

Understanding Bandwidth



Bandwidth

- Describes the maximum data transfer rate of a network/internet connection. It measures how much data can be sent over a specific connection in a given amount of time.
- “Bandwidth is usually measured in Bits per Second (Bit/s) or Megabits per Second (Mbit/s)”
- While “bandwidth” and “internet speed” are often used interchangeably, they actually refer to two different aspects of internet service. Internet speed is the measure of how fast information is transferred, while bandwidth refers to the capacity of an individual internet connection.

Upload vs Download

Upload Speed, Download Speed, and Your Internet Activities

For the general consumer, **download speeds are much faster than upload speeds**. This makes sense because consumers generally download much more information than they upload. **Streaming videos or music, reading a blog post, or scrolling through your Instagram feed** are all activities with almost no upload needed once they're initiated. They're all passive applications, not interactive applications.

Upload speeds become much more important for interactive applications. While some common interactive applications, like online gaming and video chat, are better with decent upload speeds, most consumer internet services provide enough upload speed to handle these things without many issues.



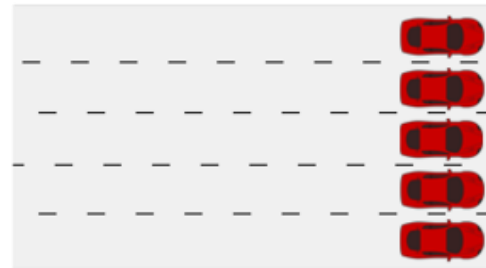
Downloading ...



Uploading ...

Freeway Metaphor

- All cars (data) travel at the same speed, so to get more data from the internet to the computer faster... our Freeway lanes (bandwidth) needs to be wider.
- Example: A 5 Mb size picture. If our bandwidth is 1 Mbps. It will take 5 seconds to download the picture. If our bandwidth is 5 Mbps.. It would take 1 second to download.



Average Use of Data

Video Streaming

- Netflix
 - 4K quality uses about 6.8GB per hour
 - HD movie uses about 3GB per hour
 - SD movie uses about 700MB per hour
- Youtube
 - 1080p HD video uses about 12MB per minute
- iTunes (Renting Movie)
 - 1 HD movie uses about 1.7GB
 - 1 SD movie uses about 1.5GB

Other Way to Stream

- High Quality Music Streaming
 - Uses about 125MB per hour
- Skype (VOIP service)
 - Uses about 13-45MB per 1 recipient
- General web browsing/emailing
 - Uses about 184MB per hour
- Cloud Based Security Systems
 - 1 camera uses about 60GB per month

How much bandwidth is enough?



- Good rule of thumb? Having about 2.0Mbps of download speed per device for general usage (emailing & web browsing), and about 5.0Mbps for each HD video stream.
- If one person is watching Youtube videos, another is streaming a movie & a third is video talking on Skype will using their phone/tablet.
- At least 19Mbps of download bandwidth would let all three people stream without impeding on the others.

Netflix and Hulu Data Settings

Control Netflix Data Usage

- Sign in to Netflix.com.
- Select the profile you'd like to change your data usage settings for.
- **NOTE:** Data usage settings cannot be adjusted from a Kids profile.
- Select **Account**.
- Under **My Profile**, select **Playback Settings**.
- Select your desired data usage setting. Low or Medium
- Select **Save**. Your changes will take effect within 8 hours.

Hulu Quality Control Settings

- Log in to your [Hulu account](#)
- Select the "Settings Gear Icon" ...
- The option to adjust quality settings will pop up (Low, Medium, High, Auto)
- Select Low or Medium.

Online Gaming Bandwidth Use

The reason there is such a gap in the averages for the downloading speed; is because it really depends on a lot of different factors. Such as size of the game, how many players play along side you, how the servers themselves are on the games, your internet providers top speeds, etc.

- Xbox One, Play station 4, Etc.
 - 40MB to 300MB per hour of online gaming

Without Proper Speeds latency can happen, also referred to as “lag,” “ping rate,” or simply “ping,” latency refers to the time from when a message is sent from one location on the internet to another and back. Latency can be affected by the physical distance between servers and individual internet connections as well as the amount of traffic on a particular network.

Congestion on the “Freeway”



- Back to the metaphor again, the more data that is being requested and sent, the more bandwidth (freeway lanes) that is being used at one time. At some point every lane is going to be taken up, so the cars (data) will take more time to get to you.

More on Congestion

- Congestion usually happens during peak times, like when everyone gets off work and logs into the internet. You can also experience slower speeds if you have a home network (and everyone is online) or someone using bad/old wires, connections or equipment.
- Peak time generally is 7-11 pm
- Think of bad wires/connections like a freeway that goes from 5 lines to 1 all of a sudden. That forces all of the cars (data) to the bottleneck, ultimately taking longer to get back to you.