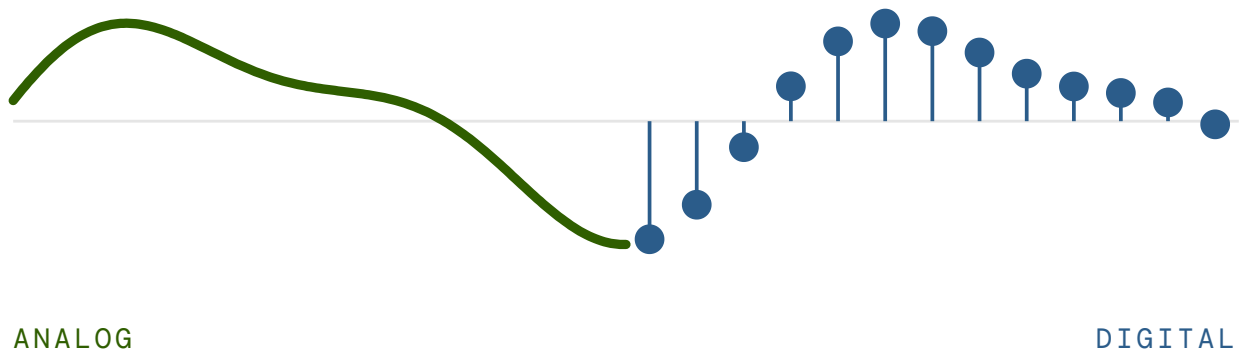


Analog vs Digital, Explained

What the two words mean, and why your Wi-Fi slows down while your TV just freezes.



The short answer

Analog keeps a smooth copy of something. Digital measures it again and again, and keeps only the numbers.

This guide answers three questions. What do the two words mean? Why does it matter to you? And what can you do when a picture freezes or Wi-Fi crawls?

The one idea behind this guide

Noise makes an analog signal worse a little at a time. A digital signal ignores noise until it can't, and then it fails all at once. Wi-Fi sits in between. It slows down in steps to stay connected.

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A word on the words

A **signal** is anything that carries information, like a sound or a radio wave. A **bit** is a single 1 or 0, the smallest piece of digital data.

WHAT IT IS

A smooth copy or a list of numbers

Put a record on a turntable. The needle rides a groove cut in the shape of the sound. That's analog.

Now stream the same song. Your phone gets a file of numbers. Someone measured the sound over and over, fast, and wrote down each measurement. That's digital.

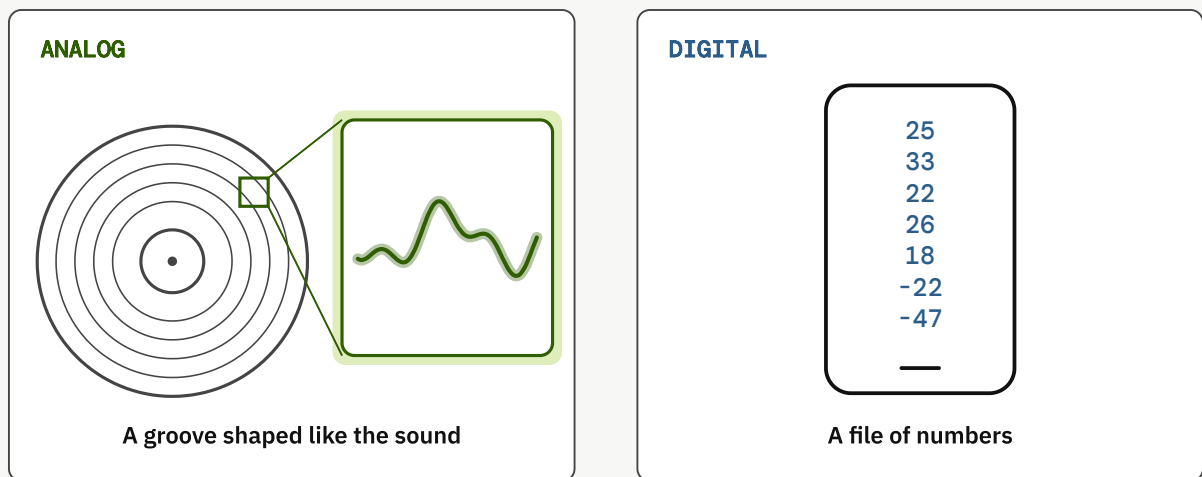


Figure 1. A groove or a list of numbers. A record keeps the shape of the sound. A phone keeps measurements of it.

