



The importance of **Broadband** Policy in productivity growth and social and governmental progress



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Summary of Key Points

- Broadband-enabled Internet applications offer exceptional opportunities for productivity gains in a host of different fields: education, healthcare, e-government, and business.
- The convergence of civil, public, and private networked virtual organizations depends on ubiquitous broadband access. With strong broadband plans and the commitment to implement them, governments can reap the rewards that citizen-focused networked virtual societies (NVSs) offer.
- Broadband is still in its nascent stages: The Organization for Economic Cooperation and Development reports that within its 30-country membership, only 22 million people subscribe to broadband Internet access, whereas 500 million people subscribe to standard telephone service.
- A *Net Impact* study that measured the potential impact of Internet business solutions on business savings and revenue predicts that when all current and planned Internet business solutions are in place by 2010, these solutions could account for 48 percent of the total anticipated U.S. productivity increase over a 10-year period.
- The same study determined that when all current and planned Internet business solutions are complete by 2010 in Europe, these solutions could account for 30 percent of the total European productivity increase over a 10-year period.
- Broadband promises vast benefits to businesses, societies, and governments. The latter are embracing the technology to make dealing with government more convenient and less costly for citizens and companies.
- Governments are also taking steps to encourage the development of broadband within their jurisdictions. Countries with the most advanced broadband infrastructures and usage have formal broadband policies and government support. Sweden, South Korea, Canada, and Japan are examples of countries that are fostering broadband development within their borders by using a variety of techniques:
 - Removing regulation that may hamper market entry and broadband development
 - Investing directly in broadband infrastructure projects
 - Establishing partnerships with the private sector to share broadband-development costs
 - Offering low-interest financing or tax credits to broadband-development companies
- Governments that want to provide their citizens and businesses with full access to the advantages of broadband will take the following steps:
 - Use regulation strategically and sparingly
 - Make broadband a national priority
 - Explore partnerships models
 - Streamline intergovernmental rules and processes
 - Provide incentives to bring broadband to rural areas
 - Lead by example and deploy e-government processes



Introduction

Recognizing the role that communication technology can play in boosting national productivity and raising living standards, governments in the European Union and North America are encouraging the development of broadband access throughout their jurisdictions. Also known as high-speed Internet access, broadband access promises to impact productivity growth in the 21st century as forcefully as the telephone did in the 20th century.

How? By allowing business people, students, doctors, teachers, lawyers, government workers, politicians, scientists, engineers, and hundreds of others to realize the productivity potential of the Internet. Broadband-enabled Internet applications offer exceptional opportunities for productivity gains in a host of different areas: education, healthcare, government, and business. In fact, to be without broadband in tomorrow's world will be the equivalent of being without telephones or cell phones in today's—unimaginable.

Moreover, ubiquitous broadband access is essential to the convergence of civil, public, and private networked virtual organizations and to unlocking the long-term productivity impact of Internet-based applications. But without a broadband plan and the commitment to see it through, governments risk missing the rewards of a citizen-focused NVS. In some cases, governments can rely on the private sector to build broadband infrastructure or portions of it. In other cases, however, where private-sector investment is insufficient to ensure that citizens and businesses reap the benefits of widespread broadband, governments must get involved.

Consequently, throughout the European Union governments, are pursuing public policies to advance broadband development in their countries. Italy's Innovation and Technology Minister Lucio Stanca likens Italy's broadband strategy to that of the country's highway-development strategy of earlier decades:

Broadband has a great potential and we are betting on its success as the ideal environment to achieve e-government and information society objectives. It is true that broadband access is still very limited in Italy, and so are related services. However, if we go back in history to the 1950s and 1960s, the government decided to invest heavily in a vision based on highways, when there were still few motor vehicles on the roads. At the time, the objective was to reduce distances to ensure a more homogeneous growth. The same objective holds for broadband. Broadband can be seen as the digital equivalent of those highways, allowing the country to achieve objectives that are critical for a modern economy.¹

Government initiatives come in a variety of forms, but largely they fall into five broad categories:

1. Removing regulation that may hamper market entry and broadband development
2. Investing directly in broadband infrastructure projects
3. Establishing partnerships with the private sector to share broadband-development costs
4. Offering low-interest financing or tax credits to broadband development companies
5. Deploying e-government solutions that capitalize on broadband infrastructure and demonstrate the value of broadband applications

This paper discusses the current state of broadband; describes its benefits to business, societies, and governments; and examines how Sweden, South Korea, Japan, Canada, the United States, and the European Union are promoting broadband growth. The paper concludes with a road map that governments can follow to ensure that their citizens and businesses benefit fully from the advantages of broadband.

