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ABSTRACT

This evaluation of the leadership and decision making of the Office of Management and Budget (OMB) and the General Services Administration (GSA) in managing the federal government's telecommunications determined that both agencies need to engage in sufficient planning and analysis to determine which telecommunications systems should be centrally provided and managed, and where close coordination is required among individual agency systems. Currently no plan exists that: (1) characterizes which agency requirements should be met by centrally provided services and which should be met by the agencies themselves; (2) identifies needed government-wide technical standards; or (3) defines the responsibilities of the central managers and the individual agencies. It was also determined that some major decisions shaping GSA's planned procurements for local and long-distance services, which total over $5.5 billion, have been made without adequate analysis. Six recommendations are made and documentation of the methodology used to evaluate various telecommunication strategies is appended. (RP)

GAO

United States General Accounting Office

Report to the Chairman, Committee on Government Operations, House of Representatives

May 1987

INFORMATION MANAGEMENT

Leadership Needed in Managing Federal Telecommunications

GAO

United States
General Accounting Office
Washington, D.C. 20548

Information Management and
Technology Division

B-219799

May 6, 1987

The Honorable Jack Brooks
Chairman, Committee on Government Operations
House of Representatives

Dear Mr. Chairman:

This report presents the results of our evaluation of whether the Office of Management and Budget and the General Services Administration, which have substantial responsibilities for managing federal telecommunications, are providing the necessary leadership and making sound decisions.

As arranged with your office, unless you publicly announce the contents of this report earlier, we plan no further distribution of the report until 30 days from its issue date. At that time, we will send copies to the Director of the Office of Management and Budget, the Administrator of General Services, and other interested parties, and make copies available to others upon request.

Sincerely yours,

Ralph V. Carlone

Ralph V. Carlone
Director

Executive Summary

Purpose

Revolutionary changes in telecommunications technology and regulations offer opportunities for increased competition, new service options, and cost economies. Poor choices among alternatives, however, may result in unreliable and unnecessarily expensive systems that are not compatible with each other, and that contain special features that do not provide the expected benefits. The government is faced with many new, complex choices which require more sophistication than was previously necessary. These decisions will affect government telecommunications into the 21st century.

The Chairman of the House Committee on Government Operations requested this report, which addresses whether the Office of Management and Budget (OMB) and the General Services Administration (GSA) are providing the necessary leadership and making sound decisions for managing the government's telecommunications.

Background

GAO estimated that the annual cost of telecommunications needed to support federal agencies exceeded $10 billion in 1981. OMB and GSA have substantial responsibility for managing government telecommunications. OMB is responsible for establishing telecommunications policy, developing a plan for meeting the telecommunications needs of the federal government, and issuing guidance on the acquisition and use of telecommunications resources. GSA establishes specific policies, regulations, and procedures for acquiring communications services and equipment; develops and operates shared voice and data systems for use by the agencies; and procures communications services and equipment for federal agencies or authorizes individual agencies to buy their own systems, as appropriate. Together, OMB and GSA are responsible for ensuring that all agency activities are sufficiently coordinated to achieve governmentwide telecommunications objectives. Individual agencies, in turn, are expected to acquire and use telecommunications resources within the requirements and guidelines established by OMB and GSA.

The local and long-distance networks managed by GSA are old and costly, and GSA is planning to upgrade them. In addition, many agencies are procuring their own systems to take advantage of opportunities for cost savings and technological advances offered by the changed environment.

Results in Brief

OMB and GSA must provide stronger leadership to assure that governmentwide and individual agency telecommunications needs will be met effectively and economically.

At the governmentwide level, OMB and GSA should do sufficient planning and analysis to determine which telecommunications systems should be centrally provided and managed and where close coordination is required among individual agency systems. However, no overall plan, which spells out the government's management strategy, exists that (1) characterizes which agency requirements should be met by centrally provided services and which should be met by the agencies themselves, (2) identifies needed governmentwide technical standards, or (3) defines responsibilities between the central managers and the individual agencies. Relevant technical information on agency requirements and appropriate economic criteria has not been identified or collected to serve as the basis for such analyses.

Some major decisions shaping GSA's planned procurements for local and long-distance services have been made without adequate analysis. Consequently, these procurements, which total over $5.5 billion, have been plagued with difficulties. For example, initial analyses regarding long-distance services did not sufficiently compare alternatives. Later analyses for these services were performed, but GAO has not evaluated them in detail. Furthermore, opportunities to share equipment among agencies were also being overlooked, and potentially large savings lost, because of deficiencies in GSA's policies and procedures when GSA considered agencies' procurement requests.

Principal Findings

Inadequate Planning by OMB and GSA

The Paperwork Reduction Act requires OMB, in consultation with GSA, to develop a 5-year plan for meeting the telecommunications needs of the federal government. The published plans, however, have essentially been a summary compilation of proposed agency procurements, and lack important characteristics one would expect of such a governmentwide plan. Adequate information had not been collected on agency requirements for various telecommunications services; appropriate methodologies for evaluating governmentwide costs had not been derived; decisions as to which services should be provided centrally had not been

made; and the need for specific technical standards had not been identified. The absence of meaningful governmentwide planning has left the government open to the risk of serious problems in the development of new or replacement telecommunications systems. Further, it has made it impossible to ascertain with any confidence whether the government is meeting its overall telecommunications objectives—achieving economies of scale (savings through proper sizing of systems), national security and emergency preparedness telecommunications systems, and system compatibility. (See pp. 18-22.)

Analyses Supporting Major Decisions Often Inadequate

Critical decisions, basic to GSA procurements, were often not supported by meaningful analyses. GSA initially examined seven alternatives to replace its existing long-distance network at a cost of over $4 billion. However, the original analysis was more anecdotal than quantitative and the methodology used in choosing the final alternative was not explained. As a result, the analysis lacked credibility and the procurement was delayed. At the urging of OMB and the GSA Administrator, GSA awarded a contract for a more extensive analysis of the FTS replacement alternatives, including a cost/benefit analysis of principal alternatives. A cursory review of this analysis shows that it addresses those issues identified by GAO as essential to the development of an FTS 2000 procurement strategy. However, GAO has not yet reviewed the new analysis in detail. (See pp. 26-39.)

Resource Sharing Not Considered

GSA was not adequately or systematically considering the sharing of telecommunications systems when it reviewed agencies' requests for authority to acquire their own systems. Neither GSA's regulations nor its internal procedures require GSA staff to evaluate the potential for sharing as an alternative to the agency-proposed systems.

In three locations alone, where GSA had approved individual agency systems, GAO estimated that shared systems would have saved the government $16 million over a 10-year period. (See pp. 40-47.)

Recommendations

GAO recommends that the Director of OMB and the Administrator of GSA develop a more comprehensive plan addressing how the government will fulfill its telecommunications requirements. This plan should include criteria (such as factors to be considered to ensure that governmentwide objectives are met) necessary for making decisions on how agencies' needs will be met. It also should provide for fundamental decisions

regarding the types of telecommunications services that should be provided centrally by GSA and the types of services that should be provided by the agencies themselves.

In addition, OMB and GSA should

- develop an explicit, uniform methodology for evaluating alternative telecommunications investments for federal use; and
- establish and effectively implement a policy for agency sharing of telecommunications resources when it is in the government's best interests.

GAO makes other recommendations concerning the acquisition of GSA's consolidated systems and the implementation of a policy of sharing among government agencies. (See pp. 50-51.)

Agency Comments

GAO discussed its findings with agency program officials and has included their comments where appropriate. Actions taken by OMB and GSA to address some of the problems described in this report are on pages 24 and 36. GAO did not obtain OMB's and GSA's views on this report's conclusions and recommendations, nor did it request official agency comments on a draft of this report.

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Appendix

Tables

Abbreviations

ADP	automatic data processing
ASP	Aggregated Switch Procurement
AT&T	American Telephone and Telegraph, Inc.
FTS	Federal Telecommunications System
GAO	General Accounting Office
GSA	General Services Administration
IPS	Internal Revenue Service
OMB	Office of Management and Budget
PBX	private branch exchange
RFP	Request for Proposals
USPS	United States Postal Service
WITS	Washington Interagency Telecommunications System

Introduction

Revolutionary changes have occurred in telecommunications[1] that demand significantly more sophistication from consumers. Rapidly improving and diversifying technology and the 1984 American Telephone and Telegraph (AT&T) divestiture have changed what was essentially a monopoly that made many basic decisions on the nature and form of government telecommunications services, into a competitive environment that offers greater efficiency in data communications, computer design, electronic mail, and an extensive assortment of other telecommunications capabilities.

The federal government is the largest consumer of telecommunications in the free world. On the basis of information obtained from government sources, we estimated[2] that the government's total expenditures for telecommunications services and equipment exceeded $10 billion for fiscal year 1981. In addition, civilian executive agencies (excluding the Department of State) responding to a General Services Administration (GSA) questionnaire reported, in 1984, 220 data and voice networks either in use or planned.

Unless the federal government is knowledgeable about the new environment, it could find itself with unreliable and unnecessarily expensive telecommunications systems whose specific features do not deliver the expected benefits. Operating in this new environment, the federal government must conduct its upgrades and procurements of new telecommunications systems while avoiding the pitfalls of excessive cost, duplication and underutilization of equipment, and systems that lack the necessary interoperability[3] to meet national security and emergency preparedness as well as daily requirements. The Office of Management and Budget (OMB) and GSA have complementary responsibilities for ensuring that these pitfalls are avoided and that the government's telecommunications systems are effectively managed.

[1]Telecommunications is the aggregate of several modes of conveying information, signals, or messages over a distance. This definition includes transmission or reception of signs, signals, writing, images, sounds, or intelligence of any nature by wire, radio, visual, or other electromagnetic system used to communicate over a distance.

[2]Financial Information Lacking on Government Telecommunications Services and Equipment (GAO/MASAD-83-16, February 25, 1983).

[3]Interoperability is a condition that is achieved among electronic communications systems or equipment when information or services can be exchanged directly between them, or their users, or both. This definition includes the ability of communications systems to function together.

Governmentwide Telecommunications Objectives

Consistent with responsibilities granted federal agencies in the Federal Property and Administrative Services Act of 1949, as amended (40 U.S.C. 471 et seq.), the Paperwork Reduction Act of 1980, as amended (44 U.S.C. 3501 et seq.), and Executive Order 12472 (Assignment of National Security and Emergency Preparedness Telecommunications Functions, April 3, 1984), we have derived governmentwide telecommunications objectives that apply to all federal communications managers. Among the most critical objectives are (1) cost economies (savings through proper sizing of systems), (2) national security and emergency preparedness requirements, and (3) system compatibility.

Cost Economies

Cost economies are addressed in the Federal Property and Administrative Services Act and the Paperwork Reduction Act. Under the former, the Administrator of GSA, to the extent that he or she determines it advantageous to the government in terms of economy, efficiency, or service, is responsible for prescribing policies and methods of procurement and the supply of personal property and nonpersonal services, including public utility (telecommunications) services. The act also gives the GSA Administrator authority to operate communications systems that provide services to one or more federal activities, where such services are economical and in the government's interests. The Paperwork Reduction Act refers to improving service delivery, increasing productivity, and reducing waste and fraud, as goals for telecommunications technology acquisitions. We believe these goals also concern cost economies.

National Security and Emergency Preparedness

Executive Order 12472 suggests the following objectives for federal telecommunications networks:[4]

- A level of interoperability that meets national security and emergency preparedness goals and day-to-day communications requirements.
- The ability to survive through or be restored after a national disaster or emergency.
- The establishment and use of appropriate technical standards to ensure necessary interoperability/ interconnectivity.

[4]Telecommunications networks owned by and/or used by government agencies. These include common-user networks shared by many government agencies and private networks dedicated to individual agencies carrying voice and/or data traffic.

The executive order also establishes the National Communications System to provide for the development of a national telecommunications infrastructure that

- responds to all federal national security and emergency preparedness needs, including telecommunications, to support national security leadership and continuity of government;
- satisfies priority telecommunications requirements under all circumstances through the use of commercial, government, and privately owned telecommunications resources; and
- incorporates the necessary combination of hardness, redundancy, mobility, connectivity, interoperability, restorability, and security to maintain, to the maximum extent possible, national security and emergency preparedness telecommunications in all circumstances.

Under Executive Order 12472, the manager of the National Communications System shall

- develop for the consideration of National Communications System managers (1) a recommended telecommunications architecture to meet current and future national security and emergency preparedness requirements and (2) plans, procedures, and standards for minimizing or removing technical impediments to the interoperability of government-owned and/or commercially provided telecommunications systems; and
- manage the Federal Telecommunications Standards Program, ensuring wherever feasible that existing or evolving industry, national, and international standards are used as the basis for federal telecommunications standards, pursuant to GSA's Federal Standardization Program and in consultation with other appropriate federal entities.

