

Community Wireless Infrastructure Research Project

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Toronto Hydro Telecom One Zone Case Study Map

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1. Brief Case Study History

Company name: Toronto Hydro Telecom Inc. (THT).

Service name: "OneZone".

Location: 185 The West Mall, Suite 500, Toronto, Ontario, M9C 5L5 Toronto, Canada.

Website: <http://www.thtelecom.ca/>

Core business: data services, fibre-optic network backbone.

When was the Wi-Fi project initiated?

February 8, 2006: THT RFP for equipment vendors was issued. March 7, 2006: Network open for use, planned 6-month free trial period. April 23, 2007: THT OneZone free trial period ended, and paid service began.
(Source: http://www.thtelecom.ca/in_the_news.html)

Ownership

THT is a wholly-owned subsidiary of Toronto Hydro Corporation (THC). THC operates three major wholly owned affiliates that carry on the business of electricity distribution, telecommunications, and street lighting/energy efficiency services. THC's primary business, in terms of assets and revenues, is the electricity distribution business. THC provides electricity to the City of Toronto.
(Source: http://www.torontohydro.com/corporate/about_toronto_hydro/index.cfm)

THC was incorporated in 1999, as the result of a series of provincial laws passed in 1998 that re-regulated the electricity industry. These laws required that publicly owned electricity distribution companies in Ontario, such as the former public Toronto Hydro, be privatized. Cities then had the option of operating these new entities as for-profit corporations, or selling them to organizations that would do so. Toronto chose to retain ownership of THC, and became the new company's sole shareholder. These laws also led to the break-up of the former Toronto Hydro, which had electricity distribution, telecommunications, energy and other operations, into a group of companies, one of which became Toronto Hydro Telecom.

THT is an OBCA corporation, that is, subject to the same legal and operational requirements as all other Ontario corporations. In addition, there are provincial laws that regulate the relationship between THT (an unregulated business) and

THC's energy distribution company (a business in the provincially regulated electricity sector). So, although the two companies are held by the same entity, THC, they act as though they are separate. In other words, each of the two companies acts in its own best interest, rather than for the collective interest of all companies held by THC. Their separation might mean, for example, that THT would not have access to the electricity distribution company's residential customer data.

(Source: Interview With David Dobbin, August 7, 2007, http://podcasts.pulvermedia.com/blog/archives/2007/08/jon_arnold_davi_4.php)

(Source: Speaking Notes for Dave Dobbin President, Toronto Hydro Telecom. Presentation to First Canadian Municipal Wireless Applications Conference & Exhibition. Toronto, Canada. May 29, 2007, www.thtelecom.ca/.../05-29-07_Dave%20Dobbin_Canadian%20Municipal%20Wireless%20Applications%20Conference.pdf)

(Source: Hydro Ottawa Annual Report, 2001, http://www.hydroottawaholding.com/holding/reports/index.cfm?dsp=template&act=view3&template_id=166&lang=e)

Financing

o Toronto Hydro Corporation's subsidiary, Toronto Hydro Energy Services, Inc. (THES) purchased the City of Toronto's street light poles for \$60 million CAN (18,000 streetlights and poles). THT signed an exclusive agreement with THES to use the light poles to mount OneZone network infrastructure. Installation cost was expected to be less than \$10 million CAN.

Source: Mikko Laine, "Toronto Hydro Telecom Set To Make City a Huge Wireless Hotspot", at www.finpro.fi/NR/rdonlyres/750D0BF5-B264-4615-B9D3-9CAE6B1CEFE6/3816/TorontosdowntownaWiFitrendsetter1.doc

o Excerpts from presentation by David Dobbin to the York Technology Association, April 27, 2006.

(i) Estimates the telecom market in the downtown Toronto-core at 13.5% of total Toronto telecom market.

(ii) Total potential WiFi-service market in Toronto sized by THT at 800,000 customers. Estimate for Canadian wireless market is \$8 billion CAN per annum.

(iii) Purchased a 20-year exclusive agreement from THSLI (now THES) to use street light poles.

