



APTN TECHNICAL PROGRAM DELIVERY STANDARDS (TV COMPONENT)

1. HIGH DEFINITION - TAPE FORMAT

a) High Definition Standards

All HD programs must be produced with an aspect ratio of 16:9. The video signals, whether originating from video cameras or Telecines, must comply with either SMPTE 274M or SMPTE-296M-1997 standards for HD Programs. HD programming shall be delivered on HD CAM video cassette tapes or XDCAM HD disks with a 1080i / 59.94 interlaced video field rate and using 4:2:2 chroma sampling.

Programs submitted for broadcast on APTN HD must be shot in formats acceptable to APTN HD, using broadcast quality media.

The following video recording formats are considered acceptable for shooting and edit mastering. However, please note that, as a delivery format, APTN will **only** accept HD CAM tapes or XDCAM discs at 1080i 59.94 with 4:2:2 chroma sampling.

HD Formats	Film Formats	Acceptable Upconversion Formats (with restrictions)
<ul style="list-style-type: none"> • Sony HD CAM • Sony HD CAM SR • Panasonic DVC PRO 100 mb HD • Panasonic HD-D5 (film transfers) • XD HD CAM 4:2:0 • XD HD CAM 4:2:2 • Panasonic P2 HD 	<ul style="list-style-type: none"> • 35 mm Film • 70 mm Film (IMAX) 	<ul style="list-style-type: none"> • Sony Digital Betacam • Sony Betacam SP • Sony MPEG IMX 50 mb (tape or XDCam) • Panasonic DVC Pro 50 (tape) • Panasonic P2

Other broadcast grade formats are introduced from time to time which may also prove acceptable. Additionally the above recording formats may be used with different camera heads e.g. Red, Hitachi, Ikegami and Thompson GVG.

APTN does not intend to promote any particular production format but we do recommend 4:2:2 chroma sampling with at least 50Mb/s recording. We recommend cameras with 3-chip 2/3 inch sensors but consider ½ inch sensors generally acceptable. Producers should bear in mind the demands of all their potential customers when considering HD production equipment purchases.

b) Use of HDV™ and “PRO-SUMER” Format

Use of visual sequences originated on HDV™ and other “Pro-sumer” formats generally will not be accepted within an HD program unless unusual circumstances warrant its use; for example, shooting in high-risk conditions which are dangerous to either the cameraman or the camera itself. **The use of any such material must be discussed with and approved by the regional Program Manager in advance.** (See Appendix B for a brief explanation of why HDV and Prosumer recording formats are only allowed in limited circumstances.) Programs may not contain any more than 15% HDV footage. The combined percentage of HDV and SD up-converted footage shall not exceed 25%.

c) Use of SD Material in HD Programs

Use of native SD visual sequences, including NTSC, PAL or SECAM, or ITU-BT R.601 digital video, is accepted only in special cases; for example, insertion of archival material. The producer shall inform APTN of, among other things, the total anticipated length of up-converted SD video material to be inserted into the HD program, and clearly justify its use. **Any use of SD sequences in an HD program must be discussed with and approved by the regional Program Manager in advance.**

When the use of 4:3 SD materials is essential and has been approved by APTN, two basic modes of aspect ratio conversion may be used: pillar-box and top-bottom crop.



In all cases of SD to HD up-conversion:

- No alteration of horizontal versus vertical proportions (geometric distortion) will be tolerated. Conversion by horizontal stretching is therefore prohibited.
- Care must be taken to ensure that the main elements of the original 4:3 composition (e.g., principal action, graphic) are preserved.
- A maximum of 25% non-HD material is allowed in production, with no more than 1 minute of continuous non-HD footage in any sequence.