The executive order also assigns national security and emergency preparedness responsibilities to other federal organizations, including OMB and GSA. The OMB Director, in consultation with the National Security Council and National Communications System, will prescribe general guidelines and procedures, which may provide mechanisms for funding federal national security and emergency preparedness telecommunications initiatives. The GSA Administrator, consistent with OMB's policy guidance, shall ensure that federally owned and managed domestic communications facilities and services meet the national security and emergency preparedness requirements of federal civilian departments, agencies, and entities. Federal departments and agencies must determine their national security and emergency preparedness

requirements and provide the National Communications System Manager with this information.

System Compatibility

The interoperability of government telecommunications systems is not only important for national security and emergency preparedness, but also for the day-to-day communications of the government (such as sharing of information within and between federal entities). GSA's telecommunications plan describes interoperability as an appropriate level of connectivity and cohesion in the government's telecommunications systems, and emphasizes that these systems must be governed by standards that ensure proper interface and reuse of equipment.

Similarly, system compatibility fosters the sharing of information within and between federal entities. In its Circular No. A-130 (Management of Federal Information Resources, December 12, 1985), OMB states that agencies often acquire technology that is incapable of communicating with other systems. The circular cites this incompatibility among information systems as a significant problem in information resources management.

Responsibility for Federal Telecommunications

OMB and GSA are the central managers for federal telecommunications activities and have complementary responsibilities. OMB is charged with overall telecommunications planning and policy making. GSA manages communications services for executive agencies, establishes telecommunications management and procurement policies, regulates these methods of procurement, and procures some communications services. The various executive agencies, in turn, are expected to acquire and use their telecommunications resources within the guidelines established by OMB and GSA.

OMB Has Principal Responsibility for Setting Policy and Oversight

OMB is primarily responsible for planning and overseeing the executive branch agencies' implementation of established policies. It also serves as the President's chief adviser on federal telecommunications activities. The Paperwork Reduction Act represents the most specific statement of OMB's authorities and responsibilities in this area. Under the act,[5] OMB

[5]The Continuing Resolution making appropriations for fiscal year 1987 (Public Law 99-591) made certain amendments to this act. For example, Section 815 of the continuing resolution amended the act to specifically require OMB to (1) maintain a comprehensive set of information resources management policies, and (2) issue within one year, in consultation with GSA, principles, standards, and guidelines to implement these policies.

- develops and implements policies, principles, standards, and guidelines for the federal government's telecommunications;
- monitors the operation of the federal telecommunications fund[6] (a revolving fund for procuring and operating telecommunications systems);
- provides advice and guidance on the acquisition and use of telecommunications equipment and coordinates (through the review of budget proposals and other methods) agency proposals for acquiring and using such equipment;
- promotes the government's effective use of telecommunications equipment;
- initiates and reviews proposals for changes in legislation, regulations, and federal procedures to improve telecommunications practices; and
- develops and annually updates, in consultation with the GSA Administrator, a 5-year plan for meeting federal automatic data processing (ADP) and telecommunications needs.

In December 1985, OMB issued Circular A-130, which contained the first policy statement on telecommunications management issued since the Paperwork Reduction Act's passage. The circular provides general policies for managing information resources and delineates the associated responsibilities of federal agencies, including GSA.

GSA Has Principal Responsibility for Central Operations and Overall Coordination

GSA has long served as the government's central operational manager for telecommunications. GSA's authority is derived largely from the Federal Property and Administrative Services Act, as amended, chiefly Sections 110, 111, 201, 205, and 206.[7]

GSA set forth its specific responsibilities in its August 1984 Executive Summary of The Telecommunications Program Plan of the General Services Administration. These responsibilities include

[6]Under Section 821 of the Continuing Resolution (Public Law 99-591), the Federal Telecommunications Fund and the Automatic Data Processing Fund established under Sections 110 and 111, respectively, of the Federal Property and Administrative Services Act of 1949, as amended, are combined (effective January 1, 1987) into an Information Technology Fund to be used by GSA in providing information technology hardware, software, or services to federal agencies.

[7]Section 822 of the Continuing Resolution (Public Law 99-591) amended this act to, in effect, include telecommunications activities within the coverage of the Brooks Act (40 U.S.C. 759), also a part of the Federal Property and Administrative Services Act, which has applied strictly to the acquisition of ADP equipment. This amendment was made in recognition of the merging of ADP and communications technologies.

- establishing policies and regulating methods of procurement and supply of communications services and equipment;
- procuring and supplying communications services and equipment, in addition to managing communications services for executive agencies;
- developing and operating common-user (shared) voice and data systems for emergency use and for day-to-day use by the civilian agencies; and
- ensuring that federally owned and managed communications facilities and services meet national security, emergency preparedness, continuity of government, security, and privacy objectives and requirements of civilian agencies.

As part of its operational responsibilities, GSA manages the Federal Telecommunications System (FTS), a nationwide network providing long-distance and local services to federal agencies on a day-to-day basis and during emergencies. The system serves the contiguous United States, Alaska, Hawaii, Puerto Rico, and the Virgin Islands. Begun in 1963, FTS serves 78 agencies with about 1.3 million telephones, 11 million miles of transmission lines, and roughly 1,655 local switches, more than 400 of which GSA manages.

Executive Agency Telecommunications Responsibilities

Under the Paperwork Reduction Act, executive agencies are expected to acquire and use telecommunications and related information technologies to improve their delivery of services and their management of programs, to increase productivity, to reduce waste and fraud, and wherever practicable and appropriate, to reduce the information processing burden on the government and those who provide information to it.[8] Responsibility for ensuring the successful employment of computer and communications technology falls in each executive agency on an agency official designated under the act as the information resources management official. This official oversees an agency's activities involving computers, telecommunications, and other technology used in managing information, and is responsible for planning, organizing, directing, controlling, and evaluating the use of the agency's information resources, including telecommunications.

The changing telecommunications environment requires a new degree of central management if the goals of cost economy, national security and emergency preparedness, and system compatibility are to be achieved.

[8]Section 816 of the Continuing Resolution (Public Law 99-591) amends this act to require agencies to develop and annually revise a 5-year plan, in accordance with appropriate guidance provided by OMB, for meeting the agencies' information technology needs.

The central managers need to guide the individual agencies and establish methodologies for evaluating telecommunications alternatives. Similarly, these central managers need to identify areas where coordination and cooperation among the agencies is required and to implement procedures to achieve federal telecommunications objectives.

Past GAO Reports

We have issued several reports evaluating the actions of OMB and GSA. In 1979,[9] we described opportunities for better coordination and sharing of agencies' telecommunications systems, which we believed would result in savings to the government as a whole. In 1983,[10] we pointed out that federal agencies did not, because of the way telecommunications costs were accounted for, know what their total costs were. As a result, these costs could not be effectively managed. In 1984, we described actions that both GSA[11] and OMB[12] needed to take to guide agencies in the new telecommunications environment brought about by the changing technology, AT&T's divestiture, federal deregulatory efforts, and increasing competition in the industry.

Objective, Scope, and Methodology

In a February 8, 1984, letter, the Chairman of the House Committee on Government Operations requested that we conduct a broad-based, governmentwide review of the effects of the AT&T divestiture on federal agencies. Subsequent discussions with the Committee further defined the focus of our work as reviewing whether the actions of the central telecommunications managers—OMB and GSA—and their relationship with individual agencies were resulting in the acquisition of cost-effective, technologically sound telecommunications in the new environment.

In conducting our review, we identified OMB's and GSA's regulatory and management roles in telecommunications and evaluated how well they were carrying out their respective central management responsibilities. We concentrated on government telecommunications activities as a whole and whether OMB and GSA (1) were providing agencies with the

[9]Economic and Operational Benefits in Local Telephone Services Can Be Achieved Through Government-Wide Coordination (LCD-80-9, November 14, 1979).

[10]Financial Information Lacking on Government Telecommunications Services and Equipment (GAO/MASAD-83-16, February 25, 1983).

[11]GSA's Telecommunications Procurement Program Requires Comprehensive Planning and Management (GAO/IMTEC-84-10, June 11, 1984).

[12]OMB Needs to More Fully Consider Government-Wide Implications in Its Telecommunications Initiatives (GAO/IMTEC-84-21, September 7, 1984).

guidance, controls, and oversight necessary to ensure achievement of agency and governmentwide objectives and (2) were ensuring that coordination and cooperation among agency telecommunications were achieved.

To determine how OMB and GSA interpreted their statutory responsibilities, we interviewed appropriate officials in both agencies. We also reviewed formal telecommunications policies, guidance, and regulations issued by the central managers. We sought to determine (1) the extent to which each divided roles and responsibilities for acquiring and managing telecommunications between itself (that is, the central agency) and the individual agencies, and (2) if these policies, guidance, and regulations provided clear direction for the executive agencies' strategic and operational activities.

We also identified, through discussions with OMB and GSA headquarters officials and reviews of planning and policy documents, major telecommunications initiatives that each agency undertook. Within OMB, we reviewed its information resources management policy circular (OMB Circular A-130), which delineated general responsibilities for the agencies, including GSA, and its budget preparation and information technology planning directives. We also reviewed annual 5-year plans for meeting federal ADP and telecommunications needs, produced jointly by OMB, GSA, and the Department of Commerce, to determine if these plans established a framework for carrying out the government's telecommunications activities.

Currently there is no particular approach that is universally recognized as a correct model of telecommunications management. To establish a basis for evaluating OMB's and GSA's management actions, we reviewed guidance they and the Department of Commerce provided to the agencies and derived criteria from this guidance that can be applied to the central management level. Our criteria also reflect common-sense decisions based on prudent management principles.

Within GSA, we reviewed three large, centralized procurements to determine if they were well planned and implemented and whether the analyses for them were adequate. We also reviewed

- comments from agencies and industry regarding GSA's procurement approach and GSA's response to these comments; and
- correspondence between GSA and OMB regarding the adequacy of the analyses for these procurements.

In addition, we reviewed GSA criteria and procedures for allowing agencies to acquire individual telecommunications systems and interviewed GSA officials to determine how these agency-level procurements will affect the centralized procurements.

We also conducted three case studies to evaluate opportunities for interagency sharing of telecommunications systems to determine whether sharing was a cost-effective alternative in these cases and logically should be considered by GSA when it reviews procurement applications from agencies. We evaluated possible opportunities for sharing by reviewing GSA's files of 401 approvals, granted agencies from October 1983 through March 1985, for acquiring individual telecommunications systems. On the basis of this and other information, our consultant analyzed three locations in GSA's New York and Fort Worth regional offices to determine whether sharing was a cost-effective alternative.

We also interviewed officials at the headquarters of 14 agencies[13] to determine (1) how the changed environment (that is the changing technology, divestiture, and competition) as well as OMB's and GSA's policies and procedures affected telecommunications management at the agency level and (2) what strategies were being implemented at the agency level to reduce costs and improve services in telecommunications. These agencies included eight civilian agencies that are currently procuring telecommunications systems or have received GSA approval to do so; Department of Defense components (including officials at the Defense Telephone Service — Washington, which is procuring a major administrative system for Defense agencies in the Washington, D.C., area); and the U.S. Postal Service because it is exempted by law from GSA oversight and is currently implementing its own telecommunications network nationwide.

We also talked to telecommunications experts at three consulting firms and read relevant literature. We talked to officials at the Federal Communications Commission and read Commission decisions to see how they affected the federal government.

Finally, we spoke to officials at both General Motors Corporation and its subsidiary, Electronic Data Systems Corporation in Detroit, Michigan, and Washington, D.C., to find out how another large organization was

[13]They were the: Departments of Agriculture; Commerce; Defense and its Air Force, Army, Army Corps of Engineers, and Navy components; Energy; Interior; and Transportation; Environmental Protection Agency; National Aeronautics and Space Administration; U.S. Postal Service; and Veterans Administration.

managing its telecommunications. We chose General Motors because it is a very large organization whose managers have taken aggressive actions to meet the challenges of the changing telecommunications environment.

We discussed our findings with agency program officials and have included their comments where appropriate. However, in accordance with the requester's wishes, we did not obtain the views of responsible officials on our conclusions and recommendations, nor did we request official agency comments on a draft of this report. Except as noted above, we performed our work in accordance with generally accepted government auditing standards. We conducted our audit between January 1985 and June 1986, but significant events occurring since June 1986 are appropriately noted as well.

