



# COMCAST TECHNOLOGY SOLUTIONS

## AD DELIVERY FORMAT SPECS

The following are the audio and video technical specifications for SD and HD spots submitted to Comcast Technology Solutions.

### FILE LAYOUT FOR COMCAST TECHNOLOGY SOLUTIONS

For all SD and HD spots submitted to Comcast Technology Solutions, spots must be submitted at ready to air lengths:

Spec 1	Leading Black	Slate	Black	Spot	Trailing Black
RTA	0 sec/0 frames	0 sec/0 frames	0 sec/0 frames	15 sec/450 frames, 30 sec/900 frames, 60 sec/1800 frames, 90 sec/2700 frames, 120 sec/3596 frames, 5 min/8992 frames	0 sec/0 frames
"A"	1 sec/30 frames	5 sec/150 frames	2 sec/60 frames		1 sec/30 frames
"B"	0 sec/0 frames	5 sec/150 frames	2 sec/60 frames		0 sec/0 frames

### HD VIDEO FORMATS

	Recommended Format—MPEG	Quicktime	Quicktime
<b>Stream Type</b>	MPEG-2 TS MPEG-2 PS	Apple ProRes 422	Avid DNxHD
<b>Video Bitrate</b>	20 - 100 Mbps (CBR or VBR)	40 - 220 Mbps (VBR)	145/220 Mbps (CBR)
<b>Frame Rate</b>	29.97 (1080i), 23.976 (1080p) 59.94 (720p) **native frame rate is preferred	29.97 (1080i), 23.976 (1080p) 59.94 (720p) **native frame rate is preferred	29.97 (1080i), 23.976 (1080p) 59.94 (720p) **native frame rate is preferred
<b>GOP Structure</b>	Closed GOP	N/A	N/A
<b>Closed Captioning<sup>1</sup></b>	EIA-608 and EIA-708	EIA-608 and EIA-708	EIA-608 and EIA-708
<b>Chroma</b>	4:2:0, 4:2:2	4:2:2	4:2:2
<b>Interlacing</b>	Upper Field First (29.97), Progressive (23.976/59.94)	Upper Field First (29.97), Progressive (23.976/59.94)	Upper Field First (29.97), Progressive (23.976/59.94)
<b>Aspect Ratio</b>	16:9	16:9	16:9
<b>Width/Height<sup>3</sup></b>	1920x1080 1280x720	1920x1080 1280x720	1920x1080 1280x720
<b>Audio Type</b>	MPEG-1 Layer 2 AES (MPEG-2 TS Only)	LPCM	LPCM
<b>Typical Transfer<sup>2</sup></b>	2-40 minutes	4-90 minutes	15-90 minutes
<b>Typical Export<sup>3</sup></b>	< 1 minute	< 1 minute	< 1 minute
<b>Notes</b>	MP@HL HP@HL	ProRes 422 LT, ProRes 422, ProRes 422 HQ are all acceptable	DNxHD 145, DNxHD 220 are both acceptable

## SD VIDEO FORMATS

	Recommended Format—MPEG	Quicktime
<b>Stream Type</b>	MPEG-2 Program Stream	Apple ProRes 422
<b>Video Bitrate</b>	12 - 30 Mbps (CBR or VBR)	20 - 65 Mbps (VBR)
<b>Frame Rate</b>	29.97 23.976 **native frame rate is preferred	29.97 23.976 **native frame rate is preferred
<b>GOP Structure</b>	Closed GOP	N/A
<b>Closed Captioning<sup>1</sup></b>	EIA-608	EIA-608
<b>Chroma</b>	4:2:0; 4:2:2	4:2:2
<b>Interlacing</b>	29.97 Upper Field First 23.976 Progressive	29.97 Upper Field First 23.976 Progressive
<b>Aspect Ratio</b>	4:3	4:3
<b>Width/Height</b>	720x486/512	720x486
<b>Audio Type</b>	MPEG-1 Layer 2	LPCM
<b>Typical Transfer<sup>2</sup></b>	1-5 minutes	2-24 minutes
<b>Typical Export<sup>3</sup></b>	< 1 minute	< 1 minute
<b>Notes</b>	MP@ML, HL, HP@HL, 422@ML, HL are all acceptable	ProRes 422 LT, ProRes 422, ProRes 422 HQ are all acceptable

30s to 2m spot assuming an average bandwidth of 5 Mbps. Use <http://speedtest.comcast.net/> to give you an idea of your bandwidth. 5 Mbps is the suggested minimum bandwidth.

<sup>3</sup>Estimated time to fully export from Avid or Final Cut Pro.

<sup>4</sup>For MPEG formats, Comcast Technology Solutions supports SD closed captioning in an EIA-608 encoding. For MPEG-TS Supply the EIA-608 encoding in both ATSC A/53 user data and additionally as SCTE-20 user data (for MPEG-PS ATSC A/53 only is required). For QuickTime formats, Comcast Technology Solutions supports SD closed captioning in an EIA-608 encoding stored as a QuickTime closed captioning text track.

