GLOBAL TECHNICAL SPECIFICATIONS

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1. OVERVIEW

This document contains the required technical specifications for High Definition (HD) & Ultra High Definition (UHD) deliverables for PBS Distribution (PBSd).

PBSd offers streaming of content on various distribution platforms and requires file delivery in accordance with the specifications outlined herein.

2. SOURCE MATERIAL REQUIREMENTS

There are no exceptions to the following requirements

- All video content delivered must not contain logos*, VITC/BITC time code, rating bugs, CC bugs, funder pods/spots, bumpers, advertisements, promotional lower thirds, overlay branding, hashtags, QR codes, social media tags, URLs, website promotion, on-air offer language and visuals, and other calls-to-action before, during, and/or after the program.

  *In the case of a contractual obligation, production logos are permitted after the closing credits of the program with prior approval from PBS Distribution.

- All video files must consist of the feature program with eight (8) seconds of slate and two (2) seconds of black and silence at the head of the program, and two (2) seconds of black and silence at the tail of the program. Do not include bars and tone before the slate.

- PBS Distribution requires seamless content. Commercial blacks & bumpers must be removed.

- When delivering UHD content, a matching HD file must also be delivered.

- All primary audio channels (i.e. audio on the video master) shall contain 5.1 surround and/or stereo. Mono audio is not accepted.

- All audio must be frame synchronous throughout the program. Audio and video may not be out of sync by more than 20 milliseconds.

- PBS Distribution requires closed captioning for all programs, promotional trailers, and bonus material. All caption files must be delivered in .scc format.

- Promos and Trailers are required for all content.

- All content, including bonus video, promos, and trailers, must be cleared for home entertainment distribution, worldwide for the duration of the contract. This includes but is not limited to funders, video, stock footage, and music.

- All content must pass through a full editorial and technical quality control (QC) process prior to delivery, confirming deliverables are both editorially and technically problem-free. QC reports must be provided when assets are delivered.

- Video, Audio, and Caption files must be delivered via PBSd's Aspera Faspex. Other delivery methods are not allowed, including but not limited to: SFTP, WeTransfer, Dropbox, or Box.

- Any audio, video or caption configurations or formats not specified in this document require prior approval with your PBSd point of contact.

3. PRIMARY VIDEO ASSET SPECIFICATIONS

3.1 Accepted Video Codecs

High Definition (HD)*: Preferred - Apple ProRes 422 HQ
      Acceptable - DNxHD MXF OP1a 175 10bit or higher resolution (mxf wrapper)

Ultra High Definition (UHD)*: Preferred - Apple ProRes 422 HQ or Apple ProRes 4444 (mov wrapper)
       Acceptable - DnxHR HQ UHD or 4K UHD IMF extension 2 (mxf wrapper)

When delivering UHD content, a matching HD file must also be delivered in compliance with the above HD codecs.

3.2 Color Space and Levels

All levels must be within legal limits and a valid range. IRE 0-100 and analogue 0-700 mV. White or black clipping must not be evident.

3.3 Resolution

HD: 1920 x 1080 pixels, compliant with SMPTE ST 274-2008 standard.

UHD (3840 x 2160 pixels) compliant with SMPTE ST 2036-1 for UHDTV1 and UHDTV2, respectively.

SD (**legacy content only, requires prior permission**): (720 x 480 pixels, 720 x 486 pixels, or 720 x 576 pixels).

Source masters should not be upscaled to a higher resolution.

3.4 Frame Rate / Scan Mode

All video assets must be edited and delivered in native frame rate (23.98, 24, 25, 29.97) and native scan mode (progressive/interlaced). Exceptions will need prior approval.

3:2 Pulldown flags are not allowed.

Mixed Frame Rates are not acceptable within the program content. All content must be delivered with a single frame rate used throughout the program.

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3.5 Aspect Ratio

The aspect ratio of all HD video content shall be delivered in the original aspect ratio. All content must fit within a 16:9 frame. The postage stamp effect (window boxing) will not be accepted for HD. 4x3 Pillarbox is only acceptable for SD archival content and must be pre-approved by PBS Distribution before delivery occurs.

3.6 Safe Areas

Safe Action is the area within which all significant action must be contained as defined by SMPTE standard 2046-1. The area is defined as 93% of the width and height of the production aperture.

Safe Title Area is the area within which all significant text must be contained as defined by SMPTE standard 2046-1. The area is 90% of the width and height of the production aperture.

3.7 Time Code & Slate Format

All program content must begin at the exact time code (01:00:00;00 or 10:00:00;00), and content should be drop frame, except for content in 23.98 and 24 framerate.

