DOE/IG-0537

AUDIT REPORT

TELECOMMUNICATIONS INFRASTRUCTURE

DECEMBER 2001

U.S. DEPARTMENT OF ENERGY
OFFICE OF INSPECTOR GENERAL
OFFICE OF AUDIT SERVICES

U. S. DEPARTMENT OF ENERGY
Washington, DC 20585

December 21, 2001

MEMORANDUM FOR THE SECRETARY

FROM: Gregory H. Friedman (Signed)
Inspector General

SUBJECT: INFORMATION: Audit Report on "Telecommunications Infrastructure"

BACKGROUND

The Department of Energy has developed an extensive telecommunications infrastructure to support its diverse mission responsibilities. Currently, the Department spends more than $26 million annually to support the telecommunications component of its information technology infrastructure. Approximately $15 million is used to maintain and operate Departmentwide mission- and business-related networks, including classified and emergency communications. The Department also spends over $11 million annually on long distance telephone, Internet, and video teleconferencing services. The Department's Chief Information Officer is responsible for developing policy governing the telecommunications infrastructure.

The Office of Inspector General has undertaken a series of reviews designed to evaluate the performance of the Department's information technology programs, including its telecommunications infrastructure. Based on this work, we have concluded, as noted in our *Special Report on Management Challenges at the Department of Energy*, (DOE/IG-0491, November 2000), that information technology is one of the most significant management challenges facing the Department. Based on this concern, the specific objective of this audit was to determine whether the Department had consolidated and optimized its telecommunications infrastructure, including its voice, data and video services.

RESULTS OF AUDIT

The audit disclosed that duplicative data transmission infrastructures existed across the Departmental complex. Further, the Department had not optimized the acquisition of Internet and video services. Specifically,

- Organizations maintained about 190 data transmission circuits that duplicated capabilities of other Departmentwide networks;

- A number of sites utilized open market sources to acquire Internet service that could have been provided from existing capacity; and,

- Organizations were maintaining video teleconferencing capabilities that were incompatible with corporate networks.

These problems occurred because the Department had not developed and implemented a coordinated approach to the acquisition and use of telecommunications equipment and services. Further, the Department had not adopted a comprehensive set of performance measures and incentives which would have encouraged both Federal employees and contractors to obtain necessary telecommunication capabilities as cost effectively as possible. As a consequence, the Department annually spends at least $4 million more than necessary to operate and maintain its telecommunications infrastructure.

MANAGEMENT REACTION

We made a number of recommendations designed to improve the performance of the Department's telecommunications infrastructure. Management concurred with our recommendations and agreed to take a number of corrective actions.

Attachment

cc: Deputy Secretary
Under Secretary for Energy, Science, and Environment
Administrator, National Nuclear Security Administration
Director, Office of Management, Budget and Evaluation
Director, Office of Science
Chief Information Officer

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OVERVIEW

INTRODUCTION AND OBJECTIVE

The Department of Energy (Department) has multiple, diverse missions such as nuclear weapons stockpile stewardship, environmental cleanup and advanced scientific research. The Department has developed an extensive telecommunications infrastructure to support these missions. Within the Department, the Chief Information Officer (CIO) is responsible for developing policy governing the management of information technology (IT), including the telecommunications infrastructure. This infrastructure permits organizations to exchange data and includes support for long distance telephone, Internet, and video teleconferencing services.

The Department spends more than $26 million annually to support its telecommunications infrastructure. Approximately $15 million is used to maintain and operate Departmentwide mission and business related networks. These networks provide services such as classified and emergency communications and support scientific research and daily business operations. The Department also spends over $11 million annually on long distance telephone, Internet, and video teleconferencing services across the complex.

In 1996, the Department began an effort to modernize its telecommunications infrastructure. Central to this effort was the development of a corporate-level network capable of supporting current and future business telecommunication needs. The resulting network, DOE Corporate Network (DOENET), was projected to improve effectiveness, efficiency and overall security of the telecommunications infrastructure. Specifically, the network was to reduce the need for dedicated, standalone data circuits at a number of the Department's sites while improving security over data transmission. In addition, the network was to ultimately provide a cost effective medium for modernizing the Department's video teleconferencing capability.

The objective of our audit was to determine whether the Department had consolidated and optimized its telecommunications infrastructure, including its voice, data and video services.

