THE INTERNET IN CANADA

Background Paper for the Information Highway Advisory Council

April 1997

Information Highway Advisory Council
(http://strategis.ic.gc.ca/ihac)

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Catherine Peters, Industry Canada, April 1997.

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ACKNOWLEDGMENTS

The author thanks the many people who contributed guidance, information, comments and suggestions to the various drafts of the paper. Council Members, members of the Internet Steering Committee on the Internet and colleagues from Industry Canada (the IHAC Secretariat and the Information Technology Industry Branch) have all been very generous with their time and assistance. Special thanks are due to Maria Kania for all her research and coordinating work and Natasha Faruqui and Renata Borysewicz for their efforts. The author is responsible for the views expressed and any errors or omissions in the paper.

EXECUTIVE SUMMARY

The Internet, its growth and its potential continue to amaze. A few years ago, the Internet was the domain of academics and researchers. Now millions of people around the world use it to communicate, educate, play, do research and conduct business. Its broad scope, adaptability and versatility create dramatic new opportunities for individuals, businesses, society and the economy. It facilitates new ways of interaction and access to new forms of goods, services and information. In many ways, millions of Canadians have integrated the Internet into their lives.

The Internet provides an ever-increasing variety of products and services to Canadians. As the network technologies improve and bandwidth grows, even more applications will be developed for the Internet. Education and health are two areas that significantly benefit from Internet developments. These groups face enormous pressure to deliver new and better services more effectively and efficiently using less money. For both, the Internet creates an alternative to deliver their services and extends their reach beyond their traditional boundaries.

Canadian content producers also can benefit from the Internet. It creates a new forum to showcase Canadian innovations and talents to ourselves and around the world. The Internet helps our artists, writers, journalists and performers reach new audiences in new and more interactive ways. Canada has produced some of the most innovative sites on the Internet.

Businesses are also exploring the potential of the Internet. Electronic commerce is a cost-effective and efficient way to conduct, manage and execute business transactions. Network-based electronic commerce creates opportunities for companies to shorten procurement cycles, cut costs on inventory and customise products. Despite these opportunities, however, electronic commerce is not developing as rapidly as previously thought and it is not clear how the Internet will generate new markets, goods and services. The problematic issues of security, privacy and encryption have yet to be effectively resolved in the public's mind. Although governments and corporations are cooperating to arrive at a solution, much work, including changing public perceptions, needs to be done.

The government recognises the value of the Internet. To encourage its growth and to show its potential, the government strives to be a model user by both using the technology and delivering programs and services to Canadians over the Internet. To better serve Canadians and to encourage the growth of the Internet and related technologies, the government has established a variety of programs. These range from Industry Canada's Strategis site with industrial and business information and services to Human Resources Development Canada's Electronic Labour Exchange, designed to help Canadians participate in the labour market.

All these applications, programs and services on the Internet point to its potential to significantly affect Canada's economic life and structure. The Internet has the power to affect jobs and their number, alter production and operating costs, affect market share, change the mix of goods and

services produced and, finally, create different patterns in competition. Whether these effects are all positive, however, is unknown, but the government must be aware of these issues to ensure that the Internet and the changes it brings to the Canadian economy benefit all citizens. To do so, it must examine many difficult issues, involving Internet infrastructure, socioeconomic implications of its development and its legal or regulatory environment. These issues, infrastructure bottlenecks and pricing, jobs and the Internet, access, content regulation (including illegal and offensive uses of the Internet), security, privacy and cryptography and taxation are all complex and in need of further study and research. Unfortunately, given the newness of the Internet, how some of these issues, and others not anticipated, will play out in the longer-term, is clouded in uncertainty.

We cannot solve many of these issues, however, in isolation. The Internet is truly international and public policy issues have implications beyond national borders. No one organisation or country can claim the Internet as under their domain, although the Americans, as the original developers of the network carry a great deal of clout. Nevertheless, nations and their citizens must work cooperatively to tackle some of the more difficult problems.

The Internet has much to offer Canadians and Canadians have much to offer through the Internet. Through its government, businesses, industries and citizens, Canada played an active role in the development of the Internet and will continue to do so. Areas as diverse as education, health services, culture, business and research will all benefit through the successful development of the Internet. To maximise its future potential, we must be aware, however, of the obstacles to its development and, perhaps more importantly, of its possible pitfalls. For the Internet to successfully help the Canadian economy grow and achieve its potential as a knowledge-based economy, cooperation at all levels -- from small communities to the international forum -- is imperative.

1. Introduction

The Internet, its growth and its potential continues to amaze. A few years ago, the Internet was the domain of academics and researchers. Today, millions of people around the world use it to communicate, educate, play, do research and conduct business. Its broad scope, adaptability and versatility create dramatic new opportunities for individuals, businesses, society and the economy. It facilitates new ways of interaction and access to new forms of goods, services and information. Continuous improvements in the technology facilitate improvements and expansions in eduction, health services, culture and business. In many ways millions of Canadians have integrated the Internet into their lives.

Despite its rapid development and its growing potential to affect the lives of Canadians, wherever they are found, the Internet is not well understood. This paper, as a background document to the Internet Steering Committee of the Information Highway Advisory Council will describe how the Internet works and some of its most common uses within the Canadian context. In addition, this paper will also identify some of the potential pitfalls in the development and integration of the Internet in Canada. The Internet poses many social, legal, economic and political questions that need to be identified, understood and resolved. Finally, this paper will set the Internet within its global context. The paper does not purport to resolve any debates, instead, it seeks to identify and clarify the issues important to the Canadian economy and society. A glossary of terms and acronyms in Appendix I clarifies some Internet-related information.

2. Definition and Description of the Internet

2.1 What is the Internet and how does it work?

The Internet is an unregulated amalgamation of over 135,000 networks around the world, all of which can exchange and share information. This network of networks has no centralized physical location, control or intelligence. Instead, all the stored information and intelligence is widely distributed, allowing each remote entity to be in charge of its own area. Each entity in the Internet has the same level of authority, priority and control, and works together according to a common set of rules.

The Internet allows computers and networks to communicate openly and effectively, despite make, architecture, speed, manufacturer, connection or resources. They do so by using TCP/IP (Transmission Control Protocol/Internet Protocol), the language of computer communication. Because TCP/IP was made widely and publicly available, information now freely transits over networks and exchanges among the various networks worldwide. E-mail, file transfers and web browsing are just a few of the services dictated by TCP/IP.

The Internet's early developers were committed to open transit networks so that they could realise the externalities associated with network growth. This open network and the TCP/IP protocols that ran over it were vital to the continued expansion of the Internet outside its original military/defence environment. For a more technical description of how the Internet operates, please see Appendix 2.

2.2 The history of the Internet

The Internet began in the 1960s as US defence department initiative to establish a communications network between the universities and the military -- the ARPANet. In the mid 1980s, the National Science Foundation (NSF), using the same TCP/IP protocols, established its own research and academic network -- NSFNet. The NSF also ran an international connections program to encourage connections to other scientific and research networks. Eventually, this highspeed network replaced ARPANet.

By the late 1980s, several for-profit organisations sought access to the Internet. The NSF did not want to subsidise Internet access for commercial ventures and subsequently it changed its administrative structure and turned over its day-to-day operations to Advanced Network Systems (ANS). At the same time, many independent companies expressed an interest to provide Internet services. The once experimental technology was clearly now commercially viable. In 1995, the NSF backbone was shutdown and a transition was made to a new privatised network.

2.3 Development of the Internet in Canada

Canada was an early adopter of Internet technology. In the 1980s, several regional education and research computer networks, including CDNNET, became operational in Canada. Canada's first national network, NetNorth, began operations in 1985. These networks continued to grow and in 1988, a group of Canada's leading universities and research institutions, together with the federal and several provincial governments, decided to create a national computer communications network. This network connected the regional networks and individual computer systems together and with the Internet. This led to the creation of CA*net -- Canada's national backbone network -- in June 1990. CA*net, a not-for-profit company, did not own transmission facilities but obtained high-capacity digital facilities from Canada's telecommunications common carriers.

By the early 1990s, the regional networks in all ten provinces were interconnected. The regional networks[1] formed CA*net's Board of Directors and directly influenced its growth and management policy formation. CA*net also connected to the Internet in the United States through high speed connections. The University of Toronto's Computing Services Department operated CA*net's network until April 1996. Until 1992, the speed of CA*net was limited to 56 Kbps. The heightened use of the Internet in the early nineties precipitated a need to upgrade the speed of CA*net to handle the increase in traffic.

In January 1993, the Canadian government announced a new jointly-funded government-industry initiative designed to stimulate industrial research and development into high-bandwidth network facilities and applications. The program was CANARIE -- Canadian Network for the Advancement of Research, Industry and Education. In CANARIE's first phase, CA*net was upgraded to T-1 or 1.5 Mbps speed. A second objective of Phase I was to connect Canada's North. CANARIE helped establish regional networks in the Northwest Territories and the Yukon and connected them to the national backbone. Finally, CANARIE established a high-speed (T-3) experimental test bed network of ATM switches in all the regions of Canada. Under CANARIE's Phase II, the CANARIE/CA*net backbone was upgraded to provide satisfactory performance under conditions of explosive growth in user demand.

