

Technical Recommendation

CST - RT – 040 - TV – v1.2 – 2016

Technical Recommendation for « Ready for Broadcast » Files (CST/FICAM/HDFORUM)

This document specifies the technical constraints applicable to the production of HD files for RFB (Ready for Broadcast) acceptance of programmes delivered to television channels in France.

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1 - SUBJECT

1.1 – PRELIMINARY STATEMENT

This document was published further to the joint project conducted by the HDForum broadcasters, the CST and the FICAM. It defines the recommendations common to the various Broadcasters with regard to the type of audio, video, container and metadata signals that must be applied when RFB (ready-for-broadcast) HD (high definition) content is delivered in the shape of files. It is a reference but in no way excludes the addition of any of the Broadcaster's specificities

1.2 – SCOPE OF THIS DOCUMENT, CONDITIONS FOR MODIFICATIONS

The scope of this document is restricted to the description of audio and video signals encapsulated in an MXF container. It constitutes a mutualisation stage for RFB Broadcaster recommendations.

For audio and video technical specifications, the scope of this document concerns all programme elements delivered to Broadcasters: trailers, sponsorship, TV movies, documentaries, series, jingles, advertising, feature films, short films, live broadcasts, etc.

The requirements of Broadcasters concerning the content and nature of delivery media are not mentioned in this document, except for identification signals, because it was decided that these should be specifically defined by each Broadcaster depending on their own requirements and the contractual framework specific to each channel and each programme.

The amendment of these recommendations (by increments to the version number) takes place according to the type and nature of the modifications made to this document. Considering that the version number is in the form A.B:

- A will change in increments of 1 in the event of the addition of major functional modifications affecting the product delivered
- B will change in increments of 1 in the event of corrections, additional specifications etc.

Any amendments to this document must be validated by all the parties who took part in drafting this version.

1.3 – TYPOGRAPHICAL RULES:

Text in italics indicates:

- Recommendations on subjective values relying on common sense on everybody's part.
- Paragraph titles in levels 3 and 4
- Denominations in Metadata fields.

Bold text indicates:

- Paragraph titles
- References to other standard documents or recommendations whose content must necessarily be observed within the framework of this document
- Elements to which particular attention must be paid by all parties for various reasons (e.g. new elements in the standard entailing changes to customary work procedures).

1.4 REFERENCES OF STANDARDS AND RECOMMENDATIONS USED IN THIS DOCUMENT :

1.4.1 Audio and Video essentials container and format

All references concerning the « *AS-10 MXF for Production Specification* » format, in its current version, are integrated into the document that is available on the AMWA website (<http://www.amwa.tv>).

1.4.2 - Video :

- SMPTE 274M : 1920x1080 HD signal parameters <http://www.smppte.org>
- ITU-R BT.709 : HD video encoding parameters
- ITU-R BT.1886 : Monitor calibration parameters
- EBU-R103: Tolerances on video signals in digital television systems (v2.0 – June 2016)

The video signal corresponds to these standards: 1080i characteristics (interlaced) at 25 images/second, whatever the format of the original video signal. 1080/25p et 1080/25PsF formats are **forbidden**.

1.4.3 - Audio

- ITU-R BS.1770-4: Leq RLB audio measurement algorithms
- ITU-R BS.775 : Layout of 5.1 speakers
- UER-R91-1998 : Allocation of channels for 5.1 audio
- EBU-R128 and R128s1: Loudness normalisation and permitted maximum level of audio signal
- EBU-Tech 3341, 3342, 3343, 3344 : technical recommendations relating to EBU R128 and R128s1
- EBU Tech 3276 and 3276s1 : Listening system calibration
- EBU Tech 3304 : 5.1 audio test signals
- SMPTE 299M : 24-byte audio for HD TV
- IEC 60268-5 : Audio listening

2 – TECHNICAL SPECIFICATIONS FOR RFB SIGNALS

2.1 – TECHNICAL SPECIFICATIONS FOR VIDEO ESSENCES

2.1.1 – Manufacturing standard

Unless stated otherwise by the broadcaster, the production standard for the Ready for Broadcast is:

1080i – 25 frames per second - 4:2:2 - image ratio 16/9

This does not preclude the production or post-production in a different standard.

2.1.2 – Vertical elimination

The following table shows the vertical positioning of the active lines in the video signal depending on the image format. A tolerance of +/- 2 lines is permitted:

Image format	16/9 Video		
	First line	End line	Number of lines
1,33	21	560	540
1,37	21	560	540
1,66	21	560	540
1,77	21	560	540
1,85	32*	550*	519*
2,35	87*	495*	409*
2,39	90*	492*	403*

- This value may be modified if the owners of the rights validate a request for specific re-framing.

