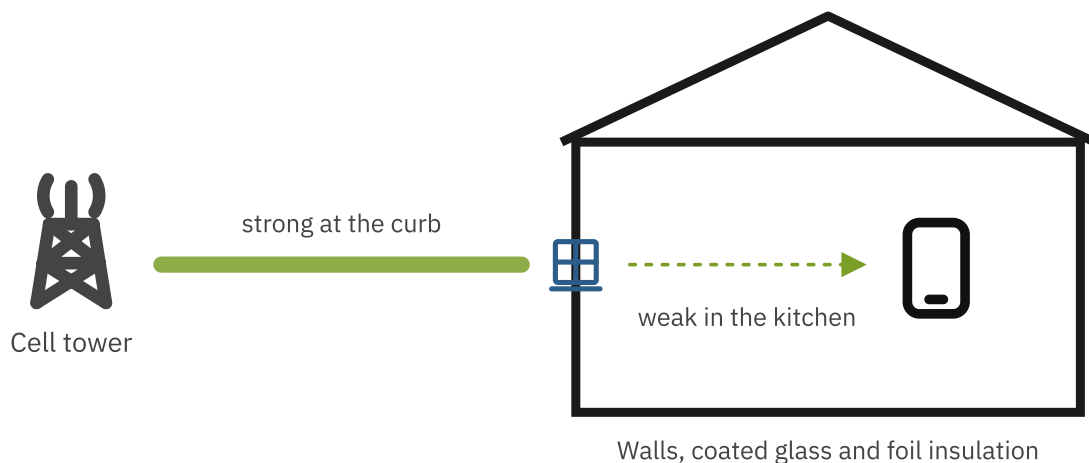


Weak Cell Signal at Home, Explained

Why your phone has bars at the curb and drops calls in the kitchen, and the free fix to try first.



The short answer

Most weak signal indoors isn't your phone. It isn't the tower either. It's the building. A signal that's fine at the curb can lose most of its strength getting through a wall or a window.

1. Wi-Fi Calling

Free, and already in your phone. Calls travel over your home internet, so walls don't matter. Try it first.

2. A booster

An outside antenna, an amplifier and an inside antenna. It only helps if there's some signal outside.

3. A network extender

A tiny cell tower from your carrier that runs over your home internet. Not every carrier still sells one.

The one idea behind this guide

A booster doesn't make signal. It makes whatever it hears outside louder, noise and all. If there's nothing usable outside, there's nothing to boost.

A word on the words

Carrier means your mobile phone company. **Bars** are your phone's rough guess at signal strength. **dB** is how engineers count signal loss. Losing 10 dB leaves one tenth of the signal. Losing 20 dB leaves one hundredth.

What's inside

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What a wall costs a signal

The signal from the tower crosses a long stretch of open air. Then it has to get through your house. Every layer takes a share.

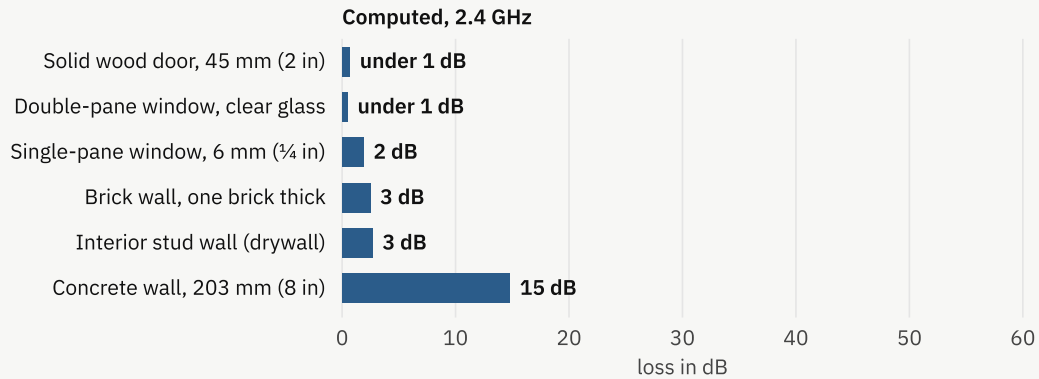


Figure 1. Some materials barely matter. Some block a lot. Wood, drywall and plain glass take little. Concrete takes much more. These are computed for one layer, head-on.

