

ConnectTO Program Update

Date: March 16, 2022

To: Executive Committee

From: Deputy City Manager, Corporate Services and Chief Technology Officer

Wards: All

SUMMARY

At its February 2, 3 and 5, 2021 meeting, City Council approved the phased implementation of ConnectTO, a collaborative program that aims to centralize stewardship of municipal resources and assets to deliver on the City's equity and connectivity goals.

This report provides an update on the first phase of the ConnectTO program, and seeks City Council's endorsement of the proposed next steps for the creation of a City of Toronto Municipal Broadband Network (MBN). The intention is that the MBN will be a City-owned, high-speed fibre broadband internet network that will support municipal operation and services, connect City-owned facilities, and that will be accessible to Internet Service Providers (ISPs) in order to provide high-speed internet services directly to Toronto residents and businesses. This report also seeks City Council's support for proposed requests to other levels of government to improve infrastructure and address the digital divide.

Since February 2021, staff have executed the ConnectTO Phase 1 work plan as directed by Council and built on the momentum of 2020 to continue expanding internet connectivity in several Neighbourhood Improvement Area communities. Specific updates and outcomes included in this report are:

- Expanded Free Wi-Fi in Community Centres and Toronto Community Housing common areas, as well as launching a Youth Learning & Work Placement Program through the Digital Canopy initiative in Tower Neighbourhoods;
- Continued partnerships with Higher Education Institutions (HEIs) to research and analyse digital access, responsible data collection and management, and the social impacts of ConnectTO;
- Initiated development of a Digital Equity Policy for the City of Toronto;
- Continued monitoring of Federal and Provincial initiatives, including activities of the Canadian Radio-television and Telecommunications Commission (CRTC);

- Continued leading regular dialogue with other big cities coast-to-coast, in the Greater Toronto and Hamilton Area (GTHA), and with the Federation of Canadian Municipalities (FCM), seeking alignment on broadband priorities; and
- Conducted ConnectTO MBN Phase 1 pre-tender information-gathering and issued a Negotiated Request for Proposals (nRFP) seeking suppliers to deploy fibre and provide low-cost high-speed internet access to 6,700 residential and business units in several Neighbourhood Improvement Areas. No responses to the nRFP were received.

It is clearer than ever that access to broadband, also known as high-speed internet service, is necessary for Torontonians to equitably participate in the economy and day-to-day life. Through 2020 and 2021, the experiences of Torontonians have highlighted the presence of a digital divide in our city, and that high-speed internet access is essential to the resiliency of our city and its residents. Toronto has the opportunity to leverage its assets and expertise in public service delivery to create an MBN. The MBN will not situate the City of Toronto as an ISP, but will instead enhance local competition by bringing more capacity to Toronto's internet service market for a broader range of private or public ISPs. These efforts will also help the City of Toronto leverage its assets in partnerships with ISPs to make high quality and reliable internet more accessible for all residents, regardless of their financial means or circumstances.

Based on research, review of relevant jurisdictions, lessons learned from the Phase 1 nRFP, consideration of sustainable business models and expert advice, Technology Services is seeking City Council support for the proposed approach and high-level planning, administration, and governance activities required over the next three years to facilitate longer-term deployment of a City of Toronto MBN. In following this approach, staff anticipate MBN construction may be able to commence by 2024 and proceed longer-term by deploying fibre infrastructure assets in parallel with planned construction projects.

Once fully implemented, the MBN would enhance the City's high-speed fibre broadband capacity, lower costs incurred by the City for its own network services, and provide the necessary infrastructure to support more robust competition in Toronto's internet service market. The City aims to achieve these outcomes by:

- Connecting City buildings, facilities and public spaces through a City-owned, high-capacity fibre broadband network (i.e. "the middle mile");
- Collaborating with private ISPs to provide affordable, high-quality internet services to residents and businesses (i.e. the "last mile");
- Creating opportunities for private ISPs to access City-wide fibre network infrastructure; and
- Ensuring that revenue or savings realized through the MBN is re-invested to support connectivity in communities with a priority focus on Indigenous, Black and equity-deserving communities.

Given the long-term nature of an MBN implementation, this report also outlines several opportunities to help bridge connectivity gaps in the shorter-term for communities in need.

This report aligns with, and supports the report from the Chief Technology Officer entitled *City of Toronto Digital Infrastructure Strategic Framework: A new Principles-based approach for the planning and use of technology and data in Toronto* which is also being considered by the Executive Committee on March 30, 2022.

Engineering and Construction Services, Social Development, Finance and Administration, Toronto Employment and Social Services, Purchasing and Materials Management, Toronto Public Health, People and Equity, Economic Development and Culture, City Planning, Parks, Forestry and Recreation, Transportation Services, Corporate Real Estate Management, Legal Services, and the City Manager's Office were consulted in the preparation of this report. In addition, Toronto Community Housing, Toronto Public Library, and CreateTO were consulted on this report.

RECOMMENDATIONS

The Deputy City Manager, Corporate Services, and Chief Technology Officer recommend that:

1. City Council endorse the proposed creation of a City-owned high-speed Municipal Broadband Network (MBN) that will, in the long term, a) support municipal services; b) connect City-owned facilities and assets; c) be accessible for Internet Service Providers (ISPs); and d) help ensure equitable access to broadband internet for residents regardless of their financial means or circumstances;
2. City Council direct the Chief Technology Officer, supported by the Chief Engineering & Executive Director, Engineering & Construction Services, the General Manager, Transportation Services, the General Manager, Toronto Water, the Executive Director, Corporate Real Estate Management, and appropriate staff in other Divisions as required, to centralize and administer the deployment and management of City-owned fibre broadband infrastructure;
3. City Council request the Province of Ontario to:
 - a. Ensure that incremental investments in broadband from other orders of government are made in urban areas and directed to fill gaps in the GTHA;
 - b. Identify provincially-owned fibre assets that can be leveraged to help close the digital divide – such as in schools, hospitals and traffic corridors; and
 - c. Review existing legislation to include provisions on open access to telecommunications cabling and trenching activities for all developments.
4. City Council request the Government of Canada to:
 - a. Ensure that incremental investments in broadband from other orders of government are made in urban areas and directed to fill gaps in the GTHA;
 - b. Recognize that high-speed internet is an essential service, and formalize a definition of affordability that combines fixed and mobile internet costs as a percentage of household income;
 - c. Collect and share local level data on fibre infrastructure assets, internet speeds, and internet service terminations/collection activities, where permissible and in cooperation with ISPs; and

- d. Request that the Canadian Radio-television and Telecommunications Commission examine supports for municipal carriers who wish to promote access to their fibre broadband networks for public and private service providers.
5. City Council forward this report for information to appropriate Federal Departments, Provincial Ministries, the Federation of Canadian Municipalities and the Association of Municipalities of Ontario;
6. City Council direct the Chief Technology Officer to explore the specific opportunities outlined in this report as well as other opportunities in continued consultation with Toronto's tech community, anti-poverty groups and potential end users, to help bridge connectivity gaps in the shorter-term for communities in need;
7. City Council direct the Chief Planner, City Planning division, to examine the inclusion of broadband access as a matter of public interest in appropriate sections within the City of Toronto Official Plan, as well as the identification of opportunities to integrate the provision of broadband infrastructure into the land use and development process in order to complement and advance the Plan's social, economic and environmental goals, with this work to start in 2023 as part of the ongoing Municipal Comprehensive Review;
8. City Council discontinue the Prudent Avoidance Policy for Siting Telecommunication Towers and Antennas, recognizing that evidence as outlined in the report shows that the policy is no longer required, and that removing this policy will assist the City of Toronto in maximizing opportunities to extend high-speed internet access across Toronto;
9. City Council request the Chief Technology Officer to report back to the Executive Committee in 2023 to provide a further progress update on the ConnectTO program.