(iv) Business case expects payback in 1.2 years (IRR not calculable), built on a three-year plan for the Greater Toronto Area.

(v) Pricing: "For the first six months, the service will be available free of charge to anyone in the 'blanketed' zone. After that time, four packages will be available, and rates will be competitive with Bell, Rogers and Telus", see <http://www.thtelecom.ca/zone-qa.html>. As of April 24, 2007, the free service was discontinued, and payment was required. Rates are \$4.99/hour, \$9.99/day, and \$29/month (tax not included). See <http://www.onezone.ca/pricing.html>.

Access

Toronto Hydro Telecom's 'blanketed' service covers six square kilometers. It is available in downtown Toronto in the area bounded by Jarvis Street west to Spadina Avenue, and from Front Street north to Bloor Street. This area includes the financial district, as well as universities, offices, hospitals, and hotels.

(Source: http://www.onezone.ca/coverage_maps.html)

2. Mission Statement and Goals

o Overall: "Toronto Hydro Telecom Inc., a wholly-owned subsidiary of Toronto Hydro Corporation, provides data services in Toronto to more than 400 commercial addresses through its 450-kilometre fibre-optic network. The company offers a broad range of data communications solutions including Ethernet, Private Line, Voice over Internet Protocol (VoIP) and Internet Access. Toronto Hydro Telecom possess a wholly owned fibre optic network that is completely diverse from those of other carriers. Through a consolidated sales group with other Utility Telecoms, business and institutional customers can enjoy seamless access across the province and into Quebec and the United States."

(Source: http://www.thtelecom.ca/about_us.html)

o Service aims: Toronto Hydro Telecom's solution to the dead zones that are currently found in downtown Toronto is to install radio access points on existing street lighting poles in order to ensure consistent connectivity. Currently, radio transmitters are located arbitrarily in coffee shops, fast food outlets, train stations or hotels, depending on the service provider. Toronto Hydro Telecom's solution will offer seamless, unfettered access to the Internet from any location with the ubiquitous Wi Fi zone. (Source: <http://www.onezone.ca/faq.html>)

o Other aims: THT views OneZone as a way to "raise brand awareness". It is unclear why THT aims to do so, or what it considers its brand to be.

(Source: Toronto Hydro Corporation Annual Report, 2006, http://www.torontohydro.com/corporate/investor_relations/financial_reports/index.cfm)

3. Network Type

o Private consortium/company (city-owned for-profit corporation)

• Rationale for choosing model:

Toronto Hydro Telecom aims to achieve a sustainable, pay-for-service model. Their view is that metro broadband networks should not be, in fact, cannot be, free nor do they think they should be funded through taxes. This is likely related to the fact that THT is legally structured as a corporation:

"Our view is that if a private company invests capital to build a network...spends money to develop a back-office infrastructure...implements password authentication tools to keep predators and other unsavory characters off its network...spends time to promote, advertise and educate consumers ...continues to invest to ensure quality service levels...and lastly, works to create a supportive regulatory environment for the benefit of the entire industry – well then, that organization should be able to recoup its investment. We can't recoup our investment through taxes or rates because Toronto Hydro Telecom is not a branch of the City of Toronto ... nor are we part of the city's I.T. department and we certainly are not part of a public private partnership".

(Source: Speaking notes for Sharyn Gravelle, Vice-president, Wireless, Toronto Hydro Telecom Wireless Cities Summit Toronto, January 24, 2007.
http://www.thtelecom.ca/downloads/01-24-07_Sharyn%20Gravelle%20Speech_Wireless%20Cities%20Summit.pdf)

- funder(s)/sponsor(s)
 - o Self-funded: Toronto Hydro Telecom.

4. Organization

- skills/capacities:

Experience in managing, deploying and operating a telecommunications infrastructure evidenced by their successful wholesale fibre optic business in Toronto. "...our staff has excellent technical skills combined with a strong service orientation and solid track record of achieving progressive results."
(Source: http://www.thtelecom.ca/our_experts.html)

- nature and management structure of the organization:

- staffing

- o Approximately 50 employees

- governance (e.g. oversight body, committees, policies, participants)

- o Wholly-owned subsidiary of Toronto Hydro Corporation (THC); both THC and THT are governed by a board of directors appointed by the City of Toronto.

