NASA Technical Memorandum 104630, Part I

NASAwide Electronic Publishing System—Prototype STI Electronic Document Distribution, Stage-4 Evaluation Report

Richard C. Tuey et al.

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Executive Summary

Overview

Stage 4 of the NASAwide Electronic Publishing System is the final phase of its implementation through the prototyping and gradual integration of each NASA center's electronic printing systems, desktop publishing systems, and technical report servers to be able to provide to NASA's engineers, researchers, scientists, and external users the widest practicable and appropriate dissemination of information concerning its activities and the result thereof to their work stations. The inclusion of NASA Headquarters as a node essentially completes a totally distributed set of report servers for formal and nonformal publications as identified by Figure 1[1]. Currently, no standard software package (single) exists across all NASA centers for either word processing or graphics, and manually pasting figures into documents is still prevalent. In addition to differences in software utilization, no standard platform across all NASA centers exists for producing the documents. Common sense dictates that it is neither appropriate nor cost-effective to define a standard set of software and compel all NASA's engineers, researchers, and scientists to conform. Rather, a common output format, such as Adobe PostScript, will be sought from among the set of software; the electronic document distribution system would only need to handle the single common output format.

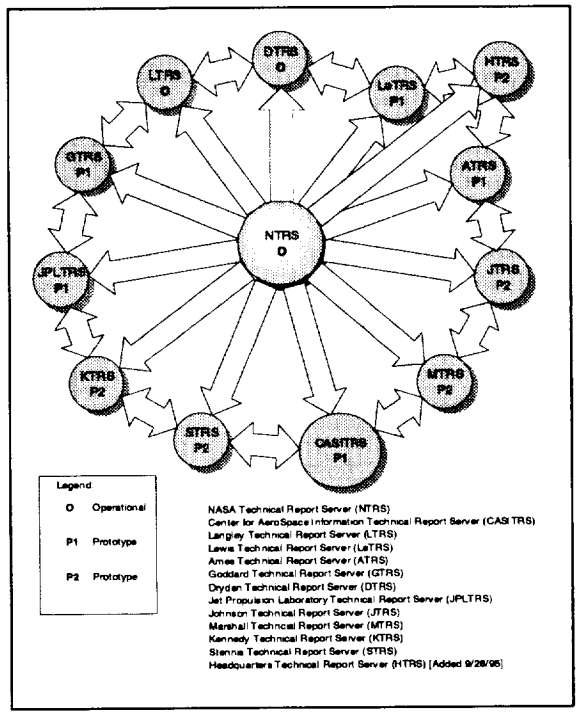


Figure 1. NASAwide Technical Report Servers.

The report is presented by an introduction, seven chapters, and six appendices; the Introduction describes the purpose, conceptual framework, functional description, and technical report server (TRS) of the Scientific and Technical Information (STI) Electronic Document Distribution (EDD) project. Chapter 1 documents the results of the prototype STI EDD in actual operation, e.g., the electronic distribution of the source document to its printed output and the distributed on-line access to technical reports available at each NASA center. Metrics identifying the number of accesses on the NASA Technical Report Server (NTRS) and on the NASA Public Affairs Information Server (NPAIS) from the period July through December 1995 are displayed by Table 1 - 13 and Table 1 - 14, respectively. A number of abstracts, reports, and fact sheets are displayed by Table 1 - 15. A profile by subject division for abstracts available from the Center for AeroSpace Information Technical Report Server (CASITRS) are displayed by Table 1 - 16.

Although in a prototype stage, the actual demonstration of print on demand, which was achieved through the distributed production of the NASA Headquarters phone directory at each center, is documented. In the past, printing was accomplished by the NASA centers as shown by

[1]Decision to exclude Headquarters as a node was made in December 1995.

the top band of Figure 2. The lower band of Figure 2 shows a fully operational electronic publishing process. The middle band of Figure 2 describes the current process. A second application included a file server that was designated the Public Affairs Information Series Server for the storage and retrieval of Public Affairs fact sheets and information summaries. Finally, a third application was added to document the pre- and post-processing steps involved during the preparation of a technical report to be published by a typical NASA researcher or engineer at a center.

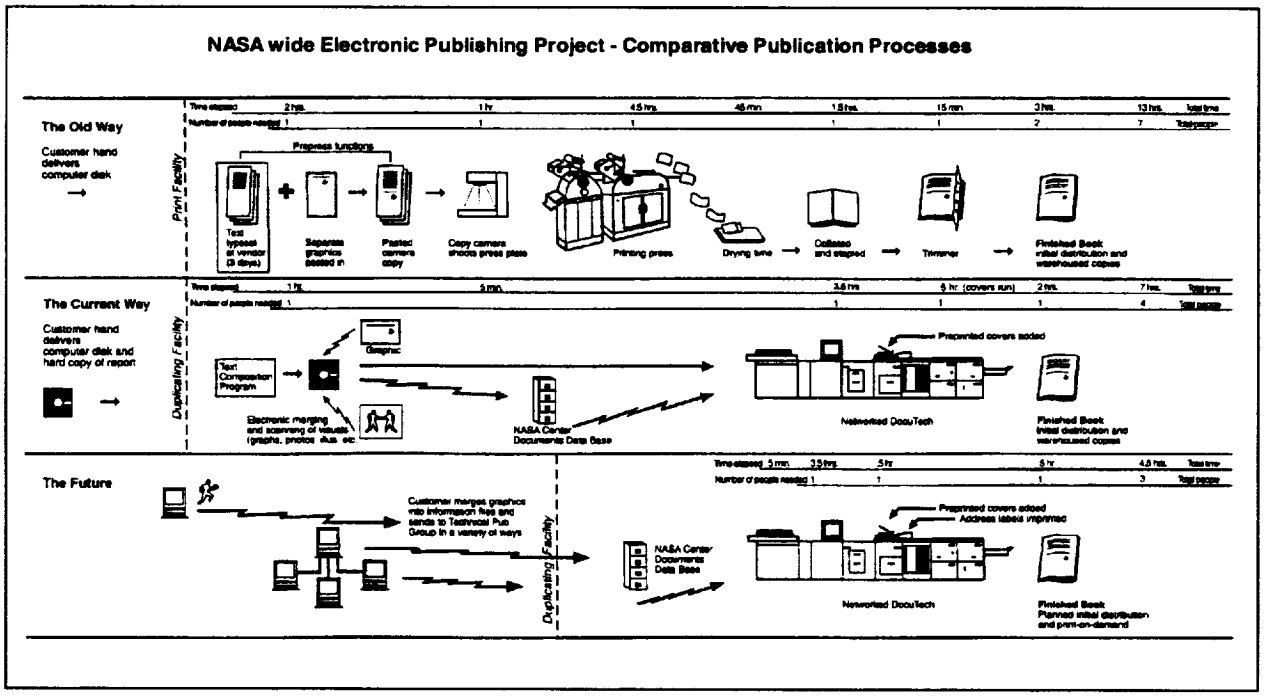


Figure 2. Comparative printing processes.

Figure 3 displays a conceptual macro view of the publication process from its conception to its storage, printing and on-line retrieval. Details are covered by Chapters 2, 3, and 4. Chapter 2 documents each NASA center's post processing publication process. Chapter 3 documents each NASA center's STI hardware, software, and communication configurations. Chapter 4 documents each NASA center's network topology. Chapter 5 documents lessons learned. Chapter 6 documents the STI standards and guidelines, and Chapter 7 documents STI EDD policy, practices, and procedures.

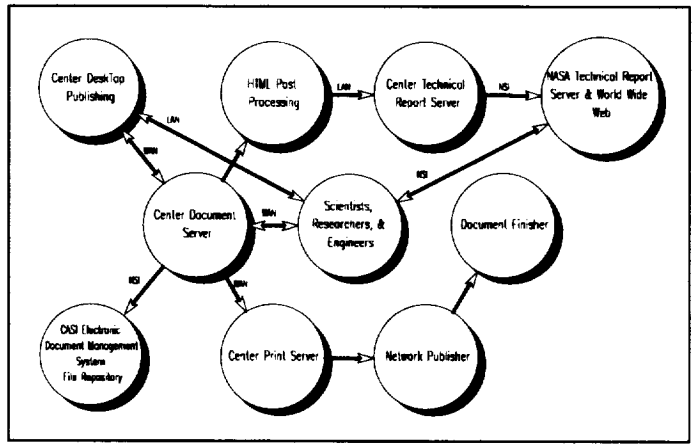


Figure 3. End-to-end functionality.

The appendices contain supporting information. Appendix A documents the STI EDD Project Plan jointly agreed to by all the participating NASA centers (Project Plan reflects status as

of November 1994; deliverables are reflected in Appendix C). Appendix B lists all the team members for the STI EDD project. Appendix C displays the progress of the STI EDD project from its start to its completion with its final delivery identified as this joint technical memorandum. Appendix D documents how a user accesses the on-line reports. Appendix E describes the creation of an hypertext markup language (HTML) file for a typical NASA fact sheet.

Recommendations

Conceptually, the prototype STI EDD project has demonstrated its potential value for the dissemination of scientific and technical work accomplished by NASA's engineers, scientists, and researchers. The statistical profiles, Tables 1 - 13 through 1 - 16 show the World Wide Web activity for the period July through December 1995. As of December 31, 1995, the prototype STI EDD was not fully integrated as a NASA Technical Report Server or a NASA Public Affairs Information Server; however, the prototype system has achieved its goal of devising a concept that is sound and feasible for the provision of scientific and technical information to the Agency, as well as to the public. In achieving a fully operational STI EDD, it is recommended that:

1. Headquarters Scientific and Technical Information Office continue to support the STI EDD full implementation across the Agency through the use of an Executive Notice or Policy Directive.

2. The STI EDD Committee be formally established with members from each NASA center, including the Center for AeroSpace Information, to coordinate and resolve Agencywide STI policy issues and interoperability for the exchange of scientific and technical information within the Agency and between agencies, as well as with commercial organizations and foreign countries.

3. Langley Research Center, who has been designated as the operations manager of the Center for AeroSpace Information, also lead the implementation of the STI EDD project, taking into consideration the initial creation of the technical publication to its availability on each center's technical report server or the availability for printed copies on designated networked high-speed production duplicators.

4. Langley Research Center continue its role as the system administrator for the NASA Technical Report Server.

5. Dryden Flight Research Center continue its role as the system administrator for the NASA Public Affairs Information Server.

6. Each NASA center take on the role of continual maintenance of the center's technical report server and public affairs information server, as well as its integration to the Agency's networked high-speed production duplicators.

7. Each NASA center participate in the integration of electronic document availability authorization (DAA) and report documentation page (RDP) as part of the publishing processes, i.e., creation to its archival and dissemination.

Strategic Enabling Technology

The NASAwide Electronic Publishing System consists of an enabling capability for each of

the five Strategic Enterprises (Aeronautics, Mission to Planet Earth, Space Technology, Scientific Research, and Human Exploration/Development) to access, via the World Wide Web, its scientific and technical works and/or print-on-demand information (text, graphics, and images) within and across the five enterprises.

When fully implemented, this enabling capability will allow the NASA centers and Headquarters to perform wide-area, networked print-on-demand environments, as well as to provide a central source for retrieving NASAwide STI on line at each user's workstation. The prototype STI EDD project has established technical report servers at each NASA center. Additionally, with the exception of Dryden Flight Research Center, each NASA center will have a networked print-on-demand, high-speed production duplicator capable of printing quality print products.

TABLE OF CONTENTS

Acronyms and Abbreviations

APAIS	ARC Public Affairs Information Server
ARC	Ames Research Center
ATRS	Ames Technical Report Server
BOC	Base Operations Contractor
CASI	Center for AeroSpace Information
CASITRS	CASI Technical Report Server (RECON Select)
DFRC	Dryden Flight Research Center
DPAIS	DFRC Public Affairs Information Server
DTRS	Dryden Technical Report Server
EDD	electronic document distribution
EDMS	electronic document management system
FTP	file transfer protocol
GIF	graphics interchange format
GPAIS	GSFC Public Affairs Information Server
GSFC	Goddard Space Flight Center
GTRS	Goddard Technical Report Server
HQTS	NASA Headquarters
HPAIS	Headquarters Public Affairs Information Server
HTML	hypertext markup language
HTTP	hypertext transfer protocol
IEEE	Institute of Electrical and Electronic Engineers
JPAIS	JPL Public Affairs Information Server
JPEG	Joint Photographic Experts Group (Standard for still image compression)
JPL	Jet Propulsion Laboratory
JPLTRS	JPL Technical Report Server
JPAIS	JSC Public Affairs Information Server
JSC	Johnson Space Center
JTRS	Johnson Technical Report Server
KDN	Kennedy Data Network
KMAN	KSC Metropolitan Area Network
KPAIS	KSC Public Affairs Information Server
KSC	Kennedy Space Center
KWAN	KSC Wide Area Network
KTRS	Kennedy Technical Report Server
LAN	local area network
LaRC	Langley Research Center
LTRS	Langley Technical Report Server
LePAIS	LeRC Public Affairs Information Server
LeRC	Lewis Research Center
LeTRS	Lewis Technical Report Server
LPAIS	LaRC Public Affairs Information Server
MPAIS	MSFC Public Affairs Information Server
MSFC	Marshall Space Flight Center
MTRS	Marshall Technical Report Server
NPAIS	NASA Public Affairs Information Server
NSI	NASA Science Internet
NTRS	NASA Technical Report Server
OLE	object link entry

PAIS	Public Affairs Information Server
PDF	Portable Data File
PON	Payload Operations Network
PSCNI	Program Support Communications Network Interface
RECON	Research Connection
RDP	report document page
SCAN	selected current aerospace notices
SODN	Shuttle Operations Data Network
SPAIS	SSC Public Affairs Information Server
SPC	Shuttle Processing Contractor
SSC	Stennis Space Center
STRS	Stennis Technical Report Server
STI	Scientific and Technical Information
TCP/IP	Transmission Control Protocol/Internet Protocol
THB	thumbnail file
TIFF	tagged image file format
URL	universal resource locator
TRS	Technical Report Server
WAIS	Wide Area Information Server
WAN	wide area network
WWW	World Wide Web
XDOD	Xerox Document On Demand

Introduction—Prototype STI EDD Project

Purpose

The specific goal of the prototype Scientific and Technical Information (STI) Electronic Document Distribution (EDD) project was to validate the functionality and feasibility of establishing a distributed repository of NASA technical reports produced by the NASA centers, which, in turn, could be retrieved by the NASA user community through the utilization of commercially available off-the-shelf software products (COTS) and/or available public domain software from the Internet such as the MOSAIC, World Wide Web (WWW), and Wide Area Information Server (WAIS). This prototype project was initiated as a proposal by the STI Office on May 2, 1994, with selected participating centers. On August 22, 1994, the STI Project Review Board approved the prototype project consisting of Lewis Research Center, Goddard Space Flight Center, Ames Research Center, and Center for AeroSpace Information (CASI). Langley Research Center was requested to participate as a member of the prototype EDD project and to provide technical expertise on the establishment of individual Technical Report Servers for each of the participating NASA centers and CASI. An approved prototype STI EDD project plan, dated November 1994, was signed by the participating centers and can be referenced in Appendix A. The inclusion of the Jet Propulsion Laboratory (JPL) occurred on January 6, 1995, and the inclusion of the Dryden Flight Research Center (DFRC) occurred on January 30, 1995, as part of the Prototype Joint STI EDD project. The inclusion of Johnson Space Center, Marshall Space Flight Center, Kennedy Space Center, and Stennis Space Center occurred on February 14, 1995, with an Addendum to the Joint TM Plan for their review and concurrences. NASA Headquarters was included on September 28, 1995, and subsequently removed in mid-December 1995.

Conceptual Framework/Functional Description

The ultimate goal of the prototype STI EDD would be the replication of a hardware configuration across all NASA centers such as that displayed by Figure I - 1 with connectivity via the

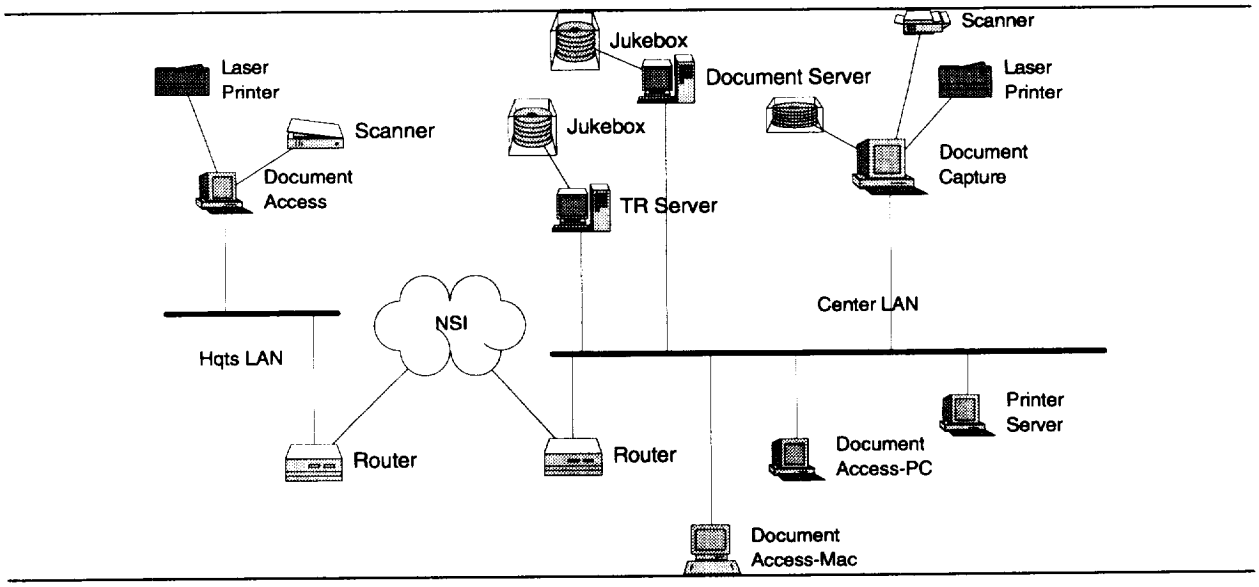


Figure I - 1. STI EDD hardware configuration.

NASA Science Internet (NSI). Figure I - 2 displays the physical locations of the NASA centers throughout the continental United States.

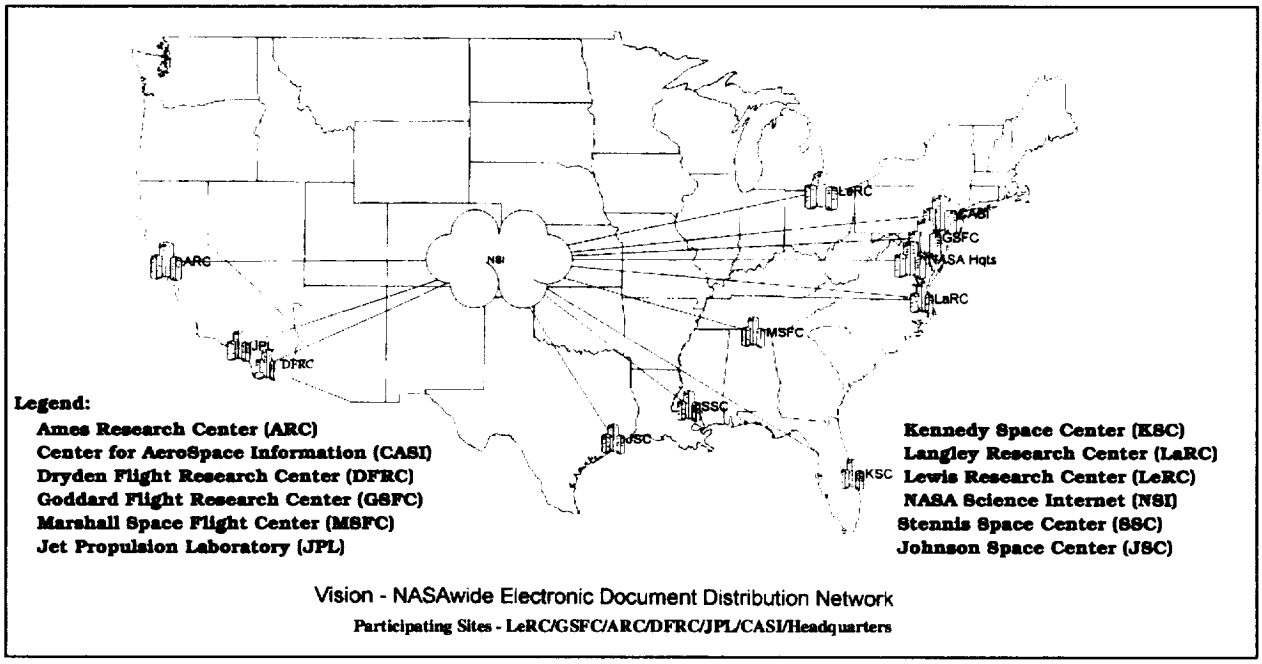


Figure I - 2. STI EDD locations.

