



Technology
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More than a waveform

A new way to store and edit audio along with note, harmonic, frequency, and amplitude information

Today, the most common method of transporting audio to a listener's device is as a compressed waveform — the raw data that describes the air vibrations produced by an instrument or vocal cords. This is the simplest way to store audio in a computer, as little processing is required to pass sound from microphone to RAM to speaker. However, is it the best way?

A philosopher once asked, "If a tree falls in a forest and no one is around to hear it, does it make a sound?". After all, the falling tree is simply producing vibrations from hitting the ground, and these can only be perceived as sound when heard by a listener. In a similar way, the vibrations in a song's waveform do not illustrate the intentions of the composer until a human brain perceives it as music.

Waveforms are effectively an encoded transport medium for audio, and even when viewed on screen using spectral analysis, without special training, they represent little in the way of what we hear as notes and passages of music. In our minds, we are able to reimagine melodies, and even a child can sing an improvised harmony along to a favourite track. When using a computer however, these simple human feats are difficult even when using the most advanced waveform manipulation tools. A method of storing audio in a way related to how humans perceive audio would provide more meaning and enable more dynamic and powerful editing control.

This is one of the reasons we created the Rip

audio file format and accompanying technologies. Rip files do not contain waveforms, but instead, highly detailed note, harmonic, frequency and amplitude information.

To illustrate how different Rips are from existing formats, if we want to quickly create a harmony, it is a simple matter of copying the relevant notes and adjusting their pitches. No complicated, slow or energy consuming processing of waveforms occurs — the pitches of the notes are simply updated, as if they were MIDI.

When we want to play back the audio, notes are converted into sine waves and output to the speakers as conventional waveforms. Parallels can be made with the brain converting notes we want to sing into air vibrations, with the use of vocal cords and other anatomy.

To support the Rip format, we invented the Ripper. Comparable to the way our ears and brains convert oscillations transmitted from a source into notes and melodies, the Ripper analyses a waveform, locates the notes and harmonics within, and generates a Rip file that sounds identical to the original when played back.

The first tool to utilise the power of the Rip format and make possible a wide range of advanced audio editing tools is Hit'n'Mix Infinity. At its simplest, individual notes (colour-coded according to instrument or layer) are displayed in a piano-roll format. These can be clicked and dragged, selected, copied, shifted up/down in pitch, stretched in duration and so on, all

without opening a single menu. Since the user works with the core components that audio is composed of at a perceptual level, we call this technology Atomic Audio Editing.

The possibilities go far deeper than this, providing tools ranging from editing the individual harmonics of notes, to cloning different audio attributes between sounds. They can be invaluable for professional music production/remixing, audio clean-up/restoration, sound design and other common sound editing, 'mix fix' and engineering-related tasks.

For Pro Tools, an AudioSuite plug-in is included so that selected audio can be processed and updated in place. Most other DAWs can open up Hit'n'Mix Infinity as an external sample editor for the same workflow. Cubase/Nuendo's Direct Offline Processing Plug-in also lets audio clips be edited directly from the project folder.

What's more, we've made it possible to access and manipulate the contents of Rip files with powerful Python scripting tools. We are hoping that many so-called *RipScripts* will be written by our coding-savvy users for the entire community to take advantage of!

A free, 1-month trial Hit'n'Mix Infinity trial is available from: www.hitnmix.com Tutorials: www.youtube.com/user/HitnMixVideo/videos Martin Dawe founded Neuratron Ltd in 1993 and their highly regarded PhotoScore music scanning and AudioScore music transcription software is used by composers, publishers and musicians worldwide. Hit'n'Mix Ltd was subsequently formed in 2010 to support the new Rip technology.

