Mark H. Goldberg
& Associates Inc.

www.mhgoldberg.com

Alternative Suppliers of Digital Network Access Facilities

A report for Bell Canada
February, 2004

Abstract

High speed telecommunications services are increasingly provided using new deployments of fibre optic based access facilities. For these optical access technologies and related services, traditional telecom carriers have no incumbent network advantage.

Fibre optic facilities in the access network can be characterized as a "green field" environment for incumbent telephone companies and new entrants alike. Both classes of carriers must build new facilities, with similar challenges, similar risks and similar opportunities for success. In most major centres, and many smaller communities, alternative suppliers of fibre optic transmission facilities have emerged. Beyond the incumbent telephone companies, there are a number of companies that are leveraging existing businesses, and existing rights-of-way derived from these businesses, in order to compete in the provision of fibre optic-based broadband telecommunications services.

Electric utilities and cable companies have been particularly active in the exploitation of their outside plant resources and their available rights-of-way in order to cost-effectively enter the broadband communications marketplace. As a result, in Bell Canada territory, a vibrant competitive market for high speed digital network access facilities can be observed.

In this report, we identify the major sources of competitive supply of fibre optic based digital network access facilities and conclude that alternative suppliers for these facilities exist and are firmly entrenched in many geographic areas.

Table of Contents

Introduction

High speed telecommunications services are increasingly provided using fibre optic based access facilities. For such optical access services, traditional telecom carriers have no incumbent network advantage. The placement of fibre optic facilities in the access network creates a new "green field" opportunity for incumbents and new entrants alike. Both classes of carriers must build new facilities, with similar challenges, similar risks and similar opportunities for success.

In most major centres, and many smaller communities, alternative suppliers of fibre optic transmission facilities have emerged. As a result, in Bell Canada territory, a vibrant competitive market for high speed access can be observed.

In this report, we identify the major sources of competitive supply of optical digital network access services and conclude that alternative suppliers for these services are established, well funded, have ready access to available rights-of-way and are now firmly entrenched in many geographic areas.

Defining Digital Network Access

Digital Network Access ("DNA") has been defined as:

> Providing a subscriber with a dedicated digital point to point or multipoint transport capability of DS-0 bandwidth or greater between the subscriber's premises and a telecommunications carrier's central office (CO) or point of presence (POP) in the same

wire centre, for the purposes of transmitting any form of information.[1]

DNA also includes inter-office, intra-exchange dedicated digital transport. DNA is a dedicated access facility, and is not by itself subject to issues of traffic congestion or access contention. Another form of high speed digital access is based on Ethernet transport protocol. Ethernet access can be distinguished from DNA based on (a) the additional equipment used to provide bandwidth management functionality for DNA facilities; and (b) the speeds at which the access components of DNA are available (e.g., DS-0, DS-1, DS-3, OC-3 and OC-12 speeds) compared to Ethernet access speeds of 10/100/1,000 Mbps. Ethernet access facilities are typically utilized for the provision of Wide Area Network ("WAN") services. Bell Canada is currently forborne from the CRTC's tariff requirement with respect to WAN services, including the Ethernet access component.[2]

DNA, as a category of access facility, has evolved over the years in response to customer network services requirements and capabilities driven by technological evolution. The first data services provided by the telephone companies offered very low bit rates (300 bits per second – "bps" – or less) in both the access and the network. Early high speed digital access services (up to 50,000 bps) became available in Canada on a general tariff basis beginning in 1973 as components of switched and dedicated data services. The first digital access service elements were 56 Kbps accesses for Dataroute, which were first introduced on a general tariff basis in 1980. DS-1 (1.544 Mbps) access facilities were introduced on a

[1] Order CRTC 2000-653, at paragraph 7
[2] Order CRTC 2000-553, as modified by Telecom Decision CRTC 2004-5, for stand alone Ethernet accesses used in conjunction with retail customer Ethernet networks (non-ILEC provided) and competitor Ethernet networks.

general basis in 1985, and DS-3 access (45 Mbps) was introduced on a general tariff basis in 1995.

Currently, DNA access facility elements are used to support a range of network services, including digital private line services, X.25 packet switching, frame relay, Asynchronous Transfer Mode (ATM), Internet Protocol / Multi-Protocol Lable Switching (IP/MPLS), ISDN, and various voice services.

