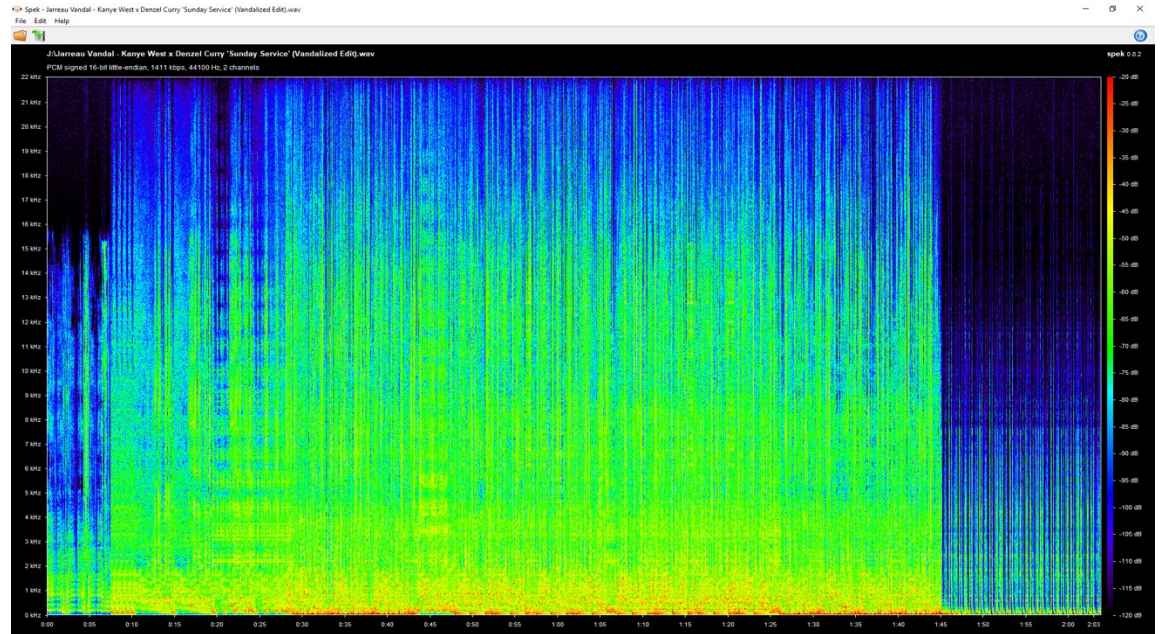# Analyzing MP3 tracks to find their true sample rate

Many times, after digging for a 320kbps MP3 of your favorite remix, you play it, only to hear a compressed, low quality track. What gives?
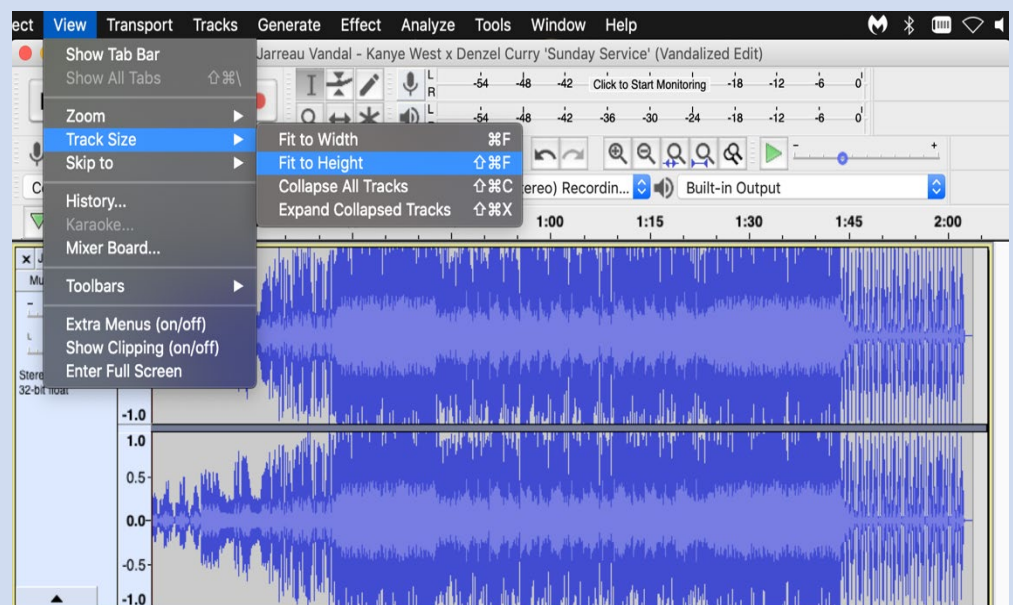
Let's look at how an MP3 compares to a CD-quality track, which has a sample rate of 44.1 kHz. This Wikipedia article breaks down what sample rate means. In essence, a CD-quality WAV file will have information from 0 kHz to 22 kHz on each left and right channel (22 kHz + 22 kHz equals approximately 44.1 kHz). Even the best quality MP3 will never achieve full CD quality, but MP3 compression relies on the fact that we can't really hear frequencies above 20 kHz.

