

REPORT EXCERPTS

Task 2 – Trans-Gulf Benefits and Valuation Task 3 – Review of Persona Communications Proposal

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Executive Summary

EWA-Canada has been contracted to review the overall reasonableness of the proposal made by Persona Communications Inc. for Government to invest in a new fibre optic connection to North American communications networks.

Based upon our review, nothing has come to our attention to indicate any major financial or technical shortcomings in the proposal. Based upon the information provided to us by the management of Persona Communications Inc, it is our opinion that without considering any ancillary benefits accruing to Persona that are beyond the scope of the trans gulf project, Persona requires the provincial funds of \$15,000,000 to implement the project.

Should the Government decide to proceed with the funding of the trans gulf project as proposed by Persona Communications Inc. the following revisions to the proposal are suggested.

1. That Persona provide a performance bond to ensure completion and cover any potential cost overruns.
2. That the provincial share should be ## fully redundant strands for both land and sea instead of ## fully redundant strands as suggested by Persona.
3. That future contracts with Persona ensure there is open and unencumbered access to the infrastructure as per Canadian regulations and standards.

Assessment and Analysis

We have been asked to review the overall reasonableness of the proposal made by Persona Communications Inc. and in particular answer the following specific questions;

- 1. A review Persona/Consortium's business case (revenue/cost forecast, assumptions, return on investment) to determine that the project requires government capital as a basis for viability; Also provide a consideration of the question: does it need a full \$15 million, would \$10 million be enough?**

Based upon the business plan provided by Persona, nothing has come to our attention to indicate that they have not considered most financial elements of the project. The overall cost assumptions used in the business case are within the ranges of industry norms and appear reasonable. The business case provides for an internal rate of return of XX%, and a net present value of just under NUMBER to Persona. This includes the government funding of \$15,000,000. It should be noted that this rate of return includes the CDLI project which forms part of the infrastructure of the cross gulf connection. Without considering the ancillary benefits to Persona, such as additional revenues derived from new services and or new communities served not currently considered in this project,

Persona does require the full \$15,000,000 funding from the government to ensure a positive rate of return.

2. Identification and a description of the project risks which give rise to the need for government capital;

As indicated in 1 above, the financial margins presented by Persona include a contribution of \$15,000,000 by the province and only allow for a **\$NUMBER** net present value. The **\$NUMBER** does not warrant Persona for any material cost overruns, nor utilizing traditional loan financing for \$15 million. This project would require an interested equity partner who can derive some benefits other than immediate cash flows. Given the limited market in Newfoundland, the number of potential investors are limited to the existing partners, the province, the federal government or the competitor, Aliant.

3. A review capital of the project expenditure plans to verify reasonableness and offer a professional opinion regarding the risks of overrun; Also consider the problem and Persona's positioning to deal with what happens if the project requires additional funding.

The capital costs assumed by Persona to complete the cross gulf connection are \$52,000,000. Industry rules of thumb would estimate the same infrastructure cost to be approximately \$46-51 million. (The Iles de la Madeleine project in 2003 cost about \$3200 per underwater kilometer. The Persona project assumes \$XXXX per underwater kilometer. Cable cost reductions over the past years may explain the reduction.)

Newfoundland does present some particular geographical challenges which may not have been completely considered in the forecasts prepared by Persona. These include rough terrain, new terrain that has never been forged before, and additional costs that may be caused by delays as a result of environmental assessment and right of way approvals not yet received. It should be noted that only limited approvals have been received in Nova Scotia which represents almost half of the overland cable distance. Persona has indicated they intend to contract with local utilities which may mitigate some of the risks.

Due to the limited return mentioned in #1. above, any cost overruns could not be readily funded by the specific project and would require additional funding by one or more of the partners. Persona has indicated that they would be fully responsible for any cost overruns. This point should be clearly defined and included in the legal contracts ultimately drafted. Persona has declined to disclose its financial statements for the reason that they are a privately held company and that they are involved in many other projects in other parts of the country which are not of concern to this project. As a result we are unable to comment on Persona's solvency nor its ability to fulfill its commitment to cover the cost overruns. Our suggestion to solve this, would be to require Persona to post a

bond to cover both the completion of the project and any cost overruns that may occur which Persona has indicated a willingness to do so.

4. If possible, to provide an estimated valuation of the ownership of dark fiber by the province.

The valuation of any asset is ultimately determined by its future use. Government does not have a specific use in mind for the fibres it will acquire, other than keeping them available as a safeguard against future monopolization of cable access to the province.

