CONNECTING OUR COMMUNITIES

A BROADBAND STRATEGY FOR DURHAM REGION

February 5, 2019


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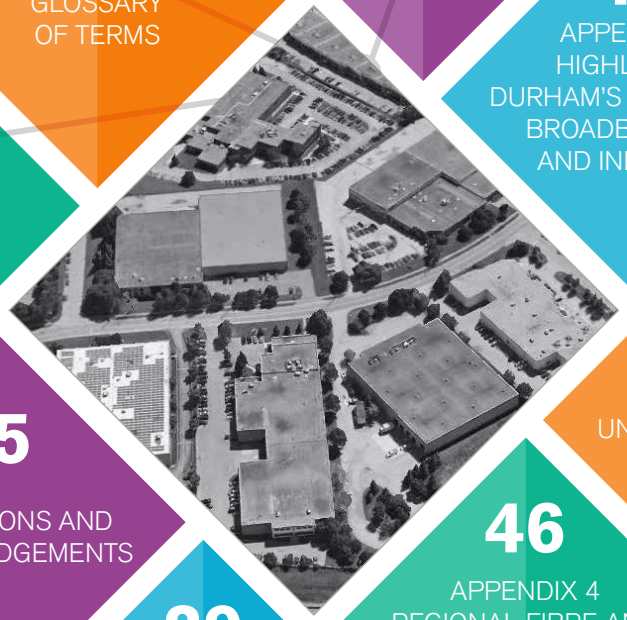

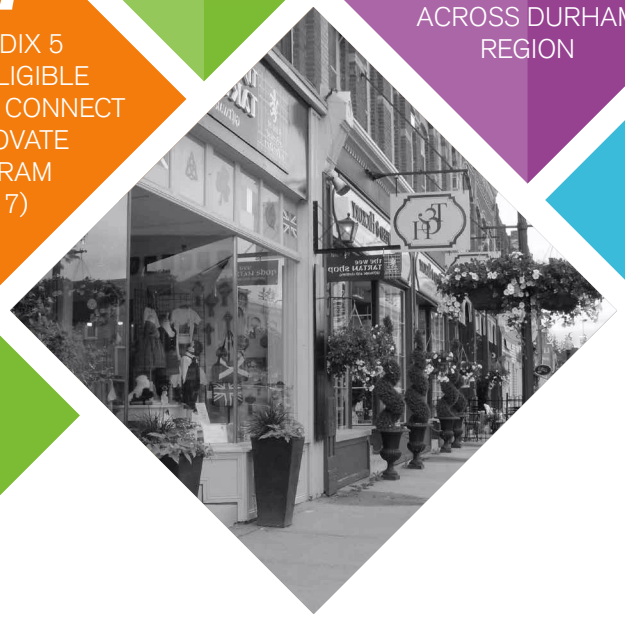

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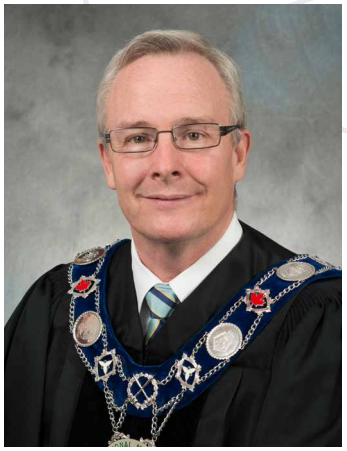
A MESSAGE FROM
THE REGIONAL CHAIR AND CEO, AND THE CHIEF ADMINISTRATIVE OFFICER



JOHN HENRY
Durham Regional Chair and
Chief Executive Officer

ELAINE BAXTER-TRAHAIR
Chief Administrative Officer

It is our pleasure to share with you the Region of Durham's Broadband Strategy and Action Plan. This is our first step into strategic planning for a digitally connected regional community. As our society and economy increasingly rely on electronic and online interactions, the Region must be prepared for and embrace this evolution.

Fast, effective broadband infrastructure is now vital for the Region's success in delivering our services and interacting with residents. It is also an essential tool for citizens to participate in their community, and for businesses to reach and respond to their customers. Reliable digital connectivity also is critical to support economic development and attract new investment to Durham.

All levels of government have a role to play in ensuring connectivity is in place to meet community needs. The Region can help to explore options and co-ordinate local efforts, but partnerships and collaboration will be essential to defining, developing and continuing to grow a broadband network to serve all of Durham.

This strategy positions us to work towards a connected region.

Yours truly,

John Henry, Durham Regional Chair and CEO

Elaine Baxter-Trahair, Chief Administrative Officer

INTRODUCTION

On May 10, 2017, Regional Council endorsed the 2017-2021 Economic Development Strategy and Action Plan for Durham Region. The plan provides a series of actions that are intended to advance the Region's economic position, while acknowledging the importance of partnerships among economic development stakeholders. It also recognizes the importance of broadband as an indispensable part of modern infrastructure in a world that is becoming increasingly connected through digital and online platforms, and identified the need for a Regional Broadband Strategy. Following the formation of a Departmental Steering Committee, and the retention of Actionable Intelligence Incorporated in a consulting capacity, stakeholder consultation on a Broadband Strategy began in September 2017.

This Broadband Strategy was completed in two phases. The first phase focused on assessing the current trends of broadband use and identifying current connectivity conditions across the region. Across all broadband user groups – namely residents, businesses, governments and institutions – the demand for increased internet connection speed and capacity is growing exponentially. Governments, for example, are beginning to explore smart cities solutions to collect data, enhance service delivery and improve decision-making. Based on trends in user needs and industry best practices for predicting future demand, connectivity guidelines for the region have been established.

Many parts of the region, particularly the urban residential areas, are benefitting from infrastructure upgrades by internet service providers (ISPs). For many, levels of service are available that meet or exceed their needs, with service quality in Durham's lakeshore urban areas competitive with other areas of the Greater Toronto Area. However, there are service gaps in locations with low customer densities, particularly in Durham's rural areas. In addition, many businesses have identified the capital cost of upgrading and/or installing broadband infrastructure to their location as being cost prohibitive. This hinders their ability to take advantage of innovative internet-based technologies, which can create a downstream impact on long-term business viability.

Addressing Durham's specific connectivity challenges requires a combined effort by many stakeholders. This includes the owners and operators of broadband infrastructure (ISPs), individual users (residents, businesses and institutions), as well as all levels of government. This strategy and its actions acknowledge that the Region does not intend to occupy the ISP space in competition with the existing marketplace, or duplicate the responsibilities of senior levels of government; but rather outlines the role that the Region should play as a supporter and facilitator of broadband infrastructure, with a focus on three priority areas: creating an environment of co-ordination and collaboration, addressing service gaps, and supporting improved affordability.

EXECUTIVE SUMMARY

VISION

Durham's residents, businesses, and institutions will have access to fast, reliable, and affordable broadband services so that they may fully participate, compete, and thrive in the 21st century.

PURPOSE

Council directed that a Broadband Strategy be undertaken to ensure the Region takes action to support broadband deployment, particularly to underserved areas. The objectives of this strategy are summarized as follows:

- To understand the broadband needs of residents, businesses, and institutions.
- To highlight trends in broadband use.
- To identify projects and service options to improve broadband service delivery.
- To highlight the need for collaboration, while encouraging investments in connectivity.
- To signal the Region's intent of being "application ready" should ISPs approach the Region for funding support towards programs offered by senior levels of government.
- To establish connectivity guidelines to ensure the Region is forward-thinking and future focused, establishing a basis to evaluate applications that may be advanced by ISPs.

THE CHALLENGE

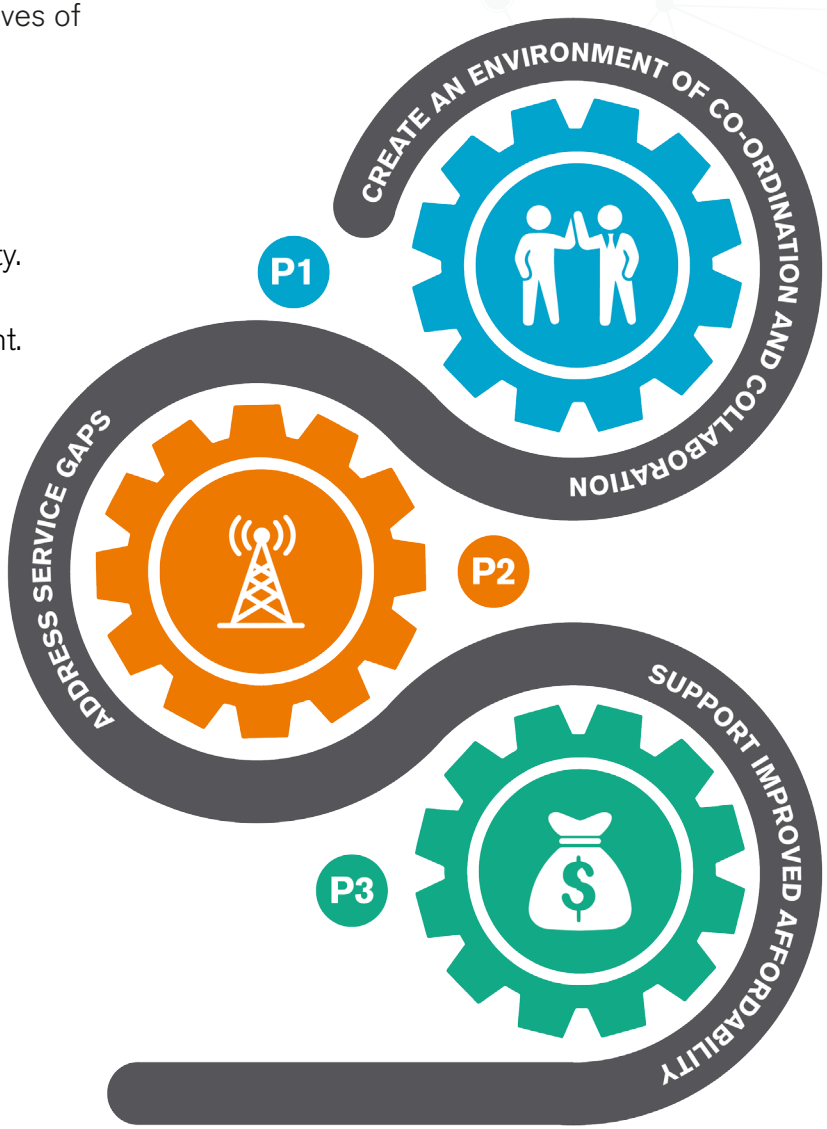
Broadband services are deployed based on market demand, and supported by business case analyses by ISPs. Therefore, areas with lower customer densities, like rural areas and employment areas, may have limited service options and service speeds. This is because there is not a sufficient cost-benefit motivation for ISPs to upgrade existing infrastructure.

THE REGION'S ROLE

The Region is not an ISP. The Region's efforts should support the expansion of broadband, in co-operation with other levels of government, stakeholders, and ISPs.

THE REGION'S

BROADBAND PRIORITIES



ACTION AND IMPLEMENTATION PLAN

The successful implementation of the strategy relies on the joint effort of many stakeholders. The following table summarizes the recommended actions contained within this strategy, along with key departments and external stakeholders.