If you're using Windows, then Spek is a free, one-click tool to get the info you need. Simply open the track, and you'll get the spectrogram. Continue down to step 5 on page 3 for an explanation of what this information means.
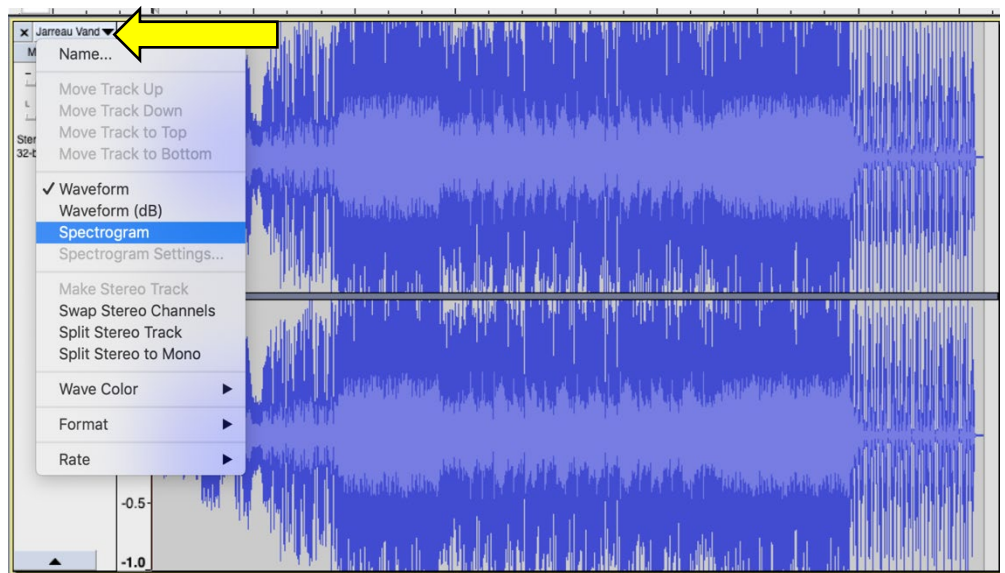