Horizontally, the SAV (Start of Active Video) must therefore be immediately followed by useful content. A gap of 0.1 μ s between the SAV and the start of the useful content is tolerated. For a given programme, this gap – if there is one – will be constant for the duration of the programme.

2.1.3 – Metrological Specifications

The table below specifies the tolerances permitted by Broadcasters with regard to the digital values of HD video components.

In accordance with recommendation EBU R 103 (v2.0 June 2016) and in order to guarantee that the color gamut is respected, we recommend that the digital values of the RGB components, as well as the Y value of corresponding luminance should, necessarily lie between the minimum and maximum values, i.e. 5-246 in 8 bytes (see table below).

System Bit depth	Range in digital sample (code) values		
	Expected video range	Preferred min./max.	Total video signal range
8 bit	16 – 235	5 - 246	1 - 254
10 bit	64 – 940	20 – 984	4 - 1019
12 bit	256 – 3 760	80 – 3 936	16 – 4 079
16 bit	4 000 – 60 160	1 280 – 62 976	256 – 65 279

The proportion of pixels whose values are outside the Color Gamut (see above table) must not exceed 1% of the total number of pixels in the active image.

2.1.4 – Subjective Image Quality

- *For images derived from a telecine, special care must be taken in dealing with defects on film prints and telecine (free of scratches, dust, specks of gelatin, defects in triggering colorimetric correction)*
- *As a general rule, the image must never have an excessive sound level, shiny defects, compression artefacts or faults due to the over-use of a noise-reduction process etc.*
- *The darkest scenes in the programme must - in all cases – be viewable in an acceptable quality when they are screened on a “general public” television. Black areas must not be stuck or squashed and details must remain visible in dark areas.*
- *Credits at the end of the programme must be legible on video.*
- *Special care must be taken with quantification conversions, especially for films made using typical « cinema » systems (codecs 10 to 16 bytes) during the conformation of the 8-byte video signal intended for the Ready For Broadcast file.*

2.2 – TECHNICAL SPECIFICATIONS FOR AUDIO ESSENCES

AIMS

The pre-requisites used for drafting this document with regard to the constraints and aims of sound broadcast on television are as follows :

- Respecting the work, in particular concerning artistic choices
- Guaranteeing comfortable listening for viewers by means of perfectly intelligible sound in the various configurations (all multi-channel types including 5.1, down-mix, stereo, mono)
- Guaranteeing continuity of perception of sound in the sequence of different programmes
- Optimising the use of metadata inherent to Dolby Digital and Dolby Digital Plus coding.

GENERAL CONSIDERATIONS

Any work done to make mixed sound tracks comply with the clauses of this recommendation must be carried out under the authority of the owners of rights or by a service provider appointed or empowered by them. The work done must be considered satisfactory by everyone involved (producer, post-producers, broadcasters).

The use of solutions that include the dynamic compression of the signal must not result in constant energy levels without any “aeration” of the sound signal over time.

UNITS

LUFS means Loudness Unit on the Full Scale. A LUFS value is the expression of a weighted measurement, K (Leq(R2LB)) on a Full Scale.

The LUFS scale is graduated in steps of 1 dB. Applying an increase of 1 dB to the measured signal results in an increase of + 1 dB in the reading on the LUFS scale.

CONDITIONS FOR LISTENING AND MIXING

These sound tracks must be mixed in an auditorium where the technical equipment and dimensions are suitable for television sound (close-up listening). For example, large cinema-type auditoria are not suitable for this kind of mixing and they are therefore not advised.

The definition of the sound level for the “validation” of sound levels in RFB programmes in a quality check room can be found in the clauses of recommendations EBU-Tech 3276 and 3276 s1.

The mixer may adjust the sound level (SPL acoustic pressure level) validated with reference pink noise (EBU Technical Recommendation R68) depending on the proposed hall and sound system, in the region of 79 dB (C) per channel (not including LFE).

2.2.1 - CONDITIONS FOR MEASURING AND LISTENING

2.2.1.1 - Types of speakers and their position

Audio mixing, mastering, encoding and quality control devices must be fitted with speakers that comply with standard **IEC 60268-5**.

The position of the speakers must comply with standard **ITU-R BS.775**.

2.2.1.2 - Calibration for listening

Sound devices must be calibrated according to the rules laid down in recommendation EBU Tech 3276s1.

2.2.1.3 - Sound level

Programmes will be checked on sound systems whose line-up level - for pink noise broadcast at -18dBFS - is 74 dB (C) SPL on every channel except the LFE channel, which is broadcasted at 78 dB (C) SPL.

This level is considered to be the one at which the overall dynamic range and the intelligibility of speech and timbre are deemed to comply with television broadcast levels.

2.2.1.4 – Measuring levels

PEAK LEVELS :

Levels – expressed in dBTP – are checked by means of an instant peak-meter, « True Peak ».