Metal takes the most of all. It bounces radio waves back, the way a mirror bounces light.

WHY IT HAPPENS

What a lab measured

A lab in the UK tested real building materials. Its results tell the same story.

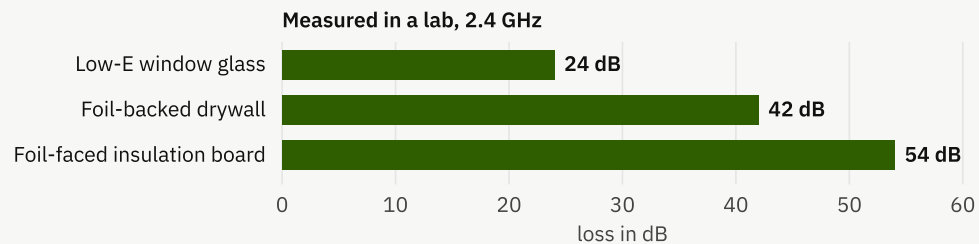


Figure 2. Measured in a lab. Same scale as Figure 1. Longer bars mean more signal lost.

KEITH'S NOTE, FROM *FIX YOUR OWN WI-FI*

"What sits between you and the box matters just as much. A thick wall, a brick chimney, a mirrored door, a metal filing cabinet, a refrigerator, a fish tank full of water. Any of those can take a real bite out of the signal, and how big a bite depends on what it is actually made of and how squarely it sits in the way."

He wrote it about Wi-Fi. The tower's signal crosses the same materials.

WHY IT HAPPENS

Energy-efficient homes block more

The features that keep heat in also keep radio out.

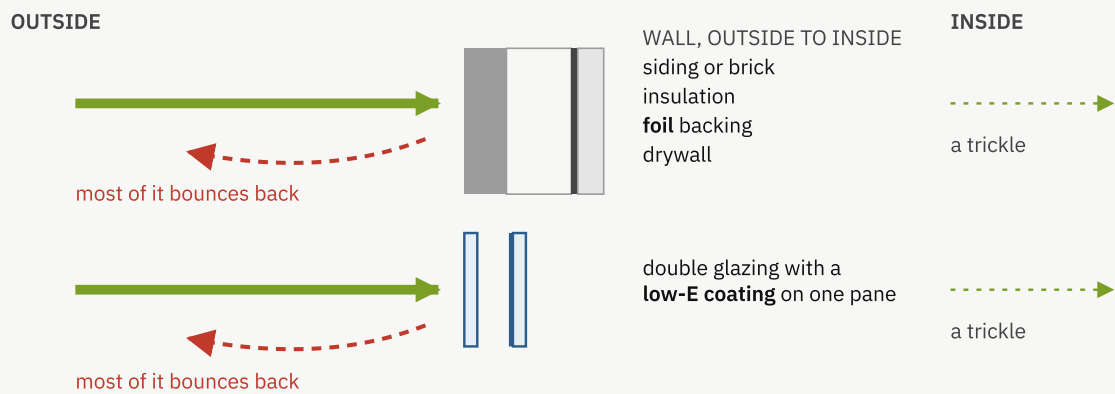


Figure 3. A thin layer of metal sends the signal back outside. It might be foil in the wall or a coating on the glass. What reaches the kitchen comes in through the gaps.

- **Low-E windows** carry a see-through coating that reflects heat. The coating is a thin layer of metal, thinner than you can see. It reflects radio waves too.
- **Foil-backed insulation and drywall** work the same way. So do metal siding and metal roofs.

