dpp®

DELIVERY REQUIREMENTS

FILE DELIVERY USING AMWA AS-11

PROGRAMME DELIVERY

DOCUMENT

Abstract

This document outlines the technical requirements for the delivery of programmes using the AS-11 UK DPP file format, as agreed by the UK Broadcasters: BBC, BT Sport, Channel 4, Channel 5, ITV, Sky, STV and TG4.
The document includes the technical parameters that all Ultra-High Definition (UHD) , High Definition (HD) and Standard Definition (SD) file delivered programmes must meet to be acceptable by the broadcasters. It is set out as follows:

Part 1: Picture and sound quality and QC requirements.

Part 2: Additional technical requirements for File programme delivery.

Part 3: Broadcaster specific requirements that are unique to **ITV**

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PART 1: GENERAL REQUIREMENTS

Technical Requirements

This part of the document details the technical and quality requirements that every programme must comply with. It also forms a binding obligation on the producers of programmes delivered to the UK broadcasters.

Assessment of quality is highly subjective and therefore dependent on the nature of the programme. Some of the quality requirements are expressed in relative terms ("reasonable", "not excessive") and it will be necessary to make a judgement as to whether the quality expectations of the intended audience will be fulfilled and whether the broadcaster will feel that value for money has been achieved.

Photosensitive Epilepsy and Quality Control

Every programme submitted for transmission must satisfy the Ofcom Photosensitive Epilepsy guidelines, which are detailed in the QC section of this document. Any programme failing to meet these requirements or any of the other QC requirements, may be rejected and returned to the supplier for repair.

Please be aware that the producer of the programme as well as the broadcaster may be liable for any action taken by Ofcom or a member of the public, for a breach of the Photosensitive Epilepsy requirements.

Equalities Act 2010

The Equalities Act 2010 (formerly the Disability Discrimination Act) states that where a service provider offers or provides services to members of the public, the provider must take such steps as is reasonable to make it easier for disabled people to make use of the service.

Broadcasters are service providers and this therefore applies to them (DCMS Guidance 2006).

Broadcasters and programme makers are required to consider the needs of people with hearing or visual impairments especially for dialogue, voiceovers and when mixing sound, as well as when generating onscreen text, subtitles and graphics.

The Communications Act 2003 sets targets for broadcasters (monitored by Ofcom) to provide subtitling, sign language and audio description services, so programme makers may be asked to provide appropriate additional material.

1 VIDEO TECHNICAL REQUIREMENTS

1.1 Video Formats

1.1.1 Ultra-High Definition

Material delivered to this specification must be acquired, post-produced and delivered as follows:

- 3840 x 2160 pixels in an aspect ratio of 16:9[1];
- 50 or 25 frames per second progressive - known as *2160p/50 or 2160p/25*;
- colour system must be YC_rC_b *only*;
- colour sub-sampled at a ratio of 4:2:2;
- colour space – ITU-R BT.2100[2];

- image dynamic range[3] parameters detailed in ITU-R BT.2100 must be agreed with the broadcaster before delivery.

The UHD format is fully specified in ITU-R BT.2100.

Notes:

The frame rate must be agreed with the broadcaster before shooting begins.

For images acquired at 50 frames a second, vision mixer cuts and edits shall occur so that the start of the first frame of the progressive video pair is aligned to the start of the first (upper) field of an interlace video signal as defined by SMPTE ST2051.

1.1.2 High Definition

Material delivered to this specification must be acquired, post-produced and delivered as follows:

- 1920 x 1080 pixels in an aspect ratio of 16:9 as defined in EBU TECH 3299 System 2;
- 25 frames per second (50 fields) interlaced[4] – known as *1080i/25,* top field first;
- colour sub-sampled at a ratio of 4:2:2;
- colour space – ITU-R BT.709.
- The HD format is fully specified in ITU-R BT.709.

1.1.3 Standard Definition

Where agreed by the broadcaster, legacy material delivered for UK SD TV transmission must be:

- 702 x 576 pixels in an aspect ratio of 16:9;
- 25 frames per second (50 fields) interlaced - known as *576i/25*, top field first;
- colour sub-sampled at a ratio of 4:2:2;
- colour space – ITU-R BT.601.

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[1] *Broadcasters may commission programmes in any of the three resolutions (7680 x 4320, 3840 x 2160, 1920 x 1080) defined in ITU-R BT.2100.*

[2] *Conventional reference primaries may be optionally used as described in SMPTE 2036-1:2014 but this limits the images to a maximum of 60fps and does NOT permit HDR images. The reference primaries in SMPTE ST2036-1 are consistent with Recommendation ITU-R BT.709 and their use MUST be agreed by the broadcaster BEFORE shooting commences.*

[3] *Details and an explanation of "image dynamic range" can be found in the ITU Report ITU-R BT.2390.*

[4] *This includes acquisition using the progressive segmented frame (PsF) format to carry 25fps progressive images.*

The SD format is fully specified in ITU-R BT.601.

Note: SD video has a picture area with a minimum of 702 x 576 pixels, where the 702-pixel wide picture must be centred in the active 720-pixel wide line. The picture information may extend the full width of the 720-pixel wide line, providing the image shape is not distorted.

1.2 Signal Parameters

In a video signal, each primary component should lie between 0 and 100% of the video range between black level and the peak level (R, G and B). Ideally, video levels should lie within the specified limits so that programmes can be distributed without adjustment.

When television signals are manipulated in YUV form, it is possible to produce "illegal" combinations that, when de-matrixed, would produce R, G or B signals outside the range 0% to 100%.

1.2.1 Video Level Tolerance

In practice it is difficult to avoid generating signals slightly out of range and it is considered reasonable to allow a small tolerance:
- *The RGB components and the corresponding Luminance (Y) signal, should not normally exceed the "Preferred Minimum/Maximum" range of digital sample levels in the table below,*
- *Measuring equipment should indicate an "Out-of-Gamut" occurrence only after the error exceeds 1% of an integrated area of the active image.*

For further details see the EBU Recommendation, EBU R103.

Any signals outside the "Preferred Minimum/Maximum" range are described as having a gamut error (or as being out of gamut). Signals cannot exceed the "Total Video Signal Range" and will therefore be clipped.

System Bit Depth	Expected Video Range	Preferred Minimum/Maximum	Total Video Signal Range
8 bit (SD Only)	16 – 235	5 – 246	1 – 254
10 bit (HD & UHD)	64 – 940	20 – 984	4 – 1019

Full range video levels must *not* be used for delivered television programmes.

Colour gamut "legalisers" should be used with caution as they may create artefacts in the picture that are more disturbing than the gamut errors they are attempting to correct. It is advisable not to "legalise" video signals before all signal processing has been carried out.

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1.2.2 High Dynamic Range

Guidance for HDR programmes is available in the HDR Supplement. However, the broadcaster must be consulted before an HDR production commences.

The Recommendation ITU-R BT.2100 specifies two High Dynamic Range (HDR) methodologies: Hybrid Log Gamma (HLG) and Perceptual Quantisation (PQ).

Note: SMPTE ST 2036-1 cannot be used for High Dynamic Range images.

The HLG specification offers a degree of compatibility with legacy displays by more closely matching the previously established television transfer curves. The PQ specification achieves a very wide range of brightness levels for a given bit depth using a non-linear transfer function that is finely tuned to match the human visual system.

Programmes can be mastered using either HDR method defined in ITU-R BT.2100.

- Programme Acquisitions delivered as PQ HDR must be converted to HLG HDR using the approach described in the Annex of ITU-R BT 2100
- HDR programmes should normally be graded on displays with a maximum brightness of between 1000 and 2000cd/m^2.

For HLG productions, it is recommended that the reference level of graphics should be 75 IRE as it leaves sufficient headroom for "specular highlights" and allows comfortable viewing when HLG content is shown on HDR and SDR displays.

Note: 75 IRE is equivalent to 203 cd/m^2 on a 1000 cd/m^2 reference display, or 343 cd/m^2 on a 2000 cd/m^2 reference display.

1.2.3 Blanking

Images must fill the active picture area. No 'blanking errors' are permitted on new, up-converted, or archive material.

A two-pixel tolerance is permitted during computer graphics or complex overlay sequences where key signals, graphic overlays or other effects do not fully cover the background image. Where animated key signals or overlays cause moving highlights at the edge of the active image it is preferable to blank these pixels completely. A note of the timecodes and reasons for these errors should accompany the delivered programme.

1.2.4 Field Dominance

For SD and HD programmes, cuts must happen on frame boundaries (i.e. between field 2 and field 1). Motion on *PsF* material must always occur between field 2 and field 1 (i.e. field 1 dominance).

If material is shot at *50 frames* a second, the correct 2-frame marker phasing must be maintained when converting to *1080i/25* or *1080PsF/25*.