2. STANDARD DEFINITION - TAPE FORMAT

a) Standard Definition Standards

All SD programs must be produced with an aspect ratio of 16:9 letterboxed. The video signals will conform to SMPTE Specification 259M. The broadcast masters submitted to APTN must be free of physical defects such as creases drop-outs, etc. These masters must be produced on properly maintained and aligned machines. SD programming shall be delivered on either XDCAM SD disks, Digital Betacam or Betacam SX with a 29.97 fps and using 4:2:2 chroma sampling.

3. PROGRAM LENGTH AND COMMERCIAL BLACKS

Duration of taped or live programs for broadcast will be:

22:00 minutes (3 segments) for a half-hour program (with 2 commercial breaks)
45:00 minutes (6 segments) for a one-hour program (with 5 commercial breaks)
70:00 minutes (8 segments) for a 1.5 hour program (with 7 commercial breaks)
94:00 minutes (10 segments) for a 2 hour program (with 9 commercial breaks)

Commercial Breaks should be laid in real-time or have a real-time duration of no less than 10 seconds of black between program segments. All commercial break locations are to be clearly identified on the accompanying videotape cue sheet. Please refer to Appendix C.

Standards for format and actual lengths of programs are determined by the Programming Department, and can change yearly. The Programming Department should always be consulted to confirm status of current and up to date standards.

4. DELIVERY SPECIFICATION

a) Time Code

The Vertical Interval Time Code (VITC) must match the Longitudinal Time Code (LTC) for the entire length of the tape. Each program tape must have continuous control track and drop-frame timecode from tape head to tape end. The time code shall be compliant with SMPTE standard 12M-1999 and follow SMPTE recommended practices RP188 and 196.

The actual program start must have time code starting at 10:00:00:00.

E.g. Bars & Tone =	09:59:00:00 to 09:59:30:00
Visual Slate =	09:59:30:00 to 09:59:40:00
Black =	09:59:40:00 to 09:59:50:00
Countdown =	09:59:50:00 to 10:00:00:00

Prior to the start of program, key information will be presented on tape as follows:

b) Bars & Tone

Thirty seconds of SMPTE colour bars and 1 KHz tone at -20 dbfs digital, or +4 dbm analog, as reference at the head of each tape or program. The colour bars, in HD 16:9 format, shall be compliant with the SMPTE recommended practice RP 219-2002. The colour bars should be generated from a test generator in the edit suite that produced the final edit, and to which the edit suite has been calibrated. The colour bars must not be generated by the internal test generator of the recording VCR.

c) Visual Slate

All programs will be identified on tape with a 10 second visual slate, indicating;



- Series title
- Program title
- Program start time code & duration
- Language of the broadcast including which audio channels if more than one language
- Audio is Stereo or Surround sound

d) Countdown

Use of a 10 second countdown leader immediately before the start of program is suggested. Countdown starts at 10 and dips to Black at the 2-second mark. Program follows immediately after. If countdown is not used, Black should be used for 10 seconds prior to program start.

All tapes will be **clear of false starts**. Beginnings and endings of programs will be clearly established and identifiable.

e) Tape Labeling

All videotapes shall be properly labeled on both the cassette and the container. The **cassette label** shall indicate the following information:

- Producer Name
- Series Title
- Program Title
- Reel number of however many reels
- Audio track allocation
- Video format identification
- Whether master or dub of master
- Duplication Facility
- Closed Caption info and Described Video info, as applicable

A Videotape Cue Sheet detailing the actual contents of each tape, with program lengths and technical notes relating to the program, must accompany the tape when it is delivered to APTN for airing.

5. CLOSED CAPTIONING

All Programs must be delivered with closed captioning. Pop-up captions are required and are defined as a phrase or sentence that appears on the screen all at once (not line by line) and stays visible for a few seconds then disappears and is replaced by another full caption. Captions should be timed to synchronize with the Program, and are placed on the screen in order and in a manner that assists in identifying the speaker.

Closed captioning and V-chip information shall conform to SMPTE Standard 334M-2000. APTN's reference device for verification of CC integrity is the Evertz 7760CCM-HD closed caption decoder.

