



BSkyB Technical Specifications for the Commissioning of Content

BSkyB

Document:

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the Commissioning of Content

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Scope

This document is written to specify the delivery of content for General Entertainment, Movies & Sky Sports. The specifications are not intended for the delivery of content for either News or Sports News.

The document covers SD, HD & 3D for both Tape and file delivery.

Although this document lists file delivery as an option, this service will not be available until later this year and by prior arrangement only.



Introduction

The prime objectives of the requirements detailed are to deliver content of both a high technical quality and of high production values. As such, limitations are specified to ensure quality thresholds are maintained both at acquisition and throughout the production process.

High Definition and 3D broadcast necessitates the highest quality to be captured at the point of creation and storage. The initial quality of capture should be maintained where possible, by minimising the re-code and transcode process within the production chain for delivery to BSkyB.

All such programme material acquired for BSkyB must be of high technical standard, with all production equipment meeting appropriate technical specifications and recommendations for broadcast within the UK. Failure to adhere to these guidelines could result in created content being rejected for use or the programme not being categorised correctly i.e. Standard Definition, High Definition or 3D (Stereoscopic) within the BSkyB EPG Broadcast Guidelines Document. Whilst these technical specifications define specific parameters, it should be noted that advancements in technology may lead to amendments, however where specific technologies can deliver enhanced production values and/or quality these will be considered as exceptions.

It is important any control and viewing rooms used to assess programme quality during post-production do not affect subjective impressions of the luminance, resolution and colour attributes of the picture. CCIR Recommendation 500 gives details of suitable viewing angles, distances, luminance levels and background lighting etc. Audio monitoring should conform to the ITU-R BS 775-1 recommendation.

Where any uncertainty of production techniques, formats and workflows arise, these should be raised and detailed prior to production commencing. For content being post produced or worked on at BSkyB we may accept file based removable media. This should also be discussed with the relevant area prior to production commencing.

Quality Assessment

BSkyB stipulates a minimum acceptable technical quality for commissioned programmes and will only transmit programme material of at least grade 3 on the CCIR quality scale for both sound and vision. To achieve this all material supplied must be better than grade 3.

In consequence, all material will be assessed prior to acceptance using the CCIR 500 or ITU-R five point grading scale shown below:

5	Imperceptible impairment	Acceptable
4	Perceptible but not annoying impairment	Acceptable
3	Slightly annoying impairment	Acceptable
2	Annoying impairment	Not Acceptable
1	Very annoying impairment	Not Acceptable

Technical requirements

Delivery Formats

SD Content

The following material is not acceptable:

- Material that has been sourced from NTSC
- Material that has been sourced from 'Standard 8' or 'Super 8' film
- Analogue sourced material
- Composite to component recordings
- Multi-generation recordings
- Content recorded onto re-used stock

Tape Delivery

625 Component Digital Betacam with an aspect ratio of 16x9 recorded onto new tape stock.

File Delivery

All SD Commissioned content delivered to BSkyB is required to be in the IMX 50 codec. The video is required to be encoded to the standard SMPTE 365M using intra frame at 50Mb/s 4:2:2 luminance/colour difference sampling ratio with an 8 bit sampling depth. The IMX 50 codec stipulates a horizontal resolution of 4:2:2P@ML.

Alongside the delivery of any of the files mentioned above an XML file shall be sent, see appendix '[Additional Files](#)' for additional Information.

HD Content

Tape Delivery

1 new stock HD Cam SR 1080/i/25. HD CAM by prior agreement with the Managers of Program Traffic.

BSkyB uses the ITU standard for defining resolution, thus 1080/P/25 means 1080 lines of 25 frames per second. 1080i = 1080 lines of 25 frames or 50 fields in interlaced content.

1080/P/25 may also be delivered where artistically applicable.



Where content is shot in a filmic (or cinematic) drama style on 1080/P/25 titles, moving captions and DVE moves content should be corrected to 1080i to avoid unacceptable motion judder issues.

To enable the HD programme to retain the highest quality throughout, a minimum of 75% must be native HD footage. Where non HD footage is utilised, it should sit within the editorial context of the program. The SD footage must not exceed 25% of the total programme, with no segments exceeding 5 minutes in any 15 minute period.

File Delivery

All HD commissioned content delivered to BSkyB should use the AVC Intra 100 codec. The video should be encoded to the standard using Intra frame at 100Mb/s with 4:2:2 luminance/colour difference sampling ratio, level 4.1 with a 10 bit sampling depth. The 100Mb/s codec also stipulates a full horizontal resolution.

The video must have a horizontal resolution of 1920 samples, and a vertical resolution of 1080 lines. Content should be delivered with a frame rate of 25 frames per second and either progressive or interlaced depending on the way it was captured.

Alongside the delivery of any of the files mentioned above an XML file shall be sent, see [‘additional Information \(Appendix 2\)’](#).

For content requiring the addition of visual effects that have been shot on file-based cameras, the following must be observed and agreed with the Visual Effects Department before delivery:

HD Delivery for Sky Creative (Visual Effects Department)

A tape must be supplied HD Cam SR 1080/i/25 (4:2:2) recorded onto new stock.

The delivery of content by file should be agreed prior to capture. The files must be provided with supporting paperwork and metadata when available.

File types currently supported are RED, Cine (Phantom), Apple ProRes, DPX (10bit log) and TGA. Other file types will be considered by prior agreement only. EDL's should be CMX3600. Separate EDL's should be provided for each video layer.



3D Content

The prime objectives of the requirements detailed are to deliver content of both a high technical quality and of high production values.

3D High Definition necessitates the highest quality to be captured at the point of creation and storage. The recode and transcode processes should be kept to a minimum within the production chain so that the highest quality possible is delivered to BSkyB.

