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THEMATIC ANALYSIS OF EIGHT CANADIAN FEDERAL BROADBAND PROGRAMS FROM 1994 TO 2016

Michael B. McNally, Dinesh Rathi, Jennifer Evaniew, and Yang Wu

ABSTRACT

This article provides a historical and thematic analysis of eight Canadian federal government broadband programs. Examination of program documents led to the identification of several themes. These themes formed the basis for understanding and revealing trends in federal programs over time. Analysis of the trends, informed by Dwayne Winseck's approach to political economy, reveals that in general federal broadband programs have not fully realized the democratic potentialities of broadband. Furthermore, there is partial evidence on the degree to which programs have facilitated private gains for telecom firms in some areas (e.g., program expenditures, technology, and market forces).

Keywords: telecommunications policy, broadband policy, Canada, historical analysis

Introduction

Canada, which was the first country to connect all of its public schools and libraries to the Internet,¹ used to be a broadband leader. For example, Canada ranked second in the Organisation for Economic Cooperation

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1. Canada National Broadband Task Force (NBTF).



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and Development (OECD) for fixed broadband subscriptions per one hundred inhabitants in 2001 but fell to twelfth place in 2014.² There is also a significant gap between broadband penetration (actual uptake) and broadband availability in Canada. According to the Canadian Radio-television and Telecommunications Commission (CRTC), while broadband (as defined by 5 Mbps download speed) is available to 96 percent of Canadian households, actual uptake is only 77 percent, and a full one-fifth of Canadians do not have broadband subscriptions at the slower 1.5 Mbps download speed.³ The difference between penetration and availability is particularly important because those who may have broadband available but do not subscribe do not realize the benefits of broadband. Canada's declining performance, and its ongoing gap between availability, which is near universal, and penetration, which is lacking by a significant amount of the population, suggest the need for continued broadband policies to address these gaps.

The article analyzes eight Canadian federal broadband programs drawn from relevant documents from the last twenty-two years. While there is considerable literature evaluating individual programs, a longitudinal comparison of federal broadband programs is necessary to provide insights for future program and policy development.⁴ The article focuses exclusively on federal broadband programs. Drawing insights from Dwayne Winseck's approach to political economy, the article suggests that over time in a number of the themes identified there has been a tendency for programs to de-emphasize or ignore the democratic potentials broadband facilitates. The article highlights several concerns in existing programs. These include a lack of scrutiny over the effectiveness of broadband programs, stewardship issues with program documents, and a high degree of reliance on the private sector to meet the needs of rural inhabitants. This historical and thematic analysis benefits policymakers, other researchers, and community stakeholders, and complements existing literature evaluating individual Canadian federal broadband programs.

2. Organisation for Economic Cooperation and Development (OECD), *Development of Broadband Access*, 13; OECD, *OECD Digital Economy Outlook*, 106, 108.

3. Canadian Radio-television and Telecommunications Commission (CRTC), *Communications Monitoring Report*, 23.

4. Clement et al.; Gurstein and Pell; Regan Shade.

Context of Canadian Telecommunications and Broadband Policy

Within Canada, broadband policy is a specific element of telecommunications policy, which is governed by the Telecommunications Act.⁵ Notably, Section 7 of the Act sets out the Canadian telecommunication policy objectives. Included within these objectives are a mix of economic and social goals. With regard to the latter, notable social objectives include:

- (b) to render reliable and affordable telecommunications services of high quality accessible to Canadians in both urban and rural areas in all regions of Canada;
- (h) to respond to the economic and social requirements of users of telecommunications services; and
- (i) to contribute to the protection of the privacy of persons.⁶

Implementation of broadband policy is primarily under the purview of the federal government; however, subnational provincial and territorial governments often supplement federal programs and policies with their own initiatives. Furthermore, regulatory and policy functions at the federal level are bifurcated between the federal department of Innovation, Science and Economic Development Canada (ISED) (formerly Industry Canada [IC]), which has a primary role in setting policy and administering the radio spectrum, and the CRTC, which is the arm's length, quasi-judicial telecommunications regulator. The CRTC has extensive regulatory responsibility over telecommunications in Canada. In this regard, one of its most important functions is cyclical reviews of basic telecommunications service that occurred in 1997/1999,⁷ 2010/2011,⁸ and the most recent review in 2015/2016,⁹ for which a formal policy outcome has yet to be decided. Although the CRTC plays a central role in Canadian broadband, ISED/IC policy is equally important. In this regard, the federal department has

5. Telecommunications Act.

6. *Ibid.*, s 7(b), (h), and (i).

7. CRTC, *Telecom Public Notice, Telecom Decision*.

8. CRTC, *Telecom Notice of Consultation 2010-43, Telecom Regulatory Policy*.

9. CRTC, *Telecom Notice of Consultation 2015-134*.

overseen a number of broadband programs over the past twenty-two years, which are the subjects of the following analysis.

Literature Review

The benefits of broadband access are extensively noted, both in Canada and abroad. For example, broadband is widely acknowledged as a driver of economic development, and a crucial infrastructure for democracy, fostering social inclusion, reducing the digital divide, and improving overall quality of life. At the same time, however, actual quantification of broadband's benefits is quite challenging due to the lack of common base measurement values and the overwhelming volume of anecdotal evidence.¹⁰

The UN Broadband Commission for Sustainable Development notes that broadband access stimulates innovation, productivity, trade, employment, foreign investment, economic growth, and, consequently, a country's competitiveness.¹¹ The World Bank has noted that it is a leading facilitator of gross domestic product (GDP) growth around the world, ensuring greater business productivity, generating demand for online services, and leading to the creation of many small businesses.¹² In the United States, for example, the Executive Office of the President notes that broadband access generates tens of billions of dollars in new consumer spending on Internet and online services each year.¹³ A 2011 UN Human Rights Council Special Rapporteur report noted that the Internet, by creating new opportunities in the creation and sharing of information and opinion, is a key enabler of human rights.¹⁴ The Broadband Commission for Sustainable Development has also noted that it promotes greater freedom of expression, civic participation, access to information, and preservation of the language and heritage of minority groups.¹⁵ Broadband access creates opportunities for all social groups, particularly the underprivileged. The US Chamber of Commerce in 2009 noted that it allows the disabled to

10. Bearing Point, 2.

11. Broadband Commission for Sustainable Development (BCSD), 31.

12. World Bank, 76–81.

13. United States Executive Office of the President, 5–6.

14. La Rue, 22.

15. BCSD, 70–74.

better communicate with each other and to participate in the labor force by working from home.¹⁶ Countries such as Finland and Spain have gone so far as to declare broadband a “legal right.”¹⁷

Canadian research has identified numerous benefits of broadband. Broadband can provide more reliable access to information and increased access to postsecondary educational opportunities through online learning services.¹⁸ Catherine Middleton outlines the drivers and corresponding anticipated benefits for each stakeholder in broadband provision, which she categorizes as societal, communal, individual, and commercial benefits.¹⁹ Benefits are realized in different ways and at different times, in regard to the development of infrastructure and subsequent broadband uptake, and when economic or other e-service benefits are attainable.²⁰ Similarly, Ricardo Ramírez offers suggestions for meaningful community participation within innovation e-services because there is a risk that the impact of these innovations will be measured by their instrumental and economic potential above their human impact.²¹ In other words, broadband services and benefits must be tailored to community needs, and their measurement of success should not be in purely economic terms. It should also be recognized that there are many examples of communities developing their own broadband solutions, and in this regard there have been several notable projects by Canadian Indigenous groups.²²

Despite the benefits of broadband, inequality of distribution and access to services are also growing. With regards to scarcity of goods and services, rural and remote communities continue to struggle with a lack of access to broadband, the corresponding benefits it can provide, and increasing marginalization and digital divide. These issues have been noted by various studies on rural citizens' service and information needs. Humaria Irshad identifies the disadvantages of citizens living in rural and remote areas, namely “low population density means a lower taxation base to support essential services; geographical remoteness means transportation difficulties; distance from markets can be a disincentive to

16. United States Chamber of Commerce.

17. De Santis, 8–9, 45.

18. Hudson.

19. Middleton, *Understanding the Benefits of Broadband*, 20–22.

20. *Ibid.*, 21.

21. Ramírez.

22. McMahon et al., 9.

new business growth; finally, remoteness usually means a lack of access to education, training and professional updating.”²³ Athena Platis points out that the deficiencies in services, education, and overall quality of life that rural communities face often force young people in them to move out, reducing their population, perpetuating their economic backwardness, and hampering their ability to maintain services.²⁴ While Irshad argues that difficulties faced by rural communities can be overcome by broadband access and points to the opportunities that high-speed networks can bring for tele-work, call-center operations, and other “distance-neutral applications and services,” she also notes that they affect Internet access.²⁵ Other research work that studied the impact of rural broadband suggests that higher levels of broadband access and market competition in the provision of Internet access services are associated with higher levels of migration and firm entry into rural and remote communities.²⁶ In their interviews, Maria Bakardjieva and Amanda Williams find anecdotes of reverse migration into rural communities, and the greatest impact of broadband on communities is in the realm of economic development.²⁷ Further, Michael Gurstein argues that low participation and poor content are at the root of the digital divide, and observes how “a consequence and sad result of the preoccupation with ‘access’ and the digital divide has been a crowding out of any serious attention being given to how the widespread availability of Internet access might be effectively used for self-development by individuals and communities with histories of social and economic inequality.”²⁸ The digital divide must be addressed not only through broadband access, but also through the development of digital skills and literacy. It also requires providing people with training on computer and information-related skills and fostering awareness among them of the potential values of information and communication technologies (ICTs).²⁹ For example, digital literacy skills are increasingly necessary for the workplace. Across OECD countries, service sector jobs requiring high-level skills

23. Irshad, 3.

24. Platis.

25. Irshad, 3.

26. Kim and Orazem; Mahasuweerachai et al.

27. Bakardjieva and Williams, 157, 161.

28. Gurstein, 223.

29. van Dijk, *The Network Society*, “The Ideology.”

connected to computers and ICTs are fast growing.³⁰ Broadband policies and programs must not only provide ICT skills to society but also highlight the value of these skills. The literature on the digital divide in Canada underscores that broadband policy must go beyond simple deployment of infrastructure to enable Canadians to fully realize the communicative potential of broadband.

