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Economic Benefits of the Administration's Legislative Proposals for Telecommunications

June 14, 1994

NII

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Summary

The Administration's legislative proposals have the potential to add in cumulative value more than $100 billion (in 1994 dollars) to Gross Domestic Product (GDP) over the next decade.

New legislation can add to GDP by creating a regulatory environment in which the following trends will accelerate:

- Productivity will increase throughout the economy as new ways of working, new ways of doing business, and valuable new services are developed.

- Jobs and other resources will shift into the telecommunications and information sector as regulatory barriers are removed. The productivity of a new job in this sector exceeds the economy-wide average.

- Increased private sector investment in an advanced telecommunications infrastructure will create a short-term increase in aggregate demand, accelerating the rate at which the economy approaches full employment.

The new regulatory environment will accomplish this by:

- reducing uncertainty about the course of regulation

- promoting competition throughout the telecommunications and information industries, and

- providing a mechanism for removing existing regulatory restrictions as the development of competition makes them unnecessary.

With the Administration's legislative proposals, the telecommunications and information sector of the economy could nearly double its share of GDP by 2003.

- If this occurs, employment in the sector could rise from 3.6 million workers today to more than 5 million workers in 2003. Most of these jobs would be shifted from other economic sectors in a full-employment economy.

To the extent enactment of the Administration's legislative proposals stimulates an acceleration of private investment, and if the economy remains below full employment through 1996, the economy as a whole could add a total of 500,000 new employment opportunities during the years 1994 to 1996.

To improve the nation's emerging National Information Infrastructure (NII) with technologies that enhance existing telephone and cable television services, the private sector may make capital investments over the next decade valued substantially in excess of $75 billion (in 1994 dollars). These investments will occur earlier with the Administration's legislative proposals than without.

Economic Benefits of the Administration's Legislative Proposals for Telecommunications

June 14, 1994

In September 1993, the Administration announced a National Information Infrastructure Initiative (NII) to "help unleash an information revolution that will change forever the way people live, work, and interact with each other." To accomplish this end, Vice President Al Gore has proposed legislative and administrative reform of telecommunications policy. The Administration's proposals are based on the following five principles:

- encouraging private investment in the NII,
- promoting and protecting competition,
- providing open access to the NII for consumers and service providers,
- preserving and advancing universal service to avoid creating a society of information "haves" and "have nots," and
- 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.

This document illustrates the great economic benefits to the nation that could be achieved through new legislation to accomplish these ends.

I. The Potential for Economic Growth

The telecommunications industry plays a crucial role in our economy. Like the railroad and highway infrastructures built in earlier generations, our telecommunications infrastructure brings people together and helps firms reach their customers and suppliers quickly and cheaply. As a result, our lives are enriched and our firms and workers are more productive.

Even without new legislation, the vast opportunities created by advances in communications and information technology will likely transform the economy and the way we live and work.[1]

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[1]The analogy to the railroad and highway networks may not be helpful in understanding the effect of the NII on industrial structure. The transportation network encouraged the development of large industrial firms by making it easier to obtain scale economies. In contrast, an advanced communications network may particularly favor small firms serving narrow market niches.

Innovation in the telecommunications and information sector is already occurring at a rapid rate. In the past decade, the facsimile machine has shifted from a curiosity to a commonplace, and the cellular telephone does not lag far behind. Television news is now transmitted instantaneously from the field to the studio by satellite. Internet use is moving beyond government and academic researchers to involve other government functions, private individuals and private sector firms as well. The number and variety of cable television channels has been growing. More and more, people work from home or the road by computer and modem, away from their physical office. The power and sophistication of personal computers in homes and offices, and what can be accomplished using them, has grown by leaps and bounds.

It is widely recognized that equally important advances in technology are on the horizon. Technical change will permit private industry to make new products and services available and affordable.[2] We can be confident that a telecommunications and information revolution is upon us, even though we do not yet know the details. Two way, interactive, broadband service will someday be the norm, although we cannot now know whether the emerging broadband network will be formed from wires, fiber optic lines, wireless technologies, or hybrids of these alternatives. And we can be confident that the computing power available to consumers of the multimedia services provided by the emerging information infrastructure will rise, even though we cannot predict whether that power will be lodged in a server outside the house or office, or in the home and office through a personal computer or a set top box connected to a television.