On a Mac, Audacity is a free too that lets you analyze a track's frequency range and much more. It's also available for Windows. It takes a few extra steps to see the track's frequency range:
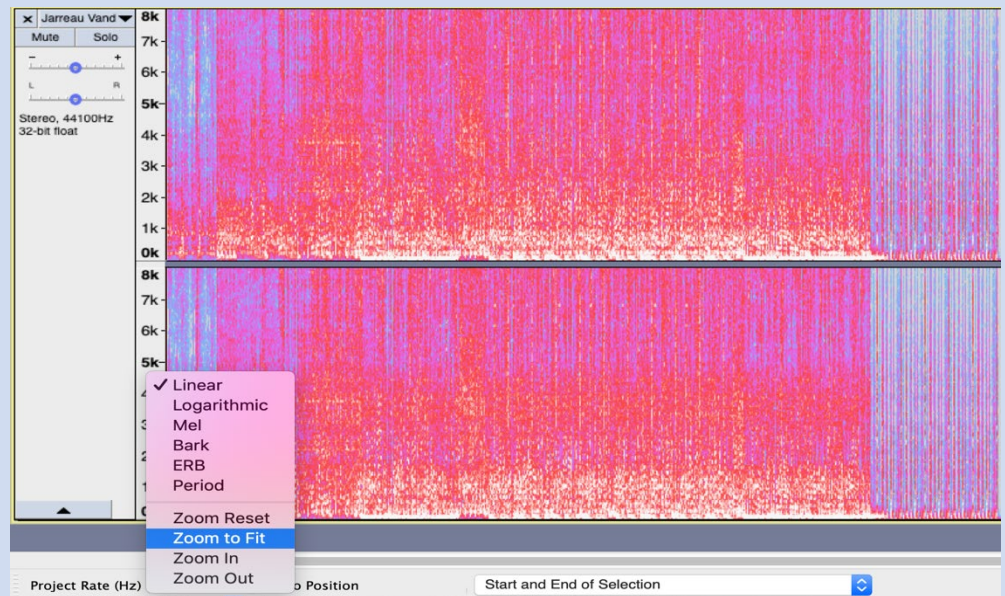
1) First, **maximize the Audacity window** on your screen, so you have more room to see the detail of the track. Then go to View>Track Size>Fit to Height to maximize the track's height.
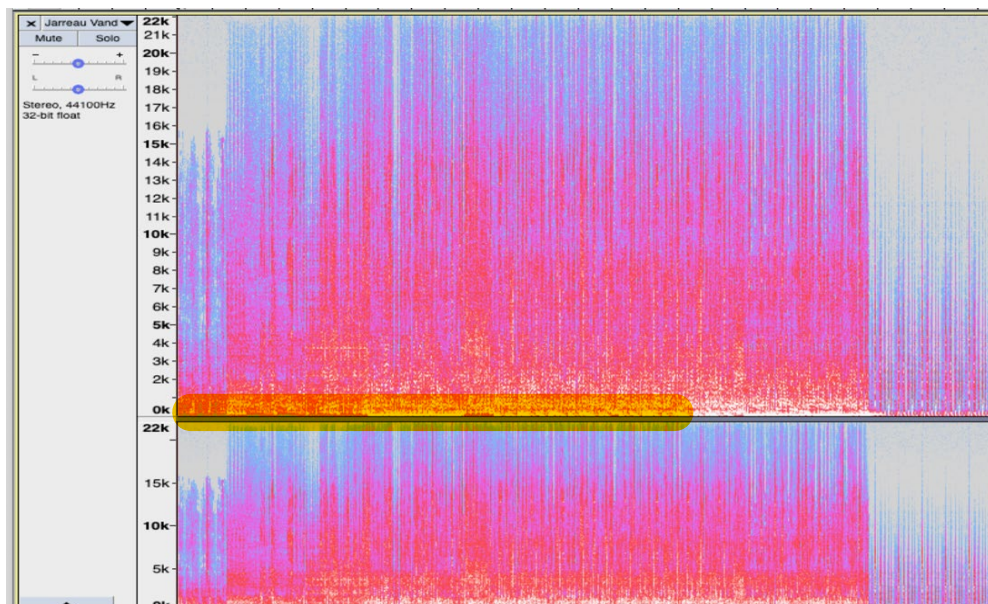
2) Next, click on the track name to reveal the dropdown menu, and select **Spectrogram,** which will show us the frequency information we need.
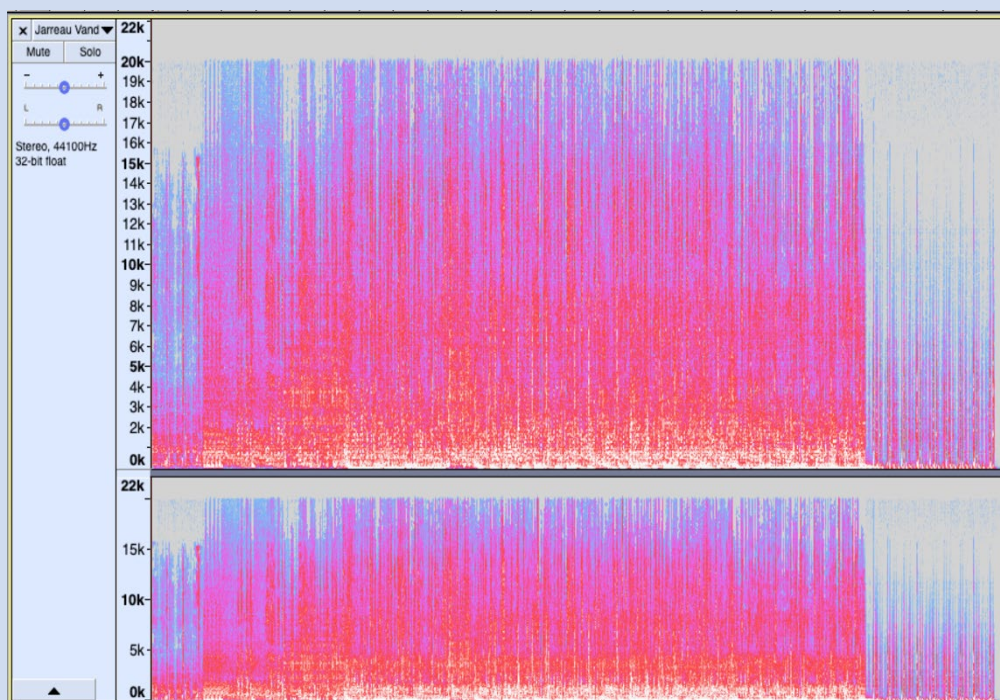