CANARIE also provided a direct subsidy to CA*net. The National Research Council originally funded CA*net, before it was self-sufficient for a short period in 1992-3. In 1993, however, CANARIE subsidised approximately 75 percent of CA*net's activities. Rapid growth in customer demand and network infrastructure meant that by 1997, CANARIE's subsidy represented approximately 25 percent of CA*net's revenues. The remaining 75 percent came from user fees. A map of the Internet backbone in Canada is in Appendix III.

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[1] NLnet in Newfoundland, NSTN in Nova Scotia, PEInet in Prince Edward Island, NBnet in New Brunswick, RISQ in Quebec, ONet in Ontario, MBnet in Manitoba, Sask#net in Saskatchewan, ARnet in Alberta and BCnet in British Columbia.

Given the changing network environment and the rapid commercialisation of the Internet, the CA*net Board decided that they accomplished CA*net's mission to foster the development of networking in Canada. Accordingly, the CA*net Board chose to cease its operations on March 31, 1997. Bell Advanced Communications (BAC) has offered to continue to provide network services to CA*nets customer base after that time.

2.4 New Internet Developments

In its early years, the Internet was primarily in the domain of academics and researchers. As the user community expanded to include businesses, other commercial ventures and the public, use and application development grew considerably. This created bottlenecks in the Internet (described below). These bottlenecks make it increasingly difficult for academics and researchers to continue to use the Internet as before. Their growing frustration over the congestion and their inability to test new applications led to the development of two parallel and somewhat overlapping Internet initiatives in the United States -- Internet II and the Next Generation Internet (NGI) -- and the CA*net II initiative in Canada.

2.41 Internet II and Next Generation Internet (NGI)

Academia drives Internet II and it will have an education-related focus although its exact nature is yet to be determined. Some would like to see it as narrowly technical for 'proof of concept' while others see it as a dedicated network for the research and education community.

The Next Generation Internet (NGI) initiative is similar, but is driven by the National Science Foundation (NSF). It plans to: connect 100 universities with a network 100 times faster than the commercial network; develop and deploy the next generation of Internet protocols; and galvanise next generation research applications.

2.42 CA*net II

Canada also has a next generation network in the planning stages -- CA*net II. This network is dedicated to universities and research institutions for advanced networking services, such as university courses. The network will be state-of-the-art with a capacity of 155 Mbps or more on fibre optic wiring. It will guarantee bandwidth and allow developments currently not possible because of the congestion problems of the broader public network. This new network and the commercial network will use common facilities.

In April 1997, CA*net II will go into operation. CANARIE facilitated this initiative and carriers, such as Bell Advanced Communications, AT&T Canada and Teleglobe will implement it. They will work with the universities, research organisations and other companies involved in R&D. When it is fully operational in two to three years, CANARIE expects to turn the network over to one or more communications companies.

3. Uses and applications of the Internet in Canada

The computers, networks and their interconnections are what makes up the Internet, but its potential lies in how it is used -- the new applications, goods, services and types of communication the Internet affords. Many believe that the Internet infrastructure will eventually become invisible to the user, as is the case with electricity today. When we want light, we do not think about the water levels behind the hydroelectric dam, the miles of high tension wires or even the wiring in our walls. We just flick a switch and assume the infrastructure will operate properly. What matters to the user is what can be done with the power. The same is true with the Internet.

This next section focuses on the applications that run over the Internet, such as health services, education and learning, culture, electronic commerce, government and public service applications and community networking opportunities. This list is not complete, but highlights some current initiatives.

3.1 Health Services

Canada's health care system is under enormous pressure from a variety of sources, such as budget constraints, an ageing population and a growing demand for new and better services. Individuals must also now assume a greater responsibility for their own health. Some of the new applications that run over the Internet will help ease these pressures and provide better access to health information.

The Internet offers a cost-effective way to deliver services, sustain an accessible health care system and improve the quality of information and care. For people living in rural regions of Canada, remote diagnostics provide specialists support to hospitals and clinics. For doctors and other health care professionals, online data bases and training programs facilitate ongoing professional development. For individual Canadians, the Internet provides access to timely, user-friendly and affordable information, services and products related to health.

CANARIE and Health Canada propose to build a national information infrastructure, called the Canadian Health Information System (CHIS). It will integrate health-related information and services created and used by communities, individuals, health professionals, hospitals and researchers across Canada. CHIS will be an open and accessible system and will assure sufficient confidentiality and privacy to: assist decision-making by health professionals and patients; support research and training; help manage the health system; and respond to the health information needs of the public. The network will be an agent of change for the health system and contribute to improving the health of Canadians. It will also foster the development of globally competitive Canadian technologies and services.

3.2 Education Applications

Educators were among the early adopters of Internet technology. They quickly realised that the Internet creates a viable alternative course delivery tool and expands the learning environment. It facilitates research and communication for both the instructors and the students and it makes learning materials available to a wider audience. Using the Internet, institutions can reach students wherever they are and at a variety of times. A university, for example, can teach the same course to students on campus, in a nearby rural community or halfway around the world.

The federal government recognises how the Internet helps education and has developed several programs to support it, such as SchoolNet. Established in 1995, this partnership program between the public and private sectors, is to provide all 16,500 K-12 schools in Canada with Internet access by the year 2000. In addition, it gives students access to online encyclopaedias, library indices, newspaper databases and discussion groups. Teachers use SchoolNet to collaborate on projects and to share and access resources across Canada and around the world.

There are hundreds of courses available on the Internet and every day there are new initiatives and opportunities. In Canada, many universities like University of Waterloo, Simon Fraser University and others offer online courses to their students. In United States, several online universities offer their students accredited degrees and diplomas. As technology and bandwidth improve, education on the Internet will only increase. More careful study of this form of learning needs to be done so that the benefits are optimised.

3.3 Canadian Content

The Internet, through the World Wide Web, provides a dynamic opportunity and potentially lucrative outlet for Canadian content producers. Traditional content producers, such as publishers, broadcasters and audiovisual, recording and film producers, have entered the Internet marketplace. New multimedia companies have also sprung up and, as the quality of content attracts the audience, strive to provide a compelling and content-rich education or entertainment experience.

Canadian news media have created some of the more innovative sites on the Internet. An Ottawa radio station was among the first in the world to deliver its programming via RealAudio over the Internet. In Canada, more than 30 daily newspapers offer online versions.[2] Canada's CBC also has a site where one can listen to the news, not just read it. Other forms of innovative content exist where participants choose the course of a play, soap opera, cartoon or novel. Internet users can also participate in real time events and role-play, generate dialogue and interact with other 'cyber actors.'

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2 The Ottawa Citizen, February 15, 1997, p. E15.

The Internet links content producers, promoters and developers to a domestic and international audience. Linking Canadians to an international system of interactive media creates a unique opportunity to foster Canadian cultural content. In addition, the Internet helps content industries improve their distribution channels and reach new audiences.

3.4 Government and the Internet

The federal government recognises the potential of the Internet for Canada. The government has provided funding support to the Internet backbone, first through the National Research Council and later through the CANARIE program. As announced in the last budget, the government will continue to support expansion of the Internet. The federal government announced a new $800 million funding program for 'infostructure.' In a knowledge society, infrastructure includes "... information and the means to store and access it." This program and others, such as the ones detailed below, will help speed the growth and use of the Internet in Canada.

3.41 The Government as a Model User

The government strives to be a model user of information technologies by using it to communicate and share informationamong government departments and with the Canadian public. The government has committed to several projects that advance its role in such initiatives as electronic commerce and information services.

To reach out and better inform Canadians, the government provides electronic access to government information and services. The government's goal is to have an efficient seamless web of networks to ease communication within the government and with all Canadians. In December 1995, the government launched its primary site on the Internet (http://canada.gc.ca) which today provides access to federal, provincial and municipal government departments, agencies, programs and services. Public Works and Government Services Canada (PWGSC) also integrates the Canada site and the Public Service Intranet Site -- used for sharing information within the public service. These sites have been well received and get approximately 45,000 and 14,000 hits per day, respectively. The federal government has expanded this concept and now offers several sites and services over the Internet, such as Industry Canada's Strategis Site (http://strategis.ic.gc.ca).

PWGSC introduced government-wide electronic security services, such as key management and electronic authorisation and identification. These services are the foundation for digital signatures, a key piece in the electronic commerce puzzle. In 1996, the Treasury Board Secretariat indicated that by 1998, electronic commerce will be the preferred means for the government to conduct business.

