

Summary of Findings and Options **1**

INTRODUCTION

Information technology-computers, advanced telecommunications, optical disks, and the like—can be used by the Federal Government to deliver services to citizens. Most Americans, if they think about it, can identify at least a few Federal services that affect their lives. These include the: ¹

- 46 million recipients of social security benefits,
- 27 million recipients of food stamps,
- 31 million Medicaid recipients,
- 14 million recipients of aid to families with dependent children,
- 15,000 scientists who receive National Science Foundation research grants each year,
- 20,000 small businesses that receive business loans,
- 600,000 persons participating in job-training programs,
- people and organizations that annually place about 1.6 million orders for a total of 110 million publications from the U.S. Government Printing Office,
- citizens who annually receive a total of 10 million pamphlets from the Consumer Information Center,

¹ U.S. Social Security Administration, "People Served Since 1980," chart, August 1993; Melvina Ford, Library of Congress, Congressional Research Service, "Medicaid: FY1994 Budget," June 30, 1993; Vee Burke, Library of Congress, Congressional Research Service, "Welfare," Jan 6, 1993; Kenneth Jest, "Welfare Reform," *CQ Researcher*, vol 2, No 14, Apr. 10, 1992, p. 327; Ann Lordeman, Library of Congress, Congressional Research Service, "Training for Dislocated Workers Under the Job Training Partnership Act," Dec. 3, 1992; U.S. Government Printing Office, "Annual Report: FY 1991," 1992; U.S. National Technical Information Service, "Catalog of Products and Services," 1992; U.S. Small Business Administration, "Annual Report: FY 1991," 1992; John Harris, Alan F. Westin, and Anne L. Finger, "Innovations for Federal Service: A Study of Innovative Technologies for Federal Government Services to Older Americans and Consumers," contractor report prepared for the Office of Technology Assessment, February 1993.



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2 | Making Government Work

- 30,000 or so academic and business researchers who receive research results and technical information each week from the National Technical Information Service, and
- 170,000 citizens who use Federal depository libraries each week.

Services are not limited, however, to monetary benefits, grants and contracts, training and education, or information. Services are defined in this study to include the “service” of making it easier and cheaper for individuals and organizations to: a) find out what Federal services are available and where; b) file documents or pay taxes; and c) participate in the governmental process—including agency and congressional hearings and related administrative, regulatory, and legislative deliberations.² Electronic delivery may lead not only to improvements in current services, but to new ways of thinking about and organizing government programs and delivery mechanisms.

Interest in the electronic delivery of Federal Government services (and related State/local services) has mushroomed. Some Federal agencies now use electronic delivery for direct deposit of payments, access to documents and data via computer bulletin boards, and distribution of publications on compact optical disks. Other agencies are conducting pilot tests of: 1) magnetic stripe or smart cards for electronic benefits transfer; 2) videoconferencing for meetings, hearings, and training sessions; and 3) computer networking for “virtual” conferences and the electronic receipt, exchange, and distribution of diverse materials such as schedules, announcements, and reports.

Electronic service delivery is closely linked to the “reinventing government” and “service to the citizen” movements that started at the State and

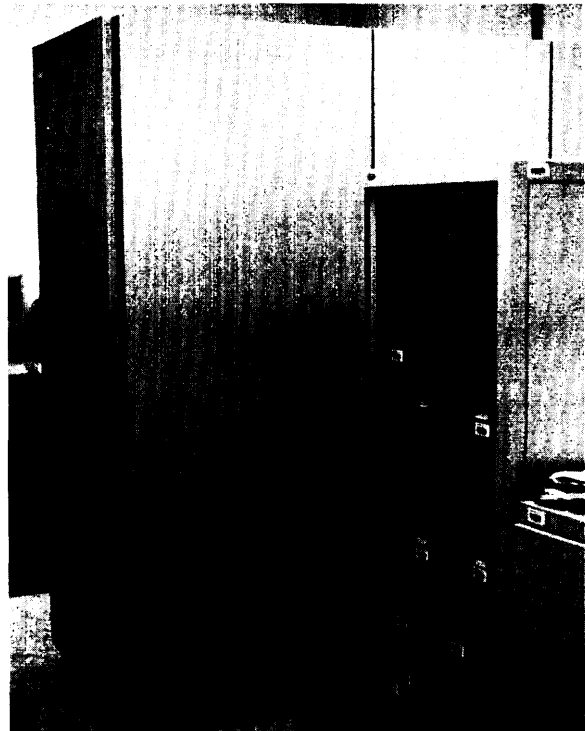
local levels and have spread to the Federal Government. The use of information technology to improve the delivery of Federal services is a major focus of the “National Performance Review” currently being implemented under the direction of the Vice President, and is a key component of the President’s “Technology Policy for Economic Growth” and related “National Information Infrastructure” initiatives.³ Delivering services electronically is now seen as directly linked to improving the Federal Government’s service to the citizens of America.

This report focuses on key topics and issues that are central to the successful use of electronic delivery by government. Briefly, the report concludes that:

1. Powerful forces at Federal, State, and local levels are accelerating the movement toward electronic delivery of government services. While information technology offers considerable potential to improve Federal service delivery, there is no assurance that its use will improve access for citizens or result in creative, cost-effective applications unless other factors are considered and dealt with.
2. The greatest risks of electronic delivery are: a) overlooking the human element and the need for affordable, user-friendly applications; b) further widening the gap between the information technology “haves” and “have-nets,” and the advantages that educated, technically proficient citizens have over those less so; and c) failing to capitalize on the opportunities for innovation and for economies of scale and scope that would result from partnerships among Federal agencies, their State/local counterparts, and

²For general discussion of government services, see Priscilla Regan, “Typology of Federal Government Services Relevant [to Electronic Delivery],” contractor report prepared for the Office of Technology Assessment, January 1992.

³ Vice President Al Gore, *Creating A Government That Works Better & Costs Less: Report of the National Performance Review* (Washington, DC: U.S. Government Printing Office, Sept. 7, 1993); President William J. Clinton and Vice President Albert Gore, Jr., “Technology for America’s Economic Growth: A New Direction to Build Economic Strength,” Feb. 22, 1993; and Information Infrastructure Task Force, “The National Information Infrastructure: Agenda for Action,” *National Telecommunications and Information Administration*, Washington, DC, Sept. 15, 1993.



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Top left: Before automation, the State of Washington maintained paper records on about 5 million licensed drivers. The paper-based system was slow, expensive, and cumbersome to use, and required hundreds of feet of shelf space.

Top right: After automation, the State of Washington maintained electronic records on licensed drivers using an optical disk system the size of a large closet. The optical system resulted in significant productivity and service improvements.

Bottom left: Using the optical disk system, the State of Washington is able to respond to a wide range of telephone inquiries in minutes or even seconds.

- the private sector in deploying electronic delivery.
3. The management structure for Federal information technology applications is outdated and needs to be redesigned, as some of the States have already begun to do. This will be a difficult, trying process. Keys to effective management of electronic service delivery

include: a) incentives and support for innovation; b) creative thinking in developing “visions” of what electronic delivery could do; c) involvement of both service recipients and agency operational staff at all stages of the project cycle; d) an emphasis on forging strategic partnerships in service delivery; and e) a deliberate, phased program for testing

4 | Making Government Work

- and evaluating electronic delivery applications prior to full-scale deployment.
4. The telecommunications infrastructure is an essential part of the electronic delivery equation. The Federal Government has not, as yet, clearly linked electronic service delivery needs and opportunities with the capabilities offered by a wide range of private sector telecommunications vendors. For electronic delivery to achieve its full potential, citizens need universal, affordable access to continually advancing telecommunications and computer networking.
 5. As the trend toward electronic delivery accelerates, many Federal information policies will become further outdated, increasing the need to update statutes on privacy, security, records management and archiving, procurement, open government, and freedom of information, among others.

FINDINGS ON ELECTRONIC DELIVERY OPPORTUNITIES AND ISSUES

■ Transition to Electronic Service Delivery Inevitable

The automation of Federal agencies and programs has been under way for three decades. Automation has focused primarily on computerizing internal functions of agencies through the use of mainframe and minicomputers, and, most recently, networked personal computers (PCs). The growth in Federal mainframe computers appears to have leveled off, while the number of PCs exploded from a handful in the early 1980s to about 1 million by 1990, to well over 2 million today.⁴ Federal use of new storage technologies also has increased with the proliferation of advanced magnetic and optical disk systems. Use of advanced telecommunications technology has

lagged in comparison. Until the mid-1980s, most agencies predominantly used basic telephone service, with more advanced telecommunications limited to the specialized, primarily scientific or technical, agencies. Agency use of telecommunications is now expanding to include facsimile, voice mail, automated telephone response, data communications, computer conferencing, video-conferencing, and the like. Almost all Federal agencies use electronic mail inhouse, and many have some kind of external electronic mail connections.

Congress and the executive branch—regardless of party—have made a commitment, even during tight budget years, to investing in the Federal information technology infrastructure. The Federal information technology budget has grown from roughly \$9 billion in fiscal year 1982 to about \$25 billion (in current dollars) in fiscal year 1993 for equipment (hardware and software), personnel, and services.⁵ The total Federal expenditure since 1980 now exceeds, conservatively, \$200 billion. The Federal information technology budget was, until the last few years, split about half and half between civilian and military agencies. The downsizing of the military has shifted the split to about 60 percent civilian and 40 percent military as of fiscal year 1993.⁶

What have the taxpayers received in return? Most Federal agencies now perform many key activities—financial, administrative, technical, and service in nature—that could not be accomplished with paper systems. The sheer volume of applications, filings, programs, and clients would require much larger staffing, if it could be manually handled at all. Agencies such as the Internal Revenue Service (IRS), Social Security Administration (SSA), Bureau of the Census, and National

⁴ Based on GSA and private sector estimates.

⁵ Office of Management and Budget, U.S. General Services Administration, and U.S. Department of Commerce, *Current Information Technology Resource Requirements of the Federal Government: Fiscal Year 1993* (Washington, DC: U.S. Government Printing Office, August 1992), see esp. pp. I–3.

⁶ Ibid.

