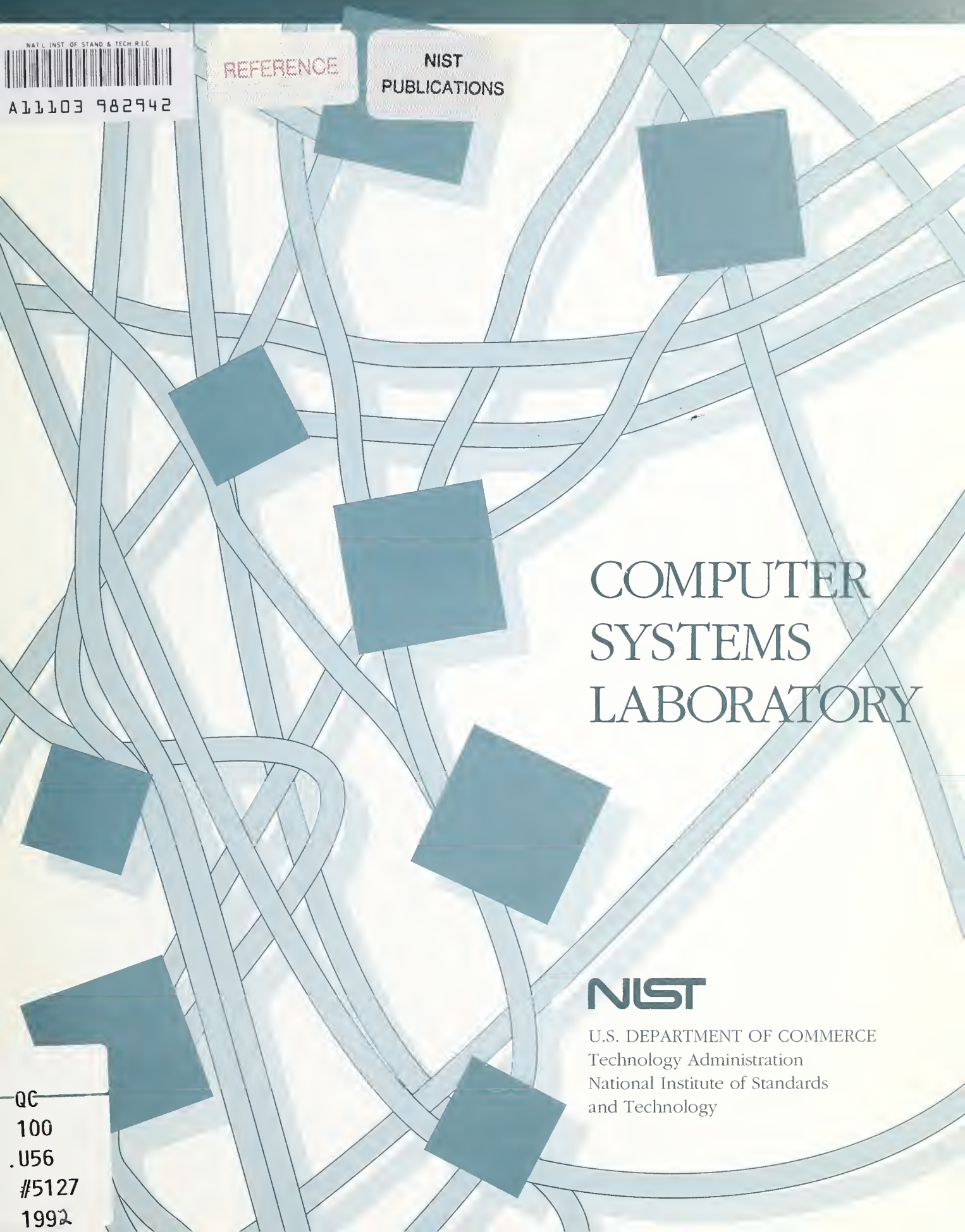
ANNUAL REPORT 1992

NISTIR 5127



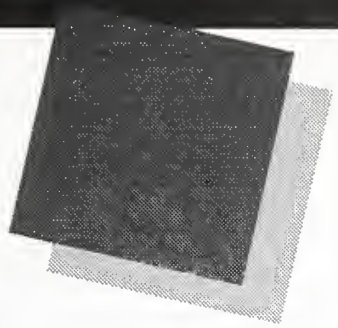
COMPUTER SYSTEMS LABORATORY

NIST

U.S. DEPARTMENT OF COMMERCE
Technology Administration
National Institute of Standards
and Technology

ANNUAL REPORT 1992

NISTIR 5127



COMPUTER SYSTEMS LABORATORY

February 1993

U.S. DEPARTMENT OF COMMERCE
Ronald H. Brown, Secretary

National Institute of Standards
and Technology
Raymond G. Kammer, Acting Director

Computer Systems Laboratory
James H. Burrows, Director

DIRECTOR'S FOREWORD

Computing and standards are woven into the structure of our modern society and economy. Two national studies done in 1992, one by the National Research Council (NRC) on computing as a discipline, and one by the Office of Technology Assessment (OTA) on the development of international standards, point up the importance of both computing and standards to our future economic well-being.

Organizations of all sizes depend upon computers to keep records, simulate complex situations, design products, control equipment, and solve computational problems. *Computing the Future*, the NRC study, cites the exceptional progress that has been made in achieving small, fast, light, and inexpensive components and in advancing computing power and use. Continued progress in computing will depend on addressing structural and funding issues, as well as sustained work in multiple processors, data communications and networking, computer security, software engineering, information storage and management, computer reliability, and user interfaces.

According to the OTA study, *Global Standards, Building Blocks for the Future*, standards affect our lives in many ways, but the process for setting standards may not work as well as it should. The U.S. has a big stake in the effectiveness of the standards process as more and more industries become dependent on trade, and as organizations become more dependent upon technology. OTA says that there is a clear need to pay greater attention to standards in an information-based global economy.

CSL Activities in 1992

The Computer Systems Laboratory (CSL) at the National Institute of Standards and Technology works at the intersection of computing and standards. We are responsible for developing standards, guidelines, and test methods, and for providing research and technical assistance on computer and related telecommunications systems.

CSL is an active participant in the development of national and international standards, and collaborates with the industry consortia that have formed to promote open systems. CSL encourages the development of off-the-shelf products and services that will serve the needs of users everywhere, not just those in the federal government. This report details selected standards, technical assistance, and research efforts, many of which were carried out in conjunction with industry, users, and other governments.

We were pleased to have contributed to TRIP '92 (Transcontinental Integrated Services Digital Network [ISDN] Project) which marked the start of standard ISDN services across the country. First developed about ten years ago but not widely implemented, ISDN integrates voice, data, and image transmissions over a single user connection using the existing telecommunications infrastructure.

TRIP '92 successfully demonstrated the implementation of national and international standards for ISDN in accordance with specifications developed by Bellcore. Co-sponsors were the Corporation for Open Systems and the North American ISDN Users Forum (NIUF), a consortium that CSL organized under a Cooperative Research and Development Agreement with exchange carriers, interexchange carriers, customer premises equipment suppliers, and users. Nationwide open houses showed ISDN applications, including video conferencing, desktop conferencing, and file and screen sharing, to industry and government organizations.

During the past year, we established a Memorandum of Understanding with the Communications Security Establishment of Canada to cooperate in future projects for computer security systems evaluation, standards development, and validation activities. I believe that both the U.S. and Canadian governments will benefit from the joint development of technical solutions to common information security problems.

Progress was made in the implementation and integration of standards that support the Computer-aided Acquisition and Logistic Support (CALS) project of the Department of Defense (DoD). Applications that meet CALS requirements are becoming commercially available. The CALS project is concerned with the generation, access, management, maintenance, distribution, and use of technical data used for the design, manufacture, and support of complex weapons systems.

The Year Ahead

We will continue to support the development of standards and technology to protect information from unauthorized modification, undetected loss, and unauthorized disclosure. Our cooperative project with the National Security Agency (NSA) is expected to result in a new federal standard for specifying computer security requirements in open systems environments. This work, which draws on the current Trusted Computer System Evaluation Criteria (Orange Book) developed by NSA, will make it easier for users to specify the level of security needed to protect data integrity and confidentiality and to assure system availability.

Several planned standards for cryptography are on our agenda: review of Federal Information Processing Standard (FIPS) 46-1, *Data Encryption Standard*, for reaffirmation or modification; completion of standards for secure message digests, for digital signatures, and for the implementation of cryptographic modules in computer systems.

The High Performance Computing and Communications Program being coordinated by the Office of Science and Technology Policy will continue to be a priority. Organized as an interagency activity in cooperation with industry and academia, this program addresses national needs for advanced computers, high-capacity and high-speed networks, and electronic data bases.

We expect to complete the Industry/Government Open Systems Specification (IGOSS) which will consolidate user requirements for computer networking products. IGOSS is being developed in conjunction with the Canadian government, the World Federation of MAP/TOP Groups, and the electric power industry and will enable major user groups with significant purchasing power to speak to the vendors with one voice.

Standards and Users

Standards are essential to the computer industry which is dependent on trade. Standards are equally important to users for reducing risks and adapting to technological change. Personal computers, networks, workstations, software packages, and other changes in computing technology have stimulated user requirements for interoperability (ability for heterogeneous systems to interoperate) and portability (ability to move an application from one system to another). Users would not find PCs useful without standards for input/output, removable storage media, control languages, operating systems, subroutines, utilities, software, and printer interconnections.

But standards are not always available to meet user requirements. Because of the rapid pace of technological change, the standards process has become complex, fragmented, and slow. The technology may have changed before a standard is completed, making it too late for implementation in products.

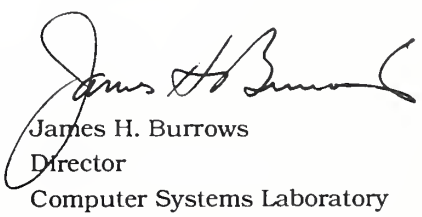
Standards are produced at different levels of abstraction and are difficult for users to integrate into coherent systems. Products implementing abstract standards may be incomplete and require extensive testing to assure interworking with existing products and systems.

Internationally accepted standards are the ultimate goal for both users and vendors. Users must continue to bring their requirements to the attention of vendors and other groups. Users should state their plans for the use of technology and keep informed on the progress of standards development. They should plan for the transition to standards in their systems and adopt policies to buy standards-based products.

Until all of the needed standards are available, users may have to complement the voluntary industry standards with other specifications, market standards, and the work of consortia. Users can develop reference models that establish a context for how different technologies required as part of an open systems environment relate to one another, and profiles that integrate standards and other specifications. Doing this cooperatively with other users can help to form a unified market for standards-based products.

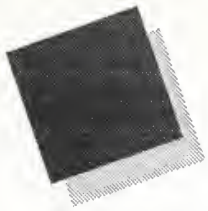
Over the past year, considerable progress has been made in the application of standards and in user awareness of the need for standards to achieve their goals of open computing systems. But there are many challenges ahead to advance the state-of-the-art of computing and to make standards work for the users of computer technology and for the computer industry.

I welcome your comments on our programs and activities which are detailed in this report.



James H. Burrows
Director
Computer Systems Laboratory

CONTENTS



OVERVIEW OF THE COMPUTER SYSTEMS LABORATORY

A major research component of the National Institute of Standards and Technology (NIST), the Computer Systems Laboratory (CSL) supports U.S. industry and government by fostering the development and facilitating the commercialization of advanced computer and telecommunications technologies. The Brooks Act (Public Law 89-306), the Computer Security Act of 1987 (Public Law 100-235), and the Omnibus Trade and Competitiveness Act of 1988 (Public Law 100-418) mandate CSL's programs and research activities.

Support to Government and Industry

In responding to the requirements of government and industry, CSL focuses on the needs of its user constituencies to establish programs and priorities in basic research, the development of standards and test methods, and technical leadership in computer and telecommunications technologies. CSL programs strive to strengthen the competitiveness of U.S. industry in the global marketplace and maintain America's technical leadership in the vital information processing industries. Government and industry alike benefit from CSL programs which advance the development of open systems, enhance the security of automated information resources, and promote the development and use of high-performance computer and communications capabilities.

Meeting the Challenge of Interoperability

Users have a diversity of requirements which no single vendor can supply. Meeting the various needs of industry and government requires an open systems environment in which hardware, software, and telecommunications products interoperate. Through cooperative efforts with industry, users, and voluntary industry standards organizations, CSL supports the development of technology and standards for application portability, interoperability, and computing architectures which support open systems. As the decade advances, more commercial, off-the-shelf products are becoming available to meet user needs to move data, applications, and people skills from one system or environment to another.

Computer Security

As open systems and networks proliferate, users want assurance that valuable information resources are protected from disclosure, destruction, or loss. The Computer Security Act of 1987 strengthened and reaffirmed CSL's role in protecting vital data in federal computer systems and networks. Our computer security program focuses on the development of standards and guidelines to federal agencies and industry, computer security awareness and training activities for users and managers, publications, conferences, and sponsorship of the Federal Computer Security Program Managers Forum and the Computer System Security and Privacy Advisory Board established by the legislation.

Research and Outreach

CSL's laboratory-based research program supports and complements its standards activities and technical assistance to the public and private sectors. Research endeavors, often in collaboration with industry or in support of other federal agencies, include diverse computer and communications areas such as data management, software engineering, information security, network architectures, and advanced systems such as Integrated Services Digital Network (ISDN). The development of test and measurement methods to evaluate conformance of products to standards remains a significant part of our research program. Six patent applications, currently pending, resulted from CSL research this year. Transferring technology to government and industry completes the research cycle.

Cooperative Ventures

Each year many organizations ask for CSL's advice and assistance in providing technical solutions to complex computer and telecommunications problems. In 1992, we collaborated with 44 government, industry, and academic institutions in formal cooperative research projects. Our ongoing workshop efforts continued, including the Open System Environment (OSE) Implementors' Workshop (OIW), the Applications Portability Profile (APP)/OSE Users' Forum, and the North American ISDN Users' Forum. Many other informal interactions with government and industry partners involved the sharing of equipment or expertise. These cooperative arrangements benefit all parties involved and significantly speed the commercialization of new products and emerging technologies.

Organizational Resources

CSL is organized into five technical divisions: Information Systems Engineering Division, Systems and Software Technology Division, Computer Security Division, Systems and Network Architecture Division, and Advanced Systems Division. Our professional staff consists of computer scientists, computer specialists, electrical and electronics engineers, and mathematicians. Staffing resources in FY 1992 included 241 full-time-equivalent employees of which 75% were professional and technical staff and 25% were administrative support personnel. In addition to CSL staff, about 31 research associates, guest scientists, and faculty appointments enhanced our research program.

Funding for CSL programs in FY 1992 consisted of $12.4 million from the NIST Congressional appropriation (STRS), including $.7 million in NIST-supported competency funding and $18.2 million in reimbursable funds, mostly for direct technical assistance from other federal agencies. About 37 organizations in government and industry received reimbursable technical support from CSL in FY 1992. The Department of Defense, the General Services Administration, and the Department of the Treasury are representative of federal agencies that utilized our resources to solve technical problems.

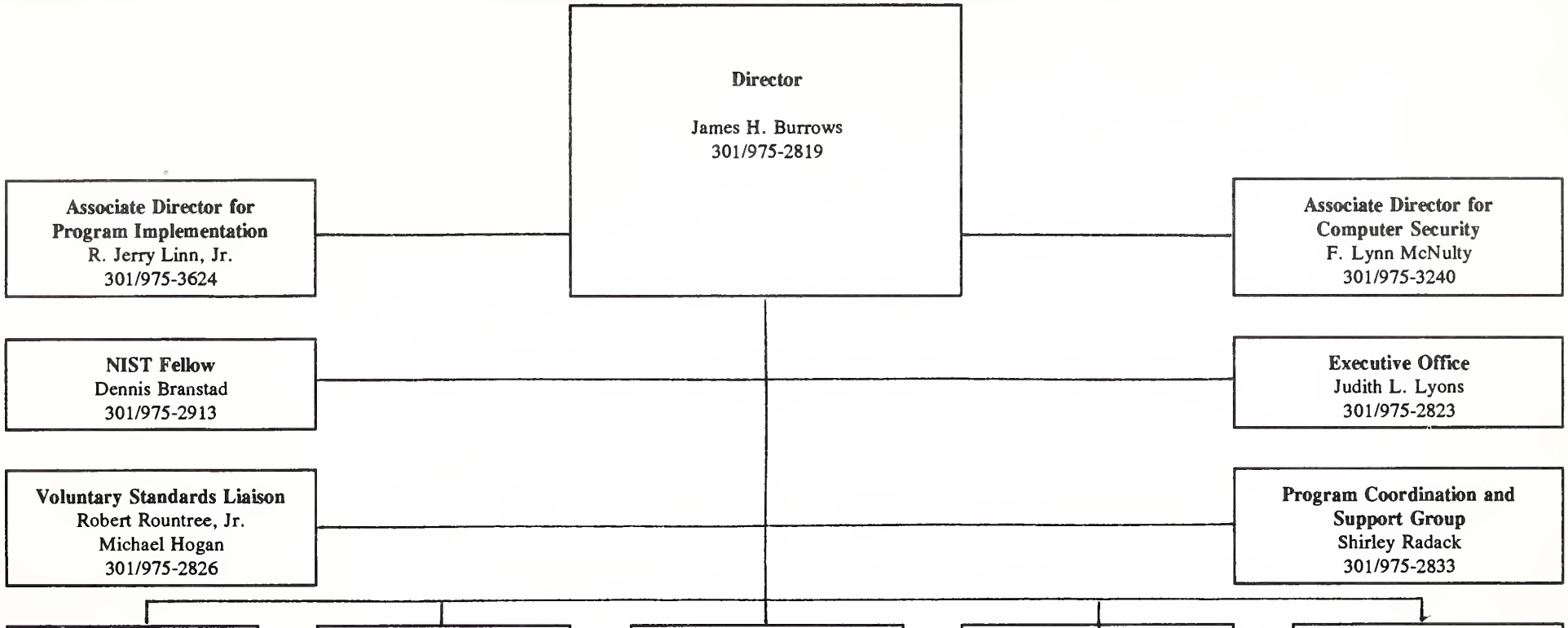
Sharing Information and Technology

A primary goal of our organization is the sharing of information and technology with government, business, academia, and the public. CSL publishes a variety of documents including Federal Information Processing Standards (FIPS) and guidelines; special publications series focusing on computer systems, computer security, and ISDN; technical interagency reports on research and tests; a quarterly CSL newsletter; and a CSL bulletin series published about eight times a year on topics of interest to the information systems community. See the Technology Transfer section for a list of FIPS and other publications currently available for sale through the Government Printing Office (GPO) or the National Technical Information Service (NTIS). A variety of conferences and workshops are sponsored and hosted by CSL throughout the year, and our staff members address many federal and private organizations each year.

CSL maintains four electronic bulletin boards to share information with computer users with dial-up capability. Bulletin boards offer information on computer security, data management, Open System Interconnection (OSI) activities, and Integrated Services Digital Network (ISDN). Instructions for accessing bulletin boards appear in Technology Transfer.

Technical highlights of our five divisions follow.

COMPUTER SYSTEMS LABORATORY



- Data Management Technology
- Computer Graphics
- Knowledge-Based Systems
- Software Standards Validation

- Open Systems Environment
- Software Quality and Assurance
- Office Systems Engineering
- Integrated Software Engineering Environments

- Security Management
- Security Technology
- Network Security Architectures
- Evaluation and Validation Techniques

- Automated Protocol Methods
- Network Applications
- Network Management
- Network Protocols
- Network Architecture

- Image Recognition
- Speech Recognition
- Parallel Processing
- Advanced Communications
- Computer Storage Media
- Distributed Systems

INFORMATION SYSTEMS ENGINEERING DIVISION

The Information Systems Engineering Division develops standards and provides technical assistance to government and industry in data administration, data management technology, computer graphics, and software standards validation.

Data Administration

CSL expanded its support to the voluntary standards efforts concerning the Information Resource Dictionary System (IRDS), both at the American National Standards Institute (ANSI) level and at the International Organization for Standardization (ISO) level. The development of the final two modules for the ANSI IRDS was completed this past year, and work is underway on the development of the next generation of the standard, known as IRDS2.

CSL assumed several leadership roles in the development of the new standard, including chairmanship of an IRDS technical subcommittee, editorship of the IRDS2 requirements document, and U.S. International Representative to the ISO IRDS committee. Development efforts on IRDS2 focus on utilizing the IRDS as a mechanism to integrate the results produced through the use of Computer-Aided Software Engineering (CASE) tools throughout an application system's life cycle. CSL is concentrating its efforts in coordinating ANSI and ISO IRDS2 development work so that the final standards specifications are in agreement.

Also initiated was the development of two new Federal Information Processing Standards (FIPS) for activity and data modeling. The FIPS are being developed in conjunction with user groups for the software modeling methodologies.

CSL maintained working agreements with the Department of Education, the Environmental Protection Agency, the Internal Revenue Service, and the Department of Defense (DoD) in areas such as tool integration, establishment of data administration policy for an organization, and integration of modeling methodologies. In all of these interactions, CSL seeks to ensure that organizations take maximum advantage of standards that facilitate open systems environments.

In recognition of significant contributions in data administration, NIST received the first Data Administration Management Association's (DAMA) Company Achievement Award at the annual DAMA Symposium which CSL cosponsors. This year's theme, Data Administration - A Value-Added Service, emphasized the ideas and technologies that deliver clearly visible value to the customers of data administration.

Data Management Technology

Division researchers participated in the development, coordination, and approval of a major extension to national and international standards for Database Language SQL. The extended standard, known as SQL 1992, revises and replaces the two existing 1989 specifications that were adopted as FIPS 127-1, Database Language SQL. Major additions include schema manipulation, which allows a schema definition to be changed; dynamic SQL, which provides facilities for dynamic construction and execution of SQL statements; diagnostics management, which communicates constraint violations and warnings to applications; connection management, which establishes and manages SQL connections; and session management, which sets the attributes of an SQL session. FIPS 127-1 is being revised to incorporate SQL 1992.

