside the Dolby Digital encoder. It balances the signals levels between theatrical mixing rooms (dubbing stages) and consumer mixing rooms (dvd or tv studios) Consumer mixing rooms are calibrated so that all five main channels are at the same sound pressure level (SPL). For compatibility reasons with older film formats, theatrical mixing rooms calibrate the surround channels 3dB lower in SPL than the front channels. The consequence is that signal levels on tape are 3dB louder. Therefore, to convert to a consumer mix from theatrical calibration it is necessary to reduce the surround levels by 3dB. On = this function is active, OFF = this function is not active. You can also choose to use the metadata settings in the external program (`Ext_meta`, only usable when the `MD_enc1` till `MD_enc4` are set to `MxA` till `MxH`). Default is OFF

#Srnd Ph Shift

Surround Phase Shift. This setting takes care that the Dolby Digital encoder applies a 90-degree phase shift to the surround channels. This allows a Dolby Digital decoder create an Lt/Rt downmix simply. For most material the phase shift has a minimal impact when the Dolby Digital program I decoded to 5.1 channels, but provides an Lt/Rt output that can be Prologic decoded to L, C, R ,S if desired. However, for some phase-critical material (such as music) this phase shift is audible when listening in 5,1 channels. Likewise some material downmixes to a satisfactory Lt/Rt signal without needing this phase shift. It is therefore important to balance the needs of the 5.1 mix and the Lt/Rt downmix for each program. On this function is active, OFF this function is not active. You can also choose to use the metadata settings in the external program (Ext_meta, only usable when the MD_enc1 till MD_enc4 are set to MxA till MxH). Default is ON

MIX METADATA

This chapter describes the control parameters to configure the mixing of associated audio services with main audio service in an advanced Dolby Digital Plus decoder. This metadata is only added Dolby Digital Plus signals coming out of encoder 1. Note that the mixing control metadata is to be carried in the additional associated audio substreams instead of the main audio substream. Any mixing metadata configured in the main audio program will be ignored when the associated audio substream contains mixing metadata.

Mix_MD_preset

This setting is the preset master for the mix metadata settings (both scale settings as well as the auto mixing metadata trigger settings). There are 4 predefined presets and 4 user definable presets (User1, User2, User3 and User4). The predefined presets are the following:

- Standard_-12 = program scale adjustment of -12dB with a normal trigger delay time (default value)
- Standard_-8 = program scale adjustment of -8dB with a normal trigger delay time.
- Slow_-12 = program scale adjustment of -12dB with a long trigger delay time.
- Slow_-8 = program scale adjustment of -8dB with a long trigger delay time.

#Mix Metadata

Mixing Metadata enable setting. This is the master control that enables all mixing metadata to be used. The following values apply:
 Off: Mixing metadata is not enabled (default).
 On: Mixing metadata is enabled.



#MixControlType

Mixing Control Type. This control selects the type of mixing support used. The following values apply:

Scale_only: Only the #ExtPRGscale parameter is used. Other mixing metadata is ignored (default).

All: All additional mixing metadata parameters can be used.

#ExtPRGscale

This control sets the scale factor that should be applied to the external program with which this audio is being mixed. The control range is +11 dB to - 50 dB in 1 dB increments. Default is 0 dB.

#Panmean

Panning Mean Angle. This parameter is where the mono associated audio stream is positioned in the surround field. When the value is 0, the panned virtual source is located in the center (0 degrees). The control operates in a clockwise direction with a resolution of 1.5 - degree increments. Default is 0 deg.

#L scale

External Left Channel Scale Factor. This control sets the scale factor applied to the left channel of the external audio program during mixing. The values follow those of #ExtPRGscale. The total gain applied to the left channel of the external program is the sum of the scale factors indicated by the #ExtPRGscale and #L scale fields. Can be set between -1dB and -28dB or -INF dB (muted). Set to Off will disable this parameter. Default is -1 dB.

#R scale

External Right Channel Scale Factor. This control sets the scale factor applied to the right channel of the external audio program during mixing. The values follow those of #ExtPRGscale. The total gain applied to the right channel of the external program is the sum of the scale factors indicated by the #ExtPRGscale and #R scale fields. Can be set between -1dB and -28dB or -INF dB (muted). Set to Off will disable this parameter. Default is -1 dB.

#C scale

External Center Channel Scale Factor. This control sets the scale factor applied to the Center channel of the external audio program during mixing. The values follow those of #ExtPRGscale. The total gain applied to the Center channel of the external program is the sum of the scale factors indicated by the #ExtPRGscale and #C scale fields. Can be set between -1dB and -28dB or -INF dB (muted). Set to Off will disable this parameter. Default is -1 dB.

#LFE scale

External LFE Channel Scale Factor. This control sets the scale factor applied to the LFE channel of the external audio program during mixing. The values follow those of #ExtPRGscale. The total gain applied to the LFE channel of the external program is the sum of the scale factors indicated by the #ExtPRGscale and #LFE scale fields. Can be set between -1dB and -28dB or -INF dB (muted). Set to Off will disable this parameter. Default is -1 dB.

#Ls scale External Left Surround Channel Scale Factor. This control sets the scale factor applied to the left surround channel of the external audio program during mixing. The values follow those of #ExtPRGscale. The total gain applied to the left surround channel of the external program is the sum of the scale factors indicated by the #ExtPRGscale and #Ls scale fields. Can be set between -1dB and -28dB or -INF dB (muted). Set to Off will disable this parameter. Default is -1 dB.

