

Municipal Public Wi-Fi A Sound Investment?



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1

Introduction

Investment in public Wi-Fi can support economic development, enhance the branding of connected communities and support access to the internet for those who cannot connect at home.

The EORN has made a \$260 million investment in high speed broadband networks supporting broadband services across most of Eastern Ontario. This investment in high quality, reliable broadband service will support economic development throughout the Region. It will entice businesses to locate in the region and help retain businesses and talent. Eastern Ontario communities can leverage the backhaul capacity provided through that investment, to deploy free public Wi-Fi and increase access to connectivity.

Municipal public Wi-Fi is playing a growing role in enabling people to stay connected. There is a strong global trend toward increased access to free public Wi-Fi provided by carriers and municipalities, enabling people to be connected everywhere. In Eastern Ontario, the trend is similar with significant and growing access to free public Wi-Fi in municipal facilities, town centres and private businesses.

In Eastern Ontario communities, there is a full range of municipal Wi-Fi offerings, from no service at all, to public Wi-Fi in all municipal facilities and town centres. As in other parts of the world, public Wi-Fi is established first in public libraries and cafés, before expanding to other venues. Many communities have plans to expand public Wi-Fi service to additional recreational facilities, municipal offices and town centres.

Is municipal public Wi-Fi a sound investment for your community? This paper presents a framework for a business case analysis for municipalities considering deployment or expansion of Wi-Fi services. This includes benefits of public Wi-Fi and cost considerations. The issues of security and liability are also discussed.

Municipal public Wi-Fi is increasingly seen as an important public service to residents, businesses and visitors to the region.

2

Definitions

Wi-Fi - wireless networking technology that provides wireless high-speed internet and network connectivity.

Wi-Fi Hotspot - a type of Local Access Network, meaning a network where multiple devices are connected to the internet over a single backhaul connections within a small area.

Wi-Fi Zone - covers a larger area, typically a downtown area. It provides internet access to any device in the area of coverage. This can support tourists passing through town or residents.

¹ Including government and private sector in-kind contributions

3

Wi-Fi Trends

The most significant trends in public Wi-Fi are the growing demand for connectivity ‘everywhere, all the time,’ the growth in carrier class Wi-Fi services, and the huge proliferation of venues where Wi-Fi is offered.

There is an emergence of a growing number of Smart Cities that use information and communications technology (ICT) to manage their operations and assets, including IT functions, transportation systems, power plants, law enforcement, community services, schools and libraries. The internet of things (IoT) is an important and growing part of this initiative. These cities use Wi-Fi for operations and for public access to the internet.

The more people are connected, the more important connectivity becomes to them. They access more and more information over the internet and become dissatisfied when disconnected. In response to the increased demand for connectivity, many municipalities are providing public Wi-Fi.

3.1 Mobile Connectivity

As more people carry mobile devices, especially smartphones, but also tablets and laptops, there will be more demand for data on the go. This will have an impact on the demand for Wi-Fi service.

We have passed the Mobile Tipping Point. Globally, more people now use mobile devices than desktop devices, as illustrated in Figure 1. People want to be connected everywhere they go.

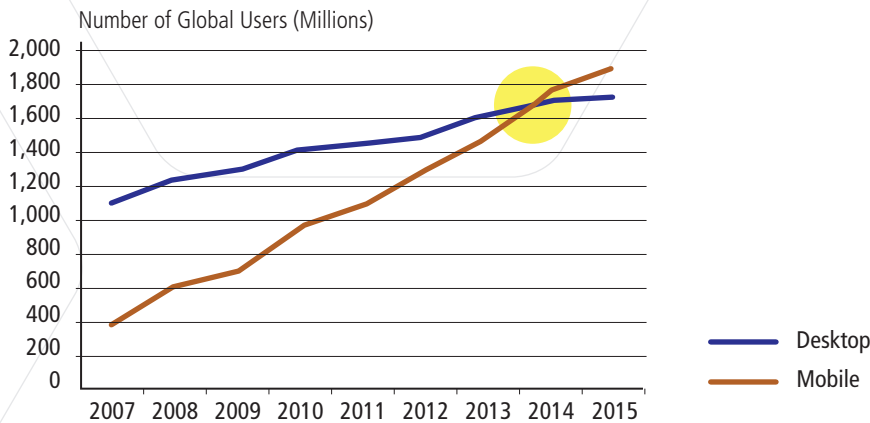


Figure 1: Mobile vs. Desktop connectivity

² Comscore, Mobile Marketing Statistics Compilation, 2016 <http://www.smartinsights.com/mobile-marketing/mobile-marketing-analytics/mobile-marketing-statistics/>

Adults (over the age of 18) spend 51% of online time, on mobile devices.³

A Catalyst study showed that in 2015, the Canadian smartphone penetration rate grew to 68% from 55% in 2014, a year over year growth rate of 25%.⁴ See figure 2.

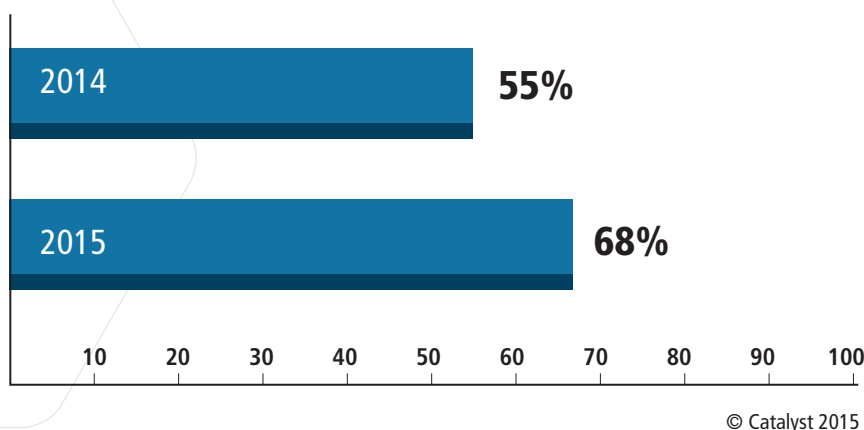


Figure 2: Canadian Smartphone Penetration Rates, 2014-15

The same study revealed, that after short battery life and small screen size, data limits are the third greatest frustration with smartphones. This frustration with data limits motivates smartphone users to use free public Wi-Fi, where possible.

3.2 Carrier Class Wi-Fi

Globally, there is very strong growth in carrier-class Wi-Fi, (where internet or mobile carriers offer Wi-Fi service) evidenced in the rise of new sites deployed – a steady annual increase from 5.2 million in 2012 to a projected 10.5 million in 2018, a compound annual growth rate of 13%.⁵ The availability and quality of public Wi-Fi are increasing rapidly. In 2015, mobile offload exceeded cellular traffic for the first time. Fifty-one percent of total mobile (cellular) data traffic (smartphone and tablet) was offloaded onto the fixed network through Wi-Fi or femtocell⁶ in 2015.⁷

Carriers have been integrating distinct Wi-Fi networks more fully into their strategies and their networks to improve customer experience and offload traffic from their networks, resulting in customer retention and reduced cost.⁸ In Ontario, this strategy is seen with Bell Mobility, as they offer free Wi-Fi in most McDonalds, Tim Hortons and Chapters Indigo locations.

³ Kleiner Perkins Caulfield Byers (KPCB), 2015 Internet Trends Report <http://www.smartinsights.com/Internet-marketing-statistics/insights-from-kpcb-us-and-global-Internet-trends-2015-report/>

⁴ Catalyst, The Canadian Mobile Market in 2015, <http://catalyst.ca/2015-canadian-smartphone-market/>

⁵ Wireless Broadband Alliance Industry Report 2013, Global Trends in Public Wi-Fi, p25, <http://www.wballiance.com/wba/wp-content/uploads/downloads/2013/11/WBA-Industry-Report-2013.pdf>

⁶ A femtocell is a wireless access point that improves cellular reception inside a home or office building. (TechTarget)

⁷ Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2015–2020 White Paper <http://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/mobile-white-paper-c11-520862.html>

⁸ Wireless Broadband Alliance Industry Report 2013, Global Trends in Public Wi-Fi,

Cogeco Wi-Fi Hotspots reflect an effort to improve the reach of their network and keep customers connected even when they leave their home or office. Cogeco internet subscribers get free access to Cogeco Wi-Fi Hotspots. After initial log-in, a device connects automatically to a hotspot within range. There are over 90 hotspots in the Kingston area, three in Gananoque, five in Belleville and eight in Peterborough and one each in Smiths Fall and Kemptville.⁹ Shaw has rolled out a Wi-Fi network in Western Canada with its Shaw GoWi-Fi service. With the Shaw network, non-Shaw subscribers can access the Wi-Fi network for a fee. Sask Tel has deployed SaskTel Select.

The initial driver for the rising investment in public Wi-Fi is the explosion of data traffic, especially that created by the growth of streamed multimedia content and web services. Increasingly people want to be connected all the time, wherever they are. The availability of smartphones and tablets, that support not only the 2.4GHz band but also the wider 5GHz (using 802.11n and 802.11ac), offer big improvements in end-user data rates as well as better network efficiency and lower costs.¹⁰

The other enabler for seamless integration of Public Wi-Fi into carrier network and business models is the network operator initiatives on seamless handoff and roaming. Next-generation Wi-Fi hotspots (NGH) enables bypassing the sign-in process with that step being done “behind the scenes”. Carrier Class Wi-Fi is provided by telcos and ILECs, primarily in metropolitan areas, but also in smaller communities, as with Cogeco and Bell Mobility’s Ontario deployments.

3.3 Proliferation of Wi-Fi Venues

The venues where Wi-Fi is available have been expanding and changing in response to the demand for connectivity on the go. There is an increase in the prevalence of downtown Wi-Fi Zones, Wi-Fi hotspots in retail outlets and places where people gather, Community Wi-Fi and Stadium Wi-Fi.

- Wi-Fi in Downtown Wi-Fi Zones - Users can stay connected within an extended area. This can be delivered by carriers or over municipal Wi-Fi networks.
- Wi-Fi in nearly all retail outlets - Initially, public Wi-Fi was found in places like libraries and coffee shops, where users would typically sit for a period of time with a laptop or tablet, but the growing use of Wi-Fi on smartphones is creating demand for instant access everywhere – the supermarket to check on a recipe online or at a sporting venue, to post a selfie, for instance.
- Community Wi-Fi - ‘Community Wi-Fi’ services or homespots are proliferating rapidly. This refers to private internet subscribers who share access to their internet connection. Fon is an example of this type of network. The Fon network is made up of shared residential hotspots, that now include more than 14 million (Oct. 2015) crowd-sourced hotspots in over 200 countries. Customers receive a special router that creates two wireless networks separated by a firewall – one network is for private use and the other for Fon users. Fon is primarily in residential areas but it is planning to expand to include businesses. There is a heavy concentration of Fon hotspots in Western Europe, Japan, South Korea and Australia.

⁹ www.cogeco.ca

¹⁰ Wireless Broadband Alliance Industry Report 2003

¹¹ <http://www.computerweekly.com/feature/Next-generation-hotspots-The-future-of-Wi-Fi>

The presence of Fon hotspots in North America is growing, but to date, it does not appear that Fon is in Eastern Ontario.