1.3 VIDEO LINE UP

1.3.1 SMPTE ST2036-1 UHD, HD and SD Programmes

UHD programmes produced using ITU-R BT.709 colour space, as well as HD and SD programmes, must use 100% colour bars (100/0/100/0) that fill the 16:9 raster. SMPTE pattern bars are not acceptable. Programme video levels must be accurately related to their associated line-up signals.

1.4 Origination

The EBU Recommendation EBU R118 is used to assess the suitability of cameras. Contact the broadcaster if there are any concerns about the suitability of a camera.

- Cameras for UHD programmes can be UHD Tier 1 or 2, but some UHD co-producers may not accept all cameras in UHD Tier 2.
- UHD programmes can only be originated with progressive scan.
- Cameras for HD programmes must meet or exceed the parameters of HD Tier 2L.
- HD programmes may be originated with either interlaced or progressive scan (see Film Motion for additional guidance). This process must be agreed with the broadcaster in advance.
- Interlaced and progressive scan HD material may be mixed within a programme if it is required for editorial reasons or the nature of the programme requires material from varied sources.
- SD acquired programmes should use Tier 2L cameras whenever practical and care should be taken when down converting.

1.4.1 DSLR Cameras

DSLR cameras are only acceptable for time-lapse sequences, stop-frame animation and other specialist requirements such as infra-red and hostile conditions. They are not suitable for use as video cameras unless they have EBU R118 test report results that meet the UHD Tier 2 or HD Tier 2L requirements. Exceptions can be made for covert shoots or dangerous locations at the discretion of the broadcaster. The broadcaster must agree to the use of DSLR cameras in advance of any shooting.

1.4.2 Drones and Remotely Operated Cameras

- Cameras attached to these devices must meet the requirements in EBU R118 unless agreed with the broadcaster in advance.
- Unless a drone or remote rig has adequate image stabilisers it is recommended that the camera attaché has a higher resolution than needed to allow electronic stabilisation to be carried out during post-production.
- Programme producers are required to ensure drones and other remotely operated cameras are only controlled by trained and licenced operators when used in the UK. Producers should be aware of specific local and territorial restrictions and regulations especially when drones and remotely operated cameras are used outside the UK.

Note: broadcasters may have additional requirements for the use of drones and remote cameras as part of their editorial or health and safety guidelines.

1.5 Film for UHD and Acquisition

Super16 film is *not* considered to be HD or UHD no matter what processing or transfer systems are used[5]. The following **35mm** film types and stock are acceptable for high definition acquisition:
- 3 perf – any exposure index although an exposure index of 250 or less is preferred;
- 3 perf – only if daylight stock with an exposure index of 250 or less is used.

To avoid causing problems with high definition transmission encoding, film should be well exposed and not forced more than one stop.

35mm stock (new or archive) scanned at UHD (or 4k and cropped to 3840) is usually acceptable for UHD production, but the entire capture, processing, scanning and post-production workflow must be agreed by the broadcaster in advance.

Note: there are some circumstances where 35mm film is not suitable for UHD programme production.

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[5] *Requirements for programmes commissioned to acquire on Super16mm film can be found here.*

1.6   Post Production

HD and SD projects must be set to export progressively shot material as interlaced. Electronically generated moving graphics and effects (such as rollers, DVE moves, wipes, fades and dissolves) must be generated and added as interlaced to prevent unacceptable judder.

UHD Projects are always progressive. Electronically generated moving graphics and effects (such as rollers, DVE moves, wipes, fades and dissolves) must be edited to prevent unacceptable judder. For 2160p/50 deliverables, such effects must be edited at 50 frames per second. If programmes are intended to be delivered as 2160p/25, this must be agreed with the broadcaster in advance.

1.6.1   Video Codecs used for Post Production

Post-production codecs used to edit HD programmes should be at least 160Mb/s. It is however acceptable to use the native camera codec provided the codec is constant throughout the production workflow.

Note: UHD post-production codec choice will depend on the delivery frame rate and the requirements of co-producers for a Mastering Format (such as IMF) delivery.

1.6.2   Film Motion or Film Effects

It is *not* acceptable to shoot *1080i/25* and add a film motion effect in post-production. High Definition cameras can capture in either *1080i/25* or *1080p/25*. Where film motion is a requirement, progressive capture is the only acceptable method. Conversion from 50 progressive frames per second material to 25 progressive frames per second is permitted, provided that the frame conversion process does not produce excessive motion judder or image softening or visible frame blending; and that an appropriate shutter speed has been used. The process must be agreed with the broadcaster in advance.

1.6.3   Frame Rate Conversion

To prevent image degradation, Motion Compensation standards conversion sometimes known as Motion Predictive or Motion Vector Conversion should normally be used.

Speed change is the preferred method of converting from 24fps (including 23.976fps) to 25fps. Due attention must be given to the audio.

Software standards conversion packages should also use Motion Compensation processing. It is not permitted to use simple "timeline" conversion. Contact the broadcaster for more information.

Below are the recommended processes for frame rate conversion.

- 24p and 24/1.001p to 25p   –   speed change is the recommended conversion process.
- 24p and 24/1.001p to 50p   –   speed change plus frame doubling.
- 30p and 30/1.001p to 25p   –   Motion Compensated Conversion required.
- 30p and 30/1.001p to 50p   –   Motion Compensated Conversion required.
- 60p and 60/1.001p to 25p   –   not recommended, speak to broadcaster if required.
- 60p and 60/1.001p to 50p   –   Motion Compensated Conversion required.
- HD 25PsF to UHD 25p–   no frame rate conversion or de-interlacing required.
- HD 25PsF to UHD 50p–   frame doubling, no de-interlacing required.
- SD/HD 25i to UHD 25p   –   use should be limited, de-interlacing.
- SD/HD 25i to UHD 50p   –   de-interlacing and frame doubling.
- De-interlacing processing should be carried out via a multi-field (five-field or greater) de-interlacer or a motion compensated de-interlacer.

Content acquired at 24 (24/1.001) fps which has been converted to 60 (60/1.001) interlace or progressive via the "2:3 pull down" process, should first have the repeated fields/frames removed to produce the original frame rate. The resulting video can then be replayed at 25 fps.

1.6.4 Up conversion to UHD

Archive or Lower Resolution (HD and SD) material will usually require de-interlacing and frame rate processing during up conversion to UHD.
It is usually best practice to convert SD or HD 60Hz standards to the equivalent SD/HD 50Hz standard before up conversion.

1.7 Picture Aspect Ratio

All new commissions must fill a 16:9 screen vertically and horizontally without geometric distortion. The following exception may be allowed but the broadcaster must give permission before shooting commences.

1.7.1 Cinemascope Ratios as Letterbox

Movies delivered to dedicated movie channels should be delivered with an active picture ratio that matches the current consumer release unless the broadcaster requests otherwise. Other programmes may use wider picture ratios if agreed in advance by the broadcaster.
Movies and programmes with picture ratios of 2.00:1, 2.35:1/2.39:1 (21:9) or 1.85:1 should be centred vertically between black bars in a 16:9 frame with no geometric distortion. If there are any variants of aspect ratio please contact the broadcaster to establish the required version.

1.7.2 Floating Images

Short sequences of images surrounded by black borders (floating images) may be used for artistic effect. However, widescreen consumer TV sets operating in Auto Zoom / Auto mode often interpret large black borders at the top and bottom of the screen as letterbox, so are likely to enlarge the picture. The resulting unpredictable zooming can be annoying for the viewer and undermine the artistic intent. If used, the black space around floating images must be consistent across sequences of images.

1.7.3 Pillar-Boxed HD Material

Some 'pillar-boxed' material is acceptable at the discretion of the broadcaster where it has been acquired on a medium that has the capability to be transferred to a legitimate HD or UHD resolution, for example, 35mm film shot using 4-perf at an aspect ratio narrower than 16:9. The pictures must be centrally framed in a 16:9 raster with no geometrical distortion.

1.8 Archive Material

Archive material must meet all the technical requirements in this document, including those for up-converted SD video where relevant.

1.8.1 General Quality

Archive material must be taken from the best available source, and any improvement or restoration work which could reasonably be expected must be done (for example grading, dropout repair or audio equalisation).

1.8.2 Up-Converted SD Material

Particular care must be taken with SD archive material in order to deliver the best possible quality after up-conversion. In general, standard definition pictures must look no worse than the original after being up converted, post processed and down converted for delivery on SD services. Only high quality up-conversion processes will achieve this.
Standard definition video contains a half-line at top and bottom on alternate fields. This must be removed on up-conversion to HD or UHD or it will introduce visible flickering at top and bottom of the HD/UHD frame.

