

WIRELESS INTERNET 101

Wireless is the technology that today most resembles magic. We want to be mobile, not tethered. Our desires notwithstanding, the future of telecommunications is more complicated than simply removing wires.

Consider your home network. You likely use a Wi-Fi router to share a DSL or cable wired connection to your home. Even as wireless devices become increasingly common,

most homes will still have a wired connection (ideally using fiber optics).

There is no single “wireless” technology. There are many different standards, speeds, and issues. Your phone may support 4G LTE, Wi-Fi, and Bluetooth – each is unique in capacity and limitations.

BASIC TERMINOLOGY

Spectrum: This is the entire range of electromagnetic wavelengths from the colors we see to frequencies used by radio and television broadcast stations. The Federal Communications Commission (FCC) regulates how the spectrum may be used and by whom.

Licensed spectrum: Specific ranges of radio wavelengths that may only be used by those holding licenses from the FCC. Technologies include 3G, 4G, LTE, WiMax, and others.

3G, 4G: G is short for “Generation” of commercial cellular network. However, marketing departments have perverted these designations so the 4G used by AT&T is not the same as 4G used by Verizon, etc.

LTE: “Long Term Evolution” is a wireless standard (4G) used by most cell phone companies to deliver cellular wireless services, most often to mobile phones.

Fixed Wireless: Connects two non-mobile locations, such as between a house and tower. The antennas are often directional to allow higher power and faster speeds than used for mobile phones.

Data Caps: limits on the amount of data a device may use over a period of time.

Unlicensed spectrum: Specific ranges of radio wavelengths dedicated to a commons that anyone may use, often with power limits. Includes microwaves, garage door openers, Wi-Fi, cordless phones, and others.

Wi-Fi: Sometimes confused with “wireless.”

Wi-Fi is a specific set of wireless protocols commonly used by computers and mobile devices. Many different firms manufacture Wi-Fi devices that meet standards to communicate with each other.

KEY POINTS



Cell phones do not use satellites.

The signal travels from your phone to an antenna, likely on a tower (as shown on left) within a few miles of your location.

Wireless networks require wires.

When your cell phone connects to the tower, the signal travels via wires to a processing hub, then again via wires to another antenna to connect “wirelessly” to the call recipient.

Wireless networks require better fiber optic networks.

The explosion of wireless demand requires higher capacity fiber optic connections to antenna sites. Wired and wireless networks complement each other; they are not substitutes.

Home Wi-Fi connections are often already faster than the Internet connection. Your wireless network may peak at 54 Mbps or more whereas your Internet connection may only be 5-10 Mbps.

REAL WORLD MEASUREMENTS

Today's mobile wireless technology alone does not meet our demand for fast Internet access. 4G wireless is slower than modern wired cable connections.

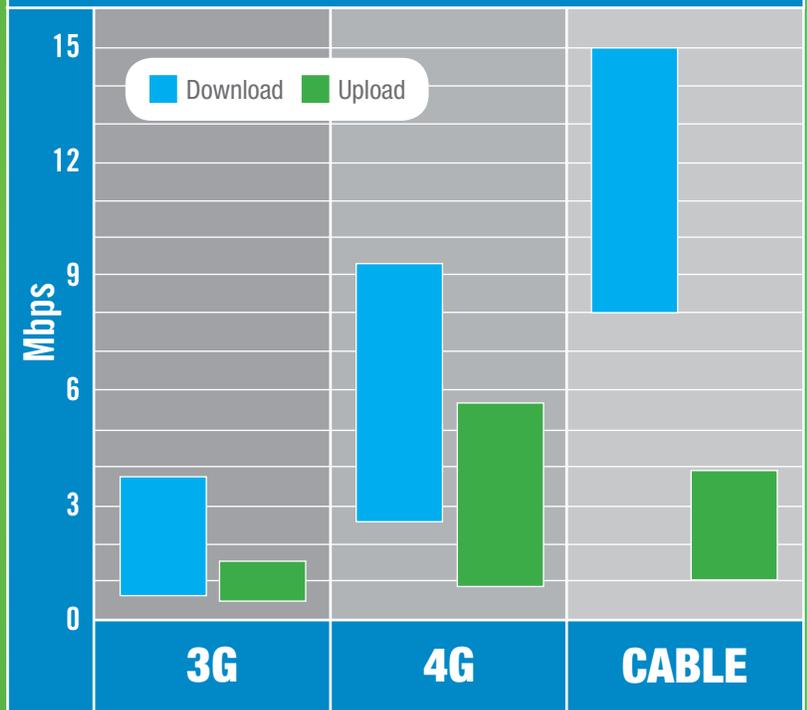
Though wireless speeds continue to improve, each tower is shared by many users whereas home wired connections are shared by comparatively fewer users. As a result, these wireless connections are unlikely to overtake modern wired connections in the home.

In 2012, PC World tested wireless Internet services from four mobile carriers in 13 U.S. cities. 3G was comparable to home DSL connections and 4G a bit slower than home cable connections. Both download and upload speeds were tested. Cable reference based on PC World tests of multiple cable companies' standard tier.

PC WORLD SPEED TEST RESULTS

3G Download / Upload	4G Download / Upload
Fastest: 3.84 / 1.44 Mbps	Fastest: 9.12 / 5.85 Mbps
Slowest: .59 / .56 Mbps	Slowest: 2.81 / .97 Mbps

COMMON SPEEDS (in Mbps)



DATA CAPS

Wireless Internet providers often impose **data caps** that discourage subscribers from using certain applications, most notable streaming video. These are generally business decisions, not technical limitations. Nonetheless, they are a reason wireless is not replacing wireline connections at home.

Exceeding **data caps** results in overages or interruptions in service that make wireless alone an expensive solution for businesses that regularly transfer large amounts of data.

Wireless providers justify data caps as a means of managing **congestion**, but consumer advocate groups argue the real motivation is maximizing revenue. An analogy is trying to manage rush hour traffic jams by limiting how many miles one can drive per month.

WIRELESS LIMITATIONS

Objects such as trees, hills, and buildings can degrade wireless signals.

Satellite Internet service is wireless but is expensive and suffers from technical limitations. We have not found anyone subscribing to satellite Internet when a DSL or cable option was available.

Congestion can result when too many devices are attempting to share the same antenna. This can be resolved by deploying more antennas, each of which should have a fiber connection. Cities with ubiquitous fiber networks can offer better wireless options.

ADDITIONAL RESOURCES:

Collect all of our Internet-Related Fact Sheets at MuniNetworks.org/fact-sheets

[Broadband Bits Interviews with Dewayne Hendricks](#)

[New America Foundation - Wireless Future Project](#)

[Public Knowledge - Mobile Innovation](#)

[Free Press - Save the Internet](#)

For more information, visit MuniNetworks.org

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