In compliance with IHAC's recommendation, the government created the post of Chief Information Officer (CIO). The officer is responsible for implementing the Information Highway in the federal government by setting policies, regulation, standards and guidelines. The CIO does

this through investments, its influence in approving budgets and finally, by expecting departments and agencies to incorporate electronic commerce into their business plans. By looking at the common needs of certain clients across departments, as opposed to viewing electronic service delivery solely through departmental jurisdictions, government can become more efficient and more responsible to the public.

3.42 Strategis

Businesses can access more than 650,000 documents on Industry Canada's Strategies web site. It houses a variety of sites, such as the Canadian Initiatives on Networking Clearing House (CINCH), the national clearing house of information on Canada's networking initiatives using WWW technology. It provides accurate, up-to-date information on the latest developments in networking infrastructure, applications, funding programs and initiates that support the Canadian Information Highway. Strategis also provides a forum for industry to build domestic and international linkages to identify market niches and investment opportunities.

3.43 Student Connections

The government also helps Canadians and Canadian companies to learn how to use the Internet. The Students Connection program places student teachers in small businesses to help them get connected to the Internet. The Horizons Plus initiative, announced in the February 1997 budget, is both a job creation and economic development program. It expects to create over 400 marketing jobs and double the number of small business exporters.

3.44 Canadian Companies Capabilities (CCC)

The Canadian Company Capabilities (CCC) program on Industry Canada's site lists companies in a multimedia database. It acts on the companies' behalf as an international broker and promotional vehicle. Canadian companies can advertise themselves, their products and their expertise to Internet users around the world.

3.45 Canadian International Information Strategy (CIIS)

The Canadian International Information Strategy (CIIS), led by the Minister of Foreign Affairs, recognizes the importance of global mass communications and advancements in electronic technology to Canadian foreign policy, international relations and international trade. CIIS's main goal is to use modern communications technologies to project a positive image of Canada in the world and to promote Canadian interests abroad.

Initially, CIIS will focus on three major areas: Canada's international broadcasting capabilities; the promotion of global electronic networks; and the use of information technology to enhance Canada's international education and development objectives. Through this program, Canada

will be better placed to advance its point of view, sell its goods and services and promote itself as a destination for investment, tourism and education.

3.46 Community Access Program

This Industry Canada initiative gives rural communities affordable public access to the Internet and the skills to use it effectively. Though a competitive process, selected communities establish and operate public access sites in low cost public locations such as schools and libraries. The aim of the program is to establish up to 1,500 centers across Canada by 1998. To date 1,200 communities have participated in the program.

This network of community sites creates new and exciting opportunities for growth and jobs, stimulates the development of new electronic learning tools and services, provides Internet training facilities for local entrepreneurs, employees, educators and students and assists the electronic delivery of government and other services. A proposed sister program to CAP is NAP -- the Neighbourhood Access Program -- whose goal will be to help provide urban centres with affordable public access to the Internet.

3.47 LibraryNet

Another initiative for a community networking model is LibraryNet, a new cooperative venture of Canada's libraries, library jurisdictions and agencies, librarians and the federal government. LibraryNet links all Canadian libraries to one another and helps create appropriate digital content.

3.48 The Green Lane

This Environment Canada site was nominated the best Canadian government site. It provides public weather forecasts, satellite images, environment consultations and information about environmental actions and upcoming events. The site is also a marketplace where users can find convenient access to specialised products and services offered on a user-pay basis (http://www.ec.gc.ca/envhome.html).

3.49 Electronic Labour Exchange

The Electronic Labour Exchange is currently under development by Human Resources Development Canada (HRDC). Designed to help Canadians participate in the labour market, it will use the Internet to facilitate the interchange between employers and job seekers.

4. Economics and the Internet

The Internet has the potential to significantly affect Canada's economic life and structure. It has the power to affect the types of employment in the economy, alter production and operating costs to companies, affect market share, change the mix of goods and services and create different patterns in competition. Developments in Internet technologies can create new industries, such as the Internet service provider (ISP) industry and change how businesses interact with their customers and with each other.

4.1 Business operations and the Internet

Businesses have begun to adapt their operations to the Internet. BCTel, for example, recently opened a 45-Mbps pipeline for Vancouver filmmakers to send daily rushes instantly to Los Angeles for review. CIBC now has its training manuals online. Air Canada sends in-flight menu details and schedule changes to its 50 caterers worldwide. A small map retailer in Ottawa uses the Internet to develop and service an international clientele. Some of these changes are introduced at the margin of the core business, while others revolutionise how business is done. In all these cases, information technologies created significant cost savings and other benefits to individual companies. Future developments in electronic commerce will bring even greater changes to the business environment in Canada.

Business, however, still has a long way to go before it realises the Internet's full potential. A recent Deloitte and Touche study found that worldwide, the overwhelming majority of companies do not plan to use the Internet for business transactions. This is due to many reasons, such as limited technical resources to fully incorporate Internet technologies into the business, the absence of a solid cost/benefit analysis, uncertainty over technical standards and, perhaps most importantly, concerns about security.

The Deloitte and Touche study also found that Canadians are less likely to adopt Internet technology than their international counterparts. Only nine percent of Canadian CIOs said their companies used the Internet for sales and marketing, compared with 22 percent in the United States and the worldwide average of 17 percent.[3] This study is a sobering antidote to the effusive optimism in others.

The Internet is a powerful and useful tool for encouraging international trade. The Internet has a large market base and low costs associated with transferring data. It is still uncertain, however, how the Internet will evolve to generate new markets, goods and services. To date, the commercial and transaction usage of the Internet have developed more slowly than traditional advertising and information use. In addition, current Internet commerce is often a substitute for existing retail options and not as an expansion of new types of businesses. As this displacement

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[3] The Globe and Mail, February 18, 1997, p. B1.

may make some sectors of the economy worse off, the net value created by the Internet has not yet been measured.

4.2 Electronic Commerce

Electronic Commerce is a cost and time efficient way to conduct, manage and execute business transactions. It creates opportunities to shorten procurement cycles, cut inventory costs, customise products and expand market shares. It includes all forms of trade based on the processing and transmission of data, including sound, text, images and moving pictures. Its expanding capabilities drastically change the traditional patterns of communication among partners at all stages. The goal of electronic commerce is essentially rapid paperless transactions, which reduce the cost and geographic constraints of global trade.[4]

Despite its low cost and widespread availability, EC is growing at a much slower rate than other uses of the Internet. While Internet usage in North America grew rapidly between 1995 and 1996, only 14 percent of users made purchases over the Internet.[5] A 1996 INPUT study, *Electronic Commerce Over the Internet*, reports that the worldwide value of goods and services traded over the Internet was only US$70 million in 1995. Canadian businesses are, however, increasing their Internet usage. A recent Canadian Federation of Independent Business (CFIB) survey of more than 15,000 SMEs found that the number of small businesses with Internet access doubled during the 1995 to 1996 period.

The transition to Internet EC will empower consumers to make more informed purchase decisions and enable businesses to increase the efficiency of their operations and expand their markets. It will also bring about many new opportunities for Canadian businesses. Many new service providers will emerge and many existing service providers will expand their business offerings. Firms involved in technology management and strategic consulting will also find their services in greater demand, as will electronic retailers and financial intermediaries such as banks.

Businesses involved in the development, production and marketing of application-based products can also be expected to be very active in the new Internet EC business environment. Products such as Web servers and other network infrastructure products, search engines, transaction management systems, and security technologies will experience increased demand as Internet EC grows in usage.

Payment and other transaction processing services will see a significant increase in activity. Forrester Research predicts in its 1996 study *Payments on the Web* that while conventional credit card systems will dominate Internet EC in the coming years, payment cards and cash cards will

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4 OECD Draft Policy Report on Global Information Infrastructure (GII), Paris, September 1996.

5 The 1996 CommerceNet/Nielsen Internet Demographics Survey (http://wwwcommerce.net/work/pilot/exec_sum.html)

also play a prominent role. Industry analysts also predict that a new class of transaction intermediaries will emerge to facilitate the high volume, low unit value transactions expected to thrive on the Internet.

Many difficulties prevent firms from capitalising on the opportunities offered by the Internet. Problems of security and privacy, consumer protection, authentication and modes of payments and regulatory uncertainties have restricted its growth to the broader consumer market. These issues must all be, to varying degrees, resolved before electronic commerce can fully realise its potential.

4.21 Small enterprises and electronic commerce

The potential for electronic commerce is particularly high for small and medium-sized enterprises (SMEs). SMEs are important to the economy as they create many new jobs in Canada. The strength of the small business sector lies in its ability to adapt to new market and economic forces through innovation.

The Internet promises the same economic benefits to SMEs as to other businesses -- lower transactions, marketing and communication costs and the opportunities for global expansion and improved networking. Despite these benefits, however, SMEs find it more difficult than expected to move into the world of electronic commerce. Some of the problems they encounter include the need to obtain Merchant status from their bank and meet the bank's bond/security deposit requirements for online credit card transactions. Banks are concerned about online merchant and consumer fraud and require the secure sites, not often available from small ISPs.