Figure I - 2 also identifies functionally each major component which can be described generally as Input Services for the capture of electronic files and/or digital images of STI technical document collections, Management and Storage Services for committing these files and/or images to permanent storage, Access Services to permit the retrieval and assembly of the stored files and/or images, and Output Services to generate high-quality printed copy of all or part of the selected files and/or documents. Specifically, each function is elaborated on, below:

Document Capture Services

This service provides the following functions:

1. Hard-copy Image Capture - The first function provides for the capture of individual page images of a document or a published article from hard-copy-based media, structuring the individual images of any multipage hard-copy document into a digital document.

2. Electronic-copy Image Capture - The second function provides for the receipt of an electronic image of a document or published article.

3. Quality Control and Error Handling - The third function allows users to control the quality of the images of the scanned pages. A digital document consisting of a group of digital images is created simultaneously with the scanning and quality control of

the image. Virtually no quality control will be required for the electronic digital images except for proper receipt of the document.

Document Management Services

This service provides the following functions:

1. Document Registration - This function assigns the attributes (e.g., document number, title, author) and indexes to the document, and indexes/checks in the document by registering it to the data base for storage on the appropriate medium (i.e., magnetic and/or optical) in the document repository.

2. Document Management and Storage - This function acts as a physical custodian and manager of collections of documents (i.e., folders of the electronic files and/or digital images) contained in the image archive. It also serves as an interface to the physical media (magnetic and/or optical) when viewing previously stored documents.

Document Access Services

This service provides the following function:

1. Access, View, and Assemble - This function includes on-line, end-user query and access to electronic files and/or digital documents stored in the archive; the ability to view those files and/or documents; assembly of selected individual files, documents or images into a new document; and view of that new document.

Document Output Services

This service provides the following function:

1. Output - This function includes the production of hard-copy output via local or networked print devices.

2. Finishing - This function includes the finishing of the output and includes the mailing address affixed thereto where capability and requirement exist.

STI EDD

The STI EDD consists of the above subsystem components to perform the daily technical report document capture, archival management, access, and print for each NASA center, internally. Figure I - 3 displays the end-to-end functionality of the STI Electronic Document Distribution system and can be best described as follows; component 1 consists of a user's workstation (scientist, engineer, researcher) desktop publishing software to produce his/her document, which, in turn, is edited by the Center's Publishing and Editorial staff. When completed and ready for final issuance as a formal report, the document (Abstract and PostScript files) is electronically transmitted to CASI's electronic document management system (EDMS) to be postprocessed (component 2) as an HTML file. The HTML file is also sent to the Center's TRS processing steps to be loaded for on-line access by World Wide Web (WWW). If the creator of the document desires to have several copies duplicated for distribution, a job ticket is prepared with appropriate duplicating specifications to be sent to the Center's Print Server and ultimate duplicating and finishing. For clarification purposes,

component 1 consists of the desktop publishing and the networked publisher subsystems; whereas, component 2 consists of the Center's Technical Report Server on the World Wide Web.

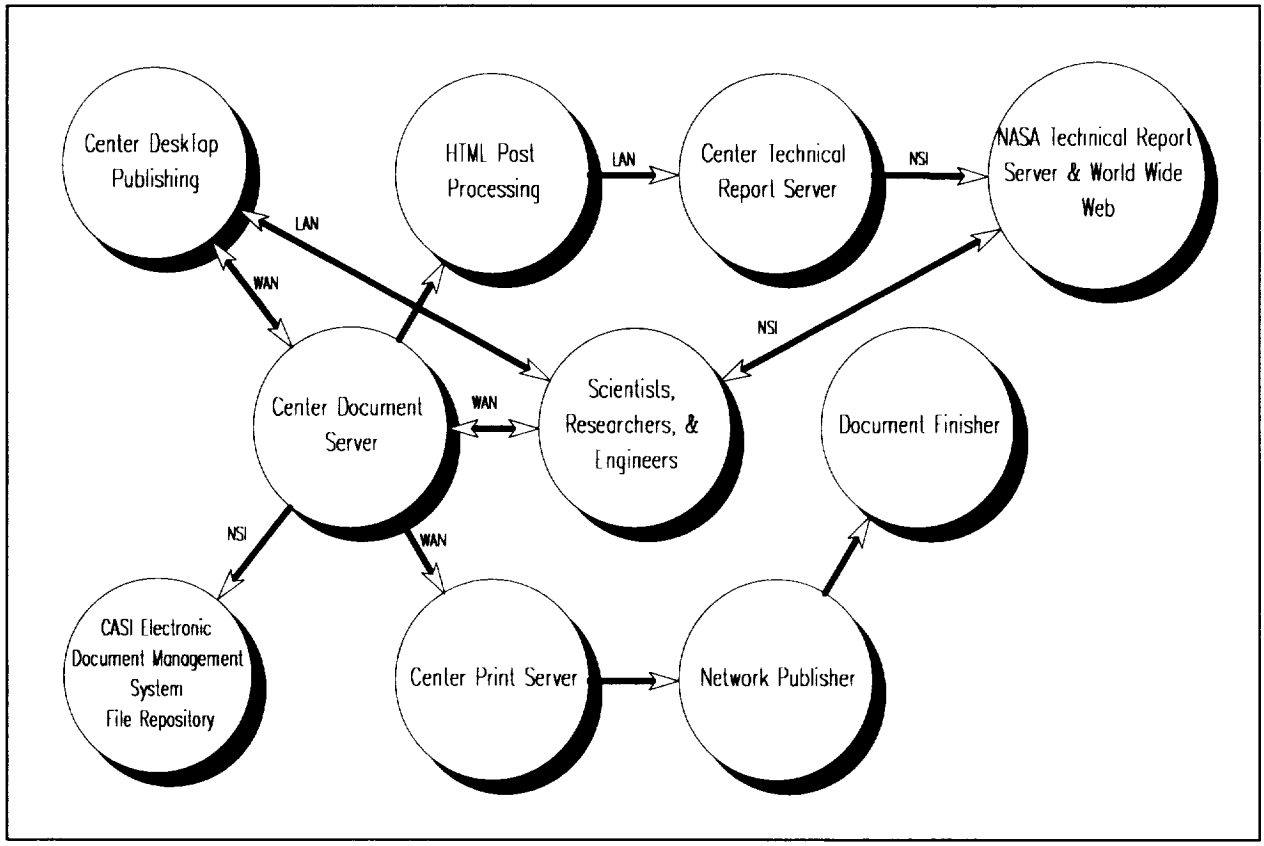
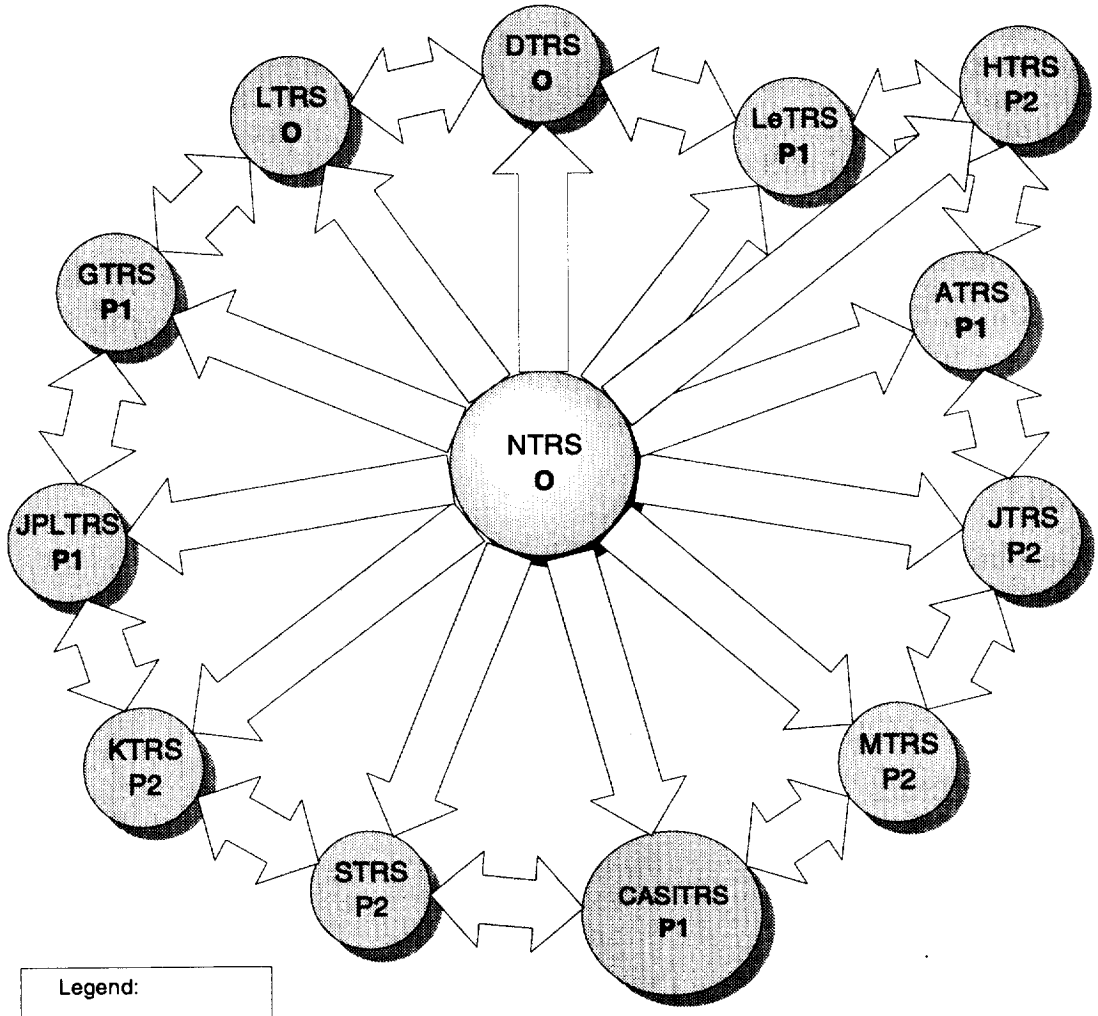


Figure I - 3. End-to-end functionality.

Technical Report Server

The next major component of the STI Electronic Document Distribution project is the implementation at each NASA center of a file server, which will contain a repository for all the technical reports produced by the center. This repository is referred to as the Technical Report Server for each respective NASA center and is displayed by Figure I - 4 with NASAwide Technical Report Server (NTRS) linking all NASA centers and CASI. It should be noted here that the CASI currently contains the historical repository of all NASA formal technical reports and serves in the role of providing a service to all NASA centers as the physical full text (hard copy) distribution center for these reports after their initial distribution by the center producing the formal report. The NTRS is the responsibility of LaRC as the lead center for its maintenance and implementation integration of all NASA center TRSs.



Legend:

O	Operational
P1	Prototype
P2	Prototype

NASA Technical Report Server (NTRS)
Center for AeroSpace Information Technical Report Server (CASITRS)
Langley Technical Report Server (LTRS)
Lewis Technical Report Server (LeTRS)
Ames Technical Report Server (ATRS)
Goddard Technical Report Server (GTRS)
Dryden Technical Report Server (DTRS)
Jet Propulsion Laboratory Technical Report Server (JPLTRS)
Johnson Technical Report Server (JTRS)
Marshall Techncial Report Server (MTRS)
Kennedy Technical Report Server (KTRS)
Stennis Technical Report Server (STRS)
Headquarters Technical Report Server (HTRS) [Added 9/28/95]

P1 - Phase 1, center joined project by Fall 1994.
P2 - Phase 2, center joined project after Fall 1994.

Figure I - 4. NASAwide Technical Report Servers.

Public Affairs Information Server

Another component of the STI Electronic Document Distribution project is the implementation at each NASA center a file server, which will contain a repository for all the Public Affairs Information Series produced by the center. This repository is referred to as the Public Affairs Information Server (PAIS) for each NASA center and is a replication of Figure I - 4 without the CASI node. The PAIS is the responsibility of DFRC as the lead center for its maintenance and implementation integration for all NASA center PAISs.

Home Page and Directory Structure

Each Technical Report Server has been implemented so that they all have the same touch and feel to the NASA end-user community. That is, each NASA center home page has been designed to have the same general hierarchy of display structure, directory structure, and access process. The recommended structures are

1. Home Page Structure-TRS

NASA Technical Report Server (Information available to the public)
- "Center" Technical Report Server
  - Technical Reports (Formal publications)
  - Digital Images

2. Directory Structure (Public Available Data)

Technical Report Series
- Archive (Abstracts)
  - 1995
  - 1994
  - 1993
  - 1992
  - 1991
  - 1990
  - 1989
  - 19xx
- Archive (Documents)
  - TM (Technical Memorandum)
    - CYxx
    - CY91
    - CY92
    - CY93
    - CY94
    - CY95
  - SP (Special Publication)
    - CYxx
    - CY95
    - CY96
  - CP (Conference Publication)
    - CYxx
    - CY91

CY92
CY93
CY94
CY95

RP (Research Publication)
CYxx
CY93
CY94
CY95

TT (Technical Translation)
CYxx
CY93
CY94
CY95

JA (Journal Article)
CYxx
CY93
CY94
CY95

TP (Technical Paper)
CYxx
CY93
CY94
CY95

CR (Contractor Report)
CYxx
CY93
CY94
CY95

AI (AIAA Paper)
CYxx
CY93
CY94
CY95

PH (Ph.D. Theses)
CYxx
CY93
CY94
CY95

PP (Papers Cleared for Presentation)
CYxx
CY93
CY94
CY95

RS (Research Results Cleared for Publication)
CYxx
CY95

The subject divisions for the scientific and technical information content follow the same structure as that used by the Center for AeroSpace Information. These subject divisions are

- Aeronautics
- Astronautics
- Chemistry and Materials
- Engineering
- Geosciences
- Life Sciences
- Mathematical and Computer Sciences
- Physics
- Social Sciences
- Space Sciences
- General

In mid-March 1995, the Public Affairs Office requested assistance in putting their information series into the Technical Report Server. Upon further examination of the information, it was decided that a companion server structure be set up instead of attempting to incorporate this data as part of the TRS. Following the same philosophy of implementation and design, each Public Affairs Information Server has been implemented so that they all have the same touch and feel to the NASA end-user community. That is, each NASA center home page has been designed to have the same general hierarchy of display structure, directory structure, and access process. The recommended structures are

3. Home Page Structure-PAIS

Non-Formal Publications
- FS Titles/IS Titles/RS Titles
  - 1995
  - 1994
- FS (Fact Sheets Cleared for Publication)
  - CYxx
  - CY95
- IS (Information Sheets Cleared for Publication)
  - CYxx
  - CY95

4. Associated Page Structures

The page structure for the STI EDD is open ended, therefore, as many categories of information that can be packaged as a group could be itemized and filed accordingly.

Acknowledgements

This project spans across many organizational entities (editorial, graphics, photographic, imaging, duplicating, distribution, communications, and computers) within each participating center. Each of the team members, reference appendix C, provided valuable insight and input to the content of this technical memorandum. Without their help, this publication could not have been prepared. Issuance of the publication as a NASA Technical Memorandum was accomplished by the Lewis Research Center.

Chapter 1—Demonstrate STI EDD

Prototype STI EDD Demo

There are two parts to the prototype STI EDD Demo, the first part consists of the ability to demonstrate electronically the transmittal of a document produced by an author to the editorial group's working file server and to subsequently retrieve the edited version from the working file server. Additionally, functionality should exist to be able to transmit a PostScript file from the author's desktop publishing software to the editorial group's file server which can subsequently be sent to the duplicating group's print server to be eventually printed according to a job ticket specification by the networked DocuTech, all electronically.

The second part will be the demonstration of the prototype STI EDD, as if the technical report abstracts existed at a single center. Physically, the retrieval of technical report abstracts will come from the following NASA centers: LeRC, GSFC, ARC, CASI, JPL, DFRC, and LaRC. The lead center for maintenance and implementation of the NTRS is LaRC. Langley will demonstrate through the NASA Technical Report Server the integration of the prototype NASA centers who will have loaded in their respective Technical Report Servers selected abstracts of technical reports available for access via the Home Page through MOSAIC or Netscape. Figure 1 - 1 displays the initial prototype STI EDD Technical Report Server linkages before the inclusion of JSC, KSC, MSFC, and SSC.

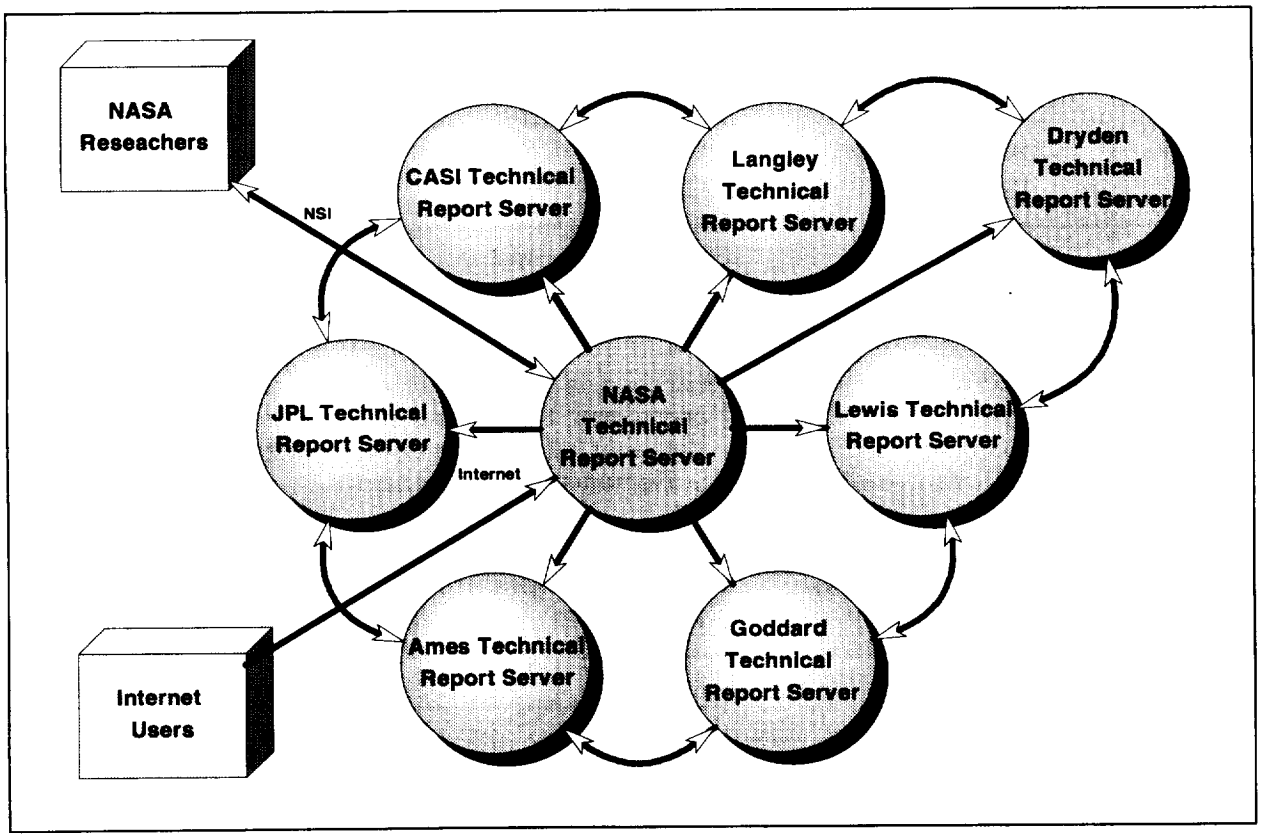


Figure 1 - 1. STI EDD Technical Report Server linkages.

Prototype STI EDD Progress

As each part of the prototype STI EDD moves forward in its implementation, each NASA center's progress in meeting this functionality has been displayed by Table 1 - 1 and Table 1 - 2 below: Specifically, each column in Table 1 - 1 from left to right can be described as Center - self-explanatory, Source To - in this case, the date a WordPerfect for Windows 6.0a source file was transmitted to the center's working file server via file transfer protocol (FTP); Source From - in this case, the date a WordPerfect source file (version 5.1 or higher) was retrieved by Headquarters' PC workstation; PostScript To - the date a PostScript file in Bookman Light was sent to be printed on a Networked DocuTech or Apple Laser Writer II NTX; Networked DocuTech - the date that the PostScript file was printed, Remarks - self-explanatory.

Table 1 - 1. Prototype STI EDD Progress - Electronic Document Transfer

Center	Source To Step 1	Source From Step 2	PostScript To Step 3	Networked DocuTech Step 4	Remarks
LeRC	2/24/95	2/24/95	2/24/95	3/1/95	Completed steps 1 to 3, successfully completed all steps
GSFC	2/14/95	2/13/95	2/13/95	2/14/95	Successfully completed all steps
LaRC	2/15/95	2/15/95	2/15/95	2/15/95	Successfully completed all steps
JPL	2/7/95	2/7/95	2/7/95	2/10/95	Successfully completed all steps
ARC	2/24/95	2/24/95	2/24/95	3/1/95	Completed steps 1 to 3
CASI	2/22/95	2/22/95	2/22/95	Apple LaserWriter II NTX	Successfully completed all steps
DFRC	2/27/95	2/27/95	2/24/95	Apple LaserWriter II NTX	Completed steps 3 to 4, successfully completed all steps

Table 1 - 2 from left to right can be described as Center - self;explanatory; TRS (Abstracts) - the date that the center demonstrated initial functionality; NTRS - the date that the center's TRS was available to the NTRS; TRS (Full Text) - the date that full text was demonstrated by center; NTRS - the date that full text was available to NTRS; Remarks - self explanatory.

