REPORT FOR ACTION

Advancing Broadband Infrastructure and Internet Connectivity

Date: November 3, 2017
To: Economic Development Committee
From: Chief Information Officer and General Manager, Economic Development and Culture
Wards: All

SUMMARY

The purpose of this report is to evaluate the current state of broadband infrastructure and internet services in Toronto, and to recommend the establishment of a collaborative process within the City to advance certain internet connectivity objectives. Specifically, the report lays out two primary connectivity objectives: that all Toronto businesses and residents, including those in low income households, have access to affordable high-speed internet, and that, where applicable, the City ensure its infrastructure is evolving to align with improved technology standards. In support of these objectives, the City should also maintain awareness of Public Sector broadband initiatives, leverage known good practices and provide input as appropriate.

Several recent Council decisions have directed staff to assess Toronto's wired and wireless broadband infrastructure and consider how the City can support internet access and affordability. Reliable high-speed internet is increasingly necessary for residents to access information and services, and for businesses to operate, expand and contribute to innovation-based economic development. Additionally, the ability of the City to adopt "smart" technology to help deliver services more effectively relies on the state of the physical enabling infrastructure.

This staff report builds on a background consultant study that concludes that Toronto has relatively good access to wired, wireless and Wi-Fi broadband. However, standard prices for wired and wireless internet across the city are likely unaffordable for low-income households, representing over 20% of Toronto's population. This has created a 'digital divide' among residents. Moving beyond the current situation benchmarked in the report towards the achievement of connectivity goals for all residents including low income households will require ongoing attention. As a first step, staff recommend the establishment of an interdivisional Internet Connectivity governance structure to consolidate knowledge about broadband issues, provide updates on key connectivity indicators, consult with Agencies and Corporations, and identify policy options and resource requirements.

RECOMMENDATIONS

The Chief Information Officer and the General Manager, Economic Development and Culture recommend that:

1) City Council direct the Chief Information Officer and the General Manager, Economic Development and Culture, in consultation with other City Divisions, Agencies and Corporations, to establish an interdivisional Internet Connectivity governance structure, comprised of a Working Group and Steering Committee. This governance structure will coordinate efforts, identify options and seek Council direction as required to improve access to affordable high-speed internet for all Toronto residents and businesses, and to ensure that City infrastructure and regulation evolves and aligns with improving technology standards.

2) City Council direct the Chief Information Officer and General Manager, Economic Development and Culture to further analyze the digital divide by comparing socio-economic data, including from the 2016 Census, and available geographic broadband penetration data to help support the digital access goals of the City's Poverty Reduction Strategy.

3) City Council direct the General Manager, Economic Development and Culture, as part of the Division's business growth services, to work with Toronto businesses that have identified a lack of required high-speed broadband services to seek equipment upgrades and additional options from internet service providers, particularly in the City's employment areas.

FINANCIAL IMPACT

Resources required to form a Working Group and Steering Committee led by the Information and Technology (I&T) and Economic Development and Culture (EDC) Divisions can be accommodated within the existing operating budgets. Any recommendations arising out of future work requiring additional resources and investments will be brought forward during future budget processes for consideration. Similarly, the recommendation to work with businesses to encourage internet service providers to provide higher speed options fits within the approved EDC budget for business growth services.

The Acting Chief Financial Officer has reviewed this report and agrees with the financial impact information.

DECISION HISTORY

The recommendations in this report respond to several requests from City Council related to internet connectivity, broadband infrastructure and possible investments in "smart city" technology applications by the City:

At its meeting on September 18, 2015 the Economic Development Committee requested staff to report back on actions Council could take to "provide free wireless internet in TCHC locations, parks, civic squares, privately-owned public spaces and interested Business Improvement Areas."
http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2015.ED6.15

At its meeting on November 3-4 2015, City Council directed staff to conduct a study "on the status of Toronto's internet connectivity and broadband capacity especially as it relates to key City and regional economic development objectives and the City's Poverty Reduction Strategy with regards to the Digital Divide."
http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2015.ED6.14

At the June 22, 2016 meeting of the Economic Development Committee, a Member Motion recommended that the City Manager "review the project underway in Santander, Spain … to initiate a similar program of incorporating smart technology." The Committee referred the item to EDC staff "to incorporate into current studies and a future report on issues of connectivity and smart technology in Toronto."
http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2016.ED13.11