The Secure Electronic Transaction (SET) standard was to be operational by early 1997. This security protocol, jointly developed by MasterCard and Visa, is to offer protected payment card transactions over public networks. SET is to alleviate some of the current business and consumer concerns and encourage businesses to begin promoting the use of electronic transactions. It now appears, however, that they will not introduce the SET standard until 1998 and may prove too costly for SMEs.

4.3 Employment effects

As Internet-related industries expand, they create new jobs. Exactly how many jobs, is still elusive, although many are willing to speculate. A recent study done by the investment bankers Takuma Amano and Robert Blohm extrapolated that the Internet in 1996 created 1.1 million jobs worldwide. They also calculated that the value creation due to Internet market expansion was greater than $200 billion.

While these numbers are difficult to apply to the Canadian context and may be too rosy, employment gains, particularly in the information and technology sectors, are possible. Several

studies have found strong evidence that information technology generates jobs and growth. In fact, Canada has a current shortage of skilled people in key information technology areas.

The net effects on employment, however, are not nearly as optimistic. A majority Canadians believe that as technology becomes more important in the economy, some people, older workers in particular, will be left behind. As to employment studies, solid evidence exists showing that information technology reduces employment in some industries, notably in the manufacturing sector. A recent Statistics Canada report, *The Information Technology Sector: A profile*, showed the industry's output grew an average of 8.1 percent a year between 1990 and 1995, pushing its share of gross domestic product from 5.5 percent to 7.6 percent. Total employment, however, dropped, and the number of jobs fell from 316,459 in 1990 to 308,843 in 1995, a decrease of 2.4 percent over five years.

One of the key economic challenges regarding the consequences of the Internet is how to address the concern that while new high-technology jobs are created, they may also be leading to net job losses in the economy, and underemployment in many other sectors. Additional study is needed to understand and possibly mitigate the negative effects of this new technology.

The debate on the relationship between technology and jobs is contentious, reflecting the underlying uncertainty as to the ultimate effects of information technology. At present, employment levels have not improved substantially in most parts of the world, despite the impressive gains in technology. Outside the high technology sector, technological change often led to decreases in employment. This uncertainty with respect to technology and jobs is doubly disturbing because a great deal is at stake -- in our society jobs are the primary source of purchasing power, allowing individuals to have access to goods and services.

There are many creative solutions and we must continue to study policies that provide alternative mechanisms to deal with the possibilities that the number and quality or jobs generated may not meet expectations. The success of the Internet, as well as our broader economic well-being is at stake.[6]

What does the Internet mean to the Canadian economy? Displacement effects, such as job losses in certain sectors of the economy will occur, namely in manufacturing and some service industries. These cannot, nor should they be, ignored. At the same time, there will also be big winners. To harness the potential of the Internet, businesses need to change the way they operate. They need to develop new models on measuring value and account for costs. They also need to realise the benefits of using networks. Increases in profitability and cost savings may be obscured, at first, by the costs in adopting the technology and adapting the business to use information technologies and capabilities effectively. More importantly, the network

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[6] Marc Lee and Geoffrey Oliver: "Jobs and Growth in the Knowledge-based Economy," p. v., Industry Canada, 1997.

externalities associated with the Internet -- the value to any one firm on the Internet increases as more join -- have yet to be fully realised.

Overall, the long-term net effect on the Canadian economy is yet to be determined, but the potential for economic growth, even under the most cautiously optimistic scenarios, exists. Internet technologies are still in the early stages and future developments are unknown. What is known, however, is that the Canadian economy will no longer be the same.

5. Issues to be resolved

Despite the uncertainty surrounding the Internet, the potential to benefit Canadians in many ways exists. It creates new business opportunities, allows for new learning environments and creates a new distribution mechanism for a variety of public and private sector goods and services. There are many other ways the Internet will benefit Canadians, but before it can become fully integrated into our society and economy, several issues need to be resolved. The infrastructure is often congested and the current price structure of Internet access may not be the most efficient in the long-run. There are also several public policy issues, such as access, employment, content regulation, intellectual property, security, privacy and taxation. This next section will describe these issues and, where possible, outline solutions or courses of actions.

5.1 Infrastructure

The Internet's beginnings and the resulting network are rather eclectic. The physical structure is limited, leading to a variety of bottlenecks to the smooth and fast operation of the Internet. These bottlenecks are obstacles to growth and must be dealt with effectively.

While most of the Internet infrastructure is separate from the public telephone system, most home users and many small businesses use the telephone system to connect to their Internet supplier. Two bottlenecks are associated with this use of the public switched telephone network (PSTN). Two other bottlenecks involve the Internet network itself.

First, the current phone network is designed to accommodate standard telephone usage patterns for voice communication in terms of bandwidth, call duration and the number of redial attempts. These old usage patterns disappear as the number of Internet and other online connections, such as faxes, increase. A Bellcore study[7] anticipates that phone access to the Internet in the year 2001 will be two to five times greater than today. If no changes, technical or otherwise, are introduced, people may regularly be unable to place a call. This is a very real concern for emergency or 911 situations.

Solutions, however, exist. The telephone companies could upgrade their network capacities at a faster rate. Alternatives, such as cable and wireless technologies will minimise the strain on the PSTN. Bypassing the PSTN may also be possible and reroute a call through an ISP if it is identified as Internet-related. Nontechnical solutions include a change to the pricing of ISP services so that people adjust their use of Internet connectivity accordingly (see pricing infrastructure access in section 5.2).

The second telephone-related bottleneck is with modems. While improvements are being made, user modem speeds and the capacity of twisted-pair copper cannot efficiently handle the

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[7] Atai, Amir and James Gorden, "Impacts of Internet Traffic on LEC Networks and Switching Systems." Red Band, NJ: Bell Communications Research Inc., 1996.

bandwidth demands of multimedia applications. This bottleneck, however, is one that can be quickly overcome with changes in technology. ADSL technologies[8], for example, expand the capacity of the twisted pair. Faster modems, alternative technologies, such as ADSL, cable modems, satellite and wireless, will all help remove this current bottleneck.

The third bottleneck is associated with the regional or national networks. These networks form the Internet backbone and are how ISPs, organisations and individuals interconnect. When these backbone networks or their NAPs (Network Access Points) become congested, the Internet slows. This creates and packet delays as well as an increase in the number packets lost. Packets are the digital bundles that carry information travelling over the Internet. Delays in transmitting packets are especially a problem for multimedia applications, such as video conferencing. Lost packets create problems of E-mail and electronic commerce applications.

Network and, to a greater extent NAP congestion, are mainly problems in the United States and they are being addressed. The number of backbone operators and their capacities have increased substantially. The Boardwatch Magazine's Spring Quarterly reports that there are now 23 backbone operators in North America, up from the 14 reported in the previous quarter. AT&T recently announced that it will spend approximately $5 billion US to beef up its backbone network and improve fast packet technology.[9] Sprint reported that it tripled the capacity of its backbone network in 1996 alone. AT&T Canada announced its intention to join a consortium with Fonorola and Ledcor Industries to build a fibre link from Vancouver to Quebec City at a total cost of $120 million.[10] Backbone operators know quality of service is important and they will continue to upgrade their facilities to meet demand.

Finally, the fourth significant bottleneck occurs at the global level when a concentration of key Internet resources channels traffic through the same route. Highly popular web sites and sites without the capacity to absorb the hundreds of thousands of hits received per day create problems, such as the general U.S. West Coast congestion. Yahoo and Netscape are the two most popular sites on the Internet and their ability to respond is often severely restrained. Similar problems arise with popular listservs and newsgroups.

Mirroring and caching help mitigate these problems. A mirror site diverts some of the traffic from the original site by replicating or duplicating the information found on another Internet sites. This can reduce traffic volume and congestion on a particular segment of the Internet.

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8 ADSL: Asymmetric Digital Subscriber Line is an emerging technology which provides high-speed Internet connection over regular telephone lines; the initial specification provides connections at speeds up to 6 Mbps downloading data and 640 kbps uploading data. Sasktel is a leader in ADSL and claims that its ADSL service is 50 times faster than the standard 28.8 Kbps modem. Sasktel (http://www.sasktel.com/st1.html).

9 Information Week, March 10, 1997.

10 Telecom Update, Angus Telemanagement Group, 1997.

Caching involves storing frequently accessed web pages on the user's hard drive. Instead of downloading the pages from the distant site, the next time the user accesses these pages, they are retrieved instantly from the user's hard drive. It is even more efficient and effective when done at the organizational level. Both practices, however, raise complex liability and copyright concerns.

Another solution is in advancing existing protocols. The World Wide Web Consortium has redesigned the http protocol. This protocol, which has been the basis of the web since 1990 will speed up download times by two to eight times.[11]

All these bottlenecks, occurring at various points along the Internet infrastructure, can be resolved or, to varying degrees, mitigated. Technical advances in the existing systems and alternatives are needed and they are both being developed. New and improved technology, however, is not the only solution. Cooperative efforts are needed to set standards and protocols and to develop new pricing systems and system architectures.

