

# TECHNICAL SUPPLEMENT FOR THE DELIVERY OF SURROUND SOUND TELEVISION PROGRAMMES



## **DPP Requirements for the delivery of surround sound**

This delivery supplement details the DPP guidance for surround sound programmes delivered as HD.

This supplement:

1. explains how to make an AS-11 UK DPP HD file with surround sound that includes the Dolby proprietary metadata required by consumer receivers and sound systems;
2. contains an overview for live and as live programmes delivering Dolby E.

Dolby metadata is vital for the correct reproduction of both surround sound and stereo in the home. The UK's HD transmission systems only send the surround audio channels to the home and viewers watching surround programmes on stereo equipment need the Down Mix metadata to create the intended stereo audio.

# 1. Overview

The Dolby metadata is carried as an SMPTE ST436 track in an AS-11 file. The DPP Metadata App has been updated to import the Dolby metadata via an xml file, create an ST436 track then “wrap” it into the AS-11 UK DPP HD file when it’s created. Currently there are no other tools that can do this but it this should change over time.

## 1.1. Processing

To make the process easier, creating an AS-11 UK DPP HD file with surround sound has been split into two parts:

1. inputting the Dolby metadata and creating an xml file using a DPP Web Application;
2. importing the xml file and creating an AS-11 file using the DPP Metadata Application.

This allows the sound facility to create and save a small xml file after the mix, using a simple web browser tool which can be accessed [here](#). Download the files into a *single* folder.

The facility that makes the final delivery AS-11 file can use the DPP metadata app to import the xml file. The DPP metadata app can be downloaded from [here](#).

Note: The DPP Dolby web app has only been tested on **Chrome**, **Firefox** and the new Microsoft **Edge** browsers, it may work in others but has not been fully tested. (Safari V8 will generate but not save the xml file).

### 1.1.1. Open the web app page

Open the app by clicking on the file called “*index.html*”. The app will open with the DPP default

The screenshot shows the 'DPP RDD-6 XML Creator' web application. It features a form with the following fields and values:

- Description: BBC Surround Test
- Dialogue Level: -23
- Line Mode Compression: Film Light
- RF Mode Compression: Film Light
- Centre Down Mix Level: -6.0
- Surround Down Mix Level: -3.0
- Surround 3dB Attn.: Disabled
- Dolby Surround Mode: Disabled
- Preferred Stereo Down Mix: LoFlo
- Surround Phase Shift: Disabled

At the bottom of the form, there are two buttons: 'Save XML' (blue) and 'Reset' (orange).

values where appropriate.

### 1.1.2. Input the Dolby metadata

Complete each of the fields. The field “Description” should be the programme or series name.

The metadata parameter values can be found in the broadcaster section of the delivery document.

### 1.1.3. Save the file

The xml file will normally be saved in the “downloads” folder.

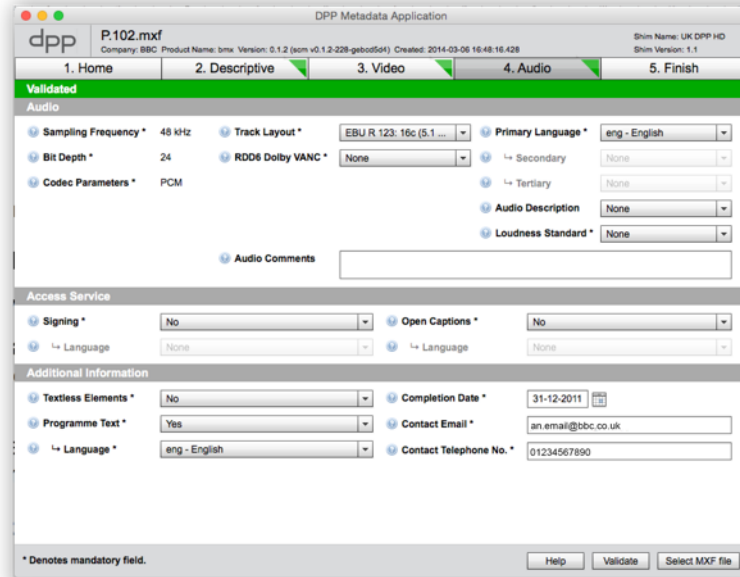
The web app saves the xml file with a unique file name e.g. “dpp\_rdd6\_d6edc14c.xml” the last section “d6edc14c” changes for each save except when none of the fields have been updated. The file can be renamed if needed.

If there are no changes to the metadata values between programmes, the same xml file can be used for every episode in a series.