In February 2016 Council endorsed a CRTC decision to require companies to make capacity on their fibre-optic networks available to other retailers at wholesale prices and, more generally, Council voted to support "competitive and affordable internet prices for [Toronto] residents."
http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2016.MM12.4

In October 2016, the Economic Development Committee requested the General Manager, EDC and the Chief Information Officer to "report back with a completed internet connectivity and broadband capacity review including an assessment of the factors that influence internet speed, access, reliability and affordability for Toronto residents, businesses and visitors." The Committee also requested staff to meet sector stakeholders and continue to work with the Smart City Working Group to support the commercialization of smart city technology and potential technology uptake by the City.
http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2016.ED15.2

In April 2017 City Council directed the City Manager to convey to the Commissioner of the CRTC the request that major telecommunications providers be required, as part of their licensing, to provide consumers with options for reasonably priced unlimited cellular data packages.
http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2017.MM27.38

COMMENTS

Through the various decisions listed above, Toronto City Council has given staff direction to review the status of Toronto's internet connectivity and broadband capacity, and to help define some of the City's connectivity objectives. The following sections summarize the results of staff's review, beginning with an outline of the factors that have made internet access essential across Toronto. The report then details the availability

and affordability of wired, wireless and Wi-Fi internet across the city, and the relevant regulations related to new equipment installation. While the City's jurisdiction and ability to influence certain outcomes is limited, the final section explains the need for an Internet Connectivity governance structure, consisting of a Working Group and Steering Committee, to monitor and direct progress on connectivity objectives in an ongoing way.

Internet Connectivity as a Basic Requirement

In late 2016, the Canadian Radio-television and Telecommunications Commission (CRTC) completed a review of the "services that Canadians require to participate in the digital economy." The Commission has a mandate to ensure access to "basic" telecommunications, but must continually update its policies as technologies evolve and spread. In its ruling following the review, the CRTC acknowledged that "broadband internet access services are vital to Canada's economic, social, democratic, and cultural fabric," and that "telecommunications regulation needs to be focused more on connectivity and capacity issues than on voice-related issues."

Broadband in the CRTC decision and in this staff report refers to internet connections that are faster than the previous standard 'dial-up' technology. The Commission established universal service objectives including that broadband (at minimum 50 Megabits per second (Mbps) download/10 Mbps upload speed) should be available on fixed networks across all regions of the country.

However, Federal budget commitments and references to this service objective have primarily focused on expanding broadband infrastructure in rural and remote communities. The Federation of Canadian Municipalities (FCM) also focuses on expanding basic services to rural Canada in order to close the 'broadband gap' seen across the country. Urban areas, and particularly large cities like Toronto, are likely assumed to already have high-speed broadband infrastructure in place and multiple service providers competing for customer business. Yet the CRTC ruling clearly indicates a changing approach that treats internet like a public utility, with implied responsibilities for all orders of government to ensure online access and digital literacy.

Broadband and digital literacy skills are necessary to achieve economic and social goals, as recent growth has been driven in part by digital technology and a growing number of services can only be accessed online. Additionally, the ability of the City to adopt "smart" technology to help deliver services more effectively relies on the state of the physical enabling infrastructure. To date however, no comprehensive assessment has been done of internet connectivity and infrastructure, or of the existence of a 'digital divide' between households based on the affordability of various services.

Like many other jurisdictions that now consider internet a basic requirement, City staff have identified the following connectivity objectives:

- All Toronto businesses and residents, including low income households, have access to affordable high-speed internet.
- Where applicable, City infrastructure and regulation facilitate market competition and the installation of evolving technology that meets consumer demand.

In support of these objectives, City Council and staff should also be prepared to provide input and adapt to Federal and Provincial broadband initiatives to ensure that Toronto's goals are met. To help determine the scope of work required to achieve these objectives, the following sections benchmark the current state of broadband accessibility, affordability and regulation in Toronto.

Current State of Broadband Infrastructure in Toronto

To fulfill the Economic Development Committee directive to conduct an internet connectivity and broadband capacity review, staff, led by I&T and EDC, engaged consulting firms Fontur International and MDB Insight to provide background research. The primary deliverable of their *Toronto Broadband Study* (included as Appendix A) was to assess "the current state of Wi-Fi, Wireless, and Broadband in the City of Toronto" using maps of "commercially available broadband wireline coverage per service provider (Fibre, Cable and DSL)." Although a lack of high-speed internet for purchase has not commonly been identified as a problem, staff were previously unable to confirm whether CRTC defined speeds were available across Toronto.