In an ongoing effort to help users and vendors determine compliance with FIPS 127-1, Database Language SQL, Version 3.0 of the NIST SQL Test Suite was released in January 1992, and has been used in SQL validations since July 1992. Version 3.0 provides 11 test suite types (interfaces) including embedded and module Language tests for Ada, C, COBOL, FORTRAN, and Pascal plus Interactive SQL tests. Twenty-six SQL Test Suite licenses were added this fiscal year. Since the NIST SQL Test Suite was released, over 120 SQL Test Suite licenses have been purchased for all versions of the test suite. Thirty-two database language processors were validated for conformance to FIPS 127-1 compared to 25 the previous year.

Under an interagency agreement, CSL continued its assistance to the DoD Computer-aided Acquisition and Logistic Support (CALS) project in the application of SQL and other data management standards to CALS requirements. NISTIR 4780, *Guide for Specifying and Building CITIS with Data Management Standards*, and NISTIR 4902, *Database Language SQL: Integrator of CALS Data Repositories*, resulted from these efforts. CSL also provided support to the Defense Advanced Research Projects Agency (DARPA) for object database technology.

A research project in hypertext/hypermedia completed its fourth year in collaboration with the Systems and Software Technology Division. The laboratory-based research is carried out in the Multimedia Systems and Database Laboratories. Through talks, workshops, and publications, project members shared knowledge and experience in the integration of hypertext technology with expert systems, database, graphics, and publishing.

Computer Graphics

Developed in cooperation with industry and other federal agencies, especially the Department of the Interior, FIPS 173, Spatial Data Transfer Standard (SDTS), was approved for use by federal agencies. The standard provides specifications for the organization and structure of digital spatial data transfer, definition of spatial features and attributes, and data transfer encoding. FIPS 173 will facilitate the transfer of digital spatial data between dissimilar computer systems.

Also approved was FIPS 177, Initial Graphics Exchange Specification (IGES). The new standard will enable federal agencies to use more effective and productive computer-aided design and computer-aided manufacturing (CAD/CAM) techniques.

Activities in support of conformance testing for graphics standards included:

CSL conducted seven validations and issued seven certificates of conformance for FIPS 120-1, Graphical Kernel System (GKS), to assist federal agencies in acquiring GKS software that conforms to the standard.

Version 2 of the Programmer's Hierarchical Interactive Graphics System (PHIGS) Validation Test Suite was completed in 1992. NISTIR 4953, *User's Guide for PHIGS Validation Tests (Version 2)*, describes the conformance testing process in detail. A PHIGS Testing Service began October 1, 1992.

A Computer Graphics Metafile (CGM) Testing Service to determine conformance to FIPS 128, CGM, and the CALS Application Profile (MIL-D-28003) was established. CGM Generator Conformance Tests were developed and beta tested. A CGM Generator Testing Service started on November 1, 1992.

As the Registration Authority for ISO Registration of Graphical Items, CSL developed the ISO Register which currently has 16 Linetypes, 19 Hatchstyles, 25 Escapes, 26 Marker Types, and 4 Generalized Drawing Primitives. To date 14 copies of the ISO Register have been licensed.

Software Standards Validation

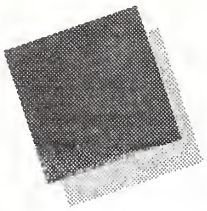
Testing programming language compilers for conformance to FIPS continued to be an important service provided by CSL. In addition to existing validation services for programming languages COBOL (FIPS 21-3), FORTRAN (FIPS 69-1), Pascal (FIPS 109), MUMPS (FIPS 125), and Ada (FIPS 119), CSL established a new validation service for the programming language C (FIPS 160). A new publication, NIST Special Publication 500-203, *Conformance Test Specifications for COBOL Intrinsic Function Module*, describes conformance testing for FIPS 21-3, Programming Language COBOL.

FIPS 172, VHSIC Hardware Description Language (VHDL), was approved in 1992 for federal agency use. The new standard promotes the portability of VHDL programs for use on a variety of data processing systems.

During FY 1992, programming and database validation services were provided to 45 private-sector companies and one government agency for a total of 126 validations. The total number of programming and database language processors currently validated as of September 30, 1992, is 397.

CSL expanded its quarterly *Validated Products List*, a collection of registers listing implementations that have been validated for conformance to FIPS. In addition to listing the validated programming language processors for COBOL, FORTRAN, Ada, Pascal, C, MUMPS, and database language SQL, the publication includes lists of validated products for Graphical Kernel System (GKS), Computer Graphics Metafile (CGM), Portable Operating System Interface for Computer Environments (POSIX), Government Open Systems Interconnection Profile (GOSIP), and Computer Security. The publication is now sold through the National Technical Information Service on a single-issue or subscription basis.

To facilitate the worldwide conformance testing effort, CSL sponsored a 6th International Workshop on Harmonizing Conformance Testing of Computer Language Standards. Experts from the United Kingdom, France, Italy, Germany, Japan, and the United States participated in the workshop. The attendees researched common areas of agreement among testing laboratories and certification authorities for harmonizing validation testing activities.



SYSTEMS AND SOFTWARE TECHNOLOGY DIVISION

This division develops standards and provides assistance in software engineering, office systems engineering, and distributed systems engineering to federal agencies and industry organizations. Technical activities during 1992 included the following:

Application Portability Profile (APP)/Open Systems Environment (OSE)

CSL initiated a revision, to be published in 1993, of NIST Special Publication 500-187, *Application Portability Profile (APP) The U.S. Government's Open System Environment Profile OSE/1 Version 1.0.* Known as the APP Guide, the document defines an open systems environment (OSE) framework by describing the information technology (IT) services, protocols, interfaces, and data formats needed by the U.S. government to support a broad range of federal applications. For each of seven service areas included in the APP, the guide recommends standards and other specifications for federal agencies to use in developing and acquiring computer systems. The APP Guide also impacted many industry organizations who adopted the recommended specifications in their internal environments to provide better management and control of IT resources.

The APP Guide enables organizations to organize and describe standards and information technology specifications needed for portability of applications software and for development of open systems. The Application Portability Profile/Open Systems Environment (APP/OSE) User's Forum met twice this year to provide a sounding board for users, vendors, and implementors on APP/OSE issues. These forums promote interchange on OSE developments in the federal government and provide guidance to federal agencies.

The NIST POSIX Testing Program

The NIST POSIX Testing Program, initiated in 1991, continued to evaluate products for conformance to FIPS 151-1, Portable Operating System for Computing Environments (POSIX). POSIX facilitates the portability of application software at the source-code level between dissimilar computer systems. Under the testing program, products are tested by one of eight laboratories accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) using the NIST POSIX Conformance Test Suite for FIPS 151-1. CSL reviews test results and issues Certificates of Validation.

Over 80 products have been issued a Certificate of Validation since the program's inception. These products are listed in CSL's quarterly *Validated Products List* and are also available on an electronic mail file server system. If the e-mail message send register is sent to posix@nist.gov, a current register of accredited testing laboratories and validated NIST POSIX products will be returned via e-mail to the sending e-mail address.

A revision to FIPS 151-1 was proposed. The revision updates the POSIX standard by adopting international voluntary industry specifications. When the new POSIX standard is approved, a testing program similar to the one for FIPS 151-1 will be established for the new FIPS.

High Integrity Software

CSL continued its ongoing effort to address the issues in producing software for use in high integrity systems, those systems that must be trusted to work dependably in some critical function. To increase public awareness and share potential solutions, CSL sponsored six lectures in the second year of its Lectures Series on High Integrity Systems. Guest lecturers provided insights on software engineering practices for high integrity software, software error prediction, the industrialization of formal methods, the transfer of software engineering technology, and the management of risk in developing and assuring high integrity software. The lecture series targeted federal and industry managers, technical staff, and users.

Under an interagency agreement with the Nuclear Regulatory Commission, CSL conducted a study of several standards, draft standards, and guidelines addressing high integrity software. The study produced a template of criteria of subjects (e.g., life cycle issues, software engineering practices, required software functionality, software assurance activities, procurement, presentation) for comparing and contrasting the documents. The study concluded that no single document met all the criteria but that a reasonable framework could be developed from these documents. NIST Special Publication (SP) 500-204, *High Integrity Software Standards and Guidelines*, presents the results of the study; a related report, NISTIR 4909, *Software Quality Assurance: Documentation and Reviews*, examines a software quality assurance standard written specifically for the nuclear industry.

CSL cosponsored the Seventh Annual Conference on Computer Assurance, COMPASS '92, an annual event providing a forum for issues of software safety, process integrity, and computer security.

Integrated Software Engineering Environments (ISEE)

CSL continued its series of ISEE workshops to develop a reference model and tool interface specifications for fully integrated software engineering environments which support software products and processes throughout the software life cycle. The workshop works closely with other programs in software engineering environments including those of the European Computer Manufacturers Association (ECMA), the Defense Information Systems Agency (DISA), the Navy's Next Generation Computer Resources (NGCR), the Defense Advanced Research Project Agency (DARPA), the Ada Joint Program Office (AJPO), the International Workshop on Computer-Aided Software Engineering (IWCASE), the National Aeronautics and Space Administration (NASA), the Software Engineering Institute (SEI), the Institute of Electrical and Electronics Engineers (IEEE), and industry efforts. CSL and ECMA published a joint NIST SP 500-201, *Reference Model for Frameworks of Software Engineering Environments Technical Report.* CSL will continue the harmonization of joint efforts with ECMA and NGCR to develop a standard ISEE for open systems environments.

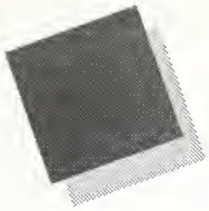
Building upon its proposal to use the ECMA PCTE (Portable Common Tool Environment) specification as the basis for development of tool interface specifications in software engineering environments, CSL collaborated with the Office of the Director of Defense Information (DDI), Department of Defense (DoD), and the Object Management Group (OMG) to establish the North American PCTE Initiative (NAPI). This initiative will develop recommendations for extending the tool interface specifications, produce a publicly available reference implementation of PCTE, establish a PCTE validation capability, and support the acquisition of PCTE implementations and PCTE-based products. In addition, CSL is establishing a federated software engineering environment laboratory (SEEL) for laboratory-based investigation of PCTE and its SEE interface specifications to support the NAPI effort.

Multimedia Systems

In the Multimedia Systems Laboratory, researchers focused on the interrelation of document standards and their benefits to users.

In support of the Department of Defense Computer-aided Acquisition and Logistic Support (CALS) program, CSL published two new documents: NISTIR 4800, *An Overview of the Document Style Semantics and Specification Language and the MIL-M-28001A Output Specification*, provides an overview of the functional similarities between the Document Style Semantics and Specification Language (DSSSL) and the Output Specification (OS) of MIL-M-28001A; NISTIR 4830, *Next Generation Documents*, summarizes the findings of a CSL-sponsored workshop on these documents and relevant standards.

In collaboration with the Information Systems Engineering Division, research continued on a joint project on hypertext and hypermedia technologies. As part of that effort, the Hypermedia Lecture Series featured five lectures on topics such as the flexible access to multimedia information, models for hypertext, the Chemistry Online Retrieval Experiment (CORE) project at Cornell University, open hyperdocument systems, and performance-based evaluation methods for hypertext. Hypermedia technologies permit the integration of searching, linking, and multimedia presentations using optical storage and networked systems.



COMPUTER SECURITY DIVISION

The Computer Security Division provides guidance and technical assistance to government and industry in the protection of unclassified automated information resources. The Computer Security Act of 1987 strengthened and reaffirmed CSL's mandate to assist federal agencies in the protection of computer systems and networks.

Cryptographic Standards

In April 1992, the Secretary of Commerce approved Federal Information Processing Standard (FIPS) 171, Key Management Using ANSI X9.17, for federal agency use. ANSI X9.17 is a voluntary industry computer security standard that defines procedures for the manual and automated management of the data (e.g., keys and initialization vectors) necessary to establish and maintain cryptographic keying relationships. This data is known as keying material. ANSI X9.17 uses the Data Encryption Standard (DES) to implement key management practices in a variety of operational environments and contains a number of options. FIPS 171 specifies a particular set of these options for the automated distribution of keying material by the federal government using the protocols of ANSI X9.17.

CSL started its third review of the Data Encryption Standard (DES) to determine its adequacy in protecting federal data in the 1990s. FIPS 46-1, DES, was approved for federal agency use in 1977 and was reaffirmed after reviews in 1983 and 1987. The DES specifies a publicly known encryption algorithm which is used with a secret key to provide secure communications.

Assistance to Federal Agencies

In collaboration with the Office of Management and Budget (OMB) and the National Security Agency (NSA), CSL visited 28 federal agencies to increase security awareness among senior managers. These visits showed that agencies are hiring professional staff to address computer security; agencies have implemented numerous management controls to protect automated information; agencies are focusing on contingency and disaster recovery planning; and agencies are conducting periodic security awareness training as mandated by the Computer Security Act. CSL will assist OMB in follow-up visits and provide technical assistance to agencies that have reported computer security as a high-risk area.

CSL maintained working agreements with the Environmental Protection Agency, the Farmers Home Administration, the Nuclear Regulatory Commission, and the National Oceanic and Atmospheric Administration in the areas of policy development and security management and administration.

CSL hosted two workshops and conducted a study to identify what federal agencies need to meet requirements in a wide variety of security and data processing environments. NISTIR 4976, *Assessing Federal and Commercial Information Security Needs*, presents the results of the study. A second study is in process that will help CSL determine the areas in which federal agencies need additional NIST guidance and standards.

CSL is developing a handbook to assist individuals in protecting their information technology (IT) resources. The handbook will introduce users to the field of IT security, highlighting security controls along with cost considerations and interdependencies.

Work continued on the federal criteria project, a joint effort of CSL and NSA to develop new criteria for trusted systems with capabilities for evaluating security controls, controlling access to services and data, and assuring the availability of data, systems, applications, and services. A draft FIPS is planned for 1993, to be followed by a workshop to consider comments received on the draft.

Computer Viruses

CSL continued to conduct research in several facets of the computer virus problem, including virus signatures and the precise identification of viruses. Precise identification is designed to enable effective cataloging and naming of viruses. NIST Special Publication 800-5, *A Guide to the Selection of Anti-Virus Tools and Techniques*, assists federal agencies in the procurement of appropriate anti-virus tools. A second document, NISTIR 4939, *Threat Assessment of Malicious Code and External Attacks*, provides an assessment of these threats on computer systems using commercially available hardware and software.

Network Security

Testing and demonstrating network security protocols continued in CSL's Open Systems Interconnection (OSI) Security Laboratory. In collaboration with NSA, CSL researchers focused on the Secure Data Network System (SDNS) Security Protocol at Layer 4, the transport layer of the OSI reference model. NISTIR 4792, *A Formal Description of the SDNS Security Protocol at Layer 4 (SP4)*, resulted from this research. A second report, NISTIR 4934, *Protocol Implementation Conformance Statement (PICS) Proforma for the SDNS Security Protocol at Layer 4 (SP4)*, identifies the capabilities and options of the protocol that have been implemented.

Also published was NISTIR 4734, *Foundations of a Security Policy for Use of the National Research and Educational Network*, which explores requirements for a national network security policy and proposes a draft policy for the National Research and Education Network (NREN). This network will link thousands of federal and industry research organizations and academic institutions nationwide.

A FIPS was developed and proposed for Standard Security Label for the Government Open Systems Interconnection Profile (GOSIP). Standard security labels will enable organizations to make access control decisions, to specify protection measures, and to carry out a communications security policy.

Sponsored by the Defense Advanced Research Projects Agency (DARPA), CSL developed an Advanced Smartcard Access Control System (ASACS). Easily carried in a wallet or purse, the smartcard provides users with a secure means for user authentication and for generating and verifying digital signatures. Digital signature technology is a crucial element in the processing of electronic documents, as a replacement for the handwritten signature.

Vulnerability Testing

CSL is interested in enhancing the security of today's systems, as well as improving the security controls of tomorrow. Current security problems often result from misuse rather than weakness of controls. Research in this area resulted in NIST Special Publication 800-6, *Automated Tools for Testing Computer System Vulnerability*. This publication will help system administrators detect vulnerabilities before security is breached.

Computer Security in Federal Procurements

In order to meet federal policies and regulations, federal agencies must include computer security considerations in all phases of information resources management. CSL published NIST Special Publication 800-4, *Computer Security Requirements in Federal Procurements*, to help agencies include computer security in the acquisition phase of systems development. In general, this process results in less expensive and better security than adding security to operational systems. A related document, NISTIR 4749, *Sample Statements of Work for Federal Computer Security Services: For Use In-House or Contracting Out*, assists federal agencies and government contractors in the acquisition of computer security services.

Cooperative Interactions

In March 1992, CSL and the Canadian Communications Security Establishment established an Memorandum of Understanding (MOU) to pursue technical cooperation in Information Security (INFOSEC). The MOU provides a framework for the two governments to facilitate the coordination and development of INFOSEC standards and criteria for the protection of sensitive unclassified data.

CSL continued its support of the Forum of Incident Response and Security Teams (FIRST) by serving as the secretariat of FIRST and chairing the FIRST Steering Committee. This collaboration of government and private-sector organizations sharing security incident-related information continues to grow both nationally and internationally.

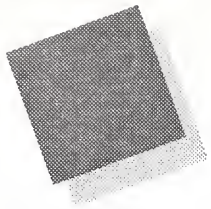
The Computer System Security and Privacy Advisory Board, established by the Computer Security Act of 1987, met four times in 1992 to discuss significant emerging computer security issues. CSL also hosted six meetings of the Federal Computer Security Program Managers Forum to share experiences and information on mutual problems and possible solutions, and sponsored the annual meeting of the Federal Information Systems Security Educators' Association (FISSEA).

Information Exchange

Sharing information with government, industry, and the public remained a high priority. CSL and NSA cosponsored the 15th National Computer Security Conference, in Baltimore, Maryland in October 1992, for about 1,800 participants from government, industry, and foreign countries. The national conference encourages the international exchange of ideas and information concerning information technology security and related standards, criteria, and testing issues. This year's conference theme was Information Systems Security: Building Blocks to the Future.

CSL enhanced its Computer Security Bulletin Board System (BBS) to facilitate dissemination of information on IT security issues, ranging from timely security alerts to CSL security publications. NISTIR 4933, *Computer Security Bulletin Board System User's Guide*, gives complete information on accessing and using this valuable resource, via a modem or the Internet. In addition, CSL participates in the Network Security Information Exchange (NSIE), which facilitates the exchange of security information on the public switched communications networks.

NISTIR 4846, *Computer Security Training and Awareness Course Compendium*, was issued to assist federal agencies in locating computer security training resources nationwide.



SYSTEMS AND NETWORK ARCHITECTURE DIVISION

Programs in the Systems and Network Architecture Division address the development and standardization of Open Systems Interconnection (OSI), the development and application of automated protocol methods, and the advancement of technology for integrated, interoperable network management. OSI networks permit equipment and systems from different manufacturers to interoperate.

Open Systems Specifications

CSL has been working with the Canadian government, the World Federation of MAP/TOP Groups, and the electric power industry to develop a common specification for computer networking products that conform to OSI international standards. The resulting Industry/Government Open Systems Specification (IGOSS) is expected to become a single North American OSI specification.

By consolidating the requirements of a large segment of the user community, the IGOSS will enable the major user groups to speak to the vendors with one voice and represents significant purchasing power for OSI systems. Future versions of Federal Information Processing Standard (FIPS) 146-1, Government Open Systems Interconnection Profile (GOSIP), will point to the IGOSS and will specify special federal government requirements and protocol specifications that have not been agreed to by the other IGOSS organizations.

Work continued to develop implementation agreements for OSI standards. Cosponsored by CSL and the IEEE Computer Society, the Open Systems Environment (OSE) Implementors' Workshop (OIW) met four times in 1992. Attendance at the workshop continued at nearly 300 participants per meeting. Formerly called the OSI Implementors' Workshop, the OIW expanded its charter in June 1992 to include OSE-related topics and changed its name to reflect its new focus. One work item introduced as a result of the expanded charter was the development of Application Programming Interfaces (APIs) which provide a portable interface to OSI networking services. NIST Special Publication 500-202, *Stable Implementation Agreements for Open Systems Interconnection Protocols, Version 5, Edition 1, December 1991*, records stable implementation agreements of OSI protocols developed by organizations that participate in the OIW. Harmonization of OIW activities with those of other regional workshops continued.

Evaluation Guidelines

CSL developed a series of evaluation guidelines for OSI applications to assist users and acquisition authorities in determining the degree to which implementations of those applications meet their specific performance and functional requirements. Evaluation guidelines for the Message Handling Systems (MHS) and the File Transfer, Access and Management (FTAM) applications were issued previously; in 1992, CSL issued NIST Special Publication 500-205, *Guidelines for the Evaluation of Virtual Terminal Implementations.*

GOSIP Testing Program

To assist federal agencies in procuring products specified by FIPS 146-1, GOSIP, CSL developed a comprehensive test policy and procedures for testing OSI products. The program provides for demonstration of technical credibility, acceptability to both vendors and users, assurance of interoperability, and provides a basis for international recognition of national testing.

Under the testing program, CSL established public registers for:

GOSIP Abstract Test Suites (ATSs)
Interoperability Test Suites
Assessed Means of Testing (MOTs)
Accredited Test Labs
GOSIP Reference Implementations
Conformance Tested GOSIP Products
Approved Accredited Lab for MOT Qualification
Interoperability Testing Services

ATSs for those protocols for which conformance testing is mandatory, approximately 30 MOTs, and about 70 OSI registered products (including Derived Products) are on the respective registers. CSL implemented a quality improvement system covering five areas of its GOSIP Testing Program: ATSs, MOTs, Labs, Test Reports, and the vendor Development Process. The GOSIP Testing Program is carried out in cooperation with the OIW, the European Community, and several accreditation bodies in Europe.

