

■ Mobile Broadband

Do you want to be connected everywhere you go? Are you tired of being tethered to your desk? With warm weather just around the corner, many people want to spend as much time outdoors as possible; that means staying connected through email, instant messaging, and surfing the web. Mobile broadband enables you to do all of this wherever you happen to be.

There have been some significant advances since we last discussed this topic in August 2007 so we figured it was time to re-visit this popular technology.

■ Tip of the Month

Factors to Consider with Mobile Broadband

When comparing mobile broadband plans, there are two important terms to keep in mind when you are assessing your options.

1) **Bandwidth or data transfer rate** – indicates how fast the data will transfer. Data traveling at a speed of 1.4 Mbps (3G upper limit speed) is about 10x slower than data traveling at 11 Mbps (Wi-Fi lower limit speed). Another way to look at this is that with an 11 Mbps connection, you can transfer 10x as much data in the same amount of time as with a 1.1 Mbps connection (given similar network conditions).

2) **Allowance** – indicates how much data you can upload and download each month. Wireless networks put stringent controls on how much each user can upload and download. Most 3G network providers allow 5 GB of data transfer each month with overage charges applied when this limit is exceeded. Off-network roaming is limited to a mere 300 MB per month. [5GB = 5,120 MB]

With 5 GB of allowance per month, you could:

- upload ~ 5,000 - 1MB photos, **OR**
- view ~ 300 YouTube videos (3 min each) **OR**
- download ~1,600 MP3 songs (3 min each)

First, some background ... There are two types of mobile broadband; 1) Wi-Fi and 2) cellular or mobile wireless (e.g., 3G). They accomplish the same thing - both technologies allow you to send/receive email, surf the web, and transfer data wirelessly but the technology underlying these standards is different.

Wi-Fi uses radio signals on either the 2.4 GHz or 5 GHz frequency to transfer data from a device with an antenna (e.g., laptop) to a router connected to the Internet. Cellular wireless also operates via radio signals but on an entirely different frequency (i.e., 800, 900, or 1800 MHz). Like Wi-Fi, cellular transmissions occur between a specific device with an antenna (e.g., smartphone) and a base station (cell phone tower).

Whereas both types of mobile broadband can get you online, there is a big difference between where and how you use them. We'll talk about these differences and compare connection speeds between wired and wireless networks in this newsletter.

Wi-Fi

Wi-Fi relates to any of the 802.11 identities: 802.11b, 802.11g, 802.11a, 802.11n. Wi-Fi speeds are rated between 11 - 300 Mbps and operate in the 2.4GHz (b,g,n) or 5 GHz (a,n) frequencies.

It works in a Local Area Network (LAN) environment with a limited range of 100 - 300 feet. For this reason, Wi-Fi is considered a wireless Ethernet

■ Websites Worth Watching

- ▶ www.tripadvisor.com - Planning a trip this summer? Find reviews for thousands of hotels, restaurants, and vacation rentals around the world. Includes trip ideas for inspiration too!
- ▶ www.nationalgeographic.com - click on Travel for more inspiring ideas.

connection. [Ethernet cabling is how most businesses connect their network devices.]

To gain access to a Wi-Fi network your device (laptop, smartphone, etc.) must be within **100 - 300 feet** of an access point (i.e., a router) in order to transfer data wirelessly. The access point connects to a wired network (LAN) then connects to an ISP source (usually DSL or cable modem via a wired connection).

On the whole, setting up a Wi-Fi network is inexpensive and relatively easy. If conditions are favorable, a Wi-Fi signal can carry more data at a faster rate than a 3G signal due to the higher frequencies (GHz range rather than typical MHz range of 3G networks).

Three downfalls to Wi-Fi:

1. The number of people on the network impedes the flow of data causing stutters and failed connections.
2. The signal will drop off as you get further away from the access point. Obstructions, like walls, floors, and interference from other devices will cause the connection speed to drop off precipitously.
3. Unless certain security measures are taken, using a public Wi-Fi hotspot increases your chances of your device being infected with malware or viruses and increases your risk of identity theft.

Despite these limitations, Wi-Fi is useful for getting online in public places like libraries, cafés, airports, and bookstores. Access is generally free in these locations although service isn't always reliable.

If you experience problems accessing public Wi-Fi networks, you can use hotspots designated by your cellular/mobile broadband provider (e.g., AT&T and Verizon). Some require you to have an account with the company while others do not. Each company has their own procedure for logging on to their Wi-Fi network. Visit their website or review your plan documents for gaining access.

