ASWG AUDIO STANDARDS WORKING GROUP

AVERAGE LOUDNESS AND PEAK LEVELS OF AUDIO CONTENT ON SONY COMPUTER ENTERTAINMENT PLATFORMS

Recommendation ASWG-R001

v1.10
August 2013

SONY COMPUTER ENTERTAINMENT ®

About The Group

The Sony Worldwide Studios Audio Standards Working Group (ASWG) consists of audio professionals representing Sony Computer Entertainment (SCE) development studios from Japan, The United States of America and Europe.
Their role is to formulate and disseminate within SCE and to the wider development community working on SCE platforms, audio standards, recommendations and best practice documentation for the development of audio content contained within interactive entertainment products.

The Group can be contacted at audio_standards@scee.net

Foreword

Up until now, there have been no official audio standards defining, or official documentation recommending the loudness of audio content within titles, or associated media developed by Sony Worldwide Studios (WWS).

This means that the loudness of audio content within interactive entertainment products vary greatly from title to title, as well as between those products and other media that can be played on SCE platforms such as films, music and television broadcasts. The purpose of the ASWG recommendations contained within this paper are threefold:

- To give consumers a consistent loudness experience between different titles and associated media on Sony Computer Entertainment platforms.
- To promote good audio engineering practices.
- To protect the format that we deliver content on.

Scope

This paper contains recommendations for the measurement of the perceived loudness of audio content, as well as maximum permitted levels of audio signals contained within interactive entertainment products created for SCE platforms.

ASWG AUDIO STANDARDS WORKING GROUP

The ASWG, considering;

a. that modern interactive entertainment hardware is capable of reproducing audio content with an extremely wide dynamic range;

b. that a lack of official loudness standards on SCE platforms in the past has led to large inconsistencies between the perceived loudness of different titles released on SCE platforms;

c. that consumers of interactive entertainment products desire the average perceived loudness of audio content to be consistent between titles and other media playable on SCE platforms, regardless of the dynamic range of that content;

d. that a significant proportion of existing titles released on SCE platforms contain audio signals that regularly measure the maximum possible level, 0 dBFS, and that this represents bad engineering practice and should be avoided wherever possible;

e. that real-time digital signal processing used in interactive entertainment audio systems such as resampling and filtering can cause peak signal levels to increase considerably, and headroom must be left to accommodate these processes;

f. that sufficient headroom must be left to accommodate the downmixing of surround content into stereo, in order to avoid clipping;

g. that traditional sample peak metering does not serve as a good indicator of the perceived loudness of audio content, and that the true peak value of an audio signal may occur between samples;

h. that an international standard for measuring the perceived loudness of audio content and true peak signals has been defined in ITU-R BS.1770-3 [1], introducing the units LKFS (Loudness, K-Weighted, referenced to digital Full Scale) and dBTP (decibels, True Peak);

i. that the EBU in its document EBU Tech Doc 3342 [2] specifies a measurement of the dynamic range of any audio content, LRA (Loudness Range, measured in LU);

j. that both home-based and portable SCE platforms are used in different environments and require different optimal average loudness levels due to the varying noise floors in those environments;

recommends;

1. that the descriptors Average Loudness Level, Loudness Range and True Peak Level should be used to describe the audio content for any interactive entertainment title;

2. that when measuring the Average Loudness Level and True Peak Level of audio content within any title, measurement tools using the algorithms defined within ITU-R BS.1770-3 must be used;

3. that when measuring the Loudness Range of audio content within any title, metering compliant with EBU Tech Doc 3342 must be used;

4. that the Average Loudness Level of audio content within a title developed for home-based SCE platforms should be normalized to a Target Level of -24 (±2) LKFS, and that this tolerance is acceptable considering the non-linear nature of interactive entertainment audio content;

5. that the Average Loudness Level of audio content within a title developed for portable SCE platforms should be normalized to a Target Level of -18 (±2) LKFS;

6. that all audio content contained within an icon or thumbnail designed to be played within the Xross Media Bar™ (XMB™) or any future graphical user interface as a previewing function, should measure a maximum of -24 LKFS for home-based systems and a maximum of -18 LKFS for portable systems. It is recommended that content is exactly -24 LKFS for home-based systems and -18 LKFS for portable systems, unless the audio content is designed to be of an ambient nature;

7. that the maximum True Peak Level of audio content within a title, or associated media on any SCE platform should not exceed -1 dBTP, measured with a meter compliant with both ITU-R BS.1770-3 and EBU Tech Doc 3341 [3];

8. that formulas used for the purpose of down-mixing surround material to stereo must maintain consistent average loudness between both surround and stereo;

9. that audio content should be measured as a whole, and should not focus on dialogue, sound effects or music specifically;

10. that audio content should be measured for as long as is practical and for a minimum of 30 minutes, and that those sections of any title that are measured should be a representative cross section of all different parts of any title, in terms of game-play;

11. that audio content should be measured in both stereo and surround configurations, and developers should ensure that the Average Loudness Level measurement is consistent between both stereo and surround configurations.

Note

(1) In August 2012, the International Telecommunications Union (ITU) updated their recommendation ITU-R BS.1770 to version 3. The difference between versions 2 and 3 is a change in the way True Peak (dBTP) is calculated. Average Loudness and True Peak measurements using metering based on ITU-R BS.1770-2 are acceptable. However, when the various metering applications in widespread use are updated to account for the changes in ITU-R BS.1770-3, these should be used.

(2) The International Telecommunications Union (ITU) specifies the units 'LKFS' (Loudness, K-Weighted, relative to digital Full Scale) in their paper ITU-R BS.1770-3. The EBU uses the units 'LUFS' (Loudness Units, relative to digital Full Scale) in their paper EBU-R128. These two units are identical and interchangeable.

(3) This update revises the ASWG's Average Loudness Level recommendation from -23 to -24 LKFS. This is to bring us into line with broadcast standards from ATSC (in the United States) and ARIB (in Japan).

References

[1] ITU-R BS.1770-3, Algorithms to measure audio programme loudness and true-peak audio levels.
http://www.itu.int/dms_pubrec/itu-r/rec/bs/R-REC-BS.1770-3-201208-I!!PDF-E.pdf

[2] EBU – Tech 3342, Loudness Range: A measure to supplement loudness normalization in accordance with EBU-R128
http://tech.ebu.ch/docs/tech/tech3342.pdf

[3] EBU – Tech 3341, Loudness Metering: 'EBU Mode' metering to supplement loudness normalization in accordance with EBU-R128
http://tech.ebu.ch/docs/tech/tech3341.pdf