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THE WHITE HOUSE
OFFICE OF THE VICE PRESIDENT

FOR IMMEDIATE RELEASE
December 21, 1993

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Remarks
by
Vice President Al Gore
at
National Press Club
December 21, 1993

Thank you. It's a great pleasure to be here. I still have jet lag, though -- nature's way of making you look like your passport photo.

I'm happy to be home. And I'm particularly happy to be talking about telecommunications to people whose lives will be shaped by the changes ahead for us.

I'm pleased to announce today that at the beginning of the year, President Clinton will present to Congress a package of legislative and administrative proposals on telecommunications. Today, I want to talk about the future we envision.

But I'd like to start by talking about an incident from the past.

There is a lot of romance surrounding the sinking of the Titanic 91 years ago. But when you strip the romance away, a tragic story emerges that tells us a lot about human beings -- and telecommunications.

Why did the ship that couldn't be sunk steam full speed into an ice field? For in the last few hours before the Titanic collided, other ships were sending messages like this one from the Mesaba: "Lat42N to 41.25 Long 49W to Long 50.30W. Saw much heavy pack ice and great number large icebergs also field ice."

And why, when the Titanic operators sent distress signal after distress signal did so few ships respond?

The answer is that -- as the investigations proved -- the wireless business then was just that, a business. Operators had no obligation to remain on duty. They were to do what was profitable. When the day's work was done -- often the lucrative transmissions from wealthy passengers -- operators shut off their sets and went to sleep. In fact, when the last ice warnings were sent, the Titanic operators were too involved sending those private messages from wealthy passengers to take them. And when they sent the distress signals operators on the other ships were in bed.

Distress signals couldn't be heard, in other words, because the airwaves were chaos -- willy-nilly transmissions without regulation.

The Titanic wound up two miles under the surface of the North Atlantic in part because people hadn't realized that radio was not just a curiosity but a way to save lives.

Ironically, that tragedy that resulted in the first efforts to regulate the airwaves.

Why did government get involved? Because there are certain public needs that outweigh private interests.

Today, as divers explore the hulk of the Titanic, we face a similar problem. A new world awaits us. It is one that can not only save lives but utterly change and enrich them. And we need to rethink the role of government once more.

How do we balance private needs and public interests?

It's important in discussing the information age that we discuss not merely technology, but communications. Because from communications comes community. Not long ago, when travel was very difficult, communities were small and communication was personal and direct. It was between families, neighbors, business partners.

Then the means of travel improved, moving us all away from each other, and making communication more difficult.

Until recently, if an immigrant came to the United States, whether from Russia, or China, or England, it meant saying goodbye to one's parents and never having a conversation with them again.

But these days, technology has brought us closer together. I read a little while ago of a family scattered all over the world. More than a hundred different members keep in touch through the Internet. They keep people informed of births and deaths and graduations. Children in more than half a dozen countries feel like they know each other -- even though they've never met.

It is important in focusing on what's ahead in communications, to zero in not on the technology, but what we use technology for.

No one says "Let's use the telephone. " They say, Let's call Grandma."

We haven't always kept that in mind.

When the telephone was invented, stockbrokers in London said "Who needs so many telephones, we have messenger boys."

It didn't take long to see that there were some things messenger boys couldn't do -- transmit both ends of a conversation, for example. We figured out new uses each time the telephone changed, from big wooden boxes on the wall, to desk phones, to ones with long cords ... to the car phones and cell phones that allow us to talk while we drive or walk.

We will do this again with the changes in store over the next decade -- one of the biggest changes the human species has ever faced.

Most people today are primarily receivers of information. We watch TV. We listen to radio.

In this decade we will transmit more and more as well.

We'll send and receive, not just on the telephone but across the full range of the new technologies. We'll turn from consumers into providers.

In a way, this change represents a kind of empowerment. The quality revolution in the factory treats each individual as a source of added value. The communications revolution recognizes each individual as a source of information that adds value to our community and to our economy.

After all, interactive TV doesn't just mean yelling at the television when the referee makes a bad call. It means holding a business meeting without leaving your living room.

It means that people at home can use their television not just as entertainment but as an active tool.

These changes have neither come overnight or out of the blue. Rather, they are the outgrowth of a steady series of changes encompassing much of our history.

It used to be that nations were more or less successful in their competition with other nations depending upon the kind of transportation infrastructure they had. Nations with deep water ports did better than nations unable to exploit the technology of ocean transportation. After World War II, when tens of millions of American families bought automobiles, we found our network of two-lane highways completely inadequate. We built a network of interstate highways. And that contributed enormously to our economic dominance around the world.

Today, commerce rolls not just on asphalt highways but along information highways. And tens of millions of American families and businesses now use computers and find that the 2-lane information pathways built for telephone service are no longer adequate.

It is not that we have a shortage of information. Indeed we often find now that we have a lot more than we know what to do with.

John Stuart Mill, who lived through much of the 19th Century was said to be the last man who knew everything. Since his time, no matter what your field, you have to resign yourself to the fact that a great deal will take place completely outside your awareness.

Take the Landsat example. We're trying to understand the global environment, and the Landsat satellite is capable of taking a complete photograph of the entire Earth's surface every two weeks. It's been doing that for almost 20 years.

In spite of the great need for that information, 95% of those images have never fired a single neuron in a single human brain. Instead, they are stored in electronic silos of data.

We used to have an agricultural policy where we stored grain in Midwestern silos and let it rot while millions of people starved to death. We now have an insatiable hunger for knowledge. And the data sits rotting away -- sometimes literally rotting by remaining unused.

Why?

Part of the problem has to do with the way information is configured and presented. Someone once said that if we tried to describe the human brain in computer terms, it looks as if we have a low bit rate, but very high resolution. For example, the telephone company decided a few years ago that seven numbers were the most that we could remember. That's a low bit-rate. Then they added three.

On the other hand, we can absorb billions of bits of information instantly if they are arrayed in a recognizable pattern within which each is related to all the others -- a human face, or a galaxy of stars.

In order to communicate richly detailed images that allow us to comprehend large volumes of data, we need to combine two technologies. Computers have an ever-growing ability to transform data into recognizable images. And we are making greater use of them every year.

But to communicate these images among ourselves, we need networks capable of carrying those images to every house and business. We know how to do that technologically, but we have to unscramble the legal, regulatory and financial problems that have thus far threatened our ability to complete such a network.

In the few places where this capacity now exists we are already using them to communicate in ways that enrich and even save our lives.

We use it with Matthew Meredith, a six year old boy who recently underwent a bone marrow transplant. His doctors recommended that he shouldn't begin his classes at Randolph Elementary School in Topeka. So the school and local telephone company teamed up to bring first grade to him through two-way video services and a television camera.

Matthew was able to take part in class. He used a fax to hand in class assignments. And the kids in his class got a glimpse of videoconferencing technology that will be common in a few years.

In West Virginia, doctors are using the Mountaineer Doctor Television Project to link to specialists at West Virginia University. A while back, for example, two-month-old Zachary Buchanan had an irregular heartbeat. Using the network, his family doctor sent an image of his heart to a pediatric cardiologist 100 miles away. His diagnosis: the condition wasn't serious -- and he didn't have to travel halfway across the state for treatment.

All of these applications enhance the quality of life. Because they do, they will spur economic growth.

After all, even the quickest glance at the telecommunications sector of the economy shows what it means for jobs. Over half of the U.S. workforce is now in information-based jobs. The telecommunications and information sector of the U.S. economy accounts for more than 12% of the GDP. And it's growing faster than any other sector of our economy.

What about dollars?

Last year total sector revenues exceeded \$700 billion. And we exported over \$48 billion of telecommunications equipment alone.

When AT&T sold the first cellular phone, they said there would be 900,000 of them by the year 2000.

Well. We have 13 million now. And it's still 1993. The predictions for mobile telephone users for the year 2000 now total 60 million.

This kind of growth will create thousands of jobs in the communications industry. But the biggest impact may be in other industrial sectors where those technologies will help American companies compete better and smarter in the global economy.

Today, more than ever, businesses run on information. A fast, flexible information network is as essential to manufacturing as steel and plastic.

Virtually every business and consumer in America will benefit dramatically from the telecommunications revolution. I see even Santa Claus is now on the Internet with his own E-Mail.

If we do not move decisively to ensure that America has the information infrastructure we need every business and consumer in America will suffer.

What obstacles lie ahead in this rush to the future?

Many of them lie in the system we have created over the last 60 years.

Systems of regulation that made sense when telephones were one thing and cable another, may just limit competition in a world in which all information can flow interchangeably over the same conduits. To understand what new systems we must create, though, we must first understand how the information marketplace of the future will operate.

One helpful way is to think of the National Information Infrastructure as a network of highways -- much like the Interstates begun in the '50s.

These are highways carrying information rather than people or goods. And I'm not talking about just one eight-lane turnpike. I mean a collection of Interstates and feeder roads made up of different materials in the same way that roads can be concrete or macadam -- or gravel.

Some highways will be made up of fiber optics. Others will be built out of coaxial or wireless.

But -- a key point -- they must be and will be two way roads.

These highways will be wider than today's technology permits. This is important because a television program contains more information than a telephone conversation; and because new uses of video and voice and computers will consist of even more information moving at even faster speeds. These are the computer equivalent of wide loads. They need wide roads. And these roads must go in both directions.

The new information marketplace based on these highways include four major components:

- First, owners of the highways -- because unlike the interstates, the information highways will be built, paid for and funded by the private sector;
- Second, makers of information appliances, like televisions, telephones and computers, and new products of the future that will combine the features of all three;
- Third, information providers -- local broadcasters, digital libraries, information service providers, and millions of individuals who will have information they want to share or sell; ...and most important,
- Fourth, information customers, justly demanding privacy, affordability and choice.

At some time in the next decades we'll think about the information marketplace in terms of these four components. We won't talk about cable or telephones or cellular or wireless because there will be free and open competition between everyone who provides and delivers information.

This Administration intends to create an environment that stimulates a private system of free-flowing information conduits.

It will involve a variety of affordable and innovative appliances and products giving individuals and public institutions the best possible opportunity to be both information customers and providers.

Anyone who wants to form a business to deliver information will have the means of reaching customers. And any person who wants information will be able to choose among competing information providers, at reasonable prices.

That's what the future will look like -- say, in ten or fifteen years. But how do we get from here to there?

This is the key question for the government.

It is during the transition period that the most complexity exists and that government involvement is the most important.

It's a "phase change" -- like moving from ice to water; Ice is simple and water is simple, but in the middle of the change it's mush -- part monopoly, part franchise, part open competition. We want to manage that transition.

And so I am announcing today that the Administration will support removal, over time, under appropriate conditions, of judicial and legislative restrictions on all types of telecommunications companies: cable, telephone, utilities, television and satellite.

We will do this through both legislative and administrative proposals, prepared after extensive consultation with Congress, industry, public interest and consumer groups, and state and local governments.

Our goal is not to design the market of the future. It is to provide the principles that shape that market. And it is to provide the rules governing this difficult transition to an open market for information.

We are committed in that transition to protecting the availability, affordability, and diversity of information and information technology, as market forces replace regulations and judicial models that are no longer appropriate.

On January 11, in Los Angeles, I will outline in more detail the main components of the legislative package we will present.

Today, though, I want to set forth the principles upon which it will be based.

There are five.

First, encourage private investment.

The example of Samuel Morse is relevant here.

Basically, Morse's telegraph was a federal demonstration project. Congress funded the first telegraph link between Washington and Baltimore.

Afterwards, though -- after the first amazing transmission -- most nations treated the telegraph and eventually telephone service as a government enterprise.

That's actually what Morse wanted, too. He suggested that Congress build a national system. Congress said no. They argued that he should find private investors. This Morse and other companies did. And in the view of most historians, that was a source of competitive advantage for the United States.

We are steering a course between a kind of computer-age Scylla and Charybdis -- between the shoals of suffocating regulation on one side, and the rocks of unfettered monopolies on the other. Both stifle competition and innovation.

The Clinton Administration believes, though, that as with the telegraph, our role is to encourage the building of the national information infrastructure by the private sector as rapidly as possible.

Second, promote and protect competition.

I've talked about highways. All roads once led to Rome. But how many lead to each home? One, or two, or more? Whatever the answer, the same principle should apply: we should prevent unfair cross-subsidies and act to avoid information bottlenecks that would limit consumer choice, or limit the ability of new information providers to reach their customers.

We can see aspects of this question in the debate over the powers of the Regional Bell Operating Companies; in the passage last year of the Cable Act of 1992; in the proposal to "open up" the local telephone loop.

Third, provide open access to the network.

Let's say someone has an information service to provide over the network. They should be able to do it just by paying a fair and equitable price to the network service provider.

Suppose I want to set up a service that provides 24 hours a day of David Letterman reruns.

I don't own my own network, so I need to buy access to someone else's. I should be able to do so by paying the same rates as my neighbor, who wants to broadcast kick-boxing matches.

Without provisions for open access, the companies that own the networks could use their control of the networks to ensure that their customers only have access to their programming. We have already seen cases where cable company owners have used their monopoly control of their networks to exclude programming that competes with their own. Our legislation will contain strong safeguards against such behavior.

Mitch Kapor, the founder of Lotus, and head of the Electronic Frontier Foundation, has spoken about the need for the national information infrastructure to be an "open platform." The IBM PC is an "open platform" that any software programmer can use. They can develop software to run on the PC and if they developed a "killer applications" like Mitch did with Lotus 1-2-3 -- they could make millions of dollars.

In the 1980s, thousands of programmers developed thousands of different programs, which have increased the productivity of our businesses, helped our children learn, and helped us balance our checkbooks.

We need to ensure the NII, just like the PC, is open and accessible to everyone with a good idea who has a product they want to sell.

This is essential if we are to have many information sources on it.

Fourth, we want to avoid creating a society of information "haves" and "have nots."

You know, the original expression "haves and have nots" comes from Cervantes.

But we're not tilting at windmills here.

This is the outgrowth of an old American tradition.

Broadcasts, telephones, and public education were all designed to diminish the gap between haves and have nots.

In the past, universal service meant that local phone companies were required to provide a minimum level of plain old telephone service for a minimal price. State and federal regulations provided for subsidies to customers in poor and rural areas.

The most important step we can take to ensure universal service is to adopt policies that result in lower prices for everyone. The lower the price the less need for subsidies. We believe the pro-competitive policies we will propose will result in lower prices and better service to more Americans.

But we'll still need a regulatory safety net to make sure almost everyone can benefit.

In the past it was relatively simple to fund universal service. The local phone companies were regulated monopolies that could be required to provide lifeline services. As more companies enter the market -- as many of the regulations are removed -- we have to find new ways of doing the same thing.

Just last week, the National Telecommunications and Information Administration of the Department of Commerce held a hearing in New Mexico to examine just that question. Our bill will incorporate the findings from the hearing and others. It

will reaffirm this Administration's desire to see that all Americans benefit from the National Information Infrastructure.

As we think about the future of universal service, we as a society ought to think about what kind of service and on what group of people we must concentrate.

Schools -- and our children -- are paramount.

The new head of the FCC, Reed Hundt, recently said, "there are thousands of buildings in this country with millions of people in them who have no telephones, no cable television and no reasonable prospect of broadband services. They're called schools."

When it comes to ensuring universal service, our schools are the most impoverished institution in society.

Only 14% of our public schools used educational networks in even one classroom last year. Only 22% possess even one modem.

Video-on-demand will be a great thing. It will be a far greater thing to demand that our efforts give every child access to the educational riches we have in such abundance.

The recent article in the Washington Post on the proposed video communication network in the D.C. area is a wake-up call to all of us concerned about "electronic redlining." If we allow the information superhighway to bypass the less fortunate sectors of our society - even for an interim period -- we will find that the information rich will get richer while the information poor get poorer with no guarantee that everyone will be on the network at some future date.

We cannot relax restrictions from legislation and judicial decisions without strong commitments and safeguards that there will be a "public right of way" on the information highway. We must protect the interests of the public sector.

That's essential in building the information highway. That's essential in providing affordable services for public education, public health and government.

The less fortunate sectors of the population must have access to a minimum level of information services through subsidies or other forms of a public interest tithe.

Fifth and finally: we want to encourage flexibility.

After all, flexibility and adaptability are essential if we are to develop policies that will stand the test of time. Technology is advancing so rapidly, the structure of the industry is changing so quickly, that we must have policies broad enough to accommodate change.

Even though the Communications Act of 1934 could not anticipate many of the technological changes of the last 60 years, it was flexible enough to allow the FCC, state regulators and the successive administrations to deal with those changes without rewriting the act every few years.

As the Administration develops its legislation we are trying hard to follow the example set by the authors of the 1934 Act. We are trying hard to enunciate key principles of policy, identify which government agencies will implement that policy, and then leave many of the details to them.

I don't want to sound like I've thought all these ideas up. The fact is, in Congress, several important pieces of legislation have already been introduced.

I've already mentioned the Brooks-Dingell bill in the House. It, and the Markey-Fields bill represent major steps forward, not to mention more than a year of hard work by other Congressmen including Congressman Boucher and Congressman Oxley.

In the Senate, Senators Danforth and Inouye have introduced a major piece of legislation. Senator Hollings is working on another.

Between now and the beginning of the next session, we'll be continuing our dialogue with Congress, industry and public interest groups to formulate our proposal for legislative and administrative action that will clear the way for the communications marketplace of the future. And part of that effort will be to continue to publicly enunciate what we want and how we will achieve it.

With high-level Congressional support, a growing consensus in industry, and leadership from the President, we have a unique opportunity. We can eliminate many of the regulatory barriers on the information highway -- and perform the most major surgery on the Communications Act since it was enacted in 1934.

We will do it by avoiding both extremes: regulation for regulation's sake, and the blind adherence to the dead hand of a free market economist. We will do it with the principle that has guided so much of the Administration's efforts over the last year: the urgent need to create flexible, responsive government.

It's fitting that this address is being delivered here at the National Press Club. Almost every form of communication is present here, in this room. I'm talking to you orally. Some of you are taking notes -- others are typing on laptops. Some of you will publish your observations through the use of printing presses, others through television or radio reports. People tuned into C-Span are watching on television. Still others are listening over a prototype of the NII -- the Internet.

All of these forms of communication bring us together -- they allow us to participate in a virtually instantaneous dialogue. They will allow us to debate, and then to build a consensus, on the nature of the information infrastructure, on the details of legislation, on the nature of regulation.

But, even more, as I said at the outset, these methods of communication allow us to build a society that is healthier, more prosperous, and better educated. They will allow us to strengthen the bonds of community and to build new "information communities."

The challenge is not, in the end, the new technology. It is holding true to our basic principles. Whether our tools were the quill pens that wrote and then signed the Declaration of Independence or the laptop computers being used to write the constitutions of newly-freed countries . . . better communication has almost always led to greater freedom and greater economic growth.

That is our challenge. That is what this Administration-- and the nation -- will achieve.

There's a story about Michael Faraday, the inventor of the electric generator. Once he was showing Benjamin Disraeli through his lab, taking great pleasure in demonstrating the effects he could produce. And at the end of the tour, Disraeli said, "Well, what good are all these things?"

Faraday answered, "What good is a baby?"

If we take the narrow view, it looks like telecommunications is well out of its infancy. But if we cast our eyes ahead a few decades -- or centuries -- we see that it's barely out of diapers. We need to look ahead, to protect it when it needs protecting, but not get in the way when it needs to walk alone.

Like those wireless operators should have done in the North Atlantic, we should be alert to where the collisions could be. And we shouldn't hesitate to chart a new course.

If we do that, then much more than the telecommunications industry will grow strong. This country and much of the human race will, as well.

Copies of the The Vice President's Speech

December 21, 1993

may be obtained electronically from:

On the internet at:

NII@ACE.ESUSDA.GOV

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And on various BBSs, including:

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THE VICE PRESIDENT
WASHINGTON

September 30, 1993

The Honorable Daniel K. Inouye
Chairman, Subcommittee on Defense
Committee on Appropriations
United States Senate
Washington, D.C. 20510

Dear Mr. Chairman:

I am writing to express my strong support for full funding (\$238 million) for the ARPA High Performance Computing and Communications (HPCC) Program. It is my understanding that the House Appropriations Committee has cut the Administration's request by \$100 million. I urge the Senate to fully fund this critically important program and to support full funding in conference.

As you know, I have long been a strong supporter of research on high-performance computing. As Senator, one of the highlights of my legislative career was the introduction and passage of the High Performance Computing Act.

As Vice President, I am actively engaged in the Administration's efforts to build on the HPCC Program to promote the development of a National Information Infrastructure (NII). The NII, a web of communications networks, computers and databases will put vast amount of information at user's fingertips -- and will change forever the way people live, work, and interact with each other.

The Administration believes that the NII is a powerful tool for tackling some of America's toughest economic and social challenges:

- It has the potential to increase our GNP by \$300 billion by increasing demand for a wide range of new high-tech products and services -- creating hundreds of thousands of jobs.
- If we can make it as easy for students to tap into the Library of Congress as it is for them to turn on their Nintendo set -- we will revolutionize the way teachers teach and students learn.
- Applications of the NII in health care, such as unified electronic claims, computer-based patient records, and telemedicine, can help control our skyrocketing health care costs while improving access.

- Information technology is an important enabler for our efforts to "reinvent government."

As I noted in a September 15th press conference, a critical element of the Administration's strategy to promote the NII is continued support for the High Performance Computing and Communications Initiative. This program will help provide the technology necessary to make the NII a reality. For example, it was ARPA's support for networking beginning in the late 1960's that has led to the explosive growth of the Internet -- which now connects over 10 million users around the world and is growing at 7 percent per month. The Internet is also a concrete example of how government can act as a catalyst -- since the government now finances only a tiny fraction of the Internet.

To the extent that the Committee has questions about the ARPA HPC program, such as how it relates to the Administration's vision of the NII, its balance between hardware and software development, and the establishment of concrete milestones, I pledge the full cooperation of the Administration in addressing these issues.

Because the ARPA HPC program is a critical component of the Administration's single most important technology initiative -- the National Information Infrastructure -- I urge you to support full funding.

I look forward to working with you on this and other issues, such as reforming our communications laws, that will help promote the development of the NII.

Sincerely,

A handwritten signature in dark ink, appearing to be 'Al Gore', written in a cursive style.