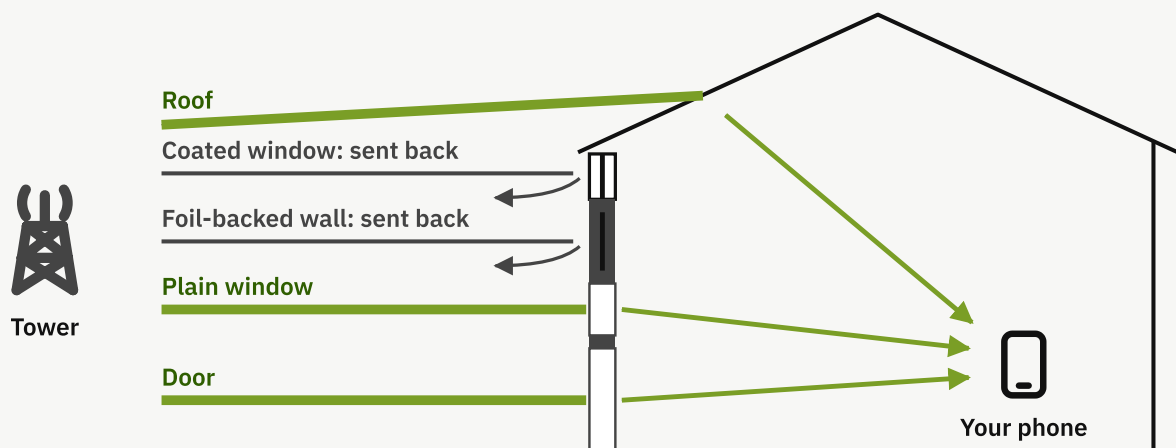


Figure 4. A sealed house lets signal in only through its gaps. Lime is the signal that gets in. Gray is the signal the coatings send back. Not to scale.

But a well-sealed house can still cut the signal to a tenth.

Why 5G struggles indoors

Carriers use many radio bands. Low bands travel far and get through walls well. Higher bands carry much more data, including most fast 5G. But walls take more out of them.

