

Algoma District Community Network
Broadband (high-speed Internet) over HSPA

Revised 17 Jan 2012

Overview of HSPA Data Connectivity

I am receiving mixed reports concerning the efficacy of using 3G HSPA cellular technology for getting broadband (high-speed Internet) connections in a residential or business environment. There are two major methods for connecting to and surfing the Internet over both the Rogers and Bell/Telus HSPA networks:

- a. Smartphones which do not require any additional hardware;
- b. Using a piece of hardware attached to a computer, be it a desktop or laptop; the most common hardware pieces are either data sticks or data hubs in everyday jargon with individual vendors branding their offers with different names like Rocket Hub or Turbo Stick.



Rogers Hub



Bell Turbo Stick

This paper is dedicated additional hardware solution, in particular some of the considerations you need to be aware of if you go this route.

Hardware Differences

The important difference between the two hardware solution is that the data stick can normally only be used on one computer at a time but on any computer that has the appropriate software loaded. It does have the advantage of being very small, about the size of a thumb drive, and easily portable.

The data hub can have multiple computers connected at the same time either by cable or WiFi. It is a larger than a data stick but is moveable. It also is capable of providing digital home phone service provided by the vendor to replace a landline connection.

Information about the **data sticks** sold by [Bell](#) and [Rogers](#) and information about the **data hubs** sold by [Bell](#) and [Rogers](#) can be found on their respective web sites.

Data Transfer Rates (DTR)

The technical term for a cell site is Base Transceiver Station (BTS). A BTS contains transmit and receive technology and also the aerials to supply a cellular signal. The networks have three speed caps depending on the design of the BTS providing the signal: - up to 7 Mbps, up to 21 Mbps and the newest cap of up to 42 Mbps which currently is only available in major metropolitan areas.

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You need to be aware that these are the best DTR under ideal conditions and the speed you can expect to receive will vary and in most cases be less.

The number of connections that can be made to a BTS at one time is finite and this capacity is shared amongst all users. Thus the more users trying to access the same BTS at the same time will result in slower speed for everyone. It is also standard practice for voice calls to take precedence over data calls, further reducing the bandwidth available of data which further reduces the speed of data connections.

The end result is that the DTR will vary with the time of day and the day of the week. Speed test readings taken throughout the day can result in radically different readings. Indeed, measurements taken within minutes of each other can show significant variance.

In the Algoma District, speeds in the 4 Mbps download range are being achieved on a regular basis dropping off to less than 1 Mbps under some circumstances. I noted one Bell advertisement stated: - “21 Mbps² maximum speed (3.5-8 Mbps average download speed)” so in this case there is some truth in advertising.

The busy hours and thus the lower DTR are usually experienced in the period 4:00 to 11:00. PM and appear to be consistent throughout the province.

Other factors that affect DTR are:

- a. Distance from the BTS. In its submission to the CRTC in support of the Deferral Account application, Bell indicated that a user had to be within 5 km of the BTS to obtain a DTR of at least 1 Mbps. It is assumed that this is without an external antenna as we have examples of speeds in the 4 – 5 Mbps range at distances from 6 to 12 km using Yagi directional antennas.
- b. Rain and foliage. Leaves either wet or dry can reduce the data rate. In my personal home set-up I get a stronger cell signal in the winter when all the deciduous trees around my house have dropped their leaves.
- c. Type of antenna and transmission lines. See below

Signal Strength

The most important thing is that you must be in range of a HSPA cell site and ideally have electrical line-of-sight (LOS) although eye-ball line of sight is the best. A good test of LOS is the ability to see the hazard warning lights that most sites have at night. (Interestingly the Batchawana site is at ground level on a cliff and does not have warning lights. There may be others.) If you are unable to receive at least even a weak signal cell on a cell handset, the ability to get HSPA broadband (high-speed Internet) is problematic although it may be achieved using an external antenna and signal amplification.