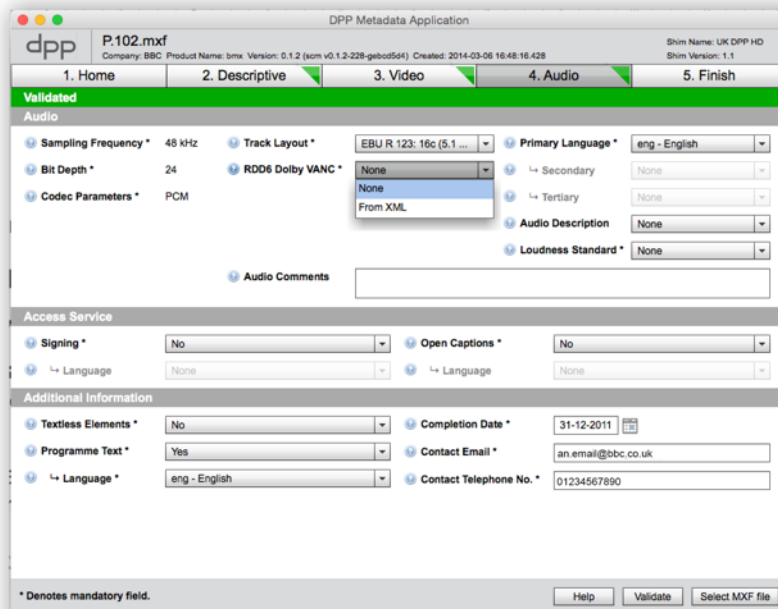
### 1.1.4. Importing the xml data via the DPP metadata app

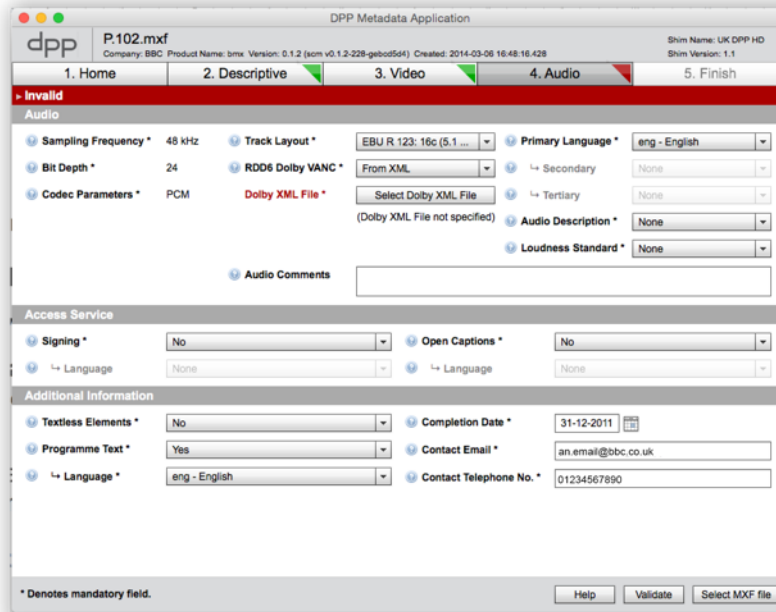
Import the mxf programme file and complete the metadata as normal. Selecting EBU R 123 16c in the “Track Layout” field activates the “RDD6 Dolby VANC” field. The default value is “None”.

**Step 1:** Select the “From XML” option from the RDD6 Dolby VANC drop down menu

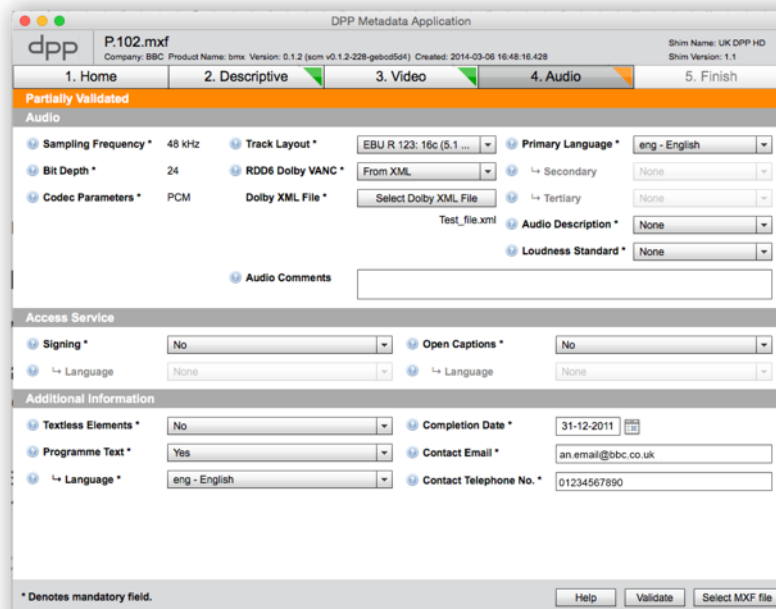


A new “Dolby XML File” button will appear and as no xml has been selected the audio tab will go red and “Invalid” will appear in the status bar.