Current recommendations:

- **SMPTE 299M** : "24-Bit Digital Audio Format for SMPTE 292 M Bit-Serial Interfaces".
- **ITU-R BS.1770-4**

LOUDNESS

History

Further to the work carried out since 2000 within the framework of FICAM / CST work groups on listening comfort and sound level, completed by the work done by the CST's Sound department and the HD Forum ; we propose a method for measuring the energy level – or loudness - which allows us to validate the value of this level for all programme types intended for television broadcast, whatever format they are in (PCM, Dolby E, etc.) and whatever the type of mixing (multi-channel, stereo, mono, etc.)

This value will also allow us to inform any metadata if encoding is used.

Metering method

The metering method we use consists of measuring the whole of the useful programme using a device that implements the algorithm described in recommendation R 128 published by EBU, as well as its appendices 3341, 3342, 3343 and 3344, producing a value given in dB LUFS.

2.2.2 – CHARACTERISTICS OF SIGNALS

2.2.2.1 - Line-up level

The line-up level reading on a Full Scale digital peak meter is -18dB FS for a sinusoidal signal at a frequency of 1000Hz.

A 1000 Hz line-up signal at -18 dBFS should display a loudness level of -18 LUFS on a metering device in EBU mode, if the signal is present on the left and right channels of a stereo programme.

If the signal is present on one channel only, the displayed level will be -21 LUFS.

As a reminder, in analogue sound: the line-up level reading on PPM quasi-peak 10 ms DIN 45406 is -9 dB and the line-up level reading is 0 Vu on a Vu meter.

2.2.2.2 - Maximum peak level in programmes (PCM or Dolby E)

The peak level for audio signals measured using True Peak, must not exceed -3,0 dB TP.

2.2.2.3 – Dynamics and loudness

For each version of the sound mixing (French, Multi-lingual, audio-description...) the following table summarises the sound recommendations for suppliers.

Short programme : a programme whose duration is less than or equal to 2 minutes.

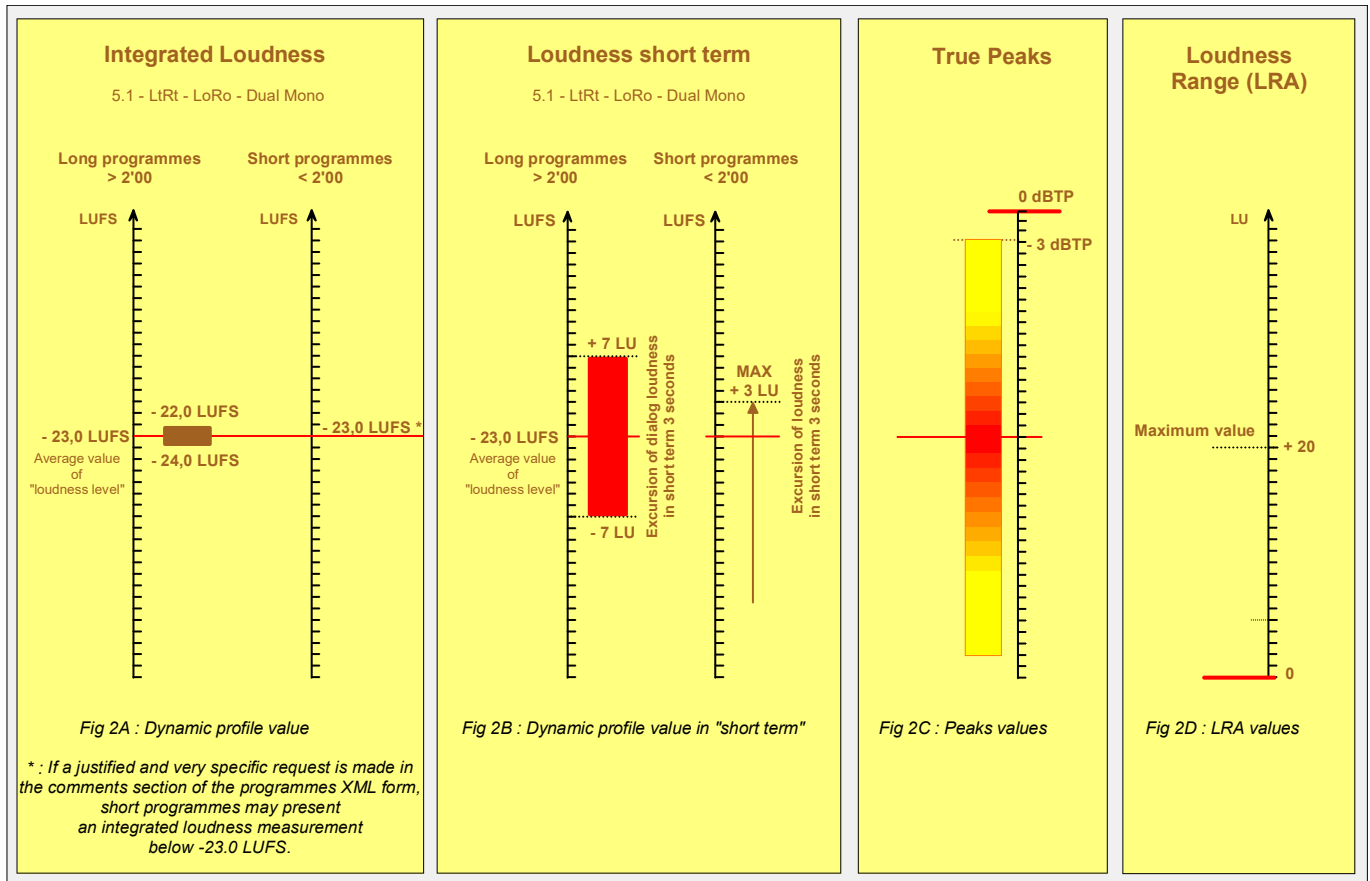
Long programme : a programme whose duration is greater than 2 minutes.