- Any VITC or switching signals visible at the top of SD material must be removed.
- Any line blanking from SD signals must not appear in the HD or UHD conversion.
- For these reasons all SD material must be zoomed-in by a small amount during up-conversion.

1.8.3 Picture Aspect Ratio

Archive material that is not 16:9 should be zoomed to fill the 16:9 raster where possible without compromising the image quality or composition. Alternatively, it may be presented in a pillar-box or letterbox format, which:

- may be of an intermediate ratio between 4:3 and 16:9, but must be of consistent width across sequences;
- must be centrally framed in the 16:9 raster;
- must show no geometrical distortion;
- must have clean and sharp pillar-box edges (i.e. any video or film edge artefacts may need to be blanked);
- must be black outside the active picture, unless otherwise specified by the broadcaster.

1.8.4 Safe Areas

Any archive captions or on-screen-text already in the archive material should be kept within the caption safe area if possible. Exceptions should be noted in the accompanying QC documents.

1.9 Use of Lower Resolution Images

To maintain a high standard and meet audience expectations, the amount of material of a lower resolution than the commissioned format is limited to **25%** of the programme's total duration. Lower resolution material must not be used for large uninterrupted sections of the programme, unless agreed by the broadcaster.

1.9.1 Non-UHD Material

Some UHD programmes will contain some material from standard definition and high definition originals and sources that do not meet the UHD requirements. This material is all called 'non-UHD' in this document. Non-UHD material includes material acquired using the following methods or formats:

- All SD and HD formats;
- Cameras that do not meet the requirements of EBU R118 for UHD Tier 2;
- All codecs with bit rates below those specified in EBU R118 for UHD;
- Film that does not meet the required standard.

1.9.2 Non-HD Material

Some HD programmes will contain some material from standard definition originals, and sources that do not meet the HD requirements. This material is all called 'non-HD' in this document. Non-HD material includes and material acquired using the following methods or formats:

- HDV from all manufactures;
- All codecs with bit rates below those specified in **EBU R118** for HD Tier 2L;
- Cameras that do not meet the requirements of **EBU R118** for HD Tier 2L;
- Material generated or processed on 720-line equipment;
- Film that does not meet the **required standard**.

1.10 3D

Programmes delivered for 3D transmission will be subject to additional requirements and agreement with the broadcaster. The **broadcaster section** gives details of 3D production and delivery.

1.11 Safe Areas for On-Screen Text

All on screen text must be clear and legible and must be within the safe areas specified. All font sizes must be legible after down conversion. There are two primary caption safe areas defined for UK transmission of 16:9 programmes.

16:9 safe	This is used by most UK programmes/broadcasters.
4:3 safe	This is required by some broadcasters for end credits or for programmes distributed internationally. Check the broadcaster requirements for guidance on end credits.

At the discretion of the broadcaster, programmes such as feature films and some acquisitions may be excluded from this requirement.

1.11.1 Text Size

The minimum SD font height is 20 SD lines. Therefore, where burnt in UHD or HD text will be down converted, the minimum height of the text should be no less than:
- 40 HD lines/pixels (to be legible after down conversion);
- 80 UHD lines/pixels (to be legible after down conversion).

1.11.2 In Vision Captions for Foreign Language Assets

Foreign dialogue should have burnt-in English subtitles, free from spelling and grammatical errors, and held for a sufficient time to be comfortably read. Subtitles must also be clearly visible at all times; if subtitles are positioned over an area of the screen which is the same colour as the font; a trim or drop shadow must be utilised and for consistency this should be used on all subtitles throughout the programme or feature.

1.11.3 Safe Areas for SD On Screen Text

16:9 Text safe	90% of Width 90% of Height	36 – 684 29 – 546	38 – 295 (F1) & 351 – 608 (F2)
4:3 Text safe	67.5% of Width 90% of Height	117 – 603 29 – 546	- 38 – 295 (F1) & 351 – 608 (F2)
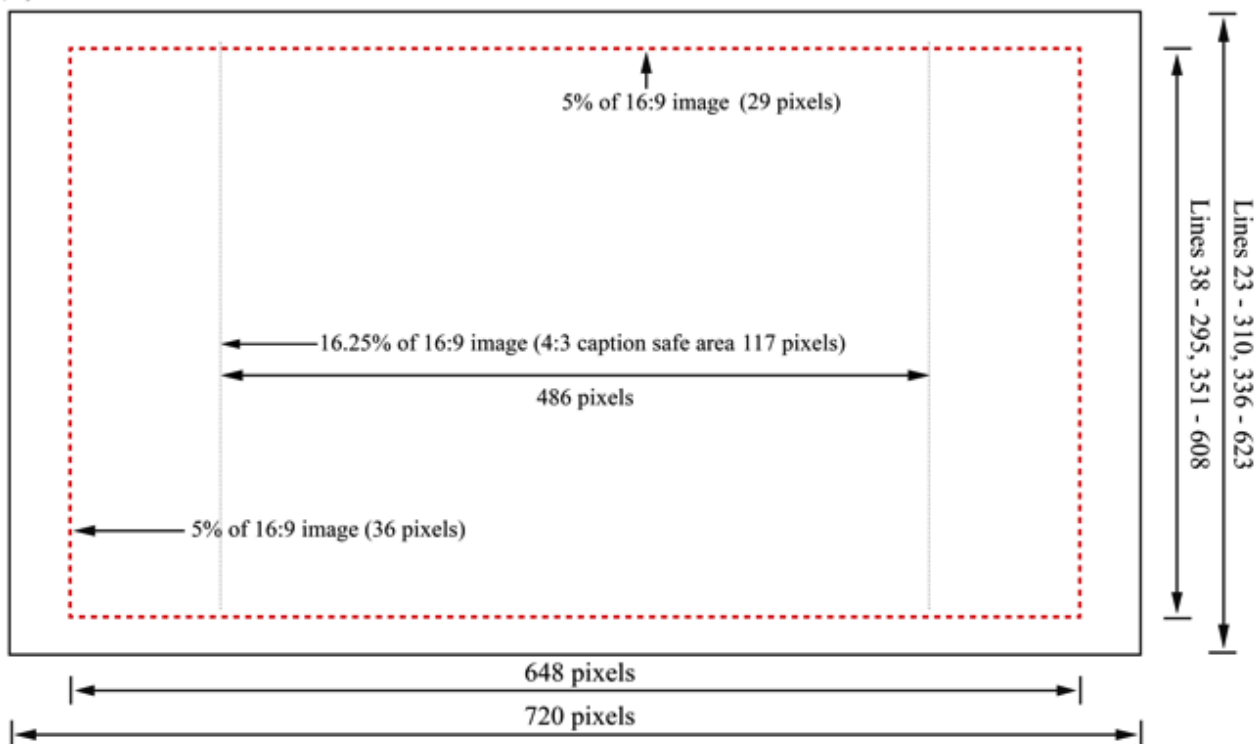
1.11.4 Safe Areas for HD On Screen Text

