

Bridging the Digital Divide

The future of the physical Internet

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United Nations Global E-Commerce 2002 Conference

I. Introduction

Slide 1 Bridging the Digital Divide
Slide 2, The Future of the Physical Internet

I would like to thank the conference organizers and the United Nations for this opportunity to speak to you today. There is no better place than the world's central forum to discuss the Internet, a resource with so much potential to bring us closer together through positive economic, social and political development.

If you are sitting in this room it's because you have some sense of the Internet's potential. You are probably also aware of the so-called "Digital Divide," the gap between people with access to the Internet and those without. The Digital Divide exists between economic and social classes within individual nations, and between nations themselves. This disparity makes it either too expensive, too complicated or outright impossible for much of the world to access the Internet.

The Digital Divide is the largest single impediment to the Internet becoming an engine of economic, social and political progress. In the next few minutes I'd like to talk about defining and measuring the Digital Divide so that we discuss in a more meaningful way

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When and Where:
Tuesday and Wednesday, all day February 26-27, 2002
United Nations Presence: E-Web Summit at the Avenue, NYC, Conference Room 4

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Yvan Simenovic Permanent Rep. of Croatia to the UN and President, UN ECOMOD	Shih F. Jhang Permanent Rep. of Korea to the UN and Chairman, UN ECOMOD Working Group on Informatics	Steve Forbes President & CEO, Forbes, and Editor in Chief, Forbes Magazine
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This Briefing is open to all "Global E-commerce 2002" attendees. See page 3 for details.

how we can bridge it by extending an affordable, accessible and sustainable Internet infrastructure to every corner of the world.

My goal today is to leave you with a fuller sense of your country's potential in the Internet world, why we should pursue that potential even in the face of limited resources, and what challenges lie ahead in bridging the Digital Divide.

Slide 3 (headline): The global neuron

The global neuron

The Internet is the most important communications development in history. It is a great equalizer that amplifies the individual's voice and can put small business on the same footing as multinational corporations. It promotes economic development, political advancement and social progress. It favors no geography or natural resource. From opening capital markets to small businesspeople in the developing world to prying open the once sealed doors of government, the Internet's ability to connect people on an interactive global neuron has changed communications' role in our lives.

Ambitious statements like this beg an important question, however: "What you're saying sounds good, but you're talking about future and potential while my country has pressing needs in the here and now. I only have so many resources. What am I going to do with them: hook a town up to the Internet, or build a new wing on that town's hospital? Am I going to pay for personal computers or immunization?" Ann Pettifor put it best a few years ago when she told a G8 meeting in Japan: "To the thousands of children in the poorest countries who die each day of hunger IT training is irrelevant. They cannot eat cybercake."

That is a legitimate point. However, I submit, that there is an equally compelling counterpoint: knowledge is power.

Throughout history, prosperity and independence have followed knowledge and learning. The Internet is knowledge. When the contents of libraries, universities, churches, museums and hospitals are on the Internet, they belong to the world. Freed from physical limitations, they exist in a medium where distance and time mean nothing. Internet-borne information can bolster efforts to fill children's mouths with more than cybercake.

Slide 4 (headline): An individualized mass medium

Once on the Internet, the diagnostic experience of a doctor in Melbourne belongs to a clinic in Papua. Computerized weather models generated in Germany become the planning tool for a farmer in Mali. No nation can afford to forgo such a potent tool for positive change because they don't think they can afford it, or they're too far back in the Internet race. We are approaching an era when Internet access and usage are as much an indicator of a country's economic strength as traditional measures like literacy and infant mortality. No one can afford to miss out, and if we take action now, they won't have to.

II. The Internet's economic, political and social promise

One of the most exciting things about this conference is the ability to gather here at the United Nations to discuss the potential of a truly global Internet. I'd like to add to that discussion by talking for a moment about the economic, political and social progress the Internet offers.

Economic Progress

Economics progress is the first and most obvious benefit of an Internet-savvy society. Steve Forbbes and Dr. Louis Blatt spoke to us about e-commerce, which has enormous potential to empower individuals, communities and businesses in the developing world. Many of them already use the Internet to find markets, financing and business expertise.

In India, public Internet kiosks and solar-powered “village computers” provide remote agricultural regions information on credit, market prices, transportation, weather and water risks. Ecuadorian communities market handicrafts and promote ecotourism on the Internet. The non-profit corporation PEOPLEink helps artisans in developing Latin American, Asian and African countries reach buyers directly by publishing images of their work on a cooperative Web site.

Similar Web-based cooperatives specialize in textiles and agricultural products. There is a thirst around the world for the richness and diversity of unfamiliar cultures. The Internet can satisfy it while enriching artisans and local businesses directly, rather than through agents who take part of the profits.

