

Technical Standards and Documentation Guide for the Delivery of Television Commercials

June 2016



Executive Summary of Technical Standards and Documentation Guide for the Delivery of Commercials.

June 2016

There are many standards that apply to television commercial delivery to broadcasters. While this may appear daunting at first, there are a few points that summarise the key aspects. Please refer to the Technical Standards and Documentation Guide for the Delivery of Commercials, June 2016 for a detailed explanation of production and delivery requirements.

Television is a dynamic industry that is in a continual state of change. This document is subject to change without notice. Users should establish the currency of this document.

Executive Summary

Commercials can be delivered in either Standard Definition (SD) or High Definition (HD) format.

SD Commercials

These must be 576i/25 (PAL 625/50 interlaced at 25 frames per second with two fields). The minimum audio requirement is for a stereo mix (Lo, Ro), or a surround encoded stereo mix (Lt, Rt) on channels 1 & 2. Commercials can be delivered in one of the following formats: -

- **File using an approved delivery provider**
- Digital Betacam tape – by special request only.

HD Commercials

These shall be 1080i/25 (Interlaced at 25 frames per second with two fields). The minimum audio requirement is for a stereo mix (Lo, Ro), or a surround encoded stereo mix (Lt, Rt) on channels 1 & 2. Commercials can be delivered in one of the following formats: -

- **File using an approved delivery provider**
- HD-CAM SR tape – by special request only.
- HD-CAM tape – by special request only.

Multi-channel sound

Material is being increasingly preferred with 5.1 multi-channel sound. Delivery of 5.1 multi-channel sound is possible subject to the conditions specified in this document. It should however be noted that not all transmission channels or platforms have support for multi-channel sound.

Audio Peak Levels and loudness

This is becoming a very controversial topic with viewers and as a consequence, governments have been considering legislation covering loudness of television stations. The audio loudness of a commercial must be normalised to -24LKFS. Measurement should be to ITU BS.1770-3 standard and related documents. Please refer to main document for full details.

Accurate Durations

Automated file based workflows has now made it necessary to have accurate durations for all commercials, therefore all supplied commercials must be frame accurate to the designated duration.

Closed Captions

Closed captioning for both HD and SD material must be supplied as a separate data file to EBU Tech.3264-E 1991 and optionally encoded into the vertical interval. Refer to the main document for details.

Audio Description

Audio Description will be available on some transmission platforms. Refer to the main document for detailed delivery standards.

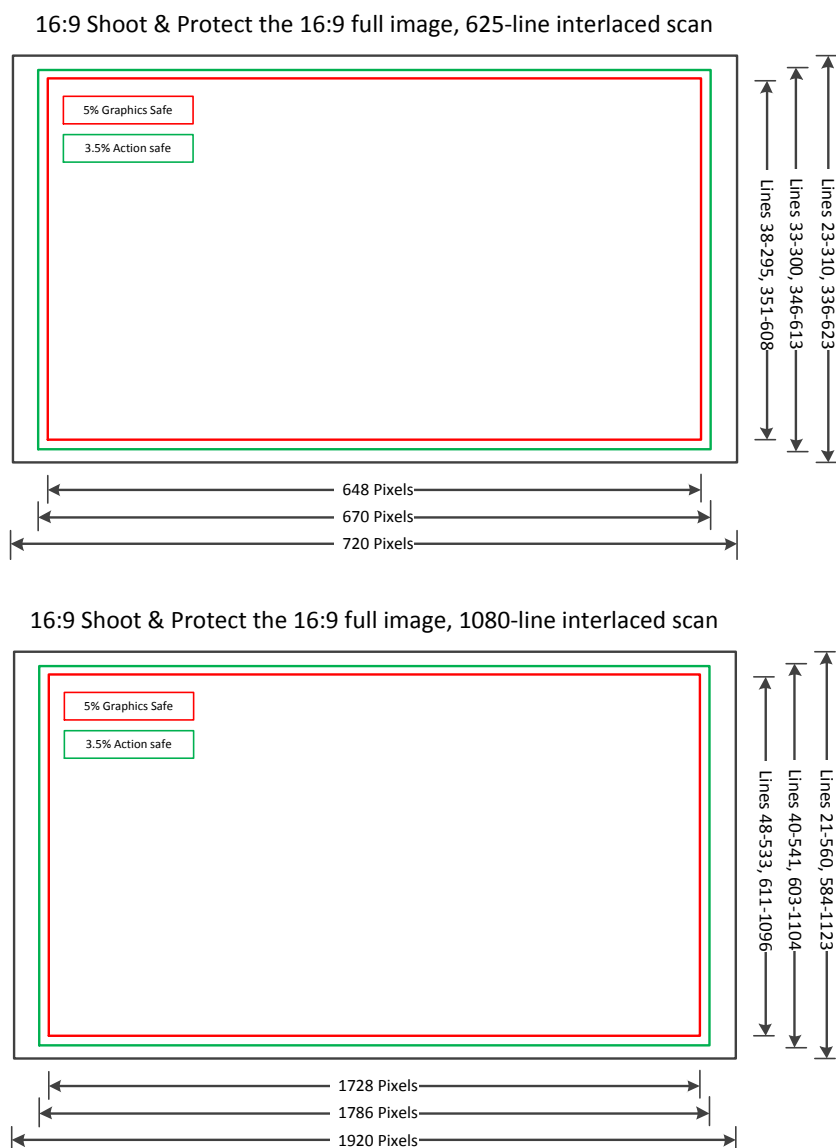
Aspect ratio

All commercials will be delivered in 16:9 widescreen. Where the original material is only available in 4:3, a 16:9 pillar boxed version is acceptable.