The Administration's legislative proposals will accelerate the rate at which the telecommunications and information revolution arrives in three ways: by reducing uncertainty about the course of regulation, by promoting competition throughout the telecommunications and information industries, and by providing a mechanism for removing existing regulatory restrictions as the development of competition makes them unnecessary. Private industry will be encouraged to invest more rapidly in the nation's emerging information infrastructure, and to develop new services more rapidly. The legislative proposals also reduce the likelihood that regulation will distort the choice of technology or other investment decisions. These effects on private investment, combined with the price reductions that will flow from new entry and greater competition, will accelerate the

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[2]Separately from its legislative proposals for regulatory reform, the Administration is funding a wide range of research and development projects, many in collaboration with industry, to improve the information infrastructure and develop improved applications.

development of new services, the creation of new jobs, and the growth of productivity for the rest of the economy.

The precise contours of the new telecommunications and information marketplace cannot be predicted because they depend on innovations not yet developed and the details of legislation not yet enacted. Because of these uncertainties, it is qualitatively more difficult to forecast the development of this sector, and the consequences of regulatory reform legislation for economic growth, than to predict, for example, the consequences for GDP of changes in the tax code or the monetary base. Accordingly, the estimates provided in this document are not comparable to the economic forecasts routinely published by the Administration. The estimates depict one plausible scenario for the development of the telecommunications and information sector, and the effects of new legislation on that development. They should be interpreted as illustrative of the character of the likely economic consequences of the new legislation rather than as a forecast of those consequences.

II. Methodology and Results

A. Baseline Scenario

The CEA estimates were made against a baseline description of the likely growth of revenues in the telecommunications and information sector in the absence of the Administration's legislative proposals. The baseline scenario was developed from recent trends, and private sector and government estimates.[3]

In making these estimates, the telecommunications sector was divided into three major components: (1) "conduit" (local and long distance telephone; cable television; wireless services; emerging services that combine data, voice and image transmissions; multimedia services such as pay per view and video on demand; and communications equipment), (2) "content" (broadcast television and radio, newspapers and magazines, motion pictures and home video, books and prerecorded music), and (3) "computers" (computer hardware and software, and computing and

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[3]If sector prices fall more rapidly than expected as a result of competition and innovation, and if the lower prices do not immediately lead to a substantial increase in demand, sector revenues could be significantly less than described in the scenario in the near term. Yet if sector prices are lower than expected because of cost-saving innovations, GDP growth would likely be greater in the long run.

data processing services).[4] In the baseline scenario, these sectors will experience significant growth in the next decade (Figure 1).

A similar baseline was created for investment in the telecommunications services component (the "conduit" category) (Figure 2). Some of this investment is needed to maintain the existing level of service when equipment breaks or becomes obsolete, or when population grows. The rest will make available the enhanced telecommunications services (e.g. switched broadband services, tele-medicine, and expanded electronic commerce) and the new information services (e.g. real-time multimedia services, electronic dissemination of government information, and "virtual" field trips for school children) that will be available on the information superhighway of the future. The bulk of the investments needed to do so will be put into place by 2003, in the baseline scenario.[5]

Only a portion of the investment depicted in Figure 2 will be dedicated to the development of enhanced services. This portion can be estimated by subtracting the current level of accounting depreciation recorded by the providers of telecommunications services--a measure of the real investment level required to maintain existing services--from the projected gross investment levels. Applying this methodology, the present value of these incremental capital investments over the next decade is approximately $75 billion in 1994 dollars.[6] This is