3) Initially, Audacity will only show about 0 to 8 kHz. We want to see 0 to 22 kHz. Right click on the frequencies and select **Zoom to Fit** to fit the full range of the spectrogram to the window.
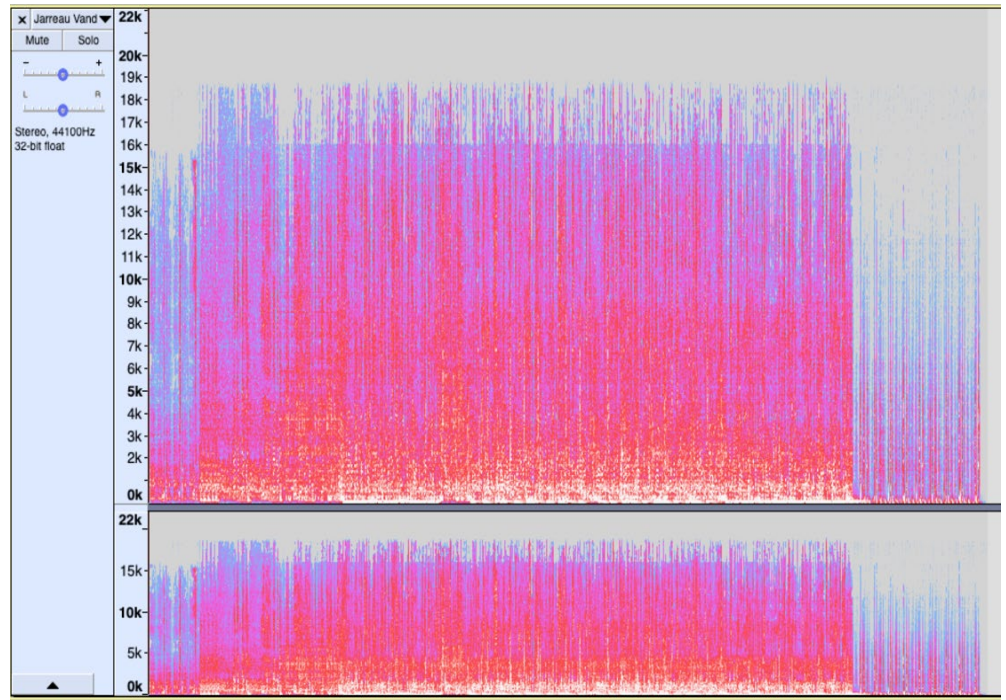
4) I'm working with a full quality **44.1 kHz WAV at 1411kbps** as reference, so you'll see information all the way up to 22 kHz. Stretch the middle bar (highlighted) to expand one track's data.
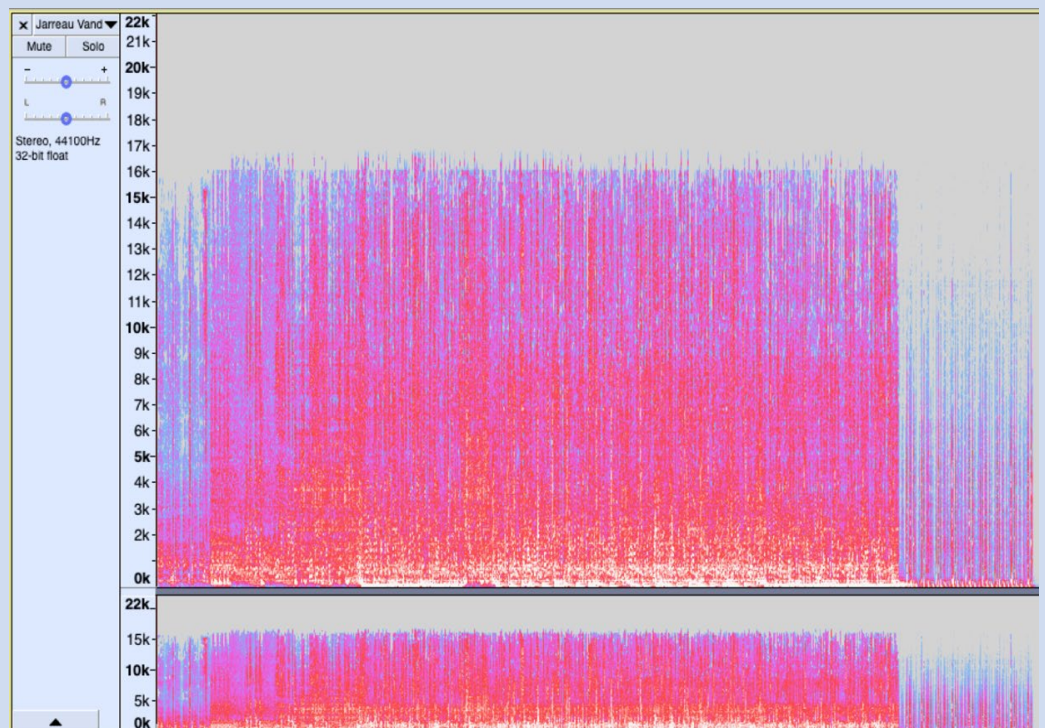