Table 1 - 2. Prototype STI EDD Progress - Technical Report Server

Center	TRS Abstracts	NTRS	TRS Full Text	NTRS	Remarks
LeRC	1/95	2/95	-	-	Titles and abstracts only
GSFC	1/95	8/95	-	-	Abstracts and citations only
LaRC	10/93	6/94	10/93	10/93	Some full text
JPL	6/95	9/95	9/95	9/95	Some full text

Table 1 - 2. (continued)

Center	TRS Abstracts	NTRS	TRS Full Text	NTRS	Remarks
ARC	4/95	-	11/95	-	Omitted until linkage resolved
CASI	1/94	1/95	NA	NA	Abstracts only
DFRC	1/95	1/95	1/95	1/95	All full text documents
MSFC	11/95	11/95	11/95	11/95	Some full text documents
JSC	12/95	-	-	-	Omitted until firewall setup
KSC	9/95	9/95	9/95	9/95	All full text documents
SSC	8/95	8/95	8/95	8/95	All full text documents

Uniform Resource Locators (URL)

Uniform Resource Locators (URL) have been identified for all the NASA Centers participating in the Technical Report and Public Affairs Information Servers by the following two sections of this joint technical memorandum.

Technical Report Servers (TRS)

Each of the URLs for the TRSs participating in the prototype joint electronic document distribution project are listed below. These are

1. LeTRS http://letrs.lerc.nasa.gov/LeTRS
2. ATRS http://jit.arc.nasa.gov/atrs/index.html
3. GTRS http://www-library.gsfc.nasa.gov/Gtrs/Gtrs.html
4. CASITRS http://www.sti.nasa.gov/RECONselect.html
5. LTRS http://techreports.larc.nasa.gov/ltrs/ltrs.html
6. DTRS http://www.dfrc.nasa.gov/ReportServer/dtrs.html
7. NTRS http://techreports.larc.nasa.gov/cgi-bin/NTRS
8. JPLTRS http://techinfo.jpl.nasa.gov/jpltrs.html
9. JTRS http://stic.jsc.nasa.gov/techreports/
10. MTRS http://mtrs.msfc.nasa.gov/mtrs/
11. STRS http://www.ssc.nasa.gov/~ssctrs/strs.html
12. KTRS http://techreports.ksc.nasa.gov/ktrs_hom.htm

Public Affairs Information Servers (PAIS)

Each of the URLs for the PAISs participating in the prototype joint electronic document distribution project are listed below. These are

1. LePAIS http://www.lerc.nasa.gov/O_Groups/pao/html/thislew.htm
2. APAIS http://www.dfrc.nasa.gov/PAIS/ARC/index.html
3. GPAIS http://pao.gsfc.nasa.gov/gsfc/service/gallery/fact_sheets/fsheet.htm
4. LPAIS http://www.larc.nasa.gov/org/pao/PAIS/index.html
5. DPAIS http://www.dfrc.nasa.gov/PAO/PAIS/index.html

6. NPAIS http://www.dfrc.nasa.gov/PAIS
7. JPLPAIS http://www.jpl.nasa.gov/archive/fsheets.html
8. JPAIS http://www.jsc.nasa.gov/pao/factsheets/
9. MPAIS http://www.msfc.nasa.gov/general/services.pubs.html
10. SPAIS http://www.ssc.nasa.gov/~pais/
11. KPAIS http://www-pao.ksc.nasa.gov/kscpao/nasafact/nasafact.htm

Walk The Talk—Part 1, Application - Headquarters Phone Directory

Through the demonstration of electronically transmitting the Headquarters phone directory to the NASA centers and having each center perform its own duplicating and distribution, cost savings and reduction in delivery of the publication can be achieved as the direct result of implementing the functionality of electronic document distribution (Part 1). Table 1 - 3 displays the facts and calculations which identified the potential savings in response time and costs through the use of this reengineering process.

Table 1 - 3. Statistical Profile

Avg GPO Cost	Copies	Revised Copies	Cycle time	Remarks
$7,126	10,766	0	3 weeks	
$200	0	1,000	3 weeks	Glossy covers only
Center				
ARC	800	1	1 day	Transmission time (3 to 8 Minutes)
DFRC	150	1	1 day	Transmission time (3 to 8 Minutes)
GISS	40	1	1 day	Transmission time (3 to 8 Minutes)
GSFC	650	1	1 day	Transmission time (3 to 8 Minutes)
WFF	100	1	1 day	Transmission time (3 to 8 Minutes)
Hqts	4,875	2,500	27	Duplication by Hqts DocuTech (Hours)
JPL	1,000	1	1 day	Transmission time (3 to 8 Minutes)
JSC	725	1	1 day	Transmission time (3 to 8 Minutes)
KSC	500	1	1 day	Transmission time (3 to 8 Minutes)
VLS	25	1	1 day	Transmission time (3 to 8 Minutes)
LaRC	300	1	1 day	Transmission time (3 to 8 Minutes)
LeRC	175	1	1 day	Transmission time (3 to 8 Minutes)
MSFC	400	1	1 day	Transmission time (3 to 8 Minutes)
Michoud	50	1	1 day	Transmission time (3 to 8 Minutes)
JPL/NASA	35	1	1 day	Transmission time (3 to 8 Minutes)
CASI	75	1	1 day	Transmission time (3 to 8 Minutes)
Total	9,900	2,500		

The distribution scenario consists of the preparation of an electronic PostScript file which can be transmitted to each center who has an FTP Server available for receipt and subsequent transmission to a network printer or the networked DocuTech. With the availability of set labeling (networked DocuTech), distribution of the finished (staple, saddle stitch, or thermal tape) telephone directory will have affixed the appropriate addressee for distribution by the center's mail room. For

this specific application, savings should occur from a general reduction in the number of copies duplicated; that is, print only what is needed and mailing (U.S. Postal Service) costs.

Cost to produce a single copy of the Headquarters Phone Directory at each NASA center is displayed by table 1 - 4, which was based upon the cost per thousand reported in the FY 1994 JCP report. For Headquarters, the cost per thousand was based upon the evaluation report, NASA TM-106510.

Table 1 - 4. Cost Per Copy by Center

Center	Cost Per Thousand	Cost Per Copy (88 pages)	Estimated Cost (100 copies)	Source
HQT	$20.10	$1.77	$4,425 for 2,500 copies	Evaluation Report, TM 106510
ARC	$24.77	$2.18	$218	FY94 JCP Report
LeRC	$36.08	$3.18	$318	FY94 JCP Report
LaRC	$27.56	$2.43	$243	FY94 JCP Report
DFRC	$24.46	$2.15	$215	FY94 JCP Report
GSFC	$23.04	$2.03	$203	FY94 JCP Report
JSC	$22.85	$2.01	$201	FY94 JCP Report
MSFC	$39.35	$3.46	$346	FY94 JCP Report
KSC	$21.35	$1.88	$188	FY94 JCP Report
SSC	$39.00	$3.43	$343	FY94 JCP Report
JPL	$45.54	$4.01	$401	FY94 JCP Report
Estimated costs to duplicate in-house copies:			$7,101	

Table 1 - 5 displays the contacts at each center for coordinating this demonstration, the FTP server for receipt of the electronic file, and the date that the electronic file was received and its subsequent printing at a network printer or networked DocuTech.

Table 1 - 5. Contacts and Status

Center	Contact	FTP Server	Date File Sent	Network Printer or Networked DocuTech	Remarks
ARC	Dennis Gonzales	128.102.194.143	4/14/95	4/27/95	Networked DocuTech
DFRC	Yvonne Kellogg	ftp.dfrc.nasa.gov	4/14/95	4/20/95	Result printed on Laser Printer
GISS	GSFC	Not applicable	-	-	Hard copy provided by GSFC
GSFC	Susan Hart	xdod.gsfc.nasa.gov	4/14/95	5/17/95	Networked DocuTech
WFF	GSFC	-	-	-	-

Table 1 - 5. (continued)

Center	Contact	FTP Server	Date File Sent	Network Printer or Networked DocuTech	Remarks
HQTS	Susan Kalmon	SneakerNet to DocuTech	4/14/95	4/28/95	Create backup file and restore on DocuTech Printer
JPL	Robin Dumas	server64h.jpl.nasa.gov	4/14/95	4/21/95	Networked DocuTech
JSC	Jennifer Lestourgeon	139.169.18.100	4/14/95	4/21/95	Networked DocuTech
KSC	Dave Severance	128.159.145.4	4/17/95	4/17/95	Networked DocuTech
VLS	KSC	Not applicable	-	-	Hard copy provided by KSC
LaRC	Andy Papp	tebtre.larc.nasa.gov	4/14/95	4/21/95	Networked DocuTech
LeRC	David Mazza	139.88.80.28	4/14/95	4/21/95	Networked DocuTech
SSC	Terry Jackson	nasadev.ssc.nasa.gov	4/14/95	5/5/95	Result printed on Laser Printer
MSFC	Jeff Robinson	eagle.msfc.nasa.gov	4/14/95	4/14/95	Networked DocuTech
Michoud	MSFC	Not applicable	-	-	Hard copy provided by MSFC
JPL/NASA	Headquarters	Not applicable	-	-	Hard copy provided by Hqts
CASI	Roy Stiltner	casi1.casi.sti.nasa.gov	4/14/95	4/28/95	Result printed on Laser Printer

Table 1 - 6 displays the old and the proposed processes in producing the Headquarters Telephone Directory.

Table 1 - 6. Headquarters Telephone Directory

Old		Proposed	
Steps	**Cycle Time**	**Steps**	**Cycle Time**
Prepare Directory	Issue Quarterly	Prepare Directory as an integrated PostScript file with graphics and text	Issue Quarterly
Prepare Master for Printing	1 to 5 days	Transmit PostScript file to center	3 to 8 minutes per center
Prepare Work Order	1 day	Prepare Job Ticket and sent to DocuTech where applicable	1 hour
Sent to GPO Term Contractor for printing	4 to 6 weeks	Print copies	0.5 to 1 minute per double stitch copy
Distribution to each center for distribution	1 - 5 days	Set Labeling where available on DocuTech	Cycle time included during printing

Table 1 - 6. (continued)

Old		Proposed	
Steps	**Cycle Time**	**Steps**	**Cycle Time**
Each center prepares for internal mailing and mails	1 day	Mailing by mailroom	1 day
Total Estimated Cycle Time	4 to 6 weeks	Total Estimated Cycle Time	1 to 2 days
Potential Productivity Improvement: Receipt of end product from 6 weeks to 2 days			

Comparing Tables 1 - 3 and 1 - 4, cost savings are not significant, whereas the cycle time for receipt of the Headquarters Telephone Directory is significant, i.e., reduced from approximately 6 weeks to 2 days. Ms. Paulette Quinn, Code JOB-1, is the primary sponsor for this application. The milestone schedule for implementation is provided below:

		Schedule	Actual Date
1.	Decision to proceed (functionality demonstrated)	5/9/95	5/9/95
2.	Acquisition of hardware/software	Jun 1995	7/5/95
3.	Convert current phone directory to WordPerfect	Jul 1995	7/20/95
4.	Decision to delay Directory to CY96	Sep 1995	9/28/95
4.	Test file transfer to Centers & formalized contacts	Nov 1995	Sch 6/96
5.	Coordinate GPO interface requirements	Dec 1995	Sch 6/96
6.	Print covers for Headquarters issuance	Feb 1996	Sch 6/96
7.	Finalized Headquarters Distribution list	Mar 1996	Sch 6/96
8.	Headquarters Telephone Directory Electronic Proof	Mar 1996	Sch 6/96
9.	Issue Headquarters Telephone Directory	April 1996	Sch 6/96

Specific contact persons and phone numbers for distribution of the Headquarters Telephone Directory and their Duplicating Facility contact persons are displayed by Table 1 - 7:

Table 1 - 7. Headquarters Telephone Directory Contacts

Telephone Directory	Duplicating Facility
Ames Research Center Ms. Rosemary Coronado (415) 614-5002	Ames Research Center John Adams (415) 604-5827
Dryden Flight Research Center Ms. Cindy Whalen (805) 258-3000	Dryden Flight Research Center Greg Shell (805) 258-3012
Goddard Institute For Space Studies Ms. Carolyn Paurowski (212) 678-5500	To be determined
Goddard Space Flight Center Ms. Marion Roby (301) 286-2761	Goddard Space Flight Center Mr. Bob Lane (301) 286-5449

Table 1 - 7. (continued)

Telephone Directory	Duplicating Facility
Wallops Flight Facility Ms. Andrea Wessells (804) 824-1234	Wallops Flight Facility Ms. June Marshall (804) 824-1568
Jet Propulsion Laboratory Ms. Susan Pateracki (818) 354-2380	Jet Propulsion Laboratory Ms. Susan Pateracki (818) 354-2380
Johnson Space Center Ms. Gail Castro (713) 483-0291	Johnson Space Center Mr. Duane Emmons (713) 483-6145
JSC White Sands Test Facility Ms. Janet Reese (505) 524-5627	White Sands Test Facility Mr. James Powell (505) 524-5011
Kennedy Space Center Ms. Ann Gary (407) 867-4256	Kennedy Space Center Mr. Walt Covington (407) 867-4256
KSC VLS Resident Office Ms. Roylan Damwyk (805) 734-8232	To be determined
Langley Research Center Ms. Nannatte Atkins (804) 864-3429	Langley Research Center Ms. Chris Ryan (804) 864-3278
Lewis Research Center Ms. Beverly Sage (216) 433-2255	Lewis Research Center Mr. Dennis Dubyk (216) 433-5805
Marshall Space Flight Center Mr. David Crutcher (205) 544-4518	Marshall Space Flight Center Ms. Becky Caneer (205) 544-4504
Michoud Assembly Facility Ms. Rachel Barthe (504) 257-2777	Michoud Assembly Facility Ms. Joyce Whitfield (504) 257-2627
John C. Stennis Space Center Ms. Karen Prude (601) 688-7729	Stennis Space Center Mr. Vince Andres (601) 688-3931
Jet Propulsion Laboratory, Resident Office Ms. Diane Webb (818) 354-5359	To be determined
NASA Headquarters Ms. Paulette Quinn (202) 358-1276	NASA Headquarters Mr. Michael Crnkovic (202) 358-0428

Walk The Talk—Part 1/2, Application - Public Affairs Fact Sheets

The second application is being proposed to demonstrate the functionality of the STI EDD to electronically provide the Public Affairs Fact Sheets on a more timely schedule to the public in terms of hard copies and access through the Internet. Ms. Elsie Weigel, Code P, is the primary sponsor for this application. Contacts at each NASA center are identified by Table 1 - 7.

Table 1 - 8. Contacts and Status

Center	Contact	Phone #	File Sent	Print	Remarks
ARC	Lito Carbonel	415/604-6270	-	-	Not required
GSFC	Tammy Jones	301/286-1707	-	-	Not required
JPL	Kimberly Lievense	818/393-4641	-	-	Not required
JSC	Barbara Tomaro	713/483-8618	-	-	Not required
KSC	Joseph Green	407/867-7242	-	-	Not required
LaRC	Jean Shanks	804/864-8810	-	-	Not required
LeRC	Marian Mroz	216/433-5573	-	-	Not required
MSFC	Judi Hollingsworth	205/544-5852	-	-	Not required
HQT	Elsie Weigel	202/358-2345	-	-	Not required
SSC	Sheryl Reynolds	601/688-7528	-	-	Not required
DFRC	Don Haley	805/258-3566	-	-	Not required

Application 2 is sufficiently different in data structure, and accessibility dictates that its implementation will have its own level 1 home page. However, access wise, it shall replicate the NTRS in its implementation. For implementation purposes, the Public Affairs comparable NTRS shall be designated the NASA Public Affairs Information Server with the acronym of NPAIS. Each center shall have its own IS file server with the following acronyms:

1. APAIS ARC Public Affairs Information Server
2. GPAIS GSFC Public Affairs Information Server
3. JPLPAIS JPL Public Affairs Information Server
4. LPAIS LaRC Public Affairs Information Server
5. LePAIS LeRC Public Affairs Information Server
6. DPAIS DFRC Public Affairs Information Server
7. JPAIS JSC Public Affairs Information Server
8. KPAIS KSC Public Affairs Information Server
9. MPAIS MSFC Public Affairs Information Server
10. SPAIS SSC Public Affairs Information Server
11. HPAIS Headquarters Public Affairs Information Server
11. NPAIS NASA Public Affairs Information Server

The lead center for the maintenance and implementation of the NPAIS is Dryden Flight Research Center (DFRC). DFRC will also house the Headquarters information series holdings. The information series will consist of the following category of holdings, fact sheets, and information summaries.

In the implementation of the PAIS HTML data structure, each center shall follow the data structure currently implemented by DFRC, who is using Microsoft Word 6.0 to generate the HTML file structure. Because of the complexity of the output structure for the information summary series, the HTML will consist of only the title and a pointer to the PostScript version of the information summary. The fact sheet will consist of an index of fact sheet titles in HTML with a pointer to the full fact sheet in HTML format. The general design of the Public Affairs Fact Sheets shall be in accordance with the following specifications:

1. Each fact sheet that ties in with the Press Release system shall be numbered sequentially within a center and shall list its issuance date by month and calendar year of issuance by using the following schema:

FS-Yr-mth-Seq #-Center, for example:	FS-95-01-001-HQTS, etc.
FS-Yr-mth-Seq #-Center, for example:	FS-95-01-00-DFRC
FS-Yr-mth-Seq #-Center, for example:	FS-95-01-00-JSC
FS-Yr-mth-Seq #-Center, for example:	FS-95-01-001-GSFC
FS-Yr-mth-Seq #-Center, for example:	FS-95-01-001-LaRC
FS-Yr-mth-Seq #-Center, for example:	FS-95-01-001-LeRC
FS-Yr-mth-Seq #-Center, for example:	FS-95-01-001-ARC
FS-Yr-mth-Seq #-Center, for example:	FS-95-01-001-MSFC
FS-Yr-mth-Seq #-Center, for example:	FS-95-01-001-KSC
FS-Yr-mth-Seq #-Center, for example:	FS-95-01-001-JPL
FS-Yr-mth-Seq #-Center, for example:	FS-95-01-001-SSC

2. The generation of the HTML for the Public Affairs Fact Sheets shall follow the same Microsoft Word 6.0 template used by DFRC. E.g.,

Tag	Description of Tag
<HTML>	Start of HTML record
<HEAD>	Masthead
<TITLE>	Title of fact sheet
<NUMBER>	Fact sheet unique number
<BODY>	Text, graphics of fact sheet
<IMG SRC="FactHeader.gif">	Image
<H1>	Header 1
<H2>	Header 2
<DL>	Definition list
<DT>	First term to be defined
<DD>	Definition of first term
<HR>	Produces a horizontal line
 	Forced line break
<B>	Bold text
<P>	Paragraph
</HTML>	End of HTML record

The old and proposed steps in producing the hard copy of the Fact Sheets at each center are displayed by Table 1 - 9.

Table 1 - 9. Headquarters Fact Sheets, Hard Copy

Old		Proposed	
Steps	**Cycle Time**	**Steps**	**Cycle Time**
Prepare Fact Sheet	Issue as prepared	Prepare Fact Sheet as an integrated PostScript file with graphics and text	Issue as prepared
Headquarters review	Not applicable	Each center prepares and sends via Email,Fact Sheet in source format for review to Code P	1 day
Prepare Master for Printing	1 to 5 days	Transmit PostScript file as an attachment to E-Mail via LISTSERV to each Center. A second file will be sent in accordance with Table 1 - 9	1 to 3 minutes per center
Prepare Work Order	1 day	Each center point of contact prepares Job Ticket and sends to DocuTech where applicable for copies	1 hour
Sent to GPO Term Contractor for printing	4 to 6 weeks	Print copies (1 to 10 pages per copy)	At rated speed, page per minute of duplicator
Distribution to each center for distribution	1 - 5 days	Set Labeling where available on DocuTech	Cycle time included during printing
Each center prepares for internal mailing and mails	1 day	Mailing by mailroom	1 day
Total Estimated Cycle Time	4 to 6 weeks	Total Estimated Cycle Time	1 to 2 days
Potential Productivity Improvement: Receipt of end product from 6 weeks to 2 days			

The steps involved for the generation of the HTML files for the Fact Sheet availability on the Public Affairs Home Page are displayed by Table 1 - 10.

