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Alternative Suppliers of Digital Network Access Facilities

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Abstract

High speed telecommunications services are increasingly provided using new deployments of fibre optic based access facilities. For these new optical access technologies and related services, we believe that 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.

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1 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 "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, offering customers competitive choice beyond the traditional incumbent telephone company.

We will identify the major sources of competitive supply of optical digital network access services and conclude that, in Bell Canada territory, a vibrant competitive market for high speed digital network access can be observed. 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.

1.1 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 typical 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.

DNA 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 ('2002-34'), the CRTC established a special class of DNA services used by competitors – CDNA. 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.

In Telecom Decision 2005-6, Competitor Digital Network Services ('2005-6'), the CRTC broadened the applications for such services, while continuing to prohibit simple resale and extending the applicable uses of the CDNA service. Competitor Digital Network (CDN) services provide various arrangements for the digital transmission of information at DS-0, DS-1, DS-3, OC-3 and OC-12 transmission speeds.[3] Under the tariff, Bell Canada has defined Competitor Digital Network Access Services, as: "'Access service' provides the Competitor with a digital access facility and link from an end-customer premise, or Competitor POP to the Bell Canada Serving Wire Centre."[4]

[3] Bell Canada Tariff CRTC 7516 Item 130.1 General
[4] Bell Canada Tariff CRTC 7516 Item 130.2 Definitions

However, we note that in 2005-6, the CRTC determined that only the lower speed services (DS-0 and DS-1) qualified as essential or near-essential facilities. Higher speed services (such as DS-3, OC-3 and OC-12) 'are not in sufficiently limited competitive supply to justify their classification as Category I services.'[5] As such, different rules are applied in the development of pricing of CDNA rates for these higher speed services.

In part because of the recognition of the increased level of competitive supply of high speed access services, and in part to ensure that incentives remain for competitors to continue to build their own facilities, the CRTC noted that:

> Competitors typically provision DS-3 customer accesses on fibre, and provision OC-level bandwidth customer accesses exclusively on fibre. The Commission also notes its view that third-party fibre-based suppliers have the potential to supply these services to competitors in greater quantities.'[6]
>
> … In this connection, the Commission also considers that the incentives to construct these facilities would be unduly diminished if DS-3, OC-3 and OC-12 accesses and intra-exchange services were classified as Category I services.[7]

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, a 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. Beyond the competitive availability of

[5] Telecom Decision CRTC 2005-6, Competitor Digital Network Services, at paragraph 209
[6] Telecom Decision CRTC 2005-6, Competitor Digital Network Services, at paragraph 208
[7] Telecom Decision CRTC 2005-6, Competitor Digital Network Services, at paragraph 209

alternate providers' fibre-based access services, CDNA permits competitors to use ILEC facilities as their own substitute for fibre, while ensuring that incentives remain in place both for ILECs to deploy fibre and competitors to construct their own facilities. CDNA provides a means for competitors to build a sufficient customer base to justify facilities self-supply.[8]

1.2 Provisioning DNA Service

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 and in some cases, 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. In 2005-6, the CRTC also observed similar characteristics for the provisioning of DNA services.[9]

When optical facilities are used, such capacity upgrades may simply involve changing interface cards at both the customer side and network side of the

[8] See, for example, Telecom Decision CRTC 2005-6, Competitor Digital Network Services, at paragraph 268
[9] See, for example, Telecom Decision CRTC 2005-6, Competitor Digital Network Services, at paragraphs 197 and 208

circuit or relatively simple software changes to activate or change speeds. Capital costs for optical electronics are in the order of $4-5000 per OC-3.

In addition, we note that there are wireless alternatives for digital access that have become increasingly reliable and cost effective for data networks. A number of firms (such as MiPPs and TeraGo Networks) have used point-to-point and point-to-multipoint radio systems in order to provision high speed access services in competition with ILEC supplied fibre.

1.2.1 Network Costs for DNA

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. Beyond the incumbent telephone companies, a number of companies are able to leverage their existing cable TV or electricity businesses, and the associated rights-of-way and facility support structures (e.g. poles and conduits) derived from these businesses, in order to compete with ILECs in the provision of fibre optic-based broadband telecommunications services.

Where structures exist, fibre can be extended in a metro environment for about $10-15 per metre, with lower costs associated with aerial placement and the higher end of the range associated with buried cable. Such projects are usually undertaken and delivered in about one month, assuming structures exist. If new support structures are required, costs are $150-200 per metre. In such cases, delivery timetables are dependent on the nature of the project.