OSI Security Protocols

CSL lead the effort in standardizing OSI lower layer security. The Transport Layer Security Protocol (TLSP), for which CSL is the international editor, became an international standard at the International Organization for Standardization (ISO) meeting in July 1992. The Network Layer Security Protocol (NLSP) was elevated to Draft International Status largely through the effort of CSL. Both standards are being introduced into the OIW and will have stable implementation agreements next year. CSL, in cooperation with NSA, is in the process of describing NLSP in a communications protocol specification language called Estelle. In OSI upper layer security, CSL persuaded the international standards community to begin work on a key management standard. CSL believes that this area needs immediate standardization by ISO and offered to be the editor for this new item.

Cooperative Laboratory for OSI Routing Technology

FIPS 146-1, GOSIP, provides the blueprint for federal procurements of multivendor, interoperable computer networking products. Supported by the Department of Energy and the National Science Foundation, CSL developed the Cooperative Laboratory for OSI Routing Technology to establish a collaborative research program with industry, government, and academia. The laboratory provides an open testbed facility for OSI routing products, fosters mature, commercially available OSI routing products, and develops methodologies and prototype tools to support conformance testing, interoperability testing, and product evaluation of OSI routing technology.

CSL conducted its second open laboratory in 1992 for interoperability testing among implementations of the OSI Intermediate System to Intermediate System (IS-IS) Intra-domain Routing Exchange Protocol. Implementations from nine vendors were tested for interoperability in a live OSI environment. As part of this effort, CSL is developing conformance testing methodologies and prototype systems for multi-party protocols such as IS-IS. At the February open laboratory, staff demonstrated a prototype Multi-party Conformance Test System for the IS-IS protocol (IS-IS MPCTS) which was exercised against vendor implementations using a sample test suite. The IS-IS test suite has since been expanded to 100 tests which have been successfully run against three vendor implementations.

Electronic Data Interchange

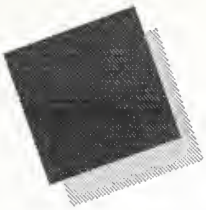
CSL assisted federal agencies in the use of Electronic Data Interchange (EDI) and the integration of EDI into open systems. Researchers developed software design documents for a set of EDI tools to assist users in prototyping, testing, and using EDI applications based on standard or non-standard transaction sets. Also designed was a system to transmit EDI transactions over X.400-based electronic mail systems, FTAM-based file transfer systems, and Value-Added Networks. Implementations based on these designs are in process. The Department of Defense, the Internal Revenue Service, and the General Services Administration sponsored these projects.

In order to provide leadership to the standardization of an X.400-based electronic mail application program interface (API), CSL chairs the IEEE X.400 API working group. The draft X.400 API standard is in the final phase of balloting and a complete IEEE standard is expected in early 1993.

Network Management

In December 1992, the Secretary of Commerce approved FIPS 179, Government Network Management Profile (GNMP), for federal agency use. The GNMP specifies the common management information exchange protocol and services, specific management functions and services, and the syntax and semantics of the management information required to support monitoring and control of the network and system components and their resources. The GNMP builds on FIPS 146-1, GOSIP, and includes GOSIP Version 2.0 by reference. The GNMP and GOSIP are interrelated and cross-reference each other as required.

CSL continued to work with industry consortia to bring the GNMP into alignment with the Open Management Roadmap, a worldwide coalition of users and industry addressing the complex problem of interoperable management of heterogenous systems and networks. The results of the Roadmap activity are agreed specifications, including the GNMP as an example procurement specification. Besides the role of catalyst, CSL is an active partner in the Roadmap, ensuring that federal requirements for interoperable network management are met.



ADVANCED SYSTEMS DIVISION

The Advanced Systems Division conducts research and provides technical assistance to federal agencies and industry organizations in advanced communications such as Integrated Services Digital Network (ISDN), distributed systems, automated recognition, data storage technologies, and parallel processing.

ISDN

CSL continued its support of the North American ISDN Users' Forum (NIUF) to ensure that emerging ISDN applications meet the needs of users. The management of the forum is governed by a Cooperative Research and Development Agreement (CRDA) with industry which now has 36 signatories. The NIUF met three times in 1992 and cosponsored the Transatlantic ISDN Project 1992 (TRIP '92) event in November which celebrated the beginning of a national ISDN network based on uniform implementation of standards. CSL hosted a week-long open house and demonstrated more than 20 ISDN applications including video/multimedia conferencing, LAN-to-LAN bridging, and Group 4 facsimile. Two new documents launched CSL's publication series focusing on ISDN: Special Publication (SP) 823-1, *Overview of Integrated Services Digital Network Conformance Testing* and SP 823-2, *Integrated Services Digital Network Conformance Testing, Layer 1 " Physical Layer, Part 2 " Basic Rate U Interface, User Side.*

Researchers concentrated on the evaluation and development of protocol standards for broadband ISDN (B-ISDN) and high-speed networking, especially control signalling and traffic management, and the development of implementation agreements, testing, and applications for the narrowband ISDN which is being deployed nationwide.

CSL announced a draft Federal Information Processing Standard (FIPS) for ISDN. The FIPS specifies a set of generic protocols for setting up transparent pipes to provide a minimal set of bearer services, and conformance test specifications for these protocols. It is based on ANSI standards and Implementation Agreements produced by the NIUF.

Development of ISDN conformance tests continued as an important activity of CSL. In 1992, CSL led the development of four more test suites within the NIUF for ISDN Layers 1, 2 and 3 protocols. These and other NIUF test suites will provide the conformance test requirements for the proposed FIPS for ISDN. CSL continues to harmonize test suites internationally as a step towards the goals of widespread availability of portable, multi-vendor equipment and mutual recognition of testing for ISDN.

Distributed Systems

Research in distributed systems focused on the technical preparation for TRIP '92. Participating federal agencies included the Internal Revenue Service (IRS), the General Services Administration, the Department of Veterans Affairs, the Department of Energy, and the Departments of the Army and Navy. Many of CSL's CRDA industry partners also took part, through the loan of equipment and services, in the development and demonstration of ISDN applications. ISDN over satellite to Goonhilly, England, was demonstrated through a cooperative arrangement with COMSAT.

CSL developed an Information Systems and Technology Strategy, coordinating the initiatives of the Corporate Information Management (CIM) Office and the Defense Information Systems Agency (DISA) for the Manpower and Personnel Command of the U.S. Navy. Strategy implementation guidance was issued in communications, application development, physical database access, facilities, procurement, decision support, and business improvement. For the IRS, CSL developed an ISDN tutorial and user's guide, an ISDN prototype of Integrated Examination System, and a tutorial on data compression.

For the Department of Veterans Affairs (DVA), projects included the integration of image technology with the DVA hospital system as well as presentations at medical computing conferences and the MUMPS Users Group. Finally, collaboration with the Defense Logistic Agency focused on multimedia on ISDN and video conferencing with an ISDN profile.

Research in distributed systems focused on the development of ISDN Applications profiles, LAN interconnectivity, video conferencing, screen sharing, and image transfer. Other areas included compression techniques and object-based information systems architectures.

Automated Recognition

In cooperation with the Federal Bureau of Investigation, CSL developed the world's first neural network fingerprint classification system. The system achieves classification accuracy of 95.4 percent with 10 percent rejects and processes a fingerprint in less than three seconds on a massively parallel computer. NISTIR 4880, *Massively Parallel Neural Network Fingerprint Classification System*, describes the system in detail. In order to test this system, researchers produced Special Database 4, containing 2000 matched 500 by 500 pixel gray level fingerprint images; 61 copies of Special Database 4 have been sold to date.

Researchers also developed a massively parallel character recognition system. The system scans a structured form filled in with hand-print, isolates the entry fields on the form, segments and classifies the hand-printed characters, and returns the hand-printed information on the form as ASCII text. The system integrates traditional image processing techniques with neural network classification techniques on a massively parallel computer to achieve end-to-end throughput of 13 seconds per form (4.3 characters per second). The system significantly improves accuracy and speed, effectively replacing key data entry in existing data capture systems.

In May 1992, CSL collaborated with the Census Bureau to conduct the first of a planned series of Optical Character Recognition (OCR) Systems Conferences; NISTIR 4912, *The First Census Optical Character Recognition Systems Conference*, presents details of the conference. Another first was the Text REtrieval Conference (TREC), held in November 1992, which was cosponsored by CSL and the Defense Advanced Research Projects Agency (DARPA). The goal of the conference was to encourage research in information retrieval from large text applications by providing a large test collection, uniform scoring procedures, and a forum for organizations interested in comparing their results. Annual conferences on text retrieval are planned.

Partially sponsored by DARPA, research in speech recognition technology proceeded in collaboration with academia and industry. The use of CD-ROM data storage media in the United States for the exchange of recorded speech databases (corpora) within the speech research community continued to advance. In addition to CD-ROM sets released for DARPA, further releases are planned as reference material for use in speech research. CSL's work on the design and development of test procedures and other materials for the DARPA Spoken Language Systems Program and other Department of Defense speech research programs continued.

Data Storage

CSL chairs the Association for Information and Image Management (AIIM) committee C21, Optical Disk Applications, and actively supports the development of standards for media error monitoring, media interchange, test methods, and life expectancy for optical disk systems. Research in data storage technologies for optical disk resulted in NIST Special Publication 500-200, *Testing Methodology to Predict Life Expectancy Values for Optical Disk Media.* This work has contributed to the draft industry standard on life expectancy of CD (compact disk) media. Optical disk research focused on data integrity studies for optical disk media, including monitoring and reporting techniques for error rate and error distribution in optical disk systems. A test platform is being developed. The National Archives and Records Administration, the Social Security Administration, the Federal Bureau of Investigation, and another federal agency partially funded this work.

Another research area focused on magnetic tape media. NIST Special Publication 500-199, *The 3480 Type Tape Cartridge: Potential Data Storage Risks, and Care and Handling Procedures to Minimize Risks*, summarizes techniques for protecting this media. A new Standard Research Material (SRM) was produced and is described in NIST Special Publication 260-118, *Calibration of NIST Standard Reference Material (SRM) 3202 for 18-Track Parallel and 36-Track Parallel Serpentine 12.65 mm, 1491 cpmm Magnetic Tape Cartridge.* SRM 3202, *Secondary Standard 12.65 mm Magnetic Tape Cartridge*, was made available for sale. The SRM provides the manufacturers of certain magnetic tape cartridge drives and media with a reference for several magnetic properties including output signal amplitude, typical field, overwrite, and resolution.

The use of imaging technology in a Social Security Administration (SSA) local-area network was prototyped to demonstrate the feasibility of imaging of general correspondence. Another SSA prototype is being developed to replace microfilm records of employee earnings with a computer system. This prototype involves research into indexing methodologies and user interface considerations resulted in the development of an algorithm for approximate match database searching.

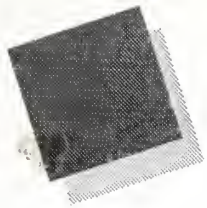
CSL hosted a March 1992 workshop on the Electronic Exchange of Fingerprint Images. A major revision of ANSI/NIST/ICST 1-1986, *Data Format for the Interchange of Fingerprint Information*, is in process. The revised standard will be the basis for the exchange of fingerprints between law enforcement agencies throughout the country. Funded by the Federal Bureau of Investigation, research included image data compression and image quality.

Parallel Processing

In 1992, researchers pursued two areas in performance measurement, the first on low-perturbation data capture hardware for parallel systems, the second simplified software approaches to performance improvement. Under DARPA sponsorship, the MultiKron Very Large Scale Integration (VLSI) instrumentation chip was successfully fabricated and the technology transferred to Intel Corporation for their Paragon supercomputer parallel system. NISTIR 4737, *Operating Principles of MultiKron Performance Instrumentation for MIMD Computers*, describes the single-chip VLSI design, which replaces earlier NIST instrumentation chip sets. A redesign and refabrication of a faster MultiKron version in a smaller-sized VLSI reticle resulted in reduced costs. CSL also designed and implemented a prototype of a local collection network for captured performance data.

On the software side, CSL devised an innovative, portable technique for assaying and improving parallel programs on multiple-instruction, multiple-data (MIMD) systems. The method, which accomplishes important sensitivity analyses of programs, is described in NISTIR 4859, *Time-Perturbation Tuning of MIMD Programs*. Whereas previous approaches have been approximate and unreliable, the new method yields accurate assays and real improvements. Preliminary results on both shared-memory and distributed-memory systems are promising and have resulted in a patent application.

TECHNOLOGY TRANSFER



SELECTED STAFF ACCOMPLISHMENTS FY 1989 - FY 1992

Department of Commerce awards for major contributions to Department programs were presented to:

Shukri A. Wakid - Silver Medal (1992)

Allen L. Hankinson - Silver Medal (1991)

David K. Jefferson - Silver Medal (1991)

Roger J. Martin - Silver Medal (1989)

Miles E. Smid - Silver Medal (1989)

Donna F. Dodson - Bronze Medal (1992)

Elizabeth N. Fong - Bronze Medal (1992)

Michael Garris - Bronze Medal (1992)

David E. Cypher - Bronze Medal (1991)

Gary E. Fisher - Bronze Medal (1991)

Irene E. Gilbert - Bronze Medal (1991)

Barbara L. Blickenstaff - Bronze Medal (1990)

David R. Kuhn - Bronze Medal (1990)

Charles L. Sheppard - Bronze Medal (1990)

J. Elaine Frye - Bronze Medal (1989)

Candice E. Leatherman - Bronze Medal (1989)

Joan M. Sullivan - Bronze Medal (1989)

David Hui-Yang Su - Bronze Medal (1989)

Recognition from External Organizations

A **1992 Federal Leadership Award** was presented to the NIST Electronic Certification Project by *Federal Computer Week* and the Open Systems Conference Board.

James H. Burrows was awarded the 1991 IRM Leadership Award by the Association for Federal Information Resources Management (AFFIRM).

James H. Burrows received the 1991 Federal Office Systems Exposition (FOSE) Award for leadership in standards development for computing, telecommunications, and computer security.

James H. Burrows received the Distinguished Presidential Rank Award in 1989 for extended exceptional performance in government.

F. Lynn McNulty, David K. Jefferson, Allen L. Hankinson, Roger J. Martin, and Frederick T. Boland received Federal 100 awards from *Federal Computer Week* for contributions to the federal systems community in 1991.

James H. Burrows, Dennis K. Branstad, Kevin L. Mills, and Shukri A. Wakid received Federal 100 awards from *Federal Computer Week* for significant contributions to the government systems community in 1990.

James H. Burrows, Allen L. Hankinson, and **Dennis D. Steinauer** received the Federal 100 Reader's Choice Awards from *Federal Computer Week* for 1989.

Allen L. Hankinson received the Distinguished Presidential Rank Award for 1992 for extended exceptional government service.

Allen L. Hankinson was elected to the UniForum Board of Directors for a two-year term beginning July 1, 1991.

Kevin L. Mills received the Interagency Committee on Information Resources Management 1991 Award for Management/Administrative Excellence for effective leadership in the federal systems community in advancing the acceptance of Open Systems Interconnection (OSI) standards.

Kevin L. Mills was elected as a senior member in the Institute of Electrical and Electronics Engineers (IEEE).

Robert Rosenthal was awarded the 1992 Award for Technical Excellence by the Interagency Committee on Information Resources Management for leadership in the field of local area networks and computer security.

Roger J. Martin received the Institute of Electrical and Electronics Engineers (IEEE) Standards Medallion in 1992 for his contributions to the establishment of POSIX test methods as standards worldwide.

Roger J. Martin received the Interagency Committee on Information Resources Management Award for Technical Excellence in 1989 for outstanding contributions to the federal information resources management community.

Mark Skall was appointed as the government representative to the National Computer Graphics Association Board of Directors for a three-year term beginning in January 1993.

Miles E. Smid received the Award for Technical Excellence from the Interagency Committee on Information Resources Management in 1990 for his contributions to the federal information resources management community, particularly in computer security.

Dennis D. Steinauer was elected chairman of the Forum of Incident Response and Security Teams (FIRST) for a one-year term beginning August 1992.

Robert J. Carpenter, Alan Mink, George Nacht, and **John Roberts** received the Allen V. Astin Measurement Science Award in 1990 for their contributions to the science of measuring the performance of multiprocessor computer systems.

Gordon Lyon was appointed Chairman of the NIST Research Advisory Committee for 1991.

Donna Harman and **Gerald Candela** received the 1990 R&D 100 Award from *Research & Development* magazine for a fast information retrieval system. They were also the recipients of the 1991 Journal of the American Society for Information Science (JASIS) Best Paper Award for Retrieving Records from a Gigabyte of Text on a Minicomputer Using Statistical Ranking.

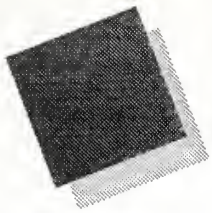
Leonard J. Gallagher received the Interagency Committee on Information Resources Management Award for Technical Excellence in 1989 for outstanding contributions to the federal information resource management community.

Leonard J. Gallagher was selected by the Oracle Corporation in 1990 as the grand prize winner of its Unleash the Genius contest for his implementation of a hypertext query facility.

Judith Newton, accepting for NIST, received the 1992 Data Administration Management Association (DAMA) International Company Achievement Award for an outstanding contribution to the direction of the information resource industry.

Edward Roback received an Unsung Hero in Computer Security Award by FedSecurity '91 and *Federal Computer Week*.

Henry Tom was appointed, for a two-year term through 1993, as a deputy member to the U.S. Board of Geographic Names. He also served as the government representative on the Board of Directors of the National Computer Graphics Association through December 1992.



PARTICIPATION IN VOLUNTARY STANDARDS ACTIVITIES

CSL staff members participate in more than 85 national and international voluntary standards activities, including the following:

American National Standards Institute (ANSI):
- Information Systems Standards Board (ISSB)
- Information Technology Consultative Committee (ITCC)
- USA Registration Authority Committee

Accredited Standards Committee (ASC):
- T1, Telecommunications
- X3, Information Processing Systems
- X9, Financial Services
- X12, Electronic Data Interchange (EDI)
- IT9, Physical Properties and Permanence of Imaging Media

Institute of Electrical and Electronics Engineers (IEEE):
- IEEE Standards Board and Committees

IEEE Groups for:
- Local Area Networks
- Portable Operating System Interface (POSIX)
- Graphical User Interface
- Software Engineering
- U.S. TAG for JTC 1 SC 7
- U.S. TAG for JTC 1 SC 22 WG 15
- Futurebus

International Organization for Standardization (ISO)/ International Electrotechnical Commission (IEC) Joint Technical Committee 1 (JTC 1) on Information Technology

U.S. Technical Advisory Group (TAG) for ISO/IEC JTC 1 (JTC 1 TAG)

International Telegraph and Telephone Consultative Committee (CCITT):

CCITT Study Groups for:
- Data Communications Networks
- Switching and Signaling

U.S. National Committee for CCITT:
- Study Group B
- Study Group D

International Organization for Standardization (ISO)

Technical Committees for:

- Industrial Automation
- Micrographics and Optical Memories for Document and Image Recording, Storage and Use

ASC X3 Subgroups for:

- BASIC
- Computer Graphics
- Credit/Identification Cards
- Database
- Data Communications
- Data Interchange
- Data Representation
- Digital Magnetic Tape
- I/O Interface
- Information Resource Dictionary System
- Information Technology Security Techniques
- LISP
- Open Distributed Processing
- Open Systems Interconnection
- Optical Digital Data Disks
- Parallel Processing Constructs for High-Level Programming Languages
- Picture Coding
- Secretariat Management Committee (SMC)
- Standards Planning and Requirements Committee (SPARC)
- SPARC Database Systems Study Group
- Text: Office and Publishing Systems
- U.S. TAG for JTC 1 SC 21
- U.S. TAG for JTC 1 SC 22

ASC X9 Subgroups for:

- Data and Information Security
- Public-Key Cryptography for Financial Institutions
- Security for Financial Systems
- Wholesale Banking

ASC X12 Subgroup for:

- Security

ASC T1 Technical Subcommittee for:

- Services, Architecture and Signaling

JTC 1 TAG Subgroups for:

EDI
Functional Standards
Procedures

ISO/IEC JTC 1 Subcommittees or Groups for:

Computer Graphics
Design and Documentation of Computer-Based Information Systems
Document Processing and Related Communication
Flexible Magnetic Media for Digital Data Interchange
Functional Standardization
Information Retrieval, Transfer and Management for OSI
Information Technology Security Techniques
Interconnection of Information Technology Equipment
Languages
Optical Disk Cartridges for Information Interchange
POSIX
Procedures
Representation of Data Elements
Telecommunications and Information Exchange Between Systems

European Computer Manufacturers Association (ECMA) Technical Committees or Task Groups for:

Lower Four OSI Layers and Local Area Networks
Magnetic Tapes
PCTE (Portable Common Tool Environment) TC33/TGEP
Reference Model for Software Environments TC33/TGRM
TC-36/TG1 Security Evaluation Criteria

European Workshop on Open Systems (EWOS)

Expert Group on Common Application Environments (to be changed to OSE)
EG-CAE

Association for Information and Image Management (AIIM)

Canadian Committee on Geomatics

Data Administration Management Association Standards and Procedures Subgroup

Federal Interagency Coordinating Committee on Digital Cartography

Federal Telecommunication Standards Committee

International Association for Identification

National Association of State Information Resource Executives (NASIRE)

National Information Standards Organization

NIST Open System Environment Implementors' Workshop (OIW)

North American ISDN Users' Forum (NIUF)

U.S. Board on Geographic Names

CSL staff members hold the following leadership positions in the above activities:

X3 and X3 Subgroups

Elizabeth Fong, Intl. Rep	DBSSG, Database Systems Study Group
Leonard Gallagher, Intl. Rep.	X3H2, Database
Mark Skall, Vice Chair	X3H3, Computer Graphics
Susan Sherrick, Intl. Rep.	X3H3.7, Validation-Testing Registration
Bruce Rosen, Intl. Rep.	X3H4, Information Resource & Dictionary
Roger Sies, Chair	X3V1.1 User Requirements
Judith Newton, Chair	X3H4.4, System Administration & Control
Henry Tom, Chair	X3L8.4, Geographical Units

JTC 1 TAG Activities

Robert Rountree, Chair for IS/IEC JTC 1	JTC 1 TAG, U.S. Technical Advisory Group
Robert Rountree, Chair	JTC 1 TAG Procedures Group

JTC 1 Subcommittees

Roger Martin, Rapporteur	JTC 1/SC 22/WG 15 Rapporteur Group on Conformance Testing
Fritz Schulz, Project Editor	JTC 1 SGFS, TR10003.3
Eugene Troy, Project Editor	JTC 1 27.16.1 General Model for Security Evaluations
Lawrence Welsch, Project Editor	SC 18 WG 1-MHMF

IEEE Standards Activities

Al Hankinson, Chair	P1003.0, POSIX Guide
Fritz Schulz, Editor	P1003.0, POSIX Guide
Roger Martin, Chair	P1003.3.1, POSIX.1 Test Methods
Anthony Cincotta, Editor & Technical Reviewer	P1003.3.1, POSIX.1 Test Methods
Dennis Steinauer, Chair	P1003.6, POSIX Security
John Barkley, Editor	P1003.8, Transparent File Access
Rick Kuhn, Secretary	P1201, Window & Graphic Interfaces
Rick Kuhn, Secretary	P1201.2, Driveability
Steve Trus, Chair	P1224, X-400 Appli. Prog. Interface
Roger Martin, Chair	TCOS Steering Committee on Conformance Tests, Technical Committee on Operating Systems
Lawrence Welsch, Sponsor	IEEE SC MMOD
Mike Rubinfeld, Chair	CD-ROM Architectures

Others:

Mike Hogan, Vice Chair	American National Standards Institute, Information Systems Standards Board
Tom Bagg, Vice Chair	Image Technology 9 Committee
Dana Grubb, Chair	Workshop on the Electronic Exchange of Fingerprint Images
Mike Rubinfeld, Chair	SIGCAT, SIG Standards

COLLABORATION WITH GOVERNMENT, INDUSTRY, AND ACADEMIA

In 1992, CSL collaborated with the following agencies in government, industry, and academia, some of which supported CSL research through funding or the loan of equipment or software.