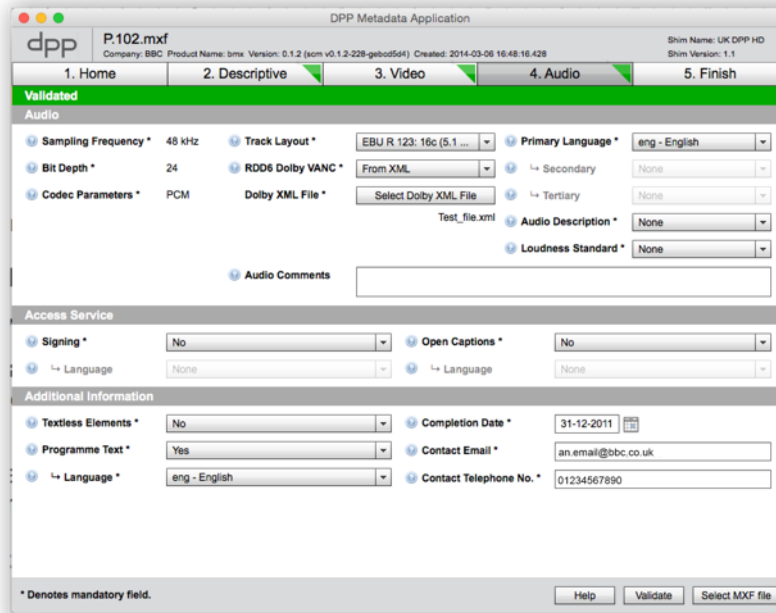




**Step 2:** Click on “*Select Dolby XML File*” to open a file navigation window, locate the xml file for the programme and load. The audio tab will go orange and the status bar will say “*Partially Validated*” (This assumes that other metadata fields have no errors).

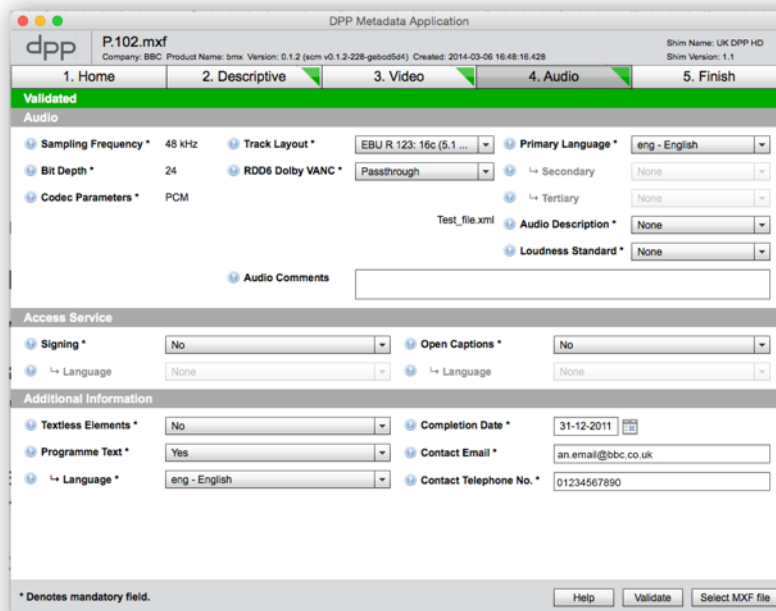


**Step 3:** When all the programmes metadata has been added, validate by clicking the “*Validate*” button. All the tabs must be green before an AS-11 UK DPP HD file can be made.



**Step 4:** Finish by selecting tab 5 “Finish” and clicking the “Generate AS-11 DPP File” button.

If an AS-11 UK DPP HD file which already has an ST436 track is loaded into the DPP App, the “RDD6 Dolby VANC” field will show “Passthrough”.



Changes can be made to the metadata fields as needed and the file revalidated without having to reload the Dolby metadata xml file. It is also possible to load a new xml file by selecting “from XML” from the now extended drop down menu.

It is *not* possible to delete or disable the ST436 track in a file. If a stereo version is needed, the file must be remade as a 4-channel stereo file (tracks 3&4 can be mute).

