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ASSOCIATION CANADIENNE  
DE LA TECHNOLOGIE DE L'INFORMATION

## Canada's Networks and the Digital Economy

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The Information Technology Association of Canada (ITAC) is the voice of the Canadian information and communications technologies (ICT) industry. ITAC represents a diverse ICT community spanning telecommunications and internet services, ICT consulting services, hardware, microelectronics, software and electronic content. ITAC's community of companies accounts for more than 70 per cent of the 572,700 jobs, \$155.3-billion in revenue, \$6.2-billion in R&D investment, \$30.4-billion in exports and \$11-billion in capital expenditures that the ICT industry contributes annually to the Canadian economy. The ICT sector currently represents 4.9 per cent of Canada's gross domestic product (GDP) and accounted for 9.4 per cent of all real GDP growth since 2002. ITAC is a prominent advocate for the expansion of Canada's innovative capacity and for stronger productivity across all sectors through the strategic use of technology.

## **1. INTRODUCTION**

As the voice of Canada's information and communication technology industry, the Information Technology Association of Canada (ITAC) has long advocated for the strategic use of the internet and internet-based technologies to expand innovative capacity and drive stronger productivity across all sectors of the Canadian economy. This paper builds on our conviction that the products and services developed by our industry are enablers of innovation, prosperity and excellence in all dimensions of modern life.

Canada encompasses a vast territory with a low population density, where managing a national digital infrastructure is more difficult and expensive than in, for example, smaller and more densely populated European countries. Nevertheless, our telecom networks are well developed and among the best in the world in terms of both technological advancement and coverage and penetration.

Much has been written about the social and economic benefits of embracing the efficiencies offered by the fundamental components of the online world – broadband networks, consumer applications and business applications. Worldwide, the performance of national broadband networks has attracted significant interest among policymakers and others in recent years. Measures like penetration rates and average speeds are widely seen as key indicators of national competitiveness in the global digital economy. Canada ranks favourably in terms of broadband rankings worldwide, and especially in relation to its key G7 trading partners.

Canada's networks are world-class by any measure; studies show that Canadians have been enthusiastic users of those networks and adopters of consumer applications online, relying on them to take advantage of e-health, e-commerce, e-government, online banking and online education. In fact, we are at or near the top of the global class in terms of household penetration, in terms of broadband usage, and in terms of web usage (measured in number of pages viewed).

Unfortunately, Canadian business has been slower on the uptake, small and medium-size businesses (SMBs) in particular. ITAC's view is that it is this lag in adoption by Canada's SMBs that needs to be addressed. Government should now focus on the broad, transformative goal of driving technology adoption across sectors of the economy, especially the adoption of online and other digital tools by SMBs. The measures of success must be adoption, productivity and economic growth.

## 2. NETWORKS

Canada has seen world-leading deployment of interconnected fibre-to-the-node (FTTN) and fibre-to-the-home networks that ensure that we remain at the vanguard of technology.<sup>1</sup> Our extensive wireless networks are also among the most technologically advanced, and there is near ubiquitous availability of advanced wireless services.

Even so, Canada's networks will require continuous, intense investment and renewal if consumers and businesses are to continue to receive the world-class, high-bandwidth services that they have come to expect. This is a very expensive undertaking – with capital expenditures totalling approximately \$10 billion each year.

Canada's telephone companies continue to increase the number of fibre-based lines, with fibre facilities being extended farther into the network. By 2011, 23.6% of total Canadian lines were already FTTN, with deployment of FTTN projected to reach 80% in some areas by the end of 2012.<sup>2</sup>

Cable operators are also heavily deploying fibre facilities in their networks. The DOCSIS 3.0 technology used by these networks enables speeds of 150 mbps or more in most parts of Canada.

Canada is also a world leader in wireless network deployment. Long-Term Evolution (LTE) – the latest in high-speed wireless technology – is now available to the majority of Canadians. As a result of LTE and HSPA network deployments, high-speed wireless services are available to almost 98% of Canada's population. In comparison, even advanced countries such as France and the UK are only now beginning the roll-out of LTE services.

Residential broadband availability (excluding satellite) was 99% nationally, with 100% availability in urban areas and 83% availability in rural areas.<sup>3</sup> With Xplornet now offering high-speed / high-capacity 4G broadband service packages to almost all of the rural population across Canada via satellite, virtually every Canadian now has access to high-speed services,<sup>4</sup> and most have access via multiple platforms.