The consultant report also recommends several actions the City could take to improve access and affordability. In most cases these suggestions will require additional interdivisional analysis by City staff before recommendations can be brought forward to City Council. Further analysis can be advanced by the Internet Connectivity governance structure proposed in this report.

Wired Infrastructure

Fontur and MDB's study looked at the main owners and operators of wired broadband networks in Toronto and the various consumer offerings in different parts of the city. All of the internet traffic in Toronto runs through 'carrier hotels' that connect to the global network of fibre and are the starting point for Toronto's wired networks. Toronto is the primary internet hub for Canada and the maintenance of the city's carrier hotel infrastructure is critical.

As expressed in the Fontur/MDB study, "in Toronto, popular wired broadband services were first offered by Rogers Cable and Bell Canada in the 1990s. While there have been many changes in the industry and in technology over the last two decades, these two companies remain the primary providers of wired broadband to Toronto households." The Fontur/MDB study states that both of these companies can provide CRTC download speeds to all parts of their Canadian networks, which includes all of Toronto. The study also notes that significantly faster (1,000 Mbps or 1 Gigabit per second) download speeds are also available for purchase across the city from Rogers, and are being rolled out to more areas by Bell.

Several other internet providers deliver their own more limited broadband cable or fibre networks in certain parts of the city. These include Beanfield Metroconnect which, as described by Fontur/MDB, has been building and operating wired broadband infrastructure particularly in and around the downtown core. Beanfield has a contract to provide internet service throughout the new waterfront planning precincts. Hydro One

Telecom, Cogeco and Allstream/Zayo all also have their own wired broadband installations in areas of Toronto and either market services directly to customers or lease bandwidth to other retailers.

Beyond the large networks that deliver internet service to customers, Toronto's wired infrastructure includes specialty networks that link partners within a sector who need to transfer large amounts of data at high speeds. These include ORION and GTAnet that connect universities, colleges and hospitals, and Sirtnet that connects film and television studios with post-production facilities.

Although companies and institutions using these networks have access to large bandwidth and high speeds, in other cases staff have heard from Toronto businesses that require very high-speed connections but are unable to get providers to bring it to the premises, even when the businesses are willing to pay all associated costs. This report recommends that EDC staff, within the mandate of business growth services, engage impacted companies and internet providers to see how this situation can be addressed.

All of the broadband cable and fibre in Toronto relies on space above and below ground including hydro poles, underground conduits and TTC tunnels. While the actual fibre or cable networks are the most immediate example of wired broadband infrastructure, conduits that carry the fibre are equally important. The availability of space in conduits is required to accommodate any new market entrants and enhanced competition.

In their summary of wired broadband infrastructure in Toronto, Fontur/MDB conclude that CRTC-defined standard internet speeds can be purchased in "most, if not all of Toronto." However, they also note that price remains a significant barrier and that a 'digital divide' exists between Toronto residents with and without access to internet, as discussed further in the affordability section below.

Wireless Infrastructure

Wireless broadband is delivered through fibre and cable to antenna and tower equipment that then sends and receives data wirelessly. Providers establish networks of cellular sites using a particular frequency that connect with smartphones and other mobile devices. Fontur/MDB explain that there are three major owners of wireless networks in Toronto: Rogers, Bell and Freedom Mobile. All other companies providing phones and data plans lease bandwidth on these networks.

Based on mapping of cellular broadband and signal testing in different locations, Fontur/MDB conclude that "the vast majority of the City of Toronto is well-covered" by wireless. All of the major wireless network owners provide coverage across the city with limited gaps "attributed mainly to topography." The consultants also point out that wireless speeds in Toronto are faster than the Canadian and worldwide averages, and also faster than average wired service. Nonetheless, antenna and tower installations must be continually upgraded and expanded as demand has required the provision of more cell sites to limit the distance to end users.

Fontur/MDB predict that wireless data usage will increase due to demand for video streaming and shifts in customer preference from wired to wireless. They highlight the possibility that "mobile data will continue to grow to a point where it will become the preferred, if not only form of broadband connectivity for consumers in the future." There has also been much recent discussion of the 'internet of things' which refers to sensors on home appliances, water meters, streetlights and other infrastructure points that are continual transmitters of wireless data. Cisco forecasts that mobile data traffic globally will "expand sevenfold between 2016 and 2021."

