



# Technical Standards and Documentation Guide for the Delivery of Bronze Level SD Programmes

June 2014

S57BSD-7-2014-Production

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## Executive Summary

Television New Zealand commissions three grades of production. These three grades of production are: -

- Gold A top end high definition (HD) production to the highest possible standards.
- Silver A second tier HD production where the content or environment makes achieving Gold standard production quality impractical or uneconomic.
- Bronze A high quality standard definition (SD) production.

Separate documents cover the three levels of production standards.

There are many standards that apply to television Programme delivery to TVNZ Ltd. 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 Bronze Level SD Programmes June 2014, 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.

Programmes should be delivered in Standard Definition format. i.e. these shall be 576i/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.

### **Programme Delivery**

Programmes can be delivered on digital Betacam Tape.

### **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**

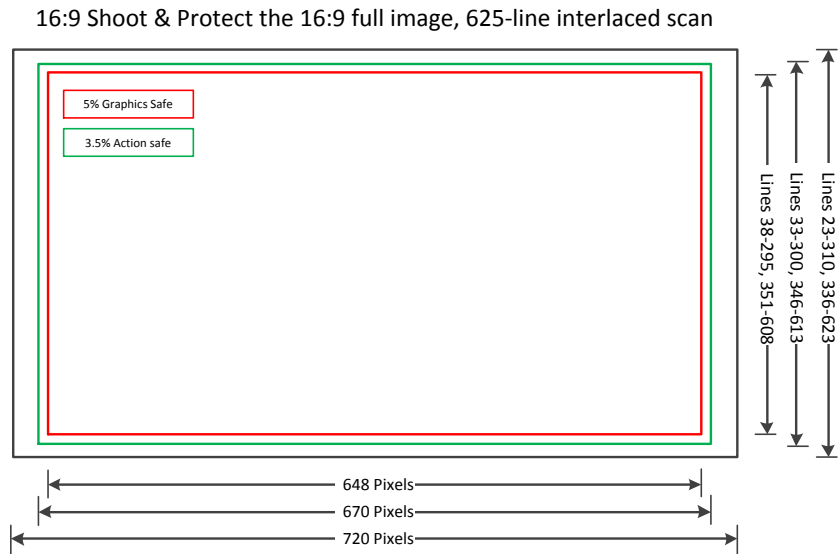
This is becoming a very controversial topic with viewers and as a consequence, governments have been considering legislation covering loudness of television stations. The audio loudness of a Programme must be normalised to -24LKFS. Measurement should be to ITU BS.1770-3 standard and related documents.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

### **Aspect ratio**

All Programmes will be delivered in 16:9 widescreen.

### Safe action and graphics areas

All programmes should be produced for a 16:9 action and 16:9 graphics presentation.



Please note that this standard meets the requirements for New Zealand and Free TV Australia. If the programme is going to also be distributed to other countries then the 16:9 action safe and 16:9 graphics presentation shown above will not possibly apply in those countries. Refer to 'Important note about safe areas' in the main section of this specification.

# Technical Standards and Documentation Guide for the Delivery of Bronze Level SD Programmes

June 2014

This document defines the technical standards for delivery for **Bronze Standard High Definition** Programmes. This replaces all previous standards publications for Programme 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 so that it can also be used as a compact reference for those charged with delivering Programmes.

## 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 Programme material is that the product delivered is of a high technical standard and quality

## Changes

The following significant changes have been made to the specification in this edition. Minor changes such as re-wording of sections are not indicated: -

1. Change to -2 dBTP from -9 dBTP for Stereo audio with the Analogue shutdown complete.
2. Change to full 16:9 options for both Action and Graphics presentation.
3. Removal of Closed Caption and Audio Description technical requirements.

# 1. General Technical Requirements

The purpose of technical specifications or requirements is to maximise the prospect that the delivered Programme 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).

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 in the Programme being rejected.

## 1.2 Video Levels and Gamut (Illegal signals)

Video levels including any line-up shall be received within the specified limits so that the Programme can be used without adjustment.

SD video levels are based on the PAL System I which specifies 0 to 100% RGB Limits.

Overshoots can be reduced by the use of a low pass IRE filter. Single lines with larger errors caused by vertical processing such as aperture correction and aspect ratio conversion are permitted if they do not exceed a 1% Luminance limit.

## 1.3 Video Line-up

Line-up signals serve to identify individual signal channels and to provide reference levels that will confirm that the programme 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. 100/0/100/0 bars is preferred, but 100/0/75/0 is acceptable.

The start of each programme shall be preceded by a graphical identification (Slate) and a countdown leader (optional). The Slate must show the Series and Episode names and numbers, the Production house and date of production, where appropriate.

Programme 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 programme.

### **1.3.1 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 to completely 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 Ofcom | 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.