FINANCIAL IMPACT

There is no financial impact. Required funding of \$725,000 for the tasks planned for 2022 is included in the Council Approved 2022 Capital Budget for Technology Services Division under WBS CIT047-14. Any additional resources required for additional phases will be included in future Capital and/or Operating Budget submissions for approval.

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

EQUITY IMPACT STATEMENT

Digital equity and bridging the digital divide is a key component of the Poverty Reduction Strategy. Affordable and reliable internet connectivity is critical for residents to be able to perform the basic activities of daily living, meaningfully participate in economic, educational, and cultural activities, and enjoy a better quality of life.

According to the CRTC, households in the lowest income quintile spend five times more of their average household incomes on telecommunications services than those in the highest income quintile. This represents approximately 9% of annual household income in the lowest tier versus 1.8% in the highest. The inability to access high-speed internet

impairs residents' ability to participate in the economy, receive essential services such as education and healthcare, and participate fully in their communities.

COVID-19 has amplified the economic gap in urban centres like Toronto and has created more barriers for marginalized and equity-deserving Torontonians.

Equitable access to the internet is a pre-condition for the health and well-being of our City, and the persistence of internet access and affordability barriers indicates underlying social equity issues. The City's commitment to the principles of digital equity is a foundation for future prosperity, and one which the City is well positioned to action by leveraging public assets for public good.

DECISION HISTORY

The Decision History for this report is provided in Attachment 1.

COMMENTS

Although internet services are widely available across the city, high prices for these services combined with lower capacity infrastructure in predominantly low-income neighbourhoods effectively shuts out many Torontonians. Gaps in the penetration of high-speed internet in low-income households is a product of market conditions and affordability. It can be cost prohibitive for ISPs to deploy higher capacity fibre infrastructure to low-income neighbourhoods where residents are unable to afford higher tier internet services. In these neighbourhoods, ISPs have few market incentives to upgrade legacy infrastructure if they believe they will not receive a return on investment in the form of increased revenues.

Low-cost service plans have been brought to market by some ISPs. However, there have been community concerns expressed about the quality, reliability and sustainability of these services in meeting their needs. There are limited market incentives, and no obligations, for private ISPs to offer low-cost packages; compounding the risks associated with the digital divide for low-income households who depend on reliable and affordable internet services.

Municipalities like Toronto are well positioned to improve digital equity by leveraging public assets for public good. Although municipalities have traditionally been absent in public policy surrounding Canada's internet service market, cities do have a vital role to play in achieving digital equality and ensuring their communities are well served.

Municipal, provincial, and federal governments can work in partnership with the private sector to bridge the digital divide and better enable residents to participate in the economic and social fabric of their communities.

ConnectTO - Phase 1 Work Plan Update

As directed by City Council, in 2021 staff conducted further jurisdictional scans (Attachment 2) and worked with regional and national municipally-focused groups on how to best address the digital divide in Toronto. In partnership with other regional governments and the private sector, staff developed a strategic framework for the MBN, created a sustainable business model, and issued a tender informed by community expertise for qualified supplier(s) to initiate affordable internet connectivity in several

identified City Neighbourhood Improvement Areas in 2022. This work also continues to include research and policy development to improve digital equity and longer-term infrastructure planning in collaboration with internal and external partners. Specific updates and outcomes include:

Expanded Connectivity in the City

Digital Canopy Extension

Through generous donations received in 2020, the Digital Canopy program was created to extend free public Wi-Fi and help bring the digital divide in low-income neighbourhoods during the pandemic. Twenty-two large apartment buildings and the surrounding areas with approximately 11,000 residents were connected with access for one year to help bridge the digital divide in the pandemic.

In 2021, the original donations were charitably extended for another year and the free Wi-Fi network will continue to operate until September 2022. The Digital Canopy program continues to benefit residents in the Woburn (Ward 24), West Hill (Ward 24), Thorncliffe Park (Ward 15), and Rockcliffe-Smyth (Ward 5) neighbourhoods.

Free Public Wi-Fi Expansion

In June 2021, the Technology Services and Parks, Forestry and Recreation Divisions initiated the implementation of Public Wi-Fi in Community Centres and Arenas. To date, three locations – Falstaff Community Centre (Ward 5), Power House Recreation Centre (Ward 3), and Wellesley Community Centre (Ward 13) – are equipped with free Public Wi-Fi in common areas. An additional 140 locations are targeted for implementation completion by 2024.

Staff are also exploring opportunities to pilot Wi-Fi in parks adjacent to the Community Centres where public Wi-Fi is being enabled, with a focus on locations in Neighbourhood Improvement Areas. Pilot outcomes will help inform a longer-term implementation strategy.

Concurrently, Technology Services and the Toronto Community Housing Corporation (TCHC) collaborated to expand and accelerate internet access for underserved communities and residents. The objective is to provide free Wi-Fi in the common areas of residential buildings. To-date, two TCHC locations in Wards 3 and 17 have been equipped with free Public Wi-Fi in common areas. An additional 152 locations are targeted for implementation by 2024.

Youth Learning & Work Placement Program Launched

In April 2021, a Youth Learning & Work Placement program was launched to provide 12 weeks of technology training for up to 15 young adults in the Digital Canopy public Wi-Fi communities. The City of Toronto partnered with the Careers Education Empowerment (CEE) Centre for Young Black Professionals to identify and onboard young adults through various outreach programs in those communities. The program was sponsored by the City of Toronto Social Development, Finance and Administration Division's Youth Development Unit. The networking curriculum content and training support was donated by Cisco Canada. Facilitated by Toronto Public Library and George Brown College, the program included Introduction to the Internet of Things (IoT), Networking Essentials,

Introduction to Wireless, a Mentoring Roundtable with various panelists including City staff, and a virtual tour of the Cisco Innovation Centre.

Despite challenges related to COVID-19, nine youth successfully completed the program with certification. Upon completion of the program, work placements were arranged by the CEE Centre. To-date, two youths have been placed with organizations that were seeking resources with skillsets acquired in the program. Continuous improvements were applied throughout the program based on feedback, surveys and insights gathered. Staff are exploring opportunities to continue and/or expand the program in the future.

Continued Research and Analysis with Higher Education Institutions

In 2020, staff partnered with several HEIs to examine "Digital access and better understanding of who is underserved and why". The results of this research are available online - <https://contrib.wp.intra.prod-toronto.ca/city-government/accountability-operations-customer-service/long-term-vision-plans-and-strategies/smart-cityto/digital-exclusion/>

Currently, Ryerson University and University of Toronto are working with staff to examine the impact that municipalities can make to help bridge the digital divide. This work includes:

ConnectTO: Evaluation and Monitoring of Social Impacts

The City has partnered with the School of Cities (SOC) at the University of Toronto for research in establishing a program evaluation and surveying methodology to broaden our understanding of digital equity barriers. Informed by the most recent research on urban digital divides, the SOC has developed a survey (Attachment 3) that is focused on highlighting where internet connectivity gaps are prominent, the family dynamics of affected households, the relationship between household income and internet affordability, and the use of the internet to support the basic activities of daily living. Combined with tools that will allow residents to assess and measure the quality of their internet services, this program will help to resolve blind spots in our understanding of Toronto's digital divide, and support evidence-based policy recommendations.

CivicLabTO Academic Summit

The City is in a collaborative and strategic partnership with eight HEIs that share information and best practices. This provides students and faculty with a living lab and opportunities for exposure to real life problems and complex challenges. This also provides the City with opportunities for innovation, intellectual exchange of ideas, critical analysis, research and evaluation, and the ability to leverage research funds. This partnership also produced a 2-day Academic Summit that examined ways in which academia, government and industry can work together to address barriers faced by equity-deserving groups in accessing and benefiting from technology and innovation.