A 2011 report assessed the real speed of broadband connections obtained by the average consumer, based on more than 52 million user tests that reflected the real

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<sup>1</sup> Including gigabit passive optical networks (GPON), DOCSIS 3.0 cable networks, high-speed packet access (HSPA), high-speed packet access plus (HSPA+) and long-term evolution (LTE) wireless networks.

<sup>2</sup> Leonard Waverman and Kalyan Dasgupta, Berkeley Research Group, LLC, *Canada's Broadband Performance: Relevant Considerations for a Digital Economy Strategy*, Report commissioned by BCE Inc. and TELUS, October 11, 2010, pages 47-48. Currently, Bell Canada is rolling out its Fibe FTTH network in Quebec, Bell Aliant is rolling out its FibreOP network in various communities in Atlantic Canada, MTS Allstream is rolling out its FION FTTN in various communities in Manitoba, and TELUS is rolling its Optik service in Alberta and British Columbia. SaskTel offers broadband through various provincial programs, including the Next Generation Access Infrastructure program. See Elizabeth Bianchini, "Quebec, Saskatchewan lead on provincial funding for broadband development", in *The Wire Report*, February 23, 2012; and "SaskTel defends Internet pricing, promises new technology", *The Leader-Post*, March 3, 2012.

<sup>3</sup> CRTC, *Communications Monitoring Report*, September 2013, pages 177, 181.

<sup>4</sup> "Xplornet's new bird operational, rural broadband coverage grows", Carri.ca, November 22, 2012.

market share of internet service providers in a number of countries.<sup>5</sup> Canada ranked 15th, based on a ranking of the average downstream broadband speed (based on actual measured speeds reflecting ISP market shares for each OECD country), putting Canada in the top half of OECD countries surveyed.<sup>6</sup> Canada ranked third among G7 countries for both 24-hour and Peak Hours Average Measured Fixed Broadband Speed, based on more than 52 million user speed tests.<sup>7</sup>

Canadian consumers are well served in residential markets, with near ubiquitous competitive networks for both wireless and broadband services. As indicated in the Government of Canada's digital-economy consultation paper,<sup>8</sup> convergence and competition between network platforms has driven continued investment in network infrastructure, with capital intensity (the ratio of capital expenditure to revenue) of Canadian service providers being in line with global peers.<sup>9</sup>

In business markets, however, while wireless services are available through near-ubiquitous competitive networks, there are still locations that are served by just one wireline broadband network.

It is important to note that Canada's enviable position overall has been achieved largely by private-sector investment – without massive government intervention such as is currently being expended in Australia, where the government has earmarked \$40 billion (and may spend more than \$90 billion<sup>10</sup>) to get to where Canada is already.

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<sup>5</sup> Lemay-Yates Associates Inc., *Comparative Assessment of Broadband Performance and Cost for Consumers among G7 and OECD Countries: Canada Always Ranks in the Top Half or Better, Report presented to Rogers Communications Inc., FINAL REPORT, December 1, 2011.*

<sup>6</sup> Lemay-Yates, 2011, pages 8, 13 and 22-26. The Average Measured Fixed Speed per country was 11.5 Mbps in Canada, with speeds for all countries varying from 2.6 Mbps in Mexico to 37.3 Mbps in South Korea. Canada placed ahead of the US, which had 11.2 Mbps. Canada also ranked 15<sup>th</sup> when comparing performance for the Peak Average Measured Fixed Broadband Speed, recording a speed of 10.8 Mbps, a decline of 5.8% from the overall average of 11.5 Mbps (page 13 and Figure 7, page 14, 28-32 and page 34).

<sup>7</sup> Lemay-Yates, 2011, page 5. Akamai ranks Canada #6 in the world in terms of global broadband connectivity (connections to Akamai of 4 Mbps or greater) with 69% of connections above 4 Mbps. South Korea ranked #1 at 84% and the US ranked #13 at 57% (Source: Akamai, *The State of the Internet, 2<sup>nd</sup> Quarter, 2012 Report*, Volume 5, Number 2).

<sup>8</sup> Government of Canada, *Improving Canada's Digital Advantage: Strategies for Sustainable Prosperity*, 2010, page 16, available at [http://publications.gc.ca/collections/collection\\_2010/ic/lu4-144-2010-eng.pdf](http://publications.gc.ca/collections/collection_2010/ic/lu4-144-2010-eng.pdf).

<sup>9</sup> The average for capital intensity in Canada between 2004 and 2009 was 15% and 13. These are higher levels than those for Australia, France and the UK during the same time and comparable to the levels in the US.

<sup>10</sup> <http://www.liberal.org.au/fast-affordable-sooner-coalitions-plan-better-nbn>.