Analog
a smooth copy

Digital
measured at fixed
moments

Stored as
a list of numbers

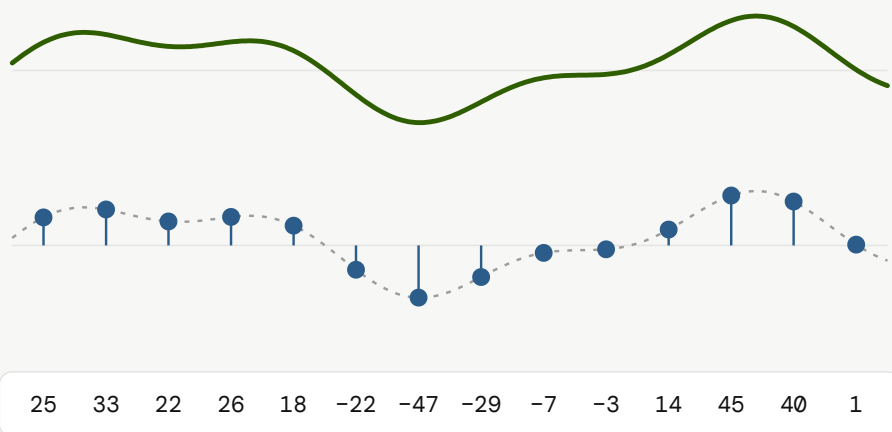
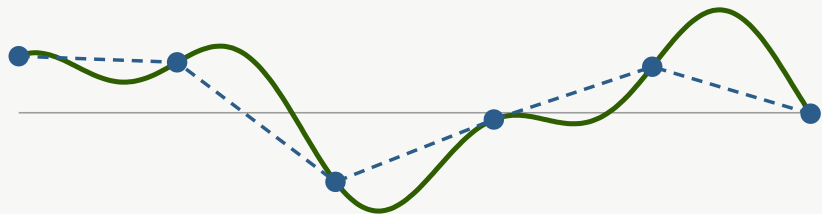


Figure 2. The same sound, kept two ways. The analog copy follows the wave everywhere. The digital copy keeps only the dots, and stores each dot as a number.

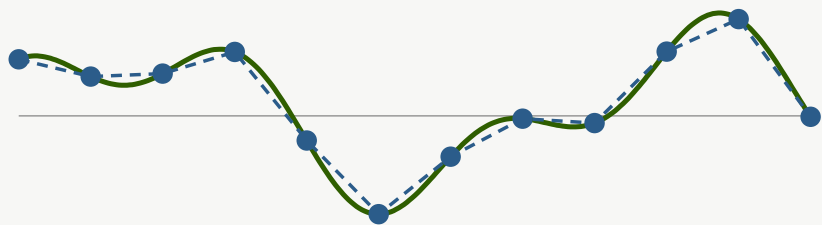
WHAT IT IS

A CD measures the sound 44,100 times every second. That's fast enough that your ears can't tell the difference.