	Short programmes	Long programmes
Measuring the integrated loudness over the whole programme	-23,0 LUFS	-23,0 LUFS ± 1,0 LU
Loudness Range or LRA	Not measured	≤ 20,0 LU We advise a value greater than 5LU to maintain good aeration of the dynamics
Maximum short term loudness	≤ -20,0 LUFS	Not measured
Short term loudness range of dialogues around the target value of the integrated loudness	Not measured	-30,0 ≤ Dialog short term ≤ -16,0 in LUFS
Maximum value of true peaks	-3,0 dB TP	-3,0 dB TP

In order to maintain sufficient intelligibility for television viewers and to take into account the considerable variations in their listening conditions, measuring the short-term loudness in sections of the programmes that include dialogues must target an average level of -23.0 LUFS and a maximum variation of 7 LU either side of the target level is permitted ; -30.0 LU is equivalent to a whisper and -16.0 LU is equivalent to a shout. Respecting the target levels for dialogues will allow the indiscriminate linear and non-linear (catch-up TV) broadcast of programmes, a multi-screen complex leading to an increasing number of listening situations by means of headphones, miniature speakers such as those on personal computers, tablets and mobile telephones.

The following diagram fixes the main points of reference on the tools that measure loudness (left side) and the maximum peak level (right side).

If a justified and very specific request is made in the comments section of the programme's XML form, short programmes may present an integrated loudness measurement below -23.0 LUFS.



2.2.2.4 - Audio/video synchronisation

Video and audio signals are synchronous with the following tolerance:

- Either a maximum lead of sound compared to image of 20ms
- Or a maximum delay of sound compared to image of 40ms.

By default, tracks encoded using Dolby E must be recorded synchronously with video (In-sync).

This will result in a delay of 1 (one) audio image compared to the video, further to decoding using Dolby E without compensating for the video delay.

2.2.2.5 - Digital Audio Format

Audio tracks must be delivered in the following digital format:

- Sampling frequency: 48 kHz
- Linear quantification: minimum 24 bytes for PCM format; minimum 20 bytes before Dolby E format
- Dolby E signals must be exempt of CRC errors (Cyclic Redundancy Code)

2.2.3 – SUBJECTIVE QUALITY

The soundtrack must be naturally balanced and adjusted according to the current rules of the trade. When one listens in a quiet environment on a sound system that has a flat frequency range, one should hear no artefacts: de-synchronisation clicks from clocks, whistles in speech, whines or wheezes in low frequencies (buzz).

Format conversions using speed variations (24/25 fps) generally require harmonisation in order to remain within the original musical tone. Harmonisation procedures on 5.1 signals are at the limits of current technology and in

some cases they are terribly destructive. Harmonisation is therefore a delicate operation that must be listened to again and validated by a qualified person.

When the verification is carried out, it will be listened on stereo and on a multi-canal system (if necessary using Dolby Surround decoding or Dolby E decoding). The compatibility of 5.1 multichannel programmes with stereo and mono sound must necessarily be validated by simulating the RF film standard mode, at the very least with verification by means of sampling for long programmes and in their entirety for short programmes.

IMPORTANT INFORMATION: During broadcast, it often occurs that the French version - when it is available as multi-channel sound – is the channel's main audio component. For TV viewers who are not equipped with a 5.1 installation, this is the component that will be « downmixed » by the receiver to be listened to in stereo or mono.

2.2.4 – TECHNICAL INDICATIONS FOR MIXING

For the requirements of making the Ready For Broadcast file, every delivery of a mixed programme must be accompanied by a standardised « Technical indications for mixing form », provided as an appendix at the end of this document. These elements will allow the operator to enter the correct metadata into the XML file.

