CONFIDENTIAL





# Establishing a Wireless Corridor in Downtown Winnipeg in Support of Community Learning and Development

## Feasibility Report

***June 10, 2005***

# Acknowledgement

Many persons contributed to, and helped guide, the development of this report. They include:

- *Sandy Altner*, Strategic Initiatives/Political Analyst, City of Winnipeg
- *Michael Boyd*, Director, Information Technology Programs, Division of Continuing Education, The University of Winnipeg
- *Patricia Burt,* Head Librarian, Red River College
- *Mary Courchene*, Dean, Aboriginal and Teacher Education, Red River College
- *Jino Distasio*, Acting Director, Institute of Urban Studies, The University of Winnipeg
- *Michael Dudley*, Senior Research Associate, Institute of Urban Studies, The University of Winnipeg
- *Marti Ford*, Chair, Aboriginal Education & Program Development, Red River College
- *Karen Keppler*, Executive Director, Smart Partners
- *Mike Langedock,* Executive Director, Technology Solutions Centre, The University of Winnipeg
- *Clarice Leader*, Project Manager, Community Connections, & Executive Director, Manitoba E-Association
- *Mark Leggott*, University Librarian, The University of Winnipeg
- *Paul Little*, Dean, Education Curriculum and Learning Resources, Red River College
- *Rhonda McCorriston*, Director, Centre for Aboriginal Human Resource Development
- *Dale Oswald,* Managing Director, Strategic Trade Partners
- *Jennifer Rattray*, Strategic Initiatives Development Director, Office of the President, The University of Winnipeg
- *George Siemens*, Instructor, Hospitality Department, Red River College
- *Ed Suzuki*, Project Manager, Destination Winnipeg

We are grateful to these persons for the time they devoted to this project, their guidance, and for working to facilitate the gathering of information and subsequent analysis. Without their contributions, this report would not have been realizable.

*Gino Braha, Facilitator*
**G. BRAHA & ASSOCIATES LTD.**

# TABLE OF CONTENTS

# Executive Summary

This document outlines the basic concepts, and a high-level assessment of the feasibility, underlying the introduction of a wireless corridor promoting community learning, knowledge transfer, and social and economic development opportunities in Winnipeg's downtown core. Through this wireless corridor initiative, Winnipeg has an opportunity to be a Western Canadian leader in the introduction of community wireless networks. Initially, the wireless grid would link key educational and cultural institutions in downtown Winnipeg to community groups and members. Over time, the potential will exist to extend access and participation to other interested community partners and access points.

Three Winnipeg downtown educational organizations: The University of Winnipeg (UW), Red River College (RRC-downtown campus), and the Centre for Aboriginal Human Resource Development (CAHRD) have agreed to partner in developing a core piece of the proposed wireless network infrastructure which will be called *LearningCITI*, or **L**earning **C**omputer and **I**nformation **T**echnology **I**nfrastructure.

The principal goal behind the *LearningCITI* concept is to provide opportunity. The value of a ubiquitous network foundation in a community like downtown Winnipeg will be realized through the doors it opens. If access to the network and the wealth of communication and information tools it presents is a portal, rather than a barrier, community synergies and ideas will flow naturally. This is particularly the case when enhanced with the power of educational institutions committed to working with the local community to create an open learning environment.

Although each of the initial three partnering institutions is distinct in their own ways, this partnership should help leverage and unify present and future educational opportunities between these three downtown educational hubs. Furthermore, the wireless corridor that will be created through this project will encourage the development of innovative approaches for student retention, enhance access to career information, and provide mentoring and support for downtown students.

A foundation will have been established to further extend this architecture within downtown Winnipeg to the Millennium Library and to all other interested partner-points in between these locations, over time. This could include, for example, community and neighbourhood centres, non-governmental (NGO) service organizations, cultural and arts centres, and local enterprises interested in growing their clientele and product/service offerings.

A number of cities and towns across North America and Europe have already taken the initiative of creating community wireless networks to generate opportunities for social and economic development. As evidenced by the experience of those cities and towns, the establishment of a wireless corridor in Winnipeg's downtown core has the potential to significantly benefit individuals, neighbourhoods and communities, special-interest and large stakeholder groups, and ultimate the City of Winnipeg as-a-whole.

The evolution path for *LearningCITI* will begin immediately with a proof-of-concept project that will pursue and test the implementation of a wireless link solution between The University of Winnipeg, Red River College, and the Centre for Aboriginal Human Resource Development. Once this proof-of-concept has been deemed successful, the intent is to establish a pilot project linking some community groups to the corridor, followed by extending the network to the broader community-in-need such as emergency shelters for the homeless and low-income housing complexes. The network could also become available to businesses, and to governmental and non-governmental organizations offering services to the public.

The *LearningCITI* infrastructure will need to be supported and maintained with people, equipment, and systems. Using the cost experiences of other cities, *LearningCITI's* infrastructure could cost in the range of $180,000 to $400,000 to implement in a 4-square-mile area of downtown Winnipeg. Annual maintenance could cost about $53,000.

As with any undertaking, *LearningCITI* will be exposed to some risks (described later in this report). Such risks will need to be mitigated through appropriate (common-sense) risk management steps.

Also, fundamental to the achievement of goals set for *LearningCITI,* will be the need to establish some form of permanent overseeing and administrative organization, and to attract additional local support, participation, and co-operation among educational organizations, community groups, businesses, and government.

# Introduction

Using wireless communication technologies and connections similar to those employed in creating wireless networks on educational campuses, cities and their communities are increasingly seeing the arrival of community wireless networks (CWNs) providing free or low-cost broadband (high-speed) access to the Internet[1].

CWNs create opportunities for educational and other organizations to form partnerships with local communities, for the betterment of these communities. CWNs promote social and economic development, community enhancement, and improvements to the quality of citizens' lives[2].

**A few terms to remember**

Throughout this report, we will be using some terms common to the world of the "wireless"[3]. We thought it best, for the sake of readership and consistency, that we define these terms as they are to be interpreted within this report. The terms are *access point, hotspot, splash page, WiFi, and WiMAX*. A definition and explanation of these terms can be found in Appendix A --- Glossary of Terms.

**Background/context**

The idea for an "educational" wireless corridor in downtown Winnipeg, and specifically the *LearningCITI* initiative, originated with the Presidents of The University of Winnipeg and Red River College, Dr. Lloyd Axworthy and Mr. Jeff Zabudsky. The Centre for Aboriginal Human Resource Development also expressed an interest in the concept, and joined UW and RRC as a third partner promoting the initiative. These organizations feel a strong desire to supply services to those in the community who would not normally be able to gain access to these services, by:

- Helping persons in the community gain access to resources they would otherwise go without.
- Giving them a medium to share resources among "like groups and industries".
- Bringing people into downtown areas that would not otherwise not have come downtown (promoting greater people incursion downtown and possibly fostering some economic development).

UW, RRC, and CAHRD see the *Learning*CITI concept as being consistent with their respective mandates of being "good corporate citizens and contributing through civic responsibility and engagement".

[1] Community Wireless Networks, Harold Feld, EDUCAUSE, January/February 2005.
[2] Civitium: Powering the Digital City.
[3] Source of definitions: www.whatis.com

The principal goal is to create opportunity via a portal of services that would likely evolve through the contribution of various organizations and communities themselves. These organizations and communities would contribute access to content, resources, access locales, etc. Logical community groupings could then create sub-communities by focusing on specific service sectors such as, say, health care or social services, or by focusing the offerings on certain groups such as the Aboriginal community.

The intent for the founding organizations is not to build and become an Internet Service Provider, but rather to facilitate the development of a Virtual Community Portal (VCP) to be accessed by the surrounding community. The portal could facilitate access to a mix of free and subscription-based information (content) and services that would attract as much diversity in participants as possible. The portal could play a role in educating users on using the network and guiding them to "what's available" on the network.

Some of the downtown constituent organizations and "neighbours" to UW, RRC, and CAHRD that could be approached to determine their interest in joining and participating in this Virtual Community Portal may include (but are not necessarily limited to) the:

- Downtown Y.
- South East Tribal Council.
- Spence Neighbourhood Association.
- Area City of Winnipeg libraries.
- West Broadway.
- Portage Place Mall.
- International Centre (a multitude of multi cultural groups are centralized there).
- Art Space Building (many not-for-profit organizations rent space in this building).
- Neighbourhood schools such as Sister McNamara Elementary School.
- Canadian Centre for Disability.
- Manitoba Hydro Building.
- Medical Arts Building.
- City Hall (this could be a part of an e-Government initiative or the "No Red Tape" committee action plan; there is also the possibility of *LearningCITI* facilitating a community broadcast of civic events, meetings, and other city-related occurrences).
- Chinatown/Chinese Cultural Centre.
- Vietnamese Cultural Centre.
- Open areas/green space such as Central Park and the Exchange Park.
- The University of Winnipeg Division of Continuing Education.
- The University of Winnipeg Institute of Urban Studies
- National Research Centre
- Winnipeg Education Centre.

- William & Catherine Booth College.
- Area Community Connections (CAP) sites.

These downtown community organizations and groups could become the cornerstones of services to local schools, non-profit organizations, and businesses, as well as to individual residences. Multicultural groups, as well as a wide variety of local non-profit organizations, will be but one step further into the development of Winnipeg's knowledge-based economy and a community defined by a culture of innovation.

## Scope of report

The scope and intent of this feasibility report is to describe the viability of establishing the proposed *LearningCITI* wireless network in Winnipeg's downtown core, considering the potential for leveraging the wireless network to offer educational and other services that would promote community learning, knowledge transfer, and social and economic development opportunities.

A first-cut assessment of likely community participation, and the anticipated benefits and costs of this wireless initiative are included in this feasibility report.

### Assumptions

In describing the feasibility/viability of establishing the proposed *LearningCITI* wireless network, certain assumptions have been made. These assumptions are technical, financial, organizational, and communal in nature, and are as follows:

#### *Technical*

That WiMAX claims about performing in a non-line-of-sight environment, reliability, and ability to integrate with WiFi technologies, are accurate.

#### *Financial*

That current funding will contribute to a working proof-of-concept solution and that sustainable funding will be secured if the intent to operate the initial solution is required beyond March 31, 2006.

#### *Organizational*

That the partners to the initiative will contribute funds and people resources in the initial implementation and on-going operations of the wireless network and its offerings.

***Community***

That community organizations and industry associations that have expressed a keen interest in working with the partners on the wireless corridor project, in participating in bringing the project to fruition, and in applying innovations that create successes for the project and benefits for the communities served, will meet their commitments.

## Report development methodology

### Process followed

A working group of interested stakeholders was formed to help guide the preparation of the feasibility report and a complementary proof-of-concept project. This working group consists of representatives from UW, RRC, CAHRD, the City of Winnipeg, Community Connections, Manitoba Energy Science and Technology, Manitoba Hydro, suppliers to the proof-of-concept project (Cisco, Dell, Powerland), Smart Partners of Manitoba, the University of Manitoba, Western Economic Diversification, and the consultant retained to help facilitate group sessions and to write the feasibility report.

### Research conducted

The Smart Partners consortium, having assembled a significant amount of information regarding technology revitalization in the downtown area, acted as a key source in supplying information for the feasibility report.

CAHRD, Community Connections, UW, and RRC also contributed information to this feasibility report.

The consultant retained to help write the feasibility report also conducted a limited literature search.

### Data collected

Information used in the development of this report originated as:

- Background papers.
- Various research studies.
- Articles and news releases.
- Extracts from relevant web sites, including sites describing the planning and implementation of wireless networks in other jurisdictions.

Sources of information are indicated throughout the report as footnotes or included in a bibliography in Appendix B.

# Vision

The shared vision for the *LearningCITI* initiative is the following:

> "To establish a wireless corridor that will support the development, empowerment and enablement, and quality of life of people living in, working in, and/or visiting Winnipeg's downtown core."