The technical criteria for 3D content acquisition and storage are detailed and differ in some elements from the basic needs for HD categorisation. This is due to the additional image processing necessary to deliver the dual images within the existing 1080i25 transmission format. Audio requirements remain unchanged.

To enable the 3D program to retain the highest quality throughout, a minimum of 75% must be native 3D footage. Where non 3D footage is utilised, it should sit within the editorial context of the program. The 2D originated footage must be HD, not exceed 25% of the total program, be of segments not exceeding 1 minute, converted in a suitable manner to fit the true 3D content and be of shots where there is minimal benefit from a true dual camera 3D acquisition.

For content that is made for alternate display devices e.g. handheld or cinema please contact your Sky Production executive.

Please refer to the 'Deliverable Summary List' for full delivery requirements.

HD 2D to 3D Conversions

- Conversions of 2D HD content to 3D is not acceptable and may only be proposed by prior agreement with understanding of the editorial techniques and conversion process involved. Automated 2D to 3D processing systems may not be utilised at this time.

Stereoscopic Alignment

- Main subject point should nominally be within an overall "depth budget" of 3% within the limits below.
- Positive disparity or image separation at distant points (into the screen) should not exceed +2% for majority of shots.
- Negative disparity or image separation at distant points (out of the screen) should be used with care and should not exceed -1% for the majority of shots.
- Care should be taken where images break frame and floating windows applied where necessary.
- Care should be taken for images breaking the frame edges with floating windows utilised where appropriate.

These are guidelines that aim to deliver managed and comfortable stereoscopic viewing. As such these limits can be exceeded for specific editorial needs, (such as Prime Vision, Graphic Content or Short Term visual impact),



managed appropriately and in line with 3D production practice. Such instances should be constrained to 4% Positive (Into Screen) and 2.5% Negative (Out of Screen)

Graphics within vision should be aligned to the base content – there should be no differential exceeding a 2% depth budget from the main viewpoint and main graphic image (ancillary graphic imagery may be greater).

Tape Delivery

Record Format

Should be at a bit rate no less than 100Mbit/s 4:2:2 for acquisition uncompressed.

- HDCamSR 4:2:2 X 2 dual link synchronous record (440MB/s X 2): Channel 1 (A) Left Eye, Channel 2(B) Right Eye
- HDCamSR Individual Left Eye tape, Right Eye tape with synchronised identical Timecode.

For 3D Delivery that has each eye recorded on a separate tape the audio should always be present on the 'Left Eye' tape.

Mastered Delivery Format

Where content is a pre encoded master for direct playout.

- HDCam SR 3D Side by Side encoded Finalised Master
- HDCam 3D Side by Side encoded Finalised Master – **Only by agreement**

For 3D Delivery that has each eye recorded on a separate tape the audio should always be present on the 'Left Eye' tape.

File Delivery

All 3D content delivered to BskyB should use separate files for left and right eye, each eye being separately encoded using the AVC Intra 100 codec. The video should be encoded to the standard using Intra frame at 100Mb/s with 4:2:2 luminance/colour difference sampling ratio, level 4.1 with a 10 bit sampling depth. The 100Mb/s codec also stipulates a full horizontal resolution.

The video must have a horizontal resolution of 1920 samples, and a vertical resolution of 1080 lines. Content should be delivered with a frame rate of 25 frames per second and either progressive or interlaced depending on the way it was captured.

Alongside the delivery of any of the files mentioned above an XML file shall be sent, see ['Additional Information' \(Appendix 2\)](#).



3D Delivery for Sky Creative (Visual Effects Department)

A dual stream tape must be supplied HD Cam SR 1080/i/25 (4:2:2 x 2) recorded onto new stock.

The delivery of content by file should be discussed and agreed with Sky Creative (Visual Effects department) prior to capture. The files must be provided with supporting paperwork and metadata when available.

File types currently supported are RED, Cine (Phantom), Apple ProRes, DPX (10bit log) and TGA. Other file types will be considered by prior agreement only. EDL's should be CMX3600. Separate EDL's should be provided for each video layer.

Video Acquisition Standards for SD

VISION: ALL material must be shot true, full height 16x9. The picture must contain a minimum of 576 PAL television lines of active picture and be anamorphically compressed in the horizontal aspect. The picture will be anamorphic when viewed on a normal 4x3 monitor but will be anamorphically correct when viewed on a 16x9 (widescreen) monitor. Everything must be framed 16x9, 4x3 safe on every shot. All action must be within the 4x3 centre cut-out safe area. Any relevant action, which is outside the 4x3 centre cut-out safe action area, is not acceptable and will be rejected ([See Safe Areas](#)). Shooting in any other format is strictly by prior written arrangement with your Production Manager.

AUDIO: It is essential that recording equipment is of the highest standard especially when producing 'fly on the wall' type programmes. The recording quality is vital, distortion and other impairments at the point of capture may not be repairable, and could cause the programme to be rejected.

Video Acquisition Standards for HD & 3D

Where electronic should be by a camera utilizing a three ½" (or greater) sensor array

- with a native resolution of 1920 by 1080 pixels and at a frame rate of 25 Frames interlaced with 50 fields or
- with a native resolution of 1920 by 1080 pixels and at a frame rate of 25 Frames Progressive or
- by prior agreement, 1280 by 720 pixels and at a frame rate of 50 Frames Progressive when converted within the camera or externally in a single process to deliver to the media at a resolution of 1920 by 1080 or
- 35mm (or greater) film where converted directly to a 1920 by 1080 format for a frame rate of 25 Frames.



Video record Standards for HD

This should be ideally at a bit rate of no less than 100Mbit/s intra frame. However 50Mbit/s intra frame 4:2:2 is acceptable for acquisition.