Aeronautics and Space Administration would literally collapse without information technology.⁷

Some agencies, in recent years, have moved beyond internal automation to the application of computers and telecommunications for delivering services and interacting with clients. Electronic deposit of Federal payments, for example, is now commonplace for Federal employees, contractors, and annuitants. The IRS electronic filing program has moved from the pilot to small-scale operational stage. Several major agency automation programs (e.g., at the Patent and Trademark Office and the Securities and Exchange Commission) combine internal automation with electronic service delivery, although frequently with difficulty. The U.S. Department of Agriculture's (USDA's) Food and Nutrition Service is conducting a series of pilot tests of electronic benefits transfer for food stamp and WIC (women, infants, and children) recipients.⁸ The Department of Veterans Affairs (VA) and SSA have pilot projects using electronic kiosks for service delivery. The National Science Foundation (NSF) is experimenting with electronic submission and review of grant proposals. And numerous agencies, including the U.S. Geological Survey, National Oceanic and Atmospheric Administration (NOAA), Defense Technical Information Center (DTIC), National Library of Medicine (NLM), National Technical Information Service (NTIS), and U.S. Government Printing Office (GPO), are disseminating Federal information in electronic formats—via bulletin boards, computer networks, and magnetic and optical disks.⁹

The movement toward electronic delivery at Federal, State, and local levels has been accelerated by powerful forces:

- intensified demands for a more responsive, more productive, and less costly government;
- relentless fiscal pressures at all levels of government;
- increasing recognition that service delivery is a core business of government;
- declining cost-performance ratios and growing user-friendliness of information technology; and
- increasing use and acceptance of information technology.

These forces are so strong that the transition toward ever greater use of electronic delivery is inevitable.

■ Information Technology Opportunities Abound

Recent advances in information technology—especially computers, terminal equipment, telecommunications, and networks—offer new opportunities to implement electronic delivery.

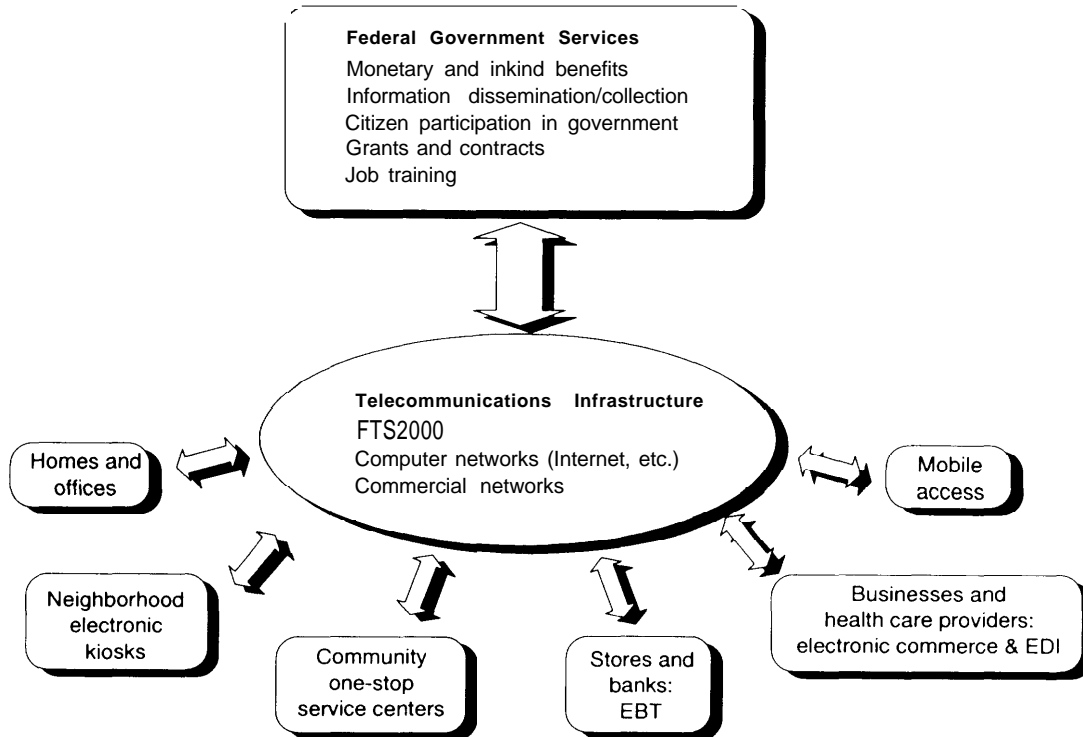
Information technologies could support electronic delivery via: a) personal computers or interactive televisions or terminals in the home, office, or school; b) electronic commerce and electronic exchange of documents with businesses and individuals; c) electronic transfer of Federal benefit payments using magnetic stripe, “smart,” or hybrid cards (the latter combine a magnetic stripe and computer chip on a single card); d) electronic

⁷ See, for example, John Harris, Alan F. Westin, and Anne L. Finger, “Innovations for Federal Service,” op. cit., footnote I; U.S. Congress, Office of Technology Assessment, *Helping America Compete: The Role of Federal Scientific and Technical Information*, OTA-CIT-454 (Washington, DC: U.S. Government Printing Office, July 1990); Charles M. McClure, Rolf T. Wigand, John Carlo Bertot, Mary McKenna, William E. Moen, Joe Ryan, and Stacy B. Veeder, Syracuse University School of Information Studies, “Federal Information Policy and Management for Electronic Services Delivery” contractor report prepared for the Office of Technology Assessment, Dec. 21, 1992.

⁸ See ch. 4 for detailed discussion.

⁹ See, for example, Richard Civile, Computer Professionals for Social Responsibility, “Broadening the Research Community: Delivering Federal Services Using Information Technology,” contractor report prepared for the Office of Technology Assessment, December 1992; U.S. Congress, Office of Technology Assessment, *Helping America Compete*, op. cit., footnote 7; U.S. Congress, Office of Technology Assessment, *Informing the Nation: Federal Information Dissemination in an Electronic Age*, OTA-CIT-396 (Washington, DC: U.S. Government Printing Office, October 1988).

Figure 1-1—Role of Telecommunications Infrastructure in Delivering Federal Services Via Six Points of Access



NOTE: The Federal services and infrastructure components shown are illustrative, not comprehensive

KEY: EBT=Electronic Benefits Transfer; EDI=Electronic Data Interchange; FTS2000=the Federal long-distance telecommunications program.

SOURCE: Office of Technology Assessment, 1993.

kiosks located at shopping malls or community centers; e) one-stop service centers in suburbs and inner cities as well as small towns; f) mobile service centers in remote or distressed areas; and g) mobile service delivery to field locations using portable terminals—in neighborhoods, on the streets, on farms, and on parklands. Many of these are being pilot-tested today, and some already are in widespread use (see figure 1-1 and table 1-1).

Technologies vary in their state of readiness for use in electronic delivery. Even if technically proven, some technologies may face user, cost, or infrastructure barriers that limit their widespread implementation (see table 1-2). Telefacsimile and computer bulletin boards, for example, are proven

technologies that can be implemented on a decentralized basis, but people must have access to a fax machine or a personal computer with a modem to use them.¹⁰ Kiosks, on the other hand, are still in the developmental stage and require further pilot tests and demonstrations. Electronic benefits transfer (EBT), in contrast, already has been extensively tested in the United States and abroad, and is ready for scaled-up, pre-operational testing.

■ Need for Federal Government Strategy and Vision

The Federal Government lacks an overall strategy or vision of electronic service delivery. As defined here, a strategy contains neither general,

¹⁰ A modem is a device that converts the digital data from a computer into analog data that can be transmitted over standard telephone lines.

Table 1-1—Illustrative Electronic Service Delivery Activities

Delivery alternative/technology	Illustrative activities
Home/office (status--widespread testing and operations)	
1-800 numbers	IRS Teletax, ' INS "Ask Immigration"
Facsimile	NIH "Cancerfax, CA State Taxfax"
Electronic bulletin board	SBA "SBA On-line NTIS "FedWorld"
Computer networks	NASA and NOAA scientific databases
Floppy disk	NLM "Grateful Meal, USDA 'Asian Trade"
CD-ROM	USGS 'Gloria, " EPA "Toxic Inventory" GPO "Congressional Record"
Electronic kiosk (status--still in small-scale testing)	
Off-line	Phoenix, AZ "At Your Fingertips, ' Mercer Island, WA "Island Access"
On-line	Tulare County, CA "Tulare Touch, " Long Beach, CA 'Auto Clerk CA State "InfoCal"
One-stop service center (status--still at the conceptual stage):	
Audio- and videoconferencing, electronic mail, computer-based services, etc.	Individual technology applications widely tested, but not colocated at Identified one-stop centers
Multimedia	DHHS Community Services Network
Mobile delivery (status--widespread but Incoherent use)	
Cellular, portable computers, very small aperture earth stations	Individual technology applications widely tested and heavily used, but not as part of an overall strategy
Electronic benefits transfer (status--many tests, limited operations)	
Magnetic stripe card and readers	Reading, PA; Albuquerque, NM, and Ramsey County MN tests for AFDC and/or food stamp delivery, State of MD operational
Smart (integrated circuit) card readers	Dayton, OH test for food stamp delivery, Casper, WY test for WIC
Hybrid (magnetic + chip) card and readers	No U S testing foreign operational use (e g., Germany)
Electronic commerce (status--many tests, extensive operations)	
Electronic data interchange (EDI)	Use by Federal agencies for invoices delivery reports, tariff filings tax forms, etc.
Electronic funds transfer	Widespread use by Federal agencies for direct deposit, funds receipt and disbursement, etc.
Electronic filing or archiving	Pilot tests, growing use by Federal agencies

KEY AFDC=Aid to Families With Dependent Children, DHHS=Department of Health and Human Services, EPA= Environmental Protection Agency, GPO= Government Printing Office, INS=Immigration and Naturalization Service, IRS=Internal Revenue Service, NASA= National Aeronautics and Space Administration, NIH=National Institutes of Health, NLM=National Library of Medicine, NOAA= National Oceanic and Atmospheric Administration; NTIS= National Technical Information Service, SBA=Small Business Administration; USDA=U S Department of Agriculture; USGS=U S Geological Survey, WIC=Special Supplemental Food Program for Women, Infants and Children