¹ A. Di Maio, Interview with Italy's Innovation and Technology Minister (Gartner Research Note [October 8, 2002])

The State of Broadband Today

Broadband refers to the capacity to deliver high-speed Internet access. Organizations can use a variety of technologies to offer broadband services—cable modems, digital subscriber telephone lines (DSL), wireless, satellite, fiber-optic cable to the home—but all share the capability to deliver large amounts of data. Consequently, broadband lends itself to data-intensive applications such as real-time video and audio, voice over IP (VoIP), videoconferencing, and large-file downloads.

Today, broadband is typically defined as 256 kilobits per second (kbps) downstream and 128 kbps upstream, but that definition can quickly change: what is called broadband today will likely be narrowband tomorrow. In fact, many would argue that one should define broadband not by its data speed but rather by its capacity to handle applications. For instance, true videoconferencing requires at least 2 megabits per second (Mbps)—more bandwidth than typical cable and DSL broadband services deliver today. High-definition television requires 6 Mbps, making this figure a reasonable bandwidth goal for homes and businesses. In fact, a high-tech coalition of companies in the United States recommends setting goals to deliver 100 Mbps to homes and businesses.

Although two-way speed is important, so too is convenience, and broadband shines here as well. With broadband, the connection is always on. Users no longer have to dial in to access the Internet, a practice that future generations will view with bemusement, not unlike how people today view our forebears who used hand cranks to start their Model-T engines. When combined with wireless access in households, this always-on characteristic will encourage spontaneous Internet use and provide truly immediate access to information and services. Someday laptops or their equivalent will be as common as clocks, mere taken-for-granted utilities found in virtually every room of the house.

Despite its promise, broadband is still in its early stages. An October 2001 report from the Organization for Economic Cooperation and Development (OECD) cites that 22 million broadband subscribers used DSL or cable modems in the OECD area. Compared with this area's 400 million mobile cellular subscribers, more than 500 million standard telephone service subscribers, and approximately 150 million dialup Internet subscribers, broadband subscribers are a substantial minority, reflecting that broadband is in its nascent stages.

Moreover, recent IDC estimates for worldwide Internet bandwidth use predict that data traffic will exceed voice traffic by the end of 2002, and IDC expects data traffic to be nearly nine times as large as voice traffic by 2005. This increase in data traffic will come from residential and business users migrating to broadband access technologies, a key enabler for new bandwidth-intensive applications and ultimately growth in throughput.

Broadband penetration rates vary widely by country, geographic location (urban vs. rural), and user type (consumer, small or medium-size business, large business). Recognizing that consumers and businesses in rural locations often lack broadband infrastructure, governments are designing initiatives to make high-speed Internet access available across geographic areas. For example, in January 2001, the Irish Minister for Public Enterprise announced funding of €75 million to extend broadband communications and e-commerce infrastructure and services, particularly in less developed parts of Ireland.² Working with numerous private-sector companies, the Irish government expects this base funding to result in a total investment of €250 million in advanced communications and e-commerce infrastructure.

The Benefits of Broadband

By bringing the digital world to our doors, broadband offers a tantalizing spectrum of benefits: increased business productivity, improved healthcare, better education, interactive entertainment, and greater government efficiency. This paper describes each of these potential benefits.

Boosting Business Productivity

Researchers at the University of California, Berkeley, the Brookings Institution, and Momentum Research Group conducted a Cisco sponsored study called Net Impact in 2002 to measure the potential impact of Internet business solutions (IBSs) on business savings and revenue. Internet business solutions are defined as initiatives that combine the Internet with networking, software, and computing hardware technologies to enhance or improve existing business processes or create new business opportunities. Early Internet business solutions included customer service and support and e-marketing and e-commerce applications. Future IBS investment will target back-office functions such as supply chain management, finance, and human resources. More than 3000 companies in the United States, United Kingdom, France, Germany, and, most recently, Italy and Canada have participated in the study.

Results indicate that adopting IBSs in both the United States and Europe would generate substantial productivity gains. Consider the United States first: The study forecasts that Internet business solutions alone could account for 48 percent of the projected U.S. productivity growth rate by 2010.