Acceptable Media Formats:

- Uncompressed
- HDCamSR,
- HDCam
- DVCProHD,
- AVC-Intra 100,
- HDD5,
- DVC Pro 100
- XD Cam at 50Mbit/s 4:2:2

Not Acceptable:

- At the time of writing, XDCam EX/SxS acquisition formats that do not support bit rates of 50Mb/s are therefore only acceptable as an exception, by prior agreement and necessary to fit the editorial context of the programme.
- HDV, DVCam, Mini DV, up conversions from SD content, 16mm and Super16mm are not classified as HD
- Super 16mm of sufficient high grade as an exception, by prior agreement and necessary to fit the editorial context of the program may be accepted.

Video record Standards for 3D

This should be ideally at a bit rate of no less than 100Mbit/s intra frame per eye. However 50Mbit/s intra frame 4:2:2 per eye is also acceptable for acquisition.

Acceptable Media Formats:

- Uncompressed
- HD Cam SR Individual Left Eye tape (the audio should always be on the Left Eye)
- HD Cam SR Individual Right Eye tape with synchronised identical Timecode.

Not Acceptable:

- At the time of writing, XDCam EX/SxS acquisition formats that do not support bit rates of 50Mb/s are therefore only acceptable as an exception, by prior agreement and necessary to fit the editorial context of the programme.
- HDV, DVCam, Mini DV, up conversions from SD content, 16mm and Super 16mm are not classified as HD

Video Record Post Production Standards for HD & 3D

Techniques and technologies should maintain the highest quality, and where the native acquisition format is not able to be utilised, the lowest possible compression ratio (highest possible bit rate) available by post production should be used. In all cases the production formats and workflows should be detailed prior to production. Where possible the native acquisition format should be utilised with no transcode process performed by the creation tools. Artefacts can be created at any point where a re-code or transform of the media is performed: it is paramount any degradation is minimised throughout the production chain in order to maintain the highest quality and deliver efficiencies to downstream coding processes.

Acceptable non linear post production Codecs

- Uncompressed native HD to SMPTE 292
- No Codec – Acquisition format utilised
- Avid DNxHD at 185Mbit/s 4:2:2 (DNxHD at 120Mbit/s 4:2:2 where no rendering is applied)
- Apple ProRez 4:2:2 at 184Mbit/s
- Others may be suitable, subject to agreement.

All material is quality and technically assessed, this checks that all levels and signals conform to industry specifications. Such specifications and HD formats are described in the technical recommendation “EBU – TECH 3299 – E”, and, in the case of 1080i/25, as further detailed in the specification “SMPTE 274M-2003” (in each case as amended from time to time).

The technical assessment does not affect the quality grades given; material could have QC pass grades but still be rejected due to technical issues.

Archive programmes and/or those made using sub-standard equipment are acceptable and this will be taken into account when assessing the material, but this does not guarantee acceptance.

For avoidance of doubt all programme levels must not exceed the following when correctly lined up to bars and tone:

- Luminance must not exceed 1v (100%) or go below blanking level (.3v)
- Chroma must be legal in all domains i.e. RGB, YUV etc and must not exceed the gamut limit.
- Relative timings of luminance and chrominance must not exceed +/- 20ns.
- Audio levels must conform to the requirements specified in the [Audio Requirements](#) section.

Please note that there are numerous quality and/or technical faults for which a programme can be rejected. If a title is rejected then full details will be given and you MUST supply a list detailing all repairs/ action taken with timecodes and descriptions of all faults fixed.

