Episode Book

EPISODE #6475

USB Audio Limits on Android for Voice Models

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SYNOPSIS

Android caps standard USB audio at 48 kilohertz, creating technical trade-offs when recording audio for speech recognition versus voice cloning. Speech models crave authentic, messy background environments, while voice clones demand strictly noise-free source material. This deep dive inspects the mobile recording pipeline, exploring how custom USB drivers bypass operating system limits, why spectrograms expose silent downsampling, and how hardware interfaces like the Shure MVX2U Gen 2 interact with mobile devices.

TRANSCRIPT



Corn

Plug a microphone into an Android phone's USB-C port and the operating system talks to it through a documented subset of the old UAC one standard, forty-eight kilohertz at the very top. Anything above that comes from an app carrying its own USB driver. Daniel is standing in that gap with a cable, gathering speech for two jobs that want opposite things. Recordings to train speech recognition, where reliable matters more than high rate. And recordings to train a voice clone, where he wants maximum fidelity and tight control of the noise.



Herman

Forty-eight kilohertz is plenty for speech, so the ceiling is less of a problem than it sounds. The more useful detail is who sets it. Android has had USB audio host mode since Android five, with rates from eight kilohertz up to forty-eight, sixteen, twenty-four or thirty-two bits, mono or stereo. The docs say code beyond those limits exists, but nobody has validated it. So when an app advertises three hundred eighty-four kilohertz, that is the app's own driver talking, not the phone.



Corn

Three hundred eighty-four. Nothing a person says up there is a word.



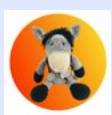
Herman

Bats, mostly. And the listing says "depending on your audio device," so the real cap is whatever the microphone or interface reports. Twenty-four bits at forty-eight kilohertz is the realistic target, and it's a good one.



Corn

Fine, but what does the phone do to the signal between the cable and the app? Does it just hand it over?



Herman

I don't know, and neither do the docs. Android's own page on USB audio never says whether capture gets resampled or processed on the way in. The audio source flags, like the unprocessed one, are written with the built-in mic in mind, and nothing says what they



Herman (continued)

do to a USB source. I'm not going to pretend that's settled.



Corn

So the header on the file can say forty-eight and nobody is obliged to mean it.



Herman

Which is why you check the file yourself. We'll get to how. First, the two jobs, because they really do pull apart. Corn, if you were collecting the speech recognition half, where would you record?



Corn

Wherever the model is going to live. Kitchen, street, a bus. I'd walk around with it.



Herman

That matches what the speech recognition side wants. Noise at a range of levels and varied conditions help, and Whisper-style models take sixteen kilohertz mono, so you throw most of the rate away later anyway.



Corn

We did an episode on collecting speech data on outdoor walks. Movement changes how you breathe and phrase things, and background noise alone doesn't reproduce that. So for that half I'd rather have the real walk than a clean studio.



Herman

And the clone half is the reverse. Noise gets learned. The Coqui guidance says noise hurts alignment and makes the output drift away from the source voice, and it wants consistent tone and pitch. Whether denoising afterwards damages clone data, nobody I've seen has measured, but my reasoning is the same as everyone's: the cleanup leaves artifacts, and the model learns the artifacts. So you control the noise at the source, in the room and at the mic, and you don't touch it afterwards.



Corn

Quiet closet for one, a bus for the other. Same microphone.



Herman

The clone side has its own fussiness. Take Chatterbox, the open model: you hand it a reference clip as a WAV file, the example is a ten-second clip, and the repo says nothing about input sample rate or how much noise it tolerates. The advice that does exist is one speaker, minimal background noise, no music, and the reference should match the target language, or the accent leaks across. I'd call it a good argument for recording your clean clips deliberately rather than mining them from long takes.



Corn

Ten seconds. You could do it in the car.



Herman

You could, and you'd get a clone of the car.



Corn

And the model doesn't say what rate it wants, so the rate is a guess either way.



