



Algoma District Community Network

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Why don't I have broadband?

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I developed this paper in response to a conversation I had with Heather Pelky, Mayor of the Township of North Shore concerning the status of broadband (Internet) service in her community

The material is my interpretation of the situation and I take full responsibility for the contents. I assumed my target audience is non-technical so in some cases I have oversimplified details in an attempt to get a point across. Although some of the material is locale specific, I feel most of the concepts have a general application.

After reading the paper, I hope you have a better understanding of some of the obstacles we face in providing broadband (BB) and to a lesser degree cellular service outside the larger urban areas – in this case defined as core population of about 300 people within 5 km or so radius.

Most people use the terms broadband and high-speed Internet interchangeably and for the average user it makes little difference. However, from an Internet Service Provider (ISP) perspective, before users can gain Internet access, it is necessary to install a broadband distribution system. This is what ADnet is all about.

This example examines the difference. ADnet would create a project with Bell Aliant to provide the broadband distribution system or infrastructure. An ISP such as Vianet could then use Bell Aliant DSL lines (the broadband distribution system) to provide Internet service to the user. The user deals solely with Vianet to obtain Internet service. Bell Aliant could also provide Internet service through its Sympatico affiliate. However, Bell Aliant has to provide infrastructure to Vianet and Sympatico on an equal opportunity basis. Vianet could also use a cable infrastructure system where it is available. This arrangement is known as 'open access' and is mandated by the CRTC. It is included as a condition of funding for any ADnet project.

The four most common technologies for broadband distribution are: DSL technology which uses the existing copper telephone lines; cable modem technology used by the cablevision companies over a fibre/copper hybrid network; wireless multipoint using a tower and radio system; and satellite direct to the user.

Distribution Technology

The lowest level of signal distribution is commonly referred to as the 'local loop', or the 'last mile' or the 'fibre to the home - FTTH'. They all mean the same thing.

The 5km radius comes into play as a technical limitation of the DSL technology. The copper lines can only extend the BB service from the DSLAM (Digital Subscriber Line Access Multiplexer), which is normally located at a local Bell site in the community, for 4.7 km of cable length. Also as the distance from the DSLAM increases, the quality (speed) of the BB decreases to eventually being ineffective. The age

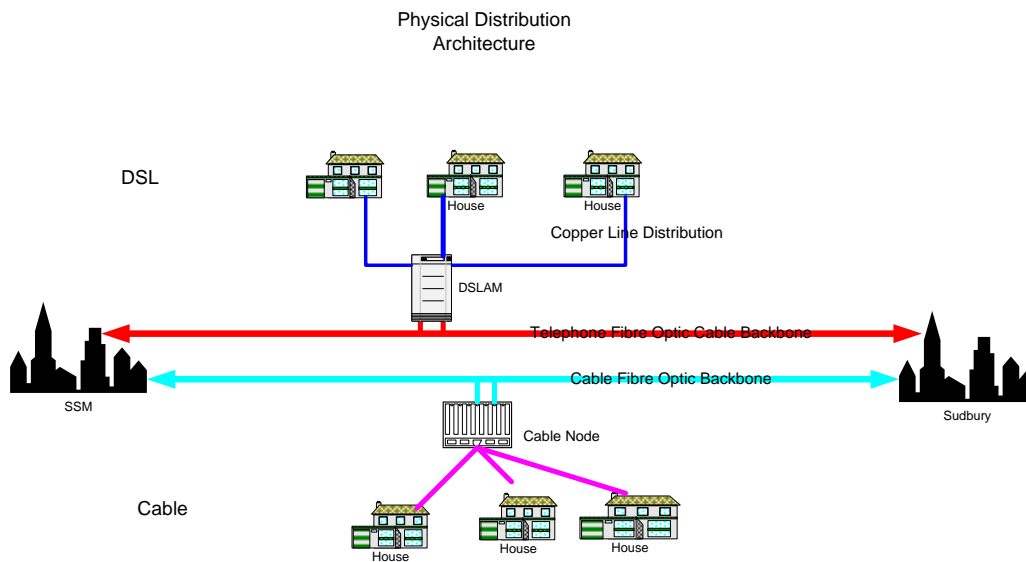
and quality of the copper lines can have a major impact on distribution distances. In the extreme case it may be necessary to replace all the copper lines. There may also be limitations on the availability of copper lines. Even though DSL and normal voice traffic can use the same copper line simultaneously, the proliferation of multiple line premises in recent years has affected the availability of what the industry calls 'good pairs' in certain areas.

