

**White Paper**

**Investment in Next Generation Networks and Wholesale Telecommunications  
Regulation**

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**September 15, 2008**

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## **Executive Summary**

Canada is at a cross-road. Once a leader in international broadband standings, Canada is now being passed by many countries in the very high speed communications services that can bring the profound benefits of information technology to their citizens. Canadian leaders would advance the interests of Canadian citizens by swiftly establishing regulatory policy that clearly ensures investors that new broadband infrastructure will not, if built, have to be provided to competitors at regulated prices.

The rapidly-accumulating evidence from the international arena is that investment in information and communications technology (ICT) is the principal driver of labor productivity growth and, therefore, overall economic growth in developed nations. A major component of ICT capital is the broadband infrastructure required to transmit information in the modern economy. The benefits of broadband infrastructure are not abstract—in addition to driving economic growth, they manifest themselves in providing to Canadian citizens and businesses increased availability, quality, and efficiency of a myriad of services that are central to citizens' well-being, including healthcare, education, government services, commerce, media, and entertainment. A 2001 report by the Canadian National Broadband Task Force argued that “the impact of broadband communications on Canadian life will be at least as great as the impact of railways, highways, airlines, traditional telecommunications and broadcasting.”<sup>1</sup> The benefits at the local level of access to broadband infrastructure have been documented in case studies of Canadian regions such as Peace River, Alberta; South Similkameen, British Columbia; South Dundas, Ontario; and Tillsonburg, Ontario.

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\* The authors acknowledge funding for this paper provided by TELUS.

<sup>1</sup> “The New National Dream: Networking the Nation for Broadband Access,” Report of the National Broadband Task Force, Government of Canada (hereafter *2001 Broadband Report*), p. 3.

The development of these advanced broadband networks requires huge, risky investment at a scale that can threaten a company's viability. Canadian companies must compete in the global capital market for such investment funds, and investors must find the prospects for earning a return sufficient to be willing to accept the risks. Unfortunately, Canada lags substantially behind the United States in spending on information technology and, as a result, its productivity growth has also lagged.

Among the most important inhibitors of capital investment in telecommunications is ill-advised regulatory policy. Rational investors in telecommunication technology must be assured that the regulations that will govern the new, "next generation" networks will not undermine their investment before they will commit to funding them. In particular, investors must be assured that mandatory unbundling of these new network facilities will not be imposed, because mandatory unbundling at regulated wholesale prices deprives the owner of the ultimate control of the assets and severely reduces the returns on these very risky projects.

Empirical analyses and case studies document the damaging effects of unbundling regulations on investment in the U.S., Europe, and elsewhere. The research also documents the beneficial effects of intermodal (investment-based) competition on broadband penetration, and the insignificance of intramodal (unbundling-based) competition on broadband penetration. That is, the empirical studies find that broadband take-up rates are increased by competition between network platforms such as cable and DSL, in which the providers must make their own, at-risk investments. In contrast, broadband take-up rates do not appear to be materially affected by the kind of competition engendered by unbundling.

It is also telling that the two largest U.S. incumbent local exchange carriers (Verizon and AT&T), who are now making massive and risky investments in fiber-to-the-home and fiber-to-the-node networks, began those investments in earnest only after the FCC issued its ruling protecting those investments from unbundling obligations. Similarly, case study analysis of several OECD countries finds that those countries that require unbundling of next-generation networks and those in which the regulatory issues are still unresolved have very limited investment in next-generation networks. It is reasonable to expect that Canadian ILECs face similar economic considerations and market constraints on their investment decisions. If the CRTC perpetuates an ambiguous policy stance toward unbundling, or affirmatively imposes unbundling requirements on new investment, we can expect continued reluctance to commit to massive broadband infrastructure investments. If, instead, the CRTC clearly and expeditiously establishes policy that protects new investments from unbundling obligations, it is reasonable to expect the kind of increased investment activity that is taking place in the U.S. and other countries with similar policies.

This is an important moment in history for Canada, at a time when the country's relatively high ranking on the world broadband scale is being threatened and massive new investments in very high-speed broadband architectures are being made by ILECs in other countries, such as the United States, Japan, and Korea. The CRTC can either

discourage continued investment and innovation in state-of-the-art information technology, or it can encourage efficient investment, innovation, and competition. Moreover, regulatory inaction by the CRTC is not benign—failure to establish clear policy to protect investment merely perpetuates the stagnation of investment. Canada's policy makers can encourage efficient investment, innovation, and competition, and thereby promote economic welfare and prosperity in Canada, by establishing a clear policy against expanding the ILECs' unbundling obligations to new broadband networks.

## **I. INTRODUCTION**

The incredible pace of technological change in information and communications technologies (ICT) has created substantial challenges for private companies and governments alike. Companies that fail to adapt and invest in the most efficient technologies do so at the risk of their own survival. This is particularly true in the communications sector as telecommunications firms and cable television companies attempt to adapt to the new possibilities provided by handheld devices, new wireless technologies, and the Internet. Nevertheless, while communications companies that fail to invest in new technology sow the seeds of their own obsolescence, the capital needed to build next-generation networks are so large that committing to these large investments also puts the company's survival at risk. Moreover, these companies' investment decisions are crucial to their home country's productivity growth. Countries with low rates of investment in and diffusion of ICT technologies are already encountering lagging productivity growth.<sup>2</sup>

Company investment decisions are guided by estimates of current and future market conditions because market conditions determine the expected profitability and risk of an investment. In telecommunications, these investment decisions are inescapably affected by current and anticipated government regulation as well. Because regulators may allow competitors access to a carrier's network facilities at regulated rates, a carrier's investment decisions must take into account the detrimental effect of such regulations on future cash flows. Given the importance of new ICT capital to a country's wellbeing, policy-makers must be cognizant of these effects. Policy-makers in Canada should establish conditions that are hospitable to investment in welfare-enhancing and productivity-enhancing broadband infrastructure, by creating regulatory certainty that the massive new investments needed to build the next generation of networks will not be subject to forced unbundling obligations. Investors cannot be expected to devote the necessary resources to a large scale infrastructure build-out without such assurances.

## **II. CANADA LAGS BEHIND MANY OTHER COUNTRIES IN BROADBAND DEPLOYMENT**

Throughout the developed world, communications technologies are expanding in speed and availability at astonishing rates, fueled by massive investments, and bringing the wide-ranging benefits of broadband connectivity to millions of people. Recently,

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<sup>2</sup> See, for example, Melvyn Fuss and Leonard Waverman, "The Networked Computer: The Contribution of Computing and Telecommunications to Economic Growth and Productivity or Why Is There No New Economy in Old Europe: A Production Function Approach," Digital Transformations Working Paper, May 2005; Melvyn Fuss and Leonard Waverman, "Why Is There No New Economy in Old Europe or The Networked Computer," London School of Economics, Digital Transformations Power Point Presentation, 2006 (hereafter, *Waverman and Fuss 2006*); Melvyn Fuss and Leonard Waverman, "Canada's Productivity Dilemma: The Role of Computers and Telecom," Bell Canada's Submission to the Telecommunications Review Panel, Appendix E-1, 2005 (hereafter, *Waverman and Fuss 2005*).

Leonard Waverman, Dean of the Haskayne School of Business at the University of Calgary, and his associates constructed a “Connectivity Scorecard,” which measures “how ‘usefully connected’ countries around the world are.”<sup>3</sup> Canada ranked fourth in this measure of connectivity,<sup>4</sup> a high ranking that reflects the country’s historic leading position in broadband deployment and penetration. Canada was the first country to deploy ADSL technology (in 1997) and the second country to deploy cable modem technology (in 1996).<sup>5</sup> But as pointed out by the Telecommunications Policy Review Panel, this leadership is now threatened.<sup>6</sup> According to OECD data, Canada’s position among OECD countries in broadband penetration has slipped, and it lags other countries in the deployment of “ultra-high-speed broadband access” based on fiber-to-the-home and fiber-to-the-node platforms and other next-generation networks.<sup>7</sup>

Another measure of broadband availability, the “Digital Opportunity Index,” prepared by the International Telecommunications Union (the U.N.’s agency for information technology), also shows a decline in Canada’s standing. This index has been calculated for 62 countries from 2000 to 2006.<sup>8</sup> In 2000, Canada was ranked No. 9 according to this metric, but by 2006, Canada had fallen to number 17.

The contrast between Canada and some other OECD countries is particularly apparent when measured by the speed of available DSL connections. In fact, according to one industry observer,

...first-rate Internet access [consists of] services that connect customers at speeds of 100 megabytes a second – a process happening today in countries that include Japan, Singapore, Taiwan, South Korea, France, and Holland. In comparison, [Bell Canada’s] top speed today is just 16 Mbps and costs more than access in these other locations.<sup>9</sup>

Similarly, a recent CBC News article, titled “Canada’s global edge in broadband dwindling,” reported that

The average broadband connection in Canada, about 7 mbps, ranks below [the OECD] average. Canada also fared poorly in cost

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<sup>3</sup> Leonard Waverman, Kalyan Dasgupta, and Justin Tonkin, “The Connectivity Scorecard,” LECG and Nokia Siemens Networks, May 16, 2008 (hereafter *Waverman et al., 2008*), p. 4.

<sup>4</sup> *Waverman et al., 2008*, p. 6.

<sup>5</sup> Telecommunications Policy Review Panel, Final Report, Industry Canada, 2006 (hereafter *2006 TPR Report*), p. 1-12.

<sup>6</sup> *2006 TPR Report*, p. 1-13.

<sup>7</sup> *2006 TPR Report*, pp. 1-13 to 1-16. See also, “OECD historical broadband penetration rates,” available at <<http://www.oecd.org/dataoecd/22/12/39574779.xls>>. We note, however, that concerns have been raised about the OECD data. See Scott Wallsten, “Understanding International Broadband Comparisons,” Technology Policy Institute, May 2008.

<sup>8</sup> For information on how this index is calculated, see “ITU: Digital Opportunity Index,” available at <<http://www.itu.int/ITU-D/ict/doi/index.html>>.

<sup>9</sup> Simon Avery, “Cope lands BCE balancing act; CEO must improve network while pleasing new owners,” *The Globe and Mail*, July 7, 2008 (hereafter *2008 07 Globe and Mail*).

versus the speed provided, ranking 27th out of 30 [OECD countries] at \$28.14 U.S. for average broadband monthly price per advertised megabit per second.<sup>10</sup>

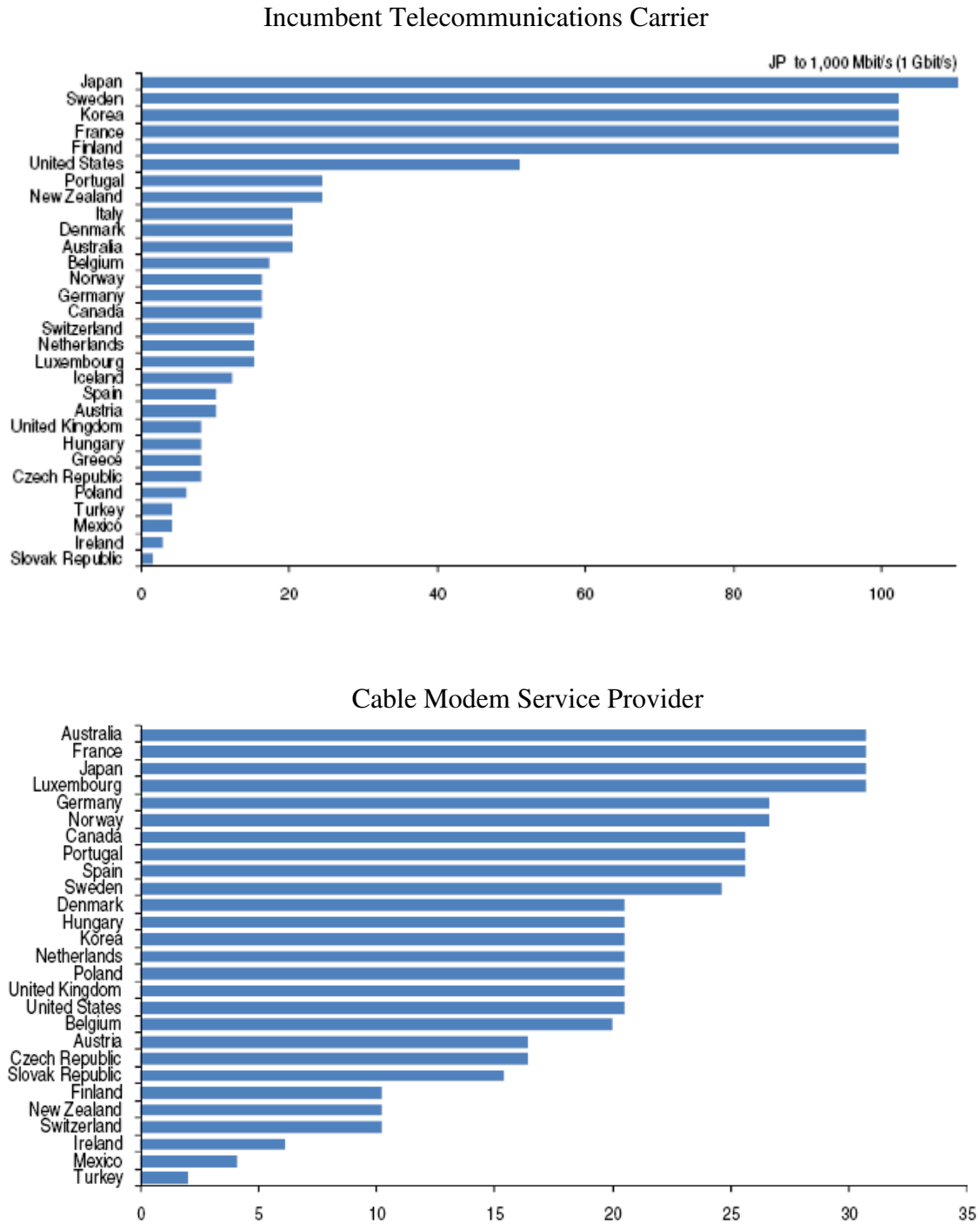
Figure 1 provides the *fastest* speeds available in OECD countries for both cable modem service and incumbent telecommunications carriers' services (principally DSL). As the figure shows, Canada's incumbent telecommunications carriers' services lag behind those of Korea, Japan, the U.S., and most EU-15 countries by this measure. In contrast, Canada's cable modem services compare more favorably with their OECD counterparts, in large part because many of the latter do not have highly-developed cable television sectors.