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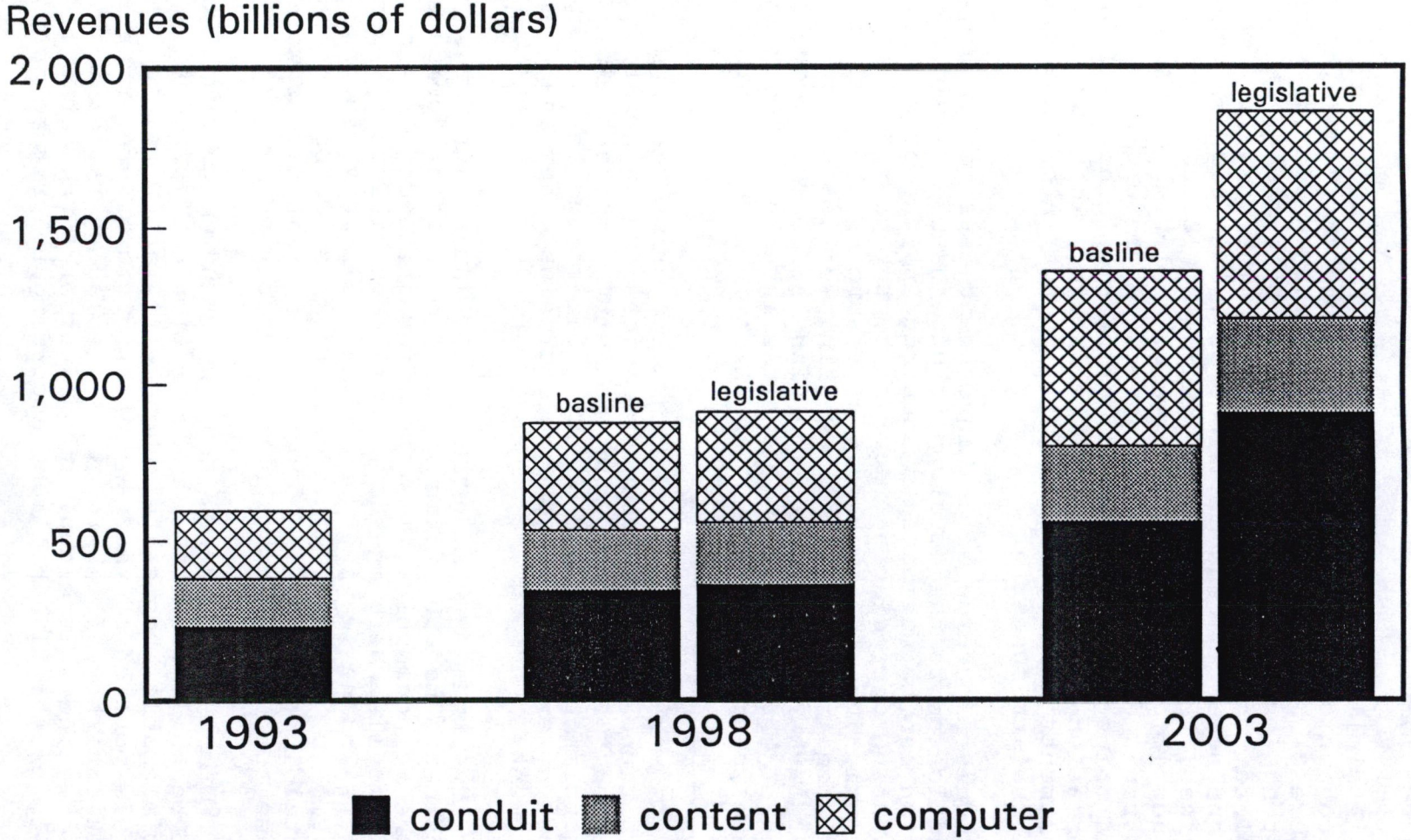
[4]These definitions exclude some activities that other definitions of the telecommunications and information sector have included. For example, the "content" component excludes commercial printing and greeting cards, and the "computers" component excludes consumer electronics other than communications equipment.

[5]The estimates illustrated in Figure 2 do not account for investments made by firms in the "content" or "computers" segment of the telecommunications and information sector, nor investments by firms elsewhere in the economy that will obtain access to new markets and new ways of providing their services from the creation of the NII. These figures also do not account for human capital investments in education and training, as workers learn to use the NII to become more productive.