Published statistics by CANARIE's Senior Director of Network Projects William St Arnoud indicated that the value of a kilometer of dark fibre in Canada is on average \$500 per terrestrial rural aerial kilometer. This figure extrapolated for subsea cable would be \$750.

The Persona current proposal is that the province will get ## strands of cable in Newfoundland (#### kilometres) and #### strands in Nova Scotia (#### kilometres) and across the gulf (#### kilometres), a total valuation of \$NUMBER per CANARIE. A study of recent transactions in the US suggests the average values to be higher at a minimum of US\$1,785 and US\$2,677 or CDN \$NUMBER. The US valuation does assume a higher population base than what Newfoundland has. Typically Canada's population base is 1/10 of the US and would therefore suggest a valuation of 1/10th of \$NUMBER. It should be noted that Persona's total costs are \$XXX for land and \$XXX for sea, more in line with CANARIE.

Industry standards indicate that annual maintenance costs are 2.5 to 5% of the original costs. (The Iles de la Madeleine project anticipated 2.9% and the Persona project forecasts 4.8%) This overpayment by the government could be resolved by considering the benefits indicated in number 7 below, and/or to request more strands as discussed in number 9. Given that the province will not be contributing to future maintenance costs, it should be considered that part of the \$15,000,000 be discounted to consider the valuation of future maintenance. Using the 4.8% percentage used by Persona in their forecasts approximately \$10,000,000 represents the purchase of fibre. Based upon the CANARIE values, the government should be receiving ## fully redundant strands on both land and sea, a value of \$NUMBER.

5. A review of project description and current competitive environment;

CDLI phase 1 will provide increased connectivity and competition in rural areas and Phase 2 of the project provides a complete ring of connectivity throughout the island including the South coast and global connectivity through Halifax, the nearest point with access to multiple fibre networks. The current environment is limited to only one supplier (Aliant) for global infrastructure and as such provides a monopoly to that supplier in

certain areas of the island. The increased connectivity to the rest of Canada and the world will increase competition and should result in better service, reduced costs and increased benefits as outlined in 6 below.

6. Provide an assessment of the predicted benefits to the economy and specific consumers (government, university, health boards);

Expected benefits are as follows;

- Attraction of more skilled labor force to the Province
- Fuller participation in academic research efforts
- The speed of medical consultation with experts residing in other Provinces
- Fuller participation in medical research efforts
- A more competitive environment in the communications industry
- More efficient pricing of available resources
- Expanded revenue base for supporting public services
- Attraction of additional businesses/industries to the Province – e.g. Dell
- Expansion of existing businesses within the Province
- Infrastructure conservation by permitting work to be done closer to home and reducing the Newfoundland diasporas
- Environmental improvements by reducing the need to travel

7. An effort to quantify the benefits, if possible with the facts available;

Given the limited time available, it is not possible to quantify the financial benefits to the province and or government. Some examples of potential savings can be illustrated as follows;

- a. Last year's survey for the College of the North Atlantic reflected costs of \$NUMBER for ## megabits of bandwidth. Persona business model suggests \$NUMBER for ## megabits.
- b. Persona is currently paying COMPANY approximately \$NUMBER monthly for 1 gigabit. The same service in central Canada is only \$XXXXX. This pricing is solely due to a monopoly market in the province.
- c. Currently the government is spending \$XXXXXXXX for data lines for core government departments. With the increased competition from this project, Persona has verbally suggested a possible savings of 50% or \$XXXXXXXX per annum.

8. To the extent possible, an assessment of the nature of the competitive environment which may emerge after the project, and the effect on prices;

It is universally recognized that broadband infrastructure and broadband access are critical to the economic growth and survival of communities in the coming years. The CDLI and phase 2 projects and other government initiatives e.g. GBI and BRAND are ensuring access to the broadband community. This phase of the project increases the coverage on the island and provides global connectivity. This will allow a duopoly of infrastructure with potential for many competitors to participate. It is likely that increased supply of off-island connectivity will put pressure on current pricing structures to be lowered. The government acquiring and maintaining an ownership position in this project will ensure a level playing field for entry of new competitors.

9. Offer an opinion regarding whether the ownership of dark fibre is a practical safeguard of the competitive environment in the long term.

The ownership of dark fibre will only provide a safeguard if the province has adequate cables to supply to future providers of service to be competitive, that there are no other restrictive points in the network and an open and unencumbered access is provided by Persona as per Canadian regulations and standards. A provider of service would require a minimum capacity. Although a fibre may be broken into smaller parts, this would require additional technical resources and hence become less valuable. Most service providers would be interested in a minimum of ###strands, hence restricting the province to only **NUMBER** future suitor(s).