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<sup>10</sup> Peter Nowak, "Canada's global edge in broadband dwindling," *CBC News*, May 20, 2008.



**Figure 1**  
**Fastest Broadband Speed Offered by Incumbent Telecommunications Carriers and**  
**Cable Modem Providers**  
(Mbits/second)



Source: OECD, *Broadband Growth and Policies in OECD Countries*, 2008.

For Canadians to enjoy the same benefits that are already being enjoyed by consumers in many other countries, investors must be willing to make substantial capital commitments to Canada's communications infrastructure. The stakes are high for telecommunications companies, cable companies, wireless companies, and others who must make strategic decisions about whether, when, and where to make risky investments in new technologies while attempting to predict and respond to the investment strategies of their rivals; and the stakes are high for Canadian citizens, whose ability to enjoy and participate in the benefits of the information revolution will be affected for years to come by investment decisions made now.

The regulatory policy decisions confronting the CRTC today can — and must — be expected to influence those investment decisions. Establishing clear policies regarding unbundling of new broadband facilities, or, in the alternative, perpetuating regulatory uncertainty regarding obligations to unbundle new broadband infrastructure, will, in either case, affect the business justification for making such investments. These investments are important to the welfare of Canadians. In the next section we provide evidence of how investment in broadband networks would benefit Canadians, enhance their social welfare, and increase Canada's economic prosperity.

### **III. INVESTMENT IN BROADBAND TELECOMMUNICATIONS INFRASTRUCTURE IS CRUCIAL TO CANADA'S ECONOMIC ADVANCEMENT**

Since the mid-1990s, economic growth in developed economies has been propelled by a revolution in high-technology products and services. This revolution began with semiconductors and computers, but it has been extended and enhanced by modern high-speed telecommunications networks which allow these computers to be interconnected. As a result, investment in information and communications technologies (ICT) is now driving economic growth in the developed world.

#### ***a. Investment drives economic growth***

Investment and innovation are the engines that fuel a country's economic growth and productivity performance. As explained by economists Rudiger Dornbusch and Stanley Fischer in their widely cited text *Macroeconomics*,

[I]nvestment spending determines the rate at which the economy adds to its stock of physical capital, and thus helps determine the economy's long-run growth and productivity performance. Faster-growing countries...generally invest a higher share of their GDP than slower-growing countries.<sup>11</sup>

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<sup>11</sup> Rudiger Dornbusch and Stanley Fischer, *Macroeconomics*, Sixth Edition, McGraw-Hill, Inc., 1994, p. 331.

The impact of investment in information technology on economic growth, however, is even more pronounced. Research indicates that investment in information technology (IT) infrastructure is increasingly important for advancing economic growth. As noted by economist Dale Jorgenson:

The vaulting contribution of capital input since 1995 has boosted growth by close to a percentage point [in the U.S.]. The contribution of investment in IT accounts for more than half of this increase. Computers have been the predominant impetus to faster growth, but communications equipment and software have made important contributions as well.<sup>12</sup>

Investment in connectivity and networking generates substantial economic value not just because of the direct benefits of connectivity to users, but because of the additional services and opportunities that the infrastructure creates, and the investments and innovations that are made in response to this improved infrastructure. As more advanced infrastructure is available, it becomes economic to make investments in developing new innovations and services that can use the new infrastructure. These new innovations and services benefit consumers and generate, in turn, more opportunities to build further on those innovations.

For example, greater availability of high-speed broadband networks makes electronic commerce more attractive to consumers and also more attractive to merchants. Offering products and services electronically (i.e., over the Internet) permits a company to expand its geographic reach significantly, but requires investment in operational support systems (such as billing), advertising, logistics, and inventory management systems. These investments are not likely to be prudent if high-speed broadband networks are not widely available for customers to access the company's products. The greater the availability of broadband, the more such complementary investments will be made. In turn, the greater the demand for support systems and services to implement electronic commerce, the greater is the incentive to invest in improvements in such systems and in the expansion of such services. In addition, the greater the reach of sellers, the more choices become available to consumers and the more vigorous therefore is competition for the sellers' products, driving down prices and expanding the ability of consumers—even those in remote areas—to enjoy the benefits of vigorous competition. All of these effects expand the overall welfare of the citizenry and the GDP of the country.

***b. Investment in information technology benefits the broader economy***

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<sup>12</sup> Dale Jorgenson, "Accounting for Growth in the Information Age," in Philippe Aghion and Steven Durlauf, eds., *Handbook of Economic Growth*, Vol. 1A, Amsterdam, North-Holland, 2005 (hereafter, *Jorgenson 2005*). Accessed from [www.economics.harvard.edu/faculty/jorgenson/files/acounting\\_for\\_growth\\_050121.pdf](http://www.economics.harvard.edu/faculty/jorgenson/files/acounting_for_growth_050121.pdf).

The effect of information technology on the economy as a whole, even beyond the direct effect on the information technology producing sector, has been studied in a variety of countries, and recent research has shown the importance of ICT to continuing and even accelerating productivity growth. For example, a number of econometric studies, particularly those by Professor Dale Jorgenson of Harvard University and his colleagues, have discovered that total factor productivity growth in the United States accelerated after 1995.<sup>13</sup> At first, this acceleration was led by the growth of the ICT-producing industries, such as computers, semiconductors, and telecommunications equipment suppliers. However, in the late 1990s and early years of this century, productivity accelerated in the ICT-using sectors of the economy. For example, economists Barry Bosworth and Jack Triplett have found that 73 percent of U.S. productivity growth has occurred in the service industries, largely because of the effects of using modern ICT technology.<sup>14</sup>

A number of other recent analyses have reached similar conclusions. For example, the OECD found a dramatic effect of information technology on productivity, concluding that the production and use of information technology was responsible for 109 percent of the growth in labor productivity from 1996 to 2002 in the U.S. and most of the growth in labor productivity in several OECD countries.<sup>15</sup>

Not all countries shared equally in this surge in productivity growth and, therefore, economic growth in general. Professors Melvyn Fuss and Leonard Waverman have shown that the EU 14, Canada, and Australia have lagged behind the United States because of lower investment and diffusion rates for ICT.<sup>16</sup> An earlier study by Fuss and Waverman, prepared for the Telecommunications Policy Review panel, showed similar results for Canada and the United States. As shown in Table 1, Canada lags behind the United States in productivity growth in both the ICT-producing sectors and the ICT-using sectors. Canada's economy produces relatively less ICT output and uses less ICT capital in the most technology-intensive sectors.

Other studies corroborate these conclusions. A 2003 study by Francesco Daveri found that Canada allocated only 19 percent of its non-residential fixed capital spending to IT in 1995-2000 while the U.S. devoted 28 percent.<sup>17</sup> A more recent study by Fuss and

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<sup>13</sup>Jorgenson 2005; Dale Jorgenson, Mun S. Ho, Jon D. Samuels, and Kevin J. Stiroh, "Industry Origins of the American Productivity Resurgence," *Interdisciplinary Information Sciences*, Vol. 14, No. 1, pp. 43-59, 2008.

<sup>14</sup> Jack E. Triplett and Barry P. Bosworth, *Productivity Growth in the U.S. Services Sector: New Sources of Economic Growth*, The Brookings Institution, 2004, p. 2.

<sup>15</sup> Organization for Economic Co-operation and Development (OECD), "The Economic Impact of ICT: Measurement, Evidence, and Implications," Paris: Organization for Economic Co-operation and Development, 2004. See, also, Jason Dedrick, Vijay Gurbaxani, and Kenneth L. Kraemer, "Information Technology and Economic Performance: A Critical Review of the Empirical Evidence," *ACM Computing Surveys*, Vol. 35, No. 1, March 2003, pp. 1-28, which reviews 50 academic studies published between 1985 and 2002 and concludes that all the studies from the mid-1990s find positive and significant returns on information technology investments.

<sup>16</sup> Waverman and Fuss 2006, slide 15.

<sup>17</sup> Francesco Daveri, "Information Technology and Productivity Growth Across Countries and Sectors," IGIER Working Paper No. 227, January 2003, Table 3.

Waverman, from which Figure 2 is drawn, shows that both Canada and the EU lag far behind the U.S. in total ICT capital per worker hour.<sup>18</sup> Fuss and Waverman find that this deficit is responsible for one-half of the difference in labor productivity between the U.S. and Canada.<sup>19</sup> The demonstrated impact of ICT investment on labor productivity indicates that the same amount of worker hours can produce more economic output when workers and firms can incorporate information technology into their job activities. Thus, if Canada's economy is to grow as rapidly as that of its southern neighbor, it must pursue policies that are congenial to investment in high technology. Telecommunications is clearly a major focus of such investment in an increasingly sophisticated, interconnected world.

**Table 1**  
**Labor Productivity Growth in Canada, the EU, and the United States, 1995-2000**  
**(Contribution to Overall Growth in Brackets)**

	<b>Canada</b>	<b>EU*</b>	<b>United States</b>
<b>Overall Growth</b>	1.8% (100%)	1.4% (100%)	2.5% (100%)
<b>ICT-Producing Sectors</b>	7.1% (24%)	8.7% (33%)	10.1% (30%)
<b>ICT-Consuming Sectors</b>	3.2% (47%)	1.6% (29%)	4.7% (56%)
<b>Non-ICT Sectors</b>	0.8% (30%)	0.7% (34%)	0.5% (14%)

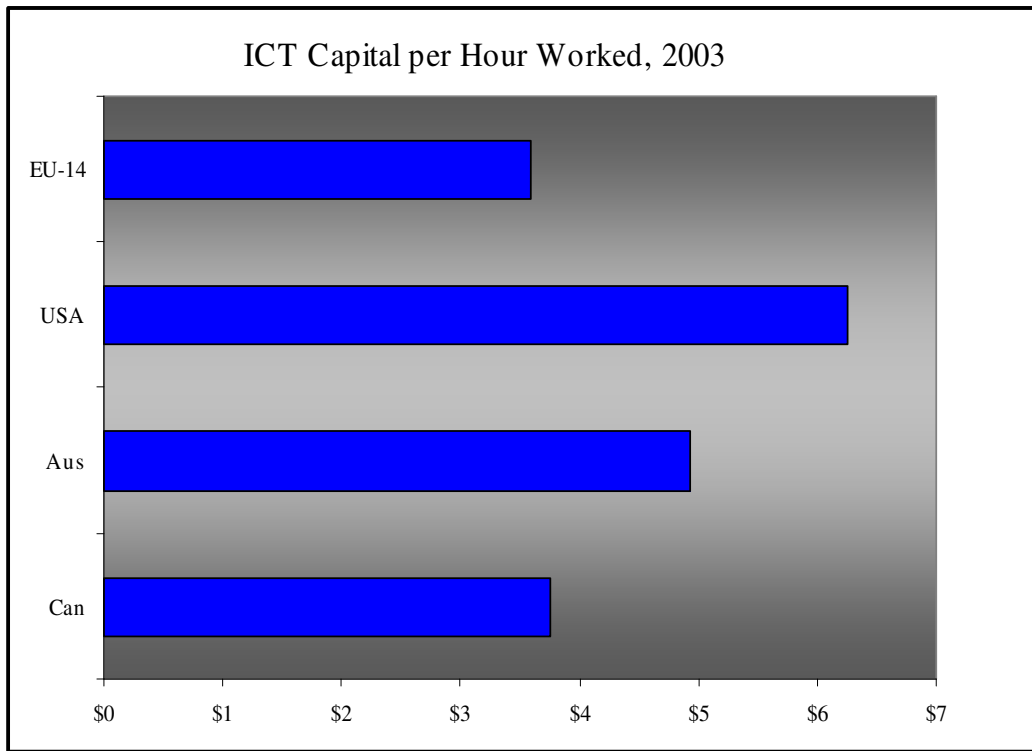
\* EU includes Austria, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Spain, Sweden and the United Kingdom.

Source: Melvyn Fuss and Leonard Waverman, "Canada's Productivity Dilemma: The Role of Computers and Telecom," Bell Canada's Submission to the Telecommunications Review Panel, Appendix E-1, 2005, Table 1.1; Bart van Ark, Robert Inklaar and Robert McGuckin, "'Changing Gear' – Productivity, ICT and Services Industries: Europe and the United States," Research Memorandum GD-60, Groningen Growth and Development Centre, December 2002.

<sup>18</sup> Waverman and Fuss 2006, slides 12 and 13.

<sup>19</sup> Waverman and Fuss 2006, slide 13.

**Figure 2**  
**Canada Lags the U.S. in High-Tech Capital per Hour Worked**



Source: Melvyn Fuss and Leonard Waverman, “Why Is There No New Economy in Old Europe or The Networked Computer,” London School of Economics, Digital Transformations Power Point Presentation, 2006, slide 11.

The beneficial effects of IT investment can also be seen at the local level.<sup>20</sup> For example, some studies of the effect of broadband deployment have focused on specific U.S. states. The Sacramento Regional Research Institute (SSRI) quantified the effects of broadband in the state of California, and found that increased broadband use contributed nearly 80 percent of the net new jobs created in California between 2002 and 2005 and about \$11.6 billion of the \$85 billion in net new payroll.<sup>21</sup> Similarly, a 2007 report by David Shideler and other researchers evaluated the effects of Kentucky’s plan for broadband deployment and adoption. The report concluded that broadband deployment had a “positive and significant impact” on total employment in Kentucky.<sup>22</sup>

<sup>20</sup> We caution the reader that the magnitude of the effects of IT investment on a local community cannot necessarily be extrapolated to the economy as a whole. For example, if IT investment in a community leads to a substantial increase in employment in that area, some or all of the newly employed workers and new jobs may have been diverted from another area.