[6]This figure assumes that the transmission infrastructure will be built as a hybrid combination of fiber optic lines, coaxial cable, copper telephone wire, and wireless transmission. If this portion of the new infrastructure were instead to be built entirely of fiber optics, replacing rather than upgrading the existing telecommunications network, the total cost could easily exceed $100 billion, according to private sector

Figure 1

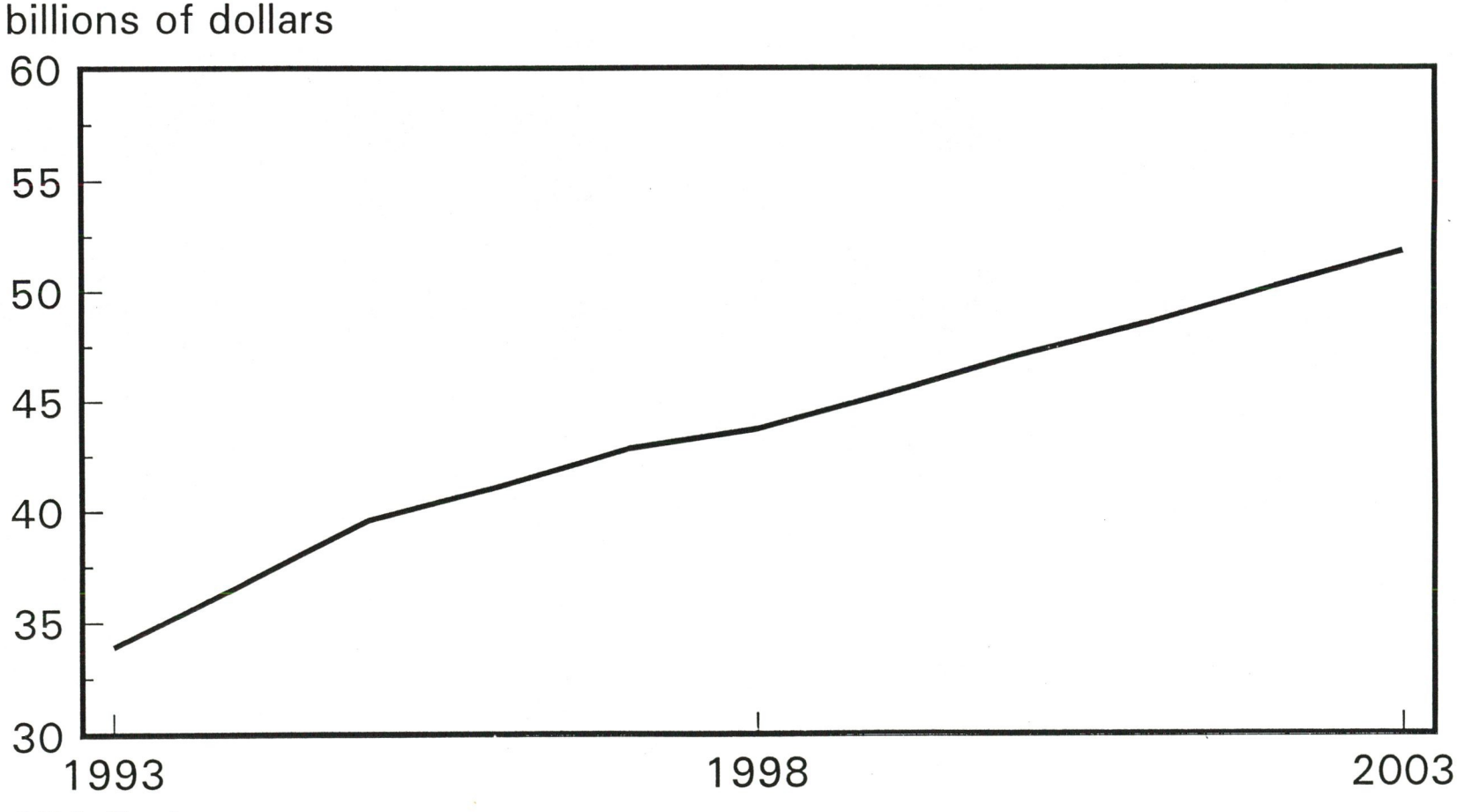
Baseline and Legislative Scenario Revenues



CEA Estimates

Figure 2

Telecommunications Services Sector Investment
Baseline Scenario



CEA Estimates

likely an underestimate of the total cost of providing advanced services because it ignores investments firms have already made and it ignores those investments that the baseline scenario contemplates would not be made until after 2003.[7]

B. Legislative Scenario

The effect of the legislative package can be understood as allowing the telecommunications and information sector to achieve certain revenue levels years earlier than under the baseline scenario, and this is how it is modeled here. The legislative projections, illustrated in Figure 1, assume that the "conduit" and "content" industries in the telecommunications and information sector will achieve by 2003 revenue levels that they would not reach until 2008 in the baseline, and that the "computer" industries will achieve by 2006 revenue levels they would not otherwise reach until 2008.[8] Moreover, the projections assume that revenues do not begin to respond to new legislation until 1998. This assumption, which may be conservative, reflects the time that may be needed for firms to adjust capital spending to the new regulatory framework and for regulators to develop the rules necessary to implement the new legislation.