#Rs scale External Right Surround Channel Scale Factor. This control sets the scale factor applied to the right surround channel of the external audio program during mixing. The values follow those of #ExtPRGscale. The total gain applied to the right surround channel of the external program is the sum of the scale factors indicated by the #ExtPRGscale and #Rs scale fields. Can be set between -1dB and -28dB or -INF dB (muted). Set to Off will disable this parameter. Default is -1 dB.

#AUTO MIXDATA

The DDP24/94 offers an automatic mode that toggles the #ExtPRGscale parameter of the encoder being controlled between unity gain (0 dB attenuation applied) and the value set in the Dolby Digital Plus Bitstream Mixing Control Parameters. This provides an automated method to scale the external (Main) Program audio when associated audio programs contain audio content. This chapter describes the parameters of the Dolby Digital Plus mixing metadata auto control. These settings are part of the mix_MD_preset preset settings

#Auto_mixing This setting switches on or off auto mixdata. Default is off.

#TrigLvl Trigger Level. This parameter sets the threshold above which the #ExtPRGscale parameter changes from 51 (0 dB gain) to the value set in the #ExtPRGscale setting. The control range is from 0 dBFS to -95 dBFS in 1 dB increments. Default is 0dB. The threshold detection is calculated on the peak value of the audio

#TrigDly Trigger Delay Time. This parameter sets the length of delay from when the audio crosses over the threshold until the #ExtPRGscale parameter starts adjust the program scale. The control range is from 0 to 5 seconds, in 32 ms (1 frame) increments. Default is 0ms

#TrigHld Trigger Hold Time. This parameter sets the length of delay from when the audio falls below the threshold level at which the #ExtPRGscale parameter is held at its attenuation value before it is released and able to return to the unity gain setting of 51. The control range is from 0 to 5 seconds, in 32 ms increments. Default is 256ms.

- #TrigAtt** Trigger Duck Attack Time. This parameter sets the time it takes #ExtPRGscale to change from its unity gain setting of 51 to the value that was set in the #ExtPRGscale setting. The control range is from 0 to 5 seconds, in 32 ms increments. Default is 128ms

- #TrigRel** Trigger Duck Release Time. This parameter sets the time it takes #ExtPRGscale to change from the value that was set in the #ExtPRGscale setting back to its unity gain setting of 51. The control range is from 0 to 5 seconds, in 32 ms increments. Default is 256ms

OUTPUT CONTROL

- Out_1** With this setting you set what audio should be on AES output 1. Can be the output of encoder 1, 2, 3 or 4. You can also forward channels 9/10, 11/12, 13/14 or 15/16 to output 2, which are unprocessed audio channels. Default is encoder 1.

- Out_2** With this setting you set what audio should be on AES output 2. Can be the output of encoder 1, 2, 3 or 4. You can also forward channels 9/10, 11/12, 13/14 or 15/16 to output 2, which are unprocessed audio channels. Default is encoder 2.

- Out_3** With this setting you set what audio should be on AES output 3. Can be the output of encoder 1, 2, 3 or 4. You can also forward channels 9/10, 11/12, 13/14 or 15/16 to output 2, which are unprocessed audio channels. Default is encoder 3.

- Out_4** With this setting you set what audio should be on AES output 4. Can be the output of encoder 1, 2, 3 or 4. You can also forward channels 9/10, 11/12, 13/14 or 15/16 to output 2, which are unprocessed audio channels. Default is encoder 4.

IN BUS CONTROL

- Override 17/24** If you want to pass processed audio from one quad speed add-on card to the other (for instance if you want to pass decoded Dolby E audio from this card to for instance a Loudness Control or Dolby D encoder add-on card next to this card) you have to use this setting. You can choose to override input channels 17/24 on the add-on bus of the next card (right side) with output channels 1 to 8 or pass the master-card audio.

Override 25/32

With this setting you can choose whether you want to override input channels 25/32 on the add-on bus of the next add-on card (right side) with output channels 9 to 16 or pass the master-card audio.

OUT BUS CONTROL

Slot1/2 ~ Slot31/32

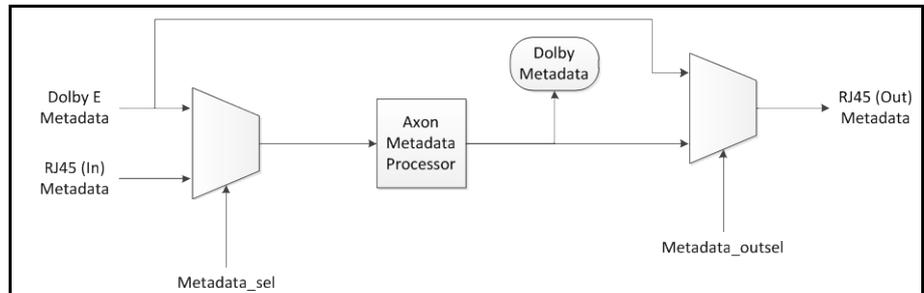
These menu items are to fill the Quad speed audio bus with the appropriate outputs. You can fill any of the 16 audio pairs (32 channels in total) with the audio that is set to Out1/2, till Out15/16. You can also switch the concerning pair to off, making that specific audio pair empty. Default Slot1/2 till Slot31/32 are set to respectively Out1/2 till Out31/32.

