ICT Infrastructure as Public Infrastructure: The Community Wireless Infrastructure Research Project

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Infrastructure Canada

Canada

ICT Infrastructure as Public Infrastructure: Research Questions

- What examples of public information and communication technology (ICT) infrastructure exist in Canada today? How is "public" defined?
- What are the different models and best practices of public ICT infrastructure in terms of deployment, technology choice and innovation, investment, governance, adoption and use?
- What are the public benefits of community-based/public ICT infrastructure provision?
- What public policies and supports are necessary to promote and sustain public ICT infrastructure?

Focus on *Public Broadband* Networks

- Should municipal broadband networks and community WiFi be considered as basic infrastructure for the 21st century?
  - Fred eZone (municipal wireless network, Fredericton)
  - Île sans Fil (community wireless network organization, Montreal)
  - K-Net (Keewaytinook Okimakanak tribal council community network, Northwestern Ontario)
  - Wireless Nomad (co-operative internet service provider, Toronto)
  - Toronto Hydro Telecom One Zone (city wide wireless network)
  - Industry Canada (government partner)

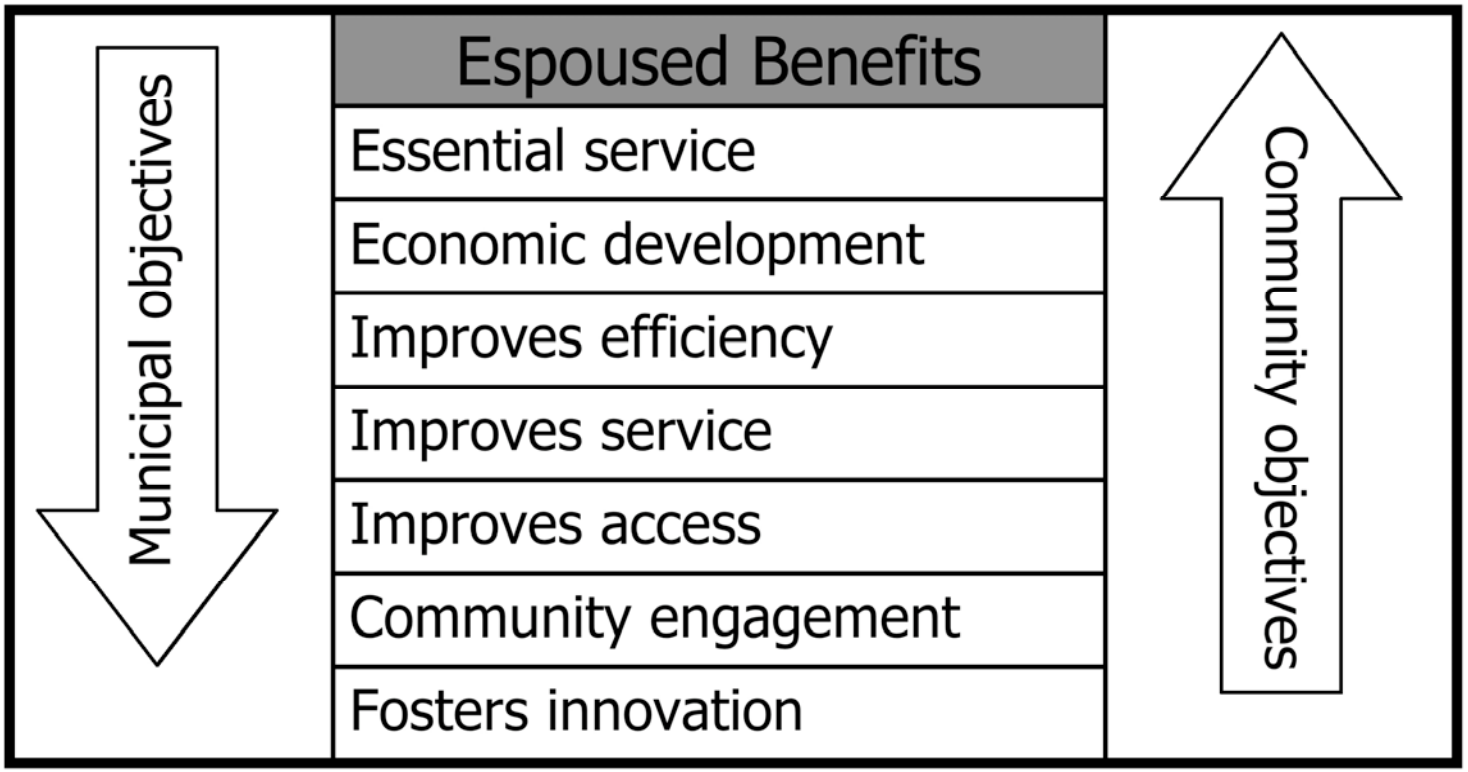
Infrastructure Innovations?