### 1.1.5. Formatting

Surround sound programmes must also have a stereo mix on Channel 1&2.

- Channels 3 & 4 and 11 to 16 can only contain M&E (stereo and surround) or must be mute.
- Surround programmes must have stereo tone on the stereo channels used and BLITS on the surround channels used.
- It is recommended that the stereo mix on channels 1 & 2 is made from the surround mix using the Down Mix values. In future, the stereo mix may only be used to make non-broadcast viewing copies.

### 1.1.6. Line-up tone downloads

A zip file of acceptable line up tones can be downloaded from the [DPP website](#).

## 2. Dolby E

The following guidance is for the use of Dolby E for live or as-live recorded surround sound programmes. The guidance is based on a Dolby branded encoder but applies to any Dolby E device that's licenced by Dolby.

### 2.1. Dolby DP571 (or equivalent Dolby E encoder)

The first DP571 in the chain must be set to "internal" metadata source.

Metadata from an external source cannot be edited in a DP571 - you have to set the metadata source to internal and rebuild it from scratch if this is required.

Dolby equipment generally uses 75Ω-unbalanced connections. If the loop-through connectors on a DP571 are not feeding another device they should be terminated.

The most important DP571 setup parameters to check are:

- "Program Config" (should be 5.1 + 2 for most things);
- The Frame Rate (The factory default is 29.97fps, should be 25fps);
- The Bit Depth (should be 20 bits);
- The Dolby E Metadata Source (internal or external);
- Dolby D metadata is enabled (note – if this setting appears in the DP571 menu the unit is running out of date firmware and MUST be updated).

The "Bit Depth" setting does not refer to the number of bits used by the audio signals but the number of bits available in the AES-3 channel used to transmit the Dolby E signal. Six channels of audio can be transmitted down a 16bit link while 8 channels must be transmitted down a 20bit link.

The gain of a Dolby E stream must not be changed - it will break the signal's integrity.

#### 2.1.1. Latency

A Dolby E stream suffers one frame of delay on each encode and decode. The UK Broadcaster standard is to align the stream to be "sync encoded" at each point in the chain.

- For tape delivery, the stream must be laid so that the encoded audio is in sync with the video and any stereo audio. The Audio Advance function will be used to move the stream 1 frame ahead of the video before decoding. As Audio Advance applies to all audio tracks, the stereo audio will be delayed by 1 frame to compensate.
- For live, or as live programmes, the stream must be timed so that the encoded audio is in sync with the video and any stereo audio. It is the responsibility of the area receiving the stream to compensate for the decoding delay.

### 2.1.2. Resilience

The DP571 has a “reversion mode” which tells the unit what Dolby E and Dolby Digital metadata parameters to use in the event of a metadata failure. This should be set to “last used”. This setting guards against temporary metadata failure, if failures occur the Dolby Digital encoding should not be affected.

### 2.1.3. Metadata Parameters

In the “*Metadata Params*” menu there are eight programs where metadata can be changed.

The number of active programs depends on the “*Program Config*” setting. If *Program Config* is set to the default 5.1+2 value, then:

- *Program 1* will contain the metadata for the 5.1 stream;
- *Program 2* will set the metadata for the additional stereo pair.

If the *Program Config* is set to 8X1 then *Program 1* will set the metadata for channel 1, *Program 2* for channel 2, *Program 3* for channel 3 etc. It is worth noting that all eight programs remain viewable even if the selected channel configuration does not make use of them.

## 2.2. Troubleshooting

The DP571 gives some indication of error conditions the following table explains the meaning of the front panel error indication lights.

| Light   | Indication   |
|---------|--|
| TC      | Green: Valid timecode signal<br>Yellow: Frame rate does not match video reference<br>Off: No TC signal detected  |
| Fault   | Red: Hardware-related fault condition<br>Off: No fault condition   |
| Remote  | Not Uses   |
| PCM Dly | Green: Valid PCM signal<br>Yellow: non 48kHz signal<br>Off: no PCM signal  |
| Error   | Red: Input not valid for current settings<br>Off: No error condition   |
| V Ref   | Green: Lock with a valid analogue composite video signal<br>Yellow: Video ref doesn't match the selected frame rate in the DP571<br>Flashing Red: The internal clock is not locked to the incoming reference |

### 2.2.1. Factory Reset

The Dolby E encoder model DP571 can be reset to factory defaults by power cycling the unit while holding down the ENTER key until “*FACTORY DEFAULTS*” appears on the LCD. Press the SETUP key when prompted to confirm.