Federal Agencies

Department of Defense
- Ada Joint Program Office
- Air Force Cryptologic Support Center
- Air Force, Scott Air Force Base, Illinois
- Army Corps
- Army, Ft. Belvoir, Virginia
- Army, Ft. Huachuca, Arizona
- Army Personnel Command Center
- Army Vulnerability Assessment Lab
- Computer-aided Acquisition and Logistics Support (CALS)
- Corporate Information Management Office
- Defense Advanced Research Projects Agency
- Defense Information Systems Agency
- Defense Logistics Agency
- Department of the Air Force
- Department of the Army
- Department of the Navy
- National Security Agency
- Naval Weapons Center, China Lake, California
- Navy Human Resources Office
- Navy Next Generation Computer Resources
- Office of the Director of Defense Information
- Strategic Defense Initiative Organization

Department of Commerce, Bureau of the Census
Department of Commerce, Office of Financial Management
Department of Education
Department of Energy
Department of Energy, Lawrence Livermore National Laboratory
Department of Health and Human Services
Department of Justice, Federal Bureau of Investigation
Department of the Treasury
Department of the Treasury, Internal Revenue Service
Department of Veterans Affairs
Environmental Protection Agency
Federal Emergency Management Agency
General Services Administration

Federal Agencies (continued)

National Aeronautics and Space Administration
National Archives and Records Administration
National Oceanic and Atmospheric Administration
National Science Foundation
Nuclear Regulatory Commission
Office of Management and Budget
President's Council on Integrity and Efficiency
Securities and Exchange Commission
Social Security Administration
U.S. Geological Survey

Industry

American Computer & Electronics Corporation
Ameritech Services
Apple Computer
ARINC
AT&T Bell Laboratories
AT&T Network Services
Baxter Healthcare Corporation
Bell Atlantic
Bell Communications Research
Bellcore
Bell Northern INRS, Montreal, Canada
Boeing Computer Support Services, Inc.
Bolt, Beranek and Newman
Cascade Communications
Cisco
CLC Associates
3COM
Combinet
COMSAT
Connective Strategies
Convex
Digital Equipment Corporation
Digitech Industries
Eastman Kodak Company
Electronic Data Systems Corporation
FastComm Communications
FiberCom
First Chicago Corporation
Fujitsu Networks Industry, Inc.
General DataComm, Inc.
Hayes Microcomputer Products, Inc.

Industry (continued)

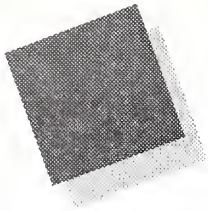
Hewlett-Packard
Hughes Aircraft Company
IBM Corporation
Idacom Hewlett-Packard, Canada
InteCom, Inc.
Intel Corporation
ISDN Systems Corporation
MCI
Mitel Corporation
MITRE
NCR
NEC America
Netrix Corporation
Network Express
Network General
Nortel Federal Systems
Northern Telecom, Inc.
Novell
NYNEX-Telesector Resources Group
OSI, Inc.
Pacific Bell
Paramax
Phased Networks
PictureTel
Proteon
RACAL Guardata
Raynor Associates, Inc.
Retix
Rockwell International Corporation
Siemens Stromberg-Carlson
Southwestern Bell Telephone Company
Sprint International
SRI International
StrataCom Federal Systems
Sun Microsystems
TASC
Telebyte Technology, Inc.
Tekelec
Teleos Communications, Inc.
Trusted Information Systems
UDS Motorola
U S WEST
Vanguard Research, Inc.
Wellfleet

Academia

Carnegie-Mellon University
Centre de Recherche Informatique de Montreal (CRIM), University of Montreal
Iowa State University
Massachusetts Institute of Technology
North Carolina State University
Purdue University
University of the District of Columbia
University of Maryland
University of Michigan
University of Pennsylvania, Linguistic Data Consortium
University of Toronto

Other

Centre National de la Recherche Scientifique (CNRS), Paris (French Government)
Laboratoire d'Informatique pour la Mecanique et les Sciences de L'Ingenieur (LIMSI), Paris (French Government)

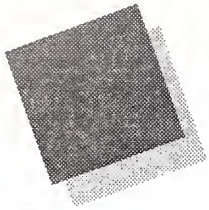


COOPERATIVE RESEARCH & DEVELOPMENT AGREEMENTS (CRDAs)

FY 1992

RESEARCH PARTNER	*PROJECT*
Software Standards Validation	
Washington Software Technologies, Inc.	Basic Test Suite
Integrated Services Digital Network (ISDN)	
American Computer & Electronics Corporation	North American ISDN Users' Forum (NIUF)
Ameritech Services	NIUF
AT&T	NIUF
Baxter Healthcare Corporation	NIUF
Bell Atlantic	NIUF
Bell Communications Research	NIUF
Boeing Computer Support Services, Inc.	NIUF
Defense Information Systems Agency	NIUF
Department of Defense	NIUF
Department of the Navy	NIUF
Eastman Kodak Company	NIUF
Electronic Data Systems Corporation	NIUF
First Chicago Corporation	NIUF
Fujitsu Networks Industry, Inc.	NIUF
General DataComm, Inc.	NIUF
Hayes Microcomputer Products, Inc.	NIUF
Idacom Telecommunications Division, Hewlett-Packard (Canada) Ltd.	NIUF
InteCom, Inc.	NIUF
IBM Corporation	NIUF
Mitel Corporation	NIUF
National Aeronautics and Space Administration (NASA)	NIUF
North Carolina State University	NIUF
Northern Telecom, Inc.	NIUF
NYNEX - Telesector Resources Group	NIUF
Pacific Bell	NIUF
Raynor Associates, Inc.	NIUF

RESEARCH PARTNER	*PROJECT*
Siemens Stromberg-Carlson	NIUF
Southwestern Bell Telephone Company	NIUF
TASC (The Analytical Sciences Corp.)	NIUF
Telebyte Technology, Inc	NIUF
Teleos Communications, Inc.	NIUF
UDS Motorola	NIUF
University of Michigan	NIUF
U.S. Air Force, Technology Integration Center	NIUF
U S WEST	NIUF
Vanguard Research, Inc.	NIUF
COMSAT Corporation	Test and Demonstrate ISDN Protocols and Services
Datacom, Inc.	EDI and ISDN
Tekelec, Inc.	ISDN and X-25 Conformance Test



GUEST RESEARCHERS FY 1992

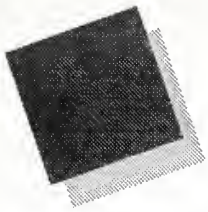
Guest Scientists and Research Associates **24**

Organizations represented included:

Armament Development Authority, Rafael, Israel
Bellcore, Livingston, New Jersey
Defense Information Systems Agency, Arlington, Virginia
Imperial College of Science and Technology, United Kingdom
Institute of Geology, Beijing, People's Republic of China
Institut National Des Telecommunications, France
National Science Foundation, Washington, D.C.
Northeast University of Technology, People's Republic of China
Planning Research Corporation, McLean, Virginia
Space Science and Technology Center, People's Republic of China
Sun Microsystems, Mountain View, California
Telecommunications Laboratory, People's Republic of China
Telecommunications Laboratories, Taiwan
Telecom, Paris, France
University of Twente, The Netherlands
Washington Software Technologies Inc., Annandale, Virginia

Faculty Appointments **7**

Loyola College, Baltimore, Maryland
University of Maryland, College Park, Maryland
University of Maryland, Baltimore, Maryland



NIST PUBLICATIONS

NIST COMPUTER SYSTEMS TECHNOLOGY SERIES FY 1990 - FY 1992

NIST SPEC. PUB. TITLE

500-169 *Executive Guide to the Protection of Information Resources*
By Cheryl Helsing, Marianne Swanson, and Mary Anne Todd
October 1989 SN003-003-02969-6 $1.50

500-170 *Management Guide to the Protection of Information Resources*
By Cheryl Helsing, Marianne Swanson, and Mary Anne Todd
October 1989 SN003-003-02968-8 $1.75

500-171 *Computer Users' Guide to the Protection of Information Resources*
By Cheryl Helsing, Marianne Swanson, and Mary Anne Todd
October 1989 PB90-147489 $17.00

500-172 *Computer Security Training Guidelines*
By Mary Anne Todd and Constance Guitian
November 1989 SN003-003-02975-1 $2.50

500-173 *Guide to Data Administration*
By Bruce K. Rosen and Margaret H. Law
October 1989 PB90-147919 $19.00

500-174 *Guide for Selecting Automated Risk Analysis Tools*
By Irene E. Gilbert
October 1989 PB90-148784 $17.00

500-175 *Management of Networks Based on Open Systems Interconnection (OSI) Standards: Functional Requirements and Analysis*
By Robert Aronoff, Michael Chernick, Karen Hsing, Kevin Mills, and Daniel Stokesberry
November 1989 PB90-161753 $28.00

500-176 *Introduction to Heterogeneous Computing Environments*
By John Barkley and Karen Olsen
November 1989 PB90-154774 $11.00

SN numbers - stocked by GPO
PB numbers - stocked by NTIS

NIST SPEC. PUB. TITLE

500-177 *Stable Implementation Agreements for Open Systems Interconnection Protocols, Version 3, Edition 1, Dec 1989*
Tim Boland, Workshop Chairman
December 1989 PB92-190479 $31.00

500-178 *Proceedings of the Hypertext Standardization Workshop, January 16-18, 1990*
By Judi Moline, Daniel Benigni, and J. Baronas
March 1990 PB90-215864 $35.00

500-179 *Object Database Management Systems: Concepts and Features*
By Christopher Dabrowski, Elizabeth Fong, and D. Yang
April 1990 PB90-216813 $19.00

500-180 *Guide to Software Acceptance*
By Dolores Wallace and J. Cherniavsky
April 1990 PB90-219627 $17.00

500-181 *PHIGS Validation Tests (Version 1.0): Design Issues*
By John Cugini, Mary T. Gunn, and Lynne S. Rosenthal
July 1990 PB90-269580 $17.00

500-182 *Guidelines for the Evaluation of Message Handling Systems Implementation*
By Steve Trus, Curtis Royster, and Paul Markovitz
August 1990 PB90-269598 $23.00

500-183 *Stable Implementation Agreements for Open System Interconnection Protocols, Version 4, Edition 1, December 1990*
Tim Boland, Workshop Chairman
December 1990 PB92-126408 $35.00

500-184 *Functional Benchmarks for Fourth Generation Languages*
By Martha M. Gray and Gary E. Fisher
March 1991 SN003-003-03071-6 $3.25

500-185 *Guide to Design, Implementation and Management of Distributed Databases*
By Elizabeth N. Fong, Charles L. Sheppard, and Kathryn A. Harvill
February 1991 SN003-003-03076-7 $3.50

500-186 *Issues in Transparent File Access*
By Karen Olsen and John Barkley
April 1991 PB91-187831 $19.00

SN numbers - stocked by GPO
PB numbers - stocked by NTIS

NIST SPEC. PUB. TITLE

500-187 *Application Portability Profile (APP) The U.S. Government's Open System Environment Profile OSE/1 Version 1.0*
April 1991 PB91-201004 $19.00

500-188 *Guide to Expert System Building Tools for Microcomputers*
By Christopher E. Dabrowski and Elizabeth N. Fong
July 1991 SN003-003-03088-1 $8.50

500-189 *Security in ISDN*
By William E. Burr
September 1991 SN003-003-03112-7 $4.25

500-190 *Proceedings of the Workshop on High Integrity Software; Gaithersburg, MD; Jan. 22-23, 1991*
By Dolores R. Wallace, D. Richard Kuhn, and John C. Cherniavsky
August 1991 SN003-003-03108-9 $5.50

500-191 *Test Methods for Optical Disk Media Characteristics (for 356 mm Ruggedized Magneto-optic Media)*
By Fernando Podio
September 1991 PB92-116409 $19.00

500-192 *Government Open Systems Interconnection Profile Users' Guide, Version 2*
By Tim Boland
October 1991 SN003-003-03119-4 $9.50

500-193 *Software Reengineering: A Case Study and Lessons Learned*
By Mary K. Ruhl and Mary T. Gunn
September 1991 SN003-003-03100-3 $2.25

500-194 *ISDN Conformance Testing, Layer 1"Physical Layer, Part 1"Basic Rate S/T Interface, User Side*
Shukri A. Wakid and Kathleen M. Roberts, Editors
September 1991 PB92-102201 $19.00

500-195 *North American ISDN Users' Forum Agreements on Integrated Services Digital Network*
Shukri A. Wakid and Kathleen M. Roberts, Editors
September 1991 PB92-102219 $26.00

500-196 *Guidelines for the Evaluation of File Transfer, Access and Management Implementations*
By Paul Markovitz, Steven A. Trus, and Curtis Royster
October 1991 SN003-003-03120-8 $5.50

SN numbers - stocked by GPO
PB numbers - stocked by NTIS

NIST SPEC. PUB. TITLE

500-197 *Guide to Schema and Schema Extensibility*
By Bruce K. Rosen and Isabella des Fontaines
November 1991 SN003-003-03126-7 $2.25

500-198 *Monitoring and Reporting Techniques for Error Rate and Error Distribution in Optical Disk Systems*
By Fernando L. Podio
October 1991 SN003-003-03125-9 $5.00

500-199 *The 3480 Type Tape Cartridge: Potential Data Storage Risks, and Care and Handling Procedures to Minimize Risks*
By Mark Williamson
November 1991 SN003-003-03127-5 $3.50

500-200 *Development of a Testing Methodology to Predict Optical Disk Life Expectancy Values*
By Fernando L. Podio
December 1991 SN003-003-03134-8 $5.00

500-201 *Reference Model for Frameworks of Software Engineering Environments*
Prepared Jointly by NIST and the European Computer Manufacturers Association (ECMA)
December 1991 SN003-003-03135-6 $5.50

500-202 *Stable Implementation Agreements for Open Systems Interconnection Protocols, Version 5, Edition 1, December 1991*
December 1991 SN903-015-00000-4 $59.00 subscription

500-203 *Conformance Test Specifications for COBOL Intrinsic Function Module*
By Carmelo Montanez-Rivera and L. Arnold Johnson
July 1992 SN003-003-03172-1 $6.50

500-204 *High Integrity Software Standards and Guidelines*
By Dolores R. Wallace, Laura M. Ippolito, and D. Richard Kuhn
September 1992 SN003-003-03171-2 $6.50

500-205 *Guidelines for the Evaluation of Virtual Terminal Implementations*
By Carol A. Edgar
November 1992 SN003-003-03189-5 $3.75

SN numbers - stocked by GPO
PB numbers - stocked by NTIS

NIST COMPUTER SECURITY SERIES
FY 1991 - FY 1992

NIST SPEC. PUB. TITLE

800-1 *Computer Security in the 1980s: Selected Bibliography*
Rein Turn, Compiler, and Lawrence E. Bassham, Editor
December 1990 SN003-003-03060-1 $11.00

800-2 *Public-Key Cryptography*
By James Nechvatal
April 1991 SN003-003-03078-3 $9.00

800-3 *Establishing a Computer Security Incident Response Capability (CSIRC)*
By John P. Wack
November 1991 SN003-003-03121-6 $3.00

800-4 *Computer Security Considerations in Federal Procurements: A Guide for Procurement Initiators, Contracting Officers, and Computer Security Officials*
By Barbara Guttman
March 1992 SN003-003-03147-0 $6.00

800-5 *A Guide to the Selection of Anti-Virus Tools and Techniques*
By W. Timothy Polk and Lawrence E. Bassham
December 1992 SN003-003-03188-7 $3.75

800-6 *Automated Tools for Testing Computer System Vulnerability*
By W. Timothy Polk
December 1992 SN003-003-03187-9 $3.25

SN numbers - stocked by GPO
PB numbers - stocked by NTIS

NIST INTEGRATED SERVICES DIGITAL NETWORK TECHNOLOGY SERIES FY 1992

NIST SPEC. PUB. TITLE

823-1 *Overview of Integrated Services Digital Network Conformance Testing*
By Leslie A. Collica, Kathleen M. Roberts, and David Su
March 1992 SN003-003-03142-9 $1.75

823-2 *Integrated Services Digital Network Conformance Testing, Layer 1 " Physical Layer, Part 2 " Basic Rate U Interface, User Side*
Daniel P. Stokesberry and Kathleen M. Roberts, Editors
March 1992 SN003-003-03143-7 $5.00

SN numbers - stocked by GPO
PB numbers - stocked by NTIS

CSL BULLETINS

JUNE 1990 THROUGH DECEMBER 1992

Roback, Edward; **Data Encryption Standard.** NCSL Bulletin. June 1990.

Flahavin, Ellen; **Guidance to Federal Agencies On The Use of Trusted Systems Technology.** NCSL Bulletin. July 1990.

Wack, John; Kurzban, Stanley A.; **Computer Virus Attacks.** NCSL Bulletin. August 1990.

McCrea, Samuel; **Bibliography of Computer Security Glossaries.** NCSL Bulletin. September 1990.

Gilbert, Dennis; **Review of Federal Agency Computer Security and Privacy Plans (CSPP) A Summary Report.** NCSL Bulletin. October 1990.

Roback, Edward; **Computer Security Roles of NIST and NSA.** CSL Bulletin. February 1991.

Roback, Edward; **FIPS 140 - A Standard in Transition.** CSL Bulletin. April 1991.

Radack, Shirley; **The GOSIP Testing Program.** CSL Bulletin. May 1991.
Saltman, Roy; **Security Issues in the Use of Electronic Data Interchange.** CSL Bulletin. June 1991.

Boland, Tim; **File Transfer, Access and Management.** CSL Bulletin. July 1991.

Lennon, Elizabeth; **The NIST POSIX Testing Program.** CSL Bulletin. October 1991.

Dray, James; **Advanced Authentication Technology.** CSL Bulletin. November 1991.

Wack, John; **Establishing a Computer Security Incident Response Capability.** CSL Bulletin. February 1992.

Branstad, Dennis; **An Introduction to Secure Telephone Terminals.** CSL Bulletin. March 1992.

Mills, Kevin and Radack, Shirley; **TCP/IP or OSI? Choosing a Strategy for Open Systems.** CSL Bulletin. June 1992.

Roback, Edward; **Disposition of Sensitive Automated Information.** CSL Bulletin. October 1992.

Roback, Edward; **Sensitivity of Information.** CSL Bulletin. November 1992.

Radack, Shirley; **Using Information Technology Standards in Federal Acquisitions.** CSL Bulletin. December 1992.