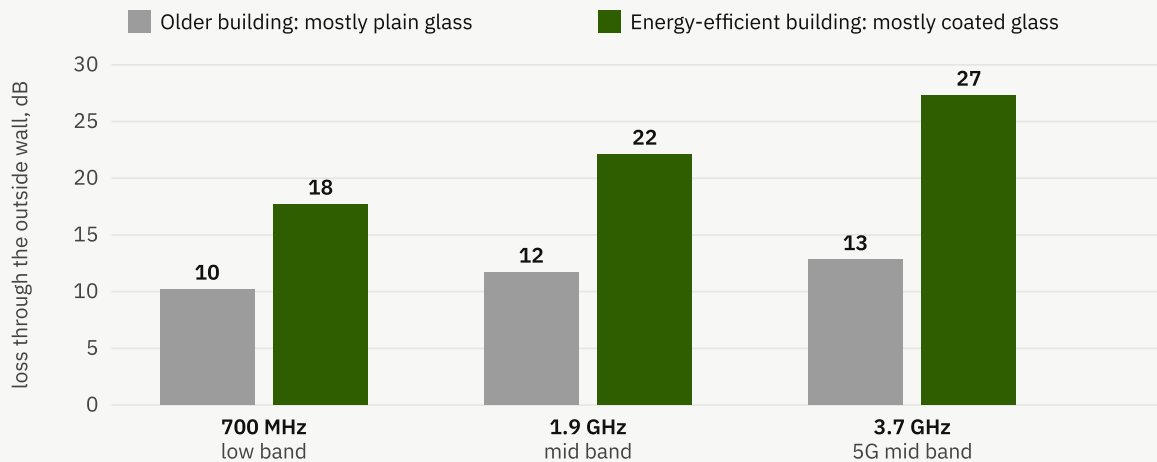


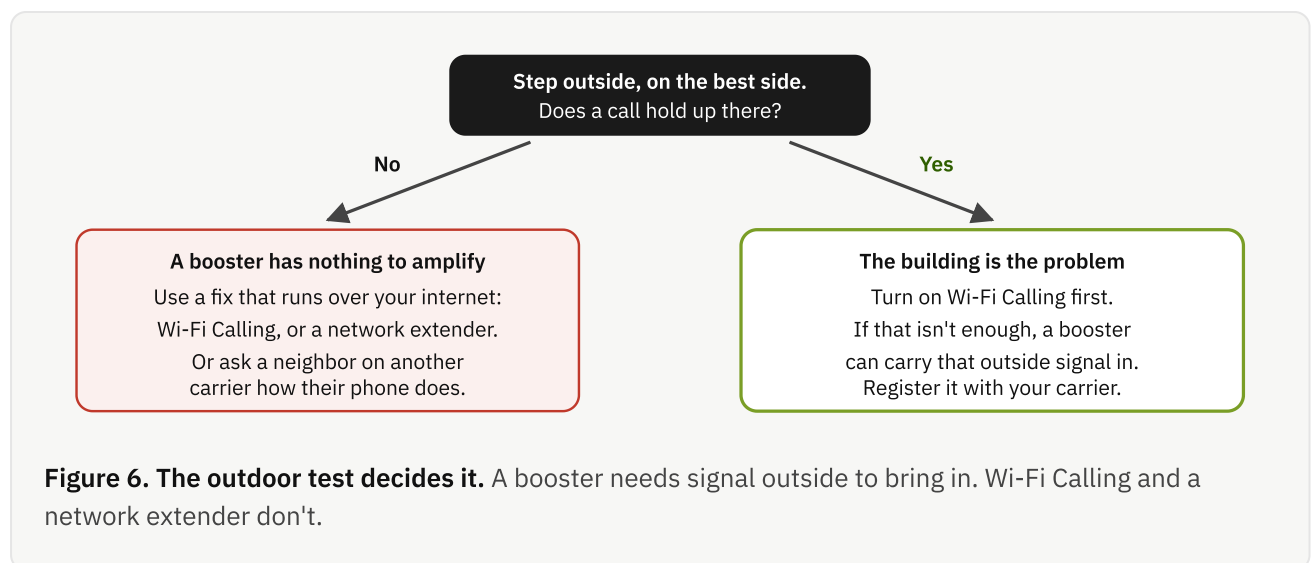
Figure 5. Higher bands lose more through the wall. The energy-efficient building (green) loses much more at the higher band on the right. The older building barely changes.

Your phone moves to whatever band it can hear. Outdoors that's often fast 5G. Indoors it's often a slower low band. So "5G outside, one bar in the kitchen" is normal. A new phone won't change it, because the walls are the same.

Find where the signal is

Ten minutes with your own phone tells you which fix fits. Judge by whether a call holds up, not by the bars.

- 1 Room by room.** Make a short call in each room you care about. Note where it breaks up.
- 2 At the windows.** Try a window on each side of the house. The best side probably faces the tower.
- 3 Up and down.** Signal is often better upstairs and worse in a basement.
- 4 Outside.** Walk around the house and the yard. This step decides whether a booster can help.



FIX ONE

Wi-Fi Calling: the free fix

If you have home internet and Wi-Fi in the room, turn on Wi-Fi Calling before you spend anything.