The allocation of the cable distribution proposed by Persona is as follows;

Contributors	Financial contributions by Partners	Percentage of financial contribution to project	Number of strands allotted – In province	Percentage of strands	Number of strands allotted – Cross gulf and Nova Scotia	Percentage of strands allotted
Province	\$NUMBER	%NUMBER	##	%NUMBER	##	%NUMBER
Alstream	\$NUMBER	%NUMBER	##	%NUMBER	##	%NUMBER
Rogers	\$NUMBER	%NUMBER	##	%NUMBER	##	%NUMBER
Persona	\$NUMBER	%NUMBER	##	%NUMBER	##	%NUMBER
Total	\$NUMBER		##		##	

It would be recommended that the province request a greater number of strands to maintain its goal of maintaining future competitiveness. As per 4 above it is recommended the province request a minimum of ###strands on both land and sea, ensuring the possibility of more than **NUMBER** additional competitor(s).

10. Any other related topics and issues as mutually agreed with you.

Due diligence should be effected on the legal negotiations to ensure that Government obtains what is required. Compliance monitoring during the implementation (build) phase, at specific milestones, will assist Government in protecting its investment.

Prior to future projects being considered, a formal process should be created by Government to simplify the application and review of unsolicited proposals.

Briefing Notes

Bandwidth Availability enhances/allows:

- Attraction of more skilled labor force to the Province
- Fuller participation in academic research efforts
- The speed of medical consultation with experts residing in other Provinces
- Fuller participation in medical research efforts
- A more competitive environment in the communications industry
- More efficient pricing of available resources
- Expanded revenue base for supporting public services
- Attraction of additional businesses/industries to the Province
- Expansion of existing businesses within the Province
- Infrastructure conservation by permitting work to be done closer to home and reducing the Newfoundland diaspora
- Environmental improvements by reducing the need to travel

Submarine Cable Costs

- Conservatively, the average cost of the most recent submarine cable has been \$25,000 /km
- Conservatively, the cost of land based cable is typically \$13,500 to \$15,000/km
- Based on 900 km under water and 2,400 km on land the cost of a dual system to Newfoundland would be between: \$51.3 to \$58 Million

Expanded Bandwidth Availability enhances/allows:

- ❖ Fuller participation in academic research efforts
 - Not having access to high bandwidth transmission capabilities is an impediment to research participation as today's research projects tend to require the sharing of extremely large data files. Having limited bandwidth capabilities can increase the time of transmission of those files by orders of magnitude. A simplistic example would be the time differential between transmitting a 1 Gigabyte file (1,000,000,000 bytes) over a 1 Megabyte (1MB) per second link and a 1 Gigabyte (1GB) per second link. Clearly the 1GB link will transmit the file in one second. However, the same file over the 1MB link will require 1000 seconds (16 2/3 minutes). Whereas two researchers connected with 1GB capability could be looking at and discussing the same information virtually simultaneously, a researcher with only 1MB connectivity would be unable to participate intelligently in that conversation.
- ❖ Fuller participation in medical research efforts
 - Similar concerns exist with participation in medical research efforts as exist in academic research efforts and, in many cases, coexistent with each other.
- ❖ Attraction of additional businesses/industries to the Province
 - Today's business environment is increasingly focused on the use and analysis of large amounts of data, for example, the effort by Google to digitize the US Library of Congress. Access to expanded bandwidth capability would allow the Province to be considered as a viable site for such efforts.
- ❖ Expansion of existing businesses within the Province
 - Expanded bandwidth would enhance the ability of existing businesses in the Province to compete for projects that previously they would not have been considered for as well as allow them to perform more efficiently in their existing practices.
- ❖ Attraction of more skilled labor force to the Province
 - Improved participation in research efforts and expansion of knowledge industry businesses will require higher skilled workers and provide better pay scales and wider variety for existing skilled workers.
- ❖ The speed of medical consultation with experts residing in other Provinces
 - Improvements in the ability to transmit medical data files to specialists for review has a direct impact on the probability of survival for certain life-threatening situations and a less dramatic, but just as real, impact on treatments for non-life-threatening illnesses.
- ❖ A more competitive environment in the communications industry

