SUBJECT: Wireless Hamilton WiFi Project (FCS09028) (City Wide)

RECOMMENDATION:

a) That the existing wireless infrastructure be reconfigured to increase availability, usability and provide increased benefit to the City;

b) That staff investigate the various reconfiguration options and report back to Council; and

c) That the components of the Wireless Hamilton infrastructure remain in place and active while alternative configurations are being investigated.

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Antonio D. Tollis
Acting General Manager
Finance and Corporate Services

EXECUTIVE SUMMARY:

Report FCS06102 was presented to Committee of the Whole and approved at the September 27, 2006, Council meeting. This report was a joint submission by the City of Hamilton and FibreWired (since purchased by Atria Networks) to the Future Fund for $501,102.98 to develop a wireless (WiFi) infrastructure in the downtown area (bordered by Barton Street, Main Street, Victoria Avenue and Queen Street) as well as five (5) ‘hotspots’ (high-speed public wireless internet access locations) in strategic locations throughout the City. This request for funding, from the Future Fund, was for the initial phase of a multi-phase wireless project and the approval for the initial phase was for a one (1) year period commencing January 2008.

The initial phase which concluded December 31, 2008, consisted of designing the infrastructure, acquiring hardware, installing sixty-nine (69) access points, implementing
the background infrastructure and web site and conducting specific projects for testing purposes.

Phase 1 provided wireless internet access to mobile City staff that are required to conduct business outside the office, while also providing any available capacity, as free internet access to the public in the downtown core and in the hotspot locations. Both the Hamilton Police Services and City staff ran projects during the initial phase to test the functionality, speed and reliability of the wireless infrastructure.

The Wireless Hamilton infrastructure provided minimal benefit to City staff, due to the number of dead zones, within the pilot area. This pilot did provide wireless internet access to the public; again, however, the number of dead zones within the pilot area made it difficult or impossible for some to connect. Members of the public that were able to access the infrastructure found it very useful and encouraged the continuation of this venture. Public members who were unable to gain access were frustrated but were still positive on the concept of wireless accessibility in the downtown area.

After completing various projects, the Working Group is of the opinion that there is benefit to be received by providing the mobile workforce with access to the corporate network. Feedback received from members of the public who were able to connect was very positive and they expressed a desire to have this continue and perhaps expanded. The Business Improvement Association (BIA) also indicated support for this initiative. The public access certainly has Economic Development and Tourism benefits; however, these benefits are difficult to place a dollar value on. The Working Group is of the opinion that the wireless technology should remain active and the benefit of wireless technology should be maximized by reconfiguring the existing network design.

If Council agrees with the staff recommendations in this report (FCS09028) and determines that the wireless infrastructure should be maintained but in a reconfigured manner, staff would have to analyze the possible alternative configurations and report back to Council, at a later date, with a recommendation.

Various Information Reports have been provided, as updates to Council, during the year. This is the final report, as requested, with Council’s approval of the Future Fund request.

**BACKGROUND:**

As an organization, the City of Hamilton has made extensive use of Atria’s in-ground fibre infrastructure and has facilitated the delivery of electronic services to a broader group of staff and extended on-line services to the public via the City’s web site. At the present time, the Atria fibre infrastructure provides connectivity to over four thousand, five hundred (4,500) City of Hamilton staff members at approximately one hundred and fifty (150) City locations. Wireless Hamilton provides an opportunity to extend the corporate network to staff working outside the office environment.

In June of 2005, through the efforts and leadership of Councillor Whitehead, the Mayor’s Wireless City Summit was held to raise the profile of wireless network development activity in the City of Hamilton. This was an event that brought information technology
innovators together to begin mapping the way to a wireless community. At that time, it was recognized that other municipalities were beginning to etch into one of Hamilton's business advantages – its broadband connectivity. Canadian municipalities, such as, Toronto, Waterloo and Fredericton, as well as American cities, such as Philadelphia, San Francisco and Albuquerque were creating Municipal wireless networks to entice businesses and people into recognizing their cities as exciting, interesting places to live and perform business. The Mayor's Summit drew strong support for the initiation of a wireless project. Subsequent meetings were held with community stakeholders to discuss wireless opportunities.