Similarly, the legislative package is assumed to accelerate

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estimates.

[7]This figure is an overestimate, however, to the extent some investments will turn out to have been spent on technological dead ends or otherwise wasted.

[8]The assumption that new legislation to remove regulatory barriers and encourage competition will accelerate revenue growth in this manner is broadly consistent with the predictions of a recently-conducted "Delphi survey." The respondents agreed, for example, that by 1998-2000 interactive multimedia services and products will have widespread consumer acceptance in the home. The survey found that this transformation will occur five to twenty years sooner than most other projections for the growth of the information superhighway. The respondents also agreed that business and regulatory barriers, not technology, are the most critical problems for the deployment of the necessary technologies. These results appear consistent with the modeling strategy adopted here: they suggest that new legislation to remove regulatory barriers and encourage competition will accelerate sectoral growth and investment, relative to forecasts based on current trends. Dwight L. Allen, Jr., H. William Ebeling, Jr., and Lawrence W. Scott, "Perspectives on the Convergence of Communications, Information, and Entertainment: Speeding Toward the Interactive Multimedia Age," Deloitte & Touche, 1994, pp. 13-14.

the rate of private sector investment in the narrowly-defined telecommunications industry. The estimates assume that 40 percent of the infrastructure investment made between 2001 and 2003 in the baseline case will instead be put into place between 1994 and 2000 with new legislation. The 40 percent figure recognizes the difficulty of accelerating investment that replaces depreciated capital stock and investment that cannot be put into place until other investments have been made. Under these assumptions, private investment will become $9 billion greater each year than the baseline projects (except half that amount in 1994).[9]

C. Consequences for GDP Growth

By accelerating private investment in the information infrastructure and accelerating the availability and development of new services, GDP will increase. The three transmission mechanisms involved are discussed in turn.

1. Multiplier Effect of Increased Investment

Every dollar of increased domestic investment before the year the economy is projected to reach full employment is assumed to increase GDP by $1.60 during the year it occurs. This multiplier is consistent with the predictions of most large-scale macroeconomic models for periods in which the economy is below full employment. In recognition of the leading position of U.S. manufacturers in producing the sophisticated capital equipment required to build an advanced telecommunications infrastructure, the analysis treats all such investment spending as domestic.

2. Shifting Inputs into a High Value-Added Sector

A new job in the telecommunications and information sector will produce greater output per labor input than the average new job in the economy. Thus, when the economy shifts inputs, especially workers, into this high value-added sector, national wealth increases even at full-employment. This cannot happen today because regulation restricts entry and otherwise creates distortions limiting sector output. Much of that regulation was necessary in the past in order to prevent the even worse distortions resulting from the exercise of market power by a natural monopolist. But as developments in technology shrink the scope of potential monopoly power in telecommunications, and as

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[9]The projections assume that new legislation will not begin to affect private investment decisions before mid-1994. This assumption is conservative to the extent investment has already begun to accelerate in anticipation of the legislative enactment.

regulatory reforms encourage the development of competition,[10] the economy can shift resources into this more productive sector, and so increase social wealth.[11]

The GDP projections assume, based on the results of a recent academic study,[12] that labor inputs will initially produce approximately 10 percent more output if shifted from the average sector into "conduit,"[13] approximately 3 percent more output if shifted into "computers," and no additional output if shifted into "content." These estimates are conservative to the extent workers shifting to the new jobs would come disproportionately from sectors of the economy with below average value added. The projections also assume that non-labor inputs would become more productive if shifted into the telecommunications and information sector to the same degree as workers.

The benefit derived from the additional shift of economic activity into the telecommunications and information sector (relative to the baseline case) that will result from the Administration's legislation is assumed to begin in 1998. As regulatory distortions are removed and resources shift into this sector, however, the sector's productivity advantage will decline. This decline is assumed to occur at a rate that would end the productivity advantage of the telecommunications and information sector by 2008.