- As has been witnessed numerous times, competition enhances the development of new products/services and tends to reduce overall costs over time. Both of these are economic benefits to the population of the Province.
- ❖ More efficient pricing of available resources
- ❖ Expanded revenue base for supporting public services
 - An ancillary effect of the above benefits is that adding new businesses, adding new revenue streams to existing businesses and increasing the number of workers at higher pay scales is to enhance the revenue base that is available to devote to public services.
- ❖ Infrastructure conservation by permitting work to be done closer to home
- ❖ Environmental improvements by reducing the need to travel

Expected Benefits from Widespread Access and Use of a Broadband Network

Introduction

GNL rightly wishes to know if its \$15 million investment in the fiber condominium project will yield benefits in excess of this investment. Assuming (1) this investment leads to an increase in the penetration of broadband access among the businesses and households of Newfoundland and Labrador; and, (2) this access is used, then the evidence suggests that the answer is “yes.” The only question is “by how much.”

The potential benefits from widespread access and use of a broadband network are both economic and non-economic in nature. Economic benefits such as productivity, output, jobs, and tax revenue are quantifiable. Benefits such as improved provision of health care services, enhanced public safety, facilitation of teleworking, enhanced educational opportunities through distance learning, and improved quality of life for disabled persons are more difficult to put into dollars. However, they are just as real and important as the more traditional economic effects.

In only a few pages, we will attempt here to summarize the studies and experiences on the benefits of increased access and use of a broadband network. Links to major references are provided for the reader seeking more details.

Economic Benefits

Background

There are two *levels* of economic benefits that result from broadband deployment and use. And within each level, there are two *types* of economic benefits.¹ Economic benefits are typically measured in dollars and jobs.

- Level I Economic Benefits

Level I economic benefits accrue from the construction and operation of the network.

- Direct benefits – are benefits *directly* attributable to the construction and operation of the network:

¹ In the parlance of economists who study such things, benefits in this context are referred to as “impacts.”

- ✓ Jobs at manufactures of equipment for the network;
- ✓ Jobs with construction companies who are building the network;
- ✓ Jobs with the telecommunications companies building and operating the networks.

Note – it is not all jobs at these companies that can be counted as an economic benefit; just the incremental jobs, those that are directly attributable to the construction or operation of the broadband network.

- Indirect benefits – are benefits *indirectly* attributable to the construction and operation of the network:
 - ✓ Jobs at electronic component companies that supply the equipment manufactures building equipment for the network;
 - ✓ Jobs at retail services (e.g. lodging, restaurants) that the service the workers directly working on or operating the network;
 - ✓ Jobs at IT companies that support the companies operating the network

Another kind of indirect benefit is the jobs and income caused by the spending of the companies who are directly and indirectly associated with the broadband network deployment or operation. This is simply the multiplier process we learned in Economics 101 – a dollar gets spent many times as it travels through the economy and creates more dollars (jobs) along the way.³

Level I benefits do not consider the dynamic economic effects that may result from the build-out. For example, building out a broadband network to a rural area may cause business establishments to remain in the area, may cause existing establishments to expand, and may cause new establishments to enter. Estimates of these Level II direct effects need to be obtained through survey work or some other means. An input-output model can then be used to estimate the indirect effects that result from these additional sources of direct spending.

- Level II Economic Benefits

Level II economic benefits are those that result from the existence and use of the broadband network. Level II benefits can also be broken down into direct and indirect benefits:

- Direct benefits:

³ A regional input-output (I/O) model is typically used to estimate the indirect benefits but its use requires the input of direct effects, which are typically in terms of spending \$. The direct effects can be either estimated or surveyed, depending on when the study is conducted. Estimates of fiscal impacts (e.g., tax revenue) can be obtained through the use of a fiscal impact model, which many state governments have in-house.

- ✓ Jobs associated with new businesses that choose to locate in the region because of the broadband network;
 - ✓ Jobs associated with the expansion of existing businesses;
 - ✓ Jobs associated with the creation of new businesses (innovation).
- Indirect benefits:
 - ✓ Jobs at companies that supply these new or expanded businesses (again, only the incremental jobs);
 - ✓ Jobs caused by the spending associated with the direct and indirect economic activity.

Hence, the total economic benefits attributable to an increase in broadband access and use are the sum of the Level I and II benefits. In other words, the full economic effect considers the initial benefits associated with the build out and the benefits that result from the use of the network over time.

Findings

So, what does the evidence show?

There have been two types of studies on the effects of broadband access and use: those that simulate national or state-level effects (simulation) and those that attempt to estimate effects using actual data (historical), either government data or data collected through primary market research mean (e.g., surveys).