### **1.3.2 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.

### **1.3.3 Audio levels and loudness**

The following audio Loudness requirements are the same as Free TV Australia's OP 59 - 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. Program audio must adhere to the following standards for all measurements: -

### **1.3.4 Audio Peak Program Levels**

On full mix and mix minus tracks (M&E – Mix Effects), true peak program levels may not rise above -2 dBTP at any point for stereo and 5.1 surround sound tracks. Note that conventional PPM's 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.1771.

Surround sound loudness is measured on 5 channels only with the LFE track excluded as per ITU-R BS.1770-3. Peak level measurements however do include the LFE track.



### 1.3.5 Audio loudness

The audio loudness of a Programme will be -24LKFS. Programme loudness is to be measured using methods and loudness meters that are compliant with ITU-R BS.1771. Please also refer to the document titled “Measurement and Management of Loudness for New Zealand Television Broadcasting” (Appendix 5)

**Table of Audio Loudness Specifications**

Track Type	Max level (True Peak)	Loudness	Loudness Range
Full Mix Stereo	≤ -2dBTP	-24 LKFS	15LU
Surround sound Mix	≤ -2dBTP	-24 LKFS	20LU

#### Notes

dbTP db True Peak.

LU Indicates the  $L_K$  without an absolute reference.

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

### 1.3.6 Audio Loudness Range (LRA)

Programs 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 Programme should not ideally exceed 15LU.

Loudness range shall be measured using a meter that complies with ITU-R BS.1771.

### 1.3.7 Audio synchronisation with encoded audio tracks

Where a Programme is supplied with encoded audio tracks such as Dolby E®, the signals recorded must be in-sync with the standard AES tracks.

See appendices for information about audio channel allocations and fixed metadata specifications for Dolby E®/AC-3 encoding.

### 1.3.8 Supply of Mix/Effects Tracks

Where a programme has the potential for overseas sales, or at the request of the commissioner, the supply of a stereo mixed Mix/Effects tracks (An audio mix without any commentary) is required. The tracks must adhere to the full loudness specifications as above.

## 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.

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 programme it should be consistent with the style of the production but not to be excessive so as to cause viewer annoyance.

### 3 Bronze Production Delivery

#### 3.1 Standard Definition Delivery

Bronze level high definition Programme delivery is currently by traditional tape, however the option of file delivery is available as defined in 3.2. It is expected that tape delivery will be phased out over a period of time.

#### 3.2 Tape Delivery of Standard Definition Programmes

Bronze level standard definition programmes can be delivered on Sony Digibeta tape.

### 4. Aspect Ratios and Safe Areas

All Programmes will be delivered in 16:9 widescreen.

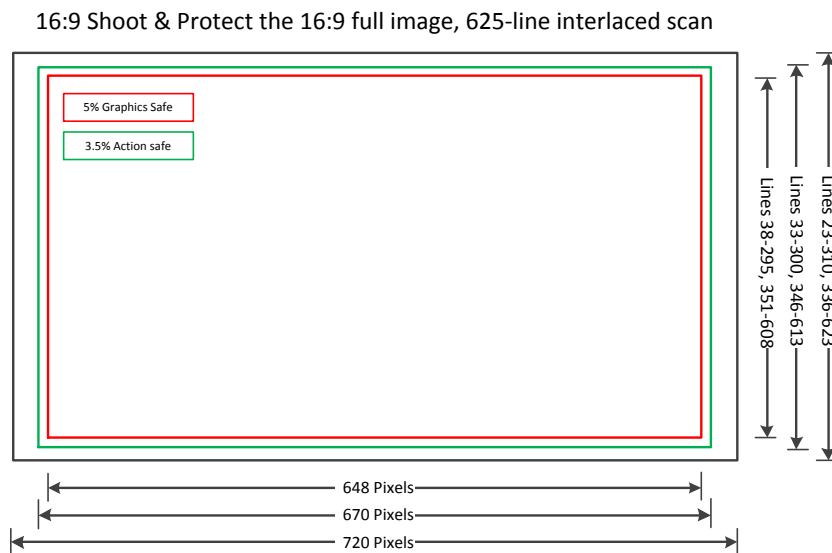
#### Safe action and graphics areas

All Programmes should be produced for a 16:9 action and 16:9 graphics presentation format This matches Free TV Australia’s recommendation OP30 Issue 6 – January 2014.

#### 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 setup of the various bits of television equipment in the home, in particular any set top box, and 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.

All programmes should be produced for a 16:9 action and 16:9 graphics presentation.