Timeframe: Ongoing (currently underway), Immediate (1to 2 years), Future (3 to 5 years)

ACTION NUMBER	ACTION DETAILS	POTENTIAL IMPLEMENTATION PARTNERS	TIMEFRAME	PRIORITIES ADDRESSED	REQUIRED RESOURCES (HUMAN/FINANCIAL)
1, 7D	Conduct inventory and mapping of Regional assets where co-location of broadband infrastructure would be available/encouraged. Include local area municipal assets where available.	Regional Works, BWG*, Broadband Co-ordinator	Immediate	P1, P2	Medium
2A	Investigate the feasibility of a Dig Once Policy.	Regional Works, Legal, Finance, and Planning, Broadband Co-ordinator, BWG	Future	P1, P2, P3	High
2B	Review development approval processes and approval conditions to support deployment of broadband in new developments.	Regional and local area municipal Planning/Works, BWG, Legal	Immediate	P1, P2, P3	Low
2C	Develop Regional Official Plan policies that support broadband deployment. Include requirements (to the greatest extent possible) that new development make provision for broadband infrastructure (conduit at a minimum).	Regional Planning and Legal, BWG, Broadband Co-ordinator, Legal	Immediate	P2, P3	Low
2D	Support the Harmonization of Municipal Access Agreements across the region and local area municipalities.	Regional Works, local area municipalities, BWG	Ongoing	P1	Low

*BWG: Broadband Working Group

ACTION NUMBER	ACTION DETAILS	POTENTIAL IMPLEMENTATION PARTNERS	TIMEFRAME	PRIORITIES ADDRESSED	REQUIRED RESOURCES (HUMAN/FINANCIAL)
3A	Assess the long-term broadband needs of Regional departments. Inventory facilities that will require capital broadband infrastructure upgrades. Include a preliminary assessment of the costs and benefits for using the Region's existing and planned broadband infrastructure to connect municipal facilities.	Regional IT and Finance, Broadband Co-ordinator, BWG	Future	P1	High
3B, 8E	Consider opportunities to aggregate service contracts.	Regional IT, local area municipalities, Broadband Co-ordinator	Future	P1, P3	Medium
3D	Undertake a feasibility study and business case analysis for a corporate municipal broadband network, including a report to Regional Council.	Regional Finance, Works, and IT, Broadband Co-ordinator, BWG	Future, pending other outcomes and funding	P1, P3	High
4	Support future funding applications.	Regional Council, Broadband Co-ordinator, BWG	Immediate and ongoing (support applications)	P1, P2, P3	Low to High
5	Identify a Broadband Co-ordinator.	Regional Senior Management	Immediate	P1	Medium
6	Form a Broadband Working Group (BWG).	Broadband Co-ordinator, local area municipalities, Regional departments	Immediate	P1	Medium

ACTION NUMBER	ACTION DETAILS	POTENTIAL IMPLEMENTATION PARTNERS	TIMEFRAME	PRIORITIES ADDRESSED	REQUIRED RESOURCES (HUMAN/FINANCIAL)
6	Establish a BWG workplan and subject areas.	BWG, Broadband Co-ordinator	Immediate	P1	Low
7A	Conduct service availability survey for business/employment locations.	Broadband Co-ordinator, Regional Economic Development, local area municipal Economic Development, BWG	Immediate	P1, P2	Medium
7B	Conduct updated Internet Speed Measurement Testing to assess connectivity conditions across the region.	Broadband Co-ordinator, BWG	Future (contingent on funding)	P1, P2	Medium
7C	Compile mapping of Regional and area municipal locations where broadband service improvements are, or will be, required.	Regional IT, BWG, Broadband Co-ordinator,	Immediate	P1	Low
8A, 8B, 8C	Develop a communication approach that provides regular updates/ meetings with internet service providers to communicate growth areas, infrastructure planning, and utility projects, as well as providing information on broadband service needs and gaps.	BWG, Broadband Co-ordinator, Regional CAO's Office	Immediate	P1, P2	Medium

ACTION NUMBER	ACTION DETAILS	POTENTIAL IMPLEMENTATION PARTNERS	TIMEFRAME	PRIORITIES ADDRESSED	REQUIRED RESOURCES (HUMAN/FINANCIAL)
8D	Develop an approach to assist property owners in the co-ordination of cost sharing of capital costs to extend broadband infrastructure to their property.	Local area municipal Economic Development, Broadband Co-ordinator	Immediate	P1, P2, P3	Low
9A	Develop an advocacy approach to provincial and federal levels of government on the importance of the availability and affordability of adequate broadband services.	Regional CAO's Office, BWG, Broadband Co-ordinator	Immediate	P2, P3	Low
9B, 7E, 7F	Create and maintain a broadband-specific web page on the Regional website, durham.ca.	BWG, Broadband Co-ordinator, Regional IT, and local area municipalities	Immediate	P1	Low
9C	Develop materials on the importance of broadband connectivity for the marketability of properties.	Regional Economic Development, Broadband Co-ordinator, BWG	Immediate	P1	Low
10	Develop a Durham Smart Cities Framework and manage resulting projects and intiatives.	Regional CAO's Office, Broadband Co-ordinator, BWG	Ongoing	P1, P2	Medium

PART 1

LOCAL CONTEXT

INTRODUCTION

Durham Region borders the County of Simcoe to the north, the City of Kawartha Lakes and Northumberland County to the east, and the Region of York and City of Toronto to the west. Durham Region is the eastern gateway to the Greater Toronto Area (GTA).

Starting from the Lake Ontario shoreline, the region continues north, crossing the agricultural and provincially protected lands of the Greenbelt and the Oak Ridges Moraine, to the southern shores of Lake Simcoe. As the largest geographic jurisdiction in the GTA, Durham Region covers a diverse landscape. This landscape includes large and small urban centres and rural settlements, as well as a vast rural area made of up pristine natural spaces and prime agricultural lands.

With few exceptions, regional governments in Ontario deliver provincially mandated programs and services. Legislation sets out the specific spheres of responsibility between regional and local area municipalities.

Durham Region provides services (including social housing, social assistance, long-term care, policing, public health and safe drinking water) to residents in an equitable and not-for-profit manner. The Region is not in the business of building and maintaining broadband networks. However, by supporting the delivery of services in a collaborative manner, the Region can assist internet service providers (ISPs) in meeting the needs of residents and businesses throughout the region.

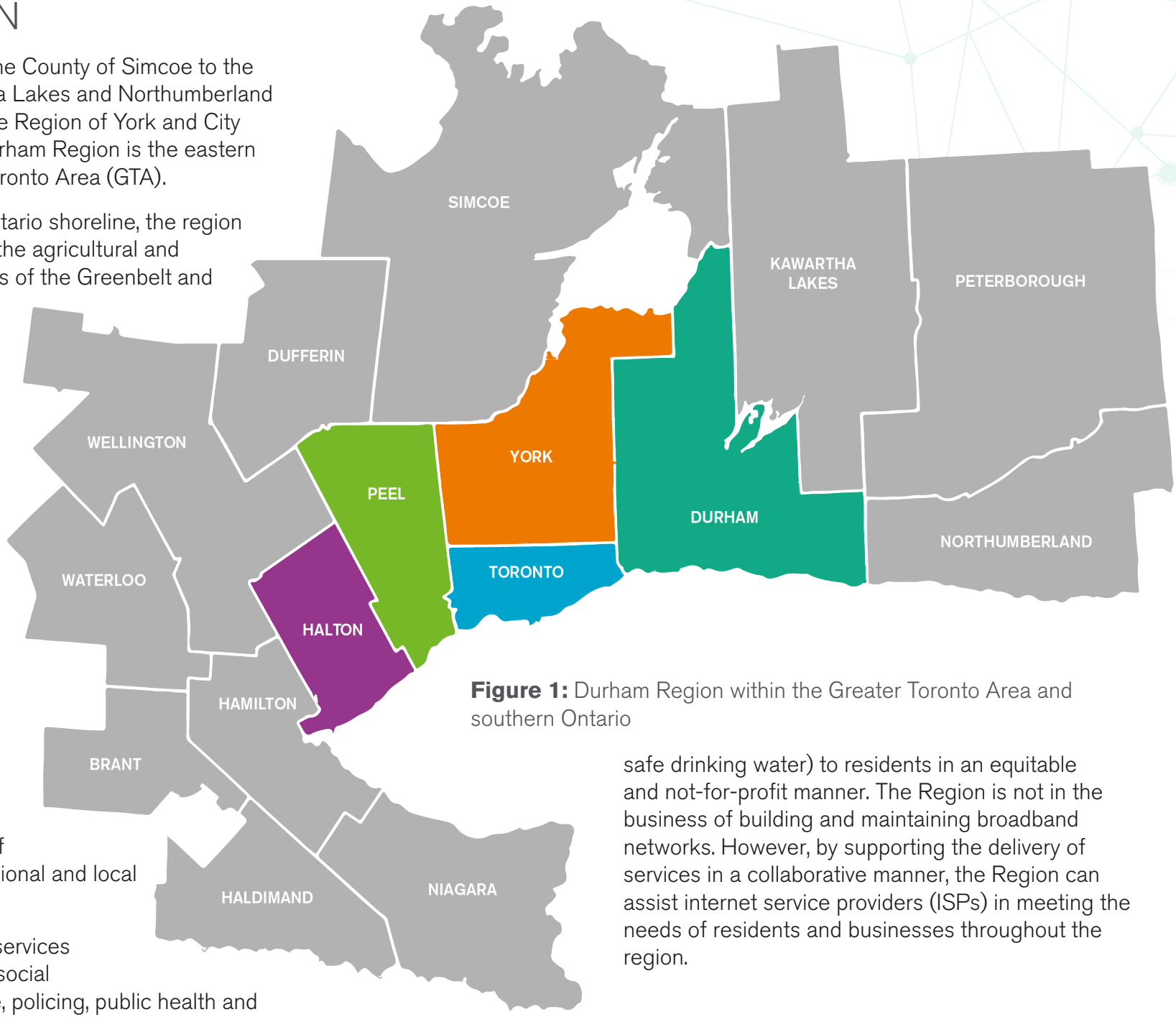


Figure 1: Durham Region within the Greater Toronto Area and southern Ontario

DURHAM REGION
PROFILE, STATISTICS, AND FACTS

Durham Region contains eight area municipalities, including the Town of Ajax, Township of Brock, Municipality of Clarington, City of Oshawa, City of Pickering, Township of Scugog, Township of Uxbridge, and the Town of Whitby.

Durham is a premiere destination to live, work and play. Ideally located within proximity to the economic centres of downtown Toronto and the Toronto Pearson International Airport employment zone, access to and from the region is provided by Highway 401, the recently expanded Highway 407, and all day GO Transit service. The integrated transportation network is complemented by an executive airport in Oshawa, transcontinental and commuter rail lines, a federally designated airport site, and deep-sea ports. Currently home to more than 685,500 residents, the region's population is forecast to almost double to nearly 1.2 million residents by 2041.

DURHAM REGION PROFILE
KEY STATISTICS

Land area: **2,537 square kilometres**
Current population: **685,500** (as of May 31, 2018)
2041 population forecast: **1,190,000 (about 1.2 million)**
Total number of jobs: **196,713** (2017 Business Count)
2041 job forecast: **430,000**
Number of businesses: **12,364** (2017 Business Count)
Designated agricultural land: **110,100 hectares**
Employment land area: **8,337 hectares**

Sources: 2017 Durham Region Business Count, 2016 Census Data, 2014 Employment Land Inventory, 2017 Growth Plan (Schedule 3)

Table 1: Durham Region Selected Key Statistics

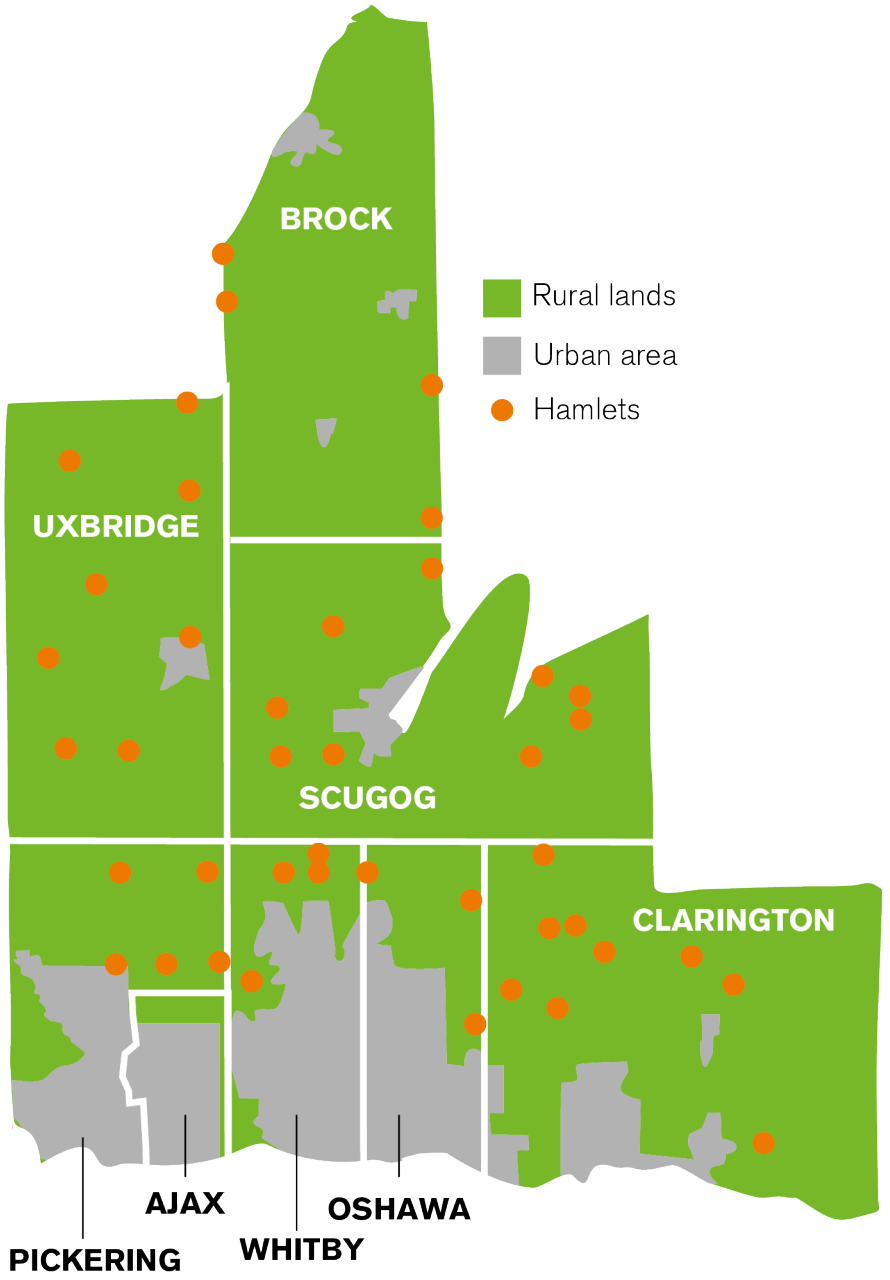


Figure 2: Durham Region's local area municipalities

COMMITTED TO ECONOMIC GROWTH

Durham Regional Council has articulated the importance of technological innovation as an economic driver through the following goals and objectives of the 2015-2018 Durham Region Strategic Plan:

- **A1** **Propel the business and investment climate forward in Durham Region to enable more local employment.**
- **A2** **Diligently attract, retain and mentor the next generation of employees to build a skilled, engaged and diverse workforce.**
- **A3** **Promote and actively capitalize on opportunities to make Durham Region a premier destination that attracts and retains entrepreneurs, innovators, visitors and residents.**
- **A4** **Renew our commitment to enhance the economic viability of Durham's agricultural sector to advance sustainable and innovative agriculture production practices and promote food system security.**
- **A5** **Find new ways to work with our partners to revitalize and grow Durham Region's position as a renowned centre of technological excellence.**

The Economic Development Strategy and Action Plan sets a bold and ambitious vision that "Durham Region will become the most prosperous and innovative region in North America," and will be the "high-tech innovation eastern gateway along the 401 tech corridor." This vision will be achieved through the continued viability of the region's traditional industries, and attracting and retaining new and innovative businesses. A fundamental objective for the Region is to provide support to the region's key economic sectors, and to create a climate that is open for business.