Simulation studies are necessary when there are insufficient actual data to analyze. These types of studies are prevalent in the early years of broadband development. Such studies can make use of input-output models, models that capture the linkages between the various sectors of an economy. Direct effects are estimated and then input into the I/O model. The I/O model then generates estimates of the total economic effect (direct + indirect), in this case, of broadband deployment and use.

As the penetration of broadband increases over time, eventually enough actual data may come into being, either over time or across geographies, to allow for a different kind of analysis. Typically, advanced statistical techniques can be used (e.g. multivariate regression) to isolate the effect of broadband on the economic indicator of interest (e.g. jobs).⁴

⁴ This does not imply that I/O models are rendered obsolete by history. On the contrary, I/O models remain very useful in estimating the total economic effects of broadband projects and may be the only way to model the complex relationships that exist in an economy. Either tool can be used to examine the historical effect of broadband deployment. It just depends on what questions need to be answered and the data available.

Findings Based on Simulation Studies

- TeleNomic Research (2002)⁵

The study estimated that widespread deployment and use of a broadband network in the US would lead to 1.2 million new and permanent jobs:

- 166,000 direct jobs in the telco industry
- 72,000 direct manufacturing jobs
- 974,000 indirect jobs

The study concluded that for every job created by the deployment and use of a widespread broadband network in the US, 4 indirect jobs would be created.

- Criterion Economics 2003⁶

The study considered the effects of achieving 95% broadband penetration in the US by 2021. The study estimated that for every \$1 million in capital investment in telecommunications networks, 18 jobs would be created. The study also estimated that such widespread deployment and use of broadband would increase economic activity by \$414 billion by 2021. Accelerating the deployment of a broadband network to reach a 95% penetration by 2013 would add a total of 1.2 million new jobs, the same number estimated by TeleNomic Research.

- CENIC/Gartner 2003⁷

The study considered the effects on the California economy of achieving a 50% broadband penetration by 2010. The study concluded that such an effort would add \$376 billion in gross state product (GSP) and create 2 million jobs. Breaking down the gain in GSP by major industry suggests that the industries which would gain the most (in terms of output) from such an initiative are retail trade, manufacturing, health care and social assistance, public education and services/business services/state and local government.

- Multimedia Victoria/ACIL Tasman 2004⁸

⁵ Pociask, S. "Building a Nationwide Broadband Network: Speeding Job Growth," TeleNomic Research, LLC, 2002.

⁶ Crandall, R. et al, "The Effects of Ubiquitous Broadband Adoption on Investment, Jobs and the US Economy," Criterion Economics, LLC, 2003.

⁷ Corporation for Education and Network Initiatives in California (CENIC), "One Gigabit or Bust Initiative: A Broadband Vision for California," 2003.

⁸ ACIL Tasman, "Regional Economic Impacts of Broadband Adoption in Victoria," prepared for Multimedia Victoria, 2004.

The study estimated the economic effects of widespread broadband adoption in the state of Victoria, Australia.

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- New Millennium Research Council 2005⁹

The study considered the economic effect of broadband deployment on seniors in the US. The major findings of the study are:

- Three types of benefits from broadband deployment and use are addressed: lower medical costs; lower costs of institutionalized living; and additional output generated by more seniors and individuals with disabilities in the labor force;
- Considered together, these three benefits are estimated to accumulate to at least \$927 billion in cost savings and output gains in 2005 dollars (with future benefits discounted for the “time value of money”) over the 25 year period, 2005 to 2030;
- This amount is equivalent to half of what the United States currently spends annually for medical care for all its citizens (\$1.8 trillion);
- Policies designed to accelerate the use of broadband for these populations, however, could significantly add to the benefits, by cumulative amounts ranging from \$532 billion to \$847 billion (depending on the wages earned by the additional working seniors);
- The policy benefits are as substantial as what the federal government is likely to spend on homeland security over the next 25 years. Total cumulative benefits, under the right set of policies, could exceed what the United States currently spends annually for health care for all its citizens.

Findings Based on Analysis of Historical Data

- UK DTI/Strategic Networks Group 2003¹⁰

⁹ Litan, R., “Great Expectations: Potential Economic Benefits to the Nation from Accelerated Broadband Deployment to Older Americans and Americans with Disabilities,” The New Millennium Research Council, 2006.

¹⁰ Department of Trade and Industry, “Economic Impact Study of South Dundas Township Fibre Network,” 2003.