ConnectTO MBN Phase 1 Solicitation

Pre-Tender Information-Gathering

As requested by City Council, staff in the Technology Services and Purchasing & Materials Management Divisions engaged with Toronto's tech community, potential end

users and anti-poverty advocacy groups in information-gathering to leverage community expertise before finalizing the tender documents for ConnectTO Phase 1.

Two public information-gathering sessions were held on Thursday, May 20, 2021. Staff presented an overview of the ConnectTO program, Phase 1 MBN scope and timeline, and strategic sourcing and nRFP approach, followed by a facilitated information-gathering discussion consisting of five guided questions and three open-ended questions. A copy of the full presentation is available online – <https://www.toronto.ca/wp-content/uploads/2021/06/989a-ConnectTO-Pre-Tender-Information-Gathering-Session-Staff-Presentation.pdf>

An online questionnaire was also made available to gather comments through to June 11, 2021. In total, 379 people participated in the pre-tender information-gathering. The following insights emerged from participant responses and were leveraged in development of the Phase 1 nRFP documents:

- MBN delivery should be through multiple qualified service providers including grassroots organizations, or through the City becoming an ISP, and preferably not through large for-profit entities
- MBN funding should primarily be provided through government investment, grants or subsidies, or a combination of these
- MBN end user service offerings should provide for a variety of reliable options
- MBN pricing should be based on fixed amounts, or needs-based cost sharing, with any surplus returned to subscribers or re-invested to grow the network.
- MBN eligibility could be determined through a variety of mechanisms ranging from an honour system to neighbourhood-based needs, etc.

A copy of the online questionnaire results summary can be found in Attachment 4.

Building on this information-gathering opportunity, engagement about ConnectTO is ongoing between staff and Toronto's tech community, anti-poverty and neighbourhood advocacy groups, and potential end users.

Tender Summary and Outcome

Staff developed an nRFP to seek bids from a supplier(s) to collaborate with the City to innovatively create the first phase (Phase 1) of an MBN. For Phase 1, the requirement was for a supplier(s) to design, finance by contributing or raising capital investment, build, operate and maintain high-speed, low cost broadband internet services for residents or businesses at specific building addresses for a five year contract period within the following previously-identified underserved Neighbourhood Improvement Areas in Toronto:

1. Etobicoke North (Ward 1)
2. Jane and Finch (Ward 7)
3. Golden Mile (Wards 16, 19 and 21)
4. Malvern (Wards 23 and 25).

In their nRFP bid, suppliers were requested to demonstrate how they would provision the MBN technically and in a timely manner with appropriate coverage, service quality and value for subscribers. For its part, the City was willing to consider and negotiate contributing existing fibre network assets, access and/or other offerings

in-kind toward the MBN network. The City's expectations outlined included implementation to be completed with services available by July 31, 2022, and that ownership of the MBN would transfer from the supplier to the City at the end of contract period or as otherwise negotiated.

Phase 1 outcomes (learnings and infrastructure) were to form the basis of future phases. Therefore, suppliers were also requested to demonstrate how open access principles, the use of smart technology and innovative partnerships would be incorporated for Phase 1 and beyond.

On September 29, 2021, the ConnectTO Phase 1 nRFP was issued through the City's Ariba Procurement System with an October 29, 2021 bid submission deadline. As requested by several vendors, the bid submission deadline was extended by two weeks, to November 12, 2021. Although 45 vendors accessed the nRFP documents within Ariba, no submissions were received, resulting in a "no bid" or failed Procurement call.

Based on vendor feedback, staff analysis of the marketplace and other municipalities' MBN procurement approaches and outcomes, the following are nRFP lessons staff learned that helped inform the proposed way forward for ConnectTO:

1. **There is little to no incentive for service providers** to partner with the City in the absence of a commitment of capital or serviceable fibre infrastructure;
2. **Dominant carriers own and control most last mile infrastructure.** The capital investment required for new infrastructure by non-dominant carriers is significant and can't be recouped through the low-cost subscriber pricing targets outlined;
3. **The City's focus on older buildings further limits partnership opportunities.** The City's vulnerable populations tend to reside in older facilities where cabling to them is largely legacy infrastructure owned by dominant carriers;
4. **The addition of more City-owned fibre and duct in or near Neighbourhood Improvement Areas would provide more opportunities** to engage non-dominant service providers, though older facility access may still pose a challenge.

Overall Phase 1 Outcomes

The outcomes of Phase 1 activities highlight opportunities for the City to assume leadership in positioning itself as a hub for digital innovation, economic opportunities, and in ensuring that digital resources are equitably available to all Toronto residents. Primary obstacles include statutory barriers which provide limited standing to municipalities in the deployment of digital resources, or in related policy levers at the Federal level.

Intergovernmental Collaboration

Continued Intergovernmental Actions

Greater Toronto and Hamilton Area (GTHA) Region

Municipalities across the Greater Toronto and Hamilton Area (GTHA) have been working together to build back better. Municipal staff are engaging in ongoing, focused discussions and collaborating to determine how the region can best address the digital

divide. Municipal civil servants established a regional working group which has collaboratively reviewed the various MBN models that are available to municipalities. They have also shared data and resources to better understand gaps in broadband availability and affordability within the GTHA.

The municipal staff across the region identified key policy, legislative and regulatory changes that could be made by the provincial and federal governments to better enable all governments to address the digital divide. Federal, provincial and municipal policy objectives are enhanced when more residents and businesses are connected to high-speed internet.

The GTHA municipalities are committed to overcoming digital access and affordability barriers for residents and businesses. To this end, the participating municipalities have committed to bring forward relevant reports to their respective Councils on this issue with similar positions. Content in subsection "Requests to Provincial and Federal Governments" in this report was developed in collaboration with municipal staff across the GTHA.

Coast-to-Coast Big Cities

The City Manager's intergovernmental relations with city managers of Canada's big cities continued to deepen in 2021. In addition to the original cities (Vancouver, Calgary, Edmonton, Winnipeg, Toronto, Ottawa, Montreal and Halifax), the City of Saskatoon has joined in digital discussions. Toronto continues to lead the dialogue on municipal digital infrastructure needs and recommendations on which to collaborate with other governments.

Specific municipal recommendations and requests were identified through meaningful dialogue aimed to increase collaboration and support on federal policy change and investment needed to leverage, integrate, and expand physical municipal assets for digital infrastructure; enable bridging of the digital divide in urban communities.

Federation of Canadian Municipalities

In June 2021, City Council requested FCM to consider required federal advocacy on broadband affordability. Continued dialogue between the City and FCM staff, along with regional and big city collaboration has amplified the municipal voice on federal digital priorities. At its March 2022 meeting, the FCM Board of Directors added the following to its policy statements representing a step forward for this advocacy. FCM's newly adopted position is broadly aligned with the recommendations outlined in this report.

- The federal government should consider the retail price of telecommunications services and strive to improve the affordability of these essential services, especially for lower-income Canadians and rural, remote and Northern communities.
- In order to improve the affordability of telecommunications services, including fixed broadband, wireless and cellular services, the federal telecommunications policy framework should include:
 - A national digital affordability target;
 - A digital affordability data strategy, which enables data sharing arrangements for research and reporting purposes;
 - A range of policy interventions intended to improve affordability in different

- regions of the country – urban, rural, remote and Northern;
- Acknowledgement of, and support for, the critical role of municipalities in providing accessible, affordable broadband Internet;
- Policies that create an enabling environment for municipal, public and non-profit broadband networks and telecommunications services; and
- Public and private sector programs that offer subsidized retail rates for low-income Canadians, specific groups and communities in order to achieve equitable access to telecommunications services.

