Echo by Device - Field Guide

Fora Soft Learn

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	**AcousticEchoCanceler 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.