# Mission

The shared mission statement for *LearningCITI* is as follows:

> *"LearningCITI* will organize, facilitate, promote, inspire, educate and celebrate through community partnership the development, deployment, and leveraging of a ubiquitous wireless network in Winnipeg's downtown core that will foster synergies and opportunities for producing broad-based innovation, community access and learning, knowledge transfer, personal development, socio-economic development, and tourism."

The term "community" reflects a comprehensive and broad spectrum of stakeholders with a strong interest in realizing positive educational, social, and economic development outcomes for neighbourhoods and individuals in downtown Winnipeg. For instance, these stakeholders could include, but not be limited to:

- Educational organizations such as the Centre for Aboriginal Human Resource Development, The University of Winnipeg, and Red River College.
- Cultural institutions such as South East Tribal Council, and the Chinese and Vietnamese Cultural Centres.
- Social development organizations such as the Spence Neighbourhood Association and the Winnipeg Social Planning Council.
- Public service organizations such as the Millennium Library and immigrant outreach programs.
- Members from political (including NGO) organizations such as the City of Winnipeg and the offices of local MLAs and MPs.
- Members form the business community such as Manitoba Hydro and the Winnipeg Chamber of Commerce.

Initially, the wireless grid would link key educational and cultural institutions in downtown Winnipeg to community groups and members. Over time, the potential will exist to extend access and participation to other interested community partners and access points.

# Goals

Primary goals of the *LearningCITI* initiative are to:

- Enhance the educational, working, and visitation environment in Winnipeg's downtown core in a manner that positively and significantly transforms life, work, and leisure to benefit the community (neighbourhoods, organizations, groups, and individuals).

- Become a catalyst that will "empower" the community to open up the latent potential inherent in its creative, innovative, cultural, and entrepreneurial abilities. The same catalyst can create an environment of greater collaboration and communication among various community groups (including businesses) such as to generate greater social (quality of life) and economic value for the community's constituents (i.e., the sum of the parts is greater than the whole).

- Establish a foundation and framework for future new and innovative uses of information and communication technologies, for the benefit of on-going and sustainable (secure) social, economic, and cultural development.

- Establish an information and service network that will be able to connect with the networks of other communities, further expanding information and knowledge transfer, and opportunities for social and economic development (e.g., the *LearningCITI* network could eventually be linked to the Brandon University network[4] and MRnet[5]).

- Contribute an important component to assist government in their programmes on improving the urban environment.

- Create one more underpinning in the City's economic development plan and infrastructure which can help attract, retain, and grow businesses.

[4] Through the CANARIE CA*net network.

[5] The Manitoba Regional Advanced Network (MRnet) provides an integrated regional broadband network for use, by its members, in multimedia and broadband technologies promotion and product/service research and development. Members include representative industry, education, and government organizations.

# What Some Other Jurisdictions Have Done and Learned

A number of cities have already taken the initiative of creating community wireless networks. The development of WiFi technology has progressed very rapidly since 2000, with lower-speed bandwidth wireless systems becoming readily available and very cost-effective. This has enabled a number of cities to take the step of implementing "smart communities". These city networks have their foundation in grassroots or public-sector-funded initiatives. In this section, we provide a few examples of these and highlight the "wireless" features adopted by these respective cities.

Becoming an "unwired city"[6] has become a principal economic and social development priority goal for many cities and towns around the world. In October 2004, the Mayor of San Francisco announced that all residents would have free wireless Internet access in the near future. Similarly, large cities such as Brussels (Belgium), Minneapolis, New-York, Philadelphia, Portland, and Spokane, and smaller cities and towns such as Austin, Chaska, Fredericton and Moorhead have implemented or are looking to create a wireless-enabled service, sometimes referred to as the "fourth utility"[7] --- the other three utilities being water, power, and sewage.

**The San Francisco/Bay Area Initiative**

San Francisco is offering WiFi service on a test basis in partnership with the mayor's office of economic and workforce development, a number of other city departments, a private sector wireless service provider, and a provider of license-free wireless data equipment[8]. The San Francisco Bay Area took top honours in a survey of U.S. wireless cities conducted by Intel**.**

**Austin Wireless City Project[9]**

The city of Austin, Texas, is acting as a facilitator and co-ordinator (a "central clearinghouse") for best practices to build, market, manage and secure free wireless hotspots for Austin and the surrounding areas. Working with public space operators, the city is developing a network of free wireless hotspots for public spaces. The city is building awareness and support within the local private and public sectors. While listening to the needs of public space operators, end consumers, and the Austin community at large, the city is engaging the assistance of domain

[6] The term "unwired city" is used to describe a city where wireless communication technologies and networks prevail and "replace" or "significantly complement" the use of land-based cables as the principal means of voice, data, text, and image electronic communications.
[7] http://www.muniwireless.com/archives/000489.html
[8] http://www.sfwireless.net/; also Roach, R. 2004
[9] http://austinwirelesscity.org

experts and community leaders, and forming strategic alliances with local technology businesses and public agencies.

The first network "hotspot" was launched in September 2003. Austin now has over 80 networked venues (locations include their City Hall, State Capitol, libraries, and parks) and 13,000 registered users. Usage is growing 35% to 40% monthly.

**Brussels, Belgium[10]**

Brussels, Belgium, a city of less than a million people covering an area of about 600 square kilometres (hence, slightly larger than Winnipeg), has a number of WiFi public sector initiatives underway. One of these is a WiFi free network that has several access points around the city. In another wireless project, touchscreen kiosks are being deployed across the city. The kiosks provide citizens with government and some commercial information and also double as WiFi hotspots[11]. All the WiFi projects use the backhaul services of a national backbone network built by a private joint venture, in part using existing fiber cable owned by the regional government and with some government funding.

WiFi users within range of a kiosk have unlimited free access to the Net. They must identify themselves to get access and they enter through a public portal similar to the one at the kiosks. Internet access is one among several services offered. Providing the service free is part of the government's strategy of getting Belgians to use the Internet.

The kiosks are being placed in heavily-trafficked areas near cafes and restaurants, so laptop and PDA users can sit down to use the service. There are apartments and small businesses near many of these access points, making people who live and work there also get free access.

**Champaign-Urbana, Illinois**

The Champaign-Urbana Community Wireless Network (CUWiN), Illinois, has built a communications network using wireless networking equipment, putting it on rooftops to connect neighbours and form a high-speed community network[12]. By building a house-to-house wireless "mesh", CUWiN makes it possible for neighbours to share broadband Internet access and services including voice over IP as an alternative to traditional phone service, and alternatives to radio and cable --- such as live broadcasts from grassroots media-makers and "Internet radio stations" in subscribers' homes.

---

[10] "Brussels: Unwired City" by Gerry Blackwell.

[11] Citizens and visitors can use the kiosks to access government information such as garbage pick-up times, how to get from here to there by public transit, contacts for police and other emergency and non-emergency regional government services. The kiosks have printers so users can carry hard copy printouts away with them. Any public content provider can submit information to be posted on the kiosk portal site at no charge.

[12] http://www.cuwireless.net/

Using open source software that turns "old, inexpensive PCs into the backbone of a mesh network", a person "burns" software to a disc, then uses it to start up a personal computer. If the computer has a supported WiFi card installed, the personal computer becomes just another self-administering node on a wireless network using a mesh topology. By continuing to offer the software for free, CUWiN "envisages a day when hardware makers will offer incredibly low-cost hardware, such as sub-$100 wireless nodes sold in retail stores like Best Buy, to extend the mesh network." (Griffith 2005).

**Chaska, Minnesota[13]**

Chaska, with a population of 22,000, has implemented a city-wide fiber/WiFi wireless broadband network for use by its residents, businesses, and municipal employees. High-speed wireless Internet services are offered by the city-owned Internet Service Provider, Chaska.net. Chaska charges consumers $16 a month to use the service. About a quarter of the 7,500 households subscribe to the service. Chaska projects that revenues from these subscribers will pay for the system, with no need to draw on taxpayer funds.

**Cleveland, Ohio[14]**

Case Western Reserve University in Cleveland, Ohio, is a founding member of OneCleveland, a non-profit entity providing connectivity to non-profit institutions and contributing to a growing metropolitan free wireless network. Established in 2003, OneCleveland links an entire spectrum of education, culture, arts, research, healthcare, and government organizations for collaboration and innovation aimed at improving the lives of Cleveland's citizens and to promote economic development and growth. Technical leadership is provided by the University. The University has also led the effort to expand the number of the seven original subscribing partners, with more than 150 organizations asking to join.

**Fredericton, New Brunswick**

Fredericton, New Brunswick has integrated traditional and wireless technologies to create a free, community-wide WiFi network (Fred-eZone) providing residents, visitors and businesses with mobile broadband access from virtually anywhere within the city municipal infrastructure. At an initial cost of $300,000., coverage extends throughout the downtown business district, city library, city hall, city parks, local arenas, business hotels, conference facilities, and some malls[15]. About 60 access points have been placed on a variety of mostly city-owned structures, including water towers, roof tops, traffic signal poles, and inside city and private buildings. The service delivers data speeds from 2 to 8 Mbps. It does not authenticate users, although soon

[13] http://www.mpsutility.com/press_release_2003.htm
[14] "OneCleveland: Connecting the Digital City", http://www.educause.edu/pub/eq/eqm05/eqm0514.asp
[15] http://www.fred-ezone.ca/fred-ezone/

users will have to register, giving their name and e-mail address to get a free account.

Fredericton, with a population of 80,000, is a regional centre for knowledge-based industries, with about 70 percent of the province's high-tech economic activity concentrated in the city. "Knowledge-based enterprises consume connectivity," says Don Fitzgerald, executive director of Team Fredericton, the city's economic development office "Our council recognized this and wanted to foster that kind of economic activity."[16]

The network helps Fredericton to differentiate itself from other cities and towns, increasing its ability to attract and retain "knowledge industries" looking for a location that offers an innovative, productive and exciting environment.

The wireless project serves as a "living laboratory" in which local firms, can develop and deliver leading-edge applications, such as Webcam traffic monitoring, resulting in new markets and new expertise. It enables the academic community to more easily collaborate with business and government. Local business people, as well as those visiting, can stay connected, free of cost and hassle, thus contributing to Fredericton's reputation as an easy place to do business. Other economic benefits include the development of a community co-op model for Internet connectivity, a lower price point for connectivity, and a value-added service for hotels and conference facilities.

Institutions and the municipal government have been able to achieve a variety of operational efficiencies. For example, "climate in all the city's buildings can now be remotely monitored and controlled by the responsible manager from virtually anywhere in town using his laptop computer instead of having to drive to each facility"[17].

Fredericton city council recently approved a second phase of their municipal wireless project, twice as big as the first phase, slated for completion by the end of 2006. Coverage will eventually be extended to include all of the city's business corridors and public spaces.

**Minneapolis, Minnesota[18]**

Minneapolis recently unveiled a plan to become an unwired city, creating a universal wireless Internet high-speed access network available to every citizen, visitor, business and municipal facility within city limits. It plans to launch a privately-owned municipal WiFi network, estimated to cost between $15 million and $20 million, and using several hundred Internet access "hot spots" for laptop computer users in metro coffee shops, bookstores, airports, and hotels. City officials expect to sign

[16] "Installing the E-Zone", by Gerry Blackwell
[17] "WiFi Network Transforms Fredericton into a Hotzone for Mobile Business and Lifestyle", Canadian Information Productivity Awards, 2004 Finalists
[18] Star Tribune

vendor and service contracts later this year, with initial service expected to start 12 months after the contracts are awarded. Consumers will be able to buy access for US$18 to US$24 per month (about half the price of wired cable modem service). No tax money is intended to be used for the wireless network, which Minneapolis indicates would be paid for, built, owned and operated by the winning bidder on the city's proposal. That is a markedly different approach than in other cities, where the cities own and operate their wireless networks. The network is expected to create economic incentives for businesses to locate to the Minneapolis area.