Europe paints a similar picture. When all current and planned IBSs are complete by 2010, the *Net Impact* study concludes that these solutions could account for 30 percent of the projected European productivity growth rate. Ferdinando Pennarola, Associate Professor of Organization and Management at Bocconi University in Milan, Italy, discusses the critical integration of broadband infrastructure and services necessary to achieve the productivity potential of IBSs:

During the fall of 2001, the Italian Government established the first task force on the development of broadband infrastructure and services. Our task force demonstrated that broadband infrastructure development has an important link with the GDP growth, nationwide. Internet business solutions often represent the application side of broadband infrastructure and services. Our task force concluded that the development of telecommunication infrastructures plus services plus applications has to be considered as ecosystem rather than a somewhat chicken-and-egg problem. In other words, there should be an organic development of broadband infrastructure and services as the enabling factor of IBS development; on the other side, the demand for higher productivity thanks to IBS will push infrastructure development to higher levels of growth.

The *Canada Net Impact* study addressed the IBS requirements of small and medium business. The research found that although 50.2 percent of subject matter experts (SMEs) were currently implementing advanced IBSs and that a further 20.3 percent were planning to do so within the next three years, fully 28.4 percent of surveyed SMEs had no plans to adopt IBSs within the foreseeable future. According to Ron McClean, Director, Academic Computing and Technologies at the Schulich School of Business of York University, Toronto, Canada, along with cost and support barriers, access to high-speed networks is a significant impediment for Canadian SMEs in smaller and rural communities.



To enable this at-risk community to respond positively to the growing e-business imperative, Canada has adopted a national broadband policy that aims to ensure broadband access to all Canadian communities by 2005:

Anything beyond a rudimentary Web presence benefits enormously from access speeds greater than those provided by traditional telephony, even for those IBS applications that might be hosted elsewhere. Even the most popular types of IBS identified in *Net Impact Canada*, namely the forward-facing, customer-focused solutions, now require a higher degree of interactivity and larger file transfers than can comfortably be delivered by older solutions.

Business Applications

As the Net Impact findings suggest, Internet business applications deployed over high-speed networks promise extraordinary economic benefits. These benefits underscore the necessity of forward-thinking governmental policies that will encourage pervasive broadband deployment and use. This section describes some of the business applications that stand to gain from broadband.

Employee Efficiency

An April 2002 study from research firm Yankee Group determined that employee efficiency was the greatest benefit that broadband Internet access service offers organizations. Fifty-eight percent of respondents said that DSL Internet access service makes employees more efficient. Fast connections allow businesses to save time and money and improve overall efficiency. Some of the efficiency-enhancing applications noted include online selling and purchasing, order and shipment status monitoring, and workforce collaboration.

Fifty percent of businesses surveyed believed that broadband Internet increased their competitiveness. In fact, the longer that companies have had high-speed Internet access, the more likely they are to say that it makes them more competitive.³

Teleworking and Mobile Access

Teleworkers and mobile workers benefit by accessing corporate applications while at home or on the road. According to IDC research, the number of telecommuters in western Europe will double from 4.3 million in 2001 to 8.7 million by 2005. Over the same period, the number of mobile workers is expected to increase from 8 million to more than 20 million.⁴ Availability of high-speed Internet access, progressive legislation, and corporate recognition of the productivity and competitive benefits of teleworking are driving these rapidly emerging virtual workplace trends. External factors such as severe traffic congestion and high costs for office space will also pressure companies to increase the number of telecommuters and mobile workers.

Even business travellers at airports are enjoying productivity gains thanks to the advent of broadband wireless LANs. These hot-spot networks provide users with high-speed Internet connections through laptop computers or even personal digital assistants. Increased airport security might slow today's travelling executives, but airport broadband networks can help them make the most of their time waiting.

Others are seeing similar benefits. A U.S.-based quantitative study designed by Cisco Systems and NOP World-Technology found that companies with wireless LAN solutions reported an average productivity gain of 22 percent per end user. Sixteen percent of

3 Broadband Buoy Small Businesses in a Down Economy, (Yankee Group, April 30, 2002)

4 Western European Teleworking: Mobile Workers and Telecommuters, 2000-2005, (IDC, October 2001)

respondents support hot-spot connectivity, and an additional 54 percent are interested in taking advantage of this capability.

Improved Partner Networks

Electronic commerce, or e-commerce, stands to help businesses streamline processes, reduce paperwork, respond to customer orders more quickly, and integrate ordering and inventory systems. By creating an integrated business ecology that comprises customers, suppliers, partners, and branches, organizations can reduce wasted effort and do things faster and more effectively.