CONCLUSIONS AND OBSERVATIONS

The Department had not effectively consolidated or optimized significant segments of its telecommunications infrastructure. Duplicative data transmission infrastructures existed across the complex, and the Department had not optimized the acquisition of Internet and video services. For example, various organizations maintained about 190 data transmission circuits that duplicated capabilities of other Departmentwide networks. A number of sites

utilized open market sources to acquire Internet service that could have been provided from existing capacity. Absent a Departmental standard, organizations were maintaining video teleconferencing capabilities that were incompatible with corporate networks. The Clinger-Cohen Act of 1996 (Clinger-Cohen) and Office of Management and Budget (OMB) guidance require agencies to acquire information technology related equipment and services, including telecommunications services, in a manner that is the most cost effective to the government. Problems with the Department's telecommunications infrastructure occurred because it had not developed and implemented a coordinated approach and specific, focused performance measures to govern the acquisition and use of telecommunications equipment and services. As a consequence, the Department annually spends at least $4 million more than necessary to operate and maintain its telecommunications infrastructure.

We also noted two additional telecommunications related areas where increased efficiencies were possible. These areas were the acquisition of long distance services at Lawrence Livermore National Laboratory and the consolidation of network services at selected locations. These matters are discussed in Appendix 1.

This audit identified issues that management should consider when preparing its year-end assurance memorandum on internal controls.

Signed
Office of Inspector General

MANAGEMENT OF THE TELECOMMUNICATIONS INFRASTRUCTURE

Telecommunications Infrastructure

The Department had not effectively consolidated or optimized significant segments of its telecommunications infrastructure. Duplicative data transmission infrastructures existed across the complex and the Department had not optimized Internet and video services acquisition and use. For example, various organizations maintained at least 190 data transmission circuits that duplicated capabilities of other Departmentwide networks. In addition, the Department spends about $1 million each year for Internet services that could be provided from existing capacity. Absent a Departmental standard, organizations were procuring video teleconferencing capabilities that were not compatible with corporate networks.

Duplicate Data Transmission Infrastructure

Despite a CIO sponsored initiative to establish a corporate network and eliminate unnecessary circuits, a significant number of duplicative data transmission circuits continue to be used by field and Headquarters locations. Based on our test work and information provided by the Office of the CIO, the Department maintains at least 190 data transmission circuits that duplicate existing capabilities of Departmentwide networks. While the Department originally planned to eliminate these circuits when the corporate network became fully functional in early Fiscal Year (FY) 2000, many organizations maintained them unnecessarily. According to officials responsible for the operation of several Departmentwide networks, if properly configured, existing networks could readily assume the data transfer services provided by these redundant circuits. Terminating theses circuits would eliminate their annual cost without significantly impacting data transmission capabilities.

Internet Services

The Department is not taking full advantage of existing Internet service capabilities. Despite existing capacity, we found that at least 25 sites procure Internet services from open market sources. Based on discussions with Department officials, we learned that the Energy Science Network (ESNet), the Department's nation-wide high performance research network, should be capable of providing Internet connectivity to most Departmental entities. Currently, all Office of Science (Science) locations obtain Internet connectivity through ESNet. In addition, we surveyed a number of other facilities, including operations offices, and contractors, and determined that many utilize

ESNet as their primary Internet service provider. In fact, until May 2000, Departmental Headquarters obtained Internet connectivity through ESNet. Now, however, a private vendor provides this service for Headquarters at a cost of about $180,000 annually. The Hanford complex, which consists of multiple contractors, also used ESNet for its primary Internet connectivity until June 1999. Hanford now uses two vendors, in addition to ESNet, at a cost of nearly $100,000 per year.

Video Teleconferencing Services

The Department had not developed and implemented a standard for the acquisition and use of video teleconferencing hardware and software. Absent a standard, Departmental organizations were procuring and maintaining capabilities that were incompatible with network based video teleconferencing protocols. While the Department contemplated that video transmission would be optimized to take advantage of Departmentwide networks, it did not specifically require organizations to transition to network based teleconferencing systems. Instead, many sites maintained teleconferencing systems that could not take advantage of the transmission capability provided by corporate networks. For example, certain sites continued to use systems that depend on separate, leased Integrated Services Digital Network (ISDN) lines. As recognized by the Department in its corporate network implementation plans, transition to network based video teleconferencing could eliminate the cost of maintaining a significant number of ISDN lines and improve overall video quality.