5.2 Pricing Infrastructure Access[12]

Congestion on the Internet has drawn attention to its pricing system. Some argue in favour of a change to models that charges people based on the marginal costs of their actions. Others, however, challenge this approach and promote maintaining the flat-rate pricing structure which has been so successful in spurring Internet growth.

If the Internet is not congested, the marginal cost of sending an extra packet is essentially zero. When the network is operating at or near capacity, however, bandwidth becomes a scarce resource. Congestion can impose a cost, reflecting delays, interruptions and lost information.

Under the current flat-rate pricing system, users pay a set fee to their ISP for a given amount of connection time. There may be an additional charge for time above the subscription package. This system does not consider peak-period usage and does little to mitigate congestion. This pricing system also treats all types of traffic the same, whether the user does E-mail or a bandwidth-intensive multimedia application. The flat fee is therefore based on the average cost and low-intensity users end up subsidising high-intensity users.

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[11] New York Times, February 17, 1997.

[12] drawn from Lee and Oliver, pp. 24-25.

One alternative is to have some form of usage-based pricing.[13] Users pay some of their bill for connection, and another portion for each bit sent or received. An analogy lies in some cellular telephone packages, where users only incur incremental costs at peak periods, while flat-rate pricing applies during non-peak times.

A downside of usage-based pricing is that there would need to be greater processing at network routers than currently exists. In addition, the accounting costs and administrative overhead may be large (in telephony, billing overhead accounts for 50% of the phone bill, according to Bailey and McKnight). Users are also concerned that they will incur higher than anticipated costs. With a flat-rate subscription, consumers know what their bill will be, and given this, they tend to use the infrastructure more. A good example of this is telephony in North America, which has much greater use of telephones, due to its flat-rate pricing structure, compared to Europe, with per-minute charging.

Both models, usage-based and flat-fee, have their advantages and disadvantages. Technology developments, such as routers with built-in accounting capabilities and tunnelling software, will help determine which method will dominate. The eventual solution may be some combination of the two models, such as a tiered price structure. No matter which model is chosen, all parties agree that the goal is to allow for more flexibility so that network congestion is addressed without deterring use.

5.3 Public Policy Issues

5.31 Access

As the Internet will most likely provide Canadians with many of their basic services -- health, education and government services -- all should be assured some level of access. What this level and speed of access should be, however, is difficult to determine. It is also difficult to predict how much will occur naturally.

A recent study by the Organization for Economic Cooperation and Development (OECD) suggests that the cost of Internet services, not language or culture, is what really dictates a country's Internet usage. This study compares Internet use among its member countries and finds that though cultural differences and the number of personal computers do play a role, the driving factor behind Internet use is the price.[14] The same study also found that Canada has the

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[13] Several variations of usage-based models have been suggested. One of the most popular in the economic literature is the Varian/MacKie-Mason "smart market" approach, where users assign a willingness to pay for immediate servicing for a given transmission. At congested routers, packets are prioritized based on these bids. However, users are only charged the price of the highest priority packet not admitted by the network (ie. the market-clearing price). This price would be zero at non-peak times.

[14] Wall Street Journal, March 14, 1997.

lowest price for Internet access in the world, mainly due to the flat rate pricing of local telephone service.[15]

These findings have important public policy implications for Canada. If the price of Internet services in Canada is low (averaging $28.36 per month for both local phone service and Internet access), policy must be geared to work on the other deterrents to Internet use in Canada. More work is needed to fully understand what these deterrents may be.

The dissemination of computers, modems and the Internet have occurred at comparably high rates, yet some segments of the population lag behind. Francophones, people with low incomes and those in remote and rural areas have not adopted the technology as quickly as other segments of the population. As predicting future levels of technology penetration for these groups is difficult, we do not know whether an access problem exists. What we need, then, is careful monitoring of the situation to provide a sound base for public policy programs that focus special attention on these groups.

5.32 Content Issues

Another important issue for Canadian public policy is how to ensure sufficient quality Canadian content. For many Canadians, this issue is as important as infrastructure, pricing and access. Due to its small population base and proximity to the United States, Canada has developed a tradition to support and regulate Canadian content and content producers. The Broadcasting Act is one such policy instrument. We now need to determine how appropriate these existing regulatory frameworks are to the Internet and the new multimedia services it carries.

Traditional broadcasting services are designed to reach large audiences and are typically distributed in point-to-multi-point network arrangements to maximize the mass appeal of the programming. They offer them at fixed times of the day or week to capture as many viewers as possible. These services also follow cultural policy rules that seek to promote Canadian cultural identity and advance the interests of creators and producers who work within the Canadian broadcasting system.

New media services however, do not have the same characteristics as the traditional broadcasting. As these services are unscheduled and offered on-demand, they do not have the same mass appeal as traditional programming. In addition, these new services are largely distributed via two-way, point-to-point network arrangements which facilitate a transactional or interactive user interface. A heated debate exists over how appropriate applying the same cultural policy rule to both types of services is. Some options for a new policy framework include adopting measures along the lines proposed by CRTC in its report on convergence, *Competition and Culture on Canada's Information Highway: Managing the Realities of*

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[15] The Toronto Star, March 20, 1997, p. C1.

Transition, which clarifies the meaning of broadcasting and program as defined in the *Broadcasting Act*.

It is possible that the natural evolution of the Internet will lead toward greater openness and access for content producers and consumers. It could then be expected to foster diversity in expressing cultural values. This would be done by ensuring that the appropriate environment and incentives exist to encourage Canadian content providers and that the technical configuration of the Internet permits open access and use for all forms of cultural expression.

5.33 Illegal and offensive content on the Internet

A minority uses the Internet to distribute illegal and offensive content. Internet technologies also make it easier to violate copyright and other intellectual property laws. Producers, parent associations and politicians are among those demanding stricter controls over the Internet, to prevent these abuses. To better understand this issue, however, knowing what is possible to control over the Internet is important.

"The Internet interprets censorship as damage and routes around it."[16] Internet technology is designed to be fault tolerant and connect unreliable networks. This is the main obstacle to controlling Internet content. If a link fails, the network reroutes packets to recover. If access to an information source is blocked, the network or the user can choose an alternate route. Blocking traffic for reasons of policy therefore assumes that all alternate routes are also blocked.

The basic assumption in control of content, therefore, is that all information is routed through a single point so that the content of the transmission may be monitored. This is usually done through firewall technology. A firewall is a computer or group of computers that enforces an arbitrary access policy by blocking or permitting traffic. Typically a firewall is a computer that sits between the outside world and an internal network, monitoring information according to some set of criteria.

To monitor effectively, all traffic must go through the firewall. The question arises as to how efficient the firewall must be to control a certain rate of transmission. A packet with no information contains 40 characters of information. At T3 speeds (45 Mbps) the firewall must process up to 140,625 packets per second. This pushes the limits of current technology and would constrain network performance. Since there are currently multiple T3 connections from Canada to outside networks, a single national firewall is technically not feasible. Similarly, controlling traffic within Canada by routing it through a firewall is not feasible.

One possible solution would be to have multiple firewalls. However, keeping the rules for content monitoring in synchronization in each firewall would be a major technical challenge.

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16 An Internet axiom credited to the Silicon Valley engineer John Gilmore in Lewis, Peter H., "The Internet's Very Nature Defies Censorship by Government or Individual" The New York Times, January 15,1996.

The cost of such an infrastructure would also become prohibitive given the exponential growth in Internet traffic.

An additional complication is that a firewall cannot traffic information that is not routed through it. Since an Internet provider or transit network can connect to the outside world by connecting to an American, European or Asian network simply by making an arrangement with a telecommunications supplier in that area with no government involvement, implementing firewalls on every international link becomes difficult, even impossible.

Another potential method to control content is by giving preference to Canadian Internet sites in search engines and other network navigation tools. Unfortunately, there is no way to determine which sites are Canadian either from the domain name, the standard way of naming a site, or from the IP address, the internal encoding used by the network to locate a site.

A third method of controlling content would be to license Internet content providers to enforce some arbitrary rules to promote production of Canadian content. This is the model used in broadcast endeavours. The Internet, however, is not a broadcasting medium. There are millions of Internet users, and any one of them may be a content producer through a home page, contributions to a newsgroup, etc. Control of millions of content producers is not feasible.

Although technically controlling content is difficult, offensive and illegal content must still be dealt with. To open the debate in Canada, Industry Canada recently commissioned a study on content-related Internet liability, *The Cyberspace is not a no-law Land.* This study concludes that overall, existing Canadian laws are adequate to deal with the Internet. This can be seen in the number of recent arrests relating to pornography on the Internet. The report's authors found no glaring problems that mandate massive legal intervention. If, upon additional study some statutes need to be changed, they should be minimal and technologically neutral.