No EIA 608 type of closed caption signal, as usually found on line 21 in SD video, shall be present in the HD video signal, either in the active video area or on vertical interval. Lines 21 and 584; these are the top lines of the active picture area in HD video signals.

6. INDIGENOUS LANGUAGE (IF APPLICABLE)

a) Language Masters Formats & Deliverables

Language masters should abide by the same video and audio specifications listed listed above. Depending on the original language in which the program(s) was produced, language masters consist of a voice over with English subtitles or French subtitles. On-screen subtitles should be keyed into the video. Under no circumstances should the monitor output of a closed caption encoder be used to record a closed caption text box in the program video. Subtitled video programs do not require closed captioning in the same language as that of the subtitles. Please consider your backdrop when subtitled and avoid font color(s) blending into the background.



7. AUDIO SPECIFICATION FOR PROGRAM TYPES

DOCUMENTARY AND CHILDREN & YOUTH PROGRAMS*

Unless discussed with and approved by the regional Program Manager in advance, the audio mix provided shall be in stereo and it must conform to the channel allocations listed in Section 10. **The use of surround sound mix must be discussed with and approved by the regional Program Manager in advance.** In the special cases where the program contract allows for a surround sound audio mix, please refer to **Appendix "A"**. If the contract calls for more than one primary broadcast language, each version must be sent on a separate tape synched and striped with identical time code. * Note, certain Children & Youth programming fall under CRTC Category 7 which will require audio descriptive video.

DRAMA AND MUSIC & VARIETY PROGRAMS (SEE APPENDIX "A")

Unless discussed with and approved by the regional Program Manager in advance, the audio mix provided shall be in Surround Sound and it must conform to the channel allocations listed in **Appendix "A"**. **The use of a stereo sound mix must be discussed with and approved by the regional Program Manager in advance. In those special cases please refer to section 10.**

8. GENERAL AUDIO SPECIFICATION

a) Standard Audio Reference Level

The APTN digital audio reference level is set at -20dBFS as defined in SMPTE recommended practice RP 155-2004. It corresponds to an analog alignment level of +4dBu. The reference tone level shall be consistent with the recorded program. In other words program audio levels should average out at approximately -20dBFS with occasional peaks at -10dBFS.

b) Program Loudness

In 2012, The CRTC implemented policies to regulate the perceived loudness of both advertisements and program content. Loudness is a perceptual quality rather than an actual level measurement. International standards have been created to ensure a standard, repeatable method of measuring, known as ITU-R BS 1770. Besides giving a value to the loudness of the content, these tools also provide a true peak reading of the audio level. We recommend that producers adopt an ITU BS 1770 compliant measuring tool to ensure their programs audio content achieves a target loudness level of -24 LKFS +/-2 LU, (Loudness units, K weighted below Full Scale) and that true peak levels (measured by the same BS-1770 compliant tool) do not exceed -2 DBFS. It is especially important to monitor levels for all program elements. Please note this applies to both surround sound and stereo audio masters. Stereo will simply perform the measurement over only two channels.

c) Subjective Audio Quality

- The audio program shall be produced with reproduction in a domestic environment in mind.
- The entire audio program shall be of superior quality, free of all noise and interference (buzz, hum, distortion, excessive sibilance)
- The entire audio program shall have an acceptable dynamic range. A compression rate sufficiently high to adversely affect the sound quality will not be accepted.
- The tonal quality of the audio shall be natural and pleasant.
- Dialogue must remain intelligible throughout the entire audio program.
- Audio-video synchronization shall be maintained throughout the program. The maximum tolerable misalignment of sound and picture shall be ± 16.6 ms (+ or - one field at 29.97 fps).
- The described video (audio) level shall be similar to the main program level. Each stereo program mix must be tested for proper phasing so that viewers with older monaural sets can still receive acceptable audio.