<sup>21</sup> “Economic Effects of Increased Broadband Use in California,” Sacramento Regional Research Institute, prepared for AT&T, pp. 24-25.

<sup>22</sup> David Shideler, Narine Badasyan, and Laura Taylor, “The Economic Impact of Broadband Deployment in Kentucky,” for presentation at the Telecommunication Policy Research Conference, Washington, D.C. September 2007, p. 11 and Table 2.

In Canada, a study commissioned in 2003 by the United Kingdom's Department of Trade and Industry of the economic impacts of a fiber network built in South Dundas, Ontario between 2000 and 2001 concluded that the direct and indirect effects of this investment of CAD\$1.3 million amounted to CAD\$21 million in increased GDP, 270 person years of employment, and CAD\$8 million in increased tax revenues.<sup>23</sup>

Taken together, these studies of economy-wide labor productivity, as well as local economic stimulation, demonstrate that the beneficial effects of investment in information technology are not just theoretical. Investment in IT has been found to have material positive effects on economic advancement at the local level and economy-wide.

***c. Investment also leads to social welfare benefits by fueling platform competition***

In countries such as Canada, in which there are (at least) two broadband networks (cable and DSL), investment in broadband infrastructure leads not only to more availability of broadband services, but to more competition among the platform providers. This in turn induces the providers to work harder to provide innovative, ever-higher-quality services at attractive prices on their platforms. Facilities-based providers have far more flexibility to provide innovative and differentiated services than do competitors using unbundled elements or resold services. It is not surprising, then, that multiple academic studies have found that intermodal (infrastructure) competition is associated with greater broadband penetration, while intramodal competition (competition based on unbundling) is not.

For example, a study co-authored by one of us examined the effect of intermodal (cable modem v. DSL) competition on broadband penetration in the U.S. The study found that intermodal competition between cable and DSL significantly increased broadband penetration after controlling for demand and cost influences. The price of the unbundled local loop, however, had no statistically significant effect on broadband penetration, implying that mandatory unbundling was not an important determinant of broadband penetration.<sup>24</sup>

More recently, in a 2006 paper, Distaso *et al.* examined the causes of broadband adoption in the European Union and similarly concluded that “while inter-platform

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<sup>23</sup> Strategic Networks Group, “Economic Impact Study of the South Dundas Township Fibre Network,” Prepared for the Department of Trade and Industry, United Kingdom, June 27, 2003, p. 29.

<sup>24</sup> Debra J. Aron, and David E. Burnstein, “Broadband Adoption in the United States: An Empirical Analysis,” in Allan L. Shampine (ed.) *Down to the Wire: Studies in the Diffusion and Regulation of Telecommunications Technology*, Nova Publishers, March 2003. Another empirical paper of broadband adoption in the US is Mario Denni and Harold Gruber, “The Diffusion of Broadband Telecommunications: The Role of Competition,” Working Paper, October 2005. Available at SSRN: [ssrn.com/abstract=829504](https://ssrn.com/abstract=829504). Denni and Gruber similarly concluded that intermodal competition significantly increases broadband penetration, but that intramodal competition has only an initial, temporary effect on penetration that is soon dissipated.

competition [between DSL and cable modem service providers] drives broadband adoption, [intramodal] competition in the market for DSL services does not play a significant role.”<sup>25</sup> A 2001 OECD study also reached a similar conclusion, finding that “[c]ountries where cable and DSL compete (rather than being jointly owned by the same entity) generally have a stronger broadband market.”<sup>26</sup> The OECD study concluded that “[t]he most fundamental policy available to OECD governments to boost broadband access is infrastructure competition.”<sup>27</sup>

Hence, while proponents of unbundling regulations argue that unbundling will enhance competition, in fact, the research shows the opposite. It is facilities-based competition that drives consumer benefits. The evidence is that unbundling harms competition and consumers because not only does intra-modal (unbundling-based) competition fail to stimulate broadband penetration, but it harms investment in platform competition, as we will discuss shortly. Policy that dampens investment in broadband infrastructure in Canada harms competition and consumers.

***d. The Benefits of Broadband Investment Include Increased Availability of Healthcare, Educational, Governmental, Business, and Other Services***

Information technology of course includes more than telecommunications infrastructure. However, the economic gains associated with investment in information technology have been attributed specifically to the communications component—the assets and infrastructure that enable large numbers of people and computers to connect, interact, and communicate with each other. According to Alan Greenspan, the former Chairman of the U.S. Federal Reserve:

[U]ntil the mid-1990s, the billions of dollars that businesses had poured into information technology seemed to leave little imprint on the overall economy. The investment in the new technology

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<sup>25</sup> Walter Distaso, Paolo Lupi, and Fabio Manenti, “Platform competition and broadband uptake: theory and empirical evidence from the European Union,” *Information Economics and Policy*, Vol. 18 No. 1, 2006, p. 88. Another empirical study of broadband adoption in the EU is Robert Crandall and Allan Ingraham, “The Relevance of Recent United Kingdom Telecommunications Policy to the Policy Choices in Canada,” Appendix D to Supplementary Material of TELUS Communications Company filed in Telecom Public Notice CRTC 2006-14, 5, July 5, 2007 (hereafter *Crandall and Ingraham 2007*). Crandall *et al.* (¶25) similarly concluded that local loop unbundling and bitstream access in the EU countries “do not contribute significantly to broadband penetration.”

<sup>26</sup> Organization for Economic Cooperation and Development, *The Development of Broadband Access in OECD Countries*, October 29, 2001 (hereafter *OECD Broadband 2001*).

<sup>27</sup> *OECD Broadband 2001*, p. 4. Another empirical study of broadband adoption in the OECD countries is Scott Wallsten, “Broadband and Unbundling Regulations in OECD Countries,” Joint Center AEI-Brookings Joint Center for Regulatory Studies, Working Paper 06-16, June 2006. Wallsten concluded that (1) “local loop unbundling has no robustly significant impact on broadband penetration,” (2) bitstream access, while having a positive effect on broadband penetration, is not statistically significant under certain specifications, and (3) subloop unbundling, i.e., access to a portion of the loop, has a negative and statistically significant impact on broadband penetration under all specifications.



arguably had not yet cumulated to a sizable part of the U.S. capital stock, and computers were still being used largely on a stand-alone basis. *The full value of computing power could be realized only after ways had been devised to link computers into large-scale networks.*<sup>28</sup>

This is what broadband networks do—they link computers, and people, into large-scale networks. Dr. Greenspan is observing that the power of computing technology is unleashed, for the benefit society as a whole, by networking them together and enabling them to communicate.

For example, at the beginning of the decade it may have been difficult for residents in rural areas to receive timely news and information, book travel, bank, or pay their bills quickly and efficiently, or even locate spare parts for their appliances, buy and sell household items, locate reference material and books on obscure topics, research health issues, or pursue a variety of hobbies and interests. Today, however, anyone with a broadband Internet connection can easily and much more efficiently do any and all of these things on Amazon.ca, Theglobeandmail.com, Expedia.ca, Royalbank.com, and a host of other websites. The deployment of ultra-high-speed broadband at speeds of 100 Mbps and higher—already available in some countries, as mentioned earlier—enables the use of applications that provide further benefits to consumers. These applications include the delivery of high-definition movies over the Internet, and an assortment of other high-bandwidth applications to aid distance learning, telemedicine, and telecommuting.<sup>29</sup>

The Quello Center for Telecommunication Management and Law at Michigan State University has summarized how broadband adoption benefits communities and society generally by increasing the availability of and access to information and other services, such as healthcare, education, and government services, and by contributing to economic activity and growth.<sup>30</sup> A 2001 report by the Canadian National Broadband Task Force identified similar benefits. In fact, the report argues that “the impact of broadband communications on Canadian life will be at least as great as the impact of railways, highways, airlines, traditional telecommunications and broadcasting.”<sup>31</sup> The

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<sup>28</sup> Alan Greenspan, “Technology Innovation and its Economic Impact,” Remarks before the National Technology Forum, St. Louis, MO, April 7, 2000 (emphasis added). Accessed from <[www.federalreserve.gov/BOARDDOCS/SPEECHES/2000/20000407.htm](http://www.federalreserve.gov/BOARDDOCS/SPEECHES/2000/20000407.htm)>. See, also, Dale Jorgenson, “U.S. Economic Growth in the Information Age,” *Issues in Science and Technology*, Fall 2001, concluding that “Communications technology is crucial for the rapid development and diffusion of the Internet, perhaps the most striking manifestation of IT in the U.S. economy.” Accessed from <[www.issues.org/18.1/jorgenson.html](http://www.issues.org/18.1/jorgenson.html)>.

<sup>29</sup> Statement of Joseph Savage, President of Fiber-to-the-Home Council North America, before the Senate Committee on Commerce, Science and Transportation, Hearing on State Broadband in the United States, April 24, 2007. Accessed from <[www.ftthcouncil.org/UserFiles/File/Fiber-to-the-Home\\_Council\\_April\\_24\\_07\\_Testimony.pdf](http://www.ftthcouncil.org/UserFiles/File/Fiber-to-the-Home_Council_April_24_07_Testimony.pdf)>.

<sup>30</sup> Johannes M. Bauer, Ping Gai, Junghyun Kim, Thomas A. Muth and Steven S. Wildman, “Broadband: Benefits and Policy Challenges,” Quello Center Report prepared for Merit Network, Inc., December 10, 2002, pp. 6-7.

<sup>31</sup> “The New National Dream: Networking the Nation for Broadband Access,” Report of the National Broadband Task Force, Government of Canada (hereafter *2001 Broadband Report*), p. 3.

CRTC has, likewise, acknowledged that there are “considerable benefits” to Canadian citizens from increased availability of broadband services, which also include “expanding Canadians’ capacity to access, create, communicate, and share knowledge and entertainment ... [and] improve[ing] access to health care, education, and electronic services.”<sup>32</sup>

The Canadian Task Force Report specifically discussed the potential benefits in several of these areas. For example, the report observes that broadband adoption can facilitate the growth of e-business, which in turn brings economic benefits, including greater market efficiency, reduced distribution and procurement costs, and increased productivity;<sup>33</sup> it can create new opportunities for educational institutions and libraries for the diffusion of knowledge and information by facilitating and enhancing the online learning experience;<sup>34</sup> and it can improve access to and reduce the costs of healthcare services and information.<sup>35</sup> Broadband access expansion can also foster new growth opportunities for the online entertainment industry and for the development of information technology applications.<sup>36</sup> All these benefits brought about by broadband deployment can be instrumental in bridging the quality of life gap that, according to the Task Force, exists between urban and rural communities in Canada.<sup>37</sup>

The information posted online by the Government of Canada about its programs for the diffusion of broadband in rural areas exemplifies the achievement of these benefits in a number of rural communities.<sup>38</sup> For example, a report written by Canadian researchers Julie Zilber, Phillip Djwa, and David Schneider documents the economic impact of broadband access in the regions of Peace River and South Similkameen. Some of their findings include the following:

- “Over 80% of all business respondents reported that absence of broadband would affect their businesses negatively;”
- “Over 18% of all business respondents stated they could not operate their businesses without broadband;”
- “62% of [pre-existing] businesses indicated that their productivity has gone up as a result of broadband, with a majority indicating an increase in productivity of more than 10%;”
- “Many businesses reported increases in pre-tax income and/or decreases in operating costs due to broadband connectivity;”

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<sup>32</sup> Telecom Decision CRTC 2006-9, ¶ 78.

<sup>33</sup> *2001 Broadband Report*, pp. 23-24.

<sup>34</sup> *2001 Broadband Report*, pp. 25-26.

<sup>35</sup> *2001 Broadband Report*, pp. 29-31.

<sup>36</sup> *2001 Broadband Report*, pp. 31-33.

<sup>37</sup> *2001 Broadband Report*, p. 3.

<sup>38</sup> See, <<http://broadband.gc.ca>>. This website reports on the progress of two initiatives, the Broadband for Rural and Northern Development pilot program and the National Satellite Initiative (NSI).

- “15% of [residential broadband subscribers] reported that their household income has increased and 39% report that their household expenses have decreased due to residential broadband connectivity.”<sup>39</sup>

Another case study posted by the Government of Canada describes the benefits experienced by the municipal government of the town of Tillsonburg, Ontario, which implemented a Strategic Technology Plan that relied greatly on the deployment of a broadband network.<sup>40</sup> It is reported that after the first year of implementing this plan, the town was able to contain property tax increases relative to its neighboring municipalities;<sup>41</sup> increase available customer service hours substantially;<sup>42</sup> and generate \$100,000 in new revenues,<sup>43</sup> among other benefits. As a result, 89 percent of residents and 80 percent of businesses said that they are satisfied with the municipal services of this small town.<sup>44</sup>

Clearly, the evidence demonstrates the scope and variety of benefits brought by broadband investment to Canadian welfare and economic prosperity, and illustrates the kinds of benefits that would be expanded and enhanced by investment in next generation networks. Providing access to the abundance of information and services available on the Internet requires investment in the broadband backbone, but more specifically, it requires investment in broadband access.

The traditional wireline telecommunication networks are no longer the technology of the future. While not obsolete for all uses, these networks cannot provide most new, high-speed services efficiently and cannot deliver the most sophisticated high-speed services at all. As a result, telecommunications carriers must invest billions of dollars simply to be able to deliver state-of-the-art services. Equally important, national governments must be aware of the imperative of such investments for future economic growth. It is this investment that is specifically vulnerable to adverse regulatory rules that impose unbundling obligations, because those obligations affect access facilities most directly.

It is clear from this wealth of research into the effects of broadband deployment that, whether looked at qualitatively or quantitatively; locally, regionally, or nationally; prospectively or historically, broadband investment enhances broadband adoption and standard economic measures of well-being, economic prosperity, and opportunity. It creates opportunities for residents of rural or remote areas to access services and products to which they would otherwise not have access; it creates opportunities to improve and

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<sup>39</sup> Julie Zilber, David Schneider, and Phillip Djwa, “You Snooze, You Lose: The Economic Impact of Broadband in the Peace River and South Similkameen Regions,” prepared by 7th Floor Media, Simon Fraser University for Industry Canada, September 5, 2005, pp. 1-2.