2 Alternate Suppliers of Fibre Based Local Access

In Ontario and Quebec, there are four categories of alternate suppliers of fibre based local access: CLECs, cable companies, community networks and Municipal Electric Utilities (MEUs). In this section, we will discuss the CLECs (Section 2.1), cable companies (Section 2.2) and the MEUs (Section 2.3). These carriers have substantial access facilities in their service territories.

2.1 CLECs

A review of a CRTC listing of non-dominant carriers (refer to "Details of the Alternative Fibre Provider Market", beginning on page 23) reveals a number of optical network based carriers, mainly consisting of a subset of the CLECs operating in Ontario. These carriers include the following:

- MTS Allstream ('Allstream', Formerly AT&T Canada)
- TELUS
- FCI Broadband (Formerly Futureway Communications Inc.)

2.1.1 Allstream

Allstream has "local networks established and under development in 29 of Canada's largest business markets."[10] When it last reported such information, Allstream's website indicated that it was located in 3348 buildings in Canada and its intra-city fibre optic network spans 4839 kilometres.[11] Its facilities and relationships allow Allstream to offer a full range of global voice and data services to its clients.

[10] http://www.allstream.com/about/network/clec.html
[11] 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.[12]

Allstream's access facilities include 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, which is now the national service operations of MTS.

The cultivation of MEUs as fibre optic access services suppliers was a long standing operational plan of AT&T Canada, now MTS Allstream. 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 broadband telecom network. AT&T reports it has made similar deals in Windsor, Ontario, and Lethbridge, Alberta."[13] A description of the evolution of these early arrangements may be found below in the description of MaXess Networks (Windsor) and Agilis Networks (Sudbury).

2.1.2 TELUS

TELUS is Canada's second largest provider of telecommunications services, largely based on its ILEC operations in British Columbia and Alberta. In Ontario and Quebec, TELUS is a CLEC and operates as a non-dominant carrier, although in parts of Quebec, TELUS Quebec (formerly QuebecTel) operates as the ILEC. While its initial entry strategy was to build its own local access facilities, TELUS is now leveraging readily available facilities from alternate suppliers and the

[12] http://www.cnw.ca/en/releases/archive/December2003/03/c8811.html
[13] Telecom Update #101: September 29, 1997.

availability of CDNA in order to extend its network reach. TELUS has on-net or near on-net access to 80% of businesses in Québec and 60% of businesses in Ontario.[14]

2.1.3 FCI Broadband

FCI Broadband (formerly Futureway Communications) promotes itself as the first to bring fibre-optics to new residential homes in Canada."[15]

FCI Broadband primarily serves suburban areas of the Greater Toronto Area. 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.[16]

[14] Canadian Data Communications Services Market Report, 2005 Edition, NBI/Michael Sone Associates Inc., at page 99
[15] http://www.fcibroadband.com/pdf/productsheets/Resi_General_Information_updated_June_3.03.pdf
[16] Toronto Star, October 21, 2002: Suburbs power 'last mile' firm

2.2 Cable Companies

2.2.1 Videotron

Quebec is home to Videotron Telecom ("VTL"), one of the most advanced telecom network providers among cable television affiliate companies. VTL offers advanced business telecom services, both private line and switched, using a 100% fibre optic based network. Analysts have estimated that in 90% of the installations, VTL deploys its own fibre facilities to the customer premises.

> 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.[17]

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.[18]

As a result, VTL has 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

[17] http://www.vtl.ca/en/solution.asp
[18] http://www.vtl.ca/en/a_propos.asp

Toronto, including the PATH route linking the underground malls; and, points of presence in about 150 major buildings in Toronto.

By 2002, VTL's network was already accessible to 80% of the businesses in the two provinces of Ontario and Quebec.[19] As of December 2004, VTL had more than 12,000 km of fibre optic cabling.

2.2.2 Rogers Telecom

Historically, while cable telecom affiliates had existed in the major cable companies based in Ontario (Rogers and Shaw), these assets were sold to such CLECs as Metronet and GT Group Telecom. As a result of merger activity, the original fibre optic networks from these cable companies evolved to be found embedded in the networks of Allstream (Rogers/Metronet) and Call-Net (Shaw/GT Group Telecom).