Al Gore

AG/tak

THE WHITE HOUSE
OFFICE OF THE VICE PRESIDENT

January 11, 1994
FOR IMMEDIATE RELEASE

Contact: 202-456-7035

VICE PRESIDENT PROPOSES NATIONAL TELECOMMUNICATIONS REFORM

Bring the Information Revolution to Every Classroom, Hospital, and Library in the Nation By the End of the Century

Los Angeles, CA--Citing the need to bring the economic, health, and educational benefits of the information revolution to all Americans, Vice President Al Gore, in a speech to the Academy of Television Arts and Sciences, today outlined the Clinton Administration's proposals to reform the communications marketplace.

Gore challenged his audience to provide free links from the information superhighways to every classroom, library, hospital, and clinic in the country. "You here today represent the companies that can do it," said the Vice President. Following The Vice President's pledge during the 30 minute speech, he stated the Administration's support for removing the legal and regulatory barriers that prevent telephone, cable and long distance companies from entering each others business.

The Vice President recalled the dream of the interstate highway system of his youth. "Today," he explained, "we have a dream for a different kind of superhighway -- an information superhighway that can save lives, create jobs and give every American young and old, the chance for the best education available to anyone, anywhere."

The Vice President said the Clinton Administration's position grew out of the following five principles, which he outlined in a December speech at the National Press Club in Washington, D.C.:

- ✓ Encourage private investment
- ✓ Provide and protect competition
- ✓ Provide open access to the network
- ✓ Avoid creating information "haves and have nots"
- ✓ Encourage flexible and responsive government action

In a much anticipated announcement, Gore presented a series of policy decisions that will "clear from the road the wreckage of outdated regulations and allow a free-flowing traffic of ideas and commerce for the benefit of all Americans."

Specifically, Gore's proposal would allow telephone companies to get into the cable business, and let cable and other companies into the telephone business.

To make such new ventures possible, the Administration will prevent states from imposing barriers to new companies entering the local phone business and will require local phone companies to make their facilities available to all comers without discrimination and to allow competitors to provide all kinds of telephone services the phone company provides now.

On the issue of the court decree governing the breakup of AT&T, Gore said he supported the effort by key Congressional chairmen to take the courts out of the phone business and provide a pathway by which the local phone companies can enter other lines of business -- like long distance service -- but including also electronic publishing and manufacturing. Gore praised the work of Congressman John Dingell (D-MI) and Jack Brooks (D-TX) and pledged his support to work with them to enact a bill this year.

Gore also recognized the work of his colleagues in the U.S. Senate; Senators Ernest Hollings (D-SC), Daniel Inouye (D-HI), and John Danforth (R-MO) and in the U.S. House of Representatives; Ed Markey (D-MA), and Jack Fields (D-TX). "In many ways our legislative goals complement (their) work, said Gore. "We expect to introduce our legislative package shortly, and to work with Congress to ensure its speedy passage."

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Remarks
Prepared for Delivery
by Vice President Al Gore
Royce Hall, UCLA
Los Angeles, California
January 11, 1994

It's great to be here at the Television Academy today. I feel I have a lot in common with those of you who are members of the Academy. I was on Letterman. I wrote my own lines.

I'm still waiting for residuals.

At first, I thought this could lead to a whole new image. And maybe a new career. No more Leno jokes about being stiffer than the Secret Service. Maybe an opportunity to do other shows. I was elated when "Star Trek: The Next Generation" wanted me to do a guest shot -- until I learned they wanted me to replace Lieutenant Commander Data.

The historian Daniel Boorstin once wrote that for Americans "nothing has happened unless it is on television." This of course leaves out a few major events in our history. But this meeting today is on television -- so apparently this event is actually occurring.

I join you to outline not only this Administration's vision of the National Information Infrastructure but our proposals for creating it.

Last month in Washington, I set forth some of the principles behind our vision. Today I'll talk about the legislative package necessary to ensure the creation of that national infrastructure in a manner which will connect and empower the citizens of this country through broadband, interactive communication.

We've all become used to stumbling over cliches in our efforts to describe the enormity of change now underway and the incredible speed with which it is taking place. Often we call it a revolution -- the digital revolution.

Speaking of cliches, I often use the analogy to autos, saying that if cars had advanced as rapidly as computer chips in recent years, a Rolls Royce would go a million miles an hour and cost twenty-five cents.

The last time I used it was at a meeting of computer experts and one of them said, "Yeah -- but that Rolls Royce would be one millimeter long."

What we've seen in the last decade is amazing. But it's nothing compared to what will happen in the decade ahead. The word revolution by no means overstates the case.

But this revolution is based on traditions that go far back in our history.

Since the transcontinental telegraph that transmitted Abraham Lincoln's election victory to California in real time, our ability to communicate electronically has informed and shaped America.

It was only a year before that election that the Pony Express was the talk of the nation, able to send a message cross country in seven days. The next year, it was out of business.

Today's technology has made possible a global community united by instantaneous information and analysis. Protesters at the Berlin Wall communicated with their followers through CNN news broadcasts. The fax machine connected us with demonstrators at Tiananmen Square.

So it's worth remembering that while we talk about this digital revolution as if it's about to happen, in many places it's already underway. Even in the White House.

The day after Inauguration, I was astonished to see how relatively primitive the White House communications system was. President Clinton and I took a tour and found operators actually having to pull cords for each call and plug them into jacks. It reminded me of the switchboard used by Ernestine, the Lily Tomlin character.

And there were actually phones like these all over the White House. They're still there. But we made progress. They're only in the press room now.

Those phones didn't meet our needs. So now, especially on trips, I use a cellular phone.

Our new ways of communicating will entertain as well as inform. More importantly, they will educate, promote democracy, and save lives. And in the process they will also create a lot of new jobs. In fact, they're already doing it.

The impact on America's businesses will not be limited just to those who are in the information business, either. Virtually every business will find it possible to use these new tools to become more competitive. And by taking the lead in quickly employing these new information technologies, America's businesses will gain enormous advantages in the worldwide marketplace. And that is important because if America is to prosper, we must be able to manufacture goods within our borders and sell them not just in Tennessee but Tokyo -- not just in Los Angeles but Latin America.

Last month, when I was in Central Asia, the President of Kyrgyzstan told me his eight-year-old son came to him and said, "Father, I have to learn English."

"But why?" President Akayev asked.

"Because, father, the computer speaks English."

By now, we are becoming familiar with the ability of the new communications technologies to transcend international boundaries and bring our world closer together. But many of you are now in the process of transcending other old boundaries -- the boundary lines which have long defined different sectors of the information industry. The speed with which these boundaries are eroding is quite dramatic.

I'm reminded of an idea of Stephen Hawking, the British physicist. Hawking has Lou Gehrig's disease. But thanks to information technology he can still communicate not only to his students and colleagues but to millions around the world. Incidentally, I read the other day that his voice box has an American accent -- because it was developed here in California.

Anyway, in that American accent, Hawking has speculated about a distant future when the universe stops expanding and begins to contract. Eventually, all matter comes colliding together in a "Big Crunch," which scientists say could then be followed by another "Big Bang" -- a universe expanding outward once again.

Our current information industries -- cable, local telephone, long distance telephone, television, film, computers, and others -- seem headed for a Big Crunch/Big Bang of their own. The space between these diverse functions is rapidly shrinking -- between computers and televisions, for example, or inter-active communication and video.

But after the next Big Bang, in the ensuing expansion of the information business, the new marketplace will no longer be divided along current sectoral lines. There may not be cable companies or phone companies or computer companies, as such. Everyone will be in the bit business. The functions provided will define the marketplace. There will be information conduits, information providers, information appliances and information consumers.

That's the future. It's easy to see where we need to go. It's hard to see how to get there. When faced with the enormity and complexity of the transition some retreat to the view best enunciated by Yogi Berra when he said: "What we have here is an insurmountable opportunity."

Not long ago this transition did indeed seem too formidable to contemplate, but no longer. Because a remarkable consensus has emerged throughout our country -- in business, in public interest groups and in government. This consensus begins with agreement on the right, specific questions we must answer together.

How can government ensure that the information marketplace emerging on the other side of the Big Crunch will permit everyone to be able to compete with everyone else for the opportunity to provide any service to all willing customers? How can we ensure that this new marketplace reaches the entire nation? How can we ensure that it fulfills the enormous promise of education, economic growth and job creation?

Today I will provide the Administration's answers to those questions. But before I do let me state my firm belief that legislative and regulatory action alone will not get us where we need to be. This Administration argued in our National Performance Review last year, that government often acts best when it sets clear goals, acts as a catalyst for the national teamwork required to achieve them, then lets the private and non-profit sector, move the ball downfield.

It was in this spirit that then-Governor Clinton and I, campaigning for the White House in 1992, set as a vital national goal linking every classroom in every school in the United States to the National Information Infrastructure.

It was in this same spirit that less than a month ago, I pointed out that when it comes to telecommunications services, schools are the most impoverished institutions in society.

And so I was pleased to hear that some companies participating in the communications revolution are now talking about voluntarily linking every classroom in their service areas to the NII.

Let me be clear. I challenge you, the people in this room, to connect all of our classrooms, all of our libraries, and all of our hospitals and clinics by the year 2000. We must do this to realize the full potential of information to educate, to save lives, provide access to health care and lower medical costs.

Our nation can and must meet this challenge. The best way to do so is by working together. Just as communications industries are moving to the unified information marketplace of the future, so must we move from the traditional adversarial relationship between business and government to a more productive relationship based on consensus. We must build a new model of public-private cooperation that, if properly pursued, can obviate many governmental mandates.

But make no mistake about it -- one way or another, we will meet this goal.

As I announced last month, we will soon introduce a legislative package that aggressively confronts the most pressing telecommunications issues, and is based on five principles.

This Administration will:

- Encourage Private Investment
- Provide and Protect Competition
- Provide Open Access to the Network
- Take Action To Avoid Creating a Society of Information "Haves" and "Have Nots"
- Encourage Flexible and Responsive Governmental Action

Many of you have our White Paper today, outlining the bill in detail. If you didn't get your copy, it's available on the Internet, right now.

Let me run through the highlights with you -- and talk about how they grow out of our five principles.

We begin with two of our basic principles -- the need for private investment and fair competition. The nation needs private investment to complete the construction of the National Information Infrastructure. And competition is the single most critical means of encouraging that private investment.

I referred earlier to the use of the telegraph in 1860, linking the nation together. Congress funded Samuel Morse's first demonstration of the telegraph in 1844. Morse then suggested that a national system be built with federal funding. But Congress said no, that private investment should build the information infrastructure. And that's what happened -- to the great and continuing competitive advantage of this country.

Today, we must choose competition again and protect it against both suffocating regulation on the one hand and unfettered monopolies on the other.

To understand why competition is so important, let's recall what has happened since the breakup of AT&T ten years ago this month.

As recently as 1987, AT&T was still projecting that it would take until the year 2010 to convert 95% of its long distance network to digital technology.

Then it became pressed by the competition. The result? AT&T made its network virtually 100% digital by the end of 1991. Meanwhile, over the last decade the price of interstate long distance service for the average residential customer declined over 50%.

Now it is time to take the next step. We must open the local telephone exchanges, those wires and switches that link homes and offices to the local telephone companies.

The pressure of competition will be great -- and it will drive continuing advancements in technology, quality and cost. One businessman told me recently that he was accelerating his investment in new technology to avoid ending up as "roadkill" on the information superhighway.

To take one example of what competition means, cable companies, long distance companies, and electric utilities must be free to offer two-way communications and local telephone service. To accomplish this goal, our legislative package will establish a federal standard that permits entry to the local telephone markets. Moreover, the FCC will be authorized to reduce regulation for telecommunications carriers that lack market power.

We expect open competition to bring lower prices and better services. But let me be clear: We insist upon safeguards to ensure that new corporate freedoms will not be translated into sudden and unjustified rate increases for telephone consumers.

The advancement of competition will necessarily require more opportunity, as well, for the Regional Bell Operating Companies. Current restrictions on their operations are themselves the legacy of the break-up of AT&T and must be re-examined.

This Administration endorses the basic principles of the Brooks-Dingell bill, which proposes a framework for allowing long-distance and local telephone companies to compete against each other.

Regulation and review of this framework should be transferred from the courts to the Department of Justice and the Federal Communications Commission.

This process of change must be carefully calibrated. We must make sure that the Regional Bells will not be able to use their present monopoly positions as unfair leverage into new lines of business. That is why the Administration supports the approach of the Brooks-Dingell provision that requires the approval of the Department of Justice and the Federal Communications Commission before the Regional Bells may provide

interexchange services -- most notably long distance.

In working with Congress, the Administration will explore the creation of incentives for the Regional Bells. We want to increase the transparency of those facility-based local services that raise concerns associated with cross-subsidization and abuses of monopoly power.

Our view of the entry of local telephone companies into cable television also balances the advantages of competition against the possibility of competitive abuse. We will continue to bar the acquisition of existing cable companies by telephone companies within their local service areas. We need this limitation to ensure that no single giant entity controls access to homes and offices. But to increase diversity and benefit consumers, we will permit telephone companies to provide video programming over new, open access systems.

Even these measures, however, may not eliminate all scarcity in the local loop -- those information byways that provide the last electronic connection with homes and offices. For some time, in many places, there are likely to be only one or two broadband, interactive wires, probably owned by cable or telephone companies. In the long run, the local loop may contain a wider set of competitors offering a broad range of interactive services, including wireless, microwave and direct broadcast satellite.

But, for now, we cannot assume that competition in the local loop will end all of the accrued market power of past regulatory advantage and market domination.

We cannot permit the creation of information bottlenecks that adversely affect information providers who use the highways as a means of supplying their customers.

Nor can we can permit bottlenecks for information consumers who desire programming that may not be available through the wires that enter their homes or offices.

Preserving the free flow of information requires open access, our third basic principle.

How can you sell your ideas, your information, your programs, if an intermediary who is also your competitor has the means to unfairly block your access to customers? We can't subject the free flow of content to artificial constraints at the hands of either government regulators or would-be monopolists.

We must also guard against unreasonable technical obstacles. We know how to do this; we've seen this problem in our past. For example, when railroad tracks were different sizes, a passenger could not travel easily from a town served by one railroad to a town served by another. But the use of standardized tracks permitted the creation of a national system of rail transport.

Accordingly, our legislative package will contain provisions designed to ensure that each telephone carrier's networks will be readily accessible to other users. We will create an affirmative obligation to interconnect and to afford nondiscriminatory access to network facilities, services, functions and information. We must also explore the future of non-commercial broadcasting;

there must be public access to the information superhighway.

These measures will preserve the future within the context of our present regulatory structures. But that is not enough. We must move towards a regulatory approach that encourages investment, promotes competition and secures open access. And one that is not just a patch-work quilt of old approaches, but an approach necessary to promote fair competition in the future.

We begin with a simple idea: Similar entities must be treated similarly. But let's be clear: our quest for equal treatment of competing entities will not blind us to the economic realities of the new information marketplace, where apparent similarities may mask important differences.

This idea is best expressed in the story about the man who went into a restaurant and ordered the rabbit stew.

It came, he took a few bites, then called the manager over. "This doesn't taste like rabbit stew!" he said. "It tastes ... well, it tastes like horsemeat!"

The manager was embarrassed. "I actually ran out of rabbit this morning and I -- well, I put some horsemeat in."

"How much horsemeat?"

"Well -- it's equally divided."

"What's that mean?"

"One horse, one rabbit."

The lesson is obvious. A start-up local telephone company isn't the same as a Baby Bell.

What we favor is genuine regulatory symmetry. That means regulation must be based on the services that are offered and the ability to compete -- and not on corporate identity, regulatory history or technological process.

For example, our legislative package will grant the Federal Communications Commission the future authority, under appropriate conditions, to impose non-discriminatory access requirements on cable companies. As cable and telephone service become harder and harder to distinguish, this provision will help to ensure that labels derived from past regulatory structures are not translated into inadvertent, unfair competitive advantages.

As different services are grouped within a single corporate structure, we must ensure that these new, combined entities are not caught in a cross-fire of conflicting and duplicative regulatory burdens and standards. This Administration will not let existing regulatory structures impede or distort the evolution of the communications industry.

In the information marketplace of the future, we will obtain our goals of investment, competition and open access only if regulation matches the marketplace. That requires a flexible, adaptable regulatory regime that encourages the widespread provision of broadband, interactive digital services.

That is why the Administration proposes the creation of an alternative regulatory regime that is unified, as well as symmetrical. Our new regime would not be mandatory, but it would be available to providers of broadband, interactive services. Such companies could elect to be regulated under the current

provisions of the Communications Act or under a new title, Title VII, that would harmonize those provisions in order to provide a single system of regulation. These "Title VII" companies would be able to avoid the danger of conflicting or duplicative regulatory burdens. But in return, they would provide their services and access to their facilities to others on a nondiscriminatory basis. The nation would thus be assured that these companies would provide open access to information providers and consumers and the benefits of competition, including lower prices and higher-quality services, to their customers.

This new method itself illustrates one of our five principles -- that government itself must be flexible. Our proposals for symmetrical, and ultimately unified, regulation demonstrate how we will initiate governmental action that furthers our substantive principles but that adapts, and disappears, as the need for governmental intervention changes -- or ends. They demonstrate, as well, the new relationship of which I spoke earlier -- the private and public sectors working together to fulfill our common goals.

The principles that I have described thus far will build an open and free information marketplace. They will lower prices, stimulate demand and expand access to the National Information Infrastructure.

They will, in other words, help to attain our final basic principle -- avoiding a society of information "haves" separate from a society of information "have nots".

There was a Washington Post headline last month: "Will the 'Information Superhighway' Detour the Poor?"

Not if I have anything to do about it. After all, governmental action to ensure universal service has been part of American history since the days of Ben Franklin's Post Office. We will have in our legislative package a strong mandate to ensure universal service in the future -- and I want to explain why.

We have become an information-rich society. Almost 100% of households have radio and television, and about 94% have telephone service. Three-quarters of households contain a VCR, about 60% have cable, and roughly 30% of households have personal computers.

As the information infrastructure expands in breadth and depth, so too will our understanding of the services that are deemed essential. This is not a matter of guaranteeing the right to play video-games. It is a matter of guaranteeing access to essential services.

We cannot tolerate -- nor in the long run can this nation afford -- a society in which some children become fully educated and others do not; in which some adults have access to training and lifetime education, and others do not.

Nor can we permit geographic location to determine whether the information highway passes by your door. I've often spoken about my vision of a schoolchild in my home town of Carthage,

Tennessee being able to come home, turn on her computer and plug into the Library of Congress. Carthage is a small town. Its population is only about 2,000. So let me emphasize the point: We must work to ensure that no geographic region of the United States, rural or urban, is left without access to broadband, interactive service. Yes, we support opening the local telephone exchange to competition. But we will not permit the dismantling of our present national networks.

All this won't be easy. It is critically important, therefore, that all carriers must be obliged to contribute, on an equitable and competitively neutral basis, to the preservation and advancement of universal service.

The responsibility to design specific measures to achieve these aims will be delegated to the Federal Communications Commission. But they will be required to do so. Our basic goal is simple: There will be universal service; that definition will evolve as technology and the infrastructure advance; and the FCC will get the job done.

Reforming our communications laws is only one element of the Administration's NII agenda. We'll be working hard to invest in critical NII technologies. We'll promote applications of the NII in areas such as scientific research, energy efficiency and advanced manufacturing. We'll work to deliver government services more efficiently. We'll also update our policies to make sure that privacy and copyright are protected in the networked world.

We'll help law enforcement agencies thwart criminals and terrorists who might use advanced telecommunications to commit crimes.

The Administration is working with industry to develop the new technologies needed for the National Information Infrastructure Initiative.

I have been working with the First Lady's Health Care Task Force, former Surgeon General C. Everett Koop, and others to develop ways we can use networks to improve the quality of health care.

Beginning this month, we are concentrating first on the legislative package I outlined earlier. We haven't invented all of the ideas it contains ourselves. Representatives Dingell and Brooks, Markey and Fields--and Senators Hollings, Inouye, and Danforth have all focused on these issues.

In many ways our legislative goals reflect or complement that work. We expect to introduce our legislative package shortly, and to work with Congress to ensure speedy passage this year of a bill that will stand the test of time.

Our efforts are not, of course, confined only to government. The people in this room, and the private sector in general, symbolize private enterprise.

Our economic future will depend, in a real sense, on your ability to grasp opportunity and turn it into concrete achievement.

As we move into the new era, we must never lose sight of our heritage of innovation and entrepreneurship.

In some ways, we appreciate that heritage more when we see countries without it. Last month, in Russia, I had a chance to see close up a country that tried to hold back the information age -- a country that used to put armed guards in front of copiers. In a way we should be grateful it did; that helped strengthen the desire of the Russian people to end Communism.

My hope is that now Central and Eastern Europe can use technology and the free market to build democracy -- not thwart it.

And my hope is that America, born in revolution, can lead the way in this new, peaceful world revolution.

Let's work on it together.

A few months ago, Toni Morrison won the Nobel Prize for Literature. It was a proud -- and signal -- moment for this country: recognition of an African-American woman who has communicated her insight and narrative power to readers all over the world.

In her acceptance speech, Toni Morrison used one version of an old story -- a parable, really -- to make an interesting point. It's of a blind, old woman renowned for her wisdom, and a boy who decides to play a trick on her. He captures a bird, brings it to her cupped in his hands, and says "Old woman, is this bird alive or dead?"

If she says "Dead," he can set it free. If she says "Alive," the boy will crush the bird.

She thinks, and says, "The answer is in your hands."

Toni Morrison's point is that the future of language is in our hands.

As we enter this new millennium, we are learning a new language. It will be the lingua franca of the new age. It is made up of ones and zeros and bits and bytes. But as we master it ... as we bring the digital revolution into our homes and schools ... we will be able to communicate ideas, and information -- in fact, entire Toni Morrison novels -- with an ease never before thought possible.

We meet today on common ground, not to predict the future but to make firm the arrangements for its arrival. Let us master and develop this new language together.

The future really is in our hands.

Thank you.