If a cablevision network such as Persona provides the BB service, the main restrictions are more economic based as they have to either build or upgrade their local community distribution cable network. In some communities, cable companies have serviced premises that are on the main backbone route but not premises off the main right-of-way. For example, Persona has a fibre backbone cable from Sudbury to SSM that is along the Hwy 17 corridor. In some cases they provided BB service to premises that are within local loop distance (usually a couple of hundred yards maximum) of the backbone but have not upgraded the whole community. I believe this is the situation in Algoma Mills. In some cases the existing cable distribution network is not capable of supporting BB or digital TV and requires a complete rebuild.

Wireless systems have the advantage of covering sparsely populated area at reasonable costs. It may be the solution to cover the more rural areas of the East Algoma region if we can get private sector vendor to get on board. No wireless solutions were proposed in the most recent RFP responses.

Satellite coverage is currently available to everyone anywhere in northern Ontario. More details are available at <http://www.xplornet.com/>. Also see reference to the SIRA programmes in the *Financial Issues* section below.

Community Distribution



The need to build or upgrade a distribution system to reach the local users opens another can of worms. Most cable or copper urban distribution systems in the north use a pole line aerial system. There are three principal utilities that have pole lines – telephone companies, electric utilities, and cable companies. The CRTC has established rules that require the three utilities to allow other utilities to attached cables to each others' poles with due regard for safety and for a fair restitution. Unfortunately, these rules can lead to inordinate delays and discussions. For example, in my area the main pole line is owned by an electric

utility. Although Bell already had cabling on the poles, the utility claims it is dangerous to add the cables needed for DSL distribution without replacing most of the poles at Bell's expense. Bell says this makes providing DSL service to my area uneconomical and it will not be available in the foreseeable future.

Cable technology allows the distribution of the BB over the cablevision network. At various locations along the local cable distribution network, 'nodes' are installed to distribute the signal to individual users. Each node can handle numerous individual users. As the number of users increase, more nodes are added. However, older analogue systems only allowed one-way signal transmission. To allow BB distribution, it is necessary to both add and remove equipment to allow two-way BB signal transmission. In many cases, the companies also upgrade from a copper/coaxial system to fibre optic cable. There are still a number of old analogue systems in the Algoma District.

Backbone

Regardless of the local distribution system, there a need to have a BB connection that will provide access to what is commonly referred to as the 'Internet cloud' or just 'cloud'. Broadband connectivity is based on a hierarchical architecture. This should not be confused with the Internet architecture which has a multi-node architecture. The former is the network highway while the latter is the cargo that runs on the highway. The cargo cannot move without the highway.

There are many variations in the basic architectural design. Regardless of the details, there has to be a way to get the Internet signal that rides on the infrastructure off the backbone and onto the local loops and vice versa. The equipment that does this is indicated by the DSLAM and the Cable Node in the diagram above. If these pieces of hardware are not installed, it is impossible to get the connectivity from the Internet cloud to the end user. Getting the signal on and off the backbone also requires the installation of specific equipment a serving central offices. The serving central office may be connected to a DSLAM over fibre optic, microwave, or even copper depending on the situation. This adds another level of complexity to the physical network.

Another term closely associated with Internet distribution is the Point-of-Presence (PoP) this is how the DSLAM and Cable Node are referred to in Internet terminology. It may also refer to routers that are installed in the network to serve specific functions. An example of this is the Ontera router installed in the Algoma Mills municipal offices.