DURHAM'S KEY **ECONOMIC SECTORS**

- Agri-business
- Energy, Environment & Engineering
- Health Sciences
- Innovative Technology
- Manufacturing
- Tourism

The Region continues to support and enable more local employment through measures, such as strategic investment in Regional infrastructure, by identifying and capitalizing on economic development opportunities, and by fostering a supportive development climate. In recent years, both residents and businesses have identified the availability of reliable and adequate broadband services as a challenge within certain areas of the region.

WHAT IS BROADBAND?

There is no one standard definition for "broadband". Simply put, broadband means internet access that is always on, available at higher speeds than traditional dial up service, and capable of transmitting large amounts of data very quickly. There are several different forms of broadband internet technologies, including telephone-based Digital Subscriber Line (DSL), cable, wireless (fixed and satellite), and fibre-optic. Each of these technologies have different capabilities for maximum service speed (expressed in megabytes per second, or Mbps).

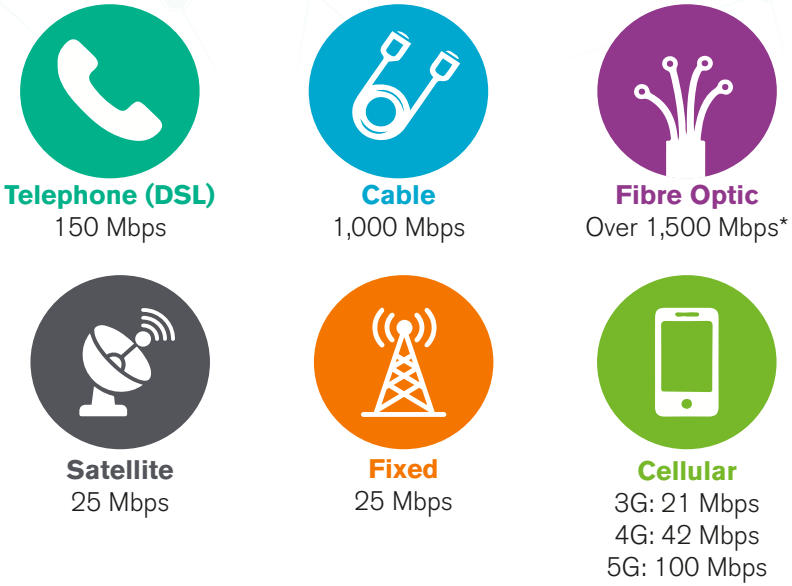


Figure 3: Broadband technology options and their highest service speeds

All of the above broadband technology options are currently being used in Durham Region. Telephone and cable lines, where they exist, are commonly used to deliver internet services in established areas. In rural areas where there is no existing "wired" infrastructure, wireless broadband technology is common. For newer construction and areas with supportive customer densities, ISPs are installing fibre-optic service, which is currently the latest and fastest broadband technology, with service speeds increasing regularly.

Figure 4: Broadband enables connectivity of global economies and societies

WHY BROADBAND IS IMPORTANT

Society, and the global economy, is increasingly digital and online. Government services, business functions and entertainment options have moved online at an increasing pace, continuing to change the way people work, play and communicate. The growing demand for fast service and constant connectivity highlights the need for fast, reliable, and affordable broadband service. Additional information on the drivers and trends in broadband use can be found in Appendix 1.

*Fibre optic service speed is limited by the electronics at either end of the line, as opposed to the fibre itself, which can theoretically transmit data at the speed of light.


Port Perry

PART 2

STRATEGY DEVELOPMENT
OBJECTIVES AND PROCESS

OBJECTIVES

Recognizing the importance of broadband for the region's residents, businesses and institutions, the Broadband Strategy for Durham Region is intended to meet the following objectives:

- To understand the broadband needs of residents, businesses, and institutions.
- To highlight trends in broadband use.
- To identify projects and service options to improve broadband service delivery.
- To highlight the need for collaboration, while encouraging investments in connectivity.
- To signal the Region's intent of being "application ready" should ISPs approach the Region for funding support towards programs offered by senior levels of government.
- To establish connectivity guidelines to ensure the Region is forward-thinking and future focused, establishing a basis to evaluate applications that may be advanced by ISPs.

PROCESS OVERVIEW

The Strategy was completed over two phases, which included broad consultation and two supporting reports from the Region's retained consultant, Actionable Intelligence Incorporated. The process is summarized below and further described in Appendix 2.

Figure 5: Broadband Strategy Process Summary

PART 3

CONNECTIVITY GUIDELINES
AND CURRENT CONDITIONS

CONNECTIVITY GUIDELINES AND CURRENT CONDITIONS

In 2016, after an extensive review, the Canadian Radio-Television Commission (CRTC) established a baseline broadband service target that Canadians will require to participate in the digital economy. The target, which applies to residential users in both rural and urban areas, benchmarks download speeds of 50 Mbps and upload speeds of 10 Mbps (e.g. 50/10 Mbps), with unlimited usage capacity. To support the achievement of the target, the CRTC established a fund of $750 million over five years to support investment in broadband infrastructure.

For businesses, government agencies and institutions, broadband needs tend to be higher and generally increase with the size of the organization. Other factors, such as the number of computers or other connected devices, as well as the market sector and the services being provided, will greatly affect the broadband needs of any given organization. Given these variances, it is challenging to predict the needs of any single business or institution without undertaking more detailed analysis.

Based on the CRTC baseline target for residential uses and current industry standards for non-residential uses, connectivity guidelines have been developed by Actional Intelligence Inc. and augmented through stakeholder feedback. It is recognized that some households, organizations, and areas (such as innovation hubs) may require higher or lower levels of broadband connectivity, based on their individual needs. It is also recognized that Durham's area municipalities may wish to establish their own targets to address local priorities. Based on the existing needs and emerging trends, the following connectivity guidelines are provided (see images to the right).

CONNECTIVITY GUIDELINES

Residential/standard home-based business use
By 2022: 50/10 Mbps
2023-2028: 100/25 Mbps
2029-2034: 150/50 Mbps

Small business
By 2022: 100/100 Mbps
2023-2028: 500/500 Mbps
2029-2034: 1000/1000 Mbps

Medium-large businesses, institutions, government agencies
By 2022: 1/1 Gbps
2023-2028: 10/10 Gbps
2029-2034: 50/50 Gbps

High-tech/specialized industries, large institutional campuses (hospitals, post-secondary institutions)
By 2022: 10/10 Gbps
2023-2028: 25/25 Gbps
2029-2034: 100/100 Gbps

DURHAM'S CURRENT CONNECTIVITY CONDITIONS

The existing connectivity conditions in Durham Region reflect those of many other jurisdictions in Ontario and Canada. This includes a strong divide in service quality and service options between urban and rural areas. In addition, the affordability of broadband is an issue for certain businesses and residents.

There are numerous ISPs operating in Durham Region including larger, established providers, as well as smaller and more recently established companies. ISPs may specialize in certain geographic areas or with a particular broadband technology. Often, the level of service and number of available ISPs is correlated with the location of the customer.

Overall, Durham's current connectivity conditions can be summarized as follows:

URBAN AREAS

- High speeds, with multiple internet service options.
- New broadband technologies, with competitive prices.
- New residential developments are well served.
- Major institutions (post-secondary education, health care, government) are able to have their needs met.
- Some connectivity issues where population densities are lower.
- Services generally meet or exceed the current CRTC baseline target.

RURAL AREAS

- Lower speeds, limited internet service options including fewer broadband technologies and limited internet service providers.
- Generally higher prices.
- Prevalence of wireless broadband technology and related issues of reliability due to line of sight obstructions.
- Available service generally does not meet the current CRTC baseline target.
- Service quality diminishes the further north one travels.

BUSINESS AND EMPLOYMENT AREAS

- Many employment areas and other business locations are not pre-serviced with adequate broadband infrastructure.
- Capital costs to install services can be prohibitive, especially for smaller businesses.
- Downtown areas with older legacy networks face challenges with costly retrofits.

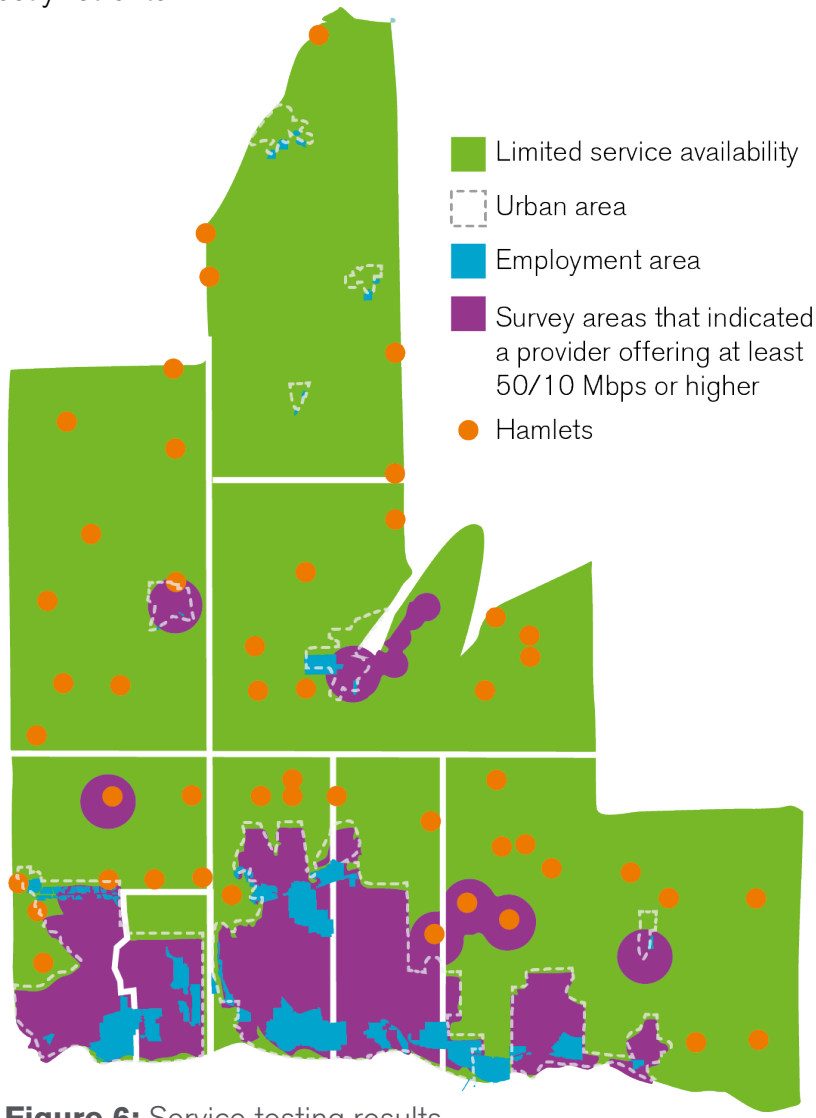


Figure 6: Service testing results


On the Lamb
Wool Shop
Naturally
PASSIONATE COOK'S
ESSENTIALS
WOODS
Contemporary Clothing
CHEESE

PART 4

BROADBAND
PRIORITIES

BROADBAND PRIORITIES

Like many Canadian municipalities, Durham's connectivity is not equally shared.