2.2.5 - SPECIFICITIES OF PCM FORMAT

2.2.5.1 - Mono

In monophonic broadcasts, the signal recorded using PCM is delivered on two contiguous audio tracks without digital bit rate compression. In order for this to be compatible with stereo signals, the two tracks containing the monophonic signal are strictly identical and in time.

2.2.5.2 - Lo/Ro and Lt/Rt Stereo

Assignment of tracks

In stereophonic broadcasts, the signal recorded using PCM is delivered on two contiguous audio tracks without digital bit rate compression. The odd track is the left channel and the even track is the right channel.

Audio Phase

This is the average result between the left and right channel of an intensity and phase stereo. To ensure the mono downmix is compatible, the phase must be mostly positive.

Specificities for Lt/Rt Surround stereo signals

Surround matrix in Lt/Rt stereo must maintain spatial coherence of the sound image and must not alter the intelligibility or the timbre of the sound message. Programmes derived from Lt/Rt mixing must never be decoded under 5.0 to be delivered. Similarly, they must not undergo decoding and Lt/Rt re-matrixing generation.

2.2.6 - SPÉCIFICITÉS FOR DOLBY E FORMAT

2.2.6.1 – Synchronisation of Dolby E and HD video 25 fps frames

To allow the video editing and signal switching without artefacts, the Dolby E header will necessarily be positioned outside a data-free section known as a Guard Band, i.e.

- between the 30th and 40th of the 1920 audio samples associated with each video image,
- in phase with line 21 (+/- 2) of the HD video signal at 25 images per second.

(Source : <http://www.dolby.com/us/en/technologies/dolby-e-preferred-alignment.html>)

2.2.6.2 – Assigning channels within a Dolby E flow

Dolby E coding takes into account 4 or 8 audio tracks depending on the following conditions:

- Programme available only with monophonic or stereophonic sound: Dolby-E coding is carried out in 2/0 configuration where the PCM version's monophonic sound is duplicated identically respectively on tracks 1 and 2 of the Dolby-E, and the PCM version's stereophonic sound from the PCM is duplicated identically track for track on tracks 1 and 2 of the Dolby-E.
- Programmes available on 5 or 6 tracks mixed respectively in formats 5.0 or 5.1: the Dolby E coding is carried out in 3/2 configuration depending on the assignment of tracks in recommended **EBU-R91-1998**,
- The specifications regarding the content of tracks 7 and 8 of the Dolby E are left at the discretion of the Broadcasters.

This necessarily requires the compulsory configuration of metadata as follows:

- Programme Configuration = 5.1+2 **or** 2+2
- Channel Mode = 3/2 **or** 2/0 for programme 1
- Channel Mode = 2/0 for programme 2
- Please refer to paragraph A.2.6.4 for the other parameters.

AES pair number (encoder entries, decoder exits)	Dolby E flow channel	2+2 configuration main mix in dual-mono or stereo	5.1+2 configuration main mix in 5.1 / 5.0
AES 1 (Channels 1 and 2)	channel 1	Left channel	Front left channel
	channel 2	Right channel	Front right channel
AES 2 (Channels 3 and 4)	channel 3		Centre channel
	channel 4		Subwoofer channel
AES 3 (Channels 5 and 6)	channel 5		Rear left channel
	channel 6		Rear right channel
AES 4 (Channels 7 and 8)	channel 7	canal optionnel (à préciser par l'éditeur)	optional channel (to be specified by broadcaster)
	channel 8	canal optionnel (à préciser par l'éditeur)	optional channel (to be specified by broadcaster)

2.2.6.3 - Compatibility of stereo reduction (downmix)

Any « 5.1 to stereo » reduction (downmix) - once the increase of gain and Lt/Rt or Lo/Ro matrixing has been applied in the metadata (next paragraph) - must:

- *Maintain the spatial coherence of the sound image*

- *Maintain the level and intelligibility of voices*
- *Maintain the balance between the various elements mixed*

The characteristics of the stereo signal phase derived from a downmix must fulfil the same requirements as a traditional stereo signal (Cf. § 2.5.2).

2.2.6.4 - Dolby E Metadata

Typology of Multi-channel programmes (Music and Others)

We can distinguish two main typological categories of Multi-channel programmes:

1. Musical programmes liable to cause problems in the event of a stereo downmix.
2. All other programmes that are not musical.

Entering the Dialogue Level value

For all programmes mixed in compliance with the principles laid down in this recommendation, the Dialogue Level value to be entered in the metadata will be identical to the Integrated Loudness measurement, carried out according to the method described in recommendation EBU R128.