The Internet offers particular promise for micro finance in the form of loans to small entrepreneurs that have proven so successful in the developing world. These loans have a 90 percent payback rate, but haven’t reached as far as they might because they are too small to attract commercial lenders. The loans are so small lenders cannot recover their processing costs. Internet-based application, information verification and loan approval reduces processing costs. That increases the profit margin enough to make micro loans attractive to commercial lenders.

The Internet’s e-commerce benefits extend beyond small business to heavy industry. For example, the U.S. Agency for International Development has identified ways for Morocco to further develop its vast phosphate resources by seeking funding and extraction technologies through the Internet. Thailand uses the Internet to promote its gem exporting industry. Online exchanges such as Cephren, Ventro, eSteel and PlasticsNet offer developing countries markets for selling raw materials, again without the cost of intermediaries.

Political progress

The Internet can also have a powerful impact on a country's political life. Two other speakers, Stephen Mendonca and Bill Edwards described how the Internet is influencing political life around the world with its potential for cost reduction and online delivery of public services.

Examples of the Internet influencing government and civic life abound in Asia, Africa, Latin America and Eastern Europe. Estonia, for example, recognizing the Internet's potential for building democratic institutions, provides public Internet access even to remote Baltic Sea islands, the OECD reports. Tunisia is not only putting all of its major ministries on line, but is planning on hooking all of its universities and schools to the Internet by the end of 2002.

Public health provides some of the most dramatic evidence of government agencies using the Internet to its best advantage. Internet-based information helped stem the spread of river blindness in Africa in the early 1990s. Public health officials from 11 West African nations in the Volta River region used a combination of computers, telephones and satellite links to track the spread of disease-carrying black flies. The technologies detailed the spread of black fly larvae across 50,000 square miles, helping local officials take precautions. The HealthNet e-mail service has extended medical knowledge to developing nations, while the Caduceus Project in Peru put Spanish biomedical information on the Internet.

Cultural progress

In the cultural arena, the Internet has unparalleled potential to educate us about each other, and to celebrate the variety and diversity of our cultures. Hap Brakely spoke about music and movies on the Internet, a topic which invokes one of the most intense debates about the Internet: whether it will stifle cultural diversity or revive it. Although many people fear the Internet will homogenize international culture, there are far more examples of the Internet as a tool to preserve at-risk cultures.

In the United Kingdom, the Internet has helped linguists keep the Welsh language alive. Native Americans in the United States use it to preserve folklore. The expatriate Vietnamese community in California stays together through e-mail. Indigenous Australian communities protect sacred information by converting it to the Internet's digital formats. And in a classic example of cultures intersecting on the Internet, Italian-speaking scholars of African history have created an Italian Internet-based virtual library of African culture for researchers and historians.

These examples demonstrate that the Internet, like any tool, can be as beneficial or harmful as the task it's applied to.

III. The Physical Internet: defining its works

That's a lot of potential. Before we can talk about who has access to that potential and the challenge of attacking what has been called the "Digital Divide," we need to pause and make sure we have a common understanding of the physical Internet. This understanding will be the foundation for our defining the limiting factors of reach, access and maintenance we must overcome to make the Internet truly global.

What's on the other side of the phone jack when you plug into the Internet? You're connecting to a network of networks linked by the universal language of TCP/IP. Described at the next level of abstraction, the Internet is the global information system linked by a unique addressing system. It supports communication using a standard protocol, or language, TCP/IP (transmissions control protocol/Internet protocol), and provides or makes available high-level services.

Servers are the Internet's fundamental engines. The two most important species of servers are:

1. **host servers** that store and translate data into TCP/IP for distribution over the Internet. Images, Web pages and text-based information live on host servers.

2. **secure servers** that store confidential personal and financial information essential to electronic commerce.

Internet servers are connected by thousands of satellite links and hundreds of thousands of miles of fiber optic strands. They link servers over backbone networks, the electronic “pipes” that carry data over large distances. Local land-line and wireless connections connect millions of Internet users with the backbones, which connect them to the information on servers.

Slide 5 (chart of global Internet pipes): This diagram shows the relative distribution of Internet bandwidth between the continents. The North America to Europe

So at its simplest, the Internet is a lot of smart boxes talking to each other in a common language across wires, fiber optic cables and wireless links. Its two key components are the servers that house its content, and the communication links that send that content over the world. The best-known applications that run over the Internet are email and the World Wide Web.

IV. Understanding the Digital Divide

Slide 6: Who owns the Internet’s building blocks?

Now that we have a common understanding of the physical internet, let’s examine where the key pieces of that structure are located and how people around the world access them. This goes to the key issue of much of the world’s dependence on established Internet powers to house important information, and whether the critical mass of people in a given area can get to it.

Host and secure server densities are the metric for measuring the Digital Divide. Find out where the secure and host servers are and you find out where the Internet – or more precisely its most valuable content – is “located.” Although the Internet has no official

epicenter, the location and ownership of servers determines, to a large degree, who is a player and who is a spectator in the Internet game.