All video files must consist of the feature program with eight (8) seconds of slate and two (2) seconds of black and silence at the head of the program, and two (2) seconds of black and silence at the tail of the program. Do not include bars and tone before the slate.

Format:
00:59:50;00 SLATE is 8 seconds (:08) in duration
00:59:58;00 BLACK is 2 seconds (:02) in duration
01:00:00;00 PROGRAM START at 1 hour or 10 Hour (international content)
BLACK for Two (2) seconds after program

3.8 Slates

A slate should be visible for eight (8) seconds before video content begins. The slate must contain the program title, episode title & number (if applicable), program total run time (first frame to last frame of picture, not including slates or textless elements), audio channel configuration, frame rate, date, and production company.

Example Slate Information:

Program Name
Episode Title & Number (if applicable)
Program Total Run Time
Frame Rate
Aspect Ratio
Texted or Textless
Production Company Name
Audio Channels

3.9 Commercial Blacks

PBS Distribution requires seamless content. Commercial blacks & bumpers must be removed.

3.10 Texted Video

All video content delivered must not contain logos*, VITC/BITC time code, rating bugs, CC bugs, funder pods/spots, bumpers, advertisements, promotional lower thirds, overlay branding, hashtags, QR codes, social media tags, URLs, website promotion, on-air offer language and visuals, and other calls-to-action before, during, and/or after the program.

*In the case of a contractual obligation, production logos are permitted after the closing credits of the program with prior approval from PBS Distribution.

All graphics and lower thirds must be within title and action safe areas per SMPTE specifications.

Episodic recaps or next-time previews must be removed from the program. If contractually obligated, they must be provided as separate files.

3.11 Textless Video

PBS Distribution requires textless masters with all of the following removed: identifying lower thirds, burned-in subtitles, translations, credits, open titles, location identifiers, numbers, text on graphics, and any other onscreen text. Texted open titles/credits and end credits must be inserted after the textless main program, separated by two seconds of black.

4. PRIMARY AUDIO ASSET SPECIFICATIONS

4.1 Primary Audio Channels

All primary audio channels on video masters shall be delivered as 5.1 Surround plus Stereo. If 5.1 audio is not available, stereo audio must be provided. Mono audio is not accepted.

4.2 Bit Depth and Rate

All audio should be formatted with a minimum 24-bit depth and 48 KHz sampling rate.

4.3 Audio Quality

All audio mixes must be free of audible clipping, noise, static and other distortions. The mix should be well balanced and equalized, with clear dialogue and narration that are not buried by effects or music.

The individual channels should be in phase to prevent cancellation or artifacts when tracks are down mixed to stereo. Stereo synthesizing is not allowed on any content.

4.4 Audio Levels

The audio mix of long form ("program") content must conform to the guidelines presented in ATSC A/85:2013, using ITU-R BS.1770-3 for loudness measurement and true-peak measurement and must apply to all channels of a program, except for LFE channels. Measured loudness shall indicate the average loudness of normally spoken dialogue during the body of the program, and the resultant average must conform to -24 LKFS, +/- 2 LU. True Peak levels shall not exceed -2 dBTP at any time.

4.5 Audio Phase and Synchronization

All audio channels must be frame synchronous throughout the program. Audio must not lead or lag video by more than one-half frame.

4.6 Audio Split Tracks

Audio split tracks are required for all content. Split tracks must be provided as separate .wav files and must be in sync with video.

Please refer to the audio split track channel assignment section of this document for configuration information.

4.7 Accessibility and Foreign Language Audio

Accessibility and/or foreign language audio including Descriptive Video Service (DVS), Secondary audio programming (SAP/LAS), and other foreign language tracks are accepted, if available. The tracks must be provided as separate .wav files and in sync with video. DVS in Spanish can be accepted if available.

Audio file format: .wav
1 or 2 channels (mono or stereo)
24 Bit
48 KHz sampling rate
1152 kbps Bitrate
Timecode should match video master

All DVS should be mixed to blend conversationally with the program. No automatic ducking or unmixed deliverables are acceptable.

4.8 Primary Audio Channel Assignments for the Video Masters

Audio channel assignments on master video files must always be adhered to in accordance with this document.

5.1 + 2.0 Channels:

Channel 1: Left Front
Channel 2: Right Front
Channel 3: Center
Channel 4: LFE
Channel 5: Left Surround
Channel 6: Right Surround
Channel 7: Stereo Left Full Mix
Channel 8: Stereo Right Full Mix
Channel 9: Left Dialogue, Music, Effects (Full Mix minus Narration/VO), undipped*
Channel 10: Right Dialogue, Music, Effects (Full Mix minus Narration/VO), undipped*

Stereo Channels (if 5.1 not available):

Channel 1: Stereo Left Full Mix
Channel 2: Stereo Right Full Mix
Channel 3: Left Dialogue, Music, Effects (Full Mix minus Narration/VO), undipped*
Channel 4: Right Dialogue, Music, Effects (Full Mix minus Narration/VO), undipped*

* NOTE: For content without Narration/VO, a Music & Effects mix without dialogue is required.