If the material is pillar boxed, it must fill the full height of the 16:9 frame i.e. A Postage stamped commercial is not permitted. A letter-box commercial that fills the full width of the 16:9 frame is however permitted i.e. A film production aspect ratio of 21:9 or similar.

Safe action and graphics areas

All commercials should be produced for a 16:9 action and 16:9 graphics presentation. This is an editorial decision that remains solely the responsibility of the Advertiser and Broadcasters will not reject commercials where this recommendation is ignored. Attention is drawn to Section 6 'Legal Liabilities'.



Please also refer to the sections 'Important note about safe areas' and 'Legal Liabilities'

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TECHNICAL STANDARDS AND DOCUMENTATION GUIDE FOR DELIVERY OF COMMERCIALS

June 2016

This document defines the technical standards for delivery for **Standard Definition** and **High Definition** commercials. This replaces all previous standards publications for commercial delivery.

Television is a dynamic industry that is in a continual state of change. This document is subject to change without notice. Users should establish the currency of this document.

Although this document is titled "Technical Standards" it also includes production guidelines and some delivery requirements for it to be used also as a compact reference for those charged with delivering commercials.

Introduction

The purpose of this document, and associated material, is to set out the technical requirements to ensure that material delivered is of a satisfactory standard and can be handled in an efficient manner.

All material must conform to the appropriate International Telecommunication Union (ITU), Society of Motion Picture and Television Engineers (SMPTE), European Broadcast Union (EBU), Free TV Australia and our own recommendations, standards and practises.

The fundamental requirement for commercial material is that the product delivered is of a high technical standard and quality.

External Standards Versions

Where an external standard is used or referenced, this document assumes that it relates to the latest version of that standard e.g. ITU-R 1770-3 is the third version of ITU-R 1770.

Changes

This release of the Technical Standards and Documentation Guide for Delivery of Commercials has the following significant change:-

1. Introduction of EBU-R103 as the measuring standard for 'Illegal' levels and colours in Television production in section 1.3.2. This will allow for automated checking and make the measuring standard more consistent between broadcasters.

1. General Technical Requirements

The purpose of technical specifications or requirements is to maximise the prospect that the delivered commercial material will be supplied in a form that will enable it to be used reliably, without any broadcaster intervention, and will enable it to pass through associated systems without noticeable impairment to the viewer.

1.1 Video System Standards for Standard Definition (SD) Delivery

All signals and recordings supplied shall be 4:2:2 SD 576i/25 (PAL 625/50 Interlace Standard).

Composite material shall conform to the relevant ITU Recommendations in all aspects of timing, frequency response and bandwidths.

Material will be assessed according to ITU-R BT601-5 Part A. All measurable signals are to conform to European Broadcast Union (EBU) standards. Failure to meet these standards will result either in the commercial being returned or the broadcaster repairing the commercial at the broadcasters option.

1.1 Video System Standards for High Definition Television (HD) Delivery

All signals and recordings supplied shall be 1080i/25 (interlaced).

The signal format will be 4:2:2 HD 1080i 50 fields, as per "System 2" in the EBU-Tech 3299 statement on High Definition (HD) Image Formats for Television Production.

The HD video signal also conforms to the following normative references:

- SMPTE 274M: "1920x1080 scanning and analogue and Parallel Digital Interfaces for Multiple Picture Rates".
- ITU-R BT.709: "Colorimetry".
- SMPTE 292M: "Bit-Serial Digital Interface for High Definition Television Systems".
- SMPTE 334M: "Vertical Ancillary Data Mapping"

Material will be assessed according to ITU-R BT709-5. All Measurable signals are to conform to European Broadcast Union (EBU) and ITU standards. Failure to meet these standards will result either in the commercial being returned or the broadcaster repairing the commercial at the broadcasters option.

1.3 General Technical Requirements for Commercial Delivery

1.3.1 Content Signal parameters

Content signals must correspond to the reference line-up levels. These include peak sound, maximum luminance & colour difference (Y Cr Cb) component levels, and black levels. Care must be taken to avoid illegal colours (Y Cr Cb component signals exceeding the gamut limit) which may be generated by some caption and graphics systems.

1.3.2 Video Levels and Gamut (Illegal signals) Tolerance

As it is difficult to avoid generating signals slightly outside the strict specifications of either ITU R601 or ITU R709, it is reasonable to allow a small tolerance. This has been defined as follows in **EBU Rec103**

- **RGB 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.

1.3.3 Video Line-up

Line-up signals serve to identify individual signal channels and to provide reference levels that will confirm that the content transmitted is likely to be within transmission signal limits and will be as the producer intended.

At the beginning of each tape, line-up signals consisting of at least one minute of first generation Colour Bars shall be present (for SD - 100/0/100/0 bars is preferred, but 100/0/75/0 is acceptable. HD -100/0/100/0 bars).

The start of each commercial shall be preceded by a graphical identification (Slate) and a countdown leader (optional). The Slate must show the Key number, Production house, Advertiser and product description where appropriate.

The video and audio signal levels must be related accurately to their associated line-up signals with no deviation being permitted

Line blanking level shall be used as a black reference for the commercial.

Where the commercial is delivered by file with embedded descriptive metadata present, the test signals, graphical identification and countdown are optional. Please note that the descriptive data's SOM value will need to reflect the actual start of the commercial not any included optional material.

1.3.4 Progressive and interlaced formats

Most productions prefer to use progressive to capture and edit their production. When it comes to delivering the completed content, issues can develop that were unforeseen during the production process. One of the reasons issues occur is that we expect delivery and we transmit, like the majority of broadcasters, in interlaced format not progressive. The conversion process can cause some objectionable artefacts, particularly with fast panning material (Horizontal movement) and roller captions. **It is essential that all conversions to interlaced have field 1 (also known as 'Odd' or 'Top') as the first field of the interlaced frame and that this be maintained for the length of the commercial.**

1.3.5 Flashing Images and Repetitive Patterns

Flickering or intermittent lights and certain types of repetitive visual patterns can cause problems for some viewers who have photosensitive epilepsy.