Herman

The sessions differ, not the hardware. Record at forty-eight kilohertz, twenty-four-bit, then come down to sixteen for recognition, or somewhere near twenty-four for a Chatterbox-type model. I'd hold that second number loosely. The guides disagree: some say twenty-two kilohertz, some twenty-four, some forty-four. What you can never do is go up from a low-rate recording.

Corn

I keep looking at that forty-eight on the file and wondering. How do you tell a true forty-eight from a stamped one?



Herman

With a spectrogram, the picture of frequency over time. Every recording has a top frequency, half its sample rate. A true forty-eight kilohertz file can carry sound up to twenty-four. If the real source was recorded at forty-four point one, the picture shows a hard wall near twenty-two, whatever the header claims. If the wall sits at eight kilohertz or sixteen, something low-rate got stretched in the middle. You compare where the wall sits with where the file says it should be.



Corn

A wall, not a gradual fade.



Herman

A cliff. The other thing to look at is the silence. Gaps between words should be a quiet, even floor. Clutter in the gaps, or a floor that surges up when you start talking, tells you something is processing the signal. You can read the stored rate and bit depth with a tool like ffprobe, and sox will draw the spectrogram. But I haven't got a command I trust to give you, so I'm not going to make one up.



Corn

One catch. If the file is a compressed one dressed up as WAV, you won't see it by eye.



Herman

A high-bitrate M P three decoded to WAV is hard to spot, yes. So record straight to WAV or FLAC and never to anything lossy.



Corn

Then the app. Everyone says there's one.



Herman

There's one that comes up again and again: USB Audio Recorder PRO from a developer called eXtream. It brings its own USB driver, saves WAV, FLAC, OGG and AIFF, and is paid. The Play listing says up to three hundred eighty-four kilohertz depending on the device, the developer's older text said a hundred ninety-two, and the tracker I've seen shows it updated at the end of October. The developer says its driver exists because Android's is limited.



Corn

Paid, and with no promise it works with your phone. That's a leap.



Herman

There's a free demo, and the developer says to try it first. It says almost all USB-C Android phones work, with exceptions for Huawei and Honor and for phones on UNISOC chips. Its device lists stopped being updated a while back, so treat that as a guide, not a guarantee. One more thing: nothing else can use the driver. While that app has the mic, the rest of the phone doesn't.



Corn

And the setting that bites people.



Herman

The default. One old review found the app starts at forty-four point one kilohertz, sixteen-bit, stereo, and you have to set forty-eight, twenty-four by hand. That review is ancient, so check yours. But half of the blaming of a good mic is blaming a default.



Corn

Is that the only app? It sounds like a one-horse race with a very expensive horse.



Herman

There are others, and the differences matter. Audio Evolution Mobile is from the same developer and uses the same driver, but as an in-app purchase. Without the purchase you get Android's own driver, which means higher latency and sixteen-bit audio, and the trial stops USB audio after forty-five seconds. Then there's RecForge II, which does WAV and FLAC from eight to forty-eight kilohertz and has a raw, no-auto-gain source option and external mic support. I haven't seen it established that its USB-mic path works, so that's a maybe. And Rode's own Reporter app records up to forty-eight, twenty-four with a Rode USB-C mic attached, which is lovely if it's a Rode mic and irrelevant if it isn't.



Corn

Three apps, and each one has a footnote the size of the app.



Herman

I'm an expert in footnotes, Corn. You're the one who'll test all three, slowly, over a month.



Corn

A week. Sloths are thorough, not slow. And no app on that list has been shown to switch off the phone's own gain control on a USB source, so the spectrogram stays on the schedule.



Herman

Would you pay for the first one, though, or start with the demo and a cable you already own?



Corn

Demo first. I'd spend nothing until the spectrogram says the phone's side of the chain is fine. The mic is the last thing I'd buy. We did an episode where a phone's own mic beat a dedicated dictation mic, and the lesson was that the recording path decides it, not the price on the box.



Herman

Same lesson in a different place. Cable and class matter more than people expect. The app needs a class-compliant device, either of the two USB audio classes, and a data-capable cable, not a charge-only one. Android's docs say manufacturers target the older class but should plan for the newer one, and that some phones can't power every peripheral.



Corn

A cable that charges but doesn't carry data. The one in my drawer, probably.



