AUDIO PROCESSING, BLOG

Audio Formats and File Types

JUNE 4, 2019

Understanding Audio File Types

In the world of audio, you are going to come across many different audio file types. With that being said, we will mention several here that are very common to the majority of DAWs. They can be categorized into 3 main groups.

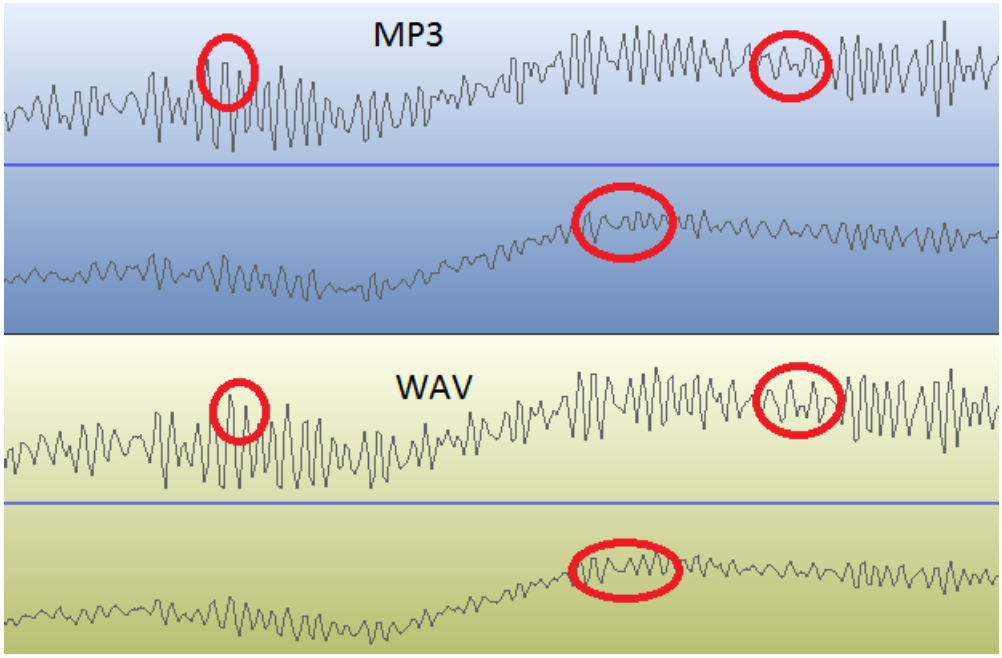
- **Uncompressed audio formats: *WAVE, AIFF & PCM***
- ***Lossless* audio formats: *FLAC, WMA, ALAC***
- ***Lossy* audio formats: *MP3 & AAC***

It is essential to understand the difference between uncompressed and compressed audio file types. Lossy or compressed file types like MP3s throw away audio information to reduce the file size. When we compress the file, it becomes significantly smaller than the original one. This has its advantages when distributing the content. However, when you are recording audio or downloading samples, always shoot for the best quality you can get. The reason for this may be self-evident to you – but it is critical for me to explain.

When you start with a lossy compressed audio source (like MP3 or AAC), further compression will compound the effect of the thrown away audio information. This can really damage the file. It also

from the beginning. Notice how compound compression has damaged the second example below.

It is an industry standard to deliver your final audio file (2-mix) to mixing and mastering engineers in an uncompressed format. They simply cannot and will not work with compressed files. Take a look at these two waveforms. They are the same performance rendered to two different qualities – WAV and MP3. The blue waveform on top is the MP3.



A few more terms you will come across when you deal with audio file formats are **Sample Rate, Bit Rate & Bit Depth.** We will cover these below.

SAMPLE RATE

The sample rate is the number of times the audio is sampled per second. For example, CD audio has a sample rate of 44100 Hz. This means that the audio is sampled 44100 times every second. The sample rate is measured in "Hertz" – a unit of frequency describing cycles per second.

Standard CD-quality audio uses a sample rate of 44.1 kHz (k means times 1000). Sampling Rates range from 8000 Hz (very, very low quality) up to 192 000 Hz (very, very hi quality). The disadvantage of very high sample rates is that they deliver huge files – not to mention – people cannot hear improvement after 44100 Hz (See Blog: **Why Waveforms?).**

BIT DEPTH and BIT RATE

Bit Rate and Bit Depth are two more important aspects of digitized sound. From the export (or render) window in your DAW, you will probably be able to choose from 16, 24, and 32 bit. SoundBrige allows these three options as well as a 32bit float option. This refers to **Bit Depth – the number of possible values to represent a sample of the signal with.** Professional studios usually offer bit depths of 24 and 32.

In digital multimedia, ***Bit Rate*** **refers to the number of bits within a unit of playback time to represent a continuous medium** (such as audio) and describes the character of the sample.

MORE ABOUT LOSSY FORMATS LIKE MP3

You can customize the degree to which the MP3 will retain or lose information during the encoding and compression process by tweaking the bit settings. Lower bit rate means the encoder will discard more or audio information during the compression process, which will affect audio quality on playback. Bit Rates for MP3 files range from 16 kilobytes per second (kbps) to 320 kbps.

A Sample Rate of 44100 Hz and a Bit Depth of 16/Bit Rate of about 320 kbps is known as the Red Book standard for audio CDs.

Here is a comparison of lossless and lossy files with their associated quality vs size.

Format	Sampling	Bit Depth	Quality	Size
Wave / AIFF	8000 - 16000 Hz	8 bit	Very low	Very small
	16000 - 32000 Hz	16 bit	Decent	Medium
	44100 Hz	16 bit	Excellent	Large
	48000 Hz and above	16 bit - 32 bit	Pristine	Very large

Format	Sampling	Bit Rate	Quality	Size
MP3	8000 - 16000 Hz	16 - 96 kbps	Very low	Very small
	16000 - 32000 Hz	96 - 196 kbps	Decent	Small
	44100 Hz	256 - 320 kbps	Good	Medium
	48000 Hz	320 kbps	Excellent	Large

For professional sound quality, record and render audio at a rate of at least 44.100 kHz and a depth of 24 bits. This way, any further processing such as mixing and editing will not result in any degradation.

If you must encode/record to MP3, aim for 320 kbps – 32bit float.

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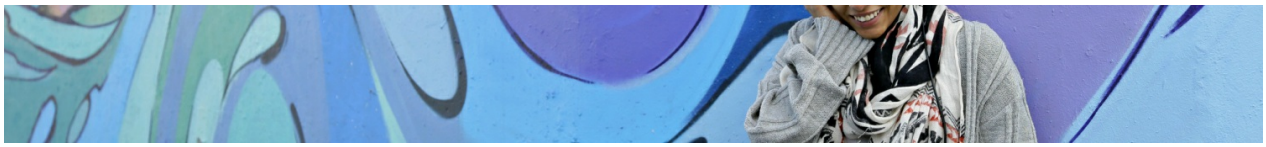

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