- Stadium Wi-Fi – The trend is toward Wi-Fi in huge venues like major sporting venues, where large numbers of bandwidth-hungry users, create profitable, if temporary, business cases revolving around sports results, information and photo sharing. In large part, this is due to the inability of carrier networks to manage the temporary huge volumes of data on their mobile networks. It is more financially and technically feasible for them to use Wi-Fi to offload the cellular network for these events. In rural settings, this might translate to the International Ploughing match, where a Wi-Fi network can be set up by a carrier temporarily, then dismantled after the event. Municipal sporting venues that attract crowds on a regular or periodic basis are better served by municipal or carrier Wi-Fi networks that remain in place.

3.4 Municipal Wi-Fi Networks

There are many municipalities, in Canada and around the world, that own and operate Wi-Fi Zones to serve their downtown areas and Wi-Fi hotspots to serve more limited areas such as libraries, recreational facilities and other municipal facilities. These systems operate increasingly on municipally owned fibre networks, but also on public networks where the municipality pays for service.

Municipal Wi-Fi system can support a variety of applications for municipal operations including fleet services, water management, smart lighting, traffic management, parking meters and security video management that help make cities safer and greener. This is the Smart City model. The same infrastructure can support free public Wi-Fi hotspots or zones.¹²

Fredericton, New Brunswick's Fred-eZone, Stratford, Ontario's Stratford_Free and Olds, Alberta's O-NET are notably successful Wi-Fi networks hosted on municipally owned fibre networks. Because these communities own their fibre backhaul facilities there is no incremental backhaul cost to their public Wi-Fi services.

In other communities, municipal Wi-Fi Zones are hosted on public networks. The Vermont Digital Economy Project launched 26 Wi-Fi zones on public networks in towns throughout the state.

The Vermont Digital Economy Project¹³ supported deployment of free public Wi-Fi in 25 communities to help business operators reach new customers and markets. In addition to deploying public Wi-Fi, the project also supported 25 new municipal websites, provided e-business advice to over 120 non-profits and 260 small businesses and placed 24 Internet Interns in libraries to help teach digital literacy. Through this project they have strengthened the social and business fabric of their communities. This success took more than public Wi-Fi. The supporting projects leveraged the Wi-Fi service for greater community impact.

In Eastern Ontario, the EORN high speed broadband network is an asset that can be leveraged to support municipal Wi-Fi services.

¹² Wireless Broadband Alliance, <http://www.wballiance.com/key-activities/connected-city-program/>

¹³ Vermont Council on Rural Development, Vermont Digital Economy Project, <http://vtrural.org/programs/digital-economy>

On a grander scale, New York City has just launched its municipal Wi-Fi project LinkNYC to cover the city with very high-speed, free, public Wi-Fi. Each Link or kiosk, is equipped with gigabit speed encrypted Wi-Fi connection, USB charging stations and free calling.

Appendix A presents examples of municipal Wi-Fi deployments that may serve as models, case studies or inspiration for Eastern Ontario communities. New York City's LinkNYC is an example of what is possible on a grand scale, while the deployments in Fredericton, Stratford, Olds, Alberta and Vermont are in communities not all that different from those in Eastern Ontario.

3.5 Venue Exclusivity

Exclusivity agreements to install and operate public Wi-Fi services for a particular venue, such as a mall, a sports facility, or even through exclusive access to municipal 'street furniture' such as lampposts, are adopted to ensure that interference from other Wi-Fi access points is virtually eliminated.¹⁴ Venue exclusivity can also secure a revenue stream as seen in the City of Ottawa Wi-Fi deployment example.

3.6 New Spectrum Options

The capacity of Wi-Fi is growing with the adoption of new frequencies and standards. The impact of this trend is felt most in the carrier space. The highest profile new band for Wi-Fi is 60GHz, where the 802.11ad standard lives. The 802.11ac standard also supports very high bandwidth.

Another important option is to run Wi-Fi in TV white spaces spectrum. Canadian regulatory changes allow TV white space spectrum to be used to deliver improved, Wi-Fi-like services in rural regions without interfering with existing TV broadcasts.¹⁵

4

Public Wi-Fi Networks in Communities Served by EORN

Public Wi-Fi across Eastern Ontario was researched by surveying the 13 upper-tier municipalities, interviewing municipal IT Directors and Economic Development Directors, IT Directors for towns with Wi-Fi Zones, ISPs and by searching the web. The survey response rate was 100%.

Survey respondents were asked about their opinions on the value of municipal public Wi-Fi. Almost all respondents were IT Managers or network administrators. This puts a particular bias on results. These people see how much Wi-Fi networks are used if they are already deployed by the municipality. They understand potential applications, and have an appreciation for the cost and time involved in deploying and managing Wi-Fi networks. Ninety-two percent of respondents felt that municipal Wi-Fi is a valuable community asset or provides moderate community value. No respondents believe that public Wi-Fi has no community value, though 23% thought that it is not the responsibility of municipal government. Results of this question are presented in Figure 3.

¹⁴ <http://www.wballiance.com/wba/wp-content/uploads/downloads/2013/11/WBA-Industry-Report-2013.pdf>

¹⁵ <http://news.gc.ca/web/article-en.do?nid=928659>

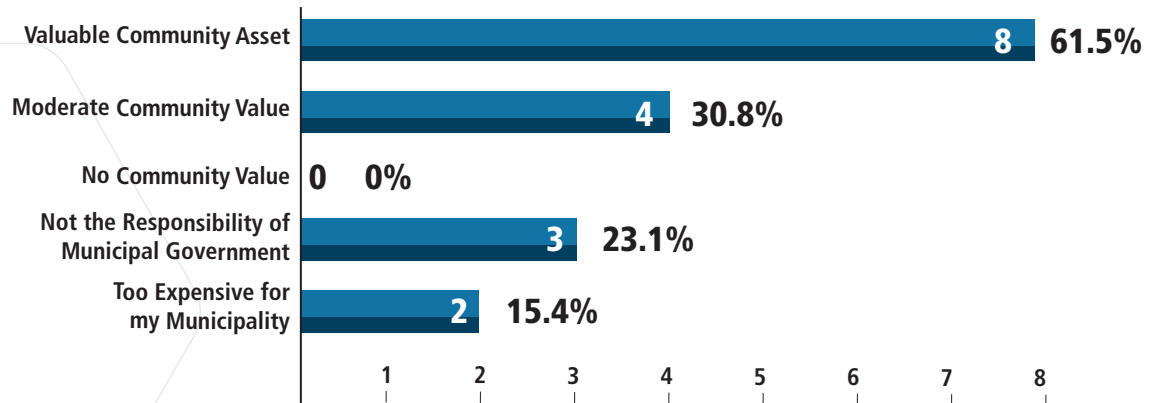


Figure 3: Opinions of Municipal Public Wi-Fi

Eastern Ontario is served by hundreds of Wi-Fi hotspots, provided by upper-tier and lower-tier municipalities, towns, internet service providers and other private businesses. All public Wi-Fi hotspots identified through this research are free. For this reason, from here on the term public Wi-Fi will be used and will imply that service is free. The most common locations for public Wi-Fi in Eastern Ontario are public libraries and coffee shops (private companies). This is consistent with global trends that see public Wi-Fi deployed in these locations first.

Public Wi-Fi is provided by upper tier and lower-tier municipal governments, towns and cities. Survey results indicate that twelve of the thirteen municipalities surveyed provide public Wi-Fi, the most common locations being libraries and municipal offices, followed by recreation and community centres. These results are presented in Figure 4.

Recall that this data is the result of a survey of upper-tier municipality's IT directors. They may not be aware of all Wi-Fi services in lower-tier municipal facilities. There may be additional facilities served by public Wi-Fi.

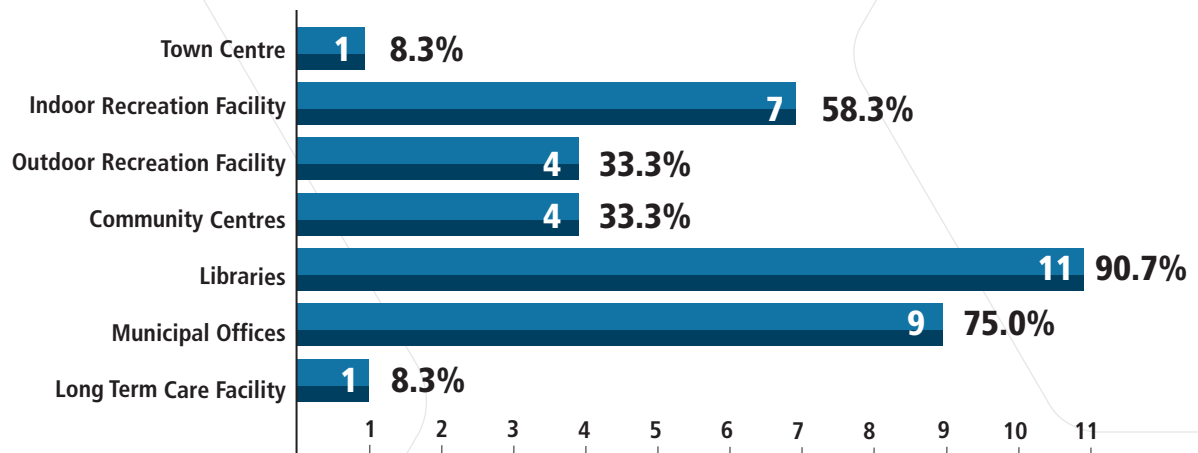


Figure 4: Location of Municipal Public Wi-Fi Sites.

4.1 Public Libraries

Over 125 public libraries in Eastern Ontario offer their clients public Wi-Fi, usually in addition to computers with Ethernet connections. These locations are heavily used. In Eastern Ontario, libraries are the responsibility of various levels of government: upper-tier, lower-tier or individual towns. Only a few libraries do not offer public Wi-Fi service. Wi-Fi has contributed to re-invigorating many rural libraries. People come to check their mail, surf the web, do work or homework. In rural areas of Haliburton, for example, the libraries are crowded with people using Wi-Fi. Many seasonal residents and visitors come to the library to log-on. Even when the libraries are closed, there are often people outside, using the Wi-Fi connection. In Perth too, the library has changed since public Wi-Fi has been provided. It's much busier and much more vibrant. This trend is seen throughout Eastern Ontario.

4.2 Municipal Offices

Seventy-five percent of respondents have public Wi-Fi in their upper-tier municipal offices. Most have access for both employees and the public. Often this service is provided in council chambers and meeting rooms as well as common areas. If the municipal office is in a central location, people may stop by to use the internet. If it is more remote, the service is used mainly by people visiting the office for service or meetings. In the older stone municipal buildings, Wi-Fi signal does not extend beyond the room in which the access point is located. The incidence of Wi-Fi service in lower-tier municipal offices is lower because they are located in smaller towns and are less likely to have access to adequate backhaul facilities.

4.3 Recreation Facilities

Many recreational facilities, including indoor recreation centres, arenas, community centres and outdoor facilities like parks, baseball fields and soccer pitches have municipal public Wi-Fi. Service is expected by many of the clients of these facilities. If they are used in sporting tournaments, results or scores are communicated. Sometimes video or live data from the game is posted, but this requires significant backhaul capacity. If the facility is rented out, the venue has more appeal and value if there is public Wi-Fi.

The City of Belleville, Ontario hosted the U19 Women's World Floorball Championships at the Quinte Sports and Wellness Centre in May, 2016. More than 400 athletes from 16 countries attended this tournament. The economic spinoff from the event is estimated to be in excess of \$1.2 million. This type of tournament requires a world-class facility, including excellent public Wi-Fi to support officials, camera crews, athletes and spectators.