BACKGROUND ON THE ADMINISTRATION'S TELECOMMUNICATIONS POLICY REFORM INITIATIVE

On September 15, 1993, the Administration issued "The National Information Infrastructure: Agenda for Action," which unveiled our National Information Infrastructure (NII) initiative. There is a national consensus that construction of an advanced NII will "help unleash an information revolution that will change forever the way people live, work, and interact with each other." The "Agenda for Action" recognized that realizing the full potential of the NII will require aggressive, far-sighted government action on a number of fronts. The legislative proposals that Vice President Al Gore has outlined today are the culmination of extensive Administration efforts in one critical area -- telecommunications regulatory reform. Similar work is being done in other important areas, including support for innovative applications that will use the NII, improving access to government information, and protecting individual privacy and intellectual property rights.

In a December 21 speech at the National Press Club in Washington, DC, the Vice President announced the Administration's plans to present a package of legislative and administrative proposals concerning telecommunications and information policy. He stated that the Administration's policy would be based on the following fundamental principles:

- ✓ Encouraging private investment in the NII;
- ✓ Promoting and protecting competition;
- ✓ Providing open access to the NII by consumers and service providers;
- ✓ Preserving and advancing universal service to avoid creating a society of information "haves" and "have nots";
- ✓ Ensuring flexibility so that the newly-adopted regulatory framework can keep pace with the rapid technological and market changes that pervade the telecommunications and information industries.

The major elements of the Administration's legislative initiative are identified below, along with a brief discussion of how each proposal advances the principles set forth above. In doing so, the Administration has studied carefully the legislative initiatives of Senators

Hollings, Inouye, and Danforth and Representatives Brooks, Dingell, Markey, and Fields. Its proposals reflect the strengths of, and build on, those bills. The Administration is building upon the dramatic steps taken by the states, including substantial and innovative regulatory reforms. The Administration intends to work closely with the states, some of which are moving aggressively to encourage competition, infrastructure modernization, and NII applications in health care, education, and government services.

In addition to the legislative package, it is a goal of this Administration that by the year 2000 all of the classrooms, libraries, hospitals, and clinics in the United States will be connected to the NII.

ENCOURAGING PRIVATE INVESTMENT AND PROMOTING COMPETITION

To fully realize the benefits of private investment and more competition in the information infrastructure, regulatory change is needed. For many years, government regulation assumed clear, stable boundaries between industries and markets. This assumption sometimes prompted regulators to view (and to regulate) firms in various industries differently, even when they offered similar services. It also caused regulators to address the threat of anticompetitive conduct on the part of some firms by barring them from certain industries and markets.

The time has come for another approach. Even if the lines between industries and markets were clear in the past, technological and market changes are now blurring them beyond recognition, if not erasing them entirely. Regulatory policies predicated on such perceived distinctions can harm consumers by impeding competition and discouraging private investment in networks and services. The Administration is therefore committed to removing unnecessary and artificial barriers to participation by private firms in all communications markets, while making sure that consumers remain protected and interconnected.

CABLE-TELCO CROSS-OWNERSHIP

The Administration proposes to remove the current cross-ownership restriction of the 1984 Cable Act, and allow telephone companies to provide video services in their local exchange areas in order to promote investments that expand consumer choices and services. To ensure that telephone company entry does not harm consumers or competition, such entry will be subject to certain safeguards, most notably a requirement that the telephone company make channel capacity available to unaffiliated video program providers on a nondiscriminatory basis. This requirement should create market opportunities for competing providers of video services, thereby reducing prices and expanding the diversity of services available to television viewers.

Further, to deter premature and potentially anticompetitive mergers between telephone companies and their most likely competitors -- existing cable companies -- the Administration proposes to prohibit telephone companies from acquiring cable systems located in the companies' local exchange areas. There would be an exception for those telephone companies operating in rural areas, which may be unable to support more than one carrier. However, to ensure that this measure does not outlive its usefulness, the Administration proposes to authorize the Federal Communications Commission (FCC) to begin proceedings that could allow such acquisitions five years after the date of legislative enactment, if certain conditions are met (e.g., the presence of sufficient competition in the telco's service area). Any telephone company/cable system acquisition would also be subject to the antitrust laws in the same manner as an acquisition in any other industry.

LOCAL COMPETITION

Competition has generated substantial benefits for consumers in a host of communications and information service markets, including customer premises equipment and long distance service. The varieties of customer premises equipment have expanded dramatically since deregulation. In addition, the price of interstate long distance telephone service for the average residential user has declined more than fifty percent in real dollars since 1984, due to competition and regulatory reform. Consumers will realize similar benefits by the expansion of competition in the local telephone service market. Competition in that market will reduce the ability of any telephone company to harm competition and consumers through monopoly control and will encourage investment and innovation in the "on and off ramps" of the NII.

Accordingly, the Administration proposes to ensure that competing providers have the opportunity to interconnect their networks on reasonable, nondiscriminatory terms, with the facilities of all local telephone companies. Such companies should also be required to unbundle their service offerings so that alternative providers can offer similar services using a combination of, for example, telephone company-provided switching and their own transmission facilities. Finally, the Administration's plan will preempt state entry barriers, as well as rate regulation of carriers that the FCC finds or has found to lack market power.

The Administration understands that the growth of competition for local telephone services may require repricing of some local services. Such repricing must not be allowed to cause "rate shock" for consumers. Therefore, in implementing network interconnection and unbundling, the FCC and state regulators will be directed to prevent undue rate increases for any class or group of ratepayers.

MODIFIED FINAL JUDGEMENT (MFJ) RESTRICTIONS

The Administration is grateful for and appreciative of the excellent job done by the courts in connection with the MFJ. The break-up of AT&T has helped spur the competition and innovation that have kept America at the vanguard of the telecommunications industry. Now, the time has come to move beyond a decree remedying only specific violations of law administered by the courts and to enact a far-reaching and comprehensive plan reflecting a vision of the telecommunications world of the future. A key element of that plan must be to promote and protect competition, the engine of progress and jobs.

LONG DISTANCE SERVICE

The Administration supports the Brooks-Dingell bill provision that requires Department of Justice (DOJ) and FCC approval before the Regional Bell Operating Companies (RBOCs) may provide interexchange services -- most notably long distance service. In determining whether to lift the restriction, the Department of Justice will apply the test contained in Section VIII(C) of the MFJ. The FCC will apply a public interest test like that set forth in the legislative proposal offered by Chairmen Brooks and Dingell. These entry tests are designed in part to ensure competition and to protect consumers and local telephone ratepayers against cross-subsidization and other potential abuses of monopoly power. In working with the Congress, the Administration will explore the creation of incentives for RBOCs to increase the transparency of their facility-based local services, because of concerns associated with cross-subsidization and abuses of monopoly power. The Administration's plan will also include an immediate and limited exception to the prohibition of the provision of long distance services incidental to RBOC provision of wireless, cable television, and certain other services.

INFORMATION SERVICES

As current law provides, the RBOCs are permitted to offer information services. The Administration supports the approach taken in the Brooks-Dingell legislation that requires a separate affiliate for electronic publishing.

MANUFACTURING

In keeping with the principle of removing barriers to participation by all firms in all markets except where necessary, the Administration proposes to remove the current ban on RBOC research, development, and manufacturing subject to safeguards to prevent cross-subsidization and discriminatory practices. The safeguards to be applied before entry would include a

notification-and-waiting-period procedure, as contained in the legislation proposed by Chairmen Brooks and Dingell, under which an RBOC would submit relevant information about its proposal to the Department of Justice, which could investigate and sue to enjoin the proposed entry. The Administration also supports substantive post-entry safeguards, as contained in legislation introduced by Chairman Hollings and passed by the Senate in the last Congress. Those safeguards include, among other things, requirements that manufacturing be kept separate from the monopoly portion of the telephone company's business, that the RBOC not discriminate in either procurement or sales, and that needed network information be timely disclosed to competing manufacturers.

OPEN ACCESS/PROGRAMMING DIVERSITY

There is a long-standing national policy, embodied in the First Amendment, of protecting diversity and competition in the flow of ideas. This fundamental interest is critical not only with respect to the provision of entertainment, but also with respect to educational material, health information, information necessary to an informed citizenry, and other programming matter. To further this goal, the Administration plans to require the FCC, one year after enactment, to impose nondiscriminatory access obligations on cable television systems, except when technology, costs, and market conditions make it inappropriate.

ENSURING REGULATORY FLEXIBILITY AND FAIRNESS

The new regulatory framework that the Administration seeks to create is designed to adjust to the technological and market changes that have undermined the regulatory regime created by the Communications Act. Legislation in this area must stand the test of time, by addressing tomorrow's challenges as well as today's. The Administration's lodestars in this efforts are flexibility, adaptability, and fairness. The regulatory instruments we choose must be supple enough to accommodate the continual change that will typify communications industries in the future. At the same time, those instruments must be equitable; similarly situated services should be subject to the same regulatory requirements.

Beyond tackling the problems that have arisen as a result of current technological and market changes, the Administration recognizes that a new kind of communications service provider will emerge, one that offers switched, broadband digital transmission services to home and office. Such firms face the potential of being regulated under two different parts of the Communications Act -- Titles II (common carriers) and VI (cable communications). These firms will also be regulated

at the state level for the intrastate component of their Title II services and at the local level for their Title VI services, creating a needlessly overlapping and complex regulatory environment.

The nation needs a flexible, adaptable regulatory regime that encourages the competitive provision of the broadband, switched digital transmission services that can truly knit homes and businesses together. The Administration will propose a future-oriented regulatory regime, to be enacted as a new Title VII to the Communications Act, that will encourage firms to provide these services.

The keys to regulatory reform:

- Flexibility
- Adaptability
- Fairness

The Administration's proposal would provide the FCC with broad forbearance authority while maintaining key public policy goals, including open access and interoperability requirements, along with obligations to support universal service. In addition, consistent with the approach taken in the 1992 Cable Act, the proposal will provide for rate regulation until competition is established in these service markets, with a presumption of forbearance for new entrants that are not dominant in related services. State and local regulation of services not subject to competition could take place subject to FCC guidelines. Under the Administration's plan, the FCC would adopt transition rules to move to this new regime. Firms would elect to be regulated under the new framework, provided that they meet threshold criteria established by the FCC.

In addition, the Administration proposes to allow the FCC to reduce regulation for telecommunications carriers that lack market power. This provision will ensure that unnecessary government regulation -- however well-intentioned -- does not harm users of the infrastructure, or impede competitive entry, investment, and the introduction of new services.

UNIVERSAL SERVICE

The United States has long been dedicated to "universal service" -- widespread availability of basic telephone service at affordable rates. As stated in the "Agenda for Action," the Administration is committed to developing a new concept of universal service that will serve the information needs of the American people in the 21st century. Indeed, the full potential of the NII will not be realized unless all Americans who desire it have easy, affordable access to advanced communications and information services, regardless of income, disability, or location.

It is a goal of this Administration that by the year 2000, all of the classrooms, libraries, hospitals, and clinics in the United States will be connected to the NII.

The Administration recognizes, however, that crafting a new, meaningful, and practical definition of universal service will require flexibility, foresight, and the balancing of diverse interests. Given these circumstances, the proposed legislation will establish several overarching guidelines and charge the expert agencies -- the FCC and the state regulatory commissions -- with establishing the details.

The Administration therefore proposes to:

- ✓ Make the preservation and advancement of "universal service" an explicit objective of the Communications Act, in order to establish the goal that advanced services be available to rural and urban lower income users, to users in areas where the costs of service are high, and to social institutions, especially schools and health care facilities.
- ✓ Charge the FCC and the states with continuing responsibility to review the definition of universal service to meet changing technological, economic, and societal circumstances.
- ✓ Establish a Federal/State Joint Board to make recommendations concerning FCC and state action on the fundamental elements of universal service. In its deliberations, the Joint Board must gather input from non-governmental organizations.
- ✓ Oblige those who provide telecommunications services to contribute to the preservation and advancement of universal service. However, the FCC, in consultation with the states, would be authorized to permit "sliding scale" contributions (e.g., to avoid burdening small providers and new entrants), or "in-kind" contributions in lieu of cash payments (e.g., to reduce the monetary payments owed by providers that offer to connect with schools, hospitals, etc.).

TELECOMMUNICATIONS POLICY REFORM

New technologies and market forces have led to a convergence of once separate communications industries, and this convergence requires a new framework to ensure that the United States remains a leader of the information age. This new framework is the Administration's legislative agenda on communications outlined by Vice President Gore. It is only one in a series of steps to encourage the development of the National Information Infrastructure (NII), a seamless web of communications networks, computers, databases, and consumer electronics that will put vast amounts of information at users' fingertips.

The Administration's legislative agenda on telecommunications seeks to facilitate greater economic growth by removing regulatory barriers, and to create new jobs, new business opportunities and expanded diversity of choice for American consumers. An advanced information infrastructure will bring into millions of homes information that will enrich people's economic, social, and political lives. Ensuring that this technology is used to promote education, health care, and information access for the benefit of all Americans is a major goal of the legislative initiatives.

Specifically, the initiatives aim to create a flexible, adaptable approach to the communications industry that will encourage the development of the information infrastructure -- a network that eventually will link homes and businesses together in multimedia community networks. The legislative initiatives promote what is known as a broadband interactive network, or a network that enables vast amounts of information to flow back and forth. In addition, the legislation will:

- ✓ Increase competition and private investment in communications by removing unnecessary regulations and artificial barriers to participation by private firms in all communications markets. For example, the Administration proposes to permit cable companies and others to provide local telephone service;
- ✓ Secure open access to the network for consumers and service providers. For example, the legislation requires all local telephone companies upon reasonable request to interconnect their networks with the facilities of competing providers on nondiscriminatory terms;
- ✓ Preserve and advance universal service for all Americans across all sectors of society. Because full and productive participation in American society will increasingly depend on access to information, the Administration is committed to promoting the availability of information resources to all people at affordable prices;
- ✓ Develop a new regulatory framework that is flexible and fair by allowing the FCC to reduce regulation for telecommunications carriers that lack market power.

The Administration's legislative agenda outlines a comprehensive approach to communications. It is a broad vision of the future of the information infrastructure, with a commitment to using communications technology to improve and enhance the lives of all Americans.

Electronic Copies of the Vice President's Speech

January 11, 1994

are available from:

On the internet:

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etc.

STATEMENT OF JOHN SCULLEY
CHAIRMAN, APPLE COMPUTER AND
CHAIRMAN, COMPUTER SYSTEMS POLICY PROJECT

**PERSPECTIVES ON THE NATIONAL
INFORMATION INFRASTRUCTURE:**
CSPP's Vision and Recommendations for Action

Before the Subcommittee on Telecommunications and Finance
January 19, 1993

Executive Summary

As the 21st century approaches, our nation's challenge is to find ways to rekindle economic growth, remain competitive abroad, and create the kinds of jobs that will enable Americans to raise their standard of living. This will require that we be more productive and innovative than our competition abroad, and that we act more quickly and more efficiently.

Across a range of industries, Americans are increasingly turning to information technology to do just that. Our ability to generate and exchange information, technology, and ideas is helping us to increase output, decrease costs, improve quality, and bring new products to market. The United States has a unique opportunity to capitalize on this increasing reliance on information technology and the benefits it can bring.

We are currently the world leader in computing and communications technologies, yet we have not taken steps that will allow us to make the most of our potential. This report calls for concerted efforts by the U.S. public and private sectors to develop and deploy an advanced information infrastructure that will put our information technology advantage to work for all Americans.

Throughout history, the United States has been successful, in part, because we have taken bold steps to make our national resources available to individual Americans by creating a variety of underlying foundations or infrastructures. Our transportation, telephone, electric power, and water systems are all solid examples of this tradition. By developing the infrastructures to make these resources readily accessible to individual Americans and easy to use, we have experienced an economic prosperity, quality of life, and global competitiveness virtually unmatched by any nation. We need to build on this tradition to carry us into the 21st century.

A national information infrastructure, which will be as accessible and easy to use as our existing national infrastructures, will revolutionize our ability to communicate and collaborate by erasing geographical boundaries. It will enable us to tap into our existing resources of creativity and knowledge. It will lead to the development of products and services today unimagined. It will create new jobs and economic strength for individual Americans. It will accelerate the development of critical technologies. And finally, it will enable us to address more effectively many societal problems, including challenges in the areas of health care, education, and manufacturing.

The call for a national information infrastructure builds upon the High Performance Computing and Communications (HPCC) Program. The HPCC Program is an excellent first step. It provides an initial research foundation to create a more extensive information infrastructure that will be broadly accessible to the public and capable of meeting a wide variety of information needs.

Nevertheless, it alone is not enough. CSPP believes the United States must make a national commitment to create a new national information infrastructure that complements, builds upon, and delivers the advantages of the research being performed in the HPCC Program, enabling the private sector to create new services that will benefit individuals in all walks of life. This will require improving upon and linking together current communications, computing, information, and human resource capabilities. More importantly, it will require developing new capabilities to enable broad access to a variety of public and private information resources. Finally, it will require the integration of a range of computing and communications technologies to enable transmission of text, images, audio, and video to anyone, anywhere, at any time.

CSPP believes the first step is to develop a consensus vision -- across industries and with the government -- of what the information infrastructure should be. It will also require building a widespread understanding of the benefits this infrastructure could bring to individual Americans. On the following pages, CSPP presents its vision of the national information infrastructure (NII). In addition, CSPP recommends the following actions be taken by the new Administration, Congress, and U.S. industry:

Summary of Recommendations

Administration Agenda

1. Make the NII a National Technology Challenge
2. Establish a National Information Infrastructure Council
3. Establish an NII Implementation Entity
4. Invest in Research for an NII
5. Fund Pilot Projects to Demonstrate Technologies
6. Develop a Public Education Program
7. Make Government Information Easily Accessible

Legislative Agenda

1. Authorize a National Information Infrastructure Council and Appropriate Funds for its Operation
2. Authorize and Appropriate Funds for Research and Technology Demonstrations

Industry Agenda

1. Continue Investments to Develop and Deploy an NII
2. Continue to Invest in Research and Development of Applications
3. Reach Out to Other Industries
4. Promote NII Efforts
5. Develop and Participate in Pilot Projects
6. Develop NII Goals and Milestones

Finally, CSPP believes the public policy principles outlined at the end of this report must be addressed jointly by the private sector and government before the information infrastructure of the future can become a reality.

Background

In December 1990, the CEOs of CSPP met with Administration officials to discuss their public policy positions on technology issues. At that meeting, CSPP was asked to assess the High Performance Computing and Communications (HPCC) Program and provide recommendations to increase industry's involvement and interest.

On December 3, 1991, after almost a year of review and analysis, CSPP issued its report and video, "Expanding the Vision of High Performance Computing and Communications: Linking America for the Future," concluding that the HPCC Program is a significant and critical undertaking. It would, CSPP determined, advance research in high performance computing and networking technologies as well as increase the use of high performance computers to solve important science and engineering problems. At the same time, CSPP observed that the HPCC Program could provide a foundation for something more. If properly designed,

wide range of social and economic problems and improve the competitiveness of U.S. industry by providing the foundation for a national communications and information infrastructure.

CSPP continues to support the HPCC Program and believes it should remain a national research priority. CSPP applauds the recent creation of a new, improved management structure for the Program, which will provide a clear mechanism to coordinate, manage, and govern the implementation of the Program and a central point for private sector interaction. In addition, CSPP commends Senator Al Gore and Representative George Brown for introducing the Information Infrastructure Technology Act in the summer of 1992 to move the HPCC effort to a new level.

The research and technology advancements supported by the HPCC Program remain a high priority for CSPP. In October 1992, in the CSPP Agenda for the 103rd Congress, we recommended enhancing and expanding the HPCC research agenda to: 1) provide the foundation for an information and communications infrastructure of the future; 2) bring the benefits of HPCC technology to individual Americans in areas such as health care, education, and manufacturing; and 3) develop technology demonstration projects.

In addition to supporting the HPCC Program, CSPP believes the nation must focus on creating the information infrastructure for the future. Together, the HPCC Program and the NII will provide the means to address the difficult challenges the nation now faces. HPCC research advancements will pave the way for the applications a national information infrastructure will make possible, and the infrastructure will provide a vehicle to deliver the benefits of HPCC research. The following report describes our vision for the infrastructure and recommendations for action that will help to make the vision a reality.

Part I: CSPP's Vision

Introduction

Information in the 21st Century

In the future, the United States' primary resource for generating economic prosperity, improved quality of life, and global competitiveness will be our ability to quickly and efficiently generate and exchange information, technology, and ideas.

Increasingly, across a range of industries from banking and retail to automotive and aerospace, information technology has become instrumental in product development, manufacturing, marketing, sales, and service. The flow of

Information has become the foundation for improving productivity and increasing innovation in most every business enterprise. U.S. industry is not, however, the only beneficiary. Information technology continues to become an increasingly integral part of the every day lives of individual Americans. Automated tellers, airline reservation systems, anti-lock brakes, and personal computers are just a few examples.

As we face the 21st century, we have an advantage over our foreign competitors. We currently lead the world in computing and communications technologies. But to make the most of the increasing reliance on information technology and our current strengths, we, as a nation, need to take the bold step of developing and deploying an advanced information infrastructure that will help us remain more productive and more innovative than our competitors abroad.

The National Information Infrastructure

What Is It?

The infrastructure of the future is a nation-wide system that will allow all Americans to take advantage of our rich resources in information, communication, and computing technologies. It will link together a range of institutions and resources, from schools and businesses to libraries and laboratories. More importantly, it will link together individuals, from senior citizens and students, to health care professionals, manufacturing managers, and business people from all fields.

The information infrastructure of the future will revolutionize the way individuals relate with one another by enabling us to work together, collaborate, and access and generate information without regard to geographical boundaries. It will enable fundamental changes in the way we educate our children, train and retrain our workers, earn a living, manufacture products, deliver services of all kinds, and interact with family and friends.

Throughout its history, the United States has followed a tradition of creating underlying national foundations -- infrastructures -- that have fostered a quality of life in America unmatched by any nation. Our transportation, electric power, and water systems are all solid examples of this tradition. As we move into the 21st century, these existing infrastructures will continue to be important, but they, alone, will no longer be sufficient to meet our national needs.

Today, we think nothing about turning on a faucet and immediately getting hot water for a shower, flipping a switch and getting electricity to make coffee, and another switch to get a weather report. We pick up the telephone without a

second thought. We must create an advanced information infrastructure for the future that will provide Americans with the same easy access to all sorts of information and people.