- Technology is standardized:
  - WiFi, WiMax, mesh networks
- Key Factors in Adoption/Use?
  - Access to high speed backbone (backhaul)
  - Local context is key
  - Geography, access to support, QoS, business case

Progress and activities to date

- Understanding the terrain of public broadband infrastructure in Canada: community and municipal providers, working with case study partners to learn what they are providing
- Articulating benefits of public broadband infrastructure, desiderata for public wireless infrastructure, review of literature and international experiences
- Investigating policy aspects of deploying public broadband infrastructure, e.g. spectrum policy

Drivers for Public Wireless Networks



Desiderata - for public wireless Internet

1. Ubiquitous
2. Affordable
3. Reliable
4. Healthy
5. Secure
6. Widely Useful
7. Cost Effective
8. Convenient and Ready-to-Hand

Desiderata (2)

9. Open
10. Neutral and Non-Discriminatory
11. High Quality
12. Privacy Enabling
13. Accessible and Usable
14. Communicative Commons Enabling
15. Civically oriented
16. Accountable and Responsive

Espoused Benefits	Desiderata
Essential service	1. Ubiquitous 2. Affordable 3. Reliable 4. Healthy 5. Secure
Economic development	6. Widely useful 9. Open 10. Neutral and non-discriminatory
Improves efficiency	7. Cost effective 8. Convenient and ready-to-hand 9. Open 10. Neutral and non-discriminatory

Espoused Benefits	Desiderata
Improves service	9. Open 10. Neutral and non-discriminatory
Improves access	1. Ubiquitous 13. Accessible
Community engagement	14. Communicative commons enabling 15. Civicly oriented 16. Accountable and responsive
Fosters innovation	1. Ubiquitous 6. Widely useful 9. Open 10. Neutral and non-discriminatory

île sans fil

WiFi Network Launch, Coverage & Use

- First free hotspot July 2003
- To date, 124 free hotspots
- Freelance workers, small businesses, community groups, students
- Spread throughout city based on requests for service
- 28,000 registered users

Technology & Infrastructure

- 802.11 IEEE “WiFi” standard equipment
- 2.4 Ghz license exempt spectrum
- Developed social software, “Wifidog” and “HAL”
- Wifidog (captive portal) and HAL enable users to see who is online as well as upload sound, text and image files
- Application has been used by over 30 different groups on 4 different continents

Research Questions

- Are community WiFi networks viable?
- Are users aware of community WiFi politics informing network access?
- What impact does community WiFi have on the local ISP market?
- Does social software increase awareness and/or efficacy of users?
- What plans does this volunteer organization have in place to maintain presence and sustain its practice?

Community/Venue-Sponsored Model

- Hotspot “hosts” pay for installation, network connection, network management provided by ISF volunteers for a fee (e.g. $140/yr for small businesses)
- Hosts agree to provide free internet to users
- ISF promotes community engagement, disseminates art, local news, community events
- Bilingual organization, operated by volunteers, 60 active members
- Funded by hosting fees, some grant support

Fredericton's Municipal Broadband Network

- e-Novations ComNet Inc., a municipally owned not-for-profit corporation deployed a 22 km fibre optic ring that provides affordable, fast broadband service to the City of Fredericton and its businesses. More than 60 km of fibre are now in place.
- This broadband network provides economic benefits to the City, and enables businesses to locate in Fredericton.

Expanding Municipal Fibre with Wireless - Fred-eZone

- Started by using Motorola Canopy technology to provide wireless connectivity to the Fredericton airport, which was beyond the reach of the fibre network.
- Recognizing the importance of "Intellectual Infrastructure", a decision was made in 2003 to provide high-speed internet access to local citizens, for free, throughout Fredericton's downtown area and business corridors
- Provides WiFi service using Cisco and Motorola equipment, 200+ radios

Research Questions

- Can other municipalities duplicate Fredericton's success? What were the enabling conditions that made it possible for Fredericton to develop its own municipal fibre? What barriers did it face? Why aren't more Canadian municipalities following Fredericton's lead?
- Can the economic development benefits of investment in information and communications technology infrastructure be measured?
- What technical challenges have arisen in deploying a city-wide network? How were they overcome?
- Does the local community support investment in "intellectual infrastructure"?
- How do community members use the Fred-eZone?

Lac Seul Reserve:

Lac Seul is located approximately 38 Km north west of Sioux Lookout Ontario. It is bounded to the north and east by Lac Seul Lake. The reserve is made up of three communities, Kejick Bay, Whitefish Bay, and Frenchman's Head. The on reserve population is 939.