The United States is the overwhelming leader in Internet hosts and secure servers, according to a recent OECD report. It has almost 200 Internet hosts per 1,000 inhabitants, more than three times as many as OECD partner United Kingdom and ten times as many as Germany and Japan. The disparity is even greater between OECD and non-OECD countries. There is a similar gap in secure servers. The U.S. has six times as many secure servers as the European Union, which is a very advanced region of the Internet world.

Most of the content on the Internet resides on servers in the U.S. and the European Union more than 85 percent of it is in English, which is probably of little value to the farmer in Mali we spoke of earlier. Almost all of the world's Internet traffic passes through the United States at one time or another. As it stands now, developing nations that want to establish an Internet presence have little alternative but to entrust content to servers and network in the developed world. This imbalance is the "Digital Divide."

The Digital Divide causes some galling ironies in the Internet world. Perhaps the purest example is the island nation of Tonga, which owns the highly sought after Internet address suffix "to." The suffix – the "natural resource" – is exclusively Tonga's to sell. However, the business and technical infrastructures for profiting from the suffix are not located in Tonga. They're in San Francisco. A truly global infrastructure would enable Tonga benefit from this asset directly, and not through intermediaries.

Closing the Digital Divide means more equitably distributing and linking servers around the world, and providing affordable local Internet access. More equitable server distribution gives sovereign nations control over proprietary content, and also leads to translation of useful foreign content into local languages. Affordable access leads to greater usage, which in turn attracts more localized content.

How the Internet works – or doesn't work

We've defined the Digital Divide as the limits of the Internet's reach, but there is one more important dimension we have to address: the Internet's performance. If we're going to close the Digital Divide and depend on the Internet to effect meaningful change, it has to work well without intensive maintenance. It has to be reliable, cheap and everywhere. Right now it's erratic, expensive and somewhere.

The Internet today is where the automobile was in the 1920s. Think about that for a minute. By the '20s, even the critics had to concede the auto was here to stay. It had proven its worth in World War I, and mass production put it in the mass audience's reach. But even by the '20s, a car still didn't last as long as a good horse and wasn't nearly as reliable. There weren't many auto-ready roads. You had to be an amateur mechanic to keep your car running because there weren't many professional mechanics around. If there was a mechanic near you, he probably cost a bundle.

Fast-forward to today. Cars routinely last for 100,000 miles and don't break down as often as they did as recently as 10 years ago. Cars got better over the years, and so did their support systems and diagnostics. Engineers discovered how to design cars that ran more efficiently. Embedded computer chips automatically tune engines to run smoothly and provide immediate diagnostic data. Between better design, diagnostics and maintenance, a car today is more likely to bore you to death than it is to break down on you.

The Internet has to go where the car did, but it has to get there much faster or the Digital Divide will get so big it may never be closed. The Internet cannot spread, or even work to its highest potential, if it's too cranky and expensive to run. The more expensive it is to run, the more Internet service providers have to charge to cover their costs. In many countries, an hour of Internet access costs a day's pay.

I can stand up here for weeks and say how important the Internet is, but no one is going to pay an exorbitant chunk of their income for something that doesn't feed, clothe, house

or educate their family. Until the price comes down, Internet access is a low priority – all potential, no reality.

Labor-intensive operations and management drive up Internet access costs. It's basic supply-and-demand economics. There isn't enough technical talent to run today's labor intensive Internet, not even in the developed world. How can developing nations compete?

V. How we can bridge the Digital Divide

We've now discussed the Internet's potential, the physical resources behind that potential, and the uneven distribution of resources around the world. The point is not to be discouraging, but to realistically assess the obstacles to bringing a workable Internet infrastructure to your country. The three obstacles right now are reach, cost of access and reliability. The Internet has to extend over the world, it must operate reliably, and it must be inexpensive enough to generate mass usage. Otherwise, it will never fulfill our expectations for it.

Developing nations do not need to duplicate the entire Internet infrastructures of the U.S. and European Union to fully participate in the Internet revolution. They primarily need backbone connections to carry long-haul traffic, Internet service providers for local access, and their fair share of host and secure servers.

Slide 7 (First African map slides): These next two slides show the progress Africa made building high-speed international access during the first few years of the Internet boom. From a high dependence on dial-up connections, shown in the first map, the continent has migrated steadily to high-speed links to handle international traffic, depicted in blue and purple on the second map.

Slide 8 (Second Africa map slide)

In the meantime, however, people are finding ways to get onto the Internet, and the font of ingenuity for providing access and holding down costs runs deep.