**Please note that this standard meets the requirements for TVNZ Ltd. and Free TV Australia. If the programme is going to also be distributed to other countries then the 16:9 action safe and 16:9 graphics presentation shown above will not possibly apply in those countries.**

## 5. 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](http://www.ebu.ch)

ITU – International Telecommunications Union [www.itu.int](http://www.itu.int)

SMPTE – Society of Motion Picture and Television Engineers [www.smpte.org](http://www.smpte.org)

Free TV Australia [www.freetv.com.au](http://www.freetv.com.au)

ATSC – Advanced Television Systems Committee [www.atsc.org](http://www.atsc.org)

ITC – Replaced by OfCom – Office of Communications [www.ofcom.org.uk](http://www.ofcom.org.uk)

AMWA – Advanced Media Workflow Association [www.amwa.tv/](http://www.amwa.tv/)

### 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 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.

#### Free TV Australia

OP 59 - Measurement and Management of Loudness in Soundtracks for Television Broadcasting

OP 30 - QUALITY SPECIFICATION FOR THE INTERNATIONAL AND NATIONAL EXCHANGE OF PROGRAMS IN SDTV AND HDTV FORMATS

#### 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

ITU-R BS.1864 Operational practices for loudness in the international exchange of Digital television programmes.

#### 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)”

RP210 Version 8

#### AMWA

AS-11: Application specification - Program Contribution to a playout facility.

## 6. Contacts

These standards are created using widely accepted standards and practises from leading Broadcasters and Broadcasting Organisations, with changes to account for local conditions. We are continually striving to improve and clarify our standards and we welcome any comments.

To seek clarification of any of the standards or interpretations in this document, or to comment, you can contact any of the following: -

- The programme commissioner handling your programme.
- Phil Hobden                      GM of Media Operations                      [phil.hobden@tvnz.co.nz](mailto:phil.hobden@tvnz.co.nz)
- Paul Hedges                      Production Services Manager                      [paul.hedges@tvnz.co.nz](mailto:paul.hedges@tvnz.co.nz)
- Mike Manders                      Senior Technical Manager                      [mike.manders@tvnz.co.nz](mailto:mike.manders@tvnz.co.nz)
- Stuart Young                      Senior Project Engineer                      [stuart.young@tvnz.co.nz](mailto:stuart.young@tvnz.co.nz)

## Appendix 1

### Default Audio Metadata for Surround Sound Programmes

TVNZ has a fixed metadata policy and assumes that any surround sound programmes that are made have been mixed to that metadata standard which will be used when encoding the programme sound for delivery to the viewer. The settings follow Television practise, not Film.

Parameter	Setting
<b>Dialogue Level</b>	<b>-24</b>
<b>Channel Mode</b>	<b>3/2</b>
LFE Channel	Enabled
<b>Bit stream Mode</b>	<b>Complete</b>
<b>Line Mode Compression</b>	<b>None</b>
<b>RF Mode Compression</b>	<b>None</b>
RF Over modulation Protection	Enabled
Centre Down mix Level	-3dB
Surround Down mix Level	-3dB
Dolby Surround Mode	Not Dolby surround
Audio Production Information	No
Mix Level	90dB
Room Type	Small
Copyright Bit	Yes
Original Bit stream	Yes
<i>Preferred Stereo Down mix</i>	<i>LtRt</i>
<i>Lt/Rt Centre Down mix Level</i>	<i>-3dB</i>
<i>Lt/Rt Surround Down mix Level</i>	<i>-3dB</i>
<i>Lo/Ro Centre Down mix Level</i>	<i>-3dB</i>
<i>Lo/Ro Surround Down mix Level</i>	<i>-3dB</i>
<i>Dolby Surround EX Mode</i>	<i>Not surround</i>
<i>A/D Converter Type</i>	<i>Standard</i>
DC Filter Enabled	Enabled
Low pass Filter	Enabled
LFE Low pass Filter	Enabled
Surround 3 dB Attenuator	Disabled
Surround Phase Shift	Enabled

Extended Bit stream Information parameters are shown in italics and the important ones are shown in **bold**.

## Appendix 2

### Acceptable Audio Channel layouts for Delivery on Digi-Beta Tape

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

All programmes must have a set of Stereo audio channels.

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

Stereo Programme 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 Right must be Rt

Stereo plus Surround Programme 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)

## Appendix 3

### Layout for all media delivery to TVNZ Ltd.

Time-code	Duration	Video	Audio
09:58:00:00	00:01:30:00	EBU Bars (100/0/75/0 or 100/0/100/0)	Line-up Tone
09:59:30:00	00:00:27:04	Ident & countdown clock	Silence
09:59:57:04 (Optional)	00:00:00:02	Peak White	1 Frame of tone (on first white frame)
09:59:57:06	00:00:02:19	Black	Silence
<b>10:00:00:00</b>		<b>Programme</b>	<b>Programme</b>
end of part	00:00:05:00		Fade or cut to silence before end of part
end of programme	00:00:10:00		Fade or cut to silence
end of programme + 10sec (Optional)	00:00:00:02	Peak White	1 Frame of tone (on first white frame)