(Source:

http://www.torontohydro.com/corporate/investor_relations/governance/index.cfm)

(Source: City Appoints Toronto Hydro Board of Directors. City of Toronto, 1999, <http://wx.toronto.ca/inter/it/newsrel.nsf/9da959222128b9e885256618006646d3/7d4aec4b15350c8085256df600464789?OpenDocument>)

- Partnerships

- o Siemens Canada selected as THT's vendor of record for equipment supply, implementation and services for the OneZone project. Siemens will use BelAir Networks wireless mesh technology.

(Source: Toronto Hydro Telecom Selects Siemens for Deployment of Canada's Largest Wi-Fi Zone. May 8, 2006,

http://www.onezone.ca/pdf/TH_Telecom_Selects_Siemens.pdf)

- who are the champions? who are the people who made this network/service work?

"Dave Dobbin, President, Toronto Hydro Telecom Inc. Dobbin is responsible for leading the market growth and development of Toronto Hydro Telecom Inc., with operational responsibilities for business strategy, sales and marketing, network operations, services creation and customer care. Prior to joining Toronto Hydro Telecom, Dave was the Chief Operating Officer of Telecom Ottawa where he created a successful telecommunications subsidiary for Hydro Ottawa Holdings Inc." (Source: http://www.thtelecom.ca/our_experts.html)

David Miller, Mayor Toronto. "This [launch of One Zone] is a watershed moment that will put Toronto on the leading edge of the telecommunications industry

nationally and globally," said Toronto Mayor David Miller. "It sends a strong signal to investors, researchers and other business partners that we see Toronto as a hub for innovation, investment and continued prosperity. It's an example of the on-going city building initiatives that make Toronto an exceptional place to live, work and play. Toronto Hydro Telecom is to be commended for its aggressive and innovative approach to using technology as a means of helping our city work better, smarter and more productively."

(Source: Toronto Hydro Telecom's New Network Goes Live in Toronto's Financial Core. Telephony World, September 6, 2006, <http://www.telephonyworld.com/cgi-bin/news/viewnews.cgi?category=all&id=1157589759>)

5. ICT Infrastructure

- current status of network services, equipment & facilities, hardware, software, use of spectrum:
- what technology/ies are they providing to their users? what hardware/software etc. is needed to provide access to these technologies?
 - o THT Wi Fi network uses 802.11 g technology and is also compatible with the 802.11 b standard. The network employs a mesh architecture that reduces the need for wired infrastructure. According to THT, by installing equipment designed to achieve indoor and outdoor coverage simultaneously, they will create a 'hotzone' that will blanket the network coverage area. This will allow for untethered use throughout the hotzone. The Wi-Fi network will work in tandem with the company's existing fibre optic network, which forms the backbone of the delivery system.
 - o Toronto Hydro Telecom uses Siemens' "Wireless Integration@vantage" wireless integration platform, which provides features such as access control, authentication and accounting. The software for this platform was developed by Garderos Software Innovations, a wholly-owned Siemens subsidiary. The network nodes are from the "Siemens Mesh@vantage MR" product family, based on wireless mesh technology from BelAir Networks.
 - o David Dobbin on THT's technology choice: "We looked at all kinds of technology. We looked at Wi-Fi, at pre-Wimax, we looked at all sorts of vendors, we issued a RFP. And, what we ended up deciding was that on a cost for performance basis, Wi-Fi was the best technology at that time to deploy. The BelAir platform we choose allows us to use Wi-Fi now, but is really neat, because it can be adapted to accommodate other technologies in the future."
(Source: Interview With David Dobbin, August 7, 2007, http://podcasts.pulvermedia.com/blog/archives/2007/08/jon_arnold_davi_4.php)
- cost of deployment
 - o Dobbin's published estimate for the capital costs for the system is \$56M. Capital investment: \$2M for first phase, \$56M full coverage. Pricing (after free trial period): \$29/mo (\$9.99/day, \$4.99/hour), \$348/yr+taxes.
- cost of ongoing operations (including staff costs)
 - o CWIRP unconfirmed calculation of \$40-50M/yr, to provide coverage to the entire City of Toronto (current project only covers 6 km²)
- what is the basis of decision making around costs/methods of infrastructure

deployment?