Minneapolis officials envision putting WiFi antennas atop Minneapolis city buildings, light poles and traffic signals and also using a high-capacity fiber-optic network to combine all the wireless signals for connection to the Internet. Fiber-optic connections also would be provided to business customers who need more capacity than wireless connections can provide.

The success of the inexpensive WiFi network in Chaska, Minnesota (please see above), and the proposed citywide WiFi networks in places like Philadelphia (referenced later below) reportedly convinced Minneapolis leaders to follow suit. The city also indicates a need for an improved broadband network that could speed up data traffic in its main buildings and extend high-speed access to several hundred other buildings. City officials are indicating the citywide wireless network is needed to improve government communications by linking every city building, police car and housing inspector to the city's databases. There is also a desire to provide broadband to an estimated 10 to 15 percent of the city's population that either is not served by high-speed Internet access or cannot afford it.

**Moorhead, Minnesota[19]**

Moorhead, with a population of 33,000, is planning to provide a wireless broadband service, named GoMoorhead!, throughout the area using a WiFi mesh topology and technology infrastructure. The network, which is expected to go live in July 2005, will cover the 13 square-miles town. An existing fiber-optic ring that encircles the city will serve as the backbone of the network. This spring, the town will be installing nearly 300 radio transceivers on utility poles and streetlights. The Moorhead Public Service, which will be operating this CWN, estimates 5,000 households and 600 small businesses will sign up for the service, at a service cost of $20 or $25 per month, respectively. Subscribers will be able to lease ($5/month) or buy ($150) a wireless bridge to connect them to the service.

**New York, New York[20]**

As one attempt to help bridge the “digital divide”, New York City Council

[19] http://www.gomoorhead.com
[20] http://www.tmcnet.com/usubmit/2005/Feb/1120406.htm

adopted a resolution to provide low or no-cost high-speed Internet access to affordable housing residents, calling on city agencies to use their funding and regulatory power to support and encourage the provision of affordable high-speed Internet service and computer purchases for the benefit of residents of affordable housing.

The resolution states that all future publicly-financed or subsidized housing properties for residents earning less than 80 percent of the median area income should provide a high-speed Internet connection in the living area of every unit to residents for free or at a cost of less than $10 per month, and that the development of programs that benefit low-income residents' use of technology, such as the affordable purchase of computers, should be encouraged.

A Committee on Technology in Government has been established with the mandate to help close the digital divide by expanding access to broadband in underserved communities of New York City, increase the strategic use of technology in government, thereby, increasing efficiency in government and enhancing the quality of public services, and promote the openness and transparency of government by making sure that public information is accessible to every New York City resident. The Committee on Technology in Government is working to achieve these goals in partnership with the private, public and non-profit sectors[21].

**Philadelphia, Pennsylvania[22]**

In August 2004, “Wireless Philadelphia” was established as a committee with the mandate to create a digital infrastructure for wireless Internet access to help citizens, businesses, schools, and community organizations make effective use of this technology, to help strengthen the city’s economy, to transform neighbourhoods, and all-the-while providing a greater experience for visitors to the city (Werbach 2004).

Appointed by the mayor, the Wireless Philadelphia Executive Committee serves as an advisory/advocacy group for wireless community networking through community outreach programs, communications with the press, and participation in meetings and conferences. Wireless Philadelphia seeks to educate the general public and businesses about the benefits of a wireless community.

Wireless Philadelphia plans to use existing wireless technologies and incorporate evolving wireless technologies as they become available. The Committee seeks to promote the third-party development of research, development and use of mobile mesh networks to enrich neighbourhood economic viability.

Philadelphia is using and promoting wireless as a way to reinvigorate inner-city neighbourhoods and to bring the benefits of technology to all

[21] http://nyccouncil.info/issues/committee.cfm?committee_id=106

[22] http://www.phila.gov/wireless/

residents regardless of income – in fact, they call it a "silver bullet for poverty"[23]. (Stone 2004).

Eventually, Philadelphia hopes to develop a process through which the initial outdoor network can be expanded to allow indoors utilization by residents, businesses, visitors, institutions, and students --- co-ordinating efforts with other city agencies to maximize the social, developmental, and educational return.

**Portland, Oregon[24]**

Free wireless access is offered in Portland in barber shops, coffee houses, bars, hotels, and restaurants. The wireless community network is overseen and guided by the Portland Telecommunications Steering Committee, whose members include Intel (the state's largest private employer and a developer of WiFi technology), an area venture capital firm, and a local telecommunications provider. Much of Portland's early WiFi success came from the efforts of a non-profit organization that offers free WiFi donated by Portland-area homes and businesses. The steering committee hopes to increase availability of free access and maintain the city's status as the "most unwired". One official is quoted as saying: "In exchange for having access to the rooftops of public buildings for free, we would ask that WiFi providers provide a tier of service for free for citizens." (Kosseff 2003).

A proposal has been put forward for a Seattle-to-Portland wireless link, possibly using WiMAX technology.

**San Diego, California**

"For a view of how wireless telecom will change the way we work and live, head to San Diego--where everyone from pharmacists to real-estate brokers is now coming unplugged" (Overholt 2004).

San Diego indicates that it owes much of its success as a primary wireless centre to the clustering of high-tech industries (e.g., electronics and military contractors) over the past decades (Simard & West, 2003). San Diego has entered into a significant business, marketing, and technology partnership arrangement with Verizon Wireless, one of North America's largest wireless communications network providers. Under the agreement, Verizon Wireless will receive the city's contract for

[23] The People's Emergency Center (PEC) is a non-profit service organization in Philadelphia that provides emergency shelter for the homeless and affordable housing for low-income and disadvantaged families. Located in specific neighborhoods, PEC deployed a wireless broadband network for community residents, offering very low-cost monthly access subscriptions and refurbished computers, complemented by training programs for PEC facility residents.

[24] www.dailywireless.org/modules

wireless telephone services, collaborate with the city on technological advancements, and become the "Official Wireless Partner"[25].

Using a simple PC card, users can immediately connect to the Internet at speeds up to 2.4 Mbps (about as fast as a cable modem) from anywhere in the network where the service is offered. The service is set up using "WiMAX-like" wireless wide area network technology that provides for a vast geographic area in its coverage zone. (Overholt 2004)

# Trends and Lessons Learned

From the above examples of city jurisdictions that are or have implemented community wireless networks, some interesting trends have emerged:

- **Opportunities for collaboration between education and city institutions.** As demonstrated particularly in the Cleveland example above, the initiative taken by the local university opened up opportunities for collaboration with the city and local organizations to promote learning, public welfare, regional development, and economic growth.

- **City governments take initiative.** In most of the examples cited above, municipal governments took the initiative in kick-starting their community wireless networks, although all appear to have quickly set up joint public-private committees and partnerships to bring technical and managerial leadership to help these networks mature, expand, and achieve their intended goals.

- **The use of public-private partnerships** is an interesting development, given some articles/dissertations expressing opposing opinion on municipal WiFi services on the basis that government should not promote or fund broadband wireless networks and services that would be "better" provided by the private sector[26].

- **The positioning of wireless networks as another municipal service and as essential infrastructure**, in the same way that roads and sewers are considered infrastructure; and, as such, laying claim to the responsibility

[25] "Verizon Wireless Named Official Wireless Partner for City of San Diego", Retrieved February 24/05 from http://www.sandiego.gov/corporatepartnership/verizon.shtml

[26] For an example, please see article(s) published by the New Millennium Research Council: "Not in the Public Interest – The Myth of Municipal WiFi Networks", Why Municipal Schemes to Provide WiFi Broadband Services Are Ill-Advised, February 2005.

for, and necessity to, invest in this infrastructure, rather than leaving it to the private sector to do.

- **The use of open-source software** that helps to keep costs low, uses a wide range of older computers, and makes the service more widely available. It also means that the WiFi service is not beholden to, or dependent on, a particular company's software product. Since the code is available to all, it makes the service highly adaptable and flexible.

- **The use of existing municipal infrastructure** (e.g., rooftops, light posts). The existing structures of the city are put to advantageous use.

- **The formation of committees**. These can be working groups or not-for-profit corporations. They are used to provide policy direction, advice, and planning for wireless network service, as well as to be the "public face" in terms of advocacy and partnerships.

- **The use of strategic partnerships**. The collaboration of several departments from different levels of government, as well as with the private sector and non-profit groups, may be necessary to bring a community wireless network project to fruition.

- **Establishing partnerships in the community.** Some cities (for example, Austin) attribute the success in the use and growth of their networks, to the establishment of partnerships in the community, and these partnerships working together and seeing that they can participate in innovations that create success for the project[27]. For example, one company helped install cabling, another a router, a third produced coasters promoting the wireless network, a fourth created public signage, a fifth hosts some servers, local technical schools provide students as network installation interns, and so on.

- **Using wireless networks to address issues of social and economic equity.** Through partnerships between NGOs, the municipality and other private sector partners, it is possible to make community wireless networks an important part of turning neighbourhoods around and bringing opportunity to the disadvantaged.

- **Proceeding in phases**. It is not uncommon for cities to start with "contained" wireless corridors, and then move into wider coverage.

- **Emphasis on the value of wireless networks to public space**. Community wireless networks give people an

[27] Austin Wireless City Project 2004 Year-End Summary.

additional reason to visit parks, cafes and other public places. It enhances street life and in general improves the quality of urban life.

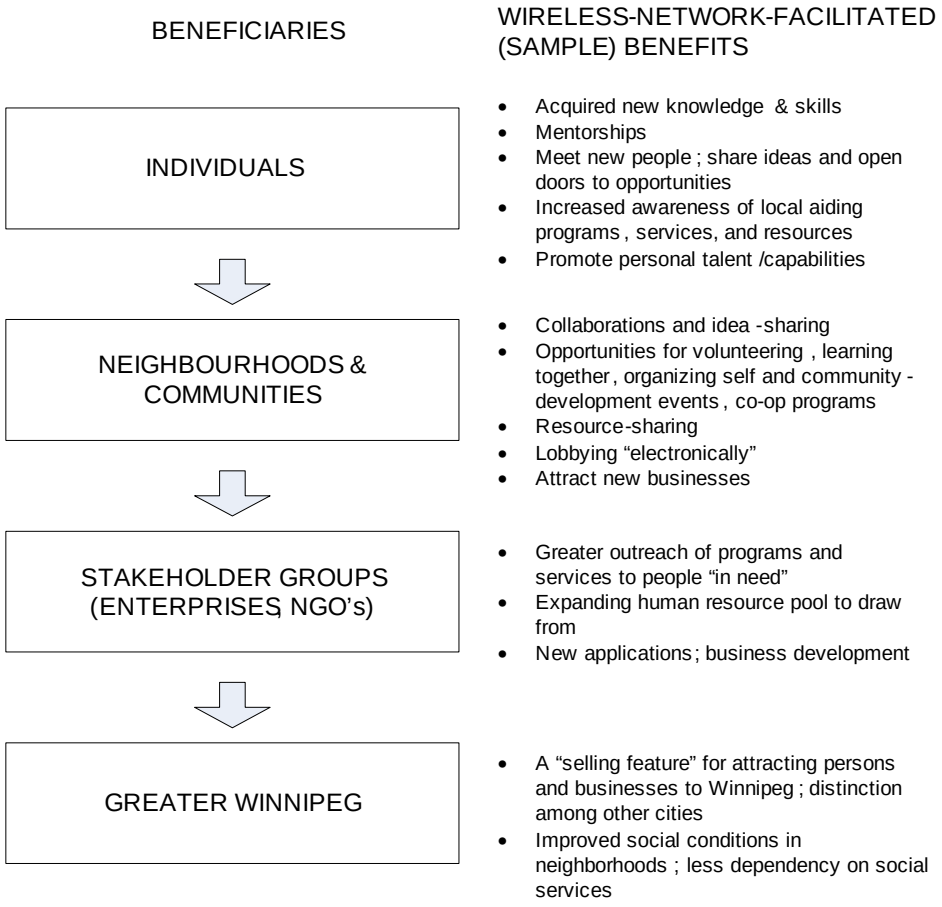
- **Paid-for wireless services do not attract as large an audience.** While wireless networks are being adopted in places like hospitals and university campuses, paid wireless connections to the Internet using one's laptop -- offered at places like cafés -- have not been as widely embraced. Paying for this service is not an inhibiting factor, but the complexity of connecting to wireless hotspots in coffee houses or in airport lounges may be, as each facility operates on its own system. Some businesses also find it difficult or inappropriate to charge a separate amenity or convenience fee.[28]

- **Local economy benefits from "off-peak" activity.** Availability of free WiFi network access appears to increase customer business traffic during what are traditionally "off-peak" hours for businesses.

