Content Delivery Requirements - Technical Specification

1.0 - Introduction

This specification covers delivery requirements for content delivered to the Pac-12 Networks, as files or on physical media. It includes high definition and standard definition content. Whenever possible, all content should be delivered according to the Pac-12 "house" specification, listed below.

MPEG2, XDCam, HD422, 1080i (1920x1080), 29.97, 50 Mbps (CBR) with PCM audio

1.1 – Content Files

Media files should be delivered directly to the Pac-12 Networks via the Pac-12 FTP Server: **ftp.p12e.net**, Port: 21. Suggested FTP clients are: Filezilla or Cyberduck. If a sender needs access to the site they should send a request to: ftp@pac-12.org . Each request must contain the following information.

Name/Company & Requested username
Requested account expiration timer (default 30 days)
Requested data quota (default 10 Gigabytes)
Email address to send account credentials

1.2 – Physical Media

All content being delivered on physical media (such as videotape, XDCam optical drives or hard drives) must be delivered to the Pac-12 Network's Technical Operations Center in San Francisco for quality control and ingest. See section 6.0 for complete details.

1.3 – Deadline

All files and physical media must be delivered a minimum of 72 hours in advance of the air date.

2.0 – Content Delivered as 1080i Files

All content delivered as 1080i or 720p files shall comply with Table 1:

Table 1: 1080i & 720p File Delivery Requirements

Description	Requirement
Frame rate	29.97
MPEG2 Video Size	50 Mbps CBR
File Extension	.mxf
Video Resolution	Full raster 1080i 1920x1080 Full raster 720p 1280x720
GOP	Long GOP (GOP size = 30 or 15, P frame distance = 3)
Chroma Subsampling	4:2:0 or 4:2:2
Audio	16 or 24 bits PCM Sampled at 48kHz
Target loudness dial norm value -24 LFKS, ±2dB. Per ATSC A/85 (Section 6) standards.	
Closed Captioning	EIA608 in a 708 Packet
PMT PID	0x01E0 (480)
Mux PID	0x01E1 (481)
Video PID - includes the PCR	0x01E1 (481)
Audio PID (1st pair)	0x01E2 (482)
Audio PID (2nd pair) REQUIRED	0x01E3 (483)
First frame of video	At the start of the file (01:00:00)
Black/silence video padding	1 seconds at beginning and end

3.0 - Content Delivered as 480i Files

This section covers any content delivered as standard definition files (please note that Pac-12 Networks is an HD facility and that SD program material should be avoided whenever possible). These files must comply with the specifications in Table 3:

Table 2: 480i File Delivery Requirements

Description	Requirement
Frame rate	29.97
MPEG2 Video Size	15mbps CBR
File Extension	.mpg
Video Resolution	720x480
GOP	Long GOP (GOP size = 30 or 15, P frame distance = 3)
Chroma Subsampling	4:2:2 preferred
Audio	16 or 24 bit PCM Sampled at 48kHz
Target loudness dial norm value -24 LFKS, ±2dB. Per ATSC A/85 (Section 6) standards.	
Closed Captioning	EIA608 in a 708 Packet
PMT PID	0x01E0 (480)
Mux PID	0x01E1 (481)
Video PID	0x01E1 (481)
Audio PID (1st pair)	0x01E2 (482)
Audio PID (2nd pair)	0x01E3 (483)
Audio PID (3rd pair)	0x01E4 (484)
First frame of video	At the start of the file (01:00:00)
Black/silence video padding	1 second at beginning and end

4.0 – Physical Media Delivery

This section covers the requirements for content delivered on physical media. All content that is delivered on physical media must conform to the specifications below.

All physical assets must be delivered only to the Pac-12 Network's Technical Operations Center the mailing address is below; and the telephone contact is 415 580 4450.

> PAC-12 Networks Attn: Patrick Phillips
> 370 3rd Street, Third Floor
> San Francisco, CA 94107

4.1 – Hard Drives

Physical Media Hard Drives – If the content is delivered on a hard drive, all drives submitted to Pac-12 Enterprises must be formatted in FAT32 or NTFS or MAC OSX (HFS+) with USB 2.0 or Firewire connectivity. Hard drives submitted must have a label attached that identifies the owner, an email and telephone number and a return shipping address. Media files on the drive must conform to file specs listed above, in Tables 1 & 2.