SOURCE Office of Technology Assessment 1993

8 I Making Government Work

Table 1-2—Technology Readiness for Electronic Delivery

Delivery alternative/technology	Readiness status
Inhome/inoffice:	
1-800, voice mail	Proven, but must be user-friendly
Facsimile	Proven, but user must have fax machine and touch-tone phone
Electronic bulletin board services (BBS)	Proven, but user must have personal computer and modem, budget for on-line charges, and expertise
Computer networks	Proven, but see above for BBS, plus require network access (possibly at additional cost)
Floppy disk	Proven, inexpensive, but has limited capacity and requires computer
CD-ROM	Proven, price varies widely, high capacity, but requires computer, CD-ROM reader, and expertise
Electronic kiosk:	
Off-line, stand-alone or polled	Proven, cost a function of volume, ready for pre-operational tests
On-line, informational and/or transactional	Developmental, needs further pilot tests
One-stop service center	
Audio conferencing	Proven, inexpensive, simple to use
Full motion videoconferencing	Proven, but still rather expensive
Compressed videoconferencing	Developmental, costs dropping, ready for pre-operational tests
Desktop videoconferencing	Developmental, needs further pilot tests
Interactive multimedia	Developmental, needs pilot tests
Computer-based services	Colocated, see home/office above
Electronic kiosks	Colocated, see kiosks above
Mobile delivery:	
Cellular	Proven, but still expensive and service areas limited
Portable computers, laptops	Proven, ready for pre-operational tests
Very small aperture terminals	Proven, ready for pre-operational tests
Transportable earth stations	Proven, needs further pilot tests
Transportable kiosks	Developmental, needs pilot tests
Personal communication networks	Developmental, needs pilot tests
Electronic benefits transfer:	
Magnetic stripe cards and readers	Proven, inexpensive, ready for pre-operational tests, large existing commercial infrastructure
Memory cards and readers	Proven, needs pilot tests
Smart (integrated circuit) cards and readers	Proven, but no infrastructure in the United States, still more expensive than magnetic stripe, ready for limited pre-operational tests (plus further pilots)
Hybrid (magnetic + chip) cards and readers	Proven overseas but untested in the United States, needs pilot and pre-operational tests
Optical cards and readers	Developmental, needs pilot tests
Electronic transactions and commerce:	
Electronic data Interchange (EDI)	Proven cost effective, users need computer, software, network access, and expertise
Electronic mail	Proven, cost effective, but see above
Digital facsimile	Proven, still expensive but costs dropping, and see above
Electronic Imaging	Proven, still somewhat expensive, and see above
Electronic filing or archiving	Proven, cost effective, and see above
Electronic funds transfer	Proven, cost effective, but requires special equipment (e.g., automated teller machines, point-of-sale terminals, wire transfer network access--can be via banks, etc.)

SOURCE Office of Technology Assessment, 1993

vague statements of intent nor overly detailed, inflexible technical or procurement plans. An effective strategy would link goals with technical options and opportunities for service delivery; identify key factors that need attention; and address such issues as user-friendliness, standards, cost, and interagency cooperation as suggested in this report. The strategy would, ideally, describe pictures of what electronic delivery could mean for Americans. The administration's "Technology Policy" and "National Performance Review" initiatives recognize the importance of information technology.¹¹ The Office of Management and Budget (OMB) has asked executive agencies to submit information on technology projects geared to "service to the citizen," and has supported the General Services Administration's (GSA's) fledgling "service to the citizen" program that involves small-scale educational, outreach, and training activities with some Federal agencies.¹² An overall strategy may emerge from these efforts, but this remains to be seen (as does the quality and completeness of such a strategy).

Without a strategy, many opportunities for technology and program integration, common technical standards and delivery platforms, partnering with State/local governments, and use of off-the-shelf commercial technology may be lost. EBT is a case in point. Pilot-testing and operational use in the United States and abroad have established the feasibility and utility of EBT. But

EBT is not likely to be cost effective for delivery of Federal benefit programs if each agency or State goes its separate way. The key to EBT success appears to be a multiprogram, multiagency, Federal/State/private sector collaborative approach. Using EBT to deliver food stamps, for example, involves the USDA; State and local government health or agriculture agencies; food retailers; the banking and electronic funds transfer systems; equipment providers; food stamp recipients; and, in some locales, voluntary community organizations that assist low-income families.

Without a strategy, Federal leadership in electronic service delivery will be in jeopardy. Since the 1950s, the Federal Government has played a major role in the application of information technology for governmental and public sector purposes, Federal contracting for computer systems, whatever its problems, has provided a stimulus to the private sector. In recent years, however, many State and local governments have, in effect, challenged the Federal Government for leadership in the management and application of information technology. Several States—California, South Carolina, and Washington, for example—are developing strategies for electronic service delivery, and the States as a whole are approaching electronic delivery from a more integrated, innovative perspective with a clear priority on improving citizen access than is the Federal Government.¹³ Innovation at the local government

¹¹ See Vice President Gore, *Op. cit.*, footnote 3; and National Performance Review Accompanying Report, *Reengineering Through Information Technology* (Washington, DC: U.S. Government Printing Office, September 1993). The National Performance Review received input from numerous government and private sector sources. See, for example, National Academy of Public Administration, Center for Information Management, "The Information Government National Agenda for Improving Government Through Information Technology," July 1993, and Service to the Citizen Intergovernmental Task Force, "We the People: Service to the Citizen Conference Results," June 1993.

¹² See Office of Management and Budget, "Information Resources Management (IRM) Plans Bulletin, OMB Bulletin 93-12, Apr. 28, 1993, esp. app D; U.S. General Services Administration, Information Resources Management Service, *Service to the Citizens: Project Report, KAP-93-1* (Washington, DC: GSA, February 1993); Francis A. McDonough and Thomas J. Buckholtz, "Providing Better Service to Citizens With Information Technology," *Journal of Systems Management*, April 1992, pp. 32-40; and Jerry Mechling, Jane E. Fountain, and Steven Kelman, *Customer Service Excellence Using Information Technology to Improve Service Delivery* (Cambridge, MA: Harvard University, John F. Kennedy School of Government, June 1993).

¹³ See Office of Technology Assessment, "California Trip Report," and "Olympia/Seattle, Washington Trip Report," Nov. 10, 1992. Also see, for example, Sharon L. Caudle and Donald A. Marchand, *Managing Information Resources: New Directions in State Government* (Syracuse, NY: Syracuse University School of Information Studies, August 1989); State Information Policy Consortium, "National Information and Service Delivery System: A Vision for Restructuring Government in the Information Age," 1992, available from the National Governors' Association, National Conference of State Legislatures, and Council of State Governments; and Council of Governors Policy Advisors, *New Alliances in Innovation: A Guide to Encouraging Innovative Applications of New Communication Technologies to Address State Problems* (Washington, DC: National Governors' Association, 1992).

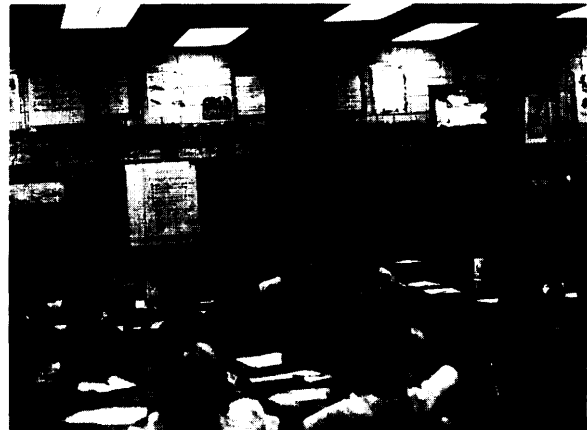
level is also increasing rapidly.¹⁴ The continuing lack of a Federal strategy could frustrate the ability of the Federal Government to maintain leadership while forming strategic partnerships with State and local governments. This, in turn, could hinder efforts to improve government services since so many Federal programs depend on State/local involvement for implementation. The net result likely would be the failure to capture the full benefits of using information technology to improve the productivity and responsiveness of government service delivery at all levels.

■ Risk of Losing the Human Element

Like any new technological application, electronic service delivery will not work if people find the technology confusing, threatening, cumbersome, generally unfriendly, or too costly to use. Electronic delivery runs the risk of losing the human element if it focuses excessively on cost savings, automation, or the technology as an end in itself—rather than on applications that are accessible, user-friendly, private, and secure, as well as cost effective.

OTA site visits found that the grassroots involvement of users—from the pilot-test to full operational stages—helps to assure user-friendly¹⁵ electronic delivery that meets citizen needs. Local schools, libraries, community centers, small-business entrepreneurs, and voluntary organizations help by directly engaging the end-users in the process. The involvement of the local community generally leads to more user-friendly solutions, and gives people a greater sense of commitment and empowerment in harnessing information technology for improved government performance.

The Federal Government can learn from the grassroots experience and reduce the tendency to design unnecessarily large, complex, and expen-



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Local schools and colleges can play a key role in delivering services electronically. Here, students at the Benito Juarez Elementary School in El Cerritos, California, participate in a video-on-demand project using fiber optic and coaxial cable networks. Teachers have full remote control and flexibility in using videos to support classroom instruction.

sive technical solutions. Local people and organizations want to be involved and can help keep this tendency in check. When scaling up, high complexity may sometimes be inevitable. But Federal agencies, overall, do not adequately use the local community infrastructure—including schools, libraries, senior centers, and town halls—in developing electronic delivery strategies and systems that are user-friendly and customer-oriented.

■ Enhanced Citizen Access Not Assured

Americans have different needs and abilities when it comes to government services and the use of technology. Electronic delivery could result in less equitable access to Federal services for some, despite the promise of the technology to improve access. Pilot tests show, on the one hand, that a broad range of citizens can easily adapt to electronic delivery. Citizens of all ages, races, and

¹⁴ See for example Patricia T. Fletcher, Stuart L. Bretschneider, and Donald A. Marchand, *Managing Information Technology: Transforming County Governments in the 1990s* (Syracuse, NY: Syracuse University School of Information Studies, August 1992); and Information Technology Policy and Management Division, State of South Carolina, *Focus 1990s: Direct Citizen Access Using Modern Technologies* (Columbia, SC: South Carolina State Budget and Control Board, May 1991).

¹⁵ User-friendly technology does not require special training or knowledge of complex keyboard or software procedures.

income and educational levels are successfully using touch screens, keyboards, or smart cards today—albeit sometimes on a small scale.¹⁶ Computer novices as well as hackers, non-English-speaking as well as English-speaking people, and persons with sight or mobility disabilities as well as the able-bodied all can participate in electronic service delivery programs.