[28] "Wireless thrives …", ITWorldCanada, February 14, 2005 retrieved at http://www.itworldcanada.com/Pages/Docbase/Viewarticle.aspx

# Anticipated Benefits for Winnipeg's Downtown Communities and Neighbourhoods

As evidenced in other cities where community wireless networks have been implemented, the establishment of a wireless corridor in Winnipeg's downtown core has the potential to benefit individuals, neighbourhoods and communities, special-interest and large stakeholder groups, and ultimately the Greater Winnipeg (please see schematic below).




In this Section, we list some of the educational, social, environmental, and economic benefits that can accrue to individuals and the greater groups.

**Educational and social benefits**

From an educational and social development perspective, community wireless networks can help:

- Individuals through –
    - Providing access to knowledge pools and skills-building courses and other content offerings.
    - People meeting new people, providing the incentive and the opportunity for persons to expand their social circle and knowledge, and to stay connected.
    - Reducing the rate of mobility --- reducing the necessity for people to move from one location to another.

**Imagine …**

A single parent, resident in downtown Winnipeg, goes online to look for a college program. She then accesses information on possible financial aid (scholarships, bursaries, student loans), day care, bus routes to school, and discovers places in her neighbourhood for upgrading, test prep, career research, housing, and jobs.

- Neighbourhoods and Communities through –
    - Facilitated on-line interactions between a community of users (sharing of ideas, innovations, opportunities, knowledge) --- creating community connections.
    - Open community access to offerings of different learning programs from area educational organizations, and providing a wealth of opportunity to create and deliver life-long learning resources and services to the surrounding community.
    - Providing opportunities for students and faculty to participate in community-based initiatives (e.g., help train local community members).
    - Students and faculty moving out to, and around, the surrounding community to hold classes --- expanding the virtual area of the campus.
    - Electronic outreaching to socially-disadvantaged areas within the community.
    - Expanding access at local recreational complexes (e.g., downtown Y) and community clubs.

**Imagine …**

A First Nations student arrives in Winnipeg and is staying with his aunt. He goes online to learn about First Nations resources and discovers a youth e-hood where he can learn about where youth go for ceremonies, to access housing, to enroll in school, to find work, to socialize, to volunteer, and to get help with his transition to Winnipeg.

- Stakeholder Groups through –
    - Educational organizations becoming an anchor and foundation for the broader community network.
    - Furthering educational organizations' missions.
    - Enhancing the reputation and goodwill of the educational organization with the local community; by being seen as serving the public interest.
    - Serving as a positive model of civic responsibility.
    - Non-profit service organizations making their programs and services known to persons "in need".
    - Providing a foundation for attracting new "educational" participants, e.g., the Millennium Library.

- Greater Winnipeg through –
    - Leveraging educational organizations' knowledge and experience in deploying networks.
    - Showing Winnipeg as a modern, technologically-current city, attracting and retaining youth and new businesses.

**Imagine …**

A Group of Aboriginal students at CAHRD's Aboriginal People's College are doing research on careers. They connect with Aboriginal professionals to survey them on their careers.

The inclusion of the Centre for Aboriginal Human Resource Development (CAHRD) at the Aboriginal Centre of Winnipeg highlights one of the many innovative aspects of the *LearningCITI* initiative. Although each institution (UW, RRC, and CAHRD) is distinct in a number of ways, this partnership will leverage and help unify present and future educational opportunities between these three downtown educational hubs. A recent groundbreaking agreement between The University of Winnipeg and CAHRD to develop a Memorandum of Understanding around the sharing of research, resources, and experiences would be further enhanced and enabled by the implementation of *LearningCITI*. Furthermore, this wireless corridor can encourage the development of innovative approaches for student retention, enhance access to career information, and provide mentoring and support for Aboriginal students.

**Cultural benefits**

**Imagine …**

A student at The University of Winnipeg is working on a paper on the historical thoughts of Aboriginal people. She connects to the Aboriginal People's College (CAHRD) and discovers the Coolidge Collection of Aboriginal people that provides an Anthropological perspective.

From an arts and culture perspective, community wireless networks can help:

- Stakeholder Groups by:
    - Facilitating seamless communication and collaborative work and information-sharing between downtown cultural and art centres such as the Millennium Library, the Manitoba Museum, the Winnipeg Art Gallery, and the Royal Winnipeg Ballet School.
    - Being used to distribute online visualizations (displays) of art, art displays, and cultural events and experiences to the community, including electronic distribution for local schools and community centres.
    - Providing a venue for introducing or expanding art and cultural community outreach programs.

**Economic and workforce development potential**

From an economic and workforce development perspective, and including the growth and retention of existing businesses, community wireless networks can help:

- Individuals through –

- Accommodating the work style of people that are "on the go" --- those that do not spend all their time in a single place.
- Servicing visitors to the city, and allowing them the opportunity to make use of the service.
- Attracting more people to work and live in the downtown area, increasing their staying time.

**Imagine …**

A downtown business uses wireless access to provide additional business opportunities. Farmer's market opens for the summer and vendors now have a link back to the main office, or a primary supplier. Orders can be made at the site and inventory checked. A used bookstore brings items from their sports collection to the market booth because the day's event is a sporting event. They still have access to their store inventory, so items they may have elsewhere could still be sold.

- Neighbourhoods and Communities through –
  - Attracting businesses to re-locate to the areas that offer wireless access (are in the vicinity of hotspots).
  - Bringing businesses to areas where students and community groups congregate, to serve them.

- Stakeholder Groups through –
  - Existing businesses using wireless access as a means to attract customers (e.g., barber shops, coffee houses, etc.); provides businesses with another opportunity to differentiate themselves competitively.
  - Acting as a draw for new customers to a business --- especially, where there is "waiting time" involved for a customer.
  - Creating jobs, as a result of growths in business.
  - Creating another advertisement venue for businesses.
  - Offering new experiences for a business' customers.
  - Providing cheaper Internet access for businesses.

**Imagine …**

A business person is in town for 3 days, going from client to client. With the wireless corridor they are always connected to head office, so the current information is always at hand.

- Greater Winnipeg through –
  - Providing another promotional "selling feature" for Winnipeg, in addition to low-cost housing, low-cost hydro, lots of sunshine, arts and culture, cheap office rent, etc.
  - Serving as a "laboratory" for the development and testing of wireless applications in a downtown geography (i.e., create opportunities for technology companies to collaborate in the research and development of wireless applications serving a downtown population).

**Environmental ("green aspect") benefits**

A wireless network, such as the one proposed in *LearningCITI,* can help produce a "cleaner" environment, by:

- Conserving energy and resources.

**Imagine …**

Community Connections places Internet Kiosks in businesses, malls, catwalks, parks: wherever access is needed.

- Reducing waste.
- Significantly reducing the need for running cable wires and telecommunications lines, and "digging up streets" in the process of doing so.
- "Freeing-up" dial-up phone lines, further reducing the need to increase physical infrastructure capacity to accommodate more phone lines.
- Reducing the amount of "hardware" (at times, eyesores) that needs to be deployed, and expensive computing devices that need to be purchased.
- Services being available electronically within "walking distance", reducing the need to travel by car or transit to an intended destination.

**Imagine …**

A First Nations woman is flown to Winnipeg with her sick daughter and her son. The daughter is at Children's Hospital. The mom and son are roomed at a downtown hotel. Mom goes online to seek emotional, social, and familial supports. She finds children's activities like the Children's Museum, family services for child care while she is at the hospital with her daughter, church services, bus routes, and where other Aboriginal people can be found.

**Enhancing public space** (Thomas Horan 2000)

A wireless network can help optimize the use of public space by:

- Creating new connections that can overcome spatial limitations.
- Being accessible from open places/spaces where people spend leisure and learning time --- such as parks and school yards.
- Other public-gathering places such as coffee houses developing into informal workplaces.
- Contributing to better land-use planning and location design for small businesses.

**Closing the "Digital Divide"/Initiating the "Digital Inclusion" Program**

The term "digital divide" describes a population "divided into people who do and people who do not have access to, and/or the capability to use, modern information technology, such as the telephone, television, or the Internet. The digital divide exists between communities in cities, and between those in cities and those in rural areas. The digital divide can also exist between the educated and the uneducated, between economic classes, between cities and rural areas, and globally, between the more and less industrially developed nations"[29]. The digital divide is accepted as one factor that tends to contribute to the poverty people experience.

A free-access or low-cost-access community wireless network, and its supporting arm, can help reduce the "digital divide" by:

- Bringing technology products, services, training and content to lower-income or disadvantaged areas of the community, including access to educational information that would have an eventual impact on closing the skills gap in disadvantaged populations.

[29] www.whatis.com.

**Imagine …**

A developer meets with a community development group in their downtown housing complex to help them with a new website. They have the connection to the wireless corridor. The developer wants to use their own laptop with all the resources and tools that they have. With the wireless access they don't need to worry about installing software, setting up on a corporate network, or dealing with firewall issues.

- Offsetting the need to subscribe to higher-cost cable-based high-speed Internet access, by substituting free or low-cost wireless Internet access.
- Allowing for the entry of low-income people into the economic mainstream.
- Facilitating access to the economic, educational and financial tools that the Internet provides.
- Leveraging the "access infrastructure" that has already been established through other successful programs such as *Community Connections*' Community Access Program (CAP) that has implemented computers with Internet access in community and resource centres.
- Having those that "have learned" become the "teachers" for those that need to know; for example, training teenagers and seniors in the community to provide technical support to neighbours.

**E-benefits (e-government, e-democracy, e-health, etc.)**

A community wireless network can act as a facilitating access channel to:

**Imagine …**

A passenger on one of the Forks' water bus checks the "History and Heritage of the Forks" audio recording on the web while crossing the Red River.

- Government applications and solutions (e-services) in Public Safety, Transportation, Education, Healthcare, Real Estate, and Public Works --- to name a few potential service areas[30].
- Promote the openness and transparency of government by making sure that public information is accessible on-line to every citizen.
- Make the application for, and receipt of, services more efficient.
- Increase public participation and interactive dialogue in the activities of government and in discussing issues; promote e-forums.

**Financial benefits**

Lower-speed bandwidth wireless systems have become readily available and very cost-effective (affordable). Wireless networks avoid the cost of

[30] In a recent focus group session, representative citizens of Winnipeg selected 25 government services they would like to see offered on-line in an e-government environment. They included access to information on various city services schedules, planned construction and repair initiatives, by-laws and regulations, businesses in violation of city ordinances, city financial and political standing/activity, special events, and access for requesting services, reporting problems and change information, remitting applications and payments, and contacting and nominating persons in public positions.

installing cable. Other financial benefits occur with:

- A reduction in the need for persons to travel around (expending fossil fuels) to “get things done”; includes, less expenses for individuals.
- An increase in the employment rate of persons acquiring new knowledge, skills, and experience.
- An increase in revenues through growths in businesses.