DSL Internet access service also allows small businesses to deal with larger corporations that handle purchasing, payment, and other transactions exclusively online. Respondents in the Yankee Group survey noted previously said that they use several broadband applications while interacting with larger companies:

- Ninety-four percent e-mail large files with attachments
- Seventy-two percent sell products and services online
- Fifty-six percent monitor order and shipping status⁵

Increased Customer Satisfaction

By increasing customer satisfaction, companies reduce customer churn and lower sales costs, in turn increasing profitability. In addition, highly satisfied customers are more likely to buy new products and services from their preferred vendors, thereby fuelling revenue growth. Companies with strong reputations for customer service will attract new clients more readily as well.

Furthermore, the IDC and Cisco *Fastrackers 2002* study of western European small to medium-sized businesses (SMBs) found that 70 percent of respondents reported improving customer-related activities after adopting mobile Internet technology solutions. But only 20 percent of western European SMBs are identified as advanced Internet users who strongly intend to adopt mobility services. This statistic underscores that affordable broadband is critical to the widespread adoption of remote customer service solutions and to the realization of associated efficiencies and profitability gains.

Enhancing Society

Strong societies are built in part on strong educational systems and strong healthcare. Broadband is quickly proving itself a valuable asset to both foundations. It also introduces a new world of online games and entertainment options that promise to drive consumer demand for high-speed Internet access.

Education

Schools have been quick to embrace the benefits of broadband. A 2002 report from In-Stat and MDR, *Making the Grade: Challenges and Opportunities in Education Broadband Networks*, notes that more than 90 percent of K–12 and 95 percent of higher education institutions have broadband access in the United States. Mainly because of the success of the government's E-rate program, schools are now looking less at how to acquire broadband connections and more at how to best integrate voice and media applications within collaborative learning environments and video-enhanced distance learning.


Educators in Europe are likewise recognizing the importance of adopting broadband technology. In a July 2002 Gallup survey, over 90 percent of primary, secondary, and professional and technical European Union schools reported having Internet connections. However, broadband access is still a goal for many European educational institutions. For example, by 2002, the U.K. government expects 20 percent of primary and secondary schools within each Local Education Authority to be connected at broadband level to take advantage of digital learning resources and to qualify for National Grid for Learning (NGfL) funding.

Some of these broadband-wired schools will be found in Lincolnshire, United Kingdom. Here a project is under way to connect 450 sites to deliver networked curriculum over broadband. Known as NETLinc, this project integrates some 106,000 users and 12,000 PCs throughout Lincolnshire to create one of the largest networked learning environments in the world.⁶ The network combines educational resources for primary and secondary schools in the region in addition to libraries and a mobile learning unit.

What are schools doing with broadband? For one, broadband allows teachers to incorporate Internet content into their lesson plans. Without broadband Internet access, teachers and students end up waiting for content to download. Students get restless and lose interest. By delivering content quickly, however, broadband allows teachers to capitalize on the Web as an educational resource. Broadband also enables teachers to bring real-time audio and video into their classrooms. Rather than point to a static picture of an African elephant, teachers can show these majestic animals marching across the savannah—a far more inspiring option, particularly to a generation weaned on video games.

⁵ Broadband, (Yankee Group)

⁶ "UK's largest networked education programme exceeds expectations on completion," M2 Presswire, October 29, 2002



Broadband also enables educational institutions to reach students well beyond local classrooms. By establishing broadband distance learning networks, schools, colleges, and universities can bring in experts to teach remote students online. This practice levels the educational playing field and cuts costs at the same time.

In addition, corporate trainers are capitalizing on the considerable promise that broadband offers as a business-training tool. IDC forecasts that by 2005, e-learning will encompass 27 percent of the business-skills training market in Europe, which will reach US\$13 billion in revenue by 2006. Although e-learning is still in its early stages, companies are increasingly turning to business-skills training outsourcing, and e-learning in particular. Technology developments that have rendered training less costly and more effective are fuelling this trend.⁷

Healthcare

In many European countries, the United States, and Canada, healthcare has become one of society's most pressing problems and greatest expenses. An ageing population is driving up the costs and complexity of providing healthcare, putting huge demands on healthcare systems poorly equipped to handle the increasing loads. Consequently, governments are looking to information, communications, and broadband technologies to help deliver high-quality patient-centered healthcare at acceptable cost.

Broadband can improve the efficiency of healthcare itself. For instance, broadband can save time for busy consultant physicians. General practitioners would determine whether a patient should consult with a specialist in person or by videoconference over the Internet. Assigning less serious cases to videoconference consultations frees the specialist to concentrate on the more serious cases in person.