On the other hand, such participation may be hampered by a major barrier—e. g., the lack of training, equipment, facilitators, and institutional support. Computer networking, for example, could help deliver services to small businesses in the inner city or to Native American craftsmen in rural Montana or Alaska.¹⁷ These business communities could use the technology to their competitive advantage, but to do this, they need access to equipment and networks, a minimal amount of training, and a supportive environment. Support in this case means persons and institutions who can encourage technology innovation, transfer understanding about “how to use the system,” and provide some transitional assistance until these entrepreneurs can go it alone. Failure to attend to these needs and opportunities runs the risk that benefits from electronic service delivery would flow more to the suburban, more affluent, and educated segments of society. This would widen the gap between the information technology “haves” and “have-nots.”¹⁸

■ Cost Effectiveness Not Assured

Electronic delivery could save money for Federal (and State/local) agencies and improve service to recipients, but this is not guaranteed, OTA’s review of available cost data and feasibility studies indicates that:

1. Many small-scale decentralized technology applications can be cost effective, meaning that government agencies can provide the same level of service at less cost or more service at the same cost—automated telephone response systems, electronic filing, compact optical disks, and computer bulletin boards are cases in point.
2. Larger scale technology applications require considerably greater levels of interprogram and interagency cooperation and coordination to be cost effective—electronic benefits transfer and electronic kiosks are examples (numerous Federal/State health and welfare agencies issuing their own cards and installing their own networks of kiosks is unlikely to be cost effective).
3. While difficult to quantify (and not counted in official budget figures), electronic delivery offers the prospect of considerable savings to service recipients and intermediaries, especially when the value of their time is included—this has been demonstrated for EBT, computer bulletin boards, and kiosks.
4. If electronic delivery makes services easier to access, it is likely to increase the demand for services that Americans are entitled to. For some services, this could increase the cost to the government. Use of EBT, for example, might stimulate demand by eligible citizens who are not currently enrolled in some Federal programs. The increased cost of these new users might more than offset savings from electronic delivery. Increased use could also lead to longer term savings by reducing the need for government expenditures on underlying health and social conditions (e.g., as with the Women, Infants, and Children Program¹⁹). Use of electronic bulletin boards

¹⁶ See examples cited in chs. 2, 4, and 5.

¹⁷ See Office of Technology Assessment, “Alaska Trip Report,” and “Montana/Wyoming Trip Report,” Nov. 10, 1992.

¹⁸ See, for example, Richard Cívile, “The Spirit of Access: Equity, NREN, and the NII,” Apr. 15, 1993, available from the Center for Civic Networking, P. O. Box 65272, Washington, DC 20035; and U. S. Congress, Office of Technology Assessment, *Adult Literacy and New Technologies* (Washington, DC: U. S. Government Printing Office, July 1993).

¹⁹ Every dollar spent on the WIC Program is estimated to save the Federal Government about \$5 to \$10 in later expenditures on child and maternal health problems.

and computer networking, on the other hand, could significantly increase Federal information dissemination at little if any increased cost, and possibly a savings, to Federal agencies.

5. Electronic delivery, even if wildly successful, would have only a modest direct impact on the Federal deficit, since the costs of administering programs and delivering services are generally small compared to the costs of the benefits provided.
6. The largest potential financial benefits of electronic delivery (impossible at this time to estimate) could come indirectly through: a) the restructuring and streamlining of Federal programs and agencies made possible in part by information technology; and b) creatively applying electronic delivery to improve fundamental social, economic, educational, and health conditions in the United States.²⁰

Federal expenditures for information technology account for about 1.7 percent of the total Federal budget (5.7 percent of the operating budget).²¹ Spending for information technology has been increasing faster over the last decade than the rate of inflation and the rate of increase in the overall Federal operating budget, but is slowing somewhat due to downsizing of the defense

budget. Evidence available to OTA suggests that the expectations for information technology to improve cost effectiveness (and service quality) are rational, but not easy to measure or fully realize. This intensifies the pressure to show a demonstrable return on investment, however difficult this might be. Prior U.S. General Accounting Office (GAO) and OTA reports, among others, have highlighted the Federal Government's struggle to keep pace with and understand the effects of technology—given the huge installed base of information technology and systems (estimated at about \$50 billion).²² Despite the best efforts of OMB and various interagency coordinating groups, most agencies proceed with electronic delivery applications largely on their own with little systematic accounting of direct and indirect costs.*³

■ Telecommunications Infrastructure Underutilized

The telecommunications infrastructure is an important part of the electronic delivery system. Whether services are delivered to people in their homes, offices, schools, libraries, or shopping malls, most services will depend on the Nation's telecommunications networks to make the connection between Federal agencies and service re-

²⁰OTA has initiated an assessment of information technology and the health care system, at the request of the Senate Committee on Labor and Human Resources. See OTA, *Helping America Compete*, op. cit., footnote 7, for discussion of the role of information technology in strengthening the U.S. scientific and technical enterprise; OTA, *Adult Literacy and New Technologies*, op. cit., footnote 18, and U. S. Congress, Office of Technology Assessment, *Linking for Learning: A New Course for Education*, OTA-SET-430 (Washington, DC: U.S. Government Printing Office, November 1989) for discussion of the role of information technology in educating children and adults.

²¹The Federal Operating budget excludes transfer payments, mandatory spending programs, and debt service. See Office of Management and Budget, U.S. General Services Administration, and U.S. Department of Commerce, *Current Information Technology Resource Requirements of the Federal Government: Fiscal Year 1993* (Washington, DC: U.S. Government Printing Office, August 1992), see esp. pp. 1–3.

²²Capital investments account for about one-fourth of the annual Federal information technology budget, or about \$50 billion of the \$200 billion total cumulative budget over the last decade. GAO has issued hundreds of reports documenting Federal information technology management problems. For a summary, see U.S. General Accounting Office, *Information Resources: Summary of Federal Agencies' Information Resources Management Problems*, GAO/IMTEC-92-13FS (Washington, DC: GAO, February 1992), and *Perceived Barriers to Effective Information Resources Management: Results of GAO Panel Discussions*, GAO/IMTEC-92-67 (Washington, DC: U.S. General Accounting Office, September 1992). Also see U.S. Congress, Office of Technology Assessment, *Federal Government Information Technology: Management, Security, and Congressional Oversight*, OTA-CIT-297 (Washington, DC: U.S. Government Printing Office, February 1986).

²³See OMB, "information Resources Management Plans Bulletin," op. cit., footnote 12. Recently enacted legislation will require Federal agencies to establish clear goals against which performance can be measured. See the Government Performance and Results Act of 1993, Public Law 103-62. OTA has initiated a study of the Social Security Administration's information technology automation program, at the request of the House Committee on Appropriations. The Committee request was based in part on GAO's concerns that the SSA had not adequately documented its technology program or developed performance evaluation and electronic delivery plans.

cipients. The infrastructure includes the public switched telephone network, various private telecommunication and computer networks, cable and broadcast television, satellite-based and mobile communication systems, and a wide variety of value-added networks that lease time on another owner's system. The potential use of the telecommunications infrastructure for electronic delivery of Federal services has received only limited and unfocused attention.

FTS2000

FTS2000 is the Federal program for the bulk purchase of basic long-distance telephone and some advanced telecommunication services from the private sector. All services packaged in FTS2000 are available in the commercial marketplace. The Federal FTS2000 contracts were awarded to two commercial long-distance telecommunications companies. To the degree that FTS2000 becomes a key part of electronic service delivery, then the overall health and future direction of FTS2000 are important.

The transition to electronic service delivery suggests the need to rethink the role of FTS2000. When first conceived, FTS2000 was intended to produce both cost efficiencies and management improvements for Federal telecommunications, compared to the earlier FTS operation. FTS2000 appears to have succeeded against that standard. But over the last decade, telecommunications technology has advanced markedly, and commer-

cial telecommunications companies and services have proliferated. The trend is toward increasingly decentralized applications, which is counter to the centralized decisionmaking and procurement on which FTS2000 is based. Now the Federal Government is on the verge of rethinking its use of information technology, placing much greater emphasis on meeting external customer or citizen needs as contrasted with internal agency requirements. OMB and GSA are taking steps to better understand future agency telecommunication needs.²⁴ But the role FTS2000 or its successor might play in delivering services to citizens is still largely unknown and unstudied.

Computer Networking

Computer networks are telecommunication systems specially equipped and programmed to link computers and computer terminals at distant geographic locations. Participants in two OTA-sponsored on-line computer conferences confirmed the importance of computer networking,²⁵ as did OTA contractor research.²⁶ FTS2000 includes some computer networking services, but these services represent a small percentage of total FTS2000 use. Numerous commercial vendors and some not-for-profit organizations offer computer networking services. The Federal Government has supported the development and operation of computer networks for 25 years, starting with ARPANET for the defense research community and evolving to NSFNET (and its associated networks) for the university research community.²⁷

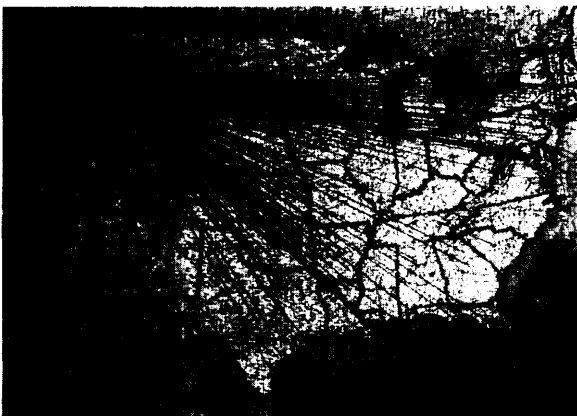
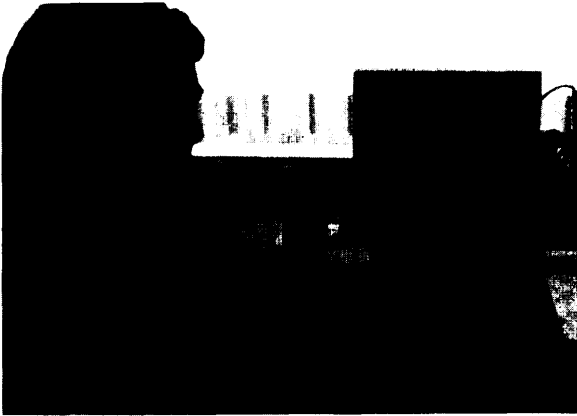
²⁴OMB is surveying agency needs for telecommunication services and technologies currently available, and agency needs for future telecommunication services and technologies. The survey results will be used by the Future Telecommunications Services Working Group, chartered by the Interagency Management Council to assess and define the future direction of FTS2000. See OMB, "Information Resources Management Plans Bulletin," op. cit., footnote 12, app. E.