Requests to Provincial and Federal Governments

Invest in the GTHA

There is an opportunity for the provincial and federal governments to ensure that incremental investments in broadband are made in urban areas and directed to fill gaps in the GTHA. The provincial and federal governments have made positive, much needed investments in broadband, including:

- a commitment of nearly \$4 billion by the provincial government to achieve universal connectivity across Ontario;
- a joint investment of \$362 million to enhanced delivery of high-speed internet in Eastern Ontario; and
- \$14.7 million in approved funding for rural and First Nations high-speed internet through Ontario's Improving Connectivity for Ontario (ICON) program.

Investments are largely focused on rural communities, which have more limited broadband access compared to urban centres. Residents in urban centres also face a significant barriers to obtaining and maintaining household connectivity. Affordability in urban areas remains problematic, with low-income households (>\$30,000 per year) devoting an average of 10% of their incomes to maintaining connectivity. While governments have implemented programs to provide more affordable internet services to low-income households, these often take the form of discounted service packages with reduced internet speeds. These initiatives have not been sufficient to meaningfully address the affordability challenge faced by many households.

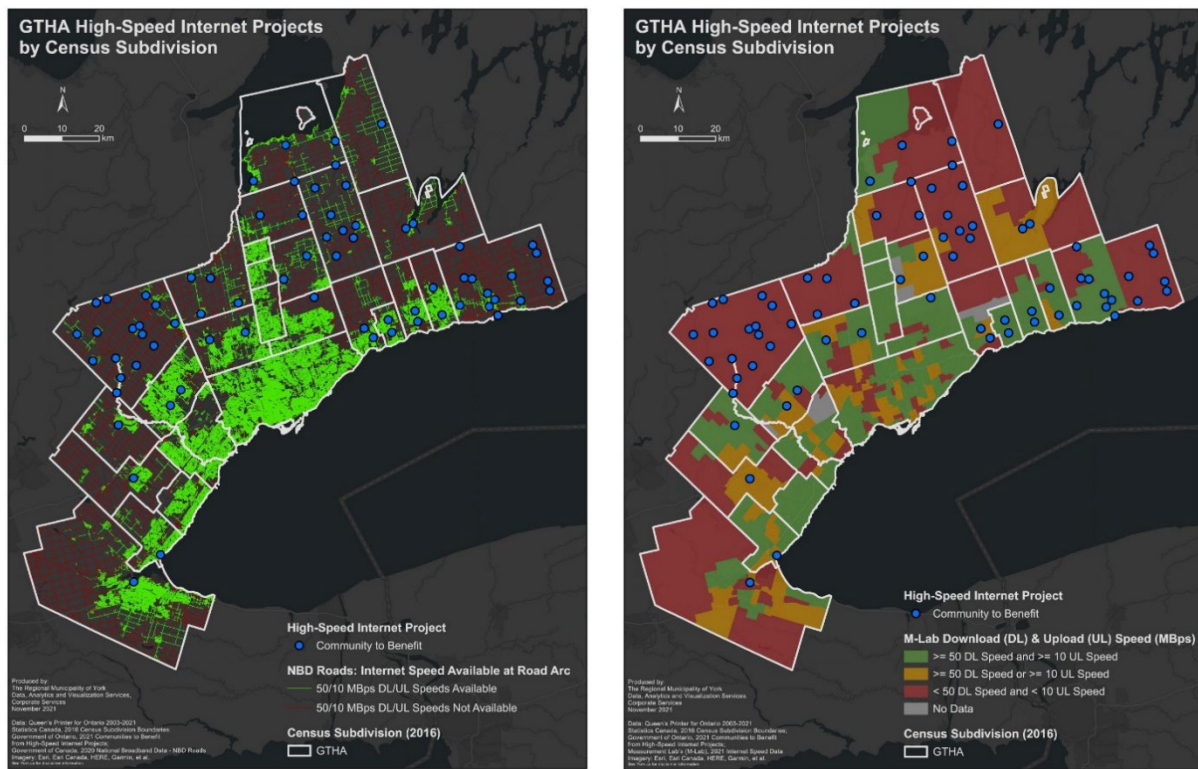
The federal government's Connectivity Strategy has set 50/10 Mbps (upload/download) as a minimum speed for Canadians. Many residents in the GTHA receive speeds below this minimum. As shown in Figure 1, residents in significant portions of the GTHA indicate gaps in the availability of 50/10Mbps internet service in urban areas, despite the existence of infrastructure in neighbourhoods that have the capacity to provide these internet speeds. The map on the left depicts where 50/10 Mbps internet speeds are available,¹ while the map on the right depicts residents' self-reported internet speeds using public diagnostic tools.² Possible explanations for lower than targeted speeds include: deficiencies in local infrastructure, affordability issues limiting uptake of these services, or a lack of consumer interest. In addition to rural communities that are

¹ Data was derived from the [National Broadband Data - Roads](#) dataset downloaded from the Canadian Government's [Open Data Portal](#) (data extract last updated March 2020)

² Data retrieved from Measurement Lab's (M-Lab) Network Diagnostic Tool between January and April 2021, which collects speed test data from a variety of common speed test platforms.

generally known to lack high-speed internet access, large areas in urban centres also lack adequate connectivity. In August 2021, the Governments of Canada and Ontario announced an investment of \$230 million to bring high-speed internet to Central Ontario. The blue dots on the below maps indicate communities benefiting from this funding in the GTHA.³ While many rural communities are receiving needed investments, there is an opportunity to make incremental digital infrastructure investments in urban areas of the GTHA.

Figure 1: Internet Speeds across the GTHA



There are opportunities to make investments in broadband infrastructure in the GTHA to improve broadband access, quality, and affordability. Broadband funding is most impactful when it is non-discretionary, directed at communities where there is evidence-based and demonstrable need, and where local competition between service providers is enhanced. Many rural areas of the GTHA meet these criteria and provincial and federal investments are needed. In addition, in many urban areas it can be cost prohibitive for ISPs to deploy higher capacity fibre infrastructure, especially in neighbourhoods comprised of older multi-dwelling units. In these scenarios, incumbent service providers have few market incentives to upgrade legacy infrastructure where higher cost services are otherwise unaffordable for low-income households. This dilemma is compounded where there are little to no local competitors. Investments from provincial and federal governments to subsidize upgrading of legacy infrastructure, and

³ Data retrieved from <https://news.ontario.ca/en/backgrounder/1000678/ontario-and-canada-bringing-high-speed-internet-to-central-ontario>

incentivize new ISPs to deploy additional fibre, can improve the affordability of high-speed internet for low-income urban households.

Identify provincially owned fibre that can be leveraged to help close the digital divide

GTHA municipalities would benefit from the province identifying provincially owned fibre assets that can be leveraged to help close the digital divide. Provincially-owned fibre – for example at hospitals, universities, colleges, and regional transit – can be used for to help address the digital divide. By identifying where provincially-owned fibre exists across the GTHA, municipalities could work with the broader public sector to leverage our collective fibre assets. The Province could play a leadership role by supporting the identification and mapping of this fibre. In turn, the Province could work with municipalities to leverage collectively owned fibre and work in partnership with ISPs to address the digital divide.

Collect and share local level data

GTHA and municipalities across the country would be better positioned to invest in and use municipally-owned fibre more effectively if the federal government collects and shares, where legally permissible, local level data on assets, internet speeds, and service terminations/collection activities (not personal information), in cooperation with ISPs. Internet service disconnections resulting from inability-to-pay are problematic, especially for low-income households with children. Research indicates internet service disconnections can compromise a low-income household's ability to work within already strained household budgets. Cities do not have access to this data from ISPs. This inhibits municipalities' ability to make data-informed decisions on how to most effectively leverage municipal resources and municipally-owned fibre to address the digital divide. Having access to data on ISPs assets, internet speeds available across the region, as well as data on service terminations, along with mapping of provincially owned fibre, would better enable municipalities to make targeted investments and work with service providers more effectively to ensure residents receive adequate internet connectivity. The competitive interests of ISPs – who benefit from significant investments of public capital and resources – can still be maintained with data sharing agreements containing appropriate non-disclosure provisions.