Herman

Android's own routing can interfere too. The docs mention a media toggle in developer options that stops the phone from grabbing USB audio on its own, and a powered hub if the phone can't power the mic. They give no figures for either.



Corn

Let's hear from a listener. This one came in as a voicemail.
Yara: Hello, this is Yara calling from the back room of my uncle's shop in Kathmandu, where I am recording this on my phone while the power is out and the generator is making that humming sound you can probably hear behind me. I wanted to ask about today's episode on collecting good voice recordings with a phone and a little microphone, because I have been trying to record my grandmother telling stories from her village, but she keeps pausing to scold the neighbor's dog, so I wonder if you think I should record her anyway or wait for a quieter day, and also I once spent three hours recording a single paragraph of a book into my phone because I kept sneezing, and now when I listen back I can hear my own breath between every word, which is honestly a little embarrassing.



Herman

Record your grandmother anyway, Yara. If the stories are for a recognition model, a scolded dog is exactly the noise it will meet, and the stories only get told once. If it's for a clone, wait for the quiet day. The breath between words is usually a microphone sitting too close in front of the mouth, so move it off to the side and a bit lower. On the gear, there's a mic for everything, so let's go through the ones that keep coming up.



Corn

Start with the cheap end, since Daniel might already own one.



Herman

The Rode NT-USB plus. Rode says it's class-compliant and works with iOS and Android, a tight cardioid condenser on USB-C. Their page gives no sample rate, no bit depth, and no power draw. So I'd want to test it before trusting it.



Corn

A condenser in a room that isn't treated. It hears the fridge.



Herman

It will hear the fridge, yes. In a padded closet that's fine, and on a walk it's the wrong tool. Next, the Shure MV seven plus. Retailers list it as a USB-C dynamic mic at twenty-four-bit, forty-eight kilohertz, and Android over USB-C. Shure's own page didn't load when I looked, so everything on it is from listings. If that holds, a dynamic mic is good for noise control, because it hears less of the room.



Corn

One cable, one mic, no box. Why wouldn't that be the answer?



Herman

Because the specs are secondhand. If it checks out in a real test, it might be. The one I have more detail on is a box, the Shure MVX two U Gen two. It's an interface that takes any XLR mic, sixty decibels of gain, forty-eight volt phantom power, powered over the cable, forty-eight kilohertz at sixteen or twenty-four bits. Engadget had it at a hundred thirty-nine dollars. One retailer says Android fourteen or later, and the original MVX two U did not have the Gen two's mobile support, so check which one you're buying.



Corn

So you bring your own microphone. Any dynamic XLR you already own.



Herman

Which dodges the thing nobody publishes, how much power each mic pulls from the phone. The only figure I've seen is a hundred milliamps for the MV eighty-eight plus, from a retailer, and the Android docs warn that a phone's port may not be able to feed some devices. So a powered hub is the cheap insurance, and a bus-powered box is the thing to test first.



Corn

A hub, a box, a cable, a phone and a mic. The studio has become a handbag.



Herman

Yes, and a cheaper box in the same idea is the Rode AI-Micro. Twenty-four-bit, forty-four point one or forty-eight, two inputs, bus-powered, Android nine or later, about eighty dollars from retailers. But it takes three and a half millimetre plugs, not XLR, so it suits a lapel or a small mic, not a studio dynamic.



Corn

Half this list sounds like a no. What's out?



Herman

The Shure MV eighty-eight plus is a stereo condenser, and Daniel isn't recording a choir. One voice, so it's the wrong shape. The Rode VideoMic Me-C sits on the phone itself, so it hears the room, and some retailers say it's discontinued. The Sennheiser Profile USB lists Android nine and up, but no result I saw gave the rate or bit depth, and I can't recommend something I can't see the format for. On the DJI wireless one, the transmitters do forty-eight, twenty-four on the wireless link, but I haven't seen what the receiver sends over USB to an Android phone. And I haven't seen Android confirmation for the Shure MV six, or Rode's wireless system over USB.



Corn

And the Zoom recorders?