In Telecom Decision CRTC 2002-34, the CRTC established a special class of DNA services used by competitors – CDNA. The CDNA service is described as follows:

> CDNA provides access arrangements to competitors for the digital transmission of information at DS-0, DS-1, DS-3, OC-3 and OC-12 transmission speeds between the competitor's end-customer premises served by a Bell Canada wire centre and either the competitor's switch located in a Bell Canada wire centre area, or a Bell Canada wire centre, in which case it must terminate on the competitor's co-located equipment.[3]

CDNA enables competitive carriers to leverage the incumbent carrier local digital access infrastructure at reduced rates. CDNA is available only to competitors and competitors are not permitted to engage in simple resale as a means to arbitrage DNA rates. CDNA is also restricted such that one end of a CDNA facility must terminate at an end customer premise and the CDNA facility must ultimately terminate on a competitor's switch. [4]

[3] Bell Canada Tariff CRTC 7516 Item 130
[4] Telecom Decision CRTC 2002-34, at paragraph 192, as modified by Telecom Decision CRTC 2002-78

In other words, a competitor could use CDNA from the incumbent carrier to provide the connection from the customer to reach the competitor's network. The core network would belong to the competitor and then egress using CDNA at the terminating end, competitor's own facilities or a third party provider's facilities. CDNA thereby permits competitors to provide a complete range of competitive high speed data services, or digital access to voice services, without the need to replicate access infrastructure.

In addition, there are wireless alternatives for digital access that have become increasingly reliable and cost effective for data networks.

Provisioning DNA Service

It is our experience that DNA service can be provided using different types of physical access facilities. Generally, lower speed DNA services, such as DS-0 and fractional DS-1 rates, are provided using copper facilities. The highest speed DNA services, OC-3 and OC-12 operating at 155Mbps and 622Mbps respectively, are defined as optical rate services and are almost exclusively provided over fibre optic facilities. In certain circumstances, OC-3 access has been provided using wireless radio facilities or using a technology known as free-space optics.

In between, from 1.544 Mbps through 45 Mbps, engineering alternatives exist for a choice between copper and optical facilities. In most cases, new installations will generally call for optical facilities, in order to permit increased flexibility for future upgrades in transmission capacity. When optical facilities are used, such upgrades may simply involve changing interface cards at both the customer side and network side of the circuit or relatively simple software changes to activate or change speeds.

Alternative Suppliers of Fibre Based Local Access

The Municipal Electric Utilities

A History of Telecom Services and Electric Utilities

Virtually every Municipal Electric Utility ("MEU") is involved in some way in the telecom industry. At the very least, support structures, such as poles, towers and conduit are sold provided to telecom carriers on a wholesale level. The next level of involvement is to permit telecom carriers to place fibre over the electric utility ground wire, which quickly evolved into the next stage of evolution: the MEU becoming a condominium fibre builder. As a fibre builder, such as Vaughan Hydro and Markham Hydro, the MEU sells capitalized IRUs – Indefeasible Rights of Use – or leases the dark fibre on a "per meter per month" basis.

The MEUs have moved along the telecommunications value chain to provide lit transport services, fully managed private line services (including the rental and configuration of customer premises transmission equipment), and network based services such as frame relay, ATM and high speed internet service. Once the final stage of telecom maturity arrived, the MEUs quickly began to recognize the business opportunities arising from large corporate users seeking a reliable, facilities-based alternative to the incumbent local exchange carrier.

For example, Hydro One Telecom typically positions its private line services at bit rates of 45Mbps and above, targeting the wholesale carrier market and very large businesses, including those seeking specific alternatives to the incumbent carriers.

> Hydro One Telecom's fibre-optic network is carried above ground on Hydro One's transmission towers providing a diverse alternative

> to incumbent carriers and it is perfectly suited for disaster recovery and redundancy applications. In combination with the security, reliability and high bandwidth available through Private Line Services, Hydro One Telecom has everything required for high-capacity disaster recovery services.[5]

Toronto Hydro Telecom offers private line services below 45Mb, but generally offers services at 10Mb Ethernet and higher:[6] "In addition to dark fibre we offer a range of access products including Private Line Services (DS-1 to OC-48) and Metro LAN (10/100BaseT Ethernet to Gigabit Ethernet)."

Revenue estimates for Hydro One Telecom were about $4.9M in 2002, estimated to grow to $6.3M in 2003. It is our experience that MEUs have generally derived about half of their revenues from wholesale services and half from major accounts.

A number of factors have led electric utilities to enter the telecommunications business. First driven to a significant measure by Sprint Corporation in the United States, long haul fibre optic cabling was placed along electric utility rights of way using a technology known as Fibre Over Ground ("FOG") wire: the placement of fibre optic cables inside the sheath with the ground wire. This aerial technique provided lower cost placement of fibre than buried cable, which required trenching, burying and covering the cabling or conduit. In addition, buried cable was susceptible to cuts from errant construction. On the other hand, while aerial cabling is affected by certain weather conditions, such as ice storms, long haul

[5] Hydro One Telecom (http://www.hydroonetelecom.com/upload_files/506731_private line.pdf)
[6] Toronto Hydro Telecom website (http://www.thtelecom.ca/prd_carrier.htm)

FOG wire was less subject to accidental cuts, because crews tend to avoid major electric installations.[7]

Because of the position of the FOG wire on these electric towers, work on these lines was performed by electric company crews. Around the same time period, in exchange for use of their rights of way, electric companies began to request some of the fibre strands for use in their internal supervisory, control and data acquisition ("SCADA") requirements. Further fibres were laid by the utilities to extend their SCADA capabilities beyond the requirements of the telecom carriers. These facilities exposed the management of the electric companies to the opportunities arising from telecommunications services exploiting resources they already controlled: rights of way, trained crews, equipment, operations support systems and billing systems.