Enable municipalities to more easily promote access to their fibre

There is an opportunity to enable municipalities to more easily promote access to their fibre. The CRTC has the authority under the Telecommunications Act to exempt classes of carriers from obligations under the Act if it deems that doing so is in the public interest. Currently, compared to ISPs, cities may be perceived as having an undue advantage in using their broadband to provide access to residents.

No revisions to the Telecommunications Act are requested. Rather, GTHA municipalities request clear guidelines for the CRTC in adjudicating on matters related to municipal carrier entrants to the internet service market (i.e. as facilities based resellers). This could be accomplished through an exemption order made by the CRTC. Non-dominant service providers constitute a fraction of revenues from national telecommunications services. Municipal carrier entrants, operating under strict capacity and revenue conditions, would not enjoy undue advantage nor pose a risk of disrupting competition in their local markets. Such an approach would also create more options

and flexibility for cities in providing broadband services on their own networks, especially in markets dominated by incumbents.

Ensure that new developments include digital infrastructure

The Provincial Policy Statement (PPS) provides overall policy directions on matters of provincial interest related to land use planning and development in Ontario. On the matter of building strong and healthy communities, the PPS indicates that healthy, liveable and safe communities are sustained by ensuring that necessary infrastructure⁴ and public service facilities are or will be available to meet current and projected needs (s1.1.1 (g)). It is important, therefore, that connectivity be recognized as an important planning feature for all new development, in the same way that we plan for other essential infrastructure such as sewer and water connections.

Requiring internet connectivity could take the form of ensuring that all new developments have adequate conduits that can be used for fibre optic cable, along with the usual duct bank. This would give municipal planners a role in closing the digital divide by ensuring that all developments have proper connectivity. Well planned developments typically include adequate internet connectivity; however making it a requirement would ensure high-speed internet in all new developments and prevent anti-competitive practices. New, innovative technology, such as 5G, will require expansive hard-wired fibre optic connectivity. This proactive requirement would avoid further risk to already congested public rights-of-way, particularly in the region's downtowns and urban centres.

The Official Plan is a first step to addressing this objective and as such it is recommended that the Chief Planner be requested to review opportunities to add policies to the Official Plan that may address these objectives.

One way to ensure internet connectivity is considered in land use planning and development is through processes such as Site Plan and Subdivision Approvals. Developers currently submit development coordination plans as part of the development approval process, but there is no requirement for this plan to include details about how a new development will be connected to the internet. Currently, developers may negotiate exclusive access agreements with preferred ISPs, which reduces competition and options available to residents. In the case of multi-unit dwellings, these agreements risk contravening provisions in the Telecommunications Act meant to prevent anti-competitive practices.

However, a review of existing legislation to consider inclusion of provisions on open access to telecommunications cabling and trenching activities for new developments may allow municipalities the added ability to ensure that our communities have the necessary infrastructure to meet current and projected needs.

Recognize broadband as an essential service

A firm federal position is required to recognize that high-speed internet access is essential for all Canadians, with a commitment by the CRTC to ensure access regardless of financial means or circumstances. Such a declaration is most effective

⁴ Infrastructure: means physical structures (facilities and corridors) that form the foundation for development. Infrastructure includes...communications/telecommunications

coming from the CRTC, as opposed to provincial or municipal governments who have little to no regulatory authority in telecommunications. The CRTC has the most impactful legislative and policy tools available to ensure access. In 2016, CRTC defined broadband as a "basic" service, signalling the commission's intention that the service should be universally available to households. However, the CRTC did not exercise its authority to direct network deployments, and has not compelled ISPs to provide broadband to all households.

Affordability barriers exist in both rural and urban regions. A key step to address the affordability divide is to formally define a target for internet affordability that combines both fixed and mobile internet costs as a percentage of household income. This target should be defined by the federal government. Currently, there is no accepted definition of affordable internet service. Unlike parallel essential utilities and services (e.g., electricity), internet services do not benefit from regulatory intervention in retail pricing. A formally defined affordability target would establish a metric that is far more meaningful than service availability alone for assessing the outcomes of public investments in broadband infrastructure.

Modernizing Policy to Support Connectivity Expansion

Developing a Digital Equity Policy for the City of Toronto

The City has partnered with Ryerson University to examine digital equity and inclusion needs in Toronto. This project will inform baseline parameters for a new Digital Equity Policy for the City through work that includes:

1. An overview of the digital challenges affecting Toronto residents, including access to internet, technology devices and digital skills among marginalized and vulnerable groups, as well as the availability of programs in the City to address these challenges.
2. A review of conceptions and best practices for digital access across peer municipal jurisdictions, including through a rights-based framework, to inform how best to expand digital equity for all people in Toronto.
3. A set of policy recommendations that synthesizes findings and helps support the development of digital equity policies that respond to the digital needs of underserved Torontonians.

Findings from this research partnership are included in Attachment 5. Next steps will involve public and stakeholder consultations in Q3 2022.

City of Toronto Official Plan

Digital connectivity now plays a similar role to physical connectivity in the day-to-day lives to Torontonians:

- it facilitates essential access to City services; and
- it helps support social equity, quality of life, and the creation of healthy, resilient and vibrant communities.

Additionally, digital connectivity helps create opportunities for greater economic growth and prosperity by such means as facilitating work and learning from home, and supporting job creation in industries that rely on broadband access.

With the important role of digital connectivity now well understood, opportunities to integrate it into the municipal regulatory framework should be explored. The Official Plan is one such opportunity. An amendment to the Official Plan that recognizes digital connectivity and broadband access as a public interest object would help advance ConnectTO objectives, particularly in relation to expansion of the MBN. Staff recommend the Official Plan be reviewed for opportunities to expand on the policy framework and that this presents an opportunity to review the Official Plan for conformity with the Provincial Policy Statement, and definition of "Infrastructure" within this context. This recommendation is supported by the Chief Planner, City Planning division.

City of Toronto Prudent Avoidance Policy - No Longer Required

The authority to regulate cell phone towers, including the siting and development of appropriate radiofrequency exposure levels rests with the federal government. Specifically, "Safety Code 6" provides protection against all established health effects, federally regulating radiofrequency levels that are regularly reviewed by Health Canada.

In 2007, the City of Toronto created the *Prudent Avoidance Policy* (Attachment 6) within the City Planning Telecommunication Tower and Antenna Protocol, which recommends that radiofrequency levels (measured in power density) in new cellphone tower installations remain 100 times below Safety Code 6. City Council endorsed this policy in 2008 (see Item 2008.HL10.3).

Over 2020 and 2021, Technology Service considered various internet connectivity solutions for public benefit, some of which were not pursued further due to the Prudent Avoidance Policy. Future innovation and proposals for connectivity, such as mesh networks leveraging tower installations, may be limited based on the Prudent Avoidance Policy. In addition, staff have also identified a need to strengthen the performance of the wireless networks within the City's telecommunications systems to support the City's return to office activities and hybrid methods of working.

In 2021, Toronto Public Health reviewed research related to radiofrequency levels and human health. Research reviewed include findings and statements from the Government of Canada, as well as other bodies such as Public Health Ontario and Vancouver Coastal Health.

In 2015, Health Canada issued a report on Safety Code 6 – Limits of Human Exposure to Radiofrequency Electromagnetic Energy in the Frequency Range from 3kHz to 300 GHz, stating that exposure limits in Safety Code 6 are based upon a thorough evaluation of scientific literature related to thermal and non-thermal health effects of radiofrequency fields.⁵

⁵ Limits of Human Exposure to Radiofrequency Electromagnetic Energy in the Frequency Range from 3 kHz to 300 GHz - Canada.ca

Further in 2020, Health Canada stated that regulations set out in Safety Code 6 reflect global best practices and align with those of many other major nations, including the United States and the European Union.⁶

As of June 2021, the Government of Canada confirmed that there are no health risks from exposure to low levels of radiofrequency, which are emitted from cellphones, cellphone towers, antennas and 5G devices. Health Canada continues to [share and promote](#) credible public health information regarding radio signals.