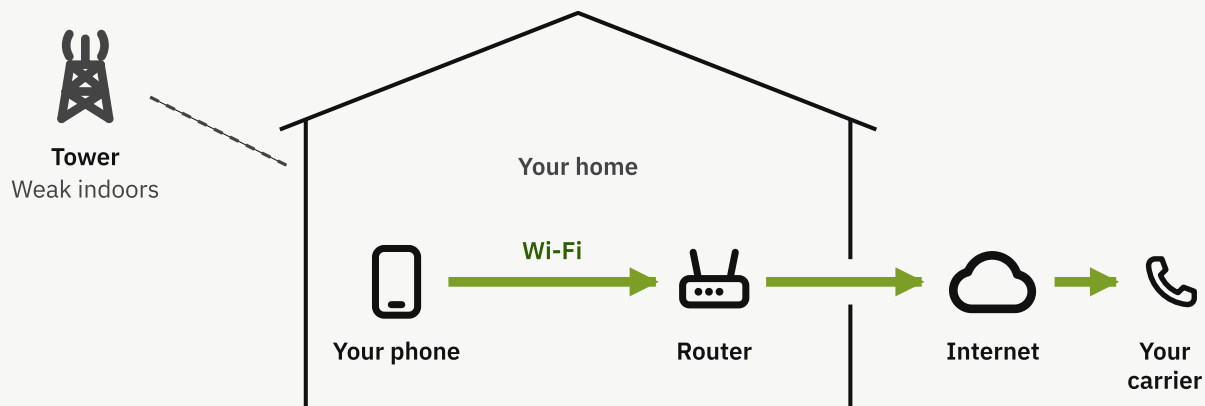


Figure 7. Wi-Fi Calling goes around the walls. The lime path is your call: over your Wi-Fi and your home internet to your carrier.

Wi-Fi Calling is your own carrier's calling service, reaching your phone over your home internet instead of the tower. Same number, same phone app, same texts.

It's a switch in your phone's settings. Each person turns it on for their own phone. Your carrier asks for an emergency address, so keep it up to date.

Where it falls short

- **Power or internet outage.** It stops when your internet stops. Plan how you'd call for help.
- **Visitors.** A guest's phone uses it only if they join your Wi-Fi and turn it on.
- **Weak Wi-Fi.** If Wi-Fi is poor in that room, calls will be too. That's a Wi-Fi fix.

The full story has its own guide

Settings for iPhone and Android, emergency calls and calling home from abroad are in *Wi-Fi Calling, Explained*.

How a signal booster works

A home booster has three parts joined by cable: an outside antenna, an amplifier, and an inside antenna. It works both ways, so your phone's reply goes back out the same path.

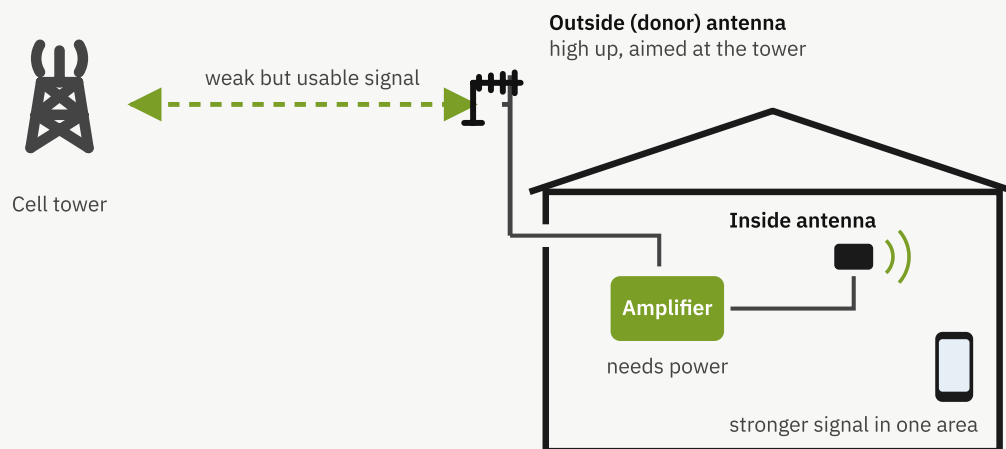


Figure 8. Catch it outside, repeat it inside. The outside antenna faces the tower. The amplifier makes the signal stronger. The inside antenna fills one part of the house.

Why it needs signal outside

An amplifier makes everything louder, including the background noise that's always there. If the outside signal is buried in noise, you just get louder noise. The UK regulator puts it simply: boosters "work best when there is a good outdoor signal."

FIX TWO

Keep the two antennas apart

The inside antenna talks. The outside antenna listens. If the outside one hears the inside one, the booster feeds on itself, like a microphone that howls near its speaker.