In the region's urban areas, ISPs are keeping pace by deploying the latest fibre-optic broadband technologies. Use of these technologies include ongoing programs to build fibre to the premises for close to 90,000 households in Oshawa and Clarington. At the same time, new advances in wireless mobile technologies (5G) are continuous. Many of the region's residents, businesses and institutions benefit from these improvements and can access the level of broadband service they require.

Service limitations continue to be a challenge within the region's rural areas. This situation is problematic as technological advances will increasingly require superior internet connections to access services and participate in modern society. Affordability will remain a challenge for lower-income households, as well as for businesses that must pay the capital cost to extend suitable services to their building.

Overall, there is a growing concern that broadband service availability to parts of Durham that are lagging behind other jurisdictions in the GTA will fall further behind if their needs cannot be met.

These obstacles cannot be solved by any single organization or level of government. Instead, it will take a combined effort by many stakeholders and partners. Durham Region recognizes the importance of broadband connectivity and is committed to taking a proactive and supportive role in the delivery of broadband throughout the region, in partnership with other levels of government, ISPs, and other key stakeholders.

During all stages of consultation, stakeholders were asked to consider what role and actions the Region could undertake to assist with these obstacles. Although many ideas and opinions were shared, areas of consensus and agreement emerged. The following summarizes the Region's broadband priorities, and the key messages and input received throughout the process.

PRIORITY 1

CREATING AN ENVIRONMENT OF CO-ORDINATION AND COLLABORATION

Highlights of what we heard:

- The Region should to take a leadership role in facilitating collaboration and co-ordination amongst the relevant stakeholders.
- There is a need for better information sharing amongst all stakeholders, including information from and to ISPs on service availability and known gaps.
- Partnerships are essential and should be a key component of the Region's strategy.
- It should be recognized that the area municipalities have different challenges and priorities. The Region should provide support for local initiatives where possible.
- The Region should facilitate regular communication between ISPs, residents and businesses.

> **"Regional government should work with higher levels of government, and the major carriers, to bring broadband to any areas that require it."**

> **"The Region should start the process of getting all levels of government involved."**

ADDRESSING SERVICE GAPS

PRIORITY 2

Highlights of what we heard:

- The Region should prioritize efforts to improve connectivity in underserved areas, as opposed to further investment in areas that are already served and meet the CRTC target.
- There needs to be a balance for addressing both urban and rural service gaps.
- The Region should focus efforts on areas of market failure and support the provision of services to these areas.
- Municipal facilities in rural areas are facing challenges. The Region should partner with other nearby government facilities (e.g. area municipal facilities) to share the cost of upgrading broadband services to these locations.
- It is critical that downtown and employment areas have access to adequate broadband services.
- Many rural businesses including agriculture, are incorporating advanced technology and require broadband services.
- The Region should leverage existing assets to support the deployment of broadband infrastructure by ISPs.

> **"Our current broadband capacity is a major deterrent to business development in our areas."**

> **"The Regional government should at least take a strong advocacy role in pressing for uniformly high-quality service across the region."**

Consultation through recent Region-led studies, including the Brock Tourism Business Retention and Expansion Project (2017) and the region-wide Local Food Business Retention and Expansion Project (2018), indicated that many businesses and organizations see limited Internet speed and access as barriers to doing business in Durham. Further, broadband connectivity in rural areas has been noted as being a critical element that should be addressed as part of the Region's Climate Change Adaptation Strategy for the Agricultural Sector to ensure that emergency alerting (around matters such as extreme weather) reach the agricultural community. Broadband connectivity is also required to enable the necessary agricultural technologies that will support the adaptive capacity of this important economic sector in Durham.

SUPPORTING IMPROVED AFFORDABILITY

PRIORITY 3

Highlights of what we heard:

- Affordability is a serious issue for businesses, as well as households that cannot afford service.
- There is an opportunity to reduce government service costs through collaboration and combining service contracts. Further exploration and analysis of this option should be conducted.
- There should be consideration of Durham's priority neighbourhoods and broadband availability. Priority Health Neighbourhoods should be a focus for improved affordability and enhanced connectivity.
- The Region should advocate to the federal and provincial governments to recognize broadband as an essential service and to ensure there is a competitive market and affordable services for all income levels.

> **"I'm not sure that the cost to upgrade connectivity is a regional issue, however, putting pressure on the broadband suppliers to help correct the problem would certainly help."**

> **"Broadband is expensive. The Region should work with the province to identify areas of service need, particularly in rural areas. The Region could be a driver to negotiate broad-based broadband prices. The Region could be a leader in assisting municipalities to install fibre."**

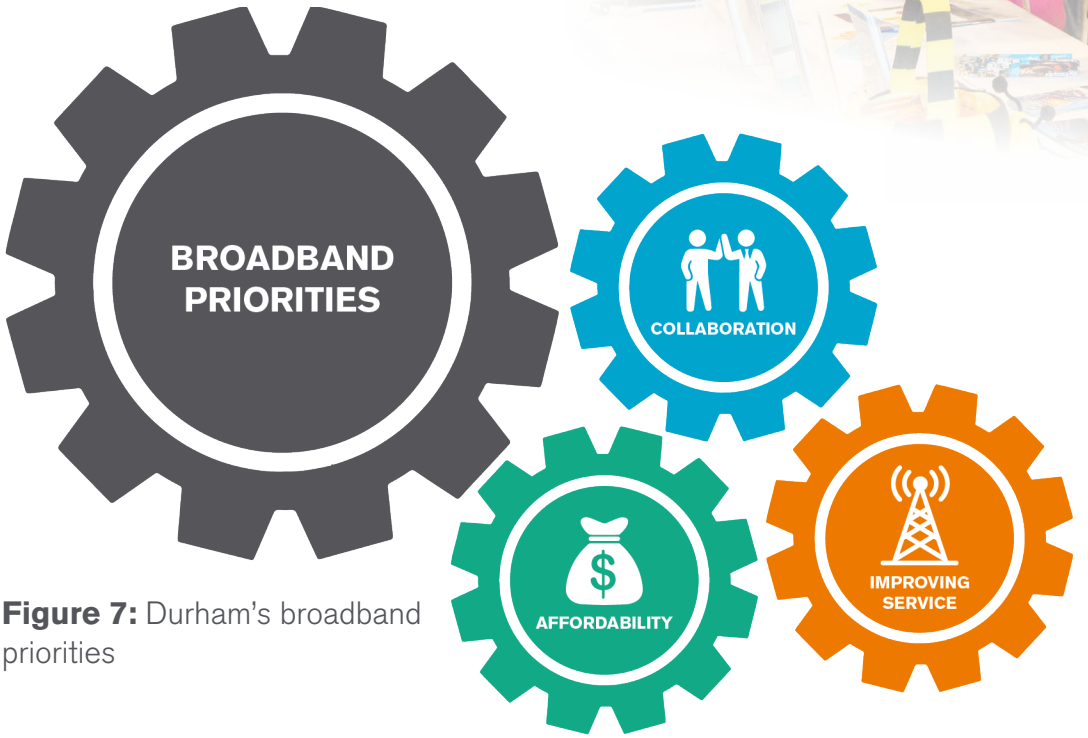


Figure 7: Durham's broadband priorities

PART 5

ACTIONS

The following actions will help support the achievement of the Region's connectivity guidelines and work towards addressing the Region's broadband priorities:

ACTION 1

LEVERAGE REGIONAL ASSETS

The Region can support the delivery of broadband services by permitting ISPs to co-locate on Regional facilities and equipment. This can include water towers, communications towers, rooftops, utility poles and other vertical infrastructure. As new technology is developed and deployed, there will be a growing desire to access existing Regional assets.

The Region currently permits telecommunications equipment to be located on Regional property, where appropriate, and has set standard fees. Promoting co-location of ISP equipment on Regional assets is a good opportunity to improve service options/ enhancement, and spur service deployment to underserviced northern and rural areas. It could also reduce the need for additional freestanding towers.

To further encourage the use of Regional infrastructure as a means of supporting the deployment of broadband services, the Region will produce an inventory of Regionally owned sites that are suitable and available for co-location/lease by ISPs.

Figure 8: Inventory of Regional assets suitable and available for co-location

ACTION 2

DEVELOP REGIONAL POLICIES AND PROCESSES TO SUPPORT BROADBAND

Regional policies and processes can affect the extent and speed of broadband deployment by ISPs. Accordingly, review of the following policies and processes will be undertaken to support broadband network expansion:

A INVESTIGATE THE FEASIBILITY OF "DIG ONCE" POLICY

Often, the highest cost associated with underground fibre deployment is the expense of digging up and restoring municipal rights-of-way. This can account for between 60 and 80 per cent of the overall cost.

The purpose of a "Dig Once" Policy is to reduce the cost of broadband deployment by providing for the placement of conduit (the plastic pipe that houses fibre-optic cable) during road construction projects, when there is easy access to the utility trench. This allows for conduit to be placed while minimizing the need and expense of excavation and restoration. At the desired time, the fibre-optic cable can then be pulled through the conduit without the need for expensive excavation.

There are varying approaches and degrees of effort to implementing Dig Once Policy. A Dig Once Policy may focus on developing a formal process to advise ISPs of construction activities. This option provides ISPs with the opportunity for the cost-efficient placement of their own conduit while the trench is open. However, this approach also requires a high degree of alignment between municipal and ISP staff, as well as project plans and budgets, which may not always be possible.

Another Dig Once option is for municipal governments to place their own conduit during municipal construction projects. In this approach, the municipality would retain ownership of the conduit, which can then be used for its own corporate purposes or as an asset that is leased for use by ISPs.

The Region of Durham currently implements Dig Once for Regional road projects. On a case-by-case basis, the Region evaluates where future fibre-optic cable may be needed for Regional transportation purposes, and places conduit during road construction and reconstruction. This conduit is reserved for future use by the Region of Durham.

Durham's local area municipalities are also developing and implementing their own Dig Once policies. To varying degrees, the City of Pickering, Town of Whitby, and Township of Scugog have implemented projects using a Dig Once approach, while other municipalities are exploring the idea.

During consultation on the development of this strategy, a desire was expressed for the Region to work with the local area municipalities to explore the concept of a consistent, region-wide Dig Once approach that includes the potential for open access to Regional conduit.

The Region will undertake an analysis of its current Dig Once practice and investigate potential

Figure 9: Municipal construction projects may lend themselves to the deployment of conduit through a Dig Once pP

changes. As part of this exercise, the following will be considered:

- The experience and success of Dig Once policies in other jurisdictions.
- Whether there is a desire or market interest for ISP access to municipally owned conduit.
- That a technical standard be developed for the location and specifications of conduit within road rights-of-way that is consistent across the region and area municipalities.
- That any potential security and access issues related to sharing infrastructure can be addressed, including necessary legal and administrative agreements.
- That the condition and age of conduit be tracked as part of the Region's asset management system.
- That the placement of conduit be prioritized to those areas where current services do not meet the Region's connectivity guidelines and where demand for improvement is most pronounced.
- That the costs of installation and anticipated return on investment be evaluated.
- The relevance of Dig Once given the increase in the use of "trenchless" technologies such as directional drilling.
- That Dig Once can be used in a manner that will not create complications of added cost due to the placement of conduit next to other infrastructure.
- An analysis of the likely number of Dig Once projects that could occur, given that Dig Once depends upon access to the utility trench, which is not typical for many construction projects.

B DEVELOPMENT APPROVALS PROCESS

Similar to the benefits of the Dig Once approach, requirements for broadband infrastructure to be included as part of new development ensures that future occupants will not be faced with costly and disruptive retrofits at a later date. There is an opportunity through the development approvals process to mandate new developments to make provisions for broadband infrastructure.

To maximize competition and service options for future residents and businesses, all ISPs should be given the opportunity to install broadband infrastructure within new developments. The Region, in co-operation with local area municipalities, will consider the use of conditions within subdivision agreements that affords all CRTC registered telecommunications service providers the opportunity to locate infrastructure in proposed municipal rights-of-way.

To enshrine these requirements, updates to the Regional Official Plan will also be required.

C PLANNING POLICY

As part of the Municipal Comprehensive Review of the Regional Official Plan, policies will be considered to support broadband infrastructure. This will include the encouragement of co-location of broadband infrastructure with existing telecommunication facilities wherever possible, as well as policies that support broadband infrastructure (conduit at a minimum) as part of new development applications.

D PERMITTING PROCESS

The process to obtain consent and permits to occupy municipal rights-of-way can vary between municipalities and can be difficult to navigate, particularly for new ISPs looking to deploy broadband networks. To streamline this process and clarify the standard requirements and conditions, the Region has developed a standardized Municipal Access Agreement (MAA). ISPs must enter into a MAA in order for the Region to authorize new installations within its rights-of-way.

To create a predictable and uniform approvals environment, Durham's area municipalities may wish to adopt a similar standardized MAA, leading to a harmonized approvals process across the region. To support this initiative, the Region will make its standardized MAA template available and share the experience in developing the template in an effort to ease area municipal implementation of this tool.