With its acquisition of Call-Net, the Rogers brand has once again become a significant force in the supply of alternate fibre-optic facilities. Rogers Network Services had been a significant competitive access provider, until it was sold to Metronet (now a part of MTS Allstream). With Sprint Canada's facilities, Rogers Telecom is the largest CLEC in Eastern Canada. It has 151 co-location points in 33 municipalities and will add more than 1000 buildings and 225,000 fibre kilometers on its network through its acquisition of former GT Group Telecom facilities.[20]

[19] Industry analysis reports and VTL press release dated December 17, 2002: Videotron Telecom Continues Push into Ontario: Company Buys Fiber-Optic Routes from 360networks
[20] May 2, 2005 news release: http://micro.newswire.ca/release.cgi?rkey=1305023480&view=1

2.3 The Municipal Electric Utilities

In Ontario, Municipal Electric Utilities (MEUs) are substantial alternate suppliers of fibre-optic cable and services for telecommunications service providers. There are no MEU based telecom providers in Quebec; however, 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 under the auspices of the Commission des services électriques de Montréal (CSEM) that makes available city-owned conduit, thereby simplifying the construction of new networks.[21]

2.3.1 A History of Telecom Services Provided by Electric Utilities

Virtually every MEU is involved in some way in the telecom industry. At the very least, support structures, such as poles, towers and conduit are 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 fibre builders some MEUs, such as PowerStream Inc. (owned by the City of Vaughan and the Town of Markham), sell capitalized IRUs – Indefeasible Rights of Use – or lease 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

[21] Refer, for example, to http://www.csem.qc.ca/Files/CadreStrategique2005.pdf for a description of the history of CSEM and its predecessor organization CSEVM, operating since 1910.

business opportunities arising from large corporate users seeking reliable, facilities-based alternatives to the incumbent local exchange carriers.

For example, Hydro One Telecom typically positions its private line services at bit rates of 45Mbps and above, focusing on lit fibre services at bit rates of 155 Mbps and above. Hydro One Telecom targets 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.[22]

Further, as evidenced by its involvement in Brampton and 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 4000 kilometres of fibre optic cable and it acknowledges that it pursues relationships with local utility networks, providing it with extensive end-to-end reach for clients. Hydro One Telecom offers a full range of fibre-based services: Rights of Way, Dark Fibre, Lit Fibre, Wholesale Carriers Provider, Managed Services. Hydro One Telecom describes its network performance, network reliability and pricing flexibility in the promotion of its services:

[22] Hydro One Telecom (http://www.hydroonetelecom.com/upload_files/506731_private line.pdf)

> 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.[23]

Toronto Hydro Telecom offers private line services below 45Mb, but generally offers services at 10Mb Ethernet and higher:

> To extend your network infrastructure, Toronto Hydro Telecom offers fibre-optic strand pairs for lease. Our Private Line services can provide dedicated data transport at service speeds ranging from DS-3 to OC-48 and beyond. Ethernet Transparent LAN offers point-to-point, point-to-multi-point or single-point-to-carrier service. For network-to-network interconnection, you can choose interfaces from one or more of Ethernet (10 Mbps), Fast Ethernet (100 Mbps) and Gigabit Ethernet (1 Gbps).[24]

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

[23] http://www.hydroonetelecom.com/upload_files/506731_private line.pdf
[24] Toronto Hydro Telecom website (http://www.thtelecom.ca/carrier_services.html)

FOG wire was less subject to accidental cuts, because crews tend to avoid major electric installations.[25]

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 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 in a community from the incumbent local exchange carrier ("ILEC").

[25] 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 29 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 the Niagara Regional Broadband Network, are completing construction of initial fibre optic facilities using the resources of the municipal electric utilities throughout the region.

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 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."[26]

Such ubiquity of access creates the opportunity for the MEUs to become formidable, responsive competitors for fibre-based access services, including wholesale services. For example, Toronto Hydro Telecom promotes rapid provisioning, network diversity and 99.9999% availability in its description of the benefits of its service: "Toronto Hydro Telecom's extensive network footprint throughout the city of Toronto puts unlimited high-speed network capacity close at hand."[27]