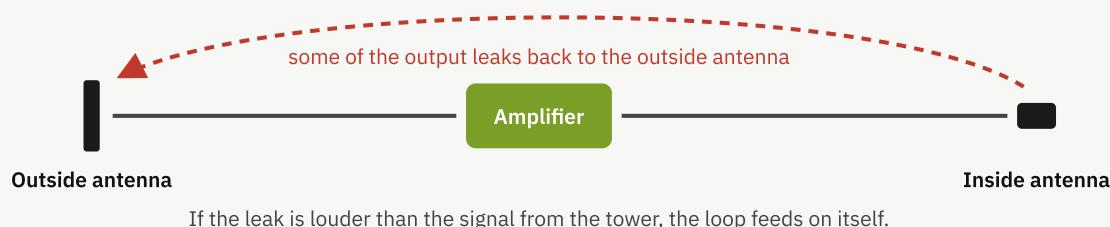


Figure 9. Distance and walls keep them apart. The gap between the two antennas has to block more than the booster adds.

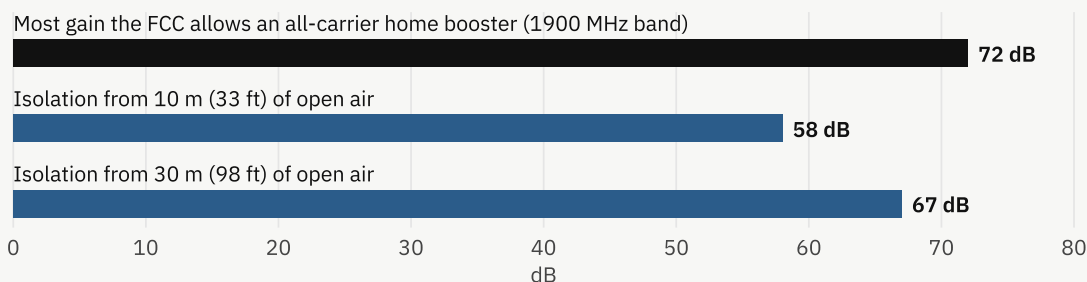
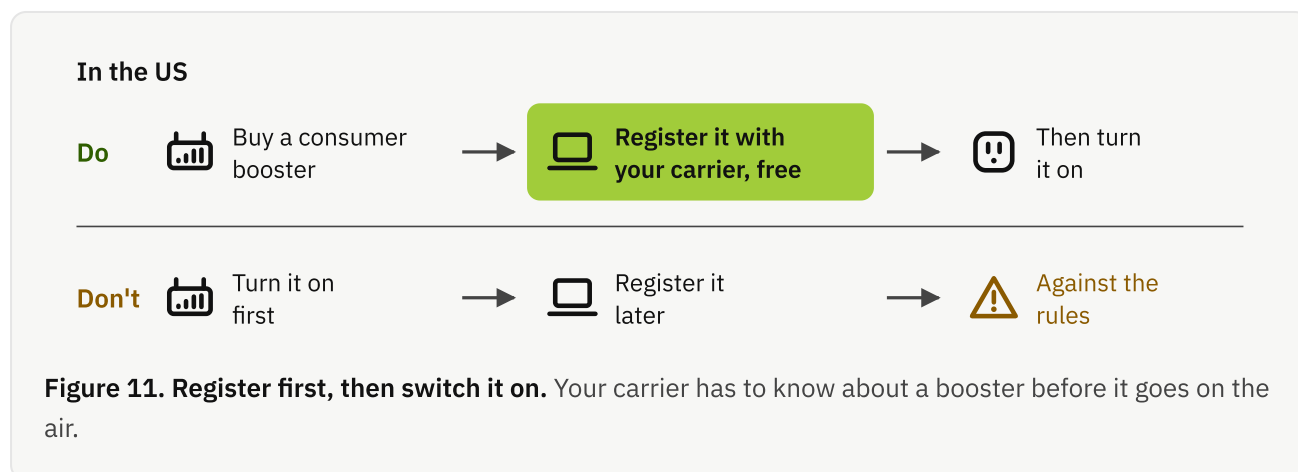


Figure 10. Open air alone isn't enough. The bar on the left is how much an all-carrier home booster may add. The others show how much distance takes away. Walls and the roof make up the rest.