Metadata_sel

With this setting you set the source of the metadata. Can be Extern RJ45 (metadata comes in via the RJ45 connector) or DolbyE_decoder (metadata comes from the Dolby E decoder). Since the DDP24 does not have a Dolby E decoder, for the DDP24 this setting is fixed to Extern RJ45.

Metadata_outsel

Here you set which metadata should be on the metadata output. Can be the processed metadata or the unprocessed metadata coming from the DolbyE_decoder. Since the DDP24 does not have a Dolby E decoder, for the DDP24 this setting is fixed to Processed metadata.



6 Status Menu

Introduction	The status menu indicates the current status of each item listed below.
Lock	This status item indicates whether the card is locked to the, with setting Lock-mode selected, source. Can be (OK) or not locked (NA)
AES_Inp_1 ~ AES_Inp_4	These items display the status of the 4 AES/EBU inputs. If there is an input, this is displayed as OK. When there's no input, it displays as NA.
Ch_1_Val ~ Ch_16_Val	If a valid signal is present on the corresponding audio channel, these items indicate OK. If the signal is between -1 and 0dBFS, it is displayed as > -1dBFS. NA indicates that no signal present.
Decoder_In	This item indicates the status of the decoder input (set with setting Decoderinput). Can be PCM, DolbyE or NA (none of the former 2, or no audio at all)
Backup_In	This item indicates the status of the decoder back-up input (set with setting Dolby_PCM_backup). Can be PCM, DolbyE or NA (none of the former 2, or no audio at all)
Meta_status	Indicates a valid metadata signal (OK), an invalid metadata signal or no metadata input at all (NA).
Enc1_AC_mod ~ Enc4_AC_mod	<p>These status items are used by cortex to indicate which Audio channel mode is detected on encoder 1 till encoder 4. Depending on this status, the correct auto bitrate is indicated. Possible audio channel modes are:</p> <ul style="list-style-type: none"> ▪ 1/0 ▪ 2/0 ▪ 3/0 ▪ 2/1 ▪ 2/1 ▪ 3/1 ▪ 2/2 ▪ 3/2

7 Events Menu

Introduction	An event is a special message that is generated on the card asynchronously. This means that it is not the response to a request to the card, but a spontaneous message.
What is the Goal of an event?	The goal of events is to inform the environment about a changing condition on the card. A message may be broadcast to mark the change in status. The message is volatile and cannot be retrieved from the system after it has been broadcast. There are several means by which the message can be filtered.
Events	The events reported by the card are as follows;
Announcements	Announcements is not an event. This item is only used for switching the announcement of status changes on/off. 0=off, other =on
Audio-Data	Audio-Data can be selected between 0 .. 255. 0= no event, 1..255 is the priority setting.
Reference	Reference can be selected between 0 .. 255. 0= no event, 1..255 is the priority setting.
What information is available in an event?	<p>The message consists of the following items;</p> <ol style="list-style-type: none"> 1) A message string to show what has happened in text, for example: “INP_LOSS”, “REF_LOSS”, “INP_RETURN”. 2) A tag that also shows what happens, but with a predefined number: e.g. 1 (= loss of input), 2 (= loss of reference), 129(= 1+128 = return of input). For a list of these predefined tags see the table on the next page. 3) A priority that marks the importance of an event. This value is defined by the user and can have any value between 1 and 255, or 0 when disabled. 4) A slot number of the source of this event.
The Message String	The message string is defined in the card and is therefore fixed. It may be used in controlling software like Cortex to show the event.

The Tag

The tag is also defined in the card. The tag has a fixed meaning. When controlling or monitoring software should make decisions based on events, it is easier to use the tag instead of interpreting a string. The first implementation is the tag controlled switch in the GPI16.

In cases where the event marks a change to fault status (e.g. 1 for Loss of Input) the complement is marked by the tag increased by 128 (80_{hex}) (e.g. 129 (81_{hex}) for Return of Input).

Defining Tags

The tags defined for the card are:

Event Menu Item	Tag		Description
Announcements	0 or NA	0 or NA	Announcement of report and control values
Audio-Data	01 _{hex} =AUDIO_ERR OR	81 _{hex} =AUDIO_OK	Audio data error or OK
Reference	02 _{hex} =REF_LOSS	82 _{hex} = REF_RETURN	Reference lost or returned

The Priority

The priority is a user-defined value. The higher the priority of the alarm, the higher this value. Setting the priority to Zero disables the announcement of this alarm. Alarms with priorities equal or higher than the Error Threshold setting of the RRC will cause the error LED on the Synapse rack front panel to light.