Theoretical Framework

The concerns of scholars with regard to ensuring effective use of broadband are reflected by the strong tradition of critical political economy of communications in Canada. Early work in this area can be traced to Dallas Smythe. Smythe argues that political economy focuses on two related questions: who gets what scarce goods and services, when, how, and where? And, who takes actions in order to provide scarce goods and services, when, how, and where?³¹ Smythe and Robert Babe both underscore that national telecommunications infrastructure in the country has historically been characterized by the dominance of large corporations and limited competition between them.³² Telecom regulation in Canada has historically involved a close relationship between the state and capital.³³

Specifically our analysis is framed by Winseck's approach to political economy. Winseck, along with other scholars (e.g., Robert Britt Horowitz) draw upon Jürgen Habermas' concept of the legitimation crisis and its corresponding impacts on telecommunications policy.³⁴ The legitimation crisis centers on the tension within capitalist democracies where on one hand the state facilitates capital accumulation and generation of private wealth for the few, but at the same time must maintain legitimacy and trust of the mass electorate.³⁵ This general conflict takes a specific form within telecommunications policy whereby policy is in conflict between facilitating capital accumulation for the dominant firms constituting the telecom oligopoly and enhancing democratic potential and human rights through

30. OECD, *OECD Skills Outlook 2013*, 409.

31. Smythe, 564.

32. Ibid., 566; Babe, 239.

33. Salter and Salter, 70.

34. Horowitz, 42; Held, 191; Winseck, 12.

35. Horowitz, 42–43; Held, 194.

the use of communicative technologies.³⁶ According to Winseck, “telecoms policy remains captive to cross-cutting pressures to realise the economic value of information versus efforts to expand the historical link between communications and democracy.”³⁷ He further asserts that in this policy environment it is difficult to reconcile the potential of telecommunications in promoting citizen democracy with corporate competition, deregulation, and free markets.³⁸ Winseck outlines the three types of telecom policy actions states can take to facilitate capital accumulation: correction of market shortcomings through investments, technology policy, and cash infusions, among other mechanisms; creation or expansion of private markets through infrastructure programs financed by public funds; and global planning initiatives.³⁹ The first two types of actions are implicated in federal broadband programs over the past twenty-two years.

To apply this framework, federal broadband programs are examined thematically, and within each theme the authors have aimed to identify if the trend in broadband programs over time has been to primarily further the democratic and human rights potentialities of communicative technologies, or facilitate private gain for firms.

Research Methodology

Federal broadband programs were analyzed using a historical comparative analysis to identify and evaluate key themes and objectives over the past twenty-two years. Using manifest content analysis, program documents were analyzed and compared by identifying common themes in the documentation for broadband programs.⁴⁰

The data was analyzed using a thematic coding and analysis approach as outlined by Lioness Ayres.⁴¹ The generation of themes involves several steps including collecting the relevant data, identifying patterns, categorizing into themes based on the emergence of patterns, and ensuring the validity of themes by examining them in comparison to related

36. Winseck, 12, 18–19.

37. *Ibid.*, 18.

38. *Ibid.*, 288.

39. *Ibid.*, 67.

40. Crano et al., 304; Rubin and Babbie, 244.

41. Ayres, 867.

literature.⁴² The process of observing and establishing themes was an iterative one that required rereading program documents to discover themes noted in other programs. Key themes identified in this article emerged from language used in the program documents using thematic analysis approach with a focus on identifying common patterns across documents while also being cognizant of the unique context of each program.⁴³

The first step of the analysis was to locate documents for major federal broadband programs under the jurisdiction of IC/ISED, and Indigenous Affairs and Northern Development Canada.⁴⁴ Using a pearl-growing technique,⁴⁵ the authors reviewed citations for known federal policy and program documents, and consulted academic literature about federal broadband policies and programs in order to identify relevant documents and determine additional materials to examine. These documents were then retrieved from active or Internet Archive versions of government websites or from a university library collection. To augment program documents, or when documents were not available, the authors analyzed additional program webpages, government news releases, and government evaluations of programs (e.g., Final Assessment of Community Access Program [CAP]). Given the temporal scope of the analysis, some documentation, particularly from earlier programs, may not have been captured through our pearl-growing approach. The following federal broadband programs from 1994 to the present were examined:

42. Aronson, 1–2.

43. Ayres, 868.

44. Some federal funding for broadband has also flowed through federal infrastructure initiatives via Infrastructure Canada; however, this funding is proportionately quite small. For example, the 2014–2015 Building Canada Fund/Plan included funding for \$33 billion worth of infrastructure, but less than \$70 million went to broadband (Infrastructure Canada, “2013–2014 Department Performance Report”; Industry Canada [IC], “Advice to the Office of the Minister,” 4–5). Of the 925 projects funded by the Building Canada Fund—Communities Component, only two were broadband or connectivity related (Infrastructure Canada, *Evaluation of the Building*, 18). The Canada Strategic Infrastructure Fund also funded \$92.2 million worth of broadband projects, though \$63.8 million of this total was actually National Satellite Initiative expenditures (Infrastructure Canada, “Canada Strategic Infrastructure”). Furthermore, Infrastructure Canada does not seem to provide specifics on broadband investments separate from other public infrastructure funding. In some cases it does provide media releases on broadband initiatives (see Infrastructure Canada, “Improved High-Speed Internet”) Given the lack of clear information on Infrastructure Canada spending on broadband, and the relatively small amounts of spending, these initiatives have been excluded from the analysis.

45. Bell, 47.

	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18
Community Access Program																									
SchoolNet																									
First Nations SchoolNet																									
Broadband for Rural and Northern Development Program																									
National Satellite Initiative																									
First Nations Infrastructure Fund																									
Broadband Canada: Connecting Rural Canadians																									
Digital Canada 150: Connecting Canadians																									

FIGURE 1 Timeline of Canadian Broadband Programs

CAP⁴⁶ (1994–2012⁴⁷)

SchoolNet (1996–2008)

First Nations SchoolNet (FNSN) (1996–2006 [IC]; 2007–2011 [Indian and Northern Affairs Canada (INAC)])⁴⁸

National Satellite Initiative (NSI) (2003–2009)

The Broadband for Rural & Northern Development Program (BRAND) (2002–2007)

First Nations Infrastructure Fund (2009–)⁴⁹

Broadband Canada: Connecting Rural Canadians (2009–2012)

Digital Canada 150: Connecting Canadians (2014–2017⁵⁰)

46. Note that CAP, SchoolNet, and FNSN were operated under the umbrella title of “Connecting Canadians” and “Canada On-line.” These three programs have been evaluated separately here, and the term “Connecting Canadians” is used to refer to the more recent broadband program that is part of Digital Canada 150. For more information on the original “Connecting Canadians” umbrella program, see Canada, “Connecting Canadians: Canada On-Line.”

47. Federal funding for CAP ended on March 31, 2012, though not all CAP sites were exclusively federal funded (Innovation, Science and Economic Development Canada [ISED], “Youth Internships”).

48. First Nations SchoolNet began in 1996 as a part of Industry Canada’s SchoolNet program. In 2006 responsibility for the program was moved to Indian and Northern Affairs Canada (INAC), which extended the program until March 31, 2011. Indigenous and Northern Affairs Canada’s website indicates that the program is still in operation; however, it is being delivered by Regional Management Organizations in various provinces. Given the lack of clarity on funding and operational delivery of the program after March 2011, the analysis is based on the operation of the program from 1996 to 2011 (INAC, *Evaluation of the First Nations, Action Plan Implementation*, 1).

49. The First Nations Infrastructure Fund was established by Aboriginal Affairs and Northern Development in 2007; however, there were no funded connectivity/broadband projects until 2009 (Aboriginal Affairs and Northern Development Canada [AANDC], 2). Budget 2016 extends funding for the First Nations Infrastructure Fund to at least FY 2017–2018 (INAC, “First Nations Infrastructure”).

50. Note that the original announcement for Connecting Canadians funding was in the 2014 budget, which indicated the project would run until 2019. Subsequently, when the program was formally announced as part of Digital Canada 150 the end date was moved forward to 2017 (Canada, *The Road to Balance*, 179; IC, *Digital Canada 150*, 8).

In the following section, the article will present the key findings from the thematic analysis of federal broadband programs.

Findings and Discussion

The article identified a number of themes in federal broadband programs, including program expenditures, access and connectivity, broadband speed, technology used, affordability, market forces, economic development, skills development, education, participation in government, and health. Within these themes there were a number of subthemes identified, such as percentage of region with access and/or connectivity, regions targeted, speed targets, regions served, the type of connection (communities, businesses, or households) and number of connections established, and serving unserved or underserved populations. Each thematic section concludes by reflecting upon Winseck's question of whether the trend over time has been to enhance the democratic potentials of communicative technologies or the facilitation of private gain for firms. The following sections examine the federal programs according to each of these themes.

Program Expenditures

Determining the total federal expenditure on broadband from all projects by ISED/IC and Indigenous and Northern Affairs/Aboriginal Affairs and Northern Development is a complicated process made fraught by contradictions in data sources. Nominally the total is roughly \$2 billion (see Table 2, pp. 74–75).⁵¹ In addition, Infrastructure Canada provided an additional \$170 million for broadband projects from 2000 to 2012, and the federal government has provided \$120 million for CANARIE, the high-speed backbone connecting research institutions.⁵² These numbers do not include any federal funds that flowed to provincial governments for broadband initiatives through federal-provincial transfer payments, nor do they include the CRTC's deferral accounts by which some rural and remote broadband connections are facilitated.

51. This number does not include the \$500 million announced in the 2016 federal budget. No details for this program have been announced yet (Canada, *Growing the Middle Class*, 104).

52. IC, "Progress Towards Improved Rural Broadband," 66–67.

One significant challenge in assessing overall program expenditures is limited information about costs. For example, the *Final Evaluation of CAP* notes the total present value cost of FNSN was \$38,945,491 (in real, 2005 dollars);⁵³ however, INAC's 2009 *Evaluation of the First Nations School-Net Program* stated FNSN was funded at a rate of \$12 million per year from FY96/97 to FY03/04, and then funding was increased (and then later decreased).⁵⁴ Based on INAC's numbers, total funding for FNSN in 2005 should be approximately \$111 million in nominal dollars.⁵⁵ Nothing seems to explain this disparity.⁵⁶ Furthermore, in many instances overall program cost/expenditure is provided without breaking down the expenditures for operating the program in contrast to the actual expenditures on broadband connections. In this regard, documents received through an Access to Information request indicate that for Digital Canada's Connecting Canadians program operating expenses were \$15 million of the total \$305 million; however, for some other programs such information is lacking.⁵⁷ The lack of clear information on program operating costs versus money spent on connections further complicates the determination of total federal spending on broadband.