OTHER NIST PUBLICATIONS
FY 1990 - FY 1992

PUB. NUMBER	TITLE
NISTIR 89-4198	*Working Implementation Agreements for Open Systems Interconnection Protocols* Tim Boland, Editor December 1989 PB90-146440 $44.00
NISTIR 89-4199	*Graphics Application Programmer's Interface Standards and CALS* By Sharon Kemmerer and Mark Skall October 1989 PB90-133091 $15.00
NISTIR 90-4228	*Prototyping SP4 A Secure Data Network System Transport Protocol Interoperability Demonstration Project* By C. Dinkel, N. Nazario, and R. Rosenthal January 1990 PB90-159609 $15.00
NISTIR 90-4240	*Architectures for Future Multigigabit Lightwave Networks* By W. Burr February 1990 PB90-198953 $17.00
NISTIR 90-4247	*Working Implementation Agreements for Open Systems Interconnection Protocols* Tim Boland, Editor March 1990 PB90-197948 $30.00
NISTIR 90-4250	*Secure Data Network System (SDNS) Network, Transport, and Message Security Protocols* By C. Dinkel February 1990 PB90-198946 $17.00
NISTIR 90-4259	*Secure Data Network System (SDNS) Access Control Documents* By C. Dinkel February 1990 PB90-188061 $23.00
NISTIR 90-4262	*Secure Data Network System (SDNS) Key Management Documents* By C. Dinkel February 1990 PB90-188079 $17.00
NISTIR 90-4267	*A Conformance Test for FDDI Medium Access Control (MAC)* By Z. Liu and W. Burr July 1990 PB90-265323 $23.00

SN numbers - stocked by GPO
PB numbers - stocked by NTIS

PUB. NUMBER	TITLE

NISTIR 90-4275 *Workloads, Observables, Benchmarks and Instrumentation*
By G. Lyon and R. Snelick
April 1990 PB90-207770 $15.00

NISTIR 90-4292 *Data Administration: Standards and Techniques, Proceedings of the Second Annual DAMA Symposium*
By J. Newton and F. Spielman
April 1990 PB90-204512 $23.00

NISTIR 4302 *Working Implementation Agreements for Open Systems Interconnection Protocols*
June 1990 PB91-120113 $45.00

NISTIR 4315 *A Collection of Technical Studies Completed for the Computer-Aided Acquisition and Logistic Support (CALS) Program Fiscal Year 1988, Volume 1 of 3, Security and Data Management*
April 1990 PB91-178889 $31.00

NISTIR 4316 *A Collection of Technical Studies Completed for the CALS Program Fiscal Year 1988, Volume 2 of 3, Graphics, CGM MIL SPEC*
April 1990 PB91-178887 $45.00

NISTIR 4317 *A Collection of Technical Studies Completed for the CALS Program Fiscal Year 1988, Volume 3 of 3, CGM Registration*
April 1990 PB91-178905 $23.00

NISTIR 4325 *U.S. Department of Energy Risk Assessment Methodology*
E. Roback, NIST Coordinator
May 1990 PB90-244484 $23.00

NISTIR 4329 *Graphics Standards in the Computer-Aided Acquisition and Logistic Support (CALS) Program, FY 1989, Volume 1: Test Requirements Document, Extended CGM (CGEM)*
D. Benigni, Editor
July 1990 PB90-257759 $38.00

NISTIR 4330 *Graphics Standards in the Computer-Aided Acquisition and Logistic Support (CALS) Program, FY 1989, Volume 2: MIL-D-28003 Revisions, CGM Registration*
D. Benigni, Editor
May 1990 PB90-228016 $38.00

NISTIR 4331 *Emulation Through Time Dilation*
By J. Antonishek and R. Snelick
May 1990 PB90-228024 $15.00

SN numbers - stocked by GPO
PB numbers - stocked by NTIS

PUB. NUMBER	TITLE

NISTIR 4349 *User's Guide for the PHIGS Validation Tests (Version 1.0)*
By J. Cugini, M. Gunn, and L. Rosenthal
August 1990 PB90-265216 $23.00

NISTIR 4359 *Domestic Disaster Recovery Plan for PCs, OIS, and Small VS Systems*
E. Roback, NIST Coordinator
August 1990 PB90-265240 $15.00

NISTIR 4362 *Security Labels for Open Systems An Invitational Workshop*
By N. Nazario
June 1990 PB90-247446 $30.00

NISTIR 4374 *The Naming Forum: Proceedings of the IRDS Workshop on Data Entity Naming Conventions*
By J. Newton
July 1990 PB90-250119 $23.00

NISTIR 4377 *A Framework for Developing a CALS Data Dictionary*
By D. Jefferson
July 1990 PB90-257585 $15.00

NISTIR 4378 *Automated Information System Security Accreditation Guidelines*
E. Roback, NIST Coordinator
August 1990 PB90-264102 $15.00

NISTIR 4382 *Working Implementation Agreements for Open Systems Interconnection Protocols*
Tim Boland, Editor
September 1990 PB90-259763 $45.00

NISTIR 4384 *Design Issues for Conformance Testing of the PHIGS Standard*
By J. Cugini and L. Rosenthal
August 1990 PB90-264094 $15.00

NISTIR 4387 *U.S. Department of Justice Simplified Risk Analysis Guidelines (SRAG)*
E. Roback, NIST Coordinator
August 1990 PB90-265257 $17.00

NISTIR 4404 *Dynamic Characteristics of Hypertext*
By R. Furuta and P. David Stotts
August 1990 PB91-107276 $15.00

SN numbers - stocked by GPO
PB numbers - stocked by NTIS

PUB. NUMBER	TITLE
NISTIR 4409	*1989 Computer Security and Privacy Plans (CSPP) Review Project: A First-Year Federal Response to the Computer Security Act of 1987 (Final Report)* Dennis M. Gilbert, Report Coordinator September 1990 PB91-107504 $23.00
NISTIR 4418	*State Occupancy Information for Performance Comparisons* By Gordon Lyon October 1990 PB91-112879 $15.00
NISTIR 4432	*Status of PDES-Related Activities (Standards & Testing)* By Cita Furlani, Joan Wellington, and Sharon Kemmerer October 1990 PB91-112888 $15.00
NISTIR 4435	*FTAM Interoperability Test* By Carol Edgar August 1990 PB91-107565 $23.00
NISTIR 4448	*Working Implementation Agreements for Open Systems Interconnection Protocols"November 1990* Tim Boland, Editor November 1990 PB91-144444 $60.00
NISTIR 4451	*U.S. Department of Commerce Methodology for Certifying Sensitive Computer Applications* Edward Roback, NIST Coordinator November 1990 PB91-120162 $17.00
NISTIR 4452	*Message Handling Systems Interoperability Tests* By Carol Edgar October 1990 PB91-112789 $17.00
NISTIR 4453	*SRI International Improving the Security of Your UNIX System* Edward Roback, NIST Coordinator November 1990 PB91-120121 $17.00
NISTIR 4484	*Multimedia Courseware in an Open Systems Environment: A Federal Strategy* By Judi Moline, Allen L. Hankinson, and Lawrence A. Welsch December 1990 PB91-143362 $17.00
NISTIR 4488	*Proceedings of the Object-Oriented Database Task Group Workshop; Tuesday, October 23, 1990, Chateau Laurier Hotel, Ottawa, Canada* Elizabeth N. Fong, Editor January 1991 PB91-157198 $23.00

SN numbers - stocked by GPO
PB numbers - stocked by NTIS

PUB. NUMBER	TITLE

NISTIR 4494 *SQL3 Support for CALS Applications*
By Leonard Gallagher
December 1990 PB91-167262 $15.00

NISTIR 4503 *Proceedings of the Object-Oriented Database Task Group Workshop, Tuesday, May 22, 1990, Atlantic City, NJ*
By Elizabeth N. Fong
February 1991 PB91-159723 $39.00

NISTIR 4507 *Working Implementation Agreements for Open Systems Interconnection Protocols (December 1990)*
Tim Boland, Editor
March 1991 PB92-126523 $43.00

NISTIR 4518 *National Aeronautics and Space Administration's (NASA) Automated Information Security Handbook*
Edward Roback, NIST Coordinator
March 1991 PB91-187781 $23.00

NISTIR 4524 *Raster Graphics Conformance Testing*
By Frankie E. Spielman
February 1991 PB91-167296 $17.00

NISTIR 4530 *Validation of an OSI Transport Class 4 Simulator*
By Okhee Kim, Sharon Heatley, and Bob Bishop
May 1991 PB91-187724 $15.00

NISTIR 4545 *Computer Security: Selected Articles*
Marianne Swanson and Elizabeth B. Lennon, Editors
April 1991 PB91-187740 $15.00

NISTIR 4547 *A Standardized General Markup Language Encoding of the Office Document Architecture Document Application Profile*
By Ronald B. Wilson
April 1991 PB91-184812 $15.00

NISTIR 4560 *Government Document Processing Requirements Report*
By Roger F. Sies
April 1991 PB91-187773 $15.00

NISTIR 4567 *Titled Raster Graphics and MIL-R-28002A: A Tutorial and Implementation Guide*
By Frankie E. Spielman and Louis H. Sharpe, II
April 1991 PB91-187708 $23.00

SN numbers - stocked by GPO
PB numbers - stocked by NTIS

PUB. NUMBER	TITLE

NISTIR 4579 *NIST Support for the Computer-Aided Acquisition and Logistic Support (CALS) Program in the Area of Graphics Standards, Calendar Year 1990*
By Daniel Benigni
May 1991 PB91-194506 $39.00

NISTIR 4594 *GOSIP Conformance and Interoperation Testing and Registration*
Nightingale, J.S.
March 1991 PB92-108943 $26.00

NISTIR 4607 *Network Registration Service User's Guide*
By Carol Edgar
Available from OSINET Corporation, (703) 883-2797

NISTIR 4608 *Electronic Data Interchange in Message Handling Systems*
By Paul Markovitz
June 1991 PB91-216622 $15.00

NISTIR 4609 *NIST Support of the CALS Program: 1990 Synopsis*
By Sharon J. Kemmerer
June 1991 PB91-193821 $15.00

NISTIR 4614 *Standard Security Label for GOSIP, An Invitational Workshop*
By Noel Nazario
June 1991 PB91-216671 $23.00

NISTIR 4630 *Performance Evaluation of Hypercube Applications: Using a Global Clock and Time Dilation*
By Robert D. Snelick
July 1991 PB91-222588 $15.00

NISTIR 4636 *U.S. Dept. of Health and Human Services Automated Information Systems Security Program Handbook*
Edward Roback, NIST Coordinator
July 1991 PB91-222638 $23.00

NISTIR 4637 *Computer Implementation of a Discrete Set Algebra*
By Leonard Gallagher
July 1991 PB91-231571 $15.00

NISTIR 4641 *Development Plan STEP Conformance Testing Service*
By Sharon J. Kemmerer
August 1991 PB92-191238 $17.00

SN numbers - stocked by GPO
PB numbers - stocked by NTIS

PUB. NUMBER	TITLE

NISTIR 4651 *Government Network Management Profile (GNMP): Public Review Version*
By R. Aronoff, K. Brady, M. Chernick, J. Fox, K. Hsing, K. Mills, and F. Nielsen
January 1992 PB92-149871 $19.00

NISTIR 4654 *Development of an Optical Disk System for the Automated Retrieval of EASEAR Records*
By Natalie Willman
August 1991 PB92-108943 $26.00

NISTIR 4655 *User's Manual for the NIST TTCN Translator Version 3.0*
By David H. Su
August 1991 PB92-172493 $17.00

NISTIR 4656 *Proceedings of the Forum on Standards for High Integrity Software*
By Dolores R. Wallace, Michael Brown, and Archibald McKinlay VI
September 1991 PB92-112267 $19.00

NISTIR 4659 *Glossary of Computer Security Terminology*
Edward Roback, NIST Coordinator
September 1991 PB92-112259 $26.00

NISTIR 4667 *Computer Security Bulletin Board System User's Guide*
By Mark Skandera and Marianne Swanson
September 1991 PB92-112390 $17.00

NISTIR 4668 *The OSINET Testing and Registration [T&R] Service Functional Specification*
By Carol Edgar and Alper Kerman
Available from OSINET Corporation, (703) 883-2797

NISTIR 4681 *On the Interchangeability of SGML and ODA*
By Charles K. Nicholas and Lawrence A. Welsch
January 1992 PB92-149830 $17.00

NISTIR 4688 *Prototyping the IRDS: An Airport Application*
By Anthony P. Sani and Henry Tom
October 1991 PB92-112580 $26.00

NISTIR 4703 *Technology Integration Workshop: Selected Papers*
Henry Tom, Editor
October 1991 PB92-158278 $26.00

SN numbers - stocked by GPO
PB numbers - stocked by NTIS

PUB. NUMBER	TITLE

NISTIR 4734 *Foundations of a Security Policy for Use of the National Research and Educational Network*
By Arthur E. Oldehoeft
February 1992 PB92-172030 $19.00

NISTIR 4737 *Operating Principles of MULTIKRON Performance Instrumentation for MIMD Computers*
By Alan Mink and Robert J. Carpenter
March 1992 PB92-181072 $17.00

NISTIR 4739 *Validated Processor List 1992, No. 1*
(Supersedes NISTIR 4690)
Judy B. Kailey, Editor
January 1992 PB92-937301 $19.00

NISTIR 4743 *Requirements and Recommendations for STEP Conformance Testing*
Sharon J. Kemmerer, Editor
Revised June 1992 PB92-213503 $19.00

NISTIR 4749 *Sample Statements of Work for Federal Computer Security Services: For Use In-House or Contracting Out*
Dennis M. Gilbert, Project Leader
Nickilyn Lynch, Editor
December 1991 PB92-148261 $19.00

NISTIR 4750 *Massively Parallel Implementation of Character Recognition Systems*
By M.D. Garris, C.L. Wilson, J.L. Blue, G.T. Candela, P. Grother, S. Janet, and R.A. Wilkinson
January 1992 PB92-149863 $17.00

NISTIR 4759 *Annual Report 1991 Computer Systems Laboratory*
By Elizabeth B. Lennon, Shirley M. Radack, and Ramona Roach
December 1991 PB92-172709 $19.00

NISTIR 4766 *Optimization of Neural Network Topology and Information Content Using Boltzmann Methods*
By Charles L. Wilson and Omid M. Omidvar
February 1992 PB92-205418 $17.00

NISTIR 4774 *A Review of U.S. and European Security Evaluation Criteria*
By Charles R. Dinkel
March 1992 PB92-172022 $17.00

SN numbers - stocked by GPO
PB numbers - stocked by NTIS

PUB. NUMBER	TITLE

NISTIR 4775 *Incorporating CALS Requirements into the CGM Standard and the CALS Application Profile - MIL-D-28003*
By Daniel R. Benigni
February 1992 PB93-118123 $44.50

NISTIR 4776 *Training Feed Forward Neural Networks Using Conjugate Gradients*
By J.L. Blue and P.J. Grother
February 1992 PB92-171990 $17.00

NISTIR 4780 *Guide for Specifying and Building CITIS with Data Management Standards*
By Leonard J. Gallagher, Joan M. Sullivan, and Joseph C. Collica
February 1992 PB92-172725 $17.00

NISTIR 4792 *A Formal Description of the SDNS Security Protocol at Layer 4 (SP4)*
By Wayne A. Jansen
March 1992 PB92-172816 $26.00

NISTIR 4800 *An Overview of the Document Style Semantics and Specification Language and the MIL-M-28001A Output Specification*
By Ronald B. Wilson
March 1992 PB92-181122 $17.00

NISTIR 4805 *FAUST: A Vision-Based Neural Network Multi-Map Pattern Recognition Architecture*
By Charles L. Wilson
March 1992 PB92-181064 $17.00

NISTIR 4806 *Procedures Manual for Testing CGM Generator Products That Claim Conformance to FIPS 128 and MIL-D-28003*
Daniel R. Benigni, Editor
March 1992 PB92-181155 $26.00

NISTIR 4816 *PBX Administrator's Security Standards, Developed by the Federal Deposit Insurance Corporation*
Edward Roback, NIST Coordinator
April 1992 PB92-187152 $17.00

NISTIR 4820 *Validated Products List 1992 No. 2*
(supersedes NISTIR 4739)
Judy B. Kailey, Editor
April 1992 PB92-937302 $26.00

SN numbers - stocked by GPO
PB numbers - stocked by NTIS

PUB. NUMBER	TITLE

NISTIR 4824 *Karhunen Loeve Feature Extraction for Neural Handwritten Character Recognition*
By Patrick J. Grother
April 1992 PB92-187111 $17.00

NISTIR 4830 *Next Generation Documents*
By Ronald B. Wilson and Roger F. Sies
April 1992 PB92-187103 $17.00

NISTIR 4843 *Managing Data"From Vision to Reality, Proceedings of the Fourth Annual DAMA Symposium*
J. Newton, M. Melley, and H. Higgins, Editors
May 1992 PB92-191212 $26.00

NISTIR 4846 *Computer Security Training & Awareness Course Compendium*
Kathie Everhart, Editor
May 1992 PB92-205442 $35.00

NISTIR 4848 *Raster Graphics Validation*
By F.E. Spielman
May 1992 PB92-196070 $19.00

NISTIR 4863 *Reject Mechanisms for Massively Parallel Neural Network Character Recognition Systems*
By Michael D. Garris and Charles L. Wilson
June 1992 PB92-213412 $17.00

NISTIR 4866 *Network Management Support for OSI Systems (NeMaSOS) Version 2.0 Programmer's Reference Manual*
By Kevin G. Brady, James F. Fox, and Robert Aronoff
July 1992 PB92-213271 $26.00

NISTIR 4871 *Validated Products List 1992 No. 3*
(supersedes NISTIR 4820)
Judy B. Kailey, Editor
July 1992 PB92-937303 $26.00

NISTIR 4873 *Automatic Indexing*
By Donna Harman
July 1992 PB92-238674 $17.50

NISTIR 4876 *An Introduction to Graphical User Interfaces and Their Use by CITIS*
By Susan Q. Sherrick
July 1992 PB92-213404 $17.00

SN numbers - stocked by GPO
PB numbers - stocked by NTIS

PUB. NUMBER	TITLE

NISTIR 4880 *Massively Parallel Neural Network Fingerprint Classification System*
By C.L. Wilson, G. Candela, P.J. Grother, C.I. Watson, and R.A. Wilkinson
July 1992 PB92-213339 $19.00

NISTIR 4892 *Research Considerations Regarding FBI-IAFIS Tasks & Requirements*
By R. McCabe, C. Wilson, and D. Grubb
July 1992 PB92-238609 $17.50

NISTIR 4893 *Topological Separation Versus Weight Sharing in Neural Net Optimization*
By O.M. Omidvar and C.L. Wilson
July 1992 PB92-222942 $17.50

NISTIR 4902 *Database Language SQL: Integrator of CALS Data Repositories*
By Leonard Gallagher and Joan Sullivan
September 1992 PB93-113637 $19.50

NISTIR 4909 *Software Quality Assurance: Documentation and Reviews*
By Dolores R. Wallace, Wendy W. Peng, and Laura M. Ippolito
September 1992 PB93-113694 $19.50

NISTIR 4912 *The First Census Optical Character Recognition Systems Conference*
By R. Wilkinson, J. Geist, S. Janet, P. Grother, C. Burges, R. Creecy, B. Hammond, J. Hull, N. Larsen, T. Vogl, and C. Wilson
August 1992 PB92-238542 $44.50

NISTIR 4923 *Comparison of Massively Parallel Hand-Print Segmenters*
By R. Allen Wilkinson and Michael D. Garris
September 1992 PB93-113561 $17.50

NISTIR 4933 *Computer Security Bulletin Board System User's Guide*
(Supersedes NISTIR 4667)
By Mark Skandera and Marianne Swanson
September 1992 PB93-113553 $17.50

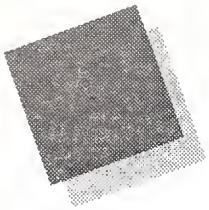
NISTIR 4934 *Protocol Implementation Conformance Statement (PICS) Proforma for the SDNS Security Protocol at Layer 4 (SP4)*
By Wayne A. Jansen
October 1992 PB93-120731 $17.50

NISTIR 4938 *Using Self-Organizing Recognition as a Mechanism for Rejecting Segmentation Errors*
By R. Allen Wilkinson, Michael D. Garris, and Charles L. Wilson
October 1992 PB93-138972 $17.50

SN numbers - stocked by GPO
PB numbers - stocked by NTIS

PUB. NUMBER	TITLE
NISTIR 4939	*Threat Assessment of Malicious Code and External Attacks* By Lawrence E. Bassham and W. Timothy Polk October 1992 PB93-120699 $17.50
NISTIR 4940	*Computer-Aided Acquisition and Logistic Support (CALS) Testing: Programs, Status, and Strategy* By Sharon J. Kemmerer October 1992 PB93-125029 $27.00
NISTIR 4950	*NIST Scoring Package User's Guide, Release 1.0* By Michael D. Garris and Stanley A. Janet October 1992 PB93-120707 $19.50
NISTIR 4951	*Validated Products List 1992 No. 4* (supersedes NISTIR 4871) Judy B. Kailey, Editor October 1992 PB92-937304 $27.00
NISTIR 4953	*User's Guide for the PHIGS Validation Tests (Version 2)* By John Cugini, Mary T. Gunn, and Lynne S. Rosenthal October 1992 PB93-126365 $27.00
NISTIR 4976	*Assessing Federal and Commercial Information Security Needs* By David F. Ferraiolo, Dennis M. Gilbert, and Nickilyn Lynch November 1992 PB93-138956 $17.50
NISTIR 4983	*A Study of OSI Key Management* By Roberto Zamparo November 1992 PB93-151579 $36.50
NISTIR 4990	*OCR Error Rate Versus Rejection Rate for Isolated Handprint Characters* By Jon Geist and R. Allen Wilkinson December 1992 PB93-146652 $17.50
NISTIR 4995	*Effectiveness of Feature and Classifier Algorithms in Character Recognition Systems* By C.L. Wilson December 1992 PB93-147197 $17.50

SN numbers - stocked by GPO
PB numbers - stocked by NTIS



PAPERS

OCTOBER 1991 THROUGH DECEMBER 1992

Newton, Judith J.; **Data Administration Management Association Symposium.** NIST Journal of Research. September/October 1991.

Wardle, Caroline; Wallace, Dolores R.; Khorramshagol, Eugene; McGuire, Eugene; Kaplan, Bonnie; **SQA Standards and Total Quality Management,** Pacific Northwest Software Quality Conference. October 1991.

Cherniavsky, John C.; Kuhn, David R.; and Wallace, Dolores R.; **High Integrity Software Standards Activities at NIST.** Proceedings, Pacific Northwest Software Quality Conference. October 1991.

Qian, X.; Wakid, Shukri A.; Vaman, D.; Cypher, D.; **Architectures for B-ISDN Networks; A Performance Study.** International Journal of Satellite Communications, Vol. 9, No. 5. October 1991.

Spielman, Frankie E.; **Electronic Image Management Standards, Open Document Architecture (ODA) and Document Interchange.** Handout for Document Image Management in Government Conference.