ACTION 3

ASSESS CORPORATE BROADBAND AND SMART CITY NEEDS THROUGH THE REGION'S CORPORATE INFORMATION TECHNOLOGY STRATEGY

A corporate Information Technology (IT) Strategy is under development, which will assess the current and future broadband needs of the Region's departments and facilities. Through the development of the IT Strategy, the following matters should be considered:

A A comprehensive assessment of each department's (including various facilities) current and planned future broadband needs, smart city/Internet of Things (IoT) solutions, existing service costs, and current ISP agreements.

B An investigation of the opportunity to aggregate broadband service contracts, including the potential for aggregation with area municipalities (e.g joint purchasing) to improve cost effectiveness.

C Consideration of the benefits to adjacent properties when evaluating capital broadband infrastructure upgrades to Regional facilities (e.g. the Region's facility acting as anchor tenant).

D A preliminary assessment of the costs and benefits for using the Region's existing and planned broadband infrastructure to connect municipal facilities. Pending the results of this assessment, a fulsome business case assessment may be required.

As noted, the Region owns and operates a fibre network. This network has been designed and constructed to support traffic management (traffic signals and live video monitoring) and is currently used exclusively for this purpose.

The Region's existing and planned fibre assets could become the foundation for a broader corporate fibre network. There is an opportunity to expand the network to connect Regional corporate facilities and assets, as well as the potential to provide connectivity to other users, should the need arise.

There may be a net benefit for providing connectivity to Regional facilities, as opposed to purchasing services from an ISP. However, the capital and operating costs associated with establishing a municipal network, as well as service level obligations and liabilities, would need to be evaluated through a detailed business case.

Staff will report to council following the completion of the IT Strategy, with a recommendation on whether or not to proceed with a feasibility study/business case analysis for developing a corporate fibre network.

ACTION 4

SUPPORT FUNDING APPLICATIONS

The Region supports the continuous deployment of broadband infrastructure within its jurisdiction. In the past, this has included co-ordinating applications for funding programs offered by the Province of Ontario and more recently, as a supporter of ISP applications under the Connect to Innovate (CTI) program.

The CRTC has established a $750 million fund, spread out over five years, to support the achievement of its 50/10 Mbps service target. On September 27, 2018, the CRTC issued Policy Decision 2018-377, which provides preliminary details on the Broadband Fund, including the following:

- The request for proposals will be issued in 2019. It will be at the CRTC's discretion whether or not to issue more than one request for proposals.
- The funding will be rolled out over five years.
- Applicants must have experience deploying, owning and operating broadband infrastructure for a minimum of three years.
- The CRTC will identify eligible areas.
- Despite the CRTC's definition of basic service being 50/10 Mbps, applications that meet 25/10 Mbps with the ability to scale up to 50/10 Mbps overtime are eligible under the program.

- Applicants will be required to demonstrate that the project is not viable without CRTC funding.
- Application scoring will include consideration of funding from other levels of government and the degree of community consultation that has taken place.

The Region will continue to provide support to ISPs that are working to address broadband service gaps in Durham. To strengthen ISP applications to the CRTC Broadband Fund, the Region will provide letters of support and assist with community consultation, where requested and where appropriate. In addition, the Region will investigate Regional financial contribution towards ISP applications to the CRTC Broadband Fund.

Requests by ISPs for Regional funding support of their applications under the CRTC Broadband fund will be evaluated against the Connectivity Guidelines, as well as additional criteria that will be established.

ACTION 5

IDENTIFY AN INTERNAL STAFF LEAD/CHAMPION (BROADBAND CO-ORDINATOR)

During consultation, stakeholders noted the importance of a designated and centralized position responsible for regional broadband initiatives. It was envisioned that establishing a "Broadband Co-ordinator" would create a sense of ownership and responsibility for implementing the actions within the strategy, as well as building up expertise and creating and maintaining relationships with the relevant stakeholders.

Dedicated staff time and resources will be required to implement the actions contained in this strategy and related Smart Cities initiatives. This includes co-ordinating and administering the formation and ongoing activities of a Broadband Working Group; ongoing communication with Regional departments; local area municipalities and other stakeholders; the development of supportive policies and practices; and the consolidation of information and data to support broadband initiatives.

Drawing on the resources of other departments, the Broadband Working Group, and expertise from the local area municipalities, the Broadband Co-ordinator will weave the various components together and advance the overall objectives of the Broadband Strategy. In order to meet these needs, provision will be made through the 2019 budget process for a temporary full-time position, which will be assigned to the appropriate department by the Chief Administrative Officer.

ACTION 6

ESTABLISH A BROADBAND WORKING GROUP (BWG)

Establishing a Broadband Working Group (BWG) will create an important resource for implementing the Broadband Strategy. The BWG should be comprised of local area municipal and Regional staff, to provide an opportunity for information sharing, problem solving, collaboration, and providing input and insight on the development of policies, practices, and initiatives that support broadband deployment and the implementation of this strategy. Recognizing that the Region and local area municipalities are undertaking broadband initiatives at varying scales with different priorities, the BWG would provide a venue for establishing and strengthening partnerships and undertaking broadband related projects where priorities and interests align. The BWG should consider opportunities that allow for broader participation by stakeholders, such as ISPs, the business community, health care, and post-secondary education, where appropriate.

It is anticipated that the BWG would address various topics and contribute towards the development of broadband supportive corporate policies where appropriate.

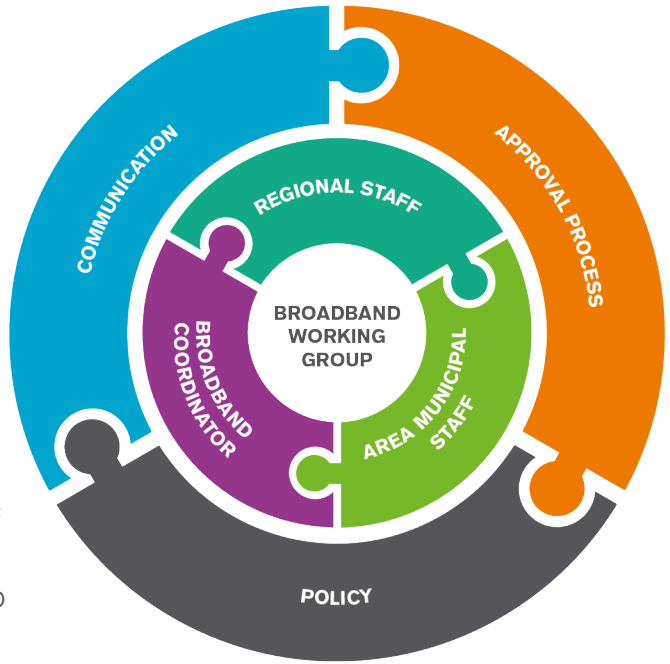


Figure 10: Conceptual organization of the Broadband Working Group

ACTION 7

CREATE AND MAINTAIN A BROADBAND INFORMATION DATABASE

Accurate and robust information is an important aspect of any decision-making process. Continuing to build and maintain a broadband information database has been identified as a valuable resource to inform future initiatives. To enable consistent monitoring of the Region's connectivity conditions – and to build knowledge that may be useful to the Region, area municipalities, ISPs, local businesses, and other stakeholders – the following actions will be undertaken:

- **A** Conduct a survey of the business community to further determine employment and business areas where service is lacking.
- **B** Conduct updated internet speed measurement testing to assess connectivity conditions across the region.
- **C** Compile mapping of Regional and local area municipal facility locations where broadband service improvements are, or will be, required.
- **D** Compile mapping of Regional and local area municipal assets where the co-location of broadband infrastructure would be available/encouraged.
- **E** Compile a list of ISPs within the region and their service boundaries (where available), to inform residents and business owners of the full range of providers in their area.
- **F** Compile and maintain a list of known programs and initiatives in support of broadband.

Where appropriate, the above noted information, as well as relevant contact information, the Region's Municipal Access Agreement template, and answers to frequently asked questions will be made available on the Region of Durham website, durham.ca.

ACTION 8

FACILITATE COMMUNICATION, COLLABORATION, AND CO-OPERATION

The Region, through the activities of the BWG and Broadband Co-ordinator, will take a leadership role in creating an environment of communication, co-operation and collaboration. Sharing information and communicating regularly is essential for conveying needs and developing effective and efficient solutions.

The following initiatives will be undertaken:

- **A** Holding regular meetings with ISPs to communicate growth areas, capital infrastructure planning, and service needs.
- **B** Increased communication on utility projects, allowing opportunities for the efficient placement of broadband conduit.
- **C** Maintaining ongoing communication with ISPs and businesses/economic development offices/chambers of commerce to understand broadband needs and service gaps.
- **D** Assisting with the co-ordination of cost sharing among property owners for the extension of broadband services to underserved areas; particularly for employment/business locations and rural area residents and businesses.
- **E** Include broadband as a regular topic for Regional and area municipal information technology manager meetings. Investigate the feasibility of aggregating internet service requirements of the Region and local area municipalities to negotiate better service contracts and prices.

ACTION 9

ADVOCATE AND EDUCATE ON THE IMPORTANCE OF BROADBAND INFRASTRUCTURE

Education and advocacy offers the opportunity to promote the importance and value of broadband infrastructure, ensure regional broadband needs are conveyed, and share information with key stakeholders. The following target groups will be engaged in the following manner:

A ENGAGE PROVINCIAL AND FEDERAL LEVELS OF GOVERNMENT

The federal and provincial ministers for innovation and economic development have recently agreed to the principles of a Canadian Broadband Strategy of Access, Collaboration, and Effective Investments. This Regional Broadband Strategy and actions generally align with the principles and directions from upper levels of government.

A communication strategy will be developed to advocate Regional needs to the provincial and federal levels of government and relevant associations (Federation of Canadian Municipalities and Association of Municipalities Ontario). Key messaging will be on the importance of broadband infrastructure to the success and prosperity of Durham Region residents and businesses. Also included will be the value of funding programs that support and spur infrastructure upgrades where known service gaps exist, and supporting research and investment in technologies that can provide cost-effective broadband solutions for rural areas. Upper levels of government should also consider making available their assets where co-location can and should occur.

In addition, the Region will advocate the importance of affordable broadband services to households of all income levels and encourage the creation of programs that provide service options to low-income households, such as the Connected for Success program offered by Rogers™, which provides a low-cost service option for those living in rent-subsidized, non-profit housing.

B CREATE A REGIONAL WEB PRESENCE

A broadband-specific web page will be developed to provide broadband information to the business community and general public. This includes developing a list of ISPs within the region and their service boundaries (where available); to inform residents and business owners of the full range of service providers in their area. In addition, a frequently asked questions document, related to the importance of broadband and general availability within the region, will be made available.

C ENGAGE PROPERTY OWNERS/MANAGERS ABOUT THE IMPORTANCE OF BROADBAND CONNECTIVITY

Material on the importance of broadband infrastructure for the marketability of properties to prospective clients will be created. Evidence will be complied of lost prospective tenants due to limited broadband connectivity, as well as success stories of broadband infrastructure investments that resulted in the attraction of new businesses. A separate strategy will be developed to communicate this information to property owners and property managers.