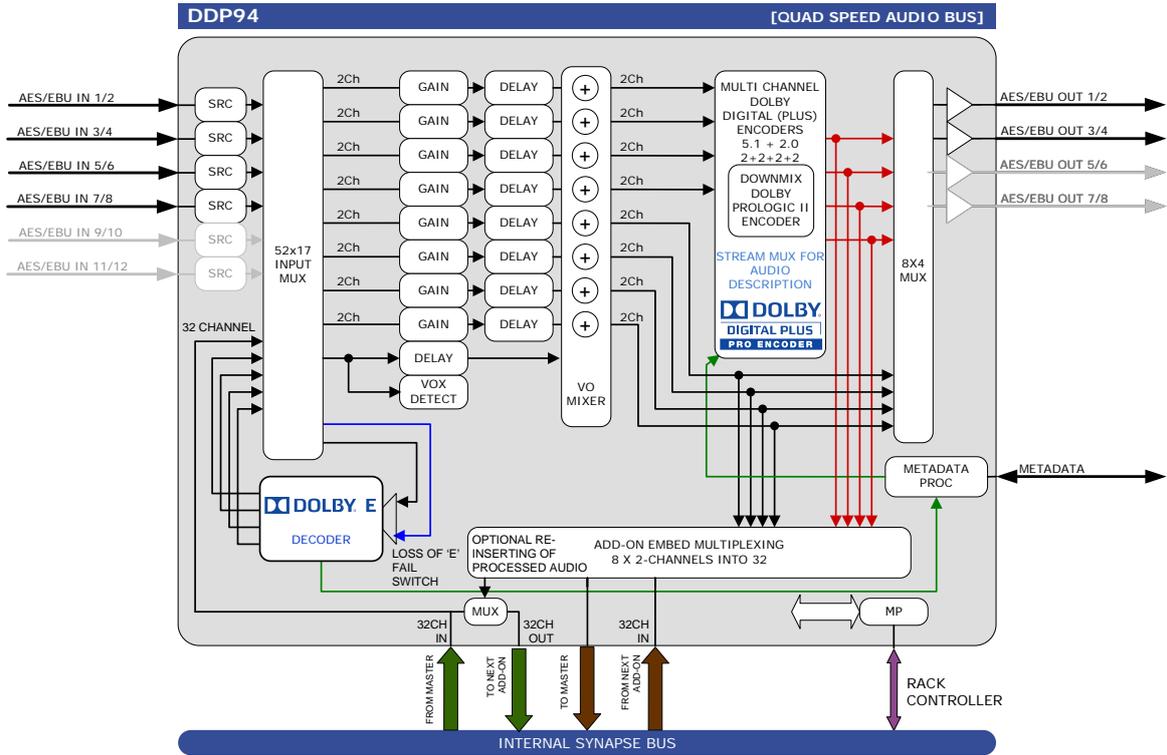
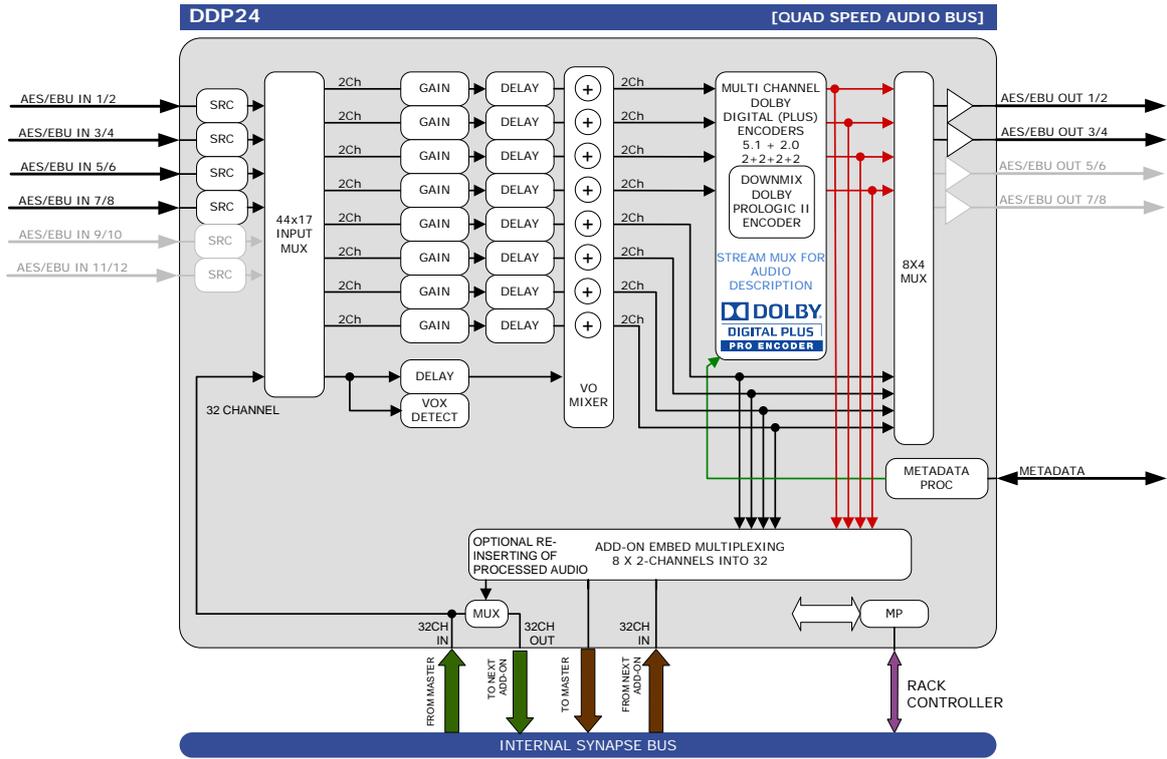
The Address

Together with the message string or the tag, the slot number or address of the card is relevant to be able to assign the event to a certain card.