As a result of interest in wireless technology, in 2005, FibreWired initiated an inaugural meeting to discuss building a wireless (Municipal Wireless) network. Participants in these sessions included representatives from Hamilton Emergency Services (ambulance and fire), Police Services, Hamilton Separate and Public District School Boards, McMaster University, Mohawk College, The Chamber of Commerce, the City’s Economic Development Division, Hamilton Port Authority, the City’s IT Services Division, the City’s Transit Division, DARTS and the Hamilton Public Library. This meeting and subsequent meetings, served as a forum to define the needs of the individual stakeholders as well as developing a list of potential applications for this infrastructure. From these meetings, a Municipal Wireless Working Group was formed to participate in the detailed planning stage. This Working Group consisted of representatives from the following organizations:

- Hamilton Chamber of Commerce
- Hamilton Economic Development
- Hamilton Emergency Services
- Hamilton Health Sciences
- Hamilton Police Services
- Hamilton Port Authority
- Hamilton Public Library
- Hamilton Street Railway
- DARTS
- Hamilton-Wentworth Catholic District School Board
- Hamilton-Wentworth District School Board
- McMaster University
- Mohawk College
- St. Joseph’s Hospital

This Municipal Wireless Working Group was strongly supportive of a ‘proof of concept’ to provide answers to a number of questions. Phase 1 of this project was to allow participants to experience the use of wireless technology and define expectations in regards to reliability, mobility and application response time. It was also to identify potential efficiencies to be gained from extending applications to mobile workforces.

The WiFi initiative was to provide an opportunity to link the mobile workers to the existing wired infrastructure allowing them to access and update data while working out of the office.

In September of 2006, Council approved the Joint request, from the City of Hamilton and FibreWired (now Atria Networks), to the Future Fund for $501,102.98 to develop a
wireless infrastructure in the downtown core, as well as, five (5) ‘hotspots’ in strategic locations throughout the City of Hamilton. Phase 1, with a one (1) year time line commencing January 1, 2008, was to be the initial phase of a multi-phase initiative. FibreWired designed the infrastructure with sixty-one (61) access points to provide coverage in the downtown core. The coverage area in the downtown core is bordered by Barton Street, Main Street, Victoria Avenue and Queen Street. The ‘hotspot’ locations are Valley Park Community Centre, Morgan Firestone Arena/Ancaster Secondary School, Pier 4 Park/Hamilton Chamber of Commerce, Turner Park and Waterdown Memorial Park. There was also an indoor access point installed to service the food court area of Jackson Square. The initial phase also included five (5) wireless cameras for Police surveillance purposes. Three (3) cameras were installed in Waterdown Memorial Park, one (1) was installed at the corner of Cannon Street and James Street North and one (1) camera was installed at the corner of Robert Street and James Street North.

WiFi is a line of sight technology and therefore access points, for the most part, were installed on street lamp arms and traffic signals for maximum coverage. In some instances, the WiFi signal was available indoors but it was ultimately designed with the mobile worker in mind, providing them with access to data when absent from the office. Phase 1 included the design and installation of the infrastructure as well as the implementation of various projects to test the functionality, speed and reliability of a wireless network.

The initial phase of this initiative was designed to provide answers to some key questions, such as:

1. Can a single WiFi network, shared by key stakeholders, provide each partner with sufficient security and bandwidth to meet their business needs?
2. Can a single WiFi network, shared by stakeholders, be deployed at a cost that can be justified by the benefits received?
3. Can the excess capacity of a single WiFi network be made available to members of the public?
4. Can a single WiFi network provide the public with an easy-to-use service?

This initiative is similar to wireless networks built in many Canadian cities including Toronto, Waterloo Region, Fredericton, Moncton, Regina and various other cities in Saskatchewan. These initiatives have been funded in various different ways. Toronto was funded by Toronto Hydro, Fredericton and Moncton were funded municipally, Regina and Saskatoon were provincial initiatives and Waterloo Region was privately funded by Atria Networks. Toronto and Waterloo Region are a for-fee-service, the balance offers the service to the public at no charge.
ANALYSIS/RATIONALE:

A number of projects were conducted, during the pilot, in order to answer the following questions:

1. Can a single WiFi network, shared by key stakeholders, provide each partner with sufficient security and bandwidth to meet their business needs?

**Security:**

The infrastructure built, along with the back-end environment, provided a very secure solution for City of Hamilton staff to access the corporate network. The infrastructure for the public was intentionally not secured, unless they had their own security in place. This was made very clear to users when they were logging onto the Wireless Hamilton network. For the general public, this service was excellent for internet browsing and email transmission; it was not, however, a safe environment for transmitting confidential information.

**Bandwidth:**

The transmission of data was never encumbered by bandwidth issues. During the pilot, the bandwidth, in place, met our needs; however, this would have to be monitored for usage, on an ongoing basis, to ensure it remained capable of covering the number of users on line. Even with the streaming video from the five (5) video surveillance cameras, there was never an issue with bandwidth.

2. Can a single WiFi network, shared by stakeholders, be deployed at a cost that can be justified by the benefits received?