The information infrastructure, used in conjunction with a collection of "information appliances" -- tools that will combine computing, communications, and video technologies, for example -- will give people in rural areas ready access to libraries, museum exhibits, job information, and medical care now only available to those who live near those resources. People all over the country will be able to work and interact with others, without even knowing their collaborators' locations. By making information resources readily available and easy to use, the information infrastructure of the future will revolutionize our ability to access the information we need and our ability to collaborate and cooperate with others.

This infrastructure will integrate four essential elements -- communications networks, computers, information, and people -- to create a whole new way of learning, working, and interacting with others. A more detailed description of the elements of the infrastructure includes the following:

Communications Networks

- a network of interconnected and interoperable public and private communications networks ("public" networks refer to those networks, such as the public switched telephone network, that are open to use by anyone; "private" networks refer to those that are limited to use by a specific group of people meeting certain criteria, such as corporate networks), providing services ranging from high to low speed, allowing a range of uses anytime, anywhere;
- agreed-upon technical standards for piecing together the network, having all its pieces work together, and plugging into it;
- the capacity to transmit information, at both high and low speeds, in a variety of data formats, including image, voice, and video; and
- multiple mechanisms, perhaps including digital signatures, to support the electronic transfer of funds in exchange for services received.

Computers

- high-performance computers resident on the communications networks to provide intelligent switching and enhanced network services;

- powerful personal computers and work stations -- including machines that respond to handwritten or spoken commands and portable, wireless devices -- that are easy to use and mask the complexity of the underlying system so people can tap into it as easily as they dial a phone; and
- distributed computer applications that are widely accessible over the network (which acts like a lending library) and that help people perform a wide variety of tasks quickly and easily.

Information

- public and private databases and digital libraries that include material in video, image, and audio formats; and
- information services and network directories that assist users in locating, synthesizing, and updating information.

People

- people of all ages and backgrounds who are easily able to use the rich and varied resources available through the infrastructure to improve how they learn, live, and work; and
- people who create, package, communicate, and sell information in the many new ways made possible by the existence of the information infrastructure.

Why Is It Important?

The investments the nation has made over the years to develop our existing transportation, communications, and energy distribution infrastructures were instrumental in making the United States an economic and political world leader. They were also instrumental in improving the quality of life for individual Americans. To remain an economic power in the 21st century, the United States must have in place an infrastructure that allows us to compete in the Information Age by providing a tool to be continually more productive and innovative.

An information infrastructure will enable the U.S. to tap into the vast resources of knowledge and creativity that already exist in this country. As the volume and complexity of our information resources has increased, it has become almost impossible for any individual or business to take full advantage of what is available. An information infrastructure will make the benefits of information technology as available to individual Americans as the transportation infrastructure made available the benefits of automotive technology and the communications infrastructure made available the benefits of telephone technology. It will create

new opportunities for the development of products and services we cannot even begin to imagine today, creating new jobs and economic strength for Americans and providing a resource for our current workers to continuously improve and upgrade their job skills.

In addition, an information infrastructure will accelerate the development of critical U.S. technologies. A strong consensus exists as to what technologies bolster the competitiveness of our economy and where we stand in those technologies relative to the rest of the world. Initiatives to develop, deploy, and use an information infrastructure will create a market demand for many of these technologies, spurring an increase in private sector investment. Moreover, these technologies would be put to work in the real world, a testing ground more powerful than the laboratory and with the potential to directly benefit individual Americans by generating advancements in commercially relevant technologies and creating an infrastructure they can use.

Finally, the information infrastructure will lead to the development of a range of new "information appliances" that will allow Americans to tap into the resources of the infrastructure in ways beyond our understanding today. Some of these tools for the infrastructure could include interactive learning devices, wireless computers capable of simulating design and engineering plans on-site, and pocket size devices allowing doctors access to medical resources from remote locations. The only thing that will limit the shape, form, and use of these appliances is our imagination.

Why Should The United States Act Now?

Today, many of the changes taking place in our economy and influencing our competitive position are driven by the advent of the information age and the new set of economic ground rules this has created. In the information age, the value of the products and services we exchange is increasingly a function of their information content and the knowledge used to create them rather than the raw materials used to produce them. Because of this shift, the ability to easily access and share information and stimulate the creation of new ideas is essential to maintaining a strong economy, developing world class industries, and enhancing the quality of life for every citizen. America now has the opportunity to create the information infrastructure required to achieve this.

Other nations, including Japan, Germany, France, and Singapore are taking significant steps to upgrade their own infrastructures and have long-term plans in place to continue doing so. With U.S. industry and government working together as partners, we can build on our already strong lead in information technology to

maintain our current lead, help us compete abroad, and improve our quality of life at home.

A coordinated, focused drive for a national information infrastructure will enable us to more effectively and efficiently devote our collective talents to developing the competitive edge against other nations. Working together toward a common goal, America will realize the benefits of an information infrastructure sooner -- we will establish the standards the world will need to follow and we will be the first to market with important new products, services, and applications for the infrastructure. More importantly, we will be able to dramatically change the way Americans learn, care for the sick and elderly, and manufacture products.

The following descriptions provide a glimpse of the important benefits an information infrastructure could make possible.

The Potential Benefits

Health Care

Americans spend more on health care than on any other industry, but they are getting less in return for their expenditures than is possible. For many people, health care is too expensive and often unavailable. CSPP believes that computing and communications technologies can provide solutions to both of these shortcomings.

Health care is a large, high growth, recession resistant industry, with spending rising about 2 1/2 times faster than GNP. In 1991, health care spending totalled \$738 billion, or 13% of GNP, up from 7.3% of GNP in 1970. The Health Care Financing Administration projects that the nation's health outlays will reach \$1.6 trillion by the year 2000. The soaring cost of health care has triggered concern about the ability of the nation to continue providing quality health and medical care as well as the ability of individual Americans to afford it.

Health care is extremely information intensive. Each year, Americans make approximately 636 million visits to doctors' offices for ambulatory care. In addition, 23 million surgical procedures are performed annually. Each visit and procedure generates large amounts of medical and financial data. There is presently no means to preserve or track that information for use in future or related health care situations. In fact, the cost of managing health care information is one of the prime causes of the increasing cost of health care.

Improving the management of this information through a health care information infrastructure will enable efficiency gains and cost savings throughout the entire health care process. First, roughly 20% of annual health care

expenditures go to administrative costs, including processing an estimated five million health care claims per day. Computing and communications technologies offer new opportunities to improve the management of and access to health care-related information and to reduce costs for processing insurance claims through electronic payment and reimbursement. Second, better access to medical data and patient medical histories will help improve doctors' diagnoses by providing fast and easy access to accurate, complete, and up-to-date information. Third, high speed networks will enable residents of rural areas and inner cities to enjoy the benefits of the latest medical technologies and expert opinions without leaving their home towns. Finally, easy access to information by individuals in their homes on self-care and healthy lifestyle practices will enable people to better manage their own health, reducing the number of visits to doctors' offices and hospitals, and increasing the likelihood that medical problems will be identified earlier.

The challenge is to create a medical information infrastructure that will support the following types of applications that could help, in the near and longer term, to solve the health care problems the nation is experiencing:

- **On-Line Patient Records** -- Hospitals, doctors' offices, and community clinics will be interconnected through high speed networks. Patient records, including medical and biological data, would be available to authorized health care professionals anytime, anywhere (with privacy assured) over these networks. This would enable health care providers to access immediately, from any location, the most up-to-date patient data, including medical images from tests, resulting in improved diagnoses and more informed treatment decisions.
- **Medical Collaboration** -- Medical personnel will use interactive, multimedia telemedicine technologies to collaborate and consult with each other over distances. Doctors in hospitals or offices will consult on short notice with experts located anywhere in the nation; emergency room physicians will provide vital assistance to emergency medical personnel on the scene via wireless technologies. Patients and their doctors would have instant access -- at affordable cost -- to experts and specialists, no matter where the patient is located.
- **Surgical Planning and Treatment** -- Physicians and surgeons will use high speed computing technologies to simulate the function of human organs to facilitate medical diagnoses and treatment decisions, and to plan complex surgical procedures. Imaging and modeling techniques will be used to produce realistic and detailed 3D models of a patient's organ, to develop the most effective and safe surgical procedures, to demonstrate planned procedures to patients and medical students, and to develop alternate

non-invasive treatments. With high speed networks, images could be transmitted instantly to experts located elsewhere for confirmation of diagnoses and treatment recommendations.

Education

To ensure a secure and prosperous future, Americans need to be able to think critically and to have access to the widest possible body of knowledge. The work force requirements of the future will increasingly require people to be able to learn new skills to adapt to changing job requirements and new technologies and to use knowledge and information to make decisions. Changes must be made to the United States' education system to ensure that it will give individuals the skills they will need for lifelong learning in a high wage, information-based economy of the future.

Meeting these challenges will require extending America's edge in computing and communications technologies to education services in schools, communities, work places, and homes. An information infrastructure for lifelong learning will offer unprecedented potential for improving lives by making knowledge readily available and usable by all Americans. Such an infrastructure would provide a tool for addressing many of the learning needs the country is facing, including, for example, making additional resources available on-line for teachers who want to improve their skills and update their knowledge; providing a means for Americans to continually acquire the new knowledge to adapt to the multiple careers many will likely undertake; providing seniors and disabled or homebound Americans direct access to information resources critical to their health and welfare; and providing better access to information that affects our quality of life and cultural awareness.

Effective deployment of a computing and communications infrastructure for education and lifelong learning requires well trained and technologically experienced teachers and administrators who can facilitate the use, installation, and management of new instructional technologies such as digital interactive video, local area networks, and gateways to national networks. Users and students will need new skills to help them retrieve, review, categorize, and analyze the information and knowledge they will be able to access. This will require investment in training for educators and students in the use of new technologies, development of model curricula and new instructional techniques, development of new information resources, improvement in the quality of existing resources, and extension of public access to electronic schools and libraries.

A national information infrastructure will create an enormous range of education and lifelong learning applications, such as:

- **On-line Job Training Libraries** -- Interactive, multimedia, digital libraries will be available on job sites to provide workers with task-oriented information that they could use, at their own convenience and pace, to improve and upgrade their job skills and performance. Workers in any job -- assembly lines, retail outlets, sales, or offices -- would be able to continuously upgrade their skills and learn new skills at any time through customized training libraries.
- **Electronic Libraries** -- Students will use on-line electronic libraries in classrooms and at home to learn more about any topic. For example, if a student wanted to learn about the works of Shakespeare -- or about a specific play -- he or she will simply turn on a computer and, with the flick of a switch, be connected to the entire works of Shakespeare, complete with photographs, videos, and recordings. The electronic libraries will include software tools to help students find the information they need, identify relevant data, analyze, and present the information and will provide access to information and reference specialists to help users locate the material they need.
- **Virtual Laboratories & Field Trips** -- Through virtual laboratories, students will perform science experiments using equipment and facilities located anywhere in the United States, including at the national laboratories, in collaboration with some of the nation's best laboratory scientists. Students will also take "field trips" to museums, observatories, science exhibits, and research centers without leaving the classroom.
- **Collaborative Learning** -- Students of all levels and ages, teachers, and experts will collaborate, in real time, via high speed networks, on a wide variety of learning projects. The collaborators will access information and high performance computing resources located throughout the country, such as images collected by NASA's Earth Observing System satellites, and would work together to develop research projects that focus on their own interests.

Intelligent Manufacturing

The U.S. manufacturing enterprise faces enormous challenges over the next decade just to keep up with new information and new technologies. The industrial world is rapidly moving to "electronic commerce," in which suppliers and design collaborators will be on-line; factories will be highly programmable and staffed with highly skilled personnel; product design and manufacturing will be fully integrated; and custom-made, high-quality products will be manufactured rapidly in small quantities. Failure to keep pace and maintain technological leadership will threaten our long-term competitive position in the world market.

Increasingly, to stay competitive, companies of all sizes must be able to respond rapidly to customer demands for high-quality products at low cost. This requires manufacturing and design processes that are highly efficient and flexible to enable the shortest possible design, development, and production times. Companies able to adapt and apply the latest information and communications technologies to their manufacturing processes will have an advantage over their less innovative competitors in the future. The challenge, therefore, is to develop, deploy and apply the technologies for a manufacturing infrastructure that incorporates computing and communications technologies to support integrated development, engineering, and manufacturing processes.

It is critical to ensure that small and medium manufacturers are stakeholders in this new infrastructure. Small and medium manufacturers are vital to the nation's economic development and growth, accounting for 40 percent of GNP, half of all employment, and more than half of job creation. Providing small and medium companies with access to computing, communications, and information resources will enable them to adopt new technologies and manufacturing techniques, reducing the cost of doing business and increasing efficiency and productivity.

Work is already underway in the private and public sectors to expand the use of advanced computing and communications technologies in the manufacturing process, but much more is needed. HPCC Program research in aerospace vehicle design and advanced materials are just a few examples of the application of high performance computing to benefit our industries. Computer-aided design (CAD) and computer-aided manufacturing (CAM) technologies are being incorporated into U.S. manufacturing enterprises at increasing rates. However, CAD/CAM technologies, which are further advanced than many other intelligent manufacturing innovations, still need improvement before they can be widely implemented and must be integrated into both the design and manufacturing processes to fully realize their benefits.

A national information infrastructure has the potential to significantly increase the productivity and quality of U.S. manufacturing by enabling applications such as:

- **Concurrent and Distributed Design, Engineering, and Manufacturing** -- Manufacturers of products, from automobiles to airplanes, and from machine tools to televisions, will distribute scheduling and production across geographically dispersed facilities to reduce production delays, minimize manufacturing, transportation, and inventory costs, perform design, engineering, and manufacturing concurrently, and leverage unique skills and availability of skilled resources. Large amounts of information, such as engineering modeling data, product specifications, test specifications, and

bills of materials, will be distributed and shared among dispersed facilities in real time. All of these techniques will significantly reduce the time to develop new products and bring them to market.

- **Electronic Commerce for Manufacturing Enterprises** -- Companies of all sizes will increase their efficiency and productivity while reducing costs by incorporating electronic commerce into their operations. Through links with suppliers, customers and local, state and federal governments, companies will be able to conduct virtually all of their essential business opportunities electronically, including: locating the best suppliers to meet their needs, identifying potential customers for their products, placing and receiving orders, exchanging payments, and ascertaining the latest government regulations affecting their businesses and submitting required compliance reports electronically.
- **Virtual Design and Manufacturing Project** -- Manufacturers of complex, expensive products will use virtual design facilities to model, simulate, and visualize product designs and manufacturing processes in advance, saving the costs of building prototypes. Eventually, virtual reality technologies will permit product designers to "walk through" new products before actually building the products and through manufacturing facilities before production begins.

Part II: Recommendations for Action

By investing in the HPCC Program, the United States has already begun investing in the research for an infrastructure based on high speed networks, high performance computers, and on-line information. CSPP will continue to work with Congress and the new Administration to implement our recommendations to improve the structure of the HPCC Program. However, we must now make a national commitment to take the next step to develop a new national information infrastructure that will provide us with the best opportunity to compete in the global economy of the future.

Through a public and private partnership to develop and deploy a national information infrastructure, we will not only lay the best foundation for remaining internationally competitive, we will also give ourselves the best chance to solve many of our domestic challenges -- the declining quality of education, the skyrocketing cost and limited availability of high-quality health care, and the need for businesses of all sizes to increase quality and productivity -- which increasingly require the ability to access and use large amounts of distributed information.

The time to act is now. Creating a national information infrastructure of the future will require improving upon and linking together current communications, computing, information, and human resource capabilities. More importantly, it will require developing new capabilities to enable broad access by millions of Americans to public and private information resources and to enable people to generate, transmit and receive text, images, and video anywhere, at any time.

Before the comprehensive information infrastructure of the future can be realized, a broad cross-section of American industries, academic and research institutions, and the federal government need to agree on a common vision for the effort. With a common vision in place, the private and public sectors can make a commitment to do what they need to do, independently or together, to make the vision a reality. While the private sector has primary responsibility for developing and making available the services, products, networks, and applications to make the infrastructure possible, the federal government has an important role as a catalyst in stimulating the effort and creating a regulatory environment that will encourage private sector investment and implementation.

To accelerate the development and deployment of a national information infrastructure, CSPP recommends that the Administration, Congress, and the private sector begin a joint effort to take the following actions:

Administration Agenda

1. **Make the NII a National Technology Challenge:** The President should declare the national information infrastructure a new national technology challenge. The President should, in his State of the Union address and his FY94 budget submission, issue a challenge to Congress, industry, academic, and research institutions, and potential users to work with him to create a new information infrastructure.
2. **Establish a National Information Infrastructure Council:** The successful development and deployment of a national information infrastructure will be contingent upon the government adopting a vision and a strategy for its implementation. The best way to accomplish these objectives is to establish a National Information Infrastructure Council, chaired by the Vice President, to provide a management focus for the effort. Members of the Council should include the Secretary of Commerce, the Director of the Office of Science and Technology Policy, the Chairman of the Federal Communications Commission, and the heads of other federal departments, agencies, and White House Executive Offices who have roles or responsibilities in the information infrastructure, and private sector experts, including representatives of industry, user groups, and research institutions. The Council should have as its initial responsibilities:

- adopting a vision for an NII;
 - working with the private sector to develop and adopt several concrete goals for the NII, with accomplishable milestones;
 - coordinating the NII activities of the various government agencies and departments; and
 - developing a strategy to address the information infrastructure policy principles listed following these recommendations.
3. **Establish an NII Implementation Entity:** Establish a federal entity to implement the National Information Infrastructure Council's vision, plans, strategies, recommendations, and other directions. The entity should have the responsibility and the authority to:
- manage and focus the NII research agenda, including research performed by the national labs;
 - coordinate, in conjunction with other appropriate agencies and departments, the NII technology demonstrations; and
 - develop strategies to overcome policy and regulatory barriers affecting the deployment by the private sector of a national communications network of interoperable, interworking networks.
4. **Invest in Research for an NII:** The FY94 budget request should include funds for precompetitive, generic research on enabling technologies for an NII, such as the following:
- research on the generic, enabling technologies needed to address challenges in health care, education and lifelong learning, and intelligent manufacturing;
 - research on the scalability problems associated with aggregating many high, medium, and low speed users;
 - technologies and architectures to ensure the security of information available in an NII and to guarantee privacy of information;
 - interoperability;
 - integrity and robustness of networks and databases;

- human/computer interfaces, such as speech and handwriting recognition and machine intelligence; and
 - research on creating and managing distributed electronic databases and libraries, such as indexing databases, digitizing libraries, and organizing material.
5. **Fund Pilot Projects to Demonstrate Technologies:** In conjunction with industry, the federal government should fund pilot projects to demonstrate the application of high performance computing and communications technologies to health care, education and lifelong learning, and manufacturing. Such projects will help solve problems in scaling technologies and accelerate development of standards.
 6. **Develop a Public Education Program:** Request the National Research Council of the National Academies of Science and Engineering to develop, in conjunction with the private sector, a program to educate the general public about the potential benefits of an NII and the impact it will have on their lives.
 7. **Make Government Information Easily Accessible:** An information infrastructure could provide federal, state, and local governments with a system to better serve their citizens while reducing the cost of providing those services. Through a national information infrastructure, people would have ready access to the most up to date information about their entitlement to health, education, housing, and social security benefits. Citizens could, for example, use the infrastructure to register to vote, renew their drivers licenses, and pay their taxes. The National Research Council should assess federal information collection and dissemination policies and practices and make recommendations on how such policies and practices should be changed to make public information easily available and accessible to citizens through the NII. The NII implementation agency should be charged with developing a strategy to implement the recommendations across all affected departments and agencies

Legislative Agenda

1. **Authorize a National Information Infrastructure Council and Appropriate Funds for its Operation:** Introduce legislation to authorize creation of a National Information Infrastructure Council to oversee development of the NII and appropriate funds for its operation.
2. **Authorize and Appropriate Funds for Research and Technology Demonstrations:** Introduce legislation, based on the Information

Infrastructure and Technology Act of 1992, to authorize research on NII technologies and demonstration projects in health care, education, and manufacturing, and appropriate funds for such projects.

Industry Agenda

1. **Continue Investments to Develop and Deploy an NII:** The U.S. computer industry is investing billions of dollars each year in research and development relevant to an NII. Industry must continue to work to develop and deploy the NII, including:
 - deployment of interoperable communications networks;
 - development of on-line databases and applications;
 - development of easy to use computers and information appliances; and
 - training people to design, develop, and use the various elements of the infrastructure.
2. **Continue to Invest in Research and Development of Applications:** Companies must continue independent and collaborative efforts to invest in research on NII technologies and development of new products and services.
3. **Reach Out to Other Industries:** CSPP will initiate a project to encourage other industries likely to benefit from the applications made possible through an NII to join the effort to achieve an NII.
4. **Promote NII Efforts:** A wide range of affected industries should form a non-profit group to work with the National Research Council to promote the NII.
5. **Develop and Participate in Pilot Projects:** Industry should undertake an effort to develop strategic plans and facilitate the formation of teams to design technology demonstration projects in health care, education and lifelong learning, and manufacturing.
6. **Develop NII Goals and Milestones:** The private sector will work with the Infrastructure Council to develop specific examples of accomplishable goals for an NII, with concrete milestones, such as, for example, a nationwide system of on-line patient records accessible by any authorized health care professional, anywhere; and all small and medium manufacturing companies networked with the manufacturing extension centers.

Policy Principles for a National Information Infrastructure

The public and private sectors have important roles in making the information infrastructure a reality. While the development and deployment of the infrastructure must be led by the private sector, guided by the forces of a free and open market, the federal government can accelerate its implementation by acting as a catalyst and a coordinator.

CSPP has identified the following important public policy principles that will have to be addressed jointly by the public and private sectors before the information infrastructure can become a reality. CSPP looks forward to working with the new Administration, new Congress, and other industry groups to address these issues.