In addition to sparse information on expenditures, program funding has been highly varied, and the emphasis on different types of broadband connections further complicates comparisons. The BRAND program launched as a "\$105 million initiative with a matching capital cost structure."⁵⁸ This program was extended to \$111.5 million, which is broken down to \$15 million for operations and management, \$10 million for Community Champion Business Plan Development Funding, and \$86.5 million for Implementation Funding.⁵⁹ This was a community-based initiative that funded 217 projects. Total expenditures for CAP were just over \$420

53. IC, "Archived—Final Evaluation."

54. INAC, *Evaluation of the First Nations*, 3.

55. Authors' calculations based on \$12 million/year funding from FY96/97 to FY03/04 and \$15 million in FY 04/05. This totals \$111 million (= 8 × \$12 million + 1 × \$15 million).

56. The figures for FNSN in the *Final Evaluation of the Community Access Program* document are derived from the *Cost-Benefit Analysis of Information Highway Applications Branch (IHAB) Programs Final Report*, which was prepared for Industry Canada by Bearing Point, a management consulting firm, in 2005. The Bearing Point document then notes that all of the expenditure information was collected from a KPMG report *Validation of IHAB Expenditure and Leverage Estimates—1994/95 to 2004/06* (Bearing Point).

57. IC, "Enhancing Rural and Northern Broadband."

58. IC/Hickling Arthurs Low, 19.

59. IC/Hickling Arthurs Low, 10.

million, and at its height (2003–2004) it was funding more than 8,800 community access points.⁶⁰ As noted earlier, even an approximate value of expenditures for FNSN is challenging to determine.

As part of a 2005 review of CAP, BRAND, and FNSN, the management consulting firm Bearing Point calculated the net benefits and cost of each program from FY 1994–1995 to FY 2004–2005.⁶¹ Based on these figures, Bearing Point determined that BRAND had the highest benefit–cost ratio⁶² at 2.57, while CAP and SchoolNet were lower at 1.06 and 1.47, respectively.⁶³ While the Bearing Point benefit–cost numbers suggest IC’s programs were increasingly successful over time, it is also important to note that CAP led to significantly higher levels of direct and indirect employment. According to the Bearing Point analysis, CAP resulted in an estimated direct employment of 14,520 and indirect employment of 3,408, while the total direct and indirect employment for BRAND was only 1,053 and for FNSN it was 942.⁶⁴ While the Bearing Point report acknowledges the challenges in quantifying benefits, it does claim that all of the calculation invariably underestimated total benefits.⁶⁵ Despite these acknowledged limitations, the Bearing Point analysis uniquely qualifies the costs and benefits of various broadband programs. This approach appears to not have been repeated since 2005.

The NSI has been the primary program through which the federal government has funded expansion of satellite-based broadband. A total of \$155 million in funding was made available, drawn from three Government of Canada departments—IC, Infrastructure Canada, and the Canadian Space Agency.⁶⁶ The NSI was funded in two rounds. The first round involved a \$20 million purchase of satellite capacity from Telesat for use by

60. IC, “Archived—Final Evaluation.”

61. Bearing Point is an international management consulting firm (<http://www.bearingpoint.com/en-us/>) that conducted a review of programs under Industry Canada’s Information Highway Applications Branch (IHAB) in 2005. The information in the report is drawn from a previous study of IHAB programs by KPMG, and the Bearing Point study is used in part to inform the Final Evaluation of the CAP program. The Bearing Point report is unique in the detail to which it attempts to quantify the economic benefits of IHAB programming. A copy of the Bearing Point report is not publically available on the Industry Canada/ISED website, but can be requested directly from the department. The authors also have a copy of the report.

62. Net benefit–cost calculations were done in accordance with the Treasury Board of Canada in their *Benefit–Cost Analysis Guide* (Treasury Board Secretariat of Canada, 11).

63. Bearing Point, 11.

64. *Ibid.*, 20.

65. *Ibid.*, 7–8.

66. IC, “Government of Canada.”

public institutions and the second round funded \$85 million for increased capacity and ground infrastructure.⁶⁷ Of the \$105 million for NSI, \$20.6 was allocated for the creation of the Northern Indigenous Community Satellite Network (NICSN).⁶⁸ Several other federal programs also provided funding for satellite connections. Both BRAND and Broadband Canada funded satellite connections. IC spent \$2.3 million as part of the Knowledge Infrastructure Program to connect Nunavut Arctic College, Infrastructure Canada funded satellite connections worth \$55 million through the Building Canada Fund, and Aboriginal Affairs and Northern Development spent less than \$1 million on enhancing satellite capacity in two communities as part of the First Nation Infrastructure Fund.⁶⁹

The two most recent household-based programs, Broadband Canada and Connecting Canadians, have aimed to address gaps in rural connectivity. Broadband Canada resulted in a total expenditure of \$225 million over three years, of which \$190 million was spent on connections for unserved and underserved households.⁷⁰ The program resulted in broadband access to 218,000 Canadian households that previously lacked access.⁷¹ In 2014, the Digital Canada 150 strategy was unveiled, with the Connecting Canadians program a central pillar. Connecting Canadians committed to spend \$305 million dollars to connect 280,000 homes,⁷² but the most recent Digital Canada 150 2.0 update noted that by 2017, 356,000 homes would have connections at the target speed, with 40 percent less cost.⁷³ Within the original projection of \$305 million, \$50 million was dedicated for the Connecting Canadians northern component, which aimed to provide connections for 12,000 homes in satellite-dependent communities in Nunavut and northern Quebec.⁷⁴ In April 2016, the Government of Canada provided an update on progress in Connecting Canadians. To date, the total expenditure was \$34,840,500, resulting in 66,165 households being connected. So far, Connecting Canadians has been slightly more cost effective,

67. CRTC, *Satellite Inquiry Report*, 118.

68. Infrastructure Canada, "Canada Strategic Infrastructure"; CRTC, *Satellite Inquiry Report*, 119.

69. CRTC, *Satellite Inquiry Report*, 120–121.

70. IC, "Audit of the Broadband Canada Program."

71. IC, "Broadband Canada: Connecting Rural Canadians."

72. Canada, *The Road to Balance*, 179; IC, *Digital Canada 150*, 8.

73. IC, *Digital Canada 150 2.0*, 4. Note the 2016–2017 Reports on Plans and Priorities by ISED contradicts the *Digital Canada 150 2.0* information and states that only 280,000 homes will be connected by 2019 (ISED, *2016–17 Report*, 63).

74. IC, "Digital Canada 150: Northern Component."

connecting households at an average cost of \$527/household in comparison to Broadband Canada, which averaged \$679/household.⁷⁵

With regards to beneficiaries of federal funding, detailed information is sparse. For the Community Access Program, this money was targeted at CAP sites that were primarily public institutions such as public libraries and other community anchor institutions,⁷⁶ although a detailed breakdown of funding amounts for specific institutions was not available. Information for specific funded projects for the NSI and BRAND could also not be located. For Broadband Canada, the government provided a website that detailed which service providers received funding and how many household connections they provided, but the exact dollar amounts of the funding were not included (and furthermore, this website is only available through the Internet Archive). Of the 218,090 connections financed by Broadband Canada, only four companies received funding to connect more than 10,000 households: Xplornet Communications (81,830 households), Corridor Communications Inc. (CCI) (34,860 households), Manitoba NetSet Ltd. (22,250 households), and Vidétron Ltée. (19,060 households).⁷⁷ These four companies thus represent 72 percent of the total connections funded by Broadband Canada. The most recent program update for Connecting Canadians does provide specific information on exact dollar amounts for each project. Of the \$34 million spent, twenty-three different Internet service providers (ISPs) received funding. Xplornet was the only service provider to be funded for projects in multiple provincial/territorial jurisdictions. Of Canada's three largest telecom firms, only Telus received funding (\$4.5 million); however, the largest single recipient of funding (\$7.6 million) was the GwaiiTel Society in Haida Gwaii, British Columbia.⁷⁸ Based on the information available from Broadband Canada (though it lacks exact dollar amounts), and Connecting Canadians, the beneficiaries of funding from the two most recent programs are primarily regional/smaller ISPs and Xplornet, a national satellite and fixed wireless access service provider.⁷⁹

75. Authors' calculations based on Broadband Canada expenditure of \$190 million (program operating costs have been excluded to facilitate comparison with most recent Connecting Canadians information).

76. IC, "Archived—Final Evaluation."

77. IC, "Broadband Canada: Connecting Rural Canadians: List of Projects."

78. Canada, "Connecting Canadians"; GwaiiTel Society.

79. IC, "Broadband Canada: Connecting Rural Canadians: List of Projects"; Canada, *Growing the Middle Class*, 104; Canada, "Connecting Canadians."

Finally, the most recent federal budget (Budget 2016) committed an additional \$500 million for rural broadband. Program details are not yet available; however, in nominal dollars this will be the largest single expenditure on broadband in Canadian history.⁸⁰

The overall trend from subsidizing public connections to ISPs suggests that broadband policy has been less focused on underscoring democratic purposes and is more focused on market creation. However, at the same time, it is notable that the primary beneficiaries of direct ISP funded have tended to not be dominant telecom firms. In this regard, broadband programs have been more focused on developing the “competitive fringe”⁸¹ rather than further entrenching the dominance of the largest players.

Access and Connectivity

Within programs, broadband targets for connectivity vary between increasing availability/access of broadband and increasing actual uptake/penetration. A 2000 report on SchoolNet measured not only the penetration of broadband in schools by province; it went so far as to identify the gap between connected computers and computers capable of supporting an Internet connection.⁸² The Final Evaluation of CAP reported household penetration by connection type and Internet use by location.⁸³ However, subsequent programs provide less detailed information about resulting uptake and usage of broadband.