Television is by nature a flickering medium (because of the 50 Hz refresh rate of typical receivers and the 25Hz effects of interlaced scanning) and it is therefore not possible completely to eliminate the risk of television causing convulsions in viewers with photosensitive epilepsy. However steps can be taken to reduce unnecessary risks.

The following guidance on the major factors involved is provided for reference. However, the ITC guidelines should be consulted for complete information.

1. Rapidly flickering images should not change at a fast rate i.e. less than 360ms (9 frames at 25 frames per second) between each flash.
2. If brightness changes for a given area of a picture are less than 25% of screen maximum brightness then that area may be discounted.
3. In marginal cases such images should be avoided if they are positioned near the centre of the screen. Changes in colour are not a problem unless they affect the red channel substantially.
4. Prominent and regular patterns which cover a large proportion of the picture area should be avoided, especially if they represent bars, spirals, or 'dartboard patterns. Moving or flickering regular patterns are particularly hazardous.
5. Care needs to be taken also with computer generated images, which, if highly detailed can cause a high degree of 25Hz inter-line flicker in the displayed television picture. Video luminance level as measured on a waveform monitor does not simply equate to screen luminance (brightness) and cannot be used to assess brightness without correcting for Gamma.

1.3.6 Sound and Vision Synchronisation

The relative timing of sound to vision should not exhibit any perceptible error. Sound must not lead or lag vision in excess of 20ms (1 field at 25 frames per second). A sound delay of greater than 20ms can be acceptable where this occurs in context to give a perception of distance.

1.3.7 Audio channel phase relationships

All audio channels must be in phase with each other and maintain that relationship for the duration of the commercial.

1.3.8 Audio levels and loudness

The following audio Loudness requirements are aligned with Free TV Australia's OP 59 – Issue 2 Measurement and Management of Loudness in Soundtracks for Television Broadcasting. Audio Levels will be evaluated by means of two measurements:-

- Peak level
- Loudness

Please note that loudness standards are still being developed and refined and so these standards may change without notice.

The commercials audio must adhere to the following standards for all measurements: -

1.3.9 Audio Peak Levels

On all audio tracks, peak audio levels may not rise above -2 dBTP (-2 dbFS) at any point. A conventional PPM with slower responses will not produce results that satisfy these standards. Maximum true peak level is to be measured using a meter that is compliant with ITU-R BS.1770-3.

Note: Surround sound loudness is measured on 5 channels only with the LFE track excluded as per ITU-R BS.1770. Peak level measurements are however done with the LFE track included.

1.3.10 Audio loudness

The audio loudness of a commercial will be -24 LKFS. Loudness is to be measured using a loudness meter that is compliant with ITU-R BS.1770-2 or 1770-3.

1.3.11 Audio Loudness Range (LRA)

Commercials should be mixed with a dynamic loudness range that is comfortable to experience for sustained periods of time. It should not be as dynamic as those mixes used for theatre or DVDs. The loudness range (LRA) of a commercial should ideally not exceed 15LU. Loudness range shall be measured using a meter that complies with ITU-R BS.1770.

1.3.12 Table of Audio Level Specifications

Track Type	Max level (True Peak)	Loudness	Measurement Tolerance	Loudness Range
Full Mix Stereo	≤ -2 dBTP	-24 LKFS	± 1 LKFS	15LU
Surround sound Mix	≤ -2 dBTP	-24 LKFS	± 1 LKFS	15LU

Notes

dbTP db True Peak. (Equivalent to dBFS)

LU Indicates the L_k without an absolute reference.

LKFS Indicates the value of LU with reference to digital full scale.

The permitted measured deviation from the target loudness level of -24LKFS shall not exceed ± 1LKFS, except for long form programmes where exact normalisation to target level is not practicable.

Also refer to Appendix 2 - Measurement and Management of Loudness for New Zealand Television Broadcasting.

1.3.13 Audio synchronisation with encoded audio tracks

Where a commercial is supplied with encoded audio tracks such as Dolby E®, the encoded signal recorded must be advanced one (+1) frame with reference to the standard audio tracks. Note that Dolby-E is only available when tape delivery is used. **The offset in frames from the standard audio tracks must be shown on the Cue Sheet**

2. Subjective Assessment Quality Requirements

2.1 General Vision Quality Requirements

It is inherently difficult to define precisely a suitable quality video product. There may therefore be some subjective assessments or reports that may be regarded as imprecise. This is an unavoidable consequence of the rapid changes in technology.

Guidelines are as follows:

- The picture must be sharp and well lit (unless artistic considerations require otherwise).
- The video signal must be free of excessive black crushing and highlight compression.
- Transient response shall be such that streaking, ringing, smear echoes and overshoots are not noticeable.
- Moiré and other patterning shall not be visible.
- Hum, cross talk and other spurious signals must not be apparent.
- Colour rendition, especially skin tones, must be a realistic representation of the scene portrayed unless artistic considerations require otherwise.
- Video processing (e.g. effects devices) must not introduce unintentional changes to luminance and chrominance levels nor cause perceptible timing shifts on entry or exit from the effect.
- Appropriate audio or video delay must be used to compensate for lip-sync errors.
- There must be no visible contouring / artefacts caused by multiple D-A and A-D conversions. Quantisation Noise shall not be apparent.

