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Digital Infrastructure

Digital Hamilton

Digital Infrastructure Working Group

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Contents

1. Executive Summary

1.1 Context

This Digital Infrastructure Report was created by the Digital Infrastructure Working Group of the Hamilton Chamber of Commerce's Digital Hamilton initiative. It was intended to provide information and perspective to the Mayor's Intelligent Community Task Force on the current state of digital infrastructure deployment/broadband availability.

Digital Infrastructure was specifically defined to be the physical hardware, interconnection medium, and preparation used to support transmission of data. Economic Development's Strategic Initiatives called for Hamilton's digital infrastructure to deliver Internet speeds of 250 Mbps to rural Hamilton, 1 Gbps to urban Hamilton and 10 Gbps to business parks by 2020.

This report was intended to offer insight into the challenges that may be preventing further investment in Hamilton and make recommendations that would further foster more investment.

1.2 Findings

Hamilton enjoys many options for broadband service and 80% of Postal Codes have at least one service with access speeds in the range of 1.6- 60.6 Mbps. The efforts of the Working Group and a MACData Institute study concluded that ongoing investment is necessary to meet the City's economic development goals. Today, that investment is challenged by:

- Current municipal regulation and a slow permit approval process;
- Cost risks presented by the Horizon/Alectra merger;
- Physical environment saturation preventing future deployments;
- Technological construction innovations that are not yet approved by the City;
- Lack of visibility into City Open Data initiatives and potential impacts;
- Lack of visibility into City Planning and Economic Development initiatives.

1.3 Recommendations

The Working Group recommends that the City:

- Simplify the permit process and Municipal Access Agreement;
- Appoint a telecommunications ambassador and an in-field support team;
- Establish semi-annual Planning and Economic Development updates with service providers;
- Promote Common Infrastructure opportunities in projects like the LRT;
- Expedite the approval of new construction technologies;

The recommendations would better position the City of Hamilton to encourage the ongoing investment that is necessary ensure broad competitive broadband options for all citizens and to reach closer to the Economic Development Department's 2020 stretch goals.

2. Scope

2.1 Overview and Purpose

The City of Hamilton is in a transformation that is moving at a rapid pace towards the future, impacting public and private sector and citizens. Citizens, Businesses and Governments are adapting at a pace seen by other cities with high growth and constantly changing demographics. Information and Communication Technologies (ICT) and other forms of "Digitization" are emerging as key core infrastructure required to support this transformation. As a follow up to Hamilton's application to the Intelligent Communities Forum (ICF) 2016 Intelligent Community of the Year, a motion was passed at council to create a Mayor's Task Force to develop an action plan for improving Hamilton's ranking by the ICF.

2.1.1 Digital Hamilton

The Hamilton Chamber of Commerce initiated The Digital Hamilton Task Force to supplement and support the work plan of the Mayor's ICF task force, with several members and the Chamber having representation on both task forces. Taking advantage of the community impetus created by the Mayor's ICF task force, the Hamilton Chamber of Commerce has identified the immediate need to establish the Digital Hamilton Taskforce to focus the conversation as well as resources to make Hamilton a leading Digital City. This needs to be done to deliver a vision and roadmap for a digital community that is agile and innovative, optimizing the value of information assets and digital technologies as a foundation for the 21st century. The task force will focus not just on the metrics of the ICF application, but also towards providing thought leadership on several additional focus areas. The Digital Hamilton Task Force will:

- Articulate the vision for a truly digital community addressing the direction for Government, Business, Not For Profit, NGO, Employers, Employees and Citizens, where everyone has the opportunity to benefit from digitization.
- Examine the characteristics of high performing digital communities and state a set of objectives for Hamilton.
- Identify priority actions to accelerate the transformation of Hamilton and embed digital thinking to drive the change, and to sustain it.
- Identify the critical milestones in current work programs amongst public and private sector organizations and any additional actions required to drive the transformation.
- Consider community and stakeholder perspectives.
- Identify methods to drive cultural change within organizations so that they are aware that 'born digital, stay digital' is preferred as the default, and that Hamilton is confident in adopting digital ways of working (including leveraging big data, open data and analytics).
- Determine methods for promoting mass adoption of digital channels by government and non-government agencies, taking into account sectors of the community that are not yet digitally-engaged.
- Define the metrics required to measure progress and demonstrate success.

