Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Implementation of the Commercial Advertisement Loudness Mitigation (CALM) Act)	)	MB Docket No. 11-93
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COMMENTS OF FRAUNHOFER USA

Fraunhofer USA[1] respectfully responds to the Commission's request for comments on the Federal Communications Commission's Notice of Proposed Rulemaking on Implementation of Commercial Advertisement Loudness Mitigation (CALM) Act, Docket No. 11-93 (the NPRM). Our comments relate primarily to issues raised in relation to the use of non-AC-3 audio codecs by broadcast stations and multichannel video programming distributors (MVPDs).

[1] Fraunhofer has been working in compressed audio technology for more than 20 years and remains a leading innovator of technologies for cutting-edge multimedia systems. Fraunhofer is universally credited with the development of mp3 and co-development of AAC (Advanced Audio Coding). Fraunhofer estimates that it has enabled more than 1 billion commercial products worldwide using its mp3, AAC and other media technologies. Fraunhofer's activities include the development of advanced audio and video codecs and participation in all relevant standards development organizations including the ATSC, SCTE, ITU, MPEG and SMPTE.

Fraunhofer supports ongoing industry efforts to provide consumers with high quality audio for digital television programming and, in particular with regard to this NPRM, with audio that has properly controlled loudness. We applaud the activities of the Advanced Television Systems Committee (ATSC) and the International Telecommunications Union (ITU) in developing standards and recommended practices intended to achieve this end. We note that standards for the Advanced Audio Codec (AAC) and its variants, developed by the ISO/IEC Moving Picture Experts Group (MPEG)[2], are fully consistent with this goal, while also enabling more efficient use of available bandwidth than previous-generation codecs.

It should be understood that codecs in the AAC Family, such as AAC LC (used, for example, in music players), HE AAC (used, for example, in satellite radio services), or HE AAC v2 (used in web audio and video streaming, as well as for ATSC Mobile DTV, and used or planned for carriage of digital television services by MVPDs) may be operated in two ways:

1) The codec may be operated without any loudness metadata where it simply conveys the audio information from source to receiver. This is the manner in which the codec is typically used in the music industry for electronic music distribution. This method is also used for some existing television services in, for example, other countries.

2) The codec may be operated with metadata that is similar to the metadata included with AC-3. If needed, technology is available to automatically convert an AC-3 audio stream's metadata into equivalent AAC metadata[3] in an AAC or HE AAC stream. This enables complete transcoding of both a program's audio

[2] Defined in IEC/ISO 14496-3
[3] Defined in ISO/IEC 14496-3 and ETSI TS 101 154

information and its loudness metadata from AC-3 to AAC either in real-time during transmission or as a file-based process.

For operation as in (2), the audio decoder in the receiving device must enable the control of the decoded audio signal by the accompanying metadata. When this is done, the AAC transmission will control the loudness of the received signal in a manner very similar to that obtained with the use of AC-3. The advantage of (2) is that the receiver may control the reproduced audio dynamic range in accordance with the viewer's preferences and listening environment, as is done with AC-3 through the receiver's "midnight mode" or other settings.

1 CALM Act Applies to All Codecs

In NPRM Paragraph 12, the Commission asks whether their conclusion is correct that "the CALM Act defines the scope and application of the new technical loudness standard as mandatory for *all* stations/MVPDs and not only those using AC-3 audio systems". We believe this interpretation to be correct and agree with the Commission's analysis. It seems reasonable that the intention of the CALM Act was to give all consumers the benefit of rules for controlling the loudness of commercials for all broadcast and MVPD channels, irrespective of the technicalities of the audio codec being used to bring the content to the home.

We note that some of the recommendations in A/85 can be applied directly to systems using non-AC-3 codecs for distribution to consumers, and the principles of other recommendations can be applied to such systems. Furthermore, as indicated in the NPRM[4], the ATSC is considering the issue of non-AC-3 codecs and we note that it has already developed the

[4] See NPRM footnotes 12 and 56

proposed "Annex K" that addresses requirements for managing audio loudness of commercial advertising in digital television when using non-AC-3 audio codecs.