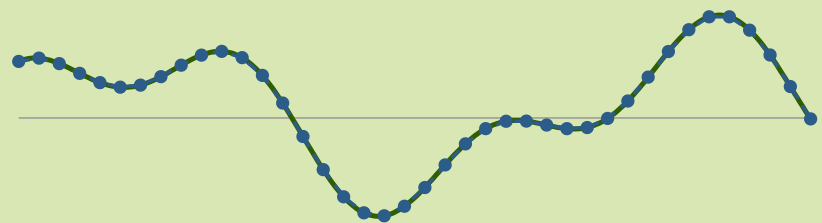
A few measurements
a rough copy



More measurements
closer



Lots of measurements
a close copy



— the real sound

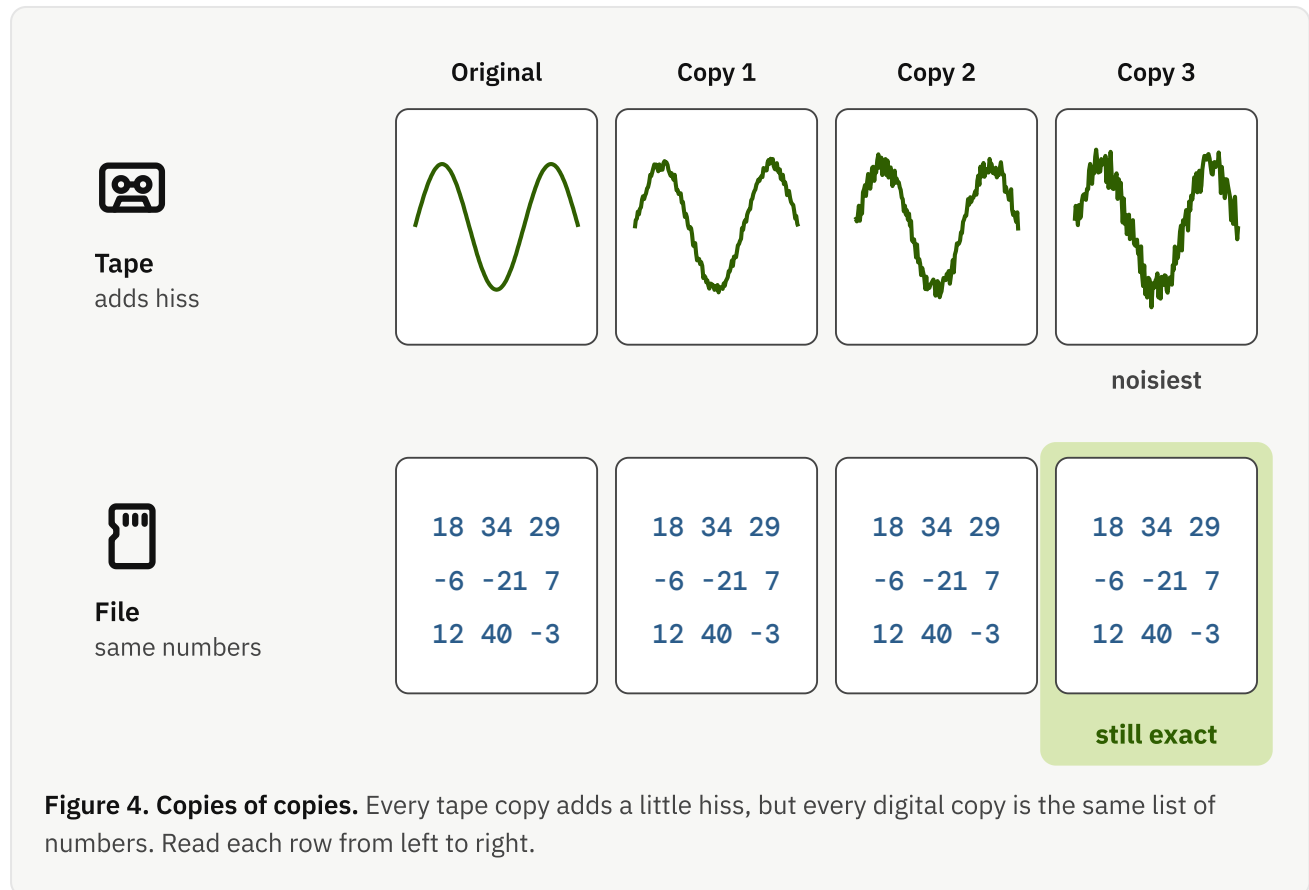
• - - - the numbers, joined up

Figure 3. More measurements make a closer copy. Join the dots and you get the digital copy. With enough dots, it lands right on the real sound.

Why a digital copy doesn't fade

Copy a cassette tape, then copy the copy. Each time, you get a little more hiss. Analog copies wear out.

A digital copy is just the same list of numbers. The computer checks every number, so the copy is exact. Your hundredth copy of a photo is as good as the first.