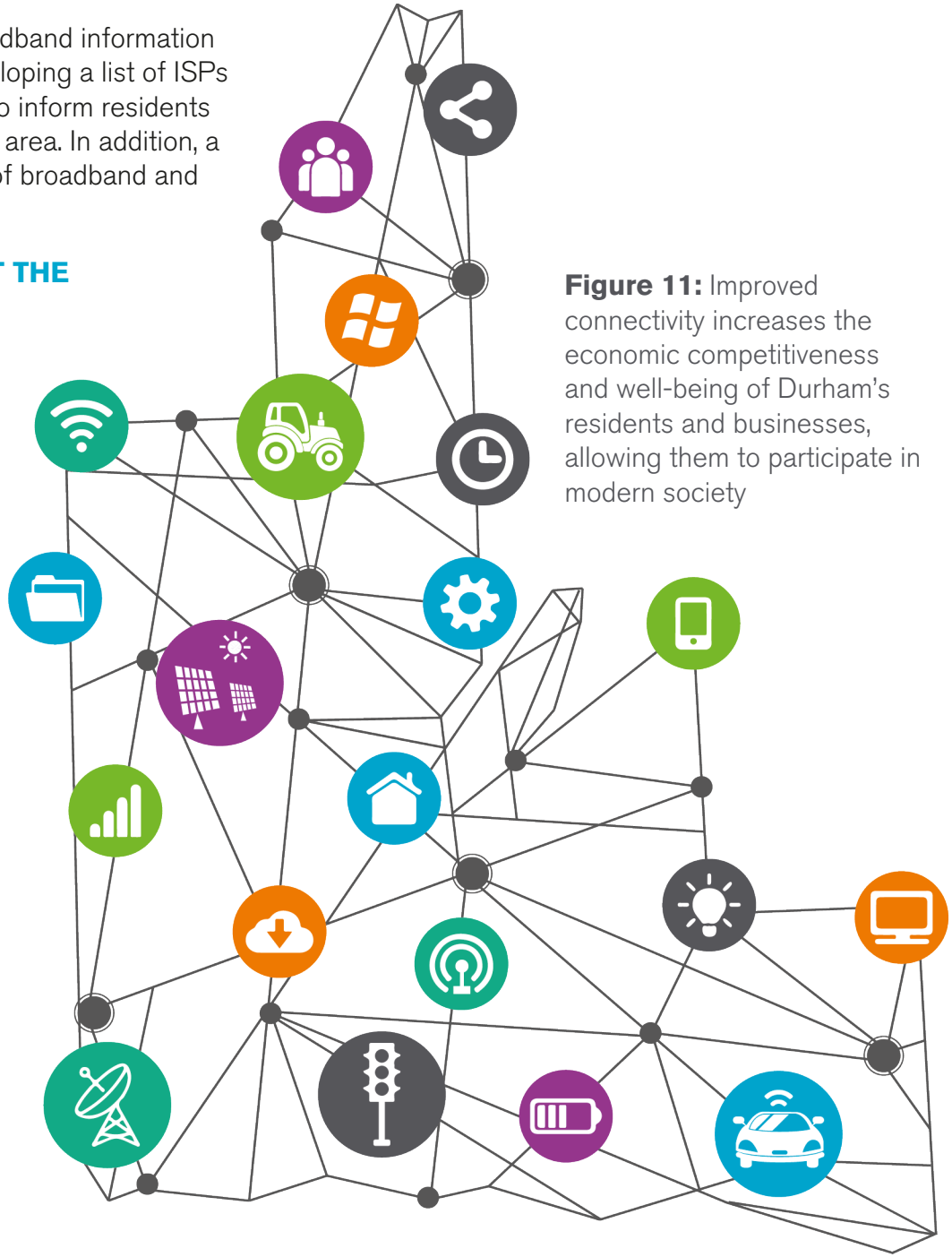


Figure 11: Improved connectivity increases the economic competitiveness and well-being of Durham's residents and businesses, allowing them to participate in modern society

ACTION 10

DEVELOP A DURHAM SMART CITIES FRAMEWORK

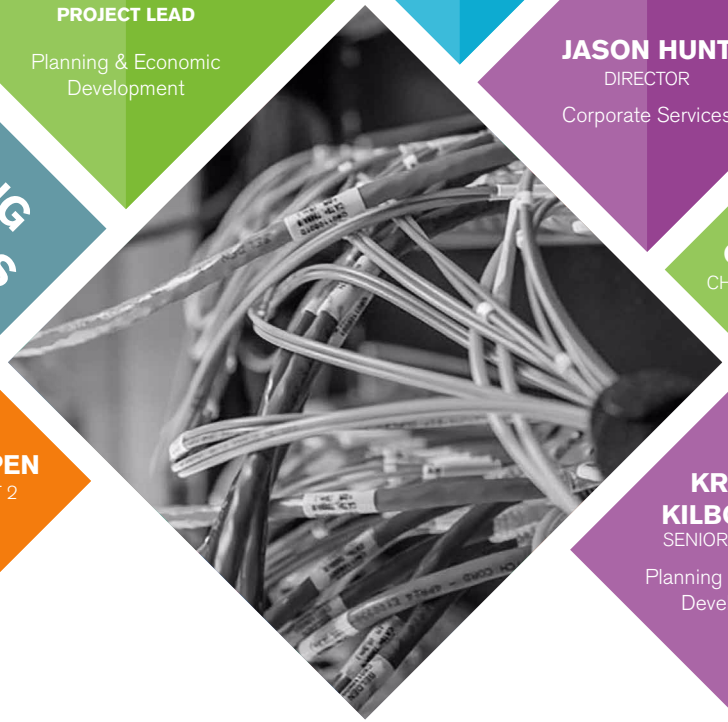
A Durham Smart Cities Framework would outline the objectives, approach and anticipated results of Durham enhancing its intelligent community status; enabling the Region to take advantage of funding and partnership opportunities as they arise. The framework would be used to explain how various smart elements fit together, identify potential partnerships and resources, and communicate Durham's Smart Cities vision. It would also provide a set of criteria to ensure that any potential projects align with Regional priorities under the strategic plan; and involve the public in decisions about where to focus our collective energy to develop as an intelligent community. Once the draft framework is complete, a council report will be prepared for consideration.

CONCLUSIONS AND

ACKNOWLEDGEMENTS

The Region of Durham recognizes the importance of adequate broadband infrastructure for the well-being and economic competitiveness of the region's residents, businesses, and institutions. Through the implementation of this strategy and its actions, the Region will position itself as a supporter and facilitator of increased connectivity. Staff will continue to report to council on the implementation of this strategy on an annual basis, or as major milestones are completed.

This work would not have been possible without the leadership of Regional Council, who have directed and supported the development of this strategy. The Region would like to provide a special thanks to all who participated in stakeholder consultation and contributed towards the creation of this document.



STAFF WORKING GROUP MEMBERS

BRAD ANDERSON
PRINCIPAL PLANNER
BROADBAND STRATEGY PROJECT LEAD
Planning & Economic Development

GARY MULLER
DIRECTOR OF PLANNING
Planning & Economic Development

JASON HUNT
DIRECTOR
Corporate Services

KEVIN RYAN
SENIOR SOLICITOR
Corporate Services

NANCY RUTHERFORD
MANAGER OF AGRICULTURE & RURAL AFFAIRS
Planning & Economic Development

SANDRA AUSTIN
DIRECTOR, CORPORATE POLICY & STRATEGIC INITIATIVES
CAO's Office

KALYAN (KC) CHAKRAVARTHY
CHIEF INFORMATION OFFICER
Corporate Services

DAVE DANKMEYER
PROJECT MANAGER, TRAFFIC MANAGEMENT & ITS
Works

STUART McALLISTER
PROJECT MANAGER, TRANSPORTATION INFRASTRUCTURE
Works

ANDREW KEPPEN
ECONOMIC ANALYST 2
Finance

KRISTY KILBOURNE
SENIOR PLANNER
Planning & Economic Development

CHRISTOPHER NORRIS
MANAGER, CUSTOMER EXPERIENCE
Durham Region Transit

ANEESAH LUQMAN
PROJECT PLANNER
Planning & Economic Development

GLOSSARY OF TERMS

Bandwidth: in computer networks, bandwidth is used to describe the rate of data that can be carried from one point to another in a given period of time.

Broadband: generally refers to 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.

Dark Fibre: refers to fibre optic infrastructure (cable) that has been installed but is not currently in use.

Download and upload speed: download speed is the rate at which data is transferred from the internet to the user's device. Upload speed is the rate at which data is transferred from the user's device to the internet. Download speeds are typically higher than upload speeds, as most users download more data than they upload. A common measurement of download and upload speeds is megabits per second (Mbps).

Fibre-optic: 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): a measurement of internet speed. One Gbps is equivalent to 1,000 Mbps or one billion bits per second (bits are the smallest unit of digital information).

Internet service provider (ISP): a company that provides users (individuals or businesses) with access (a connection) to the internet and related services.

Last mile: refers to the technology and process of connecting the end customers (home or business) to the first network interface point.

Lit Fibre: refers to active fibre optic cable with attached electronics that is capable of transmitting data.

Long Term Evolution (LTE): in telecommunications, Long-Term Evolution (LTE) is a standard for high-speed wireless communication for mobile devices and data terminals.

Megabits per second (Mbps): a common 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).

Wi-Fi: an abbreviation for wireless fidelity, meaning you can access or connect to a network using radio waves, without needing to use a wired connection.

APPENDICES

APPENDIX 1: Drivers and trends in broadband use
APPENDIX 2: Study process details
APPENDIX 3: Highlights: Durham's corporate broadband use and initiatives
APPENDIX 4: Regional fibre and adjacent Regional facilities
APPENDIX 5: Areas Eligible Under the Connect To Innovate Program (2017)
APPENDIX 6: Business Locations within Durham Region (2017)
APPENDIX 7: Lot Densities across Durham Region

DRIVERS OF BROADBAND USE

Broadband needs are increasing across all sectors, with three major trends driving demand.

VIDEO

Across all sectors, video is the largest component of bandwidth use. Video use is commonly associated with communications and entertainment. However, it is also used for educational and instructional services, health-care services, conferencing, training and security/surveillance. Streaming and/or video downloads consume a particularly large quantity of bandwidth. For the residential market, online video accounts for 83 pe rcent[1] of bandwidth use within an average month.

Figure 12: Durham Region uses broadband to live stream council meetings

[1]Canadian Radio-television and Telecommunications Commission (2017). Annual Monitoring Report. Retrieved from: https://crtc.gc.ca/eng/publications/reports/policymonitoring/2017/cmr.htm

THE INTERNET OF THINGS (IoT) AND SMART CITIES

The Internet of Things (IoT) is a general term used to describe a broad range of devices that are manufactured with embedded electronics, software and sensors. Once connected to a network, IoT applications can continuously monitor and automate equipment and devices. IoT technology is becoming widespread and popular and is now commonly found in homes (thermostats andlighting), used as wearables (smart watches and health devices), for government (lighting, water/waste water monitoring, and parking lot use), and business use.

Figure 13: Automated dairy equipment

Smart Cities (or, intelligent cities, are they increasingly known) use this broadband-enabled technology to collect and analyze data, and to connect with citizens and run government operations more efficiently. At the regional level, sensors may be used to monitor traffic and transportation systems, water and waste management, law enforcement applications, information systems and community services. Like many municipalities, Durham is turning its attention to how technology may be used to manage challenges such as urban population growth, aging populations, environmental sustainability, and pressures on public finances.

CLOUD COMPUTING

Cloud computing is the practice of relocating computer functions from personal computers to centralized servers. This method of computing allows for the storage and accessing of data and programs over the internet, instead of a personal computer hard drive.

Cloud computing is becoming commonplace for both business and consumer uses. Microsoft Office 365 is an example of a cloud computing application. Office 365 consists of Office Online, Exchange Online, SharePoint Online, and OneDrive for Business. These online versions of Microsoft Office software enable access to web-based applications and Regional data via the internet from any device, anywhere, at any time.

Other examples of cloud computing used by the Region include PointClickCare, a resident software used by the Region's long-term care facilities, as well as Remedy Force, a troubleshooting ticketing system used by Durham's Corporate Services Department, Information Technology Division.

Figure 14: Regional server rooms. Cloud computing allows for data and applications to be centrally located and accessed by multiple devices.

MUNICIPAL GOVERNMENT TRENDS DRIVING BROADBAND USE

Regional and area municipal governments are evolving their business models to continually adopt information technology into their services and operations. There is an increasing reliance on broadband connectivity to improve efficiencies and enhance business operations such as e-government services to residents and businesses.

Listed below are examples of applications and services used and offered by municipal governments that are increasing the need for broadband connectivity:

- Transportation and traffic management including cameras, signals and connectivity for real time departure information at transit stops and stations.
- Applications that use large data sets, such as Geographic Information Systems (GIS).
- Smart City technology and applications.
- Web-based applications and cloud services.
- Field operations and access to data in the field.
- Security and surveillance.
- Online training.
- Video-conferencing and streaming.
- Communication: websites, social media presence, and citizen interaction (streaming of meetings, remote participation, internet voting).
- Hosting and accessing open data.
- Electronic submission of documents, plans and reports.
- Self-service tools (such as online government services).
- Online recruiting.
- Electronic tendering, invoicing and payments.
- Technology in long-term care homes (such as bedside tablets).
- Public Wi-Fi at municipal sites.

TRENDS AT THE REGION OF DURHAM

Regional broadband demands are rapidly increasing, with internet usage at Regional facilities increasing at over 40 per cent per year for at least the past three years.

Demand for high-speed internet connections at Regional facilities will continue to accelerate with higher resolution broadcasting and increased demand for shared occupancy on Regional networks. Currently, 60 per cent of Regional facilities have access to fibre-optic connections. However, this number will continue to increase over the coming years.

TRENDS IN HEALTH CARE

Like other services, the health-care system is moving online at an increasing pace, changing the way people access health-care services. The health-care system is implementing internet, mobile, and video technologies to improve patient outcomes and support patients at home and in their own communities. Lakeridge Health, the health and hospital network servicing Durham Region, is undertaking several initiatives that will place a greater emphasis and demand for increased broadband connectivity, including:

- A new shared Health Information System (HIS) across all hospitals in the Central East Local Health Integration Network (LHIN). The HIS will facilitate the sharing of health information (including data, high resolution images and video), which requires dependable high bandwidth broadband connectivity, with low latency and built in redundancy.
- Efforts to increase collaboration with primary care to provide eReferral and eConsultant services.
- Investigating virtual care, including eVisits and remote care management in patient homes. The implementation of virtual care requires affordable, high-speed broadband access to all households.
- An increased focus on clinical decision support, precision medicine, predictive analytics, and population health, support by artificial intelligence and machine learning. The computing power needed to realize these ambitions make cloud computing necessary, which, in turn, requires greater broadband connectivity.