Financial Issues

The installation of the distribution network infrastructure can be an expensive undertaking. Fibre optic installation can cost anywhere between \$15 - \$25 per metre or \$15,000 - \$25,000 per kilometre. The networking electronics and other equipment costs need to be added to that. Cellular telephone costs can run about the same for each kilometre of highway coverage. A single cell tower can run as low as \$100k to as high as \$1.5 million. Local distribution costs vary according to the locality, right-of-way ownership, existing pole lines and underground conduits.

All broadband (Internet) services open to the public in Canada are run as private sector, for profit organizations. This includes Ontera which is a provincial government owned for profit agency. There are no public operated or funded networks. This means that if a company cannot make a profit, they will not provide service.

Both the federal and provincial levels of government have support programmes that will provide limited funds to defray the private sector's capital costs. There are no current programmes that offset ongoing operational and maintenance (O&M) costs. This sustainability factor forms a substantial part of the process leading to the private sector's decision to install broadband.

In most cases, the private sector is expected to provide between 50% and 25% of the capital costs associated with a project. Government also caps the amount they will provide for each project under

normal circumstances. While exceptions can be made on a case-by-case basis and often are, the current normal limits are \$500K for federal funding and \$1M for provincial funding. Federal and provincial funds can be combined but there are prohibitions on the process of 'stacking' that obtain funds from more than one federal or one provincial source for the same project at the same time. These programmes also require that the services provided be priced competitively with equivalent services elsewhere in Canada or the province. This further limits the flexibility of the private sector to provide service.

The bottom line is that there is no way private sector companies can be forced to provide service in any particular area. There needs to be a sound business case that will offer a reasonable return on investments.

The governments have opted to use the Community Based Networks (CBN) as the delivery mechanisms for the programmes. Unfortunately they do not provide direct financial support, so called 'core funding', to cover basic operating expenses. They do allow the CBNs to bill for selected costs as detailed on a specific project basis. For the most part, CBNs depend on fee-for-service charges, donations and membership fees to cover their basic costs. Since January 2008, the ADnet staff has volunteered their service for a small monthly honorarium to cover basic office costs.

Occasionally, a government will come up with a targeted programme. One such programme is SIRA. This Federal programme is designed to provide satellite based broadband connectivity to remote rural businesses. For reasons of economy of scale, - (see reference to core funding above) – ADnet works with NEOnet to provide the service in the Algoma District. More details are available at <http://www.neonet.on.ca/projects/sira.php?menu=a&sub=af>. In return, ADnet manages the provincial library connectivity programme for the NEOnet area.

Bell Fibre Link SSM to Sudbury

In response to a number of 911 outages, Bell Aliant upgraded the connectivity between SSM and Sudbury by creating a second fibre route running SSM–Wawa–Chapleau–Sudbury to supplement the SSM–Thessalon–Spanish–Espanola–Sudbury fibre route. This upgrade was completed in May 2008 and announced with great flourish by Bell at that time.

As I understand the project, it included a spur off the main SSM – Sudbury cable up Hwy 108 to Elliot Lake. This work likely account for the reason that DSL service is will be available in the Serpent River area. Since they had to reconfigure the cable anyway, they probably added a DSLAM capability.

While this addresses 911 continuity for SSM, it still leaves the East Algoma region vulnerable as all rerouting of 911 calls takes place at the SSM or Sudbury switching centres. A cut somewhere between Thessalon and Espanola has the potential to isolate the communities. At an East Algoma Chiefs, Mayors, and Reeves Council meeting in April 2008, Bell Aliant presented a solution to this problem at an estimated cost of \$8M. NetCentral and ADnet amended the existing RFP to ensure it made the Bell Aliant 911 proposal eligible for inclusion in any response.

We were able to do this because the 911 necessitated the installation of numerous additions to the three existing drop/insert points on the fibre optic cable at Thessalon, Spanish, and Espanola. More drop/insert points offer more opportunity for the deployment of DSL. The proposed upgrade would also provide the additional capacity on the fibre optic cable needed to carry the increased traffic load. This would be done by the use of electronic equipment that takes advantage of the characteristics of different colour light to carry signals. This effectively increases the carrying capacity of the cable exponentially without the need to install additional fibre strands.

Unfortunately, none of the responses took advantage of the opportunity to address either the backbone expansion or the increased broadband coverage.