What Is Latency and How Do You Fix It?

Latency, also called ping, measures how much time it takes for your computer, the internet, and everything in between, to respond to an action you take (like clicking on a link). For most of us, latency won't affect our video streaming, Spotify listening, or Instagram surfing. But if you game or use satellite internet, latency can have a big impact on your online experience.

You know how you'll be watching the news, and the host will cut away to a reporter on the scene of an epic ice cream truck meltdown (500 waffle cones lost, but no one was injured)?

The anchor will say, "Over to you, Jerry," but the reporter will stand there, smiling blankly at the camera for an uncomfortable amount of time before finally blurting, "Thanks, Ben."

This delay between the in-studio news anchor and the reporter is the same as the latency you experience online. Only, you're the news anchor, and the link you're mashing in hopes that it will open up that must-view homemade ice cream recipe is the reporter on the scene.

In other words, latency affects how responsive your internet connection, video, or game feels.

Ideally, your latency would be zero milliseconds—but chances of this happening are lower than chances that we find a secret alien base on the dark side of the moon. Luckily, there are a few ways to lower your latency that we'll go over in a minute. (Or you can skip ahead.)

You can also test your own internet latency at home.

Other names for latency

You may have heard your fellow netizens mention **lag, ping, or ms**. All of those terms also refer to **latency**.

What causes latency?

Latency is affected by several factors: distance, propagation delay, internet connection type, website content, Wi-Fi, and your router.

Some of these factors are fixable, while others are just part of everyone's online experience. So if you're wondering why your latency is so high, here are some likely culprits.

1. Distance

Distance is usually the main cause of latency—in this case, it refers to the distance between your computer and the servers your computer is requesting information from.

For example, if you live in Madison, Wisconsin, and you visit a website hosted by a server located in Chicago, Illinois, the response time of the website should be pretty quick. That's because your request has to travel a relatively short distance of 147 miles and back.

But if you live in Miami, Florida, and try to access that same website hosted by a server in Chicago, the response time will be slower. This is because your request has to travel 1,381 miles to the Chicago server and back to you in Miami.

What is round-trip time (RTT)?

Round-trip time (or RTT), is the amount of time it takes for your request (like hitting enter on a Google search) to reach a server, and then have that server's response get back to your computer.

Your request → the server's response → your computer

2. Propagation delay

Real quick, let's talk about propagation. In physics, propagation is "the sending out or spreading of light or sound waves, movement, etc."[1] When we're talking internet, propagation is the action of sending out your data packets to a server.

Your data packet → the server

This brings us to **propagation delay:** this is how long it takes for your data packets to reach that. (But it doesn't include the time it takes to cross the full distance back to your computer—that's round-trip time.) Propagation delay is just one piece of the puzzle when it comes to how much latency you experience.

3. Internet connection type

Your internet connection type can also play a role in how high or low your latency is. For the most part, DSL, cable, and fiber internet tend to have lower latency, while satellite internet tends to have higher latency.

Latency by connection type[2,3]

- **DSL:** 24–42 ms
- **Cable:** 15–27 ms
- **Fiber:** 10–15 ms
- **Satellite:** 594–612 ms

4. What's on a website

Ever clicked on a link and waited several minutes for the website to load far too many GIFs, ads, or large images? Yup, you just experienced latency thanks to someone plastering *The Office* memes all over their Angelfire page.

If a website is home to lots of large files, like HD images or videos, or multiple third-party ads (the horror), your web browser has to download all of those files and ads to show them to you. And if those files or ads are hosted on a server that's far away from you, there's going to be a little latency thanks to distance.

5. Wi-Fi vs. Ethernet cable

If you want to reduce your latency as much as humanly possible, you'll want to use an Ethernet cable to connect to the internet.

Does Wi-Fi affect latency?

Wi-Fi is great, yes, but your wireless signal is more susceptible to noise, meaning your data packets likely need to be re-sent, or retransmitted, if they become lost.