If these trends continue, Fontur/MDB predict that the City "will see increased demand from traditional carriers for use of City infrastructure (street poles, buildings etc.)." This is particularly true if the next (5th) generation (5G) of wireless broadband technology, already in development, becomes the standard and requires an extensive hardware rollout. The consultants recommend that the City should leverage its own assets to carry new wireless equipment.

They also recommend that "standards should be established by the City (as they are in other jurisdictions) to ensure a minimum level of [wireless] service availability" in new buildings. Approximately "80% of mobile device use originates indoors," yet "wireless signal loss occurs when trying to penetrate building materials." Although many building developers are providing it, in-building wireless systems are not required in new construction. The consultants identify this as a safety concern given that 70% of 911 calls come from mobile devices. It is not clear whether the City has a mechanism to make this a requirement or if it would require Federal or Provincial legislation like changes to the building code. These and other questions arising from consultant recommendations can be further addressed by a City staff Working Group and Steering Committee.

Finally, the consultants make note of existing City procedures related to the installation of new wireless equipment. Although the approval of telecommunication towers and antennas is within Federal jurisdiction, Industry Canada requires proponents to go through a consultation process as specified by the local land-use authority or municipality. The City of Toronto has developed its own Telecommunication Tower and Antenna Protocol and has updated it several times to set out criteria and guidelines for the evaluation of tower and antenna proposals. The City then relies on Industry Canada withholding approval if these criteria are not met. When antenna equipment is installed on structures owned by the City or any of its Agencies or Corporations, the local Councillor must be alerted. In order to encourage the placement of wireless infrastructure away from residential areas, the City has waived the requirement to conduct public consultation for proposed towers and antenna in employment areas with sufficient buffers.

The City also maintains a Prudent Avoidance policy that encourages telecommunication tower and antenna proponents to limit radiofrequency exposure levels for their installations in Toronto to 100 times below Health Canada's Safety Code 6 standard. Proponents are Federally required to test for the Health Canada exposure limits, and if this reading is above the Prudent Avoidance maximum, City staff will suggest ways to lower exposure. Fontur/MDB note that the policy provides for lower limits than Federal guidelines and expressed concerns that this could have a negative impact on

deployment of infrastructure. However, in City staff's assessment the policy does not appear to have been a significant barrier to previous applications, especially since compliance remains voluntary.

Wi-Fi Zones

Wi-Fi is a form of wireless broadband that does not use a proprietary frequency and is available, usually with a password, to all users within reach of a signal. It is an important part of the internet connectivity infrastructure mix that exists in Toronto as it provides free online access in various locations. It is also likely an amenity for tourists for whom roaming charges can be expensive. While free Wi-Fi cannot be relied on to provide the "anywhere, anytime" internet access that is an expectation for many, Fontur/MDB report that there are likely "thousands of Wi-Fi hotspots in Toronto," installed by different actors to achieve both public and private goals. For example:

- many retail businesses offer Wi-Fi as a way to attract customers and to deliver targeted advertising;
- the Toronto Public Library (TPL) provides free Wi-Fi in all 100 of its branches and lends Wi-Fi hotspot devices as part of its mandate to advance digital inclusion and digital literacy for all Torontonians;
- the TTC has capitalized on a revenue opportunity by leasing subway tunnels to run fibre and cable, and has leveraged this new infrastructure to provide a Wi-Fi signal on platforms and trains (supplemented by advertising revenue);
- through the City's Digital Main Street program, several Business Improvement Areas (BIAs) are developing Wi-Fi networks using BIA-owned street furniture. The Wi-Fi is intended to allow BIA member businesses to engage with customers and to learn more about their shopping habits by tracking movement through stores;
- as part of its initiative to build technology-enabled 'intelligent communities' Waterfront Toronto is installing neighbourhood-wide Wi-Fi; and,
- the Toronto District School Board recently completed its initiative to provide Wi-Fi in all schools with a ratio of one access point for every 50 students.

Publicly available Wi-Fi is also provided at several City facilities including some council chambers, councillor offices and rotundas at Scarborough Civic Centre, Etobicoke Civic Centre, North York Civic Centre and City Hall.