The MEU sector began providing raw, un-lit fibre optic cabling ("dark fibre") on a wholesale basis to CLECs. Most have now added opto-electronics and are providing lit transmission services and fully managed private line services. As demand for such services have emerged from a variety of sectors, the scope of the services from MEUs has increased, as has the geographic reach of their networks. In some cases, these utilities offer broadband services in advance of such services even being available from the incumbent local exchange carrier ("ILEC").

[7] Today, buried cable plant is generally a preferred method of deployment to avoid city clutter, including a proliferation of poles. Buried cable can also be more reliable than overhead cable due to Canada's weather. New methods of deployment of customer access fibre are becoming more common, including surface inlaid fibre installations, where saw cuts and plastic cable guards can replace trenches and conduit.

In the United States, entire electric companies have transformed themselves into telecom carriers, in some cases, abandoning their electric utility roots. The electric companies serving the majority of Ontario's citizens have, in some way, entered the telecom services business. In many cases, the MEU has been the underlying carrier for municipal and community network initiatives, driven into this role because the local phone company did not have fibre optic cabling available for broadband services.

As will be seen, there are affiliates of at least 22 Ontario electric companies providing fibre based access services to customers in at least 40 communities and regions. These range from the largest communities, such as Toronto, Hamilton and Ottawa, to much smaller towns, such as Pembroke, Orono and Uxbridge. The networks are available from Windsor to Kingston, Sudbury to Sault Ste. Marie. In many of these communities, similar optical facilities are not available from the phone company. Other communities, including Niagara Falls, have made public announcements in respect of plans to establish fibre optic telecom affiliates using the resources of the municipal electric utility.

Ontario Electricity Act

Legislation under Ontario's Electricity Act appears to liberalize rights of way and easements to extend easement rights to the MEUs telecom operations:

> 1. If part of a transmission or distribution system is located on land with respect to which the transmitter or distributor has an easement or other right to use the land, the transmitter or distributor may,

> (a) use the land that is subject to the easement or other right for the purpose of providing telecommunications service; or
>
> (b) enter into agreements with other persons, including affiliates of the transmitter or distributor, authorizing them to use the land that is subject to the easement or other right for the purpose of providing telecommunications service.[8]
>
> ...
>
> 4. The transmitter or distributor is not required to pay any compensation for attaching wires or other telecommunications facilities to a transmission or distribution pole pursuant to clause (1) (a).[9]

These sections appear to facilitate the continued growth of MEU telecom networks on existing easements that were originally granted for the provision of electric power. The telecom affiliates of the electric utilities have exploited the ubiquity of their hydro-electric delivery networks and access rights-of-way in order to provide rapid delivery of fibre-based telecom services to retail and wholesale customers. The ability of telecom operations to leverage the ubiquity of electric networks was described by the General Manager of Sault Ste. Marie's PUC Telecom as: "Our service can reach into areas that others don't, because the power network is the most pervasive on the planet. It's where the phones aren't and the cable isn't."[10]

[8] Electricity Act - 1998, c. 15, Sched. A, s. 42 (1).
[9] Ibid. c. 15, Sched. A, s. 42 (4).
[10] February 5, 2004, Toronto Star, Page B1: *Sault Ste. Marie makes high-speed power play*

Such ubiquity of access creates the opportunity for the MEUs to become formidable, responsive competitors for consumer services through wholesale dark fibre. In respect of its Dark Fibre service, Toronto Hydro Telecom promotes "Fast Provisioning: We have one of the shortest provisioning cycles in the industry. This helps to minimize your set-up time and maximize the return on your investment."[11]

Ontario MEUs

The MEUs have aggressive growth plans in extending the reach of their networks. Telecom Ottawa announced it was increasing its fibre reach from 300 km to 500 km in the first half of 2003.[12] This capital build program was announced in conjunction with a strategic partnership between Telecom Ottawa and the Ottawa-Carleton Catholic School Board, which "leverages Telecom Ottawa's all-optical, 10 Gigabit Ethernet network - the largest such metropolitan-wide network in North America."[13] Telecom Ottawa describes its network ubiquity:

> Telecom Ottawa's 600-kilometre, all-optical network continues to rapidly expand and connect areas of the Ottawa region where affordable broadband bandwidth was previously unavailable.[14]

In Windsor, MaXess Networks operates as the telecommunications division of EnWin Utilities. According to its coverage maps, MaXess provides service in

[11] http://www.thtelecom.ca/prd_dark_fibre.htm
[12] April 28, 2003 Press Release: http://www.telecomottawa.com/english/media/pr_7.htm
[13] ibid.
[14] December 17, 2003 Press Release: http://www.telecomottawa.com/english/media/pr_13.htm

Windsor, Sarnia, Chatham, Leamington, Wallaceburg and a number of other communities in the area.[15]

The MEU companies tend to operate in cooperation with each other and in many cases, in cooperation with major interexchange carriers to extend their network reach. For example, Fibretech Communications is privately held by the electric utilities of Kitchener, Waterloo and Cambridge.[16]

Another cooperative model is found in the FibreWired group, which speaks of itself as an expanding collective of like-minded utilities.

> The FibreWired Network is an association of community-owned utilities in Ontario that provide high-speed telecommunications services to their home communities. Our ultra high-speed fibre optic network is one of the most extensive in Ontario. We're rapidly expanding. We're continually building our fibre optic infrastructure within each of our communities. And we're adding new communities to our Network to provide province-wide coverage.[17]

The FibreWired Network includes the electric utilities in: Brantford, Burlington, Guelph, Halton Hills, Hamilton, Kingston, Milton, Oakville and Ottawa River.

The FibreWired consortium focuses on those customers in communities that may be underserved or completely unserved by incumbent telecommunication service providers. "This group of eight [now nine] electric-utility-owned communication service companies are today delivering high-bandwidth services to regions and

[15] http://www.maxessnetworx.com/index2.htm and http://www.maxessnetworx.com/map.jpg
[16] http://www.fibretech.net/fibre/financial.htm
[17] http://www.fibrewired.com/network/fwabout.shtml

customer who might otherwise not have access to such."[18] In respect of the ubiquity of its network reach:

> Our ultra high-speed fibre optic network is one of the most extensive in Ontario. We're rapidly expanding. We're continually building our fibre optic infrastructure within each of our communities. And we're adding new communities to our Network to provide province-wide coverage.[19]

On its website, FibreWired indicates that it has a relationship with Allstream in order to provide further geographic reach to its access networks. The site states that "AT&T Canada [sic], a national facilities-based carrier, gives our network a global reach. It offers clients a variety of products for voice, data and message communications as well as the most advanced technology in the world, including next-generation Asynchronous Transfer Mode (ATM) switching technology."[20]

In the case of GSTi, the telecom arm of Sudbury Hydro, the company recognizes the significant investment provided by Allstream (formerly AT&T Canada). "AT&T Canada [sic], a national facilities-based carrier, has invested significantly in establishing Greater Sudbury's advanced technology platform. AT&T Canada provides the network with a link to its global telecommunications network."[21]

The cultivation of MEUs as fibre optic access services suppliers was a long standing operational plan of AT&T Canada. In 1997, Angus Telemanagement reported: "The Sudbury Hydro-Electric Commission, in partnership with AT&T Canada Long Distance Services, has opened the first leg of a 50 km local

[18] Network World, November 29, 2002: "Hydro spinoffs could succeed where CLECs stumbled" http://www.fibrewired.com/news/161202.shtml
[19] http://www.fibrewired.com/network/fwabout.shtml
[20] http://www.fibrewired.com/faq/2084.html
[21] http://www.sudburywired.com/about/Our_Partners.asp

broadband telecom network. AT&T reports it has made similar deals in Windsor, Ontario, and Lethbridge, Alberta."[22]

Further, as evidenced by its involvement in the Simcoe County network, Hydro One Telecom also provides extended area services to many of the local MEUs. Hydro One Telecom operates more than 3000 kilometres of fibre optic cable and it acknowledges that it pursues relationships with local utility networks. Hydro One Telecom indicates that CLECs are among its wholesale customers. In its company overview,[23] Hydro One Telecom has described its range of services in its customer value chain: Rights of Way, Dark Fibre, Lit Fibre, Wholesale Carriers Provider, Managed Services. The company has focused on lit fibre services at bit rates of 155 Mbps and above. Hydro One Telecom describes its network performance, network reliability and pricing flexibility in the promotion of its services:[24]

> When you're looking for a private line provider, you want to be assured that the service you select is totally secure and totally reliable, and that you have the options and pricing flexibility your organization requires.

Cable Companies

There are no MEUs in Quebec. On the other hand, alternative optical telecom service providers and facilities based carriers have emerged thanks to policies friendly to the development of such networks at the municipal level. For example, Montreal established a program of city owned conduit to simplify the construction of new networks.