Table 1 - 10. HTML Processing Steps

Steps	Description
1	Source file prepared using Microsoft Word 6.0, graphics integrated into file
2	Source file output as HTML output format and transmitted to each center via LISTSERV
3	Each center's point of contact processes the HTML received from Headquarter's Public Affairs point of contact into the center's URL for fact sheets.
4	Fact Sheets available for on-line retrieval via Internet

The unique numbering schema for the Public Affairs Information Summaries shall be in accordance with the following specifications:

1. Each Information Summary which ties in with the Press Release system shall be numbered sequentially within a center and shall list its issuance date by month and calendar year of issuance by using the following schema:

IS-Yr-mth-Seq #-Center, for example: IS-95-01-001-HQTS, etc.
IS-Yr-mth-Seq #-Center, for example: IS-95-01-001-DFRC
IS-Yr-mth-Seq #-Center, for example: IS-95-01-001-JSC
IS-Yr-mth-Seq #-Center, for example: IS-95-01-001-GSFC
IS-Yr-mth-Seq #-Center, for example: IS-95-01-001-LaRC
IS-Yr-mth-Seq #-Center, for example: IS-95-01-001-LeRC
IS-Yr-mth-Seq #-Center, for example: IS-95-01-001-ARC
IS-Yr-mth-Seq #-Center, for example: IS-95-01-001-MSFC
IS-Yr-mth-Seq #-Center, for example: IS-95-01-001-KSC
IS-Yr-mth-Seq #-Center, for example: IS-95-01-001-JPL
IS-Yr-mth-Seq #-Center, for example: IS-95-01-001-SSC

2. The complexity of the output format for the information summaries is such that the generation of the HTML format should wait until future COTS or public domain software is available. Therefore, only a PostScript is available via the HTML index of information summaries.

Walk The Talk—Part 1/2, Application - Producing a Technical Report for TRS

The third application being proposed is to demonstrate the pre- and post-processing steps involved during the preparation of a technical report to be published by a typical NASA researcher or engineer at a center. The steps that Ms. Heidi Barnes takes in preparing her publication for issuance as an SSC Research Paper are documented by the following paragraphs. Figure 1 - 2 displays the process flow for producing a technical report on a user's workstation, printing it locally for draft copies, and sending it to the networked production publisher for finished copies. Figure 1 - 2 also displays the creation of the HTML file for its processing on the center's designated Technical Report Server.

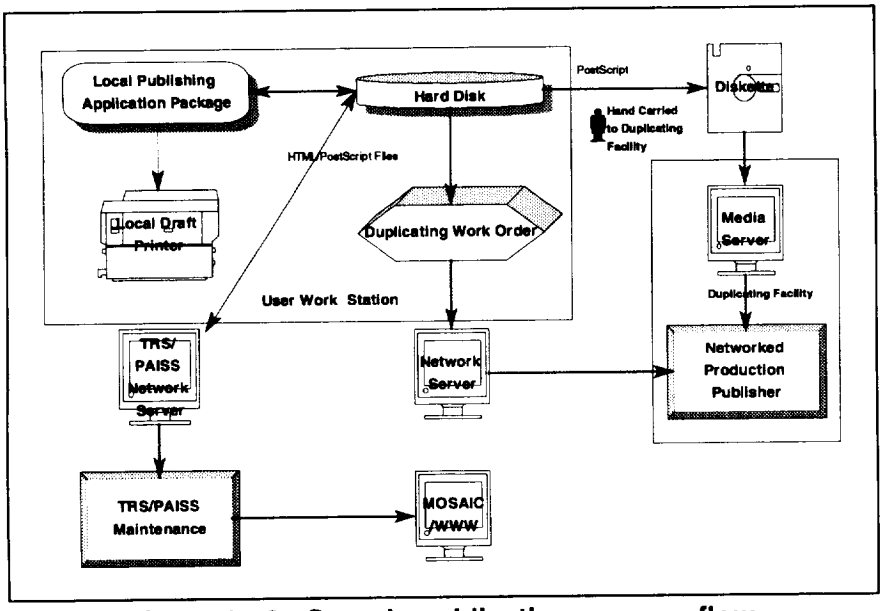


Figure 1 - 2. Generic publication process flow.

Figure 1 - 3 displays the specific steps that a researcher would take in preparing a typical Technical Memorandum or, analogously, all formal technical publications (e.g., Research Publication, Special Publication, etc.) at Stennis Space Center (SSC).

The new process flow results in a reduction in the amount of time required to reproduce and distribute a technical document. The availability of the document through the Internet also prevents needless mass distribution of the document to other centers and government organizations. Table 1 - 11 provides a comparison between the old and the proposed new way of doing business.

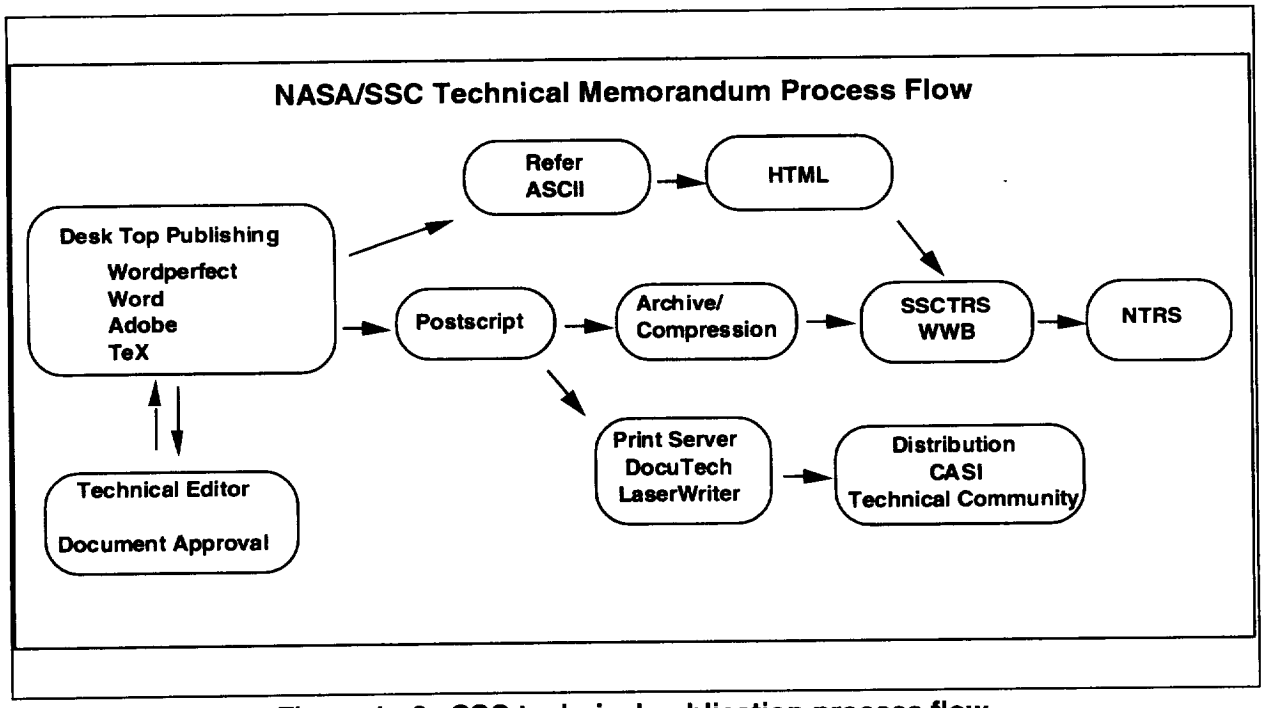


Figure 1 - 3. SSC technical publication process flow.

Table 1 - 11. SSC Technical Memorandum Hard Copy Production

Old		Proposed	
Steps	Cycle Time	Steps	Cycle Time
Prepare technical memorandum	Issue as prepared	Prepare technical memorandum as an integrated PostScript file with graphics and text	Issue as prepared
Headquarters review	3 to 4 days	Send hard copy to HQTS, response/approval via e-mail	2 to 3 days
Prepare master for printing	1 to 5 days	Transmit PostScript file to Print Server	10 to 15 minutes
Prepare work order / Send to Contractor for printing	300 copies / 4 to 6 weeks	Prepare work order and send to printer	75 copies / 5 days
Distribution / Receive labels from CASI	2 to 5 days	Store technical memorandum which is available electronically	1 day
Total Estimated Cycle Time	5 to 8 weeks	Total Estimated Cycle Time	1 to 2 weeks

The electronic copy of the Technical Memorandum is made available on the SSC Technical Report Server, which is accessible through the NASA/SSC home page. Table 1 - 12 shows the process that one follows to put a document on the STRS.

Table 1 - 12 HTML Processing Steps

Steps	Description
1	ASCII source file prepared using WordPerfect or Word by TM author.
2	Source file reformatted as an HTML file.
3	HTML file loaded on SSCTRS and linked to the compressed PostScript TM file.
4	NTRS notified of database update, TM available for on-line retrieval via Internet.

The documents are numbered according to the NHB 2200.2 standard and the group number is assigned by NASA Headquarters STI Office by Center. SSC subsequently groups the publications on the STRS according to the year in which they were published for easy access of new publications. Additional search routines or links from specific organizational codes can assist one in finding relevant technical documents.

Metrics (Usage Statistics)

Total reports accessed by the Hostnames for the NASA Technical Report Server and the NASA Public Affairs Information Series Server from July through December 1995 are displayed by the following two summaries. More detail specifics as to specific accesses within a Center's TRS, countries, and organizations are not displayed, but are available as backup to these summaries.

Technical Report Server (NTRS)

The NTRS database consists of the following Technical Report Servers:

As of June 1994:	LaRC, DFRC, ICASE, NAS, RECON, SCAN, STELLAR
As of August 1994:	includes GISS
As of September 1994:	includes ADS
As of February 1995:	includes LeRC
As of June 1995:	STELLAR removed from NTRS
As of July 1995:	includes NACA citations
As of August 1995:	includes GSFC, SSC
As of September 1995:	includes KSC, JPL
As of November 1995:	includes MSFC

Table 1 - 13. NTRS Accesses

Domain	July	August	September	October	November	December
.com	5,765	5,668	18,148	6,104	11,681	8,209
.edu	3,127	3,308	11,571	4,170	8,636	4,565
.foreign	7,755	8,029	30,814	11,496	22,962	14,273
.gov	228	401	1,090	328	742	435
.nasa.gov	2,066	2.032	6,083	1,850	4,778	4,045
.net	1,273	1,282	1,922	1,401	2,423	2,125
.org	258	315	1,098	370	742	715
.mil	635	618	1,922	568	1,632	725
.unknown	4,414	4,421	13,954	5,657	10,577	8,286
Total	25,521	26,074	86,602	31,944	64,173	43,378

During November 1995, the number of .foreign (Reference Table 1 - 14) accesses had the following profile:

1.	Australia	771
2.	Canada	1,661
3.	Germany	4,225
4.	Finland	584
5.	Italy	940
6.	Japan	2,060
7.	Netherlands	1,254
8.	Sweden	963
9.	United Kingdom	3,027

Public Affairs Information Server (NPAIS)

Table 1 - 14 displays the number of accesses for the period July through December 1995. This data is based upon the following centers, DFRC, ARC, GSFC, and Headquarters.

Table 1 - 14. NPAIS Accesses

Domain	July	August	September	October	November	December
.com	170	502	1,267	2,508	2,522	3,081
.edu	76	126	495	1,421	1,243	1,437
.foreign	72	199	821	2,253	2,741	2,260
.gov	105	6	26	66	142	102
.nasa.gov	257	731	1,079	2,792	2,371	2,855
.net	16	39	321	582	771	915
.org	-	12	29	58	60	76
.mil	12	11	98	147	98	102
.unknown	265	420	1,078	2,688	2,331	2,664
Total	973	2,046	5,214	12,515	12,279	13,492

For the month of November 1995, the domain .foreign for over 100 files sent are as follows:

1.	Australia	177
2.	Canada	338
3.	Germany	288
4.	Finland	141
5.	Italy	104
6.	Japan	336
7.	Netherlands	108
8.	Sweden	234
9.	United Kingdom	543

Metrics (Number of Abstracts/Reports)

Table 1 - 15 displays the available abstracts and full text reports availability per the "as of" date. Three Dryden fact sheets have been index to permit linkage to the NTRS.

Table 1 - 15. Available Abstracts/Reports

Service	NTRS	NTRS	NPAIS	NPAIS
As of: 12/31/95	Abstracts	Reports	Index Only	Reports
LeRC	1,200	3		1
GSFC	40			50
LaRC	537	537		21
JPL	'2,000'			23
ARC				8
CASI	2,079,394	Not On Line	NA	NA
DFRC	648	26	3	51
MSFC				15
JSC				0
KSC				23
SSC				18
Headquarters	NA	NA		16
Total	2,081,779	566	3	226

As of July 13, 1995, CASI provided a profile of TRS records by subject division for NASA-produced reports and open literature. This profile is displayed by Table 1 - 16.

Table 1 - 16. CASI TRS Report Profile

Subject Divisions	NASA Technical Reports	Open Literature
Aeronautics	117K	144K
Astronautics	109K	135K
Chemistry and Materials	115K	141K
Engineering	129K	274K
Geosciences	76K	116K
Life Sciences	22K	28K
Mathematical and Computer Sciences	45K	43K
Physics	57K	84K
Social Sciences	13K	5K
Space Sciences	21K	145K
Total	704K	1,115K

Chapter 2—STI EDD Publishing Process

Chapter 2 describes each center's STI EDD work flow process, including how the abstract source files are converted to the hypertext markup language (HTML), indexed, and included in the technical report server.

Post Processing STI EDD Work Flows—GSFC

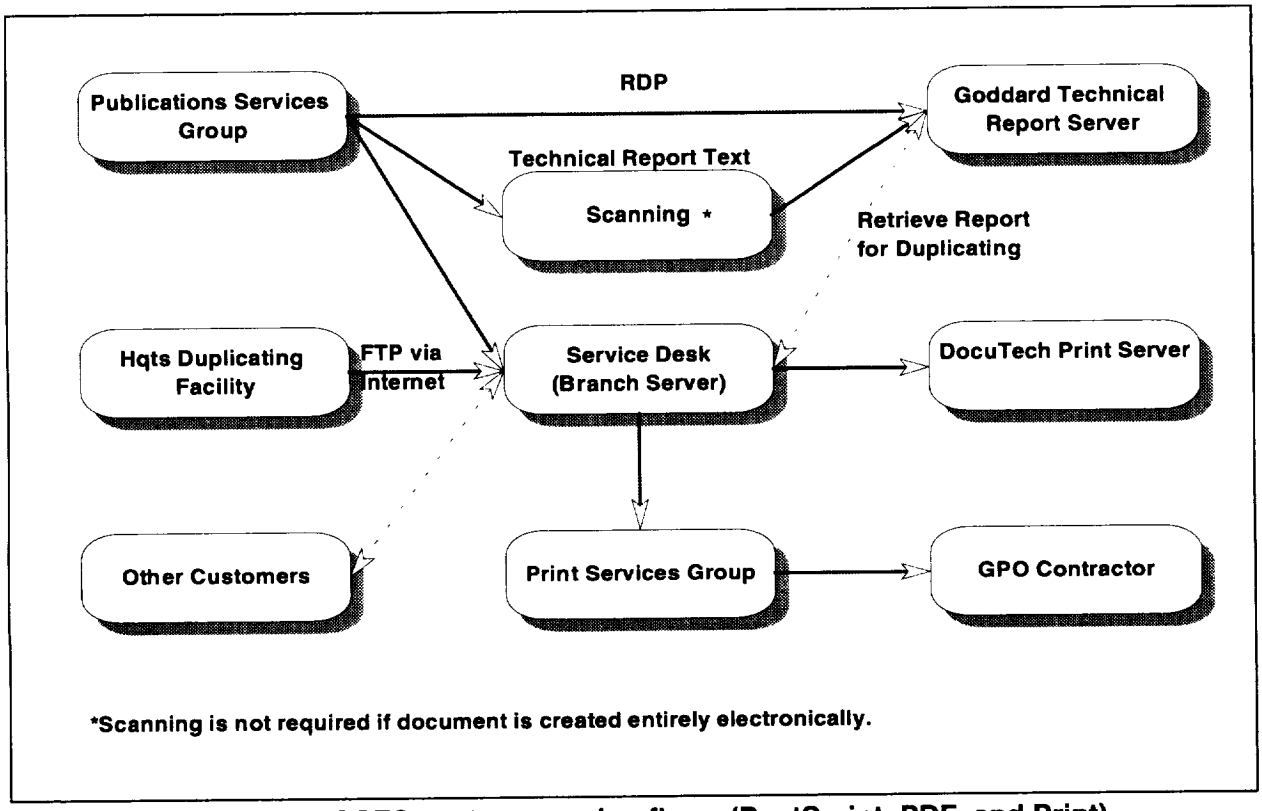


Figure 2 - 1. GSFC post processing flows (PostScript, PDF, and Print).

The Goddard publishing cycle (Figure 2 - 2) will not be affected by the transition to electronic publishing, although the methodology will change.

The document cycle is as follows:

- author to editor for editing.
- to author for proofing and/or correction, (sometimes the corrections and formatting of the document are performed by our Publications Group).
- through the editor who provides the formal document number and assembles all required accompanying paperwork.
- to printing.

- to the mail room for distribution (or other delivery point as requested by the author).

- appropriate number of copies are delivered to the editor for fulfillment of CASI requirements and internal files.

The production of Goddard formal documents has generally been done on hard copy from the editing stage through providing material to the printer. Goddard is also very reliant upon outside contract support to perform much of the production work required.

Electronic Files:

In the first step of the transition to electronic publishing we have begun requiring authors to supply us with their document in electronic format. We receive this file after the author has incorporated editing changes, and then we typeset and format the document to conform to the STI specifications. Some of our authors format or typeset their document themselves following instructions in the STI Handbook; in which case, we check layout, paginate, and insert windows for photos, if necessary, before sending the job to be printed. (We plan to develop electronic templates for formal document layout in the more common software applications, which we can provide to our authors. A group at Goddard has developed these templates, and we want to build on what they have started.)

Photos and Drawings:

While text documents are not difficult to handle electronically, there is the issue of photos and line drawings to be included with the text. Ultimately, we expect to handle these items electronically, as well, but presently, they are cropped and dropped into keylines in the text by the printer. (There are several difficulties to iron out at this stage of production. Publications staff will need training to work with images electronically, and authors will have to accept the cost of contractor formatting and image scanning. In the interim, we will need to work out how mixed documents can be provided to the GTRS and CASI as full electronic versions while we are moving to total electronic work methods. The solution may be to continue to scan the final printed document to capture images and text in one file.)

Server and Work Tickets:

The Technical Information Services Branch's (TISB's) server is available to receive files from our authors electronically. Once the document is complete, it will be placed on the server, where the Service Desk can retrieve it, determine if it is to be duplicated or printed, and route it to the appropriate functional area. TISB anticipates that in early fiscal year 1997, its customers will be able to send electronic "work tickets" to initiate the hard-copy reproduction of documents contained in the TRS system. This will bring the system into a more fully electronic and remote-access environment. (At this writing, customers use hard-copy work tickets to request copies of printed material.)

RDP Pages:

Publications staff prepare RDP pages electronically and print them on laser printers as hard-copy, camera ready art to be printed. We have recently developed a procedure for extracting the data from the RDP, exporting it to WordPerfect, and tagging it for the GTRS and the searchable abstract database. This procedure seems to work well.

Feeding the GTRS Full Text:

Documents which have already been printed will be scanned as PostScript and PDF files. Research is being done into software that would enable these files to be batched into documents; otherwise, each page would appear as a separate file. Adobe Acrobat is being considered as a solution to this requirement.

Formal Documents that are partially electronic (text, but not photos or drawings) may have to be scanned from the printed page as well to provide an integrated electronic document to the GTRS.

The ultimate electronic product would incorporate text, photos and drawings within the file and would be able to feed the GTRS directly, when saved as PostScript. Full electronic files have the additional benefit of providing CASI unlimited quality reprint capability for that document, and this file will also be the source for printing, whether on the DocuTech or on a GPO printer.

Metrics:

Table 2 - 1 reflects for the production of formal documents at Goddard for the last 4 years:

Table 2 - 1. Formal Document Production

Document	Fiscal Year 92	Fiscal Year 93	Fiscal Year 94	Fiscal Year 95
TM	51	27	40	24
CP	16	22	6	12
RP	10	16	12	4
TP	7	8	4	0

From this we can project 40 TMs, 15 Conference Publications (CP), 13 Research Publications (RP), and 6 Technical Papers (TP) per year on average. There is no way to estimate the file sizes for past or future Goddard documents at this time, since none of them has been produced electronically, and they vary tremendously in the number of pages and number of photos and illustrations, as well. This will be better known when the documents are being produced electronically, or as they are scanned for the GTRS. If Adobe Acrobat has been chosen as the user interface for the GTRS, converting the documents to Portable Document Format (PDF) will result in significantly smaller files per document.

Post Processing STI EDD Work Flows—LeRC

The publishing process has been evolving for several years as part of our preparation for total electronic publishing. Through concerted efforts in the last 2 years, nearly all documents produced by our production department contain all electronic elements. The EDD project has further spurred this transition. The technical publications function is coordinated by the Publishing Team's Coordination Office, which takes in all work. The normal document cycle is

- Author submits draft copy for publication services or final copy for printing and dissemination services only, along with the required forms.
- Production jobs are sent to the various departments for editing, drawing or revision of figures, layout, and proofing. Printing jobs are sent to layout, where the cover and RDP are prepared.
- The author reviews final layout and obtains supervisory/management approval, as required.
- The Coordination Office assigns or obtains the formal document number, compiles all required paperwork, and sends the completed job to printing and back to layout for conversion of the RDP information into ASCII format.
- The layout department transfers ASCII-format RDP information to the LeTRS, where it is first converted to HTML, then loaded into the public access directory.