Special case

For certain older programmes encoded in Dolby E simply after adjusting their Integrated Loudness value to -23 LUFS, it often occurs that the average level of dialogues differs greatly from this value.

In this case and in order to maintain the sound quality of dialogue phases of the programme, the sound intensity measurement should be entered into the Dialogue Level metadata, as measured by equipment using the Dialogue Intelligence algorithm. In such a case, this decision will be explained in the comments section of the programme's XML form.

Metadata corresponding to 5.1 / 5.0 / 2.0 programmes

We can distinguish three different categories of Dolby-E metadata to be entered during the encoding process:

- 1. Fixed metadata which are solely dependent on the « Channel Mode » parameter (3/2 with active LFE for programmes using 5.1, 3/2 without active LFE for programmes using 5.0 and 2/0 for stereo programmes)**
- 2. Default metadata that may be modified during encoding on the grounds of a justified request based on the mixing and encoding forms appended hereto.**
- 3. Metadata dependent solely on mixing which may be validated by a measurement.**

Any alterations to metadata set out in the table below constitute grounds for refusal to broadcast if they are not backed up by means of a comment in the programme's XML form and they remain subject to the Broadcaster's approval.

NB : The Extended BSI mode must necessarily be switched on for 5.1 et 5.0 programmes. However, it must not be switched on for stereo formats.

Parameters		Programme 5.1	Programme 5.0	Stereo Programme (2.0)	Mono/dual Programme	Reference Signal
	"Dialog level"	- 23,0 LUFS ± 1 (to be measured)	- 23,0 LUFS ± 1 (to be measured)	- 23,0 LUFS ± 1 (to be measured)	- 23,0 LUFS ± 1 (to be measured)	- 31,0 LUFS
	Program Name	Broadcaster choice**	Broadcaster choice **	Broadcaster choice **	Broadcaster choice **	Test_Check
Audio Processing	Channel Mode	3/2	3/2	2/0	2/0	3/2 ou 2/0
	LFE Channel	Enable	Disable	N/A	N/A	5.1: Enable 5.0: Disable 2.0: N/A
	DC Filter	Enable	Enable	Enable	Enable	Enable
	Low pass Filter	Enable	Enable	Enable	Enable	Enable
	LFE Low pass Filter	Enable	Disable	N/A	N/A	5.1: Enable 5.0: Disable 2.0: N/A
	Srnd Phase Shift*	Enable	Enable	N/A	N/A	3/2: Enable 2.0: N/A
	Srnd 3 dB Attenuation	Disable	Disable	N/A	N/A	3/2: Disable 2.0: N/A
Dynamique	Line Mode Pro	Film LIGHT	Film LIGHT	Film LIGHT	Film LIGHT	None
	RF Mode Pro	Film Standard	Film Standard	Film Standard	Film Standard	None
	RF Overmod Protect	Disable	Disable	Disable	Disable	Disable
Bitstream Info	Bitstream Mode	Main Complete	Main Complete	Main Complete	Main Complete	Main Complete
	Center Downmix Level	0.707 (-3 dB)	0.707 (-3 dB)	0.707 (-3 dB)	0.707 (-3 dB)	0.707 (-3 dB)
	Srnd Downmix Level	0.707 (-3 dB)	0.707 (-3 dB)	0.707 (-3 dB)	0.707 (-3 dB)	0.707 (-3 dB)
	Dolby Srnd Mode	N/A	N/A	Dolby Surround enabled	Dolby Surround enabled	N/A
	Copyright bit	Yes	Yes	Yes	Yes	Yes
	Original Bitstream	Yes	Yes	Yes	Yes	Yes
	Audio Production Info	Disable	Disable	Disable	Disable	Disable
	Mix Level	N/A	N/A	N/A	N/A	N/A
	Room type	N/A	N/A	N/A	N/A	N/A
Extended BSI	Preferred Stereo Downmix*	Lt/Rt	Lt/Rt	N/A	N/A	3/2: Lt/Rt 2.0: N/A/N/A
	Lt/Rt Center Downmix Level	0.707 (-3 dB)	0.707 (-3 dB)	N/A	N/A	N/A
	Lt/Rt Surround Downmix Level	0.707 (-3 dB)	0.707 (-3 dB)	N/A	N/A	N/A
	Lo/Ro Center Downmix Level	0.707 (-3 dB)	0.707 (-3 dB)	N/A	N/A	N/A
	Lo/Ro Surround Downmix Level	0.707 (-3 dB)	0.707 (-3 dB)	N/A	N/A	N/A
	Dolby Surround EX Mode	Not Surround EX	Not Surround EX	N/A	N/A	N/A
	A/D Converter Type	Standard	Standard	Standard	Standard	Standard

* Surround Phase Shift and Preferred Downmix parameters are inter-dependent. Please refer to paragraph 2.2.6.4 for their parameters.