The ongoing cost to maintain the existing infrastructure is $8,839.00 per month which is paid to Atria Networks to maintain and manage the infrastructure. The sixty one (61) access points allocated to the two (2) square kilometre pilot were not sufficient to provide ubiquitous coverage and therefore, with some areas experiencing no or poor ability to connect, maximum benefits were not achieved. To achieve maximum benefit from this technology, it would be essential to have complete coverage within a pre-defined area or to have numerous hotspots that staff could access. Having areas without coverage or with poor coverage in the downtown core minimizes the value of the infrastructure for both the City’s mobile workers and the public. An example of this impact on the mobile City employee would be experienced by the fixed premises inspector who is conducting a restaurant inspection in an area with no coverage. They are forced to revert to paper methods and update the information when they return to the office. It also means they are not able to access information about previous inspections while on-site. The public experienced frustration due to incomplete coverage and an unreliable signal. They are not guaranteed to be able to access the internet from everywhere within the pilot area. Trial and error signal searching ends up leaving
the public frustrated and they find other alternatives, such as going to the library and using the public internet terminals.

3. Can the excess capacity of a single Wi-Fi network be made available to members of the public?

The answer to this is absolutely yes. At no time during the pilot, did the situation arise where there was no or little bandwidth available for City staff and the general public. If this network were to be reconfigured to provide ubiquitous coverage in a pre-determined area, this would increase utilization by staff; however, it is felt this infrastructure would continue to provide adequate bandwidth to meet City needs.

4. Can a single Wi-Fi network provide the public with an easy-to-use service?

A user survey was placed on the wirelesshamilton.com website seeking the general public’s feedback as to whether or not the service was simple to use. With the exception of those who were unable to pick up the signal, the answer was always yes. Access to the service was extremely easy. As this is a free service to the general public, there was no need to authenticate the user which meant there was no log-in or password required to gain access.

After completing various projects the Working Group concluded that there is benefit to be received by allowing City staff to access the corporate network when working out of the office. The existing infrastructure configuration does provide benefit to staff, but it is minimized due to lack of guaranteed availability within a pre-defined area. The feedback from the general public who were able to connect during the initial phase, was very positive. The BIA also supports this initiative and the public access certainly has Economic Development and Tourism benefits that are difficult to put a dollar value on. The Working Group feels the benefit of wireless technology could be maximized by reconfiguring the existing hardware.

A reconfigured infrastructure could take many forms and will require additional time to perform the necessary evaluation on all possible options to ensure the optimal benefits are received from wireless technology. The following options would require staff to conduct further analysis and bring a report to Council, at a later date, with a recommended configuration. If it is Council’s wish to retain the wireless infrastructure, in an improved manner, some of the options to be reviewed by staff include the following:

- Reduce the downtown core coverage area and move access points to provide coverage for the Downtown Community Improvement Plan area from Cannon Street to Hunter Street (capturing the GO Station), and Queen Street to Wellington Street. This would allow the City to redeploy eighteen (18) access points into this coverage area. Analysis would be required to determine if additional access points beyond the eighteen (18) re-deployed would be required to provide an appropriate level of coverage. A financial analysis would also be required to determine dollars required to re-deploy existing access points. This option would maintain the five (5) current hot spots located strategically throughout the City;
Reduce the existing downtown core coverage area and move access points to provide improved coverage over a smaller area. Perhaps the coverage area would be reduced to include Main Street to Cannon Street, and Hess Street to Catharine Street. This would allow us to re-deploy twenty-eight (28) access points into this smaller coverage area. This smaller area currently has twenty-five (25) access points. Analysis would be required to determine if all thirty-six (36) access points currently outside this area would be required to provide ubiquitous coverage. If they are not all required this would provide an opportunity to create additional hot spots elsewhere in the City. A financial analysis would also be required to determine dollars required to re-deploy access points. This option would maintain the five (5) current hot spots located strategically throughout the City;

Reduce the downtown ‘wireless zone’ further to include Bay Street to John Street, and Main Street to York Boulevard. This would allow us to provide ubiquitous coverage in a smaller downtown core and create a number of hotspots strategically located throughout the City for staff and general public use. Financial and coverage analysis would be required.

Remove the downtown ‘wireless zone’ and create a number of hotspots throughout the City. Strategically placed, this would provide numerous hotspots throughout the City. This would allow mobile City workers to access data, update files and deal with emails while out of the office. It is possible these could be placed in areas, similar to the existing five (5) hotspots, where they would be of benefit to the general public as well. Analysis would be required to determine cost to remove and re-install access points. Coverage analysis would also be required;

Maintain the existing infrastructure and expand the number of access points. Additional access points would improve the quality of the coverage in the existing two (2) square kilometre area. This option could also include the addition of hotspots. This would require additional funding for hardware, infrastructure redesign and installation.