2.3.2 Ontario MEUs

The MEUs have aggressive growth plans in extending the reach of their networks. For customers with locations outside their own city limits, MEUs partner with electrical utility equivalents in neighbouring or other communities (e.g., Toronto Hydro Telecom and Enersource Telecom in Mississauga, ON) to provide a complete solution. Prior to 2004, cooperation among the MEUs in Ontario was ad hoc, with differing terms depending on the specific situation. In mid-2003, seven MEUs formed a consortium (now 10 members)[28] to develop a basic framework for how services would be exchanged between the companies as well as consistent quality standards, service level agreements and product portfolios. The agreement was finalized in early-2004. The consortium members began the marketing effort in early-2005, with the key messages being one point of contact, a common product set and consistent quality across Ontario. The

[26] February 5, 2004, Toronto Star, Page B1: Sault Ste. Marie makes high-speed power play
[27] http://www.thtelecom.ca/dark_fibre.html
[28] Enersource, Fibretech, Fibrewired Guelph, Fibrewired Hamilton, Fibrewired Kingston, Hydro One Telecom, Maxess, SCBN, Telecom Ottawa, Toronto Hydro Telecom

customer can choose to deal with any of the consortium members and obtain all of its services through that company, regardless of location within the service areas covered by the consortium.

Telecom Ottawa announced it was increasing its fibre reach from 300 km to 500 km in the first half of 2003.[29] 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."[30] In a March 2005 press release, Telecom Ottawa describes the extent of its network ubiquity:

> Telecom Ottawa is a network services provider based in Ottawa with operations throughout Eastern Ontario. The company owns and operates the largest 10 Gigabit metropolitan-wide network in North America, with more than 700 kilometres of fibre optic cable. [31]

Toronto Hydro Telecom Inc. (THTI), is a wholly owned subsidiary of Toronto Hydro Corporation that provides dark fibre and "lit" data services to businesses in Metropolitan Toronto. Although THTI was incorporated in 2000, the initial telecommunications operation was created in 1994 to capitalize on the electrical distribution system's vast network of underground ducts and overhead wires. Since then, the company has provided dark fibre within the city of Toronto, leasing excess capacity or laying additional fibre to fulfill customer needs. This network also provides infrastructure for telecom carriers to connect fibre optic cables throughout Toronto. At year-end 2004, the company's network is reported

[29] April 28, 2003 Press Release: http://www.telecomottawa.com/media/press.htm?id=13
[30] ibid.
[31] March 23, 2005 Press Release: http://www.telecomottawa.com/media/press.htm?id=37

to be comprised of approximately 550 fibre route kms with connections to approximately 450 buildings. According to THTI, the rise of MEU telecom affiliates has been possible thanks to being "well-funded, nimble niche players," having a high quality fibre network in place and dramatic growth momentum.[32]

In Windsor, MaXess Networks operates as the telecommunications division of EnWin Utilities. According to its coverage maps, MaXess provides service in Windsor, Sarnia, Chatham, Leamington, Wallaceburg and a number of other communities in the area, based on a network with 'hundreds of kilometers of fibre optic cable.'[33]

In the case of Agilis Networks (a subsidiary of Sudbury Hydro and operated by Greater Sudbury Telecom Inc.), its network consists of "750km of fibre optic cable running throughout the Sudbury Region as well as a direct connection to Toronto. The density of the network allows us to be within 500 meters reach of 90% of all businesses."[34]

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 Cambridge, Kitchener and Waterloo.[35]

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

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[32] http://www.thtelecom.ca/downloads/pres_cts-conference_061604.ppt - slide 5
[33] http://www.maxessnetworx.com/index2.htm and http://www.maxessnetworx.com/map.png
[34] http://www.agilisnet.com/about1.htm
[35] http://www.fibretech.net/fibre/financial.htm

> 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. [36]

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 electric-utility-owned communication service companies are today delivering high-bandwidth services to regions and customer who might otherwise not have access to such."[37]

In another cooperative model, Hydro One Telecom and Toronto Hydro Telecom joined their sales forces in February 2005, to lower their cost of sales and allow for a single point of contact for customers. The combined organization is offering lit fibre services from 2Mb to Gigabit rates.

A further discussion of the alternative supply of fibre based services can be found in the following section.