Wireless Community Network:

- The Lac Seul community network is one of over 60 PoPs on the K-Net First Nations broadband network.
- Community owned Wifi/Licensed Spectrum radios cover Lac Seul's three communities.
- Wifi enables "free" residential access (within line of sight).
- Licensed radios enable QoS service for Telehealth, Videoconferencing, and other broadband applications.
- Community employees manage the local network infrastructure in partnership with K-Net Services, and TBay Tel (formerly Superior Wireless).
- Uptake of the network has been hampered by a harsh climate, and local human resource challenges…

Research Questions:

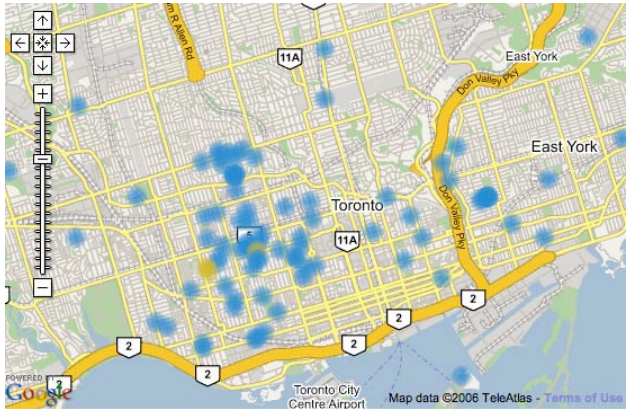
• What are the strengths and vulnerabilities of Lac Seul's community ownership model?

•What applications do Lac Seul's users consider essential community network services?

WIRELESS NOMAD
Your Community Wireless Internet Provider

Wireless Nomad – Toronto

- Co-operative Internet Service Provider operating in Toronto, Ontario
- Subscription-based residential DSL broadband service
- Uses customized Wireless Nomad routers which provide shared access to Wireless Nomad account holders
- Anyone can create a free account to get WiFi access to Wireless Nomad nodes
- As of November 2006, Wireless Nomad had 127 nodes with 2510 users



Wireless Nomad Toronto WiFi Locations

Research Questions

- Is this cooperative sharing model viable for creating a basic free service while maintaining a high quality subscription service?
- Can sharing via mesh networks improve reliably while reducing costs?
- Can this model work for a municipal scale service?

Toronto Hydro Telecom Municipal WiFi Network

WiFi Network Coverage & Use

- Phase 1 launched Sept, 2006 - financial district
- Phase 2, December 2006 - downtown core 6km^2
- Business, tourists, hotel/restaurant patrons, students
- City-wide, 630km^2 - 2009?
- Streets, public spaces, indoors to 30m from curb
- 7Mbps (bidirectional) high speed internet access
- 20,000 registered users, average 260 simultaneous

Technology & Infrastructure

- 802.11 IEEE "WiFi" standard equip
- 2.4 Ghz license exempt spectrum
- Multi-radio mesh network (vendors: Bel Air & Siemens)
- 20,000 access points on Toronto Hydro street light poles
- existing 450 km Toronto Hydro fibre network for backhaul

Research Questions

- Is the THT business model a viable one?
- To what extent will 'One Zone' be adopted for domestic and business use?
- How can 'One Zone' be used to benefit low income neighbourhoods?
- What changes in Internet use, communication, work practices, and social relations are associated with ubiquitous connectivity?
- How can 'One Zone' be harnessed to increase civic engagement?
- What is the rationale and business case for offering wireless broadband service as a low cost or free public utility, as some municipalities do?
- What are the potential benefits of doing so?

Toronto Hydro Telecom Municipal WiFi Network

Public/Private Subscriber Model

Business Case

- Provincially mandated wireless metering by 2011 ???
- Combined data/internet services market of $1billion
- Seamless access vs. 200 fragmented 'hotspots
- Can offer cheaper service than Bell, Rogers etc
- Potential cost-saving municipal applications (e.g. parking tags)

Network & Service Costs

- Capex - $2M for Phase 1, $56M full coverage
- Pricing (6 month free trial) $29/mo ($10/day, $5/hour)
- Competitors (Bell, Rogers) are up to 30% more
- Positive return on investment within 1 year with 1% mkt share

Ownership & Governance

- Wholly–owned subsidiary of Toronto Hydro Corporation (THC)
- THC shareholder: City of Toronto
- THC pays annual dividend to City of Toronto (2005 = $68M)

Longer term goals

- Documentation of successes and failures in Canadian public broadband deployments, documentation of best practices
- Theorizing about public aspects of infrastructure
- Understanding parallels between public broadband and earlier instances of public ICT infrastructures
- Developing policy recommendations for deployment of public wireless infrastructures

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Title Search **Download our database:**

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We'll be adding a link for you to upload additional references shortly. If you come across something you think we'd like to know about, please send us a note to *info* at *broadbandresearch* dot *ca*.

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