** The Programme Name entered must not contain any characters with accents or spaces.

Figure 2: Table of Dolby-E metadata default parameters for 5.1, 5.0, 2.0, dual and mono formats

ABCDE	Fixed metadata dependent solely on the « Channel mode » parameter
ABCDE	Default metadata that may be modified if justified (cf. Notes)
ABCDE	Metadata dependent on the mixing

3 - DELIVERABLES

3.1 - GENERALITIES

A programme delivered in the shape of a file comprises the following, whatever its length:

- A single MXF Op1a file containing the video essentials and the associated audio essentials
- A metadata file in XML format
- If appropriate, one or more STL files containing the associated sub-titles
- If appropriate, a list of sub-titles, the original text and the transcription of the final credits.

The start of the programme (first image and first useful sound) must necessarily begin at a whole hour Time Code (eg.. 00:00:00:00, 01:00:00:00, 10:00:00:00). The presence of lead-in elements before the first image, or after the last useful image of the programme (black, neutral backgrounds) remain at the broadcaster's discretion.

3.1.1 – FILE NAMING

This identifier is at the Broadcaster's discretion.

3.1.2 - IDENTIFICATION OF THE PHYSICAL MEDIUM

In the event the programme is delivered on a physical medium (hard disk, computer cartridge...), this medium must be labelled with the following information:

- Delivery identifier
- Programme title (and if appropriate, the sub-title or the episode number)
- The duration (HH:MM:SS:II)
- The Magnetic Recording number or Case number or Identifier number

This information must also be reproduced on a paper form accompanying the medium, along with the following extra information:

- Identification of the audio tracks present
- Any comments that may be useful for the verification: possible image or sound defects ascertained, occasional problems with image/sound synchronisation etc.

3.1.3 – DEMATERIALIZED DELIVERY

Each Broadcaster may offer dematerialised delivery solutions for all the files comprising the Ready For Broadcast deliverable.

3.2 – FILE FORMATS

3.2.1 - MXF ENCAPSULATION FORMAT

The MXF multimedia file containing the programme will comply with the AMWA AS10 standard. The generation profile will follow the "High_HD_2014" (<http://www.amwa.tv/projects/AS-10.shtml>) shim.

Precautions concerning the Time Code

The various Time Code elements that an MXF file may contain must be coherent among themselves and must be present in the "Material Package", "Source Package" and the "System Item" in the MXF file.

3.2.3 AUDIO FORMAT

Type and number of tracks

MXF Ready to Broadcast files will have 8 audio tracks and each different track will be transported by a different AES3 track.

Each audio track in the MXF file will carry an AES3 stream, with 24 bit audio resolution at 48 kHz sample frequency. Two AES3 tracks / stream may – if required – transport a Dolby E encoded stream. The assignment of the file's 8 tracks, as well as any tracks that may be Dolby E encoded, must be made clear in the associated XML file as per each Broadcaster's recommendations.

3.2.4 SUB-TITLES FORMAT

Programmes in foreign languages will be broadcast in their original version with French sub-titles. Most programmes also comprise specific sub-titling for the hard of hearing.

Sub-titles file format

Any programme that is to be broadcast with sub-titles must be accompanied by one or more sub-title files that comply with UER standard N19-2002 (STL file), that respects the following instructions: The names of the STL files will be indicated by the broadcaster

- Sub-titles must be synchronous with the Time Code in the MXF file delivered.
- The exit Time Code of the last sub-title in the programme must be positioned 3 seconds, at the latest, before the last useful image of the programme to avoid the last sub-title getting stuck on the broadcast of the following programme.
- The general information in the « blocGSI » in the STL file (programme name, Time Code at the start of the programme etc.) will be completed. The table below supplies extra information; the Broadcaster reserves the right to modify the parameters at his discretion:

	Teletext Mode	
Programme title (OPT)	To be completed	
Version	French	Deaf and hard-of-hearing
Page code (CPN)	850	
Time Code Format (TC)	25 i/s (STL25.01)	
Display standard (DSC)	Teletext – Presentation of level 1 (1)	
Character code (CCT)	Latin (00)	
Language (LC)	French (0F)	
Time Code at the start of the programme (TCP)	Complies with time code at start of MXF file delivered	
Size of characters	Double height – single width	
Maximum number of characters per line	37	
Colour of sub-titles	White	As per CSA* chart
Number of rows (MNR)	23	23
Position of sub-titles	Maximum 2 lines of text Horizontal centred	As per CSA* chart

* <http://www.csa.fr/content/download/20043/334122/file/Chartesoustitrage122011.pdf>

3.2.5 - FORMAT OF METADATA FILE

It is compulsory to deliver a programme file in XML format with each MXF file.