WHY IT MATTERS

Your ears are still analog, and so are your speakers. So your phone turns the numbers back into a smooth wave before you hear it. It doesn't come out as a staircase.

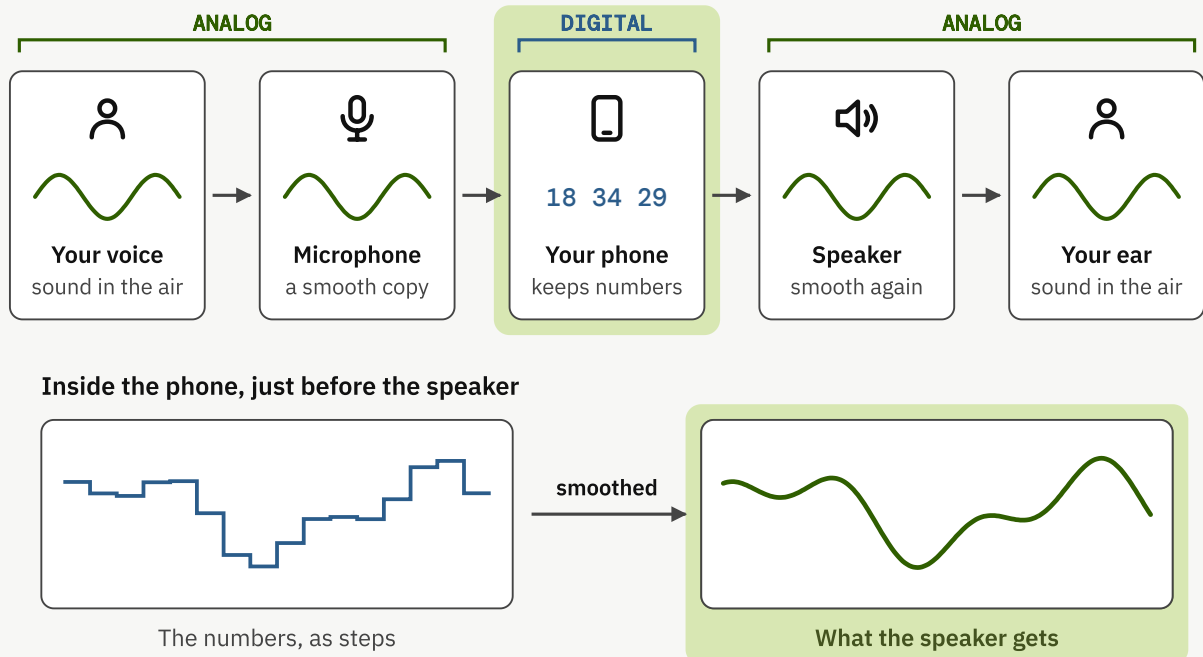


Figure 5. Analog at both ends, digital in the middle. Sound is only numbers while it is stored or sent. Before the speaker plays it, the phone smooths the steps back into a wave.

Files don't fade, but drives fail

A digital file never wears out, but the phone or drive holding it can break. Keep two copies of anything you can't replace, in two different places.

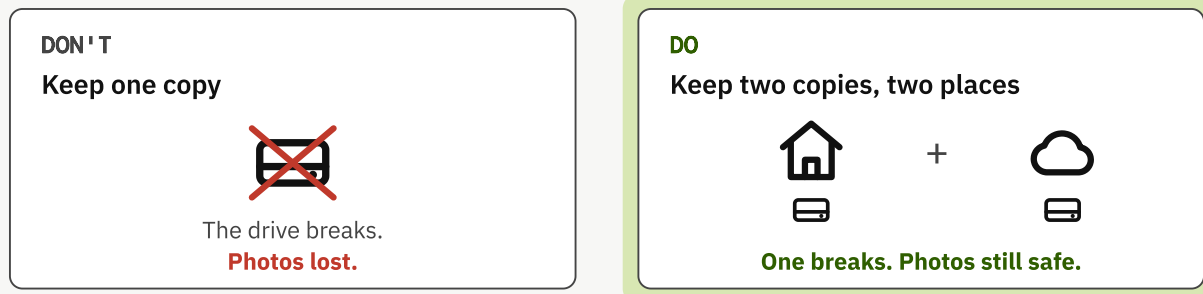


Figure 6. One copy can be lost. Two copies in two places are safer. A cloud backup counts as a second place, but a delete on your phone can delete it there too.