2.2 General Audio Quality Requirements

Audio signals must be suitable for reproduction in a domestic environment. Dynamic range should be restricted and changes in loudness controlled so that the viewer has no need to adjust volume during or between programmes and commercials.

All stereo recordings must provide good mono compatibility.

The audio shall be free of spurious signals such as noise, hum and cross-talk. Sibilance, distortion and wow and flutter should not be apparent.

The audio shall not show dynamic and frequency response artefacts as a result of the action of noise reduction or low bit rate coding systems.

Audio compression should be used as little as possible as the effects of compression used for broadcast distribution and transmission can exacerbate impairments. When audio compression is used to control the dynamic range of the commercial it should be consistent with the style of the production but not to be excessive so as to cause viewer annoyance.

3. Production Delivery

3.1 Standard Definition Delivery

The preferred method is using files via one of the commercial delivery companies offering delivery services to us. Alternative delivery on Digi-betacam tape is only available by prior arrangement in exceptional circumstances. Note that the SD delivery options are at the Broadcaster's discretion.

3.1.1 File Delivery of Standard Definition Commercials, Option 1

All files will be MXF wrapped as per SMPTE 377M and related documents. Broadcasters however reserve the right to re-wrap the file into other standards for its own internal processes. The following specifications apply to the deliverable MXF file.

Operational Patterns

Acceptable patterns are: -

- OP1a – Single Item/Single package as per SMPTE 378M.

Video

The file shall have the following video essence parameters: -

Codec	IMX-30i
Compression	MPEG-2
Profile and Level	MP@HL and 422P @ HL
Video bit rate	30Mbps
GOP structure	1 – I-Frame only
Frame Geometry	720 x 576 interlace 2:1 @ 25 Frames per second

Audio

All audio will be delivered as separate mono tracks of uncompressed PCM with a bit rate of 48 KHz and a bit depth of 24 bits. Various options for channel allocation are detailed below

The minimum audio requirement is for two tracks consisting of stereo audio. The supplier may also provide discrete 5.1 sound and mix/effects tracks as required. The tracks should follow one of the options listed below, however a Broadcaster may be able to handle other track combinations:-

- 16 Audio channels. These will consist of individual mono PCM streams at a bit rate of 48 KHz and a bit depth of 24bits. SDI embedded audio compliant with SMPTE 272M. This must consist of stereo audio on channels 1&2 and optionally discrete surround audio on channels 3 through 8. The remaining 8 channels will always be silent.
- Where no audio is on a channel that channel must be present and silent.

The channel allocation of the audio will conform to one of the options detailed below.

Audio channel layout options for files (Based on EBU R48-2005 Case 11b)

Audio Description (AD) can be optionally provided as a stereo pair on channels 11 & 12 under either of the two options below;

Option 1: Stereo Audio

All commercials must have a set of Stereo audio channels.

Audio Channel 1	Left (Lo or Lt)
Audio Channel 2	Right (Ro or Rt)
Audio Channel 3-16	Silent

Option 2: Surround Audio

Audio Channel 1	Stereo Left (Lo or Lt)
Audio Channel 2	Stereo Right (Ro or Rt)
Audio Channel 3	Front Left
Audio Channel 4	Front Right
Audio Channel 5	Centre
Audio Channel 6	LFE
Audio Channel 7	Surround Left
Audio Channel 8	Surround Right
Audio Channel 9-16	Silent

3.1.2 File Delivery of Standard Definition Commercials, Option 2

Files can be either MXF wrapped or GXF (General eXchange Format (SMPTE 360-2009)) formatted depending upon the Broadcasters specific requirement. Note that MXF file versions must use Operational Pattern OP-1A.

Video

The file shall have the following video essence parameters: -

Compression	MPEG-2 Transport Stream, Program Stream or Packetised Elementary Streams.
Profile and Level	422Profile @ Main Level
Video/Audio bit rate	Minimum 15Mbps, maximum 25Mbps
GOP structure	Long GOP. Sequence header must be output for every GOP
Maximum GOP length	15
Frame Geometry	720 x 576 interlace 2:1 @ 25 Frames per second

Audio

All audio will be delivered as separate mono tracks of uncompressed PCM with a bit rate of 48 KHz and a bit depth of 24 bits. Various options for channel allocation are detailed below

The minimum audio requirement is for two tracks consisting of stereo audio. The supplier may also provide discrete 5.1 sound and mix/effects tracks as required. The tracks should follow one of the options listed below, however a Broadcaster may be able to handle other track combinations:-

- 16 Audio channels. These will consist of individual mono PCM streams at a bit rate of 48 KHz and a bit depth of 24bits. SDI embedded audio compliant with SMPTE 272M. This must consist of stereo audio on channels 1&2 and optionally discrete surround audio on channels 3 through 8. The remaining 8 channels will always be silent.
- Where no audio is on a channel that channel must be present and silent.

The channel allocation of the audio will conform to one of the options detailed below.

Audio channel layout options for files (Based on EBU R48-2005 Case 11b)

Audio Description (AD) can be optionally provided as a stereo pair on channels 11 & 12 under either of the two options below;

Option 1: Stereo Audio

All commercials must have a set of Stereo audio channels.

Audio Channel 1	Left (Lo or Lt)
Audio Channel 2	Right (Ro or Rt)
Audio Channel 3-16	Silent

Option 2: Surround Audio

Audio Channel 1	Stereo Left (Lo or Lt)
Audio Channel 2	Stereo Right (Ro or Rt)
Audio Channel 3	Front Left
Audio Channel 4	Front Right
Audio Channel 5	Centre
Audio Channel 6	LFE
Audio Channel 7	Surround Left
Audio Channel 8	Surround Right
Audio Channel 9-16	Silent

3.1.3 Tape Delivery of Standard Definition Commercials

Standard definition commercials can also be delivered on tape or disc using one of the following formats. No other tape or disc format is acceptable:-

Sony Digital Betacam

The channel allocation of the audio will conform to one of the options detailed below.

