Video Transfer

@ NATIONAL BOSTON

Technical Specification Guide

for

High Definition Broadcast Applications

Video Specifications

1. **Frame size:**
   HD images shall be <u>1280 x 720</u> or <u>1920 x 1080</u> pixels with an Aspect Ratio of 16:9.

2. **Up-Conversion:**
   Up-converted standard definition video cannot constitute an entire program.

3. **Image quality:**
   Video images shall be free of dropouts as well as impairments such as compression artifacts, tears, stutters, jumps and head switching. Non-visual content such as VITC, VITS, or Closed Captions shall not be visible to the viewer.

4. **Black Levels:**
   Black luminance levels must be <u>0.0 Volts</u>.

5. **Component Levels:**
   Peak Luminance and Color Difference signals must not exceed <u>0.7 Volts</u>.

6. **RGB Gamut:**
   RGB signal levels derived from the Luminance and Color Difference signals must fall within the <u>0.0 to 0.7 Volt</u> range. Note that it is possible for certain combinations of in-range component signals to produce out-of-range RGB signals. Therefore, RGB gamut must be independently confirmed.

7. **Blanking:**
   Full-screen images shall completely fill the active picture area of the image frame.

Vertical Blanking	
Format	**Active Lines**
720	26 - 745
1080	21 - 560

Horizontal Blanking	
Format	**Blanking Width**
720/59.94p	5.0 μS
720/50p	9.4 μS
1080/59.94i	3.8 μS
1080/50i	9.7 μS
1080/23.98p	11.2 μS

8. **Safe Areas:**
   - **All significant action must take place within the central 93% of the image frame.**
   - **All significant text must fall within the central 90% of the image frame.**
   - **All 4:3-Protected text must fall within the central 90% of a 4:3 center-cut image frame.**

Safe Area Dimensions			
Format	**Safe Action**	**Safe Title**	**4:3 Protected Title**
720	1190 x 670	1152 x 648	864 x 648
1080	1786 x 1004	1728 x 972	1296 x 972

Audio Specifications

1. **Track Assignments:**

Non-Surround - 4 Track Configuration	
Track Number	**Track Assignment**
1	Stereo Left or Left Total
2	Stereo Right or Right Total
3	The use of tracks 3 and 4 vary and may include Mono,
4	M&E, SAP, or DVI/DVS depending on the intended use.

5.1 Surround - 4 Track Configuration	
Track Number	**Track Assignment**
1	Stereo Left or Left Total
2	Stereo Right or Right Total
3	Dolby E – See next table.
4	

Dolby E Track Assignments	
Track Number	**Track Assignment**
1	Left Front
2	Right Front
3	Center
4	Low Frequency Effects (LFE)
5	Left Surround
6	Right Surround
7	The use of tracks 7 and 8 vary and may include Mono,
8	M&E, SAP, or DVI/DVS depending on the intended use.

2. **Dolby E Frame Alignment:**
   Dolby E signal frames must be recorded <u>one frame ahead</u> (advanced) of each corresponding video frame. This alignment results in synchronized picture and sound following Dolby E decoding.

3. **Down-mixing:**
   Audio program mixes (stereo and surround) must be configured to produce full-quality stereo and mono down-mixed outputs. Stereo tracks must therefore contain in-phase audio. Surround tracks must be compatible with standard down-mix settings of −3dB for center and surround channels.

Audio Specifications (continued)

4. **Audio Measurements:**
   Audio levels must be measured in compliance with <u>ITU BS.1770</u> for Loudness and True-Peak metering.

5. **Audio Quality:**
   Audio content must be free of dropouts as well as impairments such as poor fidelity, distortion, clipping, noise, or excessive compression.

6. **Audio Loudness:**
   Audio content must have a Loudness of <u>−24LKFS ± 2dB</u>. This is an average reading taken over the duration of the program. Audio levels within different program areas or sections must be consistent.

7. **Dialog Loudness:**
   Dialog levels must have a Loudness of <u>−24LKFS ± 2dB</u>. This is an average reading taken over the duration of the program. Music and effect levels must be sufficiently below dialog to ensure that the dialog can be clearly understood upon first listening under typical listening conditions.

8. **Peak Levels:**
   Peak audio levels should not exceed <u>−6dBFS</u>. Peaks as high as −2dBFS may be acceptable during brief periods of dramatic impact provided that dialog remains clearly understandable. It should be noted that audio levels might be limited to -10dBFS by older distribution chains.

Time Code Specifications

1. **Frame Count Mode:**
   <u>Drop Frame</u> time code must be used for all 59.94 Hz recordings.

2. **Time Code Tracks:**
   Matching digital VITC and LTC must be present in all recordings.

3. **Code Start/End:**
   Time code recording must begin at <u>00:58:30:00</u> for 59.95 Hz formats and at <u>09:58:30:00</u> for 50 Hz formats. Time code must continue without any discontinuities until at lease 30 seconds beyond the end of the program.

Closed Caption Specifications

1. **CC Encoding:**
   Closed Caption data must be encoded in compliance with <u>CEA-708-C with 608 Compatibility Bytes</u> on 59.94 Hz recordings.

2. **Multi-Language Configuration:**
    Primary language captions must be presented in caption <u>Service 1</u>. Optional secondary language captions must be presented in caption Service 2.

3. **Caption Data Location:**
    Closed Caption data must be encoded on <u>Line 9</u> of the VANC data space.

Leader and Trailer Specifications

1. **Test Signals:**
    Recordings must begin with <u>60 seconds</u> of test signal Color Bars and Tone.

2. **Color Bars:**
    Color Bars must contain a 100% white level, a black level and either 75% or 100% saturated colors.

3. **Tone:**
    Tone must be present on all active audio channels. Tone levels must be set to <u>−20dBFS</u>. Tone frequency should be no higher than 1KHz. A typical tone frequency is 400 Hz. 5.1 Surround mixes should utilize an 80Hz tone at −30dBFS for the LFE channel.

4. **Slate:**
    A visual slate must immediately follow the test signals for a period of <u>30 seconds</u>. Slate content requirements vary depending on the intended use.

5. **Countdown:**
    A countdown clock must be keyed over the slate starting exactly 10 seconds before the start of the program. Each clock change will coincide with the start of a second and be accompanied by 1 frame of audio tone. A white circle should appear around the countdown clock during the 1 frame of audio tone as a lip sync indicator. The number "2" must be the last number to appear and will vanish along with the entire slate at the end of its accompanying tone.

6. **Program Leader:**
    Black and silence must follow the countdown and continue until the start of the program.

7. **Program Start:**
    The program start must occur at time code <u>01:00:00:00</u> for 59.94 Hz formats and at <u>10:00:00:00</u> for 50 Hz formats.

8. **Trailer:**
    At least <u>30 seconds</u> of black and silence must follow the end of the program material.