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[10]The Administration's legislative proposals will encourage the development of competition by, for example, allowing cable firms to offer telephone service and vice versa, unbundling local telephone services, creating a level playing field for all service providers (including wireless providers), guaranteeing all providers open access to the network on nondiscriminatory terms, and ending rate regulation of firms lacking market power.

[11]More technically, the marginal productivity of labor and other inputs in this sector is higher than the economy-wide average because regulation intended to protect against monopoly abuses cannot perfectly substitute for competition. Legislation that encourages greater competition and the removal of unnecessary regulation will allow inputs to shift into this sector, increasing social wealth.

[12]William T. Dickens, "Good Jobs: Increasing Worker Productivity with Trade and Industrial Policy," working paper, University of California, March 11, 1992.

[13]This figure is for the conduit component excluding telecommunications equipment; the initial productivity gain for shifting resources into telecommunications equipment is taken to be only 8.4%.

3. Greater Economy-Wide Productivity

The new information infrastructure will boost the economy's productivity.[14] Productivity gains arise for at least two reasons: geographically distant firms will be able to behave in more ways as though they were neighbors, and changes in the innovation process arising from new ways of working will increase the likelihood of future innovations. If the investments that will develop the NII are accelerated, so services come on line more quickly than in the baseline case, these productivity gains will commence more quickly than under the baseline scenario.

The GDP estimates below assume that a productivity boost from the new infrastructure begins in 1998 under the Administration's legislation. The incremental productivity gain is assumed to be 0.03 percent per year, commencing in 1998. This figure is consistent with other estimates of the productivity gains from infrastructure investments, and excludes productivity gains already captured by virtue of the shift of workers to high value-added industries.

The productivity rate is assumed to revert to the baseline trend between 2000 and 2008. This treatment of the productivity increase is conservative because it ignores the possibility that the productivity rate increase will instead persist.

4. GDP Projections

Taking into account all three transmission mechanisms, the new legislation is projected to create a stream of annual GDP increases over the next decade with a present value of more than $100 billion. More than $30 billion of the increases will come from the multiplier effect of increased investment. Economy-wide productivity increases account for more than half of the remainder.

D. Consequences for Employment

An increase in GDP that takes place when the economy is operating below full employment will create new jobs. (In contrast, no new jobs are available at full employment even if

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[14]Productivity gains of this sort are plausible. For example, one study found a large social gain to computerization in the finance services industry not captured by the manufacturers of computers. The downstream benefits of technical progress in mainframe computers between 1958 and 1972 were estimated as at least 1.5 to 2 times the level of expenditures in this sector. Timothy F. Bresnahan, "Measuring the Spillovers from Technical Advance: Mainframe Computers in Financial Services," American Econ. Review, vol. 76, 1986, pp. 742-55.

GDP rises.) Based on the predictions of large-scale macroeconomic models, one billion dollars of new GDP created by putting unused resources to work is assumed to create 17,000 to 20,000 new jobs. As a result, the economy as a whole could add a total of 500,000 new employment opportunities during the years 1994 to 1996.

E. Growth and Employment within the Telecommunications and Information Sector

The rapid growth projected for telecommunications and information sector revenues will lead the sector to grow as a fraction of GDP. Figure 3 depicts the growth of inflation-adjusted revenues for this sector under the baseline and legislative scenarios.[15] In 1993, telecommunications and information revenues equaled more than 9 percent of GDP.[16] With the Administration's legislative proposals, the sector's GDP share could nearly double between 1993 and 2003.

In 1993, 3.6 million workers were employed in the telecommunications and information sector. Under the baseline scenario, assuming that recent trends in the growth of sector revenues per employee (average labor productivity) continue, the sector will employ more than 4.5 million workers in 2003. Acceleration of revenue growth (and acceleration of labor productivity growth) in the legislative scenario will lead the sector to employ up to 5.5 million workers in 2003.