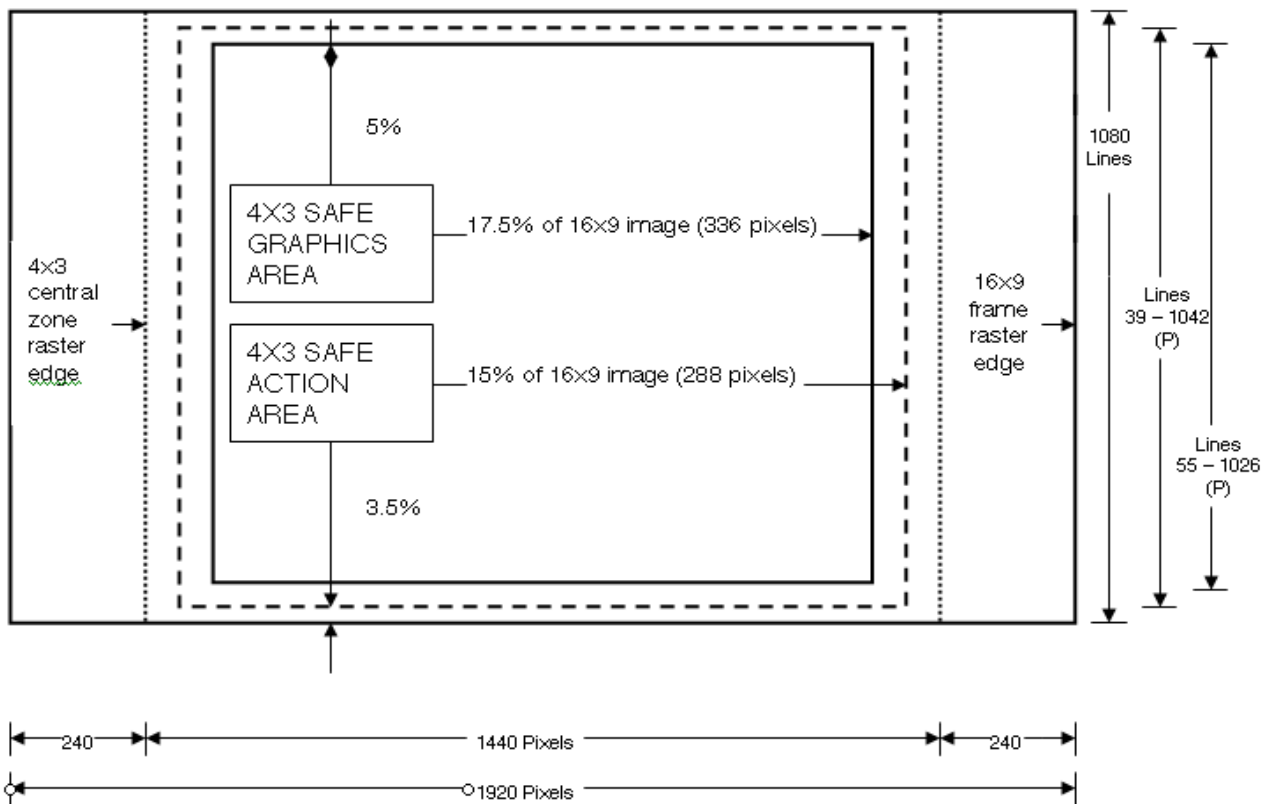
Shooting/Filming

VISION: All contents must be shot and produced in the native delivery format or of a higher resolution. All HD Framed content (16x9) must maintain safe action within the 4x3 centre cut-out safe action area. Any relevant action, which is outside the 4x3 centre cut-out safe action area is not acceptable and may be rejected.

Safe areas

All action, graphics, rostrums must be correctly framed throughout and be such that any conversion to a SD anamorphic 16x9 frame will allow those viewers who have their set top box set to 4x3 mode to retain safe picture content. This means that all action has to be within the 4x3 centre cut-out safe action area, and all graphics, rostrums etc must be within the 4x3 centre cut-out safe graphic area.

The 4x3 viewers who have their Set Top Box set to 4x3 will have 1/8th of the HD version on each side cropped, this must be allowed for and the only way to do so is to ensure that all the above rules are enforced.



HD Shoot to Protect 4x3, defining Action and Graphics Safe Areas.

(Not to scale)

Additional Content Limitations

Harmful image sequences that have been shown to trigger epileptic seizures (PSE) should be avoided. Necessary tests should be employed prior to the release of the content, and all sequences that do not conform to Ofcom standards should be corrected prior to delivery.

High Definition

PLEASE NOTE:

- Multiple resolution or format changes are not allowed.
- Any material that had not been framed for the 4x3 - SD viewer is not allowed.
- Any graphics that is outside the 4x3 centre cut-out safe graphic area; this extends to all newspaper heading etc is not allowed.
- All framed split screen effects must be within the 4x3 centre cut-out safe action area. Any boxes, which extend outside this area, may cause the programme to be rejected. If the framed split screen boxes are moving around then the whole box frame does not have to be within the 4x3 centre cut-out safe action area, but the important detail within the frames must spend sufficient time within the 4x3 centre cut-out safe action area.

Delivered Material

- All material must have been protected by suitable packing material for delivery.
- All cassettes must be in their case.
- All tapes must be rewind fully
- There must be labels on the cassette case and on the tape itself, ensuring that they do not obstruct the spools.

ALL LABELS MUST GIVE THE FOLLOWING INFORMATION:

- Name of recording facility house
- Title
- Sub-title/episode
- Format (SD, HD or 3D)
- Aspect ratio
- Audio track configuration
- ID Reference number

ALL MATERIAL MUST HAVE A RECORD REPORT INSIDE THE CASSETTE CASE AND DETAIL THE FOLLOWING INFORMATION:

- Name of facility house
- Title



- Sub-title/episode
- Audio line up/reference level
- Audio track configurations
- HD format
- Total running time with details of breaks etc
- Any processes used i.e. DVNR, legalisers, audio compressor, ARC etc
- Any problems/comments
- Name of VT Operator/Editor
- Completed Facility House check list
- ID Reference Number

Line up requirements

Timecode

- LTC must be recorded on the designated track at a flux level of 100nwb/m corresponding to 0dBu (PPM4)
- Timecode must be locked to video and must be continuous throughout the tape, including the line-up section and any breaks.
- The timecode for the first frame of the programme must be 10.00.00.00.
- VITC must match LTC throughout.

File delivery

Timecode will also be delivered within the MXF file, according to MXF Op1a specification.

Program Content

- There must not be any closed captions/embedded subtitles unless specifically requested.
- All foreign/alien language must have in vision/burnt in English subtitles
- There should be approx. 20 seconds of black between parts followed by a 30 second clock with all relevant information relating to the part. All parts should start on the minute.
- Programme format, number of parts, duration, breaks bumpers etc must be agreed with the Sky commissioning dept. in advance. Transitions between programme and bumpers should not overlap (e.g. not mixed), to ensure that bumpers can be easily removed if reversioned.
- Audio must not start before part “in” point.
- Audio must fade to silence half a second before end of part “out” point and end of programme.
- The picture must be held for a minimum of ten seconds from the end of part “out” point and end of programme.

Programme information sheet and music cue sheet must be completed and provided for each programme tape.



Audio requirements

Full details of the audio specifications can be found in the relevant section in the Appendix: [‘Basic Requirements’ \(Appendix 5\)](#), [‘Surround Sound Line up’ \(Appendix 6\)](#), [‘Stereo Line Up’ \(Appendix 7\)](#), [‘BLITS tone’ \(Appendix 8\)](#), [‘Dolby Metadata & Downmixing’ \(Appendix 9\)](#).