Flater, D.W.; Yesha, Y.; **An Efficient Management of Read-Only Data in a Distributed Information System.** Journal of Intelligent Information Systems.

Harman, Donna K.; **The SMART System After 30 Years - Evaluation Issues Then and Now.** 14th International Conference on Research and Development in Information Retrieval. October 1991.

Newton, Judith J.; **Developing and Applying Data Entity Naming Conventions.** Data Resource Management, Data Resource Mgmt. Vol 2. No.4. October 1991.

Linn, Richard J.; **Conformance Testing Methodologies and Architectures for OSI Protocols.** IEEE Computer Society Tutorial.

Williamson, Mark P.; **An Initial Appraisal of the Potential Risks Associated with the Storage of Data on 3480 Type Media and A Summary of the Care and Handling Procedures Required to Minimize these Risks.** Proceedings, Tape Head Interface Committee. November 1991.

Aronoff, Robert; Chernick, C. Michael; Stokesberry, Daniel P; **OSI Systems Management Standards.** Proceedings of IEEE Milcom '91 Conference. November 1991.

Nielsen, Fran; **An Overview of the Government Network Management Profile (GNMP).** Proceedings of IEEE Milcom '91 Conference. November 1991.

Polk, W. Timothy; Bassham, Lawrence E., III; **Virus Naming Procedures.** Anti-Virus Product Developers' Conference Proceedings. November 1991.

Nightingale, Stephen J.; **Report of the ISO/IEC Workshop on Worldwide Recognition of OSI Test Results, May 6-8, 1991.** NIST Journal of Research. November/December 1991.

Radack, Shirley M.; **A Report on the 6th International Conference on the Application of Standards for Open Systems.** NIST Journal of Research. November/December 1991.

Kuhn, David R.; IEEE'S POSIX: **Making Progress.** IEEE Spectrum. December 1991.

Dimmick, Darrin L.; Garris, Michael D.; Wilson, Charles L.; **Structured Forms Database.** Technical Report Special Database 2, SFRS, NIST. December 1991.

Gallagher, Leonard J.; **Database Management Standards: Status and Applicability. Computer Standards and Interfaces.** North Holland Publishing Company. December 1991.

Wilkinson, R. Allen; **Segmenting Text Images with Massively Parallel Machines.** Intelligent Robots and Computer Vision, volume 1607, pages 312-323. Boston, Massachusetts. SPIE, 1991.

Moline, Judi; **Designing Multimedia Systems for Museum Objects and their Documentation.** Chapter 13, Multimedia Information Systems. Buckland and Stone, Eds., Learned Information, Inc. 1992.

Harman, Donna K.; **Inverted Files, Ranking Algorithms, and Relevance Feedback and Other Query Modification Techniques.** Information Retrieval: Data Structures and Algorithms, Prentice - Hall, 1992.

Harman, Donna K.; **User Testing: A Statistical Information Retrieval System.** Bulletin of the American Computing Journal, Volume 10. 1992.

Blue, J. L; Grother, Patrick J.; **Training Feed Forward Networks Using Conjugate Gradients.** Conference on Character Recognition and Digitizer Technologies, San Jose, California. February 1992.

Schneeman, Richard D.; Nicholas, Charles K.; **A Standard Microkernel Interface Facilitates Portable Server Development.** Proceedings of IEEE 3rd Workshop on Workstation Operating Systems. February 1992.

Garris, Michael D.; Wilson Charles L.; Blue, J.L.; Candela, Gerald T.; Grother, Patrick J.; Janet, Stanley; Wilkinson, R. Allen; **Massively Parallel Implementation of Character Recognition Systems.** Conference on Character Recognition and Digitizer Technologies, San Jose, California. SPIE/IS&T. February 1992.

Podio, Fernando L.; **Research on Methods for Determining Optical Disk Media Life Expectancy Estimates.** SPIE/IS&T Symposium on Electronic Imaging: SPIE International Society for Optical Engineering. February 1992.

Garris, Michael; Wilkinson, R. Allen; **Handwritten Segmented Characters Database.** Technical Report Special Database 3, HWSC, NIST. February 1992.

Garris, Michael; **Design and Collection of a Handwriting Sample Image Database.** Social Science Computing Journal, Volume 10. 1992.

Tang, Debra; Liu, Jinsheng; Favreau, Jean-Philippe; **The IS-IS Multi-Party Conformance Test System.** The 5th International Workshop on Protocol Test Systems. Montreal, Canada.

Ruhl, Mary K.; Gunn, Mary T.; **Letter to the Editor of Computerworld.** March 10, 1992.

Garris, Michael D.; Wilson, Charles L.; **A Neural Approach to Concurrent Character Segmentation and Recognition.** Southcon '92 Conference Record, Orlando, Florida. IEEE. March 1992.

Polk, W. Timothy; Bassham, Lawrence E., III; **UNIX Security Tools 5th International Conference on Computer Viruses and Security.** March 1992.

Wakid, Shukri A.; Cypher, D.; **Standardization for SONET and ATM and Open Issues.** Proceeding of the Third Annual Workshop on Very High Speed Networks. 1992.

Wilkinson, R. Allen; **Handprinted Segmented Characters Database.** Technical Report Test Database 1, TST1, NIST. April 1992.

Grother, Patrick, J.; **Karhunen Loeve Feature Extraction for Neural Handwritten Character Recognition.** Proceedings, Applications of Artificial Neural Networks III, Orlando, Florida. SPIE. April 1992.

Fong, Elizabeth N.; Morris, K.C.; Dabrowski, Christopher; **Proposed Persistent Object Base Testbed: Program and Planning.** DARPA Software Technology Conference. April 28-30, 1992.

Cypher, David E.; Wakid, Shukri A.; **Standardization for SONET and ATM and Open Issues.** Journal of High Speed Networks. 1992.

Watson, Craig; Wilson, Charles L.; **Fingerprint Database.** NIST Special Database 4, FPDB. April 18, 1992.

Wilson, Charles L.; **FAUST: A Vision-Based Neural Network Multi-Map Pattern Recognition Architecture.** Proceedings of Applications of Artificial Neural Networks III. Orlando, Florida. SPIE. April 1992.

Harman, Donna K.; **Automatic Indexing. ASIS Monograph Advances in Indexing.** Learned Information Inc., Medford, NJ. Spring 1992.

Garris Michael D.; **A Platform for Evolving Genetic Automata for Text Segmentation (GNATS).** Science of Artificial Neural Networks, Orlando, Florida. SPIE. April 1992.

Kemmerer, Sharon J.; **CALS Testing: Programs, Status, Strategy.** CALS Journal. May 1992.

Burr, William E.; Wakid, Shukri A.; Dhadesughoor, V.; Nightingale, Stephen J.; Qian, X.; **A Comparison of FDDI Asynchronous Mode and DQDB Queue Arbitrated Mode Data Transmission for Metropolitan Area Network Applications.** IEEE Transactions on Communications. 1992.

Wallace, Dolores R.; Kuhn, David R.; Ippolito, Laura M.; Beltracchi, L. (NRC); **An Analysis of Standards for the Assurance of High Integrity Software.** International Symposium on Nuclear Power Plant Instrumentation Control, Tokyo, Japan. May 1992.

Katzke, Stuart W.; **A Framework for Computer Security Risk Management.** Risk Management for IT Systems and Projects Symposium, Munich, Germany. May 12-13, 1992.

Mills, Kevin L.; **Communicating Data in a Confusing World: Standards Provide the Key.** Federal Computer Week. May 1992

Favreau, Jean-Philippe; Hogrefe, D. (Switzerland); Kroon, J.; (The Netherlands); **Formal Methods in Conformance Testing: Status and Expectations.** Proceedings of 12th International Symposium on Protocol Specification, Testing, and Verification; Lake Buena Vista, FL. June 1992.

Harman, Donna K.; **Relevance Feedback Revisited.** Proceedings of 15th International Conference on R&D in Information Retrieval, Copenhagen, Denmark. June 1992.

Boland, Timothy; **Draft Working Implementation Agreements for Open Systems Interconnection Protocols.** June 1992.

Wallace, Dolores R.; Kuhn, David R.; Ippolito, Laura M.; **An Analysis of Selected Software Safety Standards.** Proceedings of COMPASS '92 Conference. IEEE Computer Society. June 1992.

Burrows, James H.; Wakid, Shukri A.; **Chairperson's Message for Gigabit Networking Workshop.** June 16-17, 1992.

Omidvar, Omid M.; Wilson, Charles L.; **Optimization of Neural Network Topology and Information Content Using Boltzmann Methods.** Proceedings of the IJCNN. June 1992.

Majurski, William J.; Dayhoff, Ruth E.; Maloney, Daniel L.; **Prototyping a Graphical User Interface for DHCP.** MUMPS Computing MUG Proceedings Issue. June 1992.

Ransom, Michael L.; **Standardized Access Control for the OSI Directory.** Handbook of Local Area Networks, 1992-93 Yearbook.

Garris, Michael D.; Wilson, Charles L.; **Reject Mechanisms for Massively Parallel Neural Character Recognition Systems.** Proceedings of SPIE 1992 International Symposium on Optical Applied Science; Vol. 1766 on Neural and Stochastic Neural Methods in Image and Signal Processing. SPIE. July 1992.

Omidvar, Omid M.; Wilson, Charles L.; **Topological Separation Versus Weight Sharing in Neural Net Optimization.** Proceedings of SPIE 1992 International Symposium on Optical Applied Science and Engineering; Vol. 1766, SPIE. July 1992.

Katzke, Stuart; Wack, John; **UNIX System Security.** URISA '92 30th Annual Conference. July 1992.

Smid, Miles E.; **Response to Comments on the NIST Proposed Digital Signature Standard.** CRYPTO 92 Proceedings.

Kemmerer, Sharon J.; **CALS Testing - Getting it Right the First Time.** Proceedings of the 1992 CALS EXPO.

Wakid, Shukri A.; Roberts, Kathleen M.; **North American Agreements for ISDN.** Special Issue of IEEE Communications Magazine. August 1992.

Lyon, Gordon; Snelick, Robert; Kacker, Raghu; **Time-Perturbation Tuning of MIMD Programs.** Paperback: Computer Performance Evaluation '92 - Modelling Techniques and Tools, Rob Pooley and Jane Hillston (eds.) Printed in Great Britain by Antony Rowe Ltd, Chippenham, Wiltshire; Pgs. 211-224, 1992. Proceedings of the Sixth International Conference on Modelling Techniques and Tools for Computer Performance Evaluation. Edinburgh, Scotland. September 16-18, 1992.

Mills, Kevin L.; **Data Communications In The Federal Government: Tomorrow Awaits.** Government Computer News. September 1992.

Su, David H.; **Letter to Editor of Network World.** September 14, 1992.

Qian, X.; Vaman, D.; Wakid, Shukri A.; Cypher, David; **Provision of Isochronous Service on IEEE 802.6.** IEEE Transactions on Communications. 1992.

Gallagher, Leonard J.; Object SQL: **Language Extensions for Object Data Management.** Invited Paper for International Society for Mini and Microcomputers (ISMM) First International Conference on Information and Knowledge Management. November 1992.

Bassham, Lawrence E., III; Polk, W. Timothy; **A Proposal for the Precise Identification of Computer Viruses.** Proceedings of the 15th National Computer Security Conference. October 1992.

Carnahan, Lisa J.; **A Local-Area Network Security Architecture.** Proceedings of the 15th National Computer Security Conference. October 1992.

Radack, Shirley M.; Katzke, Stuart W.; **The Role of NIST in International Information Technology Standards.** Proceedings of the 8th Asia Pacific Information Systems Control Conference, Singapore. October 1992.

Chang, Shu-Jen; **Priorities for LAN Security - A Case Study of a Federal Agency's Lan Security.** Proceedings of the 15th National Computer Security Conference. October 1992.

Ferraiolo, David; Kuhn, David R.; **Role-Based Access Controls.** Proceedings of the 15th National Computer Security Conference. October 1992.

Flahavin, Ellen E.; **TMach, A Symbol of International Harmonization.** Proceedings of the 15th National Computer Security Conference. October 1992.

Flahavin, Ellen; Toth, Patricia; **Concept Paper - An Overview of the Proposed Trust Technology Assessment Program.** Proceedings of the 15th National Computer Security Conference. October 1992.

Gilbert, Dennis; Pitcher, Sadie; Maconochy, Dr. W.; Swanson, Marianne; **Information Technology (IT) Security Requirements.** Proceedings of the 15th National Computer Security Conference. October 1992.

Jansen, Wayne A.; **SDNS Security Management.** Proceedings of the 15th National Computer Security Conference. October 1992.

Troy, Eugene; **Perspectives and Progress on International Criteria.** Proceedings of the 15th National Computer Security Conference. October 1992.

Troy, Eugene; Ross, Ron; Ferraiolo, David; Basic, Eugene; Wood, Jonathan; **Perspectives and Progress on International Criteria.** Proceedings of 15th National Computer Security Conference. October 1992.

Henry, Tom; **Standards Issues and Initiatives.** GISDEX' 92 Conference. October 1992.

Wilson, Charles L.; Candela, Gerald; Grother, Patrick J.; Watson, Craig I.; Wilkinson, R. Allen; **Massively Parallel Neural Network Fingerprint Classification System.** Journal of Artificial Neural Networks. 1992.

Omidvar, Omid M.; Wilson, Charles L.; **Information Content in Neural Net Optimization.** SPIE Transactions on Image Processing. 1992.

Yesha, Yelena; **Query Routing and Object Caching in a Large Distributed Information System.** International Conference on Information and Knowledge Management. November 1992.

Wilkinson, R. Allen; Garris Michael D.; **Comparison of Massively Parallel Hand-Print Segmentors.** Intelligent Robots and Computer Vision: Algorithms, Techniques, and Active Vision, volume 1825. Boston, Massachusetts. SPIE. 1992.

Wilkinson, R. Allen; Garris, Michael D.; Wilson, Charles L.; **Using Self-Organizing Recognition as a Mechanism for Rejecting Segmentation Errors.** Intelligent Robots and Computer Vision: Algorithms, Techniques, and Active Vision, volume 1825. Boston, Massachusetts. SPIE. 1992.

Wilson, Charles L.; **A New Self-Organizing Neural Network Architecture for Parallel Multi-Map Pattern Recognition - FAUST.** Progress in Neural Networks, volume 4. 1992.

Wilson, Charles L.; Blue, J.L.; **Neural Network Methods Applied to Character Recognition.** Social Science Computer Review, volume 10. 1992.

Wilson, Charles L.; **Massively Parallel Neural Network Recognition.** Proceedings of the IJCNN, volume III, pages 227-232. June 1992.

Lyle, James R.; **Program Slicing.** Entry on Program Slicing in Encyclopedia of Software Engineering. September 1992.

Law, Margaret H.; **Template-Driven Systems Development with IDEF: Enterprise Standards for Reuse.** Proceedings of the IDEF Users Group 1992 Fall Conf. on Business Process Design - A Strategy for Corporate Information Management; Washington, DC. Oct. 1992.

Radack, Shirley M.; **Information Technology Standards in Federal Acquisitions.** Federal Data Center Issues - A View to the Future, to be published by the Council of Federal Data Center Directors.

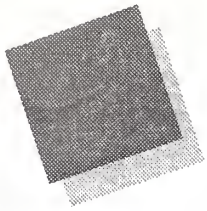
Wallace, Dolores; Ippolito, Laura; Kuhn, D. Richard; Beltracchi, Leo; **Standards for High Integrity Software.** 20th Water Reactor Safety Information Meeting. October 21-23, 1992.

Harman, Donna K.; **Evaluation Issues in Information Retrieval.** Information Processing & Management, Vol. 18, No. 4, pp 439-440, Printed in Great Britain. 1992.

Jefferson, David K.; **Impact of Computer-Aided Acquisition and Logistic Support (CALS) on the Applications of Standards for Open Systems.** Proceedings of the 7th International Conference on the Application of Standards for Open Systems. November 1992.

Schneeman, Richard D.; **Porting Multimedia Applications to the Open System Environment.** IEEE Software. November 1992.

Kuhn, David R.; **A Technique for Analyzing the Effects of Changes in Formal Specifications.** The Computer Journal. December 1992.



CONFERENCES AND WORKSHOPS

October 1991 - December 1992

1991

October 1-4	North American ISDN Users' Forum (NIUF)
October 1-4	14th National Computer Security Conference (cosponsored by the National Computer Security Center [NCSC])
October 11	Lecture Series on High Integrity Systems
October 11	Lecture on Object-Oriented Databases
November 8	Lecture Series on High Integrity Systems
November 8	Lecture Series on Hypermedia
November 12	Applications Portability Profile/Open System Environment (APP/OSE) Users' Forum
November 18	Computer Security Awareness Seminar
December 2	Computer Security Day
December 3	Lecture Series on High Integrity Systems
December 9-13	OSI Implementors' Workshop (OIW) (cosponsored by the Institute of Electrical and Electronics Engineers [IEEE] Computer Society)

1992

January 24	Lecture Series on Hypermedia
February 14	Lecture Series on High Integrity Systems
February 18	Object Technology Lecture
February 18-21	Spatial Data Transfer Standard Workshop
February 25-26	Federal Information Systems Security Educators' Association
February 25-28	North American Integrated Services Digital Network (ISDN) Users' Forum (NIUF)
March 6	Lecture Series on Hypermedia
March 9-13	OIW (cosponsored by IEEE Computer Society)
April 3	Lecture Series on High Integrity Systems

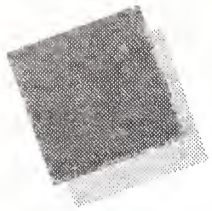
April 10	Lecture Series on Hypermedia
April 27-29	CD-ROM Technical Conference
May 11	Object Technology Lecture
May 12-13	5th Annual Data Administration Management Association (DAMA) Symposium
May 14	APP/OSE Users' Forum
May 15	Lecture Series on Hypermedia
May 18	Lecture Series on High Integrity Systems
May 18-22	NIST Integrated Software Engineering Environment (ISEE) Users' Forum
May 27-29	First Optical Character Recognition (OCR) Systems Conference (cosponsored by Bureau of the Census)
June 2-5	NIUF
June 8-12	OIW (cosponsored by IEEE Computer Society) (note name changes to Open Systems Environment Implementors Workshop [OIW])
June 15-18	COMPASS '92 7th Annual Conference on Computer Assurance (cosponsored by the IEEE National Capital Area Council and the IEEE Aerospace and Electronics Systems Society)
June 19	Software Producibility MODIL Workshop on Reuse
June 23-26	Department of Defense Electronic Data Interchange Conference (cosponsored by the Office of the Asst. Secretary of Defense Production and Logistics)
August 7	Software Producibility MODIL Workshop
September 21-25	OIW (cosponsored by IEEE Computer Society)
September 28	Software Producibility MODIL Workshop
October 9	Lecture Series on High Integrity Systems
October 13-16	15th National Computer Security Conference (cosponsored by NCSC)
October 27-30	NIUF
November 4-6	First Text Retrieval Conference (TREC) (cosponsored by Defense Advanced Research Project Agency [DARPA])
November 9	ISEE Users' Forum

November 10	APP/OSE Users' Forum
November 16-20	Transcontinental ISDN Project '92 - (cosponsored by NIUF and Corporation for Open Systems)
November 30	Computer Security Day
December 1	Lecture Series on High Integrity Systems
December 7	GOSIP Procurement Symposium
December 10-11	Workshop on High Integrity Software
December 14-18	OIW (cosponsored by IEEE Computer Society)

PLANNED CONFERENCES AND WORKSHOPS

1993

February 8-12	NIUF
February 17-18	Federal Digital Signature Applications Symposium
February 23-24	Federal Information Systems Security Educators' Association
February 25	Lecture Series on High Integrity Systems
March 8-12	OIW (cosponsored by IEEE Computer Society)
May 11-12	6th Annual DAMA Symposium
May 25-26	APP/OSE Users' Forum
June 7-11	OIW (cosponsored by IEEE Computer Society)
June 14-17	COMPASS '93, 8th Annual Conference on Computer Assurance (cosponsored by the IEEE National Capital Area Council and the IEEE Aerospace and Electronics Systems Society)
June 21-25	NIUF
August 30	Text Retrieval Conference (TREC)
September 13-17	OIW (cosponsored by IEEE Computer Society)
September 20-24	16th National Computer Security Conference (cosponsored by NCSC)
October 18-22	NIUF
November 17-18	APP/OSE Users' Forum
December 6-10	(OIW) (cosponsored by IEEE Computer Society)



TALKS

During the past year, CSL staff members presented papers and gave talks to a large number of external organizations, including the following:

Air Force Cryptologic Support Center
American Bar Association
American National Standards Institute (ANSI)
American Society for Industrial Security
Americas Telecommunications Standards Symposium
Anti-Virus Product Developers' Conference
Applications Portability Profile/Open Systems Environment (APP/OSE) Users' Forums
Armed Forces Communication and Electronics Association (AFCEA)
Association for Computing Machinery (ACM)
Association for Federal Information Resources Management (AFFIRM)
AT&T Bell Laboratories

Bell Atlantic
Bureau of Census

CALS/CE Expo '92 Industry Steering Group
Canadian Communications Security Establishment
Carnegie-Mellon University
Carnegie Institute of Washington
COMPASS '92 Annual Conference on Computer Assurance
Computer-aided Acquisition and Logistic Support (CALS) EXPO '92
Computer Security Institute
Computer Integrated Manufacturing Conference
Corporation for Open Systems

Data Administration Management Association (DAMA)
Data Interchange Standards Association
Data Processing Management Association
Defense Advanced Research Project Agency (DARPA)
Delft University, Delft, The Netherlands
Department of Commerce (DoC)
Department of Defense
Department of Energy
Department of Justice
Department of Veterans Affairs
DoC Telecommunications Coordinating Committee
DoD Information Management Directorate Computer Security Conference '92

Eastman Kodak
EDI and Government Computer News Conference
Electronic Data Interchange National Conference
Enterprise Networking Event '92
Environmental Protection Agency
European ISDN Users' Forum

