

Echo by Device - Field Guide

Why each device echoes, who should own the canceller, and the fix - on one page.

How hard is the echo? (by device)

Device	Echo	Why
Wired headset / earbuds	Trivial	Sealed speaker - almost no echo path; tiny fixed delay
In-ear AirPods (Bluetooth)	Easy on echo	Sealed in ear; issue is HFP quality, not echo
Laptop at volume	Moderate	Short stable path; louder echo + some distortion
Open-room speakerphone	Hard	Long reverb tail + distortion + double-talk
Classic Bluetooth speaker/headset	Hardest	Large, moving loop delay breaks alignment

Why call audio sounds worse: A2DP vs HFP

A2DP (listening)	One-way stereo, full bandwidth, NO mic. AAC/aptX, 44.1-48 kHz.
HFP (on a call)	Both directions but MONO voice. CVSD 8 kHz / mSBC 16 kHz, 64 kbit/s.
The switch	Opening the mic forces A2DP -> HFP. That is the quality drop on calls.

Who owns the echo canceller (pick ONE per platform)

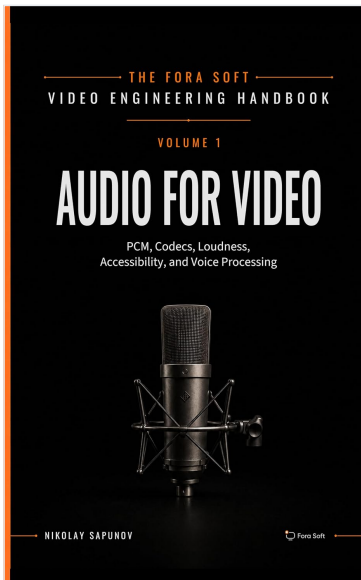
Platform	Owner	How to engage
Desktop browser	WebRTC AEC3 (software)	echoCancellation: true in getUserMedia
Mobile browser	Usually platform / hardware	Same constraint, different engine
iOS / macOS native	Apple Voice-Processing I/O	Audio session .voiceChat mode
Android native	AcousticEchoCanceller or AEC3	VOICE_COMMUNICATION source

Remember

- ☐ AEC lives or dies on delay alignment: it must match reference to echo within a few ms.
- ☐ Bluetooth loop delay is large (often toward 200 ms) AND moving - the worst input for the estimator.
- ☐ Opening the mic switches classic Bluetooth from A2DP music to HFP mono voice. Quality drops.
- ☐ AirPods rarely echo - sealed in the ear. 'Echo on AirPods' is usually HFP quality or double-processing.
- ☐ Speakerphone = long reverb tail + distortion + double-talk; symptom is half-duplex clipping.
- ☐ Pick ONE canceller owner per platform. Never stack software AEC on an already-cleaned signal.
- ☐ Echo for ~1 s after switching device = delay estimate and filter re-converging. Normal.
- ☐ Recommend wired headphones; design the audio for the day the user hits speaker anyway.

Companion to: 'Echo Cancellation on Speakerphones, Bluetooth, and AirPods'

www.forasoft.com/learn/audio-for-video/articles-audio/aec-on-bluetooth-speakerphone-airpods



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This field guide explains why each device echoes, who should own the canceller and what Bluetooth HFP does to call audio. Volume 4 covers real-time voice processing in depth: AEC, AGC, noise suppression and VAD, plus codecs, channels and sampling.

WHAT YOU WILL FIND INSIDE

- Acoustic echo cancellation (AEC)
- AGC, noise suppression and VAD
- Speech codecs and bandwidth
- Channels and sample rates

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Users hear echo on speakerphones or Bluetooth headsets?

We will find who owns the canceller on each platform, fix delay alignment and test on the devices your users have. 250+ video products shipped since 2005.

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