8 LED Indication

Error LED	The error LED indicates an error if the internal logic of the DDP24/94 card is not configured correctly or has a hardware failure.
Input_1 LED	This LED indicated the presence of a valid AES/EBU audio signal on input 1.
Input_2 LED	This LED indicated the presence of a valid AES/EBU audio signal on input 2.
Input_3 LED	This LED indicated the presence of a valid AES/EBU audio signal on input 3.
Input_4 LED	This LED indicated the presence of a valid AES/EBU audio signal on input 4.
Input_5 LED	This LED indicated the presence of a valid AES/EBU audio signal on input 5. Only working when setting In_Out is set to 6in_2out.
Input_6 LED	This LED indicated the presence of a valid AES/EBU audio signal on input 6. Only working when setting In_Out is set to 6in_2out.
Reference LED	Indicated the presence of a valid reference signal on the selected reference input connector (ref-1 or ref-2).
Data Error LED	This LED indicates a data error.
Connection LED	This LED illuminates after the card has initialized. The LED lights for 0.5 seconds every time a connection is made to the card.

9 Block Schematic

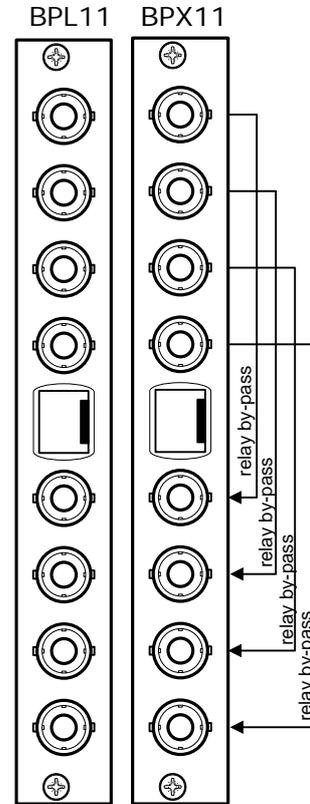


10 Connector Panels

The DDP24/94 can be used with the BPL11 or BPX11. The following table displays the pinout of these backpanels in combination with the card.

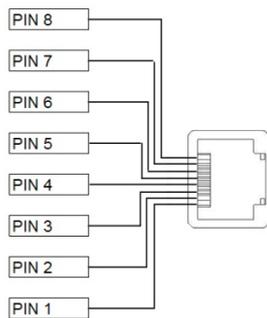
AES/EBU IN 1/2
AES/EBU IN 3/4
AES/EBU IN 5/6
AES/EBU IN 7/8
METADATA OUTPUT
AES/EBU (OR BITSTREAM) OUT 1/2
AES/EBU (OR BITSTREAM) OUT 3/4
AES/EBU (OR BITSTREAM) OUT 5/6 (OR INPUT 9/10)
AES/EBU (OR BITSTREAM) OUT 7/8 (OR INPUT 11/12)

BPX11 only in 4in/4out mode



!Unused inputs and outputs must be terminated with the correct impedance!

GPI pinning

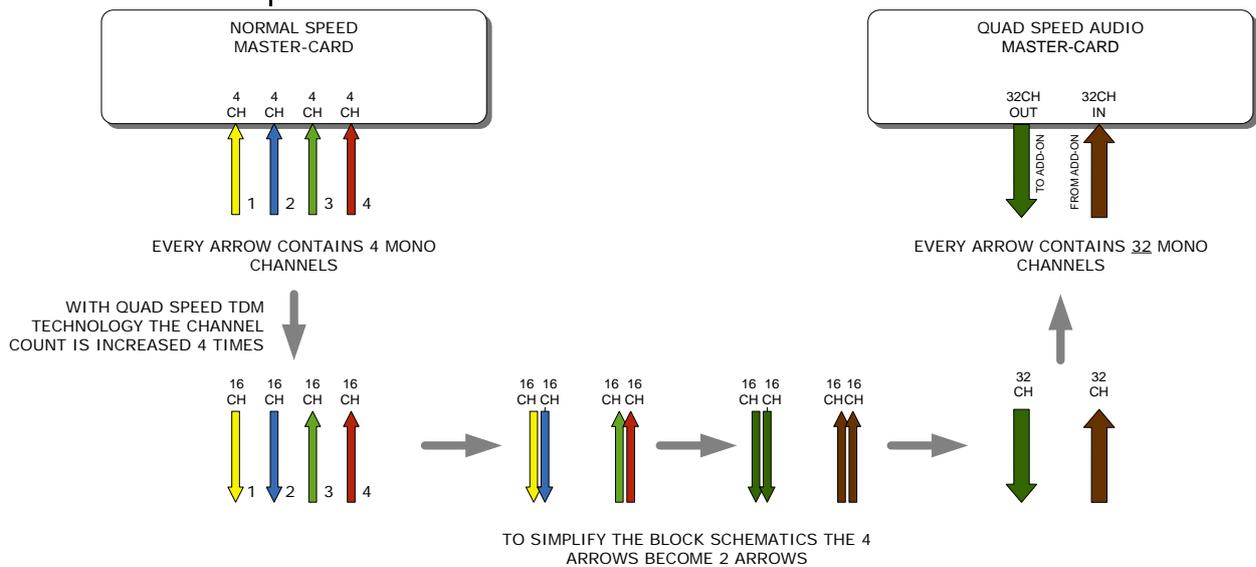


Pin	Function
1	Not used
2	Not used
3	Metadata (TXA+)
4	Not used
5	Not used
6	Metadata (TXA-)
7	Not used
8	Ground

Appendix 1: Quad speed ADD-ON bus

The internal audio ADD-ON bus needed an upgrade for some applications. We wanted more channels (32 per video stream seem possible in the near future). And we want the bus to be bidirectional, so 32 channels in and 32 channels out at the same time.