<sup>40</sup> Thomas S. Dawe and Michael Curri, “Town of Tillsonburg: Economic Impact Case Study,” INS Consulting, January 2003 (hereafter *2003 INS Consulting*), p. 8.

<sup>41</sup> *2003 INS Consulting*, p. 2.

<sup>42</sup> *2003 INS Consulting*, p. 19.

<sup>43</sup> *2003 INS Consulting*, p. 4.

<sup>44</sup> *2003 INS Consulting*, p. 42.

expand health, educational, and social services; it creates opportunities to increase governmental and business efficiency; and it provides entertainment. The Commission should be mindful that policy decisions that would artificially depress incentives to invest in the broadband infrastructure that would permit more people to have access to high quality broadband services would therefore harm social welfare. This includes the infrastructure that supports ADSL services, existing and new, as well as next generation networks. Regulatory decisions that allow the market to create efficient incentives to invest in broadband infrastructure and equipment advance social welfare in very material and concrete ways.

#### **IV. EXPANDED UNBUNDLING OBLIGATIONS WOULD DISCOURAGE INVESTMENT IN NEW NETWORKS, THEREBY REDUCING SOCIAL WELFARE AND COMPETITION**

For many decades, the national incumbent telecommunications carriers (ILECs) in Canada, the U.S., and all other countries we have studied enjoyed a unique and pre-eminent economic position. No one else could provide the ubiquitous interconnectivity that the ILECs could provide. This is no longer the case. ILECs are faced with competition from a variety of platforms, including wireless and cable television. The bread and butter of the ILECs in earlier decades—voice and low-speed data services—can now be provided over the Internet at very low cost by cable television and other platforms. The revenues supporting the telephone network platform are inexorably shifting to high-speed data and video services —services that can be provided by cable television companies, 3G and 4G wireless networks, and even fixed wireless networks.

In order to compete effectively in this increasingly rivalrous sector, ILECs must upgrade their networks, providing much greater speed and capacity. These upgrades require large capital expenditures and very risky choices among alternative network architectures. Few ILECs have committed to building the most expensive of these networks with fiber to the premises (FTTP) because of the market risks involved and the attendant regulatory risk of future wholesale obligations. Indeed, none of the European Union carriers has begun building such a network. As we show in Section V below, this is at least partly due to the explicit threat of EU unbundling obligations for new networks.

Canada is fortunate to have two competitive fixed-wire networks, one owned by the ILEC and one owned by a cable television company in each geographic market. Consistent with the anticipated effects of competition between these two networks and between these networks and three national wireless carriers, Canadians enjoy low voice telephony rates and very high quality service.<sup>45</sup> The two fixed networks also compete aggressively in providing broadband, but the ILECs in Canada have not yet upgraded their fixed-wire networks with the ability to deliver video services and very high speed broadband internet access, as we discussed earlier. In part, this is because of the high cost of building the extremely high speed infrastructure required for video.

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<sup>45</sup> See OECD, *Communications Outlook*, 2007, Chapter 7 for comparisons of fixed-line and mobile pricing across OECD countries. Canada has among the lowest residential rates, below-average small-medium enterprise rates, and below average rates for low-usage and high-usage mobile customers. Its medium-usage mobile rates are slightly above the OECD average.

The lack of extremely high-speed DSL in Canada is not the result of a dearth of recent investment. Data drawn from ILEC financial reports show that Canada's ILECs have been investing more intensely than most of their OECD counterparts.<sup>46</sup> Canadian ILECs are, apparently, willing and able to access capital to make what they and the market consider to be prudent network investments, but those investment tradeoffs have not favored high-risk high-speed infrastructure in the current regulatory environment. Hence, the problem is not the lack of past investment, *per se*, but the large capital requirements and the increasing risk of investing in higher speed facilities in a country with low population density and aggressive cable competition. In this environment, regulatory uncertainty over future unbundling regulations for new network facilities is particularly harmful for investment decisions in such state-of-the-art facilities.

*a. Investment Funds Are Provided In Response to Profit Opportunities*

Expanding unbundling obligations to new broadband services would not advance welfare or competition. Rather, such expansive regulatory obligations would be detrimental to both social welfare and competition because they would depress incentives to invest in broadband infrastructure that would enable the very services that would be unbundled.

Business firms do not make investments for altruistic reasons but rather make investments in order to earn a return on the invested capital. For any company to make any investment, it must determine, and convince the capital market, that the investment is reasonably likely to produce a positive return in net present value (NPV) terms sufficient to compensate for the risk incurred. When companies seek funding to execute a project, they compete for those funds with all other potential projects in the economy, not just with other investment opportunities available to the company itself and not just with investment opportunities in the same industry or geographic area. The market for investment capital is global, and individual companies in Canada compete for investment capital with projects in other countries and other industries. Firms will invest in projects from which they expect to receive the best risk-adjusted returns. Any factors that call into question or threaten a project's potential profitability will affect the ability of the firm to justify funding it.

Factors that affect profitability of investment decisions include the anticipated demand for the services that are enabled by the new infrastructure, the anticipated growth rate of the demand, the degree of uncertainty about the future demand, the costs of providing the services, the anticipated prices that can be charged for the services in light of the anticipated competition, and, importantly, the regulatory rules and obligations to

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<sup>46</sup> In testimony before the CRTC in the Essential Facilities proceeding, one of the authors (Crandall) showed that North American ILECs have been investing much more in their networks than have the EU ILECs. See, *Crandall and Ingraham 2007*, p. 13.

which they are subject. Any regulatory restrictions that harm the business case for investment will necessarily be relevant to the investment decisions by the regulated companies and their shareholders.

The Telecommunications Policy Review Panel recognized a variety of detrimental effects of excessive regulation in its most recent report, by noting that “inappropriate regulatory constraints may reduce incentives for cost reduction, investment and innovation from what they would be in an unregulated market.”<sup>47</sup> The Panel further asserts that “inappropriate” regulation “lessens the rewards for taking risks and reduces the likelihood that risky innovation and investment will be undertaken.”<sup>48</sup> As a result, the Panel has recommended that regulation be used to “supplement, not replace” the market, and that Canada’s regulatory framework rely on competition as much as possible.<sup>49</sup> These recommendations are guided by the same principles contained in the Government’s 2006 Policy Direction to the CRTC, stating that the Commission should “rely on market forces to the maximum extent feasible as the means of achieving the telecommunications policy objectives”<sup>50</sup> and should design its regulatory framework “with a view to increasing incentives for innovation and investment in and construction of competing telecommunications network facilities.”<sup>51</sup>

Imposing regulatory obligations to unbundle advanced infrastructure will necessarily dampen the incentives to invest in advanced infrastructure. Imposing regulatory obligations on ILECs to unbundle broadband infrastructure will not only dampen incentives by ILECs to invest, but also investment incentives by CLECs and by competitive infrastructure providers, such as cable companies. Dampened incentives to invest are likely to result in decreased and delayed actual investment.

***b. Unbundling results in diminished control of one’s assets, which undermines investment incentives***

There are at least two rational reasons that any company in an ILEC’s position might decide to reduce or delay investments in broadband infrastructure if it is required to offer its broadband infrastructure to competitors on regulated terms and conditions. First, the wholesale price at which it is required to provide the unbundled elements or services may not be expected to generate an adequate return that justifies the investment. In addition, regardless of the price at which the unbundling is required, there is a value to maintaining ultimate control of one’s assets, which is removed when a company is

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<sup>47</sup> 2006 TPR Report, p. 3-10.

<sup>48</sup> 2006 TPR Report, p. 3-10.

<sup>49</sup> 2006 TPR Report, p. 3-6.

<sup>50</sup> Order Issuing a Direction to the CRTC on Implementing the Canadian Telecommunications Policy Objectives, P.C. 2006-1534 December 14, 2006 (hereafter *2006 Policy Direction*), § 1(a)(i).

<sup>51</sup> *2006 Policy Direction*, § 1(c)(ii). Canada’s Competition Review Panel has also observed the importance of designing policies that do not interfere with the market. In its 2008 report, this Panel emphasized the importance of effective regulatory reform, pointing out that “regulations often unnecessarily or inadvertently constrain Canadian competitiveness because public policy initiatives are rarely designed to minimize their impact on competition.” See, “Compete to Win: Final Report – June 2008,” Competition Policy Review Panel, Public Works and Government Services Canada, 2008, p. 90.

required to provide use of its assets to others on regulated conditions. The incentive of a company to make risky investments in assets is harmed if it is deprived of the control and deployment of those assets. Mandatory unbundling inherently diminishes the ILEC's control of its assets and is likely to create future conflicts over network architecture.

Control is fundamental to the notion of ownership and, therefore, to the desirability of investment. From an economic perspective, what uniquely identifies ownership relative to other forms of contractual relationships is control of the use (or non-use) of the asset. As Oliver Wendell Holmes explained in 1881,

But what are the rights of ownership? They are substantially the same as those incident to possession. Within the limits prescribed by policy, the owner is allowed to exercise his natural powers over the subject-matter uninterfered with, and is more or less protected in excluding other people from such interference. The owner is allowed to exclude all, and is accountable to no one. The possessor is allowed to exclude all but one, and is accountable to no one but him.<sup>52</sup>

Modern economists take a similar view. For example, respected economists Oliver Hart and John Moore, in their work on the nature of property rights, explain that:

[T]he sole right possessed by the owner of an asset is his ability to exclude others from the use of that asset. That is, the owner of a machine can decide who can and who cannot work on that machine, the owner of a building can decide who can and who cannot enter the building, the owner of an insurance company's client list can decide who has and who does not have access to the list, and so forth.<sup>53</sup>

In studying the relationship between ownership and control, economists have concluded that ownership rights over an asset are important because they confer control, and control *affects and determines the incentives to invest in the asset*.<sup>54</sup> As U.S. Seventh Circuit Judge and renowned scholar of law and economics, Richard Posner, put it:

It is highly desirable from an economic standpoint that valuable resources should be made subject to a right of exclusive use, control, and benefit in someone. Without such a right, incentives to invest in the production of valuable goods will be suboptimal –

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<sup>52</sup> O.W. Holmes, Jr., *The Common Law*, Little, Brown, and Company, 1881, p. 246.

<sup>53</sup> Oliver Hart and John Moore, "Property Rights and the Nature of the Firm," *Journal of Political Economy*, 1990, vol. 98, no.6, p. 1121.

<sup>54</sup> Sanford J. Grossman and Oliver D. Hart, "The Costs and Benefits of Ownership: A theory of Vertical and Lateral Integration," *Journal of Political Economy*, 1986, Vol. 94, No. 4, pp. 691-719. See, also, Paul Milgrom and John Roberts, *Economics, Organization and Management*, Prentice Hall, Englewood Cliffs, 1992, Chapter 9.

for example, the owner of farmland will have no assurance that he will be able to reap where he has sown.<sup>55</sup>

Or as Nobel laureate Douglass North and co-author Robert Paul Thomas said succinctly:

Economic growth will occur if property rights make it worthwhile to undertake socially productive activity.<sup>56</sup>

Depriving an investor of the right to control the use of an asset and determine if, how, and when it is used, and by whom, so as to maximize its value as market factors, risk factors, and technological factors change, therefore will decrease the incentive to invest in those assets in the first instance. This is a fundamental reason that unbundling rules for new network facilities, which interfere with the owner's control of its assets, impede investment in such assets regardless of the price at which unbundling is mandated. This is particularly true for next generation networks because such unbundling requirements are likely to allow competitors who lease unbundled elements of these networks to frustrate the incumbent's future investment plans if such investments are inconsistent with the competitors' business plans. For this reason, regulators should avoid encumbering next-generation networks with future controversies over the deployment of new technologies.

***c. Regulated prices cannot be assured to establish efficient investment incentives***

In addition to the issue of control, however, a separate reason that unbundling requirements for advanced infrastructure would tend to dampen investment is that it is, realistically, impossible for regulators to determine the optimal price at which unbundled services or elements could be provided and encourage economically efficient incentives for investment and innovation. There is no one regulatory pricing mechanism that simultaneously satisfies all of the principles that would characterize an acceptably efficient and tractable regulated price for an unbundled element.<sup>57</sup> Hence, prices that result from regulatory mechanisms will generally be either too high or too low to achieve an efficient outcome.

Prices of unbundled elements that are too low are particularly detrimental to investment, because investors would not be compensated for the risks they face and would, thereby, be encouraged to direct their capital resources elsewhere. Based on our experience with the pricing mechanism in the United States and our participation in the

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<sup>55</sup> Richard A. Posner, "Savigny, Holmes, and the Law and Economics of Possession," *Virginia Law Review*, Vol. 86, No. 3, p. 551.

<sup>56</sup> Douglass C. North and Robert Paul Thomas, *The Rise of the Western World: A New Economic History*, Cambridge University Press, 1973, p. 8.

<sup>57</sup> Statement of Dr. Debra J. Aron, "Pricing Principles for Wholesale Services in the Canadian Telecommunications Industry," Appendix C to Evidence of TELUS Communications Company in Telecom Public Notice CRTC 2006-14, March 15, 2007.



essential facilities proceeding in Canada, it is clear to us that the prospect of regulatory prices that are inadequate to promote investment is a realistic concern.<sup>58</sup>

In any regulatory pricing process, there is an inevitable risk that the rates that would ultimately be ordered would not be sufficient to recover the forward-looking, long-run cost of the assets, including their opportunity cost and adequate compensation for investment risk. The sensitivity of investors to the potential for inadequate compensation for investment risk would be particularly acute for large investments in new technology such as next generation networks, because of the materiality of the risks, as we will discuss in the next section. The prospect of making large investments in assets that could be subject to regulatory pricing mechanisms, and the associated prospect of regulator-set prices that may not be fully compensatory, would certainly discourage a company from making the investment to begin with.