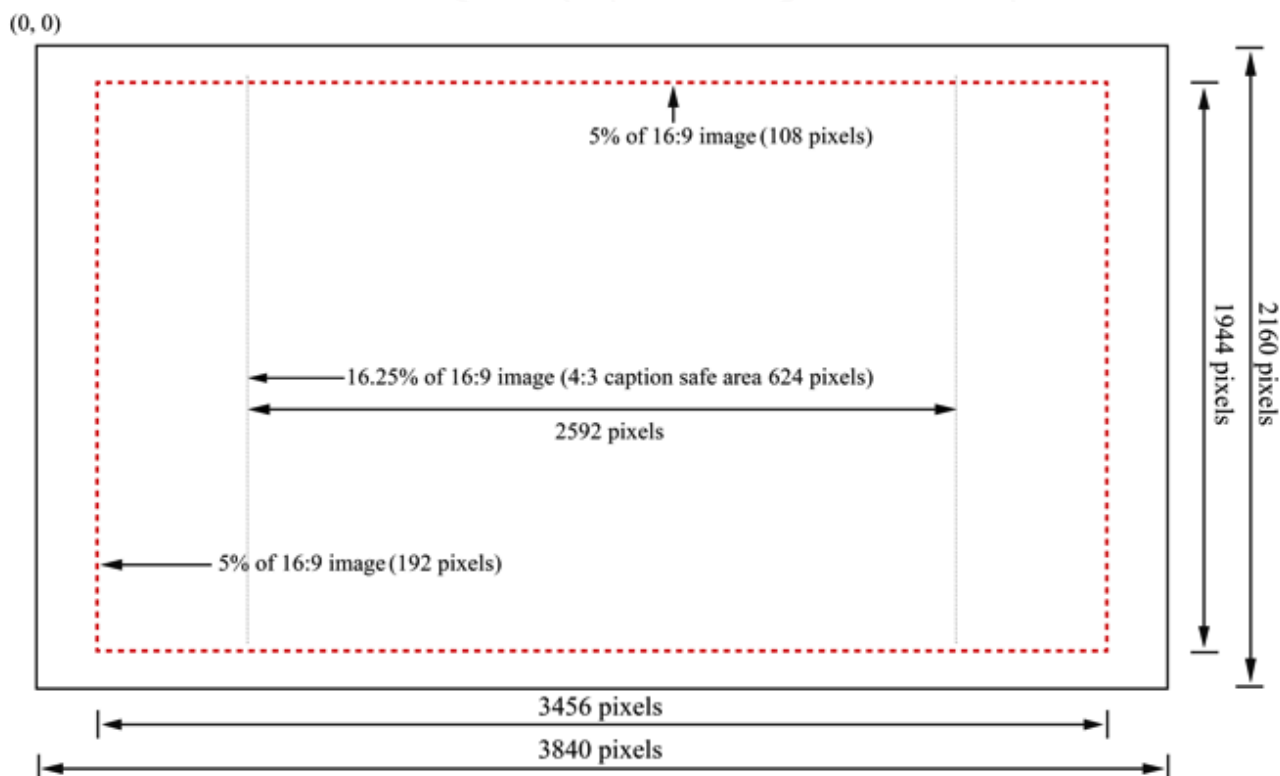|			
16:9 Text safe	90% of Width 90% of Height	96 – 1823 54 – 1025	48 – 533 (F1) & 611 – 1096 (F2)
4:3 Text safe	67.5% of Width 90% of Height	312 – 1607 54 – 1025	- 48 – 533 (F1) & 611 – 1096 (F2)
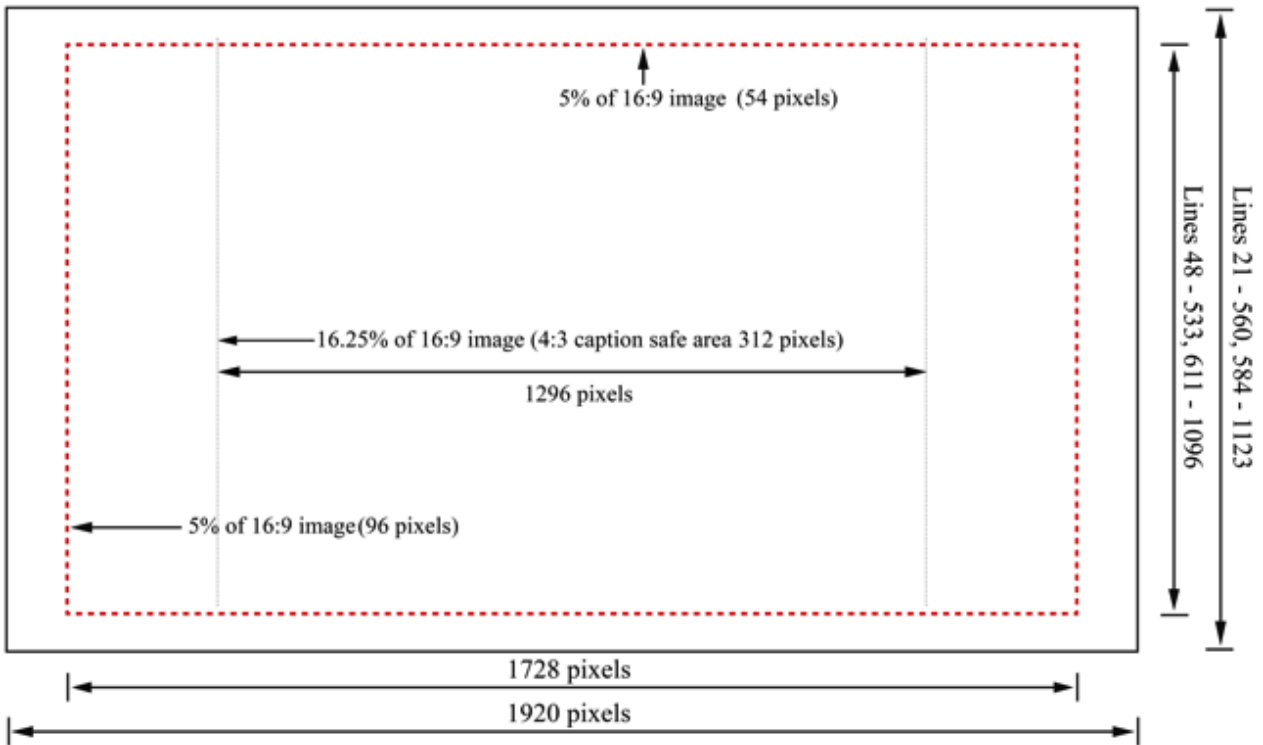
1.11.5 Safe Areas for UHD On Screen Text

16:9 Text safe	90% of Width 90% of Height	192 – 3647 108 – 2052	-
4:3 Text safe	67.5% of Width 90% of Height	624 – 3215 108 – 2052	-
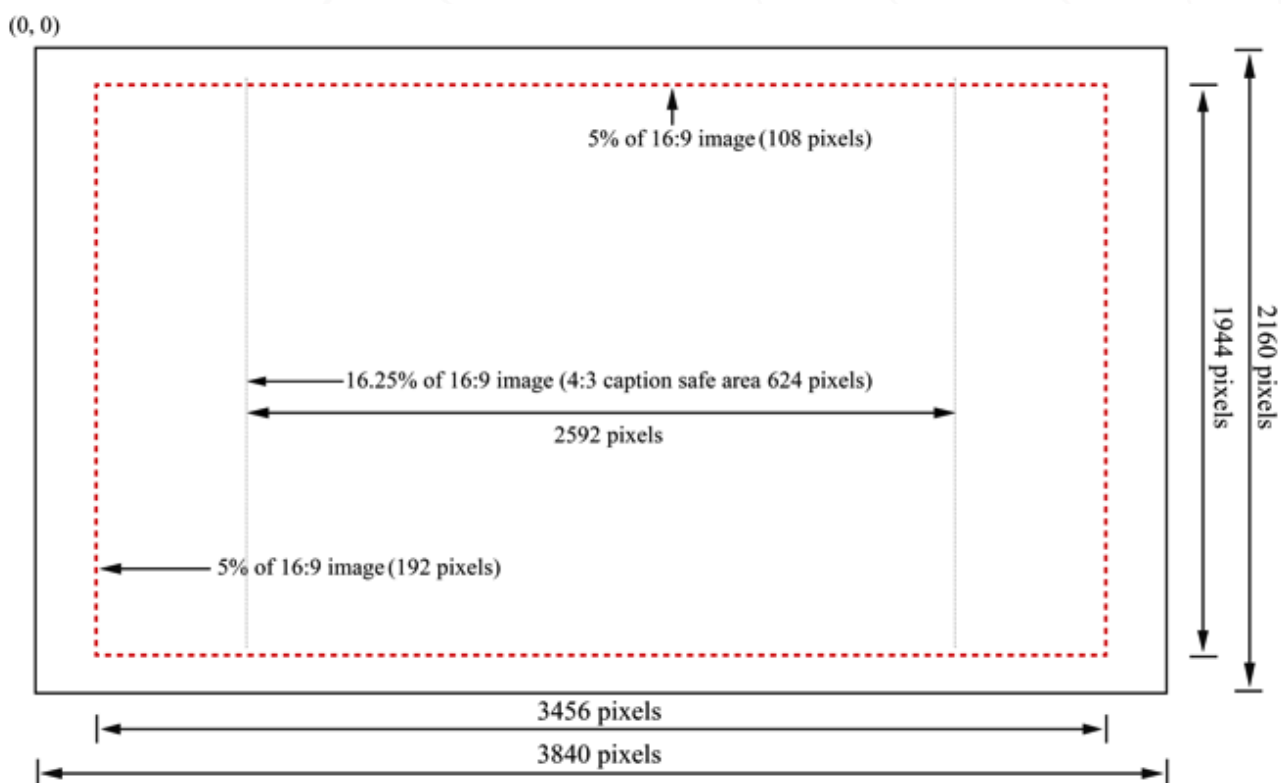
2   AUDIO TECHNICAL REQUIREMENTS

2.1   Dialogue

Broadcasters receive many complaints about unclear dialogue. Remember the audience has not seen the programme many times before transmission and has not seen a script. The audience does not usually have "broadcast quality" audio reproduction equipment. It is the responsibility of the producer to ensure that dialogue is clear, easy to hear and to understand by a first-time viewer who is using consumer equipment.