9. DESCRIPTIVE VIDEO

All programs certified under the following CRTC categories must include audio descriptive video: 2b Long Form Documentary, 7 Drama/Comedy, 9 Variety, 11a General Entertainment and Human Interest, 11b Reality, and programs targeted at children. APTN will accept either a monaural mix on Audio Channels 3 or a stereo mix with the left total on channel 3 and right total on channel 4.



10. STEREO MIX SPECIFICATIONS

Where a stereo audio program delivery has been agreed to, it must be consistent throughout (with the exception of leaders and black segment delimiters). Stereo audio must be fully mono compatible and producers should perform a monaural check of their stereo mix. The audio channels must be in the proper phase. When the left and right stereo channels are actively combined to mono there should be no discernible change in audio level or fidelity. The audio track layout shall conform to the following table. If more than one primary language is called for in the contract, a separate tape will be required for each language. A separate monaural alternate language (SAP) may be included on each master tape, on channel 4. This will give viewers unfamiliar with the primary broadcast language a second option.

Stereo Master Channel Allocations
Channel 1 - Program left (Lt or Lo)
Channel 2 - Program right (Rt or Ro)
Channel 3 – Described Video mono or Ltl
Channel 4 – Described Video Rt (if applicable)

11. NON-COMPLIANCE

Written approval from APTN prior to broadcast will be required in circumstances where programs produced do not adhere to or meet ANY of these technical standards and parameters. Further, Programs that do NOT comply with these standards may be required to deliver separate SD masters, at APTN's request, at no further expense to APTN, and at APTN's sole option.

12. APTN RIGHT OF REFUSAL

Notwithstanding the technical specifications contained above, APTN reserves the right to reject any submitted program tape whose **perceived** or **subjective** technical quality is judged to be unacceptable.

13. UPDATES TO PROGRAM DELIVERY SPECIFICATIONS

APTN reserves the right to periodically review and modify this specification. Before submitting new programming, please check with your representative to confirm you have the latest version.

14. BROADCAST MASTER TAPE DELIVERY

All program tapes will be delivered to **APTN's Winnipeg facility**, in compliance with the delivery dates as defined in Term Sheet of the Program Production and License Agreement.

APTN
339 Portage Avenue, Winnipeg, Manitoba CANADA, R3B 2C3
Attention: Scheduling and Creative Services
Tel: (204) 947-9331



APPENDIX A

SURROUND SOUND MIX SPECIFICATIONS

All programs produced in Surround Sound **must deliver in both High Definition and Standard Definition formats.**

If the HD program contract calls for a surround sound audio mix delivery to APTN, the audio should be mixed directly from basic tracks in a proper surround sound monitoring environment. Passing a stereo mix through an up-mixing processor is not recommended since many give unpredictable results and consequently may cause the tape to be rejected by APTN.

High Definition Surround Sound masters must have the tape (or disk in the case of XDCAM masters) audio tracks laid out as per **Table "A"**. The audio channel assignments **within** the Dolby E stream on tracks 3 and 4 shall conform to **Table "B"**. The video to audio timing reference must be advanced by two frames to compensate for the Dolby E encode and decode processes. APTN does not accept AC3 encoded audio, and cannot accept HD CAM SR masters.

Standard Definition masters must have the tape (or disk in the case of XDCAM masters) audio tracks laid out as per **Table "C"**. Likewise since some HD programs will be down-converted and down-mixed for broadcast on Standard Definition channels, the program supplier must also test his surround sound audio mix in a total down-mix to monaural sound for those viewers viewing on a simple television set. Each surround sound audio mix shall be tested for acceptable quality reproduction in a stereo down-mix for viewers with stereo-only systems.

If the contract calls for more than one primary broadcast language, each version must be sent on a separate tape synched and striped with identical time code.