Every radio wave is analog

Wi-Fi, your phone and digital TV all send digital data. But what leaves the antenna is always a smooth wave. Nothing flies through the air as ones and zeros.

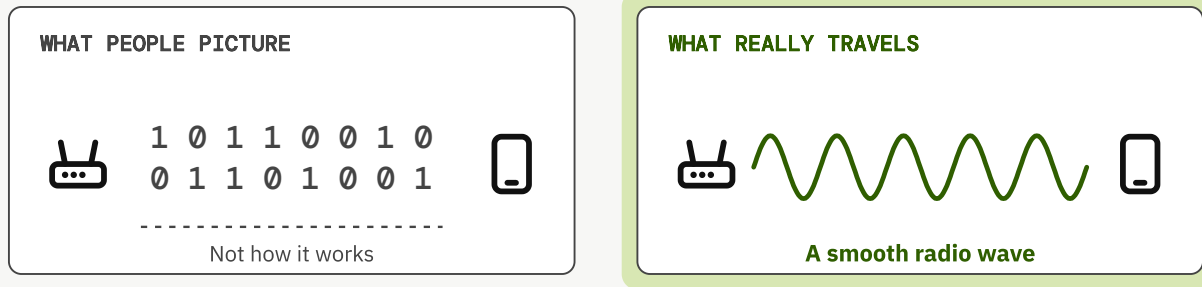


Figure 7. Only waves travel through the air. The ones and zeros stay inside the router and the phone.

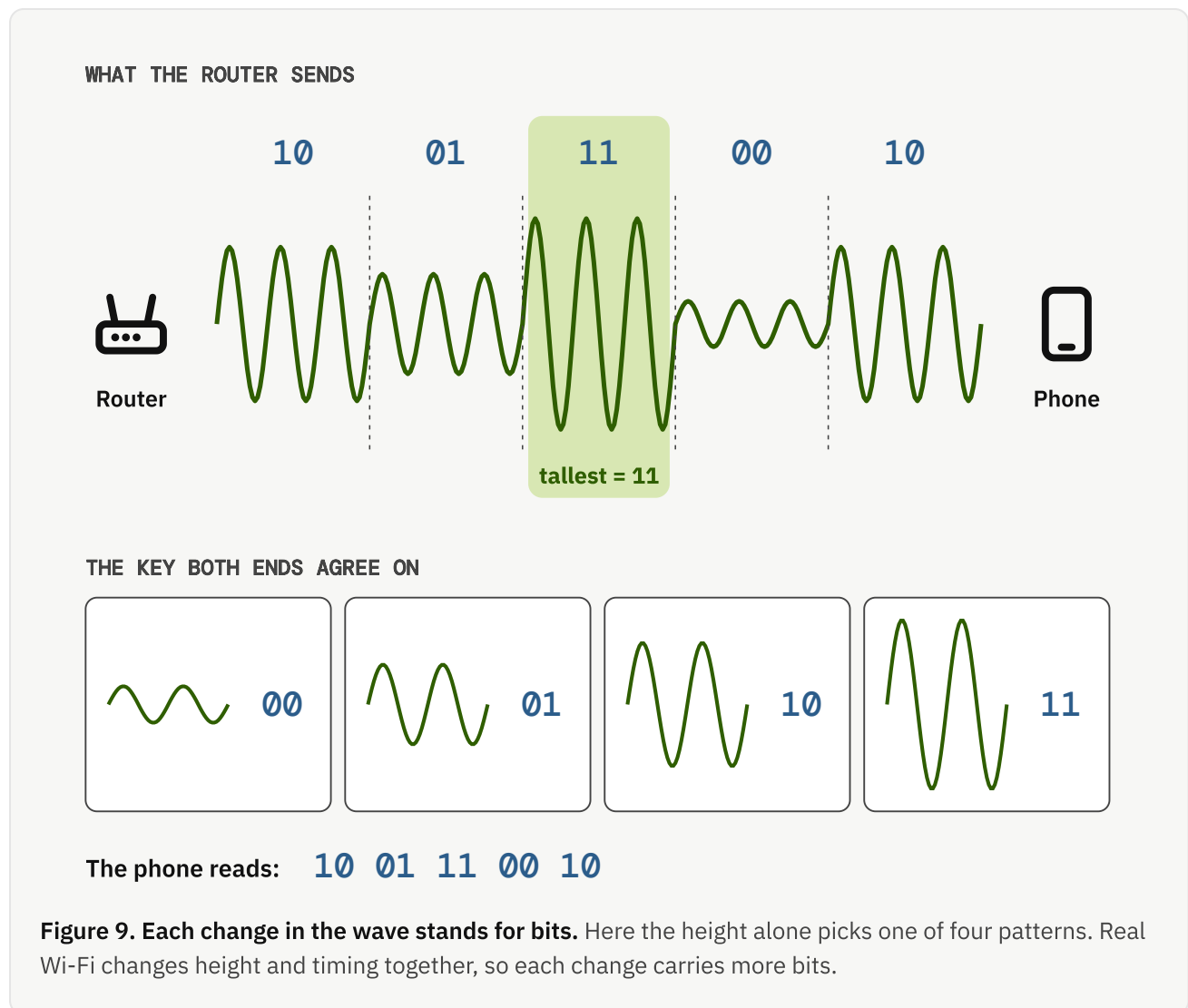
The sender starts with a steady wave. To send data, it changes the wave a little. It can change how tall the wave is, how fast it wiggles, or its timing.