In fact, videoconferencing over the Internet is likely to play a large role in the healthcare systems of tomorrow. Primary- or secondary-care practitioners could use videoconferencing to diagnose problems and recommend treatments for patients hundreds of kilometres away. Specialist doctors can advise general practitioners or nurses in remote regions and in so doing offer improved healthcare no matter where patients live. In addition, patients avoid the costs and inconvenience of travelling to urban centres for routine medical consultations.

⁷ "European Business Skills Training Defies Slowdown to Reach \$13 Billion by 2006," (IDC, January 21, 2002)

For example, the St. Oswalds Hospice in the United Kingdom, a charity to care for people with advanced illnesses, has set up a videoconferencing network to expand services and reduce costs. Specializing in palliative care, the St. Oswalds Hospice uses videoconferencing to link with other hospices in the United Kingdom and abroad. The hospice also uses the network for training nurses, holding research meetings, sharing information, and bringing in guest lecturers without having to pay travel and living expenses.⁸ Similarly, broadband can allow physicians to remotely view CAT scans, examine x-rays, and inspect digital radiography images—all applications that require large bandwidths. Broadband will also help healthcare systems operate more efficiently, a compelling attraction that can ease pressure on spiralling expenses. Many potential applications exist:

- **Prescriptions**—Given the millions of prescriptions written every year, automating a system to issue prescriptions would cut costs substantially.
- **Electronic health records**—The cornerstone of the online approach, electronic health records could do more than serve as the electronic equivalent of the paper files used today. Instead, they could bundle information and services relating to the history and treatment of individual patients. For instance, patients may be able to add to their own records, to describe, for example, their drug therapy experiences and to interact with their health programs in new and dynamic ways. Secure networks and encrypted files will keep patient information confidential.
- **E-procurement**—Health services consume a huge variety and volume of goods and services. Maximizing the efficiency of this consumption and working with suppliers to ensure that they meet exact standards would be extremely valuable.

Healthcare organizations operate within a myriad of interrelated environments. Success relies on balancing these forces. For example, in the United States, the Health Insurance Portability and Accountability Act (HIPAA) establishes national standards for electronic healthcare transactions and national identifiers for providers, health plans, and employers. It also addresses health-data security and privacy, both vital industry concerns. By establishing standards and promoting the widespread use of electronic data interchange, healthcare systems will become more effective and efficient.

Entertainment

The plethora of potential broadband entertainment options today includes general Web surfing, video on demand, online shopping, music and video downloading, Internet radio and music streaming, gaming, gambling, and chat groups. Are consumers, however, prepared to pay for these online entertainment options?

According to a February 2002 survey conducted by Sage Research, Inc. and sponsored by Cisco Systems, the answer is yes. The survey, *Customers at the Gate: Mounting Demand for Broadband-Enabled Services*, examines the Internet-delivered services desired by U.S. households and reveals that many consumers are willing to pay for education, entertainment, and communications services that high-speed, always-on broadband connections can deliver. The study found that 44 percent of U.S. households are willing to pay for entertainment services, 42 percent for communications services, and 39 percent for education services.

Streamlining Government Processes

Governments too can reap the rewards that broadband offers. By putting services online (e.g., information services, license renewals, tax submissions, forms, voting, census taking, and so on), governments can reduce the costs of offering services, improve responsiveness, and make dealing with government more convenient.

Governments see the advantages.

In April 2002, the European Commission released a study on the availability of online public services in 15 European Union member states as well as Norway, Iceland, and Switzerland. The study found that the level of online availability of public services in the different countries is 55 percent, a rise of 10 percent just since October 2001.⁹

The European Union Commissioner for Enterprise and Information Society, Erkki Liikanen, explains the importance of online government:

Putting government services online can increase the quality of services in several ways. First, the quality improves as the services become more accessible--common complaints when accessing public services concern the delays often encountered while waiting to be dealt with in public offices, combined with limited opening hours. Second, full advantage of the potential for better quality can be taken by reengineering administrative processes—the ‘back office.’ Experience with online service delivery in business shows that there is potential for improvement in terms of quality, timeliness, and more-informed clients. The public sector can certainly learn from the experiences of the private sector.¹⁰

⁸ “Mobility drives Internet technology adoption for increased productivity in the small to medium-sized business sector”, M2 Presswire, September 5, 2002

⁹ Web-based Survey on Electronic Public Services (European Commission, April 2002)

¹⁰ A. Di Maio, Interview with the EU Commissioner for Information Society (Gartner Research Note [June 20, 2002])

Liikanen's second point warrants a closer look. To fully capitalize on the potential that broadband offers, governments need to consider the Internet not merely as an electronic repository for forms but as a catalyst for overhauling the way that bureaucracies interact with citizens and businesses. In other words, simply shifting thousands of paper forms to the Web may make these documents easier to obtain, but unless governments take the opportunity to streamline and integrate the processes that the forms represent, e-government will be but a shadow of its potential.

