A Primer to Halifax Networking and the Digital Divide

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This is intended as a basic guide to familiarize candidates with some of the issues and the opportunities surrounding Internet access in HRM and the lack thereof in some quarters.

1. The Players

Halifax Nova Scotia is perfectly located at the point where Internet traffic from Europe and America meet via trans-Atlantic cable. It's geologically and politically stable with a temperate climate, yet still off the beaten track. If it had lower power costs and sustainable green energy production, it would be a natural place to host data.

Halifax was one of the earliest cities in Canada to adopt public Internet access. A private company called NSTN was the first to offer Internet access in the form of analog dial-up in the early 1990s. They have long since been sold off and no longer exist.

Chebucto Community Net was formed shortly after by a combination of people from the libraries, universities, and government and ordinary citizens. They were the first to realize the potential of the Internet and more importantly, the potential for people to be left behind from this new form of communication. This has since been named "the Digital Divide".

In a nutshell, the Digital Divide these days refers to lower income people, the elderly, the sick and those new to the technology, and all the combinations of those groups. These are the people who have trouble affording the higher fees of highspeed Internet and who need help using Internet.

At the same time Chebucto Community Net was being founded, C@P, the Community Access Program, was being founded, and by many of the same people. Primarily funded by Industry Canada with the province of Nova Scotia contributing the remaining third, C@P free public Internet access sites located in public buildings became centers for accessing government services such as Job Search Services.

ACORN-NS, the Atlantic Canada Organization of Research Networks, was formed in the early 1990s. An Optical Regional Area Network, or ORAN, ACORN-NS connects member institutions together with fibre-optic cable in a very highspeed connection. Member institutions include the universities, major government departments both federal and provincial including Capital Health and the Bedford Institute and an assortment of smaller organizations including Chebucto Community Net and the Valley Community Fibre Network.

ACORN-NS is the Nova Scotia affiliate of CANARIE, Inc., a non-profit corporation supported by the federal government dedicated to the running and improvement of a highspeed research and education network. Each province has its own equivalent to ACORN-NS connecting major research and education resources together.

ACORN-NS will be incorporating as a non-profit corporation and changing its name over the next year.

Members of ACORN-NS enjoy free peer networking with major providers such as Google, YouTube, and a host of other large information providers as well as all other member institutions of all the various provincial ORANs.

Within a couple of years of Internet coming to Metro, cable company Eastlink (annual revenue ~$590 million) and telephone company Bell Aliant (then Maritime Tel & Tel) (annual revenue ~$2.7 billion) were offering home highspeed Internet access. With prices starting in the $50/month area after taxes, many lower income people are left out from being able to afford home Internet access.

In the nearly two decades since Chebucto Community Net came into existence, home Internet prices between Halifax's two main providers have remained pretty static. Both providers see Chebucto as a competitor and have between them somehow managed to keep almost the entire local highspeed Internet market to themselves.

As of summer of 2012, C@P no longer receives funding from the federal government while provincial funding has remained level. Some C@P sites are able to receive funding for specific programs such as Job Search Services. Overall C@P was underfunded in the years prior to 2011; now it's to survive on a fraction of that amount.

2. The Technology

Analog Dial-up: maximum speed 33.6 Kb/sec, requires land-line telephone, computer with telephone modem.

Digital Dial-up: maximum speed 56 Kb/sec, requires land-line telephone, computer with telephone modem.

Highspeed Internet: maximum speed 1 Gb/sec, requires Gb network adaptor, wired ethernet connection. Most home highspeed Internet connections are under 10-15 Mb/sec. Most older home network adaptors are 10-100 Mb.

Highspeed connections are mostly DSL using copper phone lines or cable Internet using coaxial cable.

Fibre-optic connections use light transmitted over pure glass fibres and are the fastest form of Internet, 100 Mb/sec +. ORANs such as ACORN-NS run traffic up to 10 Gb/sec while speeds of up to 100 Gb/sec can be found on CANARIE, Inc. fibre. As methods to send light over the fibre-optic cable improve, more and faster data streams can be sent over the same physical strand of fibre. Fibre-optic cable is fairly expensive to install.

Dark fibre: unlit fibre, installed but not being used. Since fibre installation is so expensive, it's common practice to install more fibre

than is needed. The excess can then be used for future growth or leased to third parties.