The new interface needed to be compatible with all existing hardware (frames) and in the implementation of the master card it sometimes needed to be backward compatible with the original ADD-ON bus.



So the MASTER-CARD is now firmware enhanced to run 32 channels in either direction (64 channels total) instead of 16 channels in one direction

Some MASTER-CARD's will have two modes and some MASTER-CARD's will only have the Quad Speed mode [where the logical ADD-ON cards are only available in Quad Speed mode]:

Dual mode MASTER-CARD's have a menu item to select the appropriate mode are. If a mode is selected all ADD-ON cards to that Master need to be in the same mode.

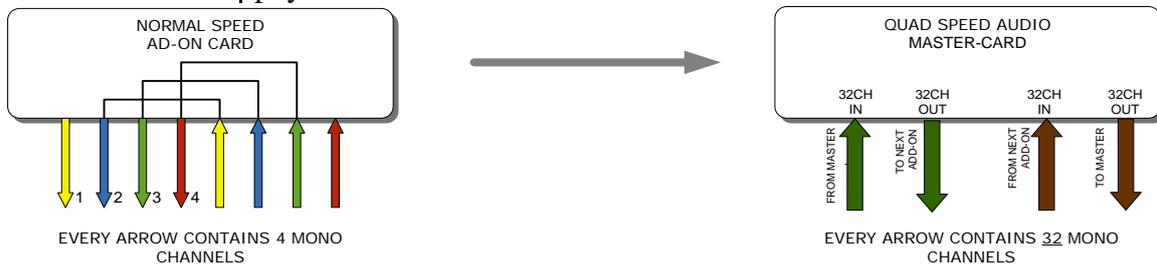
The following features and rules will apply:

- Up to 32 channels output from the master card with looping to up to 3 ADD-ON cards
 - The ADD-ON card just picks the channels it wants to process
 - Some ADD-ON cards will have the possibility to re-inject processed audio onto the next ADD-ON card
- Up to 32 channels input on the master card
 - If the master card can handle less than 32 channels, the lowest channel numbers will be used, as the ADD-ON card will always generate 32 channels (where some channels can be empty or silent)
- Channel shuffling is done in the ADD-ON card
 - The Master Card has only one setting to enable the quad speed

audio bus

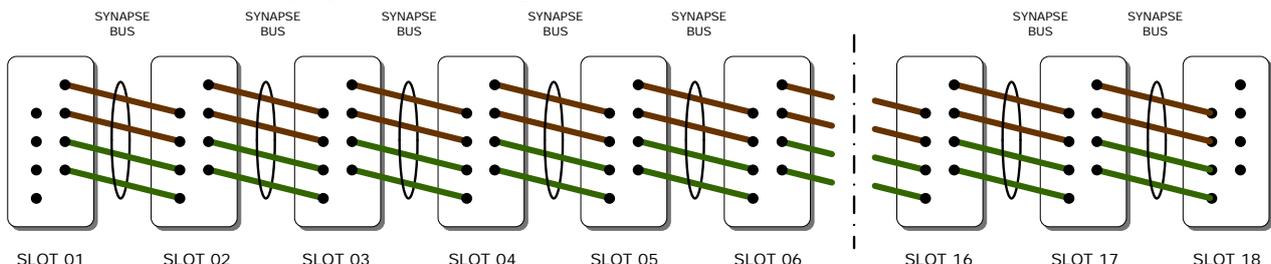
- Every Quad-Speed ADD-ON card takes 32 channels from the ‘right hand ADD-ON card’ and adds (or overwrites) the local processed channels.
 - This can be done for any of the channels that are processed in the ADD-ON card
- Some Master Cards are switchable between normal and quad-speed bus
- Channel designations on the block schematics:
 - Channel 1-32 (or less) are injected into the dark green large arrow from Master Card to ADD-ON card and looped on to the next ADD-ON card via the dark green arrow
 - The ADD-ON card injects up to 32 channels into the brown large arrow
 - An ADD-ON card will also actively loop extra processed channels into the next ADD-ON card, and finally into the Master Card
- The cross looping of the original design is now a straight loop
- The quad speed bus can also work in one direction
 - You can use a Quad Speed audio bus to de-embed audio from the master and present on the ADD-ON card as AES/EBU, Bitstream (like Dolby) or analog audio

If applicable the ADD-ON card can also be used as in injection point of physical audio streams



The ADD-ON cards also provide a looping function from one ADD-ON to the next ADD-ON card. This is however a more intelligent looping with optional re-insertion and multiplexing of signals.