Figure 2 - 2 illustrates the processing steps.

We have over 100 abstracts available on LeTRS, but only a few also contain the full text. For the full text documents, we currently intend to place PostScript, HTML, and, perhaps, PDF on the

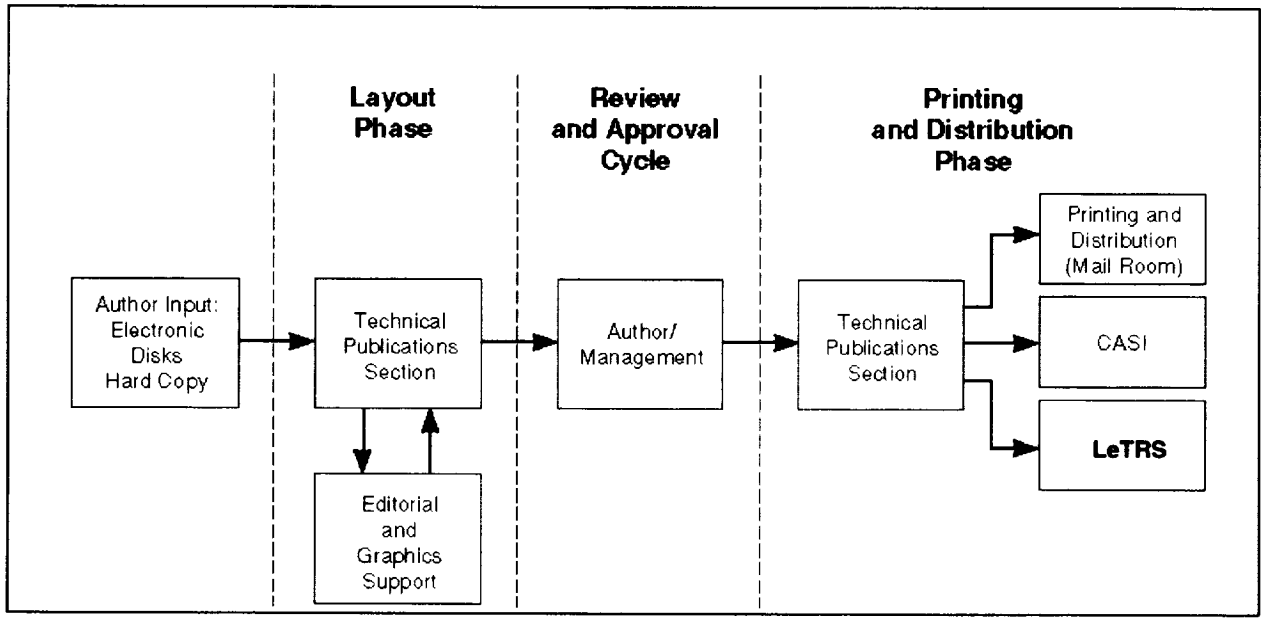


Figure 2 - 2. LeRC publishing process.

server. Most authors who prepared their own files for inclusion on the sever supply PostScript files. These files are inspected for document and file integrity only, and only the cover, RDP, and any standard disclaimer pages are added by the Publishing team staff.

Older documents that need to be made available on LeTRS will be scanned. Figure 2 - 2 displays the HTML processing steps and closely follows the Marshall Space Flight Center's processing steps.

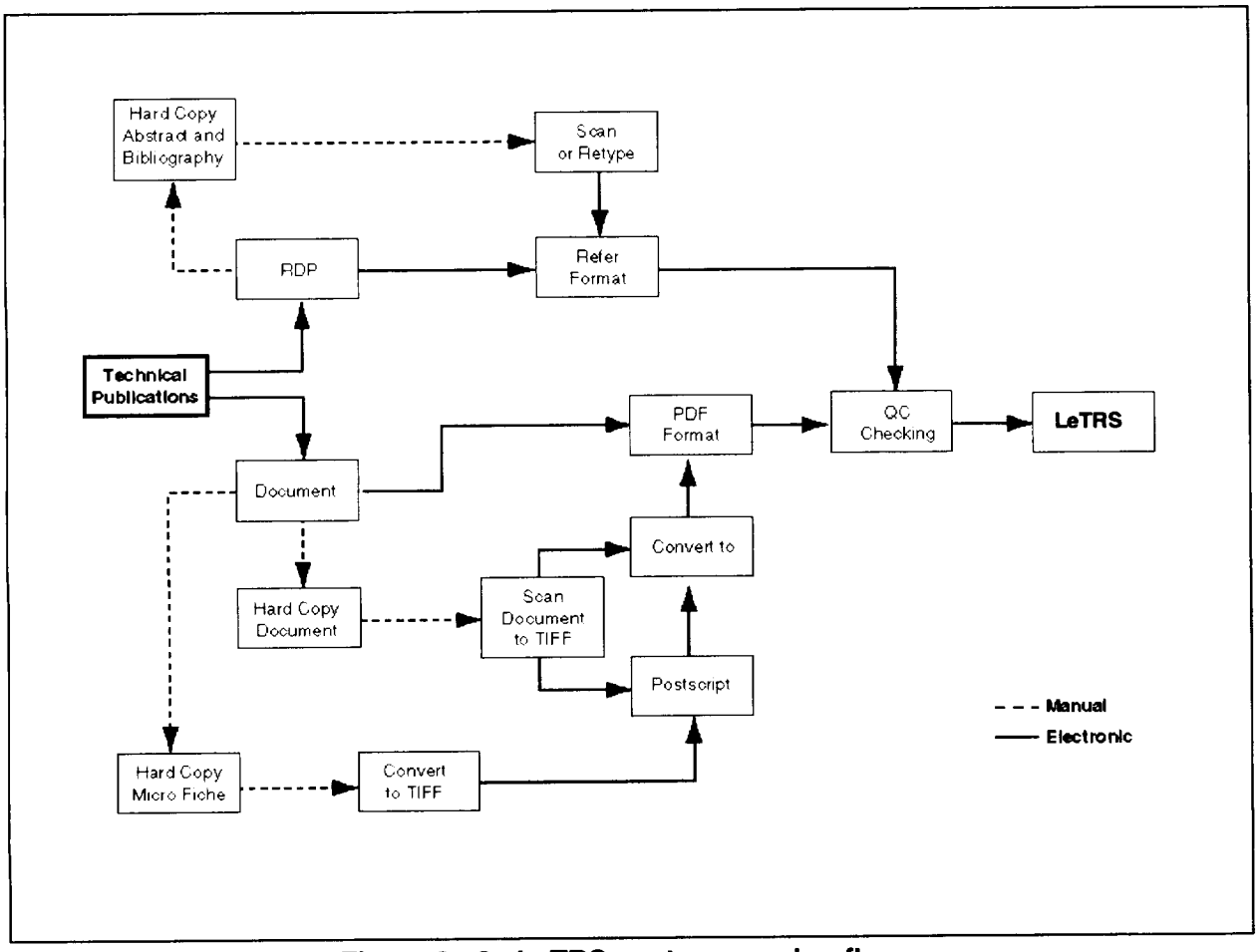


Figure 2 - 3. LeTRS post processing flows.

Post Processing STI EDD Work Flows—ARC

The publishing process at Ames will change only slightly to accommodate the ATRS. Electronic text has been required for several years, and electronic figures have become the norm. There are some hard copy figures, but for ATRS, the figures are scanned and converted into graphical interface format (gif) format for placement in HTML.

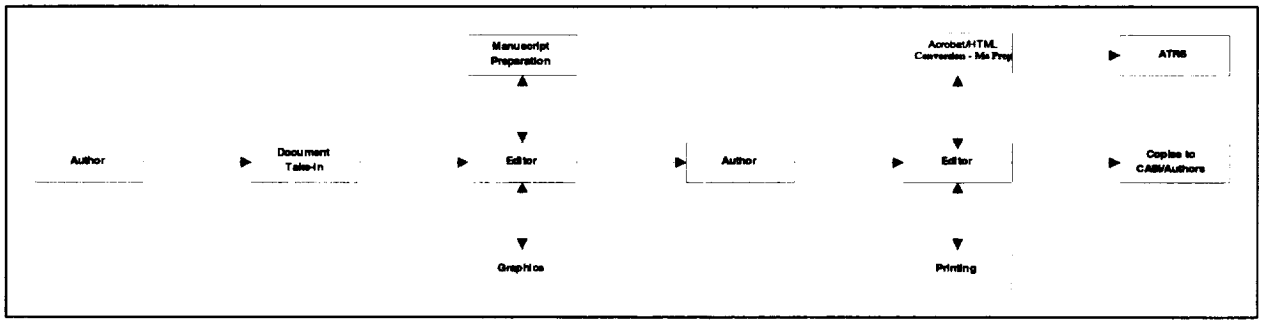


Figure 2 - 4. ARC publishing process.

The Ames publishing process is as follows:

1. The researcher makes an appointment with the take-in desk to turn in a document to the Documentation Technology Branch. At the time the researcher makes the appointment, the take-in representative makes sure the researcher has the proper publishing paperwork completed (ARC 310, FF 427, and service request).

2. The researcher delivers to the take-in representative a hard copy of the document (text and figures), an electronic copy of the document, and the required forms listed in step 1. The take-in representative reviews the document and determines if graphics assistance is necessary. At that time the take-in representative can ask a graphics specialist for input regarding the figures, or can indicate on the take-in sheet that the editor needs to coordinate figure preparation. High-numbered documents are assigned a report number at the time of take in. Editors assign report numbers to low-numbered documents just prior to printing. Once the take-in is complete, the document is given to the Graphics and Editorial Lead to assign to an editor.

3. The editor works directly with the author, graphics specialist, and manuscript preparation specialist to prepare the camera-ready document.

4. After the author approves the editing and signs the ARC 310, the editor works with the Reproduction Technology Branch to have the document printed (either in-house for high-numbered documents, or through GPO for low-numbered documents). Documents that are printed in house and that are completely electronic can be sent directly to the DocuTech™ to be processed by the Reproduction Technology Branch. Some documents that are printed by GPO are sent in electronic format, as well.

5. While the hard copy document is being printed, manuscript preparation personnel prepare the HTML version of the document and send it to the ATRS coordinator.

6. The editor sorts the printed documents to be sent to CASI and the author. Mail room personnel pick up and ship the documents.

7. The editor closes the job and returns the original materials to the author.

Currently, Ames is focusing on putting the NASA formal series reports online. We have started with fiscal year 1995 documents and will work back from there. The fiscal year 1994

documents are being placed on the ATRS in PostScript, but eventually will be replaced with Adobe Acrobat versions with HTML abstracts. Abstracts of journal articles and full-text meeting papers will also be included as time permits.

Post Processing STI EDD Work Flows—LaRC

For the Langley Technical Report Server (LTRS), Figure 2 - 5 illustrates the processing flow for each type of publication which eventually would end up as a hypertext document in the Langley Technical Report Server.

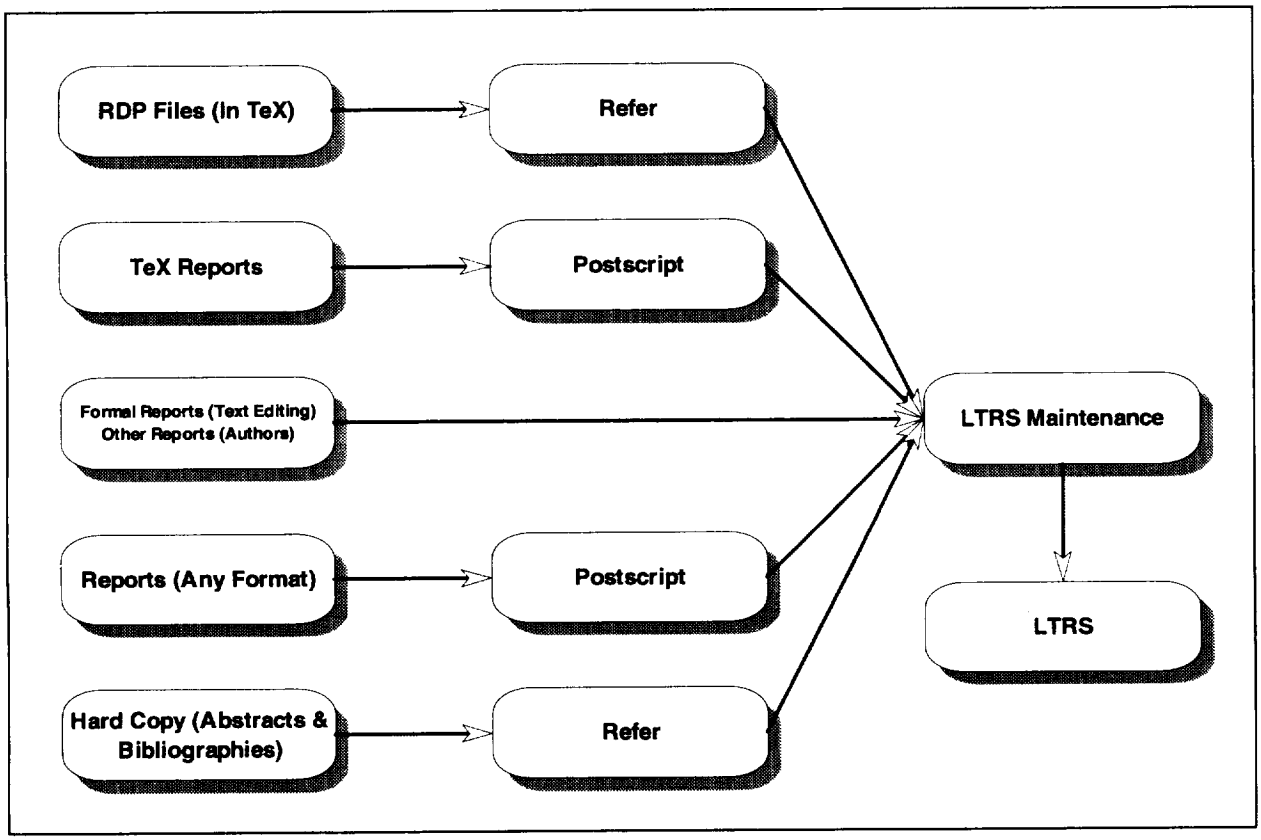


Figure 2 - 5. LaRC HTML post processing flow.

Central to wide use of any document delivery system are the quality and extent of the collection. LTRS currently provides access to over 500 unique reports, including NASA reports, journal articles, conference papers, and NASA-sponsored theses. During the first 18 months of operation, LTRS has delivered over 11,000 copies of reports from this database.

The initial report set was comprised of unrestricted NASA formal technical reports that the Research Publishing and Printing Branch (RPPB), STID, had archived in native electronic format, that is, in the format of the software used to produce the reports (TEX). These files were converted to PostScript format, a de facto standard used for output to printers. Supplying reports in the PostScript format provides most users with the ability to download and print. The formal reports continue to be a large subset of the total number of reports available from the system.

The RPPB continues to input new NASA Langley formal reports into the LTRS system, which is located on a Sun Sparcstation 20 running Solaris 2.3 in RPPB. After the manuscripts are approved for printing and hardcopy distribution, the same electronic files are processed into PostScript files for electronic delivery and submitted to LTRS. Because these reports are all produced with the same publishing software (i.e., FrameMaker or TEX) and conventions, the abstract and citation in refer or ASCII format can automatically be extracted from the electronic file. A script is used to convert the refer or ASCII files into HTML. The resulting HTML files are then indexed with WAIS and included on the server.

Authors may submit their reports directly to LTRS by preparing a citation in refer or ASCII format and submitting it, along with a PostScript file for the report, to Research Information Management personnel in RPPB. If the report is already available on line, the author may simply include the universal resource locator (URL) so that LTRS can point to the report on the author's server. Documents formatted with HTML are also accepted. Research Information Management verifies the document availability.

The most limiting factor to the quality of the LTRS report collection is that not all reports are complete. Often manual processes are still used to produce the report manuscripts; for example, photographs and illustrations may be pasted up instead of electronically inserted. Then, the reports on LTRS do not include the manually inserted material. To help alleviate this problem, RPPB has made an effort to prepare completely electronic publications. Whenever possible, the original electronic figure files are obtained from the authors and revised for the publication. Other figures are redrawn electronically and photographs are scanned and inserted into the document.

Post Processing STI EDD Work Flows—CASI

Processing at the CASI differs from center processing, since the CASI operation results in the creation of citations and abstracts of technical reports produced and published by the centers, as well as journal articles and conference proceedings. Reference Figure 2 - 6.

The CASI Technical Report Server (CASITRS) database is derived from the NASA RECON/STIMS database, which contains nearly 3 million bibliographic citations and abstracts for publicly available aerospace documents, journal articles, and conference proceedings. The CASITRS database currently contains close to 1½ million bibliographic citations from 1970 through current.

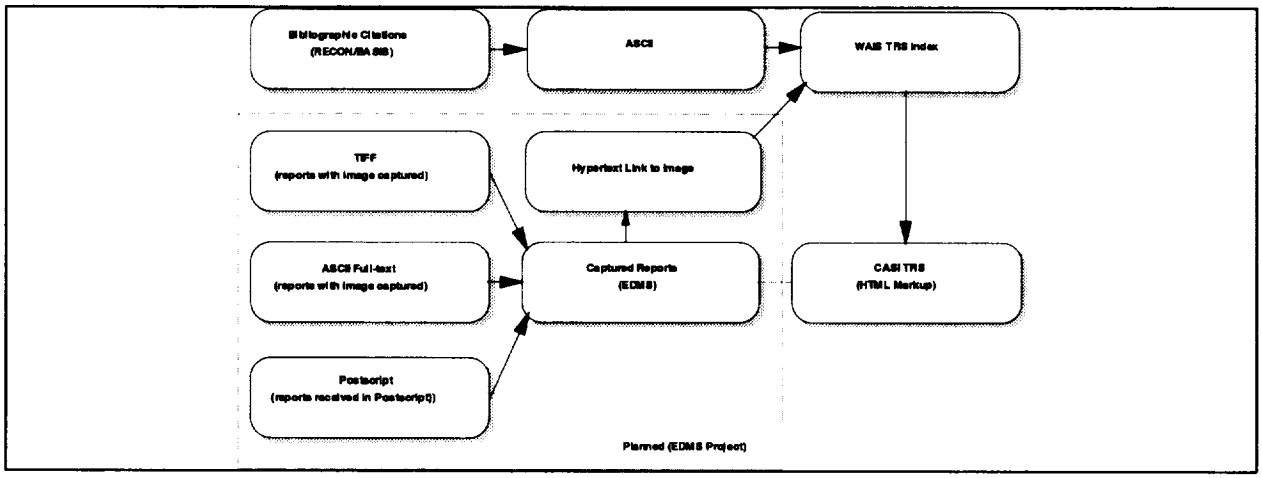


Figure 2 - 6. CASI post processing flows.

The CASITRS database is divided into three main series, which can be searched independently or collectively:

1. Scientific and Technical Aerospace Reports, which contains bibliographic citations and abstracts of technical reports produced by NASA

2. Open Literature, which contains bibliographic citations and abstracts of journal articles and conference proceedings

3. NACA, which contains bibliographic citations and abstracts from the National Advisory Committee on Aeronautics (NACA) collection, NASA's predecessor organization (Note: NACA information is not yet available)

The CASITRS uses commercial WAIS 2.0 software from Wais, Inc. Access to the World Wide Web is available through any client that supports forms. The following types of searching are supported: natural language, literal strings, Boolean queries, and fielded search. The fields available for searching are shown in Table 2 - 2.

Table 2 - 2. CASITRS Searchable Fields

Field	Description	RECON/STIMS Source Field
AB	Abstract	249 Abstract 239 Analytic Note
AU	Author	150 Personal Author 155 Personal Author Affiliation
CC	Category	116 Subject Category
CN	Contract Number	179 Contract Number
DN	Accession Number	021 Accession Number
IT	Subject Term	197 Major Subject Term
JT	Journal/Meeting Title	166 Journal Title 174 Presentation Note
LA	Language	172 Language Note
ON	Publisher	158 Publisher
OS	Corporate Source	142 Corporate Source
PD	Publication Date	095 Publication Date
RN	Report Number	185 Report Number
TI	Title	145 Unclassified Title 148 Title Supplement

The directory structure for the CASITRS is

.../RECONselect/OPENLIT/openlityy.txt
.../RECONselect/STAR/staryy.txt
.../RECONselect/NACA/nacayy.txt
.../RECONselect/Indexes/Openlit/openlityy

.../RECONselect/Indexes/Star/staryy
.../RECONselect/Indexes/Naca/nacayy

where yy is the two-digit year. The indexes for each of the file collections is logically combined using the WAIS "multi-database" feature. The data is NOT in HTML format. The WAISGATE routine does perform a little HTML markup "on the fly" for display of a record.