The push to integrate the Internet and Web-based technologies into government combines three separate, but connected elements:

1. Improving organizational effectiveness

How can the Internet and Web-based solutions allow government agencies to gain the kinds of organizational benefits that the private sector clearly enjoys: lower costs, higher productivity, and better quality?

2. Improving service delivery

How does the Internet equip governments to enhance the quality, range, and impact of its services? To achieve these objectives, governments will have to do more than simply provide information: they will need to broaden their capacities to deal with customers and citizens in complex transactions.

3. Improving the quality of citizen engagement

How does the Internet help to better involve citizens in the policy process and, in that sense, help to refresh the democratic process itself? Can the Internet inspire more people to vote in elections and make their voices heard—a concern for democracies around the globe.

The extent to which governments succeed on these three fronts will depend on several variables:

- Leadership and a shared vision
- A practical plan to move from strategy to execution
- The right mix and level of governance and resources
- The capacity for systemic versus incremental change
- The ability to track performance and measure results

How successful are governments' online initiatives? In its third annual global eGovernment report, consulting firm Accenture revealed that governments are more frequently treating businesses and citizens as customers and embracing the tenets of customer relationship management—foreign territory for most governments until recently.

The report ranked the online presence of 23 countries: Canada was ranked as the leader, Singapore a close second, and the United States third—the same order as last year. Although the gap between the top- and bottom-rated countries expanded, Accenture awarded higher ratings to many countries, suggesting that governments are taking their online opportunities more seriously.¹¹ Nevertheless, if governments hope to improve their online performances, they will have to get better at creating single-entry, easy-to-access, simple-to-navigate Web sites that start with the citizen's problem or requirement and quickly and easily assemble all the information, resources, and interactivity needed to satisfy the citizen's need.

Government Broadband Policies in Action

This section highlights certain initiatives that five countries, Sweden, United States, Canada, South Korea, and Japan, are taking to promote broadband development. These initiatives include direct investment, partnerships, deregulation, and national and regional policies. The section concludes by discussing the *eEurope* action plan launched by the Commission of European Communities in 2002.

Sweden—Direct Investment

After Sweden liberalized its telecommunications industry in 1993, the City of Stockholm created a municipally owned company called Stokab in 1994 to provide dark fiber infrastructure capacity to end users and operators. Stockholm hoped that creating Stokab would lead to the rapid introduction of advanced telecommunications services to its businesses and citizens. And it has.

With easy access to the city's water, sewer, and electricity ducts and tunnels and a relationship with city officials that minimizes red tape, Stokab has laid some 4000 km of cable (500,000 km of fiber) throughout Stockholm. Stokab leases its dark fiber to banks, insurance companies, retailers, media companies, universities, urban networks, property owners, computer and IT companies, telecom operators, Internet operators, cable TV companies, mobile telephony operators, and network capacity operators.¹²

Stokab claims that Stockholm has a higher degree of fiber penetration than any other city in the world. Not surprisingly, Sweden is constructing other municipal networks based on the Stokab model, and these networks are creating more competition in local markets and lowering prices. Customers in Sweden get access to a future-proofed fiber-optic broadband platform, greater service choice, and competitive prices—an attractive combination, all of which can be traced to Sweden's pioneering broadband policies. Sweden was the first country in Europe to establish a broadband strategy and to consider developing broadband infrastructure with public funding.

Canada and the United States—Partnerships

Governments that want the private sector to help develop broadband infrastructure can create partnerships with companies to share costs. In these cases, countries have concluded that government involvement is required to gain private-sector participation.

Canada

In Canada in November 2000, the Alberta provincial government announced that it would provide \$US125 million to help develop a high-speed broadband network called SuperNet. This network would link every school, hospital, library, and government facility in the province by 2004. When the project completes, some 422 communities across the province will have access to a high-speed broadband network that will open doors to distance education, telemedicine, online government services, and e-commerce. In addition, by gaining online access to a host of important services typically offered only in large cities, companies will have far greater choice to locate near customers, suppliers, resources, or recreational areas—essentially anywhere they wish.