Figure 8. One wave, three ways to change it. Each wave starts the same. After the dashed line, one thing changes. The receiver watches for those changes and reads them as numbers.

ON THE AIR

Wi-Fi changes the height and the timing at the same time. Each small change stands for a few bits. That's how a smooth wave carries your video.



Three ways a signal fades

Move away from the source, and every signal gets weaker. What you notice depends on the kind of signal.

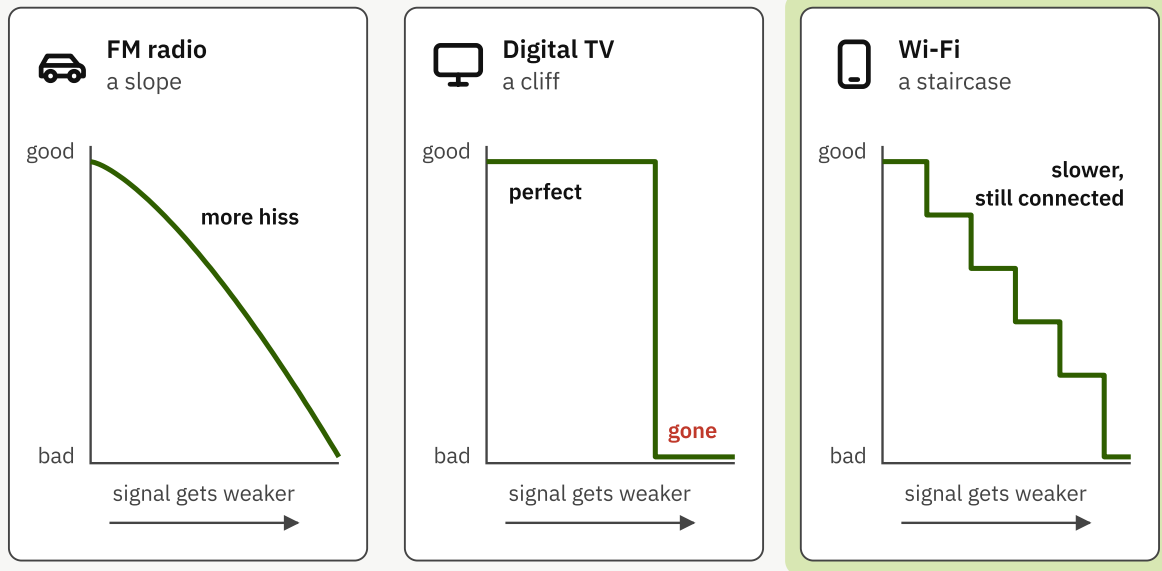


Figure 10. A slope, a cliff and a staircase. Wi-Fi sits in between: it slows down in steps to stay connected. A sketch, not a measurement.