Central Management Actions Do Not Ensure That Telecommunications Objectives Are Met

OMB's and GSA's 5-year plan for meeting federal telecommunications needs does not identify the full extent of agency requirements and does not establish a framework for fulfilling the government's telecommunications needs. Although OMB and GSA have issued some valuable guidance to agencies for managing their telecommunications, the scope of such guidance is insufficient for planning, acquiring, and managing the agencies' telecommunications resources. Because of the inadequate planning by and guidance from OMB and GSA, there is no assurance that either agency or governmentwide objectives will be met.

The OMB-GSA 5-Year Plan Does Not Provide an Adequate Framework for Federal Telecommunications Activities

The Paperwork Reduction Act of 1980 (44 U.S.C. 3505(3)(E)) requires that OMB, in consultation with GSA, develop a 5-year plan for meeting federal ADP and telecommunications needs. In their guidance to the individual agencies contained in one of the plans, OMB and GSA stress the need for central management within each agency to provide the leadership necessary for coordinating agencywide telecommunications. This guidance encourages agencies to establish a "decision framework" that identifies key objectives, makes the basic strategic decisions regarding overall system architecture, and establishes standards. Although the act only required OMB and GSA to develop a 5-year plan once, they have produced governmentwide plans annually since 1983.[14] The 5-year plan is essentially a compilation of proposed agency ADP and telecommunications procurements; it does not offer a framework by which GSA and other agencies should carry out their telecommunications activities. Somewhat incongruously, OMB and GSA have failed to provide at the governmentwide level, the decision framework that they urged for agency management. Without this framework, there is no assurance that telecommunications objectives of individual agencies or the government as a whole will be defined or achieved.

Guidance Stresses Need for Overall Agency "Decision Framework" For Managing Telecommunications

In developing an initial 5-year plan, OMB and GSA took some steps to meet the challenges of the changed telecommunications environment. A Five-Year Plan for Meeting the Automatic Data Processing and Telecommunications Needs of the Federal Government, Volume 1: Planning Strategies (April 1984) is a guidance document for federal agencies issued jointly by OMB, GSA, and the Department of Commerce. The 5-year plan describes a decision framework that delineates management functions

[14]Section 815 of the Continuing Resolution (Public Law 99-591) amended the Paperwork Reduction Act to now require that OMB annually revise this plan.

and raises relevant questions and issues for agencies' telecommunications planning. The decision framework consists of three levels:

- Long-term or strategic planning develops and documents the agency's direction and specifies the activities and resources necessary to support the defined missions, goals, and objectives.

- Tactical planning involves identifying and scheduling the appropriate means for attaining individual ADP and telecommunications objectives that support the strategic plan.

- Operational planning integrates individual tactical plans and drives day-to-day activities.

The plan lists the types of questions that agencies need to ask to begin planning:

- Strategic decisions. What technologies can support the strategic objectives of the organization? What are the costs of different alternatives? Can strategic objectives be supported with existing equipment?

- Tactical decisions for incorporating new technologies. Is the program best suited to centralization, decentralization, or some mix? Should pilot projects be attempted? Should a strategy of design evolution, specific design requirements, or some mix be relied on?

- Use of commercial products and services and standardization. In selecting systems' networks and architectures, are off-the-shelf products or standards available or should department standards be required?

- Program phasing. What requirements should be given priority in support of the strategic objectives? Are the requisite personnel on board? Is the necessary equipment available and fully operational or presently being developed? What effect will procurement regulations have on phasing? How compatible is compatible equipment?

The plan also states that the telecommunications management roles and responsibilities for managing the ADP and telecommunications program should be established. Through formal designation of these roles, management procedures and structures that will govern the agency's ADP and telecommunications program are established. Because roles and responsibilities fundamentally influence planning, it is critical that they be clearly understood and accepted by those involved in developing the

strategic plan. The 5-year plan provides criteria for (1) long- and short-term planning, (2) decisions that department and agency management need to make, and (3) the roles that should be fulfilled to ensure the development of a viable telecommunications system.

The Plan Does Not Address Key Telecommunications Issues

We believe the three levels of planning and the types of decisions outlined in the plan equally apply to OMB's and GSA's activities at the central management level. However, we found that neither OMB nor GSA had made certain key determinations involving such planning and decisions, nor were these determinations incorporated into the 5-year plan to establish the boundaries within which GSA and the agencies would carry out their telecommunications. As a result, OMB and GSA are providing little direction at a time when substantially increased management is imperative.

From the guidance provided in the 5-year plan, we found that the following critical factors were missing:

(1) Federal telecommunications requirements, the technology to be used in meeting these requirements, networks that must communicate with each other to meet governmentwide objectives, and the standards necessary to ensure interoperability.

(2) Decisions regarding the areas in which (a) GSA should offer telecommunications services on a centralized basis for a large number of executive agencies, (b) individual federal agencies should acquire their own systems, or (c) some combination of alternatives (a) and (b), including shared telecommunications systems, will provide maximum benefit to the government as a whole.

(3) Delineations of the responsibilities of the central managers and those of the individual agencies.

(4) Proposals for changes in legislation and regulations, as needed, to facilitate implementing these strategic decisions.

To implement these decisions, OMB and GSA will have to consider certain others:

(1) For centrally provided services, GSA should decide whether these services should be provided by the government or by the private sector, evaluate ways to minimize costs by consolidating systems, establish the

technical standards to interconnect agencies, and establish controls to ensure adherence to central management's decisions.

(2) For agencies' self-provided services, OMB and GSA should issue detailed guidance on planning, acquiring, and managing telecommunications projects, including methodologies for preparing alternative analyses; OMB and GSA should establish and execute controls to ensure that agencies follow all appropriate guidelines and steps; and they should establish the accounting requirements for telecommunications costs.

(3) Where some combination of individual agency and consolidated services best meets government needs, OMB and GSA should establish methodologies for selecting among alternatives, including consideration of shared telecommunications systems among agencies, and establish procedures to ensure that all appropriate guidelines and steps are followed.

By applying the above as criteria to assess whether OMB and GSA are effectively carrying out their planning responsibilities, we find that they have not made a number of decisions affecting the federal telecommunications program.

OMB and GSA have not determined the full extent of federal telecommunications resource requirements necessary to support agencies' missions, goals, and objectives. Instead, the 5-year plan focuses on the agencies' technology acquisition plans.

OMB and GSA have yet to establish methodologies or criteria for deciding which telecommunications services and equipment should be centrally procured by GSA for mandatory use by agencies, which services should be centrally procured for optional use by agencies, and which services are best provided by the agencies themselves. Instead, GSA is proceeding to upgrade the existing local and intercity telecommunications services it provides agencies while these agencies are requesting and are getting GSA approval for acquiring their own systems. Furthermore, GSA has no policy or procedure to determine if agency sharing of telecommunications systems results in cost savings (see chapter 4).

OMB and GSA have not determined whether or which telecommunications systems being developed individually ought to interconnect to meet federal objectives (such as a communications system that interconnects agencies in times of emergency). Instead, as stated above, GSA and the agencies' telecommunications seem to be uncoordinated.

Despite the federal objective to have compatible systems, OMB and GSA have not established or chosen the technical standards necessary to facilitate the compatibility of those systems as needed for emergency and daily communications requirements of the government.

Guidance for Choosing Between Alternatives Is Insufficient

Although OMB and GSA have issued some guidance to the agencies for planning, acquiring, and managing their telecommunications resources, this guidance is insufficient. While it provides a good start, we believe it is not sufficiently detailed for agencies to do a thorough and consistent analysis of the telecommunications alternatives available to them. In addition, guidance prepared by the National Bureau of Standards is useful, but was not designed to provide a specific methodology for analyzing telecommunications investments. Consequently, the agencies use a variety of methods to determine the costs and benefits of procuring their telecommunications systems, and these methods are not regulated by governmentwide criteria.

OMB Guidelines

OMB's Office of Information and Regulatory Affairs issued guidelines that outline what OMB budget examiners should be looking for in agencies' telecommunications budget requests. Guidelines for Evaluating Telecommunications Budget Requests (October and November 1984) and 1987 Budget Review Guidance for the Telecommunications Investment Proposals detail both general principles and a set of analytic steps an agency should follow to justify its telecommunications investments. In the latter document, OMB states that a cost/benefit analysis of alternatives should be done for any large investment; the bigger the investment, the more extensive the analysis should be.

The budget examiners are to consider the following key points when reviewing agencies' cost/benefit analyses:

- The costs and benefits of alternatives should be quantified in enough detail for a decision maker to make a rational choice.
- All costs should be explicitly considered.
- More than one projection of future costs and benefits should be evaluated and the underlying rationale clearly stated.
- Factors that are identifiable but not quantifiable (for example, telecommunications security and protection against "hackers") should be analytically addressed.

While this guidance is good, it does not go far enough. The criteria described address appropriate issues for analyzing telecommunications investment alternatives, but this guidance does not provide necessary details, such as specific cost items to consider. Furthermore, although these guidelines have been informally given to some agencies, they have not been formally issued to all agencies.

In August 1986, we asked OMB officials why their agency had not formally issued these guidelines. They said that OMB believed that agencies should have as much flexibility as possible and should not be confined to a particular approach or methodology. In addition, while publication of this budget review guidance would be helpful, there are currently no firm plans to publish it, in part because of staff shortages.

GSA Guidelines

GSA has not issued specific guidelines to the agencies on ways to analyze alternative telecommunications investments. GSA's Federal Information Resources Management Regulations (1) require agencies to submit some cost and other information when requesting GSA approval to change or acquire telecommunications systems, and to complete a comparative cost analysis of alternatives, and (2) identify some cost categories that should be included in the comparative analysis. However, GSA does not describe the procedures to follow in conducting the analysis or the methods by which an agency should arrive at its cost figures; nor does it specify particular cost elements that should be included, or require identification of the time frames for purchases.

National Bureau of Standards Guidelines

The National Bureau of Standards, which develops standards and guidelines for agency ADP and telecommunications, outlined a framework for cost/benefit analyses in Guidelines for Documentation of Computer Programs and Automated Data Systems for the Initiation Phase (Federal Information Processing Standards Publication 64, August 1979). While this guideline is primarily directed at software being developed for computer systems, it offers a framework for some of the steps and considerations in cost/benefit analyses. Items such as assumptions made, analysis methodology followed, evaluation criteria used, description of alternatives considered, and the costs and benefits of the various alternatives are shown as elements of an analysis. The guideline provides a useful framework for investment analyses that is more descriptive than the OMB or GSA guidance discussed above. However, it does not contain a specific list of telecommunications costs or other related factors, such as

penalties for terminating present services, that ought to be considered when analyzing an investment.

Evaluation of Agency Analyses

To determine if the agencies were following common criteria in analyzing telecommunications investments, we reviewed the cost/benefit analyses from six agencies whose telecommunications are subject to GSA's oversight. These agencies are the Departments of Agriculture, Commerce, Interior, and Transportation; the Environmental Protection Agency; and the National Aeronautics and Space Administration.

Using the OMB in-house guidance and the National Bureau of Standards framework as criteria, we found fundamental weaknesses in the cost/benefit analyses reviewed. The basic assumptions and relevant data on which costs were based were not spelled out clearly, time periods used in pricing systems varied from 5 to 15 years, no agency explicitly included all of OMB's key cost categories (management, transition, user support, space and facilities, and administrative costs) in its analysis, and agencies were not discounting at all or were using different approaches to discounting.[15] In addition, we found that the agencies usually included only an analysis of two alternatives—the present telecommunications costs and projected costs of the proposed system. Alternative systems were seldom considered.

Such deficiencies in the agencies' analyses raise questions about the ability of agency and GSA management to make sound investment decisions in telecommunications. These deficiencies highlight the need for detailed guidance that spells out procedures for analyzing alternative systems.

Some steps have already been taken to improve procurement procedures. OMB officials told us in August 1986 that OMB's Circular No. A-11, Preparation and Submission of Budget Estimates, issued May 28, 1986, now instructs the agencies to prepare cost/benefit analyses for proposed telecommunications investments included in their fiscal year 1988 budget submissions. According to the circular, agencies are to provide detailed cost/benefit analyses for major information technology (telecommunications and ADP) initiatives contained in their budget requests. The agencies are to follow the Federal Information Processing Standards

[15]To compare two or more alternatives, the cost of each at its "present value" must be considered. To find the present value of expected future costs, a technique called discounting is used. This technique determines the amount of money that, if invested today at a selected interest rate, would be sufficient to meet expected future costs.

Publication No. 64 in preparing their analyses, show a 10-percent return on investment for each initiative, and include a detailed description of cost/benefit figures, including assumptions made, alternatives considered, and analyses for evaluating uncertainty. The circular states that OMB will provide additional instructions for preparing these cost/benefit analyses in the future.