### 3. PRICING AND USAGE

Canada clearly has world-class networks, and by some measures world-leading networks, but having great networks is not enough. The services they carry have to be priced, operated and marketed so that Canadians use them. Here again, Canada is well situated, as pricing for wireline internet service in Canada is comparable to other countries.

A recent report compared Canada to the five countries included in the CRTC report for average cost of megabit per second of measured speed – ‘measured’ rather than ‘advertised’ speed being the preferred metric to use in calculating average costs.<sup>11</sup> The results show that Canada is second-least expensive at \$2.68. Only Japan is less expensive at \$1.34, with France at \$2.88, United States at \$2.89, Australia at \$3.69, and United Kingdom at \$3.79.

While the OECD’s annual report on wireless prices is typically cited in international comparisons of affordability, we think a better measure is mobile spending as a percentage of gross domestic product (GDP). This metric allows us to compare against countries that have different costs and standards of living. By this measure, Canada is second lowest among G8 countries and third lowest among G20 countries.<sup>12</sup> Furthermore, compared to the United States, Canada is more affordable for smartphones.<sup>13</sup> The OECD recently reported that pricing comparisons among the 34 OECD countries show that Canada is less expensive than the US in 14 out of 21 ‘wireless baskets’.<sup>14</sup>

Roaming rates is another area where Canadians are much better served than some international comparisons have suggested. As the US is Canada’s closest neighbour, 80% of all people travelling abroad from Canada go there. Such high traffic means that Canadians enjoy much lower wireless roaming rates in the US than elsewhere. In a roaming-rate comparison published by the OECD in 2011,<sup>15</sup> the headline conclusion was that Canada’s roaming rates for downloading a very small ‘bucket’ of data (1 MB in one session) are the highest among OECD countries. However, as noted by a more recent study, the more relevant comparison is what Canadians pay for a larger bucket of data (20 MB over 20 sessions in one month) in its most frequented destination, the US.<sup>16</sup> On this metric, Canada had some of the lowest roaming rates in the OECD and ranks as the seventh-least expensive of 34 countries.

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<sup>11</sup> Lemay-Yates, 2011. Both the OECD and CRTC’s Wall Communications report, *Price Comparisons of Wireline, Wireless and Internet Services in Canada and with Foreign Jurisdictions*, April 2012, used advertised prices.

<sup>12</sup> Merrill Lynch, *Wireless Matrix*, January 3, 2013.

<sup>13</sup> For example, on an iPhone 5, on a voice-and-data plan with all the same features and 1 GB of data, customers in Canada pay less on a monthly basis than customers with AT&T and Verizon in the US.

<sup>14</sup> OECD, *Communications Outlook 2013*, July 11, 2013.

<sup>15</sup> OECD, *International Mobile Data Roaming*, May 30, 2011, chapter 7.

<sup>16</sup> Yves Rabeau, Montreal Economic Institute, *Is the Canadian Wireless Sector Competitive?*, September 2012.

In any case, Canadians have been early adopters and prolific users of all forms of modern communication and have always been at or near the top globally in the use of advanced broadband networks.<sup>17</sup> Canada is a global leader in fixed internet household penetration. According to the CRTC's most recent international comparison of leading industrial countries,<sup>18</sup> Canada had 80% penetration at the end of 2011. Only France at 83% had a higher penetration, followed by the UK also at 80%, the US at 74%, Germany at 70%, Japan at 68%, Australia at 60% and Italy at 58%. A separate recent ranking of 148 countries reports that 86.8% of Canadians use the internet, again putting us among the world's leaders.<sup>19</sup>

We are a close second behind the US in the world in terms of internet usage, spending an average of 41.3 hours per month online in 2012.<sup>20</sup> Canadians are also first in the world in online video watched per viewer. Moreover, the average amount of data downloaded per month per residential subscriber increased 21.2% between 2010 and 2011 – from 14.8 to 17.9 gigabytes.

Basic wireless coverage in Canada extends to 99% of the population, and advanced wireless networks used to support smartphones and mobile internet sticks reach 98% of Canadians.<sup>21</sup> The widespread roll-out of LTE, which enables extremely fast wireless data speeds, places Canada in the rank of other advanced economies like Germany<sup>22</sup> and far ahead of other European countries such as France or the United Kingdom,<sup>23</sup> which are only now beginning to deploy LTE. The payoff: Canada was among only a handful of countries that saw the original launch of the first LTE-enabled smartphone.