- o Cost recovery and profit
- technical challenges in deploying infrastructure
 - o Equipment Street light poles were not all up to the required standard. The company's original plan was to use the poles to attach wireless access points. That plan hit a snag when it was discovered that not all of the available poles were suitable candidates:

“When we selected the financial district as the first district, we were quite surprised that . . . a very low percentage of them had 24/7 power at the pole,” said Vice-President of Wireless Sharyn Gravelle. Upgrades and retrofits for the affected poles brought about a delay. It also became apparent that not every area of the city that had been targeted for Wi-Fi had the requisite number of poles. The area around the Eaton Centre, for example, is completely bereft of street lights since there is already enough ambient light from stores, displays and tourist attractions. The area had to be rezoned slightly, said Gravelle, to take advantage of light poles on neighbouring side streets.”

(Source: “Police concerns, poor street light poles snarl Toronto Wi-Fi project, Proposed city-wide wireless service pushed back until September”, July 20, 2006, by Neil Sutton, <http://www.itbusiness.ca/it/client/en/home/News.asp?id=40122>.)

- technical challenges in operating infrastructure
 - o None known.
- properties of the network (is it open? is use of the network restricted in any way? secure? healthy? accessible? what is its capacity - ie. numbers of concurrent users?) - how are decisions made in this regard?
 - o It is a fully encrypted network.
 - o Privacy concerns: Law enforcement raised a number of concerns around illegal or unsavory use of the Wi-Fi Internet service. Toronto Hydro Telecom was asked to devise a way to trace the network's users during the free service period. The solution was to text-message a login ID and password directly to users once they have supplied a cell phone number.

“It doesn't mean we're tracking, it doesn't mean we're adverse to privacy,” said Gravelle, “but the company had to come up with a user authentication process to satisfy the authorities. There were some concerns that were raised with police services such as the possibility that criminals would use the network to communicate with one another or prey on minors, she said. We had dialogues with these folks because we want to take that very seriously. Once a billing system goes into effect after the free six-month trial, the company will attempt to provide a login system that incorporates land-line and e-mail verification as well as the existing cell-phone system.”

(Source: “Police concerns, poor street light poles snarl Toronto Wi-Fi project, Proposed city-wide wireless service pushed back until September”, July 20, 2006, by Neil Sutton, <http://www.itbusiness.ca/it/client/en/home/News.asp?id=40122>).

o Public Health concerns: Concerns about electro magnetic fields and their possible health effects proved a reason for the delay in launching the service on the original July 2006 timeline. According to THT, Toronto Public Health is now satisfied that the network complies with safety guidelines, including those from Health Canada and Industry Canada, and has deemed it “low risk.”

(Source: Interview With David Dobbin, August 7, 2007,

http://podcasts.pulvermedia.com/blog/archives/2007/08/jon_arnold_davi_4.php)

- what is the geographic range of the network? is there ubiquitous service?
 - o One zone is located in five different, contiguous sections of downtown Toronto, covering an area of six square kilometers, for a grand total of 235 city blocks. (Source: Speaking notes for Sharyn Gravelle, Vice-president, Wireless, Toronto Hydro Telecom Wireless Cities Summit Toronto, January 24, 2007. http://www.thtelecom.ca/downloads/01-24-07_Sharyn%20Gravelle%20Speech_Wireless%20Cities%20Summit.pdf)
- does the network offer QoS? what is the organization's philosophy on reliability of the network? (e.g. best effort?)
 - o Best effort
- future plans for network extensions, further deployments, new services?
 - o 2009?? entire city: ~ 1M households & businesses, 2+ million residents, 630 sq km
- is this public infrastructure?
 - o No