2.2   Loudness

It is no longer acceptable to deliver new programmes mixed to the old PPM6 specifications.
Programmes must be mixed to comply with EBU R128. Exceptions may be made for movies intended for dedicated movie channels or platforms. Where the broadcaster requires a Blu-Ray/DVD surround mix with a greater dynamic range, a stereo R128 mix must also be supplied. The Broadcaster will supply details of how the audio is to be delivered in these cases.

2.2.1   Loudness terms

R128 terms used in this document, how they are measured and the DPP delivery requirements are listed below.

LU	Loudness Unit	1LU = 1dB change in loudness	EBU Tech 3343
LUFS	Loudness Unit relative to Full Scale	LUFS	EBU Tech 3343
LRA	Loudness Range	LU	EBU Tech 3342
Programme Loudness (EBU Tech 3343)	The loudness measured over the duration of the programme.	LUFS	Non-live -23.0 LUFS ±0.5LU Live (including as-live) -23.0 LUFS ±1.0LU
Maximum True Peak (EBU Tech 3343)	The maximum value of the audio signal waveform.	dBTP (True Peak)	It is recommended that the maximum true peak level should not exceed -3dBTP. Content will fail if the maximum true peak exceeds -1dBTP
Programme Loudness (EBU Tech 3343)	The loudness measured over the duration of the programme.	LUFS	Non-live -23.0 LUFS ±0.5LU Live (including as-live) -23.0 LUFS ±1.0LU
Loudness Range (EBU Tech 3342 & 3)	This describes the perceptual dynamic range measured over the duration of the programme	LU	Programmes should *aim* for an LRA of no more than 18LU
Loudness Range of Dialogue	Dialogue must be acquired and mixed so that it is clear and easy to understand	LU	Speech content in factual programmes should aim for an LRA of no more than 6LU A minimum separation of 4LU between dialogue and background is recommended

All programmes must be compliant with the *Programme Loudness* and *Maximum True Peak* requirements below. Other parameters are currently given for guidance only.
Although the target loudness is -23 LUFS, in exceptional circumstances other target levels may be permitted by agreement with the broadcaster. Other target levels must be agreed with the broadcaster before the final mix.

2.2.2 **2.2.2 Guidelines for True Peak Audio Levels**

The following table is *only for guidance* on the true peak levels of different types of audio. At all times dialogue should be distinct and clear.

Uncompressed Music	-3 dBTP
Compressed Music (depending on degree of compression)	-10 dBTP
Heavy M & E (gunshots, warfare, aircraft, loud traffic, etc.)	-3 dBTP
Background M & E (office/street noise, light mood music etc.)	-18 dBTP

2.3 Metering requirements

Meters must comply with the specifications in EBU Tech 3341. Programmes must be measured using the EBU Integrated (I) mode and the measurement must be applied to the whole programme (EBU Tech 3343). The optional LFE channel must be excluded from all measurements.

2.4 Stereo audio requirements

Stereo tracks must carry sound in the A/B (Left/Right) form.
If mono originated sound is used, it must be recorded as dual mono, so that it may be handled exactly as stereo. It must meet all the stereo standards regarding levels, balance and phase.

2.4.1 Stereo Line-Up Tones

Each stereo audio pair must have either EBU stereo **or** GLITS line-up tone (not a mix of both). Tone must be 1kHz (2kHz is acceptable on M&E channels), sinusoidal, free of distortion and phase coherent between channels.
Digital Audio Reference level is defined as 18dB below the maximum coding value (-18dBFS).

2.4.2 Stereo Phase

Stereo programme audio must be capable of down-mixing to mono without causing any noticeable phase cancellation.

2.5 Surround Sound Requirements

Surround sound is transmitted in the 5.1 format and should be delivered as discrete tracks.

Surround sound programmes must also include a stereo mix that meets all requirements for stereo delivery. This should generally be an automated down-mix of the surround channels, using the same down-mix parameters as are held in the metadata.

For both the surround mix and stereo down-mix to comply with EBU R128 the down-mix should be normalised before layback.

Stereo and surround audio tracks must be synchronous.

2.5.1 Surround Line-Up Tones HD Programmes

Each group of surround tracks must carry BLITS tone. Tones must be sinusoidal, free of distortion and phase coherent between channels. Stereo tracks derived by down-mixing from the 5.1 audio should carry a down-mix of the BLITS tones, using the same down-mix parameters as those specified in the accompanying metadata. Any other stereo tracks delivered with the programme must carry stereo tone. is acceptable to use the EBU BLITS tone on HD programmes.

2.5.2 AES Sample Timing

Very small timing differences between audio tracks in a surround programme will not be heard unless the stereo down-mix is monitored acoustically. An error of as little as one or two samples between the Left, Right and Centre channels can cause phasing and comb filtering for those listening in stereo.

Timing differences between audio channels must be no more than 0.2 samples (i.e. the timing between each channel of the six audio tracks of a surround sound signal).

2.6 Surround sound mixing requirements

To help programme makers meet their responsibilities, it is important that all transmitted audio can be easily and clearly monitored by both editorial and technical staff during the production process.

To maintain a house style for certain programme types or strands, broadcasters may have specific requirements for the mixing mode as described below.

2.6.1 Dialogue and a Surround Mixer

There are three modes for the placing of dialogue in a surround mix.

Mode 1 All dialogue should be present in each of the three front channels – but this does not mean that the dialogue must be at equal level in each of the front channels. Mode 1 is generally more suited to the home listening environment.

Mode 2 In-vision dialogue across the three front channels and out-of-vision dialogue in the centre channel only.

Mode 3 All dialogue in the centre channel only. Mode 3 is similar to cinema mixing and as such may be the least suited to the home listening environment.

For details of the mode required for each programme type see the <u>broadcaster section</u> at the beginning of this document.

2.6.2 General Mixing Requirements

The stereo mix delivered with a surround programme will not be transmitted on the HD platforms. Viewers of the HD channels listening in stereo (or mono) will always hear a receiver derived automated down-mix of a surround sound programme using the Dolby Metadata parameters. HD platforms only transmit AC3 (DSAT) or AAC (DTT) audio either as Stereo or Surround.

The stereo mix may not be transmitted on the Standard Definition channel(s) either, depending on platform. Some SD channels already only transmit an automated down-mix and this practice will increase.

The audio parameters controlled by the metadata include: centre and rear down-mix levels, LFE level, and the extent of any dynamic range control applied. Therefore:

- It is essential to check the automated down-mix using a monitoring system that applies or simulates the metadata settings. Any external processor (e.g. a Dolby DP570) must be set to apply the programme's metadata;
- The Lt/Rt and Lo/Ro fold-down parameters used for down mixing must match the settings in the Dolby metadata – especially the down-mix levels of the CENTRE and SURROUND legs;
- pre-mixed stereo content should be up-mixed, where appropriate, to match the surround sound to maintain the audio image throughout a surround broadcast. A method of up mixing approved by the broadcaster must be adopted, which anchors dialogue to the front and disperses effects around the image;
- up-mixed material must also down-mix to stereo and mono with no audible artefacts. The injudicious use of phase shifting and delay within some up-mixing algorithms may become more noticeable in the subsequent receiver down-mix process, and result in unacceptable down-mixed audio;
- where up mixing is not available, stereo sections or inserts containing speech should be "converged" (spread) across LEFT, RIGHT and CENTRE channels adding an element into the Centre channel of the surround mix. **The front L/R channel levels should generally be 6dB lower than the Centre-channel level.**

For general surround sound (e.g. audience reaction) phase-coherence invariably benefits both the wrap-around effect in 5.1 and the stereo down-mix. Coincident microphone techniques (e.g. crossed-pairs) tend to outperform spaced mono microphones in this context.

2.6.3 Stereo and Centre Channel Monitoring

It is essential that the mono and stereo down-mixes of a surround programme are monitored in at least equal measure to the surround mix. A large majority of viewers will be listening in stereo rather than 5.1 for some time to come.

It is also important to be aware that the centre channel could allow viewers listening in surround to overhear off-microphone conversation not intended for broadcast, but which may be masked when monitoring in stereo or mono.

2.6.4 Consistency of Image

When a surround programme contains mono content interleaved with stereo pre-recorded items it is important to maintain the consistency of the sound image and prevent the effect of dialogue appearing to jump between Centre Only and Phantom Centre (Left/Right) only.

2.7 Dolby metadata settings

For the correct reproduction of the audio by domestic receivers, it is vital that the correct metadata is input and carried through the broadcast chain to the consumer. There are differences in the settings based on programme type or genre as well as requirements for specific or dedicated television channels (e.g. Sport Channels, Movie Channels, Music Channels etc.). Dolby metadata *must* remain constant throughout a programme.

It is not possible to publish a common set of Dolby metadata settings that would be appropriate for all programme's styles. The UK broadcasters have limited the parameters that can be varied to the following:

- Dialogue Level;
- Line Mode Compression;
- RF Mode Compression;
- Centre Down-Mix Level;
- Surround Down-Mix Level;
- Surround 3dB Attn.;
- Dolby Surround Mode;

- Preferred Stereo Down-Mix;
- Surround Phase Shift.