Slide 9 Public Internet Access

More than 5,000 cyber cafés around the world provide public Internet access. In Nepal and South Korea, cyber cafes have quickly become part of youth culture. The Gartner Group found that 60 percent of Internet users in India get their access in cyber cafés. Peru, Kazakhstan and Egypt are among many countries providing Internet services through post offices, community centers, libraries, video shops and police stations, according to the OECD. Caixa Bank runs automated teller machines over the Internet to extend banking services to remote Amazon communities.

Most such access points serve the minority of the population that live in urban areas. Thailand, for example, is only 30 percent urban, yet 90 percent of its Internet users live in cities, the Internet Society reports. The challenge of reaching non-urban populations is a microcosm for everything we have to accomplish for the Internet to succeed. Once again, it's a threefold challenge of extending the physical infrastructure, holding down access costs, and improving reliability.

First, extending the physical infrastructure. We must extend the Internet beyond primary cities to provincial capitals, regional cities, towns and villages, many of which never got proper phone service because running land lines was too expensive. Progress in satellite Internet links promises to solve much of that problem. Satellite Internet links can now send and receive Web pages in places with no phone lines, an advancement over earlier satellite links that could only send Web pages.

The second part of the challenge is holding down costs so people can afford to access the Internet. That means providing people with simple, reliable Internet access devices and low-cost Internet access service. Personal computers are too expensive, complicated and fragile to work in most environments. Indian and Brazilian engineers are working on

stripped-down, low cost computers for accessing the Internet. They use open-source software, forgo hard drives and use older chips to hold down cost and complexity. Cell phones show the most immediate potential. They can only display textual information, but they are durable, versatile, and easy to use.

After economical Internet devices comes economical Internet access. African nations came up with an ingenious method of holding down local charges when they created special area codes for dial-up access. The special area codes have lower rates for Internet access to help build usage, which will further drive down costs.

Slide 10 (Bar chart of access costs in Africa): As this chart shows, despite the phenomenal progress African nations have made in access, cost is still an issue. In most the U.S. and European Union, flat-fee pricing has replaced more expensive metered service.

The third, and perhaps most important challenge, is to make the Internet self-healing. Physical expansion and economical access depend on it. The Internet is already too big for manual management. Without aggressive deployment of automated diagnostic and repair technology, management costs will soak up resources better devoted to infrastructure expansion. Manual management also raises operating costs, which in turn lead to higher access charges and lower usage.

Rapid progress in automated Internet management shows real potential to cut overhead operating costs and lower access charges by creating what we need for a truly global Internet: self-diagnosing and healing networks. When the networks that comprise the Internet don't need constant attention, the Internet can grow to serve new areas. As it grows, it will attract more users. Automation, in the form of self-diagnosis and self-healing, will hold down costs where distance or economics keep the pool of technical talent small.

A growing infrastructure spreading out from existing centers; economical access through low charges and inexpensive access devices; a self-healing infrastructure: these are the essential ingredients of an Internet that truly embraces and enriches the entire world.

VI. Conclusion and a call to action

At the beginning of this speech I called the United Nations the most appropriate forum for talking about the Internet's role in a developing world. I'd like to close by suggesting that it become the forum for turning that talk into action.

There are dozens of private and public initiatives trying to extend the Internet to people on the far side of the Digital Divide. These efforts need the coordination and profile that a joint effort with the United Nations and private industry

Writing for the Internet Society, Madanmohan Rao made this observation: "Much discourse about the Internet economy in developing nations seems to be heading toward increasing polarization. One camp – the 'e-uphoric enthusiasts – believe that e-commerce is the answer and will soon lift the sagging fortunes of all developing nations. The other camp remains quite skeptical, believing the Internet is merely going to leave the bulk of developing world's population on the other side of the digital divide. The reality, of course, lies somewhere in between, but unfortunately, these two camps do not creatively engage in joint brainstorming often enough."

This is the venue for creative brainstorming. This is the venue for turning brainstorming into ideas that make the Internet a reliable, accessible, affordable reality all over the world.

We will get there by first focusing on the boxes, wires, satellites and antennae that comprise the Internet. We will get there by ensuring that everyone can afford and operate a device, appropriate to their environment, that taps the Internet. We will get there by

ensuring the Internet infrastructure diagnoses and fixes itself so operating it does not sap our resources and increase its costs.

Slide 11 (headline slide): Concord taking action to bridge the Digital Divide

My company, Concord Communications, invites other companies to join in a leadership role to collect and act on the best ideas for extending the Internet to every person on the globe. We believe the spread of a stable, secure, economical Internet will make the world not only a better place to do business, but a safer place for us all to live.

As I said a few minutes ago, the Internet is knowledge – knowledge of opportunities, knowledge of resources, knowledge of each other. That knowledge of each other may be the Internet's biggest contribution to creating a world in which the differences between us can be resolved and celebrated, rather than exploited. The ingenuity is in this room. Can the action be far behind?

New York, February 2002

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