1. **Access** -- Because an informed citizenry is essential to the nation's growth, all individuals must have access to the NII.
2. **First Amendment** -- To ensure freedom of expression in an NII, First Amendment principles guaranteeing freedom of speech, as articulated by U.S. courts, should apply to electronically-transmitted communications.
3. **Privacy** -- Consumers of NII services have a right to privacy in their use of the NII.
4. **Security** -- Information available through the NII must be protected against unauthorized access, tampering, and misuse, consistent with the needs of the applications and the desires of the user.
5. **Confidentiality** -- NII users must be free to use effective, industry-developed encryption to ensure confidentiality of communications and data.
6. **Affordability** -- To promote maximum use, the NII must be affordable.
7. **Intellectual Property** -- The fundamental principles of copyright should apply to electronically-available information in the same manner as for other media.
8. **New Technologies** -- While it is impossible to anticipate all of the technologies that will eventually be part of the NII, the political and regulatory environment must encourage the development of new technologies and their incorporation in the NII.
9. **Interoperability** -- The NII must support maximum interoperability among networks in this country and internationally.

10. **Competition** -- Service providers must have fair and open access to the NII in order to assure competition among such providers.
11. **Carrier Liability** -- Information services carriers and distributors who have no editorial control over the contents of electronic information should not be liable for the content of the information transmitted over the NII.

For Official Use Only

Highlights of National Information Infrastructure Applications Activities

A Report for the FY 1996 Budget Process

**Information Infrastructure Task Force
October 24, 1994**

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Executive Summary

This package of information has been prepared by the Information Infrastructure Task Force (IITF), the inter-agency team chaired by the Secretary of Commerce, which is implementing the President's action plan for developing, in partnership with the private sector, an advanced information infrastructure, the National Information Infrastructure (NII). Development of the NII has the potential to significantly improve the way people use information in their jobs and other aspects of their daily lives by bringing vast amounts of information and greatly improved services to virtually every citizen.

Private industry will be responsible for virtually every major facet of the NII and the information marketplace it creates. Nevertheless, the government will play an important role in this process by complementing and enhancing the benefits of private sector initiatives. As Vice President Gore has observed, "Our goal is not to design the [information] market of the future. It is to provide the principles that shape the market. And it is to provide the rules governing this difficult transition to an open market for information. We are committed in that transition to protect the availability, affordability and diversity of information and information technology as market forces replace regulations and judicial models that are simply no longer appropriate."

Earlier this year, the Vice President asked the IITF to highlight NII-related activities as input for the FY 1996 budget process. In this first year of such an effort, the IITF has focused on NII applications. This report identifies and illustrates what the Administration is doing to accelerate the development and deployment of NII applications. Since NII applications permeate so much of the government's activities, the IITF has not attempted to catalog the entirety of the government's involvement in the NII. Instead, the IITF has focused on illustrating where the government is committing its resources by describing key initiatives within each of eight application areas. This information is intended to help guide the FY 1996 budget decision-making process.

We have identified new initiatives proposed for inclusion in the FY 1996 Budget, as well as existing programs that are restructuring their efforts in a significant way. The primary goals are to provide a clear and compelling description of key efforts to accelerate NII applications and to increase the profile of NII-related activities in the core programs of all agencies. This report provides an input to the FY 1996 budget process. We hope to publish, at an appropriate time, a document based on this report to inform the public of the scope and range of the Administration's NII investments and efforts.

Introduction

This report, the Highlights of National Information Infrastructure Applications Activities: A Report for the FY 1996 Budget Process, is designed to highlight key initiatives that support the Administration's goals in the development and deployment of applications of the National Information Infrastructure (NII). The report has been prepared by the Administration's Information Infrastructure Task Force (IITF), the inter-agency team coordinating the development and use of the NII across government.

The NII will consist of (1) conduits, interconnected, interoperable telecommunications networks, (2) information appliances including computer systems, televisions, fax machines and telephones (3) software, information services, and information databases (e.g., "digital libraries"), and (4) trained people who can build, maintain, and operate these systems. In the future, the NII will enable all Americans to get the information they need when they need it, where they need it, and at an affordable price. Secretary of Commerce Ronald Brown notes that the NII and the information revolution will result in "a fundamental change in the way we work, the way we learn, and the way we communicate. Knowing how the Industrial Revolution permanently altered American life, we can only begin to imagine how we will be transformed by becoming an information society."

Private industry will build, own, and operate the NII and the information marketplace it creates. Private industry will build and manage the networks, provide the information tools and much of the information that travels the networks, and develop most of the applications that use the networks. But government remains a major influence on the NII and is committed to its development. In his State of the Union Address, President Clinton set as a National goal connection of the Nation's classrooms, libraries, schools, and clinics to the information infrastructure by the year 2000. Government policies on telecommunications reform, universal service, open access, privacy, security, interoperability, and standards, to name a few, will help shape the way the NII develops. Government actions, such as regulatory changes and intellectual property protection can help remove barriers to critical social and commercial applications of the NII. The federal government will use the networks to provide more efficient delivery of information and services to citizens. Another important role for government is coordinating U.S. activities with those of other countries, so that a truly international marketplace for information products and services can develop. As the Vice President has said, the international community is on the way to building a Global Information Infrastructure. Internet pioneer Robert Kahn believes that "Without government involvement on an international basis, it is unlikely that a global information infrastructure will emerge" [R.E. Kahn, CACM, Vol. 37, Nr. 8 (Aug 1994)].

The White House formed the IITF to articulate and implement the Administration's vision for the NII. The task force consists of high-level representatives of the federal agencies that play a major role in the development and application of information and telecommunications technologies. Working together with the private sector, the participating agencies are developing comprehensive technology, telecommunications, and information policies and promoting applications that best meet the needs of both the agencies and the country. Agencies are sharing information on NII-related activities, making it possible to leverage each other's work and avoid overlaps in activities. By helping build consensus on difficult policy issues, the IITF enables agencies to make and implement policy more quickly and effectively.

The IITF's Committee on Applications and Technology (CAT), chaired by Arati Prabhakar, Director of the National Institute of Standards and Technology, coordinates the Administration's efforts to develop, demonstrate, and promote applications of information technology in manufacturing, education, health care, government services, libraries, environmental monitoring, electronic commerce, and other applications. To determine tasks and priorities, the CAT draws on a wealth of input and comments from the private sector. Individuals, companies, and professional societies commented on issues papers and two reports on application areas. These reports, "Putting the Information Infrastructure to Work" and "The Information Infrastructure: Reaching Society's Goals", can be consulted for more information on the application areas discussed in this document. These reports are available through the IITF Secretariat. In addition, a partnership between industry and government resulted in a highly successful conference in September 1994: "Breaking the Barriers to the National Information Infrastructure." Nearly all the products from these activities are available to the public electronically through the Internet, providing a demonstration of the way government publications can be delivered using the NII.

Earlier this year, the Vice President asked the IITF to highlight NII-related activities that would increase the profile of federal NII-related efforts and assist Administration policy makers in determining where federal spending is being used on NII-related application areas. On June 24, 1994, Ronald Brown, Secretary of Commerce and Chair of the IITF, and Leon Panetta, then Director of the Office of Management and Budget, directed the IITF's Committee on Applications and Technology to identify new and existing federal initiatives that are significant to the NII. To accomplish this task, the CAT drew on the broad-based participation of people from across the government. In July, the CAT identified eight NII applications as categories into which agency submissions would be organized. The eight application areas are digital libraries; education; electronic commerce; environmental monitoring and natural resources management; government services; health care; manufacturing; and transportation. The CAT chose these as the core set of applications because there are significant public interests to be served by the application of advanced information and communication technologies in these areas.

From the end of July through October, a team of CAT participants from several federal agencies reviewed information from 20 agencies on more than 350 initiatives and 28 inter-agency programs and developed a framework for highlighting the Administration's NII-related efforts.

In addition to these contributions, we have also received preliminary input from the National Science and Technology Council (NSTC) Research and Development Budget Cross-cut. Agencies' NII-related programs and initiatives that have been submitted for the NSTC R&D Budget Cross-cut are noted in each of the eight application areas. Within the NSTC, the High Performance Computing and Communications (HPCC) Program has an important role in the development of the NII. The newest element of the HPCC Program, the Information Infrastructure Technology and Applications component, builds on and expands the research goals of the existing HPCC components and will provide critical enabling technologies that support each of the eight application areas. For a more detailed representation of agencies' HPCC efforts, please refer to the HPCC FY 1996 Budget Notebook.

The culmination of this effort is represented in this report, which was reviewed by the IITF at its meeting on October 4, 1994. Each of the eight applications areas provides a summary description of existing federal efforts and specific information to highlight key initiatives. The report also contains a spreadsheet that organizes all agency submissions into categories that reflect important issues or objectives for that application. Recognizing that a number of programs have contributions that span across application areas, the report lists programs and initiatives in each of the application areas where they have relevance.

Highlighted NII Initiatives

<i>Application Areas</i>	
Digital Libraries	
	Comprehensive Digital Library Initiatives (NASA, NSF, Library of Congress)
	New Technologies (DoC/NIST, DoE, NASA, NARA, NSF)
	Seamless Electronic Information Location and Access (DoC/Census, DoD/DISA, DoE, DoI/FGDC, DoJ, DoL, NASA, NSF, SBA)
	Library Infrastructure Grants (USDA/RDA, DoC/NTIA, Ed)
Education	
	Federal Leadership Activities (DoC/NOAA, EPA, NASA, NSF, and other agencies)
	Planning (Ed)
	Research and Development, Including Demonstrations (Ed, NASA, NEH, NSF)
	Deployment of Technology (USDA, USDA/RDA, USDA/REA, DoC/NTIA, Ed, DoL/OSHA, NEH)
	Professional Development (Ed, NASA, NEH)
Electronic Commerce	
	Development of Technology (DoC/NIST, DoE)
	Development of Standards (DoD/DISA, NASA)
	Development of Architectures (DoC/NIST, DoD/DISA, DoE, Treasury, GSA, SBA, VA)
	Development of Applications/Demonstrations (USDA, DoC/NIST, DoD/DISA, DoE, HUD, DHHS, DoL, Treasury, EPA, NASA, NSF, SBA, TVA, VA)
Environmental Monitoring and Natural Resources Management	
	Research and Modelling Programs (USDA/Forest Service, DoC/NOAA, DoE, EPA, NASA)
	Information Access/Connectivity (USDA/Forest Service, DoC/NOAA, DoE, DoI/NBS, EPA, NASA, NSF, and other agencies)
	Data Standards and Interoperability (USDA, USDA/Forest Service, DoI/FGDC, EPA)

Table continues on next page.

Highlighted NII Initiatives (cont'd)

<i>Application Areas</i>
Government Services
Information Access Projects (USDA, DoC, Ed, DHHS, DoI, DoJ, DoL, EPA, GSA, NASA, NEH, SBA, & other agencies)
National Performance Review Projects (USDA, DoC, DoD, DoE, DoJ, DHHS, DoL, Treasury, EPA, GSA, NARA, NEH, SBA, USPS, VA, & other agencies)
Service Delivery Projects (USDA, DHHS, HUD, DoI, DoL, NARA, VA, and other agencies)
Information Infrastructure Development (USDA, DoC, DoD, DoE, DHHS, HUD, DoI, DoJ, DoL, GSA, NASA, NARA, NEH, NSF, SBA, & other agencies)
Health Care
Health Care Access Programs (USDA/RDA, USDA/REA, DHHS/HCFA, DHHS/NIH, DHHS/ORH, DHHS/PHS, NASA, VA)
Health Care Quality Programs (USDA/REA; DoE; DHHS; AHCPR, CDC, CRDL, HCFA, HSTAR, NHIC, NLM, ODPHP, SAMSHA, SSA; DoL; NASA; VA)
Health Care Cost Containment Programs (DHHS/HCFA)
Infrastructure Investments Specific to Health (DoC/NIST, DoC/NTIA, DHHS/NLM, NASA)
Manufacturing
Research and Development (DoC/NIST, DoE, NSF)
Deployment (USDA/RDA, DoC/NIST, DoE, NASA, TVA)
Education and Training (DoE)
Transportation
Intelligent Vehicle-Highway Systems IVHS (DoT/FHWA, DoT/FTA, DoT/NHTSA)
Spatial Data and Reference Infrastructure (DoC/NOAA, DoT/FAA, NASA)
Mesoscale Aviation Weather Systems (DoC/NOAA, DoT/FAA)
Air Traffic Management and Control (DoD, DoT/FAA, NASA)
Waterway Management & Vessel Traffic Systems (DoC/NOAA, DoD/ACE, DoT/MARAD, DoT/USCG)

I. Digital Libraries -- Overview of Application Area

A "digital library" is a collection of electronically accessible records and recordings on various storage media, consisting of text, video, images, numerical tables, data observations, software, audio and image sequences (narrated films) for access, retrieval, browsing, query and display. Digital library technology supports the vision of linking of these resources and making them available to the citizen from their home, office or mobile environment through the National Information Infrastructure (NII). The ability of digital libraries to store and share knowledge, history and culture will be central to the success of the NII.

Digital libraries will provide access to an improved flow of electronic government information and world-wide digitized resources, and provide long-term access to the records and expressions of culture and scholarship. They will help to ensure that information is accessible to all and prevent the formation of a society divided into information haves and "have-nots." Most importantly, digital libraries promise to revolutionize our education methodology, and allow all elements of our society the ability to assimilate information according to one's own associative interest and curiosity.

Existing barriers to achieving the digital library vision fall into the areas of technology; policy and standards; and education. Technology is required to store, locate, browse, retrieve and distribute digital library information. Conversion technology is needed to digitize text and images which currently exist in a non-digital format. Standards and policy are needed to ensure that consistent strategies can be deployed when utilizing digital libraries. Training on how to use digital libraries on the NII and on how to incorporate these resources into the home and workplace to improve our quality of life and standard of living will be key to attaining the vision.

Digital library initiatives will help breakdown the technological barriers to achieving the digital library vision. These initiatives are taking place in agencies across the government. The National Aeronautics and Space Administration (NASA), the National Science Foundation (NSF) and the Library of Congress have established comprehensive digital library programs that are structured to meet the goals of the NII. Many of these and other federal efforts are public/private partnerships and involve substantial private sector investment. Other federal agencies have targeted the development of specific technologies relevant to digital libraries. For example, the National Institute of Standards and Technology (NIST) is developing a spoken natural language interface to libraries. Digital library efforts to provide seamless electronic location of and access to existing sources of federal information are the most prevalent. The Department of Energy (DoE) and NASA efforts to make their scientific and technical information available in digital format are representative of this type of effort. Financial assistance to help today's libraries acquire the infrastructure necessary to embrace digital technologies is another area of federal investment which is key to the development of digital libraries. The Department of Education's interlibrary collaboration grants is one model of this type of activity.

Within the digital libraries application, investment gaps were noted in the areas of training programs, standards and intellectual property rights, and digitization of text and images. Future investment in these areas is critical to realizing the digital library vision.

II. Digital Libraries -- Highlighted Initiatives

Federal digital library initiatives can be grouped into the following categories:

(1) Comprehensive Digital Library Initiatives. Both NASA and NSF established comprehensive, multi-year digital library initiatives during FY 1994 which are specifically targeted at achieving the NII goals for government action. These initiatives encourage private sector participation and cost sharing in programs to promote technological innovation and new applications with regard to digital libraries on the NII. The NASA effort makes available a treasure of environmental and space science images by encouraging the access of remote sensing data products over the Internet and the projects involve broadcast TV, cable TV, industry, academia, K-12 schools, and museums. Areas of investigation address universal service and access, education, user interfaces, and intelligent searches. In addition, the NASA project reaches out to a much broader audience than ever addressed before on a regular basis (potentially millions of people over major TV networks nightly). The project also encourages the creation of new job opportunities and new industrial opportunities by bringing high-speed (ethernet capability) into homes and schools over standard cable TV channels at reasonable costs.

(2) New Technologies and Information Products. A number of agencies have focused on developing specific technologies related to digital libraries to further the goals of the NII. NIST is sponsoring research on a spoken natural language interface to digital libraries. The Department of Energy is developing digital library tools in their Digital SuperLab. The DoE Computer Incident Advisory Capability addresses information security issues, while their National Storage Lab seeks out new techniques for handling the massive storage requirements which are inherent in the NII vision. The DoD Intelligent Archive and the NASA Access Mechanism are technology projects seeking to advance the use of intelligent interfaces and agents for information retrieval.

(3) Seamless Electronic Information Location and Access. Digital library efforts to provide seamless electronic location of and access to existing sources of federal information are the most prevalent digital library applications currently being funded. These projects promote seamless, interactive access to government and other information. Initiatives in this area are addressing scientific and technical information, software, business/economic data, and humanities information. These projects will result in the enrichment and expansion of the knowledge base available via the NII.

(4) Library Infrastructure Grants. The role of libraries in the future will be to advocate and help provide information equity and universal access for the public. Libraries will continue to coordinate and facilitate preservation of records and expressions of the nation's intellectual and cultural life both in traditional and digital formats. Many libraries need financial assistance to help them acquire the infrastructure necessary to embrace digital technologies. The Department of Education's LSCA Title III Interlibrary Collaboration Grants, the Department of Agriculture's Community Facility Loans, and the Department of Commerce's Telecommunications and Information Infrastructure Assistance Program provide assistance of this type.

Digital Libraries

Agency Contributions

Comprehensive Digital Library Initiatives

*Digital Library Project (NSF)

**Digital Library Projects (NASA, Library of Congress)

New Technologies

*Spoken language interface to libraries (DoC/NIST)

Computer Incident Advisory Capability (DoE)

Digital SuperLab (DoE)

Electronic Exchange of Full-text Documents (DoE)

Intelligent Archive (DoE)

National Storage Lab (DoE)

NASA Access Mechanism (NASA)

Archival Electronic Records Inspection and Control (AERIC) & Archival Preservation System (APS) (NARA)

Interactive Systems Program (NSF)

Seamless Electronic Information Location and Access

Scientific and Technical Information

Internet/NII Information Search Tools (DoE)

Information Locator Prototype (DoE)

Digital Library for Energy and the Environment (DoE)

Scientific Information Dissemination Project (DoE)

National Spatial Data Infrastructure - NSDI (DoI/FGDC)

Combined DNA Index System (CODIS) (DoJ)

Computerized Information System (OCIS) (DoL)

NASA STI Program Infrastructure Upgrade (NASA)

National Technology Transfer Center (NASA)

Software

DISA Repository Systems (DoD/DISA)

NetLIB (DoE, NSF)

Repository-based Software Engineering Program (NASA)

Mosaic (NSF)

SBA Software Clearinghouse (SBA)

Business/Economic

STAT-USA Data Dissemination (DoC/Census)

Humanities

Collaborative Projects Program (NEH)

Digital Information Evaluation (NEH)

Virtual Library Models (NEH)

Prototype Distribution of Cultural Materials through the NII (NEH)

Editions Program (NEH)

Archaeology Program (NEH)

Reference Materials Program (NEH)

Library Infrastructure Grants

Telecommunications and Information Infrastructure Assistance Program (TIAP) grants (DoC/NTIA)

Community Facility Loans (USDA/RDA)

LSCA Title III Interlibrary Collaboration Grants (Ed)

* Indicates initiative has been identified by the NSTC R&D Budget Cross-cut

**Although not formally part of the Administration's Budget Process, the Library of Congress wished to include this project for the report.

I. Education -- Overview of Application Area

The National Information Infrastructure (NII) promises every business, government agency, hospital, home, library, and school in the nation access anywhere, anytime to voice, data, full-motion video, and multimedia applications. The NII will be capable of interweaving schools, homes, and workplaces and reintegrating learning into the community fabric. The impact of these capabilities on learning -- for children, advanced students, and lifelong learners -- will be substantial. When fully realized and available equitably in all learning sites, these technologies will support the transformation of education into an active, hands-on process that engages the minds and imaginations of all learners and fosters the promise of lifelong learning.

Through the use of these technologies and a national commitment to quality education, students of all ages and abilities will reach the highest standards of academic achievement. Students will be able to access multimedia electronic libraries and museums containing text, images, video, music, simulations, and instructional software. Teachers, engineers, business managers, and all knowledge workers will have available new methods of working and learning, and will collaborate and share ideas with one another.

Despite the promise of NII-related technologies to improve learning, the pace of technology adoption in education over the last decade has been slow. To address this, President Clinton has set as a National goal connection of the Nation's classrooms, libraries, schools, and clinics to the information infrastructure by the year 2000. Continued government leadership and investments in NII-related efforts will provide support for these important initiatives and stimulate private sector investments in the arena of learning technologies.

Significant gaps in the federal government's investments exist in support for planning; research, development, and demonstration; technical assistance; and professional development. For planning, technical assistance, and professional development, more resources could effectively be used under existing authorities. In research, development, and demonstration, the most immediate need is for a more coherent and focused federal investment. However, it must be noted that the bulk of investments needed to bring about the NII must come from state and local governments, which together provide 93% of K-12 education funds and the majority of support for education at other levels. As reflected in the Department of Education's Goals 2000 program, close cooperation between federal, state and local education agencies will therefore be essential to the timely development of important educational applications.

II. Education -- Highlighted Initiatives

The federal government's current efforts that support the development of the NII for lifelong learning span at least six different agencies. For the purposes of this exercise, the federal government's efforts can be organized into five categories: federal leadership activities; planning; research and development; deployment; and professional development.

II. Education – Highlighted Initiatives (Continued)

(1) Federal Leadership Activities. The Clinton Administration has made technology for education a policy priority. In his State of the Union Address, President Clinton set as a National goal connection of the Nation's classrooms, libraries, schools, and clinics to the information infrastructure by the year 2000. Both the Department of Education and the White House Office of Science and Technology Policy have focused new resources on providing leadership to the nation in this area. Components of this effort include the development of a long-range plan for technology in education, to be completed in FY 1995; conferences drawing together educators, private sector leaders, regulators, and others; development of better statistical information about current uses of telecommunications in K-12 schools; support for legislative and regulatory changes; and other activities.

(2) Planning. The Clinton Administration's K-12 education policy will provide support for state and local systemic education reform. New legislation will also provide support for states and communities to focus all activities on the achievement of high standards by learners. Highlighted programs in this category include:

- ***Goals 2000: Educate America Act (Ed).*** This program represents the Administration's framework for education reform and is designed to provide resources to states and communities to develop and implement comprehensive education reforms that help all students reach high academic and occupational skill standards. In FY 1994, it provided grants for the integration of technology and information infrastructure into state education improvement plans. Grants in FY 1995 and successive years will support the implementation of state plans and the development of local plans.