Broadband Canada's 2009 *Application Guide* provides statistics on the share of Canadian households and Canadian rural households with broadband availability (taken from the CRTC's *Communication Monitoring Report 2009*) before the program started.⁸⁴ However, the final website from the program notes only the number of funded projects (84) and households connected (218,000).⁸⁵ The program's FAQ site does indicate that upon completion of Broadband Canada and other provincial, territorial, and private sector initiatives, the availability of broadband will be 98 percent in

80. Canada, *Growing the Middle Class*, 104; Canada, “Connecting Canadians.”

81. Winseck, 65.

82. IC, “SchoolNet's Online Connectivity.”

83. IC, “Archived—Final Evaluation.”

84. IC, *Broadband Canada: Connecting Rural Canadians: Application Guide*, 5.

85. IC, “Broadband Canada: Connecting Rural Canadians: About the Program.”

Canada;⁸⁶ however, it is difficult to determine the exact impact Broadband Canada's 218,000 connections had based on available statistics.

Similar to Broadband Canada, the NSI, BRAND, and the Connecting Canadians programs only target increasing broadband availability. A 2004 broadband FAQ by IC provides broadband availability information for both the NSI and BRAND. With regard to the NSI, it notes that 28 percent of Canadian communities have broadband, but for BRAND it states that only 20 percent of Canadian communities have broadband available, with 4,200 communities still requiring access.⁸⁷ Inexplicably, BRAND's measurement of community availability does not match the NSI's measure of community access, even though these figures are provided in the same document. The 2006 Formative Evaluation of the BRAND pilot project noted that the BRAND pilot resulted in 896 communities gaining broadband availability.⁸⁸ The report also notes that "other programs" connected a further 1,100 communities, but does not report which programs facilitated these connections.⁸⁹ Round one of the NSI resulted in fifty-two communities gaining access,⁹⁰ and round two led to connections for forty-three communities.⁹¹ Information on how the remaining 1,000 communities were connected in the mid-2000s is unavailable.

Connecting Canadians claims to increase access at higher speeds, stating "over 98% of all Canadians will have access to high-speed Internet at 5 megabits per second (Mbps)"⁹² at the end of the program. However, this goal falls short of the CRTC's aspirational goal of all Canadians having access to download speeds of 5 Mbps by the end of 2015.⁹³ There is also some lack of clarity on what the date for this target is. The 2014 Budget, which first identified the funding for Connecting Canadians, and IC's/Innovation Science and Economic Development's 2015–2016 and 2016–2017 *Report on Plans and Priorities* have an end date for the program of 2019,⁹⁴ but *Digital Canada 150 2.0* suggests that the program will conclude by 2017 with a total of 365,000 households connected rather than

86. IC, "Broadband Canada: Connecting Rural Canadians: Frequently Asked Questions."

87. IC, "Broadband: FAQs."

88. IC/Hickling Arthurs Low, 19.

89. Loc. cit.

90. IC, "National Satellite Initiative: About Us."

91. CRTC, *Satellite Inquiry Report*, 52–53.

92. IC, *Digital Canada 150*, 7.

93. CRTC, *Telecom Regulatory Policy*, para. 76 and 79.

94. IC, *2015–16 Estimates*, 34; ISED, *2016–17 Report*, 63; Canada, *The Road to Balance*, 179.

280,000.⁹⁵ The difference between the glossy *Digital Canada 150 2.0* document, which is aimed at a broad, public audience, and the less widely consumed *Reports on Plans and Priorities* is curious, and it is ultimately unclear how many households will be connected under Connecting Canadians and on what timeline.

Considerable differences among the documents with regards to availability and penetration statistics impede the comparison of programs. Meaningfully comparing broadband programs would be much simpler if both availability and penetration numbers before and after the program were made available, and there has been a general trend toward less meaningful information being provided at the conclusion of programs.

Federal programs consistently emphasize reaching the unserved and underserved populations in northern, rural, and remote areas, particularly First Nations populations.⁹⁶ In addition, CAP explicitly addresses demographic groups considered part of the digital divide.⁹⁷ Similarly, both the NSI and BRAND aimed to “ensur[e] that these technologies are tools of inclusion, not exclusion.”⁹⁸ The Final Evaluation of CAP noted “addressing access and use issues that are, in part, determined by low levels of income, low levels of literacy or language barriers has been beyond the scope of the program’s core objectives and activities.”⁹⁹ Programs since CAP do not appear to have made addressing these issues a priority.

The success of each initiative has consistently been gauged by the percent of all Canadians, households, or businesses that have access to broadband. Unserved and underserved populations have the greatest barriers to connectivity and would benefit from programs that measure changes in penetration rates, rather than access provided. While the term “underserved” has become a more common qualifier in program documentation than “unserved” over time, since all communities have satellite access, underserved communities often fail to have equitable access to broadband to enable their full participation in the digital economy and are likely to be overlooked in recent program access targets. Connecting Canadians

95. IC, *Digital Canada 150 2.0*, 4.

96. *Ibid.*, 7; IC, “Broadband Canada: Connecting Rural Canadians: Frequently Asked Questions”; IC, “Audit of the Broadband Canada Program”; IC, “Archived—Final Evaluation”; IC/Hickling Arthurs Low, iii; IC, “National Satellite Initiative: About Us”; IC/KPMG Consulting LP, ii.

97. IC, “Archived—Final Evaluation.”

98. IC, “Broadband: FAQs.”

99. IC, “Archived—Final Evaluation.”

refers to, but does not name, unserved areas, stating “we will work with Internet Service Providers (ISP) and provinces and territories in areas of the country where broadband Internet access is at slower speeds or non-existent.”¹⁰⁰ Other documentation from the program substitutes underserved for unserved: “the Government will work with local communities, as well as provincial, territorial and aboriginal governments, ISPs and other stakeholders, to identify locations that are underserved and most in need of further support.”¹⁰¹ Further, this document includes the caveat, “in some instances, Internet Service Providers (ISP) will not be able to provide service to 100% of households within a community designated as served,”¹⁰² highlighting the complexity and misleading nature of designating served, underserved, or unserved at the community level but setting access goals at the household level. In addition, the number of connections established by each program is often provided as a numeric total that makes it challenging to compare with goals for increasing availability, which are usually provided as a percentage. These measurements for program success with regard to availability and penetration should be consistent, ideally with both metrics provided.

While the switch from a focus on increasing penetration to increasing availability does not directly suggest greater revenues for telecom firms—if customers have broadband available but do not subscribe this does not impact the profits of telecom firms—the shift away from encouraging increases in penetration through programs and policies suggests that policymakers could do more to encourage the democratic potentials of broadband by requiring increases in penetration rather than availability.

Broadband Speed

Generally, the target download speeds of broadband initiatives correspond to the CRTC’s definition of broadband at the time the program was introduced. CAP, Broadband Canada, and the First Nations Infrastructure Fund define broadband as a minimum of 1.5 Mbps download.¹⁰³ Conversely, Connecting Canadians aligns with the CRTC’s aspirational target

100. IC, *Digital Canada* 150, 5–6.

101. IC, *Connecting Canadians: Digital Canada*, 2.

102. Loc. cit.

103. IC, *Broadband Canada: Connecting Rural Canadians: Application Guide*, 5; IC, “Archived—Final Evaluation”; AANDC, 29.

minimum download speed and seeks to update infrastructure to speeds of 5 Mbps download; however, its northern component aims only to provide services at speeds of at least of 3 Mbps download.¹⁰⁴ Some programs had speed targets more ambitious than CRTC definitions of broadband at the time. For example, FNSN increased their speed target to 10 Mbps from 1.5 Mbps in 2007. However, connectivity at this speed was only met by 6.1 percent of schools two years later, while 41.9 percent of schools had service between 1.5 and 10 Mbps.¹⁰⁵

Often target download speeds are justified by the services they can support. Over time the programs have demonstrated evolving language around the needs/uses for broadband. For example, IC in 2004 defined broadband as “a high capacity two way link between an end user and access network suppliers capable of supporting full motion, interactive video applications.”¹⁰⁶ BRAND targeted “increased capacity of recipient communities to develop and use on-line applications and services”¹⁰⁷ as a desired outcome of the program. The FAQ page for the NSI and BRAND noted current uses of broadband including e-mail, web browsing, voice and video streaming, and remote surgery.¹⁰⁸ The current Connecting Canadians program articulates that 5 Mbps is necessary for use of cloud computing, video streaming, and participation in distance education.¹⁰⁹

Generally programs have aligned speed targets with current uses of technology; however, this approach is not without shortcomings. During the CRTC’s review of basic telecommunication services in 2011, the Commission noted “several parties indicated that it would be unrealistic to establish target speeds, given the range of technologies being used and the various stages of broadband deployment throughout the country” and “argued that any target would not be meaningful because of the rapidly changing broadband Internet service environment.”¹¹⁰ Furthermore, aligning speed targets with current use also fails to account for future uses.

Upload speed targets require greater prioritization in program planning and goal setting. Upload speed targets are rarely set by programs and have never been symmetrical with download speed targets. This goes against the

104. IC, *Digital Canada 150*, 7; IC, “Digital Canada 150: Northern Component.”

105. INAC, *Evaluation of the First Nations*, 11, 14, 18.

106. IC, “Broadband Dictionary.”

107. IC/Hickling Arthurs Low, 15.

108. IC, “Broadband: FAQs.”

109. IC, *Digital Canada 150*, 2.

110. CRTC, *Telecom Regulatory Policy*, para. 65.

National Broadband Task Force's (NBTF) recommendation that a symmetrical target be used (then 1.5 Mbps).¹¹¹ CAP only focused on download speed targets.¹¹² Broadband Canada provided an upload speed target, but it was only 384 kbps.¹¹³ Connecting Canadians increased upload speed targets to 1 Mbps, though for projects funded under the rural component the targeted upload speed was only 512 kbps.¹¹⁴ The lack of emphasis on upload speed targets would seem to indicate a view that federal broadband programs tend to envision end users as primarily needing broadband for consumptive rather than generative purposes.