To build SuperNet, the Alberta government is partnering with Bell and Axia SuperNet Ltd., which also includes Microsoft and Cisco Systems. The prime contractor, Bell, is investing approximately US\$65 million in the project.¹³ With the government's financial contribution, SuperNet becomes much more commercially attractive to the private-sector partners. Alberta wins too: schools, hospitals, businesses, and citizens in rural Alberta will soon have access to the same broadband services and prices that urban Albertans enjoy.

United States

In the United States, the City of Chicago has committed \$US32 million a year for the next 10 to 12 years to encourage the development of high-speed fiber-optics and switches throughout the city.

The goal is to create a new city-wide communications infrastructure that will spur economic development and keep Chicago at the leading edge of the information society.

To fulfil this vision and build the infrastructure, Chicago intends to partner with several private-sector companies. Known as CivicNet, the network will be managed, operated, and marketed by the city's private-sector partners. CivicNet promises to offer high-speed communications to corporations, businesses, banks, universities, healthcare organizations, and community technology centers throughout the city.¹⁴

South Korea and Japan—Multifaceted Approaches

Today, 21 percent of Korean households, 10 million of 48 million, subscribe to broadband Internet access. The Korean government attributes this world-leading broadband penetration rate to the US\$9 billion invested in broadband over the past four years. Korea estimates that this investment has generated US\$13.9 billion in productivity, US\$4.7 billion in value-added services, and 590,000 new jobs between 1998 and 2002.¹⁵

This extensive penetration results from both high population densities and South Korea's vision to transform itself into a knowledge-based economy. Application drivers include Internet cafes, Internet phone calls, online educational opportunities, and e-government initiatives.

13 Alberta SuperNet Web site, www3.gov.ab.ca/innsi/supernet/about5.html

14 City of Chicago CivicNet Web site, www.cityofchicago.org/CivicNet/Description.html

15 "Broadband Net Users Pass 10 Million Mark," www.korea.net, November 6, 2992,

The popularity of broadband also has helped boost information technology-related exports, increase e-commerce, and improve Web content.

The country backed its broadband vision, which was announced in 1995, by deregulating the telecommunications sector and investing approximately US\$1.6 billion in a new high-capacity backbone network. This network allows service providers to offer broadband services without having to deal with the incumbent telephone carrier, Korea Telecom, thereby promoting competition and service choice.

South Korea has also committed some US\$950 million in low-cost loans to spur broadband deployment in rural areas.¹⁶ The Ministry of Information and Communication encourages rural communities to form associations with municipal governments, regional education leaders, and telecommunications operators to promote IT in their regions and drive the applications that broadband allows. Furthermore, since May 2001, condominiums newly built by the government, government enterprises, and certain construction companies must be wired for broadband just as they must be fitted with adequate fire-protection systems. Other governments should consider this forward-thinking model for new construction.

With the initiative *e-Korea Vision 2006*, the Korean government announced plans for telecom companies to invest US\$10.9 billion in high-speed broadband networks over the next three years. This program includes significant government-backed loans to Korea Telecom. By 2005, all households will be able to access the Internet at a minimum speed of 1 Mbps.

The *e-Japan* plan has a similar goal for linking all homes in Japan with high-speed Internet connections by 2005. The Japanese government has targeted US\$16.7 billion for the program, which includes tax incentives, low-interest loans, strong government-facilitated competition, and digitizing of government and education services. The government has also made network security and reliability a priority. Currently the fastest-growing DSL market in the world, the government estimates that Japan is nearing access speeds of 30–100 Mbps to 30 million households and ultrahigh speeds to 10 million households.

All of the various national initiatives described previously—deregulation, direct investment, low-cost loans, and regulation—add up to create an entrenched broadband culture, a culture sculpted by a strong government vision and a propensity for action.

A Broadband Infrastructure Action Plan for the European Union

In May 2002, the Commission of European Communities released an action plan entitled *eEurope 2005: An information society for all*. The objective of this action plan is to “provide a favourable environment for private investment and for the creation of new jobs, to boost productivity, to modernise public services, and to give everyone the opportunity to participate in the global information society.”¹⁷

The plan proposes to achieve this objective by following two approaches. First, it intends to stimulate services, applications, and content, covering both online public services and e-business. Second, the plan also addresses broadband infrastructure and security. By adopting these two interdependent approaches, the European Union hopes to become the world’s most competitive and dynamic knowledge-based economy by 2010.