(3) Research and Development. At least five federal agencies engage in research, development and demonstrations. Under this rubric are activities such as research on educational outcomes facilitated by technology; the development and testing of new software and applications; the development of network models in educational settings; and support for pilot projects that provide visible examples of success and failure and critical experience and evaluation data. Highlighted programs in this category include:

- ***Challenge Grants (Ed).*** The Department of Education will support grants to consortia that include school districts in high-poverty areas and other entities such as private sector firms, universities, and museums to develop technology-supported learning opportunities.
- ***Network Infrastructure for Education Program (NSF).*** As part of the National Science Foundation's Education and Training contribution to the High Performance Computing and Communications (HPCC) Program, this initiative provides grants to alliances of academic institutions, school districts, professional societies, state agencies, and others concerned with education reform to complete policy studies and research, development and demonstration projects related to the role of electronic networks in support of reform education.

II. Education -- Highlighted Initiatives (Continued)

(4) Deployment of Technology. Programs in the Department of Commerce and the Department of Education support the deployment of communications and information technologies into learning settings. Highlighted programs in this category include:

- ***Title I (Ed).*** Title I of the Elementary and Secondary Education Act, previously known as Chapter 1, is the largest federal education program, providing support for services to help over 6 million poor children and children in high-poverty areas learn to high standards in over 53,000 schools. Funds are distributed by formula according to student population and poverty statistics, and spending decisions are made at the school district level. A significant fraction of Title I dollars (approximately 15%) will support the acquisition of computers, software, and networking equipment to support instruction and administration.
- ***Telecommunications and Information Infrastructure Assistance Program (TIIAP) (DoC/NTIA).*** This program provides matching grants to non-profit entities, including schools and universities to help them access new telecommunications and information technologies. In FY 1994, 22 grants were awarded for education applications.

(5) Professional Development. The development of skills among the nation's educators -- including teachers, administrators, and instructors of all kinds -- is a major bottleneck for the development of the NII. New technology tools must become familiar to and accepted by the nation's educators. Professional development is costly and time-consuming; it takes as many as two years of experience with new equipment for teachers and instructors to become fluent users of new technology tools. Highlighted programs in this category include:

- ***Eisenhower Professional Development Program (Ed).*** This program will provide grants to states, school districts, and institutions of higher education to provide access to professional development that support state and local systemic reform efforts. It is anticipated that a significant share of these funds will support training related to instructional technology, networking, and distance learning.
- ***Regional Educational Technology Support and Professional Development Consortia (Ed).*** The Department of Education will support a system of regional educational technology support and professional development consortia, which assists states, school districts, and schools in the use of technology, including networks, and will provide professional development opportunities for educators.

Education

Agency Contributions

Federal Leadership Activities

Global Learning and Observation to Benefit the Environment (DoC/NOAA, NASA, NSF, EPA, and other agencies)

Planning

*Goals 2000: Educate America Act (Ed)

Regional Education Laboratories (Ed)

Research and Development, Including Demonstrations

Basic Research and Dissemination Authority -- Regional Education Labs (Ed)

Challenge Grants (Ed)

Dept. of Education Research Activities (Ed)

Fund for Improvement of Post Secondary Education (Ed)

Fund for Innovation in Education -- Computer-based Instruction and Teacher Networking Grants (Ed)

*National Institute on Disability and Rehabilitation Research (Ed)

Special Education -- Technology Applications (Ed)

Technology, Educational Media, and Materials Program (Ed)

*K-12 Education Project (NASA, NSF)

Funds for Interactive Learning Centers (NEH)

Funds for Collaborative Projects Linking Institutions (NEH)

Leadership Opportunity in Science and Humanities Education (NEH)

Special Opportunities in Foreign Language Education Grants (NEH)

*Education & Human Resources (MOSIS, Superquest, Networking Infrastructure for Education, etc.) (NSF)

Deployment of Technology

Distance and Community Learning from the Cooperative Extension Service (USDA)

Community Facility Loans (USDA/RDA)

Distance Learning-Medical Link Grant Program (USDA/REA)

Distance Learning-Medical Link Loan Program (USDA/REA)

Technical Assistance Program (USDA/REA)

Telecommunications and Information Infrastructure Assistance Program (TIIAP) grants (DoC/NTIA)

New Elementary and Secondary Education Act Initiatives -- Consolidated ESEA Technical Assistance Centers (Ed)

Special Education Grants (Ed)

Star Schools (Ed)

*Technology-related Assistance for Individuals with Disabilities (Ed)

Title I (Ed)

OSHA Employee and Employer Education and Training (DoL/OSHA)

Equipment for Multimedia Exhibits (NEH)

Nebraska Plan to Link Rural-Urban Resources (NEH)

* Indicates initiative has been identified by the NSTC R&D Budget Cross-cut

Table continues on next page.

Education (cont'd)

Agency Contributions

Professional Development

*AskERIC Service (Ed)
Eisenhower Professional Development Program (Ed)
Gopher-FTP-WWW site (Ed)
Regional Educational Technology Support and Professional Development Consortia (Ed)
Spacelink (NASA)
Division of Education Programs (NEH)
Expanded Exemplary Award Program (NEH)
Funds for Professional Development (NEH)
Division of Fellowship and Seminars (NEH)
Teaching with Technology Initiative (NEH)

* Indicates initiative has been identified by the NSTC R&D Budget Cross-cut

I. Electronic Commerce – Overview of Application Area

The vision of electronic commerce is to enable U.S. companies to increase productivity and adaptability to changing markets. Electronic commerce will provide an integrated collection of low-cost, reliable services to handle tremendous volumes of business and technical transactions and to amass, analyze, and control large quantities of data. Organizations will be able to improve efficiency and accuracy, and reduce costs, while providing faster, more reliable, and more convenient services. U.S. companies will be able to reengineer their business processes, and then use the National Information Infrastructure (NII) to realize the productivity potential of their current and future information technology investments. Smaller firms will be able to enter and participate at lower cost and with greater efficiency in new markets, and larger firms will be able to evaluate, select, and more readily work with other companies. New ways of doing business and new forms of economic activities will become commonplace, including telecommuting, global sourcing arrangements, new training and education capabilities, and disaggregated alliances or networks of companies.

Electronic commerce will provide the services to achieve this vision by integrating communications, data management, and security services to allow business applications within different organizations to automatically interchange information. Communications services transfer the information from the originator to the recipient, according to formats defined by the data management services. Security services authenticate the source of information, verify the integrity of the information received by the recipient, prevent disclosure of the information to unauthorized users, and verify that the information was received by the intended recipient. Electronic commerce applies and integrates these infrastructure services to support business applications such as electronic bidding, ordering and payments, and exchange of digital product specifications and design data.

Many companies and government agencies use electronic commerce to facilitate internal operations and interact seamlessly with their trading partners, but they usually require highly structured, previously established agreements on communications, data formats, and security. The resulting costs and lead times create economic barriers to widespread use of electronic commerce applications by small- and medium-sized companies. Other barriers to electronic commerce include real or potential problems with scalability, interoperability, and ease of use. Developing and implementing electronic commerce is a top priority throughout the federal government, but many public and private investments are concentrated on short-range payoff. There is insufficient long-range investment in the standards and technologies needed by industry to develop the next generation of electronic commerce. For example, collaborative engineering and agile manufacturing may require sharing high volumes of very complex data. High-speed communications, transaction management, and the management of many interrelated versions of data are needed to support these requirements and to seamlessly integrate research, design, engineering, production, marketing, and sales.

II. Electronic Commerce – Highlighted Initiatives

The electronic commerce spreadsheet is divided into the following sub-categories:

- (1) Development of Technologies.** Initiatives in this category focus on developing, improving, and integrating communications, data management and security services. These critical services are required to access, to manage and to ensure the security of information resources.
- (2) Development of Standards.** Initiatives in this category focus on developing standards for both the supporting technologies and the content and structure of electronic commerce transactions. The former standards will be needed to ensure the interoperability of electronic commerce software and hardware produced by different vendors. The latter standards will ensure that the recipient of the information is able to understand the structure and meaning of that information.
- (3) Development of Architectures.** Initiatives in this category focus on interacting and combining standards and technologies to form complete electronic commerce systems. An important element of the development of new architectures is the Administration's Federal Electronic Commerce Acquisition Team (FECAT). FECAT is defining the Electronic Commerce architecture called for in the President's Executive Memorandum of October 26, 1993 on "Streamlining Procurement Through Electronic Commerce." The Memorandum directs the head of each executive department or agency to ensure that budgetary resources are available for electronic commerce implementation in each respective department or agency.
- (4) Developing Applications/Demonstrations.** These programs focus on a specific application of electronic commerce, demonstrating the feasibility and potential value of a particular electronic commerce architecture.

Electronic Commerce

Agency Contributions

Development of Technology

Federal Public Key Infrastructure Pilot Program (DoC/NIST)

Electronic Component Development (DoE)

Development of Standards

Defense Message System (DoD/DISA)

Digital Signature and Security Services System (NASA)

Development of Architectures

Electronic Billing and Payment for the Manufacturing Industry (DoC/NIST, DoE, Treasury)

Technical Architecture Framework for Information Management (DoD/DISA)

Infrastructure Security Projects (DoD/DISA, DoE, SBA)

Electronic Acquisitions (GSA, VA)

Development of Applications/Demonstrations

Rural Business Enterprise Grants Program (USDA/RDA)

Electronic Commerce/Electronic Data Interchange Projects (USDA, DoD, DoE, EPA, DHHS, DoL, HUD, NSF, VA)

TECNET network and database (DoC/NIST, DoE)

Electronic Proposal Project (DoE)

AMTEX - Demand Activated Manufacturing programs (DoE)

CALS Roadmap 2000 (DoE)

Open Systems Laboratory (DoE)

Electronic Data Interchange for Selected Industry Sector Reporting (EPA)

Electronic Submission of Single Family Claims (HUD)

Postal Electronic Commerce Services (NASA)

International Trade Data System (Treasury)

Technology 2020 (TVA, DoE)

**Electronic Copyright/Management System (ECMS) (Library of Congress)

***Although not formally part of the Administration's Budget Process, the Library of Congress wished to include this project for the report.

I. Environmental Monitoring and Natural Resources Management -- Overview of Application Area

Just as we monitor industrial output, consumption of goods and services and other indicators of economic health, so must we monitor environmental indicators to judge the state of the environment. An improved National Information Infrastructure (NII) will allow for the development of a nationally integrated network of observing systems, computational centers, archives, libraries and information dissemination systems to address the Nation's needs for environmental data and information. Such an infrastructure will serve as an enabling integrating agent for diverse observational data and information by building upon the national investment (both public and private) in environmental monitoring, protection, and natural resources management activities.

Past and current environmental monitoring have proven highly effective for collecting and processing large quantities of environmental data. However, the ability to perform comprehensive environmental monitoring currently is limited in two critical areas. First, the infrastructure for data collection and analysis is extremely fragmented. This limits the capacity to provide timely access to data and/or information in standard formats. Secondly, there is a lack of information tools to make detailed, comprehensive environmental measurements, and then to integrate and interpret them in support of a host of scientific, policy and operational uses. Raw data needs to be converted into useful information which conveys the multi-disciplinary nature and interconnectedness of environmental factors, thus providing a framework for improved policy and investment decisions.

The nationally integrated networks and tools proposed for development under the NII agenda will permit analysts, scientists, policy makers and the general public to have better access to more reliable information. Measurable progress in this regard will be observed in several areas: (1) reduced time to assemble environmental information for emergency action; (2) enhanced ability to locate and retrieve comprehensive, up-to-date, critical data for economic analysis and environmental policy considerations; (3) improved quality of environmental research, due to improved access to multiple agency databases; and (4) enhanced enforcement of government regulation for pollution control and natural resource utilization. There is the additional benefit that environmental information will be made more transparent, allowing both the public and policy makers to better track the economic benefits of annual investments in environmental observation and protection.

II. Environmental Monitoring and Natural Resources Management -- Highlighted Initiatives

The programs highlighted for environmental monitoring and natural resources management activities promote the goals of environmental research and modeling, information access/connectivity, and interoperability of heterogeneous information systems. Critical to achieving these goals is the role of the High Performance Computing and Communications (HPCC) Program. Technologies developed by HPCC participating agencies and others will provide new algorithms; computational and information processing tools; transport mechanisms; and data translation services to support the environmental monitoring and natural resources management applications of the NII.

(1) Environmental Research and Modeling. The US Global Change Research Program, which involves academia, the private sector and most US agencies with environmental programs, consists of research activities that involve deployment of a number of new environmental observing systems. The networking component of this program is embodied in the Global Change Data and Information System (GCDIS) which is intended to provide the appropriate level of communications technology, interoperability, and connectivity to allow easy exchange of data among participating agencies. Other smaller projects are also being undertaken to support research applications with environmental monitoring data.

(2) Information Access/Connectivity. The Federal Geographic Data Committee (FGDC) has as its goal the creation of a national digital geographic information resource, known as the National Spatial Data Infrastructure (NSDI). The scope of the NSDI includes all geographic or "spatial" data including climatic, demographic, natural resource, oceanographic, and geophysical data. The GCDIS, mentioned above, plans to develop network interconnectivity, interagency gateways, and establish procedures and policies for global change data and information dissemination among the participating agencies. Other initiatives include projects for increasing access to energy efficiency and renewable energy information available via the Internet. This information, which includes databases, bulletin board systems, on-line catalogs, and lists of manufacturers and vendors, will assist state governments in implementing provisions of the Energy Policy Act of 1992 and voluntary initiatives of the Climate Change Action Plan.

(3) Standards and Interoperability. The issue of common standards and/or interoperability is a central component to most of the highlighted initiatives. The FGDC has taken a lead role in the development of data content, exchange and metadata standards needed to implement the NSDI. The primary focus of the GCDIS is to establish and maintain effective mechanisms to integrate the disparate elements of global change information and data. Current plans call for the adoption of common standards for data exchange.

Environmental Monitoring and Natural Resources Management

Agency Contributions

Environmental Research and Modelling Programs

Infrastructure Project (USDA/Forest Service)
 Eastside Ecosystem Management Program (USDA/Forest Service)
 Resource Management Applications Program (USDA/Forest Service)
 Satellite Active Archive for on-line environmental satellite imagery dissemination (DoC/NOAA)
 MOSIAC implementation on environmental information dissemination systems (DoC/NOAA)
 Support Seasonal Forecasting (DoC/NOAA)
 *Geophysical Fluid Dynamics Laboratory atmospheric and oceanic modelling (DoC/NOAA)
 *Support for National Meteorological Center (NMC) (DoC/NOAA)
 Distributed Generation and Use of a Synthetic 3D Seismic Dataset (DoE/Defense Programs)
 NII Accessibility for Independent Gas and Oil Producers (DoE/Defense Programs)
 Clean Water Act, Section 305 (b) (EPA)
 Information Collection Rule (EPA)
 Remote Sensing Databases (NASA)

Information Access/Connectivity

Natural Resource Data Management and Dissemination (USDA/Forest Service)
 Base Network Connectivity (DoC/NOAA)
 Interagency National Environmental Index (DoC/NOAA)
 Management and Dissemination of Weather Data in Near-real-time (DoC/NOAA)
 Global Learning and Observation to Benefit the Environment (DoC/NOAA, NASA, NSF, EPA, and other agencies)
 *Information Dissemination Activities (DoC/NOAA)
 Digital Library for Energy and the Environment (DoE)
 Energy Efficiency and Renewable Energy -- The Energy Efficiency and Renewable Energy Network (DoE)
 Energy Efficiency and Renewable Energy -- FEMP Electronic Superhighway (DoE)
 Energy Information Highway Program (DoE)
 Development of Safe Drinking Water Information System (EPA)
 Inventory and Reporting of Chemical Usage (EPA)
 TRI Information Systems (EPA)
 Support for Enforcement Targeting, Tracking, and Compliance Activities, including FFTS, FFIS, and FAHWCD (EPA)
 Support for IDEA to Analyze and Develop Enforcement Targeting Possibilities (EPA)
 Second Phase of Technology Transfer Network (EPA)
 Electronic Review and Revision System for SIPS (EPA)
 Public Access Efforts (EPA)
 National Biological Survey (NBS) / National Biological Information Infrastructure - NBII (DoI/NBS)
 Earth Observing System (EOS) Program Digital Library and Data & Information System (NASA)
 Global Meteorological Satellites (GMS) Online (NASA)

Data Standards and Interoperability

Resources Management Applications Program (USDA/Forest Service)
 NSDI - Environmental Data - Soil Conservation Service (USDA)
 NSDI - Digitized Soils Maps - Soil Conservation Service (USDA)
 Common Survey Data Structure Project (USDA/Forest Service)
 National Spatial Data Infrastructure - NSDI (DoI/FGDC)
 Data Integration and Management efforts (EPA)
 Modernization of STORET National Water Quality System (EPA)
 Development of Environmental Information Acquisition and Architecture (EPA)
 Standardization of Key Information Identifiers (EPA)

* Indicates initiative has been identified by the NSTC R&D Budget Cross-cut

I. Government Services -- Overview of Application Area

Today, the use of information technology (IT) can create a government that overcomes the barriers of time and distance to perform the business of government and provide information and services to the public. Information technology can swiftly be employed to transfer funds, answer questions, collect and validate data and keep information flowing smoothly within and outside government. In an electronic world, high speed information links will carry the data necessary to support government operations. The development of this infrastructure will enable the creation of "virtual agencies" which will allow citizens access to integrated program information and services.

The National Performance Review (NPR) has been an important element of the Administration's efforts to improve the delivery of government services. In the NPR report, Vice President Gore recommended an executive order to create a customer driven government. The President signed this order on September 7, 1993 and set a standard for government services to equal the best in business.

The NPR's Reengineering Through Information Technology team noted that customers of government services often find dealing with the federal bureaucracy to be complicated, slow, and confusing. Uncoordinated, cumbersome, paper based delivery of government services further complicates the customers' efforts. To address this problem, the NPR IT report outlined a three part agenda for spreading information technology's benefits to the federal government: (1) strengthen leadership in information technology, (2) implement electronic government, and (3) establish support mechanisms for "electronic government." The NII initiatives highlighted below will help accelerate the Administration's transition to an "electronic government."

II. Government Services -- Highlighted Initiatives

NII programs fund the development of information systems and support services in the following five categories:

(1) **Proposed Information Access.** Information access programs will improve public access to government information by allowing agencies to make such information available electronically. These investments include the National Telecommunications and Information Administration's (NTIA) Telecommunications and Information Infrastructure Assistance Program (TIAP), which awards competitively-selected matching grants to state and local governments, public institutions, and non-profit entities to help them access new telecommunications and information technologies. The TIAP will allow state and local governments to make government information more accessible to its citizens and to deliver social services in a more efficient manner. In FY 1994, 15 grants were awarded for these types of applications.

II. Government Services – Highlighted Initiatives (Continued)

(2) Proposed Implementation of National Performance Review (NPR). Implementation of the Administration's NPR information technology recommendations will provide the necessary investments to facilitate the transition to an "electronic government." Projects include investments to establish an electronic mail address directory for the entire federal government; reduce the burden on employers of filing wage and tax data by sharing information among States and the IRS; create multi-agency electronic benefits transfer (EBT) for payment of government assistance services; and speed import/export processing while providing integrated trade data to policy makers.

(3) Proposed Investments in Service Delivery. This category encompasses programs that will use information technology to deliver services such as loans, benefits, and grants directly to the public. These investments build on the High Performance Computer and Communications (HPCC) Program's research, including voice and signature recognition, to bring the benefits of federally-sponsored R&D into the lives of Americans on an everyday basis. Benefits from these proposed investments include improving the timeliness of service delivery, making government services more readily available to the public through electronic means, and allowing the use of electronic filing of information collections wherever possible.

(4) Proposed Initiatives Supporting General Information Infrastructure Development. As the federal government moves closer to an "electronic government," the agencies will need to provide upgrades to their existing communications networks. This category captures a broad range of agency initiatives that will enhance the government's existing telecommunications infrastructure and assist in the development of employee bulletin board systems and local and wide area networks. This category also includes programs that will accelerate critical NII enabling technologies and provide direct funding and loans for telecommunications and computer network infrastructure enhancements in both the public and private sector.

Government Services

Agency Contributions

Information Access Projects

Electronic Information Delivery at the National Agriculture Library (USDA/NAL)
National Agriculture Statistics (USDA/NASD)
NSDI Environmental Data - digitization and increased access (USDA/SCS, interagency)
STAT-USA Data Dissemination (DoC/Census)
Office of Defense Conversion (DoC/EDA)
Telecommunications and Information Infrastructure Assistance Program (TIIAP) grants (DoC/NTIA)
Patent and Trademark Information On-line (DoC/PTO)
Libraries, Dissemination, and Distance Learning (Ed)
Agency Implementations of the Recommendations of the Electronic Mail Task Force (Government-wide)
Electronic Research Administration Program for the Management of Grants (DHHS/NIH)
Reengineered Disability System (DHHS/SSA)
Federal Geographic Data Committee - National Geospatial Data Clearinghouse (DoI)
National Biological Survey (NBS) / National Biological Information Infrastructure (DoI)
Agency Implementation of the Government Information Locator Service - GILS (DoI, interagency)
Combined DNA Index System (CODIS) (DoJ/FBI)
Freedom of Information and Privacy Act Document Processing System Project (DoJ/FBI)
Access to IMIS Information (DoL, EPA)
Training Technology Resource Center (DoL)
Employment and Training Administration - Training Technology Resource Center (DoL)
OSHA - Access to Integrated Management Information System Information (DoL/OSHA)
Data Integration and Public Access Efforts (EPA)
Clearinghouse on Computer Accommodation - IT Accommodation and Accessibility (GSA)
National Technology Transfer Center (NTTC) Gateway and Resource Center (NASA)
Division of Public Programs: A National Conversation on American Pluralism and Identity (NEH)
Export Assistance (SBA)
Business Information Centers (SBA)

National Performance Review Projects

Plan for the Effective Use of IT Throughout Government - Support of GITS, E-mail, etc. (DoE, GSA)
Electronic Benefit Transfer (USDA, DHHS, Treasury)
Coordinate, Recommend, and Implement IT Initiatives to Improve Customer Service (EPA, GSA)
Work with Private Industry to Advance the Implementation of IT to Provide Citizen Access to Government (GSA)
One-stop 800 Number Calling Service (DoE, DHHS/SSA, GSA, DoL, Treasury)
Implement an Integrated, One-stop Government Services Kiosk (DHHS/SSA, DoJ/INS, Treasury, GSA, USPS, VA)
Implement an Integrated, One-stop On-line Service (DoE, DHHS, DoL, GSA, NEH, SBA, NARA)
National Law Enforcement / Public Safety Network (USDA, DoJ/FBI, Treasury)
Intergovernmental Tax Filing (DHHS/SSA, Treasury/IRS)
International Trade Data Index (Treasury/Customs)
National Environmental Data Index (DoC/NOAA)
E-mail Networks and Support (DoE, DoL/OSHA, DHHS, GSA, SBA)
Telecommunications & Post-FTS2000 Environment (DoD/DISA, GSA)
Consolidate and Modernize Government Data Processing Centers (DHHS, DoL, Treasury)
Reengineer Basic Systems for Improved Delivery of Government Services (GSA, Treasury)
Consolidate and Integrate Federal Government Private Networks (GSA, Treasury)
Ensure Network System Privacy and Security (DoC, DoD/DISA, DoD/NSA, DoE, DoJ, GSA, SBA)
Provide Training and Technical Assistance in IT to Federal Employees (USDA, DoD/DISA, DoL, GSA, NEH)

Table continues on next page.