²⁵ See Frank Odasz, Big Sky Telegraph, "Computer Conference on Electronic Service Delivery to Rural/Small Town America," contractor report prepared for the Office of Technology Assessment, Jan. 8, 1993; and T.M. Grundner, National Public Telecomputing Network, "The OTA/NPTN Teleforum Project: An Experiment With a Multi-City Electronic Town Hall," contractor report prepared for the Office of Technology Assessment, January 1993.

²⁶ See Richard Civile, op. cit., footnote 9; Harms et al., op. cit., footnote 1; McClure et al., op. cit., footnote 7; Susan G. Hadden and W. James Hadden, Jr., "Government Electronic Services and the Environment," contractor report prepared for the Office of Technology Assessment, November 1992.

²⁷ See U.S. Congress, Office of Technology Assessment, *Advanced Network Technology*, OTA-BP-TCT-101 (Washington, DC: U.S. Government Printing Office, June 1993); U.S. Congress, Office of Technology Assessment, *High Performance Computing & Networking for Science*, OTA-BP-CIT-59 (Washington, DC: U.S. Government Printing Office, September 1989); Charles R. McClure, Ann Bishop, Philip Doty, et al., *The National Research and Education Network (NREN): Research and Policy Perspectives* (Norwood, NJ: Ablex Publishing Corp., 1991); Charles R. McClure, Joe Ryan, and William E. Moen, *Public Libraries and the Internet/NREN: New Challenges, New Opportunities* (Syracuse, NY: Syracuse University School of Information Studies, 1992).

PHOTOS: FRED B. WOOD



Top: Computer networking can improve citizen access to Federal Government services. But users must have access to the necessary computer equipment, training, and financial resources. Big Sky Telegraph, headquartered in Dillon, Montana, has pioneered computer networking for rural America.

Bottom: This map of the United States depicts the computer connections between Big Sky Telegraph in Dillon, Montana, and the rest of the continental United States plus Alaska and Hawaii. Computer networking can help rural areas like Western Montana benefit from electronic delivery of Federal and other government services.

Much of the federally supported networking community now uses the Internet family of computer networks (actually many separate networks that use common standards for transmitting data among computers).

Computer networking appears to be a viable way to deliver many Federal services electronically if it is accessible and affordable. For citizens who can afford and know how to use computers at home or work, computer networking can open new “electronic doors” to Federal services. But the distribution of computer accessibility is heavily skewed toward the more educated, affluent citizens. Even among the academic research community, computer networking use at present is in transition because the National Science Foundation (NSF) is ending its direct support for Internet---except for high-end use by supercomputing centers---although indirect support through research and institutional grants is likely to continue in some form. The functional equivalent of the National Research and Education Network (NREN) will, in essence, be provided by private vendors, not through a federally supported computer network.

Many Internet users who are federally subsidized are concerned about how this transition will play out. Internet access is not yet part of basic public switched telephone service (nor is it readily available via FTS2000), but is increasingly available from other private computer net working services. From the perspective of electronic service delivery, the key is the provision of widely accessible and affordable computer networking to citizens as part of the Nation’s private sector telecommunications and computer infrastructure.

Enhanced Universal Service

For electronic delivery of government services to work on a large scale, all geographic areas of the Nation need to have access to advanced digital telecommunication services, whether these are used to access agency FTS2000 systems, dial-up Internet services, or otherwise connect electronically with Federal agencies. These telecommunication services must be interoperable from one part of the country to another, and among various

telecommunication companies, in order to ensure end-to-end electronic connectivity between Federal agencies and their clientele.²⁸

Virtually all telecommunication carriers—from the largest Bell operating companies and alternative long-distance providers to the smallest rural telephone companies—are upgrading their plant and equipment. Most are committed to providing all-digital trunk networks with advanced digital switches and high-capacity fiber optic trunk lines by the mid-1990s, if not before. These upgrades reflect, in part, declining equipment costs and increasing competitive pressures.

The larger companies are conducting research and development on advanced digital switching and networking that will ultimately allow interconnectivity among a wide range of end-user equipment for an ever-expanding portfolio of voice, data, image, and video telecommunication services. At the same time, technical advances continue to provide ways to squeeze more sophisticated applications through the old standby—copper wire—that goes into most homes and offices today. Many Federal services could be delivered electronically over the existing public telephone network, and many more could be delivered using integrated digital technologies (e.g., Integrated Services Digital Network—ISDN). The eventual widespread deployment of high-capacity transmission links, such as fiber to the office and curb (and homes, perhaps in conjunction with cable television and other video serv-

ices), would support more advanced service delivery applications. These might include multipoint videoconferencing, extensive telecommuting, digital libraries, and remote interactive multimedia (e.g., for telemedicine and distance learning).

Electronic delivery of Federal services should evolve to take advantage of new transmission technologies as they become available. At present, however, the Federal Government is not defining—in any coherent or focused way—the telecommunications capabilities needed to support such services. Nor is the Federal Government updating the definition of universal telephone service to reflect advancing telecommunication technologies. Universal, interoperable service is a hallmark of the public telephone system today, and will need to remain so in the future if electronic government service delivery is to be accessible and affordable. These same standards presumably would be applied to any other vendors that become a de facto part of the public switched network, such as cable, satellite, mobile, or computer communication carriers.²⁹

■ Policy and Management Structure Outdated

The Federal policy and management structure for electronic activities includes governmentwide statutes (e.g., the Paperwork Reduction Act and Privacy Act), regulations and guidance (e.g., those issued by OMB and GSA), and the 100,000 or so Federal employees engaged in information policy,

²⁸ See generally U.S. Congress, Office of Technology Assessment, *Critical Connections: Communication for the Future*, OTA-CIT-407 (Washington, DC: U.S. Government Printing Office, January 1990); U.S. Congress, Office of Technology Assessment, *U.S. Telecommunications Services in European Markets*, OTA-TCT-548 (Washington, DC: U.S. Government Printing Office, August 1993); National Telecommunications and Information Administration, U.S. Department of Commerce, *NTIA Telecom 2000: Charting the Course for a New Century*, NTIA Special Publication 88-21 (Washington, DC: U.S. Government Printing Office, October 1988); National Telecommunications and Information Administration, U.S. Department of Commerce, *The NTIA Infrastructure Report: Telecommunications in the Age of Information*, NTIA Special Publication 91-26 (Washington, DC: NTIA, U.S. Department of Commerce, October 1991).

²⁹ See U.S. Congress, Office of Technology Assessment, *Critical Connections*, op.cit., footnote 28; NTIA, *Infrastructure*, op.cit., footnote 28; Arthur Melmed and Francis Dummer Fisher, *Towards a National Information Infrastructure: Implications for Selected Social Sectors and Education* (New York, NY: New York University, Center for Educational Technology and Economic Productivity, December 1991); K. Kendall Guthrie, "Communication Information Systems: Lessons for a Redefinition of Universal Service," Working Paper, Universal Service for [the Twenty-First Century Project, University of Texas at Austin, Winter 1991; Richard Civile, "A Vision of Change: Civic Promise of the National Information Infrastructure," Center for Civic Networking, draft public interest agenda, July 1993; and Ronald D. Doctor, "The National Information Infrastructure Social Equity Considerations," School of Library and Information Studies, University of Alabama at Tuscaloosa, Apr. 13, 1993.

management, and operational activities. The structure is increasingly outdated, with a growing mismatch between policy goals and operational realities. Most policies either predate the electronic era or reflect the time when centralized mainframe computers dominated and telecommunications meant “plain old telephone service” (POTS). During the 1980s, Congress modestly updated some of the basic information policy statutes (on privacy, security, electronic surveillance, and information management, for example³⁰) to reflect early to mid-1980s technology and applications. The ongoing transition to ever greater levels of agency automation and, most recently, electronic service delivery will create tensions between new applications and the old policy framework.

Management of Federal information technology and applications is organized around the Information Resources Management (IRM) concept. IRM is relatively new (little more than a decade old), and was intended to provide an integrated approach to managing the hardware, software, personnel, services, and other components of the government’s information technology activities. IRM was not well defined when the Paperwork Reduction Act of 1980³¹ was enacted. While IRM was modestly refined by Congress in 1986,³² it is still unevenly understood and accepted by government agencies. At least at the Federal level, the rapid rate of advance in information technology and applications has made it difficult for IRM to fulfill its original promise.³³ The transition to electronic service delivery will further stress the existing IRM structure and staff, absent significant changes.

The OTA study found:

1. a governmentwide IRM and information management bureaucracy that, despite the best intentions of dedicated individuals, seems trapped in paperwork, minutia, and procedural red tape—with the odds stacked against innovators and visionaries;
2. a governmentwide IRM and information technology planning and budgeting process that, despite recent efforts to accommodate service to the citizen, is still not keeping pace with changes in technology and applications;
3. a massive challenge in retraining many IRM staff to think more creatively about electronic delivery opportunities, better understand and stay abreast of breaking technology developments, and reach out more aggressively to State/local, grassroots, and private sector partners in electronic delivery;
4. continuing confusion or conflict over the roles of agency IRM and program staff, and Washington DC headquarters and field staff, in electronic delivery initiatives;
5. a strong tendency among national agency managers in Washington, DC to develop plans and make decisions without adequate involvement of the field managers responsible for implementing technology and delivering services;
6. lack of technology integration across agency, program, and service lines;
7. lack of integration of Federal services across agency and technology lines;
8. a continuing lack of adequate consultation with end-users—despite an improving trend—when designing and testing electronic delivery systems; and

³⁰ See the Computer Matching and privacy protection Act of 1988, Public Law 100-503; Computer Security Act of 1987, Public Law 100-235; Electronic Communications Privacy Act of 1986, Public Law 99-508; and Paperwork Reduction Reauthorization Act of 1986, Public Law 99-500.