Given that the Commission has confirmed that "We will incorporate [into our rules] future versions of the ATSC A/85 RP as they become available",[5] it follows that the CALM Act can apply also to the use of non-AC-3 codecs.

2 Compliance with the ATSC A/85 Recommended Practice

2.1 NPRM Paragraph 27, Question 1

In NPRM Paragraph 27, the Commission seeks "comment on whether and how MVPDs that do not use AC-3 audio system can comply" [with ATSC A/85]. The issue is to what extent A/85 is relevant to non-AC-3 systems. Our comments are as follows:

a) The requirements set out in the proposed Annex K to A/85, mentioned in Section 1 above, are directly applicable to non-AC-3 transmission of commercial advertising.
b) Some of the recommendations in the body of A/85 can be applied directly to systems using non-AC-3 codecs for distribution to consumers.
c) While agreeing with the Commission's statement that "the specific methods for establishing and maintaining the audio loudness mentioned in the ATSC A/85 RP are not applicable to the non-AC-3 audio systems",[6] we believe the methods described in A/85 could be readily adapted or extended to apply to systems using non-AC-3 codecs with audio metadata capabilities (in particular the MPEG AAC family). We note that any recommendations for using such methods should take into account the

[5] See NPRM footnote 40
[6] See NPRM Paragraph 27

capabilities of audio decoders in receivers or set-to-boxes to respond to audio metadata.

d) It is important to note that systems using non-AC-3 codecs without metadata require techniques for loudness and dynamic range control that are somewhat different from those using audio metadata.

2.2 NPRM Paragraph 27, Question 2

In NPRM Paragraph 27, the Commission states that "some MVPDs, which do not use AC-3 in the transmission of audio content to consumers nevertheless use AC-3 within their distribution network and transcode content to a non-AC-3 format after commercials are inserted." The Commissions also indicates that "if the dialnorm was set properly while the content was encoded in the AC-3 format, the loudness adjustments will be made when the content is transcoded to another format as if such transcoding occurred in the consumer's own premises". Based on this, the Commission seeks comments on "whether the CALM Act should be interpreted to permit non-AC-3 transmission of commercials if the loudness of commercials is effectively controlled using the techniques described within the ATSC A/85 RP prior to such transmission occurring". We assume that "transmission" in this case is intended to include MVPD distribution to consumers. We believe the answer to this question is yes but other possibilities should also be considered. Comments are as follows:

a) The technique described (using the AC-3 *dialnorm* metadata parameter to control loudness during decoding of AC-3 at an MVPD facility prior to re-encoding with a non-AC-3 encoder) is valid and necessary if the non-AC-3 codec used for distribution to the consumer has no capability for using audio metadata. However, this arrangement lacks the capability of systems that deliver audio metadata to the home,

where the receiver or set-top box can adjust the characteristics of the audio to suit a particular listening environment.

b) *Dialnorm* is not the only metadata parameter used by an AC-3 decoder for level control. The parameters for *Dynamic Range Control* and *Downmix* (for producing two-channel stereo correctly from 5.1 channels) are also significant. Hence these parameters must also be set properly when the content was encoded as AC-3, and used by the decoder.[7]

c) While codecs without metadata capability, such as MPEG-1 Audio Layer II, are currently used by some MVPDs, it is likely that the more efficient MPEG AAC family of advanced audio codecs, with metadata capability, will increasingly be used in the future. In that case, considerations for A/85 are as stated in Section 2.1 above, with one additional consideration for transcoding from AC-3, as follows.

d) Where audio is transcoded from AC-3 to an AAC codec with metadata, techniques are available for automatically mapping the AC-3 metadata into AAC metadata. This maintains the flexibility for use of metadata by the consumer decoder.