If they're too close, the booster turns itself down. Then the good-signal area shrinks, sometimes to one room. Mount the outside antenna high, aimed at the tower. Put the inside antenna far away, with the roof or walls between.

The rules for boosters

A bad booster can interfere with everyone's service, so there are rules.



- 1 **In the US, buy one labeled as a consumer booster.**
- 2 **Register it with your carrier, free, before you turn it on.** Your carrier's website shows how.
- 3 **Check it carries your carrier's bands.** Ask your carrier which bands serve your area, and compare with the box.
- 4 **Use only the parts it came with,** and turn it off if your carrier asks.

Outside the US, rules vary. The UK allows some approved models. Australia allows one only with your carrier's written OK. Check with your carrier and your country's regulator first.

STOP

Emergency calls through a booster

The required label warns that your location may be missing or wrong when you call 911 through a booster. Tell the dispatcher where you are.

CAUTION

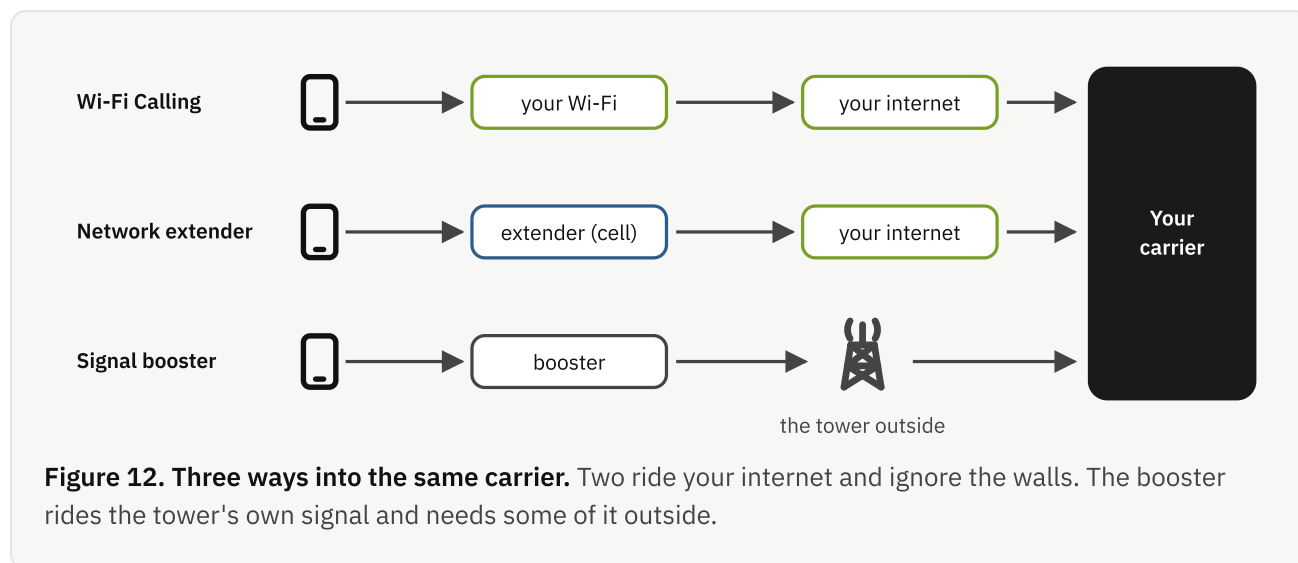
RVs and boats

A home booster is only for a fixed spot inside a building. Boosters for cars, boats and RVs are a different kind.

FIX THREE

Network extenders

A network extender is a tiny cell tower from your own carrier. It sits in your house and connects over your home internet. Your phone thinks it's a tower.



Like Wi-Fi Calling, it needs no signal outside. Unlike Wi-Fi Calling, it can also work for a visitor's phone on the same carrier. It needs power and internet, and it stops in an outage. Not every carrier still sells one. Ask yours. Some lend them to customers who qualify.