The United Counties of Prescott and Russell understand Wi-Fi as a service their residents and businesses expect. They offer public Wi-Fi at most municipal facilities, as described in the following profile.

The United Counties of Prescott and Russell Wi-Fi Network

In The United Counties of Prescott and Russell, the upper-tier municipality provides public Wi-Fi in the town of Hawkesbury. Almost all upper-tier facilities and many lower-tier facilities in Prescott and Russell are served with Wi-Fi, in most cases, for both employees and the public.

If new facilities are built, Wi-Fi service is normally part of the plan and is installed as part of the communications system at the time of construction. There is public Wi-Fi in municipal offices (council chambers, lobbies, meeting rooms), all libraries, arenas, the water plant, emergency services facilities and the public works garage.

The bandwidth provided is sufficient to browse the web, send texts, download e-mail and photos. Although the speed offered is limited and not designed to offer large streaming capabilities, users are still able to access some streaming content. The network is password protected and the password is updated periodically. Users get the password at the office of the facility they are in. Installation and maintenance are done by the United Counties IT team.

A full re-design of the IT infrastructure was completed a few years ago. This was a major undertaking that has resulted in an infrastructure that is relatively easy to manage. The infrastructure is based on a fibre connection at the United Counties Main office and fibre connections in the remote sites. All the traffic is routed to the main connection at the United Counties main office where it is inspected by the corporate firewall. The entire Wi-Fi infrastructure is managed from a single AP controller, with a deployment that is standard across all locations. Installation of a new hotspot can be done quite simply, by replicating an existing one. County staff and residents are pleased with this service. The United Counties IT team is currently looking to upgrade the fiber connections in remote sites in order to be able to offer better performance for the various Wi-Fi connections.

4.4 Downtown Wi-Fi Zones

Public Wi-Fi in downtown zones is a response to the trend toward connectivity everywhere. Some Eastern Ontario towns and cities provide public Wi-Fi in their town centres, some are considering it and some don't feel it's their responsibility. This is normally the responsibility of the town itself and not the upper-tier municipalities. The towns of Perth and Greater Napanee provide public downtown Wi-Fi Zones as described in the following profiles.

Perth Ontario Wi-Fi Zone

In Lanark County, there is a Wi-Fi Zone serving all of downtown Perth and much of Stewart Park. When there are concerts or festivals in the park, usage is particularly heavy. At other times, visitors bring picnics to the park and access Wi-Fi.

Cottagers come into town for the Wi-Fi. Seasonal residents and visitors to the area use the Wi-Fi in the park or downtown and spend more time in town than they might otherwise. This brings economic benefit to the town, as visitors shop and eat while they are there. The Wi-Fi Zone was installed by WTC Communications of Westport Ontario.

The Town of Greater Napanee Wi-Fi Network

The Town of Greater Napanee has deployed a free Wi-Fi network as a service to residents and tourists and a way of making the town more progressive. They want to appeal to a modern connected clientele. Napanee has recognized that people want to be online all the time.

A splash page (the page users see when they sign on) promotes town events or directs tourist to a tourist information page and a live kiosk. In summer 2016, Napanee will have a summer student develop a walking tour of the town that is accessed through Wi-Fi hotspots.

Wi-Fi service is available throughout the downtown area, on both sides of the river. It is very popular during the many public events and festivals that take place downtown. The Strathcona Paper Centre, a busy recreation complex is connected and heavily used. Boaters who dock at Conservation Park are regular Wi-Fi users. One of the first things boaters do once docked is take out their phones and tablets. Service is available at the skate park, Springside Park, the boardwalk, Conservation Park and docks, the boat launch.

Surveillance cameras are present in certain areas, with live stream CCTV transmitted over the Wi-Fi network.

The Napanee network was installed in 2014 by Storm Internet Services. The largest cost element was hardware, including a 21-meter tower, two 6-meter towers, routers and cabling. Napanee monitors their own network, and has a service contract with Storm for repairs and maintenance. The network includes more than 20 Access Points.

Arnprior, Belleville and Peterborough have plans to deploy public Wi-Fi zones in the near future.

4.5 Municipal Plans for New or Expanded Wi-Fi

As more communities buy fibre services, the capacity to deploy enhanced services including Wi-Fi is greatly increased. A municipal fibre connection can be shared across all facilities. This allows capacity for Wi-Fi for operations, administration and public use. Some municipalities, including Prescott and Russell, Haliburton and the City of Belleville provide public Wi-Fi at almost all their facilities. Several communities that are planning to adopt fibre services in the near future, also have plans to expand the offering of public Wi-Fi in administration buildings, parks, recreation facilities, town centres, campgrounds and marinas. Figure 5 illustrates the survey response to the question about plans to deploy new or additional municipal public Wi-Fi sites.

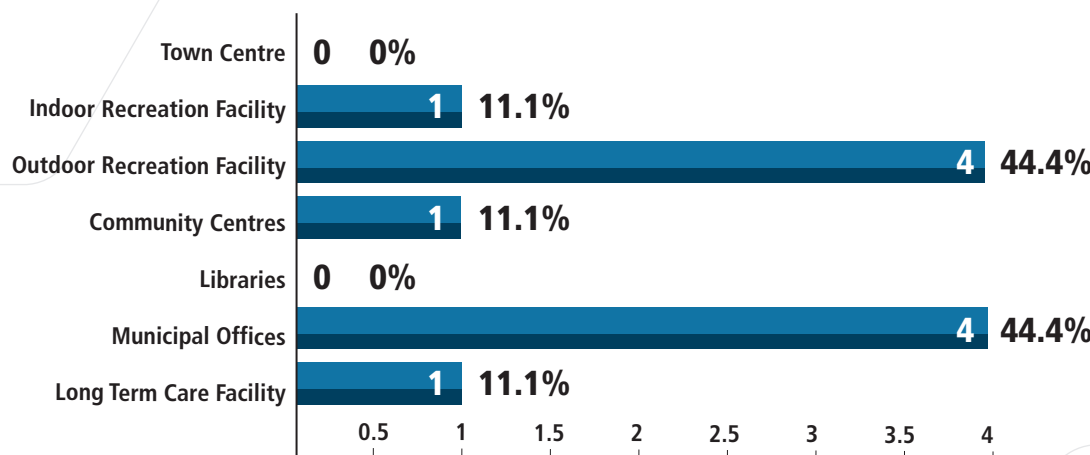


Figure 5: Municipal Wi-Fi Deployment Plans

As fibre is extended to additional communities, the capacity to provide public Wi-Fi is greatly enhanced. Many of the plans for expanded Wi-Fi service follow the deployment of fibre. In Stormont, Dundas and Glengarry, for example, the availability of high-speed DSL is enabling public Wi-Fi at a municipal marina and a campground. In Frontenac County, fibre to a municipal long-term care facility allows capacity for Wi-Fi for residents and guests.

The County of Haliburton is planning to upgrade its municipal Wi-Fi network in 2016. A new fibre connection will provide 100 Mbps service: half for operations and half for public Wi-Fi use. The County will introduce a central management system that will allow it to collect data on traffic and usage at all sites and manage traffic load. It is expected that the new system will require about four hours per month of network management time. This is more work than the current, un-managed system takes, but will provide much better service to the County's clients. A Haliburton arena has been approached about live streaming hockey games. Its 10/1 Mbps connection is not sufficient for this. However, the planned new fiber service will allow plenty of capacity for live streaming games. Enhanced Wi-Fi service at a large park, where concerts and festivals are held, is expected to be a great support for community vibrancy and economic development.

This is really only part of the picture as other tiers of municipal government may also have plans. Wi-Fi Zones in town centres are typically owned and operated by the town or the Business Improvement Association, as in Peterborough.

Peterborough Wi-Fi Zone

The Peterborough BIA will launch a Wi-Fi Zone covering about half of the downtown core in May 2016. The network will serve businesses, outdoor areas including patios and park benches and apartments in the downtown core. The network will be wide open. Sign-on will require agreement to the terms of service but no password. Bandwidth provided will be sufficient to stream high quality video including Netflix. At very busy times, such as during festivals or events, data per user will be reduced.

The Peterborough BIA will collect data through the network for use by its business community. It will collect real-time data on how many devices (proxy for people) enter the service area, how long they stay, where they spend time and when they leave. Both raw and analyzed data will be available to business owners. This zone analytics data will be of value to business operators, who will receive access to the data for free. This type of data could also be sold, but the Peterborough BIA has decided to give it to business owners as they already contribute to the cost of the network through BIA fees. This data does not include any personal information.

A partnership has been formed between the BIA and Cogeco, whereby Cogeco will contribute data backhaul for the network. Peterborough Utilities will provide cherry pickers for equipment installation. Equipment and professional services have been sourced from Softchoice.

4.6 Public Wi-Fi Provided by Private Sector Companies

The biggest private providers of public Wi-Fi in Eastern Ontario are Bell Mobility and Cogeco. Hotspots are also provided by many coffee shops, restaurants, inns, hotels, marinas and smaller ISPs.

Cogeco Free Wi-Fi is available mostly in the Kingston area, where there are 90 hotspots. There are also hotspots in Peterborough, Belleville, Kemptville and Smiths Falls. This service is a variant of the public free Wi-Fi model, as service is available only to Cogeco internet subscribers. It is nominally free, as the service is paid for as part of subscribers' internet service fee. The Cogeco hotspots are located in restaurants, cafes, stores, inns, medical clinics and other customer facing outlets.

Bell Mobility provides unlimited access to free public Wi-Fi in participating Tim Horton's, McDonald's and Chapters Indigo locations. There are over 135 participating locations in EORN-served areas of Eastern Ontario. There are more of these locations in high density areas, but they are also present in small towns.

Many business owners, including coffee shops, restaurants, retailers, inns, hotels clinic and others offer public Wi-Fi to their customers. Normally, businesses expect and appreciate it when Wi-Fi users buy something. Most retailers who offer public Wi-Fi service find that it keeps customers in their facilities longer and see a correlation between having public Wi-Fi and increased sales. If the incremental cost is \$10 to \$50 per month for incremental backhaul capability, it is easy to see how increased revenue could rapidly exceed that.

In Central Frontenac, North Frontenac Telephone Company is providing public Wi-Fi service to visitors at Sharbot Lake beach. The original plan was to fund the service by selling advertising on splash page (the screen you see to log on to the Wi-Fi). However the population was not large enough for this to be successful. North Frontenac Telephone Company decided to maintain the site at their expense, as a community service. Wi-Fi is enjoyed by picnickers in the summer and snowmobilers, ice fishers and cross county skiers in the winter.

5

The Business Case for Free Public Wi-Fi

Developing a business case for public Wi-Fi forms an easy-to-follow framework to support a decision on municipal deployment. As municipal public Wi-Fi is typically provided at no cost to the user, the benefits are in the form of value to the municipality and its residents and businesses. That value is subjective, though real. It is difficult to quantify the benefits of Wi-Fi, just as it is difficult to quantify the benefits of the internet. Nonetheless, benefits can be identified in qualitative terms. In some cases, the Wi-Fi network can generate revenue, but this is not the norm. Deployment and operating costs for Wi-Fi infrastructure depend on the area to be served, the level of service to be provided and many other variables. Cost estimates can be developed by municipal IT staff, with quotes from service providers and equipment vendors. This document will provide a framework for deriving costs and benefits.