The study also finds that the most difficult cases are not those that directly infringe the law (be it privacy, intellectual property, Criminal Code, etc.) but those that do so indirectly. In these instances, assigning liability is dependent upon the jurisdiction and the statute involved (participation provisions of the Criminal Code, the right to authorisation under the Copyright Act or various liability under civil or criminal law). In general, the more knowledge or control one has over the content, the more likely one is held liable. This does not mean, however, the less you know, the better off you are, as this is a socially, if not legally irresponsible attitude. The authors believe that it makes good business sense to be good corporate citizens. This approach can be seen in the Canadian Association of Internet Providers' (CAIP) voluntary Code of Conduct.

Overall, Canada should seek to maintain a balance between the rights of all stakeholders while preserving basic Canadian values such as freedom of speech, privacy and the prohibition of illegal and offensive materials.

5.34 Security and Privacy

To better address the emerging privacy and security issues on the Internet, the Canadian government developed a privacy toolkit consisting of voluntary codes of practice, privacy enhancing technologies, framework legislation and consumer awareness. While none of these elements alone is enough to provide adequate levels of protection, they can be used in combination with one another to provide a solid basis for the protection of personal information.

Significant progress has been made in forwarding all aspects of the government's privacy agenda through support of toolkit activities. The release of the Canadian Standard Association's Model Code for the Protection of Personal Information in March of 1996 was an important step in ensuring greater privacy protection. The Code represents a consensus among representatives of various levels of government, the private sector, consumer groups, and others. Many industry associations, including the Canadian Bankers Association, have used the CSA Model Code to develop new industry codes, or to update existing ones. The CSA Code has also become a national standard for Canada, and the International Organization for Standardization is presently considering it.

The Government has made significant progress toward ensuring the recognition of the right to privacy in legislation. Canadians already have privacy legislation which covers the activities of the public sector. On May 23, 1996, the Government announced plans to develop data protection legislation covering the private sector. The Ministers of Industry and Justice will release a public consultation document on protecting privacy in the private sector which outlines various legislative options, and are consulting the provinces to ensure a harmonized approach to the issue.

Stimulating public awareness has been an important component of many government initiatives. The release of the public consultation paper on private sector privacy legislation will provide an excellent opportunity for distributing information to the public and generating media interest in these issues. As part of its public awareness commitment, Industry Canada has also hosted annual Symposiums on Privacy-Enhancing Technologies which provide rare opportunities for representatives of a wide variety of interests, including consumer representatives, privacy advocates, different levels of government and the private sector, to come together to discuss privacy and technology issues.

The Government remains committed to all four privacy tools in the privacy toolkit, and is confident that this approach will provide the kind of privacy protection and security that Canadians are looking for to fully benefit from Internet developments.

5.35 Cryptography and the Public Key Infrastructure

Once the exclusive preserve of governments, cryptography is increasingly seen as an enabling technology for the information society. Cryptography has two main components: the encryption

of communications, documents or databases for confidentiality; and digital signatures or the electronic means of authenticating the sender and recipient. These components allow cryptography to be used for the protection of privacy, the conduct of electronic commerce and the security of intellectual property on the information highway.

The Government of Canada is reviewing federal cryptography policies and is committed to develop a balanced policy framework for the production, deployment and use of cryptography. This framework will serve to protect the vital economic and financial information held in Canada's private sector and will secure individual privacy, while safeguarding law enforcement and national security responsibilities to the public and the government.

The September 1995 IHAC final report addressed security issues and put forward a number of recommendations regarding cryptography, the security requirements for electronic commerce, and a Public Key Infrastructure (PKI). PKI is a network that uses public key cryptography to allow secure electronic financial transactions and exchanges of sensitive information among individuals, firms and organizations even in cases where the participants are relative strangers. The Canadian federal government required a Public Key Infrastructure (PKI) to provide a uniform key/certificate management structure for confidentiality (encryption) and digital signatures for sensitive but unclassified information across the federal government. This Public Key Infrastructure will allow the federal government to deliver services to Canadians, provide electronic commerce and confidentiality services to Public Service employees and better protect the privacy of information used in government business.

The September 1995 IHAC report stated: "It is likely that broad-based security will be achieved through several PKIs, to be built by different public and private entities." In Canada, one can already see the emergence of private sector Certification Authorities (CAs) which are the basic building blocks of a broad-based infrastructure for secure and private communications. In other countries, a variety of models for PKIs, CAs and Trusted Third Parties (TTPs) are being explored and started. These developments raise questions of interoperability, cross-certification and harmonized policies and practices.

Given the range of interests involved, both domestically and internationally, the challenge before governments, organizations and individuals is to achieve the balance championed in the 1995 IHAC report.

5.36 Internet and taxes

Taxation and the Internet is usually divided into two debates: concerns about the tax payment by information service providers; and taxation on Internet transactions. The latter is discussed below.

Online commerce has opened the issue of taxing goods sold over the Internet. Business communities and individual Internet users across the world are struggling with the questions of who is responsible for collecting sales tax and what constitutes a sufficient presence to compel a business to pay income tax to a jurisdiction. The borderless design of the Internet makes it impossible to determine with accuracy where the buyer making a purchase is located. With a typical mail-order, the product has a definite destination while with a purchase over the Internet, the information is downloaded on the Internet and the seller does not know its destination. Sophisticated encryption used to protect business transactions also makes outright tax avoidance possible. Items will be purchased, delivered over the net but in an encrypted form. Tax collectors will be unable to easily decipher the product and the amount paid. Governments are also concerned about the potential for international tax evasion on the borderless Internet.

Undoubtably, these issues will eventually be resolved, however, many Internet users are concerned with the possibility of stifling the growth of the Internet by taxing online commercial activities. The evolving Internet technologies may help by developing software packages to assist businesses in controlling online commerce.

6. International Aspects of the Internet

6.1 Domain Name Registration

As the Internet crosses many different jurisdictions, governance is an ongoing issue. Many believe that for the Internet to achieve its full potential, true-self governance is the best method of operation. The exponential growth in the number of users and the World Wide Web has, however, tested this model of operation. The issue of domain name registration, an essential element Internet communication, has been dealt with in a manner consistent with the goals of self-governance and efficient operation.

The domain name specifies Internet locations, such as web sites and E-mail addresses. The current system of registration has been subjected to many pressures, including the lack of available space on the existing top level domains (.com, .net and .org) and legal pressures regarding the intellectual property of the names.

The Internet Society (ISOC), with the support of such organisation as Internet Assigned Numbers Authority (IANA), Internet Architecture Board (IAB), Federal Networking Council (FNC), International Telecommunication Union (ITU), International Trademark Association (INTA) and World Intellectual Property Organization (WIPO), came together to form the IAHC, the Internet Ad Hoc Committee to resolve the domain name issue. They recently announced the creation of seven additional top level domains which will help ease the shortage of name space on the Internet.

Domain name registration is also an intellectual property minefield. While it is possible for Acme Groceries in Winnipeg and Acme Carpets in Vancouver to use the same name, they cannot both have the URL http://www.acme.ca. To deal with this and related issues, the IAHC helped create an intellectual property dispute settlement procedure, to be administered by the World Intellectual Property Organization Arbitration and Mediation Centre, in Geneva.

To guide future registrar developments, an association comprising all the registrars, the Council of Registrars (CORE), to be established under Swiss law will create and enforce requirements for registrar operations. A separate legal instrument spells out these requirements that each registrar must agree.

The IAHC plan includes the establishment of a non-regulatory policy framework in the form of a Memorandum of Understanding (MoU) which both the public and private sector will be invited to sign. The MoU will provide a mechanism for signatories to advise on future policy evolution of the global Internet domain name system. Whether this proposal will gain sufficient international support, however, has not been determined. There are still many outstanding issues that need to be resolved.

In Canada, addresses with the country code .ca are handled through a committee led by John Demco at the University of British Columbia. To qualify for a .ca domain name, a company must be a federally incorporated entity. Given the phenomenal growth of the Internet, the long-term viability of the current .ca administration practice may soon be reviewed.

6.2 Approaches taken by foreign governments to control illegal and offensive content

Like many other communication technologies, the Internet carries a considerable amount of potentially illegal and offensive material. Although the already existent national laws of various countries apply to the offensive/illegal material on the Internet, many countries feel there is a need to introduce a regulatory system for the Internet.

Various recommendations have been made. The Australian and German governments, for example, suggest implementing international standards that prevent Internet users from bypassing local rules. Germany is drafting its first federal multimedia censorship laws which will make both the providers and users accountable for illegal content. The German government also urges other countries to agree on a code of conduct for international users of the Internet. The European Union would like to license Internet service providers across Europe or have European Union governments communicate their national Internet regulations to a monitoring team for coordination. The British government amy start applying laws regulating television content to the Internet. After the unsuccessful attempt to implement the Communications Decency Act (this law made it a crime to transmit to minors material deemed indecent), the Supreme Court of the United States will review whether the new federal law regulating indecency on the Internet violates the First Amendment. The decision of the Supreme Court may also set the standard for all future regulation of the Internet. Various governments have suggested establishing an international law which will make both providers and users responsible for illegal content that is pornographic, violent, or racist.