TABLE "A" HD Surround Master	TABLE "B" Dolby E Channel Assignment	TABLE "C" SD Master Mix
Channel 1 - Left Total Channel 2 - Right Total Channel 3 - Dolby E (see Table B) Channel 4 - Dolby E (see Table B)	Channel 1 - Left Front Channel 2 - Right Front Channel 3 - Center Channel 4 - LFE Channel 5 - Left Surround Channel 6 - Right Surround Channel 7 - Descriptive Video or Left total Channel 8 - SAP or Right total	Channel 1 - Left Total Channel 2 - Right Total Channel 3 - Descriptive Video Mono or Lt Channel 4 - Descriptive Video Rt (if applicable)

APPENDIX B

BROADCAST PRODUCTION FORMATS VS HDV AND PROSUMER PRODUCTION FORMATS

B.1.1 Resolution

Broadcast HD sensor resolution is 1980x1080 for 1080i or 1080p and 1280x720 for 720p. For HDV the sensor resolution are 1440x1080 and 1280 x 720 respectively. To get to proper bit rate for 1080i or 1080p, interpolation is required.

B.1.2 Sensitivity

The sensors for broadcast cameras are usually 2/3 inch (diagonal). The best prosumer cameras use 1/2 sensors resulting in a 50% (or one f stop) drop in light gathering ability. The remaining prosumer cameras and virtually all consumer cameras use 1/3 inch sensors. This results in two f stops reduction in sensitivity from broadcast grade. This reduction in sensitivity not only affects the ability to shoot in low light but it also affects the dynamic range of the camera. In a high contrast scene, either the blacks get crushed or the highlights get clipped. Additionally the lenses on these cameras are not usually changeable, have smaller apertures than broadcast grade cameras, and don't use the best quality glass, thus further compromising sensitivity.

B.1.3 Compression

To record HD video all camera recorders need to compress the video data to manageable levels. HD Broadcast cameras sample luminance information (Black and white) at 74.25 Mhz and two color channels of color information at 37.125 Mhz.each. This is known as 4:2:2 full bandwidth video Full bandwidth HD video requires 1.5 billion bits per second. A 16Gbyte memory card costing \$100 would only last a minute and a half. Even an XDCAM disc holds only 50 GBytes and would last only 5 minutes. To save 25% of the bandwidth off the top, Prosumer and HDV cameras sample the chroma channels every second frame. This is known as 4:2:0 but is still too high a bit rate to be practical. All classes of video camera can reduce their recording data rate by applying MPEG2 compression. HDV cameras record at 20 to 25 Million bits per second. Prosumer cameras can record at up to 35 million bits per second. Broadcast cameras generally record at 35 Mbits/sec and higher.MPEG2 compression has to be performed in real time which means it is done with hardware. The more sophisticated the hardware, the better the results.

B.1.4 Features

- HDV and most prosumer cameras do not have time code.
- They don't have external microphone inputs therefore no wireless microphone mounts.
- They don't have interchangeable lenses
- They generally made of plastic components that don't stand up as well to constant use.

It is important to consider the intended primary purpose of each class of camera. Consumer cameras are meant for consumers to record important personal and family events for a very limited audience. Prosumer cameras are intended for corporate videos, professional wedding videos, community college training, etc. The audience is larger and has higher expectations.

Broadcast cameras are meant for broadcast use. The audiences are very large, the programs will be played many times, and the expectations of the customer are very high.



APPENDIX C

Videotape Cue Sheet

This Cue Sheet must be included with all Masters submitted (one per Master).

Production Co. name:		Phone #:
SERIES/SHOW TITLE:		Season #:
EPISODE TITLE:		Episode #:
Language Version:	<input type="checkbox"/> English <input type="checkbox"/> French <input type="checkbox"/> Other: _____	
Format:	<input type="checkbox"/> HD <input type="checkbox"/> SD <input type="checkbox"/> Letterbox <input type="checkbox"/> Pillarbox <input type="checkbox"/> Centre Cut <input type="checkbox"/> Full Screen <input type="checkbox"/> SD Safe	
Additional Features:	<input type="checkbox"/> Closed Captions <input type="checkbox"/> Open Captions <input type="checkbox"/> Subtitled <input type="checkbox"/> Descriptive Video <input type="checkbox"/> Stereo Audio <input type="checkbox"/> Dolby E 5.1 Audio <input type="checkbox"/> Other Audio: _____ <input type="checkbox"/> Audio DB Levels _____	
APTN MC Operator Initials: _____ Date: _____ <input type="checkbox"/> Disclaimer Required		