General

- It is essential that audio recording equipment is of the highest standard. The recording quality is vital, as distortion etc at the time of recording cannot be fixed and could cause the programme to be rejected.
- The audio record level must be related accurately to the line-up levels recorded at the head of the tape, and both should be correct in preset/unity. Tracks 1 & 2 programme peak sound levels must not exceed line-up levels by more than +8 dBu (PPM 6). Audio tracks must be accurately matched, correctly balanced and in-phase throughout.
- The recommended average dialogue levels for speech based programmes should be between PPM 3½ & 5 (-20dBFS to -14dBFS). Low level dialogue such as whispers are allowed to fall below PPM 3½ and high level dialogue such as shouting can exceed PPM 5. Certain programmes such as sport may necessitate audio levels that regularly peak near, but not above, PPM 6.
- The audio mix should reflect the style and genre of the programme, and should use the dynamic range as much as possible, reflecting some subtlety and variation in level where appropriate. Subjective loudness should always be consistent and at a level that is comfortable to experience for the entirety of the programme.
- It is important that dialogue is clear and audible throughout the programme.
- All 24/25 fps conversions must be pitched changed accordingly.

Where required as part of delivery, full 5.1 mix, 5.1 M&E mix minus music and commentary and clean commentary/narration may be required and can be delivered separately - check with your Sky production executive Sky 1 always require these elements on the same tape.

File Delivery

Audio will be supplied transported and wrapped within the MXF Op1a file specification. The audio track layout is shown in section titled [‘Audio Mapping’ \(Appendix 3\)](#). The audio should be sampled at 48 KHz with 24 bits per sample.



Audio Metadata

Audio metadata supplied with content will be held in a SMPTE 436 track within the MXF Op1a file. The 436M track is a direct copy of the vertical ancillary space of the SDI signal (VANC) carrying SMPTE 2020 metadata.

Track Requirements

Stereo Delivery – General Programming SD

Tracks 1 & 2	Stereo main audio Left (A1) and Right (A2)
Tracks 3 & 4	Stereo M&E (Undipped) Left (A3) and Right (A4)

Stereo Delivery – Sport SD

Tracks 1 & 2	Stereo main audio Left (A1) and Right (A2)
Tracks 3 & 4	Stereo Clean Effects audio Left (A3) and Right (A4)

Multi-channel Surround 5.1 Tape Delivery

When multi-channel audio is required and delivered on tape it must be encoded using Dolby E

HD Cam and HD Cam SR tape Delivery (e.g. Sky 1)

Tracks 1 & 2	Stereo main audio mix Left (A1) and Right (A2)
Tracks 3 & 4	Dolby E Encoded 5.1 Main Audio Mix
Tracks 5 & 6	Dolby E encoded 5.1 M&E (Undipped) (HDCamSR only)
Tracks 7 & 8	Dolby E encoded 5.1 Sync Sound (Sync atmos & FX only)
Tracks 9 & 10	Dolby E encoded 5.1 Music Only
Tracks 11 & 12	Stereo Narration / Commentary



Multi-channel (5.1) delivery for LIVE TRANSMISSION (non tape delivery)

Programmes without clean effects or M&E audio

Tracks 1 & 2	Stereo main audio Left (A1) and Right (A2)
Tracks 3 & 4	Mute
Tracks 5 & 6	Dolby E Encoded 5.1 Main Audio
Tracks 7 & 8	Mute

Programmes with clean effects (e.g. live sport)

Tracks 1 & 2	Stereo main audio Left (A1) and Right (A2)
Tracks 3 & 4	Stereo Clean Effects audio Left (A3) and Right (A4)
Tracks 5 & 6	Dolby E Encoded 5.1 Main Audio
Tracks 7 & 8	Dolby E Encoded 5.1 Clean Effects

Dolby E configuration

The order of the audio tracks within the Dolby E stream(s) must comply with the following list: (tracks 7 & 8 not used)

Dolby Track	Audio Track
1	Front Left
2	Front Right
3	Centre
4	LFE
5	Left Surround
6	Right Surround

The Dolby metadata Dialnorm parameter should be set to -23dB, and the programme loudness as measured according to EBU R.128 must correctly match this level +/-2dB. Full Dolby metadata requirements are listed in under [‘BSkyB Dolby Encoder Metadata Settings’ \(Appendix 4\)](#).

Multi-channel (5.1) timing on tape

The Dolby E encoded signal should be in sync with the stereo signal and vision on tape. Off tape we will assume that the resulting Dolby E decoded material will be one frame late due to the inherent latency of the Dolby-E decode process. This one frame offset is taken into account and corrected in the transmission process.

Dolby-E Streams

- Dolby E stream(s) should be present and continuous from the commencement of line up until 60 seconds after the end of the programme.

Dolby E Metadata settings

- The required Dolby E metadata parameters are detailed in [‘BSkyB Dolby Encoder Metadata Settings’ \(Appendix 4\)](#).

Audio Phase

All audio tracks must be supplied with the correct phase relationship throughout the programme, including the reference tone signals used for line-up before the start of the programme.

In particular the stereo tracks must be fully mono compatible such that, when Left and Right channels are summed to a mono track, there is no significant change to the audio level or fidelity.

Where a Clean Effects or M&E mix is supplied the elements which are common to both mixes must be in phase and at the same level, so as to avoid difficulties with editing or mixing between these tracks.

Sound/Vision Sync

Sound and Vision should be delivered in sync throughout the programme. Lip-sync accuracy must remain within the limits of audio + 10ms/-20ms relative to vision.



Noise reduction in Digital Recordings

Digital Audio recordings shall be supplied without digital noise reduction or pre-emphasis.