The three fixes side by side

	 Wi-Fi Calling	 Booster	 Network extender
 Needs signal outside	 No	 Yes	 No
 Needs home internet	 Yes	 No	 Yes
 Works for visitors	 Only on your Wi-Fi	 Yes	 Same carrier only
 Cost	 Free	 You buy it	 Usually bought from your carrier
	 Works in your favor	 A limit to know	

Figure 13. Each fix wins in different places. Read down a column to see one fix. A lime check means it works in your favor.

The order that saves money

Wi-Fi Calling first. Then check for signal outside. Only then choose a booster or a network extender.

Four things people get wrong

MYTH A booster creates signal where there is none.

FACT It only makes louder what its outside antenna hears. No signal outside, nothing to boost.

MYTH It's my phone.

FACT Usually it's the building. Coated windows and foil-backed walls block far more than plain glass.

MYTH 5G will fix my indoor coverage.

FACT The fast 5G bands lose more through walls. Indoors your phone often uses a slower band.

MYTH Put the booster's antenna where the signal is weakest.

FACT The outside antenna goes where the signal is strongest. The inside one goes where you need it.

SOURCES

Where these facts come from

Checked in September 2026. Carrier products and pages change, so read your carrier's current page before you buy.

- 47 CFR § 20.21, Signal boosters (eCFR, up to date as of 24 September 2026; section last amended 2018): conditions (a)(1) to (7), label text (f), registration (h), network protection standard (e), gain limits (e)(8)(i) (C), anti-oscillation (e)(5), power down (e)(6)
- FCC, Consumer Signal Boosters (fcc.gov/wireless/bureau-divisions/mobility-division/signal-boosters/consumer-signal-boosters), page updated 14 March 2016; read from the Internet Archive copy of 25 March 2026 because fcc.gov refused automated requests
- ITU-R P.2040-4 (09/2025), Effects of building materials and structures on radiowave propagation above about 100 MHz: §2.2.2.1 multilayer method and Table 3 material constants (Figure 1, computed head-on)
- Ofcom, Building Materials and Propagation, Final Report 2604/BMEM/R/3/2.0 (Aegis Systems, Signal Science and BRE, 14 September 2014): Table D-1 lab losses; §8 whole-house results; §4.3 thin metal films
- 3GPP TR 38.901 V17.0.0 (ETSI TR 138 901, 2022-04): Table 7.4.3-1 material penetration losses and Table 7.4.3-2 O2I building penetration loss model (Figure 5)
- Free-space path loss between isotropic antennas at 1880 MHz: $20 \log_{10}(d \text{ in m}) + 20 \log_{10}(f \text{ in MHz}) - 27.55$ dB (Figure 10)
- Ofcom, Statement: Mobile phone repeaters (statement 4 November 2021; Wireless Telegraphy (Mobile Repeater) (Exemption) Regulations 2022 in force 16 June 2022; consultation 4 October 2023), read from the Internet Archive copy of 14 August 2025
- ACMA, Using mobile phone boosters and repeaters (acma.gov.au/using-mobile-phone-boosters-and-repeaters), read from the Internet Archive copy of 19 April 2026
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- T-Mobile Support, Register a signal booster; 4G LTE CellSpot setup & help
- AT&T Signal Booster FAQ (attsignalbooster.com/faq.html)
- Verizon LTE Network Extender product page and LTE Network Extender FAQs; Verizon "No longer supported" device list
- AT&T Cell Booster product page (att.com/buy/accessories/Specialty-Items/att-cell-boosters.html); AT&T Cell Booster FAQ, KM1459978, updated 26 August 2026
- Keith Parsons, *Fix Your Own Wi-Fi*, Chapter 5 (the quotation on page 4)

Other guides in this series

Wi-Fi Calling, Explained · *Home Internet, Explained* · *How Your Devices Access the Internet, Explained* · *Starlink, Explained* · *Find My, Explained*

No booster brand is named or recommended in this guide. WLAN Pros has no relationship with any booster maker or carrier.