#### Notes

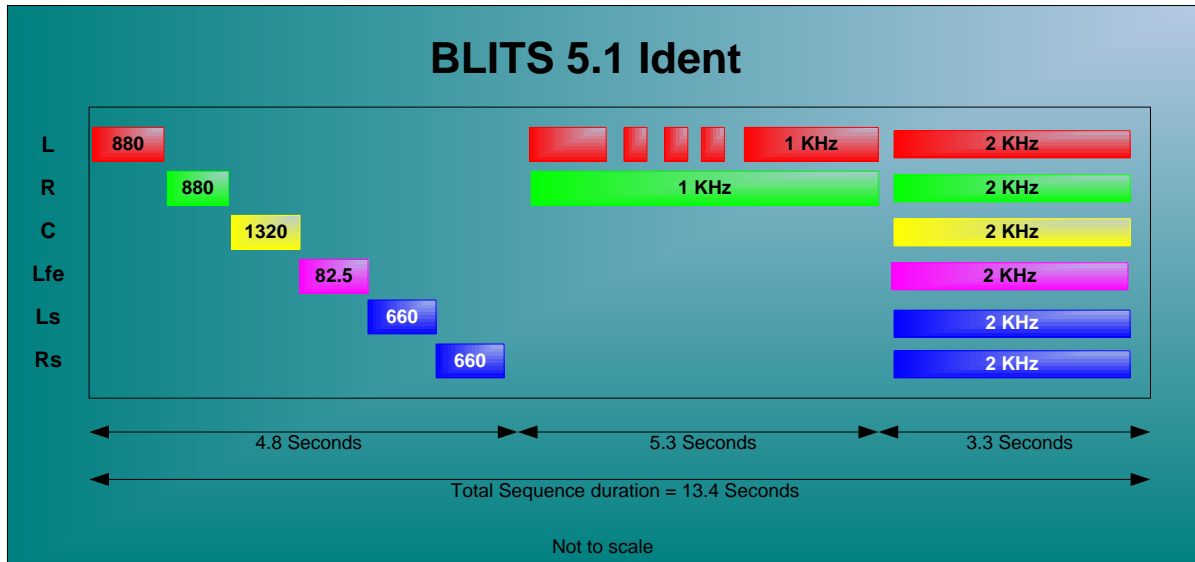
1. The optional 2 frames peak white with one frame tone pulse is to enable checking of video to sound sync. The 2 frame video requirement is to allow for any standards processing.
2. Line-up Tone will consist of the following: -
  - Stereo line-up. All stereo channels must use 1 KHz tone identifying the left channel using interrupted tone. Level will be -18dBFS (EBU standard) or -20dBFS (ITU standard). The Level standard used should be indicated on the Slate/Ident.
  - All Surround sound channels must carry BLITS tone.
3. \*Time code can start on any full hour (minimum is 01:00:00:00) however the standard of programme start at 10:00:00:00 is preferred. Duration of the break between parts can be variable but if the break is longer than 5 seconds of black then the next part must start on a full minute. Slates for parts are optional.



## Appendix 4

### BLITS 5.1 Channel Identification and Line-up tones

**BLITS** is an acronym for '**Black and Lane's Ident Tones for Surround**', It was developed by Sky Television Sound Supervisors Martin Black and Keith Lane through 2005,2006 to provide a standardised form of channel identification and alignment for surround sound material.



The sequence comprises of three sections

The first section comprises short tones at -18 dBFS to identify each channel. Different frequencies are used to help distinguish between the channels. Left and Right channels are pitched at 880 Hz, Centre at 1320 Hz, LFE at 82.5 Hz, and the two surrounds at 660Hz.

The middle section is only present on the Left and Right channels, again at -18 dBFS. This is intended to provide an identifier that looks 'normal' when checking a stereo down-mixed version. Continuous 1 KHz tone is present on the Right channel, while the Left channel is interrupted four times in order to differentiate it from EBU or BLITS stereo identifier tones.

The final section provides a phase check for all channels using a 2 KHz tone at -24 dBFS. When summed to stereo using default down-mix values this should produce tones of about -18 dBFS on each channel.

The sequence repeats, taking roughly 14 seconds for each cycle. Unlike the EBU Line-up for multi-channel systems the channel identifiers don't move around the listening room in a clockwise rotation. Instead, they reflect the AES standard of channel allocation: L, R, C, LFE, Ls, Rs. The reason for this is that multi-channel bar-graph meters are generally configured with this channel order. A logical progression of tones across the meter is easy to comprehend and so spot any missing or miss-assigned channels.

## Appendix 5

### 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 (Issue 2 February 2013 - updated)

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 Issue 2 - February 2013 – updated.

Loudness Normalisation (Reference) value	-24 LKFS
Loudness measuring tolerance	$\pm 1$ 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  $\pm 1$ 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 - 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.