5) I've re-encoded the same track as a **320kbps MP3**. Notice how the frequency reaches about 20 kHz. This is the quality you want to aim for when acquiring MP3 tracks. There is full perceived aural information.

6) Here is the same track encoded as a **192kbps MP3**. The cutoffs around 18.5 kHz and 16 kHz show how the MP3 compression is removing audio information to save space. Depending on the track, this may still be an acceptable level of compression. Other tracks with lots of detail in the high frequencies may start to sound muddied or dull.

7) Finally, here is the track as a **128kbps MP3**. Sometimes, an MP3 that is encoded at 320kbps has an underlying 128kbps MP3 track. Even though the 320 track has a data rate capable of carrying frequencies up to 20 kHz, the MP3 encoder cannot re-create the missing higher frequencies if they're already gone from the source material.

Again, some tracks without a lot of high frequency details may sound OK with this amount of compression. However, ripping tracks from Soundcloud or YouTube will often result in audio at 128kbps. If you buy the same track off of Beatport, or grab it from a record pool, and do a side-by-side comparison, the audio quality will be drastically better in the true 320kbps MP3. This method will help you compare different MP3s you find to see which one has the best audio quality.

Of course, to hear these differences you need a speaker system or headphones capable of producing the full range of frequencies we can hear. I love the Audio Technica ATH-M50x headphones. Buy them refurbished from this link for a great price. They're used in recording studios everywhere. Happy digging!