For details of the settings required for each programme type see the [broadcaster section](#).

Where required, Dolby surround metadata specified in SMPTE RDD 6 must be carried in an SMPTE ST 436 track, as detailed in the [AS-11 UK DPP HD](#) specifications.

See the [Surround Sound Supplement](#) for details of how to add the metadata to AS-11 UK DPP HD files.

2.7.1 Guidance for Acquired Programmes and Movies

Acquired programmes and movies can be received with or without metadata. Unless the audio is re-mixed during a compliance edit, any supplied metadata should be passed though. If no metadata exists the following parameters should be used.

Dialogue Level	-23dB
Line Mode Compression	Film Standard
RF Mode Compression	Film Standard
Centre Down-Mix Level	-3dB
Surround Down-Mix Level	-3dB
Surround 3dB Attn.	Movies – Enabled All others – Disabled
Dolby Surround Mode	Enabled
Preferred Stereo Down-Mix	LtRt
Surround Phase Shift	Enabled
Surround Down-Mix Level	-3dB
Surround 3dB Attn.	Movies – Enabled All others – Disabled

2.8 Sound to vision synchronisation

The relative timing of sound to vision should not exhibit any perceptible error. Sound must not lead or lag the vision by more than 5ms.

2.8.1 **Audio/video sync markers**

To assist in maintaining A/V sync through the post-production process, a 'sync plop' should be used which must meet the following conditions:

- the sync plop must be between timecode 09:59:57:06 and 09:59:57:08;
- the audio plop must be 1kHz tone in all channels (82.5Hz in the LFE channel) at -24dBFS (-18dBFS is acceptable for stereo programmes);
- the duration of the vision flash must be 2 frames to allow it to pass through standards conversion successfully;
- the duration of the audio plop must be 1 frame, starting on the first frame of the vision flash. It must be synchronous across all audio channels and with the video flash (within ±5ms).

If an end sync plop is used it must be no closer than 10 seconds to the end of the programme and comply with the relevant points above.

3   Quality Control (QC)

It is the responsibility of the production company to ensure programmes meet the technical and editorial requirements of the commission. This responsibility includes ensuring the company carrying out the QC process has adequate resources.

3.1   General Quality

All programmes are expected to reach a high standard of video and audio quality. This does not mean low quality material cannot be used. Archive and specialist low quality material used in context is acceptable. If there is any doubt, contact the broadcaster for advice.

3.1.1   General Video Quality

- The picture must be well lit and reasonably but not artificially sharp.
- The picture must be free of excessive noise, grain and digital compression artefacts.
- The picture must be free of excessive flare, reflections, lens dirt, markings and obstructions (e.g. lens hood), and lens aberrations.
- Movement must appear reasonably smooth and continuous, and must not give rise to distortions or break-up to moving objects, or cause large changes in resolution.
- The picture must be free of excessive black crushing and high light compression. Hard clipping of highlights (e.g. by legalisers) must not cause visible artefacts on screen.
- There must be no noticeable horizontal or vertical aliasing, i.e. jagged lines, or field-rate or frame-rate fluctuations in fine detail.
- Colour rendition, especially skin tones, must be consistent throughout and provide a realistic representation of the scene portrayed unless it is altered as an editorially essential visual effect.
- The picture must be stable and continuous – i.e. no jumps, movements, shifts in level or position. There should be no flash frames or very short shots unless editorially essential.
- There must be no visible contouring / artefacts caused by digital processing. Quantisation noise must not be apparent.
- There must be no noticeable spurious signals or artefacts e.g. streaking, ringing, smear, echoes, overshoots, moiré, hum, cross-talk etc.

3.1.2   General Audio Quality

- Sound must be recorded with appropriately placed microphones, giving minimum background noise and without peak distortion.
- The audio must be free of spurious signals such as clicks, noise, hum and any analogue distortion.
- The audio must be reasonably continuous and smoothly mixed and edited.
- Audio levels must be appropriate to the scene portrayed and dynamic range must not be excessive. They must be suitable for the whole range of domestic listening situations.
- Surround and Stereo audio must be appropriately balanced and free from phase differences which cause audible cancellation in mono.
- The audio must not show dynamic and/or frequency response artefacts due to the action of noise reduction or low bit rate coding systems.

3.1.3   UHD Programmes

QC requirements for UHD programmes *must* be discussed with the broadcaster before shooting begins. Initially quality controls will be on a genre-by-genre basis. In time, as broadcasters and co-producers gain a better understanding of UHD they will be able to provide more guidance.

3.2   Photosensitive Epilepsy (PSE)

Flickering or intermittent lights and certain types of repetitive visual patterns can cause serious problems for viewers who are prone to photosensitive epilepsy. Children and teenagers are particularly vulnerable.
All UK Television channels are subject to the Ofcom BROADCASTING CODE 2020 which states:
Section 2.12
Television broadcasters must take precautions to maintain a low level of risk to viewers who have photosensitive epilepsy. Where it is not reasonably practicable to follow the Ofcom guidance (see the Ofcom website), and where broadcasters can demonstrate that the broadcasting of flashing lights and/or patterns is editorially justified, viewers should be given an adequate verbal and also, if appropriate, text warning at the start of the programme or programme item.
The Ofcom guidance is <u>here</u>.

3.2.1   PSE testing

Programmes for file delivery must be tested using any file-based PSE device that meets the guidance given by Ofcom. The DPP maintains a list of devices, available <u>here</u>.
Live and as live programmes may continue to use the Cambridge Research FPA 2.5 PSE device.
Additional requirements for Live programmes are given in the Live versions of the DPP delivery specifications.
Broadcasters require a PSE report (pass certificate) to be delivered with all programmes.
- PSE reports must be in pdf form and named according to the broadcaster's naming convention.
- The relevant metadata details must be completed.
- It is recommended that live programmes produce and keep a copy of the PSE checks carried out during the final rehearsal (if there is one) and the transmission.

Any failure whatsoever will result in rejection of the programme, and any affected sections must be repaired and re-tested before acceptance.

3.2.2   PSE – broadcast warnings

In exceptional cases, verbal and/or on-screen text warnings may be used at the beginning and during the programme. Each broadcaster has a policy on the inclusion of content that may cause harm or offence and will only be considered if:
- demonstrable attempts have been made to correct or replace the images,
  - and
- the relevant content is completely integral and necessary to the context of the programme,
  - and
- permission to use the relevant content has been cleared by the broadcaster and documented in writing by those responsible for the commissioning/editorial content.

No broadcaster allows a programme maker to authorise the use of warnings for material that fails a PSE test. Advance notification and planning requirements will vary by broadcaster.

3.2.3   UHD Programmes

UHD programmes may have a wider colour space than HD or SD programmes so only approved PSE devices can be used (irrespective of the dynamic range). It should be noted that there is no change to the current PSE requirements for testing HDR content. Contact the broadcaster for the latest advice on testing UHD programmes.

3.3   Automated Quality Control (AQC)

Any device that carries out the DPP AQC tests based on the EBU QC Test Items can be used.
Details of the DPP QC requirements can be found here.
The production company should ensure that all technical and editorial warnings or comments are acted on or noted.
 Mandatory requirements must be acted on or rectified. Broadcasters require an AQC report in PDF form, to be delivered with the master programme.

3.4   Eyeball Quality Control

Broadcasters require an eyeball QC report in PDF form, to be delivered with the programme file. The eyeball QC check is to ensure video and audio quality are consistent throughout. Further information on the eyeball QC parameters and an eyeball QC form template can be found here.

3.5   File Compliance (File delivery only)

The File Compliance check confirms that the file itself meets the **AMWA AS-11** technical requirements. A compliance check is carried out by the broadcaster before a programme file can be accepted. AQC devices with a AMWA Format Conformance Testing Certificate can be used to check AS-11 compliance.

PART 2: Fɪʟᴇ Dᴇʟɪᴠᴇʀᴇᴅ Pʀᴏɢʀᴀᴍᴍᴇs

This part of the document details the additional technical requirements that programmes must comply with for the successful file delivery of programmes.