This plan follows the *eEurope 2002* plan that has guided stakeholders to increase Internet adoption, to promote competition and encourage new services such as e-commerce, and to invite the launch of advanced mobile and multimedia services. Countries are using the plan to help citizens participate in society and to equip workers with the skills that a knowledge-driven economy demands. Schools throughout the European Union are installing computers and Internet connections, and government services are increasingly shifting online.

The *eEurope 2005* action plan focuses on both broadband infrastructure and on multimedia content and services. This dual focus reflects that to be successful, broadband requires both infrastructure and services. The difficulty is that services drive infrastructure investment and new services depend on having suitable infrastructure available—the classic “Which came first—the chicken or the egg?” conundrum. For this reason, the *eEurope 2005* action plan will attempt to promote the simultaneous development of infrastructure and services.

The plan also seeks to create a safe, ubiquitous broadband environment where all people can securely participate in the information society in their mother tongues and use any variety of technology to do so: personal computers, mobile terminals, digital televisions, and so on.

The *eEurope 2005* action plan outlines how European Union members can coordinate their approaches to build the information society. (Today, the European Union has 15 member states and is preparing for the accession of 13 eastern and southern European countries.) By following the plan, member countries stand to gain several benefits: economic growth, improved productivity, employment, and European social cohesion. As Erkki Liikanen notes, however, achieving the goals of the plan will require that governments at all levels collaborate closely:

A broadband strategy will play a complex role because it is affected by many different policies: town and country planning, research policy, taxation, and regulation. These policies are carried out at all levels: international, European, national, regional, and local. Therefore, a broadband initiative should bring the application of such policies together, to provide a consistent and effective policy solution.¹⁸

17 Commission of the European Communities, *eEurope 2005: An information society for all*, (Brussels, May 28, 2002)

18 A. Di Maio, Interview with the EU Commissioner for Information Society (Gartner Research Note [June 20, 2002])

A Broadband Road Map for Governments

What should governments do to ensure that their citizens and businesses fully benefit from the myriad opportunities offered by broadband? This paper recommends following these steps:

1. Use regulation strategically and sparingly.

Policymakers need to create a regulatory environment that encourages investment, rewards innovation and risk, and produces competition. Regulations that deter the development of broadband applications and services will greatly impede the growth of broadband networks. The adoption of current and future Internet applications will ultimately drive demand for broadband, in turn stimulating further network investment.

2. Make broadband a national priority.

Governments must commit to implementing broadband and set ambitious goals. If goals have been set already, they should be reevaluated. Are they sufficiently aggressive? Could they be exceeded? For instance, governments could commit to making high-capacity broadband connections available to all homes and small businesses by the end of this decade. To realize such an objective, governments will need national policies that encourage investment in a true broadband network.

3. Explore partnerships models.

A successful broadband program requires the cooperation and participation of numerous players: governments, service providers, equipment and application vendors, private enterprises, and public institutions. Governments need to facilitate this participation and encourage the parties to strive to meet common broadband objectives.

4. Streamline intergovernmental rules and processes.

Federal, regional, and municipal governments must work together to encourage broadband investment. Companies willing to invest in a high-speed network should be able to access rights of way without excessive regulation, fees, or red tape.

5. Provide incentives to bring broadband to rural areas.

Even in a regulatory environment that hastens broadband deployment, some segments of the population, including rural residents, will not have broadband access. Establishing investment incentives to encourage broadband deployment in these underserved communities makes sense.

6. Lead by example and deploy e-government processes.

Governments that embrace e-government processes not only improve their own efficiency but also illustrate to the public and to businesses some of the advantages that broadband offers. By adopting broadband solutions, governments appear proactive and forward thinking as well.



Conclusion

Broadband-enabled Internet applications promise to fuel productivity growth in virtually every corner of the industrialized world. Broadband-equipped nations stand to benefit from improved access to healthcare, better education, more efficient and convenient government, streamlined business processes, and higher standards of living. Moreover, ubiquitous broadband holds the key to converging civil, public, and private networked virtual organizations and the creation of citizen-focused NVSs.

Recognizing the stakes and the substantial returns that participating in a global information society offers, governments are encouraging the development of broadband networks and applications using a variety of means, including tax incentives, grants, direct investments, private-sector partnerships, and low-interest loans.

Countries without a broadband vision and the commitment to see it through risk falling behind and having to play “catch up”—a potentially costly gamble. Governments that succeed will support their broadband visions with policies that encourage private investment in broadband infrastructure and services.

Bringing broadband to all citizens by the end of this decade should be a national imperative for every modern country. With the right policies and a commitment to work together, industry and policymakers can accomplish this goal.

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