OMB's Circular A-11 instruction for agencies to follow Federal Information Processing Standards Publication No. 64 for analyzing telecommunications investment alternatives is a positive step. If the executive agencies perform all of the recommended cost/benefit analysis procedures, then OMB and GSA will have a better means of analyzing agencies' proposed telecommunications investments. However, factors unique to telecommunications, such as penalties for early termination of service contracts, are important but would not necessarily be considered. Therefore, OMB and GSA need to issue further instructions to ensure that agencies cover these factors in their analyses and provide them to OMB for its reviews of agency telecommunications budgets and to GSA for its reviews of agency requests for delegations of procurement authority.

Major GSA Procurements May Not Achieve Federal Objectives

GSA is planning three large upgrades that will replace its existing federal telecommunications systems. Each is expected to serve several agencies and to significantly increase the capabilities of voice and data service. However, original planning was either not done or done without adequate analysis to ensure that governmentwide objectives would be met: cost economies, system compatibility, and effective national security and emergency preparedness telecommunications.

GSA Plans to Replace Existing Service to Agencies

GSA's plans for providing federal users with a modern, efficient, and economical telecommunications system include upgrading its consolidated systems with three large procurements that are estimated to cost $5.5 billion. These are (1) the FTS 2000 (replacing the intercity communications system), (2) the Washington Interagency Telecommunications System (upgrading local service in the Washington, D.C., area), and (3) the Aggregated Switch Procurement program (upgrading the remainder of GSA's local services nationally).

Analysis for Procurement of FTS 2000 Lacked Important Elements

GSA's decisions to make FTS 2000 voluntary and to rely on vendor-provided services rather than services of federal facilities represent significant departures from present practices and enter into areas where GSA has little experience. Such critical decisions should be based on sound analysis to ensure that government telecommunications systems achieve the maximum benefits at the least cost. GSA did not perform a sufficient analysis of alternatives to determine how to minimize costs in the proposed system. In addition, the analysis did not provide enough support for the proposed strategy of using one prime contractor and leasing, rather than purchasing, the system. Similarly, the decision to make FTS 2000 voluntary is not well documented. As a result, GSA had to delay the FTS 2000 upgrade while comprehensive analyses were completed by a private contractor.

The FTS 2000 is a proposed program to spend approximately $4.5 billion over 10 years to purchase replacement telecommunications services for the long-distance portion of the current FTS. The current FTS, outdated in its technology, does not offer the features and services many agencies desire. Also, it is more expensive to operate than GSA anticipates the new system will be. Early in the planning for FTS 2000, GSA explored with its consultants the expected evolution of the telecommunications markets, particularly with regard to the degree of competition and regulation expected. GSA officials told us that they believed it was essential to get industry involved early to identify developments in technology and in

the types of services likely to be offered by vendors. GSA issued the final Request for Proposals (RFP) on December 31, 1986, and proposals are to be submitted to the government by June 30, 1987.

FTS, as currently configured, is a nationwide telecommunications system managed by GSA, which also performs engineering and administrative functions. In the draft RFP for the FTS 2000, GSA proposed that a single prime contractor provide end-to-end, long-distance telecommunications service. The prime contractor will also provide all management, administration, engineering, billing of system users, changes, and any rearrangements that might be needed.

On October 15, 1985, GSA issued its Federal Information Resources Management Regulation Bulletin 29, which announced that the currently configured intercity FTS would be replaced, and that membership on the proposed replacement system would be voluntary. The present FTS is mandatory for agencies. According to the bulletin, GSA plans to terminate the currently configured mandatory FTS intercity system by January 1990. Those agencies that planned to move from the existing FTS voice and low-speed data communications system to the FTS 2000 system would not require GSA approval. However, agencies that planned alternative service had to obtain GSA approval and had to submit their plans for such service to GSA by March 31, 1986. GSA officials told us that they have taken steps to involve agencies that are major users of FTS in planning for FTS 2000, with the hope that these agencies will select the GSA-provided service.

Initial Procurement Decisions Not Well Supported

We examined the initial analyses that GSA prepared in March 1985 and originally sent to OMB, justifying GSA's procurement decisions, and found them lacking. We believe that such analyses should include

- identification and justification of assumptions;
- identification and comparison of alternatives;
- description and rationale supporting the weighting system used, including the effect of policy considerations on the weights;
- some quantification of costs (for instance, a comparison of present to future costs based on different scenarios); and
- some analysis of the optimum number of users needed to fully use various quantities of telecommunications facilities and take advantage of bulk rates.

Although GSA initially prepared a three-part analysis for the FTS 2000 procurement, which identifies assumptions and identifies and compares alternatives, we did not find the other components listed above. In one part, Government Policy Impact Comparisons of FTS Alternatives for 1987-1997, GSA lists the advantages and disadvantages of seven alternatives. However, there is no explanation of how the conclusions are determined. GSA says that one alternative would offer "appreciable" cost savings (a statement that is not quantified), and another alternative would offer "maximum" cost savings (a statement that also is not supported). Nor does GSA describe sufficiently the effects of policy considerations—such as the role of government, size of government, and budget impact—on its analysis. As a result, neither the policy considerations nor the weighting system is clear. When we asked the responsible official at GSA for the backup documents to the three-part analysis, he said that figures had been collected from many sources, but had not been reconstituted into a comprehensive document.

In the second part of the three-part analysis, FTS 2000—Cost Benefit Analysis, GSA explains its strategy more fully by elaborating on the principles guiding the procurement design. However, the reasoning behind the principles is not clearly explained. For instance, one principle reads, "The entire contract will be through a single prime contractor." This statement is cross-referenced to the assumption that "the procurement must require no capitalization or up-front money provided to the vendor." Neither the principle nor the assumption is explained. GSA also cross-references, to the relevant principles, the assumptions on which the strategy is based. However, the connection between assumptions and principles is not clearly explained. In addition, the savings projected in the cost/benefit analysis are more anecdotal than quantitative. GSA does not quantify how much the government would save by using the strategy that it eventually proposed in the draft RFP. Specifically, GSA does not state whether greater savings would be achieved from a system managed by GSA and leased from several vendors or a system leased from one primary vendor.

The third part of the three-part analysis, Economic Comparisons of FTS Alternatives, 1987-1997, is a further examination of the seven alternatives considered. This analysis contains several assumptions that are not supported by explanations. For instance, in alternative 2—upgrade of present system—the analysis assumes total growth of FTS to be approximately 4 percent annually. In alternative 5—single prime contractor for all telecommunications and management services—the analysis forecasts growth of the new system to be initially 5 percent, increasing to

8 percent by the third year, and achieving 10 percent by the seventh year. These figures are questionable because GSA never states how it arrived at the percentages.

On the basis of these analyses, GSA decided that it should contract with a single prime contractor in acquiring long-distance telecommunications service for participating agencies.

GSA officials maintained that GSA was innovative in its approach to replacing FTS. GSA held a conference of industry representatives in February 1985 to announce the FTS 2000 concept and worked with various companies to shape its procurement. Also, GSA issued a draft RFP in October 1985 to obtain comments from the telecommunications industry in order to put the RFP into final form. Some of the comments provided by industry expressed concerns regarding (1) limited minimum financial guarantees, (2) the need for information on interfaces between FTS 2000 services and local services provided by GSA, and (3) aspects of national security and emergency preparedness requirements. Upon completing its review of the draft RFP, OMB notified GSA by letter, dated December 18, 1985, that it desired more extensive analysis and asked questions that OMB wanted addressed by the contractor and by a panel of telecommunications experts who were to be retained by GSA.

In December 1985, at the urging of OMB, and GSA's Administrator, GSA awarded a $250,000 contract to perform a more extensive analysis of the FTS replacement alternatives, including a cost/benefit analysis of principal alternatives. The results of this analysis, Cost/Benefit Analysis of Alternatives for the Replacement of the Federal Telecommunications System Intercity Network (3 volumes), were delivered to GSA in May 1986 and made available to us in September 1986. We believe, based on a cursory review, that the analysis addresses those issues we identified as essential to the development of an FTS 2000 procurement strategy. On the basis of the analysis, the contractor recommended that GSA procure the FTS 2000 services for all agencies from two or more vendors offering a full range of services, in continuous competition for orders, rather than one vendor.

GSA rejected this recommendation. A GSA official said that GSA was concerned about dealing with multiple vendors, especially when troubleshooting problems, and about dividing agency services among the competing vendors. GSA did adopt an approach generally similar to its original draft RFP, in which GSA procures the FTS 2000 services for the agencies from a single vendor. This approach was endorsed by a panel

assembled by a second contractor at the request of GSA. The report, entitled Recommendations on Issues and Strategies for Federal Telecommunications System (FTS) Replacement: A Panel Report, was submitted to GSA in July 1986. A revised RFP encompassing this approach was issued by GSA on December 31, 1986. Prospective vendors have until June 30, 1987, to submit their bids. We have not reviewed in detail either the contractor-supplied analysis, the report of the panel, or the RFP.

GSA is depending on private vendors to manage the procurement. GSA officials told us that GSA had awarded a technical assistance services contract to a private vendor for help in preparing the RFP, which included putting together a model for evaluating the bids submitted. The officials also expect to award contracts for technical assistance services to help manage the transition from FTS to FTS 2000 and to monitor the winning contractor's activities through the contract's life.

GSA continues to face several potential obstacles in its efforts to replace the existing FTS, which include effectively managing and controlling the procurement and implementation of FTS 2000 through a series of technical assistance contracts. These efforts involve evaluating the bids, selecting the winning bidder, and monitoring and controlling the prime contractor selected to implement the contract.

Impact of Voluntary Agency Participation Not Analyzed

Although the level of federal agency participation is critical to the success of FTS 2000, GSA has decided, without adequate analysis, that agency use of the system would be voluntary. GSA has not asked for vendor prices for various levels of service, nor does it have a methodology to determine when it is better for agencies to stay on or leave the FTS. Vendor comments on the draft FTS 2000 RFP reflected concerns about the limited minimum guarantees and the requirement for a fixed-rate contract with no escalation allowed. The risks of a 10-year contract were also noted. OMB's comments on the draft RFP expressed concern that such a requirement creates incentives on the part of the vendors to bid low and renegotiate later, making it difficult to evaluate the bids.

In its initial analysis of the FTS 2000 procurement, GSA stated that its entire strategy for the procurement rested on one requirement: that the government enter the market to purchase a sufficiently large aggregate of services to make the contract attractive to vendors.

GSA officials told us, on August 25, 1986, that the RFP for the FTS 2000 would ask vendors to propose services and costs for all agencies presently on the FTS. Agencies planning to leave the existing FTS were to notify GSA by October 1986 instead of March 1986. GSA officials told us that they needed information on which agencies would leave the FTS, in order to allocate termination costs. An agency leaving the FTS intercity network must reimburse the remaining FTS customers for the extra costs associated with disconnecting its service, reducing the remaining circuits, and updating database and billing procedures.

The GSA Deputy Commissioner for Telecommunications Services told us that use of the FTS 2000 had to remain voluntary to ensure that the winning vendor would keep costs competitive through the 10-year contract. He said that unless agencies had the freedom to move on or off of the FTS 2000, the vendor would have no incentive to keep prices competitive. Under the proposed system, agencies can sign up to use FTS 2000 services for an initial 3-year period, then renew or leave the system.

GSA officials also told us that, although they have no written commitments from the agencies, they are in contact with the largest users and do not expect them to leave the system. Four months before final contract award, agencies will be asked to either sign up for the FTS 2000 for the initial 3-year period or propose alternative service. GSA officials told us that the agencies would have to join the FTS 2000 "on-faith," because GSA would not have final cost information by the sign-up date.

Sound Methodology to Justify Use of Alternatives Is Not Yet Developed

In the April 12, 1984, Federal Register, OMB announced its intent to propose new procedures so agencies could choose, on the basis of actual market prices, among competing vendors for long-distance telecommunications. Under this proposal agencies could, with OMB permission, leave FTS for some other provider, beginning in fiscal year 1986. OMB also anncunced that it would consider both economic and national security implications of agencies leaving FTS.

A month later OMB established an interagency task force to develop criteria by which agencies could justify leaving FTS and by which OMB could review the governmentwide impact of tnese departures. Until the April announcement, GSA was the final arbiter in cases where agencies applied to leave FTS. GSA's Federal Information Resources Management Regulations were changed in June 1985 to make OMB the final decision maker between GSA and an agency in contested cases.