# Current Environment

This Section provides an overview of the geographic area and "environment" in which it is intended that *LearningCITI* be implemented. It describes the "participating" places (known at the time of writing), the existence of current access points, and the demographics of the population within the geographic boundary of the *LearningCITI* initiative.

### Places (Organizations)

At the time of writing, the following organizations have agreed to participate as members of the *LearningCITI* network, trusting that this network will become a sustainable, reliable, and continuous offering, following some early proof-of-concept trials (more about this later).

#### CAHRD

The Centre for Aboriginal Human Resource Development (CAHRD) is a community-driven, non-profit human resource development organization serving Winnipeg's Aboriginal community, comprising approximately 65,000+ people and the fastest growing segment of Winnipeg's population. CAHRD's focus is to help urban Aboriginal people secure employment, by offering a number of programs including literacy, upgrading, post-secondary education and other training programs.

CAHRD is developing this year an integrated and sustainable housing facility (Neeginan Village) close to its downtown building, offering supports and services to ensure Aboriginal people who are homeless or at-risk of homelessness have access to safe, affordable, emergent and urgent housing options.

#### RRC/Princess St.

Red River College is a large institute of applied learning in Manitoba, with one campus located in downtown Winnipeg (Princess Street). It provides quality education and training for full and part-time students, and offers more than 110 diploma, certificate and apprenticeship programs.

#### The University of Winnipeg

A downtown, urban campus, The University of Winnipeg is spread over several city blocks. It is a provincially and privately-funded post-secondary institution with undergraduate and selected graduate programs, offering over 400 courses in 40 subject areas.

#### Other organizations/locations

UW's Division of Continuing Education (DCE) is also a

participant. DCE is a major resource to the University and the community with regard to the programming it develops in response to community needs, the audiences it targets, and the knowledge and experience it brings to bear provincially on the conceptualization and delivery of adult education.

DCE's economic impact on downtown Winnipeg is significant. DCE employs or contracts close to 300 instructors and staff to serve some 5,000 full- and part-time students with programs in Aboriginal Studies, Educational Assistant Diploma studies, English as a Second Language, Information Technology, International Languages, and Management Studies. DCE is located in the heart of Winnipeg's historic Exchange District in the newly renovated Massey Building.

**Imagine …**

A recent immigrant to Winnipeg is attending an orientation session at a downtown community centre, where he is also able to use one of several available wireless computers to look up information on assisting resources in English language tutoring, housing, job opportunities, baby sitters, educational programs, bus routes and schedules, and recreational events.

**Access points**

Both UW and RRC have a WiFi network with "hotspots" allowing students to connect wirelessly to the respective campus networks.

Throughout downtown Winnipeg, there are a significant number of other WiFi open access and private "hotspots" already established. For example, specifically within the initial contained downtown area targeted by *LearningCITI,* "hotspots" could be found in the Fairmont Hotel, Fyxx Espresso Bar (Albert St.), Gourmet Cup shops in CanWest Global Place and Winnipeg Square, the Holiday Inn, and many other locations[31]. Please refer to the location map in Appendix C. It is the intent of the *LearningCITI* initiative to explore with the owners of these hotspots the desire and feasibility to leverage and connect with these other wireless networks for the benefit of greater broadband coverage and access availability for all downtown constituents.

Over 200 CAP site locations have been set-up in Winnipeg, with a significant proportion of these operational in the downtown core in community and resource centres such as Thunderbird House, The Salvation Army, the Spence Neighbourhood Association, and Lions Manor.

**Demographics and socio-economic profile**

The *LearningCITI* network is ultimately intended to be accessible to those who live in, work in, and visit Winnipeg's downtown core. An understanding of the numbers and demographics of this collective target audience is essential to good planning for the service and its offerings.

According to the 2001 Census[32], Winnipeg's downtown core resident population is approximately 7,300 --- living in a land area of approximately 1.6 square kilometres (or about 4,600 people per square

[31] http://www.fatport.com/locations/; http://www.wi-fihotspotlist.com/browse/
[32] http://www.winnipeg.ca/census/2001/Community

kilometre)[33]. The table below outlines the demographic distribution of these 7,300 persons:

| | |
|---|---|
| Number of seniors (age 55+) | 1,850 (25%) |
| Aboriginal people | 2,200 (30%) |
| Other minorities | 2,700 (37%) |
| Number who live in apartment buildings | 6,400 (87%) |
| Single persons (over the age of 15) | (75%) |
| Single-parent families | (50%) |
| Persons with post-secondary education | 2,000 (27%) |
| Average employment income range | $20K to $60K[34] |
| Unemployment rate | Over 11% |
| Persons with disabilities (aged 15+) | 760[35] |
| Homeless persons | 530[36] |

**Imagine …**

A family vacationing in Winnipeg is staying at a downtown hotel. The family signs out a GPS/Wireless equipped PDA for the duration of their stay. They have three kids and the first thing that happens minutes after they leave the hotel is one needs to go to the bathroom. The family accesses the PDA and "click" on "amenities". With their location known, a list of closest public washrooms is displayed on the PDA.

The number of persons who work in downtown Winnipeg is approximately 70,000[37].

UW is home to more than 8,000 students. RRC has over 32,000 full-time and part-time students, of which 1,700 take their classes in the downtown campus. The Aboriginal People's College component of CAHRD, which has approximately 100 students at present, is expected to see an increase in its student enrolment to 500 urban Aboriginal students within the next 5 years. Neeginan Village is expected to house approximately 56 families while they attend education and training through CAHRD[38].

There were approximately 2.7 million visitors to Winnipeg in 2003, of which 1 million originated from out-of-province[39]. Nearly 90% of these visitors were over the age of 15. About half had a greater-than-one-day stay, averaging 3 days. Slightly over 30% stayed in a hotel/motel.

**Distinctive/unique factors**

Winnipeg's size, geography, continental location, and topography have distinctive features that enhance the "desirability" and "feasibility" of implementing a wireless offering. These include such factors as:

[33] This includes only the neighbourhoods of Centennial, Civic Centre, China Town, Colony, and Central Park Exchange District, Portage and Main, Portage-Ellice. Other neighbourhoods of downtown Winnipeg (e.g., West Broadway) are not reflected in the population statistics shown.
[34] The majority of incomes lean toward the lower amount in the range.
[35] Number increases to approximately 6,600 when applying larger inner city boundaries.
[36] Social Planning Council of Winnipeg indicating number of persons "on the street, in shelters and other accommodation" (May 2003).
[37] Centre Plan: Development Framework. June 1999.
[38] Eagle Eye View Document, March 2005
[39] Statistics Canada Tourism in Canadian Cities - A Statistical Outlook 2003

**Imagine …**

*Other potential "tourist" applications accessible through a PDA* --- Where to find a Vegetarian restaurant? Choose Dining and pick the one that fits. What children's clothing stores are there? Check for the closest one, or maybe one is listed at the top because they have their annual sale. Need to know next bus coming to the stop you are standing in front of? All the things we look for in print and take time to weed through are there and in context.

- A harsh winter climate, encouraging many people to minimize the amount of "travelling about" to secure information, goods, and services.
- A downtown land area of reasonable, contained distances.
- A flat landscape providing no significant physical man-made or natural barriers to "communicating through open air" (we have no really tall buildings or mountains).

**Current and short-term initiatives/happenings**

A number of other initiatives/happenings are occurring in downtown Winnipeg that could create synergies with the *LearningCITI* initiative. These include, but are not limited to the:

- Millennium Library wireless initiative.
- Activities of WiFi Winnipeg --- a non-profit "community of interest" that aims to achieve wireless network coverage for most or all of the City of Winnipeg. This endeavour anticipates using wireless networking equipment coupled together will participants' knowledge to create an economic network within regulation radio frequencies. It also intends to act as one massive network between the users to enable file sharing and multiplayer gaming.
- CentreVenture downtown development initiatives intended to boost the downtown area's population of full-time residents, create new activity, and foster economic growth in the heart of the City.
- Winnipeg Chamber of Commerce who has installed a wireless network in their facility on Portage Avenue, to assess the merit of wireless technology. (Those who have made use of the network agree that it adds value to the location.)

.

# Desired/Target Environment

This Section explores and describes the "characteristics" of *LearningCITI* as it is anticipated it could be implemented and evolve in Winnipeg's downtown core.

## Definition of the Model

### Organizations/Partners/Constituencies

The University of Winnipeg, Red River College and the Centre for Aboriginal Human Resource Development are committed to fostering an environment that recognizes and supports the key elements of Canada's Innovation Strategy.

### Progression

One possible evolution path for *LearningCITI* is as follows:

#### Immediately

Based on the availability of beta equipment and spectrum, a "proof-of-concept" project will pursue and test the implementation of a pilot WiMAX wireless link solution between Red River College, The University of Winnipeg and the Centre for Aboriginal Human Resource Development campuses. The proof-of-concept project is expected to be completed by end of May 2005, with findings being published shortly thereafter.

**Imagine …**

*Information on Demand* **–** A street party to celebrate Manitoba Day - flat panels are installed at strategic locations to provide the latest venue or event information, no costly wired access required. The City installs solar powered kiosks in conjunction with a week-long event being held downtown. Kiosks are installed anywhere needed and removed when the event is over.

#### Near-term

The link solution, having extended wireless coverage from The University of Winnipeg to Red River College and onward to the Centre for Aboriginal Human Resource Development, would position these stakeholders to conduct a comprehensive pilot project linking some community groups to the corridor (pilot project specifics will be defined towards completion of the "proof-of-concept"). At least one school and non-profit group would be invited to participate in the pilot --- examples being Sister MacNamara Elementary School and the Winnipeg Boys and Girls Clubs.

#### Short-term

Assuming a successful outcome of the pilot phase of this imitative, the potential will then exist to further extend the architecture within Winnipeg to the Millennium Library and to all other interested partner-points in between the four locations (UW, RRC, CAHRD, and Millennium Library). The possibility can also be explored to broaden the wireless

**Imagine …**

A home-bound person with physical disabilities or chronic medical condition places a grocery order online for same-day delivery, and applies for certain services from community health resources (e.g., home care or periodic visitations).

**Imagine …**

A low-income family, residing in a housing complex, having "outgrown" their apartment and looking for other affordable housing checks the online registry of available downtown housing.

**Imagine …**

A student on an exercise machine at the downtown Y glances through the Millennium Library's catalogue of books and audio offerings on a specific subject, and places a reserve order for a selection of these, prior to venturing to the Library to pick them up.

coverage concept to key communities in the surrounding Winnipeg areas, including communities served by the South East Tribal Council and Manitoba Keewatinook Ininew Okimowin organizations.

**Future**

Access could then be extended to the broader community-in-need, for example, emergency shelters for the homeless and low-income affordable housing complexes.

Network access could then also be open to businesses and to governmental and non-governmental organizations offering services to the public.

**Targeted stakeholders/audience(s)/users**

*LearningCITI* access, functionality, and offerings will be aimed for the benefit of the following audiences:

- UW, RRC, and CAHRD campus communities.
- CAP sites users.
- Persons who reside downtown including those with a permanent address and those with high mobility or who are homeless.
- Persons who reside in downtown low-cost housing complexes.
- Persons who reside downtown but have difficulty physically accessing community supports and services.
- Persons who could be facing long wait lists for admission to any of the downtown educational institutions.
- Members of cultural institutions such as Thunderbird House.
- Users of public service organizations such as the Millennium Library.
- Members from the government and business community such as the City of Winnipeg, local businesses, and business associations.