	A	B	C	L
1				
2		MetaPADTV	Fabriquer le XML / Generate XML	
3				
4				
5		Général / General		Obligatoire / Compulsory
6		Nom du MXF		OUI / YES
10				
11		Description Fichier		
14		Diffuseur / Broadcaster		OUI / YES
15		Fournisseur du fichier / File provider		OUI / YES
16		Nature de programme / Program nature	Programme	OUI / YES
18		HouseID		OUI / YES
21		Titre Programme Local / Local Program Title		OUI / YES
22		Titre Episode Local / Local Episode Title		NON / NO
23		Titre Programme Original / Original Program Title		NON / NO
24		Titre Episode Original / Original Episode Title		NON / NO
25		RevisionID / RevisionID		OUI / YES
32				
33		Informations techniques / Technical informations		
34		TC in Fichier (amorçage) / File TC in (amorce)	10:00:00:00	OUI / YES
35		TC out Fichier (postroll) / File TC out (postroll)	10:14:59:24	OUI / YES
36		TC in Programme / Program TC in	10:00:00:00	OUI / YES
37		TC out Programme / TC out Program	10:14:59:24	OUI / YES
38		Spécification fichier	AS10	OUI / YES
49		Description de la segmentation / Segmentation description		
50		Nombre de parties / Number of parts	2	OUI / YES
51				
52		Description de la partie 1 / Part 1 description		
53		Numéro de partie / Part number	1	OUI / YES
54		TC in (Programme ou message) / TC in (Program or message)	10:00:00:00	OUI / YES
55		TC out (Programme ou message) / TC out (Program or message)	10:04:59:24	OUI / YES
56				
57		Description de la partie 2 / Part 2 Description		
58		Numéro de partie / Part number	2	OUI / YES
59		TC in (Programme ou message) / TC in (Program or message)	10:05:00:00	OUI / YES
60		TC out (Programme ou message) / TC out (Program or message)	10:14:59:24	OUI / YES

Broadcasters may provide an example of an XML file along with a « MetaPADTV V1-x » Microsoft Excel file containing pre-defined information zones to complete the various broadcasting and technical fields that describe the programme

The « MetaPADTV V1-x » Excel file will include macros that allow the XML file to be generated.

The Excel file macros usually automatically generate the name of the MXF file using the data entered when the XML is generated.

For a multi-party programme, the entrance/exit time codes for each section must necessarily be entered in the XML file.

4 – GLOSSARY OF ACRONYMS

4.1 TECHNICAL TERMS

ACRONYM	DEFINITION
AS	Application Specification : drafted by AMWA, an AS corresponds to a particular specification in the technical parameters of a complex format, to simplify its interoperability by corresponding to cases in which they are used
CRC	Cycling Redundance Code : Redundancy code to improve the sturdiness of digital information.
EAV	End of Active Video
K ou R2LB	Weighting curve derived from the B curve applied to an audio source within the framework of a loudness measurement.
LTC	Longitudinal Time Code
LU ou LUFS	Loudness Unit or Loudness Unit relative to the Full Scale : unit for measuring loudness as defined in recommendation EBU R128
MXF	Material eXchange Format : file format devoted for the exchange of professional media
PCM	Pulse Code Modulation: referenced as the digital representation of an analogue signal without any flow reduction or compression algorithm.
PPM	Peak Program Meter : type of peak-meter used for measuring an audio signal
SAV	Start of Active Video
SDI	Serial Digital Interface : standard for transmitting an uncompressed digital television signal (audio, video, ancillary data)
VANC	Vertical ANCillary data space : digital information not integrated into the digital image
VITC	Vertical Internal Time Code

4.2 ORGANISATIONS

ACRONYM	DEFINITION
AES	Audio Engineering Society : international organisation of sound engineers, producing standards in the field of sound
AMWA	Advanced Media Workflow Association : organisation that specifies uses and recommendations for dematerialised production
CSA	<i>Conseil Supérieur de l'Audiovisuel</i> : the body that regulates television channels in France
CST	<i>Commission Supérieure Technique de l'Image et du Son</i> : Association of Technicians from the fields of sound and image in cinema and television.
EBU	European Broadcast Union (Union Européenne de Radio Télévision), European organisation that brings together public television and radio channels
FICAM	<i>Fédération des Industries du Cinéma, de l'Audiovisuel et du Multimédia</i> – French Federation of Cinema, Television and Multimedia Industries
HDFORUM	French association that promotes improvements to the quality of television services. It comprises three groups : broadcasters, industrial entities and distributors
IEC	International Electrotechnical Commission : organisation that produces standards for the electric and electronic industry
ITU	International Telecommunications Union (ou Union Internationale des Télécommunications), in charge of recommendations and international planning of telecommunications (IUT in French)
SMPTE	Society of Motion Picture and Television Engineers : American association of television and cinema engineers