Here's some brief information on the major providers:

AT&T

For AT&T, you need a high speed Internet or wireless account and you can get free access to their Basic Wi-Fi service. The Basic service will enable you to login

to thousands of managed Hot Spots at various retailers and public places around the country. Per session and monthly charges are also available for non-AT&T customers.

For more info on AT&T's Wi-Fi service, visit:

- <http://www.att.com/gen/general?pid=5949>

VERIZON

For Verizon, you need to be on a monthly Verizon Wireless Mobile Broadband or GlobalAccess service plan to gain access. Verizon's Wi-Fi Hotspot network includes thousands of locations in the US, Canada and Mexico. According to Verizon, Wi-Fi usage does not impact your monthly data allowance when connected via a hotspot.

For more info on the Verizon's Wi-fi service, visit:

- <http://www.verizonwireless.com/b2c/mobilebroadband/?page=wifiaccess>

T-MOBILE

For T-Mobile, only paid service is available. There are many rate options to choose from depending on the type of service you need. T-Mobile has thousands of hotspots on their network in various locations around the US and have international agreements for roaming as well.

For more info on T-Mobile's Wi-Fi, visit:

- http://hotspot.t-mobile.com/services_about.htm

SPRINT

For Sprint, Wi-Fi access is available for Sprint PCS Vision customers. By downloading the Sprint PCS Connection Manager with Wi-Fi software, you gain access to Wi-Fi locations around the country.

For more info on Sprint's Wi-Fi, visit:

- <http://www1.sprintpcs.com/explore/ueContent.jsp?scTopic=pcsWiFiAccessFromSprint>

Note: You may need to call Sprint as details are limited on their website.

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3G Wireless

3G, or 3rd Generation, is another type of mobile communication standard. 3G service enables users to watch movies, engage in videoconferencing, watch TV broadcasts, surf the web, and email wherever your wireless network provider provides service; this includes sitting at your desk or traveling in a car, train, etc.

3G technology has been around for close to a decade now and has been internationally widespread for the past 5 years. Other well known US standards include: **GSM / EDGE** - AT&T, T-Mobile; **CDMA** - Verizon, Sprint; **WiMAX** - Sprint, Comcast, Time Warner Cable; and the upcoming **LTE** (Long Term Evolution) - Verizon, AT&T, T-Mobile. GSM, EDGE and CDMA are considered 2G and 3G wireless whereas LTE and WiMAX (currently being developed and have just been released, respectively) are considered pre-4G wireless.

Specifics of 3G Service

3G service operates in a Wide Area Network (WAN); wherever your cellular company has coverage, you can use the service. It allows for simultaneous transmission of voice and data similar to how DSL allows you to talk and surf the web at the same time with your landline phone.

3G service requires a mobile broadband card (internal or external) and a data plan provided by cellular carriers. Most wireless providers limit their 3G service plans to 5GB/month (on network) with additional charges for going over this limit or for roaming.

The biggest difference between 3G and Wi-Fi is the coverage area. 3G service is determined by the location of your cellular provider's transmission towers not the local Wi-Fi access point. It is an always on connection that does not require you to login each time you want to connect. It is reliable even when mobile - in certain places your connection stays intact even while traveling over sizable distances.

Typical download speeds for 3G service are between 600 Kbps and 1.4 Mbps – very similar to low end DSL service. Despite the negative press AT&T has been receiving lately, they have made great strides in improving their network over the past year. Currently, AT&T has the fastest average 3G download and upload speeds across the US, based on a study conducted in Dec 2009 – Jan 2010 by Novarum and PC World. The study took place in 13 major US cities encompassing 7 million cellular subscribers. *Figure 1* shows the results.

3G Network	Avg Download Speed	Avg Upload Speed	Avg Reliability
AT&T	1410 kbps	773 kbps	94%
Sprint	795 kbps	396 kbps	94%
T-Mobile	868 kbps	311 kbps	92%
Verizon	877 kbps	434 kbps	92%

Figure 1. Study conducted in Dec 2009 / Jan 2010 showing average 3G network speeds. Source: <http://www.pcworld.com>

4G Wireless

4G is the 4th generation mobile wireless standard. The ultimate goal is to reach 100 Mbps while traveling and 1 Gbps while stationary. Real world testing doesn't even approach these figures yet although it is faster than 3G service. 4G wireless enables users to view HDTV content, engage in multimedia streaming, and use IP telephony (like Vonage and Skype).