PHASE ONE

ASSESSING CURRENT CONDITIONS AND NEEDS

Phase One focused on understanding current conditions within the region and identifying the needs of businesses, residents, government agencies and institutions. In March 2017, the Departmental Steering Committee was formed to oversee the project. In August 2017, following a competitive bid process, Actionable Intelligence Incorporated was retained to assist in the development of the strategy.

From September to December 2017, Actionable Intelligence conducted background research on broadband trends and undertook a gap analysis of internet service availability in the region. In total the availability of internet service was assessed at 600 properties.

Research from other sources was also considered, including information from Dr. Reza Rajabiun, which summarized connectivity in Durham, based on internet speed measurements. While service in the urban areas is as good or better as other areas in the Greater Toronto Area (GTA), these findings confirmed that connectivity in rural Durham is among the lowest levels in the GTA.

Consultation sessions were held with internal and external stakeholders, including Regional staff; representatives from the local area municipalities; libraries; emergency services; post-secondary institutions; public utility corporations; and the business community. Over 100 individuals participated and a similar number of comment sheets were completed and submitted.

In February 2018, Actionable Intelligence completed its Phase One findings, outlining the results and potential roles the Region could undertake. The Phase One Summary Report was received for information by the Durham Region Committee of the Whole, with a presentation provided at the May 2, 2018 meeting.

PHASE TWO

IDENTIFYING ROLES AND ACTIONS FOR DURHAM REGION

Phase Two focused on evaluating and scoping the appropriate roles and actions for the Region to undertake. Again, interviews were conducted with area municipal staff, based on the proposed connectivity targets and soliciting feedback on the most appropriate role for the Region.

Opinions from municipal staff were diverse. Some felt the Region's Broadband Strategy should be ambitious and visionary, and not necessarily grounded in "what can be done." Others felt it should be realistic and implementable. Similarly, there were varied options on the proposed connectivity targets, with some of the opinion that the targets were too low, and others of the opinion that they were too high and unachievable in the rural areas. Despite these differing opinions, there was unanimous agreement that the Region had a role to play in supporting broadband. There was also generally a positive reception to the work completed to date.

In June 2018, the results of the area municipal interviews were presented to the Steering Committee. In addition, the Steering Committee evaluated the various roles the Region could undertake.

In September 2018, Actionable Intelligence Incorporated completed its Phase Two Recommendation Report. The report – which considered the information collected in Phase One and the results of consultation and direction received during Phase Two – recommends that the Region pursue a role that supports and facilitates broadband network expansion, with a series of related action. This Broadband Strategy incorporates the advice of Actionable Intelligence Incorporated.

In November 2018, a draft Regional Broadband Strategy was circulated to stakeholders for review and comment. Stakeholder comments were incorporated into the final version of the strategy.

HIGHLIGHTS:

DURHAM'S CORPORATE BROADBAND USE AND INITIATIVES

As one of the largest employers, landowners, and service providers in the region, The Regional Municipality of Durham is a major consumer of broadband services. Currently, regional assets located throughout the region are connected using a combination of ISP contracts, a regionally owned fibre network (for traffic management purposes), and wireless/radio communications.

Although the Region's broad departmental and facility needs are currently being met, it is anticipated that evolving public and user expectations for greater government e-services, changing technology, and other potential service delivery enhancements will place greater demands on improved connectivity in the future.

REGIONAL INFORMATION TECHNOLOGY STRATEGY

The corporate Information Technology (CS-IT) group is currently working on multi-year projects to build-out fibre and provide Wi-Fi to Regional offices, and expand the use of cellular (3G/LTE) for mobility and isolated sites.

Once fibre is built-out to Regional offices, higher speeds, faster response times, and better availability are possible. Although a minimum speed of 10 Mbps was established as the wide area network strategy in 2015, the speed of each site can be adjusted through an ISP to meet business requirements as they evolve and deliver additional services with minimum impact.

With Wi-Fi being installed at Regional offices, wireless devices (laptops, smartphones, and tablets) can be introduced. No longer constrained to using computers in certain physical locations, employees can use mobile devices allowing for increased efficiency, collaboration, and/or access to information.

As the importance and usage of the internet is steadily increasing at the Region, the CS-IT group is also working on a multi-year project to establish a backup internet connection for all Regional offices through the wide area network. For Regional Headquarters, a failover connection was implemented in 2015.

DURHAM REGION TRANSIT INITIATIVES

Several initiatives are currently underway and planned by Durham Region Transit (DRT) that will create an increased reliance on broadband connectivity.

CURRENTLY UNDERWAY

- Installation of on-board camera systems on all DRT buses that record and download video content upon return to the depot.
- Equipping all DRT buses with Intelligent Transportation System technologies including real time vehicle locator capabilities. This technology will improve predictive forecasts and performance monitoring.
- Testing of transit signal priority technologies to enable DRT buses to communicate with and prioritize traffic signal changes, allowing for improved transit reliability.
- In 2017, DRT launched the first version of On Demand service in the townships of Brock, Scugog, and Uxbridge. DRT continues to monitor and assess opportunities for introducing additional On Demand service areas. Future versions of this service delivery model will rely on the use of online and smartphone apps for contacting and booking services.
- The Greater Toronto and Hamilton Area (GTHA) regional fare card (Presto) is the preferred payment method on DRT and its partner agencies. Loading of fare products onto cards and future mobile payment options requires a robust broadband network to support the distribution and payment throughout the region.

FUTURE INITIATIVES

- Solar powered real-time predictive bus departure at transit stops.
- Information screens indicating real-time predicted arrivals, local news, weather, location-based content and exclusive promotions.

- Wi-Fi for customers.
- Pilots to test the use of autonomous/electric shuttles to support first mile and last mile connections to regional and high frequency transit services. As automated technology testing and adoption advances, including expanded vehicle-to-vehicle and vehicle-to-infrastructure connectivity, additional capacity will be needed.

SMART CITIES INITIATIVES

Supporting the growth of a smart, inclusive and resilient community requires equitable access to digital infrastructure, as well as public input on where to deploy smart solutions. In September 2018, the Region hosted a Smart Cities Forum to connect with the community about how the Region can use technology and innovative solutions to address economic, social and environmental challenges. Key questions that continue to be discussed include:

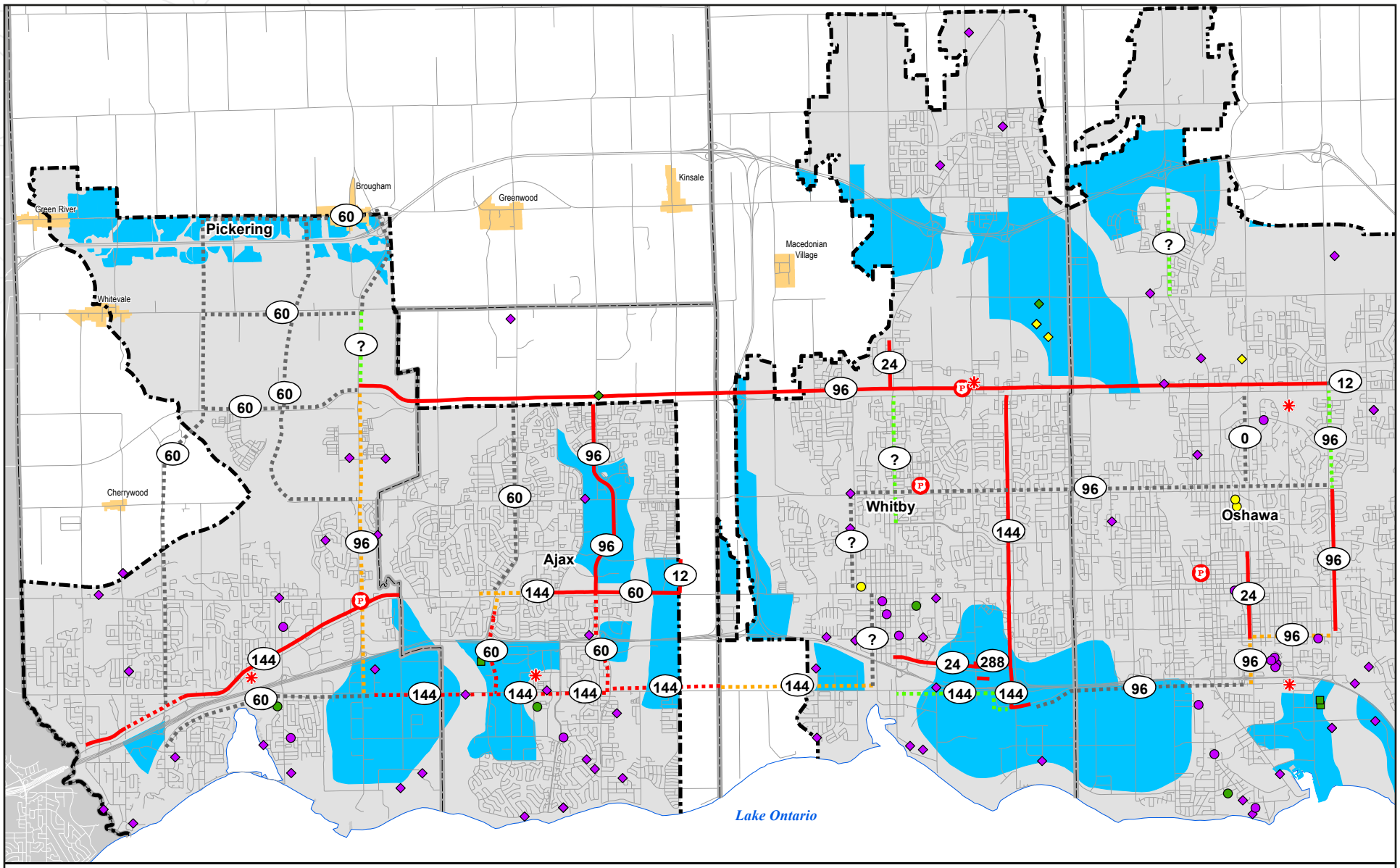
- What can we do to ensure Durham Region is a "smart" community?
- How can technology solutions create economic opportunities, improve sustainability and enhance the quality of life in Durham Region?
- How can we enhance our collaboration with traditional and non-traditional partners?
- How can we improve information sharing to empower residents?

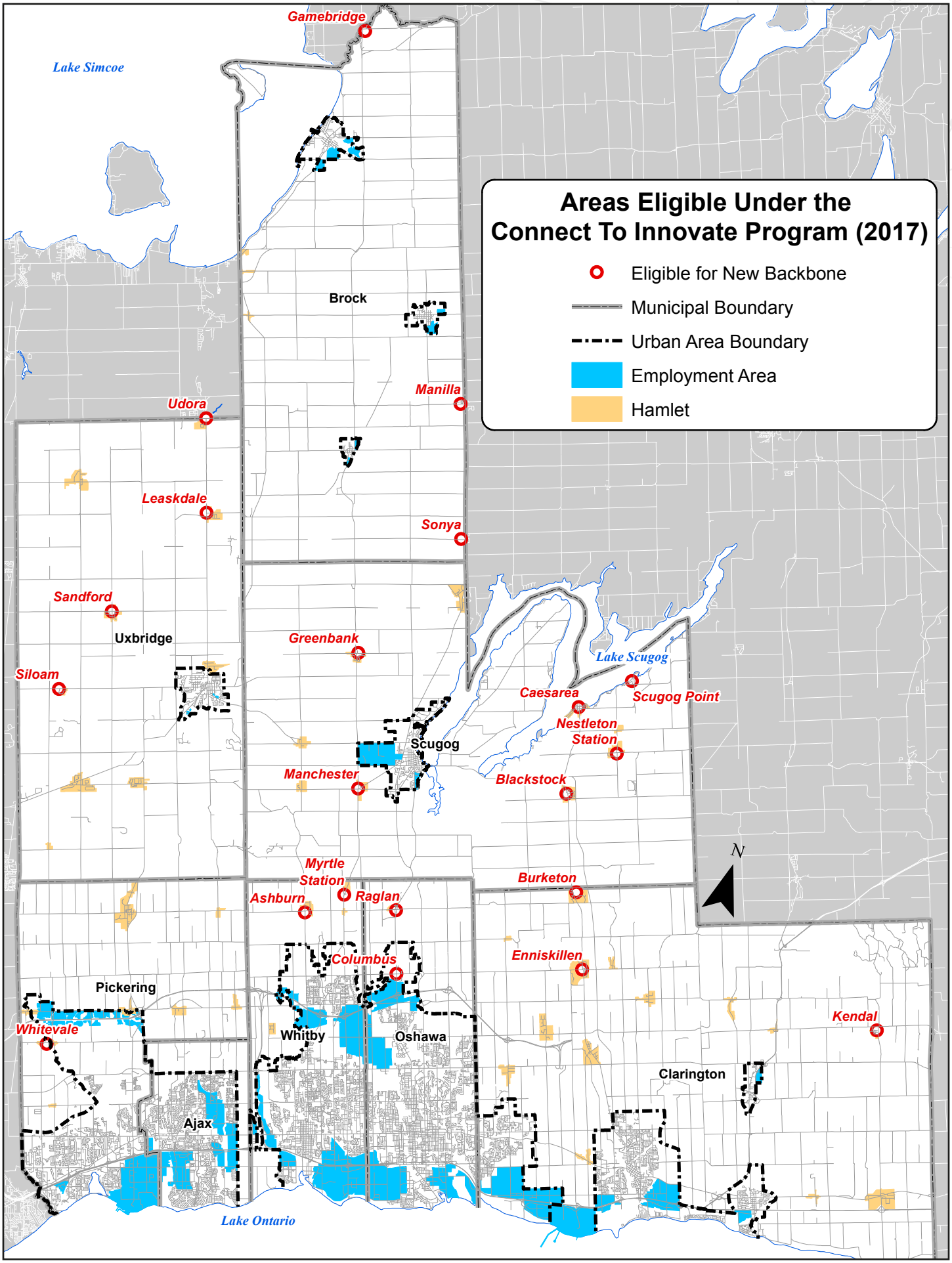
Next steps on the Region's smart cities journey align well with this broadband strategy, including the development of a Durham Smart Cities Framework to provide structure and direction to Regional projects. Such a framework would clarify the objectives, approach, and anticipated results of adopting the smart cities approach. A framework would help refine the purpose and direction of becoming an intelligent city, as opposed to recommending specific technology solutions.