[22] Telecom Update #101: September 29, 1997.
[23] http://www.hydroonetelecom.com/downloads/overview.pdf
[24] http://www.hydroonetelecom.com/upload_files/506731_private line.pdf

In addition, Quebec is home to Videotron Telecom ("VTL"), one of the most advanced telecom network providers among cable television affiliate companies. VTL offers advanced telecom services, both private line and switched, using a 100% fibre optic based network.

> Using SONET, ATM and IP technologies, our Network Solutions offer end-to-end digital transmission services that connect to local area networks, video equipment and multiple interface telephone switches.
>
> We also offer a number of frame configuration options. Whether SONET, ATM or Ethernet technologies, your business can rely on a choice of 100% fibre-optic network access solutions and high quality and capacity point-to-point or multipoint links.[25]

Since 1989, VTL has built its own network in the regions of Montreal, Québec City, Ottawa-Hull, Saguenay Lac St-Jean, and eastern Quebec regions. It was the first CLEC in Canada to be issued a test number for local telephone number portability (1997). By 2001, VTL had placed 8600 km of fibre around the province of Quebec and it claims to have a service region covering 90% of the Quebec business market. In 2002, VTL acquired many of the assets of Stream Intelligent Networks, providing it with a significant presence in the environs of Toronto.[26] Stream had rights of way access agreements with a number of municipalities including Toronto, Markham, Mississauga, Oakville, Burlington and Hamilton; a fibre optic network in major buildings in the commercial core of Toronto, including the PATH route linking the underground malls; and, points of presence in about 100 major buildings in Toronto. As of December 2002, VTL claimed to have more than 10,000 km of fibre optic cabling accessible to 80% of

[25] Videotron Telecom Website: http://www.vtl.ca/en/solution.asp
[26] http://www.vtl.ca/en/a_propos.asp

the businesses in the two provinces of Ontario and Quebec.[27] In an update issued following its December 2003 announcement of the acquisition of Carlyle Group's stake in VTL, Quebecor stated:

> Its network has over 8,400 km/cable in Quebec and 2,000 km/cable in Ontario and reaches more than 80% of businesses located in the metropolitan areas of Quebec and most of the business located in the major metropolitan areas of Ontario.[28]

While such telecom affiliates had existed in the major cable companies based in Ontario (with Rogers and Shaw), these assets were sold to CLECs. The fibre optic networks from these cable companies can now be found embedded in the networks of Allstream and 360 Networks / GT Group Telecom. A further discussion of the alternative supply of fibre based services can be found in the following section.

[27] VTL press release dated December 17, 2002: *Videotron Telecom Continues Push into Ontario Company Buys Fiber-Optic Routes from 360networks*
[28] Quebecor press release dated December 22, 2003: *Quebecor Inc. and Quebecor Media Inc. Announce the Purchase of the Prefered Shares Held by Carlyle in Videotron Telecom*

Details of the Alternative Fibre Provider Market

In producing this listing of alternative providers of fibre based telecom services in Ontario, we have sought to use public and readily available information.

CRTC Lists

The Canadian Radio-television and Telecommunications Commission ("CRTC") maintains lists and registrations of certain classes of telecommunications services providers.

Class A BITS Licensees

The following is a list of MEUs that hold Class A Basic International Telecommunications Services ("BITS") licenses:

- Enersource Telecom Inc. (Hydro Mississauga)
- Hydro One Telecom Inc. (Hydro One)

We note that MEUs that provide private line services do not need BITS licenses unless they carry traffic to the border

Non-dominant Carrier List

The CRTC also maintains a list of non-dominant carriers. The December 18, 2003 listing includes the following MEU based carriers:[29]

- 1425445 Ontario Ltd. (Utilities Kingston)
- Brantford Hydro Inc.

[29] http://www.crtc.gc.ca/eng/public/Iplists/Non-Dom.htm

- Cobourg Networks Inc. (Lakefront Utility Services Inc.)
- Enersource Telecom Inc. (Hydro Mississauga)
- Fibretech Telecommunications Inc. (Cambridge, Kitchener and Waterloo)
- Fibrewired Burlington Hydro Communications (Burlington Hydro)
- Fibrewired by Guelph Hydro Inc. (Guelph Hydro)
- Great Lakes Power Limited (Sault Ste. Marie)
- Greater Sudbury Telecommunications Inc. (GTSi) (Sudbury Hydro)
- Halton Hills Fibre Optics Inc. (Halton Hills Hydro Electric Inc.)
- Hamilton Hydro Services Inc. (Hamilton Hydro)
- Hydro One Telecom Inc. (Hydro One)
- MaXess Networx (Enwin – Windsor)
- Oakville Hydro Communications Inc. (operating as Blink Communications) (Oakville Hydro)
- Ottawa River Energy Solutions Inc. (Beachburg, Killaloe, Mississippi Mills and Pembroke)
- Peterborough Utilities Inc. (Peterborough)
- Public Sector Network ("PSN") (Brampton, Peel Region)
- PUC Telecom Inc. (Sault Ste. Marie)
- SCBN Telecommunications Inc. (Barrie Hydro, Orillia Power, Innisfil Energy Services, Tay Hydro Electric)
- Telecom Ottawa Limited (Hydro Ottawa)
- Toronto Hydro Telecom Inc. (Toronto Hydro)
- Veridian Energy (Belleville, Pickering, Ajax, Port Hope, Uxbridge, Bowmanville, Newcastle, Orono, Beaverton, Cannington and Sunderland)