Post Processing STI EDD Work Flows—JPL

Documents are prepared for the TRS in a variety of ways. Preferably, an electronic file is available from either the author, the publications editor, or the Document Review Services. (Document Review Services has historically maintained a hard-copy archive of all documents cleared for external release.) If an electronic file is available, that file is saved as both a PostScript file and a PDF file. If an electronic file is not available, the hard copy is scanned using the Adobe Capture software. If a document is planned to be utilized later, the Capture's Optical Character Reader (OCR) capability will also be run and the document will be put into HTML or Standard Graphic Markup Language (SGML.) In addition, JPL will track information access through the JPLTRS. Heavily accessed information packages will later be made available in HTML or SGML.

Approval of documents for placement onto the TRS follows a two-step process, which is similar to that used for hard-copy reports. The author supplies a copy of "Authorization for External Release of Information" (JPL form 1330). This electronic form notes the URL of the information to be cleared. Document Review Services (part of Technical Information) and the Office of Patents and New Technology work together to expedite clearance of scientific and technical documents in light of International Technical Authorization Release (ITAR) and European Authorization Release (EAR) regulations, NASA policy, patentability, and adherence to the Prime Contract between NASA and the California Institute of Technology. Authors are notified electronically when their information is cleared for release, and the information is prepared for posting to the TRS.

While the document-preparation initial software used can be on nearly any platform and of any configuration, the final software for viewing on the TRS are PostScript and PDF. Both PostScript and PDF are being provided to ease cross-platform availability and access. As possible, HTML or SGML versions will also be provided to allow users to take advantage of the more powerful features of hypertext linkages.

The metadata is entered into the Refer format in ASCII, which is then used to generate an HTML citation and abstract file for the JPLTRS.

Document output is accomplished with a Xerox DocuTech Network Publisher and two network color copiers (Figure 2 - 7). This system is explained in more detail in Chapter 3, JPL EDD Configuration.

Documents can be labeled electronically using Set Labeling software on the DocuTech. Electronic document distribution lists are stored, updated, and managed on a separate workstation. Electronic lists are forwarded using FTP to the DocuTech, bypass the ticketing application, and are merged and applied to documents while in production.

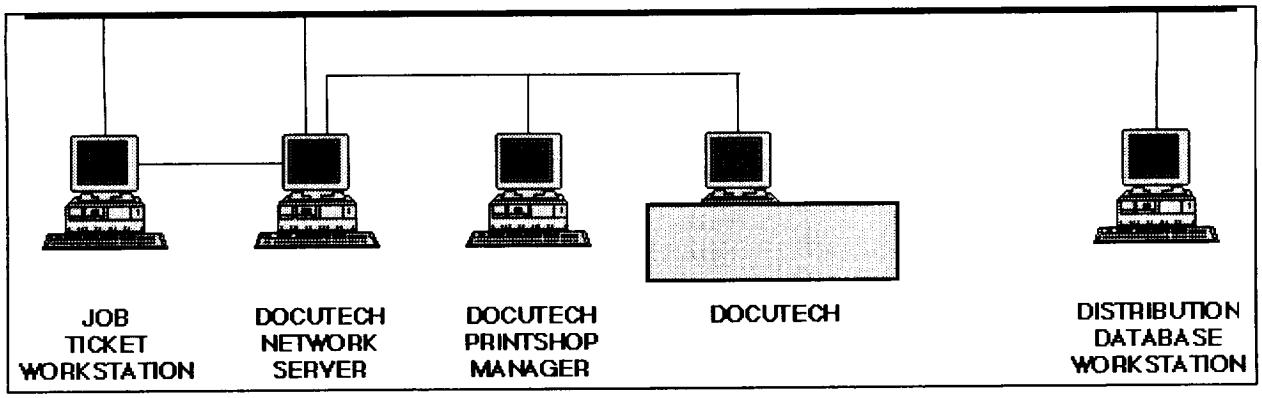


Figure 2 - 7. DocuTech connections.

Post Processing STI EDD Work Flows—DFRC

Components of DFRC Publishing System:

1. Center Desktop Publishing Subsystem

Engineers and researchers prepare document text and preliminary figures at their workstations (UNIX, Mac, or PC). Files can be retrieved via the network by the Dryden STI group and formatted into FrameMaker or given to the Dryden technical editors on disk and hard copy. Completed documents are currently printed in the Reproduction Shop.

The files are formatted by the technical typists into a FrameMaker document on MacIntosh Quadra computers. Any photographs used are scanned in at 200 dpi on Leafscan 45 (for negatives) or Microtek Scan Maker (for photos).

For report art, the graphics department also uses MacIntosh Quadras. Software includes Adobe Photoshop, Adobe Illustrator, Adobe PageMaker, and Canvas. Proof copies are printed out by the Agfa Compugraphic 9400 Imagesetter, Apple LaserWriter Pro, Cal Comp, LaserWriter 360, Correct Print 300i, or Accelerwriter 8100.

The technical typists import the final graphics and scanned photos into the FrameMaker document. Completed documents are placed in the DTRS. To satisfy current regulations, hard copies are printed in the reproduction services department on Xerox 5090 or the Minolta CF-80 color printer.

2. Network Publishing Subsystem

Not applicable, since duplicating volume does not justify installation of a network publishing system such as the network DocuTech.

3. Technical Report Server Subsystem

Provides host for HTML and PostScript files, WAIS, WWW, and web browser software.

4. NASAwide Communications Subsystem

Dryden's LAN serves as the connection from user workstation to document server. A T1 connection is available between Dryden LAN to NSI net.

DFRC Publishing Process:

Dryden has published electronic documents for several years. In 1994, use of the Technical Report Server created the need to streamline the publishing process. This new process uses existing software to make a single unit or "book" from many pieces, i.e., the cover, text and graphics, and Report Documentation Page (RDP).

The STI EDD project will provide the means to standardize the procedures with the other NASA centers.

Dryden follows these steps to publish documents:

1. Submit completed CF-427 for approval

2. Outline review
    a. Check for militarily critical technologies
    b. Outline patent/commercial potential

3. Author rewrite

4. Peer review

5. Hard copy and disk copy (text and figures) to editor

6. Agreed upon corrections to Graphics and Technical Typing departments

7. Finished manuscript to Reproduction Services, for hard copies

8. Electronic document (book version) to DTRS*

9. Internal/external and CASI requirements mailed

*Unclassified, unlimited documents only. Authorization required for all documents put on line.

Review Process:

To submit research papers for conferences or NASA series reports, Dryden researchers first prepare an outline of the project. This draft is submitted for outline review, which helps keep the topic concise. After incorporating the suggestions from the outline review, the author(s) must submit the completed research paper to a peer review. This group reviews all aspects of the paper to guarantee that the material is correct.

A recent addition to this process is a check by Dryden's Technology Utilization Office. The TU group works with experts chosen from various technology fields to determine whether the information must be protected. The Department of Defense book (*Militarily Critical Technologies List*) is the reference used. The TU Office is also responsible for determining the level to which the technology can be commercialized.

Dryden requires that civil service and contractor researchers provide their manuscripts (text and figures) in an electronic format (on disk, or readily available on a file server) and in hard copy. At this stage, the manuscript has been approved by branch- and directorate-level supervisors, and the CF-427 has been signed off.

Editorial Support:

The technical editor is the focal point for NASA's published documents. The editor assigns an internal number to the project (Dryden's series of "H" numbers refers to the days when it was the "High-Speed Research Center"). This number is associated with project for its lifetime. The editor also assigns the NASA series number, according to the type of report designed by the author's supervisor (TM, TP, SP, etc.) and arranges for the mailing labels according to CASI's Subject Category list. After the editing process, the manuscript is given to the Technical Typing and Graphics departments.

Manuscript Preparation:

After the text and figures have been edited, the project is separated into two sections (three if photographs are used). The Technical Typing department imports the document into FrameMaker on MacIntosh computers, and makes the editing changes. The Graphics department imports the figures into the proper NASA format. Once the figures have been approved by the author, they are imported into the manuscript by the Tech Typing staff. Any photographs used are scanned in by the Imaging Technology department. The scanned photos are then placed on the Tech Typist's file server and imported within the document.

Report Documentation Pages are prepared electronically with information extracted from the paper. The cover, title page, and table of contents are also created electronically.

Reproduction Services:

All NASA series reports are printed in the Reproduction Services department, unless special GPO requirements state otherwise.

The Dryden Technical Report Server:

As of January 1, 1995, all Dryden published documents (with the proper approval) are submitted to the Technical Report Server. Many projects published before this date are partially electronic, and must have certain elements scanned in to make them complete.

Papers published before 1989 will be scanned. We are researching ways to provide the most efficient means of scanning in many years of work.

Metrics:

Table 2 - 3 represents the last 3 years' production of formal documents at Dryden:

Table 2 - 3. Formal Document Production

Category	FY92	FY93	FY94
TM	39	26	33
CP	11	1	2
TP	0	1	3
CR	10	6	4
JA	1	4	2
Conference Papers	39	36	34

After sign off by the responsible party, the electronic copy of the report in FrameMaker file is placed into a FrameMaker "book" format, which incorporates the title page, body, and RDP into a single document. The FrameMaker books are transferred to a UNIX server over the network. A PostScript copy of the report is generated and placed on he DTRS server for public distribution.

A citation (ASCII refer format) file is created for each document from the information contained in the RDP form. This citation file is transferred to a UNIX host and is used to generate an HTML citation file in the DTRS. This HTML citation file is indexed into the DTRS WAIS database for searching and retrieval (Figure 2 - 8.)

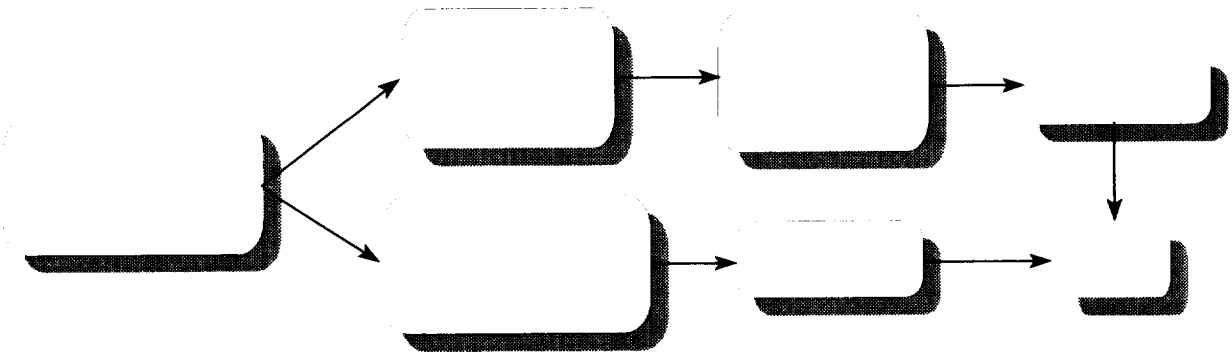


Figure 2 - 8. DFRC HTML post processing.

Post Processing STI EDD Work Flows—JSC

JSC Publications Work Flow

The publishing process at JSC is coordinated by the Publications and Graphics Group in the Information Services Division. Figure 2 - 9 shows JSC's publishing process at the macro level. The normal document cycle is as follows:

1. The document is received from an originator/author. Currently, about 80% of our documents are received in electronic format.

2. An editor is assigned primary responsibility for the document and coordinates all editing, integrating of text and graphics, final layout decisions, etc.

3. The editor is responsible for getting all applicable information for the RDP to the Publications Coordinator who handles generating the RDP, entering the information into our publications database, assigning appropriate numbers, and coordinating distribution list development.

4. Unless we will be working with a considerable number of graphics or a special layout format is required, the majority of our documents remain in Microsoft Word with graphics integrated as Tiff files where possible. Several of our documents are, however, edited in Word and then formatted in Pagemaker. On occasion we still have those documents with graphics in hard copy format only. For those documents, the photographs or illustrations are either scanned in our graphics shop or sent under separate cover to the print shop and scanned into the document using the DocuTech.

5. After final approval is received from the author/originator, the document is prepared for print. For in-house printing, the electronic file is converted to PostScript and placed on a server in our PostScript directory for pickup by the Printshop who knows the document is there after receiving an electronic print request form. The few documents we send to GPO are usually sent in hard-copy, camera-ready format unless an integrated electronic file is required to produce the best quality product. We have begun sending these kinds of documents to GPO

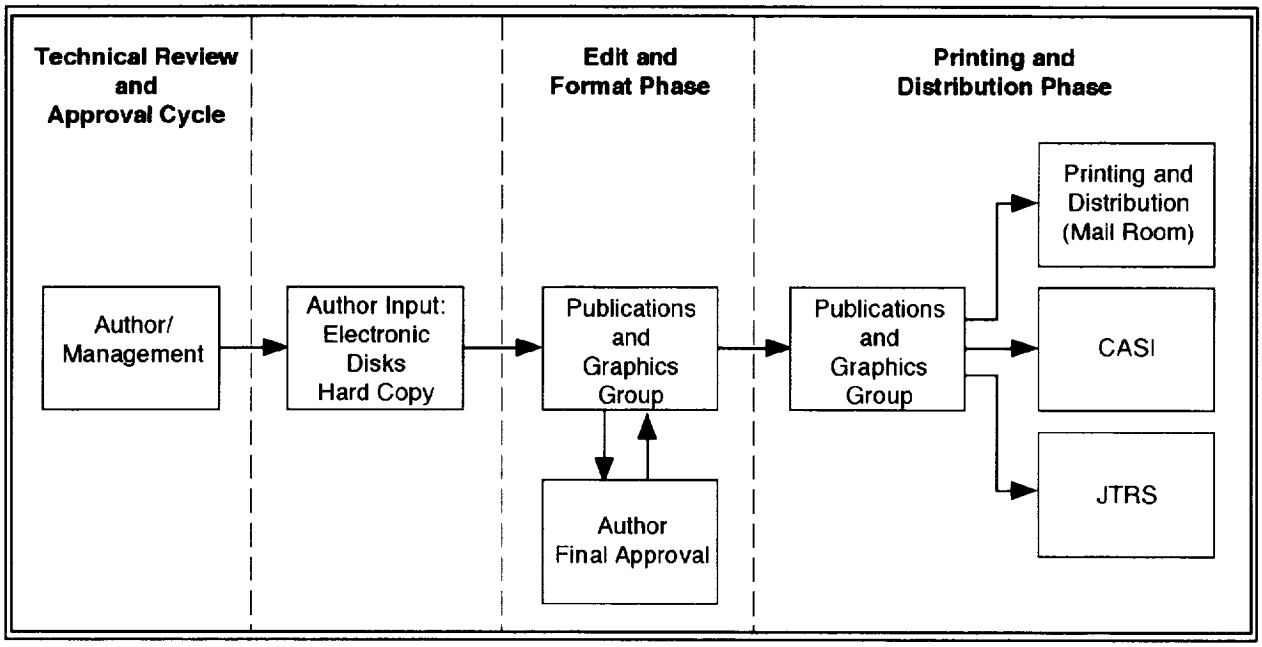


Figure 2 - 9. JSC publishing process.

in PostScript format on a CD.

6. Currently, we are keeping Word documents in native format for placement on the JTRS; Pagemaker files are saved as PDF.

Document output is accomplished with two Xerox DocuTech Network Publishers and two network color copiers. An in-house program acts as a job ticketing and tracking source for incoming documents for output. The tracking software enables duplicating personnel to manage network jobs for all output devices. An overview screen displays all requests with requester name, date, and time required; pages and copies requested; and printing status. Detailed information is displayed on the ticket.

RDP information is being placed on the JTRS as follows: The RDP file is currently created by our Publications Coordinator using our electronic forms software package. The database file is sent to the JTRS administrator's machine for conversion to text using a Perl language script. The text file is then used to generate an HTML citation and abstract for placement on the JTRS. The abstract file will be indexed into the JTRS file based on the year of publication and is made available for word searching. It is our plan to link the title of the documents directly to the reports.

Post Processing STI EDD Work Flows—MSFC

The publishing process at MSFC has been evolving as rapidly as feasible toward electronic publishing; therefore, the EDD project has facilitated enhanced coordination and productivity rather than making significant changes in the existing publication work flow. The technical publications

function is coordinated by the Technical Publications section of the STI Team, which is supported by a contractor-operated publications production group. The normal document cycle is

- Author submits document to Technical Publications (TPubs) for approval and project initiation.

- TPubs gives document to contractor for editing, incorporating graphics, finalization, proofing, and return.

- TPubs returns document to author for final review and supervisory/management approval.

- Publications contractor transfers RDP (ASCII) and completed document (PDF and/or PostScript) to TPubs.

- TPubs assigns formal document number and compiles all required paperwork.

- TPubs transfers abstract electronically to report server administrator for input to MTRS.

- TPubs gives document to printing and mail room for distribution as appropriate.

- TPubs prepares appropriate documentation for CASI and internal file requirements.

- TPubs transfers full document to report server (MTRS) administrator for input to MTRS.

Figure 2 - 10 identifies at a macro level MSFC's publishing processing steps. Production of formal MSFC documents traditionally has been hard copy ready for printing, sometimes containing "paste-up" illustrations for special cases, although authors are encouraged to provide electronic or computer disk drafts of documents. Almost all authors now supply draft material (text or text and graphics separately or integrated) to Technical Publications in electronic form -- either on disk or electronically over Center networks. In conjunction with the electronic publishing project, heightened awareness of capabilities is resulting in increased electronically submitted draft documents from authors and electronic exchange of documents among all the publications production elements. Some authors submit essentially final documents that require only minor editing, formatting, and GPO style compliance changes. The editors currently are able to use approximately 80 to 90 percent of the text draft versions furnished and approximately 60 to 70 percent of the graphics.

The production contractor can now return electronically to Technical Publications PostScript and/or Portable Document Format (PDF) versions of many documents essentially ready for the MTRS. Also, a disk can be provided for any hard copy initial distribution printing by GPO for many technical reports. Electronic exchange has significantly improved the total production time schedule. The goal is for the contractor publications production group to provide essentially all documents to Technical Publications in totally electronic form by early fiscal year 1996. Also, as e-mail network compatibility increases, capability for electronic exchange of fully integrated documents should also improve the time required for the author's final review of the completed product.

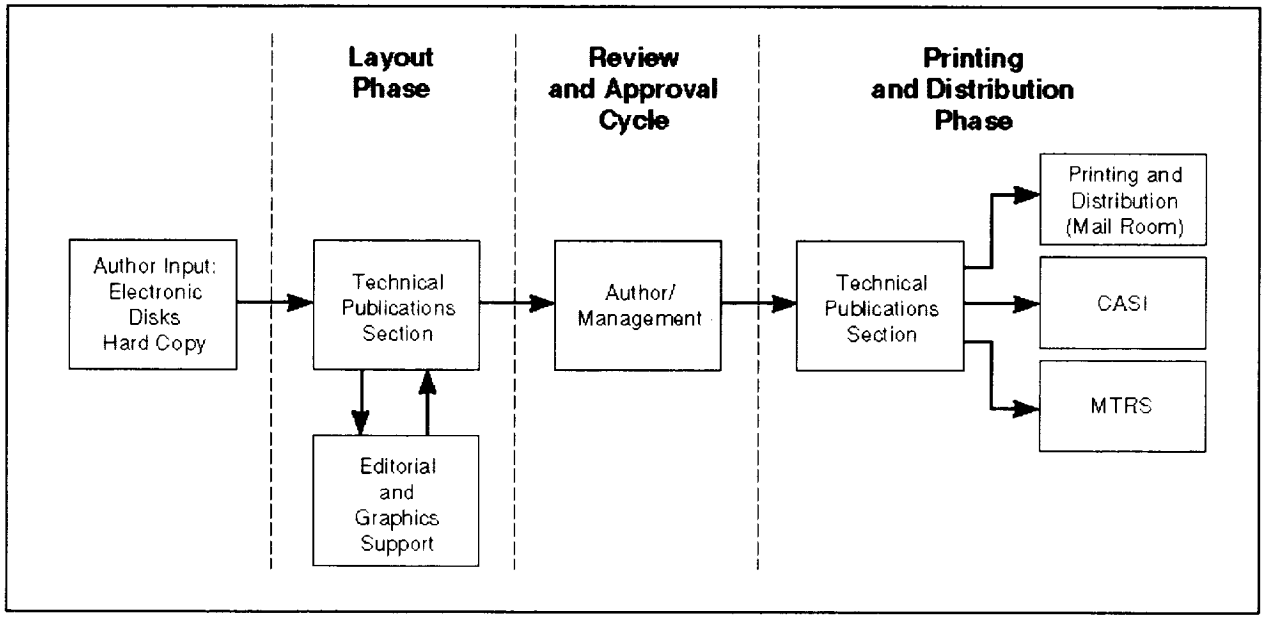


Figure 2 - 10. MSFC publishing process.

Photographs and some computer-generated illustrations sometimes present challenges for a totally electronic process, although some limited successful testing of scanned fully electronic compound documents has been done. Authors are encouraged to have the graphics section prepare illustrations for publications and to provide separate text and graphics to facilitate final integration of the document by the publications production personnel.

