FEATURES

aptX and aptX HD: Bluetooth audio codecs explained

Ever wonder how good or bad Bluetooth audio is? Now you don't have to.

By Robert Triggs•March 14, 2023

Let's face it: Bluetooth audio quality has **never really been good enough** to satisfy the pickiest listeners out there, and a number of competing "high quality" **codecs** have appeared to fill the void in quality left by the default low-complexity sub-band codec (**SBC**) found on all Bluetooth headsets. Qualcomm's aptX is the most commonly supported alternative in both headphone and smartphone products, as it "delivers CD-like audio quality" while aptX HD is "indistinguishable from High Res audio" (according to **Qualcomm**). Bold claims for Bluetooth technology, but is any of that true?

Fitting audio of any reasonable quality into a small enough package to send over a data-limited connection is an inevitable matter of compromise. Codecs regularly manipulate audio quality to save on bandwidth, which often means distortion, added noise, compression artifacts, and poor quality. So how does aptX achieve its audio quality, and how does it compare to the higher quality aptX HD?

Editor's note: this article was updated on

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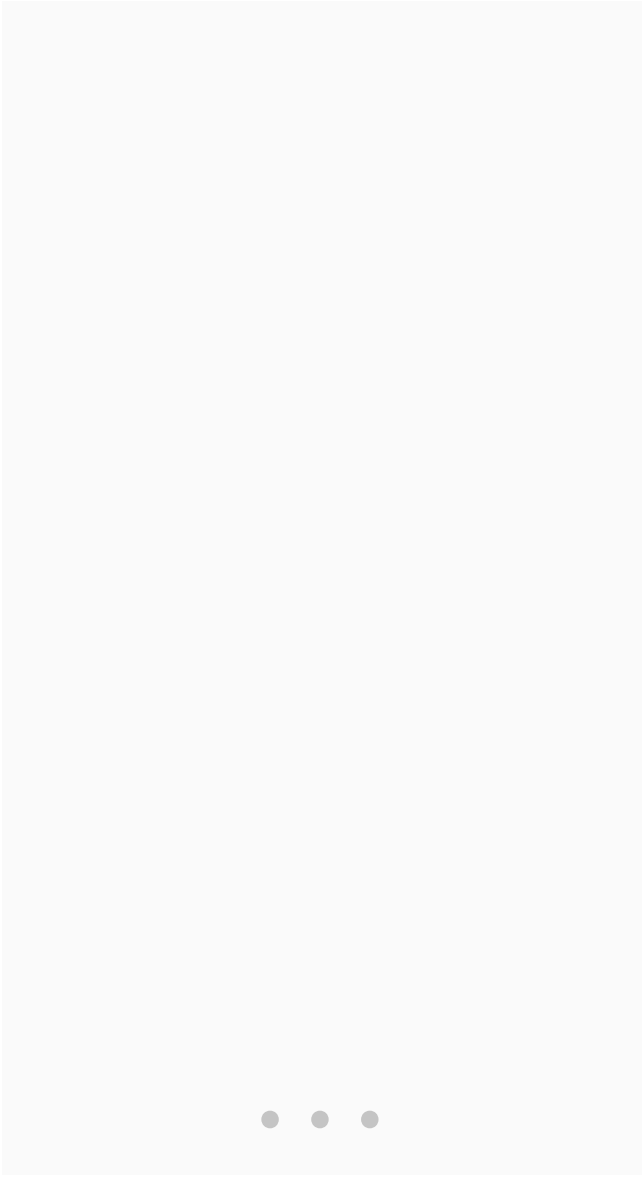

What is aptX?

Before we go any further, it's worth pointing out what aptX actually, y'know, *is.* Qualcomm has developed a number of Bluetooth codecs in the aptX family for a number of years, including

aptX, aptX HD, aptX Adaptive, aptX Lossless, and aptX Low Latency. Each of these are what's called a codec, or a way for a source device (like a phone or computer) to transmit data to a listening device like headphones. The codec will provide a means for each device to agree on a way to encode and decode the data into a format that can then be used to accomplish its goal—whether that's data, or audio.

While Sub-Band Codec (SBC) is mandatory for all Bluetooth devices to have as a lingua franca of sorts, not all devices need to be able to use aptX or any of its family. In general, aptX and its related codecs are prized for their audio quality and in some cases latency. However, this can vary depending on which flavor of aptX you're using. Today, we're only looking at aptX and aptX HD.

What is frequency response?

The two major factors that determine the size of digital audio files are sample rate (frequency), and bit depth. By removing a