In addition, there are a number of other facilities based carriers that can be found on the CRTC website. Videotron Telecom is among a number of Quebec cable company affiliates that can be found on the CRTC list of non-dominant carriers. Others in this category include Cogeco, and Transvision Cookshire.

Non-MEU Community Networks

In some cases, companies listed in the CRTC list of non-dominant carriers are not-for-profit community-based networks. For example, Upper Canada Networks ("UCNet") is in this listing. On its website, UCNet states:

> All the national carriers have high-speed fibre-optic networks running right through the heart of Leeds & Grenville. However, we can't get on these networks the way other communities can. Leeds & Grenville has remained a 'digital desert', isolated from the wired world around us. Without connectivity we won't be able to compete in the global marketplace, the economic growth of our communities will stagnate and our children will be forced to move far away to find employment.
>
> The members of UCNet are in the process of building a broadband community network, linking and connecting the community together at an affordable price. We will offer Leeds & Grenville a high speed, high-capacity network where providers can compete on a level playing field, offering a full-range of services at competitive prices to customers.[30]

Included is this category are:

- Upper Canada Networks
- W3 Connex Inc.

There are a number of government led initiatives to dramatically increase the number of similar community networks. SCBN, which appears in CRTC non-dominant carrier list, is the Simcoe County Broadband Network, operated by Barrie Hydro, Orillia Power, Innisfil Energy Services and Tay Hydro Electric. SCBN is the underlying carrier for the Simcoe County Access Network (SCAN), a non-profit consortium that has secured both Federal and Provincial funding to

[30] www.uppercanada.net: "About Us"

accelerate the development of advanced network capabilities in its territories. The Federal Government has programs under the Industry Canada Broadband initiative, as well as previous funding provided under the Telecommunications Access Program and separate programs funded by HRDC, FedNor and other agencies. Provincially, Ontario has programs under its Connect Ontario banner, encouraging the development of community advanced network initiatives, often in cooperation with MEUs.

Quebec school boards have started to register on the non-dominant carrier list, as a result of their participation in the Réseau de l'information scientifique du Québec (RISQ) program. The February 6, 2004 listing shows two new entries from Commission scolaire au Coeur-des-Vallées and Commission scolaire de l'Énergie, joining Commission Scolaire des Samares, which had registered previously.[31]

RISQ is a Montreal-based non-profit corporation, wholly owned by Quebec's universities, that builds and operates high-performance optical networks, for research and education institutions. It has deployed a 5,000 km network in Quebec, providing end-to-end connectivity that links Quebec's research, educational, training and cultural institutions "from Hull to Sept-Iles, from Sherbrooke to Roberval, and from Rouyn to Rimouski."[32] "Its redundant loops cover vast areas of Quebec, linking every university and research institute in the province; numerous college-level institutions, several school boards, and many other institutions are also part of the network."[33]

[31] http://www.crtc.gc.ca/eng/public/Iplists/Non-Dom.htm
[32] http://www.risq.qc.ca/enbref/index.php?LANG=EN#reseau
[33] http://www.risq.qc.ca/reseau/architecture/index.php?LANG=EN

Other companies

The listing of non-dominant carriers includes a number of other optical network based carriers, mainly consisting of a subset of the CLECs operating in Ontario. These carriers include the following:

- Allstream (Formerly AT&T Canada)
- FCI Broadband (Formerly Futureway Communications Inc.)
- GT Group Telecom Services Corp
- Cable VDN Inc.

These carriers have substantial access facilities in their service territories. In the CRTC proceeding associated with Telecom Public Notice CRTC 2002-4, the aggregated evidence published by the CRTC on October 30, 2003 clearly demonstrated that CLECs and certain other carriers had substantial self-supply in the provision of digital network access facilities, predominantly in Bands A and B (and Band C for Bell Canada). Moreover, the CRTC information did not take into consideration self-supply arising from MEUs. As discussed, MEUs represent a significant and rapidly growing source of self-supply of digital network access facilities.