[36] http://www.fibrewired.com/network/fwabout.shtml

[37] Network World, November 29, 2002: "Hydro spinoffs could succeed where CLECs stumbled" http://www.fibrewired.com/news/161202.shtml. We note there are now nine members of the Fibrewired group: Brantford, Burlington, Guelph, Halton Hills, Hamilton, Kingston, Milton, Oakville and Ottawa River

3 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. Over the course of various proceedings, the CRTC has gathered information about the availability of self-supply for access facilities. In the CRTC proceeding associated with Telecom Public Notice CRTC 2002-4, the aggregated evidence published by the CRTC on October 30, 2003 demonstrated that such carriers had substantial self-supply in the provision of digital network access facilities, predominantly in Bands A and B (and Band C in Ontario and Quebec). Moreover, the CRTC information did not take into consideration self-supply arising from MEUs. As discussed above, MEUs represent a significant and rapidly growing source of self-supply of digital network access facilities.

3.1 CRTC Lists

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

3.1.1 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)
- Telecom Ottawa Limited (Hydro Ottawa)

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

3.1.2 Non-dominant Carrier List

The CRTC also maintains a list of non-dominant carriers. The listing as of July 11, 2005 includes the following MEU based carriers:[38]

- 1425445 Ontario Ltd. (Utilities Kingston)
- Brantford Hydro Inc.
- Cobourg Networks Inc. (Lakefront Utility Services)
- 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)
- Fibrewired Hamilton (Hamilton Hydro)
- Great Lakes Power Limited (Sault Ste. Marie)
- Greater Sudbury Telecommunications Inc. (GTSi) (Sudbury Hydro)
- Halton Hills Fibre Optics Inc. (Halton Hills Hydro Electric)
- Hydro One Telecom Inc. (Hydro One)
- MaXess Networx (Enwin – Windsor)
- Niagara Regional Broadband Network Limited (Energy Services Niagara, Grimsby Hydro, Port Colborne Fibre, Niagara Falls Hydro)
- 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)

[38] http://support.crtc.gc.ca/tlcmlsts/default.aspx?indx=29

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. Allstream, Rogers, Call-Net (now Rogers Telecom) and FCI Broadband all appear on CRTC lists of non-dominant carriers or CLECs.

3.2 Non-MEU Community Networks

In some cases, companies listed in the CRTC list of non-dominant carriers are not-for-profit community-based networks. Included is this category is W3 Connex Inc., a company building hybrid wireless and fibre based networks in less dense parts of the province of Ontario, including Prince Edward County Network (Belleville area), Blue Sky Network (in the Sudbury – North Bay region) and other areas.

There are a number of government led initiatives to dramatically increase the number of similar community networks. SCBN, which appears on the CRTC's non-dominant carrier list, is the Simcoe County Broadband Network, operated by Barrie Hydro, Orillia Power, Innisfil Energy Services and Tay Hydro Electric. SCBN, an MEU-based carrier, is the underlying facilities provider for the Simcoe County Access Network (SCAN), a non-profit consortium that has secured both Federal and Provincial funding to 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 HRSDC, FedNor and other agencies. Provincially, under its Connect

Ontario banner, Ontario has provided funding to encourage 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. At least 9 Quebec school boards are now represented on the non-dominant carrier list as of July 11, 2005:[39]

- Commission scolaire Pierre-Neveu
- Commission scolaire de la Beauce-Etchemin
- Commission scolaire de la Vallée-des-Tisserands
- Commission scolaire de l'Énergie
- Commission scolaire au Coeur-des-Vallées
- Commission scolaire des Samares
- Commission scolaire des Grandes-Seigneuries
- Commission scolaire des Chênes
- Commission scolaire des Hauts-Cantons

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 6,000 km network in Quebec, 5,000 of which use fibre, 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."[40] "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."[41]

[39] http://support.crtc.gc.ca/tlcmlsts/default.aspx?indx=29

[40] http://www.risq.qc.ca/organisme/vue_ensemble/index.php?LANG=EN#reseau
[41] http://www.risq.qc.ca/reseau/architecture/index.php?LANG=EN

3.3 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 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.
- *Flexible Contracting*: Can justify construction of a build based on flexibility in customer contract terms to secure required revenue flow for cost recovery.

This last item is a significant advantage in providing appropriate incentives to match the risk of new fibre construction. We also note that MEUs and cable companies are unlike stand-alone new entrant telecom competitors ("CLECs") in an important manner: they 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.

4 Conclusion

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 ubiquitous, 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 in cooperation 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, in some cases, in advance of such services being available from the ILEC.

As such, we conclude that alternative suppliers to Bell Canada for digital network access services are already established, well financed, have ready access to available rights-of-way and are now firmly entrenched in many geographic areas in Ontario and Quebec.

5 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 25 years of global industry experience, for 9 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.