Wi-fi: network access using radio waves. Maximum speed of 300 Mb/sec, typically under 54 Mb/sec. Usually uses 2.4 GHz radio frequency; can use 900 MHz, 5 GHz among others. The 11 channels of the public 2.4 GHz spectrum are heavily trafficked in most urban areas resulting in poor transmission range and slower speeds.

Bandwidth: a measure of network traffic. Networks have physical bandwidth limits imposed by the particular network protocol and the equipment used in the network, in other words a speed limit for how much data can flow over a system at one time. Once a network has been physically set up, which can be an expensive prospect, the cost to pass data over it is negligible. Some providers choose to charge artificially high rates for bandwidth or impose rationed caps on the amount of data a user can access that bear little or no resemblance to the actual cost of providing the network access or recovering setup costs.

Peer networking: when two or more networks make an arrangement to pass their network traffic over each other's physical network. Peer networked traffic is typically faster because it uses shorter more direct routing and cheaper since the bandwidth costs are reduced, sometimes to zero.

PPP access: Point to Point Protocol - the standard language of the Internet, how computers on the Internet talk to each other.

Malware: programs that do Bad Things. Typically steal personal information and/or use the computer to do Bad Things to other computers.

Terms: A 1 or 0 is a bit. Eight bits is a byte. A byte is enough information to represent a number or letter.

1000 bits is a kilobit. 1000 kilobits is a megabit. 1000 megabits is a gigabit. 1000 gigabits is a terabit.

3. The Digital Divide

Chebucto Community Net has been training people in the use of the Internet and providing dial-up access since June 1994. It's the oldest running Internet provider in the Maritimes and the second oldest community net in Canada after Ottawa. It is a non-profit registered charitable society.

Our studies show that $10 per month is the drop-off point for what some people can afford to spend on Internet access. We have worked very hard to keep our access in this price range. We charge individuals $125 per year for full 56K PPP access and there is no tax due on this amount or hidden 'extra' charges or fees. We offer unlimited usage, no limits on hours.

For those unable to afford the $125 per year, we offer a completely free access to the Internet using a text interface. This service requires a computer with a phone modem and a terminal emulation program such as Windows HyperTerminal or PuTTY.

Here's the Google home page using the text service Lynx web browser:
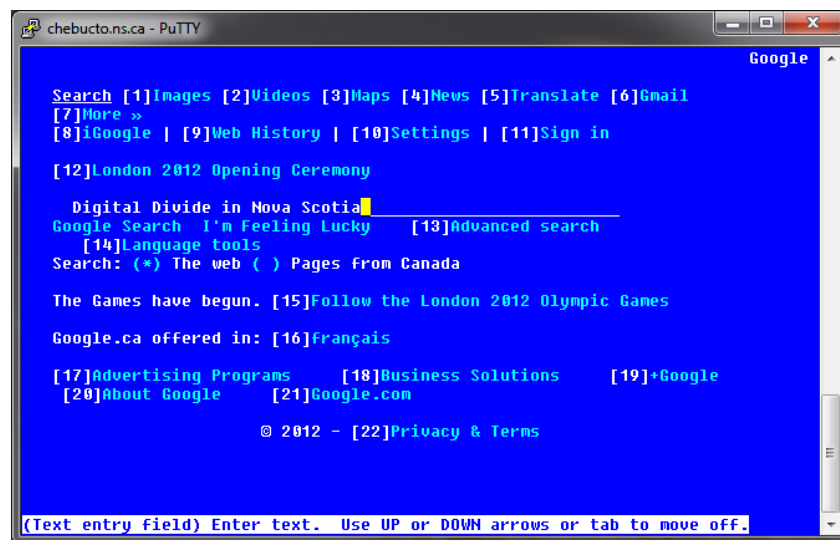
All of our accounts include email and webspace.

Lately we've been seeing usage of the text interface rising as apparently more low income people are having to use it for their Internet access. While it is a very basic access to Internet resources, it does allow uploading and downloading of images or other files, full access to email and even the ability to directly edit web page files in place while completely protecting users from any sort of accidental infection by malware. A user would need to purposefully download and run malware to get infected.

By 2010 Statistics Canada numbers, income plays a big part of whether or not you have home Internet access. Income of $87,000 a year or above: 97% do. Income of under $30,000 a year: 54% do.

Where you live plays a part. Overall 81% of urban Canadians have Internet access, 71% do in rural Canada.

93% of homes with a child or with more than three people in the house have Internet access; only 58% of those living alone do.