Other bodies, such as Public Health Ontario's forthcoming 2022 review and Vancouver Coastal Health⁷ have stated that there is no conclusive scientific basis for the premise of chronic and/or cumulative health risks from radiofrequency energy at levels below the limits outlined in Safety Code 6.

The Government of Canada has confirmed there are no health risks beyond those established in Safety Code 6. As such, the rationale that underpinned the development of the City's Prudent Avoidance Policy no longer applies. Based on evidence documented in recent public health research, the policy is no longer required and continued compliance unnecessarily limits the City's ability to effectively improve connectivity and promote innovation in the future. Therefore, the Technology Services Division, following consultation with Toronto Public Health, recommends that City Council that the Prudent Avoidance Policy be discontinued.

Developing a Dig Once Policy for the City of Toronto

Despite its importance, the rollout of connectivity in the urban environment can be complex. The process features an extensive range of stakeholders, both internal and external to the City. In the context of Toronto's MBN, a "Dig Once" policy can be expanded by integrating the installation of conduit for fibre optic cable into major capital and construction projects such as upgrades or repairs of water mains or sewer pipes; repairing or building roads, streetcar tracks and sidewalks; or the construction of transit infrastructure. This sustainable approach to expansion of the MBN requires minimal upfront financial investment, can result in significant long-term savings through reduced re-construction costs, and will foster resilience through gradual expansion of the network over time. As the City creates and maintains more publicly-owned fibre assets, staff propose to conduct extensive internal and external consultation that will inform its development of a draft "Dig Once" policy for future City Council consideration.

ConnectTO Phase 2+ - Proposed Way Forward

Digital equity and bridging the digital divide is a key component of the Poverty Reduction Strategy. Affordable and reliable internet connectivity is critical for residents to be able to perform the basic activities of daily living, to meaningfully participate in economic, educational, and cultural activities, and to pursue a better quality of life.

Despite being one of the most highly serviced broadband markets in Canada, broadband affordability and access barriers persist amongst Toronto's most vulnerable

⁶ Petition e-2424 - Petitions (ourcommons.ca)

⁷ <http://www.vch.ca/public-health/health-topics-a-z/topics/cell-tower-technology>

residents. Rising costs for housing and basic needs are already straining low-income households. Without a reliable and affordable way to connect to the internet, these households face an additional deficit in their ability to make-ends-meet. Ensuring broadband access regardless of financial means will mitigate the economic, health, and social costs associated with the digital divide, and reflects the principles of the City's Poverty Reduction Strategy.

Municipal Broadband Network: Longer-Term Objectives

The creation of the MBN is the primary and long-term pillar of ConnectTO. Following the successes of other Canadian and US municipalities, City Council has supported the early stages of pursuing a fibre-optic broadband network to bridge the digital divide. The MBN will enhance operational and financial efficiencies across City divisions, and streamline the City's ability to provide network services for its own operations. The MBN is envisioned to be designed, implemented and managed as an *open-access* network, meaning, City owned fibre infrastructure will be made available to public and private ISPs to support internet connectivity for business and residential purposes as well.

This supports the City's social equity objectives by ensuring high-capacity fibre broadband infrastructure is more broadly accessible in areas of the City that are currently underserved, or served only by a limited range of incumbent ISPs. This will enable opportunities for participation in Toronto's internet service market by a more diverse range of ISPs, and allow the City to hold service providers accountable to certain performance and pricing standards.

The internal business case for the City to deploy its own fibre broadband network is also compelling. Jurisdictional scans of Canadian municipalities who have deployed their own fibre network infrastructures highlight the following risks associated with maintaining our current model:

- *ROW Congestion*: private carriers do not license fibre to competitors, which means that installation of fibre conduit in municipal ROWs by competitors will quickly overwhelm the capacity of public ROWs. A municipal open-access fibre network has the potential to alleviate this risk by adding manageable fibre capacity to the market, and making it available to competitive service providers;
- *Meeting Obligations*: the City has a responsibility to ensure efficient management of public resources, access to public ROWs, and services delivery;
- *Financial Sustainability*: because of a lack of competition in the fibre network market, municipalities have few options to lower their own costs for network services. One effective way for municipalities to prevent escalating service costs is to become fibre network owners/operators themselves;
- *Lock-in*: The cost of leasing fibre network services from dominant carriers is accompanied by long-term service contracts individually tendered by different municipal divisions. This creates the risk of costly and inefficient network service duplication across the City;
- *Limited Opportunities for Expansion*: The City's ability to expand its services by taking advantage of future "Smart City" technologies, such as 5G networking, will depend on our ability to support the capacity and speed requirements of these devices. The current model of individual network service leases between City

divisions significantly limits our ability to coordinate network activities, and enhance service delivery through real-time information sharing between municipal divisions.

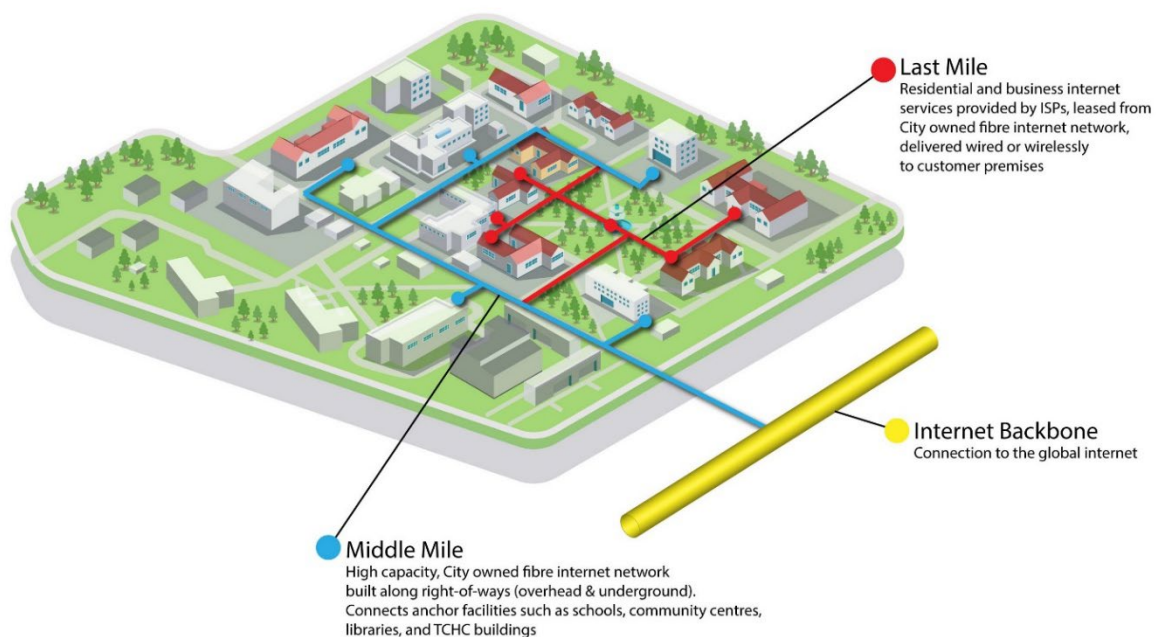
Municipal Broadband Network: Proposed Next Steps

Once fully implemented, the MBN aims to increase the City's fibre broadband capacity, lower the City's costs for its own network service needs, and provide the necessary infrastructure to support more robust competition in Toronto's internet service market.