4   Pʀᴏɢʀᴀᴍᴍᴇ Fᴏʀᴍᴀᴛ

4.1   Programme Layout for File Delivery

All programmes delivered on file must be laid out with elements in the following pattern relative to timecode:

09:59:30:00	20"	UHD programmes made to SMPTE ST 2036 & all HD/SD programmes must use 100% Bars (100/0/100/0)	HD/SD Line-up tone
		UHD BT.2100 UHD Line-up **SDR**	UHD DPP UHD Tone
		UHD BT.2100 UHD Line-up **HDR**	
09:59:50:00*	At least 7"	Ident Clock or Slate	Silence
09:59:57:06 (optional)	*2fr*	*2 Frames minimum 50% white*	*1 Frame 1kHz tone (on first white frame)*
no later than 09:59:57:08	At least 2" 18fr	Black	Silence
10:00:00:00**	-	Programme	Programme
end of part	5"	freeze or 'living hold' after end of part	fade or cut to silence by end of part
end of part + 5"	At least 1"	Black	Silence
next whole minute minus 10" (optional)	*7"*	*Ident Clock or Slate – next part*	*Silence*
Start of part minus 3"	3"	Black	Silence
end of programme	5"	freeze or 'living hold'	fade or cut to silence by end of programme

end of programme + 10" (optional)	2fr	2 Frames minimum 50% white	1 Frame 1kHz tone (on first white frame)
next whole minute minus 10" (optional)	7"	Ident Clock or Slate – next part	Silence
Start of part minus 3"	3"	Black	Silence

**For legacy delivery the 90 second line-up and 30 second Ident Clock or Slate can be used*
**For programmes delivered on multiple files, 2nd and subsequent files should have programme part starting at the next 'whole hour' T/C with line-up and ident laid out as above with appropriate offset.

4.2   Programme Parting

There must be only **one** programme in each file, although a programme may be either soft or hard-parted within that file as specified by the broadcaster, according to the diagrams below. Only when agreed in advance with the relevant broadcaster, programmes in several parts may be delivered in more than one file.

4.2.1   Single Part or Soft Parted Programme

A single part programme will always be played from the start point to the end point without interruption. Soft parting is where a programme is provided as a single continuous programme, but the broadcaster may break the transmission of the programme at several points to insert commercials or for other reasons. IN and OUT points for continuous playback must be included with the delivery metadata; suggested timecodes for breaks should **not** be included.

LINEUP		↙ IN OUT ↘				Textless or other material
		PROGRAMME				
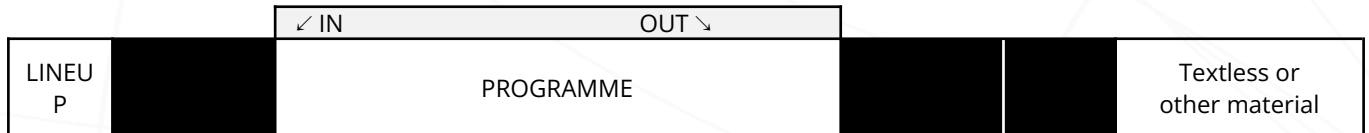
4.2.2 Hard-Parted Programme

A hard-parted programme is billed and scheduled for transmission as a single entity, but is delivered as a single file containing clearly separated parts between which adverts, trails etc. will be inserted. Although it is acceptable for each part to start at the top of a minute, see the [broadcaster section](#) for specific hard parting requirements.

Hard Parted programmes should be formatted as shown. The start timecode and duration of each part must be included in the metadata.

LINEUP	IDENT / CLOCK	PART 1 of …	BLACK OR LIVING HOLD	CLOCK	PART 2 of …	BLACK OR LIVING HOLD	CLOCK	PART 3 of …	BLACK OR LIVING HOLD		Textless or other material

4.3 Multi-Part Programme Delivered on Multiple Files

Where a programme's delivery must be split over more than one file, it must comply with the formatting below.

FILE 1

LINEUP	IDENT / CLOCK	PART 1 of 6	BLACK OR LIVING HOLD	CLOCK	PART 2 of 6	BLACK OR LIVING HOLD	CLOCK	PART 3 of 6	BLACK OR LIVING HOLD		Textless or other material

FILE 2

LINEUP	IDENT / CLOCK	PART 4 of 6	BLACK OR LIVING HOLD	CLOCK	PART 5 of 6	BLACK OR LIVING HOLD	CLOCK	PART 6 of 6	BLACK OR LIVING HOLD		Textless or other material

4.4 Start and End

It is usual for the sound and vision to be automatically cut to air on transmission, so early vision or sound is not normally required. Vision may fade up from black starting at 10.00.00.00 if desired.

All programmes must end with a fade or cut to silence **before** the intended end point. Any fade out or reverb must be allowed for within the programme duration.

Vision freeze or 'living hold' must be held for a further 5 seconds after the end point.

Any other programme elements after the end of the programme should not start less than 1 minute after end of programme.

4.5 The Ident Clock or Slate

A countdown clock or slate clearly displaying the following information must precede the start of programme. A clock or slate is optional for subsequent parts of a multi-part programme:

- Programme I.D. number;
- Programme title (and series number if applicable);
- Episode number (if applicable);
- Episode subtitle (if applicable);
- Version (pre/post watershed etc. if necessary);

- Part number (if applicable).

No technical information may be included. The clock or slate may display telephone contact numbers for the post-production facility and production company, and may display company branding.

Where a moving clock is used, it must provide a clear countdown of at least 7 seconds, including a hand moving in 1 second steps (i.e. **not** smooth motion) around a circular clock face. Clocks with only digital countdown are not acceptable.

There must be no audio tone or ident over the clock.

4.6   Audio Channel Allocations HD and SD

HD files must contain either 4 or 16 channels of audio. SD files must contain 4 channels of audio.

Additional "deactivated" channels are technically stored in the file but these are not "usable" / "valid". Audio content must be delivered in accordance with the table below. The EBU R48 or R123 code must be included in the metadata.

EBU Reference	Programme Type	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
R48: 2a	**Stereo**	Stereo Final Mix L	Stereo Final Mix R	Silence	Silence												
R123:4b	Stereo with M&E	Stereo Final Mix L	Stereo Final Mix R	Stereo M&E L	Stereo M&E R												
R123:4c	Stereo with Audio Description	Stereo Final Mix L	Stereo Final Mix R	Stereo Audio Des L	Stereo Audio Des R												
R123:16c (5.1 with M&E)	Stereo, 5.1 & M&E	Stereo Final Mix L	Stereo Final Mix R	Stereo M&E L	Stereo M&E R	5.1 Final Mix L	5.1 Final Mix R	5.1 Final Mix C	5.1 Final Mix LFE	5.1 Final Mix Ls	5.1 Final Mix Rs	5.1 M&E L	5.1 M&E R	5.1 M&E C	5.1 M&E LFE	5.1 M&E Ls	5.1 M&E Rs
R123:16c (5.1 with AD)	Stereo, 5.1 & Audio Description	Stereo Final Mix L	Stereo Final Mix R	Stereo Audio Des L	Stereo Audio Des R	5.1 Final Mix L	5.1 Final Mix R	5.1 Final Mix C	5.1 Final Mix LFE	5.1 Final Mix Ls	5.1 Final Mix Rs	5.1 M&E L	5.1 M&E R	5.1 M&E C	5.1 M&E LFE	5.1 M&E Ls	5.1 M&E Rs
R123:16d	5.1 Two Languages	5.1 Lang 1 L	5.1 Lang 1 R	5.1 Lang 1 C	5.1 Lang 1 LFE	5.1 Lang 1 Ls	5.1 Lang 1 Rs	*	*	5.1 Lang 2 L	5.1 Lang 2 R	5.1 Lang 2 C	5.1 Lang 2 LFE	5.1 Lang 2 Ls	5.1 Lang 2 Rs	*	*
R123:16f	Three Languages	Stereo Lang 1 L	Stereo Lang 1 R	Not Used	Not Used	Stereo Lang 2 L	Stereo Lang 2 R	Not Used	Not Used	Stereo Lang 3 L	Stereo Lang 3 R	Not Used	Not Used	*	*	*	*

Note:
- **R48:2a is the normal audio configuration for stereo programmes delivered to ITV for broadcast unless specified otherwise in your contract.**
- R123:16c is the normal layout for surround programmes;
- R48:2a, R48:4b, R123:4b, R123:4c, R123:16c must only be used for programmes with single language soundtracks;
- R123:16d must only be used for programmes with dual language soundtracks;
- R123:16f must only be used for programmes with 3 different language soundtracks.

Any unused audio tracks (including where you do not have an M&E) in the 16 track groups above must contain digital silence, encoded as PCM audio.

For compatibility with stereo systems, any audio generated as mono must be presented on two phase-coherent tracks, and flagged as stereo.

Any additional audio tracks required by the broadcaster must be delivered separately as 'B-WAV' files.

The naming conventions used in all related documentation and metadata must match those specified above.

4.7 UHD Audio Channel Allocations (AS-11 DPP X1)

The MXF file:
- must only include Sound Tracks as specified in this document;
- must use "Audio Layout Mode 1." This is defined in AS-11 DPP X1.