2.1.2 Digital Infrastructure Working Group

The first working group struck under the Digital Hamilton Task Force is the Digital Infrastructure Working Group (hereafter the Working Group) comprised of local Hamilton service providers. This Working Group will undertake to 1) review and assess the current state of digital infrastructure, 2) identify gaps and opportunities to create digital equity amongst all Hamiltonians, and 3) develop a public and private infrastructure plan to enable the goals, objectives, and recommendations. The output of the Working Group is intended to inform Mayor's Intelligent Community Task Force on how to enable and promote local service provider investments.

2.2 Work Plan

2.2.1 Working Group

The Working Group was established by invite to any service provider offering or supporting service provider Internet or telecommunications services in the Hamilton market, and the Hamilton Chamber of Commerce. The final work group was comprised of:

- Bell Canada
- Clearcable Networks
- Cogeco Connexion
- Detour Wireless
- Execulink Telecom
- Hamilton Chamber of Commerce
- HCE Telecom
- NetAccess Systems
- Rogers Communications
- TekSavvy

The Working Group agreed to meeting monthly in-person and via teleconference on the last Thursday of each month from December 2016 through December 2017.

2.2.2 Independent Survey

The Working Group identified that it would be useful for an independent third-party study that would ensure data confidentiality to report aggregate results of overall digital infrastructure serviceability in the City of Hamilton (urban and rural areas). The independent survey was created to collect service area and capacity data from each service provider at the **postal code level**. The data would include location and offered range of download and upload speeds as well as the type of physical (copper, fiber, or wireless) in that postal code.

To facilitate a professional independent study and leverage the research capabilities of McMaster University, the McMaster Industry Liaison Office was engaged to contract with the University. The City and service providers jointly entered an agreement with the MACData Institute for a Study under the direction of Dr. Elkafi Hassini.

2.2.3 Digital Infrastructure Report

The Working Group established a plan to create a Digital Infrastructure Report as input to the Mayor's Intelligent Task Force. The purpose of the Report was to provide perspective on the current state of broadband availability in the City of Hamilton, offer insight into challenges that may be preventing further investment in Hamilton, and make recommendations that would further foster more investment in support of Economic Development's Strategic Initiatives for broadband availability as defined in the Economic Development Action Plan, 2016-2020.

2.3 Defining Digital Infrastructure

The Working Group determined that digital infrastructure must be defined.

2.3.1 Definition

For the purposes of this Working Group, Digital Infrastructure is specifically defined to be the physical hardware, interconnection medium (wireless, wired, or fibre), and preparation (conduit, duct) used to support transmission of data regardless of link layer technology.

2.3.2 Economic Development Stretch Goal

The Working Group acknowledges and commends the Economic Development Department's stretch goal of "Enhance Hamilton's image as a Digital City by enabling access to broadband Internet speeds of 250 mb/second to all rural Hamilton, 1 gig/sec to all urban Hamilton and 10 gig/sec to all of our business parks and major commercial areas"[1] by 2020.

[1] City of Hamilton, *Economic Development Action Plan*, 2016-2020

3. Findings: Current Status

3.1 Independent Study Results

The independent study was completed the MACData Institute of McMaster University under the direction of Dr. Elkafi Hassini. It was delivered to the Working Group by McMaster on October 30, 2017. The results pertain specifically to the defined and approved Terms of Reference for the study. The study contains proprietary information pertaining to the business of the participating service providers and thus will remain commercially confidential as the release of such information could have irreparable competitive impact. A summary of findings is provided in this section.

3.1.1 Approach

The study looked at 13971 unique six-digit postal code zones across Hamilton and evaluated the binary presence of at least one broadband service delivered at given speeds by at least one of copper (all forms of copper wired technology including cable and DSL), fibre, or fixed wireless across all participating service providers from the Working Group. Based on the Working Group's membership, there were eight eligible service from whom data was requested. All service providers entered nondisclosure agreements McMaster University. Six of the eight service providers submitted broadband access data. The data collected included Postal Code binary presence of at least one offered speed for Copper Upload, Copper Download, Fiber Optic Upload, Fiber Optic Download, Wireless Upload, and Wireless Download. The study makes clear that

> *"It is important to note that the data collected was based on the local delivery units in the Hamilton area. Therefore, the internet speeds in each local delivery unit are not representative of individual household speeds."*[2]

3.1.2 General Findings

The study shows a lack of services in some postal costs in both the urban and rural areas, but wide close availability of broadband services in many areas. Overall, "copper is the most common used mode (servicing 11304 zones), followed by wireless (10784), and fiber optic (1817)."[3] Moreover, "Of the serviced areas there are 5419 zones, or 38.78%, that are serviced by one technology."[4]

A total of 1094 were serviced by all technologies of which 1029, only 7.3%, had a reported maximum download of 1000 Mbps and 65, or less than 0.5%, had a maximum download speed of 100 Mbps. The study pointed out that 80% of the zones only had access to maximum speeds in the range of 1.6- 60.6 Mbps.