The study examined the economic effects of investing \$1.3 million in a fiber network by South Dundas Township, Ontario, Canada using primary market research and I/O analysis.

- Survey results indicated that between June 2001 and April 2003 62.5 new jobs were created and \$2.8 million in commercial and industrial expansion took place (direct effects);
- Entering the direct effects into an I/O model for the area suggested that over the subsequent 2 to 4 years, the local economy would experience the following:
 - \$25.22 million increase in GDP for Dundas County and \$7.87 million increase for the Province of Ontario
 - 207 person years of employment for Dundas County and 64 for the rest of Ontario
 - \$3.5 million increase in provincial tax revenues and \$4.5 million increase in federal tax revenues.
- Industry Canada – Churchill/Parrsboro Study 2005¹¹

The study considered the effects of broadband access and usage on two small Canadian communities, Churchill in Manitoba and Parrsboro on Nova Scotia. Churchill gained then lost broadband connectivity; Parrsboro gained and retained its connectivity. Methodology was primary market research (survey) to attain direct effects together with analysis using Statistics Canada Census 2001 data.

Major findings: Churchill

- Jobs outsourced due to lack of broadband – 4 FTE, which provides \$190,225 in earned income that was lost as a result of broadband being lost;
- Jobs supported by broadband (retained) – 2.7 FTE, which provides \$102,721 in earned income retained within the community;
- The implication of losing 6.7 jobs in a community with 590 people employed (in the 2001 census) because of the loss of broadband is equivalent to Ottawa losing 5,638 jobs.

Major Findings: Parrsboro

- During the interview results it was learned that the presence of broadband was a significant determinant in Kerr Heating Products remaining in the community. This metal fabricator provides 100+ jobs to the community, which represents approximately \$3.5 to \$4.5 million in gross annual household income (based on an assumed average wage of \$35K to \$45K per annum).

¹¹ Industry Canada, “Broadband Economic Impact Study Final Report,” 2005.

- Jobs supported by broadband (retained) of 0.5 FTE, which is equivalent to \$13,000 in earned income retained. This is equivalent to maintaining 350 jobs in Ottawa.

- CBER 2005¹²

The study estimated the effects of broadband deployment on county-level business activity in Kentucky, Ohio, Pennsylvania and West Virginia using regression analysis.

- Concluded that in West Virginia (only state for which data existed), firms of similar age are 14 to 17 percent more productive in areas in which broadband access is available.
- Concluded that wages are positively related to broadband access for the services and financial services industries in Ohio, Pennsylvania and West Virginia.

- Applied Economic Studies 2005¹³

The study examined the effect on business activity of offering access to a municipally-owned broadband network to health care facilities, private businesses and schools in Lake County, Florida, starting in 2001. Regression analysis was used.

- Compared the growth in Lake County's economic activity (gross sales) relative to a control group of Florida counties that were similar but lacking municipal broadband networks.
- Concluded that offering access to the municipal broadband network to the private sector in Lake County resulted in a 100% higher growth in gross sales relative to the control group of counties.

- Economic Development Agency 2006¹⁴

Using US zip code level data for 22,390 zip codes, the study examined the effect of broadband deployment over the 1998 – 2002 period using regression analysis. Major findings of the study:

- Broadband added between 1 and 1.4% to the employment growth rate.

¹² Center for Business and Economic Research, "The Residential and Commercial Benefits of Rural Broadband: Evidence from Central Appalachia," Marshall University, 2005.

¹³ Ford, G. and T. Koutsky, "Broadband and Economic Development: A Municipal Case Study," Applied Economic Studies, LLC, 2005.

¹⁴ Economic Development Agency, "Measuring the Economic Impact of Broadband Deployment," US Department of Commerce, 2006.

- Broadband added between 0.5 and 1.2% to the growth rate of new businesses.
- Housing rents (proxy for property values) was 6% higher in 2000 in zip codes where broadband was available by 1999.
- Broadband added between 0.3 and 0.6% to the share of establishments in IT-intensive industries.
- Broadband reduced the share of small establishments (<10 employees) by between 1.3 and 1.6%.

Annex A

EWA-Canada Ltd. Corporate Profile

EWA-Canada was incorporated and has been in operation since June 1988. EWA-Canada is an ISO 9001:2000-registered, Canadian-managed and -staffed company committed to excellence in delivering world-class solutions. EWA-Canada is a systems engineering company recognized as Canada's premiere provider of IT Security and Assurance services in Canada. Our solutions are based on the vast expertise of our personnel and a systems approach that employs vendor-neutral selection and implementation of appropriate technologies.

