

## Wi-Fi Connection

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### The Network Speed Measured by the App is too Low. What's Wrong?

ISP subscribed download speeds should **NEVER** be used as a benchmark for potential wireless download speed potential. Wireless will **NOT** equate to wired technology.

As devices connect to an access point a mobile device incapable of high performance or reflecting weak signal strength may affect overall wireless performance. As the signal strength of a single device declines, the wireless access point allocates resources to maintain a connection and any degree of performance. This may affect overall access point performance. Online devices that may be sending data to cloud managed systems may use available bandwidth upstream. Should upstream usage be at a maximum, this will **absolutely** affect download speeds as any and all performance requires unfettered bidirectional communication.

The speed corresponds to the slowest element in your network - if your Internet is the slowest, it will be the Internet. But it can easily be your modem, router, and also iPhone/iPad.

One note to Wi-Fi routers - even though the theoretical speed of various Wi-Fi technologies is much higher, typical speeds are as follows (these numbers are only orientational, exact speeds depend on the router distance, number of wifi networks in the neighborhood etc.):

- 802.11b - ~4Mbps
- 802.11g - ~20Mbps
- 802.11n - ~75Mbps
- 802.11ac - ~250Mbps on iPhone 6 (**limited by CPU power**)

Example:

If you have a 802.11b/g Wi-Fi router and 40Mbps Internet connection, your router will cause you connect the Internet 20Mbps over Wi-Fi.

### Potential sources of Wi-Fi interference

Learn how to minimize wireless interference that can cause slower performance or disconnection from your Wi-Fi network devices.

If you see one of the following, check for wireless interference:

- Low signal strength in the Wi-Fi menu
- A slower connection to the Internet when using your Wi-Fi connection
- Slower file transfers between computers over Wi-Fi
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## Sources of Interference

These things can cause interference with Wi-Fi networks if they are nearby.

- **Microwave ovens**
  - Using your microwave oven near your computer or Wi-Fi base station might cause interference.
- **Direct Satellite Service (DSS)**
  - The coax cable and connectors used with some types of satellite dishes can cause interference. Check the cabling for damage that could cause radio frequency interference (RF leakage). Try replacement cables if you suspect interference.
- **Power sources**
  - Certain external electrical sources like power lines, electrical railroad tracks, and power stations can cause interference. Avoid locating your Access Point, or Wi-Fi router near power lines in a wall, or near a breaker box.
- **2.4 GHz or 5 GHz phones**
  - A cordless telephone that operates in the 2.4 GHz or 5 GHz range can cause interference with wireless devices or networks while taking calls.
- **Wireless RF video**
  - Wireless video transmitters that operate in the 2.4 GHz or 5 GHz bandwidth can cause interference with wireless devices or networks.
- **Wireless speakers**
  - Wireless audio that operates in the 2.4 GHz or 5 GHz bandwidth can cause interference with other wireless devices or networks.
- **Certain external monitors and LCD displays**
  - Certain displays can emit harmonic interference, especially in the 2.4GHz band between channels 11 and 14. This interference might be stronger if you're using a notebook computer with the lid closed and have an external monitor connected. Try changing your access point to use 5 GHz or a lower 2.4 GHz channel.
- **Poorly shielded cabling**
  - External hard drives or other devices with poorly shielded cabling can interfere with your wireless devices. If disconnecting or turning off the device appears to help, try replacing the cable that connects the device to your computer.

## Other wireless devices

Other wireless devices that operate in the 2.4 GHz or 5 GHz bandwidth (microwave transmitters, wireless cameras, baby monitors, a neighbor's Wi-Fi device) can cause interference with Wi-Fi or bluetooth connections.

Some devices might not specifically state that they operate in the 2.4 GHz or 5 GHz band. The product's documentation should indicate the bands the device uses to operate. These might be referred to as "Dual Band" or "Wi-Fi" or "Wireless" devices.

## Wireless barriers

A device's location and building construction materials can affect Wi-Fi and Bluetooth performance. If possible, avoid barriers or change the placement of your Wi-Fi or Bluetooth devices for a clearer signal path.