The following description, illustrated below in *Figure 2 - Image of Middle Mile Deployment*, is proposed as the way forward to lead and ensure effective MBN deployment and administration for the City:

- Connect City buildings, facilities, and public spaces through a City owned, high-capacity fibre broadband network (i.e. the "middle mile");
- Create collaboration between the City, or a City entity, and private ISPs to provide affordable, high-quality internet services to residences and businesses (i.e. the "last mile");
- Create opportunities for private sector in City-wide open-access duct network;
- Ensure that revenue and/or cost savings realized through the MBN are re-invested to support digital equity, with a priority focus on Indigenous, Black and equity-deserving communities.

Figure 2 – Middle Mile Deployment (source: Technology Services Division)



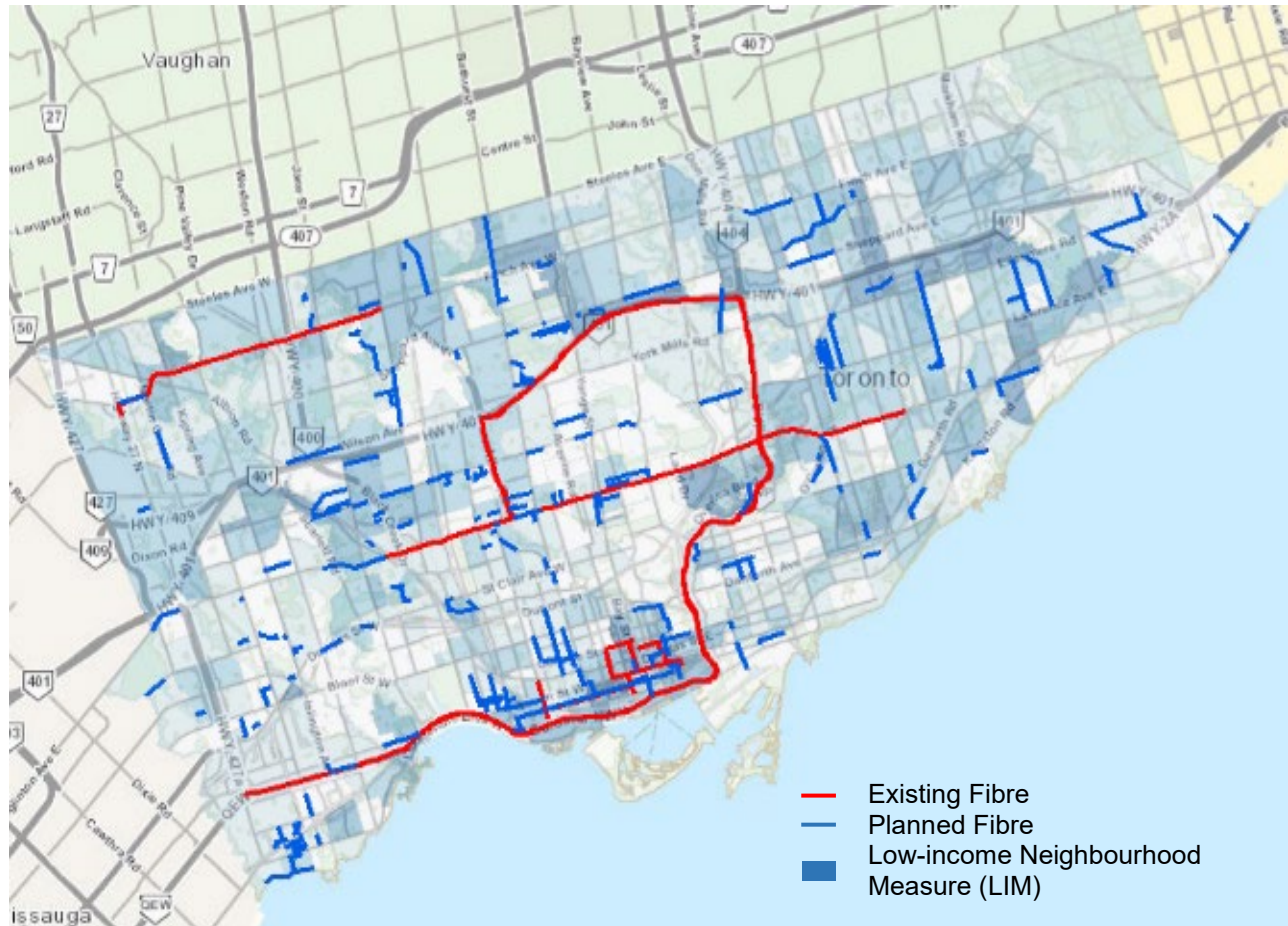
The current conditions under which the City leases, operates, and manages fibre network infrastructure are challenges to be reconciled through centralized oversight, standardization, governance, and coordination of divisional fibre network activities.

In collaboration with Engineering & Construction Services, Transportation Services and other City Divisions, as appropriate, Technology Services is seeking City Council's direction to lead the planning, administration, and governance efforts required over the next three years to facilitate the longer-term deployment of the MBN.

Under the proposed deployment model, Engineering & Construction Services (ECS) will fulfill the role of managing coordinated fibre deployment projects, with Technology Services acting as the City's primary Fibre Asset Owner. Technology Services will not initiate fibre construction projects itself. Instead, a "dig once" approach will be utilized in which fibre infrastructure will be deployed alongside parallel capital construction projects that require the excavation of public ROWs (e.g. road resurfacing, sidewalk reconstruction, water main replacement).

A map illustrating existing and proposed fibre deployment based on known projects is provided below in *Figure 3 - Existing & Proposed Fibre Based on Scoped Projects*. Under the "dig once" deployment model the costs of deploying fibre infrastructure should be significantly reduced, with an estimated savings of 85% per kilometre of fibre in urban environments.

Figure 3 - Existing & Proposed Fibre Based on Scoped Projects

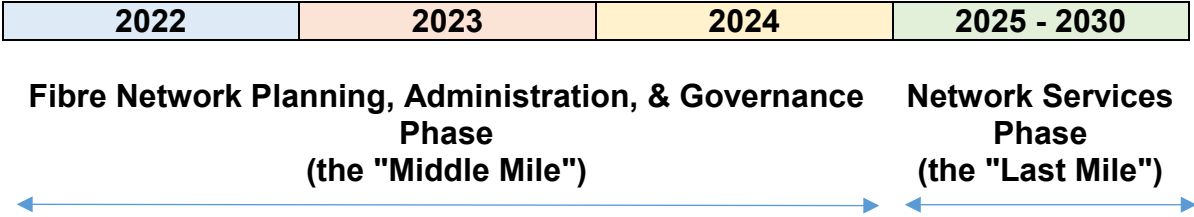


As the City embarks on this ambitious plan to re-capitalise its existing fibre infrastructure and augment with new infrastructure, legal and regulatory due diligence is required, including a comprehensive legal review and a fibre asset audit which will be initiated in 2022.

Coordinated planning, administration, policy development and governance activities, including the legal review and oversight required to establish the City as a non-dominant regulated telecommunications carrier, will require Technology Services to oversee and partner with key divisions engaged in parallel construction activities through 2024. Once the governance structure is established, management of the open access provisions of the MBN will be administered by Technology Services. This will include:

1. Supporting and managing the network service needs of City operations;
2. Managing leasable and leased capacity within City owned fibre network duct;
3. Managing leasable and leased capacity on the City owned fibre broadband network;
4. Supporting wireless and 5G deployments for City divisions and agencies; and
5. Managing the ongoing build-out of the MBN, including identifying opportunities with City divisions and agencies engaged in capital construction activities (i.e. CreateTO).

The chart below provides a high-level overview of the MBN Next Steps activities and timelines. Any activities requiring Council approval to proceed further will be brought back by staff for Council consideration, as required.