[2] Hassini and Sheth, *City of Hamilton Broadband Infrastructure*, MACData Institute, McMaster University, October 2017
[3] Ibid
[4] Ibid

The resulting finds make clear that additional investment is necessary to meet the City's economic development strategy objectives.

> *"Based on maximum download speeds, while the Hamilton area enjoys wide options of coverage, there are still gaps where options are limited. This can present some hurdles to business development in cases where limited speeds are available. It can also lead to access issues for residents where those who use internet for work may have limitations due to low speeds and those of limited income may have a barrier to access the internet when it is only available at high speeds with expensive rates. It is therefore recommended that the task force further looks at these gaps and identify possible remedies to fill them."*[5]

The study also points out the deficiencies of working strictly at the postal code level.

> *"The study data provided pertains specifically to the availability of given access speeds within each postal code in the city. It does not assure that such service will be available at every address in that postal code, nor does it indicate whether additional construction and or charges may be necessary to service a specific address in the postal code."*[6]

It further recommends potential future studies to consider more detailed data that could provide more accurate results. "We recommend a follow up study that would also look at the actual download and upload speeds as well as more granular data on coverage."[7]

3.1.3 Context Regarding Postal Code Level Data

The Working Group, consistent with the McMaster study, identified that the use of postal code level data would produce coverage maps that would communicate an incorrect perception that broadband services are widely and broadly available across an entire postal at little or no build cost.

This is particularly problematic in rural postal codes which tend to be large and have low density. In such postal codes the binary presence of a single service within the postal code does not mean that such services are affordably and broadly accessible in the entire geography of the postal code.

For this reason, mapping the binary presences of a single service within a postal code as an indicator of broadband availability necessary needs to be read in the context of presenting an opportunity for service expansion rather than service immediate and low-cost availability.

[5] Ibid
[6] Ibid
[7] Ibid

3.1.4 Absence of LTE, Wi-Fi, and Satellite

The Terms of Reference for the study accounted for the inclusion of wired (all forms of copper technology), fibre, and fixed-wireless services available from the participating service providers. The study did not contemplate the inclusion of the LTE/Mobile services which boast 100% coverage from several carriers, Wi-Fi for which Hamilton has more than 400 free and open Wi-Fi hotspots, and satellite services that may be available from national or international service providers.

3.1.5 Outcome

The results of the McMaster study clearly indicate that ongoing investment in digital infrastructure is necessary to meet the City's economic development strategy goals.

While the study is very successful in identifying some specific areas that are lacking the presences of fibre, including postal codes within the urban center of Hamilton, it fails to accurately identify the all the rural areas that require additional investment because of the binary nature of the data requested in the Terms of Service. Moreover, the including the availability of LTE, Wi-Fi, and satellite is likely to expand broadband service availability in some but not all the areas of need.

The results therefore should be considered specifically within the context of the Terms of Reference and not be construed as broad service availability in every postal where services were identified.

3.2 Challenges

In the current environment, Working Group members identified that there are several challenges with investing and deploying digital infrastructure in Hamilton.

3.2.1 Municipal Regulation/Legislation

The permitting process for building utility infrastructure including fibre is among the slowest in the province. This protracted period causes delays to build new fibre which in turn drives up the cost to do business in Hamilton. Ultimately it can discourage new investment from incumbent providers and new entrants who will choose to invest where processes are more timely.

3.2.2 Horizon Utility Merger to Alectra Utilities

The Working Group identified a risk that the new utility may apply more standardized regulations for implementing digital infrastructure across communities. The individual providers need to proactively address this risk with the new utility, but it may serve as a deterrent to future investment is the regulations are more cumbersome that other regions.

3.2.3 Physical Environment Saturation

In some districts and corridors within Hamilton, real estate is sufficiently full as to make it impossible to add new conduits. Some roads are saturated due to the high infrastructure density builds in the past (above average number of independent operators & value as a consumer market). Several of the independent operators were subsequently consolidated. There are situations where singular suppliers might have ownership of a majority of easement within a certain road. Lack of space will deter the entry of new service providers.

3.2.4 Technology Innovations

The Working Group members pointed out that new technologies have emerged for fibre installation such as micro-trenching whereby a thin ribbon of fibre is placed in a shallow saw cut were not approved for use in Hamilton. The technologies for deployment of digital infrastructure will continue to innovate and the city will always need to consider new alternatives as such advancements will lead to ease of deployment, lower cost to deploy, and lower cost to restore.