If you live in the greater Philadelphia area, you may have recently seen commercials for Clear - Super Fast Mobile Internet. Clear (on the Sprint network) currently offers a type of 4G wireless, called WiMAX, in 27 cities across the US, including Phila, Las Vegas, Chicago

and Seattle. Right now, 4G service is spotty in these markets but will improve over the next year. Clear's documents claim speeds of 3 – 6 Mbps but real world values can be much less. For those interested in trying out the service, Sprint offers a 4G Day Pass. With a 4G enabled device, you can sign up for a 1 day service plan for \$9.99 without a long term commitment. Visit <http://www.sprint.com> for more details.

Comcast also offers a mobile broadband service called High-Speed 2go™. Metro area (4G) and Nationwide 4G/3G plans are available. For more info, visit: <http://www.comcast.com/mobilebroadband>

Comparison of Internet Connection Speeds

- **Dial-up** – Slowest Internet connection. With a 56k modem, you can download 56 Kbps.
 - **DSL** – 10x faster than dial-up. With a DSL modem, typical download speeds reach 768 Kbps to 1.5 Mbps. Faster service is available in select areas.
 - **Cable** – 4x to 6x faster than DSL. With a cable modem, typical download speeds reach 2 to 5 Mbps. High end cable service can reach speeds as high as 14 to 16 Mbps.
- Cellular wireless
- **GSM** – pre 3G wireless network; typical download speeds on a GSM network are 75 Kbps to 135 Kbps
 - **CDMA** – Typical download speeds on a CDMA network are 14.4 Kbps to 115 Kbps.
- Mobile Broadband
- **EDGE** – Enhanced GSM network; considered 3G but speeds are rated slower - 400 Kbps to 1 Mbps.
 - **3G** - Typical download speeds for 3G service are between 600 Kbps and 1.4 Mbps – very similar to low end DSL service.
 - **Wi-Fi** – Speeds rated between 11 – 300 Mbps; achieved speed depends on many factors such as distance from access point, number of people on the same network, and the type of networking standard used (i.e., 802.11x).
 - **WiMAX** – A type of 4G service; Download speeds rated between 3 – 6 Mbps. Upload speeds slower.
 - **LTE** - Another type of 4G service still in development. Verizon is slated to have the first LTE network up and running. Speeds are set for 12 Mbps.
 - **Future 4G** – According to industry reps, 4G speeds will reach 100 Mbps while traveling and 1 Gbps while stationary. We will eventually see these speeds but not for several years.

Wired vs. Wireless Networks

While mobile broadband has advantages, speed is not one of them. If **speed is a concern**, you'll have to stick with your **wired** connection (i.e., Cable = 6 Mbps while 3G = 1.6 Mbps). Cost is also a major factor; the cost of a mobile broadband data plan will definitely be higher than a wired connection given the small data allowances (5GB per month on network) for 3G and WiMAX plans.

A final consideration for wireless networks is security. Wireless networks are much easier to infiltrate unless

security measures are put in place such as logging in with WPA credentials for Wi-Fi networks, regularly scanning your device with anti-virus and anti-malware software, keeping the OS updated, and being vigilant with web sites visited and email attachments opened.

If wireless networks are managed improperly, they can be troublesome but if controls are put in place, they can add significant value for both personal and business use.

Conclusion

Mobile broadband has become a convenient way to stay connected the past few years. Millions of people take advantage of either Wi-Fi or 3G (and now WiMAX) to get online in public places or while traveling.

There have been several small scale tests on the differences between Wi-Fi and 3G and in most cases, Wi-Fi is faster than 3G (e.g., transferring small files, wireless radio transmission). Service varies widely though depending on conditions (i.e., how far you are from the nearest hotspot, what obstructions are in the way, how many people are currently on the network). If there is a lot of traffic on the network, Wi-Fi connections can slow to a crawl rendering it unusable. Since 3G service is managed, there is less chance for network

slowdowns (although they do happen).

Whereas Wi-Fi can be fast and free at times, 3G, WiMAX and the upcoming LTE network enable a user to travel while accessing network resources via cellular towers. These networks, because they are licensed and managed, tend to offer more reliable service. 4G networks, due to faster speeds and greater bandwidth, will further advance the conveniences of mobile broadband although we won't see true 4G speeds for many years.

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