Although the interagency task force met several times between May 1984 and April 1985, OMB told us in August 1986 that the procurement of the FTS 2000 overtook the development of criteria to leave the present FTS. OMB said that the task force had not developed criteria but had offered a list of issues to consider.

Also, in 1985, OMB asked the Army Corps of Engineers to perform a joint study with GSA to develop a "least cost to the government analysis" for use when an agency applied to leave FTS. In the meantime the Corps conducted a study that looked at alternatives to FTS.

A GSA official told us that GSA was to prepare a report on the cost to the government should the Corps provide its own arrangements for long-distance service. GSA's work would have compared the costs to the remaining users of the FTS against the costs or savings to the Corps upon leaving the FTS. The Corps submitted a draft of its study to GSA in August 1985, but GSA has not completed its report because of time and staffing constraints.

In two draft documents (Determining FTS Long-Distance Facilities Attributable to Serving a Specific Customer Agency and Cost Comparison Handbook For Analysis of FTS Customer Agency Long-Distance Costs), GSA proposed criteria to evaluate agency proposals for alternative long-distance services. GSA sent the drafts to OMB for comments in August 1985. As of June 1986, OMB had given no comments to GSA, nor had the drafts been finalized, because of personnel changes at OMB.

GSA tried again to guide agencies separating from its centralized systems in its regulation Bulletin 29 of October 15, 1985. GSA requires agencies not joining the FTS 2000 to submit (1) a transition plan and (2) an agency telecommunications request to obtain GSA approval for the planned alternative service. Information to be provided by an agency in its telecommunications request includes

- a description of current services;
- deficiencies in the current services, and improvements needed;
- future requirements in basic service delivery, national security and emergency preparedness, traffic projections, administrative and engineering support, management and control, and connectivity;
- a plan for satisfying the agency's future requirements, including assumptions made, technical approaches, major activities, priorities, schedules, resources required, returns on investment, and plan management and tracking; and

- a plan for removing the agency's access to and traffic from the existing FTS, including termination payments to GSA for leaving the existing FTS.

GSA has instructed agencies wishing to choose alternative service to determine and document the methods they are considering, including FTS 2000 and other appropriate methods, such as commercial service offerings. GSA stipulated that each method should be evaluated, then compared to others to determine the method most likely to meet the agencies' service requirements at the lowest overall cost.

However, GSA cannot now supply the agencies with a cost analysis of the FTS 2000 since it does not yet have FTS 2000 cost information. In addition, GSA has not instructed the agencies on how to document their alternative analyses. Chapter 2 (pp. 24-25) demonstrates that agencies often use different methodologies when analyzing the costs of telecommunications for different alternatives.

The importance of using an established methodology to evaluate the costs and benefits of remaining on or leaving FTS is demonstrated in analyses done by GSA and the United States Postal Service (USPS). Each analysis separately studies the effects of USPS' leaving the FTS. GSA's study looked at the impact of removing the USPS traffic from the FTS network and USPS' cost when using FTS versus its own private network.

GSA officials told us that, because of economies of scale in telecommunications networks, a reduction in usage of FTS does not result in a proportional reduction in costs. GSA would be able to eliminate only an increment of FTS facilities that carry USPS traffic. The GSA analysis concluded that remaining FTS users would incur additional costs of approximately $4 million annually.

The USPS analysis examined the costs and benefits of alternatives for fulfilling its long-distance requirements. It concluded that the chosen alternative would save USPS $29.9 million (discounted at 15 percent) over the first 10 years of operation. This analysis, however, did not consider overall repercussions in the form of incremental cost increases to the remaining FTS users.

GSA and USPS conclusions were based on different assumptions about FTS costs. GSA projected that future FTS cost increases would be minimal because cost-saving measures had been implemented, such as installing additional trunks and circuits. USPS, however, projected that its future FTS costs would continue to increase, based on historical increases of

11 percent between 1976 and 1982. As a result, GSA inflated the FTS cost per call by 3 percent annually, while USPS inflated its FTS costs by 6 percent. Because of these differences in assumptions and methodologies, we could not determine whether USPS' proposed telecommunications system represented an appropriate alternative to FTS.

WITS Program Has Encountered Problems

The Washington Interagency Telecommunications System (WITS) was originally designed to employ a centrally acquired and managed core network. All federal agencies in the Washington, D.C., area would be required to connect to the core network in a standard, GSA-defined manner. GSA was to provide specifications that standardized the requirements for connecting to the core network. GSA believes there are technical, economic, and managerial benefits to consolidation, such as minimizing redundancy and ensuring that networks are compatible. However, GSA did not develop a core network, to which the agencies could interconnect and thereby use the common facilities. Instead, GSA issued authorizations to the agencies to procure their own systems, without stipulating technical interconnection standards. Now, GSA has issued an RFP for WITS and is awaiting the submission of contractor proposals. However, some agencies have already procured their own systems under the previously granted authorizations, and may or may not be connected to WITS. In order to include more agencies in WITS, GSA is withdrawing authorizations for some agencies and still other agencies will remain on the present Centrex system.[16] Such actions may result in lost compatibility between agencies, and expected benefits that do not materialize.

Uncertainties About Agencies WITS Will Serve

The original recommendations of the Washington Telecommunications Interagency Committee were published in 1982. The committee recommended that WITS serve all Washington-area federal agencies, either directly (through a GSA-managed, central core network) or indirectly (through the connection of individual, agency owned and managed private branch exchanges (PBXs)[17] to the GSA core network). At that time,

[16]A telecommunications service switch at the local telephone company that provides special features, such as calling within one location of an organization by dialing only a few numbers. Like local-exchange service, Centrex enables users to originate and receive calls within a defined area and to gain access to the long-distance network.

[17]A private switching system, usually located on the customer's premises, that directs telephone calls internally, or externally to networks, such as the public telephone system. Also may be referred to as a private automated branch exchange.

the recommendations were accepted in total by GSA's Assistant Administrator, Office of Information Resources Management.

Agencies wishing to procure their own telecommunications systems must get approval from GSA. In the case of WITS, consistent with the original WITS recommendations, GSA approved 17 agency requests to acquire their own systems, because the agencies wanted to take advantage of new technologies and savings offered by the changed environment. GSA's approval letters specified that the agencies' new systems must interface with the WITS core network when it is implemented, provided that the arrangement is economically advantageous to the government.

Since issuing these approvals, plans for WITS have evolved from a network that would connect individual agency PBXs to each other and to intercity service, to a dedicated system serving both GSA-owned and GSA-leased buildings. As plans for the network have changed, GSA has changed its plans for agency participation in WITS, which initially would have served all Washington-area federal agencies, but is now expected to be one of three systems serving these agencies.

In August 1985, we asked the Authorizations Branch chief if GSA would recall approvals from agencies that had not yet purchased their telecommunications systems, to ensure that the WITS central network had as many users as possible. He said GSA would not recall approvals, because the RFP for the central network had not been completed. In February 1986, the WITS Program Director told us that agencies purchasing PBXs to connect to WITS would not be able to fully benefit from the new technology. He also said that during 1985 he tried to persuade agencies planning to procure their own telecommunications systems to stop the procurements and wait for WITS.

By August 1986, GSA had developed a plan for WITS that changed the concept of the program. It moved from a single system supporting all federal agencies in the Washington, D.C., area, including the Department of Defense, to one of three systems in the area. According to the proposal, local services in the Washington, D.C., area will be by (1) agency-dedicated systems, (2) WITS, and (3) Centrex or other service. Agencies

that have already acquired their own systems will join WITS at their discretion.[18] GSA plans to recall approvals granted agencies in GSA-owned buildings in the downtown area that have not yet issued their RFPs. According to GSA, agencies that are having their approvals recalled are NASA, the Environmental Protection Agency, and the Departments of Agriculture, Commerce, Health and Human Services, Interior, and Justice. As of January 15, 1987, only the Environmental Protection Agency and the Departments of Agriculture and Health and Human Services have had their approvals recalled.

GSA Did Not Issue Technical Standards to Assure Compatibility Between Systems

In order for WITS to serve the entire Washington, D.C., area, GSA planned to issue technical standards to assure compatibility between agency PBXs and the GSA core system. As originally intended, GSA was to initially procure the core network and a number of agency-level PBXs. Later procurements of local switching systems had to be compatible with the core system.

A GSA contractor designed a core network. GSA sent out an initial draft RFP containing this design for industry comment in January 1985. The WITS Program Director told us that vendors' reactions to this design convinced GSA that it should develop functional requirements rather than the network design, and the vendors would then design a system and determine how the functional requirements would be met.

GSA, following the original plans for WITS, issued approvals, beginning in September 1981, to those agencies wanting to acquire their own systems. However, GSA did not release a final RFP for WITS until October 1986. In the meantime, having no core network, GSA could include only vague technical specifications in the approvals granted the agencies. As one such example reads, "the new system must be interfaced with the Washington Interagency Telecommunications System core network when it is implemented, provided that the arrangement is the most economically advantageous to the government."

The WITS Program Director told us that GSA had to issue 17 approvals because it had no better alternative to offer. He also said that agencies that have purchased or are purchasing their own systems were buying

[18]These agencies include: the Departments of Commerce (National Bureau of Standards only), Energy, Interior (Reston, Virginia, locations only), State, Transportation, and Treasury; Federal Emergency Management Agency, Federal Trade Commission, National Aeronautics and Space Administration (Goddard Spaceflight Center only), Agriculture Research Center, and National Institutes of Health.

automated equipment that probably would not accommodate all WITS features because of technical incompatibilities.

GSA's Lessons From First Aggregated Switch Procurement

GSA's regional telecommunications procurement is presently delayed while lessons learned from the first Aggregated Switch Procurement (ASP) are incorporated into the program. GSA has had to rethink questions of management and membership since the first procurement. That procurement involved a program to upgrade the GSA local service consolidated telephone systems outside the Washington, D.C., area in order to meet the long-term voice and data communications requirements of system users. ASP is estimated to cost $500 million over 10 years. GSA began competitively replacing the old switches on a system-by-system basis in 1975. By the end of 1983, 78 of 419 systems had been replaced. On July 28, 1983, GSA's Assistant Administrator for Information Resources Management directed the regions to develop 3-year plans to acquire aggregated quantities of equipment under a single RFP for each region. The first such RFP was issued on April 28, 1983, for 15 locations in New England. In early 1984 the remaining regions began implementing plans to competitively award contracts for all the upgraded systems by 1987, with installation by 1989.

A June 1984 GAO report[19] stated that:

"Although coordination of procurements and definitions of requirements and specifications for the ASPs is not complete, GSA has already issued the RFP for the first ASP, which covers the New England area. GSA has also planned the schedule for award and cutover of the remainder of the ASP program."

Since that report, the first Aggregated Switch Procurement (ASP I) contract has been awarded and is presently being installed. However, an official in the Office of Regional Telecommunications Services told us that further RFPs for the program are being delayed until GSA decides whether daily technical management functions, such as processing requests for repairs and changes, should be done by GSA staff, as is the case in ASP I, or whether a contractor should perform all such management functions.

As a result of ASP I, GSA realized that it would not need a switch management center for each region. GSA installed a switch management center to collect and analyze the amount of system usage and monitor the

[19]GSA's Telecommunications Procurement Program Requires Comprehensive Planning and Management (GAO/IMTEC-84-10, June 11, 1984).

system performance of ASP I. GSA officials told us that the capability of the region I center far exceeds what is needed and it will therefore not be put to full use.

GSA originally planned to install switch management centers on a region-by-region basis. However, as a result of the high labor cost in operating a center and the fact that each center can process large amounts of data, GSA decided to procure one center to monitor the balance of the PBXs throughout the country. In August 1986, GSA officials told us that GSA now plans to procure switch management functions instead of equipment.

Coordination Between GSA Units Improving

GSA's Information Resources Management Service did not coordinate its first ASP procurement sufficiently with GSA's Public Buildings Service. According to officials in GSA's Office of Regional Telecommunications Services, the ASP contract lacked the flexibility to add, delete, or change PBX sites after award. This rigidity has led to the purchase of excess equipment under ASP I.

GSA has established a policy for selecting space to house its consolidated telecommunications system and has incorporated this policy in the model Request for Proposals for ASP. In a May 1986 memorandum GSA defined criteria for planning and selecting space to house the consolidated telecommunications systems. The memorandum identified leased and government-owned space:

- Category I locations are government-owned buildings and leased buildings with a minimum of 5 years remaining on the lease from the projected cutover date. These locations will house primary or main PBXs.
- Category II locations are buildings with leases of 3 to 5 years from projected cutover. Costs to relocate equipment must be considered if primary or main PBXs are installed in Category II space.
- Category III locations are buildings with leases of less than 3 years from the projected cutover date. These locations will continue to be served from the present system until the Public Buildings Service renews the lease or provides alternative space.