Some countries, such as Singapore, have already set up Internet regulations. All Internet Service Providers must channel their traffic through the Singapore Broadcasting Authority controlled proxy servers. Saudi Arabia and Vietnam control access via a single Internet gateway.

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Appendix I: Common Internet terms

- **ADSL** - Asymmetric Digital Subscriber Line is an emerging technology that provides high-speed Internet connection over regular telephone lines. The initial specification provides connections at speeds up to 6 Mbps downloading data and 640 kbps for uploading data.

- **ARPANet** - the proto-Internet network created by ARPA -- the Advanced Research Projects Agency (ARPA). The original idea was to connect together universities and high-tech defence contractors.

- **Backbone** - a high-speed line or series of connections that forms a major pathway of a network.

- **Bandwidth** - The amount of data that can be sent through a connection. The total frequency spectrum (in Herts-cycles per second) that is allocated or available to a channel, or the amount of data that can be carried (in bits per second) by a channel.

- **Caching** - one of the most popular methods of reducing network traffic. This technique stores frequently accessed web pages on the user's hard drive to be instantly retrieved the next time the user visits the site. This is fastern than down-loading the pages from a distant site and is more efficient and effective when done at the organizational level.

- **CANARIE** - Canadian Network for the Advancement of Research, Industry and Education. It is a partnership between the private sector and government to accelerate the development and application of the communications infrastructure in Canada.

- **CA*net** - an amalgamation of university and private-owned groups that managed the Internet network in Canada. Established in the late 80s, it fostered a cooperative environment for connectivity between Canada's regional networks. It completed its operations on April 1, 1997.

- **DNS** - Domain Name System - a large, globally distributed database that translates domain names into numeric Internet address and vice versa. It makes it possible for people to use the Internet without having to remember the addresses associated with each computer on the network.

- **Domain Name** - the unique name that identifies an Internet site. Domain Names have two or more parts, separated by dots. The part on the left is the most specific and the part on the right is the most general. A given machine may have more than one domain name but a given domain name points to only one machine.

- **FTP** - File Transfer Protocol - a protocol used to transfer files directly from one computer to another.

- **HTTP** - HyperText Transport Protocol - a protocol used by the World Wide Web.

- **ISDN** - Integrated Services Digital Network is a higher-speed connections service that uses existing phone wire, but replaces modems with special digital adapters. ISDN speeds are roughly 64 kbps to 128 kbps -- up to 5 times faster than a conventional modem.

- **Intranet** - private Internets that use standard Internet protocols, such as TCP/IP and HTTP, and are set up for the communication of ideas and information within an organization. They are typically set up behind a firewall to control access to the corporate information.

- **IP number** - Internet Protocol - the Internet protocol that defines the unit of information passed between systems that provides a basis packet delivery service.

- **Kbps** - kilobits per second. This is a measure of how fast bits are transmitted over the network. One kilobit is made up of 1,024 bits. It is also a speed rating for computer modems and indicates the maximum number of bits the device can transfer in one second under ideal conditions.

- **Mbps** -Megabits per second. One megabit is equal to a thousand kilobits.

- **Mirror site** - diverts some of the traffic from the original site by duplicating the information found on another Internet site. This practice helps reduce traffic volumes to specific sites and mitigates Internet congestion.

- **NAP** - Network Access Points - a layer of two switched service that is not directly involved with routing IP datagrams; it serves as a means for moving data between the ISP networks in a manner that will not restrict which Internet working protocol or routing policy is used.

- **NAP** - Neighbourhood Access Program - is a program whose goal will be to help provide urban centres will affordable public access to the Internet.

- **NGI** - Next Generation Internet - an American initiative with three goals: to connect universities and national labs with high-speed networks that are 100-1000 times faster than today's Internet; promote experimentation with the next generation of networking technologies; and to demonstrate new application that meet important national goals and missions.

- **Protocol** -a formal description of message formats and the rules two or more machines must follow to exchange those messages. Protocols let users perform operations on other computers over a network.

- **PSTN** - the Public Switched Telephone Network is a circuit-switched analogue network which makes connections for the duration of telephone call. These connections are usually use for voice but can also carry data between facsimile machines and computers (via a modem).

- **SMTP** - SMTP (Simple Mail Transfer Protocol) the basic programming language behind the Internet's e-mail functions.

- **T1**- an Internet backbone line that carries up to 1.544 million bits per second (1.544Mbps).

- **T3** - an Internet line that carries up to 45 million bits per second (45Mbps).

- **TCP/IP** -Transmission Control Protocol/Internet Protocol - the basic protocol managing communications; it makes certain that two computers reach an agreement about the basic rules of data exchange and guarantees that messages are properly packaged and transmitted through the network.

- **Telnet** - the Internet standard protocol for remote terminal connection service.

- **World Wide Web - (WWW)** - also known as the web. It is one of the most popular applications on the Internet for finding and receiving information. It provides a means of sharing and accessing information across multiple sites. That info can be text, graphics, audio and video.

- **URL** - Uniform Resource Locators - the address for a resource on the Internet; it provides a standard format for the transmission and reception of a wide variety of information types.

Appendix II: How the Internet Works

There are two layers to the Internet's infrastructure: physical and logical. The logical portion consists of the rules or guidelines which define the Internet's services and abilities. The physical infrastructure consists of the hardware and software components. The physical infrastructure dictates what is possible for the system where as the logical infrastructure, defines the services. Together they form a service that easily expandable, requires little administrative input, and is extremely reliable.

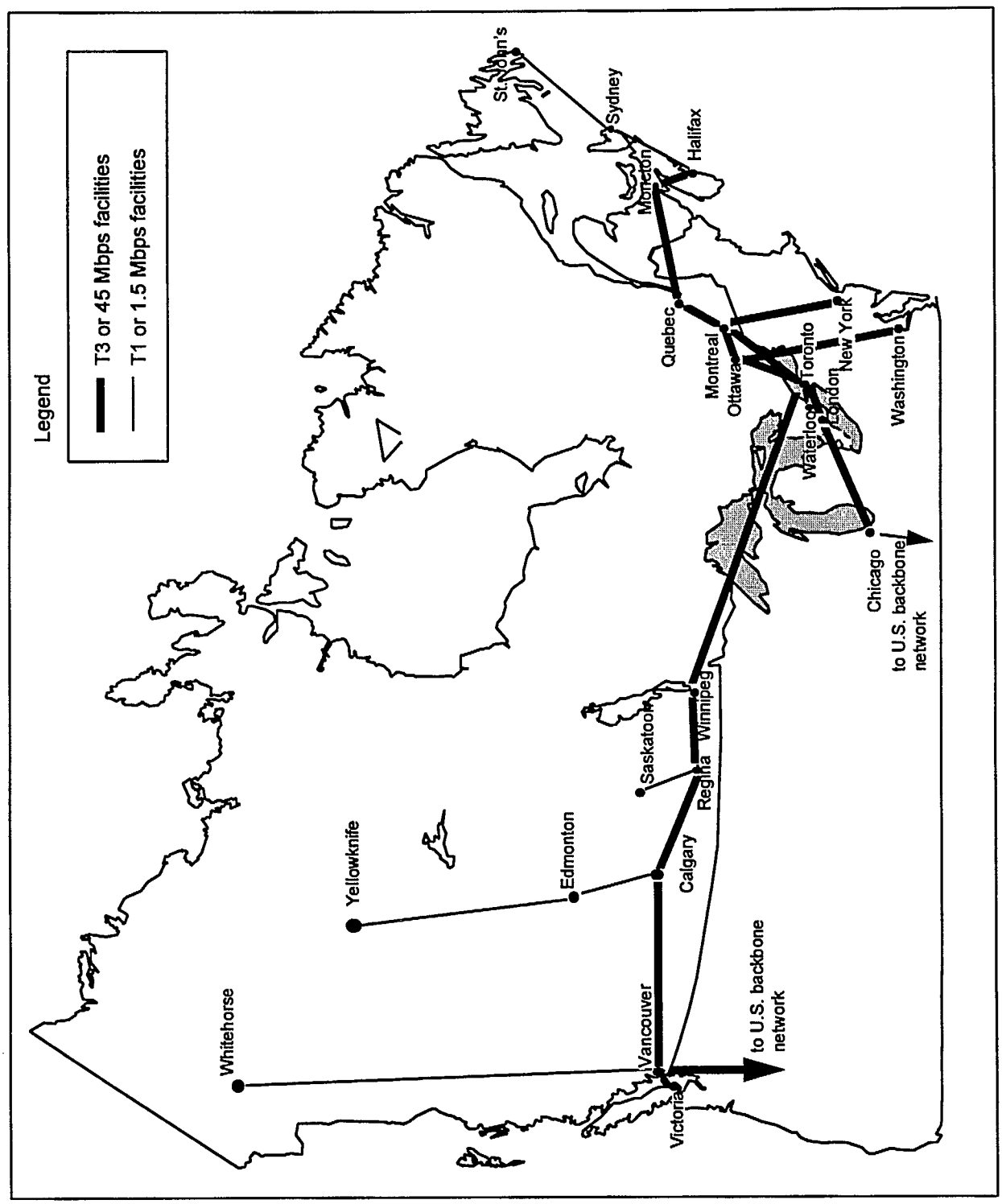
The Internet allows computers and networks to communicate openly and effectively regardless of make, architecture, speed, manufacturer, connection or resources. If these entities are to understand each other, all the connected systems must talk to each other in the same way, just as humans do. The TCP/IP protocols, a set of rules created by Internet designers, define the language used for all aspects of Internet communications. File transfers, electronic mail, information transmission, user addressing and data routing are just a few of the services dictated by TCP/IP. Implemented on this language are the user-friendly services that have become common such as the World Wide Web, News groups, discussion areas and online games.