Fontur/MDB describe Wi-Fi in Toronto as a growing patchwork. While Wi-Fi is not ubiquitous, there are a variety of locations where residents and tourists can access it. There has also been some voluntary coordination by members of the city's tech sector including Wi-Fi location maps and apps. Informed by their review of Toronto and other jurisdictions, the consultant team recommends that Wi-Fi should be allowed to proliferate through the various organizations that have an interest in providing it. This could involve the expansion of the Digital Main Street program which provides a toolkit to interested Business Improvement Areas to install Wi-Fi networks. It could also involve some additional City-run locations, following the TPL's model, including community centres, employment centres and civic squares which offer critical services and are therefore highly accessible to low income residents. This would require new or redeployed resources and/or the identification of new funding models.

Affordability of Internet Connectivity

Although Toronto has good overall access to internet options, there is clearly a digital divide based on affordability. Statistics Canada data shows that slightly more than 60 percent of Ontario households in the lowest income quartile have 'access' to broadband internet at home, meaning that it is available for purchase. In Toronto nearly 100% of households have 'access' but this refers only to the necessary infrastructure being in place. In practice, access depends on affordability.

According to Fontur/MDB the average price in Toronto for home broadband (50 Mbps download) service is approximately $72 per month. This is in the middle range for North American peer cities but far above average prices for some cities in Europe and Asia. The consultants have pointed out that equivalent internet services are cheaper on average from "discount carriers that lease the 'last mile' from Rogers and Bell at wholesale rates regulated by the CRTC." However, as owners of networks, Rogers and Bell can offer 'bundles' with other services that lower the price for each individual service. Although Fontur/MDB were not able to compare prices by neighbourhood, they note that it is cheaper per household to wire and provide service to multi-dwelling buildings and higher population density areas. These denser areas are also more likely to attract additional providers helping to further lower prices.

Wireless broadband is also known to be more expensive in Canada than in many other countries. The background study finds that the average advertised monthly price in Toronto of a mobile plan with at least 1 gigabyte of data is between $60 and $95 depending on phone and activation details. The study points out that a consumer "who uses both wired broadband and wireless broadband would have a monthly bill of more than $150."

As noted in the Toronto Poverty Reduction Strategy, one in four children and one in five adults in the City live in poverty, defined by Statistics Canada's Low-Income Measure (approximately $40,000 for a family of four). Internet at current average prices is a significant expense for a low-income household. For example, a single person receiving Ontario Works receives up to $706 per month to meet all basic needs including food, shelter and transit. A monthly fee of $75 for either home or wireless internet represents more than one-tenth of that payment, making it fundamentally unaffordable. ACORN Canada is an advocacy organization that has developed an 'Internet for All' campaign. Surveys of their membership indicate that internet is "extremely expensive" and often paid for by "forgoing other household expenses."

The Poverty Reduction Strategy includes an action to "expand digital access and literacy to ensure residents can effectively access programs and services online." Fontur/MDB note both Rogers' Connected for Success program that offers $9.99/month internet to all residents of rent geared to income dwellings (including all TCHC buildings), albeit at lower than CRTC standard speeds (10 Mpbs), and the Toronto Public Library's Wi-Fi hotspot lending program available in certain neighbourhoods for six months at a time. As internet standards change, these kinds of programs will need to adapt to keep up and to prevent a digital divide from growing larger. A survey of library computer users shows that "27% of users do not have regular personal access to a

computer connected to the internet, other than the library, and 67% of Wi-Fi users surveyed come to the library to work or study."

The significantly cheaper internet rates that are standard in Europe and Asia indicate that there may be ways to reduce costs and bridge the digital divide in Toronto. The following section suggests some initial actions the City can take.

Improving Access and Affordability

The CRTC's review of access to the digital economy and its declaration of universal service objectives is reflective of a broader trend across the world. Specifically, many national governments and international organizations have similarly turned their attention to broadband quality and access. However, it is often the investment decisions of private internet service providers and the capacity of municipal infrastructure systems that most directly impact the ability of residents and businesses to connect online. Some cities, especially where private sector providers have not made significant investments in infrastructure, have taken an active approach to broadband access by, for example, building their own fibre networks or owning and operating large Wi-Fi zones.

In contrast, Toronto has been able to attract significant private sector broadband investment and has only recently started to examine a broader role for the City in addressing city-wide broadband and connectivity issues in an ongoing way. While the I&T Division responds to the City's own technological needs, and the EDC Division actively supports the tech sector and digital innovation across the economy, there is currently no City Division, Agency or Corporation primarily responsible for increased connectivity among Toronto residents.