6. Key Services

- what services does the organization provide or enable? e.g.:
 - ✓ internet access
 - x local content
 - x remote community access
 - x public safety
 - x education
 - ? voice communications
 - x telehealth
 - ? other

7. Users

- who uses the network/services provided by this organization?
 - o Businesses and residential users, students, local citizens and tourists within footprint.
 - o During the free trial period, THT observed that the network was most highly used Mondays to Fridays, between 2 pm and 5 pm. And, the areas of One Zone that had the highest traffic were those behind city hall, where there are hotels

and university student housing, and in the financial district, suggesting that users of the downtown network are primarily students and mobile business workers. (Source: Speaking notes for Sharyn Gravelle, Vice-president, Wireless, Toronto Hydro Telecom Wireless Cities Summit Toronto, January 24, 2007.

http://www.thtelecom.ca/downloads/01-24-07_Sharyn%20Gravelle%20Speech_Wireless%20Cities%20Summit.pdf)

o As of August 2007, after 3 months of the paid service model THT found: 40% monthly users (only expected 10% would be monthly), such as laptop users, like salespeople moving throughout the downtown core; 40% daily users, such as business people, people in hotels, at conventions; 20% hourly users, such as people checking their email. THT had also found that users were mobile, that is, individual users didn't tend to access the network from just one point, but to logon from different points. Users were using the network both indoors and outdoors.

(Source: Interview With David Dobbin, August 7, 2007, http://podcasts.pulvermedia.com/blog/archives/2007/08/jon_arnold_davi_4.php)

It should be noted that the weather during these three months was likely conducive to the use of the network outdoors – where it is primarily available, use of the network may fall as the weather becomes colder. THT should have data that would help them to assess the possibility of a weather-based shift in usage, because the network has already operated (though, largely on a free, trial basis) for more than a year.

- what services are most widely used?
 - o Internet access, email
- is the network/service easy to use?
 - o Yes, 900 concurrent users are connected to OneZone during our high peak time. (Source: Speaking notes for Sharyn Gravelle, Vice-president, Wireless, Toronto Hydro Telecom Wireless Cities Summit Toronto, January 24, 2007. http://www.thtelecom.ca/downloads/01-24-07_Sharyn%20Gravelle%20Speech_Wireless%20Cities%20Summit.pdf)
- what devices are used on the network?
 - o Wireless-enabled laptop computers, mobile headsets and other mobile devices, VoIP phone calls.
- what role (if any) do intended target groups and users play in the development of the network and its major programs?
 - o There appears to be no consultation between potential users and the service provider.
- do users have significant input into the development of the network/services?
 - o No
- what does it cost for users to access the network/services? pricing model(s)? how are issues like affordability considered in developing pricing models?
 - o The network could be used for free until April 23, 2007. Current prices are \$29/mo, \$9.99/day, \$4.99/hour.
 - o Affordability not directly considered – pricing 30% below commercial

competitors i.e. Bell and Rogers, for monthly service.

- are there public access points available to people who do not have the technology (e.g. laptop) to use the service?

- o No

8. Financial & other resources

- funding sources (with dollar amounts) for organization and projects:

- o Self funded by THT; dividends from operating profits go to City of Toronto.

9. External stakeholders

- what stakeholders influence, or are influenced by, the initiative?

- o City of Toronto is the main stakeholder. There is very little evidence of influence by the City of Toronto on THT direction.

- how have these shaped the development and activities of the organization?

- o N/A

10. Impact and benefits

- what impact does the network/service have on the broader community in which it is active?

- provision of universal coverage/access?

- o Service is available for those with a wireless enabled laptop, payment must be made by credit card. During the free trial period, potential users required a cell phone in order to register for the service.

- low cost or free service for disadvantaged

- o Not at present

- free service in parks and public spaces? (who does this benefit?)