<sup>5</sup>For MPEG formats, Comcast Technology Solutions supports HD closed captioning in an EIA-708 encoding in ATSC A/53 user data. An additional EIA-608 encoding, also as ATSC A/53 user data, is required for backwards compatibility reasons. For QuickTime formats, Comcast Technology Solutions supports closed captioning in an EIA-708 encoding as a QuickTime closed captioning text track. An additional EIA-608 encoding also within a QuickTime closed captioning text track is required for backwards compatibility reasons.

<sup>8</sup>Comcast Technology Solutions adheres to SMPTE RP 2046-2 - title safe areas should be 90% of the width and 90% of the height of the part of the image to be extracted. Comcast Technology Solutions determines duration based on 29.97 DF regardless of source media frame rate. All content delivered over :120, should be edited and uploaded using DF.

Comcast Technology Solutions adjusts each outbound transcode to conform to receiver specifications, both audio and video.

# COMCAST TECHNOLOGY SOLUTIONS

## ADDELIVERY FORMAT SPECS

### HD/SD AUDIO FORMATS

	HD & SD	HD & SD	HD ONLY
<b>Encoding Type</b>	MPEG-1 Layer 2	AES/LPCM	AES/LPCM
<b>Number of Channels</b>	2 - Stereo	2- Stereo	6, 8, or 10
<b>PIDs/Channel per PID</b>	1/2	1/2	3/2, 4/2, 5/2, 1/6, 1/8. 1/10
<b>Channel 1</b>	Stereo Left	Stereo Left	Left Front
<b>Channel 2</b>	Stereo Right	Stereo Right	Right Front
<b>Channel 3</b>		Mono SAP (optional) <sup>7</sup>	Center
<b>Channel 4</b>		Mono VDS (optional) <sup>7</sup>	Low Frequency Effects
<b>Channel 5</b>			Left Surround
<b>Channel 6</b>			Right Surround
<b>Channel 7</b>			Lt Stereo (optional) <sup>6</sup>
<b>Channel 8</b>			Rt Stereo (optional) <sup>6</sup>
<b>Channel 9</b>			Mono SAP (optional) <sup>7</sup>
<b>Channel 10</b>			Mono VDS (optional) <sup>7</sup>
<b>Bit Depth</b>	16	16	16
<b>Bit Rate</b>	384 Kbps	1536 Kbps	1536 Kbps
<b>Sampling Rate</b>	48 KHz	48 KHz	48 KHz
<b>Instantaneous Peak Audio Max</b>	-8 dBFS	-8 dBFS	-8 dBFS
<b>Average Peak Audio Max</b>	-10 dBFS	-10 dBFS	-10 dBFS
<b>Average Levels</b>	-20 dBFS	-20 dBFS	-20 dBTP
<b>True Peak</b>	-2 dBTP	-2 dBTP	-2 dBTP

When sending 5.1 audio, the Lt/Rt pair is optional and we will automatically create the pair as a mix down of the 5.1 channels. If the Lt/Rt pair is included then we will use those and not create a mix down. Both sides of the pair must be included. If you do *not* have Lt/Rt pair do not send these channels as silence, but rather do not include these channels.

Any audio on channel 3,4 when sending stereo or channel 9,10 when sending 5.1 is assumed to be SAP and VDS. If you do *not* have SAP *and* VDS do not send these channels as silence, but rather do not include these channels. If you have SAP *or* VDS then include both channels but make the one you don't have silent (even throughout the slate - no beeps or tone during the slate). Please make sure audio levels meet FCC CALM ACT requirements.

## COMCAST TECHNOLOGY SOLUTIONS RADIO SPECIFICATION

The following are the radio technical specifications for SD and HD spots submitted to Comcast Technology Solutions.

### FILE LAYOUT FOR COMCAST TECHNOLOGY SOLUTIONS

Radio spots submitted to Comcast Technology Solutions are not checked for duration and may include slates of any length.

### RADIO FORMATS

	Recommended Format—MPEG	WAV	WAV
<b>Encoding Type</b>	MPEG-1 Layer 3 (MP3) MPEG-1 Layer 2 (MP2)	PCM	PC
<b>Extension</b>	.mp3, .mp2	.wav	.aif
<b>Number of Channels</b>	2 (Stereo)	2 (Stereo)	2 (Stereo)
<b>Bit Depth</b>	16, 24	16, 24	16, 24
<b>Bit Rate</b>	192 – 320 Kbps	1536 Kbps, 2304 Kbps	1536 Kbps, 2304 Kbps
<b>Sampling Rate</b>	44.1 KHz, 48 KHz	44.1 KHz, 48 KHz	44.1 KHz, 48 KHz
<b>Instantaneous Peak Audio Max</b>	-8 dBFS	-8 dBFS	-8 dBFS
<b>Average Peak Audio Max</b>	-10 dBFS	-10 dBFS	-10 dBFS
<b>Average Levels</b>	-20 dBFS	-20 dBFS	-20 dBFS