A reconfigured infrastructure would allow the City to take advantage of other wireless initiatives that have been developed outside of the Wireless Hamilton project. Wireless technology has been implemented in some City facilities and the continuation of access when leaving a facility certainly increases staff efficiency. The combination of Wireless Hamilton and the internal wireless networks of the City of Hamilton and the Hamilton Public Library offer a great deal of potential in mobilizing applications and allowing staff to access data when working away from the office.

**ALTERNATIVES FOR CONSIDERATION:**

**Alternative 1.**

Status quo is always an option. The cost for this option is $8,839 per month. This would continue to provide minimal benefit to the City’s mobile workforce due to the sporadic ability to access the network. This would continue to provide wireless coverage to the downtown core but again, it is not optimal as connection within the ‘wireless zone’ is not guaranteed. The analysis indicates this would not be in the corporation’s best interests.
Alternative 2.

This alternative would be to disband the project. This was the initial phase of a multi-phase project and it was meant to provide a test of the functionality of wireless. If the City is not prepared to finance this any further it will be necessary to remove the equipment and discontinue the initiative. One-time funding would be required to remove the equipment from the street lamp arms and perhaps there would be some resale value from this equipment if a market can be found.

**FINANCIAL/STAFFING/LEGAL IMPLICATIONS:**

To maintain the current Wireless Hamilton infrastructure will incur a cost of $8839 per month paid to Atria Networks. If it is decided that staff are to investigate alternate configurations of the infrastructure, staff time will be required to investigate the alternatives, design the infrastructure, conduct the financial analysis and prepare a follow-up report to City Council. Existing Legal Agreements with the Hamilton Utilities Corporation and the Hamilton Yacht Club would have to be extended allowing us roof-top access to their facilities for access points.

**POLICIES AFFECTING PROPOSAL:**

N/A.

**RELEVANT CONSULTATION:**

Staff met with Neil Everson, Director of the Economic Development and Real Estate Department who indicated support for this initiative, as a positive factor in attracting new business, into the City of Hamilton. This department also supports the recommendation of this report and encourages the reconfiguration to cover the Downtown Community Improvement Plan Area. This department would also encourage the investigation of the possibility of a joint venture with McMaster to provide wireless coverage to the McMaster Innovation Park (MIP). Ideally, from an Economic Development perspective, this coverage should encompass the entire West Hamilton Innovation District bordered by Aberdeen Avenue, Dundurn Street South, and Main Street West and the MIP.

Staff also met with Ross Memmolo, Director of Information Technology Services, and Tim Fletcher, Forensic Video Technician, both with Hamilton Police Services who conducted specific projects to test the wireless infrastructure during the past year. They indicated an increased need for wireless technology both for foot patrol officers and video surveillance. Mobility is very important for Hamilton Police Services and they have every patrol vehicle set up as a mobile office with as much information as possible available in the vehicle. Wireless technology is being pursued by Hamilton Police Services for video surveillance and also for video transmission from a command centre in an emergency situation. They are currently investigating a solution involving an interference free wireless spectrum that the Federal Government has made available for public safety purposes only. City of Hamilton and Hamilton Police Services staff have worked together on this initiative and there is ongoing open communication to share solutions and work in partnership wherever possible.
Staff met with Peter MacNeil, Chief Technology Architect and Cathy Poper, Acting Supervisor, Network Services of the City of Hamilton’s Information Services Division. They have implemented a number of wireless infrastructures internal to City facilities and view Wireless Hamilton as a means to extend this access to the corporate network when staff are working outside the office. An example of this would be the ability of the Hamilton Street Railway (HSR) Transit Supervisor’s ability to connect to Wireless Hamilton when situated in the Gore Park area and access all information available to them as if they were working in their office.

Staff met with Kit Darling, Director, Information Technology and Bibliographic Services of the Hamilton Public Library (HPL). The HPL is a strong proponent of wireless technology and was directly involved in facilitating the initial sessions with the community partners for Wireless Hamilton. The HPL currently has public wireless access, in a number of branches, and views wireless technologies as a potential means to link the travelling Bookmobiles to the corporate network and the internet. Wireless Technology is also fundamental to their developing strategy for alternative service delivery to the inner-city and to rural areas.

**CITY STRATEGIC COMMITMENT:**

By evaluating the “Triple Bottom Line”, (community, environment, economic implications) we can make choices that create value across all three bottom lines, moving us closer to our vision for a sustainable community, and Provincial interests.

- Community Well-Being is enhanced. ☑ Yes ☐ No
- Environmental Well-Being is enhanced. ☑ Yes ☐ No
- Economic Well-Being is enhanced. ☑ Yes ☐ No

Does the option you are recommending create value across all three bottom lines? ☑ Yes ☐ No

Do the options you are recommending make Hamilton a City of choice for high performance public servants? ☑ Yes ☐ No