Telecommunications Infrastructure Management

The Clinger-Cohen Act requires the Department to develop and implement programs to ensure that information technology related resources, including telecommunications services, are acquired and utilized in a cost effective and efficient manner. In addition, Clinger-Cohen requires that system performance be closely monitored, and that development and acquisition of information technology be based on an integrated, enterprise-wide architecture. Among other things, Clinger-Cohen implementing guidance, OMB Memorandum 97-15, requires that agencies' telecommunications services acquisitions be based on an integrated planning and evaluation process. In addition, OMB Circular A-130 requires agencies to ensure that improvements to existing information systems and the development of planned information systems do not unnecessarily duplicate resources available within the same agency.

Telecommunications Standards and Performance Measures Needed

Even though suggested by OMB guidance governing telecommunications related services, the Department had not developed and implemented specific standards and had permitted its only telecommunications related directive to lapse. Specifically, guidance that required a coordinated approach for building and maintaining its telecommunications infrastructure was not in place. Organizations were not required to coordinate with one another to aggregate demand or to insure compatibility of services. The lack of standards and an up-to-date Departmentwide directive contributed to development of duplicative telecommunications infrastructure and the inefficient procurement of telecommunication services.

While certain performance measures were in place, the Department had not developed specific performance measures regarding its telecommunications infrastructure. As required by the Government Performance and Results Act of 1993, we noted the Department had developed performance measures related to telecommunications; however, they were confined to maintaining network availability. Specific performance measures focused on consolidation and optimization of its infrastructure were not in place. Such measures would provide an important management tool for eliminating redundancy and improving overall efficiencies. When combined with milestones and a phased implementation plan, these measures could help ensure success in the telecommunications area.

Opportunities for Savings and Other Benefits

Opportunities for significant savings in the Department's telecommunications program exist. Based on our testing and on data provided by various sources, we determined that the Department spends at least $4 million annually more than necessary on voice, data and video services. For example, the transfer of data now carried by redundant data circuits to an existing Departmentwide network could save the Department about $3 million per year. Savings of about $1 million per year are also available by utilizing existing Internet service capacity. In addition, development and implementation of a comprehensive video teleconferencing strategy could result in additional savings.

In addition to reducing overall cost, consolidation of Internet service could have additional benefits. For example, the Department could reduce security risk and compatibility/management problems associated with using multiple, private providers. According to corporate network feasibility studies, security risks could be reduced through consolidating and limiting the Department's separate connections to the Internet.

Such action would serve to reduce potential entry or infiltration points by hackers or other malicious users. In addition, limiting the number of providers would result in fewer connections to manage and support, potentially reduce procurement costs, and should help eliminate compatibility issues.

RECOMMENDATIONS

To optimize the Department's telecommunications infrastructure, we recommend that the CIO in conjunction with the Lead Program Secretarial Officers:

1. Develop an enterprise-wide telecommunications architecture that includes all voice, data and video services. This should include the development of standards governing the acquisition and use of telecommunications related equipment and services.

2. Develop a strategy to eliminate redundant data transmission circuits and migrate data to an existing Departmentwide network.

3. Where appropriate, use existing capacity to provide Internet connectivity to Department organizations.

4. Where appropriate, transition video services to a Departmentwide network.

5. Develop specific, focused performance measures governing the development and implementation of an enterprise-wide telecommunications architecture.

6. Develop and implement a Department-level directive to establish the enterprise-wide telecommunications architecture.

MANAGEMENT REACTION

Management concurred with the findings and recommendations identified in our report. Management's comments and proposed corrective actions are included in their entirety in Appendix 4.

AUDITOR COMMENTS

Management's comments are responsive to our recommendations. When fully implemented, these actions should reduce overall costs and improve the effectiveness and efficiency of telecommunications within the Department.

OTHER MATTERS

We also noted two additional telecommunications related areas where increased efficiencies are possible. These include the acquisition of long distance services at Lawrence Livermore National Laboratory (Livermore) and the consolidation of network services at selected locations.

Long Distance Telephone Services

While the Department has largely been successful in managing the transition of its long distance telephone services to the Federal Telecommunications Services 2001 (FTS) contract, additional cost efficiencies are possible. Despite its expressed intent to consolidate all long distance telephone services under the FTS contract, the Department permitted Livermore to contract with an alternate long distance carrier. While this action initially appeared to be beneficial to Livermore, we determined that the overall cost to the Department would be increased by about $70,000 per year. Specifically, Livermore's analysis did not consider the increased costs to other Departmental organizations associated with its use of an alternate long distance carrier. Under the current contracting arrangement, all Government organizations utilizing the FTS contract are forced to pay a higher than normal rate when placing calls to Livermore.