Herman

The H six essential is listed as a six-in, two-out interface over USB-C with Android. It works on paper, but it's a lot of box for one voice, and I haven't confirmed the older H four n Pro or the H one essential on Android at all.



Corn

Which leaves the question Daniel is after. Could a headset do it? It puts the mic an inch from the mouth, which sounds like a gift for noise.



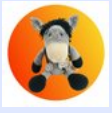
Herman

That's the appeal, and it's real. Distance stays constant and the signal-to-noise ratio is good. The cost is baked in. You get proximity boost, breath and plosive pops, a coloured response, and most gaming and office USB headsets run noise suppression you can't switch off, with no published specs. Also, mine wouldn't sit on a donkey's ears, so I speak from the edge of the field.



Corn

The headband would lose, and you'd keep the headache.



Herman

Would you wear one for hours of recording, Corn? Because that's a real cost for ASR sessions on a walk.



Corn

Mine would slide off in ten minutes. I'd put the microphone in my pocket and talk to my chest, which is its own kind of coloured response.



Herman

For the clone data, I wouldn't use one. The colour is in every sample and you can't take it out. For the recognition data, a headset is defensible if the one you pick is documented class-compliant at forty-eight kilohertz with no processing, and if it passes the spectrogram test, especially if the model will end up used behind a headset anyway. A lavalier on USB-C lists forty-eight kilohertz and fifty hertz to twenty kilohertz, and that's the general spec shape. The point is to verify it, not to trust it.



Corn

That's a lot of "if."



Herman

A reliable chain is one where every link has been checked, so yes, a lot of "if."



Hilbert

Reliable. Sixty dollars for reliable, one Saturday in eighty-five, from a man called Gerald who hired out recording gear and said the word four times. Desmond Teague wanted his father's speech at the retirement dinner on tape. Thirty dollars, and I'd said yes before he finished asking. I put the microphone on a stand by the door, because there's nowhere on a snout for a clip, and I wanted the applause as well as the speech. Herman, you're running a little hot on the S's, pull back from the desk. Anyway, it was a function hall with a hundred and forty chairs, and I got all of it.



Herman

The distance is what did it. At the door, the room is louder than the voice, so the hall's echo and the chatter are in every part of the recording.



Hilbert

Forty minutes of a hall. His father's in there somewhere behind a man eating soup. I gave Desmond his thirty dollars back. His cousin Maureen had put a pocket recorder on the head table in front of the old man and got every word.



Corn

A foot from the plate would have saved you thirty dollars.



Hilbert

Closer to eighteen inches than a foot, her recorder. The salt cellar was in the way.



Corn

A pocket recorder at a head table beat a hall's worth of rented gear. Placement was free and the rental was sixty dollars. I'd rather Daniel spent his budget on a quiet room.



Herman

Gain is the other place money goes, and a box with sixty decibels of it is worth having for a dynamic mic that wants driving. Here's what I'd put to Daniel, then. One chain does both jobs, with different sessions. For the clone data: a dynamic mic close to the mouth, in the quietest room you have, through the MVX two U Gen two. If you want one cable, the Shure MV seven plus, but only if its listing holds up when you test it. Either goes into USB Audio Recorder PRO, WAV at forty-eight kilohertz, twenty-four-bit, with no denoising anywhere. Check the first take on a spectrogram before you record the rest.



Corn

And the recognition data uses the same rig, the same file format and the same checks, but in the kitchen, on the street, on the walk. Then downsample to sixteen kilohertz afterwards. Anything you record that way can come down to sixteen, and nothing recorded at sixteen can go up.



Herman

One test to run before anything else is the free demo on your own phone. If the app doesn't see the mic, nothing else on this list matters.



Corn

The open question is how close is close enough. A pocket recorder a foot and a half from a plate was enough at a dinner, and a headset sits an inch from the lips. The sweet spot is somewhere between the two, and the spectrogram will tell Daniel where.



Herman

Thanks to our producer Hilbert Flumingtop for keeping the levels sane while we talked.



Corn

This has been My Weird Prompts. You can find every episode at my weird prompts dot com.



Herman

See you tomorrow.