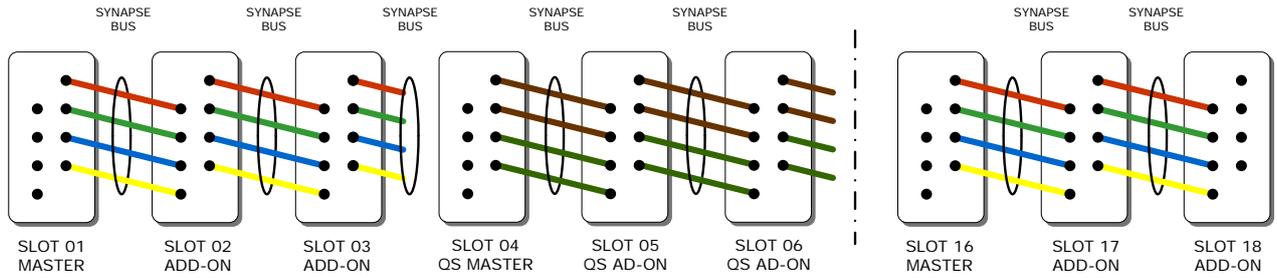
Cascading of Quad Speed cards works identical to normal add-on cards. Every connection in the example below transports 16 mono audio channels (= 32 channels per color). It shows the inter slot connections ‘in quad Speed mode’ as part of the frame bus PCB.



The system makes use of the same passive copper traces on the internal bus PCB as normal add-on bus cards.

The maximum amount of ADD-ON cards in Quad Speed mode is 3. These 3 ADD-ON cards will run all on the same clock in the same phase as the MASTER-CARD. This guarantees that audio channels that are processed in different ADD-ON cards will still operate in the same phase, something very important when processing multiple discrete surround channels.

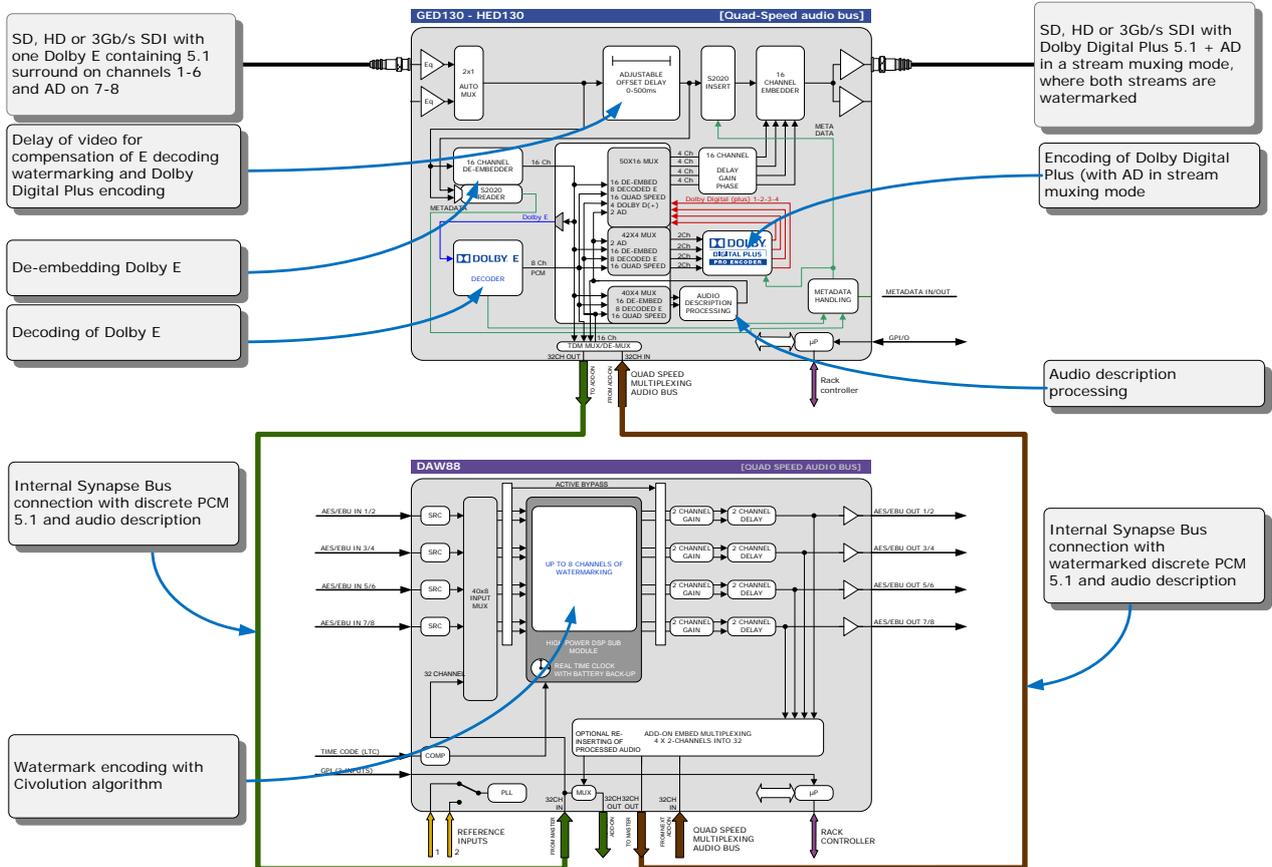
You can mix normal speed Master-Cards with Quad Speed MASTER-Cards in one frame as the MASTER-CARD breaks the connection to the left hand card. All cards to the right of the master must be in the same mode as the master.