Of those not using the Internet, 51% are seniors. In our studies we've seen that there is a technology knowledge drop-off starting with people born before the early 1970s, now in their late 30s and older. Those who've worked with computers in their jobs tend to pick up new computer skills the easiest. Getting seniors online requires a modest amount of training; once they've found something that appeals to them and their social group, an informal learning circle is usually formed for skills to be shared among the circle's members.

40% of those without Internet access are those in the bottom quarter of the population by income.

About 10% of Chebucto users identify as having health and disability issues. 11% of our users identify as having incomes under $12,000 a year.

4. Solutions

A) Tin Tier - Do nothing.

The choice of the current HRM Council.

Let an underfunded C@P program try to carry several times its own weight. While statistics have put forward that volunteers to the program contribute up to eight times the funded dollar value of C@P by their efforts, expecting them to deliver even more with about two thirds less money to work with is a recipe for volunteer burn-out and failure.

For its part, Chebucto Community Net is not government funded and has less money to work with each year as more affluent members move to commercial highspeed access leaving fewer members to cover the operating costs. We've become experts at getting the most for our dollar but even for us there is a limit somewhere out there without new funding from some quarter.

B) Brass Tier - Do something.

The C@P program is essential to providing basic access to people who otherwise would not have any. Funding Halifax Region C@P would help. About $700,000 a year would bring things back to 2011 levels, more would be better.

C@P is basic access, it does not replace home access and since it is usually housed in public buildings it has limited access hours which make it difficult for some. One recent new Chebucto user talked about how she would have to book an Access-a-Bus a week in advance, use it to get a half hour on a public terminal then have to leave on schedule to get back home. Each time she wanted to do something online she'd need to pay for the bus and plan it a week ahead.

Shift-workers and people working more than one job have the same issue with limited open hours.

C) Silver Tier - Build municipal wireless Internet hotspots.

Many municipalities have decided to provide wireless access in their downtown core or other choice areas. On the plus side, with some care in selection of locations for hotspots this could go a long way to addressing network access shortfalls.

Downsides are monitoring use and abuse of the connection. While a totally open network would be the easiest to run and log into, abuse of network resources are a legitimate concern and could result in bans on city network IP addresses, etc. by other networks or services.

D) Gold Tier - Fund Chebucto Community Net's Wifi

With 18 years of experience with running a community Internet and an existing user infrastructure already in place, Chebucto's plan for wireless would be to provide web page access (port 80) only over the open public network, greatly reducing the damage a malicious user could do using the network while maintaining free access to local and peered web sites. A user login over a secure encrypted Virtual Private Network would be used to gain full Internet access.

A user login would cost $125 a year and tie a real person to the actions carried on under that login. We've found this to be enough to keep people out of trouble.

Costs of setup would be low - economical equipment, volunteer or low cost staff. We've had mentoring and training programs before and could re-establish them.

E) Platinum Tier - Municipal Fibre Network

This would be the ultimate solution to the problem. Expensive to set up but fifty years, a hundred years from now this network infrastructure would still be in use, even as the speeds of data carried over the fibre increased decade by decade.

A municipal fibre network would be free of bandwidth restrictions and encourage all kinds of datastream-hungry

businesses to locate in Metro. With greater network purchasing power, access to the Internet through peering with other networks would be a substantial money saver over the current situation.

Google is pulling this as a pilot project in Kansas City, offering unlimited downloads, speeds of 1 Gb/sec and a monthly cost of $70.

See the Valley Community Fibre Network for more benefits of having a municipal fibre network.

5. Conclusions

We've seen what inaction does. Halifax was one of the technology leaders in the 1990s, in no small part through the efforts of Chebucto Community Net and C@P and our early adoption of Internet access. We've let this slip year after year since, government content to let commercial interests run the technology agenda for their own benefit and ignoring the interests of the wider public.

The future of society is as a knowledge and information based economy. The more and deeper we can adopt this awareness now, the better suited and more successful we will be to take advantage of the opportunities.

Letting the commercial marketplace dictate the pace and amount of technology available to us is a mistake. We've tried that and it's made us one of the lagging countries in the world for network speed while paying among the highest access costs.

We believe at Chebucto that we've got the ideas to make the Digital Divide a shadow of its former self; we just need the resources to turn those ideas into reality. Together we can change Metro for the better by letting more people have more access and more opportunity. It's bold planning but frankly we have long been in need of some bold leadership locally.