A soft reset can be performed by pressing the SHIFT, → and ESC keys simultaneously. The unit's settings will not be affected by a soft reset.

It is recommended a full reset is carried out when a unit is first used before entering the settings below.

**Notes:**

1. The three key parameters changed during a factory reset are *DIALNORM* (reverts to -27), Dolby *Srnd EX* parameter and the *Srnd 3dB Attn*.
2. *Lo/Ro* stands for Left only/Right Only. This down-mix is the best suited for reproduction from stereo speakers or headphones. It is created by mixing the Ls and Rs channels into the front L and R channels. The Centre is split between the L and R channels. The levels at which the other channels are mixed in are set by the metadata. LFE is ignored. The *Lo/Ro* mix preserves left/right separation and allows a mono compatible down-mix.
3. **\*\**Lt/Rt*** stands for Left total/Right Total. Ls, Rs and Centre are folded down into the left/right pair using parameters set by the metadata. LFE is ignored. In a *Lt/Rt* mix the surrounds are summed and added to the left channel; they are also added to the right channel with a 180° phase shift, which allows a Pro Logic decoder to reconstruct the surrounds. This is a stereo compatible Dolby down-mix and is not the ideal down-mix for stereo reproduction.

### 2.3. Metadata settings overview

| Parameters               | Recommended Settings         | Notes  |
|--------------------------|------------------------------|--|
| Program Config           | 5.1 or 5.1 + 2               | Produces a 6 channel or 8 channel stream                                   |
| Frame Rate               | 25                           | Must be 25 for DPP delivery  |
| Bit Depth                | 20                           | Sets encoded bit depth   |
| Program Description      | Serial Number and Location   | E.G. SN123456789-My-OB-Truck-21  |
| Reversion Mode           | Last Used                    | Live programmes  |
| Metadata Source          | Internal                     | Live programmes 1 <sup>st</sup> unit "Internal" following units "External" |
| Dolby D Metadata         | Not valid                    | If this is available the unit MUST be updated before use                   |
| Dialogue Level           | -23dB                        | Set to match the measured programme loudness level                         |
| Channel Mode             | 3/2                          | Indicates which channels are in use  |
| LFE Channel              | See broadcaster requirements | Enables or disables the LFE Channel  |
| Bit-stream mode          | Complete Main (CM)           | Audio service carried in the bit steam (Information)                       |
| Line Mode Compression    | See broadcaster requirements | Preset compression value for Line mode decoding                            |
| RF mode compression      | See broadcaster requirements | Preset compression value for RF mode decoding                              |
| RF over-mod compression  | Disabled                     | Pre-emphasis to protect over-mod when stream is RF modulated               |
| Centre down-mix level    | See broadcaster requirements | Level of the center channel in the stereo L & R                            |
| Surround down-mix level  | See broadcaster requirements | Level of the surround channels in the stereo L & R                         |
| Dolby surround mode      | See broadcaster requirements | Indicates if an Lt/Rt is contained requiring Pro Logic decoding            |
| Production Information   | No                           | Indicates mix level and room type values are set (not required)            |
| Mix Level                | 80dB                         | Indicates the approx. mix level in the control room (information)          |
| Room Type                | Small                        | Indicates the control room type (information)                              |
| Copyright bit            | Yes                          | Indicates if material has copyright protection (information)               |
| Original bit stream      | On                           | Indicates if the Dolby Digital stream is the master (information)          |
| Preferred down mix       | See broadcaster requirements | Down mix preference LtRt (Pro Logic) or LoRo (stereo)                      |
| Lt/Rt Centre down mix    | Same as centre down mix      | Level of Centre channel in LtRt down mix                                   |
| LT/RT Surround down mix  | Same as centre down mix      | Level of Surround channels in LtRt down mix                                |
| Lo/Ro Centre down mix    | Same as centre down mix      | Level of Centre channel in LoRo down mix                                   |
| Lo/Ro Surround down mix  | Same as centre down mix      | Level of Surround channels in LoRo down mix                                |
| Dolby Surround EX mode   | Not Surround EX              | Identifies the stream as coded for 6.1 Dolby EX                            |
| A/D convertor type       | Standard                     | Information  |
| DC filter                | Enabled                      | Applies 3Hz blocking filter before encoding                                |
| Low pass filter          | Enabled                      | Pre encoding anti-aliasing filter  |
| LFE low pass filter      | Enabled                      | Applies a 120Hz 8th order filter the the LFE channel                       |
| Surround 3dB attenuation | See broadcaster requirements | Used to preserve capability with older file formats                        |