3.3 Adjacent Observations

There are related projects that impact the deployment of digital infrastructure.

3.3.1 Open Data Projects

The Working Group is aware that the City of Hamilton is undertaking an Open Data and Digital Strategy, but details are not available to the Working Group. Alignment with the City effort may prove useful when details are available as it will assist with service provider planning.

3.3.2 Previous and Current Service Provider Collaboration

The Working Group acknowledged that member companies have a history of working together in a carrier wholesale relationship for various opportunities around the City. It is expected that such arrangements will continue and perhaps even expand because of the collaboration on this Working Group.

3.3.3 LRT Opportunity

The implementation of an LRT in the central corridor of the city offers a unique opportunity to deploy significant digital infrastructure to meet future demands and considerably lower cost than if done in isolation. Moreover, the urban intensification anticipated along an LRT corridor is likely to drive the need for even more digital infrastructure. For that reason, the Working Group has approached Metrolinx and the LRT Project team to ensure sufficient consideration for digital infrastructure. At the direction of the Mayor's Intelligent Community Task Force, regularly scheduled meetings between all service providers and the LR Project have commenced with a view to finding appropriate options for broadband deployment along the LR route. These efforts must continue.

4. Recommendations

4.1 Opportunities

To facilitate the advancement of digital infrastructure investment, several opportunities exist. This section outlines the recommend opportunities to encourage and support additional investment in digital infrastructure and broadband availability.

4.1.1 Process and Workflow

The members of the Working Group recommend that the City consider the development of an online portal or tool that would allow service providers to submit permit requests for specific routes and see in near-real-time whether there are other existing requests for the same or similar routes. It is felt that this approach will reduce the permit request workload on the City and encourage service provider collaboration. Furthermore, the Working Group recommends the City review and simplify the permit approval process.

4.1.2 Telecom Ambassador

Some members of the Working Group noted an insufficient understanding of the City's current processes for physical telecommunication network construction. The Working Group recommends that the City appoint a telecommunications ambassador to assist new entrants in finding their way to approval and implementation.

4.1.3 Projecting Infrastructure Demand

Members of the Working Group were interested in collaborating with the City of Hamilton towards future residential and commercial growth patterns, zoning, and economic clusters. For example, how many housing units are approved or projected in the next few years and in which areas? Service providers felt that the City doesn't currently have readily available data sets that allow an assessment of what services may be required in the future. This may be a combination of Planning and Economic Development department data in a single data set.

This this end, the Working Group recommends that a semi-annual meeting be established the Planning and Economic Development departments.

4.1.4 Common Telecommunications Infrastructure Opportunities

The Working Group determined that with the recommended online tool, telecom ambassador, and insight into the anticipated infrastructure demand, the service providers would be able to establish an aspirational goal to find opportunities to collaborate.

4.1.5 Simplification of Municipal Access Agreement

Complex municipal access agreements with significant technical and business obligations are a deterrent to investment. Thus, other regions with more telecommunications-friendly civil infrastructure requirements are likely to attract the investments. The Working Group recommends that the City review the current Municipal Access Agreement with a view to simplification of requirements in alignment with other regions.

4.1.6 Consideration and Approval of New Technologies

The Working Group members noted that broadband construction technologies are evolving with innovative methods to deal with space and legacy infrastructure problems. Newer methods including micro-trenching, keyholing, and under-road-bed builds are providing lower cost to deploy, lower cost to repair, and reduced impact on citizens. The Working Group recommends that the City entertain submission and approval of new technologies to reduce the cost to build.

4.1.7 In-Field City Support

The Working Group recommends the development of an in-field City support team to mutually resolve found in-field obstacles as required and better coordinate with City capital construction. Under this arrangement, the proposed in-field support team would have the authority to revise and approve alterations to plan without re-permitting and will compile the data from in-field discoveries for return to City documentation.

4.2 Future Measurements

To help with ongoing deployment of digital infrastructure the Working Group would recommend that the City establish a confidential data collection process to track broadband availability in the city somewhat like the independent study. The data should be reported in aggregate to help policy makers understand deficiencies. Such a measurement process could be conduct semi-annually consistent with the Planning and Economic Development meetings. However, to be more successful the data collection should go beyond postal code, consistent with the recommendation of the McMaster study, to something more detailed such a percentage population serviced or even service delivery address. Undertaking such a data collection initiative would present a substantial work load burden to the service providers therefore participation would likely be contingent upon the City's demonstrated desired to spurn investment by committing to and advancing some of the recommendations from this report.