Stereo M&E version/International Version

Should B SkyB require an M&E version of the programme you should offer the following as a separate media delivery on textless HDCam SR 1080/P/25 master:

Audio track 1	Stereo left (Final full mix)
Audio track 2	Stereo right (Final full mix)
Audio track 3	Stereo Left M&E (Undipped) (See Appendix 10)
Audio track 4	Stereo Right M&E (Undipped) (See Appendix 10)

Stereo International Version

Where there is a requirement for an International version you should provide the following stems on a separate HDCam SR master. Please discuss this with your Sky Production Executive during the commissioning process.

Alternatively the stems can be delivered on a DVD-R containing .B WAV files with matching timecode and synchronisable to the programme with the track layout as follows below and with sound [undipped \(Appendix 10\)](#).

The .B WAV files should be at 48kHz, 24 bit sample rate.

Audio track 1 & 2/ or .B WAV	Stereo Full Mix
Audio track 3 & 4/ or .B WAV	Stereo M&E
Audio track 5 & 6/ or .B WAV	Stereo sync sound/Atmos/Fx only
Audio track 7 & 8/ or .B WAV	Stereo Music Only (Undipped) (See Appendix 10)
Audio track 9 & 10 or .B WAV	Mono/Stereo narration/Commentary



5.1 M&E VERSIONS/Reversioning

BSkyB requires an M&E version of the programme, you should offer the following as a separate media delivery on a textless HDCam SR 1080/P/25 master.

Audio track 1	Stereo left (full mix)
Audio track 2	Stereo right (full mix)
Audio track 3	Dolby E 5.1 full mix
Audio track 4	Dolby E 5.1 full mix
Audio track 5	Dolby E 5.1 M&E – (undipped) (See Appendix 10)
Audio track 6	Dolby E 5.1 M&E – (undipped) (See Appendix 10)

5.1 International Version

Please discuss this with your Sky Production Executive during the commissioning process.

Where there is a requirement for an international version you should provide the following 5.1 stems on a separate textless HDCam SR master encoded with Dolby E.

Alternatively the stems can be delivered on a DVD-R containing .BWA V files with matching timecode and synchronisable to the program with the track layout as follows below and with sound undipped [\(See Appendix 10\)](#)

Audio track 1	Stereo left (full mix)
Audio track 2	Stereo right (full mix)
Audio track 3	Dolby E 5.1 full mix
Audio track 4	Dolby E 5.1 full mix
Audio track 5	Dolby E 5.1 M&E – (undipped) (See Appendix 10)
Audio track 6	Dolby E 5.1 M&E – (undipped) (See Appendix 10)
Audio track 7	Dolby E encoded 5.1 Sync Sound (Sync atmos & Effect only)
Audio track 8	Dolby E encoded 5.1 Sync Sound (Sync atmos & Effect only)
Audio track 9	Dolby E encoded 5.1 Music Only (Undipped) (See Appendix 10)
Audio track 10	Dolby E encoded 5.1 Music Only (Undipped) (See Appendix 10)
Audio track 11	Stereo/Mono Narration/Commentary
Audio track 12	Stereo/Mono Narration/Commentary

On all programmes B Sky B must be able to reproduce the exact full 5.1 mix as found on the HD master from the stems if necessary.



Aspect Ratio

SD Content

SD content must be delivered in an aspect ratio of 16x9, 4x3 content is only accepted by prior arrangement with Managers of Program Traffic.

HD Content

HD content must be delivered using a 16x9 aspect ratio.

3D Content

3D content must be delivered using a 16x9 aspect ratio. BSkyB will accept letterbox versions.

BCAP Guidelines

Delivered content will conform to BCAP guidelines and loudness measured to EBU R.128.