On the basis of these criteria, the Information Resources Management Service is working with the Public Buildings Service to identify those locations where PBXs can be installed economically.

GSA has also amended the ASP contract specifications to allow the government to add, delete, or change PBX sites after contract award. Vendors will also be asked to submit costs for the removal and reinstallation of equipment to support unplanned moves or requirements.

GSA Is Not Effectively Coordinating Agency Sharing of Local Telecommunications

GSA has not established a policy for deciding when shared[20] telecommunications systems could best meet the agencies' needs and fulfill the objective of least overall cost to the government. Without a policy for thorough analysis of the alternatives, GSA has permitted agencies to acquire individual telecommunications systems that may not be cost-effective from a governmentwide viewpoint as is shown in the case studies that follow.

On the basis of our analysis of possibilities for sharing telecommunications among several federal offices located in two U.S. cities, we estimate that, if GSA had required sharing, rather than authorizing three agencies to acquire their own systems, about $16 million could have been saved over 10 years. These results suggest the need for GSA to develop and implement an aggressive policy on system sharing.

Lack of Policy Prevents GSA From Promoting Shared Telecommunications Systems

GSA is responsible for providing the most economical telecommunications service while meeting the agencies' needs. However, GSA has not fully met its responsibility as central manager because it has not established a policy that requires agencies to share telecommunications when GSA determines that greater efficiency and lower overall costs would result. Neither GSA's Federal Information Resources Management Regulations nor its policies or procedures require GSA staff to evaluate the potential benefits of sharing as an alternative to systems proposed by the agencies. Under the Federal Property and Administrative Services Act of 1949, as amended (40 U.S.C. 481(a)), GSA, when it determines that such action is advantageous to the government in terms of economy, efficiency, or service, can (1) prescribe the policies and procurement methods of public utility services (including telecommunications) and (2) procure public utilities for the use of executive agencies.

GSA Has Not Systematically Evaluated Sharing

Although we found a few cases where GSA considered sharing, its reviews of agency requests for authority to acquire telecommunications resources did not systematically include system sharing as an alternative. Each year, GSA receives several hundred requests from agencies

[20]By sharing we mean two or more agencies in close proximity (in the same or nearby buildings) using the same telecommunications resources—likely a private branch exchange—installed at a single location with one agency providing local services to other agencies. Opportunities to share occur when one agency has received or is requesting GSA approval to acquire its own system. Sharing is distinguished from GSA-consolidated local Centrex service and GSA's Aggregated Switch Procurement, which is a bulk procurement of private branch exchanges for installation at multiple locations within a GSA region. Once GSA's aggregated procurements are completed, sharing may still need to be considered by GSA for locations not upgraded through the aggregated procurements.

seeking major changes to their telecommunications systems. However, its procedures for reviewing these requests do not include any requirement for evaluating the benefits of shared systems or for gathering sufficient information to identify potential locations or evaluate the benefits of shared systems. Instead, GSA's regulations require the staff to compare the costs and services of the agency-proposed system to that of the GSA-consolidated system and approve one alternative, with cost as the primary criterion. Without adequately evaluating the option of sharing, GSA cannot effectively respond to an agency's contention that sharing a telecommunications system with other agencies will adversely affect its mission. As a result, GSA cannot determine whether approvals granted to federal agencies to procure their own telecommunications systems are in the government's best interests.

Agency telecommunications requests are sent to GSA's Information Resources Management Service where they are reviewed by the Authorizations Branch and the Technology and Program Implementation Group. The Authorizations Branch is responsible for making a final decision on all agency requests for major changes to telecommunications systems. The Authorizations Branch forwards the request to the Technology and Program Implementation Group; the latter, in turn, may send it to the GSA regional office where the new system is to be located. The Technology and Program Implementation Group reviews the request to determine if it contains the 13 elements required by GSA's regulations. These elements include a description of the current system, its costs, and the functional characteristics of the new system. The regional office's telecommunications branch evaluates the request and determines (1) whether GSA can provide the service to the agency and (2) what effect granting approval would have on the GSA-consolidated system and future GSA initiatives. The Technology and Program Implementation Group reviews the information it develops along with the evaluation information received from the region. It then recommends a course of action to the Authorizations Branch.

GSA officials at headquarters and in the two regional offices we evaluated (New York and Fort Worth) told us that their reviews focus on the impact the proposed system will have on the GSA-consolidated system and on any initiatives GSA is planning. While they do not systematically consider sharing now, officials in both regions told us that they believe GSA should establish procedures requiring consideration of a shared telecommunications system.

GSA's Deputy Commissioner for Federal Information Resources Management told us in August 1986 that GSA had spent 2 years trying to convince certain agencies to share telecommunications resources—without success. He said that agencies want to operate and control their own systems and do not want to share their systems with or provide services to other agencies. He considered it useless for GSA to make further attempts at getting agencies to share, without specific direction from an authority higher than GSA (such as the Executive Office of the President).

GSA Does Not Obtain Sufficient Data to Identify Potential Locations for Sharing

Until April 1985, neither GSA headquarters nor regional office staff we visited were required to gather information that would enable them to identify agencies that could potentially share telecommunications. Information such as identifying other federal agencies in the building where the proposed system was to be located, determining whether the building where the PBX was to be located had more than one address, and finding out if there were other nearby federal agencies and buildings was not collected, nor were the agencies required to file such information as part of their requests.

In an April 1985 memorandum, GSA, without modifying its requirements for information to be submitted by the agencies, instructed its own regions to collect and analyze technical requirements that would be used to determine whether the requesting agency would be required to remain on the GSA-consolidated system or be authorized to acquire its own system. Information to be obtained and steps to be performed included

- obtaining the address of the requesting agency, the distance from GSA's PBX, and addresses of other nearby federal agencies;
- identifying other federal agencies in the same building as the requesting agency and determining the number of telephone lines they use;
- obtaining from the requesting agency comments that justify the proposed individual agency telecommunications system;
- determining anticipated cost increases imposed on agencies that remain on a GSA system after another agency has left;
- providing the requesting agency with cost-comparison data that justifies continued service from the GSA system; and
- holding discussions with the requesting agency to determine how GSA can best fulfill agency needs using an existing or proposed GSA system.

The memorandum required that the regions submit a report covering the above steps, when recommending that an agency either remain on a GSA-consolidated system or procure its own telecommunications system.

Although the above information would help identify possible opportunities for sharing, additional information, such as the requirements of potential partners, would still be needed to evaluate such opportunities. Furthermore, GSA officials told us that they have no plans to use the information gathered under the April 1985 memorandum to determine the cost-effectiveness of requiring that a proposed system be shared with other federal agencies.

GSA Does Not Evaluate an Agency's Claims of Adverse Impacts From Sharing

Because GSA has no systematic process for evaluating system sharing, it cannot respond to an agency's contention that sharing its requested separate system with other agencies will adversely affect its mission. In our review at the New York and Fort Worth regional offices and at GSA headquarters, we found no evidence that GSA attempts to validate agencies' claims that sharing a system has adverse effects.

In one instance, the Office of the U.S. Attorney in Manhattan identified several adverse impacts as reasons for not sharing its system with occupants of the U.S. Courthouse. GSA's New York regional office, when reviewing the request of the Office of the U.S. Attorney, identified this location as potentially suitable for sharing telecommunications, not because GSA systematically gathered information to determine this fact, but because both the Attorney's Office and the Courthouse happened to be located across the street from GSA.

Officials in the Office of the U.S. Attorney refused GSA's suggestion to share, stating their belief that the Office of the U.S. Attorney, an executive branch agency, was "not favorably inclined" to share a telecommunications system with the judicial branch. Attorney officials cited, as additional reasons for not sharing, security of telephone conversations and delay of the system's procurement if they had to determine and incorporate telecommunications requirements for the Courthouse occupants. Without validating the Office of the U.S. Attorney's claims, GSA approved the acquisition of a separate telecommunications system for the Attorney's Office.

Our analysis suggests that it would cost about $4.2 million less over a 10-year period for the Office of the U.S. Attorney and the U.S. Courthouse occupants to share a common system rather than maintain separate systems.

When an agency requests authority to procure a telecommunications system, GSA should require it to identify and demonstrate any benefits or adverse impacts sharing would have on its mission. We can foresee that a number of reasons can be given for not joining in a shared system. Inadequate staff to operate and manage the shared system or inadequate facilities to house a PBX are two examples. Where an agency alleges adverse impacts, GSA does not require the agency to analyze (1) the costs of hiring additional staff to operate and manage the shared system, (2) availability of alternative facilities, and (3) additional costs for constructing facilities to accommodate the larger, shared system. Without an appropriate analysis, GSA has no basis for determining if agency objections are unfounded and a shared system would be more cost-effective and efficient.

Shared Telecommunications Systems Show Significant Potential for Savings

To determine if sharing telecommunications systems is cost-effective in some instances, we looked at federal offices in three locations in New York City and Albuquerque, New Mexico. In each location, we determined that a shared configuration met the expressed functional requirements of the agencies at a significantly lower cost than the system approved by GSA. We estimated that, had GSA required shared systems rather than approving separate systems for three agencies, about $16 million could have been saved over a 10-year period. We believe the results of this analysis suggest the need for GSA to take advantage of opportunities for system sharing.

Alternative Telecommunications System Configurations Analyzed

We analyzed two locations in Manhattan, New York, that were in a highly concentrated business district. At the first location, the Office of the U.S. Attorney for the Southern District of New York received GSA's approval in January 1984 to procure its own telecommunications system (a PBX). The U.S. Attorney's Office is located adjacent to the U.S. Courthouse.

At the second location, the Internal Revenue Service's (IRS) Manhattan District Office received GSA's approval in April 1984 to procure its own telecommunications system (a PBX). The IRS' District Office, the sole tenant in a government-leased building, is located one block from the IRS'

Northeast Regional Office, which is a major tenant in a multi-tenant federal building. Another tenant in this building, the U.S. Postal Service, on October 15, 1985, implemented its own PBX system as part of its planned nationwide telecommunications system. At the time of our review all the agencies in all of these buildings, except the Postal Service, were receiving GSA-consolidated Centrex services.

We analyzed four alternative telecommunications configurations for the two locations:

- All agencies continue to receive GSA-leased Centrex services (the existing system configuration).
- The two agencies with GSA approval acquire their own systems while the others continue to receive GSA-leased Centrex services.
- Each of the four buildings has a PBX installed.
- The Office of the U.S. Attorney[21] and IRS proceed with their acquisitions but provide services to the other agencies in the nearby buildings.

The third location, in Albuquerque, New Mexico, has a much smaller downtown business district. A regional office of the Agriculture Department's Forest Service received GSA approval to procure its own telecommunications system (PBX), which was installed in March 1984. The Forest Service is located in a building that houses other federal agencies, is across the street from another federal building, and is one block from two other federal buildings. At the time of our November 1985 visit, the Forest Service had installed over half of its new PBX system lines and was receiving Centrex service through GSA for the remaining 200 lines. All other agencies in this cluster were receiving GSA-consolidated Centrex services.

The Forest Service's PBX was designed to meet only the Service's requirements and could not be expanded to accommodate the telecommunications needs of other federal agencies in the Service's building or in those buildings nearby. We, in our analysis of shared systems, hypothetically replaced the Forest Service PBX with a system that could provide service to all of these federal agencies. The alternative configurations analyzed were as follows:

[21]In August 1985, after we completed our analysis, GSA withdrew its approval from the Office of the U.S. Attorney. GSA reasoned that, since the U.S. Attorney's Office had not acted on the approval it received about 18 months before and GSA's ASP contract was scheduled to be awarded in 1986, any action by the U.S. Attorney's Office would result in parallel procurement actions that would be neither economical nor in the best interests of the government.

- The Forest Service PBX is retained and the remaining agencies continue to be served with GSA-leased Centrex service until 1989. In 1989, Centrex service is replaced by a PBX capable of meeting the telecommunications requirements for all agencies except the Forest Service.
- The Forest Service PBX is retained but all other federal agencies immediately begin to receive service from another PBX.
- The Forest Service PBX is replaced with one that can meet the requirements of all agencies in the four buildings.

Results Show Sharing to Be a Cost-Effective Alternative

The results of our analyses, shown on the next page, suggest that, compared to the GSA-approved configurations for the three locations, the government could save $16 million over 10 years if agencies shared their telecommunications systems. Moreover, we estimate that, in Manhattan, it would cost the government $4.4 million less if all agencies continued receiving GSA-leased Centrex services rather than proceeding with the GSA-approved configurations. All dollar amounts represent 10-year cumulative totals that have been discounted at a nominal rate of 10 percent.[22] Variable costs were increased by an inflation factor of 4 percent.