³¹ Public Law 96-311.

³² Paperwork Reduction Reauthorization Act of 1986, Public Law 99-500.

³³ See McClure et al., op. cit., footnote 7; U.S. General Accounting Office, *Information Resources*, op. cit., footnote 22; Caudle and Marchand, op. cit., footnote 13; and OTA, *Federal Government Information Technology*, op. cit., footnote 22.

9. lack of adequate time and incentives for local agency managers and staff to do strategic planning and “brainstorming” on how to deliver services better—in part using information technology.

OPTIONS FOR MANAGING THE TRANSITION TO ELECTRONIC SERVICE DELIVERY

Congress can affect the rate, nature, and consequences of the transition to greater use of electronic service delivery. The fundamental challenge is to develop a clear Federal strategy that assures that services are delivered equitably, cost effectively, and in keeping with policy objectives.

The executive branch will be largely responsible for implementing electronic delivery at the agency level. Agency activities, in turn, will be guided by the White House, OMB, and other governmentwide policy and management agencies. Congress will review and consider the plans and proposals that result from the ongoing “National Performance Review” and “National Information Infrastructure” initiatives, as well as OMB’s continuing information policy activities.

The administration’s proposals may include elements that, if acceptable to Congress, would require only continuing oversight rather than explicit legislative or budgetary action. OTA has identified several areas, however, that are likely to need congressional action regardless of executive branch proposals, and other areas that may require action depending on the specifics of executive branch proposals.

■ Implementing Strategies for Successful Electronic Delivery

OTA identified seven key strategic elements of successful electronic delivery. Collectively, these strategies would constitute the backbone of a governmentwide electronic service delivery initiative. They would, if implemented, represent a considerable shift in emphasis towards a creative, innovative, citizen- or client-centered approach to service delivery. These include:

1. *grassroots involvement* of local citizens and recipients of Federal services;
2. *community infrastructure development* involving schools, libraries, community centers, town halls, and other local agencies that can help facilitate electronic delivery through training, education, and implementation (see box 1-A);
3. *encouraging innovation* by Federal agency employees, clients, and other participants in trying new ways of delivering services electronically;
4. *creating directories* to agency services (including information services and information about other services);
5. *creating alternative futures* for electronic delivery by generating new ideas for the use of information technology and matching electronic opportunities with agency missions;
6. *strategic partnering* between Federal and State/local government agencies; voluntary, not-for-profit, or philanthropic organizations; and commercial companies engaged or interested in electronic delivery; and
7. *pre-operational testing* of electronic delivery systems on a regional or national scale prior to full deployment, including explicit early attention to performance evaluation and policy development.

Congress and the administration could require that these strategic elements be included in all Federal agency plans and budgets for electronic service delivery, and provide agencies with guidance or directives on implementation. Congress could, at a minimum, reinforce the importance of these strategies through general statutory language, and perhaps more specific report language, to accompany the reauthorization of the Paperwork Reduction Act (PRA) and through annual appropriations. The PRA is one of the key governmentwide statutes that provides congressional guidance on Federal use of information technology for agency automation and service delivery. The PRA authorization expired in 1989; sub-

Box 1-A—Using the Community Infrastructure for High Leverage Electronic Delivery

The involvement of the local community infrastructure can greatly facilitate electronic service delivery. The infrastructure, as defined here, includes people and organizations experienced in helping meet the needs of local citizens and/or in training and assisting citizens in using information technology:

- Schools, libraries, community centers, town halls, and hospitals offer some of the most highly leveraged opportunities because these locations are typically heavily used and well respected, and provide a multiplier effect for technology investments.
- At the local level, technologies and locations suitable for multiple users offer the greatest return on investment. The concept of the community communications center has considerable potential to aggregate demand for and uses of electronic delivery at a central, accessible location.
- Local high schools frequently serve this purpose in small towns and rural areas.
- Educational institutions in general—whether high schools, community colleges, or universities—are very interested in using information technology, tend to be more familiar with the technology than the community-at-large, and are well suited to the training needs likely to be associated with major electronic delivery initiatives.
- Schools and hospitals already benefit from ongoing Federal and State computer, distance learning, and telemedicine programs.
- Various voluntary, self-help, and information response and referral organizations are already plugged into the local community, and some receive funding from Federal and State social service programs.
- Small business innovation centers and economic development councils play similar roles for the local business community, typically with partial Federal and State funding.
- The key is to find synergies between these and the many other government programs that collectively can provide the building blocks for electronic service delivery.

SOURCE: Office of Technology Assessment, 1993.

sequent reauthorization efforts have not yet reached fruition but are continuing.³⁴

Congress could work with, and monitor, OMB to develop detailed guidance for agency information technology planning and budgeting on electronic delivery. One possible set of directives is illustrated in table 1-3. This example includes specific budget set-asides (as a percentage of agency information technology budgets) for grassroots involvement, community infrastructure development, and innovation—activities that otherwise are likely to be underfunded. This table also includes set-asides for performance evaluation and policy development for pre-operational testing activities—essential for providing the infor-

mation needed to make decisions on whether and when to commence full deployment.

The congressional committees with governmentwide oversight (Senate Committee on Governmental Affairs and House Committee on Government Operations) may find it helpful to hold annual oversight hearings on electronic delivery activities of Federal agencies. Should Congress determine that OMB and the line agencies are unable or unwilling to adequately fund and implement the electronic delivery strategies, then the oversight committees could work with the appropriate authorizing and appropriations subcommittees to include specific guidance in annual agency funding bills and accompanying report language.

³⁴ See S. 681, the Paperwork Reduction Reauthorization Act of 1993, Mar. 31, 1993, S. 560, the Paperwork Reduction Act of 1993, Mar. 10, 1993, and H.R. 2995, the Paperwork Reduction Act of 1993, Aug. 6, 1993.

Table 1-3—Illustrative Guidance to Federal Agencies on Electronic Service Delivery

Success factor	Possible congressional or Office of Management and Budget guidance
Grassroots citizen involvement	Required component of all electronic delivery project plans 0.25% minimum set-aside from agency information technology (IT) budget
Community infrastructure development	Optional component of project plans; but 0.25% minimum set-aside from agencywide IT budget allocated to infrastructure development
Encouraging innovation	Required agencywide program: 0.5% minimum set-aside from agency IT budget; required participation in innovation clearinghouse
Creating directories	Required; each agency to plan and implement directory (or directories) to agency services and information; required participation in governmentwide directory
Creating alternative futures	Required component of agency annual and 5-year Information Resource Management (IRM) plans
Strategic partnering	Required component of agency annual and 5-year IRM plans; optional component of project plans, but must be considered
Pre-operational (pre-op) testing	Prerequisite for all medium- to large-scale regional or nationwide electronic delivery systems
Pre-op evaluation	Required component of pre-op testing plans; 5% minimum set-aside from pre-op testing budget
Policy development	Required component; 5% minimum set-aside from pre-op budget

SOURCE Office of Technology Assessment, 1993

■ Assuring Equitable Access to Electronic Services

To have effective access, citizens need to know that services exist and how to obtain them, and be able to make the electronic connections necessary to receive the services on an affordable basis. Assuring equitable access is important to reduce, not widen, the substantial gap between the information “haves” and “have-nets.” The distribution of computer resources, for example, is heavily skewed toward the more affluent, educated segments of U.S. society (see table 1-4). Rural and inner city residents, persons with disabilities, and senior citizens are among those who have a lot to gain—or lose—from electronic delivery. Citizens with special needs can be “winners,” but only if they are active participants with sufficient technical and financial support.

No single action by Congress or the executive branch will ensure equitable access. Rather, it will come from the combined effects of several actions—starting with a new agency planning and budgeting process that incorporates the strategies discussed above, and emphasizes grassroots involvement, community infrastructure development, and directories.

Congress could affirm its intent that the executive branch develop directories or “electronic road maps” to help citizens identify and locate relevant services. A Federal Information Locator System (FILS) was mandated by the PRA 13 years ago, but is far from fully implemented. Congress could add statutory and report language, when reauthorizing the PRA, that further defines the need for a directory or family of directories to Federal services and information. Federal directo-

Table 1-4—Illustrative Distribution of Citizen Access to Computer Resources

	Percentage of respondents that:	
	Use a computer at work	Have a computer at home
Educational level		
Less than high school	10	13
High school graduate	26	19
Some college	43	32
College graduate	58	38
Postgraduate	68	60
Income level		
\$ 7,500 or less	10	13
\$ 7,501-\$15,000	20	12
\$15,001-\$25,000	29	21
\$25,001-\$35,000	33	22
\$35,001-\$50,000	43	34
\$50,001 and over	55	47

SOURCE. Based on a 1990 national survey of 2,254 library patrons conducted by Louis Harris and Associates. For results and analysis, see Alan F. Westin and Anne L. Finger, "Using the Public Library in the Computer Age: Present Patterns, Future Possibilities," American Library Association, 1991.

ries can be implemented using wide-area search and retrieval technologies, as well as electronic bulletin boards and gateways, that allow individual agency directories to function collectively as a "virtual" governmentwide directory.

The cost of electronic delivery can be a major barrier to access. OMB recently issued a revised Circular A-130 on "Management of Federal Information Resources"³⁵ that prohibits agencies from charging more than the marginal cost of electronic information dissemination, unless explicitly authorized by statute, and permits agency heads to reduce or waive fees if necessary to carry out agency missions or meet the needs of agency clients. Congress could include this provision in a reauthorized PRA, and make clear that the pricing policy applies to electronic delivery of all Federal services—not just information.

Congress also could direct OMB to review all agency activities that might be included in an

"electronic public access safety net" to assure access for those citizens who might otherwise fall through the cracks of electronic delivery. The review should cover, at a minimum, the:

- Federal Information Center operated by GSA;
- Consumer Information Center operated by the Government Printing Office (GPO) for GSA;
- Depository Library Program operated by GPO's Superintendent of Documents (SupDocs) in cooperation with about 1,400 participating libraries;
- GPO/SupDocs' "Federal Bulletin Board" and other electronic directory and dissemination initiatives;
- National Technical Information Services' (NTIS') "FedWorld Bulletin Board" and other electronic service activities;
- USDA's "Electronic" Extension Service initiative;

³⁵Office of Management and Budget, Circular A-130 Revised, "Management of Federal Information Resources," *Federal Register*, vol. 58, No. 126, July 2, 1993, pp. 36068-36086.

