

SD Version 1.4 – 08/2014

## TECHNICAL STANDARDS FOR DELIVERY OF TELEVISION PROGRAMS TO FAYETTEVILLE PUBLIC ACCESS TELEVISION

The Standards include:

- Technical Specifications: the technical production methods, which must be used, and the parameters, which all material must meet to be acceptable for telecast on the channel.
- Picture and Sound Quality requirements: Some of the Quality Requirements are expressed in subjective terms (“reasonable”, “not excessive” etc), and it will be necessary to make a judgment as to whether the program meets the quality expectations of the Channel.
- Delivery Requirements: specifications regarding the form and layout of the program material.
- Quality Control: Every program submitted for telecast must satisfy a Quality Control process specified by the Channel. Any program failing the QC process on disk or file may be rejected and returned to the producer for repair and resubmission.

### **Submission Format Summary**

All programs must be delivered on one of the following media:

DVD

Digital file (regardless of storage media)

### **All programs must meet the following digital format specifications:**

#### **MPEG-2 - Program Stream ONLY**

NOTE: “Transport Stream” is NOT acceptable.

**Aspect Ratio:** NTSC 4:3 (Video may be “letterbox”. Video MAY NOT be Full Height Anamorphic (FHA). See below.

**Resolution (pixels):** 720 x 480 (Horizontal x Vertical)

**Frame rate:** 29.97 fps

#### **Maximum bit rate:**

This setting is dependent upon the editing/encoding system you are using:

If you are using Final Cut Pro or Apple Compressor, the bit rate must be set for **10 Mb/s** and **MUST BE Constant Bit Rate (CBR)**

If you are using Adobe Premier Pro or Media Encoder, the bit rate MAY be set for Variable Bit Rate (VBR) with Min 6 Mb/s, Avg 8 Mb/s, Max 10 Mb/s. This is the recommended setting. If the output is set at Constant Bit Rate (CBR) the bit rate must be set at 10 Mb/s.

**Color sub-sampling:** 4:2:0

**Structure:**

This setting is dependent upon the editing/encoding system you are using:

If you are using Final Cut Pro or Apple Compressor set the structure to: IBBP group of pictures (30 frame maximum GOP size)

If you are using Adobe Premier Pro or Media Encoder set the structure to: Closed GOP every 15 frames

**Audio encoding:** 44.1 KHz sampling frequency

**NOTE:** Audio must be encoded into the MPEG file using **Audio Layer II**

**Audio mix:** Stereo mix; or mono-mix to both left and right channels.

**NOTE:** Split-Track audio is NOT acceptable

\*\*MPEG filenames may contain up to 27 characters (no spaces) and must end in “.mpg” extension

## 1 General Quality Requirements

### 1.1 Picture Quality

- The picture must be free of excessive noise, grain and digital compression artifacts
- Movement 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 highlight compression
- Hard clipping of highlights (e.g. by legalizers) must not cause visible artifacts on screen
- There must be no noticeable horizontal or vertical aliasing, i.e. jagged lines, field or frame rate fluctuations in fine detail

- Color rendition, especially skin tones, must be consistent throughout, and a realistic representation of the scene portrayed unless it is altered as an artistic visual effect
- The picture must be stable and continuous - i.e. no jumps, movements, shifts in level or position
- There must be no visible contouring / artifacts caused by digital processing
- Quantization noise must not be apparent
- There must be no noticeable spurious signals or artifacts, e.g. streaking, ringing, smear, echoes, overshoots, moiré, hum, cross-talk etc.

## 1.2 Sound Quality

- The audio must be free of spurious signals such as clicks, noise, hum and any analog distortion unless it is necessary for artistic effect
- 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 artifacts as a result of the action of noise reduction or low bit rate coding systems

## 2 Technical Requirements – Video

### 2.1 Standard Definition Format

All material delivered must be:

- **720 x 480 pixels in an aspect ratio of 4:3 Standard Definition (NOT FHA, Full Height Anamorphic)**
- **29.97 frames per second interlaced - commonly known as 480i/29.97**
- **Color sub-sampled at a ratio of 4:2:0**

#### Post-production

Electronically generated moving graphics and effects (such as rolls, DVE moves, wipes, fades and dissolves) must be generated and added as interlaced to prevent unacceptable judder.

#### Film motion or 'film effect'

Only film effect processes that attempt to maintain the full resolution of the original are acceptable. Straight field duplication is not acceptable. Where film motion is a requirement the use of progressive capture is the preferred method.

#### Field dominance

Field dominance must always be **Lower Field First**

## 2.2 Video Levels and Gamut (illegal signals)

Standard Definition digital signals will be assessed according to the recommendation **NTSC RS170A**

Video levels must be received within the specified limits so that the program material can be used without adjustment. Any signal outside the specified limits is described as a gamut error.

### Measuring signal levels

Digital video levels are usually measured with a device which displays a trace like a traditional waveform monitor. This gives readings in mV (emulating an analog signal), or as a percentage of the allowable levels.

The limits of signal levels are defined by reference to a nominal black level and a nominal white level.

Black level comprises R, G and B all at zero (or 0% or 0mV) and white level is all three components at 100% or 700mV.

In a picture signal, each component is allowed to range between 0% and 100% (or 0mV and 700mV).

### Tolerance of out of gamut signals

In practice it is difficult to avoid generating signals slightly outside this range, and it is considered reasonable to allow a small tolerance, which has been defined as follows:

- **RGB (color) components must be between -5 % and 105% (-35 and 735mV)**

- **Luminance (Y) must be between -1% and 103% (-7mV and 721mV)**

Slight transient overshoots and undershoots may be filtered out before measuring, and an error will only be registered where the out of gamut signals total at least 1% of picture area. Many monitoring devices are designed to detect errors to this specification.