Smartphone market penetration, as a proportion of all mobile subscribers, was at 62% as of December 2012, the third-highest in the world.<sup>24</sup> Canada ranks 10<sup>th</sup> out of 21 developed markets in wireless minutes of use per capita, ahead of France, Germany and the United Kingdom.<sup>25</sup> Users, including those in Canada, are now increasingly moving to mobile data. The availability of faster smartphones and the high-speed LTE networks that support them is driving this adoption of mobile data.

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<sup>17</sup> Waverman and Dasgupta, 2010, page 31ff.

<sup>18</sup> CRTC, *Communications Monitoring Report*, September 2013, page 203.

<sup>19</sup> World Economic Forum, *Global Competitiveness Report*, August 2013.

<sup>20</sup> ComScore, *Digital Canada Future in Focus 2013: Key Insights from 2012 and What They Mean for the Future*, March 2013, page 6.

<sup>21</sup> CWTA estimates.

<sup>22</sup> <http://www.fiercemobilecontent.com/press-releases/mobile-broadband-13-million-households-already>

<sup>23</sup> See <https://wirelessintelligence.com/analysis/2012/04/bonjour-lte-comes-to-france> and

<http://www.tuaw.com/2012/10/04/4g-lte-to-launch-in-uk-on-october-30/>

<sup>24</sup> ComScore, *Mobile: Future in Focus: 2013*, 2013, page 39.

<sup>25</sup> Merrill Lynch, *Wireless Matrix*, January 3, 2013.

#### 4. CANADA'S DIGITAL CHALLENGE

As the discussion above shows, Canada has excellent networks, competitive pricing and very high rates of household usage for wireless and wireline services. Accordingly, there is little need for government to subsidise the deployment of broadband networks here as has been done in other countries.

Still, though the vast majority of Canadian households have enthusiastically taken up broadband services and applications, many low-income households have been left behind. It is estimated that two million Canadian households have no computer and hence no connectivity and that most of these households are from the 20% of the population with the lowest income.<sup>26</sup> There is no easy solution to mitigate this problem, but it needs to be addressed.

Furthermore, however enthusiastically the vast majority of Canadian households have embraced ICT, the same cannot be said for Canadian businesses, particularly small and medium-sized businesses. The rate of ICT adoption among Canadian businesses is lower than that of their US counterparts,<sup>27</sup> and this phenomenon must be studied and addressed, whether the reasons are regulatory, structural or attitudinal. It is estimated that 30% of SMBs do not even have a website.<sup>28</sup> According to one report, Canada's internet economy contributed only 3% of GDP in 2010 compared to an average of 4.1 % in the G20 countries and 4.7% in the US.<sup>29</sup> At the current rate, by 2016 this gap will grow and Canada will be at 3.6% while the G20 average will be at 5.3% and US at 5.4%.

Enhancing the Canadian economy's productivity and capacity to innovate is of paramount importance in today's increasingly digital world, but Canadian firms, particularly the SMBs that form such a significant part of our economy, were slower to use digital technologies than firms of similar size in other countries. "When it comes to ICT, Canada has room to improve. Our businesses invest \$2400 less per employee per year in computers, software and training than their American counterparts do. This is a gap we need to close."<sup>30</sup> The gap may have narrowed since, but it still exists and merits attention.

Some studies have attributed the lag in Canadian business uptake to the preponderance of smaller firms in the economy,<sup>31</sup> which invest less in ICT and spend less on research and development. What small firms do here makes a big difference

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<sup>26</sup> Based on Statistics Canada, *2010 Canadian Internet Use Survey*.

<sup>27</sup> For example, the adoption of Session Initiation Protocol (SIP) trunking, which delivers telephone services and unified communications over a single IP-enabled connection, is progressing at five times the pace in the US as it is here – \$643.1 million in the US in 2011 versus only \$12.7 million in Canada. See also Berkeley Research Group, *Connectivity Scorecard 2011*.

<sup>28</sup> Scott Smith, Director of Intellectual Property and Innovation Policy, Canadian Chamber of Commerce, testimony before the House of Commons Standing Committee on Industry, Science and Technology, April 30, 2013.

<sup>29</sup> Boston Consulting Group, *Internet Economy in the G-20*, March 2012.

<sup>30</sup> Michel Bergeron, Business Development Bank of Canada, testimony before the Standing Committee on Industry, Science and Technology, House of Commons, October 19, 2011.

<sup>31</sup> IDC Capex Report.



because firms with fewer than 100 employees make up 98.1% of Canada's 1.1 million employer businesses<sup>32</sup> – a larger proportion than in many of Canada's global peers. ITAC sees this under-use of technology as a critical contributor to our failure to achieve our potential, and impairs our overall capacity for innovation.<sup>33</sup> It is one of the key challenges that Canada must overcome in the interest of our future success and prosperity. We must also aggressively seize the opportunities that digital technologies present for our governments and public services.

