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# ATSC Approves Recommended Practice on Loudness

It is well known that loudness variations between programs and commercials and between DTV channels have been problematic since the introduction of digital television. The ATSC DTV standards A/52 and A/53 define and require the use of **dialnorm** metadata to control the loudness level of audio at the DTV receiver, but there has been widespread confusion about the correct way for this to be implemented through the broadcast chain. Therefore, in 2007, the ATSC established a group within the Specialist Group on Video and Audio Coding (TSG/S6), to focus on this issue and produce a recommended practice (RP) to guide the industry. The Audio Loudness Group (S6-3), led by Jim Starzynski of NBC Universal completed its work earlier this year and on November 4, the ATSC membership approved for publication the "ATSC Recommended Practice: Techniques for Establishing and Maintaining Audio Loudness for Digital Television (A/85)."

The following Scope, Background and Organization sections explaining the basics of the RP are extracted from the approved document, which will be available for download in the near future from the ATSC Web site: at: http://www.atsc.org/standards/practices.php.

atsc

Advanced Television Systems Committee

### *Scope*

This ATSC Recommended Practice (RP) provides guidance to broadcasters and creators of audio for ATSC high-definition (HD) or standard-definition (SD) television content. It recommends production, distribution and transmission practices needed to provide the highest quality audio soundtracks to the digital television audience.

This RP focuses on audio measurement, production and postproduction monitoring techniques, and methods to effectively control loudness for content delivery or exchange. It recommends methods to effectively control program-to-interstitial loudness, discusses metadata systems and use and describes modern dynamic range control. This RP also includes specific information on loudness management at the boundaries of programs and interstitial content.

In addition, the RP includes two Annexes which can function as short stand-alone "Quick Reference Guides" to two specific communities of interest: station/MVPD engineers and audio production staff.

### Background and Introduction

Despite the conclusion of the DTV transition, many broadcasters and the production community have been slow to effectively adapt to the changes required to transition from analog NTSC audio techniques to contemporary digital audio practices. With digital television's expanded aural dynamic range (over 100 dB) comes the opportunity for excessive variation in content when DTV loudness is not managed properly.

Consumers do not expect large changes in audio loudness from program to interstitials and from channel to channel. Inappropriate use of the available wide dynamic range has led to complaints from consumers and the need to keep their remote controls at hand to adjust the volume for their own listening comfort.

The NTSC analog television system uses conventional audio dynamic range processing at various stages of the signal path to manage audio loudness for broadcasts. This practice compensates for limitations in the dynamic range of analog equipment and controls the various loudness levels of audio received from suppliers. It also helps smooth the loudness of program-to-interstitial transitions. Though simple and effective, this practice

permanently reduces dynamic range and changes the audio before it reaches the audience. It modifies the characteristics of the original sound, altering it from what the program provider intended, to fit within the limitations of the analog system.

The AC-3 audio system defined in the ATSC digital television standard uses metadata or “data about the data” to control loudness and other audio parameters more effectively without permanently altering the dynamic range of the content. The content provider or DTV operator encodes metadata along with the audio content. From the audience’s perspective, the Dialog Normalization (dialnorm) metadata parameter sets different content to a uniform loudness transparently. It achieves results similar to a viewer using a remote control to set a comfortable volume between disparate TV programs, commercials and channel changing transitions. The dialnorm and other metadata parameters are integral to the AC-3 audio bit stream.

ATSC document A/53 Part 5:2007 [1], which the FCC has incorporated into its Rules by reference, mandates the carriage of **dialnorm** and correctly set **dialnorm** values.

The industry has recognized that a new proficiency in loudness measurement, production monitoring, metadata usage and contemporary dynamic range practices is critical for meeting the expectations of the content supplier, the broadcaster, the audience and governing bodies.

This document provides technical recommendations and information concerning:

- Loudness measurement using the ITU-R BS.1770 recommendation.
- Target loudness for content exchange without metadata.
- The setup of reference monitoring environments when producing for the expanded range of digital television, with consideration for multiple listening environments in the home.
- Provides methods to effectively control program-to-interstitial loudness.
- Effective uses of audio metadata for production, distribution and transmission of digital content.
- Dynamic range control within AC-3 audio and contemporary conventional dynamic range control as an addition or alternative, including recommendations for loudness and dynamics management at the boundaries of programs and interstitial content.

## Organization

This document is organized as follows:

**Section 1** – Outlines the scope of this document and provides a general introduction.

**Section 2** – Lists references and applicable documents.

**Section 3** – Provides a definition of terms, acronyms and abbreviations for this document.

**Section 4** – Explains the technical background of the AC-3 multichannel audio system.

**Section 5** – Explains audio loudness measurement based on techniques defined by ITU-R Recommendation BS.1770.

**Section 6** – Makes recommendations for exchange of content without metadata.

**Section 7** – Provide guidelines for the practical use of agile and fixed metadata within production, distribution and transmission environments.

**Section 8** – Describes methods to effectively control program-to-interstitial loudness.

**Section 9** – Examines key issues relating to Dynamic Range Control (DRC).

**Section 10** – Specifies the setup of sound systems for digital television including the alignment of control room monitor systems to a reference sound pressure level.

**Annex A** – Program Loudness: provides background on the BS.1770 loudness and truepeak measurement algorithms.

**Annex B** –Room Acoustics and Loudspeaker Placement: discusses basic principles of control room monitoring.

**Annex C** –Room Correction: examines issues relating to the interaction of sound from loudspeakers and the room.

**Annex D** – Quick Reference Guide for setting the acoustical sound level reference for TV monitoring rooms.

**Annex E** – Loudness Ranges: examines the range of loudness within which a listener will accept loudness changes within and between content items.

**Annex F** – AC-3 Dynamic Range Control Details.

**Annex G** – AC-3 Metadata Parameters.

**Annex H** – Quick Reference Guide for station and MVPD engineers for loudness management by stations and MVPD operators.

**Annex I** – Quick Reference Guide for audio mixers creating content (commercials and programs).

As previously announced in *TV TechCheck*, on November 4, the ATSC hosted a special seminar in Washington D.C. focusing on audio issues and focusing on the new loudness RP, with the presenters being audio professionals active in the industry and closely involved in the ATSC work. The event was well-attended by representatives from all segments of the industry, including broadcast networks and stations, cable, satellite, cable networks, advertising industry organizations, and several manufacturers.