Once a network cost is identified, and the benefits of the service are captured, it is possible to make an informed decision as to whether the benefits are worth that investment. Available budget will help determine the service offering. If quantified benefits and costs are required to compare a Wi-Fi project to other potential investments (Net Present Value analysis), the qualitative analysis is a good starting point for that analysis.

5.1 Leveraging the EORN Investment in Broadband

The EORN has made a \$260 million investment (including government and private sector in-kind contributions) in fibre and access networks supporting broadband services across most of Eastern Ontario, and high speed fibre services to more than 50 business parks and commercial areas in the region. This investment in high quality, reliable broadband service supports economic development by enticing businesses to locate in the region. It also provides ample capacity for municipalities to support public Wi-Fi.

In addition to the infrastructure investment, EORN/EOWC has negotiated a long-term Master Business Internet Agreements (MBIA) with Bell Canada for the provision of high-speed internet fibre services for all 103 municipalities and First Nation communities across Eastern Ontario and Nexicom Inc. for the Peterborough area. The favourable pricing in this agreement contributes to a positive business case for municipal public Wi-Fi. Highlights of the Bell agreement include:

- Connectivity at 100 Mbps (symmetrical) with ability to increase capacity.
- MBIA term of 10 years (2016-2026).
- MBIA Pricing is available at any point in the 10-year agreement.
- Those in present agreements with Bell or Nexicom may upgrade to the new agreement with no penalty.
- Capital cost is the responsibility of the client and can be amortized into monthly rates or paid up front.
- Pricing can be reviewed throughout the term of the contract to ensure market competitiveness and speed enhancements.

This agreement offers significantly lower pricing that was previously available. For example, some counties were paying \$1500 per month for 20 Mbps service. The MBIA pricing offers a discount of 94% per Mbps on that pricing, allowing access to much greater capacity. Service offered under the MBIA is on a direct connection, therefore not subject to general network congestion. This level of service can provide affordable backhaul capacity for public Wi-Fi service.

5.2 The Benefits of Municipal Public Wi-Fi

Before deploying or expanding municipal Wi-Fi, a community should assess the value the service can bring. Typical benefits to municipal public Wi-Fi are presented here. Each municipality, knowing their particular environments and populations can estimate the extent to which the value described here will apply to them.

Wi-Fi provided by private enterprise can offer many of the same benefits to a municipality. Encouraging businesses to offer free public Wi-Fi can be a good way to get some of the desired benefits.

The areas where public Wi-Fi tends to have the most impact are: economic development, community branding, support for municipal programs and services, and internet service to low income residents and residents without broadband access at home. Public Wi-Fi can enhance the vibrancy and attractiveness of communities, retaining and attracting young people and business and tourists.

For the purpose of this analysis, the benefits of public Wi-Fi service are presented in qualitative terms. The following are elements a municipality should consider when weighing the value of Wi-Fi service in their community against the costs of installing and maintain Wi-Fi infrastructure.

5.3 Economic Development

Broadband and fibre services are attracting more businesses to Eastern Ontario. Public Wi-Fi provides an incremental boost to economic development, by helping existing businesses increase sales and through social media promotion of the region. Both private and municipal Wi-Fi service contribute to economic development.

The most popular on-the-go smartphone activities of consumers in Canada as of March 2014 were getting directions (81%) and finding new restaurants (60%)¹⁶ (See Figure 6). These are activities that support commerce in the community. Making these activities cheaper and easier makes good business sense for a municipality.

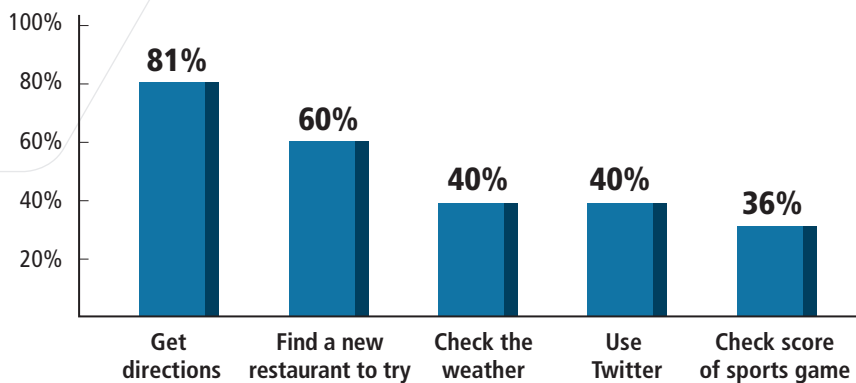


Figure 6: Most Popular On the Go Smart Phone Activities of Consumers in Canada in March 2014

The trend toward mobile communications, globally and in Canada, was presented in Section 3. Providing Wi-Fi in public places, whether downtown zones, recreational facilities or private businesses, provides these connected people a service they want, encouraging them to spend time and money in the community. Social media users love to share photos of themselves and their friends. People sharing photos of themselves having a wonderful time is great promotion for your town.

Many businesses have their own Wi-Fi service. Most cafes and restaurants offer public Wi-Fi to keep people on their premises longer, buying more. Increasingly, customers feel dissatisfied if Wi-Fi is not available. As noted under Wi-Fi trends, many shops now have Wi-Fi connections. Shoppers can do product research on the spot or photograph it and send the photo to their friends for approval, often closing the sale. The additional sales enabled by Wi-Fi can help businesses become more profitable.

Public Wi-Fi increases foot traffic. People walking on the sidewalk are more likely to stop into a store than those driving by. As indicated in the City of Belleville Business Retention and Expansion Report, small town foot traffic is desirable, hopefully leading to increased sales.¹⁷

¹⁶ Statista, Canada: Smartphone Users Activities on the go 2014, <http://www.statista.com/statistics/442985/smartphone-mobile-activities-on-the-go-canada/>

¹⁷ Downtown Belleville Business Retention and Expansion Project, 2014, p.18 http://belleville.ca/images/uploads/Final_Report_-_BR%2BE.PDF

Business people will regularly meet in public places. They often need Wi-Fi and buy coffee and food.

Travelers passing by a town or village may decide to stop to for a meal or to check their mail.

Once they stop, they can use their mobile service, if they have it, or use Wi-Fi on their smart phone. People prefer free Wi-Fi over cell service if there is no cellular signal, if they have no mobile data plan, or if they are trying to stay within the usage allowance of their mobile data plan.

Cellular service, though improving rapidly, is still unavailable in 20% to 30% of populated areas of Eastern Ontario¹⁸. Cellular network capacity can be limited, causing slow, frustrating service.

Public Wi-Fi provides an alternative.

Splash screens (the screen users see when they log onto Wi-Fi), can suggest things to do in town.

They may suggest a local market or festival, a municipal service or activity or they can direct users to a business, perhaps for an advertising fee. Splash pages can also be used to conduct short focused surveys on relevant community issues. Answering a short survey can be included as part of the acceptance of the terms and conditions for using and signing into the free Wi-Fi.

Public Wi-Fi adds value to facility rental, attracting sporting events, fairs, festivals and meetings.

Often, event organizers simply cannot hold events in venues that do not have public Wi-Fi. They need it for operations and their customers demand it. Presentations often include web links. Many sporting events require Wi-Fi to post results and to satisfy the fans' need for constant access. For example, Wi-Fi in arenas will attract more and bigger tournaments. The City of Ottawa confirmed that when they rent conference rooms, they charge an additional fee to activate Wi-Fi. The meeting room Wi-Fi service draws more meetings to their facilities and is profitable.

Retaining young residents in rural areas is important to the continuity and vitality of communities.

Connectivity is extremely important to this demographic. Public Wi-Fi makes connectivity cheaper and more available to them and signals that the community is right for them.

Seasonal residents are also very important to many rural communities. They come into town as cottagers or visitors and frequent shops, restaurants, marinas and other facilities. Wi-Fi zones and Wi-Fi hotspots will help keep them in town or at public facilities. Instead of picking up their boat and leaving a marina, they may stay for coffee or lunch, if they can be connected. More tourists come, stay longer, spend more money and make the area feel more active, livable and vibrant. They will choose cottages, campgrounds, inns, B&Bs and hotels that have Wi-Fi. The idea of "getting away from it all" has much more limited appeal than it once did.

5.4 Community Branding and Marketing

The availability of public Wi-Fi is a feature of technically and socially progressive towns and cities. It can bring an atmosphere of vibrancy and success to a community. Recognized brands including Smart City and Intelligent Community can be pursued to secure the capability and image they represent.

The smart city is defined by Wikipedia as an urban development vision to integrate information and communication technology (ICT) solutions in a secure fashion to manage a city's assets.

The goal of building a smart city is to improve quality of life by using technology to improve the efficiency of services and meet residents' needs. Public Wi-Fi can also play a role.

¹⁸ EORN data

Smart City

An Intelligent Community is a designation conferred by the Intelligent Community Forum to applicants who understand the challenges of the Broadband Economy and have taken conscious steps to create an economy capable of prospering in it.¹⁹ Kingston, Burlington, Ottawa, Stratford, Sudbury, Toronto, Waterloo and Windsor-Essex are all Intelligent Communities in Ontario.

Without attaining Intelligent Community status, a municipality can brand itself as a progressive community that embraces information and communications technology (ICT) for the benefit of its residents, visitors and business people. Making public Wi-Fi available is one of many indications that the municipality understands and believes in the community value of connectivity. Promoting this service and the values that underlie it can enhance the reputation of the municipality.

The municipality's brand must then be promoted to create awareness. Signage is an important step. It should indicate all public Wi-Fi sites. The municipality's web site should also inform the public of the availability of public Wi-Fi. A Wi-Fi splash screen can support branding by requiring users to see promotional material or community service messaging.²⁰

Social Wi-Fi can also be used to promote the municipal brand. Social Wi-Fi requires users to like a Facebook page or tweet about the venue hosting the hotspot (the municipality in this case). This serves as the login process for the Wi-Fi network. Once connected, Wi-Fi analytics provide demographic and engagement information about the user, to the site host. Information available includes how long they are online as well as the information in their social networking profile (age, gender, affiliations, interests, etc.) This allows the municipality to share personalized offers, provide mobile payment facilities, generate a marketing list, track consumer behaviour and build its brand.²¹

5.5 Collaboration with other Municipal Programs and Services

In many communities, free public Wi-Fi is seen by residents and the municipality as part of the public service offering. It supports other programs and municipal services.

The following examples illustrate how public Wi-Fi supports other municipal services:

- **Public libraries:** Almost all public libraries in Eastern Ontario offer their clients Wi-Fi. The internet is the most popular and in many cases the only way to access current information. Customers can access the internet through library computers, or on their own devices over Wi-Fi. Public Wi-Fi has transformed many libraries from quiet places with limited selections of recently published books to active social and educational hubs.
- **Municipal administrative and operations facilities:** Public Wi-Fi is often provided in municipal buildings for the benefit of the public and business visitors.

¹⁹ Intelligent Community Forum, intelligentcommunity.org

²⁰ Wireless Broadband Alliance, Connected City Program, <http://www.wballiance.com/key-activities/connected-city-program/>

²¹ <https://econsultancy.com/blog/64277-how-to-use-free-wi-fi-for-social-marketing-and-analytics/>

- Recreation centres, sporting venues and meeting rooms: Public Wi-Fi enables spectators, people waiting for players, and participants of various activities to access the internet while at the facility. Public Wi-Fi is necessary for hosting many types of events and meetings. The availability of Wi-Fi makes facilities easier to rent and can attract a higher rental price.
- Special events: Events such as concerts, fairs, and markets all benefit from public Wi-Fi.