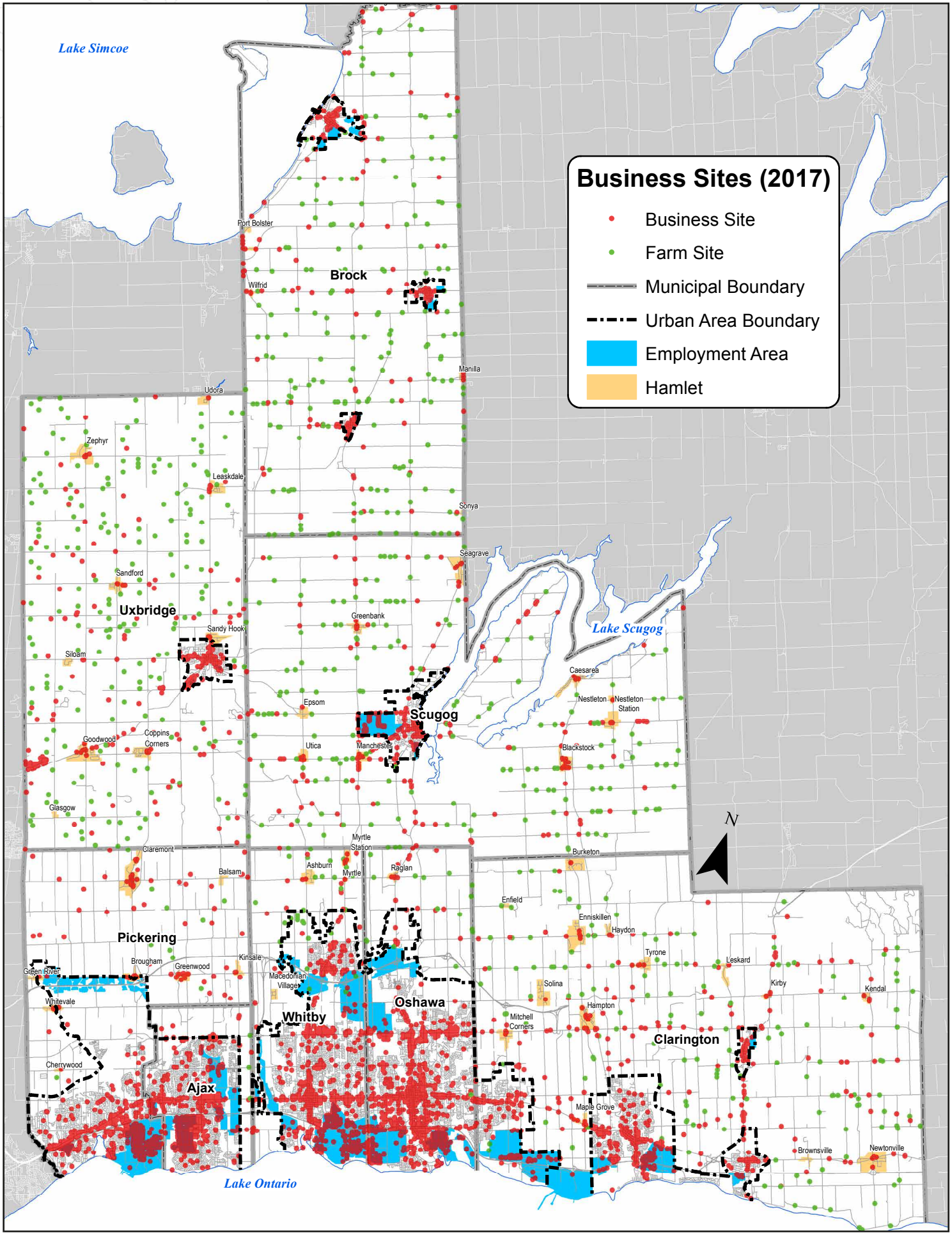
Initial projects undertaken within this framework could include:

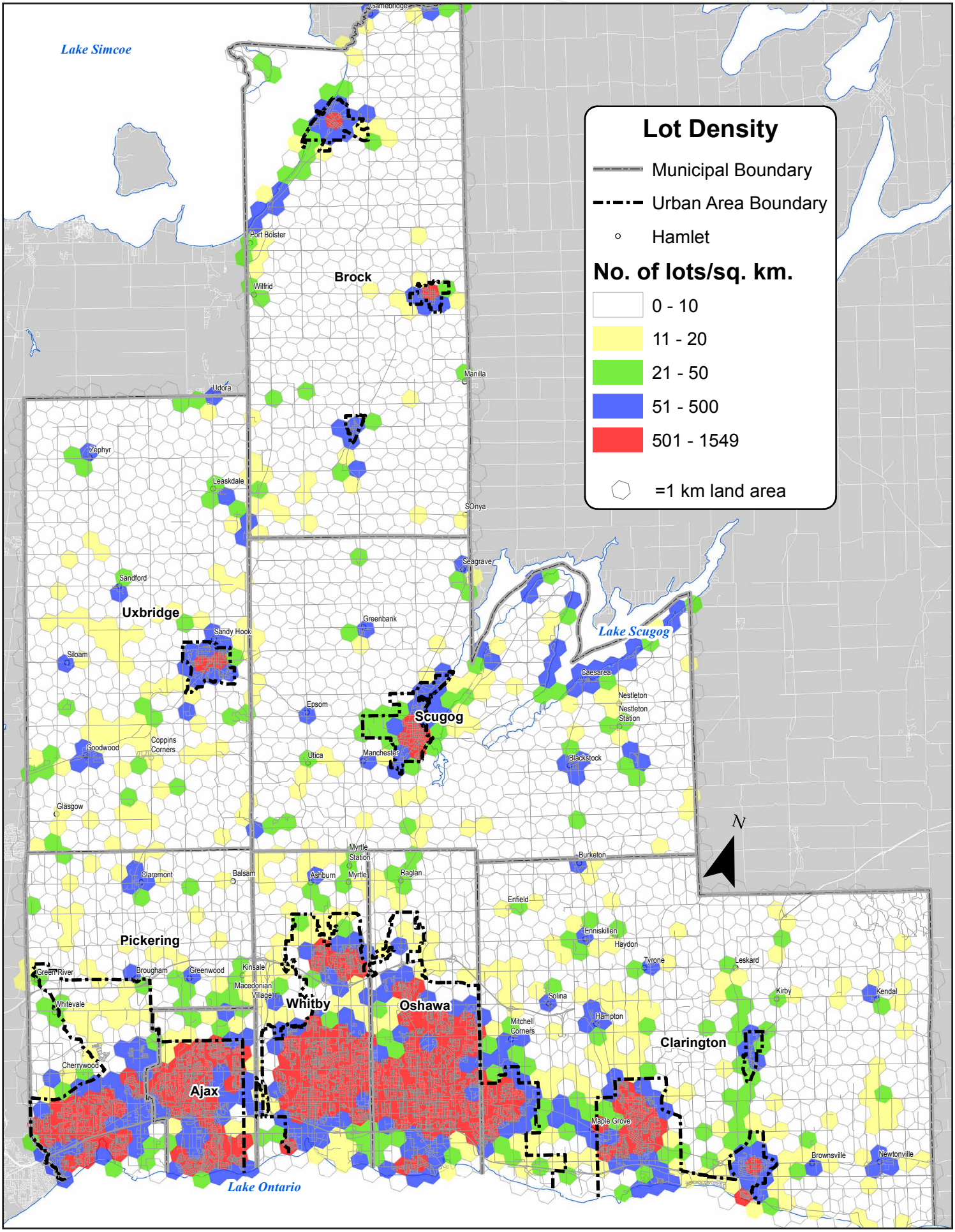
- Holding community consultations focused on specific priority sectors including small business, energy, transportation, and public health.
- Proceeding with the development of short-term pilot projects and partnerships, including autonomous vehicle pilots through Durham Region Transit, partnerships with the Durham College AI Hub, and opportunities to undertake accelerated research projects.
- Applying to the next wave of the federal Smart Cities Challenge, anticipated in spring 2019.

The strongest smart city models focus on people. A framework would act as a guide to ensure that potential projects fit with the Region's strategic priorities and reflect public input.


Pickering
Ajax
Whitby
Oshawa
Brougham
Greenwood
Kinsale
Macedonian Village
Green River
Whitevale
Cherrywood
Lake Ontario
Planned Regional Fibre Deployment and Adjacent Regional Facilities
Number of Strands Not Yet Determined
Number of Strands
Existing
2018
2019
2020
Beyond 2020
Administration
Police Station
Long-Term Care Home
Transit
Waste Management
EMS Station
Child Care
Social Housing
Depot
Water/Sewer Facility
Municipal Boundary
Urban Area Boundary
Employment Area
Hamlet
N


Areas Eligible Under the Connect To Innovate Program (2017)
Eligible for New Backbone
Municipal Boundary
Urban Area Boundary
Employment Area
Hamlet
Gamebridge
Lake Simcoe
Brock
Manilla
Udora
Leaskdale
Sonya
Sandford
Uxbridge
Greenbank
Lake Scugog
Siloam
Caesarea
Scugog Point
Nestleton Station
Scugog
Manchester
Blackstock
N
Myrtle Station
Burketon
Ashburn
Raglan
Columbus
Enniskillen
Pickering
Kendal
Whitevale
Whitby
Oshawa
Clarington
Ajax
Lake Ontario


Business Sites (2017)
Business Site
Farm Site
Municipal Boundary
Urban Area Boundary
Employment Area
Hamlet
Lake Simcoe
Lake Scugog
Lake Ontario
Port Bolster
Wilfrid
Brock
Manilla
Udora
Zephyr
Leaskdale
Sonya
Seagrave
Sandford
Uxbridge
Greenbank
Sandy Hook
Siloam
Epsom
Scugog
Utica
Manchester
Goodwood
Coppins Corners
Glasgow
Caesarea
Nestleton
Nestleton Station
Blackstock
Burketon
Claremont
Balsam
Myrtle Station
Ashburn
Myrtle
Raglan
Pickering
Brougham
Greenwood
Green River
Whitevale
Cherrywood
Kinsale
Macedonian Village
Whitby
Oshawa
Ajax
Enfield
Enniskillen
Haydon
Tyrone
Leskard
Kirby
Kendal
Solina
Hampton
Mitchell Corners
Clarington
Maple Grove
Brownsville
Newtonville
N


Lake Simcoe
Lake Scugog
Lake Ontario
Lot Density
Municipal Boundary
Urban Area Boundary
Hamlet
No. of lots/sq. km.
0 - 10
11 - 20
21 - 50
51 - 500
501 - 1549
=1 km land area
N
Brock
Uxbridge
Scugog
Pickering
Whitby
Oshawa
Ajax
Clarington
Cambridge
Port Bolster
Wilfrid
Manilla
Udora
Zephyr
Leaskdale
SOnya
Seagrave
Sandford
Sandy Hook
Siloam
Greenbank
Caesarea
Nestleton
Nestleton Station
Epsom
Manchester
Utica
Blackstock
Goodwood
Coppins Corners
Glasgow
Myrtle Station
Burketon
Claremont
Balsam
Ashburn
Myrtle
Raglan
Enfield
Enniskillen
Haydon
Tyrone
Leskard
Green River
Brougham
Greenwood
Kinsale
Macedonian Village
Whitevale
Solina
Kirby
Kendal
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Mitchell Corners
Cherrywood
Maple Grove
Brownsville
Newtonville