- other individual agency clearinghouse and information center programs; and
- federally funded information and referral centers or agencies.

Based on the results of this OMB review and the grassroots and community infrastructure involvement, Congress could determine whether other, stronger measures are needed to assure equitable access to electronic delivery. These could include reorganization of existing agency activities and/or the establishment of a partially federally funded, not-for-profit “Corporation for Electronic Service Delivery” or the equivalent.

■ Reinvigorating Federal Information Resources Management

Significant change is needed to jump-start the Federal IRM bureaucracy to move in new directions that emphasize service to the citizen and electronic delivery. Congress could use amendments to the PRA, or equivalent legislation (e.g., a new “Federal Information Management Act” or “Electronic Service Delivery Act”) and accompanying report language, to provide a clear sense of legislative intent by:

- redefining information resources management and training to emphasize electronic service delivery with an end-user or customer orientation;
- strengthening IRM leadership in the agencies (e.g., requiring a full-time senior IRM official or “chief information officer” who participates in top-level agency decision making on service delivery initiatives);
- strengthening the involvement of IRM and agency program staff responsible for service delivery in all stages of electronic delivery initiatives;
- refocusing the Federal IRM organization (e.g., by reorganizing to create new organizational units on electronic delivery within OMB’s Office of Information and Regulatory Affairs, GSA’s Information Resources Management Service, and the National Institute of Standards and Technology (NIST’s) Computer System Laboratory);

- refocusing the IRM advisory committee structure to help assure that OMB, GSA, NIST, and individual agencies get sufficient input from service recipients, community groups, State/local governments, researchers, and private companies;
- redefining agency annual and 5-year IRM planning to emphasize electronic service delivery (e.g., with specific attention to the electronic delivery success factors—see table 1-3);
- requiring OMB to establish a new, publicly accessible electronic clearinghouse on electronic delivery innovations (possibly as a service of FILS);
- requiring OMB to develop and apply a checklist for successful partnering of Federal and State/local agencies at the exploratory/planning, pre-operational, and operational stages of electronic delivery (see table 1-5 for an outline);

Table 1-5—illustrative Checklist for Successful Partnering in Electronic Service Delivery

Exploratory/planning stage

- Project planning task force
- Community workshop or retreat
- Technology demonstration or sharing center
- Local advisory committee

Pre-operational stage

- Cooperative development of operating rules (e.g., assignment of technical and programmatic responsibilities)
- Early resolution of key issues (e.g., cost- and risk-sharing)
- Creative use of requests for information (RFIs) and proposals (RFPs)
- Pilot projects and demonstrations

Operational stage

- Scaling up roles and resources
 - Incorporating pilot-test results
 - Selecting lead agencies and participants
 - Firming up the commitments (and responsibilities) of all partners
 - Providing training and user support
 - Building in a periodic evaluation component
-

SOURCE: Off Ice of Technology Assessment, 1993

- requiring OMB and the Department of the Treasury to develop an electronic benefits transfer plan; and
- requiring NIST to develop an electronic delivery technology plan (e.g., that addresses technical options, user-friendliness, interoperability, standards, and security).

■ Updating Federal Procurement Practices

As with other Federal information technology activities, some electronically delivered services will be contracted to the private sector, others will be implemented by the agencies, and still others will proceed as part of partnership agreements between Federal agencies, their State/local counterparts, and/or the private sector.

Major procurements for electronic service delivery could further strain a Federal procurement process that is already overly complicated, lengthy, rigid, and unnecessarily expensive. Federal technology managers frequently find themselves locked in by cumbersome procurement practices that leave little room to adapt to technology changes and result in guaranteed early obsolescence of Federal automation programs. Major agency automation initiatives have, in the past, typically taken several years to a decade or more. Procurement strategies that may have worked reasonably well in the 1970s and 1980s are likely to result in automated systems for the 1990s that will be two or three generations of technology behind on the day they become operational.³⁶ To improve procurement practices, Federal agencies need to:

- take advantage of new breakthroughs in less expensive, off-the-shelf commercial equipment, software, and services;

- use systems that are interoperable with each other and with the private commercial telecommunications and computer infrastructure;
- seek creative opportunities for intra- and inter-agency procurement partnerships that take advantage of the economies of scale and scope made possible through electronic delivery;
- use procurement strategies that are flexible and evolutionary rather than rigid and static; and
- use information technology to open up competition and cut procurement overhead and red tape.

Congress could direct OMB and GSA to review and revise procurement procedures accordingly. Congress could hold periodic oversight hearings on information technology procurement strategies and practices, and if necessary consider statutory changes and accompanying report language to provide further, stronger guidance.

Congress also needs to monitor the administration's ongoing review of OMB Circular A-76, "Performance of Commercial Activities," to ensure that any change will better balance the sometimes competing considerations of electronic delivery: public accountability, equity of access, government efficiency, public/private sector cooperation, and equity of competition (a "level competitive playing field").

OMB's revised Circular A-130 prohibits agencies from placing copyright or copyright-like restrictions on the use or reuse of Federal information, whether it is provided directly by Federal agencies or by private contractors.³⁷ The intent is to help assure fair access for both the value-added information industry and the general public. Congress could include this provision in a reauthorized PRA.

³⁶ See Thomas Giammo, *Managed Evolutionary Development GUIDEBOOK: Process Description and Application* (Arlington, VA: U.S. Patent and Trademark Office, February 1993); Steven Kelman, Jerry Mechling, and John Springett, *Information Technology and Government Procurement: Strategic Issues for the Information Age* (Cambridge, MA: John F. Kennedy School of Government, Harvard University, June 1992); Armed Forces Communications and Electronics Association, "Evolutionary Acquisition Draft Report," Mar. 12, 1993. For a general discussion of electronic markets and procurement, see U.S. Congress, Office of Technology Assessment, *The Electronic Enterprise: Opportunities for American Business and Industry*, forthcoming.

³⁷ OMB, "Management of Federal Information Resources," op. cit., footnote 35.

■ Updating Other Federal Information Policy Statutes

The information policymaking process generally has lagged technological advances and new applications by several or more years. Electronic service delivery provides a framework for balancing the reality of decentralized, dispersed, user-oriented agency automation with the need for some measure of centralized, yet flexible, policy direction and oversight.

The transition to electronic delivery of many Federal services will require a review, and in many cases the eventual updating, of other Federal information policies, including those already discussed above. First priority should be placed on updating the Privacy Act, since electronic delivery that involves personal or financial information will increase the risks to personal privacy. Congress should consider: a) extending the Act to cover non-Federal systems that participate in electronic delivery of Federal services; and b) establishing an independent Privacy Protection Commission or Board to serve informational, ombudsman, advocacy, investigative, and oversight functions concerning the privacy aspects of electronic delivery.

Electronic delivery should provide new opportunities for promoting open government and public access to Federal meetings, records, and archives (while still tightly controlling access to private, proprietary, national security, and other exempted material). Congress could ask OMB and the National Archives and Records Administration to conduct a detailed review of any statutory changes needed to assure that the Freedom of Information Act, Government in the Sunshine Act, Federal Advisory Committee Act, and Federal Records Act are fully applicable to electronic delivery. Congress could likewise ask OMB and NIST to conduct a review of any changes needed in the Computer Security Act, Computer Fraud

and Abuse Act, and related statutes to help assure the security of electronic delivery systems.³⁸

■ Using the Telecommunications Infrastructure Better

The telecommunications infrastructure is critical to the success of electronic service delivery, but the infrastructure will be provided largely by the private sector—not by the government. The government and the private sector have a synergistic relationship: greater focus and priority on electronic delivery of Federal (and State/local) services will speed up infrastructure development by the private sector, and vice versa.



FRED B. WOOD

This microwave relay station transmits telephone calls and computer data between Anchorage and Fairbanks, Alaska, and is part of the telecommunications infrastructure needed to electronically deliver Federal services to all parts of the Nation.

³⁸ OTA has initiated a study on information security and privacy in network environments, at the request of the Senate Committee on Governmental Affairs. Also see U. S. Congress, Office of Technology Assessment, *Privacy Rights in Computerized Medical Information*, forthcoming.

OMB and GSA are conducting studies on the future of FTS2000 (the current contract expires in 1998). Congress could redirect this effort so that OMB and GSA: 1) use more creativity in visualizing the potential future role for telecommunications in electronic delivery, and 2) develop more complete and authoritative information for deciding whether and in what form FTS2000 should be extended. Price and service comparisons between FTS2000 and commercial offerings are still incomplete and inconclusive. Congress could direct OMB and GSA to develop a program of agency experiments to conduct more complete and realistic price and service comparisons of electronic delivery using advanced telecommunications. These experiments could be based on technology, agency, program, service, or geography, or some combination thereof.

Congress also could direct that FTS2000 planners specifically address partnering and access questions. For example, if several Federal agencies partnered with the State of California's Info-Cal kiosk project, could FTS2000 be used to provide the long-distance link between users in California and agencies in Washington, DC (or elsewhere around the country)? Or if USDA and the Department of Health and Human Services partnered with their State agency counterparts on a nationwide EBT network, could FTS2000 be used as part of the telecommunications backbone? Or if FTS2000 is brought to Federal agency outposts in rural or remote areas with limited or no telecommunication alternatives, could rural hospitals and schools that receive partial Federal funding use FTS2000?

Whatever the future of FTS2000, Congress should insist on interoperability between FTS2000, agency local area networks, and commercial telecommunication networks. To achieve economies of scale and scope, many electronic delivery scenarios are predicated on interoperability of telecommunication systems across agency, programmatic, and even public/private lines. The more problems encountered with incompatible technical standards when interconnecting

FTS2000 systems to each other and the public switched network, the costlier the service and the greater the frustration to providers and users at all levels. The current FTS2000, and all future versions, need to strive for maximum interoperability in order to forestall difficult and costly problems with electronic service delivery deployments. Otherwise, Federal telecommunications will go the way of Federal computer systems—more than two decades worth of computers were installed with widely varying and frequently incompatible software and technical specifications. Intensive Federal and private sector efforts to standardize computer connections will, hopefully, result in interoperable Federal computers, but this will come at great difficulty and expense.

