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Multichannel use of the BWF audio file format (MBWF)

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Note: Since the publication of this document, the EBU has published Doc. Tech 3306, which describes the RF64 extended file format for audio. RF64 can be used to transport multichannel programmes (together with a stereophonic version of the programme, if required) and it enables the use of file sizes in excess of the 4 Gbyte limit experienced in 32-bit environments. This newer file format adds to the means described in this document for the carriage of multichannel audio in BWF-compatible file formats.

Introduction

The Broadcast Wave Format is a file format for audio data. It can be used for the seamless exchange of audio material between different broadcast environments and equipment based on different computer platforms. As well as the audio data, a BWF file contains the minimum information, or Metadata, that is considered necessary for all broadcast applications. The EBU has added a "Broadcast Audio Extension", or <bext> chunk to the basic WAVE format.

There is now a requirement for a standardised way of representing multichannel audio using the Broadcast Wave Format. The two obvious candidates for achieving this are the interleaving of multiple channels into a single file, or allowing a safe association to be made from a set of mono files. Both approaches have their advantages and disadvantages, particularly with respect to file size limitations and transfer times.

The workflow reliability of both these mechanisms is now beginning to be established through test production and transmissions of 5.1-surround sound in the Swedish Members SR and SVT, as well as in other EBU Member organisations.

BWF overview

The Broadcast Wave Format is based on the Microsoft® RIFF WAVE audio file format. The BWF was conceived from the fact that countless PCs were equipped with Microsoft® software that could play back RIFF WAVE audio files. The BWF structure is basically a container keeping a small amount of Metadata in the <bext> chunk, and stereo or mono audio, coded in PCM or MPEG Layer II in the wave audio part of the file. Its success has been considerable and its use has spread world wide to many radio broadcasters, manufacturers and audio archives. The EBU (in EBU Tech 3285) and the AES (in the AES31 Standard) both publish the BWF standard.

The EBU has developed a series of additional chunks that extend the functionality of the BWF. These chunks are described in supplements to Tech 3285.

A new XML structure, the <axml> chunk, allows a general transport of more fields of Metadata. The XML structure can be aligned according to the EBU Tech 3293 Dublin Core standard and also can be used with an addition of internally used Metadata fields.

The <link> chunk allows for a cluster of files stacked together to get a longer playing time than available with the 4 Gbyte limit for one individual WAV file. This is of course very useful especially for multichannel files. (In this connection it should be noted that WAV files intended for DVD production are limited to an individual size limit of 1 Gbyte).

The MBWF

The Mono Files Approach

The main advantage of forming a multichannel BWF group from mono BWF files is that individual files may be downloaded and processed without opening other redundant file data.

Where such operations are common it is also desirable to carry other editing Metadata (EDLs) with these files. Part 3 of AES31 is entitled "Simple project interchange" [1999-06-15 printing]. This provides a convention for expressing this edit data in text form in a manner that enables simple and accurate computer parsing while retaining human readability. It also describes a method for expressing time-code information in character notation.

Equipment using AES31-3 is in wide use within EBU Members, and can utilise this type of MBWF specification immediately. In order to maximise exchange efficiency, the following additional information should ideally be held within **each file of a set**:

- A common identifier.

- An index specifying the position of each file within the set.

- An indicator of the total number of files in the set (allows receiving applications to establish whether they have located all the constituent files).

- A simple channel descriptor that describes the position of the channel in space (for example L, R, C, LFE, LS, RS, as defined in EBU R91-2004).

The channel descriptor should be omitted if, for example, the files contain separate instruments rather than a surround mix.

The Interleaved Files Approach.

The Microsoft WAV_FORMAT_EXTENSIBLE format for multichannel WAV files with specification of speaker layout is compatible with EBU R91-2004 up to 8 channels, and forms one of the recording options for the DVD-Audio format.

Several common music and audio applications can generate such files without any currently known compatibility problems.

Common Requirements for the MBWF.

- Unless otherwise agreed, the track allocations/identifications should be according to EBU R91-2004. This provides for a two-channel stereo mix to be carried on tracks 7 and 8, separately from the main 5.1 channel mix.

- The short name should be MBWF. This avoids confusion with any file suffix.

- The LFE (Low Frequency Effects) channel if present, should be limited in audio bandwidth to 120 Hz, but sampled at the same rate as the main channels (normally 48 kHz).

Common MBWF Advantages.

- Carries 5.1 surround in most existing formats along with a two channel stereo mix (separate or matrixed) in the common wave file container.

- Stereo is backwards compatible and playable on all BWF-computers.

- Backwards compatibility to BWF in using all earlier EBU-approved chunks.

Bibliography

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EBU Tech 3285-2001:	Specification of the Broadcast Wave Format – A format for audio data files in broadcasting: Version 1.
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EBU Tech 3276 suppl. 1:	Listening Conditions for the Assessment of Sound Programme Material - Supplement 1, Multichannel Sound
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EBU Tech 3306-2007	RF64: An extended File Formatfor Audio *A BWF-compatible multichannel file format enabling file sizes to exceed 4 Gbyte*