Note: - Cue sheets must list the audio channel layout.

All commercials must have a set of Stereo audio channels.

Audio Channel 1	Stereo Left (Lo or Lt)
Audio Channel 2	Stereo Right (Lo or Lt)

Stereo commercial with M&E

Audio Channel 1	Stereo Left (Lo or Lt)
Audio Channel 2	Stereo Right (Ro or Rt)
Audio Channel 3	M&E Left – If Stereo Lt/Rt then M&E Left must be Lt
Audio Channel 4	M&E Right – If Stereo is Lt/Rt then M&E Left must be Lt

Stereo plus Surround commercial within Dolby-E

Audio Channel 1	Stereo Left (Lo or Lt)
Audio Channel 2	Stereo Right (Ro or Rt)
Audio Channel 3) Dolby-E (takes up two channels)
Audio Channel 4)

3.2 High Definition Delivery

The preferred method is using files via one of the commercial delivery companies offering delivery services to us. Alternative delivery on HD-CAM SR or HD-CAM tape is only available by prior arrangement in exceptional circumstances. Please note that some Broadcasters do not accept HD commercials. Check with the relevant Broadcaster.

3.2.1 File Delivery of High Definition Commercials

All files will be MXF wrapped as per SMPTE 377M and related documents. Broadcasters however reserve the right to re-wrap the file into other standards for its own internal processes. The following specifications apply to the deliverable MXF file.

Operational Patterns

Acceptable patterns are: -

- OP1a – Single Item/Single package as per SMPTE 378M.

Video

The file shall have the following video essence parameters: -

Codec	XDCAM HD422
Sampling	4:2:2
Bit Rate	50Mbps
GOP structure	L=12 M=3
Frame Geometry	1920x1080 interlace 2:1 @ 25 Frames per second

Audio

All audio will be delivered as separate mono tracks of uncompressed PCM with a bit rate of 48 KHz and a bit depth of 24 bits. Various options for channel allocation are detailed below

The minimum audio requirement is for two tracks consisting of stereo audio. The supplier may also provide discrete 5.1 sound. The tracks should follow one of the options listed below, however a Broadcaster may be able to handle other track combinations:-

- 16 Audio channels. These will consist of individual mono PCM streams at a bit rate of 48 KHz and a bit depth of 24bits. SDI embedded audio compliant with SMPTE 272M. This must consist of stereo audio on channels 1&2 and optionally discrete surround audio on channels 3 through 8. The remaining 8 channels will always be silent.
- Where no audio is on a channel that channel must be present and silent.

The channel allocation of the audio will conform to one of the options detailed below.

Audio channel layout options for file (Based on EBU R48-2005 Case 11b)

Audio Description (AD) can be optionally provided as a stereo pair on channels 11 & 12 under either of the two options below;

Option 1: Stereo Audio

All commercials must have a set of Stereo audio channels.

Audio Channel 1	Left (Lo or Lt)
Audio Channel 2	Right (Ro or Rt)
Audio Channel 3-16	Silent

Option 2: Surround Audio

All commercials must have a set of Stereo audio channels.

Audio Channel 1	Stereo Left (Lo or Lt)
Audio Channel 2	Stereo Right (Ro or Rt)
Audio Channel 3	Front Left
Audio Channel 4	Front Right
Audio Channel 5	Centre
Audio Channel 6	LFE
Audio Channel 7	Surround Left
Audio Channel 8	Surround Right
Audio Channel 9-16	Silent

3.2.2 Tape Delivery of High Definition Commercials

High definition commercials can also be delivered on tape or disc using one of the following formats. No other tape or disc format is acceptable:-

Sony HD-CAM SR	Preferred
Sony HD-CAM	

The channel allocation of the audio will conform to one of the options detailed below.

Note: - Cue sheets must list the audio channel layout.

Acceptable Audio Channel layouts for Delivery on HD-CAM SR

All commercials must have a set of Stereo audio channels.

Audio Channel 1	Stereo Left (Lo or Lt)
Audio Channel 2	Stereo Right (Lo or Lt)
Audio Channel 11	Mixed Stereo Left and AD – Optional
Audio Channel 12	Mixed Stereo Right and AD – Optional

Stereo Commercials with M&E

Audio Channel 1	Stereo Left (Lo or Lt)
Audio Channel 2	Stereo Right (Ro or Rt)
Audio Channel 3	M&E Left – If Stereo Lt/Rt then M&E Left must be Lt
Audio Channel 4	M&E Right – If Stereo is Lt/Rt then M&E Left must be Lt
Audio Channel 11	Mixed Stereo Left and AD – Optional
Audio Channel 12	Mixed Stereo Right and AD – Optional

Stereo plus Surround Commercials within Dolby-E

Audio Channel 1	Stereo Left (Lo or Lt)
Audio Channel 2	Stereo Right (Ro or Rt)
Audio Channel 3) Dolby-E (takes up two channels)
Audio Channel 4)
Audio Channel 11	Mixed Stereo Left and AD – Optional
Audio Channel 12	Mixed Stereo Right and AD – Optional

The Dolby-E tracks will be in the following order: -

Audio Channel 1	Front Left
Audio Channel 2	Front Right
Audio Channel 3	Centre
Audio Channel 4	LFE
Audio Channel 5	Surround Left
Audio Channel 6	Surround Right
Audio Channel 7	Stereo Left (Lt)
Audio Channel 8	Stereo Right (Rt)

Stereo plus Discrete Surround Audio in Media Works and TVNZ format with Optional M&E and AD channels