RDP Pages: Previously, the contractor publications support group had been preparing RDP pages electronically and printing them on high-resolution printers as camera-ready hard copy for the printing process. The RDP page is now created with the Center's electronic forms application and saved as an ASCII file. Beginning with fiscal year 1995 reports, the editors, using information provided by Technical Publications, prepare the RDP page and return it electronically to Technical Publications for completion of document number and any other final information prior to sending to the MTRS. The MTRS post processing steps are displayed by Figure 2 - 11.

The RDP file is sent to the MTRS administrator's machine for conversion to a Refer format using a Perl language script on a SUN workstation. The Refer file is then used to generate an HTML citation and abstract file for the MTRS. The abstract file will be indexed into the MTRS file based on the year of publication and will be available for word searching. When a paper copy of the RDP is the only thing available, the MTRS administrator will have the page scanned to TIFF and converted to text or have it retyped into a Refer format to use.

Bibliographic citations and abstracts for fiscal years 1992 through 1994 have been electronically converted, HTML tagged, and placed on the MTRS. Any retrospective addition of abstracts for earlier years, most of which must be scanned, will depend on resources available.

MTRS Full Text: Current MSFC efforts are concentrated on placing FY 1995 abstracts, as well as full-text NASA technical reports, on the MTRS. Abstracts of journal articles and other technical papers will be addressed in the future as time and resources permit.

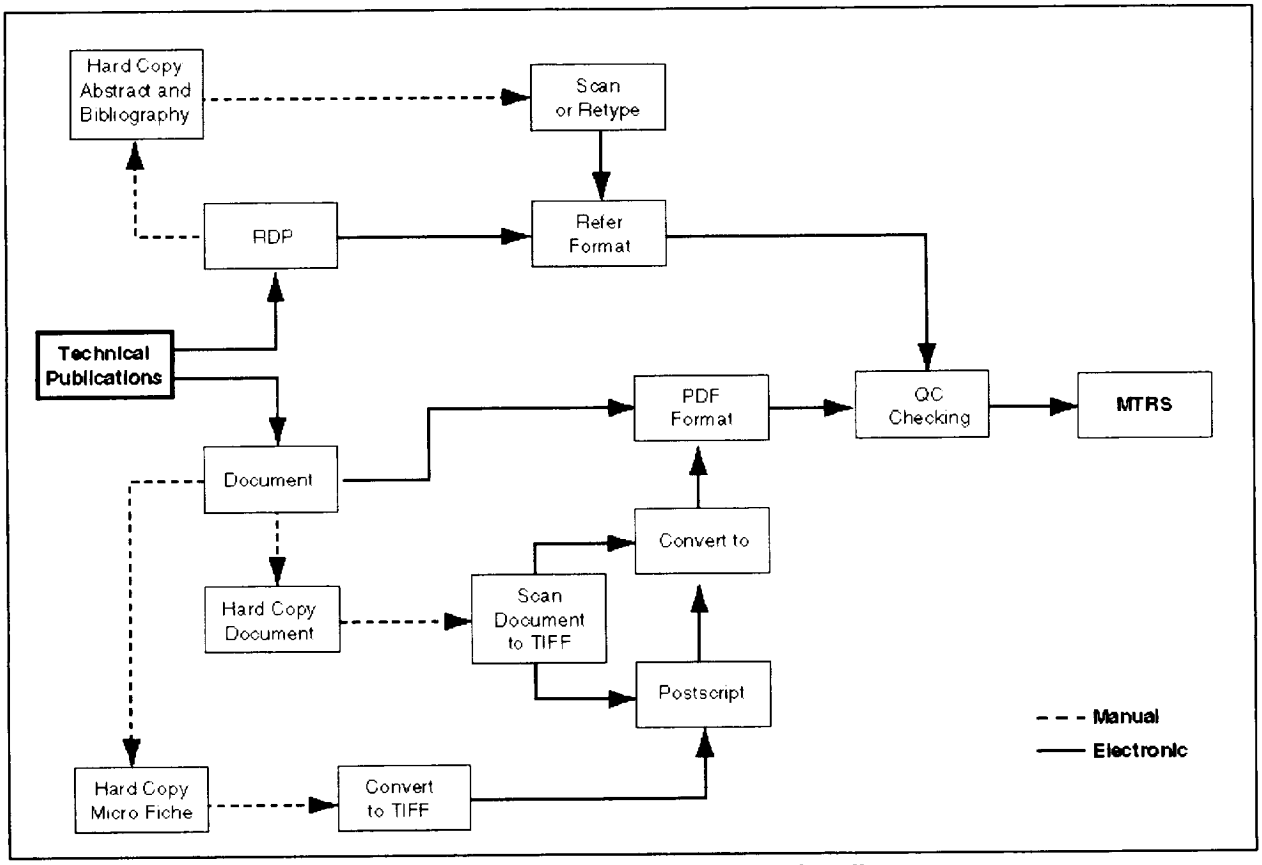


Figure 2 - 11. MTRS post processing flows.

Although occasional special arrangements must be made, primarily to deal with graphics or photographic problems, a workable approach for fully electronic processing has been tested. This method is currently used to the maximum extent possible, and the objective is to make it standard procedure. After final approval by the responsible party, the electronic version of the publication in Word or Pagemaker is converted to a PDF file and transferred to Technical Publications. When all instructions for printing, distribution, and CASI requirements are complete, Technical Publications transfers the document electronically to the MTRS administrator.

When a document is prepared by the publications production group, a PDF format will be created when the document is completed. This version will be used with the Refer format to complete a document when stored on the MTRS. When a document comes in with author-supplied

graphics of poor quality that the publications production group is unable to improve, the graphics page will be scanned and inserted in the electronic document when the PDF is created.

In some cases it is desirable to make an older document available on the MTRS. When paper copy is the only available format, the document is scanned to TIFF and converted to PDF. When microfiche is the only format of the document, the pages are electronically converted to TIFF and then converted to PDF. For current and future operation, the goal is to improve coordination between the authors and Technical Publications to have 100 percent electronic documents so that no documents have to be scanned.

The PDF format in use is the Adobe PDF. This multipage PDF format will give the browsers of the document the closest look and feel to the published document and will be a more reasonable size for long-term document storage.

Post Processing STI EDD Work Flows—KSC

KSC does not have a formal editorial/publications staff. An author at KSC produces the publication in total with support by KSC's Graphics Branch who assists the author in the preparation of covers and illustrations. The KSC Document Availability Authorization (DAA) representative

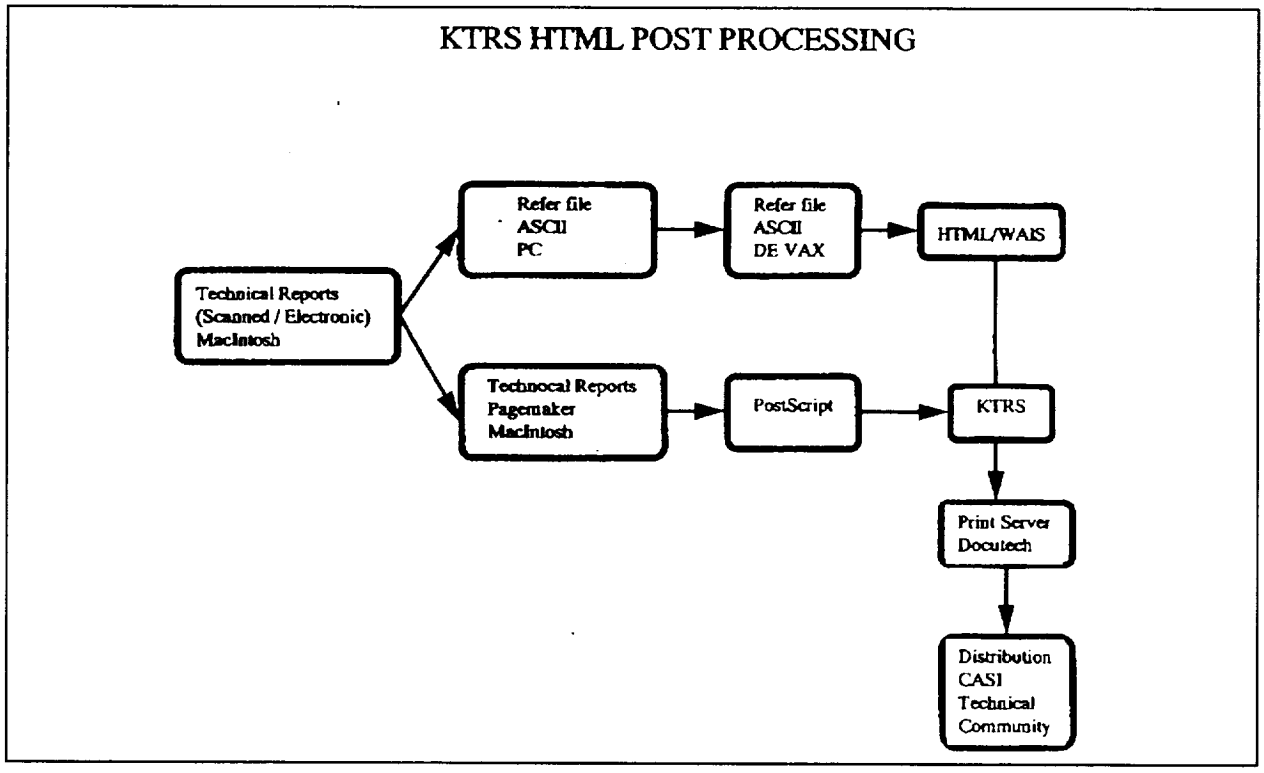


Figure 2 - 12. KSC HTML post processing.

obtains approval for official release of the publication and also provides limited technical guidance to the author. After completion of the publication and receipt of the DAA approval, the author submits the publication to printing for publication and distribution. Distribution of KSC's STI EDD project effort is assigned as follows:

1.	Center Services	Oversight
2.	Library	KTRS technical content
3.	Public Affairs	PAIS content
4.	Graphics	File input
5.	CAD/CAE	Server maintenance
6.	Printing Plant	Printing/Distribution

Post Processing STI EDD Work Flows—SSC

At SSC, Figure 2 - 13 displays the process flow for producing a technical report on a user's workstation and its printing locally for draft copies and to the network-connected production publisher for finished copies. Figure 2 - 13 also displays the creation of the HTML file for its processing on the center's designated Technical Report Server.

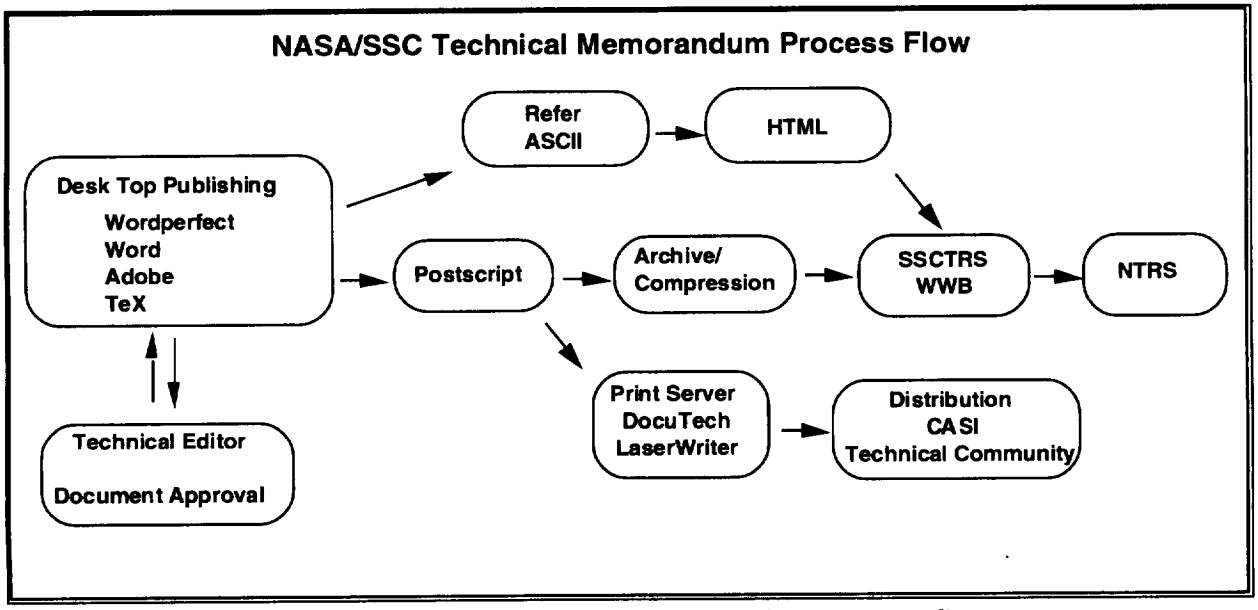


Figure 2 - 13. SSC technical publication process flow.

At SSC, like KSC, there is no formal editorial/publications staff outside of the Public Affairs office. Therefore, most technical reports will be generated by users using the SSC Desktop Services office automation software suite. These are currently defined as WordPerfect, Lotus, Powerpoint, and M/S Project. M/S Word, and Excel, and other publishing packages are available on a "as needed" basis. Documents will be output from the user in a "word processing" or PostScript format. After peer-reviews and final edits are completed, the document will be sent to the SSC Technical Report Server (STRS). Currently a manual process of converting the document to a "compressed PostScript" format, adding the document to the Web Server, and updating the appropriate HTML links is invoked. A secondary process of producing a set of "hard-copy" documents utilizing SSC DocuTech printer is also invoked. This not only completed the requirement for a distribution of a limited set of "hard-copy" documents to the CASI technical community, but it also validates that the document stored on the STRS can actually be printed on a DocuTech printer for later reproduction as needed.

At present, SSC will not produce an HTML or ASCII file of the technical report as shown in Figure 2 - 13, but the capability will exist for future expansion.

Post Processing STI EDD Work Flows—HQTS

In mid-December 1995, it was decided to omit Headquarters as a node in the STI EDD project. Headquarters requirements for this capability will be satisfied by the Center for AeroSpace Information.

Refer Tags for WAIS—TRS

Tag	Refer Description	STI RDP	XDMS
%A	Author's name	Block 6	Authors
%B	Book containing article referenced		
%C	City (place of publication)	Block 9	
%D	Date of publication	Block 2	Pub Date
%E	Editor of book containing article referenced		
%F	Footnote number or label (supplied by refer)		
%G	Government order number	Block 10	External ID
%H	Header commentary, printed before reference		
%I	Issuer (publisher)	Block 9	Publisher
%J	Journal containing article		
%K	Keywords to use in locating reference	Block 14	Key Words
%L	Label field used by -k option of refer		
%M	Bell Labs Memorandum (undefined)		
%N	Number within volume		Edition
%O	Other commentary, printed at end of reference	Block 11	Cust/Dates Used
%P	Page number(s)	Block 15	# of Pages
%U	URL address		
%Q	Corporate or Foreign Author (unreversed)		
%R	Report, paper, or thesis (unpublished)		
%S	Series title		Subtitle
%T	Title of article or book	Block 4	Title
%V	Volume number		Volume
%X	Abstract or miscellaneous information (ignored by all utilities)	Block 13	Abstract

For reference purposes, tagging for the TRS data fields is displayed and cross referenced to the Report Documentation Page (RDP), as displayed by Figure 2 - 14, and the Xerox Document Management System (XDMS) properties page, as displayed by Figure 2 - 15. The Hyper Text Markup Language (HTML) is a subset of the standard generalized markup language used for tagging text so that it can be displayed as hypertext. An example of this conversion is displayed by Figure 2 - 16. The Refer tags with their associated description are also displayed and have been cross reference to the Report Document Page (RDP) and the Xerox Document Management System (XDMS).

As of August 1, 1995, the decision was made that the XDMS did not meet the requirements as a dual-purpose file server that would perform functions as a production control medium for storage and retrieval of publications that the editorial and publications staff would use. The XDMS did not meet the requirements for the creation of the HTML files to be FTPed to the XTRS as well as

an imaging capture system for them. An alternative enabling system will be used by each center as the need arises; otherwise, each center's implementation will follow its current process.

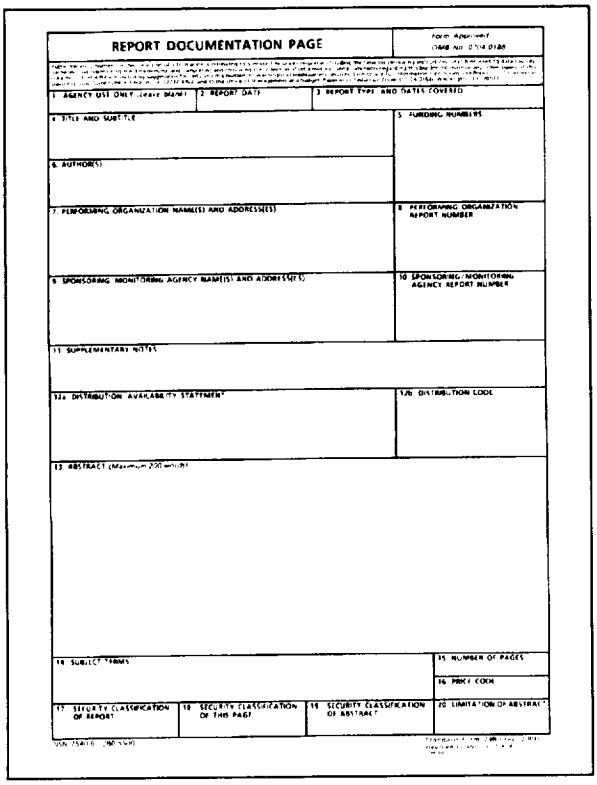


Figure 2 - 14. RDP page.

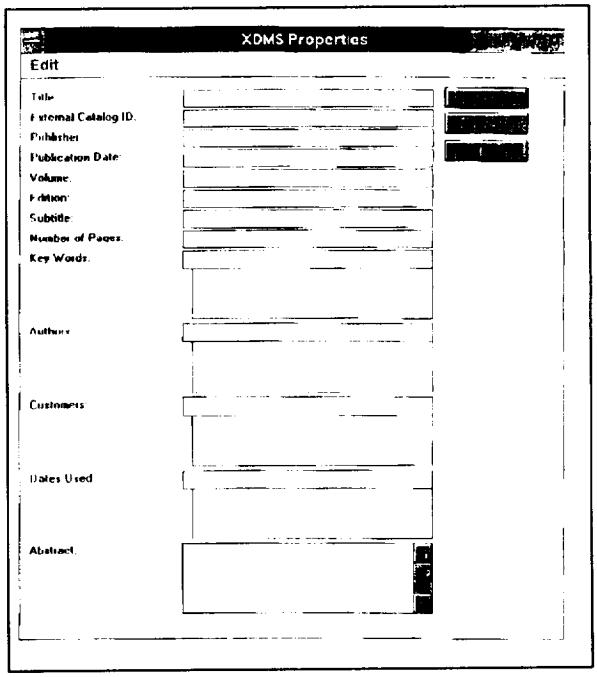


Figure 2 - 15. XDMS page.

%D October 1993
%T A Comparison of Queueing, Cluster and Distributed Computing Systems
%A Joseph A. Kaplan
%A Michael L. Nelson
%I NASA Langley Research Center Hampton, VA 23681-0001
%R NASA TM-109025
%K Distributed Computing, Clusters, Workstations, Queueing Systems
%P 48
%O ftp://techreports.larc.nasa.gov/pub/techreports/larc/93/tm109025.ps.Z
%X
Using workstations clusters for distributed computing has become popular with the proliferation of inexpensive, powerful workstations. Workstation clusters offer both a cost effective alternative to batch processing and an easy entry into parallel computing. However, a number of workstations on a network does not constitute a cluster. Cluster management software is necessary to harness the collective computing power. In this paper, we compare a variety of cluster management and queueing systems: Distributed Queueing Systems (DQS), Condor, LoadLeveler, Load Balancer, Load Sharing Facility (LSF - formerly Utopia), Distributed Job Manager (DJM), Computing in Distributed Networked Environments (CODINE) and NQS/Exec. The systems differ in their design philosophy and implementation. Based on published reports on the different systems and conversations with the system's developers and vendors, a comparison of the systems are made on the integral issues of clustered computing.

Figure 2 - 16. Refer.

Chapter 3—STI EDD Hardware, Software, and Communications

STI EDD Project Configuration

The NASAwide electronic publishing system (EPS) configuration consists of several major subsystems, with each subsystem playing a role in the overall configuration. Each subsystem (desktop publishing, network publisher, technical report server, and communications (local area network (LAN), wide area network (WAN), NASA Science Internet (NSI), and Internet) and its components are displayed in Figure 3 - 1.

Specifically, each subsystem and its components are

1. Electronic Document Publishing Subsystem
   a. Center's STI publications branch submits publications that have been through their editing process or prepared by their desktop publishers and typesetters.
   b. Scientists, researchers, and engineers submit publications that they have prepared with various desktop publishing software on their workstations.

2. Network Publishing Subsystem
   a. Print Server to serve as repository for the printing of center publications.
   b. Network Publisher to serve as high-speed, high-volume duplicating machine.
   c. Document finisher to serve as a high-speed, high-volume final assembly of center publications and its distribution (set labeling).

3. Technical Report Server Subsystem
   a. HTML post processing component to prepare the center publication for input to the search and retrieval software, WAIS.
   b. WWW to serve as platform for the Technical Report Server with HTML version of the center publication.