F. Foreign Trade in the Telecommunications and Information Sector

Neither the baseline nor the legislative scenario fully captures the potential benefits to the telecommunications and information sector, or the U.S. economy as a whole, from the

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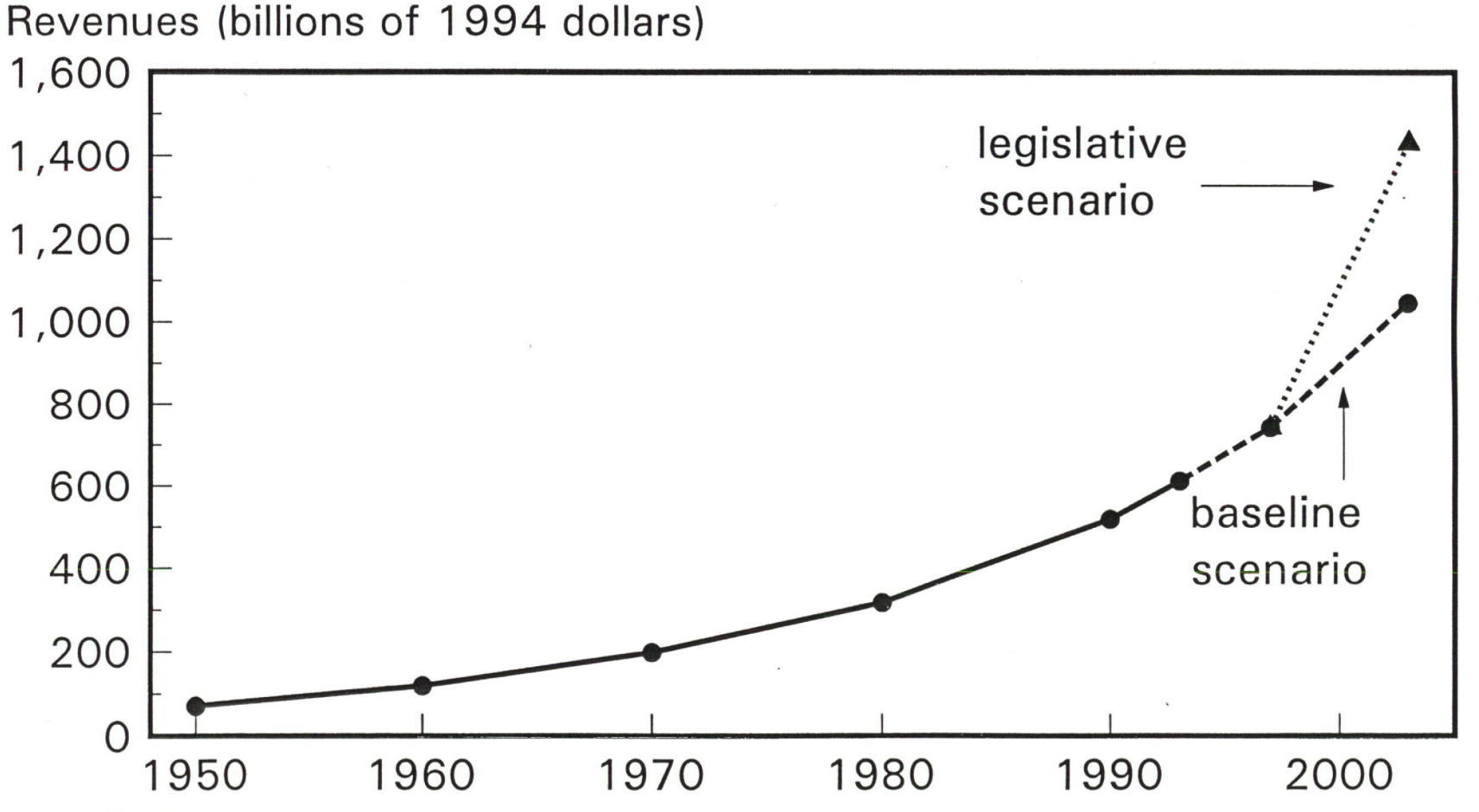
[15]Although much of the sector's revenue increase comes from the development and diffusion of new innovations, some is likely an artifact of the way service functions are classified. For example, during the 1950s, firm expenditures on preparing payrolls were probably not classified as part of the telecommunications and information sector. Yet to the extent the payroll function requires the use of computer hardware and software, and data processing services, it is more likely to be so classified today.