One further problem with regards to speed is that more recent programs that have funded ISPs (Broadband Canada and Connecting Canadians) appear to have no requirements to ensure that advertised speed targets are actually and consistently delivered to customers. For example, the application guide for Connecting Canadians requires applicants to provide information on the planned advertised speeds (both download and upload) for the connections the program will finance, but requires nothing from applicants with regard to how consistently the new connections will be able to meet advertised speeds.¹¹⁵ While a recent CRTC report concluded that wireline broadband services in Canada almost always meet or exceed advertised speeds, this study specifically excluded fixed wireless and satellite access, which are more prominent outside of urban areas.¹¹⁶ The lack of emphasis on actual (instead of advertised) speeds means that residents in these areas may fail to experience the target speeds and subsequent applications they support. Ideally, applicants should be required to provide information on advertised and actual speeds.

Generally, Canadian programs have strived for achievable but modest targets. Although achievable targets benefit policymakers by ensuring that they have an easier time declaring programs as successful, the relative lack of higher download and upload speed goals implies that full benefits of broadband may not be realized. Furthermore, the focus on download over upload speeds suggest that policymakers view Canadians primarily as consumers of broadband services rather than creators who require higher upload speed targets. As such, the trend in broadband programs with

111. NBTF, 4.

112. IC, "Archived—Final Evaluation."

113. IC, *Broadband Canada: Connecting Rural Canadians: Application Guide*, 10.

114. IC, *Connecting Canadians Application Guidelines*, 5.

115. *Ibid.*, 24.

116. SamKnows, 4, 6.

regard to speed again suggests that maximizing the democratic potential of broadband technologies has not been the primary focus of Canadian broadband programs.

Technology Used

Although the broadband programs reviewed vary in scale, the technology mandated or suggested within each program affects the quality of broadband and subsequent services provided. While section 7(g) of the Telecommunications Act/Canadian Telecommunications Policy objectives encourages innovation in the provision of telecom services,¹¹⁷ programs have not necessarily required innovative connection types over legacy ones. Some programs choose to be technology-neutral, a parameter that puts greater focus on connectivity than infrastructure and follows the NBTF recommendation that technological neutrality be a guiding principle.¹¹⁸ BRAND, Broadband Canada, and the current Connecting Canadians programs are the only federal technology-neutral programs. For BRAND, this meant it used an open competitive process to allow the market to decide the best technology for the program.¹¹⁹ While Broadband Canada permitted the use of a range of wireless and wireline connection types,¹²⁰ Connecting Canadians provides the same range of options, but states, “the type of infrastructure available within a community will depend on its size, local topography and other factors.”¹²¹ Technologically neutral programs can encourage the use of outmoded or cheaper technologies such as DSL.

For reaching the unserved and underserved, many programs cite the role of satellite, including SchoolNet, BRAND, and Connecting Canadians, and the NSI was exclusively satellite-driven.¹²² The ongoing emphasis on satellite connections in Canada is not without its critics. Many groups raised concerns in this regard as part of their interventions

117. Telecommunications Act, c. 38, s. 7(g).

118. NBTF, 5.

119. IC, “Broadband: FAQs.”

120. IC, “Broadband Canada: Connecting Rural Canadians: Frequently Asked Questions.”

121. IC, “Digital Canada 150: FAQs for Canadians.”

122. IC, “Digital Canada 150: Northern Component”; IC/Hickling Arthurs Low, 38; IC/KPMG, 11.

in the CRTC's most recent review of basic telecommunication services.¹²³ Incumbent ISPs, such as Bell, however, support technology neutrality and the ongoing provision of satellite in "satellite-served communities," since "the capability of those services will increase as the price continues to decline."¹²⁴ The CRTC in its own Satellite Inquiry Report highlighted the limitations of satellites by noting, "Internet speeds in satellite-dependent communities are well below those available in communities served by terrestrial facilities, and are, in most cases, below the Commission's target speeds of 5 megabits per second (Mbps) download and 1 Mbps upload."¹²⁵

What is notable, particularly with more recent programs, has been a lack of emphasis on increasing fiber connections. For example, Broadband Canada noted that fiber, DSL, and cable (along with fixed wireless access and satellite) were all eligible technologies.¹²⁶ Thus, the program gave no preference to fiber over other legacy technologies.

TABLE 1 Broadband Canada: Funded Projects by Connection Type¹²⁷

Connection Type	Number of Households Connected	Share of Total Connections
Fixed wireless	85,690	39.29
Fixed wireless or satellite	55,240	25.33
Satellite	41,900	19.21
Mobile wireless	19,480	8.93
Fixed wireless over satellite	7,980	3.66
Wireline	3,930	1.80
Wireline/wireless	1,720	0.79
DSL/wireless	1,100	0.50
DSL	530	0.24
Mobile wireless over satellite	520	0.24
Total	218,090	

123. CRTC, *Telecom Notice of Consultation 2015-134*; Alberta Association of Municipal Districts and Counties, 4; Canadian Federation of Agriculture, 2; Canadian Media Concentration Research Project; Columbia Basin Broadband Corporation, 11.

124. Bell Canada, 17, 29, 46.

125. CRTC, *Satellite Inquiry Report*, 6.

126. IC, "Broadband Canada: Connecting Rural Canadians: Frequently Asked Questions."

127. IC, "Broadband Canada: Connecting Rural Canadians: List of Projects."

Furthermore, as indicated in Table 1, the number of wireline connections was relatively small, and this category does not delineate between cable and fiber connections. Connecting Canadians has repeated the approach of Broadband Canada by making DSL connections eligible for funding.¹²⁸

The emphasis on technological neutrality in Canadian broadband programs has been useful for facilitating a greater diversity in connection types, though to some degree it undermines the goal of innovative service provision. Ultimately technologically neutral policies and programs have the effect of encouraging legacy connections (such as DSL) and continued use of satellite connections in remote areas. The lack of any program attempting to stimulate last mile fiber connections suggests that broadband programs have tended to favor ensuring the profitability of telecom firms over securing Canadians access to more robust and modern connection types.

Affordability

The affordability of broadband is a prominent theme within federal programs and aligns with section 7(b) of the Telecommunications Act/Canadian Telecommunication Policy.¹²⁹ A consistent emphasis by programs including CAP, Broadband Canada, and BRAND is to provide affordable access.¹³⁰ BRAND and Broadband Canada hoped to provide affordable broadband services in urban, rural, and remote areas or to unserved and underserved households, respectively.¹³¹ BRAND was motivated in part by the Telecommunications Policy Review Panel recommendation that the government start a program to ensure affordable and reliable broadband in all regions of the country.¹³²

The Connecting Canadians program goes the furthest with regard to detailing how affordability factored into the program and it is a key element by which projects are assessed. Applicants are required to submit

128. IC, "Digital Canada 150: FAQs for ISPs."

129. Telecommunications Act, 7(b).

130. IC, "Archived—Final Evaluation"; IC, *Broadband Canada: Connecting Rural Canadians: Application Guide*, 5; IC/Hickling Arthurs Low, ix.

131. IC, *Broadband Canada: Connecting Rural Canadians: Application Guide*, 5; IC/Hickling Arthurs Low, ix.

132. IC/Hickling Arthurs Low, i, 57.

information on monthly cost for the subscriber, and projects with lower end-user costs are to receive higher ratings than more expensive projects.¹³³ Furthermore, applicants are required to detail costs for a plan that allows subscribers a minimum of 45 GB/month.¹³⁴ For projects falling under the northern component, the specifications are even clearer—plans must allow 20 GB/month and not cost more than \$80/month.¹³⁵ In contrast, Broadband Canada's application guide did note a commitment to affordability,¹³⁶ but did not quantify affordability.

As indicated by the Canadian Telecommunication Policy objectives, affordability is a key element of broadband service. While programs have consistently emphasized this point, the development of a more quantitative approach to assessing affordability, particularly in the northern component of Connecting Canadians, is a useful development and future programs should continue this approach.

In contrast to other themes in broadband programs, whereby the tendency has been to de-emphasize the democratic potentials of broadband technology and favor enhancing ISPs' profits, the recent Connecting Canadians program's use of quantified affordability criteria represents a step in the opposite direction. At the same time, though, it should be noted that federal programs have not strongly emphasized universal, affordable broadband access; however, it should also be acknowledged that this was a significant issue in the CRTC's most recent review of basic telecommunication services.¹³⁷

Market Forces

In order to execute these programs, there has been a varying reliance on market forces, which increased as programs shifted their focus from public/community connections to household access.¹³⁸ Early programs were strongly focused on directly funding public access points. CAP funded public access points at schools, libraries, and community centers, and at

133. IC, *Connecting Canadians Application Guidelines*, 6–7.

134. *Ibid.*, 6.

135. *Ibid.*, 6–7.

136. IC, *Broadband Canada: Connecting Rural Canadians: Application Guide*, 5.

137. CRTC, *Telecom Notice of Consultation 2015-134*.

138. IC, "Archived—Final Evaluation."

its high point in 2003–2004 there were 8,800 public sites being funded.¹³⁹ The NSI was designed to fund access to satellite capacity for communities, which in turn would acquire services from telecommunications service providers.¹⁴⁰ ISPs were not eligible to apply for satellite capacity, and eligibility was restricted to governments, legally incorporated not-for-profits, and Aboriginal bands that committed themselves to act on behalf of communities.¹⁴¹ BRAND funded underserved communities. This funding could be used to either develop business plans that demonstrate the need for broadband, or fund the implementation of broadband services.¹⁴² Eligible recipients for either business plans or implementation of services included legally incorporated not-for-profits and “Indian Bands,” though provincial and territorial governments were eligible only for implementation of services.¹⁴³ While early programs focused on direct funding for public institutions and communities, over time funding programs became more focused on providing subsidies to ISPs.