Public Wi-Fi can be an integral part of the municipal service offering. Often Wi-Fi is essential for event organizers, and meeting participants who might be using non-mobile devices.

5.6 Service to Low-income and Underserved Residents.

“Rural family income levels are 15 per cent lower than levels in metropolitan Ontario.”²² The high cost of access to internet and mobile data can be a hindrance to equality in access to education, employment, health and social connection. There are certainly opportunities to support low-income residents.

Municipal public Wi-Fi can provide many of the benefits of internet connectivity to those who do not have connectivity at home and/or have little or no mobile data service. This could be for reasons of:

- Affordability of internet service: Rural service can be limited and expensive.
- Affordability of mobile data plans: Residents who have cell phone plans may choose small data plans or no data plans, knowing that they can rely on public Wi-Fi in certain places. It is very expensive to supply a family with multiple children with data plans.
- Inability to access internet from home: up to 5% of residences in Eastern Ontario still do not have good access to terrestrial-based internet.²³

There are other ways that Wi-Fi can be used to support low-income residents. In some cases, devices are required as well as the connection to the internet.

- Public Wi-Fi can be installed at social services facilities, food banks, shelters, employment centres or drop-in centres.
- Wi-Fi Zones may provide home internet service to residents in low-income apartments.

The public Wi-Fi Zone in Greater Napanee serves 250 apartments. The service provides moderate bandwidth service, enough to do email and web-searches, moderate-quality video calling, but not enough to stream high quality video.

The Peterborough BIA public Wi-Fi Zone provides service to downtown apartments. This is high bandwidth service, sufficient to meet most internet needs. During high data traffic events, bandwidth is reduced.

²² Dec 2015, Focus on Rural Ontario Fact Sheet, <http://www.farms.com/news/focus-on-rural-ontario-fact-sheets-show-rural-income-levels-and-trends-101871.aspx>

²³ EORN web site, eorn.ca

Through public Wi-Fi, low income residents can gain access to the benefits of internet connectivity. The most notable of these are:

- Social connection: The ability to connect with family and friends via social media, email or video and enjoying entertainment options through internet television/movie services and gaming. Marginalized residents often own a smartphone, but have trouble making monthly payments.
- Improved public access to government services and information.
- Economic potential: The ability to search for jobs online, to apply online, to operate home based businesses, to telecommute, to do online banking and investing.
- Educational: The ability to take online courses, to do coursework at a bricks and mortar institution from home, to submit assignments from home, to do online research, to read online material.
- Health care: To access health services (eHealth Ontario, online lab results, online consultations with medical professionals in another community), to use eHealth monitoring services (alarms, glucose monitors, etc.), remote diagnostics, to research health related topics, to find appropriate health services.

A side benefit of having access to the internet in public places is reduced isolation. Sometimes, members of rural communities can become isolated. Going to a public place creates opportunity for interaction with other community members.

5.7 Revenue Generating Opportunities

Municipal public Wi-Fi is typically provided as a public service but there are some opportunities to generate revenue. Examples include:

- Splash screen advertising, other ad-based revenue programs.
- Exclusive rights to locations where Wi-Fi hotspots are located can be sold.
- Wi-Fi Zoning analytics: Data on user traffic can be sold, used by the municipality, or made available to community members. The type of data available is aggregate real-time data on the number of users by area or by type of device.
- With Presence Analytics tools, the network operator can track the unique mobile access control (MAC) addresses of smartphones as they pass through an area. From this it can gather statistics on footpaths, dwell times and time of day traffic volumes at various locations, gaining insight into what areas are drawing traffic. Data is collected whether users log onto the public Wi-Fi service or not, as long as the phones have Wi-Fi turned on. MAC addresses are unique to each device and therefore are traceable to unique owners. Operators must be careful to explain that no individual information is used in their analysis.²⁴ The information provides valuable insights for business operators, municipal planners, economic development organizations and BIA's. The Peterborough BIA has plans to provide this type of information to their member

²⁴ <http://blog.mojonetworks.com/top-reasons-to-use-wi-fi-zoning-analytics/>

businesses. Municipalities have been known to sell this information to developers or other interested parties. Social Wi-Fi, described in Section 5.4: Community Branding and Marketing can also provide valuable data for municipal planners and businesses.

- Facilities can be rented at a higher price, and more frequently if they have public Wi-Fi.

The City of Ottawa has deployed a revenue-generating Wi-Fi system, presented in the following profile.

City of Ottawa Free Public Wi-Fi Program

The City of Ottawa Community Champions Program is a successful partnership between EION/ IceNet Wireless and The City, providing 25 free Wi-Fi sites in public gathering spaces in major recreation facilities and administrative buildings in Ottawa.

Through this program, The City of Ottawa granted EION Wireless exclusive rights to provide free Wi-Fi in 25 city facilities. In exchange for exclusive venue rights, EION installed the Wi-Fi infrastructure, including access points, wiring and backhaul services, maintains the network, provides technical and bilingual customer service support and provides the city with monthly revenue including a percentage of advertising revenue.

EION, with its partner IceNet Media, provides advertising on digital displays at city facilities where free public Wi-Fi is offered. For example, at the Nepean Sportsplex, a very active city sports complex, IceNet presents ads on displays to be viewed by all those who see the display. This is a larger audience than that using the free Wi-Fi and viewing splash screens on mobile devices, generating larger ad revenue. IceNet also displays public service announcements on behalf of the city on the digital displays.

The city of Ottawa also contracts with IceNet to provide Wi-Fi service in some meeting rooms and rental spaces. In these cases, the incremental facility rental fees from the availability of Wi-Fi cover the cost of the Wi-Fi.

The City of Ottawa and its customers are extremely satisfied with their public Wi-Fi service.

There are instances where public Wi-Fi provided by a municipality is intended to provide revenue (City of Ottawa). However, most municipal Wi-Fi deployments are intended as a non-revenue generating public service.

Estimating the Cost of Municipal Wi-Fi

The cost side of the business case for Wi-Fi deployment includes the capital cost to deploy the equipment and the operating cost to manage and maintain the system.

Estimating the cost of a Wi-Fi system depends on many factors associated with the deployment. By understanding the cost elements, communities can tailor the service offering to fit within the available budget. This section will identify factors that affect cost and provide some very general examples.

IT departments deploying new Wi-Fi networks can either deploy and manage them themselves, or contract with a service provider to deploy and manage their network. This will depend on the resources available to the IT department: the skills, time and money.

Ninety percent of upper-tier municipalities in Eastern Ontario have deployed and currently manage their own Wi-Fi hotspots. Some of the same municipalities have also contracted out some elements of their deployments. Wi-Fi Zones in town centres are often deployed by a third party. It is essential to set out the specifications of the required Wi-Fi system and get quotes for components or, if contracting out, for the full project.

The major factors that contribute to the cost of a Wi-Fi network are:

Networking Equipment

There is a large offering of networking equipment on the market. The 5GHz Access Point (AP) devices that support 802.11ac standards will provide the best performance and security. Pricing varies with functionality and brand. Factors that will impact equipment selection include:

- Size of area to be served, which determines the number of access points required and the range of each access point.
- Number of devices to be supported.
- Mobility, such as if users need transparent handoff from one AP to the next.
- Type of activity supported (related to bandwidth required).
- Network Control, per AP or centralized.
- Spectrum and standards.
- Content filtering.
- Indoor vs. outdoor deployment.

Municipal IT staff have had great success with many makes and models.

Network Architecture: A standard, centralized architecture offers efficiencies, as installation and operation procedures are the same in each deployment. There may still be differences in equipment to meet the requirements of each site.

Internet Connection

To support public Wi-Fi, the connection to the internet requires sufficient bandwidth to support the expected traffic. Public Wi-Fi is provided on a best effort basis, but if there is truly not enough backhaul capacity to support users, they will be dissatisfied, defeating the purpose of the service.

The amount of bandwidth required will depend on the situation. In a library, users will be doing work or research, perhaps over an extended period of time. Increasingly, this can involve video content or access to the cloud, perhaps for Dropbox or Google Drive. The system will be expected to support Google search and YouTube viewing, but perhaps not feature-length HD video. Data downloaded usually exceeds data uploaded, even with cloud services, as most users consume much more data than they produce or publish.

In a town centre, or sports venue, the typical on-the-go internet activities as indicated in Figure 6, page 18, would be expected (get directions, look up a restaurant, check the weather, Twitter, sports updates). These are not data intensive activities.²⁵ Increasingly, users post photos or video, but expectations of public Wi-Fi may allow for a few seconds delay, as photos are transferred.

Some networks operate at a higher standard and support data intensive activities, as does the Peterborough BIA public W-Fi network.

The table in Figure 7 provides a template for calculating sufficient backhaul capacity to support expected Wi-Fi users. This table provides estimates of download bandwidth; upload capacity can be lower. The network operator can determine the type of activities they want to support and provide sufficient bandwidth. For example, in Figure 7, high bandwidth services are not supported. To estimate required bandwidth, estimate the number of simultaneous users and the activities they are likely to engage in. Then, estimate the percentage of total simultaneous users engaged in each activity.

Bandwidth usage per activity x Percent of users engaging in a particular activity x no of simultaneous users = Bandwidth required

Only a portion of people in the served area will be online at the same instant. In this example there are 50 simultaneous Wi-Fi users assumed to be in a town centre venue.

²⁵ Robert Moskowitz, Sept 25, 2013, <http://quickbooks.intuit.com/r/marketing/5-problems-to-avoid-when-offering-free-wi-fi/>

Application	Bandwidth Usage Level	Bandwidth Usage (Kbps)	% of Simultaneous Users	Bandwidth required (Kbps)
No. of Simultaneous Users			50	
Instant Message	UltraLight ²⁶	1	30%	15
E-mail	Light	200	10%	1,000
Web search or apps (map, restaurants, weather)	Light	200	40%	4,000
Facebook	Light ²⁷	200	10%	1,000
YouTube	Medium	900	5%	2,250
Upload Photos	Medium	900	3%	1,350
Skype with video	Medium	900	2%	900
Google Drive, Dropbox	Heavy	2000	0%	0
Video Streaming	Heavy	4000	0%	0
Bandwidth Required				18,015

Figure 7: Bandwidth Requirement Calculation

The bandwidth required to support the 50 simultaneous users in Figure 7 is 18,015 Kbps or 18 Mbps.

A potential problem with public Wi-Fi is that a few people may attempt to use too much data. While most guests will engage in low bandwidth on-the-go activities, some may want to download large files, such as video files and will slow down the service for everyone else. To ensure that a few prolific file downloads do not disrupt the service for others, limits can be set for download and upload speeds. These limits should be established based on the expected use of the service and the total available bandwidth. The provider can also establish limits on the daily data transfer per user. The town of Perth imposes a limit of 50 Mbps per user per day. The public Wi-Fi provider is not an ISP and provides service on a best effort basis.

²⁶ Ken Millberg, How to Calculate Network Bandwidth Requirements <http://searchenterprisewan.techtarget.com/definition/bandwidth>, IM <1 kbps, VoIP-56 Kbps, Standard Video (480p)-1 Mbps, HD Video (720p)-4 Mbps, HDX Video (1080p) >7Mbps

²⁷ <http://www.tested.com/tech/smartphones/3105-how-much-data-the-most-popular-smartphone-tasks-and-apps-actually-use/> Google Maps 150-200 Mbps to search a location. Facebook – 200kbps to open the app and update the stream if you haven't used it for a while. Last updated in 2011

Most municipal facilities will already have an internet connection. IT Directors interviewed have stated that the incremental cost to add to an existing connection to support public Wi-Fi is small to nil, particularly if they have fibre services. They also said that they ensure adequate bandwidth for employee use and based on reasonable cost, decide the amount they will make available for public use. If they have a 100/100 Mbps fibre link to their facility and need 50 mbps for municipal employees, they will make 50 Mbps available for public use.