Federal Bureau of Investigation
Federal Computer Security Program Managers' Forum
Federation of Government Information Processing Councils
Fingerprint Image Analysis Workshop
Fourth Workshop on Computer Security Incident Handling
FTS 2000 Interagency Management Council

George Washington University
Geographic Information & Spatial Data Exposition (GISDEX)
GOSIP Security Profiles, Interop 92 Conference
Government Users' ISDN Security Conference

Hewlett-Packard
Honeywell Federal Systems Division

Information Systems Security Association (ISSA) '92
INFORUM
Independent Telephone Pioneers Association
Institute for Supercomputing Research of Japan
Institute of Electrical and Electronics Engineers (IEEE)
Institute of Engineers, Australia Conference
Institut National de Telecommunications, Evry, France
Interagency Working Group on Management of Data for Global Change
Internal Revenue Service
International Conference on R&D in Information Retrieval
International Data Administration Symposium
International Joint Conference on Neural Networks '92
International Neural Network Society
International Workshop on Harmonizing Conformance Testing of Programming Languages, Milano, Italy
INTEROP '92, Washington, DC
International Conference on the Applications of Standards for Open Systems, Paris, France

Johns Hopkins University

Library of Congress, Washington, DC

MITRE Corporation

National Aeronautics and Space Administration
National Archives and Records Administration
National Association of State Election Directors
National Communications Forum, Chicago
National Computer Graphics Association
National Computer Security Center
National Computer Security Conferences
National Contract Management Association
National Endowment for the Humanities
National Science Foundation
National Security Agency
National Security Industrial Association
Naval Surface Warfare Center
Network Security Information Exchange

North American Integrated Services Digital Network Users' Forum (NIUF)
Northern Telecom
Nuclear Regulatory Commission

Office of Management and Budget
Ohio Supercomputing Research Center
Oklahoma Gas and Electric Company
Open Software Foundation
Open System Environment (OSE) Implementors Workshop (OIW)
Overseas Security Advisory Council

Presidential Council on Integrity and Efficiency

Quality Assurance Institute

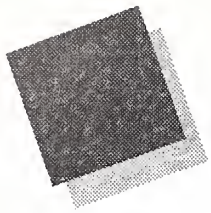
Royal School of Librarianship, Copenhagen, Denmark

Second National Conference on Optical Storage Laws and Regulations
SecurTech '92 Conference
Securities and Exchange Commission
Smithsonian Seminar on Scientific Imaging
Society of Manufacturing Engineers
Software AG Federal Industry Group
Software Engineering Institute
Software Engineering & Its Applications, Toulouse '92
Standards for Computer Integrated Manufacturing Conference
Sun Microsystems
Symposium on High-Speed Telecommunications and Integrated
Hospital Imagery

Tenth International IFIP WG6.1 Symposium on Protocol Specifications, Testing, and Verification
Third Annual Workshop on Very High Speed Networks
TRIP '92 Washington Event
Trusted Information Systems

Unigraphics Users Group
University of Arizona
University International Processing, Zurich, Switzerland
University of Maryland
UNIX International
URISA Urban & Regional Information Systems Association
U.S. Army Computer Vulnerability/Survivability Study Team
USDA Information Resource Management Conference

X/OPEN



ELECTRONIC BULLETIN BOARDS

CSL operates three electronic bulletin boards for information exchange:

Information about computer security	(301) 948-5717
9600 baud only	(301) 948-5140
Information about data management activities and applications	(301) 948-2048 and 948-2059
Information about the North American Integrated Services Digital Network (ISDN) Users' Forum (NIUF)	(301) 869-7281

Users can reach the bulletin boards by dialing the numbers listed above. Terminals should have the following capabilities:

ASCII, 300, 1200, or 2400 baud (9600 baud available for computer security bulletin board only), 8 bits with no parity or 7 bits with even parity, 1 stop bit.

If a connection is not established at the end of two rings or if the line is busy, hang up and try again.

After CONNECT, strike the carriage return twice and the system will be accessed. The system will now guide you through the bulletin board by asking key questions and providing helpful menus.

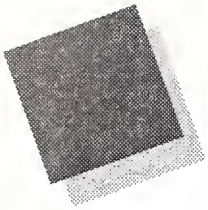
ACCESSING INFORMATION ON VALIDATED PRODUCTS

CSL publishes a *Validated Products List* (VPL), a collection of registers describing implementations of Federal Information Processing Standards (FIPS) that have been validated for conformance to FIPS. Updated quarterly, the list also contains information about the organizations, test methods, and procedures that support the validation programs.

The VPL contains conformance testing information for the following information technology standards: Programming Languages COBOL, Fortran, Ada, Pascal, C, and MUMPS; Database Language SQL; Graphics; GOSIP; POSIX; and Computer Security. Entries in the printed VPL are contained in WordPerfect, Version 5.1 files.

To access the VPL via the Internet:

Type: ftp speckle.ncsl.nist.gov (internet address is 129.6.59.2)
Login as user ftp
Type your e-mail address as the password
Type: cd pub/vpl
Type: binary
Type: dir



USER GROUPS SPONSORED BY CSL

The **Open System Environment (OSE) Implementors' Workshop (OIW)** meets four times a year to discuss detailed implementation specifications for OSE standards.

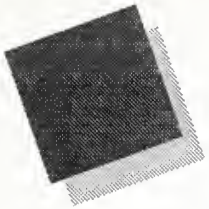
CONTACT: Tim Boland
B-217 Technology Building
National Institute of Standards and Technology
Gaithersburg, MD 20899
Telephone: (301) 975-3608

The joint **ISDN Users' Workshop and ISDN Implementors' Workshop of the North American ISDN Users' Forum (NIUF)** meets three times a year to address application requirements and to develop application profiles for ISDN products and services.

CONTACT: Dawn Hoffman
B-364 Materials Building
National Institute of Standards and Technology
Gaithersburg, MD 20899
Telephone: (301) 975-2937

The **Applications Portability Profile/Open System Environment (APP/OSE) Users' Forum** meets twice a year to identify federal requirements and to discuss the development of an architectural approach to applications portability in an open system environment.

CONTACT: Joe Hungate
B-266 Technology Building
National Institute of Standards and Technology
Gaithersburg, MD 20899
Telephone: (301) 975-3368



FIPS PUBLICATIONS LIST BY FIPS NUMBER

1992 December

FIPS NO.	CATEGORY	TITLE-DATE	CHANGE NOTICES
0	(1)P	General Description of FIPS Register 68 Nov 01	
1-2	(2&3)S	Code for Information Interchange, Its Representations, Subsets, and Extension (ANSI X3.4-1977, X3.32-1973, X3.41-1974) 84 Nov 14	
2-1	(2)S	Perforated Tape Code for Information Interchange (ANSI X3.6-1965/R1965/R1983 & R1991) 84 Nov 14	
3-1		WITHDRAWN	1
4-1	(4)S	Representation for Calendar Date and Ordinal Date for Information Interchange (ANSI X3.30-1985/R1991) 88 Jan 27	
5-2	(4)S	Codes for the Identification of the States, the District of Columbia and the Outlying Areas of the United States, and Associated Areas 87 May 28	1
6-4	(4)S	Counties and Equivalent Entities of the United States, Its Possessions, and Associated Areas 90 Aug 31	1
7		WITHDRAWN	1
8-5	(4)S	Metropolitan Statistical Areas (MSAs) (Including CMSAs, PMSAs, and NECMAs) 84 Oct 31	6
9-1	(4)S	Congressional Districts of the U.S. 90 Nov 30	

***Approved in 1992**

Category Key: **(1)** General Publications **(2)** Hardware Standards/guidelines **(3)** Software Standards/guidelines **(4)** Data Standards/guidelines **(5)** Computer Security Standards/guidelines **(6)** ADP Operations Standards/guidelines **(7)** Computer-Related Telecommunications Standards **(8)** Conformance Tests

S-Standard **G**-Guideline **P**-Program Information Document **T**-Conformance Tests

FIPS NO.	CATEGORY	TITLE-DATE	CHANGE NOTICES
10-3	(4)S	Countries, Dependencies, Areas of Special Sovereignty, and their Principal Admin. Divs. 84 Feb 09	13
11-3	(3)G	Guideline: American National Dictionary for Inform. Systems (ANSI X3.172-1990) 91 Feb 01	
12-2		WITHDRAWN	1
13	(2)S	Rectangular Holes in Twelve-Row Punched Cards (ANSI X3.21-1967/R1980 & R1991) 71 Oct 01	
14-1	(2)S	Hollerith Punched Card Code (ANSI X3.26-1980/R1991) 80 Dec 24	
15		WITHDRAWN	1
16-1	(7)S	Bit Sequencing of Code for Information Interchange in Serial-By-Bit Data Transmission (ANSI X3.15-1976/R1983 & R1990) 77 Sept 01	1
17-1	(7)S	Character Structure and Char. Parity Sense for Serial-By-Bit Data Communication in the Code for Inform. Interchg. (ANSI X3.16-1976/R1983 & R1990) 77 Sept 01	
18-1	(6)S	WITHDRAWN	1
*19-2	(4)G	Catalog of Widely Used Code Sets 92 July 01	
20		WITHDRAWN	1
21-3	(3)S	COBOL (ANSI X3.23-1985 & X3.23A-1989) 90 Jan 12	2

***Approved in 1992**

Category Key: **(1)** General Publications **(2)** Hardware Standards/guidelines **(3)** Software Standards/guidelines **(4)** Data Standards/guidelines **(5)** Computer Security Standards/guidelines **(6)** ADP Operations Standards/guidelines **(7)** Computer-Related Telecommunications Standards **(8)** Conformance Tests

S-Standard **G**-Guideline **P**-Program Information Document **T**-Conformance Tests

FIPS NO.	CATEGORY	TITLE-DATE	CHANGE NOTICES
22-1	(7)S	Synchronous Signaling Rates Between Data Terminal and Data Communication Equip. (ANSI X3.1-1976) 77 Sept 01	
23		WITHDRAWN	1
24		WITHDRAWN	1
25		WITHDRAWN	1
26	(2)S	One-Inch Perforated Paper Tape for Information Interchange (ANSI X3.18-1967/R1974, R1982, & R1990) 73 June 30	
27	(2)S	Take-Up Reels for One-Inch Perforated Tape for Information Interchg. (ANSI X3.20-1967/R1982 & R1990) 73 June 3	
28		WITHDRAWN	2
*29-3	(1&3)P	Interpretation Procedures for Federal Information Processing Standards for Software 92 Oct 29	
30	(3)S	Software Summary for Describing Computer Programs and Automated Data Systems 74 June 30	
31	(5)G	Guidelines for Automatic Data Processing Physical Security and Risk Management 74 June	
32-1	(2)S	Character Sets for Optical Char. Recognition (OCR) (ANSI X3.2-1970/R1976, X3.17-1981/R1989, X3.49-1975/R1982 & R1989) 82 June 25	
33-1	(2)S	Character Set for Handprinting (ANSI X.3.45-1982/R1989) 84 Nov 05	

***Approved in 1992**

Category Key: **(1)** General Publications **(2)** Hardware Standards/guidelines **(3)** Software Standards/guidelines **(4)** Data Standards/guidelines **(5)** Computer Security Standards/guidelines **(6)** ADP Operations Standards/guidelines **(7)** Computer-Related Telecommunications Standards **(8)** Conformance Tests

S-Standard **G**-Guideline **P**-Program Information Document **T**-Conformance Tests

FIPS NO.	CATEGORY	TITLE-DATE	CHANGE NOTICES
34	(1)P	Guide for the Use of International System of Units (SI) in Federal Information Processing Standards Publications 75 Jan 01	
35		WITHDRAWN	1
36		WITHDRAWN	1
37		WITHDRAWN	1
38	(3)G	Guidelines for Documentation of Computer Programs and Automated Data Systems 76 Feb 15	
39	(5)G	Glossary for Computer Systems Security 76 Feb 15	
40	(2)G	Guideline for Optical Character Recognition Forms 76 May 01	
41	(5)G	Computer Security Guidelines for Implementing the Privacy Act of 1974 75 May 30	
42-1	(6)G	Guidelines for Benchmarking ADP Systems in the Competitive Procurement Environment 77 May 15	
43		WITHDRAWN	1
44		WITHDRAWN	1
45	(4)G	Guide for the Development, Implementation & Maintenance of Standards for the Representation of Computer Processed Data Elements 76 Sept 30	
46-1	(5)S	Data Encryption Standard 88 Jan 22	

***Approved in 1992**

Category Key: **(1)** General Publications **(2)** Hardware Standards/guidelines **(3)** Software Standards/guidelines **(4)** Data Standards/guidelines **(5)** Computer Security Standards/guidelines **(6)** ADP Operations Standards/guidelines **(7)** Computer-Related Telecommunications Standards **(8)** Conformance Tests

S-Standard **G**-Guideline **P**-Program Information Document **T**-Conformance Tests

FIPS NO.	CATEGORY	TITLE-DATE	CHANGE NOTICES
47		WITHDRAWN	1
48	(5)G	Guidelines on Evaluation of Techniques for Automated Personal Identification 77 Apr 01	
49	(6)G	Guideline on Computer Performance Management: An Introduction 77 May 01	
50		WITHDRAWN	1
51		WITHDRAWN	1
52		WITHDRAWN	1
53	(3)S	Transmittal Form for Describing Computer Magnetic Tape File Properties 78 Apr 01	
54-1	(2)S	Computer Output Microform (COM) Formats and Reduction Ratios, 16 mm and 105 mm (ANSI/AIIM MS5-1991 & MS14-1988) 91 Jan 15	
55 DC-4	(4)G	Guideline: Codes for Named Populated Places Primary County Divisions, and Other Locational Entities of the United States and Outlying Areas 87 Jan 16	1
55-2	(4)G	Same as 55DC expect without codes 87 Feb 03	1
56	(6)G	Guideline for Managing Multivendor Plug-Compatible ADP Systems 78 Sept 15	

***Approved in 1992**

Category Key: **(1)** General Publications **(2)** Hardware Standards/guidelines **(3)** Software Standards/guidelines **(4)** Data Standards/guidelines **(5)** Computer Security Standards/guidelines **(6)** ADP Operations Standards/guidelines **(7)** Computer-Related Telecommunications Standards **(8)** Conformance Tests

S-Standard **G**-Guideline **P**-Program Information Document **T**-Conformance Tests

FIPS NO.	CATEGORY	TITLE-DATE	CHANGE NOTICES
57	(6)G	Guidelines for the Measurement of Interactive Computer Service Response Time and Turnaround Time 78 Aug 01	
58-1	(4)S	Representations of Local Time of the Day for Information Interchange (ANSI X3.43-1986) 88 Jan 27	
59	(4)S	Representations of Universal Time, Local Time Differentials, and United States Time Zone References for Information Interchange (ANSI X3.51-1975) 79 Feb 01	
60-2		WITHDRAWN	3
61-1		WITHDRAWN	2
62		WITHDRAWN	3
63-1		WITHDRAWN	2
63-1		SUPPLEMENT Additional Operational Specs for VBRMSS 2	
64	(3)G	Guidelines for Documentation of Computer Programs and Automated Data Systems for the Initiation Phase 79 Aug 01	
65	(5)G	Guideline for Automatic Data Processing Risk Analysis 79 Aug 01	
66	(4)S	Standard Industrial Classification (SIC) Codes 79 Aug 15	
67	(2)G	Guideline for Selection of Data Entry Equipment 79 Sept 30	
68-2	(3)S	BASIC (ANSI X3.113-1987) 87 Aug 28	

***Approved in 1992**

Category Key: **(1)** General Publications **(2)** Hardware Standards/guidelines **(3)** Software Standards/guidelines **(4)** Data Standards/guidelines **(5)** Computer Security Standards/guidelines **(6)** ADP Operations Standards/guidelines **(7)** Computer-Related Telecommunications Standards **(8)** Conformance Tests

S-Standard **G**-Guideline **P**-Program Information Document **T**-Conformance Tests

FIPS NO.	CATEGORY	TITLE-DATE	CHANGE NOTICES
69-1	(3)S	FORTRAN (ANSI X3.9-1978/R1989) 85 Dec 24	
70-1	(4)S	Representation of Geographic Point Locations for Information Interchange (ANSI X3.61-1986) 86 Nov 14	
71	(7)S	Advanced Data Communications Control Procedures (ADCCP) (ANSI X3.66-1979/R1990) 80 May 14	1
72	(6)G	Guidelines for Measurement of Remote Batch Computer Service 80 May 01	
73	(5)G	Guidelines for Security of Computer Applications 80 June 30	
74	(5)G	Guidelines for Implementing and Using the NBS Data Encryption Standard 81 Apr 01	
75	(6)G	Guideline on Constructing Benchmarks for ADP System Acquisitions 80 Sept 18	
76	(3)G	Guideline for Planning and Using a Data Dictionary System 80 Aug 20	
77	(3)G	Guideline for Planning and Management of Database Applications 80 Sept 01	
78	(7)G	Guideline for Implementing Advanced Data Communication Control Procedures (ADCCP) 80 Sept 26	
79		WITHDRAWN	1

***Approved in 1992**

Category Key: **(1)** General Publications **(2)** Hardware Standards/guidelines **(3)** Software Standards/guidelines **(4)** Data Standards/guidelines **(5)** Computer Security Standards/guidelines **(6)** ADP Operations Standards/guidelines **(7)** Computer-Related Telecommunications Standards **(8)** Conformance Tests

S-Standard **G**-Guideline **P**-Program Information Document **T**-Conformance Tests

FIPS NO.	CATEGORY	TITLE-DATE	CHANGE NOTICES
80		WITHDRAWN	1
81	(5)S	DES Modes of Operation 80 Dec 02	1
82	(2)G	Guideline for Inspection and Quality Control for Alphanumeric Computer-Output Microforms (ANSI/AIIM MSI-1980) 80 Sept 26	
83	(5)G	Guideline on User Authentication Techniques for Computer Network Access Control 80 Sept 29	
84	(2)S	Microfilm Readers (ANSI/AIIM (NMA) MS20-1979) 80 Oct 31	
85	(2)S	Optical Character Recognition (OCR) Inks (ANSI X3.86-1980/R1987) 80 Nov 07	
86	(2)S	Additional Controls for Use with Amer. Natl. Std. Code for Inform. Interchg. (ANSI X3.64-1979/R1990) 81 Jan 29	2
87	(5)G	Guidelines for ADP Contingency Planning 81 Mar 27	
88	(3)G	Guideline on Integrity Assurance and Control in Database Administration 81 Aug 14	
89	(2)S	Optical Character Recognition (OCR) Character Positioning (ANSI X3.93M-1981/R1989) 81 Sept 04	
90	(2)G	Guideline for Optical Character Recognition (OCR) Print Quality (ANSI X3.99/R1991) 83 Sept 29	

***Approved in 1992**

Category Key: **(1)** General Publications **(2)** Hardware Standards/guidelines **(3)** Software Standards/guidelines **(4)** Data Standards/guidelines **(5)** Computer Security Standards/guidelines **(6)** ADP Operations Standards/guidelines **(7)** Computer-Related Telecommunications Standards **(8)** Conformance Tests

S-Standard **G**-Guideline **P**-Program Information Document **T**-Conformance Tests

FIPS NO.	CATEGORY	TITLE-DATE	CHANGE NOTICES
91		WITHDRAWN	1
92	(4)G	Guideline for Standard Occupational Classification (SOC) Codes 83 Feb 24	
93		WITHDRAWN	1
94	(2)G	Guideline on Electrical Power for ADP Installations 83 Sept 21	
95	(4)S	Codes for the Identification of Federal and Federal Assisted Organizations 82 Dec 23	24
96	(6)G	Guideline for Developing and Implementing a Charging System for Data Processing Services 82 Dec 06	
97		WITHDRAWN	2
98		WITHDRAWN	2
99	(3)G	Guideline: A Framework for the Evaluation and Comparison of Software Development Tools 83 Mar 31	
100-1	(7)S	Interface Between Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE) for Operation with Packet-Switched Data Networks (PSDN), or Between Two DTEs, by Dedicated Circuit (ANSI X3.100-1989) 91 Mar 20	
101	(3)G	Guideline for Lifecycle Validation, Verification, and Testing of Computer Software 83 June 06	

***Approved in 1992**

Category Key: **(1)** General Publications **(2)** Hardware Standards/guidelines **(3)** Software Standards/guidelines **(4)** Data Standards/guidelines **(5)** Computer Security Standards/guidelines **(6)** ADP Operations Standards/guidelines **(7)** Computer-Related Telecommunications Standards **(8)** Conformance Tests

S-Standard **G**-Guideline **P**-Program Information Document **T**-Conformance Tests

FIPS NO.	CATEGORY	TITLE-DATE	CHANGE NOTICES
102	(5)G	Guideline for Computer Security Certification and Accreditation 83 Sept 27	
103	(4)S	Codes for the Identification of Hydrologic Units in the United States and the Caribbean Outlying Areas (USGS/CIRCULAR #878-A & ANSI X3.145-1986) 83 Nov 15	1
104-1	(4)S	ANS Codes for the Representation of Names of Countries, Dependencies, and Areas of Special Sovereignty for Information Interchange 86 May 12	1
105	(3)G	Guideline for Software Documentation Management 84 June 06	
106	(3)G	Guideline on Software Maintenance 84 June 15	
107	(2&3)S	Local Area Networks: Baseband Carrier Sense Multiple Access with Collision Detection Access Method and Physical Layer Specifications and Link Layer Protocol (ANSI/IEEE 802.2 & 802.3) 84 Oct 31	
108	(2)S	Alphanumeric Computer Output Microform Quality Test Slide (AIIM MS28-1983) 84 Nov 05	
109	(3)S	Pascal (ANSI/IEEE 770X3.97-1983/R1990) 85 Jan 16	
110	(3)G	Guideline for Choosing a Data Management Approach 84 Dec 11	
111		WITHDRAWN	2