4.9 Audio Split Track Channel for .wav file delivery

Discrete .wav files must be delivered as listed below. Zipped audio files are not accepted.

For content without Narration/VO, a Music & Effects mix without dialogue is required.

5.1 Surround Full Mix
Left (Music, Ambience, Effects, Background Dialogue)
Right (Music, Ambience, Effects, Background Dialogue)
Center (Dialogue or Narration, including Dialogue not in English)
Low Frequency Effects (Explosions/Music Effects)
Left Surround (Music, Ambience, Effects)
Right Surround (Music, Ambience, Effects)

Stereo Splits
Music
Effects
Dialogue (mono or stereo, as recorded)
Narration/VO (mono)
Full Mix
Dialogue, Music, Effects mix (undipped)

Other Acceptable Audio, if available
Archival audio stem
5.1 Spanish Full Mix
5.1 DME
5.1 ME (only for programs without narration)

PBSd does not collect any additional audio files other than those listed above.

5. CLOSED CAPTIONING

To meet various compliance standards and in the interest of serving deaf and hard of hearing individuals, PBS Distribution requires closed captioning for all video content, including promos, trailers and bonus material.

5.1 Encode Standard

Closed Captioning must be encoded as specified in the CEA 708 standard.

5.2 Format

All caption files are required in .scc format and must match the time code and frame rate of the master asset. They should not be embedded within the video master.

5.3 Accuracy

Captions must match the spoken dialogue, narration, and song lyrics.

All dialogue, including paraphrasing, slang, grammatical errors, utterances such as "um" and other spoken irregularities, must be preserved in captions.

Non-verbal audio cues (i.e. offscreen noise) which are not visibly obvious must be conveyed by captions to the fullest extent possible.

Captions must use appropriate punctuation, capitalization, correct verb tense, and proper spacing between words.

Captions reflecting the loudness of dialogue or noises can be all capitalized, i.e., someone yelling or the sound of a gunshot.

There must be accurate representation of numbers, including related symbols such as dollar signs, etc.

Captions must identify speaker, the existence of music, sound effects, and audience reaction to the greatest extent possible, given the nature of the program.

 If there is more than one speaker, captioning must identify each speaker through identification (e.g. speaker name, narrator, etc.) or position on the screen, making it clear who is speaking.

When speakers are off-screen, captions must identify who is speaking if hearing viewers are able to discern who is speaking.

5.4 Caption Style and On-Screen Placement

Captions must pop-on and may not roll up.

Captions must not overlap or run off the edge of the screen.

Proper placement requires that caption fonts be sized for legibility.

Closed captioning in ALL CAPS is prohibited. Although captions identifying speakers can be capitalized.

Lines of captioning shall not overlap one another.

No redundant captions are allowed where burn-in subtitles appear on screen.

Captions shall not block important visual content on the screen including (but not limited to) character faces, featured text such as lower-third identifiers, graphics, burned-in subtitles, credits, and other information that is important for understanding program content.

Captions must be placed in the center lower third of picture but should be temporarily moved into the upper third of the picture if captions conflict with on screen lower third graphics or text as described above.

Placement of captions may not remain in the upper third of the picture throughout the entirety of the video.

Captions should not cover a subject's mouth while speaking.

 No dual language captions are currently accepted (example: full Spanish + full English captions simultaneously appearing on screen). This rule does not apply to an English caption file that occasionally preserves a word or line of dialogue in a non-English language for educational or cultural purposes.

5.5 Synchronization

Captions must coincide with their corresponding spoken words and other sounds to the greatest extent possible.

Captions should appear when the corresponding speech or sound begins.

Captions should end when the speech or sound ends.

To the extent possible, captions are to display on the screen at a speed that can be read by viewers.

6. SECONDARY VIDEO ASSET SPECIFICATIONS

Trailers and promos are required for each program. Bonus material can be delivered if available. All promos, trailers, and bonus material must be fully post produced (finished) and meet the same technical requirements as the primary video files (e.g. native framerate, no overlay branding, etc.). Closed caption files are required for these assets.

6.1 Accepted Video Codecs

Please refer to section 3.1 for video requirements.