The risk that regulatory prices would not be compensatory is magnified by the fact that any investment in new fixed-wire networks is largely sunk. That is, the company making the investment cannot remove the assets and deploy them in alternative pursuits if they prove to be non-remunerative in the telecom sector. Thus, a decision to invest today in a given technology is irrevocable and potentially very costly. In contrast, if a competitor were to be granted access to these assets, once they are in place, at regulated rates, the competitor's decision would not be irrevocable. If it is allowed to lease these facilities on a short-term basis, it could simply walk away if a new technology were to appear. For this reason, economists refer to the competitor as having a "real option" which should be priced into the regulated rate.<sup>59</sup> Alternatively, the competitor could be required to share the incumbent's investment risk by leasing the asset for its entire life. In this way, if the competitor remained solvent, it would be faced with its proportionate share of the risk of early obsolescence.

Regulators typically do not include a real-option premium in the wholesale price of unbundled network elements, or impose long-term lease obligations. As a result, decisions to require unbundling of new network facilities result in a substantial diminution in the expected payoff from ILEC investments in such facilities.<sup>60</sup> If these

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<sup>58</sup> See, e.g., Debra J. Aron, E. Gerry Keith, and Francis X. Pampush, "State Commissions Systematically Have Set UNE Prices Below Their Actual Costs," white paper, January 13, 2004. In the Essential Facilities proceeding concluded last year, in which we both participated, the Commission established prices based on a methodology of Phase II costs plus a 15 percent markup. See, Telecom Decision CRTC 2008-17, "Revised Regulatory Framework for Wholesale Services and Definition of Essential Service," March 3, 2008, ¶134. There was no showing in that proceeding that this pricing formula has or would generate efficient incentives for investment in the existing network architecture, and certainly no showing that this formula would be sufficient to compensate investors for the risk of investing in a fiber network to provide higher speed advanced services. Indeed, there was no attempt to quantify the risks of forward-looking investments in advanced networks in the determination of the 15 percent markup in PN 2006-14.

<sup>59</sup> Avinash K. Dixit and Robert S. Pindyck, *Investment Under Uncertainty*, Princeton University Press, 1994 (hereafter *1994 Dixit and Pindyck*); Lenos Trigeorgis, *Managerial Flexibility and Strategy in Resource Allocation*, MIT Press, 1996.

<sup>60</sup> For an illustrative calculation of the real options premium in telecommunications, see Jerry Hausman "The Effect of Sunk Costs in Telecommunication Regulation," in James H. Alleman and Eli M. Noam, eds, *The New Investment Theory of Real Options and its Implications for Telecommunications Economics*, 1999.

facilities prove to be successful in delivering new services to customers, other companies will use them at rental rates that are insufficient to reward the ILEC's assumption of the technological and economic risks in deploying them. If the facilities prove to be uneconomic or are soon overwhelmed by new technologies, competitors will avoid them, leaving the ILEC to write off large amounts of fixed investment. Thus, requiring an ILEC to unbundle facilities not yet in existence but risky to deploy will severely reduce the incentive for ILECs to build them.

*d. The risk of information technology investment is greater now than in the past*

We have explained why unbundling obligations would discourage investment. The vulnerability of investment incentives to regulatory interference is substantially enhanced by the fact that investment in broadband infrastructure entails substantial risk. Earlier generations of network investment by ILECs were much less risky than current investments because the carriers were explicitly or implicitly shielded from competition by government authorities. For example, when most ILECs invested in digital switches in the 1980s, they could be assured that these investments would be paid off over their useful lives because there was a very low probability that new carriers or services would emerge to bid away their traditional voice/data customers (and because rate-of-return regulation—the effective mode of regulation at the time—was designed to assure ILECs an opportunity to recover costs). Clearly, today's ILECs enjoy no such assurances, either from regulators or from the market.

On the contrary, the principal reason that the incumbents are now under substantial pressure to upgrade their networks is the competitive effect of cable television, mobile wireless, fixed wireless and even satellite platforms. Many of these platforms can now offer voice, data, and video services. In Canada, as in the U.S. and most other countries, the ILECs are losing lines each year,<sup>61</sup> as customers switch to services offered by these alternative providers. Without the ability to offer video services, ILECs do not have a comparable offering to the popular “triple play” offerings of cable providers, for example, who can provide bundles of voice, video, and broadband internet access services. Even if ILECs make the large investments necessary to build extremely high-speed networks, however, there is no guarantee that enough customers will be retained or wooed away from competitors—who already offer higher speed services—to justify the massive costs.

Equally important, it is far from clear what technologies should be employed in these new networks. Should fiber be built all the way to the final subscriber? Should video services be offered in the traditional multi-channel broadcast mode, or should it be

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<sup>61</sup> Canadian Radio-television and Telecommunications Commission, “Communications Monitoring Report,” July 2008 (hereafter *2008 Monitoring Report*), Table 5.2.4. The ILECs' aggregate line loss in 2007 was -3.9%. The compound annual growth rate (CAGR) for 2004-2007 was -4.1%. This includes residential, business and wholesale lines. Residential lines declined by 6.7% in 2007, and the 2004-2007 CAGR was -6.0%.

offered through a complex Internet protocol-based video network? In the U.S., for example, Verizon is building a high-speed fiber network to the customers' premises and offering video in the traditional multi-channel broadcast mode. AT&T, in contrast, is building fiber to the "node" (i.e., to the neighborhood, where the fiber connects to legacy copper facilities to reach each living unit) through which it offers an interactive Internet Protocol Television (IPTV) service. At this juncture, no one can safely predict which architecture will prove the more successful or, indeed, if either will prove to be a good investment given the rapid changes in communications technology, the developments in wireless broadband technologies, and consumer demand.

The increasing risk to investors of deploying capital in ILEC networks is captured by the rising measure of systematic risk of holding their equities, as measured by the estimated equity "betas" from the capital asset pricing model.<sup>62</sup> A value of beta equal to one reflects an equity whose systematic risk is average for the entire market. A beta less than one reflects an equity whose systematic risk is below average for the market. In earlier years, before the competition from cable television and wireless telephony accelerated, the regulated common-carrier ILECs typically had equity betas of about 0.6.<sup>63</sup> However, in recent years, these equity betas have increased significantly, often to levels of substantially more than 1.0, the average for the entire financial market. We have estimated the equity betas for a number of the developed world's ILECs over the past few years. These results are shown in Table 2. The chart shows that the days of low-risk betas of around 0.6 are long gone and virtually all of the incumbent companies are showing significantly higher risk in recent years. Note the continuing rise in the estimates in the last two years.

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<sup>62</sup> Economists and the capital market consider "systematic" risk to be an important and useful measure of the riskiness of holding a stock because systematic risk is the risk that cannot be avoided by diversifying one's portfolio.

<sup>63</sup> Robert W. Crandall, *Competition and Chaos: U.S. Telecommunications Since the 1996 Telecom Act*, Brookings Institution Press, 2005, Table 5.4 (estimates for 1998-2001). The estimates for SBC, Verizon, and Bell South were below 0.6. The estimates for Qwest (U S West) were substantially above 0.6 due to the Qwest-U S West merger and the subsequent accounting scandal.

**Table 2**  
**Estimated Systematic Risk ( $\beta$ ) of Investing in ILEC Equities**

<b>Company</b>	<b>Estimation Period</b>	
	<b>5 Years (7/31/03- 7/24/08)</b>	<b>2 Years (7/31/06- 7/24/08)</b>
AT&T (U.S.)	1.07	1.44
BCE (Canada)	0.75	1.23
BT Group (UK)	1.16	1.42
Belgacom (Belgium)	0.83	1.05
Deutsche Telekom (Germany)	1.11	0.91
France Telecom	0.94	0.80
KPN (Netherlands)	0.79	1.05
NTT (Japan)	0.20 <sup>^</sup>	0.14 <sup>^</sup>
TDC (Denmark)	0.28 <sup>^</sup>	0.03 <sup>^</sup>
Telecom Italia	1.18 <sup>*</sup>	1.19
Telecom New Zealand	0.97	1.01
Telefónica (Spain)	1.09	1.10
Telekom Austria	1.38	1.52
Telia-Sonera (Sweden)	1.13	1.48
Telstra (Australia)	0.87	1.00
TELUS	1.57	1.91
Verizon (U.S.)	1.02	1.26

<sup>^</sup> Coefficient is not statistically significantly different from zero

<sup>\*</sup> Estimation period – 11/28/03-7/24/08 for Telecom Italia

Source: Regression estimates from monthly data from <http://finance.yahoo.com>.

The risks involved in broadband investment projects are vividly articulated by the assessments by Wall Street analysts of these investments in the U.S. The two largest U.S. telecommunications companies, AT&T and Verizon, have made multi-billion dollar investments in fiber buildouts to enable them to provide video and other broadband services along with telephony, as we have mentioned. Analysts commenting on Verizon's and AT&T's massive broadband investments have expressed mixed views on whether these investments will ultimately compensate their investors adequately for the risks taken, with some analysts expressing optimism and others skepticism.

A recent report by Bernstein Research, for example, concludes that "Even with aggressive assumptions about incremental adoption and retention, we believe the FiOS [Verizon's fiber-to-the-home initiative] project, in aggregate, falls well short of earning its cost of capital."<sup>64</sup> An earlier report by industry analysts Pike & Fisher was also pessimistic, stating that its "report suggests Verizon is spending so much on FiOS that it

<sup>64</sup> Craig Moffett, "Verizon (VZ): Project FiOS... Great for Consumers, but What About Investors?" Bernstein Research, January 14, 2008, p. 4.

could take a decade or more for the company to pay back its investment should it fall considerably short of its market-penetration goals.”<sup>65</sup> In contrast, Stifel Nicolaus analysts Christopher King and Billie Warrick were fairly optimistic about Verizon’s FiOS product, predicting that “Verizon will still be able to offer a superior product to cable (and AT&T) due to its FTTH [fiber-to-the-home] architecture, and will still be able to generate a positive ROI [return on investment], given its superior product offering to its cable competitors, in our view.”<sup>66</sup>

The divergent views of analysts of these high-stakes investments illustrate the risk and uncertainty faced by the investors. The fact that the investments necessary to build broadband infrastructure are, by their very nature, large and inherently risky renders the ability and incentives of companies to make those investments particularly vulnerable to being depressed by regulatory interference. Projects with inherently significant risk, as these are, would be especially sensitive to regulatory risk.

While imposing unbundling obligations on new broadband networks would dampen incentives to invest in broadband infrastructure, it would not necessarily have the same effect on investment in each geographic area in which investments are contemplated. The effects of the depressed investment incentives would be most immediately and directly felt in areas where the economics of investment are at the edge of profitability even without unbundling burdens. This is likely to be in already-disadvantaged geographic areas. Hence, consumers in the least attractive areas for investment in advanced broadband networks would be the ones who would likely be disproportionately deprived of the new investment. Such an outcome would indeed be a perverse and, presumably, unintended consequence of regulatory policy whose goal is to advance consumer welfare for all Canadians.

*e. Incentives for cable companies to invest and compete would be depressed by unbundling rules on ILECs*

The effect of regulatory rules on the incentives to invest extends beyond the direct effects on the ILECs. The vigor and speed with which ILECs make investments in broadband infrastructure will affect the vigor and speed with which cable and wireless broadband companies will continue to invest in response, and the ferocity of intermodal competition.

This phenomenon has been vividly exhibited in the U.S., where the deployment of advanced networks by the telecommunications incumbents has been (at least in part) a competitive response to the investments in advanced technologies made by cable companies—whose investments have enabled the cable companies to offer multiple

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<sup>65</sup> “Verizon FiOS: Economics, Prospects and Impacts,” Pike & Fisher, July, 2007.

<sup>66</sup> C. Christopher King and Billie Warrick, “AT&T Increasing Project Lightspeed Budget; Riskier than FiOS?” Stifel Nicolaus, May 8, 2007, p. 2.

services, including voice, over their networks, in direct competition with the ILECs.<sup>67</sup> As we elaborate in a later section, the planned rollouts of next generation facilities by the U.S. ILECs has in turn spurred further investments by competing broadband providers, including the cable companies.

It is reasonable to expect a similar dynamic in Canada if investment is encouraged rather than discouraged by regulatory decisions. Today, the ILECs in Canada face significant challenges if they wish to compete effectively against cable providers, who currently offer much faster Internet access services and the attractive “triple play” bundles (of video, telephony, and high-speed Internet) that the ILECs are currently unable to match. This technological gap is manifesting itself in changes in the Canadian providers’ market shares. From 2003-2005, ILECs in Canada held a slight lead on cable providers in the total share of Internet access revenues. However, in 2006, cable overtook the ILECs’ share of Internet access revenues, because cable Internet access revenues grew more rapidly than ILEC Internet access revenues.<sup>68</sup> It is reported that the Canadian ILECs’ decreased effectiveness in attracting customers stems at least in part from the lower quality (i.e., lower speed) of their Internet services, which we discussed earlier. For instance, a recent article in the *Globe and Mail* reported the following:

Today, cable companies are selling Internet services to households at speeds three times faster than what Bell Canada can offer, bundling lucrative television and phone services in the process. By next summer, that gap is likely to widen to more than six times greater.

Cable players that include Rogers Communications Inc. and Vidéotron Ltée have been using their technical advantage to poach Bell customers, after they have spent billions of dollars to create lightning-fast networks.<sup>69</sup>

The article goes on to explain that were Bell Canada to upgrade its network in order to offer Internet services of comparable speed, it would require the ILEC to incur network investments of up to \$800 to \$1,200 per customer. It is reasonable to expect, in light of the experience in the U.S., that if Canadian ILECs were to make investments at that level, Canadian cable companies would be compelled to respond with their own increases in investments, service improvements, and innovations.

The contrasting experience in the U.S. and Canada is instructive. In the U.S., it is evident that vigorous intermodal competition, spurred by aggressive ILEC and cable investment, is triggering yet further investments by both ILECs and cable companies. If Canadian ILECs are provided a regulatory environment conducive to investment, it is

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<sup>67</sup> “CORRECTED, UPDATE-1, AT&T raises spending outlook for U-verse expansion,” *Reuters*, November 6, 2007.

<sup>68</sup> *2008 Monitoring Report*, Table 5.3.1, p. 210.

