NOTE 1

BWF Energy Levels in AudioScience MPEG Bitstreams

1. Introduction

This application note details how to extract and use the energy information present in AudioScience MPEG bitstreams. This information may be used for visualising the audio in editing applications. The energy data is compliant with the Broadcast Wave Format (BWF) specification (see Ref 1) and the MPEG bitstreams produced by Digigram and Antex Electronics audio adapters.

Note, only MPEG Layer II bitstreams are discussed in this document.

The MPEG Layer II bitstreams are made up of a series of frames, each frame containing 1152 compressed audio mono or stereo samples. During encoding, a peak signal/energy level is determined over the samples in each frame and inserted into the frame as Ancillary data.

In order to extract the energy, you need to know the MPEG frame size and the location of the energy in the frame.

2. Frame size

For MPEG Layer II, the frame size, N, is determined as follows:

$$N = (int)(144 * BitRate / SampleRate)$$

The following table shows some common frame sizes:

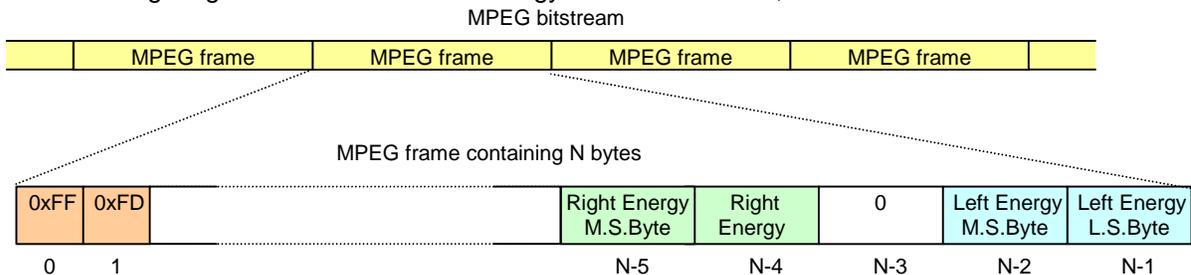| Sample Rate (Hz)	Standard BitRate	Actual Bitrate	Framesize, N (bytes)
32000	192000	192000	864
44100	256000	255718.75	835
48000	256000	256000	768

Note that for 44.1kHz sample rates, the bitrate is slightly less than the desired "standard" bitrate, so that the frames are a constant size and can be edited/visualised.

3. Location of Energy Information

The energy for each channel is contained in a 16bit word, located at the end of the frame. It corresponds to the absolute peak of the samples in the frame. The value ranges from 0..32767. The 16bit word is stored in big endian format (most significant byte 1st).

The following diagrams show where the energy levels are located, and their format.

MPEG bitstream

	MPEG frame	MPEG frame	MPEG frame	MPEG frame	

MPEG frame containing N bytes

0xFF	0xFD		Right Energy M.S.Byte	Right Energy	0	Left Energy M.S.Byte	Left Energy L.S.Byte
0	1		N-5	N-4	N-3	N-2	N-1

NOTES:
1. For a mono channel file, the energy is contained in the Left energy bytes only.

4. References
"Specification of the Broadcast Wave Format - Supplement 1: MPEG Audio", EBU Technical Document 3285 - Supplement 1 - 1997. http://www.sr.se/rd/bwf/

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