[22]The interest rate was selected arbitrarily. Using the approximate average of Treasury Department marketable security yields as of mid-March 1985, when we did our analysis, we calculated the average rate to be 11.26 percent. For simplicity, we chose to use the 10-percent rate. We also recalculated the results using 8-percent and 12-percent nominal rates to determine the sensitivity of the results to the rates used. Sharing was again the least expensive of the alternative configurations.

Table 4.1 Ten-Year Cost Figures for Alternative Telecommunications Configurations

Dollars in millions

	Alternatives			
	#1 Existing Centrex	#2 GSA Approved	#3 Multiple PBXs	#4 Shared System
Manhattan				
U.S. Attorney/U.S. Courthouse				
Cost	$6.8	$7.3	$4.3	$3.1
Savings (additional cost) over existing system		$(0.5)	$2.5	$3.7
Savings over GSA-approved system			$3.0	$4.2
IRS/Multi-agency building				
Cost	$13.1	$17.0	$9.0	$6.6
Savings (additional cost) over existing system		$(3.9)	$4.1	$6.5
Savings over GSA-approved system			$8.0	$10.4
Albuquerque				
Forest Service/Multi-agency buildings				
Cost	$5.2[a]	$5.2[a]	$3.9	$3.8
Savings over existing system			$1.3	$1.4
Savings over GSA-approved system			$1.3	$1.4
Total for three locations				
Cost	**$25.1**	**$29.5**	**$17.2**	**$13.5**
Savings (additional cost) over existing system		$(4.4)	$7.9	$11.6
Ten-year savings over GSA-approved system			$12.3	$16.0

[a]Same configuration used.

Although non-cost factors, such as system reliability and compatibility with other systems, could be considered when selecting the best alternative, there would have to be substantial differences on these non-cost factors to overcome the differences in cost between sharing and the other configurations. We conducted several analyses, and each time assigned different weights of importance to the relevant factors. The results of these analyses demonstrated that, using reasonable non-cost considerations, sharing was still the best choice.

Conclusions and Recommendations

Conclusions

OMB and GSA are not providing the leadership necessary to ensure that federal telecommunications needs will be met efficiently and economically. This lack of leadership affects almost every area where action by a central manager is required. Given the magnitude of the planned investment and the increasing federal dependence on telecommunications, it is critical that an overall strategy be formulated to ensure that all federal requirements are considered and all technical and management alternatives are thoroughly evaluated. OMB and GSA have been given broad responsibility and authority for federal telecommunications activities under the Paperwork Reduction Act and the Federal Property and Administrative Services Act, as amended, and the effective functioning of these activities depends directly on the manner in which OMB and GSA perform their duties.

Perhaps the most critical of these duties is governmentwide planning. Changes within the past decade in the nature of and demand for telecommunications, in the variety and complexity of the technology, and in the economics of using the technology, all call for a knowledgeable and considered reassessment of federal management of resources in the new environment.

We believe that determining the best strategy requires a careful analysis of the needs for telecommunications support throughout the government, considering such factors as how to achieve savings through proper sizing (economies of scale), technical constraints on interoperability, and the availability of competitively priced services. In the current environment, it is not obvious which aspects of telecommunications are best left to the individual agencies and which would benefit from central management. Evidence suggests that some areas would benefit from close coordination among agencies. Opportunities appear to exist for significant economies of scale in the use of equipment, goals of national security and emergency preparedness seem to depend on interoperability of systems across agency lines, and the ability to bargain in the marketplace for services and equipment is to some degree dependent on the scale of demand. Similarly, alternatives for achieving objectives exist, including government ownership of facilities versus the purchase of services. Choices among these alternatives are difficult and require an understanding of the probable evolution of the technology, the structure of the commercial marketplace, and the government's requirements for support. None of these alternatives should be selected without considerable study.

Since OMB and GSA have done insufficient analysis on this strategic level, no overall framework exists that spells out a federal management strategy to (1) determine which requirements must be met by centrally provided services, (2) establish guidelines for buying versus leasing equipment, (3) provide governmentwide standards, and (4) define the responsibilities of the central managers and the individual agencies. Basic decisions have not been made, such as identifying what criteria should be used to choose among alternatives or what technical information should be used to determine agency requirements. Such circumstances expose the government to the risk of serious problems in the development of new or replacement telecommunications systems. Furthermore, these circumstances make it impossible to ascertain with any confidence whether the government is meeting its overall telecommunications objectives.

The problems with central management extend beyond governmentwide planning. The decisions reached regarding the central provision of services (FTS 2000, WITS, and ASP) have been made without adequate analysis. Consequently, the associated procurements have incurred false starts, wasteful delays, and uncertainty regarding their eventual success. The FTS 2000, the largest integrated system for long-distance telecommunications in the United States, is a striking example of needed analysis. While GSA's original proposal to acquire this system represented a significant departure from present practices, its approach was unsupported by any meaningful analysis of the effect of the abandonment of government-managed facilities in favor of commercially provided services. GSA also disregarded the fact that, by giving agencies authority to leave the system voluntarily, it was unable to guarantee levels of purchases. As a result, the acquisition of these needed services has been delayed and the success of the system is still in question.

Even GSA's efforts to share equipment across agency lines in order to meet common local requirements has not fared well. GSA's current policies and procedures do not require that sharing be considered when agencies request authority to acquire telecommunications for local service. Information needed to properly evaluate such arrangements is not routinely collected, and significant potential savings in some cases may go unrecognized and unachieved.

One area where we found that OMB and GSA made progress is in the guidance they offer to individual agencies in coordinating management of their own telecommunications. Ironically, it is OMB and GSA's failure to

apply the principles of this guidance on the governmentwide level that constitutes their greatest weakness.

Recommendations

We recommend that the Director of OMB and the Administrator of GSA take the following actions to provide needed direction to the government's telecommunications:

- In order to provide a framework for decision making, to define agency telecommunications needs, to decide which services should be provided centrally by GSA and which services should be provided by the agencies, and to establish responsibilities between the central managers and the individual agencies, OMB and GSA should jointly develop, document, and implement a comprehensive plan for meeting governmentwide telecommunications needs. This plan should be developed using the guidance OMB and GSA prescribed for the agencies in the 5-year ADP/telecommunications plan, but should be applied to the central management level. The plan should be based on appropriate analyses that are necessary for making decisions on how agencies' needs will be met. It should include established economic criteria (such as factors to be included in performing cost/benefit analyses for governmentwide acquisitions), and specific noneconomic criteria (including factors that ensure governmentwide objectives are met).

  This plan should offer guidance on the types of telecommunications services that should (1) be provided centrally by GSA and be mandatory for civilian agency use, (2) be provided centrally by GSA but used at the agencies' discretion, and (3) be provided by the agencies themselves.

  OMB and GSA should establish a process to gather critical information so that they, as central managers, can make informed decisions on these issues.

- Until OMB and GSA complete the framework document regarding which services should be provided centrally by GSA and which services should be provided by the agencies themselves, the GSA Administrator (1) should not approve agency purchases of individual systems where these agencies were originally intended to be served by WITS; (2) should recall approvals already issued to agencies originally intended to be served by WITS where their Requests for Proposals for individual telecommunications systems have not yet been issued; and (3) should not award a contract for the FTS 2000.

- To enhance agency decision making on telecommunications that would best satisfy needs and objectives, OMB and GSA should establish an explicit, uniform methodology for comparing alternatives. The methodology should describe the essential cost elements and the procedures for conducting analyses, and should be enforced by OMB in its budget process, and GSA in its review process.

  We recommend that the OMB Director work with the Administrator of GSA to establish and systematically implement a policy requiring agencies to share their proposed telecommunications systems when GSA determines, through a cost and technical analysis, that sharing best achieves service requirements, efficiency, and least overall cost to the government. This policy should be incorporated in GSA's Federal Information Resources Management Regulations and in internal procedures.

  Specific actions that the Administrator should take to implement this policy include directing GSA's Information Resources Management Service

- to ensure that information identifying which agencies might share systems is acquired and used;
- to obtain additional information where the potential for sharing exists between the requesting agency and other agencies—which telecommunications requirements of these agencies can be met by a new, shared system; the costs of existing services for all agencies involved and estimated costs for the requesting agency's proposed system; physical requirements for the PBX (such as building environment, space availability, and location); and how long the agencies will occupy their current locations; and
- to mandate an evaluation and cost comparison when GSA determines that a shared system is feasible—the alternatives to the government, including agencies' claims of adverse impacts from sharing, and the most sensible alternative from a governmentwide viewpoint should be clarified in this evaluation.

Methodology Used to Evaluate Various Telecommunications Strategies

Our conclusion that sharing[23] of telecommunications systems is sometimes a cost-effective alternative to approving individual agency systems is based on the results of analyses performed at three locations. The analyses were performed by a telecommunications consultant with previous experience in planning systems for a Bell operating company, and this consultant was assisted by GAO staff. In addition, the work was reviewed by an independent expert. We used a discounted cash flow analysis and a comparative cost-analysis methodology. A 10-year analysis period was selected because it is the maximum time in which GSA can enter into contracts for telecommunications services. Locations where we performed the analyses, and the alternative telecommunications strategies are described in chapter 4, but are delineated here in greater detail to assist the reader.

The purpose of our analyses was not to design the optimal telecommunications system, but rather to develop adequate information to determine if sharing is feasible and a cost-saving alternative in three instances. This appendix summarizes the results of our analyses and the assumptions used in reaching our conclusions.

Information Gathered for Analyses

To determine if sharing telecommunications systems was a viable alternative that GSA should routinely consider, we gathered information on agencies at locations that potentially could share systems.

Data Base of Agency Locations That May Share Systems

To identify opportunities for sharing systems, we developed a data base of agency telecommunications approvals. GSA's Authorizations Branch manually maintains individual files for all agency requests. We entered information from the approvals GSA granted to 401 agency locations from October 1983 through March 1985, and 307 installed or planned Postal Service PBX locations, into a data base. With the data automated we could sort it by geographic locations, such as by cities.

We identified 57 approvals for telecommunications systems planned for agency locations in GSA's New York and Fort Worth regions for the period October 1983 through March 1985. We evaluated all 57 locations to determine those that would offer the best potential benefits from a shared telecommunications system. Our selection was based, in part, on

[23]By sharing we mean two or more agencies in close proximity (in the same or nearby buildings) using the same telecommunications resources—likely a private branch exchange—installed at a single location with one agency providing local services to other agencies. Opportunities to share occur when one agency has received or is requesting GSA approval to acquire its own system.

information gathered during either on-site visits to these locations or telephone interviews with GSA or agency staff.

The initial criterion we used for selection was proximity to other federal agencies. The second criterion, for those in close proximity, was the size of the systems (total number of telephone lines) in a location. We believe one of the many factors facing a decision maker when determining the viability of a shared telecommunications system is the distance between locations. The further apart locations are, the more complex and costly the design of a shared system becomes. As a result, we refined this criterion to locations that were within two blocks of each other. In terms of system size, we selected three configurations having the largest number of lines within the respective region. These two criteria limited us to examining only those cases involving relatively simple designs. Theoretically, benefits from a shared telecommunications system may also be present in cases involving more complex designs; however, this possibility was not tested. In other cases, conditions (such as agencies that were exempt from GSA or available equipment that was inappropriate) precluded consideration of sharing.

Five locations—Albuquerque, New Mexico; Dallas and Austin, Texas; and two locations in Manhattan, New York—met both of our criteria. In the remaining 52 locations, sharing may still be a viable alternative but more difficult and costly to accomplish. Through discussions with GSA staff, and site visits, we later discovered one additional location (in Brooklyn, New York) outside the original 57 where we believe GSA should have considered a shared telecommunications system.

To determine if shared systems were more economical than the individual agency systems approved by GSA in our three cases, we performed an alternative cost analysis at the two Manhattan locations and the Albuquerque location. Our analysis compared the cost and feasibility of various configurations, each of which met all existing and anticipated agency telecommunications requirements. The results of our analyses indicate that, in each location, a shared system would have been more economical than the GSA-approved individual agency system. We estimate that over a 10-year period the shared systems, employing the least costly configuration, would save $16 million over the approved systems. (See page 47.)

