



CONTENT PROVIDER REQUIREMENTS

And Guide to TVN's Qualification Program V1.4

Exhibit G – MPEG-2 Encoding Specification

VIDEO

- MPEG-2, main profile, main level.
- 4:2:0 Chroma subsampling.
- NTSC 4:3 aspect ratio.
 - Optional 16:9 aspect ratio (future).
- Frame rate 23.97 for film-based source material with 3:2 pull down applied.
- Frame rate 29.97 for video-based source material.
- Horizontal Blanking shall be at zero (0) IRE.
- Component Video Content Reference Black Level shall be at zero (0) IRE.
- Time compressed/expanded content is not acceptable.

AUDIO

- 48 kHz sampling.
- Dolby Digital at 192 kbps for two (2) -channel stereos.
- Dolby Digital at 384 kbps for Dolby 5.1.
- Must conform to the ATSC standard as specified in Document A/52.
- Two-channel audio must be Dolby Stereo encoded for compatibility with Pro-Logic decoders.
- AC/3 registration descriptor must be included in the stream information contained within the program PMT.

GENERAL ELEMENTARY STREAM REQUIREMENTS

- Decoding Time Stamps (DTS) and Presentation Time Stamps (PTS) must be accurate as defined in the MPEG standard and clarified in the Technical Corrigendum 2 to that standard (ISO/IEC 13818-4:1998/Cor-2:1998).
- Each stream must start on an access unit boundary and consist of an integral number of access units.
- Each stream within the program should start without any significant leader (such as black video frames) and end without any significant trailer.

RESOLUTION

- $\frac{3}{4}$ (528x480) resolution or $\frac{1}{2}$ (352x480) resolution, at the discretion of the compressionist.

TRANSPORT STREAM REQUIREMENTS

- PCR accuracy at 27 MHz must be +/- 5ppm.
- PCRs must occur with a separation of 40 mS or less.
- The Transport Stream must consist of 188 byte packets.
- The Transport Stream must carry only a single program (SPTS).
- Encoded material shall be delivered in ONE continuous Transport Stream without discontinuities.
- The Transport Stream must start on a packet boundary and contain an integral number of transport packets.
- The Program Number Parameter value shall be one (1).

- A Program Association Table (PAT) must occur in the Transport Stream before any Program Mapping Table (PMT).
- Both PAT and PMT must be inserted in the Transport Stream greater than four (4) times a second.
- The first PCR packet must have the Transport discontinuity_indicator flag set to one (1).
- Transport packet at the start of a Group of Pictures (GOP) must have random_access_indicator set to one (1).
- The Program Clock Reference (PCR) PID must be the same as the Video Stream PID.
- A PCR time stamp must be present in any packet containing the start of a video Packetized Elementary Stream (PES) payload.

GROUP OF PICTURES (GOP) – VIDEO STREAM REQUIREMENTS

- Each GOP must be preceded by a sequence header and a sequence extension.
- Each GOP must contain an I-Frame as the initial picture frame.
- GOPs shall have an M=3.
- GOPs shall be closed to start, open after that, if needed.
- GOPs shall nominally be 12 for 24fps Film Source Material.
- GOPs shall nominally be 15 for 30fps Video Source Material.
- Video Stream must conform to the T-STD buffer model.
- Video Stream must be encoded to the ISO/IEC 13818-2 standard.
- Video Stream must not make use of any MPEG-2 Scalable Extensions (Sequence Scalable Extension, Picture Temporal Scalable Extension or Picture Spatial Scalable Extension).
- Each picture within the video stream must be carried within a single video PES packet.
- Each picture within the video stream must be encoded with a picture_structure of frame.
- Each set of sequence header, sequence extension and GOP header packets within a video stream must occur at the start of a new video PES packet that carries the PTS/DTS of the first picture in the GOP.

BIT RATE

- Video shall be encoded at a Constant Bit Rate (CBR).
- Video encode rate shall be no greater than 3.18 Mbps.
- CA and SI are not included.
- MPEG-2 Transport Stream will include the Video, English Audio and PSI Data.
- Content will be delivered as a single MPEG-2 Transport Stream.
- The output data rate shall be no greater than 3.75 Mbps. The sum of the Video and any one Audio shall not exceed 3.75 Mbps.
- If additional audio streams are included with the content, the delivered Transport Stream will have an output data rate of no greater than 3.75 Mbps, plus the bitrate associated with the additional audio tracks.
- **Note:** Comcast requests the combined Transport Stream rate with video and two channels of audio with minimal null packets should be no more than 3.375 Mbps as opposed to 3.75 Mbps.

PASSES

- Inverse telecine pass, followed by scene-by-scene encoding.

- QC cleanup, if necessary.

PIDS

- PMT PID 0x1E0 (decimal 480).
- Video PID 0x1E1 (decimal 481) includes PCR.
- Audio PID one 0x1E2 (decimal 482).
 - Optional Audio PID two 0x1E3 (decimal 483).
 - Optional Audio PID three 0x1E4 (decimal 484).
 - Additional Audio tracks shall follow the same numbering pattern.
- Content must have accurate PAT and PMT prior to delivery.
- Language must be encoded with the ISO639.2 language descriptor.
- All video PMTs must be identified with stream_type=0x02 (MPEG-2).
- All audio PMTs must be identified with stream_type=0x81 (Dolby Digital).

CLOSED CAPTIONING / ALTERNATE LANGUAGES / V-CHIP

- ANSI SCTE 20 2001 (formerly DVS157) with a future addition (dual carriage) of the ATSC A/53 closed captioning format.

SUBTITLES

- Subtitles carried in a separate PID per SCTE DVS 026.

NAMING CONVENTION

- The asset file name must not exceed 35 characters, inclusive of the .mpg extension using the following convention:

TVN Assigned Provider Prefix + Asset_ID + Underscore (_) + File Type (movie, promo, or photo)
+ Extension (.mpg, .bmp, etc.)

For Example: HGTV00112233445566778899_movie.mpg

NOTE: Manzanita Systems Multiplexer Users: TVN recommends the use of RAI = Yes, PESAlign = Yes, and, NoEmptyAF = Yes in your configuration files. This is due to some Affiliates' VOD configurations not being able to handle content without this specific setting. For more information refer to your Manzanita Owner's Manual.