**Offerings**

The *LearningCITI* infrastructure has the potential to facilitate various learning, business, and volunteer opportunities. The service should not make it too difficult for the occasional or casual user to connect to the service and content offerings.

**What functions would it perform?**

In initial phases, the *LearningCITI* infrastructure could offer access to pre-registered users at any location within the "broadcast" circumference of three antennas

**Imagine …**

A student team is preparing a live broadcast from City Hall for their term project --- something not possible usually without a "CBC-level" broadcasting infrastructure. With the wireless corridor all the student team needs is the digital camera/video camera with a feed to the server and away they go. Schools could integrate "News" teams in various courses as a way to connect with the community, tell stories, or whatever other application they can think of. A student representative attends the City Hall meeting and reports back for the team at the school to work with the coverage from the field.

**Imagine …**

Students in need of certain books, equipment, art and other supplies, are able to borrow, swap, or barter these through an online exchange network specifically set up to facilitate students' access to needed educational materials/provisions.

strategically positioned on or near the UW, RRC, and CAHRD campuses.

Prospective users could be able to self-administer their registration by accessing the *LearningCITI* portal through a computer with a wireless card and web browser. The self-registration process could involve the users answering a number of general and authenticating questions.

**What contents would be prescribed**

The *LearningCITI*'s portal could display content categories that are logically-grouped and that would help serve virtual sub-communities. The content could be "self-built" by interest groups (e.g., healthcare community, aboriginal community, etc…) to help overcome gaps in sharing of information and resources.

The content management infrastructure could be there to allow the creation of special-interest-groups' own blogs and websites, and the co-ordinated development of common interest-based online communities and web site applications, whether it be educational courses, workshops, community service, hobbies, or business opportunities. collaboration of high school, college and university volunteers, and local entrepreneurs and businesses.

Access could be made available to a wealth of e-learning service opportunities for students in K-12, and at S1-4, college, and university levels. The opportunities to link senior students at the secondary and university levels with younger students and local organizations, and the opportunities to promote collaboration among high school, college, and university students and volunteers with local entrepreneurs and businesses, are particularly compelling.

**What program(s)/training would be delivered?**

The following constitutes some of the "learning offerings" that could become accessible to anyone who is part of the *LearningCITI* community wireless network initiative, either free-of-charge and/or though a nominal subscription fee:

- Delivery of learning components via a learning object repository, accessible to creators and consumers.

- A virtual reference service, which could provide one-on-one live help while doing

research and using campus resources. This could ultimately be extended to document delivery services that are currently not available to the community.

**Imagine …**

*Education in the Exchange* – A student, taking the joint University of Winnipeg/Red River College Creative Communications program, can work, study, sleep downtown and still have access to the resources at campus. She could use her Podcasting application to download yesterday's lecture while sitting down having lunch at the bistro across from Market Square. She could be checking bus transit schedules between the campuses.

- Subject to negotiating favourable license conditions, access to some of the partnership's specialized and provincially-licensed learning resources, such as licensed databases like EBSCOHost (Electronic Journals Service, a gateway to thousands of e-journals), Oxford Reference (language and subject reference works in a single cross-searchable resource which contains over 100 dictionary, language reference, and subject reference works), Encyclopedia Britannica, Homework Help (chat-based resource), White Buffalo e-Zine (Aboriginal youth focused magazine), and ProQuest (an online information service to thousands of current periodicals and newspapers, many updated daily and containing full-text articles from 1986[40])[41].

**Imagine …**

The educational institutions suddenly have the ability to provide additional resources, on demand, on time. A group of high school students decide to meet downtown to work on their project. While they are working, they "click" the Virtual reference link to get live help on a tricky topic and access some journal articles.

- Delivery of core instructional material, including streaming video and audio, as well as webcasting, of classroom lectures, conferences, special lecture and events, etc. Having the higher bandwidth backbone of a WiMAX network and its range could ultimately result in the signals being directed to other schools and community groups within 20 miles in helping to deliver this content.

- Provision of support services, such as virtual reference and online homework help. In this scenario, education students, librarians and computer technicians could be available to provide assistance to members of the *LearningCITI* community.

[40] Deep backfiles of archived material now covers 5.5 billion pages of microfilm

[41] The Manitoba Library Consortium (MLC) initiates and coordinates activities related to resource sharing and library networking, among interested and member groups. MLC negotiates licenses for content databases to secure favourable rates. In the context of *LearningCITI*, MLC could be approached to become a source for some of the content accessible through the *LearningCITI* portal, help evaluate content, and assist in negotiating access/licensing contracts.

- Access to complex learning environments from other institutions in Canada, as well as to applications developed locally.

As the network expands, the partnership could offer some digital library services to local non-profits and companies. For example, a number of local organizations have expressed interest in the university's repository software as a way to organize and provide access to documents produced by their community.

A local volunteer group could be organized to extend the concept of providing application development support to local businesses and organizations. This could include having Applied Computing students work with these groups to provide custom web-based applications. The key opportunity with these projects will be to use the technology foundation to support the community's development.

**Imagine …**

A young man wearing a Red River College sweatshirt, and clutching a laptop computer dashes into a clothing store/grocery/office and says "am I too late to apply for the trainee position?" The receptionist laughs and says, "Hardly, we've only just posted it about two minutes ago! How on earth did you find it so fast?" "I was sitting in the Tim Horton's down the street having a coffee when I tried the student work placement site," says the young man, "...I could have been here faster but I had to wait to cross the street because of the traffic!"

**What equipment and access infrastructure would be offered?**

One important component that must be addressed is the identification and provisioning of equipment capable of connecting to the wireless corridor by making personal computers available in both public areas and eventually into learners' homes.

Local private firms, such as Powerland Computers, larger companies such as Cisco Systems, Dell, Nortel Networks, Manitoba Hydro, and MTS Allstream (MTS), as well as CANARIE, MR*net, Industry Canada, and industry associations designed to encourage innovation in Canada's educational and high-tech sectors, have expressed an interest in working with UW, RRC, and CAHRD on the *LearningCITI* initiative. Powerland Computers have already consented to becoming the primary private sector partner on this project, providing expertise and industry links for the development of the wireless framework as well as facilitating greater access to computers for organizations and homes. Cisco and Dell have offered component equipment for the proof-of-concept phase of the wireless corridor project at substantial price discounts. MTS has offered the broadband Internet link for one year at no charge.

A "mesh" architecture, where every receiver can act as a transmitter, and where every device added to the network makes the network stronger by adding range and capacity within the network, may be considered. Economical directional antennae will be used. These

antennae will be placed on higher elevations (mostly on the rooftops of buildings) to "route around" buildings.

**What hours would the service(s) be available?**

The *LearningCITI* wireless network would be available 24 x 7, although technical and other support for the network would likely be available only during normal working hours, at least initially.

**Business model --- Non-profit or for profit?**

There is a cost to implement the *LearningCITI* infrastructure and to maintain the equipment. There will also be a cost to the Internet broadband service. *LearningCITI* will want to operate at least on a cost-recovery basis.

The initiation of an educational technology development strategy that focuses on finding ways to affordably support Winnipeg's "at risk" residential downtown neighbourhoods is a key objective of *LearningCITI*.

Under a free or fee-based service model, *LearningCITI* could help facilitate the provision of reconditioned personal computers and support for their use. Both The University of Winnipeg and Red River College, through their respective partnerships with Dell Canada and HP Canada, are motivated to develop a program in affiliation with Powerland Computers and First Nations Power Technologies, to offer these computers to in-need/at-risk members of our neighbouring communities.

It may be feasible to underwrite the cost of placing re-conditioned computers (costing under $100 for each system, less the wireless access card) into community centers and homes that do not have accessible technology.

Existing non-profit associations may be used to help set up the network, either on a volunteer basis or for nominal payment.

A nominal monthly fee could be charged local businesses for access to the wireless network, and some advertising may be allowed, potentially creating a revenue stream to help sustain and expand the network[42,43].

[42] Chaska, Minnesota is one town, for example, that offers a community wireless network and Internet service for US$16 to US$25 per month. Their offering includes speeds comparable to cable or DSL, no activation or equipment charges, no tie-up of phones, no long term contract, quit at any time, billed on utility bill, five free email accounts, and 10 MB web space.

[43] Other business models include allowing service providers to lease capacity on the wireless networks, and split installation costs in exchange for service and revenue sharing.

**Options/Alternatives for delivery --- WiFi vs. WiMAX**

Two technology options are available for deploying the wireless *LearningCITI* network infrastructure. These are WiFi and WiMAX, and are described below.

**WiFi**

An abbreviation for "wireless fidelity", it describes a category of wireless local area network that uses a spectrum of radio waves to transmit signals similar to many remote control devices, including cell phones and laptop computers. WiFi follows the international telecommunication specifications known as the 802.11 set in the transfer of data.

Standard WiFi technologies have an average range of 300 feet (with a maximum range of approximately 1,000 feet outdoors).

One main disadvantage of the WiFi solution is the relatively low 56Mbps speed bandwidth and the short 300-feet or less distances covered by a single wireless access point.

With a mesh architecture design, several inexpensive WiFi nodes simply need to be installed. True broadband requires dense cell architecture. Between 15 and 20 WiFi cells in a mesh formation are needed to adequately cover a square mile.

Foliage, population density, and transmission frequency are factors that determine network infrastructure capabilities, needs, and costs.

**WiMAX**

WiMAX, a wireless technology currently under development, promises to surpass WiFi's relative low-speed bandwidth and short coverage distance. Initial WiMAX products are expected to be commercially available in spring 2005. WiMAX is based on the 802.16 standard that allows wireless coverage to extend up to 30 miles (50 kilometres) and can provide ISP-level bandwidth to a single access point. One WiMAX tower could link hundreds of users to the Internet, while retaining high-speed data transfer rates. Supporters of the WiMAX technology and standard include large IT network component firms such as Intel, Nortel, and Cisco. As an Internet Protocol (IP)-based technology, WiMAX can accommodate the transmission of multi-media (data, voice, photo, video).

This new technology offers many benefits over existing technologies, not the least of which is its much larger range than traditional WiFi, and provides an interesting business opportunity

for local high-tech firms. WiMAX can help reduce or eliminate the need for a number of hotspots.

The much smaller number of access points required under WiMAX topology, means that less technicians are required to support the network infrastructure and to reach a customer/user base. WiMAX allows broadband service providers the ability to service customers that previously only had much-slower-speed (56K) access.

WiMAX cannot currently be used while a user is moving, say in a car (WiMAX mobile technology is predicted to be available in 2007).

**Preferred option**

Given the current state of technology, the potential offered by WiMAX, and successful outcome to the proof-of-concept project, the preferred "solution" for deploying the *LearningCITI* network would be a hybrid architecture containing both WiMAX (802.16) for backhaul connection to the more traditional WiFi (802.11b/g) access point/hotspot technologies. This would offer a truly innovative and exciting opportunity to bring Internet access to all citizens in the Winnipeg downtown core.

**Broadband accessibility and operational licensing**

Following the proof-of-concept and pilot stages, *LearningCITI*'s broadband channel to the Internet would likely be provided by a national telecommunication carrier such as MTS Allstream and/or Bell/GT, or CANARIE/MRnet if *LearningCITI* remains as an education/research asset.

*LearningCITI* will adhere to Industry Canada's conditions ad licensing/regulatory requirements for operating the wireless network within specific licensed/unlicensed ranges of the electromagnetic (broadcasting) spectrum. It would be preferable if *LearningCITI*'s equipment and transmission protocols would be such as to be capable of operating in the unlicensed spectrum (more flexible, cheaper, customizable to needs, less administration) versus licensed spectrum (high-power networks).

**Required investment**

The infrastructure will need to be supported and maintained with people, equipment, and systems. Some form of "help desk" will likely need to be established.