More recent programs depart from direct public funding for connections and communities; they instead focus on funding service providers. Broadband Canada listed publicly owned entities and First Nations’ organizations as eligible for funding, but it also provided funding to private companies and not-for-profits. The primary factor determining eligibility for funding under Broadband Canada was not the type of organization, but a requirement that recipients be legal Canadian entities that could build and operate broadband infrastructure.¹⁴⁴ While some local governments and First Nation groups received Broadband Canada funding, primarily the money flowed to private sector companies.¹⁴⁵ Connecting Canadians marks a further evolution toward reliance on market forces. Funding was only made available to ISPs as part of the program, and IC goes so far as to state, “The final decision to offer high-speed Internet in a given area rests with individual ISPs.”¹⁴⁶

The trend toward increasing reliance on market forces is not surprising. This approach is consistent with section 7(f) of the Telecommunications

139. Ibid.

140. IC, “Broadband: FAQs.”

141. Ibid.; IC, *National Satellite Initiative: First Call*, 2.

142. IC/Hickling Arthurs Low, ii.

143. IC, “Broadband: FAQs.”

144. IC, “Broadband Canada: Connecting Rural Canadians: Frequently Asked Questions.”

145. IC, “Broadband Canada: Connecting Rural Canadians: List of Projects.”

146. IC, “Connecting Canadians: For Canadians.”

Act/Canadian Telecommunications Policy objectives.¹⁴⁷ It is reflective of the recommendations of the Telecommunications Policy Review Panel Final Report,¹⁴⁸ as well as the Cabinet directive to the CRTC¹⁴⁹ and the 2007 Spectrum Policy Framework for Canada¹⁵⁰ by IC, all of which emphasized not just reliance on market forces, but reliance on market forces to the maximum extent feasible. Coupled with the shift toward market forces has been the emphasis on household rather than community connections. IC stated in its final evaluation of CAP in 2009, “While the Federal Government views broadband internet access as an essential infrastructure, it is now emphasizing private sector development and access by households, rather than public access.”¹⁵¹ That same year as part of a Broadband Canada press release, IC stated, “As communities vary greatly in size, this program focuses on connecting households,”¹⁵² further underscoring the shift from community to household access.

Although the increased reliance on the market to provision broadband service does align federal broadband programs with policy objectives, the degree to which the federal government has shifted roles in ensuring broadband—reflected in the language from the Connecting Canadians program—represents an overreliance on the market and reduction of role of government in an area of crucial infrastructure. For individuals overall, the shift from community to household access can result in a loss of skill training at community sites.

As government policy shifts toward greater reliance on market forces, areas such as rural and remote communities with lower population densities and income will not benefit from the shift. These areas are not providing enough conditions for market forces to emerge due to lack of economies of scale, remoteness of location, geographical conditions, and reduced purchasing power for goods and services. Furthermore, as noted by the Telecommunications Policy Review Panel, reliance on market forces can be undermined by significant market power, abuse of dominance, and network externalities.¹⁵³ These factors are present in the Canadian telecom

147. Telecommunications Act, 7(f).

148. Canada Telecommunications Policy Review Panel (TPRP), 2-12, 3-5, and 3-6.

149. Order Issuing a Direction to the CRTC on Implementing the Canadian Telecommunications Policy Directives, 1(a)(i).

150. IC, *Spectrum Policy Framework*, 9.

151. IC, “Archived—Final Evaluation.”

152. IC, “Broadband Canada: Connecting Rural Canadians Launches.”

153. TPRP, 3-9.

market, which is characterized by an oligopolistic core and competitive fringes.¹⁵⁴ Market forces, underpinned by the concept of maximizing shareholder value, have potential to conflict with social policy objectives and the public good. As the Telecommunications Policy Review Panel Final Report noted explicitly, “social policy objectives that may not be met through competitive market forces or economic regulation alone.”¹⁵⁵ As broadband programs have increasingly relied upon market forces, the potential social benefits may not be realized, suggesting that democratic potentialities of broadband may be lost in favor of private gain.

Economic Development

Economic development is a central policy concern of ISED and a consistent theme in broadband programs. This can be traced to ISED’s mission “to foster a growing, competitive, knowledge-based Canadian economy.”¹⁵⁶ SchoolNet, drawing on the 1996 IC whitepaper *Building the Information Society*, had for one of its main thrusts “realizing the economic and social benefits for all Canadians of the Information Highway and allowing them to participate fully in the emerging information society.”¹⁵⁷ Likewise, under CAP, a program objective was to “stimulate economic growth in rural areas” and the impetus for this was section 7(h) of the Telecommunications Act.¹⁵⁸ In its call for applications for Round 1 funding, the NSI asked applicants to provide realistic anticipated economic benefits that will result from the project,¹⁵⁹ and, as reported in the media, an objective of the NICSN funding by NSI was to increase the potential for innovation and economic development.¹⁶⁰

The importance of sustainable businesses within rural and remote communities has been a consistent theme within the economic development objective of many programs. BRAND, Broadband Canada, and Connecting Canadians underscored the benefits of broadband access for existing

154. Winseck, 65.

155. TPRP, 6-3.

156. ISED, “About Us.”

157. IC/KPMG, 19.

158. IC, “Archived—Final Evaluation.”

159. IC, *National Satellite Initiative: First Call*, 2.

160. Newswire.

businesses in the communities.¹⁶¹ Economic development is prominent in BRAND's objectives, including how funding addresses unserved community needs such as job creation and economic development.¹⁶² Broadband Canada's application guide informs citizens that investments in broadband infrastructure can create value-added jobs, facilitate new business models and opportunities, increase profitability and productivity of current businesses, and allow citizens to gain experience from broadband services, leading to increased employee recruitment and job retention and creation.¹⁶³ Although the Connecting Canadians program is focused on household connections, it notes the relationship between broadband access and ensuring communities are viable for business by retaining individuals.¹⁶⁴

A means of ensuring community business viability is through participation in the digital economy and access to global markets. BRAND's mission was to "improve the communities' participation in the national and global economy" and it had the strategic outcome of ensuring communities' sustainability.¹⁶⁵ Broadband Canada also aimed to "provide essential infrastructure to Canadians in remote and rural areas allowing them to participate in the Internet economy by getting access to information, services and opportunities that would otherwise be out of reach."¹⁶⁶ Under Digital Canada 150, however, the digital economy is only referenced under the economic opportunities pillar, not the Connecting Canadians section.¹⁶⁷

In their respective final evaluation reports, there is some evidence of the programs' tangible economic benefits for citizens. In its report, FNSN focuses on the career benefit for students from skills acquired and the "youth employment strategy" made possible by the network.¹⁶⁸ The evaluation of BRAND identifies general economic benefits, including new jobs, skills development, and sustainable economic development, with particular emphasis on community viability: "existing businesses deciding to remain in the community and/or expanding their operations, new businesses

161. IC/Hickling Arthurs Low, vii; IC, *Broadband Canada: Connecting Rural Canadians: Application Guide*, 4; IC, *Connecting Canadians: Digital Canada*, 1.

162. IC/Hickling Arthurs Low, ii.

163. IC, *Broadband Canada: Connecting Rural Canadians: Application Guide*, 4.

164. IC, *Connecting Canadians: Digital Canada*, 2.

165. IC/Hickling Arthurs Low, 11.

166. IC, *Broadband Canada: Connecting Rural Canadians: Application Guide*, 5.

167. IC, *Digital Canada 150*, 15.

168. INAC, *Evaluation of the First Nations*, 9, 20.

locating in the community.”¹⁶⁹ Further, BRAND notes that two-thirds of community champions who responded to the evaluation survey agree that the program “led to improved economic opportunities.”¹⁷⁰ The Bearing Point analysis concluded that benefits from BRAND totaled \$87 million, from CAP were \$474 million, and from FNSN were \$57 million by 2005.¹⁷¹ Furthermore, in addition to quantifiable monetary benefits, the Bearing Point analysis also underscores the nonquantifiable benefits that flowed from each of these programs, including increased social capital, improved productivity, environmental benefits, and local business development.¹⁷² *Digital Canada 150* argues that Broadband Canada is a success story. It highlights that the program brought services and economic opportunities to communities, and specifically highlights that it connected twenty-six First Nation communities in Northern Ontario and the entire population of the Îles-de-la-Madeleine.¹⁷³ These economic benefits, however, are only described broadly with limited evidence.

Though economic development has been a consistent goal of federal broadband programs, demonstrable evidence of such development for newer programs is less well documented compared to earlier programs. More recent programs (particularly Broadband Canada and Connecting Canadians) would benefit from the detailed analysis and scrutiny earlier programs underwent and reported. Considering new programs have provided capital to ISPs, the government should endeavor to demonstrate the benefits of this funding to the communities targeted by these programs. Without this kind of detailed analysis, it is difficult to assess the degree to which new programs have enhanced economic opportunities for communities and individuals.

Skills Development

Within Canadian broadband programs, the objective of citizen skills development has always been tied to the digital economy. The core objective of CAP and SchoolNet was to provide skills training in IT technologies as a means for citizens to seek job opportunities or participate in the global,

169. IC/Hickling Arthurs Low, vi, vii.

170. Ibid., 39.

171. Bearing Point, 12.

172. Ibid., 21–23.

173. IC, *Digital Canada 150*, 10.

knowledge-based economy.¹⁷⁴ Skill development was a cornerstone of CAP, and the program eventually took on a Youth Initiative element that funded internships at CAP sites.¹⁷⁵ CAP's final evaluation provided some evidence that training resulted in individuals being able to secure employment.¹⁷⁶ SchoolNet created positions to overcome barriers to increased ICT use in schools.¹⁷⁷ In addition, the SchoolNet Youth Employment Initiative helped "youth between the ages of 15–30 . . . with proficiency in information and communication technology, acquire valuable employability skills to secure longer-term careers in technology by providing relevant, marketable work terms in schools and libraries."¹⁷⁸ BRAND stated that broadband was crucial by providing opportunities for skill development.¹⁷⁹

While skill development has been a key priority of IC and its broadband programs, a review of departmental *Reports on Plans and Priorities* indicates a declining emphasis on skills development over time. IC, in its 2001–2002 *Report on Plans and Priorities*, claimed, "through strategic investments in skills development, knowledge creation and new technologies, the government is committed to expanding Canada's knowledge base and innovation and research capacity, and accelerating Canada's leadership in the new economy."¹⁸⁰ Its 2005–2006 *Reports on Plans and Priorities* identified the Department's interest in promoting "economic development by ensuring Canadians, communities and businesses have access to reliable modern ICT infrastructure and the skills needed to fully participate in the digital economy."¹⁸¹ By 2014, however, digital skills were significantly less of a concern. The 2014–2015 *IC Report on Plans and Priorities* states that "promoting economic development in communities encourages the development of skills,"¹⁸² shifting the emphasis on skills development from government to the individual.