***Approved in 1992**

Category Key: **(1)** General Publications **(2)** Hardware Standards/guidelines **(3)** Software Standards/guidelines **(4)** Data Standards/guidelines **(5)** Computer Security Standards/guidelines **(6)** ADP Operations Standards/guidelines **(7)** Computer-Related Telecommunications Standards **(8)** Conformance Tests

S-Standard **G**-Guideline **P**-Program Information Document **T**-Conformance Tests

FIPS NO.	CATEGORY	TITLE-DATE	CHANGE NOTICES
112	(5)S	Password Usage 85 May 30	
113	(5)S	Computer Data Authentication 85 May 30	
114		WITHDRAWN	1
115		WITHDRAWN	1
116		WITHDRAWN	1
117		WITHDRAWN	1
118		WITHDRAWN	1
119	(3)S	Ada (ANSI/MIL-STD-1815A-1983) 85 Nov 08	1
120-1	(3)S	Graphical Kernel System (GKS) (ANSI X3.124-1985, X3.124.1-1985, X3.124.2-1988, X3.124.3-1989) 91 Jan 08	
121	(2&3)S	Videotext/Teletext Presentation Level Protocol Syntax (North American PLPS) (ANSI X3.110-1983(R1991)/CS T500-1983) 86 May 06	
122	(8)T	Conformance Tests for FIPS PUB 100 Version of CCITT 1980 Recommendation X.25, etc. 86 May 28	
123	(3)S	Specification for a Data Descriptive File for Information Interchange (DDF) (ANSI/ISO 8211-1985/R1992) 86 Sept 19	
124	(3)G	Guideline on Functional Specifications for Database Management Systems 86 Sept 30	

***Approved in 1992**

Category Key: **(1)** General Publications **(2)** Hardware Standards/guidelines **(3)** Software Standards/guidelines **(4)** Data Standards/guidelines **(5)** Computer Security Standards/guidelines **(6)** ADP Operations Standards/guidelines **(7)** Computer-Related Telecommunications Standards **(8)** Conformance Tests

S-Standard **G**-Guideline **P**-Program Information Document **T**-Conformance Tests

FIPS NO.	CATEGORY	TITLE-DATE	CHANGE NOTICES
125	(3)S	MUMPS (ANSI/MDC X11.1-1984) 86 Nov 04	
126	(3)S	Database Language NDL (ANSI X3.133-1986) 87 Mar 10	
127-1	(3)S	Database Language SQL (ANSI X3.135-1989 & X3.168-1989) 90 Feb 02	
128	(3)S	Computer Graphics Metafile (CGM) (ANSI X3.122-1986) 87 Mar 16	
129	(2)S	Optical Character Recognition (OCR) - Dot Matrix Character Sets for OCR-MA (ANSI X3.111-1986) 87 May 06	
130		WITHDRAWN	2
131		WITHDRAWN	2
132	(3)G	Guideline for Software Verification and Validation Plans (ANSI/IEEE 1012-1986) 87 Nov 19	
133		WITHDRAWN	1
134-1		WITHDRAWN	1
135		WITHDRAWN	1
136		WITHDRAWN	1
137	(7)S	Analog to Digital Conversion of Voice by 2,400 Bit/Second Linear Predictive Coding 84 Nov 28	
138	(7)S	Electrical Characteristics of Balanced Voltage Digital Interface Circuits 75 Sept 24	

***Approved in 1992**

Category Key: **(1)** General Publications **(2)** Hardware Standards/guidelines **(3)** Software Standards/guidelines **(4)** Data Standards/guidelines **(5)** Computer Security Standards/guidelines **(6)** ADP Operations Standards/guidelines **(7)** Computer-Related Telecommunications Standards **(8)** Conformance Tests

S-Standard **G**-Guideline **P**-Program Information Document **T**-Conformance Tests

FIPS NO.	CATEGORY	TITLE-DATE	CHANGE NOTICES
139	(7)S	Interoperability and Security Requirements for Use of the Data Encryption Standard in the Physical Layer of Data Communications 83 Aug 03	
140	(7)S	General Security Requirements for Equipment Using the Data Encryption Standard 82 Apr 14	
141	(7)S	Interoperability and Security Requirements for Use of the Data Encryption Standard with CCITT Group 3 Facsimile Equipment 85 Apr 04	
142	(7)S	Electrical Characteristics of Unbalanced Voltage Digital Interface Circuits 80 Jan 31	
143	(7)S	General Purpose 37-Position and 9-Position Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment (EIA-RS-449) 85 June 10	
144	(7)S	Data Communication Systems and Services User-Oriented Performance Parameters (ANSI X3.102-1983/R1990) 85 May 28	
145		WITHDRAWN	1
146-1	(2&3)S	Government Open Systems Interconnection Profile (GOSIP) 91 Apr 03	1
147	(7)S	Group 3 Facsimile Apparatus for Document Transmission 81 Aug 19	
148	(7)S	Procedures for Document Facsimile Transmission (EIA-RS-466) 82 Apr 14	

***Approved in 1992**

Category Key: **(1)** General Publications **(2)** Hardware Standards/guidelines **(3)** Software Standards/guidelines **(4)** Data Standards/guidelines **(5)** Computer Security Standards/guidelines **(6)** ADP Operations Standards/guidelines **(7)** Computer-Related Telecommunications Standards **(8)** Conformance Tests

S-Standard **G**-Guideline **P**-Program Information Document **T**-Conformance Tests

FIPS NO.	CATEGORY	TITLE-DATE	CHANGE NOTICES
149	(7)S	General Aspects of Group 4 Facsimile Apparatus (EIA-536-1988) 88 Nov 04	
150	(7)S	Facsimile Coding Schemes and Coding Control Functions for Group 4 Facsimile Apparatus (EIA-538-1988) 88 Nov 04	
151-1	(3)S	POSIX: Portable Operating System Interface for Computer Environments (IEEE 1003.1-1988) 90 Mar 28	
152	(3)S	Standard Generalized Markup Language (SGML) (ISO 8879-1986) 88 Sept 26	
153	(3)S	Programmer's Hierarchical Interactive Graphics System (ANSI/ISO 9592.1,2,3-1989 & ANSI/ISO 9593.1 & 3-1990) 88 Oct 14	
154	(7)S	High Speed 25-Position Interface for Data Terminal Equipment and Data Circuit-Terminating Equipment (EIA-530-1987) 88 Nov 04	
155	(7)S	Data Communication Systems and Services User-Oriented Performance Measurement Methods (ANSI X3.141-1987) 88 Nov 04	
156	(3)S	Information Resource Dictionary System (IRDS) (ANSI X3.138-1988) 89 Apr 05	
157	(2)G	Guideline for Quality Control of Image Scanners (ANSI/AIIM MS44-1988) 89 Sept 13	
158	(3)S	The User Interface Component of the Applications Portability Profile (MIT X Version 11, Release 3) 90 May 29	

***Approved in 1992**

Category Key: **(1)** General Publications **(2)** Hardware Standards/guidelines **(3)** Software Standards/guidelines **(4)** Data Standards/guidelines **(5)** Computer Security Standards/guidelines **(6)** ADP Operations Standards/guidelines **(7)** Computer-Related Telecommunications Standards **(8)** Conformance Tests

S-Standard **G**-Guideline **P**-Program Information Document **T**-Conformance Tests

FIPS NO.	CATEGORY	TITLE-DATE	CHANGE NOTICES
159	(7)S	Detail Specification for 62.5um Core Diameter/125-um Cladding Diameter Class Ia Multimode, Graded-Index Optical Waveguide Fibers (ANSI/EIA/TIA-492AAAA-1989) 90 Dec 27	
160	(3)S	C (ANSI X3.159-1989) 91 Mar 13	
161	(3)S	Electronic Data Interchange (EDI) 91 Mar 29	
*162	(7)S	1,200 Bits Per Second Two-wire Duplex Modems for Data Communications Use on Telephone-Type Circuits 92 Apr 02 (Supersedes FIPS PUB 136/Former Federal Standard 1008)	
*163	(7)S	2,400 Bits Per Second Two-Wire Duplex Modems for Data Communications Use on Telephone-Type Circuits 92 Apr 02 (Supersedes FIPS PUB 133/Former Federal Standard 1005A)	
*164	(7)S	2,400 Bits Per Second Four-Wire Duplex and Two-Wire Half-Duplex Modems for Data Communications Use on Telephone-Type Circuits 92 Apr 02 (Supersedes FIPS PUB 133/Former Federal Standard 1005A)	
*165	(7)S	4,800 Bits Per Second Four-Wire Duplex and Two-Wire Half-Duplex Modems for Data Communications Use on Telephone-Type Circuits 92 Apr 02 (Supersedes FIPS PUB 134-1/Former Federal Standard 1006A)	
*166	(7)S	4,800 and 9,600 Bits Per Second Two-wire Duplex Modems for Data Communications Use on Telephone-Type Circuits 92 Apr 02 (Supersedes FIPS PUB 134-1/Former Federal Standard 1006A)	

***Approved in 1992**

Category Key: **(1)** General Publications **(2)** Hardware Standards/guidelines **(3)** Software Standards/guidelines **(4)** Data Standards/guidelines **(5)** Computer Security Standards/guidelines **(6)** ADP Operations Standards/guidelines **(7)** Computer-Related Telecommunications Standards **(8)** Conformance Tests

S-Standard **G**-Guideline **P**-Program Information Document **T**-Conformance Tests

FIPS NO.	CATEGORY	TITLE-DATE	CHANGE NOTICES
*167	(7)S	9,600 Bits Per Second Four-Wire Duplex Modems for Data Communications Use on Telephone-Type Circuits 92 Apr 02 (Supersedes FIPS PUB 135/Former Federal Standard 1007)	
*168	(7)S	12,000 and 14,400 Bits Per Second Four-Wire Duplex Modems for Data Communications Use on Telephone-Type Circuits 92 Apr 02	
*169	(7)S	Error Correction in Modems Employing Asynchronous-To-Synchronous Conversion 92 Apr 02	
*170	(7)S	Data Compression in Modems Employing CCITT Recommendation V.42 Error Correction 92 Apr 02	
*171	(5)S	Key Management Using ANSI X9.17 (ANSI X9.17-1985) 92 Apr 27	
*172	(3)S	VHSIC Hardware Description Language (VHDL) (ANSI/IEEE 1076-1987) 92 June 29	
*173	(3)S	Spatial Data Transfer Standard (SDTS) (DOI/USGS Specs.) 92 August 28	
*174	(7)S	Federal Building Telecommunications Wiring Standard (ANSI/EIA/TIA-568-1991) 92 August 21	
*175	(7)S	Federal Building Standard for Telecommunications Pathways and Spaces (ANSI/EIA/TIA-569-1990) 92 Aug 21	
*176	(7)S	Residential and Light Commercial Telecommunications Wiring Standard (ANSI/EIA/TIA-570-1991) 92 Aug 21	

***Approved in 1992**

Category Key: **(1)** General Publications **(2)** Hardware Standards/guidelines **(3)** Software Standards/guidelines **(4)** Data Standards/guidelines **(5)** Computer Security Standards/guidelines **(6)** ADP Operations Standards/guidelines **(7)** Computer-Related Telecommunications Standards **(8)** Conformance Tests

S-Standard **G**-Guideline **P**-Program Information Document **T**-Conformance Tests

FIPS NO.	CATEGORY	TITLE-DATE	CHANGE NOTICES
*177	(3)S	Initial Graphics Exchange Specification (IGES) (ASME/ANSI Y14.26M-1989) 92 Nov 30	
*178	(7)S	Video Teleconferencing Services at 56 to 1,920 kb/s (CCITT Series H Recommendations H.221;230;242;261;320 - 1990) 92 Dec 21	
*179	(2&3)S	Government Network Management Profile (GNMP) 92 Dec 14	

***Approved in 1992**

Category Key: **(1)** General Publications **(2)** Hardware Standards/guidelines **(3)** Software Standards/guidelines **(4)** Data Standards/guidelines **(5)** Computer Security Standards/guidelines **(6)** ADP Operations Standards/guidelines **(7)** Computer-Related Telecommunications Standards **(8)** Conformance Tests

S-Standard **G**-Guideline **P**-Program Information Document **T**-Conformance Tests

Superintendent of Documents **Publications** Order Form

P4

Order Processing Code:
* 7058

Charge your order. It's Easy!

To fax your orders (202) 512–2250

Please Type or Print (Form is aligned for typewriter use.)

Prices include regular domestic postage and handling and are subject to change. International customers please add 25%.

Qty.	Stock Number	Title	Price Each	Total Price
			Total	

(Company or Personal Name) (Please type or print)

(Additional address/attention line)

(Street address)

(City, State, ZIP Code)

(Daytime phone including area code)

(Purchase Order No.)

May we make your name/address available to other mailers? YES ☐ NO ☐

Please Choose Method of Payment:

☐ Check Payable to the Superintendent of Documents

☐ GPO Deposit Account ☐☐☐☐☐☐☐ – ☐

☐ VISA or MasterCard Account

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

☐☐☐☐ (Credit card expiration date)

Thank you for your order!

(Authorizing Signature) (3/93)

Mail To: New Orders, Superintendent of Documents
P.O. Box 371954, Pittsburgh, PA 15250–7954

U.S. DEPARTMENT OF COMMERCE
National Technical Information Service
SPRINGFIELD, VA 22161

NTIS ORDER FORM

TELEPHONE ORDERS
Call (703) 487-4650

FAX Your Order (703) 321-8547 TELEX 89-9405 Subscriptions: (703) 487-4630
(See reverse side for RUSH and EXPRESS ordering options)

- HANDLING FEE: A handling fee is required for each order except Express, Rush, Subscription, QuikSERVICE, or Pickup orders.
- SHIPPING: **U.S.:** Printed reports and microfiche copies are shipped First Class Mail or equivalent.
  FOREIGN: Regular service: Printed reports and microfiche copies are shipped surface mail.
  Air Mail service to Canada and Mexico: add $3.50 per printed report; 75¢ per microfiche copy.
  Air Mail service to all other addresses: add $7.50 per printed report; $1 per microfiche copy.
  Subscriptions and standing orders are sent surface mail; contact NTIS for Air Mail rates.

1 *Address Information*

DTIC Users Code:_____ Contract No. __ _____ __
Last six digits

PURCHASER: DATE:_____

Last Name First Initial

Title

Company/Organization

Address

City/State/ZIP

Attention

Telephone number

SHIP TO (Enter ONLY if different from purchaser):

Last Name First Initial

Title

Company/Organization

Address

City/State/ZIP

Attention

Telephone number

2 *Method of Payment*

☐ Charge my NTIS Deposit Account __ __ __ __ __–__

Charge my ☐ Amer. Express ☐ VISA ☐ MasterCard

Account No. _____ Exp. _____

Signature: _____
(Required to validate all orders)

☐ Check/Money order enclosed for $_____
(Payable to NTIS, in U.S. dollars)

☐ Purchase order **ADD $7.50 per order†**

Purchase Order No. _____

3 *Order Selection* (For computer products, see reverse)

Enter NTIS order number(s) (Ordering by title only will delay your order)	Customer†† Routing (up to 8 digits)	QUANTITY Printed Copy	QUANTITY Micro-fiche	UNIT PRICE	Foreign Air Mail	TOTAL PRICE
1.						
2.						
3.						
4.						
5.						
6.						
7.						

☐ **OVER**—Order continued on reverse

SUBTOTAL From Other Side	
Regular Service Handling Fee per order ($3 U.S., Canada, and Mexico; $4 others)	
Purchase Order Fee if required ($7.50)	
GRAND TOTAL	

†Purchase Order Service: There is a $7.50 charge for this service. It is restricted to U.S. addresses There is no additional charge for subscription orders. A late payment charge will be applied to all billings more than 30 days overdue.

†† Customer Routing Code: NTIS can label each item for routing within your organization. If you want this service, put your routing code in this box.

NTIS does not permit return of items for credit or refund. A replacement will be provided if an error is made in filling your order, if the item was received in damaged condition, or if the item is defective.

PR-OFA
1/30/90

U.S DEPARTMENT OF COMMERCE
National Technical Information Service
SPRINGFIELD, VA 22161

NTIS ORDER FORM—Side 2

3 *Order Selection (Cont.)*

Enter the NTIS order number(s) (Ordering by title only will delay your order)	Customer Routing	QUANTITY Printed Copy	QUANTITY Micro-fiche	UNIT PRICE	Foreign Air Mail	TOTAL PRICE
8.						
9.						
10.						
11.						
12.						
13.						
14.						
15.						
16.						
17.						
18.						
19.						
					Subtotal	

ENTER this amount on the other side of this form.

4 *Computer Products*

If you have questions about a computer product, please call the Federal Computer Products Center at (703) 487-4763.

Enter the NTIS order number(s) (Ordering by title only will delay your order)	Customer Routing	TAPE DENSITY (9 track) 1600 bpi	TAPE DENSITY (9 track) 6250 bpi	TOTAL PRICE
20.				
21.				
22.				
23.				
			Subtotal	

All magnetic tapes are sent air mail or equivalent service to both U.S. and foreign addresses.

ENTER this amount on the other side of this form.

SPECIAL RUSH and EXPRESS ORDERING OPTIONS

Telephone: **(800) 336-4700**
in Virginia call:
(703) 487-4700

RUSH SERVICE—Orders are processed within 24 hours and sent First Class or equivalent. U.S., Canada, and Mexico, add $12 per item, other countries add $14.50 per item (Air Mail postage additional, see other side).

EXPRESS SERVICE—Orders are processed within 24 hours AND delivered by overnight courier. Available to U.S. addresses only, add $22 per item.

NIST-114
(REV. 9-92)
ADMAN 4.09

U.S. DEPARTMENT OF COMMERCE
NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

MANUSCRIPT REVIEW AND APPROVAL

(ERB USE ONLY)
ERB CONTROL NUMBER | DIVISION
PUBLICATION REPORT NUMBER: NISTIR 5127 | CATEGORY CODE

INSTRUCTIONS: ATTACH ORIGINAL OF THIS FORM TO ONE (1) COPY OF MANUSCRIPT AND SEND TO: THE SECRETARY, APPROPRIATE EDITORIAL REVIEW BOARD.

PUBLICATION DATE: February 1993 | NUMBER PRINTED PAGES

TITLE AND SUBTITLE (CITE IN FULL)

COMPUTER SYSTEMS LABORATORY ANNUAL REPORT - 1992

CONTRACT OR GRANT NUMBER | TYPE OF REPORT AND/OR PERIOD COVERED

AUTHOR(S) (LAST NAME, FIRST INITIAL, SECOND INITIAL)
Lennon, Elizabeth B.
Radack, Shirley M.
Roach, Ramona K.

PERFORMING ORGANIZATION (CHECK (X) ONE BOX)
[ ] NIST/GAITHERSBURG
[ ] NIST/BOULDER
[ ] JILA/BOULDER

LABORATORY AND DIVISION NAMES (FIRST NIST AUTHOR ONLY)
Computer Systems Laboratory, Office of the Director

SPONSORING ORGANIZATION NAME AND COMPLETE ADDRESS (STREET, CITY, STATE, ZIP)

RECOMMENDED FOR NIST PUBLICATION

[ ] JOURNAL OF RESEARCH (NIST JRES)	[ ] MONOGRAPH (NIST MN)	[ ] LETTER CIRCULAR
[ ] J. PHYS. & CHEM. REF. DATA (JPCRD)	[ ] NATL. STD. REF. DATA SERIES (NIST NSRDS)	[ ] BUILDING SCIENCE SERIES
[ ] HANDBOOK (NIST HB)	[ ] FEDERAL INF. PROCESS. STDS. (NIST FIPS)	[ ] PRODUCT STANDARDS
[ ] SPECIAL PUBLICATION (NIST SP)	[ ] LIST OF PUBLICATIONS (NIST LP)	[ ] OTHER
[ ] TECHNICAL NOTE (NIST TN)	[X] NIST INTERAGENCY/INTERNAL REPORT (NISTIR)	

RECOMMENDED FOR NON-NIST PUBLICATION (CITE FULLY) [ ] U.S. [ ] FOREIGN

PUBLISHING MEDIUM
[X] PAPER [ ] CD-ROM
[ ] DISKETTE (SPECIFY)
[ ] OTHER (SPECIFY)

SUPPLEMENTARY NOTES

ABSTRACT (A 1500-CHARACTER OR LESS FACTUAL SUMMARY OF MOST SIGNIFICANT INFORMATION. IF DOCUMENT INCLUDES A SIGNIFICANT BIBLIOGRAPHY OR LITERATURE SURVEY, CITE IT HERE. SPELL OUT ACRONYMS ON FIRST REFERENCE.) (CONTINUE ON SEPARATE PAGE, IF NECESSARY.)

The Computer Systems Laboratory Annual Report - 1992 describes the annual computer and related telecommunications activities and accomplishments of the Laboratory. Following the Director's Foreword, an overview of the Laboratory is presented, including a current CSL Organization Chart. Overviews of CSL's five technical divisions are featured next, followed by a section on Technology Transfer which details the vehicles CSL uses to disseminate research and information to the public and technical communities. A list of Federal Information Processing Standards (FIPS) and FIPS order information conclude the annual report.

KEY WORDS (MAXIMUM 9 KEY WORDS; 28 CHARACTERS AND SPACES EACH; ALPHABETICAL ORDER; CAPITALIZE ONLY PROPER NAMES)
annual report; Computer Systems Laboratory (CSL); computers; computer standards; Federal Information Processing Standards (FIPS); telecommunications; telecommunication standards.

AVAILABILITY
[X] UNLIMITED [ ] FOR OFFICIAL DISTRIBUTION. DO NOT RELEASE TO NTIS.
[ ] ORDER FROM SUPERINTENDENT OF DOCUMENTS, U.S. GPO, WASHINGTON, D.C. 20402
[ ] ORDER FROM NTIS, SPRINGFIELD, VA 22161

NOTE TO AUTHOR(S) IF YOU DO NOT WISH THIS MANUSCRIPT ANNOUNCED BEFORE PUBLICATION, PLEASE CHECK HERE. [ ]

ELECTRONIC FORM