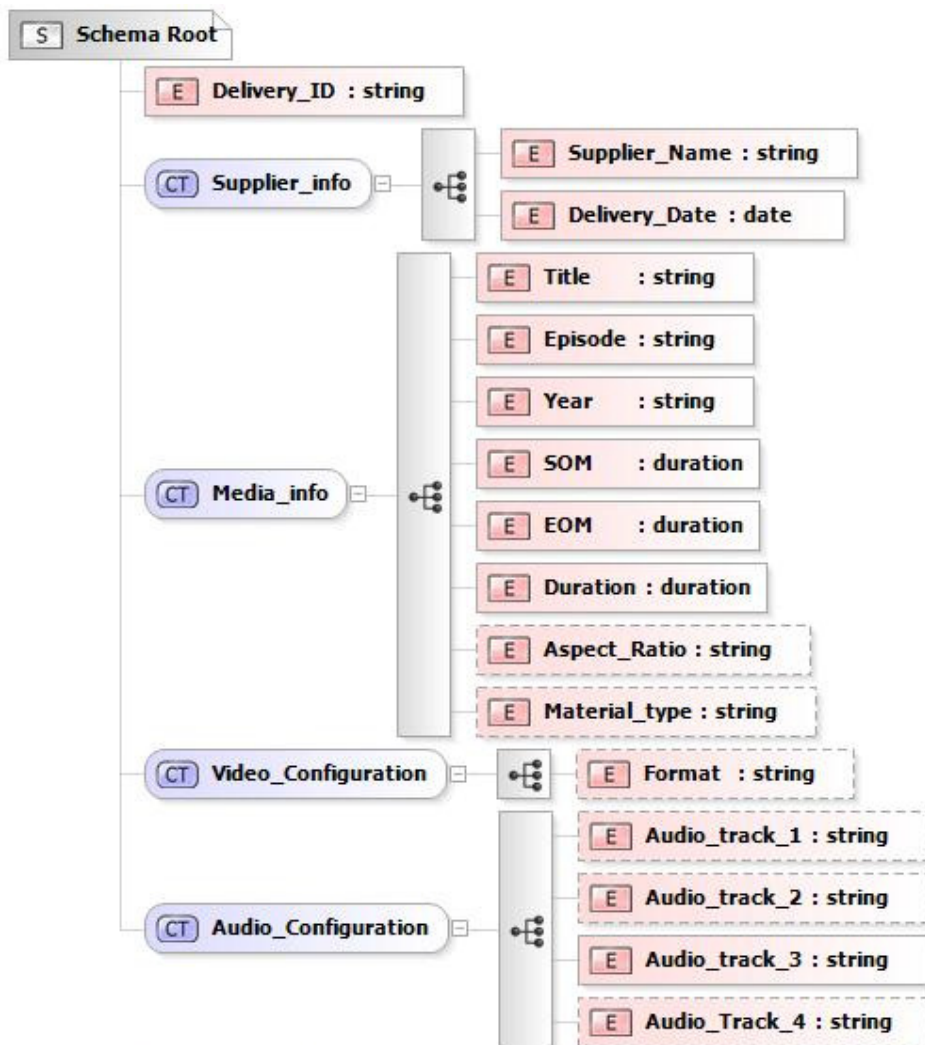


Appendix

Additional Delivery Information

Appendix 1 - Additional files

Alongside the delivery of any of the files mentioned above an XML file shall be sent. This will contain information about the content and shall take the following form;



Liquid XML Studio Developer Edition (Trial) 8.0.2.1941

Appendix 2 - Example XML Document (XSD)



BSKYB_File_Delivery_ExampleXSD.TXT



Appendix 3 - Audio Mapping – File Delivery

AES	Track	Mix	Leg	
1	1	Stereo Mix	L	
	2		R	
2	3	Stereo Mix	L	
	4		R	
3	5	5.1 Surround Full Mix	L Front	
	6		R Front	
4	7		Centre	
	8		LFE	
5	9		Left Surround	
	10		Right Surround	
6	11		5.1 Surround Effect/M&E	L Front
	12			R Front
7	13	Centre		
	14	LFE		
8	15	Left Surround		
	16	Right Surround		

Appendix 4 - BSkyB Dolby Encoder Metadata Settings

Sky 1 HD, Sky Arts HD, Sky Living HD, Sky Atlantic HD, & Sky Sports HD

BSkyB DP571 Dolby® E Encoder Settings		
Metadata parameter name:	Sky Sports	Other Channels
Prog Description	Location of Encoder (E.g: SKY 7 Main A)	Location of Encoder (E.g: SKY 7 Main A)
Dialogue Level ¹	-23dB (+/-2dB)	-23dB (+/-2dB)
Channel Mode	3/2	3/2
LFE Channel	Enabled	Enabled
Bitstream Mode	Main Complete	Main Complete
Line Mode Pro	Film: Light	Film: Standard
RF Mode Pro	Film: Light	Film: Standard
RF Overmod Protect	Disabled	Disabled
Centre Downmix Level	0.707 (-3 dB)	0.707 (-3 dB)
Surround Downmix Level	0.5 (-6 dB)	0.5 (-6 dB)
Dolby Surround Mode	Dolby Surround	Dolby Surround
Audio Prod Info	No	No
Mixing Level	85 dB	85 dB
Room Type	Not Indicated	Not Indicated
Copyright	Yes	Yes
Original Bitstream	Yes	Yes
Preferred Stereo Downmix	Lt/Rt	Lt/Rt
Lt/Rt Centre Mix Level	0.707 (-3 dB)	0.707 (-3 dB)
Lt/Rt Surround Mix Level	0.5 (-6 dB)	0.5 (-6 dB)
Lo/Ro Centre Mix Level	0.707 (-3 dB)	0.707 (-3 dB)
Lo/Ro Surround Mix Level	0.5 (-6 dB)	0.5 (-6 dB)
Dolby Surround EX Mode	Not Dolby EX	Not Dolby EX
A/D Converter Type	Standard	Standard
DC Filter	Enabled	Enabled
Lowpass Filter	Enabled	Enabled
LFE Lowpass Filter	Enabled	Enabled
Srnd 3 dB Atten	DISABLED	DISABLED
Srnd Phase Shift	Enabled	Enabled

Line Up Requirements

Appendix 5 – Basic Requirements

09.57.00.00	2 minutes of bars and tone. Colour bars must have 100% luminance and 100% saturation.
09.59.00.00	30 seconds of black and silence
09.59.30.00	27 seconds of identification clock
09.59.57.00	3 seconds of black and silence
10.00.00.00	Start of programme. This must be field 1 dominant throughout
End of Prog	Minimum of 60" of black and silence including Dolby E silence where Dolby E is present