The Internet is implemented on a variety of communications hardware. All of the information being managed, administrative or otherwise, is stored on servers. Routers and gateways determine the direction of the individual steps the information must follow to get to its destination. But linking all of this together, including the networks and service providers, are standard telecommunications facilities. Phone lines and telecommunications switches, the same ones used for voice communications, connect the networks and Internet hardware together. In most cases, the telecommunications resources used are leased from the telecommunications carriers.

Some Internet service providers have invested enough in leased lines to create their own networks, both regional and national. These networks are often treated as backbones, high-speed and high-capacity paths, which connect to smaller service provider regional networks and to other backbone networks to increase their coverage. All parties involved generally agree to carry each other's traffic openly and freely across their respective networks.

Before messages and data are sent across the Internet, regardless of the application, they are divided into smaller pieces called packets. The packets contain not only portions of the information, but also additional data used for error detection, addressing, and reconstruction. Once the source transmits the packets, the routers and gateways determine where the packets will go on an individual basis. At the destination, the packets are collected, arranged in the appropriate order, and the original information is extracted.

Appendix III: Canada's Internet Backbone



From "Economic Analysis of the Internet Service Provider Industry in Canada," Maurice Estabrooks (Industry Canada) 1997.

Appendix IV: International Connectivity

The key factor to the success of the Internet is network interconnection at all levels. Connections can be made via land lines, submarine cables and wireless systems, including satellites. Teleglobe Canada supplies overseas connections through submarine cables and satellite services, while connections to the United States can be made via long distance telecommunications carriers. Because of the costs involved, however, international connections tend to link backbone networks only, which are supplied by larger corporations.

The networks within the Internet, both domestic and international, are connected together by standard telecommunications facilities. These facilities can be leased for the specific use of Internet communications. The Canadian telecommunications system which is comprised of these facilities is one of the best in the world, and international connections for both data and voice transmissions are readily available. Yet there are few direct connections between Canada and countries abroad. The low count of Canada-overseas Internet links is not an issue of technology or availability, but of price. As an illustration, the CANTAT-3 cable carries far less than it can, but a price of $250,000 per year for one megabit-per-second capacity hinders many from acquiring overseas connections. Instead, it is far less expensive to lease high-speed connection into the United States and use their established connections.

The design and implementation of the Internet is such that data is transmitted through the "most likely successful" links. Because the U.S. backbone networks offer much higher capacity than those in Canada, and because the U.S. has many more international connections available, a significant amount of Canadian Internet traffic (domestic and international) flows to its destination through the United States. Yet this form of bypass does not necessarily violate Canadian telecommunications policy, which states that basic telecommunications services to be routed overseas should pass through Teleglobe's facilities. To date, data and store-and-forward services such as voice-mail, World Wide Web, electronic mail and others have been classified as enhanced or value-added, and are excluded from the coverage of this policy.

Certain conditions must be met before connecting networks together at network access points or Internet exchanges (NAP/IX). First and foremost, the network provider applying for interconnection must be registered as an Internet service provider (end-access or network provider) with assigned domains, address blocks and other required system identifiers. The next step is the completion of peering agreements, which define the protocols for network provider information exchange at the NAP/IX. Peering agreements are completed by all interconnected providers on an individual basis or in totality with a multilateral (multi-company) peering agreement; the method depends on the NAP/IX. Once the peering agreements have been formalized with all involved parties, the final administrative and connection operations are performed to complete the process.

Appendix V: Internet Governance

No one owns or runs the Internet. Instead it is a global network supported by many thousands of participating networks. There are, however, a number of organizations responsible for coordination, standardization and registration. Some of these are listed below.

CAIP - Canadian Association of Internet Providers fosters the growth of a healthy and competitive Internet service industry in Canada through collective and cooperative action on issues of mutual interest. It has identified its objectives to be to: provide Internet architecture coordination and general Internet registration policy and services in Canada; provide a forum for dealing with issues of common interest to the membership; pro-actively promote the views of the Corporation to organizations such as regulatory or government bodies; promote a positive image for the Internet industry and to educate and build awareness for Internet industry issues; facilitate the global expression of Canadian culture and commerce; represent the Canadian Internet industry to international bodies; and do all such other things as are incidental or conducive to the attainment of the above objects.

CISOC, the Canadian Internet Society, is an open not-for-profit, non-governmental Canadian organization for the representation, promotion, co-operation and coordination of the Internet and its technologies and applications in Canada. Still in its early stages, it will represent the Internet in Canada and provide a neutral and informed viewpoint relative to Internet issues for the user community governments and other regulatory or consultative bodies within Canada such as IHAC, its subcommittee on the Internet, provincial versions of IHAC or similar committees, Industry Canada various branches concerned with the Internet. To ensure a solid promotion of the Internet spirit in all parts of Canada, CISOC will foster the creation of regional organizations that would bring together all Internet users of a given region while creating an environment where like-minded groups and associations such as CAIP, or others, can feel conformable in a creating a partnership or federation with CISOC. The Organisation will also ensure the representation of the Canadian point of view in international fora that deal with the Internet related issues. It should also undertake to work with all interested parties on technical issues such as Address Space Management, Domain Name Space Management or Encryption key management since they have a national impact on the Canadian Internet.

CIX - Commercial Internet Exchange Association is a non-profit, trade association of Public Data Internet work service providers promoting and encouraging development of the public data communications Internet working services industry in both national and international markets. The CIX provides a neutral forum to exchange ideas, information, and experimental projects among suppliers of Internet working services. The CIX broadens the base of national and international cooperation and coordination among member networks. Together, the membership may develop consensus positions on legislative and policy issues of mutual interest.

Cyberlaw Institute is located entirely online. Its goals are to provide resources for scholars, practitioners and to help generate solutions to problems that are arising in cyberspace. Also it is responsible for identifying constraining legal and policy issues in this area as well as the encouraging the development of Cyberspace Law as a distinct discipline. Cyberlaw Institute supports the growth of new electronic communities in this area.

EFF - Electronic Frontier Foundation works to ensure that the principles embodied in the Constitution and Bill of Rights are protected as new communication technologies emerge. It works to ensure that common carriage principles (require that network providers carry all speech, regardless of its controversial content) are upheld in the information age. It also works to convince congress that all measures that support broader public access to information should be enacted into law. The Foundation supports an Electronic Freedom of Information Act and other legislation to make government information more accessible to citizens. The Electronic Frontier Canada (EFC) was founded to ensure that the principles embodied in the Canadian Charter of Rights and Freedoms remain protected as new computing, communications, and information technologies are introduced into Canadian society.

IAB - Internet Architecture Board is an organization oversees research and development into Internet activities. It is also responsible for the technical evolution of the network. The IAB provides oversight of the architecture for the protocols and procedures used by the Internet. The IAB provides oversight of the process used to create Internet Standards. The IAB serves as an appeal board for complaints of improper execution of the standards process.

IETF - Internet Engineering Task Force is a component of IAB and is responsible for developing Internet standards for review by the IAB.

ISOC - Internet Society is an independent international organization for global cooperation and coordination for the Internet. Its principal purpose is to maintain and extend the development and availability of the Internet and its associated technologies and applications - both as an end in itself, and as a means of enabling organizations, professions, and individuals worldwide to more effectively collaborate, cooperate, and innovate in their respective fields and interests. Among many other goals, its specific purposes include developing, maintaining, and disseminating standards for the Internet and its Internet working technologies and applications as well as contributing to the growth and evolution of the Internet architecture. The Society is governed by its Board of Trustees elected by its membership around the world. The members are bound by a common interest in maintaining the development and global scaling of the Internet. They comprise the companies, government agencies, and foundations that have created the Internet and its technologies as well as innovative new entrepreneurial organizations contributing to maintain that dynamic.

ITU - International Telecommunication Union in Geneva, Switzerland, is an intergovernmental organization in which the public and private sectors cooperate for the

development of telecommunications. It adopts international regulations and treaties governing all terrestrial and space uses of the frequency spectrum and develops standards to facilitate the interconnection of telecommunication system on world-wide scale. The organisation also fosters the development of telecommunications in developing countries.