MXF files using audio channel labelling defined in SMPTE ST377 may contain up to 128 audio tracks. These tracks may be in any order and may contain up to 128 channels in any configuration BUT the sound tracks listed in the table below must always be included in the MXF file in the order specified.

1ˢᵗ Track	2	Stereo Main Mix	L, R	Eng	1
2ⁿᵈ Track	6	Surround Main Mix	L,R,C,LFE,Ls,Rs	Eng	1

Any additional Sound Tracks that are included in the MXF file must be as specified in the table below. The inclusion of additional Sound Tracks must be discussed in advance with the broadcaster.

Stereo *(SMPTE20678StandardStereo)*	2	Alternative Mix (such as an additional language) *(AlternativeProgram)* or Music & Effects (M&E) *(MusicAndEffects)*	Ask broadcaster	Ask broadcaster
5.1 *(_51SoundfieldGroup)*	6	Same as the Stereo Sound Track above *(AlternativeProgram)* or *(MusicAndEffects)*		1 for each Stereo Sound Track above
Stereo *(SMPTE20678StandardStereo)*	2	Audio Description Mixed with Programme Audio *(AudioDescriptionProgramMix)*		Ask broadcaster
Mono & Control *(AudioDescriptionStudioSignal)*	2	Audio Description *(AudioDescription)*		Ask broadcaster

Exactly one Dolby Audio Metadata Bitstream must be included in the MXF file. This bitstream must contain metadata that is accurate for all of the 5.1 Sound Tracks included in the MXF file.
Note: The AS-11 UK DPP X1 Specification mandates how a Dolby Audio Metadata Bitstream is embedded in the MXF file.

4.8   Audio Only Files

Additional audio only files related to a programme, such as Audio Description files, must be supplied as BWF (sometimes called 'B-WAV') files, conforming to the specification in EBU-Tech 3285. File duration and timecode must exactly match the principal MXF file.

4.9   Closed Captions (Subtitles)

Closed captions or subtitles must be delivered as a separate file as required by each broadcaster. The separate file must be named identically to the principal MXF file, apart from the filename extension.

5   Fɪʟᴇ Rᴇᴏᴜɪʀᴇᴍᴇɴᴛs

5.1   UHD Files

The programme must be delivered to the AS-11 DPP X1 specification ("MXF Program Contribution – DPP UHD"). Further details about UHD file programmes are given in the broadcaster section.

5.1.1   UHD Video Codec

The video essence in the file must be encoded as AVC / H.264 Long GoP. The AVC / H.264 coded video in each MXF file must have a mean data rate (mean value across the entire file) of at least:

Long GoP (inter coded)	2160p/25	200Mb/s
6	2160p/50	250Mb/s

Note: These data rates are likely to be revised as the standards related to UHD mature and more practical experience is gained.

5.1.2   UHD High Dynamic Range

The choice of HDR type (and any special arrangements needed for delivery of the file that arise as a consequence) must be discussed in advance with the broadcaster.

HDR requirements are detailed in Recommendation ITU-R BT.2100 and the Report ITU-R BT.2390.

5.1.3 UHD Audio

UHD programmes must be delivered with **both** Stereo and Surround (5.1) audio. See Audio Channel Allocation

5.1.4 UHD Additional Requirements

AS-11 X1 DPP UHD files will contain:
An embedded XML document containing descriptive metadata;
A Segmentation Track to identify the in-point and out-point of each programme segment.

5.2 HD Files

The programme must be delivered to the AS-11 UK DPP HD specifications that describe exactly how the file must be constructed to meet DPP requirements. The HD file must contain the required metadata.

5.2.1 HD Video Codec

The video essence in the file must be encoded as AVC Intra Class 100 as defined by SMPTE RP 2027. This equates to an actual video essence data rate of approximately 113Mbits/s. The AS-11 UK DPP HD specification gives full technical details of how the file should be constructed.

5.2.2 HD Audio

All audio tracks must be encoded as PCM with a sample rate of 48kHz at a depth of 24bits/sample.

5.3 SD Files (Legacy programmes only)

Delivery of standard definition legacy programme files must be by agreement with the broadcaster. Those files must meet the following requirements.
The programme must be delivered to the AS-11 UK DPP SD specifications that describe exactly how the file must be constructed to meet DPP requirements. The SD file must contain the required metadata.

5.3.1 SD Video Codec

The video essence in the file must be encoded at a nominal bitrate of 50Mbit/s using the SMPTE ST 0356 D-10 stream specification. This is a constrained version of MPEG-2 4:2:2 P@ML. The AS-11 UK DPP SD specification gives full technical details of how the file should be constructed.

5.3.2   SD Audio

The audio must be frame interleaved with the video as described in the AS-11 UK DPP SD specification. All 8 audio tracks must be encoded as PCM in an AES3 stream with a sample rate of 48kHz at a depth of 24bits/sample.

5.4   Timecode

Timecode must be as specified in the AS-11 UK DPP specification. To ensure compatibility with downstream systems it is very important that timecode is continuous and inserted in the file exactly as specified.

5.5   Metadata

Metadata is the name for all the information which is not the audio or video essence, but which is required to ensure that contents of the file can be identified correctly.
Descriptive metadata is usually added manually by the producer of the file. This includes information which will be read by the users of the file in order to identify the material and use the appropriate parts for further operations. It will include the titles and ID numbers for the programme, and the allocations of the audio tracks present.

5.5.1   Delivery Requirements in MXF

Metadata within the principal MXF file must be as described by the AS-11 UK DPP specification and must correctly reflect the material contained in the file.
Descriptive metadata must be included in the relevant metadata tracks within the file.

5.5.2   Metadata Completion

Examples of metadata required are in the Metadata Supplement.

DPP AS11 File delivery Upload Details

Please note the credentials required to upload your AS-11 file, plus supporting documentation, can be sourced in advance during normal office hours from content.delivery @itv.com.
Due to security reasons it is not possible to publish the file upload credentials in this document. Please note the file upload credentials will change every 90 days in accordance with ITV security policy. It is therefore important you obtain this information in advance during normal office hours from ITV Delivery. We strongly advise you obtain the appropriate credentials from ITV Content Delivery prior to attempting a file upload to avoid any issues.

PART 3: BROADCASTER SPECIFIC INFORMATION

6   TECHNICAL RESPONSIBILITY AND CONTACTS:

ITV is required to ensure that programme technical quality in maintained to a high technical standard. The main points of contact within ITV for further help and advice regarding AS11 programme file delivery to ITV can be obtained from the below contacts.

NAME		
Liam Calland **Senior Content Operations Executive.**	**liam.calland@itv.com**	**0113 222 8769**
Content Operations	**contentoperations@itv.com**	**0113 222 7537**

Please note the above contact details are strictly for programme technical and delivery enquiries relating to programme production/delivery only. Any other queries should be directed to ITV Viewer services at itvviewerservices@itv.com.

CONTENT DELIVERY BUSINESS HOURS:

Monday to Friday 09:30-18:00 (Excluding UK Public Holidays) Outside of these hours please call the Content Operations DMO on 0113 222 7537.

File Naming Requirements – Programme Files

Programme files delivered to ITV must be named as below. NB Filenames must be in upper case, with file name extensions in lowercase. Contact ITV for programme specific identifier information.

Requested Programme File Name Format	Example Filename	Notes
ITV use dashes in the filename instead of underscore.	x-xxxx-xxxx-xxx.mxf	N/A

Please note the only place where slashes (/) should be replaced with dashes (-) is in the file name of your delivered programme file. Examples below:

AS-11 UK DPP File:	x-xxxx-xxxx-xxx.mxf
DPP Production Number Metadata Field:	x/xxxx/xxxx#xxx
Production Number on Clock:	x/xxxx/xxxx#xxx

File Naming Requirements – QC Reports

The following QC Certificates should be created using the file naming structure inclusive of production number as outlined below with the PDF files electronically delivered via the same delivery method as the AS-11 file, as agreed with ITV Content Delivery at the on-boarding stage.

Automated QC Report: FileName_AQC.pdf (Example: 2-xxxx-xxxx-xxx_AQC.pdf)

Craft/Eyeball QC Review: FileName_EYE.pdf (Example: 2-xxxx-xxxx-xxx_EYE.pdf)

PSE Test Report: FileName_PSE.pdf (Example: 2-xxxx-xxxx-xxx_PSE.pdf

Some AQC devices incorporate the PSE certificate into the AQC report. If this is the case, the single file should be named as follows:

FileName_PSE_AQC.pdf (Example: 2-xxxx-xxxx-xxx_PSE_AQC.pdf)

Version Control:

V6.0	05-06-2019	Document re-brand

Document Accuracy:

Every attempt has been made to ensure that the information contained in this document is accurate. Errors in this document should be reported to the DPP on info@thedpp.com

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