Allstream has "local networks established and under development in 29 of Canada's largest business markets."[34] Allstream's website indicates that it is located in 3348 buildings in Canada and its intra-city fibre optic network spans 4781 kilometres.[35] Its facilities and relationships allow Allstream to offer a full range of global voice and data services to its clients.

[34] http://www.allstream.com/about/network/clec.html
[35] http://www.allstream.com/about/at.html

> Spanning more than 18,800 kilometres, Allstream has an extensive broadband fibre-optic network and the greatest reach of any competitive carrier in Canada, and provides international connections through strategic partnerships and interconnection agreements with other international service providers.[36]

Allstream's access plant includes the assets formerly built by Rogers Network Services, a cable company affiliate that was acquired by Metronet, a CLEC which in turn merged with AT&T Canada, the predecessor company to Allstream.

FCI Broadband (formerly Futureway Communications) promotes itself as "one of the world's most advanced communications networks to serve business and residential customers. In fact, we are Canada's first multi-fibre, multiple service provider with 100% underground technology."[37]

FCI Broadband serves areas that are not in the typical downtown core. The Toronto Star described its business model as:

> Futureway's big niche has been to deliver high-speed fibre-optic links over its own network directly to homes and offices, mainly in new GTA subdivisions. By building and bridging this "last mile," Futureway provides its customers with access to all sorts of broadband Internet, data and video services, in addition to traditional telephone service.
>
> In fall 2000, Futureway had more than 1,000 residential and business customers in Brampton, Vaughan, Markham and Richmond Hill, with plans for expansion into Milton, Oakville and northern Toronto.[38]

[36] http://www.cnw.ca/en/releases/archive/December2003/03/c8811.html
[37] http://www.futureway.ca/business/about.html
[38] Toronto Star, October 21, 2002: Suburbs power 'last mile' firm

According to information available from its website, Group Telecom offers a complete range of services, based on its own optical infrastructure.

> We offer a comprehensive range of services from local and long distance voice products to leading-edge products such as high-speed optical transport, wavelengths, Internet transport, Gigabit Ethernet, and optical virtual private networks (OVPNs). Our optical mesh fiber network, which is one of the largest and most advanced in North America, spans 50,000 route miles and 70 major cities in the US and Canada, and includes 17 metro networks in nine Canadian provinces.[39]

As noted in Telecom Decision CRTC 2002-34, "Group Telecom stated that all of its 62 existing co-location sites were provisioned with its own fibre, as would be the case for most of its planned co-location sites."[40]

Group Telecom's network includes a number of relevant acquisitions, most notably the telecom assets of Hydro London and Shaw Fiberlink, formerly a cable television affiliate.

Câble VDN "working together with its strategic partner, Gaz Métropolitain Plus, have built a fibre-optic metropolitan area network"[41] using the rights-of-way of the Montreal natural gas utility. Operating within the city of Montreal, VDN boasts "the network consists of over 20,000 kilometres of fibre-optic cable." [42]

"VDN is able to link buildings and municipalities within entire industrial and commercial zones around Montreal to create an efficient and transparent

[39] http://www.360.net/About_Us---Executives.asp?ShowBio=1&ID=1
[40] Telecom Decision CRTC 2002-34, at paragraph 188
[41] http://www.vdn.ca/ENG/docu/VDN-feuillet-Total-E.pdf
[42] ibid.

network." It plans to further extend its network into the Greater Montreal Metropolitan Region, "using hundreds of kilometres of fibre optic"[43] cabling.

New Entrant Incentives

New entrants, such as the MEUs, cable companies and community networks enjoy some network benefits which provide certain network cost advantages over the incumbents. The incumbents continue to enjoy solid brand loyalty and a nearly universal market presence in voice services and legacy data products. Still, there are a few network deployment issues that may lower the cost base for a many of the new entrants:

- *Cost of Capital*: Typically, MEUs have a very low cost of capital, thanks to their parent government owned utility;
- *Incremental cost base*: Optical facilities are able to share support structures (conduit, poles, rights of way, building access, etc.) that are associated with the utility affiliate; and,
- *Greenfield Business Case*: New products are able to be deployed without consideration of legacy investment, operations support systems, processes and even consideration of cannibalization of other revenue streams.

These, in no way, provide an overwhelming advantage over the telephone company, but MEUs and cable companies alike are distinct from stand-alone new entrant telecom competitors ("CLECs") in an important manner: they both already have a business relationship with most customers in the community. The MEU is providing electricity; the cable company provides television broadcasts. In the case of the MEU, as local citizens, the customers are also shareholders. The provision of telecommunications services by these companies becomes an extension of the long standing relationship with the potential customer base.

[43] http://www.vdn.ca/ENG/current.html

Conclusion

While this report has focused on the large number of alternative suppliers of digital network access facilities in the province of Ontario, we note that these capabilities are replicated elsewhere in Bell Canada territory, as seen in the case of Videotron Telecom and Câble VDN operating in Quebec.