Congress also could ask OMB and GSA, in collaboration with the National Telecommunications and Information Administration (NTIA), Office of Science and Technology Policy (OSTP), and perhaps the Federal Communications Commission (FCC), to:

- review the role of Internet, ISDN, and broadband/fiber to the home/curb in electronic service delivery;
- develop possible revisions to the concept of universal telephone service to include advanced telecommunications and computer networking needed to support electronic delivery; and
- review the administration's computer network and National Information infrastructure (NII) plans to assure that electronic delivery needs are fully addressed.

■ Assuring Accessible, Affordable Computer Networking

Access to computer networks could become an addition to the modern version of universal telephone service, whether it be Federal agencies delivering services over the Internet family of computer networks via FTS2000 and other commercial carriers, or citizens receiving Federal services over computer networks via their local telephone company or some other specialized

computer network. This approach appears consistent with the President's technology policy, which looks to the private sector for implementation of national computer networks. The emerging consensus suggests that NREN properly refers not to a federally funded computer network like NSFNET, but to a program that relies primarily on the Nation's private sector telecommunications and computer infrastructure-encompassed by the NII concept—for the provision of widely accessible computer networking.³⁹

The President's technology plan recognizes the potential links between the NII and government service delivery. Congress could refine and define these links as part of specific proposals for which congressional approval is sought or required. Congress also could explicitly address the links between electronic service delivery and legislation on computer networking and the NII.⁴⁰

Congress traditionally has a special responsibility for assuring equitable telecommunication service to rural and remote areas of the Nation. This responsibility logically would extend to the use of computer networking for the electronic delivery of Federal services to rural America. Rural telephone companies and cooperatives are doing remarkably well in upgrading their plant and equipment. However, while most rural areas now have single-line telephone service, many areas are not yet served by the digital switches and higher capacity trunk lines needed to support advanced

telecommunication capabilities. These improvements are being made, but will take at least several more years to complete.⁴¹

Rural areas can benefit from "rural area networks," or "RANs," set up to achieve the critical mass of users and resources needed to support advanced rural telecommunications—including computer networking. Congress could direct the Rural Electrification Administration and FCC, and possibly OMB, NTIA, and other executive agencies, to ensure that rural and remote areas are included in governmentwide strategies for computer networking and electronic service delivery. Rural communities must have affordable access to a modern telecommunications and information infrastructure if they are to share in the benefits of electronic service delivery, continue to be economically viable, and maintain their role in American life.⁴²

■ Assuring Cost-Effective Electronic Benefits Transfer

After a decade of testing and pilot projects, electronic benefits transfer (EBT) appears ready to take off as a viable alternative to the current paper-based system for delivering many Federal services.

EBT tests and evaluations, using magnetic stripe or "smart" (computer chip) cards, indicate that:

³⁹See U.S. Congress, Office of Technology Assessment, *Advanced Network Technology*, op. cit., footnote 27; U.S. Congress, Office of Technology Assessment, "National Information Infrastructure Initiative: Context for the Future," Telecommunication and Computing Technologies Program Planning Paper, April 1993.

⁴⁰See S. 4 the National Competitiveness Act of 1993, Jan. 21, 1993, Title VI—the Information Technology Applications Act of 1993, as reported out on May 25, 1993, by the Senate Committee on Commerce, Science, and Transportation, and H.R. 1757, the National Information Infrastructure Act of 1993, as approved by the House on July 26, 1993. H.R. 1757, for example, includes the following provisions that are directly relevant to electronic delivery of government services: Connections Program—to foster the creation and connection of local community networks to the Internet, including educational institutions, libraries, and local governments; Training—of teachers, students, librarians, and State and local government personnel in use of computer networks and Internet; Network Security and Privacy—research needed to assure security and privacy of networked transmissions; Ease of Internet Use—research needed to simplify access to and use of Internet by nonspecialists and persons with disabilities; Applications—including networked access to distance learning, telemedicine, digital libraries, and government information; Networked Depository Libraries—to facilitate access to Federal, State, and local government information via Internet; and Federal Information Locator—to be accessible by the public via Internet.

⁴¹See U.S. Congress, Office of Technology Assessment, *Rural America at the crossroads, Networking for the Future*, OTA-TCT-471 (Washington, DC: U.S. Government Printing Office, April 1991).

⁴²Ibid

- EBT technology is proven, reliable, easy to use, and decreasing in cost.
- Recipients, retailers, financial institutions, and local program administrators who have tried EBT prefer it to paper.
- EBT can reduce costs to government agencies, retailers, financial institutions, and recipients.
- Recipients using EBT experience an added sense of dignity and security.
- EBT can improve the integrated delivery of several social service benefit payments and simplify the process of issuing and redeeming benefits.
- EBT can reduce fraud and abuse, e.g., for unauthorized or illegal purchases.
- EBT is most likely to be cost effective if it can be used for multiple services and programs and is based on a standardized commercial technology and infrastructure.

Despite these optimistic findings, sufficient information is not available to assure that EBT is cost effective or to make sound technical decisions on nationwide implementation—such as a national rollout of EBT for food stamps using a magnetic stripe card⁴³ or a nationwide “health passport” using a computer chip card.⁴⁴ Federally supported pilot tests have assessed the use of magnetic stripe cards thoroughly, but have given only limited attention to smart cards and have entirely overlooked hybrid cards (that combine features of both magnetic and smart cards).

The next logical step toward nationwide EBT deployment is a scaled-up, multitechnology, multiple-program, and regionally based EBT feasibility test that would help to determine:

- the total cost of developing and implementing a national EBT system;

- the optimal system design (e.g., on-line, off-line, or integrated system; magnetic, smart, or hybrid card);
- the most appropriate deployment strategy;
- the level of Federal/State and public/private cooperation needed to develop and implement EBT cost-sharing and standardized EBT operating rules and procedures;
- the most effective mechanisms for Federal/State leadership and interagency coordination on EBT; and
- the revisions to Federal and State laws and regulations needed to facilitate a transition to EBT.

Congress could direct OMB, the Department of the Treasury, and responsible agencies to design and implement a program of scaled-up feasibility tests. Congress could, if necessary, reinforce this direction through amendments and/or report language to authorization and appropriations bills.

■ Increasing Congressional Use of Electronic Delivery

In addition to oversight and policy actions, Congress can participate in electronic delivery through its own use of information technology. Several applications are technically feasible and have been pilot-tested, at least on a small scale. These include videoconferencing for committee hearings; electronic bulletin boards for hearing and legislative materials, schedules, etc.; and computer conferences for public input and dialogue. Members of Congress and staff, for example, can now access the Internet computer network; and the House of Representatives has wired several hearing rooms for videoconferencing.⁴⁵

Congress gradually is building the information infrastructure on Capitol Hill that could support electronic service delivery. Ultimately, in addition

⁴³ As proposed by the Food and Nutrition Service, U.S. Department of Agriculture.

⁴⁴ As is being considered by the White House Health Care Reform Task Force.

⁴⁵ Several congressional offices are experimenting with In[et] for public access to congressional information. For a general discussion, see Stephen Frantzich, “Electronic Service Delivery and Congress,” contractor report prepared for the Office of Technology Assessment, January 1993.

Box B-Illustrative Electronic Connections to the Federal Government

Send electronic mail to the White House:

President Clinton-president @whitehouse.gov via Internet

Vice President Gore-vice.president@whitehouse.gov via Internet

Also available on CompuServe, GENie, America On-Line, and MCI Mail, among others

Obtain Library of Congress on-line news and event information:

Dial into the LOC News Service Bulletin Board

202-707-3854 dial-up computer number

202-707-9217 bulletin board operator assistance

Browse the Library of Congress electronic card catalog with 25 million entries--locis.loc.gov via Internet (Mon-Fri 6:30am-9:30pm, Sat 8am-5pm, Sun 1-5pm EST), Includes 15 million entries on books and serials, and 10 million entries on other types of material such as music, software, maps, legislation, copyright registrations, braille, and recorded items.

Check the National Technical Information Service's "FedWorld" Electronic Bulletin Board listing over 3,000 files and providing gateway access to over 100 individual Federal agency databases.

703-321-8020 dial-up computer number

703-487-4608 bulletin board operator assistance

Check the Government Printing Office's "Federal Bulletin Board" for a listing of documents and databases that can be downloaded (free directory access, fees charged for displaying or downloading documents).

202-512-1387 dial-up computer number

202-512-1530 bulletin board operator assistance

Browse the General Service Administration's Clearinghouse on Computer Accommodation Bulletin Board for information on electronic access by persons with disabilities.

202-219-0132 dial-up computer number

202-501-4906 bulletin board operator assistance

Send electronic mail about this report to the Office of Technology Assessment, U.S. Congress—fwood@ota.gov, thausken@ota.gov, egonzalez@ota.gov, or elecdelivery@ota.gov via Internet.

NOTE: As of press time, the Internet and bulletin boards listed above do not charge for access; **fees** may apply for downloading; users are responsible for their own **long-distance telecommunication** charges, if applicable. All bulletin board settings are 1,200 or 2,400 bits per second, 8 bit, no parity, 1 stop bit **(8N1)**.

SOURCE: White House, Library of Congress, National Technical Information Service, Government Printing Office, General Services Administration, Office of Technology Assessment, 1993.

to scheduling and status information, complete congressional reports and documents also could be made available electronically. These could include committee reports and hearings, as well as public documents issued by the congressional support agencies—the Congressional Research Service (CRS), Congressional Budget Office (CBO), GAO, and GPO, in addition to OTA. Several of these congressional agencies (e.g., GPO,⁴⁶ GAO, and OTA) already are experimenting with electronic dissemination. Taken together, electronic service delivery applications could further open Congress to the people, strengthen the role of Congress as the people’s branch of government, and, in the process, set an example for the executive branch and the Nation.

Information technologies offer, in sum, almost limitless near-term opportunities for electronic delivery of Federal services by the government directly or in partnership with State/local agencies and the private sector (see box 1-B for some current Federal electronic connections). New technologies allow electronic delivery to accommodate the diversity of citizens’ needs. However, assuring that electronic delivery benefits all citizens—not just the affluent and computer literate—and makes best use of scarce taxpayer dollars will require an extraordinary level of congressional policy attention and oversight and agency execution.

⁴⁶ The Government Printing Office Electronic Information Access Act of 1993, Public Law 103-40, authorizes or mandates a variety of GPO electronic dissemination activities.