<sup>69</sup> *2008 07 Globe and Mail*.

reasonable to expect similar escalation of investment not only by ILECs but by cable companies as well, to the benefit of Canadian citizens.

*f. CLEC investment in broadband would be dampened by expanding unbundling obligations on ILECs*

Unbundling obligations for advanced networks would be expected to not only dampen incentives for ILECs and other platform providers such as cable companies to invest, but also for CLECs (those companies who would use the unbundled broadband services) themselves to invest. The incentives of the beneficiaries of the unbundling policy to make investments in new facilities rather than use the unbundled elements are significantly reduced if they can utilize the incumbent's resources at regulated rates rather than incur the risk to build their own or negotiate for commercial agreements, an effect that is well-recognized in the economics literature.<sup>70</sup>

In the U.S., the FCC explicitly acknowledged the fact that by declining to require unbundling of ILECs' advanced infrastructure it would encourage CLECs to invest in alternative infrastructures and innovative options:

...with the knowledge that incumbent LEC next-generation networks will not be available on an unbundled basis, competitive LECs will need to continue to seek innovative network access options to serve end users and to fully compete against incumbent LECs in the mass market.<sup>71</sup>

Level 3 is an example of a CLEC in the U.S. that has invested successfully in its own broadband infrastructure. Level 3 has expanded its operations through a number of acquisitions, including Broadwing, Focal, ICG, Wiltel, and Looking Glass Networks.<sup>72</sup> In 2006, Level 3 completed its initial planned deployment of its "next generation of optical transport technology" in North America and Europe, and reported that its Internet backbone business was growing at a rate of 70 percent per year.<sup>73</sup>

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<sup>70</sup> Debra Aron, Ken Dunmore, and Frank Pampush, "The Impact of Unbundled Network Elements and the Internet on Telecommunications Access Infrastructure," presented at the Harvard Information Infrastructure Project, Impact of the Internet on Communications Policy, December 3, 1997. For the fundamentals of decision making under uncertainty, see 1994 Dixit and Pindyck; and Avinash K. Dixit and Robert S. Pindyck, "The Options Approach to Capital Investment," *Harvard Business Review*, May-June, 1995, pp. 105-115.

<sup>71</sup> Report and Order on Remand and Further Notice of Proposed Rulemaking, *In the Matter of Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers et al.*, before the Federal Communications Commission, FCC 03-36, Released: August 21, 2003, ¶ 272, footnotes omitted.

<sup>72</sup> "Level 3: Company History," [http://www.level3.com/about\\_us/company\\_history/index.html](http://www.level3.com/about_us/company_history/index.html). In 2007, Level 3 acquired Broadwing, who previously acquired Focal. See, "Level 3 Completes Acquisition of Broadwing," Level 3 Press Release, January 3, 2007, <http://www.level3.com/newsroom/pressreleases/2007/20070103.html>, and "Broadwing Communications To Expand Its Reach with the Addition of Focal Communications," Business Wire, September 2, 2004.

<sup>73</sup> Level 3 10-K for 2007, p. 65; and Tim McElligott, "Stage Set for Wholesale Carriers," *Telephony*, March 20, 2006.

Permitting competitors to rely on the incumbent's facilities at regulated rates undermines the incentive of those competitors to take risks because it offers a low-risk means of participating in the market. It limits the incentive for the kinds of aggressive investment that can lead to improved technologies and new products but that can also lead to failure. This prospect of failure is inseparable from the prospect of successful innovation, and is faced by all investors in new technology, including ILECs and cable companies. It is wrong-headed and destructive public policy to provide artificial protection from legitimate risk, particularly in a market where risk is the seed of innovation and where innovation lies at the heart of the benefits that should arise from competition.

Moreover, like many regulatory conditions, companies that avail themselves of the incumbent's unbundled network elements may come to view these transitory measures as an entitlement, and may demand that the unbundled elements continue to be available long after their initial purpose has disappeared. This is a classic flaw associated with what is known as the "infant industry" rationale for protectionist policy.

Often implemented in the form of tariffs to protect a fledgling domestic industry from foreign competition, the infant industry rationale induces policy makers to bestow temporary preferential treatment on a certain industry or class of competitors in order to boost their ability to compete until the industry or competitors mature. In addition to distorting incentives to enter the market, the problem with infant industry protectionism is that it is very difficult to eliminate the preferential treatment once the infant industry is on its feet. As noted by economist Alfred Kahn, "so long as companies are insulated from competition, they are, to that extent and for that reason, less likely ever to grow up and attain the ability to compete without such special protections."<sup>74</sup>

Expanding ILECs' unbundling obligations to new broadband services is particularly harmful because the risks of broadband investment are great and the benefits of innovation are so significant for social welfare. Moreover, these obligations reduce the prospective profitability of investing in the new next generation broadband networks. Regulators should not discourage CLECs from engaging in broadband innovation and investment activities by offering artificial protection from risk via the imposition of expanded unbundling obligations on ILECs.

## **V. REGULATION OF NEXT GENERATION NETWORKS IN OTHER COUNTRIES**

Recent evidence demonstrates that the detrimental effect of unbundling obligations on investment that we have discussed as a matter of principle is borne out in fact. A number of studies find that unbundling is associated with reduced investment. In contrast, the U.S. experience provides a vivid example of the powerfully positive effect

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<sup>74</sup> Alfred E. Kahn and William E. Taylor, "The Pricing of Inputs Sold to Competitors: A Comment," *Yale Journal on Regulation* 11 (1994), pp. 225-240, at p. 234..



that removal of unbundling obligations, and regulatory certainty, can have on unleashing investment. Establishing clear, certain rules exempting new broadband services from unbundling can be expected, based on sound empirical evidence, to stimulate investment in broadband infrastructure, to the benefit of Canadian citizens. In this section, we examine the experience in select countries of regulatory policy and the development of advanced broadband networks.

*a. The United States*

The U.S. is one of the few countries that has committed to no mandatory unbundling of new, broadband facilities. This policy has evolved slowly as the FCC implemented the local competition provisions of the 1996 Telecommunications Act. Lengthy regulatory proceedings after the passage of the 96 Act resulted in an extremely complicated wholesale network unbundling regime that diminished the incumbents' incentives to invest in network facilities after 2001. However, after repeated chastisements by U.S. courts, including the Supreme Court, the FCC began to reverse course. The FCC decided to abolish line sharing (the requirement that incumbents permit competitors to offer DSL on the same line over which the incumbent was providing voice service to the customer) and to largely forbear from requiring unbundling of new deployments of fiber to the home (FTTH) in its August 2003 "Triennial Review" local-competition order (the "TRO").<sup>75</sup> The FCC based its decision on its conclusion that incumbents had no inherent advantage in building new facilities and that any unbundling requirement would discourage their investment in these facilities:

With respect to new FTTH deployments (*i.e.*, so-called "greenfield" construction projects), we note that the entry barriers appear to be largely the same for both incumbent and competitive LECs – that is, both incumbent and competitive carriers must negotiate rights-of-way, respond to bid requests for new housing developments, obtain fiber optic cabling and other materials, develop deployment plans, and implement construction programs... Thus, we conclude that incumbent LECs do not have a first-mover advantage that would compound any barriers to entry in this situation...

Thus, we determine that, particularly in light of a competitive landscape in which competitive LECs are leading the deployment of FTTH, removing incumbent LEC unbundling obligations on FTTH loops will promote their deployment of

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<sup>75</sup> Report and Order and Order on Remand and Further Notice of Propose Rulemaking, *In the Matter of Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers*, before the Federal Communications Commission, Released: August 21, 2003.

the network infrastructure necessary to provide broadband services to the mass market.<sup>76</sup>

At that time the provision of video services by phone companies was in its infancy.<sup>77</sup> Within months, Verizon announced that it would begin deploying its version of fiber to the home, which it subsequently called “FIOS.”<sup>78</sup> In the next four years, it expended billions of dollars to pass 11 million homes with FIOS Internet services and enrolled 2 million subscribers to these services.<sup>79</sup> Its current plan includes investment of \$23 billion nationwide between 2004 and 2010 to pass 18 million homes, over half the homes it serves.<sup>80</sup> Verizon’s projected total investment of \$23 billion nationwide is equivalent to the total private investment in mining and oil field equipment in the United States over the last three years.<sup>81</sup>

AT&T, the largest U.S. ILEC, has also begun to roll out a fiber-to-the node service, delivering voice, data, and IP-based TV services in its territory. By June of 2004, AT&T (then SBC) had announced plans to deploy a fiber network offering IP-Video and high-speed broadband services. In January of 2008 AT&T’s so-called “U-verse” network passed approximately 7.9 million living units and had 231,000 subscribers.<sup>82</sup> The investment required to roll out the U-verse network is projected to be as much as \$6.5 billion through 2008.<sup>83</sup>

The FCC’s decision to forbear from imposing unbundling regulations on new broadband facilities clearly contributed to these aggressive investment decisions. In a 2005 working paper, Professor Thomas Hazlett reached a similar conclusion. Professor Hazlett directly examined the effect of U.S. network sharing rules on competition and investment. He noted that cable companies, whose broadband services were largely unregulated, invested more quickly in their broadband networks than did telephone companies, who were required to share their broadband facilities with competitors. He also observed that once line sharing regulations were lifted, the number of DSL subscribers began to grow more quickly. From his examination of the pattern of CLEC entry, he concluded that

[The] data suggest that resale competition achieved via unbundling regulation does not lead to additional facilities-based entry, but

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<sup>76</sup> *Id.* at ¶¶ 275, 278.

<sup>77</sup> *See*, for example: Carol Wilson, “Telco video: Is the third time charmed?” *Telephony Online*, July 11, 2005.

<sup>78</sup> “Verizon, in Historic First, Begins Large-Scale Rollout of Advanced Fiber-Optic Technology With Keller, Texas, Deployment; Announces Plans for Offering New Services,” Verizon press release, May 19, 2004, available at <<http://investor.verizon.com/news/view.aspx?NewsID=511>>.

<sup>79</sup> “Verizon Reports Double-Digit Earnings Growth, Strong Operating Cash Flows, Sales Gains in All Key Areas in 2Q,” Verizon press release, July 28, 2008, available at <<http://investor.verizon.com/news/view.aspx?NewsID=931>>.

<sup>80</sup> Verizon Press Kit, “All About Verizon FiOS,” <<http://newscenter.verizon.com/kit/fios-symmetrical-internet-service/all-about-fios.html>>, accessed February 25, 2008.

<sup>81</sup> US Bureau of Economic Analysis, Table 5.5.5. Private Fixed Investment in Equipment and Software by Type.

<sup>82</sup> “AT&T U-Verse Timeline,” available at <[www.att.com/gen/press-room?pid=5838](http://www.att.com/gen/press-room?pid=5838)>.

<sup>83</sup> Todd Spangler, “AT&T: U-Verse TV Spending to Increase,” *Multichannel News*, May 8, 2007.

displaces such activity...In fact, investment flows fall dramatically in the sector for both incumbents and entrants, as network sharing increases. This pattern cannot be explained solely by the business cycle, as it is distinct from that observed elsewhere in adjacent markets where different sharing rules apply.<sup>84</sup>

The FCC completed its deregulation of broadband facilities in 2005 when it determined that all fixed-wire broadband services are information services and declined to impose unbundling obligations or to require providers to offer the broadband transmission component as a stand-alone service.<sup>85</sup> This allowed it to eliminate any requirement that ILECs provide a broadband transmission service to competitors and to extend the deregulation to broadband over power lines (BPL) and to wireless broadband services.<sup>86</sup> In this deregulatory environment, broadband subscriptions in the U.S. have soared, more than trebling in the three years ended June 2007.<sup>87</sup> Clearly, the FCC's forbearance policy has borne substantial fruit for U.S. citizens.

Verizon and AT&T are not alone among communications companies in the U.S. in substantially increasing their investments since the TRO decision. Consistent with the mutually-reinforcing dynamic of responsive competitive investments we discussed earlier, cable companies have made massive investments in their broadband infrastructures as well. While the combined annual capital expenditures of AT&T and Verizon have increased from \$17.1 to \$24.6 billion since 2004, the aggregate annual capital expenditures of the three largest publicly held cable providers, Comcast, Cablevision, and Time Warner Cable, have nearly doubled, from \$5.6 billion to \$10.1 billion.<sup>88</sup>

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<sup>84</sup> Thomas Hazlett, "Rivalrous Telecommunications Networks With and Without Mandatory Sharing," *AEI-Brookings Joint Center for Regulatory Studies Working Paper*, Washington DC, March 2005, p. 4.

<sup>85</sup> Fifth Report, *In the Matter of Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996*, before the Federal Communications Commission, Released: June 12, 2008, available at [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/FCC-08-88A1.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-08-88A1.pdf), ¶¶ 40-41 (hereafter *FCC Fifth Broadband Report*). The FCC also declined to interfere in ILECs' copper retirement decisions, and to require that ILECs who have built a broadband fiber network provide CLECs with access to the broadband functionality of their networks where they have retired copper. Rather, where the overlain copper is retired, the ILEC must provide only a narrowband UNE (64Kbps) over its fiber network, not a broadband UNE. See Report and Order and Order on Remand and Further Notice of Proposed Rulemaking, *In the Matter of Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers et al.*, before the Federal Communications Commission, FCC 03-36, Released: August 21, 2003, ¶ 281 and footnote 8221; and 47 CFR 51.319 (a)(3)(iii)(C).

<sup>86</sup> *FCC Fifth Broadband Report*, ¶ 41.

<sup>87</sup> Federal Communications Commission, "High Speed Services for Internet Access: Status as of June 30, 2007," March 2008 available at <[http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/DOC-280906A1.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-280906A1.pdf)>, Table 1.

<sup>88</sup> SEC filings: Verizon 10-K Exhibit 13 for 2006 and 2007; AT&T Inc. 10-K Exhibit 13 for 2006 and 2007; SBC 10-K Annual Report for 2004; BellSouth 10-K for 2005; AT&T Corp. 10-K for 2004; Comcast 10-K for 2006 and 2007; Cablevision 10-K for 2006, 2007; Time Warner Inc. 10-K for 2006 and 2007. For AT&T Inc. and Verizon investment for the "wireline" segment was used, and for Comcast, Cablevision and Time Warner Inc. the "cable" segment was used.