Audio Channel 1	Stereo Left (Lo or Lt)
Audio Channel 2	Stereo Right (Ro or Rt)
Audio Channel 3	Front Left
Audio Channel 4	Front Right
Audio Channel 5	Centre
Audio Channel 6	LFE
Audio Channel 7	Surround Left
Audio Channel 8	Surround Right
Audio Channel 9	M&E track – Optional
Audio Channel 10	M&E track – Optional
Audio Channel 11	Mixed Stereo Left and AD – Optional
Audio Channel 12	Mixed Stereo Right and AD – Optional

Stereo plus Discrete Surround Audio in Sky format with Optional M&E and AD channels

Audio Channel 1	Stereo Left (Lo or Lt)
Audio Channel 2	Stereo Right (Ro or Rt)
Audio Channel 3	M&E track – Optional
Audio Channel 4	M&E track – Optional
Audio Channel 5	Front Left
Audio Channel 6	Front Right
Audio Channel 7	Centre
Audio Channel 8	LFE
Audio Channel 9	Surround Left
Audio Channel 10	Surround Right
Audio Channel 11	Mixed Stereo Left and AD – Optional
Audio Channel 12	Mixed Stereo Right and AD – Optional

Acceptable Audio Channel layouts for Delivery on HD-CAM

All commercials must have a set of Stereo audio channels.

Audio Channel 1	Stereo Left (Lo or Lt)
Audio Channel 2	Stereo Right (Lo or Lt)

Stereo Commercials with M&E

Audio Channel 1	Stereo Left (Lo or Lt)
Audio Channel 2	Stereo Right (Ro or Rt)
Audio Channel 3	M&E Left – If Stereo Lt/Rt then M&E Left must be Lt
Audio Channel 4	M&E Right – If Stereo is Lt/Rt then M&E Left must be Lt

Stereo plus Surround Commercials within Dolby-E

Audio Channel 1	Stereo Left (Lo or Lt)
Audio Channel 2	Stereo Right (Ro or Rt)
Audio Channel 3) Dolby-E (takes up two channels)
Audio Channel 4)

The Dolby-E tracks will be in the following order: -

Audio Channel 1	Front Left
Audio Channel 2	Front Right
Audio Channel 3	Centre
Audio Channel 4	LFE
Audio Channel 5	Surround Left
Audio Channel 6	Surround Right
Audio Channel 7	Stereo Left (Lt)
Audio Channel 8	Stereo Right (Rt)

4. Aspect Ratios and Safe Areas

All commercials will be delivered in 16:9 widescreen. Where the original material is only available in 4:3, a 16:9 pillar boxed version is acceptable.

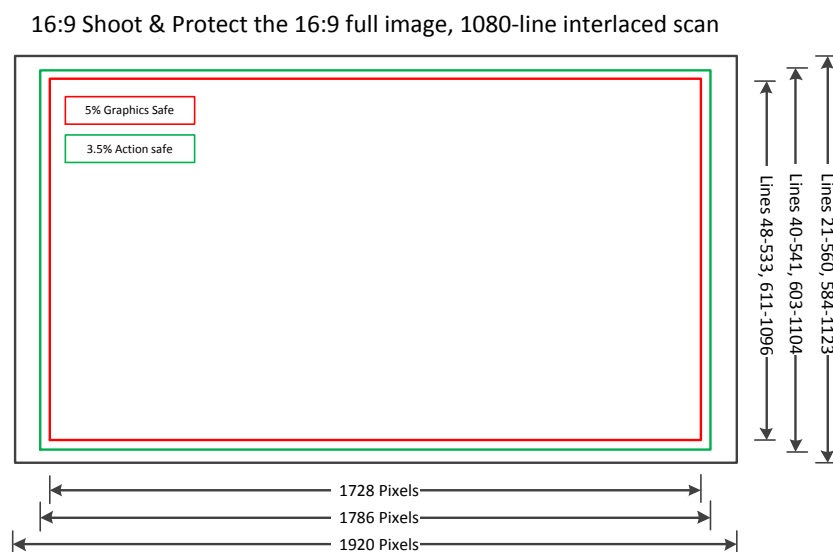
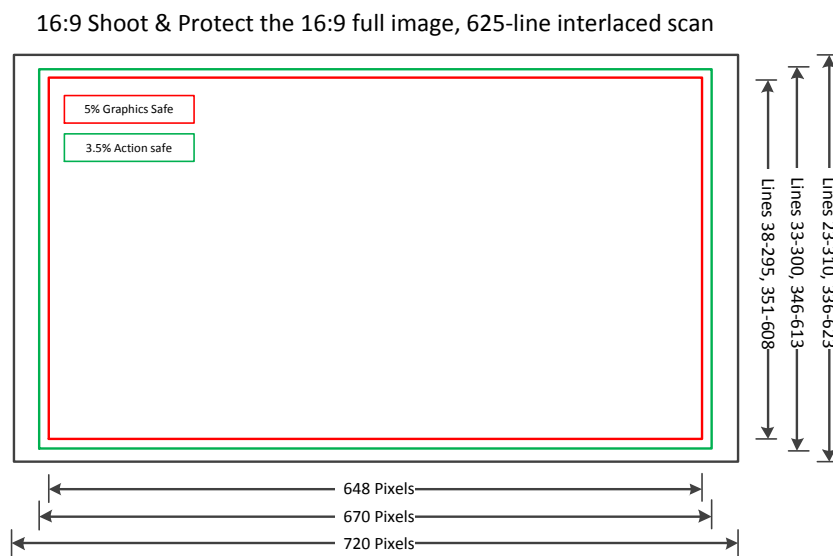
If the material is pillar boxed, it must fill the full height of the 16:9 frame i.e. A Postage stamped commercial is not permitted. A letter-box commercial that fills the full width of the 16:9 frame is however permitted i.e. A film production aspect ratio of 21:9 or similar.