The existence of non-ILEC fibre networks is not simply a manifestation of large cities. MEUs in smaller centres and rural regions are providing advanced services to their communities. Not only have we shown that large and medium-sized cities have multiple suppliers of fibre networks, but we have also shown that smaller communities have developed their own independent capabilities to provide fibre optic based services. While the reach of electric company fibre optic networks may not yet be pervasive, neither can such a claim be made for incumbent telephone company fibre networks.

Many of the smaller communities identified in this report have developed non-ILEC supply precisely because the ILEC had not yet developed such advanced services. Further, these communities have developed relationships with similar local ventures in other communities and with inter-exchange carriers, such as Hydro One Telecom and Allstream to extend the reach for their clients.

In this way, we have seen that alternative carriers, including MEUs and companies leveraging cable TV, electric utility and natural gas rights-of-way have provided communities with advanced telecom connectivity, rapid provisioning of fibre optic services, completely independently of the ILEC and indeed, frequently in advance of such services being available from the ILEC.

As such, we can conclude that alternative suppliers for these services are established, well funded, have ready access to available rights-of-way and are now firmly entrenched in many geographic areas.

Summary

Because of its inherent flexibility to provide expanded broadband capacity, high speed telecommunications services are increasingly installed using fibre optic based access facilities to connect the customer premises to the service provider's central office. For these optical access services, we have found that traditional telecom carriers have no incumbent network advantage.

Fibre optic facilities in the access network represent a "green field" environment for incumbents and new entrants alike. Both classes of carriers must construct new physical facilities, with similar challenges, risks and opportunities for success. There are a number of companies that are leveraging existing businesses in order to compete in the provision of fibre optic-based broadband telecommunications services. Electric utilities and cable companies have been particularly active in the exploitation of their outside plant resources in order to cost-effectively enter the data communications market. In each case, the incumbents and new entrants have deployed fibre-optic rings, passing nearby to major potential sources of customers. Both groups must still build the final link, connecting the customer to the metropolitan fibre ring.

As a result, in Bell Canada territory, a vibrant competitive market for high speed access can be observed and was demonstrated in the breadth of self-supply in the provision of digital network access facilities, published in the aggregated evidence by the CRTC on October 30, 2003 in the proceeding associated with Telecom Public Notice CRTC 2002-4. We have identified major sources of competitive supply of digital network access services and conclude that alternative suppliers for these services are established, well funded, have ready

access to available rights-of-way and are now firmly entrenched in many geographic areas.

Credentials

Mark H. Goldberg & Associates Inc. is a telecommunications industry consulting practice that specializes in assisting its clients to understand the implications of changes in competitive markets. Drawing on 24 years of global industry experience, for more than 7 years, the firm has assisted clients in Canada and around the world in all sectors of the industry: new entrants and incumbents, end users, manufacturers and software suppliers, government regulators and industry associations.

Mark Goldberg is the president of Mark H. Goldberg & Associates Inc. He has been involved in the planning, engineering, operation and management of national and global telecommunications networks, for both incumbents and new entrants. In the course of his corporate career, he served as Vice President Network Services for Sprint Canada, where he was responsible for the planning, engineering, administration and operations of its national network. He held similar responsibilities for TelRoute Communications Inc. As such, he has direct experience in the construction and operation of advanced, competitive telecommunications networks in Canada.

Prior to these positions, he created the discipline of Regulatory Technology at Unitel Communications (a predecessor to Allstream). In this role, he was responsible for the development of telecommunications network interconnection architectures for the introduction of telecommunications competition in Canada. He has testified on competitive network architectures before the CRTC in proceedings that led to its landmark decisions related to long distance and local competition. He also prepared cross-examination and participated in CRTC reviews of capital spending programs by the incumbent carriers.

His background includes serving as Western Regional Manager, based in Denver, Colorado, for Bell Northern Research (BNR), the research and development arm of Nortel Networks, acting as a liaison with the research activities for US West (now Qwest). Prior to this, He was with AT&T Bell Laboratories, based in Holmdel, New Jersey, responsible for AT&T's voice services proposal for the United States federal government communications system, known as FTS-2000.

His telecommunications career began with Bell Canada's regional network administration and engineering organizations, based in South-Western Ontario.

Mr. Goldberg has lectured at the University of Western Ontario and he is currently a member of the Advisory Board for the Masters of Engineering in Telecommunications at the University of Toronto. He is the co-founder of GST Conferences, a telecommunications industry training and conference company and the producer of the annual Canadian Telecom Summit held in June of each year.

His views are often quoted in the *National Post* and *Globe and Mail* and he is a frequent commentator on telecommunications industry issues for Report on Business Television.