Additional Information on the Viability of Shared Telecommunications Systems

Our analysis at the three locations required the collection of telecommunications requirements from each potential partner, including

- agency telecommunications requirements (such as the number of lines needed for both voice and data traffic (usage) currently and in the future) to be met by a new system;
- special telecommunications requirements that a new system would have to meet (such as secured data transmission lines);
- existing service costs for all agencies involved and estimated costs for the requesting agency's proposed system;
- physical requirements (such as building environment, space availability, and location) for the PBX;
- period of time the agency will occupy the current location; and
- expandability of any existing PBX.

On the basis of this and other information readily available to GSA, we conducted analyses that considered factors such as (1) the flexibility, maintainability, reliability, and compatibility of different systems; (2) penalties for early termination of Centrex service contracts; (3) alternative network designs (using microwave transmission and copper wire) to connect buildings; and (4) anticipated future voice and data traffic requirements. On the basis of our experience in conducting these analyses, we consider these factors to be essential in any evaluation of whether a shared system is economically and technically feasible and whether it would meet all agencies' telecommunications requirements.

We used information similar to what GSA's regions are required to collect, as mandated by the April 1985 memorandum, and other information that is accessible within GSA to identify locations potentially suitable for sharing systems. For example, the Public Buildings Service of GSA, responsible for maintaining most of the federally controlled buildings in the nation, keeps lists that show the locations of all federally occupied (owned and leased) buildings and the tenants therein. These lists include the expiration date of the building lease, which could be of importance to the decision maker since relocating a PBX is costly and could adversely affect the cost-effectiveness of a procurement. In one instance, we were told that the U.S. Postal Service was planning to purchase, as part of its national telecommunications network, a PBX for a Postal Service unit in Austin, Texas, at a cost of approximately $98,000. The unit, however, will relocate to a new building in 2 years; the cost to move the PBX is estimated by the Postal Service to be $100,000.

Neither GSA headquarters nor the two regional offices visited used Public Buildings Service information to identify locations that could share systems. We used these lists and other sources, including the telephone directory, and were able to identify locations where several federal agencies were in close enough proximity to share systems.

Descriptions of Locations

We performed our analysis at three locations. The two Manhattan, New York, locations were in a highly concentrated business district with several clusters of federal agencies. The Office of the U.S. Attorney for the Southern District of New York received GSA's approval in January 1984 to procure a telecommunications system (a PBX). The Attorney's Office is adjacent to the U.S. Courthouse; an above-ground walkway connects the buildings. The telephone company considers these buildings a single location. As such, there are no additional costs to have telephone lines running between the buildings and the PBX. There are 908 Centrex lines in the buildings, and the government spends about $80,000 a month for telephone service.

The IRS' Manhattan District Office, the sole tenant in a government-leased building, also received GSA's approval to procure its own telecommunications system (a PBX). This office is located one block from the IRS' Northeast Regional Office, a major tenant with several other agencies in a federal building. Another tenant in this building is the U.S. Postal Service, which, on October 15, 1985, implemented its own PBX system as part of the planned nationwide Postal Service telecommunications system. The Postal Service will not share its PBX with any of the federal agencies located in the same building because it does not want the problems involved in serving as a telephone company for other agencies. At the time of our review, all of the agencies (excluding the Postal Service) were receiving GSA-consolidated Centrex services. The federal government spends about $153,000 monthly for the 1,773 Centrex lines at the two buildings.

The other location, Albuquerque, New Mexico, has a much smaller downtown business district, which contains a cluster of federal agencies. The Department of Agriculture's Forest Service, Southwestern Region, received GSA's approval to procure its own telecommunications system and installed a PBX in March 1984. The Forest Service is located in a building with other federal agencies, is across the street from another federal building, and is one block from two other federal buildings. There are 1,387 lines in the four buildings; monthly telephone costs are approximately $76,900. At the time of our visit in November 1985,

the Forest Service had connected half of the lines to its new PBX and was receiving Centrex service through GSA for the remaining 200 lines. It planned to have all of its lines connected to the PBX by December 1985. All of the other federal agencies in this cluster were receiving GSA-consolidated Centrex services.

Our analysis of the three locations compared the cost and feasibility of various system configurations. Information on current and future telecommunications requirements was obtained through discussions with agency officials. Each configuration met all current and anticipated agency requirements. We also made physical inspections of each building to assess the adequacy of space, ventilation, wiring, and emergency power.

Assumptions Made in Cost Projections

The assumptions we made concern the type of PBX selected, procurement methods, network services and performance levels, inflation and discount factors, personnel needs, and environmental requirements.

Equipment Selected and Procurement Method Used

The telecommunications systems we selected had the capacity to meet all existing and anticipated agency requirements. Information on requirements was obtained by interviewing officials responsible for carrying out an agency's telecommunications mission and by reviewing GSA telecommunications records. The same PBX was used in all of the alternative system configurations we developed, a control mechanism that enabled cost differences to be attributed to other elements in the configurations.

The Forest Service used the outright purchase method of procurement to acquire its Rolm PBX in Albuquerque. We used this procurement method for those configurations where the Forest Service PBX was used. In the configurations where a PBX other than the Rolm was used, the cost of an AT&T System 85 procured through a 5-year lease was employed. The two agencies in Manhattan planned to acquire their PBXs through a 5-year lease. For the Manhattan analyses, we used this procurement method. Although an outright purchase of a system is a more cost-effective method, officials of both agencies in Manhattan believed they would be unable to obtain the large sums of money needed for this type of procurement. While the monthly lease type of procurement requires the fewest funds monthly, the total cost of the procurement is the highest.

Information on most system hardware and software costs was obtained from GSA's Authorized Communications Schedule Price List, Federal Supply Schedule 58. Costs of components not listed in Schedule 58 were obtained from American Telephone & Telegraph Information Systems' national price lists. The costs for network services that include various types of communications lines (trunks) that connect the agency's PBX to the public network were obtained from tariff[24] schedules in effect during our work. System maintenance costs are included in the monthly costs when agencies lease their equipment. When agencies assumed ownership of the system, the cost of a maintenance contract was included in the cost analysis. The maintenance costs we used are representative of the costs that private industry would pay for a similarly sized telecommunications system.

Network Services and Performance

Network service costs include the costs of the communications lines (trunks) that connect the agency's PBX to the public and federal telephone networks. Network service costs also include costs associated with installing the trunks. Our consultant determined the required number of trunks based on data maintained by GSA and on estimated future telecommunications requirements that agency officials told us would be needed to meet anticipated increases in data transmission. Determining the correct number of trunks is vital in determining costs and the ability of users to access the networks. If too few trunks are provided, users will find it difficult to make calls and transmit data. On the other hand, if an excessive number of trunks are provided, excessive costs will be incurred.

At the two Manhattan locations, neither the U.S. Attorney's Office nor the IRS knew what level of service their future PBXs would provide. Therefore, we designed the alternative configurations to provide the agencies with a service level in excess of industry standards (5-percent blockage—5 calls out of 100 made during an average busy hour would have to be redialed), but not as good as the existing GSA-provided Centrex service (essentially nonblocking). In all of the alternative telecommunications configurations we developed, agencies using a PBX would receive a service level that permitted the completion of 97 calls out of 100 without delay during an average busy hour. The remaining three calls would have to be redialed.

[24]A statement filed by a telecommunications common carrier with the appropriate state or federal public regulatory agency. This statement describes the service offered and lists the charges and conditions for using that regulated service.

In Albuquerque, determining an appropriate level of service was more difficult. The Forest Service's PBX was designed at a service level that permitted the completion of 98 calls out of 100 without delay during an average busy hour. But, at the time of our analysis, the system had not been completely cut over and agency officials could not tell us the actual level of service they were experiencing. In the first two Albuquerque telecommunications configurations, we did not alter the level of service required by the Forest Service. However, for the other agencies, we designed their systems to provide a service level that permitted the completion of 99 out of 100 calls without delay during an average busy hour. Although this grade of service exceeds that of the Forest Service, it is not as good as the level of Centrex service that all of the agencies were currently receiving.

Inflation and Discount Rates

All variable costs were inflated at a 4-percent rate. This rate represents the average increase in the consumer price index between the second quarter of 1983 through the second quarter of 1985—the period of time of our review. All costs were discounted at a nominal rate of 10 percent, which was arbitrarily selected. The average yield for Treasury Department marketable securities (bonds and notes) maturing before March 1995 at the time we started our analysis (mid-March 1985) was determined to be an average rate of 11.26 percent. For simplification, we chose to use the 10-percent rate. We tested the sensitivity of the results to the rate used, recalculating the results using first an 8-percent and then 12-percent nominal rate. The results were the same—the sharing option was the least expensive for all three locations.

Personnel Requirements

We also estimated the personnel requirements for the operation, oversight, and administration of the system and included estimates of these costs in our projections. The costs were based on our consultant's experiences and observations of the personnel needs for systems of similar sizes.

Environmental Requirements

The consultant estimated the need for and cost of upgrading heating, air conditioning, ventilation, and electrical systems to support the switching equipment's environmental requirements. He also evaluated the need for and cost of replacing telephone wires within the buildings. His assessments were based on observations made during site visits to all of the locations.

Alternatives Considered and Discounted Cash Flow Analyses Performed

A discounted cash flow analysis of various alternative telecommunications configurations was performed. Investment alternatives normally involve incurring different costs at different times. For two or more alternatives to be compared on an equal economic basis, it is necessary to consider the costs of each alternative currently or at its "present value." To find the present value of expected future costs, we used the technique of discounting. This technique determines the amount of money that, if invested today at a selected interest rate, would be sufficient to meet expected future costs.

In Manhattan the existing system and three hypothetical configurations were analyzed for the two locations:

- Configuration one retained the existing Centrex service for all agencies included in the analysis.
- Configuration two had IRS' Manhattan District Office and the Office of the U.S. Attorney proceed with their planned procurements of PBX systems. The agencies at 90 Church Street and the U.S. Courthouse would continue to receive Centrex service.
- Configuration three provided each of the four buildings with a PBX that would be interconnected by a few tie-lines to provide intercommunications.
- Configuration four had two PBXs serve the needs of all agencies in the four buildings. The PBX to serve 90 and 120 Church Street would be located at 120 Church Street, where the preponderance of stations[25] are located. The U.S. Courthouse and the Office of the U.S. Attorney would receive service from a PBX situated in the U.S. Attorney's building.

Unlike the agencies in Manhattan, the Forest Service located in Albuquerque had, at the time of our study, installed a PBX. It was designed to meet only the Forest Service's requirements and could not be expanded to serve other federal agencies in the same building or in the three nearby buildings. Consequently, in configuration three, below, we hypothetically replaced the Forest Service PBX with a system that could provide service to all of the agencies. In the first two configurations, we used the Forest Service's PBX and another system to serve all other agency telecommunications requirements. The second configuration was the same as the first, except that we altered the time at which a second PBX was installed for use by the other federal agencies.

[25]One of the input or output points of a communications system, such as the telephone set in the telephone system or the point where a computer interfaces a leased private line.

The different configurations analyzed in Albuquerque were as follows:

- Configuration one retained the Forest Service PBX and continued to lease Centrex service for the other agencies until 1989, the estimated time for the installation of GSA's ASP. In 1989, Centrex service would be replaced by a second PBX acquired under the ASP program, which would serve all agencies except the Forest Service.
- Configuration two called for the leased Centrex service to be terminated immediately and a PBX procured to support all agencies except the Forest Service. The Forest Service would retain its purchased Rolm PBX. This alternative included a one-time penalty that GSA and the Forest Service would have to pay for breaking a Centrex service contract.
- Configuration three called for acquiring a single System 85 PBX that would serve all of the federal agencies in the four buildings. This configuration assumed that the government would incur a penalty for terminating Centrex service 20 months prior to the expiration date, but did not include the costs to remove the existing Forest Service PBX.

Comparative Analysis Methods

We evaluated the functional characteristics of these configurations and the financial consequences of selecting a particular strategy. The methods used are accepted throughout industry for the evaluation and selection of PBX alternatives. Tax effects and depreciation factors were not used in the cash flow analysis since they are not applicable to government. Table I:1 shows the cost categories, applicable (A) and not applicable (N/A) to each system configuration by location.

Table I.1: Applicable Cost Categories by Location

	Manhattan Locations Configuration				Albuquerque Configuration		
Costs	One	Two	Three	Four	One	Two	Three
System hardware	N/A	A	A	A	A	A	A
System maintenance	A	A	A	A	A	A	A
Facilities modification	A	A	A	A	N/A	N/A	N/A
Local network	A	A	A	A	A	A	A
Centrex	A	A	N/A	N/A	A	A	N/A
Centrex termination	N/A	A	A	A	A	A	A
Personnel	A	A	A	A	A	A	A
Rewiring	N/A	A	A	A	N/A	N/A	N/A

Note: A = applicable; N/A = not applicable

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