Analog fades on a slope. Old TV got snowy. FM radio gets more hiss the farther you drive.

Digital TV drops off a cliff. The picture looks perfect, right up until it freezes or disappears.

Wi-Fi steps down a staircase. As the signal weakens, Wi-Fi switches to a simpler, slower way of sending. It only drops you when even the simplest way fails.

KEITH'S NOTE

“Get closer to the box. Walls, floors, furniture, and distance all chew up the radio signal between you and the box on the wall, and the further away you sit, the more gets chewed up.”

Keith Parsons, *Fix Your Own Wi-Fi* (WLAN Pros, in preparation, 2026), chapter 5

Four things people get wrong

Each myth is followed by what's true.

MYTH Digital always sounds better.

FACT Digital is better at copying and at ignoring noise. How good it sounds depends on how much of the sound it keeps.

MYTH Wi-Fi sends ones and zeros through the air.

FACT What travels is a smooth wave. The ones and zeros are in the small changes to that wave.

MYTH Digital sound comes out of the speaker in steps.

FACT Your phone smooths the numbers back into a wave before the speaker plays it.

MYTH A weak digital signal just looks a little worse.

FACT Digital TV usually looks fine until it stops. Wi-Fi slows down in steps instead.

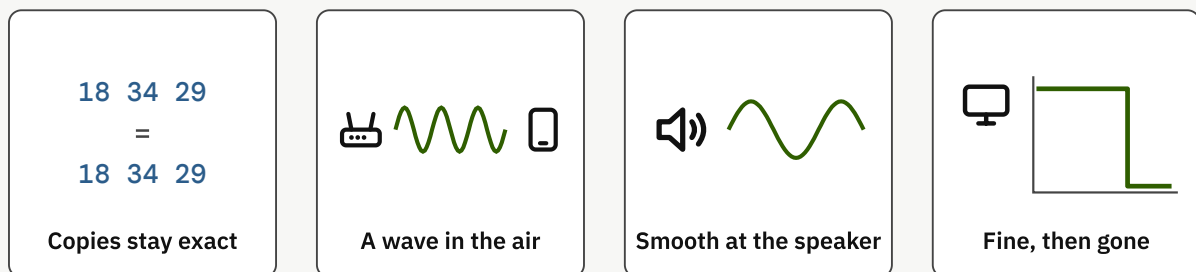


Figure 11. The four facts, in pictures. One picture for each fact above, in the same order.

What this means at home

Wi-Fi slow far from the router?

DON'T



Far away, walls in the way

DO



Closer, clear path: faster

Saving music or photos?

DON'T

18 34 29 $\xrightarrow{\text{convert}}$ 18 _ 29

Converting can drop some

DO

18 34 29 $\xrightarrow{\text{copy}}$ 18 34 29

Copying loses nothing

Figure 12. Two things you can do today. Move closer or clear the path, and Wi-Fi climbs back up its staircase. Copy files rather than converting them.

TV channels vanish instead of going fuzzy?

That's the cliff. Raise or aim the antenna, and watch the signal meter in your TV's menu.

Want the best music?

Turn on lossless in your music app, and listen through a wire. Bluetooth squeezes the sound.

SOURCES

Where these facts come from

Checked 28 September 2026. Music app settings change with updates.

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- Apple support article 118295, Apple Music lossless audio ("Bluetooth connections aren't lossless")
- FCC, Antennas and Digital Television, and converter-box troubleshooting guide: the cliff effect
- Keith Parsons, *Fix Your Own Wi-Fi* (WLAN Pros, in preparation, 2026), chapter 5

About this guide

Written for people who aren't technical and want to know what the two words mean. Company names appear only where their own documents are the source. The guide is independent and isn't affiliated with any maker or broadcaster.

About the author

Keith Parsons, CWNE #3, has designed, installed and troubleshot Wi-Fi for over 25 years. He runs Wireless LAN Professionals and the WLPC conferences.