THE BUSINESS CASE FOR AUDIO WATERMARKING

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ABSTRACT

This presentation will review the applications of audio watermarking for the recording industry. It will examine the reasons for placing watermarks in sound recordings, the benefits which might result and the potential hazards which need to be overcome. It will cover the objectives, methodology and results of the MUSE project, one of whose tasks was the evaluation of "embedded signaling" systems. Finally, it will look at recent developments in the adoption of watermarking in the recording industry.

1. OVERVIEW

Watermarking has been a dream for the recording industry for years. The technologies to deliver it have advanced enormously in the last few years and it now appears that time may be right for the record companies to adopt them and secure some of the asserted benefits. These include:

- The ability to verify that an infringing recording is the same recording as an original without employing specialist listeners to do expensive A-B tests.
- The ability to trace airplay so that radio station licence fees (from territories where these are paid to record companies—which does not include the US) can be distributed accurately to the companies whose product is played, and so that marketers can quickly know what is getting played.
- The ability to form part of a copy management system for both consumer electronics and IT systems
- The ability to determine whether on-line exploitations of recordings have been licensed or not.

The MUSE project, which was jointly funded by the European Union and the recording industry had, as part of its objectives, an evaluation of available technologies for watermarking audio. The criteria against which the available systems were judged were:

Audibility The system should be inaudible, even under stringent testing conditions, to the best professional listeners in the industry.

Robustness The system should survive treatment in the usual kinds of processes used by the recording industry and its customers. This includes digital to analogue conversion and coding with perceptual codecs such as MPEG Layer 3.

Tamperproof-ness An attempt to remove or obscure the watermark should damage the value the music completely.

Cost The system should be inexpensive to license and implement, whether in consumer equipment or in computers.

The search produced many contenders and these were tested exhaustively. Whilst the results themselves are confidential to the project partners, the methodology will be described in the presentation.

The process by which individual record companies decide to adopt a particular technology (and they would have difficulty deciding together for anti-trust reasons) is still uncertain, but an update on progress will be given at the conference.

Opinions differ on whether a search for a single system is justified. Whilst it is convenient to be able to assert copyright with one system and subsequently add a transaction record with a different (or possibly the same) system, the testing of these combinations for audibility become difficult.

Even when decisions have been reached on systems to be deployed, the industry processes have to be adapted to accommodate them. For instance, where should a watermark be inserted. It is tempting to say that this should happen at glass mastering (or the e-commerce version which is probably "server loading"), i.e., after all creative processes have been completed. This is consistent with a supportable system having been demonstrated as being inaudible. However, in real life, it is likely that the watermark will be added

during the pre-mastering process, which still in the care of a skilled sound expert. He or she will wish to assure themselves that the watermark is truly inaudible for that particular recording.

Additionally, if watermarking is to be used to track airplay, infrastructure for monitoring needs to be created. If it is to be used for copy management, then consumer electronics companies need to be persuaded to implement it. Much remains to be done.

Finally, technology does not stand still. Whilst the industry's requirements are plain on audibility, newer technologies will be more robust or more tamperproof. Acting simply as customer for these technologies, the recording industry is not terribly interested in how these improvements are delivered. It is however concerned that an evolution path exists from today's technology to tomorrow's.