This sentiment is reflected in the Digital Canada 150 program. It mentions "digital skills" not under Connecting Canadians, but under the final section of the document ("Moving Forward"), where it urges individuals

174. IC, "Archived—Final Evaluation"; Canada, "Connecting Canadians: What is SchoolNet?"

175. IC, "Archived—Final Evaluation"; ISED, "Youth Internships."

176. IC, "Archived—Final Evaluation."

177. IC/KPMG, iii.

178. Canada, "SchoolNet: Answers to FAQs."

179. IC/Hickling Arthurs Low, vii.

180. IC, 2001–2002 *Estimates*, 1.

181. IC, 2005–2006 *Estimates*, 26.

182. IC, "Archived—2014–15 Estimates."

to “acquir[e] the skills and embrac[e] the opportunities of the digital economy.”¹⁸³ In addition Digital Canada 150’s two identifiable skills training programs are the general Canada Job Grant and the two-decade-old Computers for Schools Program.¹⁸⁴

The Digital Canada 150 2.0 document has an increased focus on skills development, but this task is relegated to other organizations. It states that the Computers for Schools program provides computer equipment and skill training to not-for-profit organizations focusing on low-income Canadians, seniors, and New Canadians, and to schools, libraries, and Aboriginal communities.¹⁸⁵ This program relies on external donations and the skill training mentioned in the context of this program is provided by other organizations, not Connecting Canadians. This revised document also promotes the Skills/Compétences Canada (SCC) organization, because its annual youth competition is supported by donations from the Computers for Schools program.¹⁸⁶ The SCC, however, is a separate organization from Connecting Canadians, which the latter supports through technical infrastructure. In addition, the SCC’s focus is on youth, a demographic that currently has the highest skills competencies. In Canada only 5 percent of youths lack basic ICT skills, on par with the OECD average.¹⁸⁷ Thus, skill development is not a key objective of Connecting Canadians as it was with earlier federal broadband programs, and has been transformed from a responsibility of government to the individual and third-party organizations. This shift suggests that as with several other themes explored in the analysis, the tendency has been for broadband programs over time to de-emphasize the benefits of broadband for individuals and communities. Broadband programs that specifically encourage the development of skills along with increasing connections would do far more to strengthen the democratic potentials of broadband technology.

Education

Education has been a consistent objective of broadband programs. CAP provided public points of access in schools, and 78 percent of all sites

183. IC, *Digital Canada 150*, 26.

184. *Ibid.*, 15.

185. IC, *Digital Canada 150 2.0*, 5.

186. *Ibid.*, 6.

187. OECD, *OECD Skills Outlook 2015*, 38.

reported “academic/education” use of their services.¹⁸⁸ Likewise, SchoolNet provided Internet access in schools and libraries and sought to “enhance educational opportunities and achievements in schools across Canada by making national and international resources available to learners and educators.”¹⁸⁹ Unsurprisingly, SchoolNet had the greatest educational focus supporting the development of online educational resources; however, an evaluation of the program noted that the federal government’s primary interest in the program was infrastructure resources rather than the development of educational resources.¹⁹⁰

The role of education in federal broadband programs has shifted from providing a physical point of access, the role of CAP and SchoolNet, to encouraging tele-education and distance education. One of the objectives of the NSI was the provision of education,¹⁹¹ and the NICSN would “improv[e] the electronic delivery of public services such as . . . education.”¹⁹² Likewise, BRAND cites education benefits: “particularly distance education, conducting research over the Internet, youth being able to stay at home and in their community to complete high school, completing college/university courses/degrees and/or taking job skills training from their community as opposed to living away from home.”¹⁹³ Broadband Canada simply lists education, along with health care and access to government services, as an area for which broadband Internet infrastructure is an important tool.¹⁹⁴ However, no specific services are mentioned. Most recently, Connecting Canadians provides a passing mention of education as one service that broadband speeds of 5 Mbps enables.¹⁹⁵

Final evaluation documents provide anecdotal evidence of distance education uptake by communities and citizens involved in broadband programs. Survey respondents for the formative evaluation of BRAND ranked “distance education, in addition to e-banking and access to CAP sites” as the three most important applications.¹⁹⁶ The Final Evaluation of CAP notes that 78 percent of sites reported “academic/education use” by

188. IC, “Archived—Final Evaluation.”

189. Canada, “SchoolNet: Mission Statement.”

190. IC/KPMG Consulting LP, 49.

191. IC, *National Satellite Initiative: First Call*, 1; IC, “National Satellite Initiative: About Us.”

192. Newswire.

193. IC/Hickling Arthurs Low, vii.

194. IC, *Broadband Canada: Connecting Rural Canadians: Application Guide*, 4.

195. IC, *Digital Canada 150*, 7.

196. IC/Hickling Arthurs Low, 26.

users.¹⁹⁷ BRAND underscores distance education as a key factor in the success of the program, as youth were able to stay in their community for education.¹⁹⁸

While educational benefits have been consistently identified as a result of federal broadband programs, there has been a change from programs attempting to empirically demonstrate the educational benefits of broadband to simply claiming they exist. Without clear evidence as to how programs such as Broadband Canada and Connecting Canadians have increased educational opportunities, it is challenging to assert that such programs are enhancing the democratic potentials of broadband technology.

Participation in Government

At the federal level, broadband programs' objective of government participation is twofold: access to government services and participation in government. The OECD observes how, more and more, "familiarity with and use of ICTs has become almost a prerequisite for accessing basic public services and exercising the rights and duties of citizenship."¹⁹⁹ Eighty-four percent of CAP sites reported use of the Internet to, among other things, find government services online.²⁰⁰ SchoolNet aligned itself with IC's initiative of "getting government right by ensuring better services and a more affordable, accessible and responsive government and making government a model user and a catalyst for Information Highway development across Canada."²⁰¹ The NSI asked applicants for the number of "Government offices (federal, provincial/territorial, municipal/local, band)" within the community to be served.²⁰² Under BRAND, the area of governance was identified as a need for unserved communities, and under the "government" sector, benefits included "being able to access and download information on government programs and services, completing and filing forms online."²⁰³ Like its predecessors the NSI and BRAND, Broadband

197. IC, "Archived—Final Evaluation."

198. IC/Hickling Arthurs Low, vii.

199. OECD, *OECD Skills Outlook 2013*, 46.

200. IC, "Archived—Final Evaluation."

201. IC/KPMG Consulting LP, 19.

202. IC, *National Satellite Initiative: First Call*, 2.

203. IC/Hickling Arthurs Low, vii.

Canada sought to improve access to government services.²⁰⁴ The NSI and BRAND touted broadband as infrastructure that can “improve the ability of citizens to participate in local, regional and national issues of interest.”²⁰⁵

Increasingly, the objective of civic participation has shifted from an act that broadband infrastructure facilitates to one tied to the objective of economic development. Broadband Canada only emphasized the importance of broadband for participation in the digital economy.²⁰⁶ Under the Digital Canada 150 initiative, there is no mention within the Connecting Canadians pillar of government service access or participation. The Digital Government pillar, however, identifies services that will be provided through Internet access on broadband, including the Open Government Initiative, which will give Canadians opportunities to learn about, and participate in, government, and “drive innovation and economic opportunities” and the Open Data Portal, which provides access to government datasets.²⁰⁷ While earlier programs emphasized participation in electronic government services, with Connecting Canadians and Digital Canada 150 the focus has shifted to the passive consumption of government services, again suggesting that federal programs have failed to fully emphasize the democratic potential of broadband technology.

Health

Like education and government, broadband programs’ support for health benefits takes the route of providing connectivity to health facilities or encouraging the use of electronic health services by citizens. Like distance education, “tele-health” is a service that the NSI hoped to make available through affordable satellite service, and the NSI funded NICSN aimed to “improv[e] the electronic delivery of public services such as health.”²⁰⁸ BRAND identified the economic benefits of tele-health for both citizens and medical professionals. According to the program, tele-health saves patients and medical professionals time from traveling to consultations and it also increases the retention of health professions in the community who,

204. IC, “Broadband: FAQs”; IC, “Broadband Canada: Connecting Rural Canadians: Frequently Asked Questions”; Newswire.

205. IC, “Broadband: FAQs.”

206. IC, “Broadband Canada: Connecting Rural Canadians: Frequently Asked Questions.”

207. IC, *Digital Canada 150*, 20.

208. IC, *National Satellite Initiative: First Call*; Newswire.

without broadband access, are more likely to locate elsewhere.²⁰⁹ Broadband Canada claimed health services as a benefit of increased access.²¹⁰ An early webpage from Connecting Canadians noted “more Canadians will be able to connect with their doctors . . . across the country.”²¹¹ However, more recent versions of this URL drop this claim.²¹² Curiously, the final evaluation of CAP provides no discussion of health benefits/outcomes.²¹³

Some programs simply mention health as an area in which services can be provided through improved access, but without reference to specific services. Unlike the provision of information, which is suitable for some education and government benefits, e-health or tele-health services require fast and reliable speeds and specific technology to support videoconferencing. The boldest claim in regard to specific health services provided over broadband was a 2004 FAQ for both the NSI and BRAND, which indicated remote surgery would be possible over broadband, though neither program provides specific evidence of this actually happening.²¹⁴

There is some evidence of broadband-enabled health services resulting from broadband programs. FNSN notes that, among other institutions, health centers have accessed the network, and 28 percent of survey respondents note that “tele-health” services were provided because of the network.²¹⁵ BRAND’s formative evaluation cites the program’s impact on health with regards to avoided time and cost for medical consultations and increased retention of health-care professionals in the community, and tele-health was ranked by survey respondents as the sixth most important broadband application.²¹⁶ These comments reflect the intended benefits in the health sector as outlined in the program documents.