6.2 Promos and Trailers

A minimum of one commercially cleared 30-second promo and one commercially cleared trailer (between 1 minute and 3 minutes runtime) is required for each series, season, and/or program. All promos and trailers must be cleared for usage worldwide.

For seasons containing multiple episodes, season-level promos and trailers must be provided. Episode specific promos are requested if available.

Closed caption files are required for promo and trailer assets.

6.3 Bonus Material

Bonus materials such as cast and crew interviews, behind the scenes features, deleted scenes, making-of specials, electronic press kits, and other supporting material may be submitted with the primary program content.

Closed caption files are required for bonus material.

6.4 Recognition/Funder Card

Recognition card (a.k.a. funder card) is an optional deliverable. This deliverable is a single-image static card exactly 5 seconds in length delivered as a separate file. The card should be clean cut at top and tail with no slate, fades, animations, URLs, or audio. The card must be delivered in the same video spec as the PBSd master delivery format (i.e., ProRes, DNX).

For full requirements, please review separate guidelines document for overview, usage, and sample cards.

6.5 Audio Requirements

Promos and trailer audio channels should match that of the program and must comply with all program audio requirements.

7. FILE NAMING CONVENTION

All media assets submitted to PBS Distribution must adhere to the following file naming convention:

There are four sections of the file name format defined below. Each section is separated by a dash (-).
File names should have exactly three dashes and no spaces. Do not use accented letters or any of the
following characters in file names: & # % $ * \ / ' " ; : ! ?

[RightslineID#]-[AssetTitleInfo]-[LanguageCode]-[AssetType]

[RightslineID#]-[AssetTitleInfo]-[LanguageCode]-[AssetType]

Rightsline ID#   Asset Title   Language Code   Asset Type

123456-PoetryInAmericaS1E1stereo-en-Texted

1. **Rightsline ID**: A unique, numerical code for each program and/or episode. This code allows our
   various departments to track the program. Your PBSd technical contact will provide the Rightsline
   IDs for your programs as soon as they are available.

2. **Asset Title**: Program Title, season/episode number and descriptors if applicable. Do not include
   spaces in the title. Underscores can be used to separate title information. Additional descriptor
   information such as audio configuration, frame rate, and textless at tail can be included in this
   section only.
       i.   36023-SanditonS1E1_51Surround-en-Textless.mov
       ii.   36023-SanditonS1E1_51Surround-en-Texted.mov

3. **Language Code**: A two-letter code, ISO 639-1 standard. The primary language code of most content
   is "en" for English, "es" for Spanish, or "fr" for French; Language Code Reference
      a.   If the language is a specific dialect include a distinction in the file name
         i.   36023-SanditionS1E1_Castilian-es-Texted.mov
         ii. 36023-SanditionS1E1_Canadian-fr-Texted.mov

4. **Asset Type**: A particular tag identifying the type of file. The Asset Type allows our system to properly
identify and associate all the various files of a program together. Each file must be submitted with one
of the following Asset Types:

Video (.mov /.mxf)
- Texted
- Textless
- Promo
- Trailer
- Bonus
- Credits

- FundingPod
- FunderCard

Audio (.wav)
- FullMix
- DVS
- SAP
- DME
- ME
- Dialogue
- Music
- Effects
- NarrationVO
- Left
- Right
- Center
- LFE
- LS
- RS
- ArchivalAudio

Caption (.scc)
- Caption
- BonusCaption
- PromoCaption
- TrailerCaption
- FundingCaption

File naming examples below:

VIDEO MASTERS
98852-FindingYourRootsS10E10-en-Texted.mov
98852-FindingYourRootsS10E10-en-Textless.mov
98852-FindingYourRootsS10E10_UHD-en-Texted.mov
98852-FindingYourRootsS10E10_UHD-en-Textless.mov
98852-FindingYourRootsS10E10Textlessattail-en-Texted.mov
98852-FindingYourRootsS10E10Textedattail-en-Textless.mov

PROMO/TRAILER/BONUS/CREDITS/FUNDING
98852-FindingYourRootsS10E10-en-Promo.mov
98852-FindingYourRootsS10E10-en-Trailer.mov
98852-FindingYourRootsS10E10-en-Bonus.mov
98852-FindingYourRootsS10E10-en-Credits.mov
98852-FindingYourRootsS10E10-en-FunderCard.mov

SCREENERS

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98852-FindingYourRootsS10E10-en-Texted.mp4
98852-FindingYourRootsS10E10BITC-en-Texted.mp4