Appendix 6 - Surround Sound line up

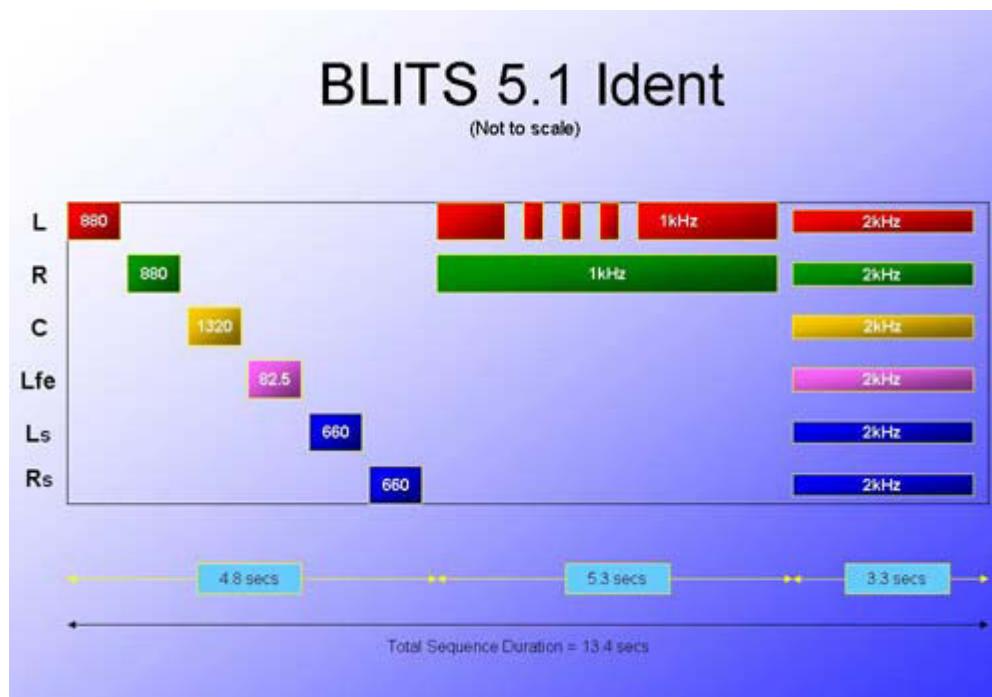
- Wherever possible BLITS tone should be used as the line-up reference signal on surround sound programmes. This should be encoded on the Dolby E tracks during the line-up period between 09:57:00 and 09:59:00. Details of BLITS tone can be found in [Appendix 8](#).

Appendix 7 - Stereo Line Up

- Where the Stereo track has been created from a downmix of the surround tracks the stereo ident should be a downmix of the original 5.1 BLITS ident signals.
- If the stereo tracks are not a downmix of the surround tracks they should carry the standard 1kHz EBU stereo ident tone @ 0dBu / PPM 4 / -18dBFS



Appendix 8 - Blits Tone



The first section is made up from short tones at -18 dBfs to identify each channel individually:

- **L/R: Front LEFT and Front RIGHT - 880 Hz**
- **C: CENTRE - 1320 Hz**
- **Lfe: (Low Frequency Effects) - 82.5 Hz**
- **Ls/Rs: Surround LEFT and Surround RIGHT - 660Hz.**

The second section identifies front left and right channels (L/R) only:

1kHz tone at -18 dBfs is interrupted four times on the left channel and is continuous on the right. This pattern of interrupts has been chosen to prevent confusion with either the EBU stereo ident or BBC GLITS tone after stereo mix down.

The last section consists of 2kHz tone at -24dBFS on all six channels. This can be used to check phase between any of the 5.1 legs.

When the tone is summed to stereo using default down-mix values this section should produce tones of approximately -18 dBfs on each channel.

The BLITS sequence repeats approximately every 14 seconds.

Link to EBU pdf document:

<http://tech.ebu.ch/docs/tech/tech3304.pdf>



BLITS -18dBfs.zip

Appendix 9 – Guidelines - Dolby Metadata & Downmixing

5.1 Surround Sound Mixing & Fold-down Guidelines for Sports and Light Entertainment

- Wherever possible the stereo version of a 5.1 programme should be an automated downmix (in Lt/Rt Prologic format) created from the 5.1 mix. A Dolby DP563 unit is ideal for this purpose.
- Please note that, should a separate stereo mix be produced, it will be transmitted only on the SD platform. HD viewers listening in stereo (or mono) will always hear an automated fold-down of the 5.1 mix.
- This is because Sky's HD platform only transmits Dolby Digital audio (either DD 2.0 or DD 5.1). So when a 5.1 show is broadcast, HD viewers listening in stereo receive a downmix from the Dolby Digital 5.1 audio. This is generated in the set-top box, using the accompanying metadata parameters. (These in turn are derived from the Dolby E metadata settings at the time of encoding). The audio parameters affected by this include: centre, rear and LFE fold-down levels, and the extent of dynamic range control applied.
- The Lt/Rt fold-down parameters set on the DP563 unit should match the settings for the Dolby-E metadata - especially the downmix levels of the CENTRE and SURROUND (rear) legs. (Refer to metadata settings document for more details.)
- If a separate stereo mix is made then it is essential to monitor the automated downmix in addition to this (e.g. using a DP570), to ensure its acceptability for HD stereo viewers.

5.1 Mixing

- In-vision speech should be 'diverged' across LEFT, CENTRE & RIGHT channels. The Centre-channel level should be between 3dB and 6dB higher than the L/R levels.
- Out-of-vision speech (including commentary and V/O) should be CENTRE-channel only. Note that it is acceptable for this element to peak to PPM 6¼ or +11dBu to achieve +8dBu on each leg of the stereo downmix.
- Stereo inserts (VTs) which contain speech should be 'converged' on playback - adding the 'phantom-centre' (mono) element into the real Centre-channel of the 5.1 mix. The Centre-channel level must not be more than 3dB higher than the Left/Right levels in this case, to best maintain any stereo elements when the resultant L-C-R is downmixed back to stereo. (Some mixing desks can converge stereo channels to L-C-R more easily than others.)
- This makes the positioning of speech within VT inserts much more consistent with the (diverged) studio mics, and thus makes stereo-only pre-records more transparent in the 5.1 mix, albeit at the expense of slightly compromising the stereo content.
- For general surround-sound (e.g. audience reaction) we have found that phase-coherence benefits both the wrap-around effect in 5.1 and of course the stereo fold-down. So coincident mic techniques (e.g. crossed-pairs) tend to outperform spaced mono mics in this context.

Appendix 10 - Undipped Audio

Where music is required undipped, this refers to undipped around the narration/commentary. Music should be dipped around sync sound on tape.