## 2.3. Aspect Ratio

All programs must be delivered in 4:3 (1.33:1) aspect ratio, with video programming full screen in 4:3 (1.33:1) or 16:9 (1.78:1) letterboxed within the 4:3 Frame.

### Active Picture Width

Active picture width is 720 pixels. All aspect ratio calculations are based on this number.

### Floating images

Short sequences of images surrounded by black borders, (floating images), may be used for artistic effect. Note however, that 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.

### **‘Letterbox’ format**

‘Letterbox’ format material is acceptable at the discretion of the Director of Media Services.

### **Notes regarding Full Height Anamorphic (FHA) material**

Full Height Anamorphic (FHA) is a technique used by publishing systems such as Apple’s Compressor to allow 16:9 aspect ratio material to be published on a standard DVD. The actual video raster size is 720 x 480, however, the video program material is “squeezed” horizontally into this smaller size. It is designed to then be played back with a compatible DVD player that will “unsqueeze” the program material into its original 16:9 format for playback on a widescreen display. The result of this “squeezing” is a distorted video image when played back on systems that cannot “unsqueeze” the FHA material.

Producers who wish to submit program material for telecast that is in 16:9 aspect ratio must submit it in “letterbox” format.

The telecast systems at Fayetteville Public Access Television are NOT compatible with FHA material. Any programs that are submitted on DVD in FHA mode will be rejected and given back to the producer to be re-submitted in a manner that is compatible with the telecast system and in compliance with these technical standards.

## **2.4 Archive Material**

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

### **General quality - archive**

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 color grading, dropout repair, or audio equalization)

### **Aspect ratio - archive**

Archive material should be adjusted/zoomed to fill the 4:3 raster where possible without compromising the image quality or composition, otherwise it may be presented in a letter-box format, which:

- must be centrally framed in the 4:3 raster,
- must show no geometrical distortion,
- must have clean and sharp letter-box edges (i.e. any video or film edge artifacts may need to be blanked)
- must be black outside the active picture

Note however, that consumer TV sets operating in Auto Zoom / Auto mode may enlarge the picture to fill the screen. The resulting unpredictable zooming can be annoying for the viewer and undermine the artistic intent.

### **Safe areas - archive**

Any captions or text already in the archive material should be kept within the caption safe area if possible, but if not, should be noted in notes on the Playback Request Form.

## **2.5 Use of HD material**

Some standard definition programs will contain material from high definition sources. Particular care must be taken to deliver the best possible quality of down-converted material.

## **2.6 Film Acquisition**

To avoid causing problems with transmission encoding film should be well exposed and not forced more than one stop. Super16 film must be cleaned before transfer and de-spotted and preferably processed to remove grain.

## **2.7 Safe Areas for Captions/Titles**

Captions and credits must be clear and legible and must be within the safe areas specified.

All font sizes must be legible.

Editing software such as Apple Final Cut Pro and Adobe Premiere Pro provide an overlay guide that defines Title Safe Area as an overlay guide in the editing windows.

### **Caption Safe Area Defined as (%)**

4:3 Caption/Titles safe area = 65% of Active Width/90% of Active Height

At the discretion of the Director of Media Services, some programs may be excluded from this requirement.

## **2.8 Standards Conversion**

When standards-converted material is included in a program, Motion Compensation (sometimes known as Motion Predictive or Motion Vector) standards conversion is required. Currently speed change is the preferred method of changing between 24fps (including 23.98) and 29.97fps standards. Due attention must be given to the audio. Use of non-linear editing platform hardware or software standards conversion is not permitted for whole programs but may be used for short inserts at the discretion of the producer.

## 3 Technical Requirements - Audio

Audio must be delivered with either stereo mix or mono mix to both Channel 1 and Channel 2 of the program audio. Split-Track audio (e.g. voice-over on one channel and music on the other channel) will not be accepted. Programs with audio present on only one channel will not be accepted.

### 3.1 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.

#### **Stereo audio levels and measurement (loudness or volume)**

Stereo program audio levels are currently measured by digital Peak Program Meters (PPM). A 1 kHz test tone should not exceed -18 dB (standard zero level) as measured on a digital audio meter. Audio average reference level is -6dB on a digital audio level meter. The Maximum Program Level must never exceed 0dB as measured on the digital audio level meter.

#### **Stereo phase**

Stereo program audio must be capable of being mixed down to mono without causing any noticeable phase cancellation.

### 3.2 Audio to Video Synchronization

The relative timing of audio to video should not exhibit any perceptible error. Audio must not lead or lag the video by more than 5 ms, unless necessary for artistic intent. This must be noted on the Playback Request Form.

## 4 Delivery Requirements

### 4.1 Media

All programs must be delivered on either standard definition video DVD (120mm only) or in MPEG digital file format on standard digital storage media (e.g. CD, DVD, SD, SDHC, CF, etc.)

### 4.2 Format Requirements

Programs that do not meet the following requirements will be rejected and returned to the producer for correction and resubmission.

**All programs must meet the following format specifications:**

- MPEG-2 - Program Stream **ONLY**  
**NOTE: "Transport Stream" is NOT acceptable.**
- **Aspect ratio:** NTSC 4:3
- **Resolution (pixels):** 720 x 480 (Horizontal x Vertical)
- **Frame rate:** 29.97 fps

- **Maximum bit rate:**

This setting is dependent upon the editing/encoding system you are using:

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- **Structure:**

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- **Audio encoding:** 44.1 KHz sampling frequency  
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