[16]Sector revenues as a fraction of GDP overstate the sector's share of GDP to the extent revenues exceed value added. For much of the sector, especially the services that are included, the difference is unlikely to be large. If commercial publishing and consumer electronics are added, sector revenues in 1993 would be closer to 10% of GDP than 9%.

Figure 3

Telecommunications and Information Sector Revenues 1950 to 2003



CEA Estimates

development of a Global Information Infrastructure (GII). That development will promote U.S. export growth, leading to increases in telecommunications and information sector revenue, domestic GDP, and domestic employment.

Over the next decade, many foreign governments will change their regulatory approaches and promote additional infrastructure investments. As other countries spend to improve their information infrastructure, privatize their existing telecommunications networks, and allow more competition, the world market for telecommunications and information is likely to experience tremendous future growth. U.S. firms, often already world leaders in these fields, can expect to achieve further success in the global market. As that success generates additional scale economies in production and encourages innovation, domestic producers will lower their costs. This dynamic promises to promote exports by enhancing the comparative advantage of the U.S. in the global marketplace.

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HAWAII INC'S
Network News

The Newsletter of the Information Industry in Hawaii

Volume 3, Number 5, March 1994

NII: Changing the Paradigms of Power

The national information infrastructure (NII) is most often talked about as a technological phenomenon—the merging of the telecommunications, computer, software, and entertainment industries.

But in the view of Washington attorney Kenneth R. Kay, NII is also a political phenomenon, and focusing on its politics may help to overcome some of the technological, economic, and other hurdles involved in developing and deploying it.

Kay, who serves as executive director of the Computer Systems Policy Project in Washington, was one of a series of nationally prominent speakers at HINTS-6, the 1994 Hawaii Information Network and Technology Symposium held March 23-24 at the Sheraton Waikiki Hotel.

"Computer technology and the NII have the potential to change the paradigms of power in this country," Kay said, "by giving people unprecedented access to information and enabling them to be information providers. As the technologies of the computer, telecommunications, cable, software, and entertainment industries converge, so do the political interests of the public, government, and a range of U.S. industries."

Kay made six observations about the "information superhighway":

• **The NII has become a national issue. It's a bipartisan issue and needs to stay that way.** "We can't permit the NII to become a battleground for political one-upsmanship —it's far too important for that."

• **The NII must be viewed as a people project, not just as a technology project.** "We need to focus on NII applications, not from a technological perspective but from the perspective of what matters to people: better health care and education, and improved and expedited government services.

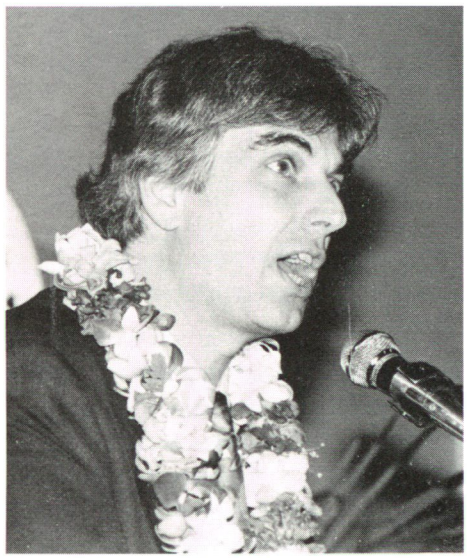
"We must not forget the parts of the NII policy that 'put people first.'"

• **The NII will not succeed without a new politics of cooperation between industry and government.** "Developing and deploying the NII will require many different activities, some appropriate for industry, some for government, and some which will require industry and government working together."

• **The political interests of the business community and the public interest community are converging.** "Cyber-space is one area where the public interest and business interests may often be in sync."

• **The NII will require unprecedented cooperation among industries.** "Companies and industries need to communicate and cooperate to ensure that existing and new NII components work together as easily, quickly, and transparently as the components of today's telephone system...An NII that is interoperable at key interfaces will help create an infrastructure that is ubiquitous, interactive, and accessible to all potential users and service providers."

• **NII politics, like all politics, is local.** "The experience gained through networks like Hawaii FYI is invaluable...Make the NII real to your representatives: train them on the Internet, get them on-line communicating with constituents, underscore the value of applications that matter in Hawaii."



Kay: "It's a political phenomenon."