4.2 – Optical Disk

XD Cam – XD Cam optical disks are also acceptable delivery media. Media files on the drive must conform to file specs listed above.

4.3 – Videotape

Physical Media Videotape - Accepted videotape formats are restricted to HDCAM (for HD), DVC-PRO, and Digital Betacam (for SD). If possible, each piece of content or program shall be on one videocassette.

Physical media specifications and deliverables.

Time Code Specifications
a.   Drop frame time code only.
b.   First frame of video begins at time code 01:00:00.

Video Format Specifications
a.   All HD content shall be provided on HDCam videotape, in 1080i format with a field rate of 59.94 Hz.
b.   All SD content shall be provided on Digital Betacam videotape, in 480i format with a field rate of 59.94 Hz.
c.   Programs available with closed captioning must be delivered with captioning.

HD Audio Track Identification/Assignments - The program master audio tracks shall be assigned in one of two ways, as follows:
a.   Track 1 – Left Stereo Channel
         Track 2 – Right Stereo Channel
         Alternate – Mono on Track 1&2

b.   Track 3 – Secondary Audio, Left Stereo Channel
         Track 4 – Secondary Audio , Right Stereo Channel
         Alternate – Secondary Audio Mono on Track 3&4

    Or

a.   Track 1 – Left
         Track 2 – Right
         Track 3 – Center
         Track 4 – Low Frequency Effects
         Track 5 – Left Surround
         Track 6 – Right Surround
         Track 7 – Secondary Audio, Left Stereo Channel
         Track 8 – Secondary Audio, Right Stereo Channel
         Alternate – Secondary Audio Mono on Track 7&8

SD Audio Track Identification/Assignments - The program master audio tracks shall be assigned as follows:
a.   Track 1 – Left Stereo Channel
         Track 2 – Right Stereo Channel
         Alternate – Mono on Track 1&2

b.   Track 3 – Secondary Audio, Left Stereo Channel
         Track 4 – Secondary Audio, Right Stereo Channel
         Alternate – Secondary Audio Mono on Track 3&4

c.   Average program audio level should be -20dbFS with no excursions above -10db.

Graphics - All files delivered via email or on hard drives (as configured to the specifications listed above) must be in one of the following formats: .MOV, .TGA, .JPEG, or .PNG.

Labeling & Documentation - A timing sheet, which indicates the program's format for commercial breaks, must accompany each piece of content. Additionally, each piece of media, as a minimum, must be accompanied with the following information:
- Provider Name
- Production agency or facility (as appropriate)
- Asset Name (Title)
- Version (if more than one is available and supplied)
- If material is a commercial spot - Ad-ID (ISCI)
  If material is programming content - Episode name and number
- Air date
- Purge date
- Length in hours, minutes, and seconds (TRT = HH:MM:SS)
- Closed captioning information (if applicable)
- Audio Track Identification/Assignments
- Video Format

Timing Sheet – The master tapes must include a timing sheet, which indicates the program's format for commercial breaks. A timing sheet must be delivered with each program. Timing sheets include; show title, episode number, Production Company or agency, number of reels if applicable, segment number, in time, out time, length of segment, cumulative running time and notes related to each segment.

Packaging – The master tapes must include the following elements, in order of ascending sequence as follows:
1. :30 seconds of color bars with SMPTE standard MTS audio leader
2. :20 seconds of slate with name of content, agency, duration, audio track assignments and version. If the content is an ad then additional information is required: advertiser, ad title, version, product and ISCI (Ad-ID) number.
3. :20 seconds of silent color black
4. Actual content
5. :20 seconds of silent color black

Physical Delivery – The delivery of physical media to Pac-12 Enterprises must be sent and delivered, pre-paid, see section 6.0 for mailing address

5.0 – Traffic Instructions

Traffic Instructions should be submitted at least 72 hours in advance of the air date. Instructions can be sent to AdInstructions@pac-12.org

APPENDIX A

Table3: Reference Documents

Ref.	Document name
1	ITU-R BS.1770-2 Algorithms to measure audio program loudness and true-peak audio level
2	ATSC A/53 Part 5 AC-3 Audio System Characteristics
3	CableLabs® VOD Content Specification Version 1.1

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