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### Examples:

- Your computer is underneath a metal desk and you try to use a wireless (Bluetooth) mouse on top of the desk. The metal in the desk might act as a shield between the mouse and your computer. You might not be able to pair the device to your computer, or the pointer might move erratically.
- Your AirPort Base Station is downstairs and your computer is upstairs. The material between the two floors is concrete with metal reinforcement. The floor might lower or block the Wi-Fi signal from your base station to your computer. You might see slower network speeds, lower signal strength, or might not be able to connect to your Wi-Fi network at all.

**Radio Frequency (RF) reflective and absorbing obstructions include the following:**

Type of Barrier	Interference Potential
Wood	Low
Synthetic material	Low
Glass	Low
Water	Medium
Bricks	Medium
Marble	Medium
Plaster	High
Concrete	High
Bulletproof glass	High
Metal	Very high

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### Reduce effects of interference from other wireless devices

If there are many wireless devices connected to your computer or nearby, you might need to adjust the channels used by your Wi-Fi devices.

To minimize interference between your Wi-Fi try the following:

- Change channels on your wireless network. Attempt to use the 2.4 and 5 GHz channels with the least interference when it starts up.
- Connect to a 5 GHz wireless network (if possible).
- Move your computer and Wi-Fi router closer to each other.

### Average Home Usage Examples

Everyone uses the internet differently; here are some commonly used applications and how much data they use:

- Websites & Email – Facebook, Twitter, CNN, eBay
  - uses less than 0.1GB per hour on average
- Online Video Gaming – Call of Duty, Halo, World of Warcraft, Diablo
  - use approximately 0.3GB – 0.5GB per hour on average
- Audio/Music Streaming – Tidal, Spotify, Podcasts
  - use approximately 0.3GB – 0.5GB per hour on average
- Standard Definition Video Streaming – YouTube, Twitch, Crunchy Roll
  - use approximately 0.5GB – 3GB per hour
- High Definition Video Streaming – CraveTV, Netflix
  - use approximately 3GB – 7GB per hour
- 4K Video Streaming or Ultra High Definition Video streaming – Netflix, IPTV
  - use approximately 10GB or more per Hour

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### Download Data

Data use is broken down into two categories, download and upload data. Download data is any data that has come from the internet, through the home modem and to your devices. There are lots of different applications that use this data, video streaming services are one of the most popular. Depending on your video quality settings, HD video streaming can also use lots of data quite quickly.

### Netflix

Let's use Netflix as an example to see how this could affect your usage. Netflix is a streaming video service, and so it uses your Internet connection based on the picture quality of the video you are watching.

- Video quality can be changed under playback settings for most streaming services to reduce data consumption. For Netflix you can change the settings for each profile, under "Your Account" then "Playback Settings".
  - Check out [Netflix's help page](#) for more information.
- **HD video** streams at an average rate of 3GB-7GB per hour
  - (Best/High/720p - 1080p) (**Blu-ray Quality**)
- **SD video** streams at an average rate of 0.5GB - 1GB per hour
  - (Better/Medium/480p) (**DVD Quality**)
- **Low Definition** streams at an average rate of 0.2GB - 0.5GB per hour
- (Good/Low/240p) (**VHS Quality**)
  - Data use at these video qualities is similar for most streaming services.
- These numbers are per device. If you are streaming on multiple devices it will use this much data for each of them.
  - Most streaming services set the quality to the highest available by default.

### YouTube

- YouTube allows you to change the settings for your account as well but it is worded differently
- If you do not have a YouTube account you can adjust video quality for each video. This is available by clicking on the gear in the bottom right corner of the video, then selecting the desired quality setting.

### Other Notes

- These numbers are per device. If you are streaming on multiple devices it will use this much data on each device.
- If you are streaming on an Apple TV, the device will be set to always stream at the highest video quality.
- **If you are using Video Streaming Services on a streaming box like an Apple TV, IPTV Box or Roku Box, you may need to manually close the streaming application or unplug them when not in use to stop the video streaming.**