Safe action and graphics areas

All commercials should be produced for a 16:9 action and 16:9 graphics presentation. However is an editorial decision that remains solely the responsibility of the Advertiser and Broadcasters will not reject commercials where this recommendation is ignored. Attention is drawn to Section 5 'Legal Liabilities'.

Important note about safe areas

Although these safe areas are derived from international recommendations and practices, the displayed area seen by a viewer is to a large extent, determined by the viewer's home equipment, in particular the set top box, and/or the type of television used e.g. LCD, Plasma, CRT. These setups are obviously outside the control of the broadcaster and so the safe areas should be treated as best case guidelines only.



5. Accurate Durations

Automated file based workflows has now made it necessary to have accurate durations for all commercials, therefore all supplied commercials must be frame accurate to the designated duration. No tolerance is permitted.

6. Legal Liabilities

Advertisers remain solely responsible for the content of the commercial (i.e. the terms and conditions, disclaimers, etc.). Broadcasters do not accept any liability for the commercial content including where a viewer action may result in restricted viewing or listening to a commercial and or it's terms and conditions and any disclaimers. Any liability or legal issue arising from the commercial remains solely with the Advertiser. Each Advertiser indemnifies the relevant Broadcaster for any damages, losses or costs incurred by that Broadcaster as a result of that Advertiser's alleged breach of this Agreement or any law or Advertising Code.

7. Closed Captions

If a commercial is being closed captioned the captioning data can be delivered in the following way: -

1. A separate data file that conforms to the EBU Tech. 3264-E 1991. The file must have the same name as the MXF file delivered with the file extension of 'STL'. Not all transmission channels or platforms support captioning facilities so please check that a particular service can provide captioning facilities.
2. In addition to the separate data file, captions can be embedded as Teletext Subtitles on line 21 of the vertical interval in standard definition (SD) or as OP-47 in the VANC on line 12 (both F1 and F2) in high definition (HD) media.

Note. A SMPTE standard to embed an EBU STL file into a MXF Generic container is being developed.

8. Audio Description

Audio description (AD) is the provision of an additional audio commentary for the sight impaired. Some broadcasters will be providing limited audio description service on their digital platform. For commercial's to make use of this service you will need to provide a separate set of stereo tracks with the descriptive commentary mixed into the normal stereo audio. This is commonly referred to as Broadcast mix. Normal level and loudness rules mentioned previously apply. Not all transmission channels or platforms support AD, so please check that a particular service can provide AD facilities.

9. International Standards and References

The external standards and publications are available via the following web sites. Please note that some organisations charge for documents and others restrict some documents to members only: -

EBU – European Broadcasting Union www.ebu.ch
ITU – International Telecommunications Union www.itu.int
SMPTE – Society of Motion Picture and Television Engineers www.smpte.org
Free TV Australia www.freetv.com.au
ATSC – Advanced Television Systems Committee www.atsc.org
ITC – Replaced by OfCom – Office of Communications www.ofcom.org.uk

Documents referred to include: -

ATSC

A/85:2009 Techniques for Establishing and Maintaining Audio Loudness for Digital Television

EBU

EBU Tech. 3264-E 1991 Specification of the EBU Subtitling data exchange format
EBU Tech. 3299 High Definition (HD) Image Formats for Television Production.
EBU R95-2000 Television Production for 16:9 Widescreen: Safe Areas
EBU R95-2008 Safe areas for 16:9 television production.
EBU R103-2016 V2.0 Tolerances on 'Illegal' colours in Television
EBU R128-2010 Loudness normalisation and permitted maximum level of audio signals.
EBU Tech Doc 3341: Loudness Metering: 'EBU Mode' metering to supplement loudness normalisation in accordance with EBU R 128.
EBU Tech Doc 3342: Loudness Range: A descriptor to supplement loudness normalisation in accordance with EBU R 128.

Free TV Australia

OP-47 - STORAGE AND DISTRIBUTION OF TELETEXT SUBTITLES and
VBI DATA FOR HIGH DEFINITION TELEVISION
OP 59 - Measurement and Management of Loudness in Soundtracks for Television Broadcasting
OP 36 – Quality Specifications for Delivery of SDTV and HDTV Commercials.

ITC

Guidelines on Flashing Images and Regular Patterns in Television

ITU

ITU-R BT601-5 Part A Studio encoding parameters of digital television for standard 4:3 and wide-screen 16:9 aspect ratios.
ITU-R BT.709 Parameter values for the HDTV standards for production and international programme exchange.
ITU-R BS.1770-3 Algorithms to measure audio programme loudness and true-peak audio level.
ITU-R BS.1771-0 Requirements for loudness and true-peak indicating meters

SMPTE

SMPTE 272M: "Formatting AES Audio and Auxiliary Data into Digital Video Ancillary Data Space"
SMPTE 274M: "1920x1080 scanning and analogue and Parallel Digital Interfaces for Multiple Picture Rates".
SMPTE 292M: "Bit-Serial Digital Interface for High Definition Television Systems".
SMPTE 334M: "Vertical Ancillary Data Mapping"
SMPTE 377M: "Material Exchange Format (MXF) —File Format Specification (Standard)"
SMPTE 378M: "Material Exchange Format (MXF) —Operational pattern 1A (Single Item, Single Package)"
SMPTE RP210 Version 8
SMPTE ST360-2009 "General Exchange Format"