This report recommends that Council direct the Chief Information Officer and the General Manager, EDC to lead this work through the establishment of an interdivisional Internet Connectivity governance structure, in consultation with City Agencies and Corporations. If data usage continues to increase as widely predicted and bandwidth needs increase in parallel, the City will benefit from a coordinated effort to ensure that regulations help enable upgrades of physical infrastructure while also maintaining safety standards and equitable access. A coordinated effort will ultimately identify the policy and program levers available to the City to advance connectivity while also informing future conversations with FCM and other orders of government on supporting municipal broadband objectives.

The Working Group within the governance structure can examine and provide timely updates on key indicators including average download speeds across the city, average prices of different types of internet subscriptions, new technology developments, and any new policies or programs related to connectivity and digital literacy initiated by other orders of government. New Census information will allow for further analysis of broadband connectivity and socio-economic data in different neighbourhoods, which can help advance the digital access and digital literacy goals of the Poverty Reduction Strategy. The Working Group and Steering Committee can also highlight immediate concerns and opportunities, and recommend that authority be delegated to appropriate

City staff to implement certain actions. Some possible areas for further analysis in the short term follow below, grouped by theme.

- *Research and Policy Analysis*

First, one important way that the City could influence prices in a well-established market for consumer internet is to facilitate the installation of new fibre and wireless infrastructure to encourage competition. While the Fontur/MDB study was able to map some of the existing fibre and wireless networks, a comprehensive map of conduits for fibre or cable is not readily available. As new installations require this knowledge, staff can pursue what information and maps are available. Likewise, staff can assess how the implementation of 5G wireless networks are likely to impact equipment installation applications.

Even additional competition however is not likely to lower the price sufficiently to make it affordable for all low-income households, particularly in parts of the city where the cost to deliver services is higher. Future update reports to City Council could therefore analyze the factors driving any changes in price levels, and review Canadian and international initiatives aimed at affordable broadband to low income households. The Working Group can monitor, for example, the number of subscribers to Rogers' 'Connected for Success' program and look at how it and similar programs could be expanded or further developed.

- *Whole of Government Co-ordination*

Interdivisional governance will also offer an opportunity to share and consolidate knowledge about connectivity initiatives led by City Agencies and Corporations. Examples include Waterfront Toronto projects and usage statistics for broadband and Wi-Fi at TPL's 100 branches and through its Wi-Fi hotspot lending program. The TTC has also recently added Wi-Fi on platforms and trains. An interdivisional process will help to monitor and advance Wi-Fi across Toronto, even as it involves multiple providers. If approved, the Working Group will keep track of the proliferation of Wi-Fi initiatives across the city and will study possible funding models and business cases being developed, including third party proposals, to add and prioritize Wi-Fi at various City facilities.

And as the City pursues investments in "smart city" technology, it will be critical to link these investments to knowledge of broadband infrastructure, initiatives and regulation that currently exists across City Divisions, Agencies and Corporations.

- *City as Facilitator*

Finally, in response to reports of Toronto businesses that are unable to get providers to bring very high-speed connections to the premises, EDC staff plan to engage impacted companies and internet providers to see how this situation can be addressed. In particular, it will be very helpful to bring service to employment areas where multiple firms are located. Results of these interactions can be shared with the Working Group and Steering Committee and will help inform the overall evolving picture of the city's broadband systems.

Next Steps

If Council approves the recommendations of this report, I&T and EDC Division staff will establish the Internet Connectivity Working Group and Steering Committee that will continue to work with a variety of City divisions, Agencies and Corporations, many of which have provided input to this report. These include the City Manager's Office; Toronto Public Health; Toronto Employment and Social Services; Social Development, Finance & Administration; Parks, Forestry and Recreation; City Planning; Long-Term Care and Housing; the Civic Innovation Office; the Chief Transformation Officer; the Toronto Public Library; the Toronto Transit Commission and the Toronto Community Housing Corporation. A formal Working Group would also seek to engage new partners including Waterfront Toronto and Toronto Hydro.

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ATTACHMENTS

Appendix A: *Toronto Broadband Study* - Prepared for the City of Toronto by FONTUR International Inc. and MDB Insight Inc. (October 2017)