2.3 NPRM Paragraph 27, Question 3

In NPRM Paragraph 27, the Commission asks whether such interpretation [that the CALM Act permits non-AC-3 transmission of commercials] would be consistent with the mandate to incorporate the A/85 RP "only insofar as such recommended practice concerns the transmission of commercial advertisements". We believe the answer to this is yes, but note that it is not possible to fully isolate the recommendations on methods for loudness control for

[7] See Annex F of A/85

commercials from recommendations that apply to other types of content, as the techniques are basically the same for all types of content. This applies to both AC-3 and non-AC-3 codecs.

3 Revisions to A/85

In NPRM Paragraph 27, the Commission notes: "that ATSC may revise the A/85 RP to account for users of other audio [non-AC-3] systems". Our comments on such potential revisions to A/85 are as follows:

a) ATSC has already developed a proposed "Annex K" that addresses loudness management for commercial advertising when using non-AC-3 audio systems. We assume that the revision to add Annex K to A/85 will proceed. We note, however, that this is a very simplified guide and does not address the separate issues of using non-AC-3 codecs with or without metadata.

b) As mentioned in Section 2.1 comment c) above, we believe the methods described in A/85 could readily be adapted or extended to apply to systems using non-AC-3 codecs with audio metadata capabilities (in particular , the MPEG AAC family), taking into account the capabilities of audio decoders in receivers or set-top boxes to respond to audio metadata.

c) As mentioned in Section 2.1 comment d) above, systems using non-AC-3 codecs without metadata require techniques to be used for loudness and dynamic range control that are somewhat different from those using audio metadata. These techniques are not currently described in A/85 but adding them would be relatively straightforward.

d) The NPRM states that "the A/85 RP also provides guidance regarding how to manage loudness of content without metadata, including non-AC-3 audio content."[8] That statement is misleading. We believe the Commission is probably referring to the text in A/85 Section 6, which says: "For delivery or exchange of content without metadata (and where there is no prior arrangement by the parties regarding loudness), the Target Loudness value should be –24 LKFS". However, we believe the drafters of A/85 intended this section to apply only to the delivery or exchange of content in the professional environment and not for delivery to the consumer. The assumption in Section 6 is that for transmission to the consumer the content will still be encoded in AC-3 with metadata, in accordance with the other recommendations of A/85.

4 Exercise of Waivers

In NPRM Paragraph 27, the Commission notes: "that ATSC may revise the A/85 RP to account for users of other audio [non-AC-3] systems" and seeks comment, if it does not do so, on "whether exercise of our waiver authority, conditioned upon use of other effective technology, would be appropriate to address this issue." In NPRM Paragraph 41, the Commission refers to their "…authority to grant waivers to MVPDs that cannot implement the ATSC A/85 RP because of the technology they use." and states: "Grant of a waiver under such circumstances would be more likely to be in the public interest if the waiver recipient can demonstrate that it, by some other means, will be able to prevent the transmission of loud commercials, as intended by the CALM Act. We seek comment on the appropriate exercise of our waiver authority under such circumstances, and on whether non-AC-3 audio systems can effectively prevent loud commercials." Our comments are as follows.

[8] See NPRM footnotes 18 and 87

a) If ATSC decides to revise A/85 as suggested in Section 3 above, the issue of waivers to MVPDs that cannot implement the ATSC A/85 RP because of the technology they use should not arise.

b) If no further revisions to A/85 are made beyond the proposed Annex K, the issue would be whether Annex K is sufficient to provide guidance for the use of non-AC-3 codecs. We note that A/85 itself currently provides no specific methods for the use of non-AC-3 codecs with and without metadata.

c) It is certainly possible for loud commercials to be prevented when using non-AC-3 audio systems. If the Commission decided to grant waivers for use of non-AC-3 codecs "conditioned upon use of other effective technology" then "effective technology" would seem to need clarification. For non-AC-3 codecs without metadata capability, readily available equipment is needed to process and adjust the audio itself before encoding. For codecs with metadata capability the technology needed is substantially the same as that currently described in A/85 for AC-3 systems but using the metadata defined for the non-AC-3 codec. As noted previously, to be effective, the use of any metadata-based system should take into account the capabilities of audio decoders in receivers or set-to-boxes to respond to audio metadata.

Respectfully submitted,

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