Appendix 1

Layout for tape delivery

Time-code	Duration	Video	Audio
00:58:00:00	00:01:30:00	EBU Bars (100/0/75/0 or 100/0/100/0)	Line-up Tone
00:59:00:00	00:00:27:05	Ident & countdown clock	Silence
00:59:57:06 (Optional)	00:00:00:02	Peak White	1 Frame of tone (on first white frame)
00:59:57:06	00:00:02:19	Black	Silence
*01:00:00:00		Commercial	Commercial
end of commercial	00:00:10:00		Fade or cut to silence
end of commercial + 10sec (Optional)	00:00:00:02	Peak White	1 Frame of tone (on first white frame)

Notes

1. The optional 2 frames peak white with one frame tone pulse is to enable checking of video to sound sync. The 2 frame video requirement is to allow for any standards processing.
2. Line-up Tone will consist of the following: -
 - Stereo line-up. All stereo channels must use 1 KHz tone identifying the left channel using interrupted tone Level will be -18dBFS (EBU standard) or -20dBFS (ITU standard)
 - All Surround sound channels must carry BLITS tone.
3. *Time code can start on any full hour (minimum is 01:00:00:00).

Appendix 2

Measurement and Management of Loudness for New Zealand Television Broadcasting

Introduction

Audio loudness, particularly for commercial content, has been a target for continual complaint from the viewers since commercial television started. Many attempts throughout the years have been made by broadcasters to reduce the problem but without any real success, and with no consistency of application between broadcasters. Modern digital signal processing (DSP) has resulted in the ability to accurately measure and therefore control loudness, which has resulted in several standards or recommendations being introduced by various broadcasting bodies. The recommendations produced are remarkably similar in requirements between each other with the broad thrust of each document aiming to achieve similar goals.

A large quantity of content comes either from Australia or the United States so it would be logical to align our loudness standards with our largest suppliers. Australia and the United States have adopted the ITU-R loudness recommendations through ATSC's A/85, and Free TV Australia's OP 59

This is a revision of the original document to now include relative and absolute gating mentioned in the original document and now incorporated into ITU-R BS.1770-3.

Recommendation

Normalisation and Peak Level

Broadcasters in New Zealand have adopted the following parameters, which aligns Free TV Australia's OP-59 Reformatted Issue 2 - February 2013.

Loudness Normalisation (Reference) value	-24 LKFS
Loudness measuring tolerance	± 1 LKFS
Maximum true peak level	-2 dBFS
Absolute gating	-70 LKFS
Relative gating	-10 dB

Measurement

1. All loudness measurements should be made using a meter complying with recommendation ITU-R BS.1770-3 (A meter conforming to 1770-2 is still acceptable) and indicating its loudness measurement with a numerical readout.
2. The permitted measured deviation from the target loudness level of -24LKFS shall not exceed ± 1 LKFS, except for long form programmes where exact normalisation to target level is not practicable.
3. For the exchange of digital television content not employing metadata to indicate loudness level, the target loudness level value should be -24LKFS.
4. For the exchange of soundtracks on digital television content that employs metadata to indicate a loudness level. Metadata value should correspond to the measured loudness value as per ITU-R BS.1770-3. This value should be used as the 'Dialnorm' metadata value in any transmission AC-3 encoder.

5. Loudness can generally be measured in two basic ways: -
 - Measuring the dialogue component of the soundtracks.
 - Measuring the full mix of the soundtracks. Note that currently the LFE track of any 5.1 mix is not included in any full mix measurement.

The selection of either method is very dependent upon the content type. Generally most television productions have large quantities of dialogue (dialogue centric) so measuring the dialogue is a valid way of determining the loudness value, provided that the dialogue selected is at a normal level i.e. it is neither shouting nor whispering. Other material such as action movies, music and content with little dialogue or dialogue that is difficult to differentiate from other sounds will require the use of the full mix measurement technique to achieve a correct reading.

6. For all short form content such as commercials and promos, a full mix measurement shall be used over the total duration of the soundtrack.
7. Long form content will be measured with a method defined by the genre of the content as in 4 above. It will not be normally possible to measure the entire soundtrack so it will be necessary to measure a sample of the soundtrack. It is vital that the sample be of sufficient duration and representative of the total soundtrack, otherwise a false reading will occur, leading to incorrect normalisation.
8. The loudness value should be noted as a LKFS value and should also include the method of measurement such as dialogue or full mix and if the total duration was checked or a spot sample of soundtrack was used. Ideally the time code points of the portion used for the measurement should also be included.

Notes

1. The ATSC document A/85 is highly recommended reading.
2. The EBU recommendations have basically adhered to the ITU recommendation however they have a -23 value for the LKFS loudness value rather than -24, a maximum true peak of -1 dBFS, and a slightly different relative gating level. The differences are so small that contents made to this standard should not be noticeable compared to contents made to the recommended standard.

Bibliography

- ATSC
A/85:2009 Techniques for Establishing and Maintaining Audio Loudness for Digital Television
- EBU
EBU R 128-2010 Loudness normalisation and permitted maximum level of audio signals.
EBU Tech Doc 3341: Loudness Metering: 'EBU Mode' metering to supplement loudness normalisation in accordance with EBU R 128.
EBU Tech Doc 3342: Loudness Range: A descriptor to supplement loudness normalisation in accordance with EBU R 128.
Reports from the EBU-Group P/LOUD
- Free TV Australia
OP-59 – Issue 2 February 2013 - Measurement and Management of Loudness in Soundtracks for Television Broadcasting
- ITU
ITU-R BS.1770-3 Algorithms to measure audio content loudness and true-peak audio level.
ITU-R BS.1771-0 Requirements for loudness and true-peak indicating meters.
ITU-R BS.1864 Operational practices for loudness in the international exchange of Digital television contents.