The problem of under-adoption has been as puzzling to policy makers as it has been to the ICT industry. ITAC-sponsored research has shown that business people, including those in the SMB groups, do not need to be persuaded that ICT investment can advance their ability to achieve business priorities. Nevertheless, they persistently demonstrate a higher level of comfort in making labour and other non-ICT investments.

Research suggests that at least part of the problem has been that a substantial proportion of Canada's SMBs have no ICT staff at all, so lack ready access to expertise in how ICT can be used.<sup>34</sup> Without trusted advisors in-house and wary of the complexity and risk associated with ICT investments, many small companies simply don't have the analytical expertise to make the appropriate investments in new products and services, or in newer approaches such as cloud computing, which not only can enhance productivity by reducing costs, but also means that a small company's data is at less risk of cyber attack and espionage. A very recent industry report noted that, internationally, SMBs with fewer than 250 employees bore 31% of all cyber attacks in 2012, as opposed to 18% in 2011; clearly the trend seems ominous for smaller companies lacking robust defences.<sup>35</sup>

In any economy, market players must be able to interact with confidence. Online commerce presents additional complexities for the securing of consumer, enterprise and government communication, all of which call for security techniques and strategies optimized for cyberspace. As Public Safety Canada acknowledges in its recent action plan for cyber security, "While cyberspace brings significant benefits, our ever increasing reliance on it is creating new and significant vulnerabilities."<sup>36</sup>

In response, government must work with the private sector in educating SMBs about the benefits of investing in ICT while continuing to protect themselves and those they deal with from threats. For small business and individuals, this means adopting security tools and policies to protect confidential and personal information. Governments and

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<sup>32</sup> Statistics Canada, *Business Register*, June 2013, see <http://www.ic.gc.ca/eic/site/061.nsf/eng/home>

<sup>33</sup> There is concern among some in the telecom industry that the business market lacks the robust level of multi-platform competition that exists in the residential market and that unless incumbent TSPs provide wholesale access to competitors on reasonable terms, efforts to increase productivity by encouraging adoption of ICT technologies by Canadian businesses will be dampened. This point is disputed by others in the industry, whose view is that mandated access can have significant negative effects on investment in network infrastructure and thus the evolution of ICT technologies.

<sup>34</sup> 50% of all small and medium-sized businesses have two or less full-time equivalent ICT staff on their payroll. See "Does ICT Matter to SMBs in Canada?" IDC, 2006.

<sup>35</sup> Symantec, *Internet Security Threat Report 2013*, April 2013, page 16.

<sup>36</sup> Public Safety Canada, *Action Plan 2010-2015 for Canada's Cyber Security Strategy*, April 2013.

other large enterprise of all kinds must also take serious steps to defend themselves, adopting harmonized security standards for all devices connected to the internet and employing best cyber-defence practices.

After all, if government and large enterprise cannot guard from cyber attacks on their systems, SMBs are much less likely to have confidence in their own ability to protect themselves. If successful, efforts to address Canada's general skills shortage should provide SMBs with easier access to the skilled staff they need.

At its core, cyber security means securing public and private information in cyberspace and protecting it from all forms of cyber threat – and is therefore increasingly fundamental to the growth of Canada's digital economy.

## **5. CONCLUDING REMARKS**

The availability of affordable broadband throughout the country has been a crucial factor, allowing Canadian consumers to take advantage of the benefits of greater connectivity, including enhanced access to government services, healthcare, education, etc. ITAC stresses that it is essential that there be a robust marketplace that encourages investment in network facilities so that telecommunication choices are available to Canadian businesses as well as Canadian consumers. Competition between telecom service providers means lower prices, greater adoption of ICT technologies and greater productivity.

The provision of still greater connectivity, through deployment of new, very high-speed broadband networks, will require massive investment in a risky environment. It is therefore imperative that governments and regulators provide an environment that both encourages competition and does not impose obstacles to investment.

ITAC believes that government should focus its efforts on the broad, transformative goal of driving technology adoption across sectors of the economy, especially the adoption of online and other digital tools by small and medium-sized businesses. The measures of success must be enhanced productivity, competitiveness and economic growth.

Some of the factors that may be inhibiting adoption by SMBs in particular have been noted in this paper. ITAC will be pleased to work with government to flesh out the picture and to discuss measures to address the situation.