The City of Belleville has a backup internet connection provided by a different service provider than their primary connection. They use the backup connection for public Wi-Fi at no incremental cost. If the primary internet connection fails, they will drop public Wi-Fi services. They provide free Wi-Fi at 20 locations on this backup connection. Wi-Fi speed is capped at 512kbps per user.

The long-term Master Business Internet Agreements (MBIA) that EORN has negotiated with Bell Canada and Nexicom Inc. make bandwidth more affordable to Eastern Ontario municipal governments.

Monitoring and Maintenance

Monitoring and maintaining a single router takes little time. However, as the number of Wi-Fi hotspots a municipality operates increases, it becomes more onerous.

Municipalities that have centrally managed Wi-Fi networks, have said that the cost and effort required to upgrade their systems have paid off in terms of their ability to manage them well. Several municipalities that have distributed systems stated that they are planning to move to a single controller for central management of their Wi-Fi networks.

In order to identify costs and opportunities associated with Wi-Fi, two examples of network architectures are presented.

- a single Wi-Fi hotspot
- multiple Wi-Fi hotspots

6.1 A Single Wireless Hotspot

A simple Wi-Fi hotspot requires an access point (AP) and an internet connection. The AP enables multiple devices to be connected to the internet using a single connection. See Figure 8. This type of hotspot might be found in a small library, a meeting room, a baseball diamond, or a small town hall.

Choose a router that meets your needs. Cost should be between about \$100 and \$200 for a basic router. A device that meets current standards (802.11ac) will provide the best performance and security.

Operating cost will include backhaul and maintenance. Backhaul costs will depend on the type of internet service available and the amount allocated to public Wi-Fi. The example below assumes an upgrade to existing Bell Fibe service. Pricing will be different for different carriers and services. A municipality that has excess capacity in their connection to the internet will not incur additional cost for Wi-Fi backhaul.

Typically, this type of Wi-Fi hotspot requires very little maintenance. If Wi-Fi access is password protected, the password should be re-set frequently. Existing facility staff can re-set and distribute the password.

The following is an example – costs will vary.

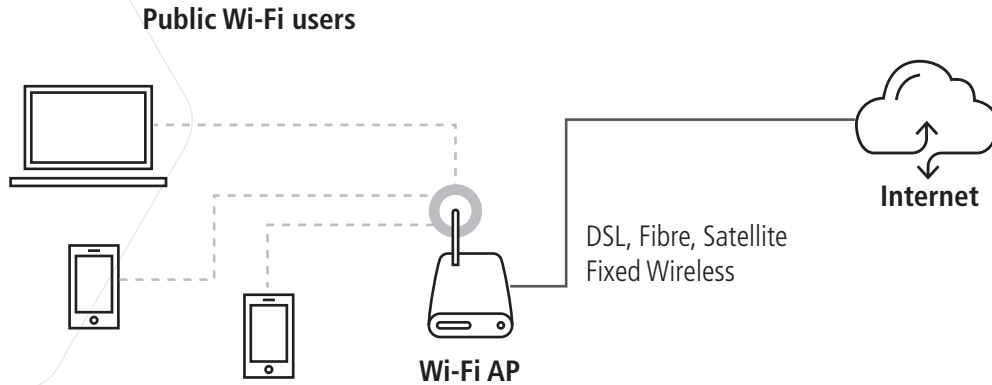


Figure 8: Simple Wi-Fi Hotspot Architecture

Capital costs associated with the multiple AP hotspot network illustrated in Figure 8.

Cost Element	Assumptions	Cost
One Access Point (AP)	Basic Indoor AP	\$100-200
Wiring	100 feet of cable, \$200/1,000 feet	\$20-\$50
Installation & setup	Two hours No new staff Loaded Labour Rate (LLR) or 0	\$0
Total		\$120 - \$250

Operating Costs

Cost Element	Assumptions	Cost
Monthly internet connection	There is an existing 25 mbps connection. Buy incremental 25 mbps Bell Business Fibe unlimited data 25 mbps \$71, 50 Mbps \$81- increment \$10	\$10
Monitoring & maintenance	<1 hour / month by existing employees - LLR or \$0	\$0
Inquiries	Typically made to the attendant who is there anyway	\$0
Total		\$10

6.2 Multiple Wi-Fi Hotspots

It is typical for municipalities to have multiple hot-spots in one or more locations. These can be independent hotspots or Wi-Fi Zones with handoff from one site to the next without dropping the connection. The architecture in Figure 9 illustrates a deployment of four Wi-Fi hotspots in a two rink arena that also has two meeting rooms. It shows four public access points (APs) connecting to the internet through a single gateway device. Each access point receives signals from wireless devices and transmits them to the gateway/AP Controller/Firewall for connection to the internet.

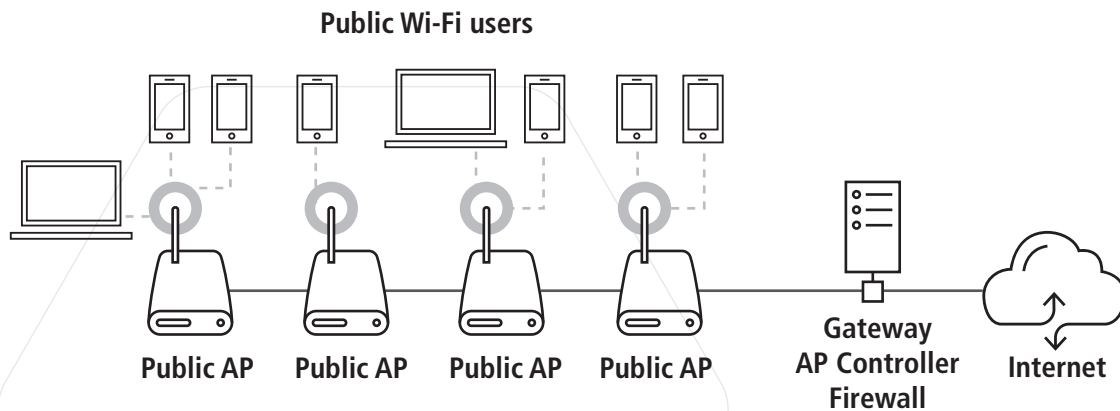


Figure 9: Multiple Wi-Fi Hotspot Architecture

The controller in Figure 9 is software that can be located on a server on an existing municipal computer. IT staff can manage all access points on their network remotely via the controller. The controller monitors traffic at each AP and flags issues. It can allocate bandwidth among APs. The gateway device will also include a firewall. Different types of APs are assumed in the example, such as outdoor APs to handle the cold in the arena. Controller (including firewall) software can be included in the price of the APs. If different functionality is required, different software can be purchased.

In calculating operating cost, some municipalities do not consider cost if incremental staff is not added. Others calculate opportunity cost if staff could work on another project, instead of spending time on network management, for example.

Capital costs associated with the multiple AP hotspot network illustrated in Figure 9.

Cost Element	Assumptions	Cost
Four AP/Routers + Controller	Basic Indoor AP	\$100-200
Server	Use an existing computer	\$0
Wiring	6,000 feet of cable, \$200/1,000 feet	\$1,200
Installation	Five hours (estimated)	
Total		\$2,140

Operating Costs

Cost Element	Assumptions	Cost
Monthly internet connection	Bandwidth – how much does this service increase total muni bandwidth usage?	\$0-\$100
Server and router s/w upgrades	Four hours /quarter - (one hour/month)	
Inquiries	Typically made to the arena attendant who is there anyway. No additional staff	\$0
Total		\$0-\$100

6.3 Wi-Fi Zones

Wi-Fi Zones as found in town centres, typically involve networks with hand-off of signal from one access point to the next, as the user moves around the area served.

The cost of this type of network will depend on the area to be served, the level of service to be delivered, access to fibre or DSL backhaul services and access to vertical real estate on which to place antennae. If the town has suitable structures in place, such as water towers, light standards, or buildings, constructing new towers may not be necessary. Whether the network is owned and managed internally or by a third party will affect operating cost. Typically, an RFP is issued for this type of network build, if it is to be done by a third party. Some ISPs will own the network and charge a monthly fee for network management. Alternately, the town can own and operate the network once it is deployed.

Costs for town centre Wi-Fi Zones deployed in Eastern Ontario have ranged from \$50,000 for about 10 APs to \$75,000²⁸ for 20 to 25 APs. In the case of the Napanee Wi-Fi network, once the CCTV security system and other costs are included, the cost is slightly over \$100,000²⁹.

²⁸ Meghan Balough, News Local, Sept 2, 2014 <http://www.napaneeguide.com/2014/09/02/downtown-wi-fi-will-be-free-to-public>

²⁹ Jim Barber, Greater Napanee News, April 8, 2014 <http://www.greaternapanee.com/council-approves-move-to-install-internet-wi-fi-and-cameras-in-key-parts-of-downtown-this-year/>

6.4 Summary

The cost/benefit analysis will help municipalities determine whether they will deploy public Wi-Fi and the level of service to provide. By evaluating what users will want to do with the Wi-Fi service and the cost to provide it, they will arrive at a sweet spot in terms of service offering.

By comparing the summary of benefits that public Wi-Fi will bring to a community and the projected cost of deploying and managing the service, it is possible to make an informed decision as to whether the benefits exceed the costs and how this project compares to other potential projects.

7 Funding for Municipal Public Wi-Fi

Where can a municipality get the money to fund deployment of free public Wi-Fi Services?

Often, the municipality providing the Wi-Fi service pays for it through their tax-funded general revenue. In the cases of Greater Napanee and Peterborough, some funding was provided by the Community Futures Development Corporations. In Peterborough, the Business Improvement Association is driving the project and is the largest funder. Peterborough Utilities is providing support for installation of equipment with their cherry pickers and Cogeco is providing backhaul service. Partnerships can provide services in kind, as seen in the Peterborough Utilities/Cogeco/Peterborough BIA partnership and the City of Ottawa's partnership with EION/IceNet.

Wi-Fi Hotspots have also been funded as part of larger projects funded through government programs such as OMAFRA's Rural Connections, Industry Canada's Connecting Canadians and Digital 150. Municipal financial contributions were required for these programs, as well.

8 Security and Liability Risks

There are manageable risks associated with providing public Wi-Fi, in the area of security and liability. Using proper security practices and policies will help mitigate security risks. Liability for Wi-Fi network issues should be understood by providers.

8.1 Security

Security of the private network is critical. The private network should be segmented from the public network using a gateway, firewall or VLAN. Public access users usually get access to the internet only. Another firewall should control incoming traffic from the internet to prevent attacks from that direction. See Figure 10.

