

Column by Renzo van Riemsdijk (Masterenzo):

What is the best sample rate?!

During the Meet The Pro session at the studios of Okapi Recordings in September of this year (2019) a very good question was asked by someone in the audience. The question was what would be the preferred sample rate for running a project and what would be the relation between a project and a chosen sample rate.

I've written a column about sample rates some time ago (column #17, *The higher the better*). Sample rate is just like dither one of those subjects that get quite some attention, while other subjects in the production process might benefit from some extra attention.

It requires good hearing skill to hear the difference between a mix in 44.1 kHz and that same mix in 96 kHz. I must admit that my attention doesn't lie anywhere near sample rates. I find the things happening **in** a mix (energy!) a lot more important.

Of course, the choice of sample rate has an influence on the sound. It has an influence on the steepness of the digital filter in A/D and D/A converters to prevent aliasing. At a lower sample rate (44.1 kHz) the digital "anti-aliasing filter" has a more steep curve. The higher the sample rate, the less steep the filter is.

And the more steep the filter, the more difficult it is to design a linear and phase coherent filter without any (or with as little as possible) aliasing frequencies within the human hearing range of roughly 20 to 20.000 Hz.

For more info about aliasing in relation to digital filtering, I'd advise you to Google terms like aliasing and Nyquist. It has to do with sampling techniques. Choosing a sample rate is also part of the sampling routine.

According to some audiophiles among us a steeper digital filter could induce more stress and less focus in the sound.

Well, I find that a bit difficult. First of all you need a very good listening environment to recognize the differences between different sample rates. Plus, a steep digital filter doesn't necessarily have to be a bad thing.

It depends greatly on the style of music. Subtle classic piano playing or a nice jazzy muted trumpet are a different league than rocking and screaming guitars and drums with drops of water coming off the snare.

And besides all that, our human hearing doesn't have a very linear frequency curve. So what to believe? Go check for yourself. Record and mix something in 44.1 kHz, subsequently record and mix exactly that same piece in 96 kHz and spot the differences. Are there any differences? Try listening on headphones or in another studio and most importantly: listen multiple times during a couple of days. Tests like the above done in the past show that a mix done in 96 kHz has a slightly different "presentation" when compared to that same mix in 44.1 kHz.

So, a less steep digital filter is easier to build and less complex. In that respect higher sample rates aren't illogical. However, most of our streaming platforms only accept files with a sample rate of 44.1 kHz to subsequently encode these files to data-compressed AAC or Ogg file formats (like mp3).

And yes indeed, *what goes up must come down*. Somewhere in that chain we call mastering a higher sample rate has to be converted back to 44.1 kHz to meet the standards of Spotify. Would you choose 44.1k during recording and mixing, there wouldn't be a need to convert the sample rate. It saves you extra processing.

But suppose you're working on a nuanced project to be released on a streaming service like Qobuz. Qobuz is a French platform that supports lossless streams with sample rates up to 192 kHz. Qobuz plays FLAC* files, offering the same quality as wav files with a resolution of 24 bits.

In that case it's not a bad idea to look at the possibilities to run your project in 96k (or 88.2 or 48 kHz). One thing to consider is the processing power of your computer. Working with higher sample rates (88.2 kHz and higher) during recording and mix can consume a fair share of your computer's processing power. You don't want to be in a situation where pressing the space bar (play) leads to message stating that playback at this moment is not possible or that playback begins but the only audio coming out of your speakers is a severe stuttering sound.

So, in conclusion we can state that sample rates higher than 44.1 or 48k are not always the better choice. Choosing the right sample rate for your project greatly depends on which format you plan to release your music and if your computer is willing and able to work with higher sample rates.

I must admit that, without any technical foundation and solely based on my gut feeling, I have a slight preference for 48 kHz as go-to sample rate. Don't ask me why but it must have something to do with a compromise: a less steep digital filter and a sample rate higher than 44.1k while still having enough computer-processing-power to spare.

If we add up the benefit of supplying higher sample rates to the vinyl pressing plant, I must admit that 48k isn't such a bad idea at all.

Well, I'm done for now and I reckon you're a bit saturated with sample rates by now...
Next month I'll try writing about a lighter subject.

Renzo

Renzo (Masterenzo) is a Rotterdam based Dutch mastering engineer. He has worked for Gery Mendes (GMB), The Legendary Orchestra Of Love and the John F Klaver Band.

More info about mastering and about Masterenzo can be found on his [website](#).

*FLAC: Free Lossless Audio Codec. An audio codec to play music, just like AAC (Apple Music) and Ogg which is used by Spotify, without any loss of quality (lossless). AAC and Ogg are compressed (lossy, less quality) audio codecs like mp3. Codec stands for **coding** and **decoding**.