Special Instructions or Comments:

<u>Indicate here if a disclaimer is required, and describe where the disclaimed action occurs:</u>	
<input type="checkbox"/> Nudity	<input type="checkbox"/> Profanity or Obscene Gestures
<input type="checkbox"/> Sexual Situations	<input type="checkbox"/> Substance Abuse
<input type="checkbox"/> Violence	<input type="checkbox"/> Other: (i.e. explicit hunting scenes)

<u>Indicate here what Program Classification symbol is required:</u>	
<input type="checkbox"/> C Suitable for children 2-7.	<input type="checkbox"/> PG



	Suitable for a general audience, at the parents' discretion for younger children.
<input type="checkbox"/> C8+ Suitable for children 8 and older.	<input type="checkbox"/> 14+ Suitable for audiences 14 and older.
<input type="checkbox"/> G Suitable for a general audience.	<input type="checkbox"/> 18+ Suitable for audiences 18 and older.

Segment	Special Video & Audio Cues	Running Time	Segment Length
1		In: Out:	
Comm. Pos.#1	Black	Time:	
2		In: Out:	
Comm. Pos.#2	Black	Time:	
3		In: Out:	
Comm. Pos.#3	Black	Time:	
4		In: Out:	
Comm. Pos.#4	Black	Time:	
5		In: Out:	



Comm. Pos.#5	Black	Time:	
6		In: Out:	
Comm. Pos. #6	Black	Time:	
7		In: Out:	
Total Run Time (TRT):			



SCHEDULE "F" –
APTN TECHNICAL PROGRAM
DELIVERY STANDARDS
(DM COMPONENT)

1. DIGITAL VIDEO DELIVERABLE SPECIFICATIONS

Frame size: 1920 x 1080
Bitrate: 7000 - 8000 kbps
Format: .mp4 OR .mov
Compression type: h.264
Frame rate: same as source
Aspect ratio: same as source - no letterboxing (no black bars - horizontal or vertical)
Audio format: AAC
Audio sample rate: 48khz
Audio bitrate: 160kbps
Delivery method: hard drive or thumb drive preferred, however a data DVD is acceptable

2. WEBSITE

Any website created by the Producer as part of the DM Component shall follow industry best practices for development and release. All websites should have ".com" or ".ca" domains unless agreed upon by both APTN and the Producer. The website should be compatible with all industry-standard operating systems and web browser. In addition, all websites should be mobile compatible.

3. WEBISODES

Delivery of webisodes will follow the same guidelines for rough and fine cut delivery as described in Section 4 of the Standard Terms and Conditions and Schedule "H". Master delivery of webisodes will use the technical specifications as outlined above in this Schedule "E".

4. MOBILE APPLICATION

Any mobile application created by the Producer as part of the DM Component shall follow industry best practices for development and release. Producer shall make reasonable effort to have the mobile application available for download in all major application marketplaces.

5. NON-COMPLIANCE

Written approval from APTN prior to launch will be required in circumstances where DM Project Materials produced do not adhere to or meet these technical standards and parameters.

6. APTN RIGHT OF REFUSAL

Notwithstanding the technical specifications contained above, APTN reserves the right to reject any submitted DM Project Materials whose **perceived** or **subjective** technical quality is judged to be unacceptable.

7. UPDATES TO DM PROJECT DELIVERY SPECIFICATIONS

APTN reserves the right to periodically review and modify this specification. Before submitting new DM Project Materials, please check with your representative to confirm you have the latest version.