Governance, Planning & Administration	Construction & Fibre Network Deployment	Open Access Management
<ol style="list-style-type: none"> 1. Establish Steering Committee 2. Establish TSD as Asset Owner 3. Conduct Legal review 4. Conduct fibre asset audit 5. Develop a Corporate "Dig Once" policy 6. Coordinate through ECS ("Dig Once") 7. Identify and map existing capital projects for fibre deployment 8. Formalize adoption of construction standards (work types) 9. Establish qualified Contractor Roster 	<ol style="list-style-type: none"> 1. TSD coordinated 3-year project plans 2. "Open Trench" activities coordinated via ECS (buried conduit, cable pulling, cable vaults) 3. "Open Conduit" activities (coordination & management of space within conduit) 4. Assess, coordinate, and administer Municipal Access Agreements 	<ol style="list-style-type: none"> 1. Dark fibre management 2. Tender for last mile services 3. Centralized network services planning 4. 5G planning

Proposed Opportunities to Help Communities in the Shorter-Term

Staff are also exploring opportunities to bridge connectivity divides for communities in need in the shorter-term. The intent is to provide supports until the longer-term MBN is deployed with services available on a neighbourhood by neighbourhood basis. Staff intend to engage with the tech community, anti-poverty groups & end users in developing solutions that work for the community. Opportunities that staff are exploring include:

Universal In-Suite Wi-Fi at TCHC Seniors Housing Facilities

Older adult communities have been identified as particularly susceptible to risks associated with social isolation which have been exacerbated throughout the COVID-19

pandemic. In November 2020, the TCHC Tenant Services Committee adopted a motion for staff to investigate the provisioning of internet services in Rent-Geared-to-Income (RGI) units, inclusive of rent, across the TCHC portfolio.

While supporting TCHC with this initiative, TSD is also exploring in-suite Wi-Fi deployment throughout the TCHC's Seniors Housing Unit facilities which would ensure critical internet services are available for about 15,000 older adults in 83 dedicated residential facilities across the City.

Establishing a City of Toronto Household Broadband Subsidy

City staff are exploring mechanisms to provide a direct-to-household financial subsidy to alleviate internet costs for communities in need. A Toronto Household Broadband Subsidy is envisioned to be made available to OW/ODSP recipients by leveraging existing social and economic support programs administered by the City, where possible. Eligibility criteria may also include completion of a survey developed in partnership with the School of Cities at the University of Toronto. Anonymized data collected through this survey will enhance the City's evidence based decision making capabilities.

Internet in New Affordable Housing Development &/or Large-Scale Revitalization Projects

City staff are exploring ways to integrate affordable high-speed internet service within new affordable housing development projects and large-scale revitalization projects, such as affordable housing, affordable rental housing, social housing, and RGI units. Similar to the overall MBN approach that will leverage parallel construction projects to deploy fibre infrastructure, staff are collaborating to identify paralleling opportunities that would provide affordable broadband access to residents of these communities, once built or revitalized.

Conclusion

As the world and our city become increasingly digital, benefits must be considered alongside risks, such as further disenfranchising communities facing barriers who already struggle to maintain basic connectivity. Digital access and affordability barriers correlate to underlying issues of social equity; with low-income, racialized, and elderly communities having fewer options for reliable broadband access available to them.

Endorsing the proposed ConnectTO next steps provides Toronto with the opportunity to create an MBN as its primary and long-term mechanism to reduce risk and support residents in all domains of daily living that require reliable access to the internet, and to help ensure internet availability for all residents, regardless of financial means or circumstances.

CONTACT

Alice Xu, Connected Community Manager, Technology Services Division, 416-392-2085, Alice.Xu@toronto.ca

SIGNATURE

Josie Scioli
Deputy City Manager, Corporate Services

Lawrence Eta, Chief Technology Officer, Technology Services Division

ATTACHMENTS

- Attachment 1:** Decision History
- Attachment 2:** Updated Jurisdictional Scan
- Attachment 3:** University of Toronto's School of Cities Social Impacts Survey
- Attachment 4:** ConnectTO Phase 1 Pre-Tender Information-Gathering Online Questionnaire Results Summary
- Attachment 5:** Ryerson University's Digital Equity Policy Report
- Attachment 6:** Toronto Public Health Prudent Avoidance Policy Report

GLOSSARY

"5G" means a fifth generation/iteration of a global wireless technology standard engineered to increase the speed, amount of data and responsiveness of wireless networks.

"Backbone" refers to a high speed line that connects different parts of a large, interconnected network.

"Backhaul" refers to the Bandwidth capacity of the intermediate portion of a Broadband network that is typically situated between the primary network Backbone and internet service customers.

"Broadband" means internet service that is always on and available at higher speeds than traditional dial-up Internet services. There are several forms of Broadband Internet service including Digital Subscriber Line, Cable, Satellite and Fibre-optic.

"Carrier" means an ISP, TSP or WSP which is registered with the CRTC.

"Conduit" refers to the physical network structures used to contain and house network cabling.

"Connectivity" means the active state of the Broadband network and dependent devices at any given time, between the end-user (Subscriber), the service provider and the Backhaul lessor.

"Digital Divide" means the gap between those that have access (through service availability, but especially affordability, etc.) to information and communications technology), and those that do not. In the context of broadband in the City of Toronto, "digital divide" is usually used to refer to the unaffordability of high-speed internet access for people with lower income.

"Dominant Carrier" means a Telecommunications Service Provider (TSP) that has control over a large segment of a particular market.

"Download Speed" means the rate at which data is transferred from the internet to a user's device. A common measurement of Download speeds is megabits per second (Mbps) or gigabytes per second (Gbps).

"Fibre/Fibre-optic/Fibre Optic" means a flexible hair-thin glass or plastic strand that can transmit large amounts of data at high transfer rates as pulses or waves of light.

"Gigabits per second (Gbps)" means a measurement of internet speed. One Gbps is equivalent to the transfer of one billion bits of data per second (bits are the smallest unit of digital information).

"Incumbent Local Exchange Carrier (ILEC)" means a local telephone company which held the regional monopoly on landline service before the market was opened up to competition.

"Internet Service Provider (ISP)" means a company that provides users (individuals or businesses) with access (a connection) to the internet and related services.

"Last Mile" means the final leg of a network that provides service from the local high-capacity fibre infrastructure (middle mile) to a home, business or community institution.

"Megabits per second (Mbps)" means a measurement of internet speed. One Mbps is equivalent to the transfer of one million bits of data per second (bits are the smallest unit of digital information).

"Middle Mile" means the physical infrastructure made up of high-capacity fibre lines between global internet networks and local networks, that is required to enable internet connectivity (last mile) for homes, businesses, and community institutions.

"Non-Dominant Carrier " means telecommunications Carriers, other than Incumbent Local Exchange Carriers, that provide network services subject to forbearance services defined by the CRTC.

"Open Access" means a network that gives public and private providers or entities wholesale access to broadband infrastructure with fair, reasonable and equal terms; i.e. any network type is able to interconnect, regardless of technology used, on equal economic and service terms

"Open Conduit" means a conduit that has cable(s) drawn through it but the end of the conduit remains open for future use/connectivity access.

"Open Trench" means a partially or totally excavated trench, including a trench in which a pipe, conduit or cable has been laid but not fully backfilled to the level of the adjoining ground and finally compacted.

"Smart Building / Smart City / Smart Technology" means a range of digital network devices that are self-monitoring, self-analyzing and self-reporting, and whose function and activity on the network do not require ongoing or direct intervention by users.

"Subscriber" means a purchaser of retail Broadband services.

"Telecommunications Service Provider (TSP)" means a provider of telecommunications services in whole or in part, including both regulated and unregulated services, such as the provision of internet access.

"Upload Speed" means the rate at which data is transferred from the user's device to the internet. A common measurement of Upload speeds is megabits per second (Mbps) or gigabytes per second (Gbps).

"Wi-Fi" means radio communications transmissions over spectrum authorized by Industry Canada for use by licence exempt wireless.