As with educational and government service provision benefits, Canadian broadband programs consistently note health benefits as an outcome facilitated by broadband. However, with some exceptions the government has provided limited evidence in its evaluation of programs to support these claims. For broadband programs to effectively enhance democratic poten-

209. IC/Hickling Arthurs Low, vii.

210. IC, *Broadband Canada: Connecting Rural Canadians: Application Guide*, 10.

211. IC, “Connecting Canadians: For Canadians.”

212. Compare IC, “Digital Canada 150: Connecting Canadians,” with the archived URL from 2014: https://web.archive.org/web/20141006190059/http://www.ic.gc.ca/eic/site/028.nsf/eng/h_00587.html

213. IC, “Archived—Final Evaluation.”

214. IC, “Broadband: FAQs.”

215. INAC, *Evaluation of the First Nations*, 8, 20.

216. IC/Hickling Arthurs Low, vii, 27.

tials of broadband, the government must go beyond simply noting the potentiality of health services delivered over the Internet and demonstrate the benefits. As with the themes of education and participation in government, without clear evidence of how these technologies are improving access to health, it is difficult to claim that broadband programs are more aligned with improving democratic and social uses of these technologies and not simply enhancing the dominance of telecommunications firms and further enabling them to profit from the provision of broadband services.

Summary Analysis of Each Program

Table 2 provides a brief overview of each program in regard to the themes analyzed.

TABLE 2 Program Summary by Theme

Theme/ Program Matrix	CAP	SchoolNet/ FNSN	NSI	BRAND	Broadband Canada	Connecting Canadians
Program Expenditure (\$CAD million)	~\$420 ²¹⁷	\$38.9	\$85	\$111.5	\$190	\$120
Access and Connectivity	Individual and household access	Individual, school, and library access	Community	Community	Household	Household
Broadband Speed	Minimum 1.5 Mbps	10 Mbps	N/A	N/A	Minimum 1.5 Mbps	Minimum 5 Mbps (North: 3–5 Mbps)
Technology Used	(Cable, DSL, dial-up, and other)	N/A	Satellite	Technology neutral	Technology neutral	Technology neutral
Affordability	Affordable access	N/A	Satellite capacity	Affordable access	Affordable access	Better ser- vice, more choice, lower prices

(Continued)

217. Funding for CAP beyond the 2009–2010 FY is not clear. This figure is taken for the Final Evaluation of the Community Access Program, which was conducted in 2009 (IC, “Archived—Final Evaluation”).

TABLE 2 Program Summary by Theme (*Continued*)

Theme/ Program Matrix	CAP	SchoolNet/ FNSN	NSI	BRAND	Broadband Canada	Connecting Canadians
Market Forces	Public access	N/A	Not compete with private sector	Address needs not provided by market forces	Address needs not provided by market forces	Market forces
Economic Development	Stimulate economic growth in rural areas	Economic benefits	Economic benefits	Sustainable businesses in rural/ remote area	Sustainable businesses in rural/ remote area	Sustainable businesses in rural/ remote area
Skills Development	IT skills	IT skills	N/A	Skills development	N/A	Citizens to acquire skills
Education	School access and academic/ education use	School and library access	Tele- education	Distance education	Education	Distance education
Participation in Government	Online govern- ment services	Accessible government	Serve government offices; improve access to services	Improve access to services and participate	Improve access to services and participate	Open gov- ernment/ open data
Health	N/A	Health center access and tele-health	Tele-health	Tele-health	Health	Connect with doctors

In summary, the effectiveness of each federal broadband program can be determined by their key objectives, since documentation on access or connectivity varies as percentage or numeric measurements, and by communities or households served. The Community Access Program provided valuable public access points to mitigate the digital divide and the provision of technical skills to encourage household adoption of broadband, which it measured following the program.²¹⁸ SchoolNet and

218. IC, "Archived—Final Evaluation."

FNSN also measured household access following their implementation, focused on educational opportunities, including tele-education, the career benefit for students from skills acquired, and the “youth employment strategy” made possible by the network, and aimed to increase connection speeds above CRTC mandates.²¹⁹ The core objective of CAP and SchoolNet was to provide IT technologies skill training to help citizens to seek job opportunities or participate in the global, knowledge-based economy.²²⁰ BRAND sought to provide affordable access in urban, rural, and remote areas, with a focus on economic development, addressing community needs including job creation and economic development locally and in the global economy, and two-thirds of community champions who responded to the evaluation survey agree that the program “led to improved economic opportunities.”²²¹ Most importantly, the evaluative documents of these programs demonstrate their tangible outcomes.

The NSI and BRAND both expanded rural and remote connections during the mid-2000s. The two programs combined resulted in 1,000 more communities gaining access to broadband, and thus significantly contributed to closing the urban–rural/remote broadband availability divide.²²² BRAND’s technological neutrality has also influenced subsequent programs.

Broadband Canada and Connecting Canadians mark a turning point in Canadian broadband policy. These programs focused on household connections, aiming to provide affordable access to unserved and underserved households and increase economic opportunities. They also reflect a growing interest by the federal government in having programs supplement market forces rather than having the government directly build infrastructure. Speed targets have been rather unambitious, though achievable in the context of rural and remote communities. Connecting Canadians has demonstrated some areas of useful program development, such as greater qualification of affordability criteria; however, in other areas it appears to have regressed in contrast to earlier programs (e.g., promotion of digital

219. Canada, “SchoolNet: Mission Statement”; INAC, *Evaluation of the First Nations*, 9, 14, 18, 20.

220. IC, “Archived—Final Evaluation”; Canada, “Connecting Canadians: What Is SchoolNet?”

221. IC/Hickling Arthurs Low, ii, ix, vi, ii, 11.

222. IC/Hickling Arthurs Low, 19; IC, “National Satellite Initiative: About Us”; CRTC, *Satellite Inquiry Report*, 52–53.

skills). Arguably the most important development over time has been the declining available evidence on the effectiveness of the broadband programs. CAP, SchoolNet, and BRAND have extensive evaluation documentation. The 2011 Audit of Broadband Canada does not compare to the detailed scrutiny under which earlier programs were put.²²³ Hopefully Connecting Canadians, upon its conclusion, will correct this recent shortcoming.

Discussion and Conclusions

As the Government of Canada rolls out its newest broadband program, the analysis of previous federal broadband programs provides many useful insights.²²⁴ With regards to program spending, it is crucial that the government provide transparent information on costs. In this regard, as the current Connecting Canadians program winds down, it is strongly recommended that the government scrutinize the program and its benefits along the same level of the Bearing Point analysis that was done on CAP, BRAND, and FNSN. Prior to funding and upon completion of programs, the government, in conjunction with the CRTC, should provide baseline statistics on both broadband availability and penetration at various speeds at a granular level (i.e., by community level) for communities being served/targeted that can be used to assess the effectiveness of a program and do comparative analysis between programs. While these statistics are reported in the CRTC's annual *Communications Monitoring Report*,²²⁵ it is necessary to identify changes in availability and penetration, both in raw numbers and percentage share, which flow directly from the new program. One particular gap the program should examine and address is barriers to access and uptake, and in this regard a reinstatement of Statistics Canada Canadian Internet Use Survey, last undertaken in 2012, would be an important step.²²⁶

223. IC, "Audit of the Broadband."

224. While the government announced \$500 million as part of its 2016 budget, the vast majority of this spending will occur beyond the FY 2017–2018. According to the budget, \$6 million is to be spent in FY 2016–2017, and \$81 million in FY 2017–2018, leaving the remainder, \$413 million, for FY 2018–2019 and beyond (Canada, *Growing the Middle Class*, 130).

225. CRTC, *Communications Monitoring Report*, 207, 209, 211.

226. Statistics Canada.

Although previous programs, most notably Broadband Canada and Connecting Canadians, have adopted a principle of technological neutrality, the government should strongly consider the value of funding legacy connection types. As suggested by Middleton, fiber and its capacity to support high-speed broadband connections allows Internet service to transcend the constraints of first-generation broadband legacy connections and into a model of abundance, providing consumers with reliable and high quality access to any online service or application.²²⁷ While previous programs have set achievable targets, the government must also realize that legacy connection types (DSL and cable) will not be sufficient for future uses and meaningful participation in a digital society. Furthermore, universal coverage at basic service levels may result from the CRTC's review of basic telecommunication services.²²⁸ A focus on increasing fiber connections, an area where Canada lags behind many OECD countries, should be a key part of the new federal program, even when such connections may be costly in rural and remote areas.

As with previous programs, the new program aims to ensure rural and remote Canadians are "equipped to participate in the digital economy and take advantage of advances in telehealth, e-learning and remote access to government services."²²⁹ There is also a crucial need for the new program to document how the \$500 million in spending enables these uses. If the new program relies primarily on the private sector, the government must recognize that historically it has not shared the same vision for realizing the socioeconomic benefits of broadband in relation to health and distance learning.²³⁰

While market forces have played a growing role in the Canadian broadband ecosystem, the government must also appreciate that in rural and remote areas such forces may be nascent or nonexistent. While Connecting Canadians clearly declared that it was the role of ISPs to provide connections, the government must show leadership and where necessary invest heavily to ensure rural and remote Canadians can benefit from the new \$500 million program.

Most importantly, new policy must place much greater emphasis on enhancing the democratic potentials broadband technology facili-

227. Middleton, "Moral Fibre," 34.

228. CRTC, *Telecom Notice of Consultation 2015-134*.

229. Department of Finance Canada.

230. Middleton, "Canada's Telecommunications Policy Environment," 69.9.

tates. In this regard, the Connecting Canadians approach to quantifying affordability in its application guide is a useful first step, but on the whole the trend of policies and programs over time has undermined the democratic potentials of broadband. The Telecommunications Act's policy objectives create a clear social objective in telecom policy; however, as revealed by the analysis, there is declining evidence that these social objectives are met to the fullest degree.

Finally, this analysis provides one other important insight for the government as it proceeds with Connecting Canadians and unveils its new program. An examination of the sources used here reveals that many of the documents about previous programs are no longer available directly from government websites. Although both the Internet Archive and Library and Archives Canada provide web captures of government websites,²³¹ there should also be a responsibility for federal departments and agencies to properly steward their information, particularly about critical infrastructure programs such as broadband. The lack of public information on programs, in particular the lack of thorough and detailed analysis of their effectiveness, undermines broadband policy as a whole. It is a core responsibility of federal departments and agencies to collect and make public tangible data and final reports on the benefits and outcomes of recent broadband programs. In this regard, the analysis contained within is limited because of the documents available; however, future work should be done exploring each of these themes in detail, and also assessing policy initiatives by provincial and territorial governments and the CRTC to provide a more holistic view of Canadian broadband. The thematic framework provided here provides a starting point for such future analyses including comparative work with other leading countries in broadband (e.g., Korea, Japan).

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231. Library and Archives Canada.

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