EWA-Canada currently has offices in Edmonton and St. John's, as well as a head office in Ottawa. Our clients include the Department of National Defence (DND), the Communications Security Establishment (CSE), the Canadian Security and Intelligence Service, Royal Canadian Mounted Police (RCMP), Nortel, Bell Canada and many other national, provincial and regional government, law enforcement, financial, energy, telecommunications and business organizations.

EWA-Canada's technical staff is currently comprised of thirty two (32) full-time highly qualified electronic engineers, systems analysts and programmer / analysts; many with extensive backgrounds in IT security operations, engineering, maintenance and equipment acquisition disciplines. Many of our staff have advanced post-graduate degrees at the Masters and Doctorate levels.

EWA-Canada has earned the reputation and role of a trusted third party by many government and corporate organizations because of:

Formal recognition

- Common Criteria lab – overseen by CSE and accredited by the Standards Council of Canada to conduct formal security evaluations of IT products to the stringent ISO 15408 standard.
- Accredited by VISA, MasterCard and JCB International to conduct security evaluations of parts of their critical payment transaction infrastructure
- National Voluntary Laboratory Accreditation Program (NVLAP) laboratory to perform cryptographic module testing and validations, overseen by the US National Institute of Standards and Technology (NIST) and CSE.
- Interac® accredited Device Certification Agent to perform independent validation testing of ABM and IDP point-of-sale terminals (including Secure PIN Entry Devices - IDP SPED) against the Interac® Security Standards.
- Accredited to perform evaluations of Personal Identity Verification (PIV) technologies to U.S. Government standards

Corporate culture

- Tradition of trusted relationships with strategic customers and partners.
- Extensive experience in being trusted advisors at national, international and provincial levels.
- Vendor-neutral solutions, with emphasis on a fully integrated security strategy based on people, process and technology.
- Strongly based on principles of integrity, ethical and trustworthy behaviour.

- Enforced formal policies, procedures and facilities for the routine handling of extremely sensitive information.

Customer protection

- No interest in the commercialization of technical products.
- Relationships defined by no-compete principles.
- Understanding of privacy concerns.

Our service offerings are detailed below.

Systems Security Engineering Consulting Services

Our goal in providing Systems Security Engineering consulting services is to help clients seek “system solutions” that rely on a combination of people, processes and technology to define the “right” requirements and ensure delivery of the “right” solution. We provide services in the following areas:

- Security Governance Models;
- Operational Concepts for Security Centers and Teams;
- Security Strategy and Plans;
- Enterprise Assessment;
- Compliance Auditing;
- Architecture Analysis and Review;
- Privacy – Security Audit;
- Wireless Security; and
- Special Projects.

Product Assurance

With so many solutions to choose from, governments from around the world have collaborated to develop a framework for verifying and validating these claims and qualifying laboratories to perform the appropriate tests. EWA-Canada operates a world class IT Security Test and Evaluation Facility that:

- provides independent, vendor-neutral evaluation services to establish trust and confidence in the security features of IT products and systems;
- is accredited by Standards Council of Canada;
- supports formal evaluations of IT security products to ISO 15408 Common Criteria standards;
- supports re-evaluation consulting support with documentation and process assistance;
- provides cryptographic validations and testing to the FIPS 140-1 and FIPS 140-2 standards;
- is accredited by Interac® to perform independent validation testing of ABM and IDP point-of-sale terminals (including Secure PIN Entry Devices - IDP SPED) against the Interac® Security Standards;
- has been contracted by the Interac® Association to prepare the next generation of testing specification and requirements for Automatic Teller Machines and Point of Sale Devices and to harmonize Canadian requirements with the Global Payment Industry; and
- validates developer’s claims related to security and privacy.

Following a successful Common Criteria and FIPS evaluation, IT products are certified by CSE and these certifications are recognized around the world.

Enterprise Assurance

Today, enterprise wide e-business applications are replacing many of the traditional means of conducting business. Within an organization these Enterprise Assurance activities can include:

- identity management;
- access control;
- authorization services; and
- non-repudiation services.

At the core of many of these new business functions is an assurance infrastructure known as a Public Key Infrastructure (PKI). EWA-Canada has built a strong PKI capability and is able to provide its clients with a complete solution addressing all facets of the PKI lifecycle.