Government Services (cont'd)

Agency Contributions

Service Delivery Projects

InfoShare (USDA)
Medical Transaction System Initiative (DHHS/HCFA)
Reengineering Disability System (DHHS/SSA)
Social Security Automation Investments (DHHS/SSA)
Submission Management and Review Tracking (SMART) Program (DHHS/FDA)
Electronic Submission of Single Family Claims (HUD)
Automated Land and Mineral Record System - ALMERS (DoI/BLM)
Implementation of "CSHO 2000" Project and Development of Electronic Reference Materials (DoL/OSHA)
Technological Innovation and New Applications (DoL)
Archival Information Infrastructure (NARA)
VBA Modernization (VA/VBA)

Initiatives Supporting General Information Infrastructure Development

Rural Telecommunications Loans (USDA/REA)
Rural Telecommunications Partnership Loans (USDA/REA)
Rural Business Enterprise Grants (USDA/RDA)
Rural Telephone Bank (USDA/REA)
Telecommunications and Information Infrastructure (USDA)
Americorps Program (USDA)
Advanced Technology Program -- Component Based Software (DoC/NIST)
Defense Information Systems Network (DISN) (DoD/DISA)
Office of the Future Pilot (DoE, DoD, DHHS, NASA, NSF)
eXperimental University NETWORK (XUNET) (DoE)
*Exploration of High Speed Networking Technologies (DoE/Human Resources, DoE/Defense Programs)
*ARIES Testbed (DoE)
Electronic Component Development (DoE)
Interbank Check Image (DoE)
Automation Investment Fund (DHHS/SSA)
Integrated Disbursement and Information System (HUD)
Minerals Management Service (MMS) / Wide Area Network (DoI/MMS)
National Park Service (NPS) / ParkNet II (DoI/NPS)
National Spatial Data Infrastructure - NSDI (DoI/FGDC)
Automation and Data Sharing Initiatives (DoJ/DEA, DoJ/FBI, DoL)
Office of the American Workplace BBS (DoL)
Integrated Management Information System (DoL/OSHA)
Local/Wide Area Network Deployment (DoE/Defense Programs, DHHS/SSA, DoI, DoL, NARA, SBA)
Implement Federal/State/Local Information Infrastructure Pilot (GSA)
Preservation and Dissemination of Humanities Resources (NEH)
Research on New Technologies for the NII (NSF)
Research Infrastructure (NSF)
Computational Science and Engineering Applications (NSF)
NSFNet (NSF)
Supercomputer Centers (NSF)
Project ACCESS (SBA)

* Indicates initiative has been identified by the NSTC R&D Budget Cross-cut

I. Health Care -- Overview of Application Area

National, state and local debate over the past year highlights the importance of health as a National Information Infrastructure (NII) application area. The goals of health care reform are to improve quality, expand access and contain costs. Health expenditures constitute a large and growing proportion of the Nation's economy. Applications such as automated claims and payment transactions, telemedicine, on-line access to clinical records, and on-line access to the latest treatment and prevention information, will help advance the health reform goals in fundamental ways.

Today's health sector, although information intensive, has not capitalized on computers and information networks as have other market sectors. Computers have been used in individual care settings and have begun to improve billing and claims transactions, but most clinical systems are not interoperable and patient information is created and re-entered numerous times. In addition, without easy communication among researchers, providers and consumers, new discoveries on prevention and care are not readily or rapidly disseminated.

Private and public sector interests in health care, health insurance, and health promotion have all begun to invest in and explore the many opportunities for the NII to improve health. Many of these initiatives show significant promise, but examine new, and as yet unproven, applications. In addition, some of the fundamental infrastructure needed to support broad implementation of new applications is lacking, most notably data exchange and content standards, such as those for medical records. The public comments on the draft health applications paper in "Putting the Information Infrastructure to Work" indicated strong support for federal government involvement in facilitating the NII and its health applications in partnership with private sector efforts. The health application paper is available through the IITF Secretariat.

The federal government is both a provider and user of the many health applications the NII supports. Many of the existing National Library of Medicine (NLM) High Performance Computing and Communication (HPCC) projects represent important research and development initiatives in health. The federal government has also been involved in a number of key investment areas, including telemedicine, standards, increased public access to health information, and research and demonstrations projects that support health specific information infrastructure.

Current and planned federal investments cover most of the important aspects of health applications, with a few exceptions. The most visible and perhaps biggest public concerns regarding health applications involve privacy and security. There is little federal investment specific to health care regarding these concerns, probably because these concerns are better met by policies rather than investments. In the absence of legislation, health specific privacy and security guidelines should be pursued. Second, the uncertainty of health applications and the extreme pressure to contain health care costs support a greater federal role in evaluation of applications. Evaluation requirements will become an increasingly critical component in funded projects. Finally, increased government support is needed to expedite private initiatives for consensus standards development.

II. Health Care – Highlighted Initiatives

The programs highlighted for health applications promote four goals, three of which are the goals of health care reform, i.e., access, quality, and cost containment. The fourth goal is development of the supporting infrastructure that will facilitate linkages among the applications supporting the health goals.

(1) Access to Care. Highlighted projects supporting increased access to health care are telemedicine and health-oriented community network investments. The Office of Rural Health, the Health Care Finance Administration (HCFA), the National Institutes of Health (NIH), and the National Aeronautics and Space Administration (NASA) are all investing in telemedicine projects that will increase access to care for remote areas nationally, and in the case of NASA's project, internationally. These projects also advance the NII goals of extending the universal service concept. The Public Health Service (PHS) has invested in a project called the Community Services Work Station. This project provides a community network that links a broad array of health and social services to provide enhanced information and access to services regardless of where an individual initially comes for help. The workstation demonstrates the value the NII can bring to a community for health and other purposes. This project will extend the universal service concept and will help coordinate policies and approaches among levels of government, in this case local, state and federal.

(2) Quality. Highlighted projects supporting improved quality of health care include the access projects already discussed, because increased access to care by its very nature can improve care. Also important are the many federal initiatives to increase the public's access to health information and comparable initiatives to give providers access to patient information and the constantly expanding health research knowledge base. Although the individual projects are too numerous to be identified individually, this report highlights the broad array of such projects. For example public access projects include: the Directory of Information Resources Online (DIRLINE), the Physician Data Query (PDQ), AIDSLINE, AIDSTRIAL, AIDS DRUG, HSTAT, the Health Care Financing Administration's on-line project, the National Health Information Center, and 1-800 lines that service the same information links but without computer access. Provider patient care information and knowledge base projects include: Rural Extension Administration's Distant Learning Medical Link; NLM and the Agency for Health Care Policy and Research computer-based patient record initiatives; Veterans Affairs' electronic medical record initiative; DoE's GRAIL program, NLM medical connections program; and, high performance communications for PDQ, Cancernet and electronic publishing as well as the current PDQ and HSTAT on-line services for providers. The CDC INPHO and WONDER projects also provide an integrated network for public health officials and an interactive information system for state, local, and academic health professionals respectively. Both the INPHO and WONDER will improve the accessibility and exchange of health promotion and disease prevention related information. All of these projects advance the NII goals of providing access to government information and furthering the universal service concept.

II. Health Care – Highlighted Initiatives (Continued)

(3) Cost Containment. The projects supporting health care cost containment include the information access and quality projects already discussed that will help consumers and providers know more about prevention and appropriate care. Highlighted cost containment projects include federal investments in health data exchange and content standards and administrative streamlining applications. Within HHS, HCFA and the Agency for Health Care and Policy Research both have investments in standards development. Standards are recognized as the linchpin for the coordinated development and implementation of health applications. Standards are critical to create greater certainty for applications investments and support improved longitudinal health care records. In the short term standards will allow streamlined claims and payment that will reduce administrative costs. In addition to the standards themselves, HCFA is developing improved claims processing that will reduce the administrative costs for Medicare and Medicaid while allowing for improved interoperability with other insurers for coordination of benefits. These projects advance a number of the NII goals, but most notably promotion of seamless, interactive, user driven operation.

(4) Infrastructure Investments. There are numerous investments in support of infrastructure development particular to health applications. Some important projects to highlight include: NLM's HPCC health care applications research and demonstrations support for testbed networks; NCCR Information Infrastructure Technology applications support; the National Institute of Standards and Technology's Advanced Technology Program's Information Infrastructure for Health Care -- a program designed to develop tools and prototype systems for health care that also accelerate infrastructure development; NASA's collaboration with the Health care Open Systems & Trials (HOST) consortium comprised of providers, insurers and IT companies working jointly to increase access to care through the use of advance information technology, initially focusing on computer-based patient records and an integrated community health care information network; in FY 1994, grants from the National Telecommunications and Information Administration's Telecommunications and Information Infrastructure Assistance Program (TIIAP) presented 14 awards for health applications. All of these support expedited development of integrated health applications. This in turn supports the NII goals of promoting private sector investment; acting as a catalyst to technological innovation and new applications; and promoting seamless interactive user driven operation.

Health Care

Agency Contributions

Health Care Access Programs

Community Facility Loans (USDA/RDA)
Community Services Work Station (DHHS/PHS)
Telemedicine Demonstrations (USDA/REA, DHHS/HCFA, DHHS/NIH, DHHS/ORH, VA)
International Telemedicine Health Care Telecommunications Network (NASA)

Health Care Quality Programs

REA Distance Learning Medical Link Loan and Grant (USDA/REA)
Computer based Patient Record (DHHS/AHCPR)
1-800 telephone lines (DHHS/HCFA, DHHS/CDC, NHIC, & CANCER)
Internet/computer links (DoE; DHHS: CDC, CRDL, NHIC, HSTAR, HCFA, NLM, ODPHP, SAMSHA; DoL/OSHA; NASA)
Kiosk access to specific health applications (DHHS/SSA)
Wonder System (DHHS/CDC)
Electronic Medical Record (VA)

Health Care Cost Containment Programs

Medicare Transaction System (DHHS/HCFA)
Standards Initiatives (DHHS/HCFA)

Infrastructure Investments Specific to Health

Telecommunications and Information Infrastructure Assistance Program (TIIAP) grants (DoC/NTIA)
ATP Information Infrastructure for Health Care (DoC/NIST)
NLM Medical Connections program (DHHS/NLM)
Global Health Monitoring Network (NASA)
Health Care Open Systems & Trials - HOST (NASA)

I. Manufacturing -- Overview of Application Area

An advanced National Information Infrastructure (NII) will enable manufacturers to transform and significantly improve all stages of manufacturing operations, from technology/market assessment and R&D to after-sales support and product disposal or reuse. Manufacturers will be able to use the NII to quickly and efficiently transfer data within and among operations; to effectively and sensibly transact business and collaborate with customers, clients and competitors; to rapidly and "virtually" prototype, simulate, and test products and processes; and to make easily and readily available the best manufacturing tools, knowledge bases, product information, and training materials regardless of location.

At present there exist a number of barriers to achieving this vision. Much of the manufacturing of the future will be done at multiple sites that are networked together. At this time however, there is not an effective mechanism to integrate all of the diverse manufacturing operations. In addition, the existing manufacturing systems do not have interfaces that conform to national (or international) standards, making it expensive for sharing of manufacturing information which is necessary to meet ever-changing customer demands in a timely, responsive and flexible manner. There is not a well developed framework of standard manufacturing processes that readily allows for the prototyping and testing of products from process models. There is also a need for more structured information about manufacturing practices and processes. Finally, companies, especially small- to medium-size, will need to change their approach to manufacturing to adopt these new NII technologies, which will require intense training for workers.

To overcome these barriers, the Administration, in cooperation with private industry, has initiated, expanded, and redirected programs designed to unleash the potential of the NII in a variety of civilian manufacturing areas. These efforts address a number of market failures inherent to the development and adoption of new technologies and include: (1) research and development in support of advanced manufacturing technology and high performance computing and communications; (2) programs to demonstrate, test, and deploy NII manufacturing applications into the private sector; and (3) programs designed to improve manufacturing education and training.

While there are many government sponsored programs designed to facilitate the development, demonstration, and deployment of NII manufacturing applications, there are areas where the government should be investing more time and effort. For example, there is a need to accelerate the development and testing of industry-led standards for product data exchange, electronic commerce, and interoperability. There is also the need to provide more testbeds where NII applications can be prototyped and demonstrated in collaboration with industry as well as focused efforts in user-acceptability and information conversion. Lastly, and perhaps most importantly, the government needs to expand its technical assistance programs and to initiate serious efforts to address industry's needs in the areas of organizational learning and worker training.

II. Manufacturing – Highlighted Initiatives

The Administration has crafted a government-wide strategy to speed the development and application of advanced manufacturing technologies. Federal involvement within the Manufacturing Area can be divided into the following categories:

(1) Research and Development. Programs falling under this category include infrastructure development that supports manufacturing applications. In addition to the base programs within the agencies there are two key thrust areas that are part of the research and development efforts within the National Science and Technology Council (NSTC): the High Performance Computing, Communications and Information Technology (HPCCIT) Subcommittee is promoting the application of information technology to the national challenge of manufacturing using the Information Infrastructure Technology and Applications (IITA) Initiative; and the Civilian Industrial Technologies (CIT) Committee is promoting a coordinated interagency effort to promote the development of advanced manufacturing technologies. Other key initiatives include:

- ***Systems Integration for Manufacturing Applications (SIMA) program (DoC/NIST).*** SIMA is an effort to develop, refine, test, and transfer advanced, computer-integrated, electronically-networked manufacturing technologies and associated applications. Research activities will focus on developing integration technologies, architectures, communication protocols and interface specifications for manufacturing software applications that support design, planning and production of products in the mechanical, apparel and process plant industries. A standards-based data exchange effort will target flexible computer integrated manufacturing issues to alleviate the lack of data exchange capability between manufacturing applications.
- ***Agile Manufacturing Initiative (NSF).*** This initiative includes a prototype of an information infrastructure to support distributed concurrent engineering, flexible manufacturing, and electronic commerce in manufacturing applications. The vision of agile manufacturing is to enable virtual companies to be formed by linking design and manufacturing operations that are physically distributed among a group of companies.
- ***Advanced Technology Program (ATP) Computer-Integrated Manufacturing (CIM) for Electronics program (DoC/NIST).*** The ATP provides funding to support critical research needed to develop key commercial technologies and to bring innovative products to market. CIM will increase substantially the base of suppliers of third-party electronics manufacturing software. The intention is that this supplier base would serve not only electronics manufacturers, but also other major manufacturing sectors such as automotive and aerospace. These goals will be achieved by encouraging electronics manufacturers to define and adopt an open CIM framework which will provide a market for others to design compliant software systems. This will permit manufacturers to rapidly respond to new market opportunities by being able to easily reconfigure their shop floor systems.

II. Manufacturing -- Highlighted Initiatives (Continued)

(2) Deployment. Programs in this category include initiatives that bring useful technologies into the marketplace and further their adoption by the private sector.

- ***Technologies Enabling Agile Manufacturing (TEAM) program (DoE).*** TEAM will enhance industrial competitiveness by advancing and deploying manufacturing technologies that promote agility. TEAM is leveraging the expertise and resources of private industry and federal agencies to develop, integrate, and deploy leap-ahead technologies enhancing the responsiveness, flexibility, and cost-effectiveness of U.S. industry. The technologies and methodologies deployed by TEAM in the five thrust areas of Product Design and Enterprise Concurrency, Virtual Manufacturing, Manufacturing Planning and Control, Intelligent Closed-Loop Processing, and Integration will enable manufacturers to transition products from design to production faster, more efficiently, and at lower cost.
- ***Manufacturing Extension Partnership (MEP) Program's Electronic Communication Linkages (DoC/NIST).*** The MEP is an industrial extension service designed to transfer developed technologies to applications appropriate for smaller businesses. The MEP is designed to be a comprehensive, yet locally responsive, network of centers that help firms upgrade their equipment, improve their processes, and strengthen their business performance. The MEP is sponsoring a specific pilot program which will demonstrate the potential value of linking the extension centers using a major network system.

(3) Education and Training. Programs that not only educate the manufacturing community as to the benefits of NII-related technologies, but also provide training to users of the technologies.

- ***Technology Information Environment for Industry (TIE-IN) Program (DoE).*** TIE-IN is a new mechanism being developed by Sandia Labs for technology transfer that can realistically reach a large percentage of the small to mid-sized companies in the U.S. It has two primary goals: (1) to reach thousands of establishments, and (2) to reduce the industry investment required to use National Laboratory technologies. TIE-IN will utilize the NII and information technologies to build smart front-ends for many existing DoE technical capabilities and electronically guide users through the process of obtaining solutions. By using these smart front-ends both the required amount of direct staff interaction with the users and the investment required by industry can be minimized. TIE-IN will operate as an electronic extension service accessible from Internet or modem to allow the user to quickly obtain solutions to problems from remote locations.

Manufacturing
Agency Contributions
Research and Development
Rapid Response Manufacturing (DoE)
*Advanced Technology Program Computer-Integrated Manufacturing for Electronics (DoC/NIST)
*Systems Integrated Manufacturing Applications (DoC/NIST)
Information Integration for Simulation Based Design & Manufacturing (NSF)
*Agile Manufacturing Program (NSF)
Deployment
Rural Business Enterprise Grants (USDA/RDA)
Manufacturing Extension Partnership Electronic Communication Linkages (DoC/NIST, DoE)
Advanced Manufacturing-NII (AM-NII) (DoE)
Object Oriented Design of Integrated Distribution Systems (DoE)
Technologies Enabling Agile Manufacturing (TEAM) (DoE)
Affordable Design and Manufacturing (ADAM) initiative (NASA)
Oak Ridge Centers for Manufacturing Technology -- Skills Campus/Virtual Enterprise Resource Center (TVA, DoE)
Education and Training
*Computational Testbed for Industry (CTI) (DoE)
Technology Information Environment for Industry (TIE-IN) program (DoE)
CALS Roadmap 2000 (DoE)

* Indicates initiative has been identified by the NSTC R&D Budget Cross-cut

I. Transportation -- Overview of Application Area

Effective use of existing transportation systems and infrastructure is central to achieving high levels of performance and efficiency in meeting our transportation needs. Overlaying the existing transportation infrastructure with a complementary information infrastructure could dramatically improve transportation service, cost, safety and efficiency. Collective advances in information technology permit the development of an "intelligent" transportation system, in which system operators and users share information and cooperate to enhance system performance, efficiency, capability, and user satisfaction.

At the policy level, the implications of wide-scale application of information technology to transportation -- technology development, economic and physical access to technology solutions, and the safety impacts of applying various technologies -- have yet to be thoroughly assessed. Existing agency programs have evolved individually and lack a comprehensive understanding of transportation information needs across agencies or the crosscutting needs of national significance.

Compared to the use of information technology in air traffic control at the applications level, the nation's transportation sector has yet to maximize its use of modern sensing, communication, and information technologies. These technologies have much to offer activities such as routing transit buses, managing harbor traffic, optimizing urban highway use at rush hour, or dispatching maintenance crews. Replacing conventional approaches with methods employing modern technology will require transportation providers to totally re-conceptualize and re-engineer these functions.

Technology development to support the vision of an "intelligent" transportation system is needed to address deficiencies in several key areas. Tools for timely production of electronic maps and charts for navigation and route planning are inadequate; methods for keeping safety-critical electronic map and chart information current are limited. New weather systems are poised to provide vast sources of information that can be used to avert transportation accidents and adverse travel situations, yet the ability to analyze and disseminate such information in meaningful ways is lagging. There is a need to better understand the impact of weather on transportation operations (particularly in the surface modes) and the potential for weather information to influence transportation safety and efficiency. Transportation command/control functions and surveillance options for increasing uniform situation awareness among system and vehicle operators represent areas where further technology development and application would be helpful.

The NII initiatives for transportation provide the basis upon which current deficiencies can be addressed. These initiatives also establish a framework for assessing and developing information technology for transportation. Short-term objectives of the initiatives include agreeing upon a unified system architecture with uniform standards, procedures, and protocols for system development, implementation, operation and maintenance. This will facilitate both establishing a consensus on the roles and responsibilities of participants in the transportation system and reaching agreement on strategies to balance efficiency, mobility, safety, health and environmental impacts.

II. Transportation – Highlighted Initiatives

The federal government's efforts within the transportation application area have been divided into five categories: Intelligent Vehicle-Highway Systems; Spatial Data and Reference Infrastructure; Mesoscale Aviation Weather Systems; Air Traffic Management and Control; and Waterway Management and Vessel Traffic Systems.

(1) Intelligent Vehicle-Highway Systems (IVHS). A public/private partnership to develop and apply a variety of vehicle, roadway, electronics, communications, and information processing technologies and services critical to improve the efficiency and/or safety of our surface transportation systems.

(2) Spatial Data and Reference Infrastructure. Initiatives in this category will accelerate the development of spatial relationships throughout all transportation systems that are critical for tracking and locating.