- o Yes, but only during the free trial period, for areas within the footprint (uncertain who benefits)

- increased tourism

- o No evidence at this time

- economic development

- o No evidence at this time

- revitalize of communities

- o Not a stated goal - No evidence at this time

- increased community cohesion

- o Not a stated goal - No evidence at this time

- increased profile for community members/artists

- o Not a stated goal - No evidence at this time

- what evidence (if any) of such impact is available?

- o None

11. Community Profile

- what are the features of the community served by this network/organization?
 - o Urban, high density areas at this time.

Policy/regulatory/legal context:

- o Currently using licensed exempt spectrum – showing interest in access to licensed spectrum for future roll-out of service; interested in use of WiMAX.
- are the services provided subject to any sort of regulation? by whom?
 - o No
- impact of new privacy legislation?
 - o None

12. Critical success factors and lessons learned

- what were the key factors that enable the development of this network/provision of this service?
 - o Acquisition of exclusive rights to street-lighting poles
 - o Existing operation of fibre-optic backhaul infrastructure
 - o Existing operation of ISP
 - o Good planning
 - o Early and effective management of health and safety concerns from public
 - o Launch backed by Mayor
 - o CEO's experience in building a similar network in Ottawa
 - o Self-funding
 - o Partnership with experienced network vendors, Siemens and BelAir

14. Assessment:

- how well has this organization/network done in meeting its stated objectives?
 - o THT has successfully met the objectives of the first 5 phases of the rollout from an infrastructure deployment perspective.
- do the stated objectives meet the needs of stakeholders?
 - o Stakeholders – users, partners, City of Toronto (shareholders). Needs have been met for partners (Siemens, etc) and the City of Toronto since dividends will be received by the shareholder. However, the service is for fee-paying users, especially business users. Thus there are categories of potential users, the government services, schools, lower income, etc whose needs are not being addressed.
- does this network/organization provide a public benefit? how?
 - o Critics point to a reduction in potentially significant public benefit because OneZone is using a private company and profit-making business model. The

benefit to those members of the public who can afford the service is access to the Internet when away from their primary networks. However, for the general public the benefits are difficult to envision.

o The public benefit according to THT is: “If one zone covered the entire city, Torontonians would have:

- Access to a high-end service with low interference (a pre-requisite for future development is access to the licensed broadband spectrum)
- Torontonians would be reaping certain economic benefits including a larger dividend back to the shareholder – a dividend that might then be used for a new park, new services, or lower property taxes.
- Torontonians would be proud to know they were living in one of the world’s most efficiently run cities – a city with everything from better municipal services to better, health care delivery to better education.
- Toronto Hydro Telecom might choose, for example, to demonstrate leadership by increasing our support for education.
- Toronto Hydro Telecom could leverage its knowledge of Wi-Fi networks by partnering with vendors, suppliers, innovators, and universities to test new products, help bring new products to market, and promote basic research”.

(Source: Speaking notes for Sharyn Gravelle, Vice-president, Wireless, Toronto Hydro Telecom Wireless Cities Summit Toronto, January 24, 2007.

http://www.thtelecom.ca/downloads/01-24-07_Sharyn%20Gravelle%20Speech_Wireless%20Cities%20Summit.pdf)

• what are the strengths and weaknesses of this network/organization?

o Strengths: a scalable, relatively robust network that was independently measured at a speed of 5Mb/s upload/download (some quality of service issues exist), fibre-optic backbone, easy access to other resources e.g. Toronto Hydro Energy Services for street light operational issue resolution.

(Source: Toronto Hydro Telecom Delivers Best Broadband Wireless Performance in North America, January 22, 2007,

http://www.onezone.ca/pdf/01-23-07_THT%20ONE%20ZONE%20DELIVERS%20BEST%20BROADBAND%20WIRELESS%20PERFORMANCE%20IN%20NORTH%20AMERICA.pdf)

o Weaknesses: Closed network, no value add to underserved parts of population, subject to interference and congestion of license-exempt spectrum users, cost.

• how could this network/organization be improved?

o Consideration of alternate business models (e.g. a model that better serves the public interest)

o Participatory development – include members of the public/government/smaller WiFi providers.