Mixing normal ADD-ON with Quad Speed ADD-ON combo's in one frame is allowed

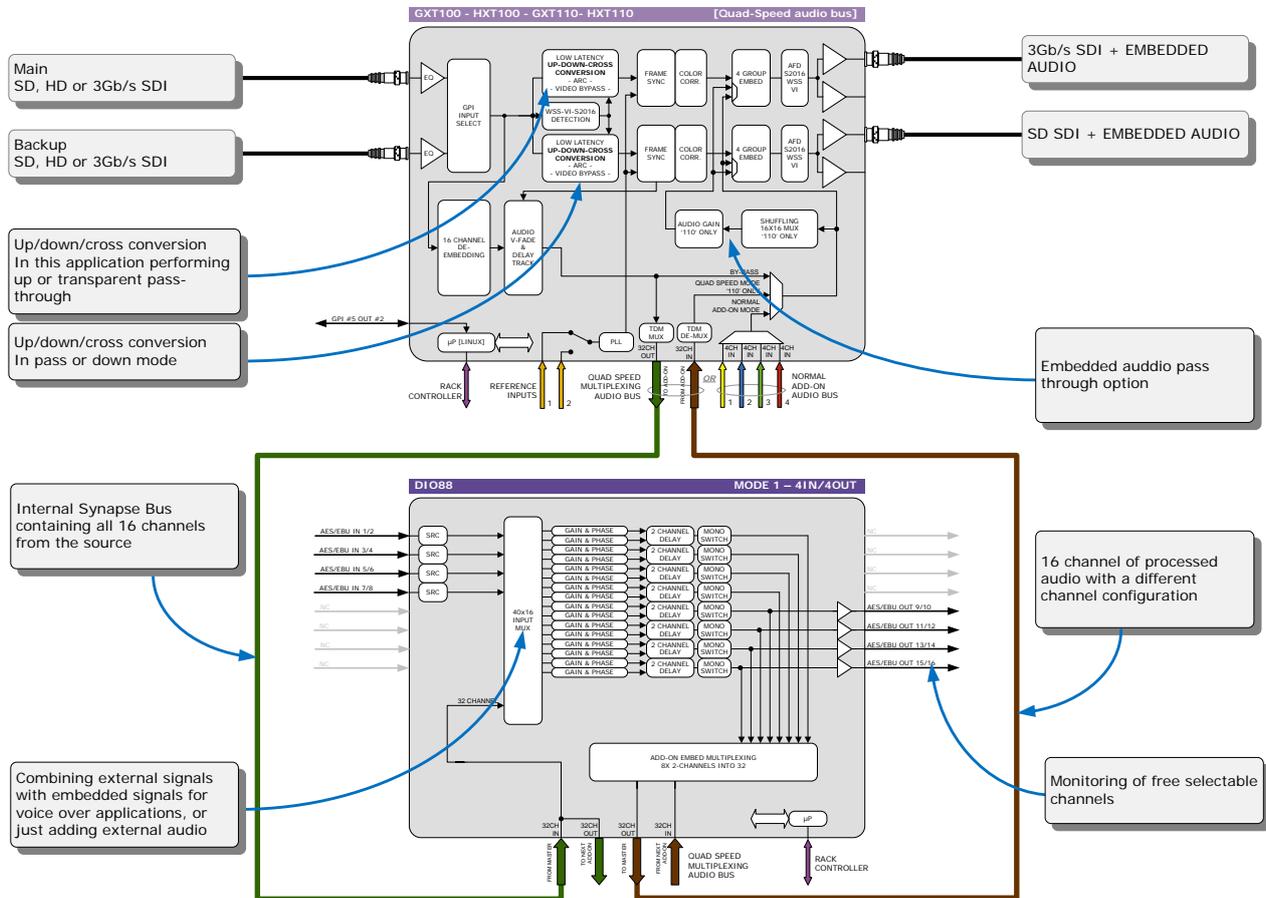
Some examples

This is an Example where we combine a MASTER-CARD that performs embedded domain Dolby E to Dolby Digital Plus encoding. Between the E-decoding and Dolby Digital Plus encoding we want to watermark the left, right and center channel of a the decoded discrete 5.1 surround channels and watermark a PCM channel used as a voice over for audio description.



Embedded domain Dolby E to Dolby Digital Plus with Watermarking. The only connection to the outside world are two BNC cables.

Another example of the Quad-Speed audio ADD-ON bus shows a transmission application where a dual up/down/cross output card is connected to a DIO88 in a setup where the embedded audio combined with external audio and a convenient PCM monitoring is available.



In the following example (next page) you will see a 4 card application that performs a massive amount of processing divided over 1 MASTER-CARD and 3 ADD-ON cards. This is a typical 'ingest' configuration and is used where the infrastructure does not use Dolby E (two in this example) but PCM+s2020. The input is a SD, HD or 3Gb/s SDI containing 2 Dolby E streams and 8 mono PCM streams. The output is the same SDI stream but with a selection of 16 channels selected out 8 original PCM channels and 16 PCM channels that are decoded from the Dolby E streams. The combo performs the following processing:

- De-embedding of 8x PCM and 2x Dolby E
- Decoding of two independent Dolby E streams
- Loudness processing of up to 16 channels sourced by any of the 8x PCM or decoded Dolby E streams
- Upmixing of a 2.0 to 5.1 if a Dolby E stream is not available
- Physical monitoring of all processed PCM streams
- Preset based shuffling of all source channels into 16 channels with the appropriate offset delays
- S2020 metadata insertion sourced from the E decoders, embedded s2020, generated presets or an external feed
- Video delay to compensate for audio propagation delay
- Embedding of up to 16 channels