At this "conceptualizing stage" in the evolution of *LearningCITI,* and without access to significantly more information, one can only draw on

the experience of other jurisdictions to derive "best guess" (rough) estimates for the dollar investment that will be required.

Philadelphia's wireless mesh network uses eight to sixteen base stations per square mile, depending on topography and obstacles like buildings. That works out to approximately US$82,000 per square mile in total capital costs. The city estimates ongoing annual maintenance costs of $1.5 million per year for a network covering a land area of about 135 square miles, or about US$11,000 per square mile (Werbach 2004). The capital investment required to extend wireless coverage to mobile users within a 300-foot radius of the equipment is now in the low hundred of dollars.

Chaska's 16 square mile network cost less than US$600,000, or about US$37,500 per square mile.

Hence, using the above "cost experiences", and without the benefit of more detailed costing analysis at this time, one can estimate that *LearningCITI* could cost in the range of CDN$180,000 to CDN$394,000 to implement in a 4-square-mile area of downtown Winnipeg. Annual maintenance/upkeep could require approximately CDN$53,000.

Aside from some "ballpark" licensing/subscription costs, the above estimates do not include costs associated with providing or developing *LearningCITI* content offerings, providing a "help desk" function and on-going technical support, ongoing promotion/marketing and administration of the initiative, securing consulting assistance, or conducting research projects.

The following table provides a list of cost items that would likely be incurred in a permanent implementation of a wireless network corridor covering 4 square miles, and an estimate of the one-time (capital) and on-going costs, associated with each item. Costs are shown at retail cost value with taxes not included. Discounts to listed costs may be provided to the procurement of these goods and services through educational and non-profit organizations. Also, pricing is expected to be reduced as wireless equipment becomes "commoditized".

| ***Item*** | ***One-time Cost CDN$*** | ***Estimated Units Required CDN$*** | ***Extended One-time cost CDN$*** | ***Annual Cost CDN$*** |
|---|---|---|---|---|
| Base station | 18,000. | 1 | 18,000. | 4,500. |
| Customer Premises Equipment (CPE)/Subscriber Unit (SU) | 6,000. | 3 | 18,000. | 4,500. |
| Hotspot (access point only) | 910. | 64 | 58,240. | 16,000. |

| ***Item*** | ***One-time Cost CDN$*** | ***Estimated Units Required CDN$*** | ***Extended One-time cost CDN$*** | ***Annual Cost CDN$*** |
|---|---|---|---|---|
| Antenna Cabling (per meter) | 70./m | 4 sets | 280. | 60. |
| Installation | 50./hr. (50 hrs./base station 25 hrs./SU) | 125 | 6,250. | 1,250. |
| Supporting software (e.g., security systems, any "billing" systems, network management systems) | 35,000. | 1 | 35,000. | 7,000. |
| Central monitoring and operational hardware (desktop, server(s), rack, ups) | 35,000 | 1 | 35,000 | 5,300. |
| Licensing (transmission, software, and content) --- annual | 10,000 | 1 | - | 10,000. |
| Broadband service subscription fee --- annual | 100./mo. | 1 | - | 1,200. |
| Routers (to connect to Internet broadband service & other base units) | 3,000. | 4 | 12,000. | 3,000. |
| ***SUB-TOTAL*** | | | ***182,770*** | ***52,810*** |
| Ongoing technical support | 90/hr. | 40 hr./mo. | - | 43,200. |
| Help Desk | 20/hr. | 150 hr./mo. | - | 36,000. |
| Administration/secretariat expenses | 2,500./ month | 12 | - | 30,000. |
| Promotion/Marketing --- annual | 10,000. | 1 | - | 10,000. |
| Research projects --- annual | 25,000. | 1 | - | 25,000. |

| *Item* | *One-time Cost CDN$* | *Estimated Units Required CDN$* | *Extended One-time cost CDN$* | *Annual Cost CDN$* |
|---|---|---|---|---|
| Consulting ---annual | 200./hr. | 150 hrs. | - | 30,000. |
| ***TOTAL*** | | | ***182,770*** | ***227,010*** |

As the proof-of-concept and pilot stages of the *LearningCITI* initiative are completed, more will be known about costs. Cost estimates can then be further refined.

**Timeline/schedule**

The proposed timeline for deployment of *LearningCITI* is as follows:

**Within the next two months (immediately)**

"Proof-of-concept" project will test the implementation of a pilot WiMAX wireless link solution between Red River College, The University of Winnipeg and the Centre for Aboriginal Human Resource Development campuses.

**Months 2 to 9 (near-term)**

A comprehensive pilot project linking some community groups to the corridor (pilot project specifics will be defined towards completion of "proof-of-concept"). At least one school and non-profit group would be invited to participate in the pilot, as well as existing students in the various campuses.

**Months 9 to 16 (short-tem)**

A further extension of the architecture within Winnipeg to the Millennium Library and to all other interested partner-points in between the four locations (UW, RRC, CAHRD, and Millennium Library). A broadening of wireless coverage to key communities in the surrounding Winnipeg areas, including communities served by cultural organizations.

**Beyond 16 months (future)**

Access would be offered (and extended) to the broader community-in-need, for example, emergency shelters for the homeless and low-income affordable housing complexes, and also be open to businesses and to governmental and non-governmental organizations offering services to the public.

## Other considerations

### Managing risks

A number of potential risks exist within this undertaking. Such risks will need to be mitigated through appropriate risk management steps, including:

- Securing adequate insurance coverage against potential liabilities resulting from user and/or content creator liability for activity on the wireless network.
- Securing adequate insurance coverage against theft of, or damage to, wireless network infrastructure equipment and software.
- Creating a separate network for security reasons, with appropriate firewalls to reduce any potential exposure to the educational organizations' own campus networks.
- Separating broadband connections from the organizations' own operations.
- Stating policy(ies) and disclaimers (e.g., "use at your own risk") up-front on the "sign-on" splash page.
- Monitoring usage and blocking illicit or unethical usage.
- Recognizing that commercial wireless offerings may be sensitive to a free or low-cost community wireless network offering. They may perceive this as "competition" and interfering with their commercial initiatives, and may protest taxpayers' dollars being used to launch a service that could erode their markets.
- Securing appropriate broadcast licenses, rights to right-of-ways, changes to premise leases where equipment will be installed on physical premises, and amending service agreements and corresponding payment structures where required (e.g., if "piggybacking" on an existing commercial broadband link to the Internet).

### Managing change

As more community members and businesses "join" the *LearningCITI* network, and as content offerings find greater utility among users (extending the "online time and traffic" per user), pressure will be placed on the network to increase the capacity of the installed network equipment and broadband link to absorb the increase in user and usage volumes. This implies that broadband service providers will also need to invest in broadband infrastructure as demand increases.

The *LearningCITI* infrastructure will also need to adapt, in reasonable response time, to shifts and changes in technologies.

**Managing the network**

For the community, the ubiquitous availability of a wireless network must be reliable, viable, and sustainable.

Ways and means will need to be found to help keep “volunteers” motivated. Training will need to be provided to those that need training.

# Sustainability

Fundamental to the achievement of primary goals set for *LearningCITI*, is the need to establish some form of permanent overseeing and administrative organization, and to attract local support, participation, and co-operation among educational organizations, community groups, businesses, and government.

**Governance and Organization**

Different models of governance and organization could be considered and assessed for their merits and potential constraints or limitations.

*LearningCITI* could, for example, be set up as a not-for-profit partnership, a co-operative, an association, or a trusteeship "providing access" to the wireless network, securing funding and applying any revenues realized to paying for the infrastructure and its ongoing support. Its relationship to the founding, sponsoring organizations (i.e., UW, RRC, and CAHRD) could be "arm's length" or could be tightly-linked to the governing structure of the parent organizations.

From the examples seen in other jurisdictions, organization models have varied from a municipality fully owning and overseeing all aspects of the wireless networks' operations, to ones where "committees" or incorporated public/private "boards" have been established to provide the necessary oversight functions.

A particular governance model may best apply for the early phases of the *LearningCITI* initiative, say for the first twelve months, followed by a different model adopted once the initiative has been well-established and has achieved its first set of early successes.

Regardless of the governance model that is ultimately chosen, a charter or "articles of organization" and by-laws will need to be developed and filed with the appropriate provincial authority to establish the formal status of *LearningCITI* as a recognized organizational entity. Periodic filing/reporting of activities and organizational standing will likely be required by the provincial authority.

As with any organization, a governance framework will need to be established to follow-through on the common (shared) vision and mission for *LearningCITI*, and its initiatives and projects, to achieve designated strategic goals and objectives.

At least one potential model would see a Board of Directors, comprising persons representative of the member sponsoring organizations (e.g., UW, RRC, and CAHRD) provide the high-level governance (due care and ultimate responsibility) for all *LearningCITI* decisions and activities. This Board's responsibilities would need to include setting strategic *LearningCITI* goals and objectives, fundraising, policy, business rules, planning, audit programs, monitoring and accountabilities. The Board of

Directors would need to be responsible for ensuring legal and ethical integrity and sustainability of the organization, its initiatives and projects.

Board governance activities will likely result in a delegation of authorities to a secretariat/administrator of the *LearningCITI* program, required to put in place and guide the necessary initiatives, projects, processes and practices to address *LearningCITI* implementation and operational needs. Smart Partners has offered to serve as the secretariat and administrative organization.

Smart Partners secretariat and administrative activities would likely need to include:

- Promoting *LearningCITI.*
- Ensuring adequate wireless infrastructure capacity and resources.
- Management and deployment of *LearningCITI* projects.
- Maintaining the *LearningCITI* web site (portal and information sites).
- Privacy, anonymity, and consent management.
- Setting/adoption of standards.
- Monitoring *LearningCITI* performance and outcomes.
- Monitoring revenues and expenses (financial and budget management).
- Co-ordinating with other related initiatives in Winnipeg or Manitoba.
- Change controls and approvals.
- Relationships and co-ordination intra- and inter-jurisdictionally.
- Vendor relationships.
- User relationships (issues and complaints raised by users).
- Risk management.
- Regular reporting to the Board.

**Declared participants, partners, and supporters**

Support, in the form of the effort provided by individuals in establishing and evolving *LearningCITI*, would likely continue to come from non-profit organizations (such as community clubs) and volunteers.

Support, in the form of core funding, would likely originate with government agencies whose mandate it is to promote community and socio-economic development. Local businesses may pay a fee for access to the Internet via the *LearningCITI* wireless network. Users may be charged a low (less than $10 per account) monthly fee. Again, it is the intent of *LearningCITI* to operate strictly on a cost-recovery basis.

Support may also be solicited, and come, from private technology companies interested in contributing to the community through “pro bono” offers of equipment, technical design, technical support, and other services.

**Declared commitments and contributions**

Getting to this point of "defining" what LearningCITI might "do and look like" and having a significant proof-of-concept project well underway, would not have been possible without the extensive commitment and collaboration that have already occurred among the three educational institutions (UW, RRC, and CAHRD) and between representatives of these institutions and private sector organizations willing to devote time and resources to the initiative. This includes private firms such as Powerland Computers, Cisco Systems, Dell, Nortel Networks, and MTS Allstream.

Community Connections, the City of Winnipeg, Manitoba Hydro, and the University of Manitoba continue to contribute time and knowledge to the initiative as it unfolds.

Other organizations such as the Millennium Library, CANARIE, MR*net, Industry Canada, and industry associations have expressed a strong interest in working with UW, RRC, and CAHRD to explore opportunities for leveraging *LearningCITI* to expand capabilities and offerings for their "client constituencies".

The level of confidence is high, such that, as *LearningCITI* takes greater shape, many other public and private organizations will want to participate, contribute, and become visibly associated with a growing, successful community wireless enterprise.