As noted by *The Wall Street Journal*, “Stung by the success of phone companies in selling packages of TV and high-speed Internet services, the [U.S.] cable industry is getting close to launching a counteroffensive – an inexpensive new technology that dramatically boosts Internet connection speeds.”<sup>89</sup> In response to ILEC competition, Comcast “hopes to begin upgrading its networks by midyear [2008], reaching about 20% of the homes along its routes by the end of the year.”<sup>90</sup> New compression technologies included in DOCSIS 3.0<sup>91</sup> will prospectively “allow the cable industry to compete on a more even footing with telecom giant Verizon Communications Inc., which is aggressively marketing a higher-performance fiber-optic network called FiOS that offers much faster Internet connection speeds than cable modems can currently deliver.”<sup>92</sup> Comcast “expects to apply some competitive pressure to AT&T Inc. in the tech-savvy Bay Area after booting up an upgrade that will cap modem speeds at 16 Mbit/s down and 2 Mbit/s upstream.”<sup>93</sup>

Comcast is not the only cable company responding to the surge in U.S. ILEC investment with even more advanced cable technology investment. *The Wall Street Journal* reports that “[o]ther cable operators, including No. 2 operator Time Warner Cable Inc., Cox Communications Inc. and Charter Communications Inc., say they’re experimenting with DOCSIS 3.0 technology and plan on putting it into play in one form or another over the coming years.”<sup>94</sup> In fact, one observer notes that “[c]able operators are certain to feel some heat from all these announcements [of ILEC fiber builds]. Indeed Time Warner has reportedly upped its cable modem speeds to 10 Mbps in markets where it competes with FiOS.”<sup>95</sup>

The mutually reinforcing cycles of investment and responsive investment between the U.S. ILECs and cable broadband providers are unlikely to end soon. The incumbent ILECs continue to develop the capabilities of their advanced networks. Verizon, for example, is beginning to roll out Gigabit Passive Optical Network (GPON) technology to replace the Broadband Passive Optical Network technology used since it began deploying its fiber-to-the-premises (FTTP) network.<sup>96</sup> AT&T continues to refine U-verse to provide even better services to its customers.<sup>97</sup>

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<sup>89</sup> Vishesh Kumar, “Cable Prepares an Answer to FiOS,” (hereafter *Cable Prepares an Answer*), *The Wall Street Journal*, February 14, 2008.

<sup>90</sup> *Cable Prepares an Answer*.

<sup>91</sup> DOCSIS is the acronym for “Data Over Cable Service Interface Specifications.”

<sup>92</sup> *Cable Prepares an Answer*.

<sup>93</sup> “Comcast Has a ‘Blast!’ in the Bay,” *Light Reading’s Cable Digital News*, February 11, 2008, accessed at <[http://www.lightreading.com/document.asp?doc\\_id=145620&site=cdn](http://www.lightreading.com/document.asp?doc_id=145620&site=cdn)>, March 12, 2008.

<sup>94</sup> *Cable Prepares an Answer*.

<sup>95</sup> Will Workman, “Telcos Fiber Plans Finally Start Paying Off,” *TV Technology.com*, May 30, 2007.

<sup>96</sup> “Verizon to Begin Deployment of New Technology That Increases Speed of FiOS Fiber-to-the-Premises Links by Four to Eight Times,” Verizon News Release, March 27, 2007 (hereafter *Verizon GPON*), <<http://newscenter.verizon.com/press-releases/verizon/2007/verizon-to-begin-deployment.html>>, accessed March 7, 2008.

<sup>97</sup> Bob Wallace, “VON: AT&T Exec Details U-verse Evolution,” *XchangeMag*, October 30, 2007, <<http://www.xchangemag.com/articles/539/7ah3011394446038.html>>, accessed March 7, 2008.

The massive investments made in broadband infrastructure since the FCC's ruling that limited broadband unbundling stand in stark and telling contrast to the experience a few years earlier in the state of Illinois. In 2001, AT&T (then SBC) had been making large investments in its broadband infrastructure—an effort known at the time as “Project Pronto.” However, in March 2001, the Illinois Commerce Commission (ICC) ruled that SBC would have to share its soon-to-be deployed broadband infrastructure at regulated rates with competitors.<sup>98</sup> SBC decided, as a result of this ruling, to deploy its resources on Project Pronto to other states where the investment would not be at risk of regulatory expropriation, and ceased Project Pronto investments in Illinois.<sup>99</sup> Later, in September 2001, after the ICC had reversed its March 2001 decision,<sup>100</sup> SBC found it economic to resume its Project Pronto investments in the state.<sup>101</sup>

### ***b. The European Union***

The European Union has pursued a decidedly different strategy from that of the U.S. Federal Communications Commission. Motivated in part by the lack of fixed-wire competition from cable television companies in many EU countries, the EU has decided to require that all incumbents provide access to their broadband services, their copper loops, and –through line sharing–the upper frequencies of these copper loops. In addition, the EU Commissioner for Information, Viviane Reding, has been promoting functional separation and has even hinted at considering structural separation of these carriers in order to promote broadband competition.<sup>102</sup>

This aggressive attitude toward regulation of ILEC broadband facilities is undoubtedly partly responsible for the lack of investment in new facilities in Europe. The European ILECs have lagged substantially behind their North American counterparts in fixed-wire network investment.<sup>103</sup> More important, none has begun a widespread deployment of fiber to the premises. Virtually all of the deployment of FTTH in Europe has been undertaken by a few new entrants or by government entities. As a result, there is very little progress towards the widespread deployment of fiber to the mass market in Europe.

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<sup>98</sup> Order, *Illinois Bell Telephone Company, Proposed Implementation of High Frequency Portion of Loop (HFPL)/Line Sharing Service*, Illinois Commerce Commission, Docket No. 00-0393, March 14, 2001, p. 25.

<sup>99</sup> Marlene Hunt, “High-speed access coming slowly,” *Grayslake Review*, July 4, 2002 (hereafter *Hunt 2002*).

<sup>100</sup> Order on Rehearing, *Illinois Bell Telephone Company, Proposed Implementation of High Frequency Portion of Loop (HFPL)/Line Sharing Service*, Illinois Commerce Commission, Docket No. 00-0393, September 26, 2001, p. 38.

<sup>101</sup> *Hunt 2002*.

<sup>102</sup> Statement by Viviane Reding after the meeting of Council of EU Telecoms Ministers, Luxembourg, 12 June 2008, available at

[http://ec.europa.eu/information\\_society/newsroom/cf/itemlongdetail.cfm?item\\_id=4181](http://ec.europa.eu/information_society/newsroom/cf/itemlongdetail.cfm?item_id=4181).

<sup>103</sup> Over the five year period, 2002-06, nine EU ILECs (Telekom Austria, Belgacom, BT, Deutsche Telekom, KPN, Telecom Italia, TDC, Telefónica, and Telia-Sonera) invested an average of 12.8 percent of annual fixed-wire revenues in their networks while the four (now three) large U.S. ILECs invested an average of 16.6 percent of revenues. (Data derived from company annual reports.)

Last year, France Telecom announced that it would begin deploying fiber in selected markets, but it appears that its deployment has in fact been minimal. More recently, it asserted that it will deploy fiber to a level of “up to 1 million homes” by the end of this year, or less than 4 percent of French households.<sup>104</sup> KPN, the incumbent in the Netherlands, notes in its annual reports that municipalities and other private companies are deploying fiber to the home,<sup>105</sup> but that KPN prefers a more conservative approach of developing a VDSL-2 technology as the cornerstone of its “foreseen” network, and investing in fiber to the premises only in selected areas.<sup>106</sup>

More recently, the United Kingdom incumbent, BT, announced its intention to roll out a new fiber network to about 10 million homes by 2012.<sup>107</sup> This announcement is a particular surprise because BT is arguably the most aggressively regulated ILEC in Europe, having submitted to the regulator’s demand for full functional separation several years ago. BT apparently will have to provide all of its facilities, including its new FTTH facilities if it builds them, on a regulated wholesale basis to its competitors. Notably, however, BT has suggested recently that it may seek relief from this requirement in order to facilitate investment: “Discussions have started with Ofcom, the UK regulator, to remove the current barrier to investment and making sure that anyone who chooses to invest in fiber can earn a fair rate of return for their shareholders.”<sup>108</sup>

BT’s press release announcing its intention to deploy FTTH was formally released on July 15 of this year, but the equity markets apparently had a forewarning. Between July 8 and July 15, BT’s shares declined by over 9 percent while the S&P 500 and the FTSE 100 declined by an average of 5 percent over the same period.<sup>109</sup> Thus, investors appear to have responded to BT’s intention to invest \$3 billion in FTTH over the next four years by reducing its market capitalization by 4 percent—or \$1.3 billion relative to the overall market. It remains to be seen if BT, in light of the market’s apparent negative reaction, will actually deploy the fiber plant as announced if it does not receive regulatory relief. It should also be noted that, as shown in Table 2, BT equity shares’ systematic risk is one of the highest among EU ILEC shares, which undoubtedly reflects the uncertainty created by the regulatory environment in the United Kingdom.

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<sup>104</sup> FT recently it admitted that it had attracted only 7,000 subscribers by the end of 2007. “France Telecom reconfirms its commitment to a healthy and balanced fiber-optic deployment,” France Telecom press release, April 22, 2008, available at

<[http://www.orangepartner.com/site/enuk/news/press/p\\_ft\\_reconfirms.jsp](http://www.orangepartner.com/site/enuk/news/press/p_ft_reconfirms.jsp)>

<sup>105</sup> KPN Annual Report and Form 20-F, 2006, available at

<<http://www.kpn.com/corporate/en/Company-profile/Annual-Reports-/Annual-Report-and-Form-20-F.htm>>, (hereafter *KPN 2006 Annual Report*), p. 20.

<sup>106</sup> *KPN 2006 Annual Report*, available at

<[http://www.sec.gov/Archives/edgar/data/1001474/000115697308000275/b54426\\_20f.htm](http://www.sec.gov/Archives/edgar/data/1001474/000115697308000275/b54426_20f.htm)>, pp. 6, 20; KPN Annual Report and Form 20-F, 2007, pp. 26, 40, 48.

<sup>107</sup> “BT Pumps Up on Broadband,” *Forbes.com*, July 15, 2008, available at

<[http://www.forbes.com/2008/07/15/bt-broadband-investment-markets-equity-cx\\_je\\_0715markets06.html?partner=yahootix](http://www.forbes.com/2008/07/15/bt-broadband-investment-markets-equity-cx_je_0715markets06.html?partner=yahootix)>

<sup>108</sup> Alain Baritault, “The mid-year report on Telefonica, Orange and BT,” *Muniwireless*, August 6, 2008 available at <<http://www.muniwireless.com/2008/08/06/mid-year-report-on-telefonica-orange-bt/>>.

<sup>109</sup> Data from <<http://finance.yahoo.com>>.

A recent paper by Leonard Waverman and his associates has demonstrated using statistical techniques the deleterious effect of mandatory unbundling on telecommunications investment in the EU. Waverman *et al.* performed an empirical analysis that investigated the inherent tension faced by regulators between promoting short-term competition and preserving the incentive to invest and innovate. Using data from several European countries,<sup>110</sup> Waverman *et al.* examined the effect of access regulations on the provision of broadband using alternate access technologies. The authors concluded that “while access regulation may promote short-term competition based on the existing [public switched telephone] network, it does so at a substantial cost. This cost is the potential reduction in alternative infrastructure investment by both incumbents and entrants.”<sup>111</sup> They further found that “regulatory policy does not merely have an impact on the relative fortunes of different access platforms, but it actually has a **very strong impact.**”<sup>112</sup> Specifically, they found that where regulations favor competition using unbundled local loops, investment in alternate access infrastructure is reduced. Further, their regression analysis “suggests that the market-stimulating effect of an LLU [unbundled loop] price reduction is not sufficient to prevent a decline in the overall number of subscriber lines served over alternate access platforms.”<sup>113</sup>

Shortly after the release of the Waverman *et al.* study, the UK regulator, Ofcom, issued a report on the appropriate regulation of next generation networks that echoed the concerns raised by Waverman *et al.* In its report, Ofcom explained that

The imposition of regulatory remedies that mandate access at a specific price may result in asymmetric risk borne by investors and a change to the prospective returns available for an investing firm...[which] may result in lower incentives to invest. This approach would cap the total returns that the firm could make if demand turned out to be high but force the firm to bear all of the losses in the event that there was virtually no demand.<sup>114</sup>

There is little evidence at this point that European ILECs will build advanced fiber networks to deliver high-speed services throughout their franchise areas. There may be some limited deployment by them or by other firms of fiber in major cities, but given the regulatory environment it is unlikely that incumbents will deploy fiber as extensively as carriers in the U.S., Japan, or Korea have already done.

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<sup>110</sup> Countries included in the sample are Austria, Czech Republic, Denmark, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, and the UK. Leonard Waverman, Meloria Meschi, Benoit Reillier, Kalyan, Dasgupta, “Access Regulation and Infrastructure Investment in the Telecommunications Sector: An Empirical Investigation,” September 2007 (hereafter *Waverman et al. 2007*), footnote 24, p. 16.

<sup>111</sup> *Waverman et al. 2007*, p. 4.

<sup>112</sup> *Waverman et al. 2007*, p. 24 (emphasis in original).

<sup>113</sup> *Waverman et al. 2007*, p. 23.

<sup>114</sup> Office of Communications (Ofcom), “Future broadband: Policy approach to next generation access,” September 26, 2007, p. 37, available at [www.ofcom.org.uk/consult/condocs/nga/future\\_broadband\\_nga.pdf](http://www.ofcom.org.uk/consult/condocs/nga/future_broadband_nga.pdf).