Consolidation of Network Services

Consolidation of network services at select locations may provide additional efficiencies while reducing annual costs. In addition to the 190 separate circuits discussed in the body of our report, we also noted that at least eight locations, listed below, are candidates for network circuit consolidation. These sites maintain connections to multiple Departmentwide networks such as DOENet and ESNet. Based on consultation with network management and other officials, we determined that if properly configured, required data could be transmitted over a single network. Preliminary data compiled by Headquarters officials indicated that the elimination of multiple network connections had the potential to save about $80,000 per year. The Department should consider consolidating circuits when evaluating network expansion, acquisition, or configuration plans at the following sites:

- Chicago Operations Office
- Idaho Operations Office
- National Renewable Energy Laboratory
- Oak Ridge Operations Office

- Oakland Operations Office
- Amarillo Area Office
- Richland Operations Office
- Savannah River Operations Office

APPENDIX 2

SCOPE

The audit was performed between April and October 2001 at Departmental Headquarters in Washington, DC; the Lawrence Livermore National Laboratory in Livermore, California; the Lawrence Berkley National Laboratory in Berkley, California; the Nevada Operations Office in Las Vegas, Nevada; the Oakland Operations Office in Oakland, California; and the Oak Ridge Reservation in Oak Ridge, Tennessee. In all, we obtained statistics on 47 separate Departmental entities through the use of a survey instrument with regard to Internet service and/or video teleconferencing capabilities.

METHODOLOGY

To accomplish our objectives, we:

- Reviewed applicable laws and regulations pertaining to the use and acquisition of information technology. We also reviewed reports by the Office of Inspector General, the General Accounting Office, and contractor internal audit organizations.

- *Reviewed the Government Performance and Results Act* of 1993 and determined whether performance plans and measures had been established.

- Reviewed numerous documents related to the Department's Corporate and Energy Science Network planning and architecture.

- Held discussions with personnel from the Offices of the Chief Information Officer and the Office of Science. We also held discussions with various officials and staff at the operations offices and laboratories we visited.

The audit was conducted in accordance with generally accepted Government auditing standards for performance audits and included tests of internal controls and compliance with laws and regulations to the extent necessary to satisfy the audit objectives. Accordingly, we assessed internal controls regarding the development and implementation of wide area networks. Because our review was limited, it would not necessarily have disclosed all internal control deficiencies that may have existed at the time of our audit. We did not rely on computer-processed data to accomplish our audit objectives.

An exit conference was held with Headquarters officials on October 23, 2001.

APPENDIX 3

PRIOR REPORTS

- *The Department of Energy's Implementation of the Clinger-Cohen Act of 1996,* (DOE/IG-0507, June 2001). While the Department had taken action to address certain IT related management problems, it has not been completely successful in implementing the requirements of the Clinger-Cohen Act of 1996. The report noted, among other things, that the Department had not closely monitored policy implementation efforts. It attributed the problems identified, in part, to the Department's decentralized approach to information technology management and oversight and the organizational placement of the CIO. The report noted that the CIO lacked the authority necessary to ensure that policy implementation was consistent across the complex.

- *Special Report on Management Challenges at the Department of Energy,* (DOE/IG-0491, November 2000). Information technology management remains one of the most serious challenges facing the Department. The Office of Management and Budget has also identified the use of capital planning and investment controls to better manage IT as a Government-wide priority management objective for FY 2001.

- *Hanford Site Contractors' Use of Site Services,* (WR-B-99-03, March 1999). Site contractors independently procured telecommunications, copying, and photography services that were already available, even though the Hanford site had enough capacity to respond to contractors' needs.

- *Review of the U.S. Department of Energy's Information Management Sys*tems, (DOE/IG-0423, August 1998). The CIO lacked the authority and resources necessary to ensure development of information architecture at the program level, which form the building blocks of a Departmental architecture. The report added that, as a result, the Department had not developed and implemented an IT architecture, although its Strategic Plan called for the implementation of Departmentwide information architecture with support standards by January 1998.

