

Qualcomm

Qualcomm® aptX™ Adaptive Audio Technology

aptX Adaptive is our next generation dynamically adjustable audio codec designed to deliver robust, low-latency, low-bit rate, high quality wireless audio.

aptX has been helping to improve audio quality in pro-audio, broadcast and consumer applications for over 25 years. This bit-rate efficient technology helps ensure you receive the highest possible sound quality from your Bluetooth audio device. aptX supports the wireless sound quality of many of the world's finest smartphones, speakers, headphones and tablets.

With aptX Adaptive we are helping to transform the future of the wireless audio listening experience. aptX Adaptive is designed to provide a viable Bluetooth® wireless alternative to wired audio devices for applications including music listening, watching video and mobile gaming.

This groundbreaking new audio coding technology combines premium audio quality, low-bit rate audio transmission, low-latency, and scalability to help create the ultimate superior wireless listening experience for end users. What this means in practice is that the codec is designed to automatically adjust to provide optimum audio quality or latency depending on what content is being played on the device while also taking into account the external RF environment to ensure robustness.

aptX audio is available as part of our feature-rich Bluetooth audio System-on-Chip (SoC) platforms, which are designed to help ensure ease of integration and reduce development time.

 **Qualcomm® aptX™ Adaptive**

This material is subject to change without notice.
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Highlights

Strong consumer brand recognition

aptX is a strong, recognized brand in the consumer electronics marketplace, providing premium audio quality in approximately 150 million Bluetooth headsets, speakers, soundbars and automotive infotainment products available in the market today.



Exceptional audio quality even at lower bit rates

aptX Adaptive is designed to offer exceptional audio quality even at lower bit rates and is backwards compatible with four billion aptX and aptX HD supported devices*. It also supports legacy Qualcomm TrueWireless™ Stereo and dual-mono Qualcomm TrueWireless Stereo modes.



Designed to meet the demands of today's wireless consumer

Many major phone OEMs are removing headphone jacks for slimmer designs, increasing the demand for high resolution wireless audio that can match the wired experience. With aptX Adaptive audio our aim is for consumers to make the move to wireless without having to compromise on audio quality.



Bluetooth wireless alternative to wired audio devices

aptX Adaptive is designed to deliver an optimal user experience for gaming, 'touch to audio', 'motion to audio' and interactive user interface applications to support increased multimedia content consumption and consumer expectation for a superior experience that is designed to "just work".



*Based on the assumption that aptX is in 100% Android smartphones sold between 2015 and 2017. Smartphone sales figures obtained from <https://www.gartner.com>

Qualcomm aptX and Qualcomm TrueWireless are products of Qualcomm Technologies, Inc. and/or its subsidiaries.



Target Audio Applications

- Wireless Headsets/Hearables
- Automotive Infotainment
- Gaming Headsets
- Speakers/Soundbars
- Handsets/Tablets
- Television



aptX Adaptive Features

- Designed to be backwards compatible with aptX and aptX HD supported devices
- Dynamic bit-rate adaption designed to ensure consistently robust audio streaming in challenging RF environments
- Dynamic bit-rate and latency adaption is based on handset user application with no need for user intervention
 - Typically 279kbps to 420kbps
- Supports exceptional audio quality even at lower bit rates:
 - aptX HD quality at 420kbps
 - aptX 'Classic' quality at 279kbps
- Low algorithmic latency — less than 2ms at 48kHz
- Low system latency — between approximately 50 and 80ms depending on implementation
- Bit-error resilience is designed to help maintain audio quality in challenging RF environments
- Supports legacy Qualcomm TrueWireless™ Stereo and dual-mono Qualcomm TrueWireless Stereo modes
- Supports virtually all major platforms including Android, Windows 10 and Mac OS.
- aptX Adaptive technology is available with many of our feature-rich Bluetooth audio SoCs including QCC5100 series, QCC302x and QCC303x.

Other aptX Audio Solutions

Qualcomm® aptX™

aptX technology helps to power the wireless sound behind many of the world's finest smartphones, speakers, soundbars, headphones and tablets. Stream music using Bluetooth wireless technology, without compromising on sound quality. The 'original' aptX audio technology supports CD quality audio over Bluetooth.

Qualcomm® aptX™ HD

aptX HD audio is designed to help Bluetooth wireless devices deliver High Definition (HD) audio. It preserves sound data through the audio transmission, resulting in a 'better-than-CD' hi-res listening experience and is engineered to enhance audio performance, even when applied to standard resolution content.

**University of Salford test results, 2015

aptX Audio Comparisons

Parameter	aptX HD	aptX for Bluetooth	aptX Adaptive @ 276kBit/s	aptX Adaptive @ 420kBit/s
THD+N @ 1kHz	-90dB	-85dB	-90dB	-100dB
Multi-tone @ 1kHz	-100dB	-100dB	-90dB	-100dB
Multi-tone @ 10kHz	-90dB	-65dB	-85dB	-95dB
Crosstalk	-155dB	-120dB	-90dB	-200dB
SNR @ 1kHz	129dB	93dB	130dB	135dB
Supported Variable Bit Rate	No	No	Yes	Yes
Word Depth	16-bit, 24-bit	16-bit	24-bit	24-bit
Sampling Frequency	44.1kHz, 48kHz	44.1kHz, 48kHz	44.1kHz, 48kHz, 96kHz	44.1kHz, 48kHz, 96kHz
Frequency Response over BT	20Hz - 22.7kHz	20Hz - 22.7kHz	20Hz - 22.7kHz	20Hz - 22.7kHz
PEAQ Audio Quality @ 280kBit/s	0.04	-0.08	-0.06	N/A
PEAQ Audio Quality @ 400kBit/s	0.04	-0.08	N/A	0.045
Bit Rate	576 Kpbs (48 kHz sampling)	384 Kpbs (48 kHz sampling)	276 Kbps	420 Kpbs
Codec Latency	1.8 - 2.0ms	1.8 - 2.0ms	1.4 - 2.0ms	1.4 - 2.0ms

QCC5100, QCC303x and QCC302x are products of Qualcomm Technologies, Inc. and/or its subsidiaries.

To learn more visit: qualcomm.com or aptx.com



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