Infrastructure Assurance

EWA-Canada believes that providing assurance that a network is configured and operating correctly is a challenging task. However, we also believe that when it's done correctly, in many cases it can result in costs savings. EWA-Canada provides Infrastructure Assurance services that begin by gaining a detailed understanding of customer requirements and developing a solution to meet the clients needs. This solution can be implemented by EWA-Canada or we can assist clients to implement a tailored solution that includes training of client staff.

The services include:

- 24/7 security policy monitoring;
- 24/7 remote monitoring of IDS sensors installed on client networks, offering immediate or delayed alarm notification and tailored escalation procedures;
- comprehensive analysis of firewall and IDS sensor data;
- firewall policy implementation;
- operational threat assessment; and
- operational risk assessment.

CanCERT™

CanCERT™ is Canada's first national Computer Emergency Response Team. Operated since 1998 by EWA-Canada Ltd., CanCERT™ is a trusted center for the collection, analysis and dissemination of information related to networked computer threats, vulnerabilities, incidents and incident response for Canadian governments, businesses and academic organizations. We are committed to, and understand, client confidentiality, privacy and legal concerns. EWA-Canada, through CanCERT™, provides the following public, client and sector services:

- International Coordination;
- Incident Response;
- Network Attack Detection Statistics;
- Alerts and Advisories;
- Help Desk;
- Information Exchange Service;
- Advanced Research and Analysis; and
- CanCERT Certificate Authority (CA).

ANNEX B

Corporate Profile, PriMetrica Inc.

PriMetrica, Inc. is a world-class provider of business and technology solutions for the telecommunication industry. PriMetrica was founded in May, 2002 by principals that have extensive expertise in assisting clients in mastering the rapidly changing telecommunications business and technology challenges. PriMetrica provides the necessary information and tools needed to make the right decisions for today and the future.

PriMetrica currently has 10 offices in eight countries around the world with over 120 employees that have earned a worldwide reputation for providing:

- Regulatory and Legal Support
- Strategic Planning and Business Case Development
- Cost and Profitability Modeling
- Demand Estimation and Modeling
- Telecomm and IT Market Intelligence

In order to best support its customers, PriMetrica is focusing on the provision of quantifiable cost and market information to the Telecom and IT sectors. With the rapidly changing competitive landscape in telecoms, it is critical that companies in this industry understand how to plan and implement procedures, pricing and policies on a forward-looking basis. PriMetrica is uniquely suited to address the current issues of greatest concern to the telecommunications sector. PriMetrica has the quantitative expertise, industry knowledge, and experience to provide timely and accurate information in the following areas:

Intermodal Competition

- Forward-looking value¹⁵ (FLV) studies on alternate delivery methods (e.g. wireless substituting for wireline access)
- FLV study on VoIP Substitution
- Profitability analysis of assets invested in specific products
- Cost efficiency analysis of retention/reacquisition processes
- Customer targeting through FLV studies

¹⁵ Forward-looking value studies are used to determine price elasticities, cross elasticities, bundling/package attractiveness, and other such information from customers on a prospective basis. They provide insight to customer behavior related to a *proposed* change, rather than measure behavior after the fact.

- Rationalization of products through forward-looking profitability measures

Bundling/Packaging

- FLV study on inclusion of LD
- FLV Study on inclusion of broadband access
- FLV study on most attractive package/bundle

Technological Impacts

- Impact of technology changes on customer choices
- Efficiency of Capex spending and budgeting improvements (better relate budgeting to actual demand through capacity measures)
- Impact of technology changes on pricing practices
- Quantification of efficiency impacts on operational practices

Annex C

IBISKA Corporate Profile

IBISKA is a technology consulting company with a focus on Networks and related Information Technology. Our services are centered on Network Infrastructures, Strategic Business Planning and Project Management.

Clients include Public and Private Sector Organizations, Major Corporations and Network Equipment Manufacturers seeking senior level expertise. We draw this expertise from an in-house pool of highly mobile professional experts and from extensive networks in North America and Internationally.

Our product portfolio is networking expertise, yet our distinctive advantage is our people. Our precise focus on Infrastructure technologies only, allows IBISKA to attract highly motivated individuals into a progressive culture that is based on openness, sharing and professional development, leading to superior efficiency in responding to the business needs of our clients. We are not a distributor or reseller of equipment and derive our business revenues from independent professional services only. The network technologies that we focused on include:

- Optical
- IP Internetworking
- Convergence
- Security
- Wireless
- Service Management

Frouin Group Corporate Profile

The Frouin Group is an Ottawa-based Chartered Accountant consulting firm that, in addition to traditional accounting, offers services for tax planning, strategic planning and development and business evolution services.