- *Major Management Challenges and Program Risks: Department of Energy,* (GAO-01-246, January 2001). This report, part of GAO's high-risk series, discusses the major management challenges and program risks facing the Department of Energy. GAO found, among other things, security weaknesses in public Internet access to sensitive information on the Department's networks and at the Department's science laboratories.

MANAGEMENT COMMENTS

Department of Energy
Washington, DC 20585
December 3, 2001

MEMORANDUM FOR PHILLIP L. HOLBROOK,
DEPUTY INSPECTOR GENERAL
FOR AUDIT SERVICES,
OFFICE OF INSPECTOR GENERAL

FROM: LINDA Y. CURETON
ACTING CHIEF INFORMATION OFFICER

SUBJECT: Response to Draft Report on "Telecommunications Infrastructure"

In response to your memorandum of October 29, 2001, attached are our comments to your draft report entitled, "Telecommunications Infrastructure". Although we generally agree with the report, we want to clarify your statement, "Within the Department, the Chief Information Officer is responsible for managing information technology". Management of Information Technology within the Department is decentralized and the CIO affects management through Departmental policy guidance, and working through the appropriate Lead Program Secretarial Officer.

If you have any questions or concerns, please contact Linda Cureton, Acting Chief Information Officer at (202) 586-0166 or Stanley Wujcik, Acting Director Headquarters Cyber Security at (301) 903-3434.

Attachment

We agree with the basic findings that the Department has not effectively consolidated or optimized the data network segments of its telecommunications infrastructure. The root cause of this ineffectiveness is attributed to several factors.

- Lack of Departmental authority to mandate and manage transition from individual data services to the DOE Corporate Network (DOEnet), i.e., active policy documents, such as, approved DOE Orders or a Directive from the Office of the Secretary that would result in positive consideration for the transition.

- Maintenance concerns and lack of diversity if all data services were included in one network.

- Existing data networks do not connect with all locations served by dedicated point-to- point data services. In addition, extending existing network services at some large locations to remote users would require additional local facilities.

- Some dedicated point-to-point circuits are required because the existing KG equipment will not operate on an ATM network.

The Office of the CIO will take the following actions to address each of the report recommendations.

Recommendation 1. Develop and implement a Department-level directive to establish the enterprise-wide telecommunications architecture.

The Office of the CIO will develop a Department-level directive that establishes an enterprise-wide telecommunications architecture. The process for completing and adopting the policies and procedures is as follows:

1) The Office of the CIO drafts the policy.
2) A directives review board will be convened to review and discuss the merits of the directive.
3) Upon completion of the initial coordination requirements, the draft directive will be coordinated Department-wide.
4) Comments will be incorporated as agreed and the directive finalized.

Recommendation 2. Develop an enterprise-wide telecommunications architecture that includes all voice, data and video services. This should include the development of standards governing the acquisition and use of telecommunications related equipment and services.

The Office of the CIO will identify the resource requirements necessary to develop an enterprise-wide telecommunications architecture or review and revise, as needed, any existing architectural plans. Once funding is approved this effort will be initiated.

Recommendation 3. Develop a strategy to eliminate redundant data transmission circuits, and migrate such data to an existing Department-wide network.

The Office of the CIO will develop a strategy and resource plan to complete an analysis of the point-to-point circuit consolidation "candidates". Upon identification of resources and completion of the analysis, the consolidation candidates will be identified to the Lead Program Support Office for action and coordination with the circuit owners.

Recommendation 4. Where appropriate, use existing capacity to provide Internet connectivity to Department organizations.

The Office of the CIO will communicate across the Complex the availability of Internet Services, and provide a connectivity analysis of the potential cost savings/avoidances. Internet services are currently provided to eight (8) DOEnet sites at no cost. This offering allows the sites to be consistent with network connection requirements without imposing any additional requirements. An impact statement will be completed in order to determine the increased capacity needed to support the identified demand and the cost impact.

Recommendation 5. Where appropriate, transition video services to a Department-wide network.

The Office of the CIO is currently identifying network convergence issues between the DOECN and DOEnet networks. Additionally, actions are being taken to pilot IP Video over the Corporate network. Upon completion of these initiatives, recommendations will be forwarded regarding convergence actions.

Recommendation 6. Develop specific, focused performance measures governing the development and implementation of an enterprise-wide telecommunications architecture.

The Office of the CIO will develop performance measures governing the development and implementation of an enterprise-wide telecommunications architecture.

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