**Other potential sources of funding and non-dollar resources**

Partners in the *LearningCITI* initiative are grateful for the financial contributions made to date by the three sponsoring educational institutions and by the federal agency, Western Diversification, that have allowed this exciting initiative to progress. This partnership will be seeking to discuss next-stage and sustainable funding with other funding agencies.

**Best Practices**

Some best practices that have evolved in other jurisdictions that should be applied to *LearningCITI* to help ensure its sustainability include the following:

- A champion and effective leader for the initiative.
- A common understanding of the vision and mission (i.e., intent) of the community wireless network initiative.
- Development of strategic collaborative public-private partnerships.
- Active fundraising.
- Actively soliciting the participation, commitment, and input/feedback from communities and stakeholders.
- Appropriately leveraging community resources.
- Planning that incorporates the demographics and statistics of the target audiences (users).

- Developing and clearly articulating policies on use, privacy, content/offerings.
- Performing regular activity monitoring, and ensuring continued alignment with initiative's vision and mission.
- Capitalizing on lessons learned.
- Adequate resources to support and administer infrastructure.
- Speaking frequently to government, business, community agencies, funders, and other stakeholders about the wireless corridor, its performance, achievements, and needs; broadcasting successes; providing regular reports and news releases.
- Actively promoting the community wireless network and its offerings, including formal awareness campaigns and organized training programs.
- Addressing problems or issues that have arisen quickly, efficiently, effectively, and decisively.
- Monitoring finances.

**Brand recognition --- marketing and communication**

A concerted effort toward *LearningCITI* brand recognition and offering awareness will need to be made. This may include:

- Common logo/emblem.
- Brochures, point-of-purchase table tent cards, stickers for windows and doors.
- Advertising in community newspapers and "local" websites.
- Registration on a hotspot directory.
- "Splash" page advertising.
- Printing cards providing directions for accessing the wireless corridor network, and making these cards available through local businesses, including hotels and restaurants.

**Measuring success**

Several "measures" will need to be used to monitor the adoption rate, utilization, and utility of *LearningCITI.* These measures may include, but not necessarily be limited to:

- Wireless network services and content offerings for community residents and businesses are universally-available and affordably-priced.
- Elected government officials and community and business leaders are committed and aligned to a long term vision for *LearningCITI* and its positive impact on economic development and community enhancement.
- Solutions are deployed by various organizations to create common interest-based web sites and applications, and more efficient access to community-relevant services and information.
- The wireless network is being used (accessed) to ease citizen-to-government interaction and save taxpayer dollars.

- A formal process exists for cooperation between the *LearningCITI* sponsors (organization) and local governments, private technology firms, and telecommunications companies.
- *LearningCITI* officials, in partnership with government and private technology firms, are taking steps to ease the technology investment burden of persons or groups “in need” residing in the community.

# Next Steps (Action Plan)

A critical first step toward realizing a viable, successful *LearningCITI* community wireless network is to secure an explicit commitment, by all interested parties, to work towards achieving the vision, mission, and goals of the initiative.

Following a successful proof-of-concept, a plan needs to be developed that describes/articulates this commitment, a phased deployment, the desired governance structure, appointment of secretariat, coordination for operations, promotion, monitoring, and support, solicitation and invocation of content offerings, and funding and resourcing strategies.

The plan should include a description of *LearningCITI* performance expectations and anticipated outcomes, together with the "indicators" that will be used to monitor these. A balanced scorecard approach may be applied to the project.

The actual execution of this plan may necessitate negotiating and finalizing relevant agreements between the parties and with other persons/entities interested in joining and contributing to the initiative.

# Conclusion

In summary, *LearningCITI*:

1. Is a collaboration of public educational organizations formed to explore the promotion of e-learning via wireless access by bridging educational and informational institutions with individuals living and working in downtown Winnipeg.

2. Believes that information and education are keys to social, economic, and cultural development.

3. Understands that wireless information technology is becoming an increasingly affordable delivery vehicle for information and education.

4. Is significantly motivated to act. Demographics within the post-secondary educational institutions in Manitoba show divergent trends. The student population is growing and these students are very Internet-connected. On the other hand, there is a growing awareness of the digital divide within at-risk communities and neighbourhoods. Disseminating information and resources via wireless delivery will promote learning.

The combination of low-cost systems and the wireless network access creates a powerful and compelling foundation for achieving learning, individual welfare and enablement, community development, and economic growth through the *LearningCITI* project.

# Appendices

**A --- Glossary of Terms**
**B --- Sources of Information**
**C --- Map of Winnipeg Hotspots**

# Appendix A --- Glossary of Terms

**“access point”** --- a station that transmits and receives data; an access point connects users to other users within a network.

**"hotspot"** --- a public or private terminal or node offering wireless access to the Internet; an access point to the Internet requiring no hard wire connection.

**“splash page”** --- the web page that users first see when signing on to the Internet via their web browser.

**“WiFi”** --- an abbreviation for "wireless fidelity", it describes a category of wireless local area network that use a spectrum of radio waves to transmit signals similar to many remote control devices, including cell phones, and follows the international telecommunication specifications known as the 802.11 set in the transfer of data. Its data connections are fast (up to 6 Mbps) but concentrated in a very small coverage area --- usually a radius of just 100 to 300 feet from a base station.

**“WiMAX”** --- an abbreviation for "Worldwide Interoperability for Microwave Access", it describes a category of wireless wide area (metropolitan area) network that uses a developing (not-yet-standardized) international telecommunication specifications known as the 802.16 set. It transfers data at very high speeds (70 Mbps or about 12 times the data transfer rates of WiFi) and has a range of approximately 30 miles from a single base station.

# Appendix B --- Sources of Information

Fredericton Expands Free City Wireless Network. *Muniwireless.* Retrieved February 24th from http://www.muniwireless.com/archives/000489.html.

"Wi-Fi Network Transforms Fredericton into a Hotzone for Mobile Business and Lifestyle". *Canadian Information Productivity Awards*. Retrieved February 24th from http://www.cipa.com/award_winners/winners_04/CityofFredericton.html

Griffith, E. (2005). Open Source Arrives for Municipal Networks. Retrieved February 24th from http://www.wi-fiplanet.com/news/article.php/3467651

Horan, Thomas A. (2000). Digital Places: Building our City of Bits. Washington, DC: Urban Land Institute.

Kosseff, J. (2003). Portland sees wireless as good for businesses. *Jojava.* Retrieved February 24th from http://joejava.com/wirelessasgood.htm

*New Millenium Research Council.* Retrieved February 24th from http://www.thenmrc.org/

Overholt, A. (2004). Wireless in San Diego. Fast Company p. 84 Retrieved February 24th from http://www.fastcompany.com/magazine/78/wireless.html

Roach, R. (2004). San Francisco Mayor Announces Wireless Internet Access Goal. *Back Issues in Higher Education 21*(20). Retrieved February 24th from http://www.findarticles.com/p/articles/mi_m0DXK/is_20_21/ai_n8680851

Shim, R. 2004. S.F. Bay Area tops in wireless cities survey. *C/net News.com.* Retrieved February 24th from http://news.com.com/2100-7351_3-5184737.html?tag=nefd_top

Simard, C. & West, J. (2003). The role of founder ties in the formation of Sand Diego's "Wireless Valley". Retrieved February 24th from

http://www.druid.dk/conferences/summer2003/Papers/SIMARD_WEST.pdf

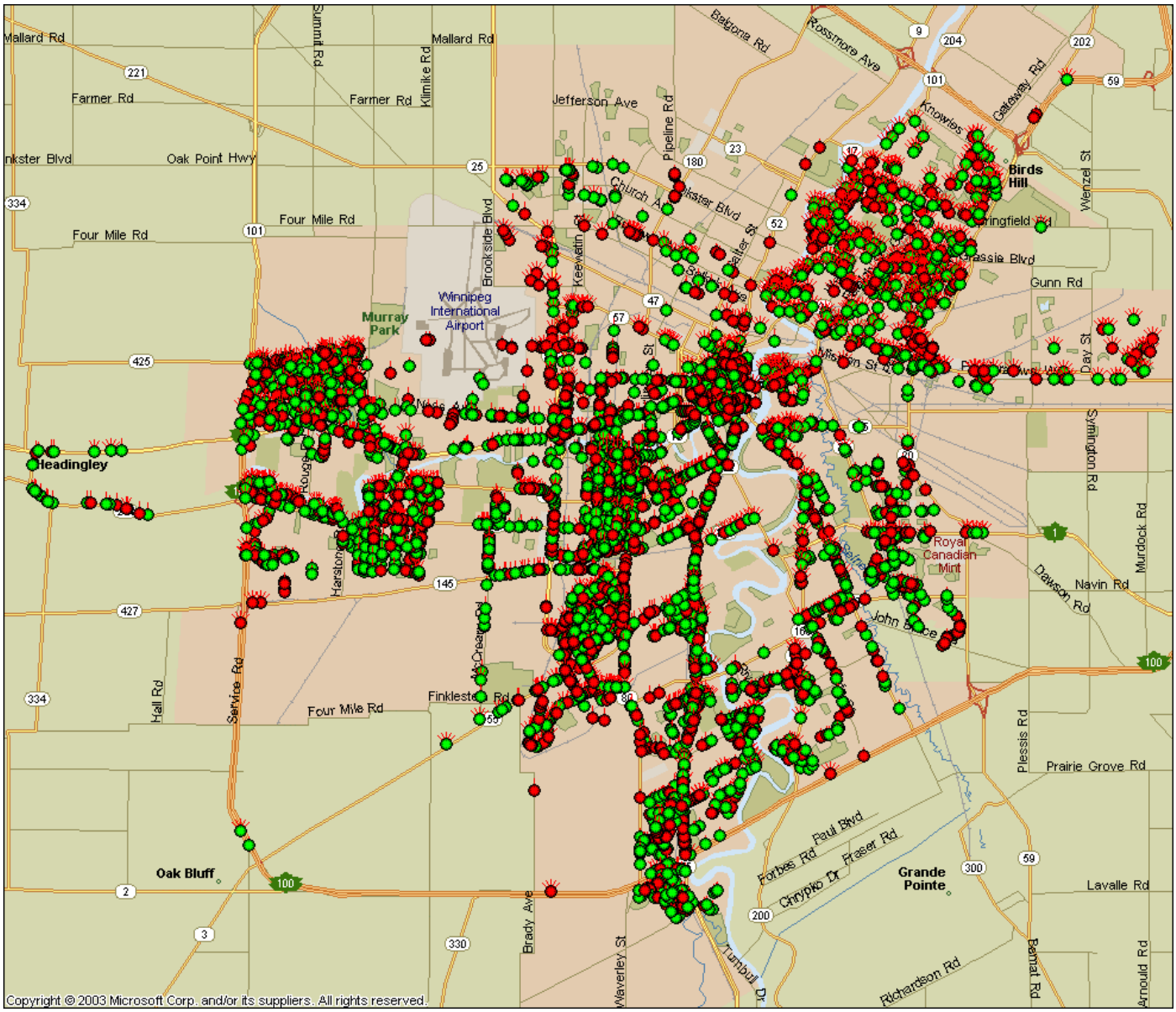
Stone, M. (2004). *Wireless Broadband a "silver Bullet" for Poverty. Digital Divide Case Study*. People's Emergency Center, Philadelphia OA. Retrieved February 24th from http://www.muniwireless.com/reports/docs/CivitiumPEC.pdf

Werbach, Kevin (2004) *Wireless Cities*. "Police. Electricity. Schools. Trash collection. Road maintenance. Parks. Wireless connectivity. Wireless connectivity???". Retrieved from http://www.thefeature.com/article?articleid=101181&sh=werbach&ref=7696680

# Appendix C --- Map of Winnipeg Hotspots

Location of hotspots in Winnipeg as of April 2005.
Green dots represent wireless open Access Points. Red dots represent secured access points.

Source and courtesy of: www.wpgwifi.com site.




June 10, 2005