Wi-Fi also has to jump through a few more hoops, like encryption protocols, to travel back and forth from your computer. And usually, those wireless signals fade, or lose strength, over distance faster than an Ethernet connection.

6. Your router

An old, slow router can bog down your computer's connection to your internet provider's modem, whether you use Wi-Fi or an Ethernet connection. This is especially true if your router doesn't support the internet speed you're paying

for *or* if you have a lot of people and devices connected to your router at the same time.

Upgrading to a new router may decrease your latency, but, unfortunately, it likely won't have too huge of an impact.

If your router comes with a Quality of Service (QoS) feature, enable it.

Some modern routers come with a feature called Quality of Service (QoS). By enabling QoS, you can tell your router to prioritize certain traffic over others.

For example, you can tell your router to prioritize your desktop computer over your kiddo's tablet. This means that your computer gets the best possible online performance, possibly at the cost of your child's tablet getting a slower internet connection. (Shh, we won't tell.)

What's the difference between latency and bandwidth?

Latency is a measure of how much time it takes for your computer to send signals to a server and then receive a response back. Because it's a measure of time delay, you want your latency to be as low as possible.

Bandwidth measures how much data your internet connection can download or upload at a time. Sometimes bandwidth gets confused with download speed, but internet speed and bandwidth aren't exactly the same.

You can think of bandwidth like a straw. Let's say you order up a tasty chocolate shake from McDonald's, but the server gave you a regular straw by mistake. The regular straw is like low bandwidth. You can't slurp up much chocolate shake through that small straw, just like you can't download a lot of data with low bandwidth.

"Think of bandwidth like a straw. Using a regular straw to enjoy a milkshake is like low bandwidth: not much milkshake can get through, just like not much data can get through."

But if you ask your server for a larger straw, now you're able to enjoy all that chocolatey goodness with no problems. Just like a plan with higher bandwidth lets you download a whole lotta internet goodness with no (er, few) problems.

Does more bandwidth reduce latency?

Yes, more bandwidth can reduce latency since there's a wider pipeline for more data to travel through, which reduces the chance data packets will get delayed.

And, on the other hand, high latency can also create a bottleneck that reduces your effective bandwidth—at least until those delayed data packets get through.

What is a good latency?

Any latency at 100 ms or lower is considered decent. Even at 100 ms, you can play most online games without much frustration.

Low latency is especially critical if you're playing a first-person shooter (FPS) game like *Call of Duty* or any other games where timing is critical (like *League of Legends* or *Need for Speed*).

Is 4 ms latency good?

A latency of 4 ms is *excellent*. We're jealous if you've got this kind of ping.

Is 20 ms latency good?

Yup, 20 ms is considered great latency. As long as your latency is under 100 ms, you shouldn't notice any lag.

Is 200 ms latency bad?

A latency of 200 ms will make certain online games or activities frustrating. Even in games where timing isn't critical, you may experience rubber-banding or stuttering.

Rubber-banding is where your in-game character runs toward a location, then seems to jump backward a few seconds later, almost as if they're stuck to a giant rubber band that snapped back.

Stuttering is similar to rubber-banding, but instead of snapping back to a position they were in several seconds ago, your character will freeze in place and skip ahead to the location you were aiming for. It almost looks like you're teleporting a few steps every few seconds.

How do you fix high latency?

There *are* some things you can do to fix high latency (besides cursing your internet connection). Take a look:

- **Turn off any downloads**, and be sure to check for anything that's downloading in the background.
- **Close any unused applications or browser tabs.**
- **Check for malware.** We once had a bug on our computer that was using up most of our bandwidth. Not fun!
- **Use an Ethernet cable** to connect your device to your router or modem, if at all possible.
- If you can't use an Ethernet cable, you may want to **invest in a mesh Wi-Fi system**, like the Google Nest Wi-Fi.
- **Update your router's and modem's firmware**—outdated firmware can even cause slow internet speeds.
- **Turn on your router's QoS feature** and set it to prioritize your device or activity.
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P.S. If you're stuck with satellite internet, high latency is sadly a fact of life. But there are some things you can do to speed up your satellite connection.