Most cell phones have a “field test reading” setting that gives reading of the signal strength in –db. A reading in the -85 db range or better is required. A smaller number is better i.e. -50 db is better than -85db, Blackberries have the mode as a readily available menu option while others need a [special code](#) to [unlock the feature](#).

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Sometimes it is possible to obtain line of LOS by going “high” with an external antenna attached to the roof or old TV tower or any other high structure that can support a fairly light antenna. Care must be taken to use a low loss cable to ensure the signal strength gain is not lost the transmission line.

Antennas

There are three major type of antennas associated with the data hardware.

- a. The built in antenna. This works fine in an area with a very strong signal
- b. Omni directional whip or rod antenna. Has low gain but can be useful to the signal in or out of building.
- c. Yagi or other directional antenna. The Yagi can be mounted externally on roof or support structure. Yagi have the ability to produce signal gains in the 6 to 20 db range



Whip or Rod Antenna



Yagi Antenna

Most of the local success uses a Yagi connected to a data hub. [Northland Consultants](#) have an excellent supply of Yagi antenna and can arrange for installation.

One user even went so far as to mount a Yagi on an old TV tower with a rotor so that the antenna could be pointed to different BTSs in the area.

Prices

The value for money of HSPA data plans can be very subjective. To some users, the speed offered is worth the cost while for some users it will be the reverse. Both Bell and Rogers offer versions of flexible rate plans. The table below show the prices in effect on 11 Dec 10 according to their web sites, As usual they are subject to change without notice. The cost of the hardware and various fees and taxes are extra.

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Rogers and Bell Hub Data Variable Rate Pricing*					Updated 30 Dec 2011	
	<u>Rogers Data Only</u>	<u>Rogers with Voice</u>	<u>Bell Data Only</u>	<u>Bell with Voice</u>	<u>Tbaytel Data Plan</u>	<u>Tbaytel Data with Voice</u>
0 GB to 3 GB	\$ 48.86	\$ 62.35	\$ 45.00	Add \$35.00	\$35.00	Add \$15.00
3 GB to 5GB	\$ 58.86	\$ 72.35	\$ 55.00	Add \$35.00	\$45.00	Add \$15.00
5 GB to 10 GB	\$ 73.86	\$ 87.35	\$ 70.00	Add \$35.00	\$60.00	Add \$15.00
10 GB to15GB	\$ 93.86	\$107.35			\$75.00 for 20 GB	Add \$15.00
Add per GB	\$10.00		\$ 15.00		\$.05 MB over 20 GB	

Data Capacity

Both carriers offer projections on the quantity of data that can be transmitted within the basic 2GB monthly allotment. Many variable factors were involved in arriving at these figures and each individuals case will be different.

<u>Sample Traffic</u>	<u>Bell</u>	<u>Rogers</u>
50,000 E-mails	2 GB	1.2 GB
4,000 E-mails with large attachments	2 GB	1.31 GB
20,000 Web pages	2 GB	4.75 GB

While this may satisfy many users, I suspect an average family with 2 kids would burn through the 2 GB limit in short. I think it is safe to say, that the HSPA option is not the best solution if the user want to view movies (typically 1.5 to 4 GB per movie), download movies or play online games.

The most recent statistics released by the CRTC indicate the following user statistics for 2009:

- a. Average Gigabytes downloaded per month per user - 12 GB
- b. Average Gigabytes uploaded per month per user - 3.4 GB

The full set of CRTC statistics can be seen [at this site](#).

Conclusion

The HSPA option is not for everyone. While there have been teething problems, the large majority of reports I receive indicated the users are happy with the technical aspects of the service. Some uses have expressed reservations about the costs of the service and the need to constantly monitor usage to ensure data caps are not exceeded.

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When compared to the current cost of satellite service and frustrations of its limited speed and Fair Use Policy (FUP), the HSPA may be worth it.

I would be interested in receiving comments from HSPA data users; send an e-mail to