### c. *Japan*

The Japanese broadband sector was somewhat slow to develop, in part because cable television systems passed only about 40 percent of households at the beginning of the decade<sup>115</sup> and have not been very aggressive in rolling out high-speed Internet services. In 2000, the Japanese regulator required NTT, the incumbent telephone provider, to begin unbundling its loops for use by competitive DSL providers.<sup>116</sup> Yahoo! BB, a subsidiary of Softbank, began to offer DSL service over NTT copper loops, pricing the service very aggressively.<sup>117</sup> Its success in attracting subscribers was emulated by others, leading to the rapid growth in DSL subscriptions to more than 15 million subscribers by the end of 2005.<sup>118</sup> NTT's share of DSL subscribers was less than 40 percent by 2005.<sup>119</sup>

To compete with Softbank and the other competitors, NTT began to deploy a FTTH network in 2002, and it now has approximately 70 percent of the country's 10 million FTTH subscribers.<sup>120</sup> This investment in FTTH has taken place despite a government policy requiring NTT to "unbundle" fiber and lease it to rivals. However, while the willingness of NTT to invest in FTTH despite unbundling obligations may appear to contradict the findings in other countries that unbundling dampens investment, in fact we believe it more likely demonstrates that the strength of the dampening effect depends on the price at which unbundled elements must be provided. The relatively high wholesale price of the fiber loop in Japan and the requirement that rivals lease a bundle of eight fibers in any given location have apparently caused such leasing to be very limited,<sup>121</sup> and has limited to some extent, and at least for the time being, the risks of non-remunerative terms and conditions that we discussed earlier. Softbank has repeatedly sought more favorable terms from the regulator, the Minister of Internal Affairs and Communications (MIC), but apparently has not been successful.<sup>122</sup> NTT reports in its latest Annual Report that the government has essentially deferred a decision on this issue:

With regards to the issue of setting per-unit interconnection charges for bifurcated lines in a passive optical network ("PON", a point-to-multipoint fiber to the premises network architecture in which unpowered optical splitters are used to enable a single optical fiber to serve multiple premises) system in the deliberations

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<sup>115</sup> OECD, *Communications Outlook*, 2007, Table 6.3, p. 183.

<sup>116</sup> Robert D. Atkinson, Daniel K. Correa, and Julie A. Hedlund, *Explaining International Broadband Leadership*, Information Technology and Innovation Foundation, May 2008 (hereafter *Atkinson et al. 2008*), Appendix D, p. D-2.

<sup>117</sup> *Id.*, p. D-2.

<sup>118</sup> OECD, *Communications Outlook*, 2007, Figure 4.13, p. 106.

<sup>119</sup> *Atkinson et al. 2008*, Appendix D, p. D-2.

<sup>120</sup> "Japan Government to Force NTT to Open Up Next-Gen Fiber-Optic Network – Report," AFX NEWS, Jan. 14, 2008, available at <<http://www.forbes.com/markets/feeds/afx/2008/01/14/afx4529495.html>>.

<sup>121</sup> *Atkinson et al. 2008*, Appendix D, p. D-2.

<sup>122</sup> "Softbank objects to NTT's fiber-optic access fee," *Japan Today*, January 18, 2008.



of the Telecommunications Council that started in Fall 2007 there were a large number of requests from other carriers regarding the regulation of connection rules for the NGN, and a debate continued over a number of sessions. In its report dated March 27, 2008, the Telecommunications Council concluded that it would be appropriate to reconsider this issue after confirming future changes in the market environment and the technologies relating to point-to-multipoint architecture. Depending on future technological changes, this debate may be revived and the direction and effects of any such review on NTT Group remain uncertain at this time.<sup>123</sup>

As a result of the limited use of leased unbundled facilities, competition in FTTH services is largely facilities-based among NTT, the electric power companies, and USEN, the largest Japanese cable company.<sup>124</sup> Unbundling obligations have not led to significant competition in providing fiber-based broadband services in Japan.<sup>125</sup>

#### *d. Australia and New Zealand*

In both Australia and New Zealand, regulatory battles over broadband policy have occupied much of the last five years. In New Zealand, these regulatory disputes appear to be coming to an end. In 2003, the New Zealand Commerce Commission declined to require New Zealand Telecom (NZT) to unbundle its network.<sup>126</sup> Then, in May 2006, the government reversed course and announced that it would begin to require New Zealand Telecom to unbundle the local loop in response to low broadband penetration and declining network investment by NZT.<sup>127</sup> In response, NZT announced that it would split itself into two separate divisions, wholesale and retail. However, it was subsequently

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<sup>123</sup> NTT, *Annual Report to the Securities and Exchange Commission, Form 20-F*, for the Year Ending March 31, 2008, p. 11.

<sup>124</sup> Yves Gassot, "Japan: from high speed to very high speed access," *Communications & Strategies*, No. 60, 4th quarter 2005, available at <[http://www.idate.fr/fic/revue\\_telech/370/CS60\\_GASSOT.pdf](http://www.idate.fr/fic/revue_telech/370/CS60_GASSOT.pdf)>, p. 237.

<sup>125</sup> It is also of note that NTT's decision to deploy FTTH has not been rewarded by the equity markets. Even though NTT has attracted more than 6 million subscribers to this service, its stock price has underperformed the market for the last five years. (Data for NTT's stock (ADR) prices, the Nikkei 300, and the S&P500 may be found at <<http://finance.yahoo.com>>.) This underperformance could reflect, in part, market uncertainty over the Japanese regulator's future decisions over the terms for unbundling its fiber plant. However, the low values for the NTT's estimated beta shown in Table 2 are not statistically significantly different from zero. This reflects the fact that the movements in NTT's stock are not correlated with the general market for some reason.

<sup>126</sup> For a review of the New Zealand regulatory decisions on network unbundling, see "Local loop unbundling: a further retreat from light handed regulation," *Bell Gully*, May 12, 2006, available at <<http://www.bellgully.com/resources/resource.00625.asp>>.

<sup>127</sup> "N.Z. Says Telecom Must Give Rivals Greater Access to Network," Bloomberg.com, May 3, 2006, available at <<http://www.bloomberg.com/apps/news?pid=10000081&sid=aAkS5cuhU0uQ&refer=australia>>.

required to break itself into three separate units in response to the Telecommunications Amendment Bill, introduced in November 2006.<sup>128</sup>

The detrimental effect of this regulatory turmoil on NZT has been substantial. Its share price fell by 50 percent in the first six months of 2006 before recovering somewhat. As Table 2 shows, the systematic risk of holding its equity has risen. Its Board replaced its CEO with a former BT executive who is presumably familiar with the problems of running a company subject to extremely tight regulatory supervision. But it has not begun to deploy fiber or other advanced network facilities.<sup>129</sup>

Australia has seen even greater regulatory turmoil. The government owned a controlling share in the incumbent, Telstra, until late 2006. After a series of regulatory disputes with the Australian Competition and Consumer Commission (ACCC) and the government, Telstra was forced to allow wholesale access to its existing fixed-line copper network, including local loop unbundling and line sharing.<sup>130</sup> These regulatory issues were not settled, however, for next generation networks, in particular for a national fiber to the node (FTTN) network that Telstra wanted to build.<sup>131</sup> Consistent with the regulatory impediments to investment, Telstra's shares declined substantially prior to the government's sale of 35 percent of its interest in November 2006,<sup>132</sup> underperforming the U.S. market average by more than 33 percent between the end of 2004 and the end of 2006.<sup>133</sup>

Because the government and Telstra could not come to an accommodation over the construction of the FTTN network, the government has committed to funding part of the cost of such network and has established a bidding process to determine whether Telstra or a consortium of competitors, led by Optus, will build the network.<sup>134</sup> The bids have now been tendered to the government, but the government has not yet chosen the

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<sup>128</sup> Jenny Keown and NZPA, "Telecom's tough year continues - it's split into three," *New Zealand Herald*, November 28, 2006, available at

<[http://www.nzherald.co.nz/section/3/story.cfm?c\\_id=3&ObjectID=10412818](http://www.nzherald.co.nz/section/3/story.cfm?c_id=3&ObjectID=10412818)>.

<sup>129</sup> Its 2007 Annual Report can only say that "The replacement of our copper network infrastructure is a very live debate in New Zealand..." Telecom New Zealand Annual Report, 2007, available at <<http://www.annualreport.telecom.co.nz/2007/download/telecom-annual-report-2007.pdf>>, p. 12. It does not suggest that it has resolved the debate in favor of proceeding with a plan to deploy fiber, and it is surely not close to devoting the capital resources to do so.

<sup>130</sup> OECD, *Communications Outlook*, 2007, Table 2.9, p. 53.

<sup>131</sup> Jo Best, "Telstra loses unbundled local loop Court challenge," *ZDNet Australia*, March 6, 2008, available at <<http://www.zdnet.com.au/news/communications/soa/Telstra-loses-unbundled-local-loop-Court-challenge/0,130061791,339286549,00.htm>>

<sup>132</sup> International Herald Tribune, "Australia sells Telstra shares for \$11.9 billion," November 19, 2006, available at <<http://www.iht.com/articles/2006/11/19/bloomberg/sxtelstra.php>>.

<sup>133</sup> Data for Telstra's stock (TLSYY.PK) prices and the S&P500 may be found at <<http://finance.yahoo.com>>.

<sup>134</sup> Marcus Browne, "G9 to launch FTTN bid as alterego, Terria," *ZDNet Australia*, May 21, 2008, available at <[http://www.zdnet.com.au/news/communications/soa/G9-to-launch-FTTN-bid-as-alterego-Terria/0,130061791,339289159,00.htm?feed=pt\\_telstra](http://www.zdnet.com.au/news/communications/soa/G9-to-launch-FTTN-bid-as-alterego-Terria/0,130061791,339289159,00.htm?feed=pt_telstra)>. Optus is owned by Singapore Telephone (SingTel).

winning bidder. Apparently, the final regulatory rules have yet to be negotiated between the ACCC, the government, and the winning bidder.<sup>135</sup>

It is difficult to predict if the Australian policy, even with government subsidies, will lead to the deployment of a modern, fiber-based broadband network. Thus far it appears to have succeeded only in lowering Telstra's share price and postponing its investment in fiber-to-the-curb.

*e. Summary of the lessons of regulation of NGNs in other countries*

This review of OECD countries' regulation of the new fiber-based networks (NGNs) points strongly to the importance of limiting the regulation of such networks. Those countries that require unbundling of broadband networks and those in which the regulatory issues are still unresolved have very limited investment in NGNs. Of the ILECs that have begun to meaningfully deploy fiber to the home or to the curb, only NTT is required to share these networks with competitors, and NTT is apparently required to do so only at a relatively high price. As a result, the other Japanese carriers have not begun to lease this fiber on a widespread basis. In the EU, Australia, and New Zealand, regulators have created a very poor environment for deploying NGNs; therefore, there has been little investment in advanced broadband networks by incumbent carriers in these countries.

## VI. CONCLUSIONS

In this paper, we have demonstrated that:

- Canada's leadership in broadband deployment is now threatened because it has not yet deployed the extremely fast, "next-generation" networks that can deliver large amounts of data and video services – networks that are currently being deployed in the United States by Verizon and AT&T, and in other countries as well.
- Canada also lags behind the United States in investment in ICT and, consequently, in productivity growth. Promoting economic growth in Canada requires that public policies be designed to facilitate efficient investment in ICT, particularly in the next-generation networks that are vital to unlocking the potential of new information technologies, and that such policy is established promptly.

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<sup>135</sup> For details of this process see, Australian Government, Department of Broadband, Communications, and the Digital Economy, National Broadband Network, available at [http://www.dbcde.gov.au/communications\\_for\\_business/funding\\_programs\\_and\\_support/national\\_broadband\\_network](http://www.dbcde.gov.au/communications_for_business/funding_programs_and_support/national_broadband_network).

- ICT investment generates substantial benefits both to the economy as a whole, and to individual citizens. The evidence is that ICT investment is a major driver of labor productivity growth. ICT investment in broadband infrastructure in particular brings to consumers the benefits of greater access to a myriad of services, including health care, education, government services, entertainment, and media, that enhance well-being.
- Deploying new, very high-speed networks requires massive investment in a risky market environment. The risk of deploying these networks is far greater than the risk that the telecommunications companies faced in deploying copper networks in the regulated monopoly era. Given the competition from cable television and wireless platforms, Canadian ILECs cannot be sure that they will be able to recover the enormous costs of next-generation networks. It is therefore imperative that the CRTC provide an environment that does not impose additional obstacles to such investments.
- Among the most important potential threats to the economic viability of next generation networks is the prospect that regulators will require unbundling of these networks at regulated wholesale prices. Such regulation would be extremely damaging to investment incentives.
- Ambiguity or uncertainty regarding what future policy will be toward new investment itself stifles investment, as investors hold back investment until the policy position is clear.
- Competition is enhanced when the engine of investment and the consequent response by platform-based competitors is unleashed by policy that encourages rather than hinders investment. Imposing unbundling obligations can only increase the number of companies offering service over the same infrastructure, not the number of genuine, facilities-based competitors or the dynamism of genuine competition. Moreover, they do so at the risk of affirmatively decreasing investment by ILECs, CLECs, cable companies, and other platform providers, a poor bargain indeed for Canadian citizens.
- It is clearly possible for the CRTC to maintain its existing essential-facilities policy towards existing network facilities while exempting new next generation networks from mandatory unbundling. This is precisely what the FCC has done in the United States, and the result has been remarkable. Immediately after the FCC announced its policy of exempting these new networks from wholesale unbundling requirements, Verizon and SBC launched massive new investments in fiber-to-the-home and fiber-to-the-node networks.

- Canada can avoid the problems now facing telecommunications carriers in the European Union, which has not exempted next generation networks from unbundling requirements. As a result, European ILECs have been very slow to develop these new networks.

Canadian leaders should recognize the importance of investment in information technologies to the welfare of Canadian citizens and establish a clear policy towards new telecommunications networks. Given the large amount of capital required to deploy these networks, Canada's lagging position in ICT investment and productivity growth, and the very risky current environment into which they must be deployed, Canadian policymakers should not delay in making clear that the network unbundling requirements that apply to the ILECs' legacy networks will not be extended to the new, next generation broadband networks.