STEREO AUDIO
98852-FindingYourRootsS10E10_Stereo-en-FullMix.wav
98852-FindingYourRootsS10E10_Stereo-en-DME.wav
98852-FindingYourRootsS10E10_Stereo-en-ME.wav
98852-FindingYourRootsS10E10-en-Dialogue.wav
98852-FindingYourRootsS10E10_Stereo-en-Music.wav
98852-FindingYourRootsS10E10_Stereo-en-Effects.wav
98852-FindingYourRootsS10E10-en-DVS.wav
98852-FindingYourRootsS10E10-es-SAP.wav
98852-FindingYourRootsS10E10_StereoLeft-en-FullMix.wav
98852-FindingYourRootsS10E10_StereoRight-en-FullMix.wav
98852-FindingYourRootsS10E10_StereoLeft-en-DME.wav
98852-FindingYourRootsS10E10_StereoRight-en-DME.wav
98852-FindingYourRootsS10E10_StereoLeft-en-ME.wav
98852-FindingYourRootsS10E10_StereoRight-en-ME.wav
98852-FindingYourRootsS10E10_StereoLeft-en-Music.wav
98852-FindingYourRootsS10E10_StereoRight-en-Music.wav
98852-FindingYourRootsS10E10_StereoLeft-en-Effects.wav
98852-FindingYourRootsS10E10_StereoRight-en-Effects.wav

MONO AUDIO
98852-FindingYourRootsS10E10-en-NarrationVO.wav
98852-FindingYourRootsS10E10-en-Dialogue.wav
98852-FindingYourRootsS10E10-en-DVS.wav
98852-FindingYourRootsS10E10-es-SAP.wav

5.1 AUDIO
98852-FindingYourRootsS10E10_51Left-en-FullMix.wav
98852-FindingYourRootsS10E10_51Right-en-FullMix.wav
98852-FindingYourRootsS10E10_51Center-en-FullMix.wav
98852-FindingYourRootsS10E10_51LFE-en-FullMix.wav
98852-FindingYourRootsS10E10_51LS-en-FullMix.wav
98852-FindingYourRootsS10E10_51RS-en-FullMix.wav

CAPTIONS
98852-FindingYourRootsS10E10-en-Caption.scc
98852-FindingYourRootsS10E10-en-PromoCaption.scc
98852-FindingYourRootsS10E10-en-TrailerCaption.scc
98852-FindingYourRootsS10E10-en-FundingCaption.scc
98852-FindingYourRootsS10E10-en-BonusCaption.scc

Replacement Asset File Naming: If a file is redelivered, you must add the version number (e.g. V2, V3,

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etc.) **within the Program Title (second section)** to indicate which version that file is.

98852-FindingYourRootsS10E10_v2-en-Texted.mov

8. CLEARANCES

All elements within the body of the texted and textless programs, and secondary assets such as bonus video, trailers, and promos, must be fully cleared worldwide in perpetuity for home entertainment distribution.

Any content including but not limited to video, stock footage, or audio that has not been cleared for home entertainment distribution must be removed from the master assets before being delivered to PBS Distribution.

Please reference your contract and delivery exhibit for further details.

9. QUALITY CONTROL (QC)

9.1 Technical Quality Control

All content must be run through a full quality control (QC) process before being delivered to PBS Distribution to ensure there are no issues with the video, audio, or captions and the content has been created per the specs listed in this document.

QC reports must be provided to your PBSd contact upon delivery of assets.

Any technical issues found by PBS Distribution post-delivery will be rejected and the production company or post house delivering assets will be required to fix the assets at their own expense and redeliver the content.

9.2 Creative Quality Control

All content must be reviewed to ensure accuracy of the editorial and creative content within the body of the program or promo/trailer. This includes spelling of lower thirds and credits, the inclusion of all names in the credits, accurately used stock footage, information has been fact checked, etc.

9.3 Replacement of Assets

If any technical, legal, or creative issues are discovered by the production company after delivery to PBS Distribution, please alert your production contact immediately and provide the following information:

1) The episode(s) and timecode(s) affected
2) A detailed description of the problem(s) that need to be addressed
3) An estimated date for redelivery of assets

Please see section 7: "Replacement Asset File Naming" for proper naming of replacement files.

While PBS Distribution will make every effort to replace problematic video and audio, all requests are subject to review, and depending on the severity of the issue and timeline for release the content may not be replaced.

Any approved replacements will incur significant manufacturing and redelivery fees, and potential product destruction fees, that will be billed back to the production company for payment to be made to PBS Distribution.

Please follow the QC procedures listed above to avoid replacements.

10. FILE DELIVERY METHOD

Video, Audio, and Caption files must be delivered via PBSd's Aspera Faspex. Other delivery methods are not allowed, including but not limited to: SFTP, WeTransfer, Dropbox, or Box.