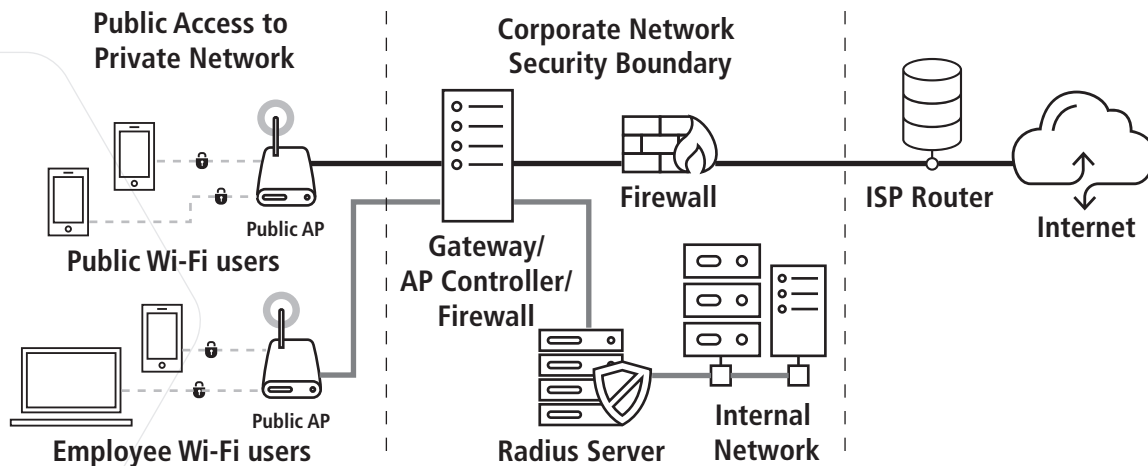


Figure 10: Network Security

Zones

Different zones should be established in the network to support users with different privileges. Establish a guest (or public) zone that is a subset of the zones for employees. Zones can be implemented with Virtual Local Area Networks (VLANs) with access restrictions enforced by an upstream device such as a gateway, AP controller or firewall.³⁰ Various authentication options can be implemented in the private corporate network, for example, Radius servers.

Policies are put in place to limit and enforce what public users can access on the corporate network. A log-on page should be presented, then the user is granted internet access. Employees will have access to the appropriate portion of the private network according to their privileges.

As illustrated in Figure 10, traffic from public Wi-Fi users comes into the network via an AP and is controlled by a gateway device to a firewall on the ISP side of the network and then, directly to the internet. There is no access to the internal corporate network. The path for public traffic is shown in green.

Public Access

Public internet access via Wi-Fi can either be secured or left open. The choice to provide security might hinge on the expected use. A public Wi-Fi zone on a street, where users are likely to engage in popular on-the-go activities (get directions, look for a restaurant, check the weather, use Twitter, check sports scores) might be suitable for open access. A meeting room or library, where users do work, would be a candidate for better security. If the network is secured, a password is required, along with agreement to a Terms and Conditions of Use Statement. Both appear on a splash page to log-on. If the network is not secured (open) the Terms and Conditions of Use Statement should be agreed to at log-on. Use of a password provides protection for the network operator and other Wi-Fi users.

³⁰ Revolution Wi-Fi <http://www.revolutionwifi.net/revolutionwifi/2011/01/wireless-network-segmentation-options.html>

Security Level	Advantages	Disadvantages
Password Protected	Owner sees and controls who gets the password	Administrative burden Password holders share the password
Open	Lower administrative burden	No control over who accesses the network

Open Wi-Fi Hotspots

Open Wi-Fi hotspots are inherently insecure. They are configured with no security to simplify administration and eliminate the need to distribute the security key (password).

There are two main security risks to the network owner with open networks.

- Users taking up too much bandwidth and network resources , e.g. Denial of Service.
- Users gaining network access to use as a springboard to launch attacks or spam, resulting in liability for the network owner.

Another risk, to users of open access points, is that a malicious user can exploit other users connected to the same hotspot. If the hotspot is left open, users must be informed that it is open and no security is provided. This should be done through a Terms of Service Agreement presented at time of sign-on. All security is the responsibility of the user.

Securing Wi-Fi hotspots

If the network owner decides to secure the Wi-Fi network, they should take reasonable care that the security is effective. Securing a Wi-Fi network involves establishing the right policies, encryption and password management. Detailed research on how to secure your network is recommended. The following are some areas that should be considered.

Encryption

The link between the User Device (Public Wi-Fi User and Employee Wi-Fi User) and the access point (AP) in the public network segment (Figure 10) should be encrypted to protect against passive eavesdroppers looking for sensitive information. To encrypt the link, the security settings on the access point /router should be turned on. The WPA2 protocol is the most robust, followed by WPA. These protocols should be used. WEP should not be used as it is not secure.³¹

PSK (pre-shared key) is the most common authentication method for public access networks. A robust password should be given out to users (a mix of 8 upper and lower case characters, symbols and numbers – not a dictionary word). A policy on the frequency of password change should be established. The password should be changed frequently -- daily is ideal. There is a tradeoff between administrative burden and security.

EAP-TLS authentication is recommended for business environments (the private municipal employee network).

³¹ Sophos, Naked Security, March 27, 2015 <https://nakedsecurity.sophos.com/2015/03/27/how-secure-is-your-wi-fi-3-things-small-businesses-need-to-know/>
<http://www.emperorwifi.com/2015/05/vlans-why-you-always-want-to-use-them.html>

Access Points

The default SSID name on access points should be changed to something unique and that will help people identify the right network to join. Do not use the default name.

Use 5GHz devices that support 802.11ac standards.

Signal Strength

To limit public Wi-Fi access to a certain area, the access point can be tuned to cover that area. For example, you might want to provide access in a hockey arena, but not in the parking lot. By reducing the power to the access point, the range will be reduced. Parking lot access is a convenience for some, but is a popular place for passive eavesdroppers and other offenders. The convenience/risk tradeoff should be considered in deciding where to extend service.

Eastern Ontario Communities

The survey of upper-tier municipalities in Eastern Ontario revealed that of those communities that provide public Wi-Fi, 33% require a log-in with password, 42% leave their Wi-Fi network completely open and 25% have a combination of some open hotspots and some protected by password.

8.2 Liability

Neither the Canadian Radio-television and Telecommunications Commission (CRTC) nor Industry, Science and Economic Development Canada have made statements about liability for activity conducted over a public Wi-Fi network or requirements relating to logon records, browser history or router logs. Similarly, this paper does not provide a legal opinion. The information presented is based on common practices.

Public Wi-Fi network operators may be able to protect themselves from liability for illegal activity on their networks by:

- Securing their network (See Section 8.1 Security)
- Implementing Terms and Conditions of Use Policies

Taking these steps will help prevent illegal activity and may provide some legal protection against liability for illegal activity. These steps are the same, regardless of the illegal activity of concern.

The infractions that municipalities are concerned about include:

- Users taking up too much bandwidth and network resources, e.g. Denial of Service
- Users gaining network access to use as a springboard to launch attacks or spam.
- Users exploiting other users connected to the same hotspot. This could be to collect passwords or other proprietary information.
- Users conducting any other illegal activity. The possibilities are endless and include terrorism-related activity, activities related to child pornography, and any other illegal activities.
- Users making available offensive, but not illegal content.

8.2.1 Terms and Conditions of Use Policies

To protect themselves from liability for activity on public Wi-Fi, municipalities should require agreement to Terms and Conditions of Use Policies. These are agreements between the Wi-Fi internet provider and user, entered into at the time of sign-on to the service. They can be presented on a splash page and managed remotely.³² Terms typically state that by connecting to the internet through this Wi-Fi service, the user agrees to be bound by the Terms and Conditions of Use.

The Terms and Conditions of Use set out the responsibility of the user and the provider and limit liability of the provider. They should include:

- An indemnity statement.
- Acceptable Use Policy (AUP) stating the type of activity that is and is not permitted. The policy should prohibit illegal behavior, distribution and communication.
- A privacy statement, explaining the open nature of the network.
- Service level commitments. (Generally there is no commitment to any particular level of service.)

Guidelines for Drafting the Policy³³

- The policy should describe areas of responsibility for all parties (the public and the provider (municipality)).
- The policy should be enforceable.
- In keeping with constant changes in IT and cybersecurity, the policy should be flexible to adapt to changes in infrastructure and security threats.
- The policy should be clear, easy to implement and avoid language that is open to interpretation such as “reasonable” and “appropriate.”
- Drafting policy should involve consultation with the organization’s IT department, security professionals and legal counsel.

The requirement to agree to Terms of Use Statement has the additional benefit of limiting unintended traffic on the network. When users keep smartphones and tablets “Wi-Fi enabled,” those devices will automatically try to connect to a public Wi-Fi network whenever they come within range. The device immediately hits the Terms of Service page and, unless the user notices and intervenes, the device drops off the network.³⁴

³² Cisco / Meraki, https://meraki.cisco.com/lib/pdf/meraki_whitepaper_captive_portal.pdf. Other vendors offer similar solutions.

³³ Infosec Institute, 2013, Acceptable Use Policy Template for Public Wi-Fi Networks. <http://resources.infosecinstitute.com/acceptable-use-policy-template-public-wifi-networks/>

³⁴ Jessica Scarpati, What happens if you remove an acceptable use policy from guest Wi-Fi? 2015 <http://searchnetworking.techtarget.com/news/4500245600/What-happens-if-you-remove-an-acceptable-use-policy-from-guest-Wi-Fi>

The following table includes links to examples of Terms of Use documents for municipal libraries, Wi-Fi Zones and Bell Mobility's network.

Internet Use Policy Examples

Organization	Link to Policy	Comments
Tim Hortons (Bell Mobility)	http://www.timhortons.com/ca/en/locations/wifi-terms-and-conditions.php	Indemnity AUP embedded in Terms & Conditions
Greater Napanee Wi-Fi Zone	See policy in Appendix B	
Kitchener, On	http://www.kitchener.ca/en/livinginkitchener/WiFi_Internet_Access.asp	Long list of unacceptable uses Consequences
County of Lennox & Addington Public Libraries	http://www.countylibrary.ca/wp-content/uploads/LAPL-Internet-Services-Policy.pdf	No restrictions No log-in No guarantees
Frontenac County Libraries	http://www.kfpl.ca/library-policies/Internet-policy	Use for illegal, actionable or criminal purposes or to access unauthorized areas-prohibited.

8.2.2 Copyright

Canada's Copyright Modernization Act is proving effective at reducing the incidence of copyright infringement. The final part of the Act went into effect on January 1, 2015. The Notice and Notice provisions of this Act require internet service providers (ISPs) to relay notices of copyright infringement allegations received from copyright owners to their customers. The identity of those under suspicion is kept confidential, unless the rights holder obtains a court order for the information. The Notice and Notice regime does not impose any obligations on a subscriber who receives a notice and it does not require the subscriber to contact the copyright owner or the intermediary.

As an example of a notice and notice action, a copyright owner might send notification to an ISP alleging that a customer, say, a municipality, has infringed their copyright. The notice must contain:

- The infringement alleged.
- The material to which the allegation applies.
- The claimant's right in the material and name and address.
- The electronic address, date and time of the alleged activity.

The ISP receiving a notice of infringement must:

- Forward the notice of alleged infringement to the customer whose account corresponds to the electronic location (IP address) and time identified in the notice. This could be a municipality offering public Wi-Fi, where a user has infringed copyright laws. This is an allegation – it could be an error, or unprovable.
- Preserve the records for six months, allowing the identity of the person to whom the electronic location belongs to be determined.

The ISP is not required to take any further action. The Notice and Notice regime does not impose any obligations on a subscriber who receives a notice and it does not require the subscriber to contact the copyright owner or the intermediary. In fact the subscriber (or municipality) should not contact the copyright owner, as they will then disclose their identity.