(3) Mesoscale Aviation Weather Systems. Programs in this category will help to develop real time weather systems able to forecast the weather in a small region.

(4) Air Traffic Management and Control. These programs will develop enhanced precision, more flexible, higher quality Air Traffic Control management capabilities to reduce delay and operating costs to system users during excessive system demands.

(5) Waterway Management & Vessel Traffic Systems. These programs will develop waterway management and control techniques, communication and presentation of infrastructure, and senior technology critical to waterway management and vessel traffic.

Transportation

Agency Contributions

Intelligent Vehicle-Highway Systems IVHS (including APTS)

- *Wireless Microwave Communications and Sensors for IVHS (DoD)
- *Demonstrations and Other Activities (DoT/FHWA, DoT/FTA, DoT/NHTSA)
- *Research and Development (DoT/FHWA, DoT/FTA, DoT/NHTSA)

Spatial Data and Reference System

- Differential Global Positioning System (DoT/FAA, NASA)
- GPS Wide Area Augmentation System (DoT/FAA)
- *Electronic Maps and Charts (DoT/FAA, DoC/NOAA)
- *Satellite Navigation R&D (DoT/FAA)

Mesoscale Aviation Weather Systems

- Manage and Disseminate Weather in Realtime (DoC/NOAA)
- ASR Weather Systems Processor (DoT/FAA)
- Aviation Weather Products Generator (DoT/FAA)
- Integrated Terminal Weather System (DoT/FAA)
- *Aviation Weather Detection / Dissemination (DoT/FAA)
- *Weather System Planning and Impact Assessment (DoT/FAA)

Air Traffic Management and Control

- *Sensors for Air Transportation System Capacity and Safety (DoD)
- Terminal Area Productivity (TAP) (DoT/FAA, NASA)
- ATC System Infrastructure (DoT/FAA, NASA)
- *Airport Surface Traffic Automation (DoT/FAA)
- *Air Traffic Management Technology (DoT/FAA)
- *Oceanic ATC Automation (DoT/FAA)
- *Terminal Area Surveillance System (DoT/FAA)
- *Terminal ATC Automation (DoT/FAA)

Waterway Management & Vessel Traffic Systems

- Infrastructure Deployment (DoT/USCG, DoT/MARAD, DoC/NOAA)
- *Research and Development (DoT/USCG, DoT/MARAD, DoC/NOAA, DoD/ACE)

* Indicates initiative has been identified by the NSTC R&D Budget Cross-cut

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AES WHITE PAPER

AESWP-1001

**Technology Report TC-NAS 98/1:
NETWORKING AUDIO AND MUSIC
USING INTERNET2 AND NEXT-GENERATION
INTERNET CAPABILITIES**



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THE WHITE HOUSE
OFFICE OF THE VICE PRESIDENT

FOR IMMEDIATE RELEASE
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CONTACT: 202/456-7035

Remarks
by
Vice President Al Gore
at
National Press Club
December 21, 1993

Thank you. It's a great pleasure to be here. I still have jet lag, though -- nature's way of making you look like your passport photo.

I'm happy to be home. And I'm particularly happy to be talking about telecommunications to people whose lives will be shaped by the changes ahead for us.

I'm pleased to announce today that at the beginning of the year, President Clinton will present to Congress a package of legislative and administrative proposals on telecommunications. Today, I want to talk about the future we envision.

But I'd like to start by talking about an incident from the past.

There is a lot of romance surrounding the sinking of the Titanic 91 years ago. But when you strip the romance away, a tragic story emerges that tells us a lot about human beings -- and telecommunications.

Why did the ship that couldn't be sunk steam full speed into an ice field? For in the last few hours before the Titanic collided, other ships were sending messages like this one from the Mesaba: "Lat 42N to 41.25 Long 49W to Long 50.30W. Saw much heavy pack ice and great number large icebergs also field ice."

And why, when the Titanic operators sent distress signal after distress signal did so few ships respond?

The answer is that -- as the investigations proved -- the wireless business then was just that, a business. Operators had no obligation to remain on duty. They were to do what was profitable. When the day's work was done -- often the lucrative transmissions from wealthy passengers -- operators shut off their sets and went to sleep. In fact, when the last ice warnings were sent, the Titanic operators were too involved sending those private messages from wealthy passengers to take them. And when they sent the distress signals operators on the other ships were in bed.

Distress signals couldn't be heard, in other words, because the airwaves were chaos -- willy-nilly transmissions without regulation.

The Titanic wound up two miles under the surface of the North Atlantic in part because people hadn't realized that radio was not just a curiosity but a way to save lives.

Ironically, that tragedy that resulted in the first efforts to regulate the airwaves.

Why did government get involved? Because there are certain public needs that outweigh private interests.

Today, as divers explore the hulk of the Titanic, we face a similar problem. A new world awaits us. It is one that can not only save lives but utterly change and enrich them. And we need to rethink the role of government once more.

How do we balance private needs and public interests?

It's important in discussing the information age that we discuss not merely technology, but communications. Because from communications comes community. Not long ago, when travel was very difficult, communities were small and communication was personal and direct. It was between families, neighbors, business partners.

Then the means of travel improved, moving us all away from each other, and making communication more difficult.

Until recently, if an immigrant came to the United States, whether from Russia, or China, or England, it meant saying goodbye to one's parents and never having a conversation with them again.

But these days, technology has brought us closer together. I read a little while ago of a family scattered all over the world. More than a hundred different members keep in touch through the Internet. They keep people informed of births and deaths and graduations. Children in more than half a dozen countries feel like they know each other -- even though they've never met.

It is important in focusing on what's ahead in communications, to zero in not on the technology, but what we use technology for.

No one says "Let's use the telephone. " They say, Let's call Grandma."

We haven't always kept that in mind.

When the telephone was invented, stockbrokers in London said "Who needs so many telephones, we have messenger boys."

It didn't take long to see that there were some things messenger boys couldn't do -- transmit both ends of a conversation, for example. We figured out new uses each time the telephone changed, from big wooden boxes on the wall, to desk phones, to ones with long cords ... to the car phones and cell phones that allow us to talk while we drive or walk.

We will do this again with the changes in store over the next decade -- one of the biggest changes the human species has ever faced.

Most people today are primarily receivers of information. We watch TV. We listen to radio.

In this decade we will transmit more and more as well.

We'll send and receive, not just on the telephone but across the full range of the new technologies. We'll turn from consumers into providers.

In a way, this change represents a kind of empowerment. The quality revolution in the factory treats each individual as a source of added value. The communications revolution recognizes each individual as a source of information that adds value to our community and to our economy.

After all, interactive TV doesn't just mean yelling at the television when the referee makes a bad call. It means holding a business meeting without leaving your living room.

It means that people at home can use their television not just as entertainment but as an active tool.

These changes have neither come overnight or out of the blue. Rather, they are the outgrowth of a steady series of changes encompassing much of our history.

It used to be that nations were more or less successful in their competition with other nations depending upon the kind of transportation infrastructure they had. Nations with deep water ports did better than nations unable to exploit the technology of ocean transportation. After World War II, when tens of millions of American families bought automobiles, we found our network of two-lane highways completely inadequate. We built a network of interstate highways. And that contributed enormously to our economic dominance around the world.

Today, commerce rolls not just on asphalt highways but along information highways. And tens of millions of American families and businesses now use computers and find that the 2-lane information pathways built for telephone service are no longer adequate.

It is not that we have a shortage of information. Indeed we often find now that we have a lot more than we know what to do with.

John Stuart Mill, who lived through much of the 19th Century was said to be the last man who knew everything. Since his time, no matter what your field, you have to resign yourself to the fact that a great deal will take place completely outside your awareness.

Take the Landsat example. We're trying to understand the global environment, and the Landsat satellite is capable of taking a complete photograph of the entire Earth's surface every two weeks. It's been doing that for almost 20 years.

In spite of the great need for that information, 95% of those images have never fired a single neuron in a single human brain. Instead, they are stored in electronic silos of data.

We used to have an agricultural policy where we stored grain in Midwestern silos and let it rot while millions of people starved to death. We now have an insatiable hunger for knowledge. And the data sits rotting away -- sometimes literally rotting by remaining unused.

Why?

Part of the problem has to do with the way information is configured and presented. Someone once said that if we tried to describe the human brain in computer terms, it looks as if we have a low bit rate, but very high resolution. For example, the telephone company decided a few years ago that seven numbers were the most that we could remember. That's a low bit-rate. Then they added three.

On the other hand, we can absorb billions of bits of information instantly if they are arrayed in a recognizable pattern within which each is related to all the others -- a human face, or a galaxy of stars.

In order to communicate richly detailed images that allow us to comprehend large volumes of data, we need to combine two technologies. Computers have an ever-growing ability to transform data into recognizable images. And we are making greater use of them every year.

But to communicate these images among ourselves, we need networks capable of carrying those images to every house and business. We know how to do that technologically, but we have to unscramble the legal, regulatory and financial problems that have thus far threatened our ability to complete such a network.

In the few places where this capacity now exists we are already using them to communicate in ways that enrich and even save our lives.

We use it with Matthew Meredith, a six year old boy who recently underwent a bone marrow transplant. His doctors recommended that he shouldn't begin his classes at Randolph Elementary School in Topeka. So the school and local telephone company teamed up to bring first grade to him through two-way video services and a television camera.

Matthew was able to take part in class. He used a fax to hand in class assignments. And the kids in his class got a glimpse of videoconferencing technology that will be common in a few years.

In West Virginia, doctors are using the Mountaineer Doctor Television Project to link to specialists at West Virginia University. A while back, for example, two-month-old Zachary Buchanan had an irregular heartbeat. Using the network, his family doctor sent an image of his heart to a pediatric cardiologist 100 miles away. His diagnosis: the condition wasn't serious -- and he didn't have to travel halfway across the state for treatment.

All of these applications enhance the quality of life. Because they do, they will spur economic growth.

After all, even the quickest glance at the telecommunications sector of the economy shows what it means for jobs. Over half of the U.S. workforce is now in information-based jobs. The telecommunications and information sector of the U.S. economy accounts for more than 12% of the GDP. And it's growing faster than any other sector of our economy.

What about dollars?

Last year total sector revenues exceeded \$700 billion. And we exported over \$48 billion of telecommunications equipment alone.

When AT&T sold the first cellular phone, they said there would be 900,000 of them by the year 2000.

Well. We have 13 million now. And it's still 1993. The predictions for mobile telephone users for the year 2000 now total 60 million.

This kind of growth will create thousands of jobs in the communications industry. But the biggest impact may be in other industrial sectors where those technologies will help American companies compete better and smarter in the global economy.

Today, more than ever, businesses run on information. A fast, flexible information network is as essential to manufacturing as steel and plastic.

Virtually every business and consumer in America will benefit dramatically from the telecommunications revolution. I see even Santa Claus is now on the Internet with his own E-Mail.

If we do not move decisively to ensure that America has the information infrastructure we need every business and consumer in America will suffer.

What obstacles lie ahead in this rush to the future?

Many of them lie in the system we have created over the last 60 years.

Systems of regulation that made sense when telephones were one thing and cable another, may just limit competition in a world in which all information can flow interchangeably over the same conduits. To understand what new systems we must create, though, we must first understand how the information marketplace of the future will operate.

One helpful way is to think of the National Information Infrastructure as a network of highways -- much like the Interstates begun in the '50s.

These are highways carrying information rather than people or goods. And I'm not talking about just one eight-lane turnpike. I mean a collection of Interstates and feeder roads made up of different materials in the same way that roads can be concrete or macadam -- or gravel.

Some highways will be made up of fiber optics. Others will be built out of coaxial or wireless.

But -- a key point -- they must be and will be two way roads.

These highways will be wider than today's technology permits. This is important because a television program contains more information than a telephone conversation; and because new uses of video and voice and computers will consist of even more information moving at even faster speeds. These are the computer equivalent of wide loads. They need wide roads. And these roads must go in both directions.

The new information marketplace based on these highways include four major components:

- First, owners of the highways -- because unlike the interstates, the information highways will be built, paid for and funded by the private sector;
- Second, makers of information appliances, like televisions, telephones and computers, and new products of the future that will combine the features of all three;
- Third, information providers -- local broadcasters, digital libraries, information service providers, and millions of individuals who will have information they want to share or sell; ...and most important,
- Fourth, information customers, justly demanding privacy, affordability and choice.

At some time in the next decades we'll think about the information marketplace in terms of these four components. We won't talk about cable or telephones or cellular or wireless because there will be free and open competition between everyone who provides and delivers information.

This Administration intends to create an environment that stimulates a private system of free-flowing information conduits.

It will involve a variety of affordable and innovative appliances and products giving individuals and public institutions the best possible opportunity to be both information customers and providers.

Anyone who wants to form a business to deliver information will have the means of reaching customers. And any person who wants information will be able to choose among competing information providers, at reasonable prices.

That's what the future will look like -- say, in ten or fifteen years. But how do we get from here to there?

This is the key question for the government.

It is during the transition period that the most complexity exists and that government involvement is the most important.

It's a "phase change" -- like moving from ice to water; Ice is simple and water is simple, but in the middle of the change it's mush -- part monopoly, part franchise, part open competition. We want to manage that transition.

And so I am announcing today that the Administration will support removal, over time, under appropriate conditions, of judicial and legislative restrictions on all types of telecommunications companies: cable, telephone, utilities, television and satellite.

We will do this through both legislative and administrative proposals, prepared after extensive consultation with Congress, industry, public interest and consumer groups, and state and local governments.

Our goal is not to design the market of the future. It is to provide the principles that shape that market. And it is to provide the rules governing this difficult transition to an open market for information.

We are committed in that transition to protecting the availability, affordability, and diversity of information and information technology, as market forces replace regulations and judicial models that are no longer appropriate.

On January 11, in Los Angeles, I will outline in more detail the main components of the legislative package we will present.

Today, though, I want to set forth the principles upon which it will be based.

There are five.

First, encourage private investment.

The example of Samuel Morse is relevant here.

Basically, Morse's telegraph was a federal demonstration project. Congress funded the first telegraph link between Washington and Baltimore.

Afterwards, though -- after the first amazing transmission -- most nations treated the telegraph and eventually telephone service as a government enterprise.

That's actually what Morse wanted, too. He suggested that Congress build a national system. Congress said no. They argued that he should find private investors. This Morse and other companies did. And in the view of most historians, that was a source of competitive advantage for the United States.

We are steering a course between a kind of computer-age Scylla and Charybdis -- between the shoals of suffocating regulation on one side, and the rocks of unfettered monopolies on the other. Both stifle competition and innovation.

The Clinton Administration believes, though, that as with the telegraph, our role is to encourage the building of the national information infrastructure by the private sector as rapidly as possible.

Second, promote and protect competition.

I've talked about highways. All roads once led to Rome. But how many lead to each home? One, or two, or more? Whatever the answer, the same principle should apply: we should prevent unfair cross-subsidies and act to avoid information bottlenecks that would limit consumer choice, or limit the ability of new information providers to reach their customers.

We can see aspects of this question in the debate over the powers of the Regional Bell Operating Companies; in the passage last year of the Cable Act of 1992; in the proposal to "open up" the local telephone loop.

Third, provide open access to the network.

Let's say someone has an information service to provide over the network. They should be able to do it just by paying a fair and equitable price to the network service provider.

Suppose I want to set up a service that provides 24 hours a day of David Letterman reruns.

I don't own my own network, so I need to buy access to someone else's. I should be able to do so by paying the same rates as my neighbor, who wants to broadcast kick-boxing matches.

Without provisions for open access, the companies that own the networks could use their control of the networks to ensure that their customers only have access to their programming. We have already seen cases where cable company owners have used their monopoly control of their networks to exclude programming that competes with their own. Our legislation will contain strong safeguards against such behavior.

Mitch Kapor, the founder of Lotus, and head of the Electronic Frontier Foundation, has spoken about the need for the national information infrastructure to be an "open platform." The IBM PC is an "open platform" that any software programmer can use. They can develop software to run on the PC and if they developed a "killer applications" like Mitch did with Lotus 1-2-3 -- they could make millions of dollars.

In the 1980s, thousands of programmers developed thousands of different programs, which have increased the productivity of our businesses, helped our children learn, and helped us balance our checkbooks.

We need to ensure the NII, just like the PC, is open and accessible to everyone with a good idea who has a product they want to sell.

This is essential if we are to have many information sources on it.

Fourth, we want to avoid creating a society of information "haves" and "have nots."

You know, the original expression "haves and have nots" comes from Cervantes.

But we're not tilting at windmills here.

This is the outgrowth of an old American tradition.

Broadcasts, telephones, and public education were all designed to diminish the gap between haves and have nots..

In the past, universal service meant that local phone companies were required to provide a minimum level of plain old telephone service for a minimal price. State and federal regulations provided for subsidies to customers in poor and rural areas.

The most important step we can take to ensure universal service is to adopt policies that result in lower prices for everyone. The lower the price the less need for subsidies. We believe the pro-competitive policies we will propose will result in lower prices and better service to more Americans.

But we'll still need a regulatory safety net to make sure almost everyone can benefit.

In the past it was relatively simple to fund universal service. The local phone companies were regulated monopolies that could be required to provide lifeline services. As more companies enter the market -- as many of the regulations are removed -- we have to find new ways of doing the same thing.

Just last week, the National Telecommunications and Information Administration of the Department of Commerce held a hearing in New Mexico to examine just that question. Our bill will incorporate the findings from the hearing and others. It

will reaffirm this Administration's desire to see that all Americans benefit from the National Information Infrastructure.

As we think about the future of universal service, we as a society ought to think about what kind of service and on what group of people we must concentrate.

Schools -- and our children -- are paramount.

The new head of the FCC, Reed Hundt, recently said, "there are thousands of buildings in this country with millions of people in them who have no telephones, no cable television and no reasonable prospect of broadband services. They're called schools."

When it comes to ensuring universal service, our schools are the most impoverished institution in society.

Only 14% of our public schools used educational networks in even one classroom last year. Only 22% possess even one modem.

Video-on-demand will be a great thing. It will be a far greater thing to demand that our efforts give every child access to the educational riches we have in such abundance.

The recent article in the Washington Post on the proposed video communication network in the D.C. area is a wake-up call to all of us concerned about "electronic redlining." If we allow the information superhighway to bypass the less fortunate sectors of our society - even for an interim period -- we will find that the information rich will get richer while the information poor get poorer with no guarantee that everyone will be on the network at some future date.

We cannot relax restrictions from legislation and judicial decisions without strong commitments and safeguards that there will be a "public right of way" on the information highway. We must protect the interests of the public sector.

That's essential in building the information highway. That's essential in providing affordable services for public education, public health and government.

The less fortunate sectors of the population must have access to a minimum level of information services through subsidies or other forms of a public interest tithe.

Fifth and finally: we want to encourage flexibility.

After all, flexibility and adaptability are essential if we are to develop policies that will stand the test of time. Technology is advancing so rapidly, the structure of the industry is changing so quickly, that we must have policies broad enough to accommodate change.

Even though the Communications Act of 1934 could not anticipate many of the technological changes of the last 60 years, it was flexible enough to allow the FCC, state regulators and the successive administrations to deal with those changes without rewriting the act every few years.

As the Administration develops its legislation we are trying hard to follow the example set by the authors of the 1934 Act. We are trying hard to enunciate key principles of policy, identify which government agencies will implement that policy, and then leave many of the details to them.

I don't want to sound like I've thought all these ideas up. The fact is, in Congress, several important pieces of legislation have already been introduced.

I've already mentioned the Brooks-Dingell bill in the House. It, and the Markey-Fields bill represent major steps forward, not to mention more than a year of hard work by other Congressmen including Congressman Boucher and Congressman Oxley.

In the Senate, Senators Danforth and Inouye have introduced a major piece of legislation. Senator Hollings is working on another.

Between now and the beginning of the next session, we'll be continuing our dialogue with Congress, industry and public interest groups to formulate our proposal for legislative and administrative action that will clear the way for the communications marketplace of the future. And part of that effort will be to continue to publicly enunciate what we want and how we will achieve it.

With high-level Congressional support, a growing consensus in industry, and leadership from the President, we have a unique opportunity. We can eliminate many of the regulatory barriers on the information highway -- and perform the most major surgery on the Communications Act since it was enacted in 1934.

We will do it by avoiding both extremes: regulation for regulation's sake, and the blind adherence to the dead hand of a free market economist. We will do it with the principle that has guided so much of the Administration's efforts over the last year: the urgent need to create flexible, responsive government.

It's fitting that this address is being delivered here at the National Press Club. Almost every form of communication is present here, in this room. I'm talking to you orally. Some of you are taking notes -- others are typing on laptops. Some of you will publish your observations through the use of printing presses, others through television or radio reports. People tuned into C-Span are watching on television. Still others are listening over a prototype of the NII -- the Internet.

All of these forms of communication bring us together -- they allow us to participate in a virtually instantaneous dialogue. They will allow us to debate, and then to build a consensus, on the nature of the information infrastructure, on the details of legislation, on the nature of regulation.

But, even more, as I said at the outset, these methods of communication allow us to build a society that is healthier, more prosperous, and better educated. They will allow us to strengthen the bonds of community and to build new "information communities."

The challenge is not, in the end, the new technology. It is holding true to our basic principles. Whether our tools were the quill pens that wrote and then signed the Declaration of Independence or the laptop computers being used to write the constitutions of newly-freed countries . . . better communication has almost always led to greater freedom and greater economic growth.

That is our challenge. That is what this Administration-- and the nation -- will achieve.

There's a story about Michael Faraday, the inventor of the electric generator. Once he was showing Benjamin Disraeli through his lab, taking great pleasure in demonstrating the effects he could produce. And at the end of the tour, Disraeli said, "Well, what good are all these things?"

Faraday answered, "What good is a baby?"

If we take the narrow view, it looks like telecommunications is well out of its infancy. But if we cast our eyes ahead a few decades -- or centuries -- we see that it's barely out of diapers. We need to look ahead, to protect it when it needs protecting, but not get in the way when it needs to walk alone.

Like those wireless operators should have done in the North Atlantic, we should be alert to where the collisions could be. And we shouldn't hesitate to chart a new course.

If we do that, then much more than the telecommunications industry will grow strong. This country and much of the human race will, as well.