If a municipality receives such a notice, they may forward it to their Wi-Fi user, if they have their identity – or not. This may be a trigger to tighten their security (change passwords more frequently), or provide clearer or firmer instructions in their Terms of Use Agreement.

Further information on the Notice and Notice Regime is available on the Innovation, Science and Economic Development Canada website.³⁵ Michael Geist, Canada Research Chair in Internet and E-Commerce Law at the University of Ottawa has provided interpretation on this regime.³⁶

8.2.3 Storage of User Data

The general practice of public Wi-Fi providers is not to store user data. Among Eastern Ontario municipalities surveyed, 91% of respondents do not store user data. If police need information about users, they must provide a warrant and can only access the information stored.

8.2.4 Content Filtering

Some municipalities use content filtering to limit access to inappropriate websites. This will limit access to some undesired content, however it is impossible to decide on or filter for all undesirable content. It would be very expensive and ineffective to try to do this. Key words and websites with undesirable content change constantly. Furthermore, filtering may provide false positives leading to requests for support.

Most libraries do not filter content to avoid censorship.

³⁵ Innovation, Science and Economic Development Canada <http://www.ic.gc.ca/eic/site/oca-bc.nsf/eng/ca02920.html>

³⁶ Michael Geist, <http://www.michaelgeist.ca/2015/04/the-copyright-notice-flood-what-to-consider-if-you-receive-a-copyright-infringement-notification/>
<http://www.michaelgeist.ca/2007/02/notice-and-notice-in-canada/>

Potential for Conflict with Private Sector Companies

It is not expected that there will be conflict between municipalities offering free public Wi-Fi and companies offering internet services for profit. Municipal public Wi-Fi often has bandwidth restrictions or data caps and provides only part of a consumer's need for data. Most consumers will still subscribe to the internet at home and buy a cellular data plan for times when they can't access public Wi-Fi or need better data security. Public Wi-Fi might even be the trial that convinces late adopters to subscribe to their own services.

In a partnership with the Peterborough BIA, Cogeco has contributed data backhaul for the Peterborough BIA public Wi-Fi network, which provides high bandwidth service. Cogeco acknowledges that it will lose business as a result of the network, however it sees public Wi-Fi as a valuable community contribution. Cogeco also receives opportunity for promotion as a sponsor of the Wi-Fi network.

In some US states, there are laws prohibiting municipal public Wi-Fi in order to protect public carriers.³⁷ This type of legislation has not been seen in Canada.

Conclusion

Public Wi-Fi provides many opportunities for municipalities to provide communications services to their residents, businesses and visitors. This service is in keeping with the growing trend of connectivity everywhere. It can support the vibrancy of a community through economic development, community branding, by supporting and enhancing other municipal service and by providing internet connectivity for those who do not have access at home for reasons of income or lack of service availability.

The improved access to broadband and fibre services enabled by EORN provides an opportunity for communities to offer this enhanced level of service. It provides backhaul capacity and pricing to enable public Wi-Fi service in many communities.

Eastern Ontario communities already provide public Wi-Fi access in almost all of their libraries and many of their other municipal facilities. In many communities there are plans to increase the offering of public Wi-Fi. The decision to make this investment can be supported through business case analysis. The business-case framework provided presents general terms for evaluation of the benefits and costs one would expect to see. As each community and network is unique, individual situations must be modeled and analyzed to determine whether municipal public Wi-Fi is a sound investment.

Proper security practices and policies can be used to mitigate security risks to network operators and network users. Liability risks can be mitigated by providing Terms and Conditions of Use Policies. Public Wi-Fi can provide economic and social support to Eastern Ontario communities.

³⁷ <http://www.motherjones.com/politics/2015/01/republicans-free-city-wifi-municipal-broadband-socialism>

Appendix A - Municipal Wi-Fi Network Examples

Fred-eZone

Fred-eZone, Fredericton's public Wi-Fi network provides residents, visitors and businesses with mobile broadband access from virtually anywhere within the city. It has been integrated into Fredericton's economic development strategy to support the city's smart identity. Fredericton sees Fred-e Zone as a symbol of a vibrant community that can retain young people and attract new immigrants. It is intended to inspire success and prosperity.

Fred-eZone Wi-Fi access points are hosted at municipal facilities such as such as libraries, rinks, parking structures, water towers, traffic signals and streetlights, with the City's fibre optic ring as a host network. There are over 100 access points in the network. As the ISP managing the community network, e-Novations makes unused network capacity available to the Wi-Fi zone, so as to incur no incremental cost.

Stratford Ontario Stratford_Free

The Wi-Fi system in Stratford, Ontario has made the whole city a broadband connectivity hotspot. Rhyzome Networks, the city-owned internet service provider (ISP), launched an initiative in 2015, that provides free wireless access throughout the downtown area. Users can connect to Stratford_Free at speeds up to one megabit per second (1Mbps), which is suitable for e-mail, web surfing and some light video, but is not intended for streaming full-length, high-definition movies.

It is considerably slower than what Rhyzome offers to its business and residential customers through its retail network. Users of the Free Wi-Fi must watch a short public messaging video (currently on energy conservation).

The Wi-Fi network consists of nodes mounted on utility poles throughout the city and backhauled over the fibre network.

The City of Stratford is a leader in technology adoption to support innovation. Its fibre network and public Wi-Fi zones form part of the ongoing effort to diversify and develop the area's economy. The city is developing a digital media centre which brings together its tradition of theater performance and its digital infrastructure.

Olds Alberta O-NET

In Olds, Alberta, a rural community of 8,600 people, the O-NET, the community owned and operated Fibre-to-the Premises broadband network provides gigabit speed internet.

Mountain View Power, a retailer of electricity that invests 100% of its profits back into the community, and O-NET have partnered to install no-charge Wi-Fi access points in various public spaces around town.

The Vermont Digital Economy Project

The goal of the Vermont Digital Economy Project was to develop more resilient communities following floods in 2011. The Vermont Council on Rural Development used funding from a federal disaster relief grant to bolster “virtual” infrastructure instead of physical. Through that program, they:

- Created 26 free Wi-Fi zones/hotspots
- Created 25 new municipal websites
- Advised over 120 non-profits and 260 small businesses
- Placed 24 internet interns in libraries to help teach digital literacy
- Delivered the Front Porch Forum to every town in Vermont. The Front Porch Forum helps establish neighbourhood connections through a moderated online forum, where everyone uses their real name. These forums led to increased community engagement.

Expanding the use of online resources has provided Vermont with benefits beyond emergency management. Business operators, including farmers, and the tourism industry are able to reach new customers and markets. The social fabric of the communities is being strengthened. The digital infrastructure has provided opportunities to develop cultural and economic capital.

The Wi-Fi zones and hotspots created in Vermont were funded through disaster relief funds, and ongoing operations are managed and paid for by the individual communities. For each hotspot, the community must manage the site, complete repairs or upgrades and pay for the connection to the Internet.

The hotspots are used by tourists passing through town, by residents who might not have access to internet at home and anyone who wants to connect to the internet without using the cellular mobile system. Since 2012, the prevalence of cell service has increased and many people use that, but Wi-Fi access allows people to use less of their expensive data plans.

Some of these hotspots have landing pages that advertise the communities they support. See <http://johnsonconnect.net>, and <http://thebethelconnection.org>. The type of link seen on these landing pages can be paid advertising or free advertising provided as a community service.

LinkNYC

LinkNYC is a Wi-Fi network designed to cover New York City with free Wi-Fi services. Sidewalk labs, a subsidiary of Google that focusses on solving problems unique to urban environments, is one of the members of the consortium that holds the contract for this project. The first kiosks were deployed in January 2016.

Each kiosk or Link is equipped with a gigabit speed, encrypted Wi-Fi connection with a 150-foot (50m) range. The kiosks include USB charging stations and free calling, through a partnership with Vonage. An integrated touchscreen provides maps and information about city services, and a digital display shows advertising and public service announcements.

It is projected that LinkNYC will generate \$US 500 million in revenue for New York City over 12 years through advertising, sponsorships and partnerships. More than a quarter of New Yorkers don't have high-speed broadband access at home but LinkNYC believes all New Yorkers should have access to the opportunities that the internet affords, from kids who need help completing their homework to those who are job searching or need emergency assistance.

Appendix B - Terms and Conditions of Use Policies

Greater Napanee Wi-Fi Terms of Use and Policy Statement

Standard terms of use

You must agree to the following text before using our wireless hotspot.

Policy Statement

Use of this network contrary to the operational and management objectives is unacceptable and prohibited.

Scope

This Policy applies to all customers and to all other users of this hotspot.

Prohibited Uses

Examples of prohibited uses of this hotspot are described below. The examples are guidelines and are not intended to be exhaustive.

Illegal/Criminal Activity

This network may not be used in connection with criminal or civil violations of laws, regulations, or other government requirements of any jurisdiction. Such violations include theft or infringement of copyrights, patents, trademarks, trade secrets, or other intellectual property, export control violations, fraud, forgery, pyramid or other prohibited business schemes; and theft, misappropriation, or unauthorized transmission or storage of funds, credit card information, personal information, or online services.

Security Violations

This hotspot may not be used to violate the security of a network, service or other system. Examples of this may include hacking, cracking, monitoring, or using systems without authorization; port scanning; conducting denial of service attacks; distributing viruses or other harmful software; smurf attacks; and unauthorized alteration or destruction of websites or other information.

Threats

This hotspot may not be used to transmit or store material of a threatening nature, including threats of death or physical harm, harassment, libel, and defamation.

Offensive materials

This hotspot may not be used to transmit or store material of an offensive nature, including obscene, pornographic, indecent, abusive and harmful materials, or to transmit to recipients material which is inappropriate for them, including obscene or offensive materials to children.

Spam

This hotspot may not be used to spam. Spam includes any of the following activities:

- Sending any unsolicited email that could be expected to provoke complaints.
- Sending email that does not accurately identify the sender, the sender's return address, and the email address of origin.
- Sending unsolicited email without identifying in the email a clear and easy means to be excluded from receiving additional email from the originator of the email.
- Collecting the responses of unsolicited email. Sending email with charity requests, petitions for signatures, or any chain mail related materials.
- Posting a single message, or messages similar in content to more than five online forums or newsgroups.
- Posting messages to an online forum or newsgroup that violate the rules of the forum or newsgroup.

Security System

This hotspot may not be used, directly or indirectly, with systems that are not configured and maintained in a manner which prevents their use by others in violation of this Policy. Examples include improperly securing a server so that it may be used by others to conduct a denial of service attack, improperly securing a mail server so that it may be used by others to distribute spam, and improperly securing an FTP server so that it may be used by others to illegally distribute licensed software.

Other

This hotspot may not be used in a manner that damages the owner's reputation or goodwill; violates another ISP's acceptable use policy and/or terms of service; or interferes with another's use of the network.

Attempts

This hotspot may not be used to attempt an activity prohibited by this Policy – whether or not successful.

General

Under no circumstances, including, but not limited to, negligence, shall the owner of this hotspot, its subsidiary and parent companies or affiliates be liable for any direct, indirect, incidental, special or consequential damages that result from the use of, or the inability to use this hotspot. You specifically acknowledge and agree that the owner of this hotspot is not liable for any defamatory, offensive or illegal conduct of any user.

If you are dissatisfied with these terms and conditions, your sole and exclusive remedy is to discontinue using this service.



For more information, contact:

Lisa Severson
Communications & Stakeholder
Relations Officer

Eastern Ontario Regional Network

Email: info@eorn.ca

www.eorn.ca