4. NASAwide Communications Subsystem
   a. Center's LAN and/or WAN to serve as communications connection from user workstation to the document server.
   b. NSI to serve as communications connection from user workstation to other NASA center's technical report servers.
   c. Internet to serve as communications connection from user workstation to outside world.

In essence, with the integration of the subsystems as an overall electronic publishing system, the EPS provides for the NASA scientist, researcher, and engineer an end-to-end process whereby he/she can prepare a document and have it edited, archived, and printed from his/her workstation. In preparing the document, he/she will be able, through the use of the technical report server, to search and retrieve all relevant publications produced by NASA staff, that is, contractors, subcontractors, and internal staff in the development of his/her publication. Figure 3 - 2 expands upon Figure 3 - 1 and displays the relevant hardware components making up the NASAwide electronic publishing system.

The center's STI program is an integral part of the electronic publishing processes, as each document becomes ready for official publication; the center's STI program verifies the document availability and performs a quality check on the format of the abstract and text before publishing on

the server.

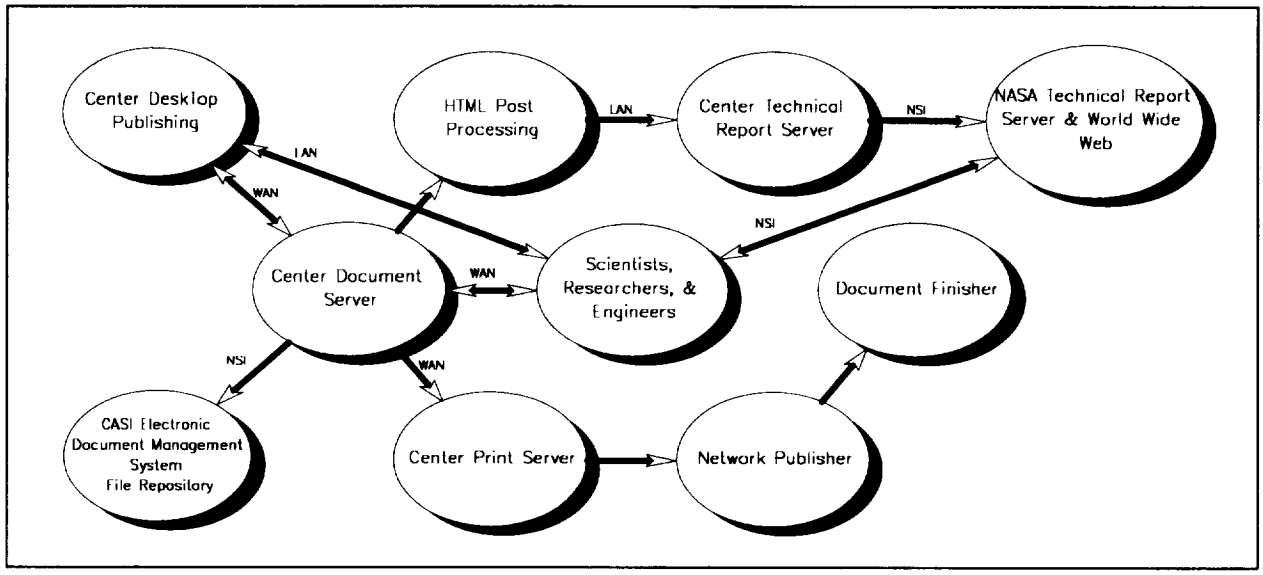


Figure 3 - 1. NASAwide electronic publishing system.

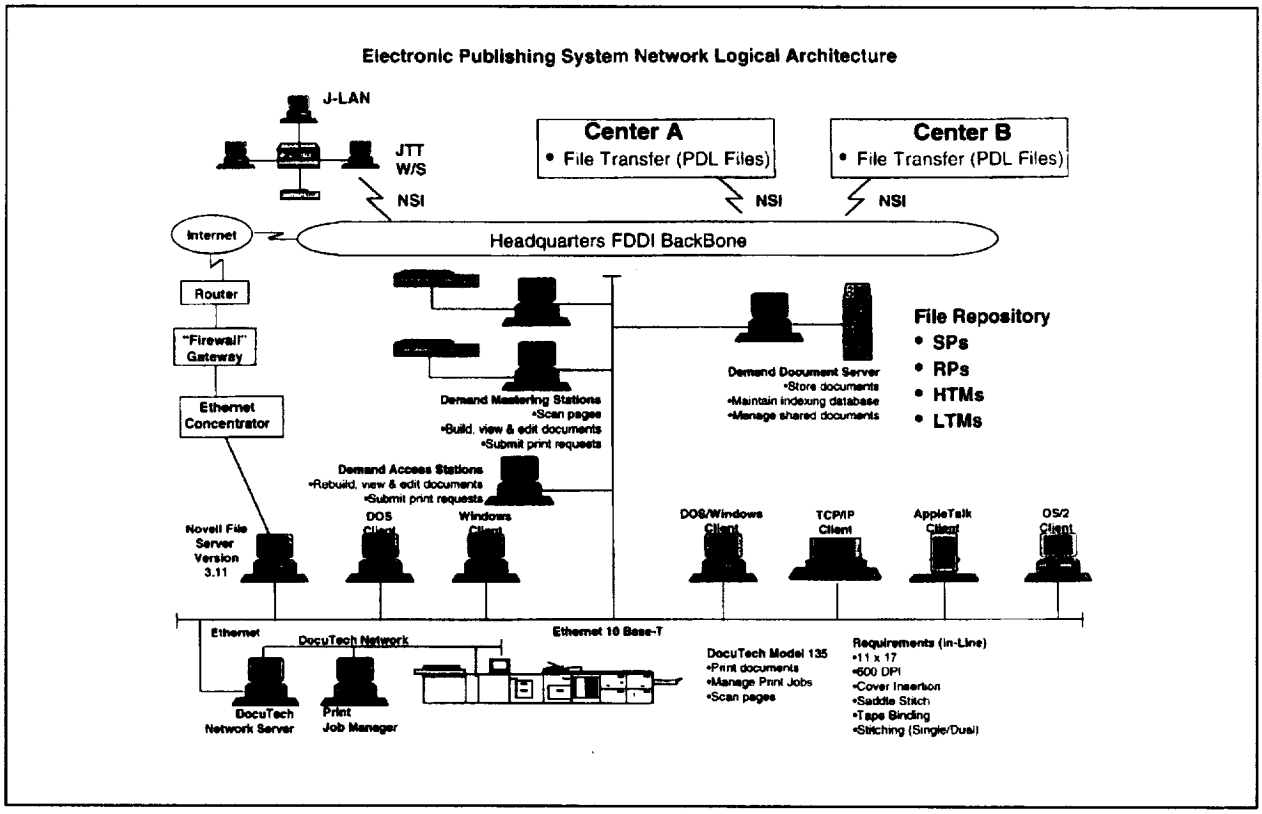


Figure 3 - 2. EPS network logical architecture.

In testing the feasibility and operational concept of the STI Electronic Document Distribution project, a prototype consisting of each of the subsystems and four participating NASA centers have been selected. Prior to full implementation, the prototype has been designed to provide, in an operational mode, a micro view of the operational NASAwide Electronic Publishing System as envisioned and described earlier. Initially, the prototype concentrates on the inclusion of the NASA research centers which produce the bulk of all technical publications. These centers are Lewis Research Center, Langley Research Center, Ames Research Center, Goddard Space Flight Center, and Jet Propulsion Laboratory. It should be noted that Dryden Flight Research Center is included by default (formalized 1/30/95) in that prior to the initiation of the STI EDD, Langley Research Center had Dryden Flight Research Center as one of the nodes in their implementation of the NASA Technical Report Server. Specific configurations for each participating center are displayed by the following figures.

STI EDD Configuration—GSFC

Within the Publications Group each editor is working on a Power Mac 7100 using System 7.5 with Microsoft Word, WordPerfect, and PageMaker software applications. (Many other software applications are available to the editors, but these are the predominant ones used in publications production.) Our supporting contractors have the same technology and most have PC systems and software as well. Conversion capability is available to the editors within their work group. This enables them to work with authors' documents which have been produced on the PC. AppleShare allows editors to share work on documents, but this is not a preferred method of production for Goddard editors.

Additional equipment available on-site and through our support contractors for publications production include both a 600-dpi and an 1800-dpi laser printer, a black and white flatbed scanner and a color flatbed scanner of 600-dpi resolution.

The EDD Team tested the Xerox Documents-on-Demand (XDOD) work station for several EDD functions. The EDD team has determined it is not suitable as the receiving server over the long run, and the database, itself, is not being located on the XDOD, since the system is not robust enough to handle the traffic that is expected on the GTRS. GSFC is investigating various methods by which full text can be made available in the GTRS.

A decision was made to relocate the GTRS to a server in the Goddard Library. There were practical, as well as philosophical, reasons for determining the GTRS' residence. When we began work on the GTRS, the Library offered server space and World Wide Web technical expertise. Moreover, EDD is an ideal team effort between the two branches. While Technical Information Services Branch (TISB) supports the development of a publication, the Library facilitates access to the publication once in final form.

The DocuTech system is in place at Goddard and will function as remote output for the GTRS, as well as for production of whatever number of formal documents are required for distribution initially.

The Technical Information Services Branch has recently installed a Digital Equipment Corporation (DEC) server which will soon be configured to receive authors' documents for production via FTP and also as a drop for completed work being sent to the service desk for either duplication or printing. This server will be the replacement for the originally intended XDOD role as the Service Desk Gateway.

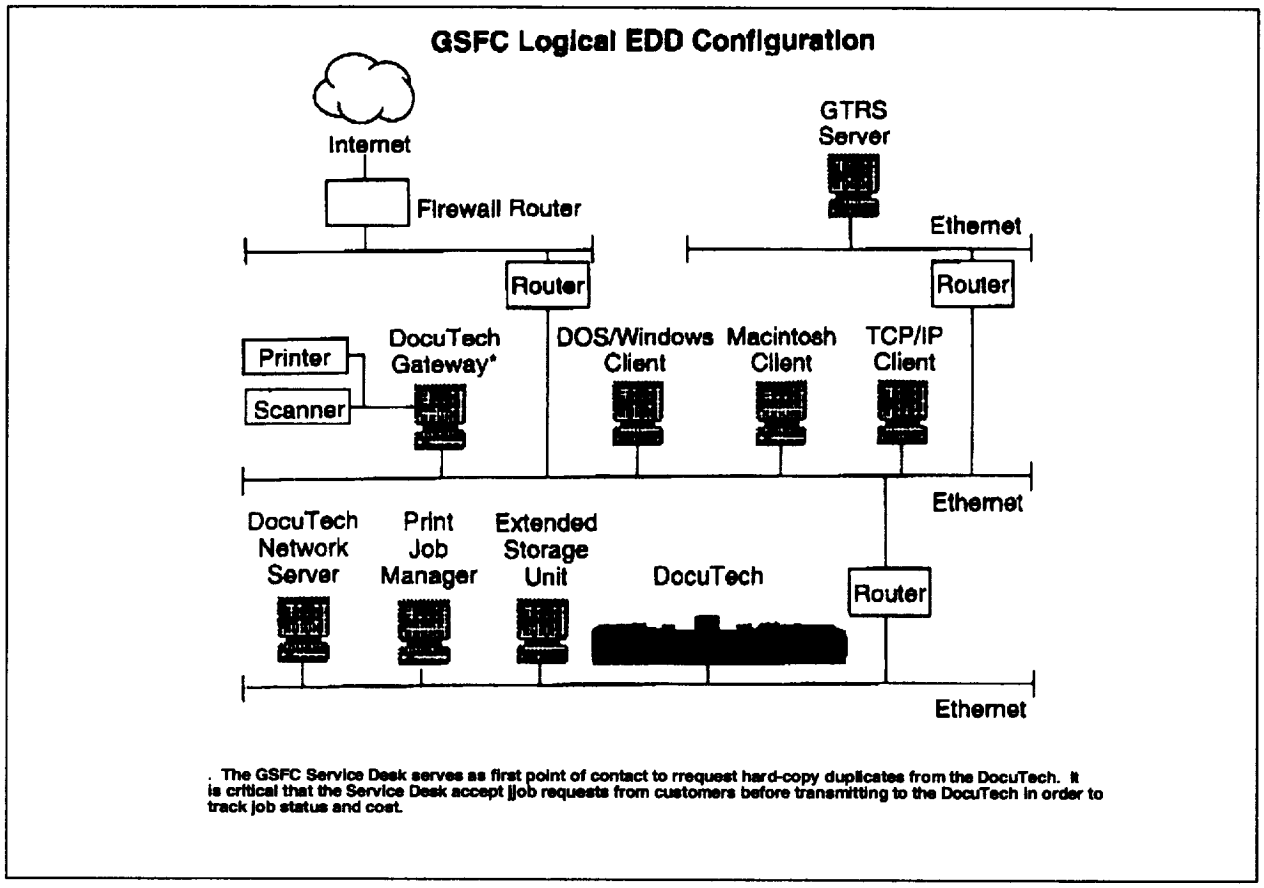


Figure 3 - 4. GSFC STI EDD configuration.

STI EDD Configuration—LeRC

The LeRC computer environment (Figure 3 - 5) in which technical documents are created and used is a multiplatform one, including primarily PC/Windows, MacIntosh, and UNIX. Authors preparing draft manuscripts at their workstations use a variety of software packages and versions, but more than 80 percent of employees centerwide have access to electronic mail capabilities and access to Microsoft Word as a standard application on Workstation Presentation Services (WPS), the Center's management information system, which facilitates communications and computer interoperability.

The STI Technical Publications section and its contractor support editors work on MacIntosh computers using the latest system software, including Microsoft Word, PageMaker, and other software applications as needed. The graphics specialists have MacIntosh computers (various FX models, Quadra 800s, 950s, and Power Mac 8100s) with software that includes Microsoft Word, PageMaker, Adobe Illustrator, Photoshop, MacDraw Pro, and others as required for a particular task. Conversion capability to various graphic formats is available. High-resolution printers are used to produce camera-ready art.

The final Word or PageMaker version of documents can be printed on several high-resolution printers for hard-copy requirements. The documents can be output in PostScript and PDF format

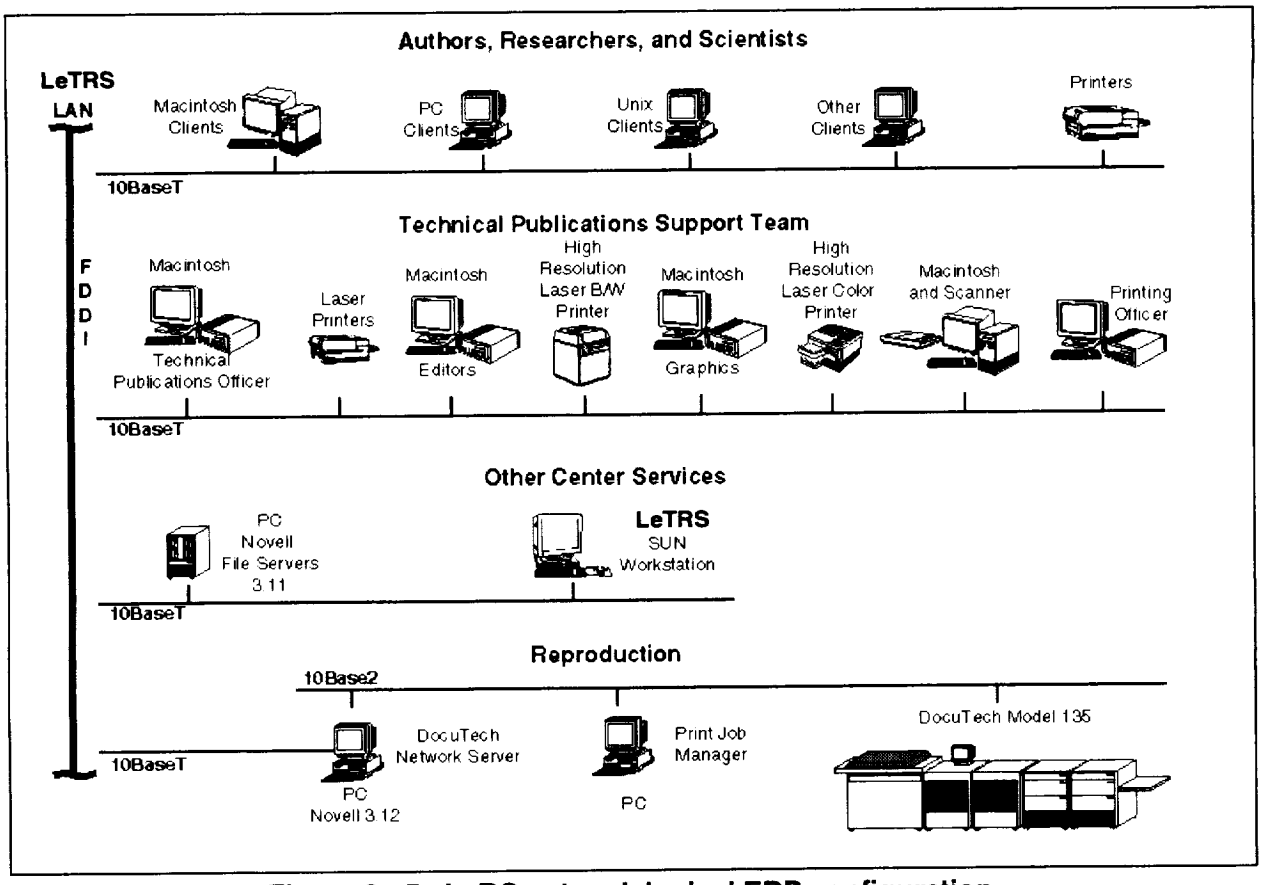


Figure 3 - 5. LeRC network logical EDP configuration.

and provided to the Technical Publications section for use on the LeTRS or for transfer to the Printing Officer for DocuTech or other printing phase requirements.

STI EDD Configuration—ARC

In the Graphics and Editorial Services group, each manuscript preparation specialist and editor has a MacIntosh computer (IIci or IIfx), System 7.01 with Microsoft Word, Aldus PageMaker, Frame Technology Corporation FrameMaker, Adobe Illustrator, and Microsoft Excel software applications. Many other software applications are available on the server, but only the most commonly used applications are listed. Manuscript preparation is possible for documents that are not Microsoft Word. Apple LaserWriter Pro 630 printers are used to output camera-ready copy.

Graphics specialists have a MacIntosh computer (Quadra 800), System 7.01 with the same software previously mentioned plus Adobe Photoshop and Quark XPress. Conversion capability to various graphic formats is available. The printers used to output camera-ready copy are the Apple LaserWriter Pro 630, Agfa Compugraphic 9400 Imagesetter, LaserMaster Unity 1200XL, and the Canon Color Laser Copier 500 with the Fiery attachment.

All members of the Graphics and Editorial Services group can connect to the Xerox DocuTech via Ethernet as displayed by Figure 3 - 6.

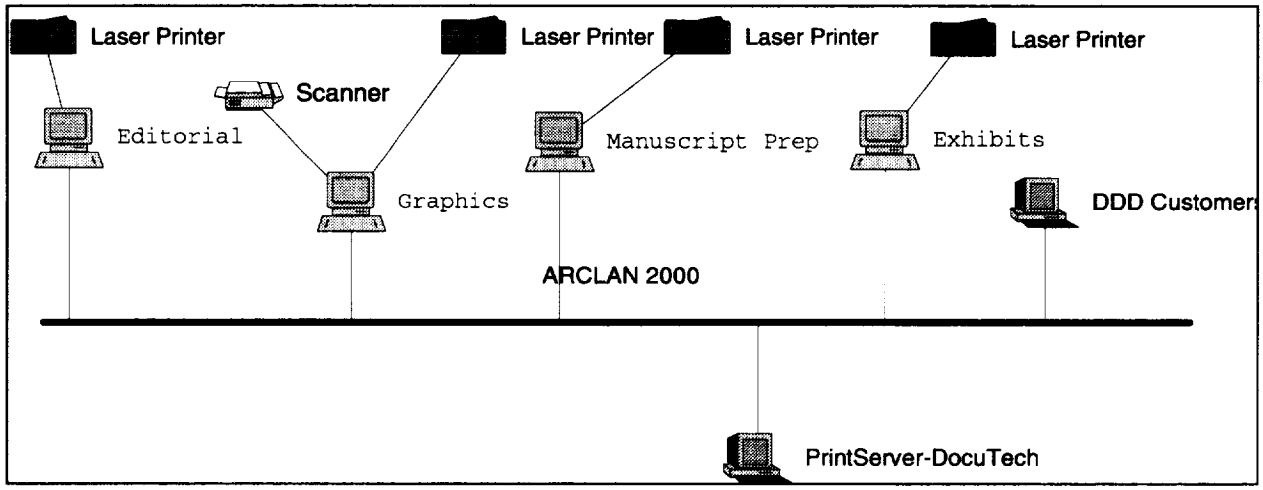


Figure 3 - 6. ARC EDD configuration.

Figure 3 - 7 displays the ARCLAN 2000 network configuration for Building N241.

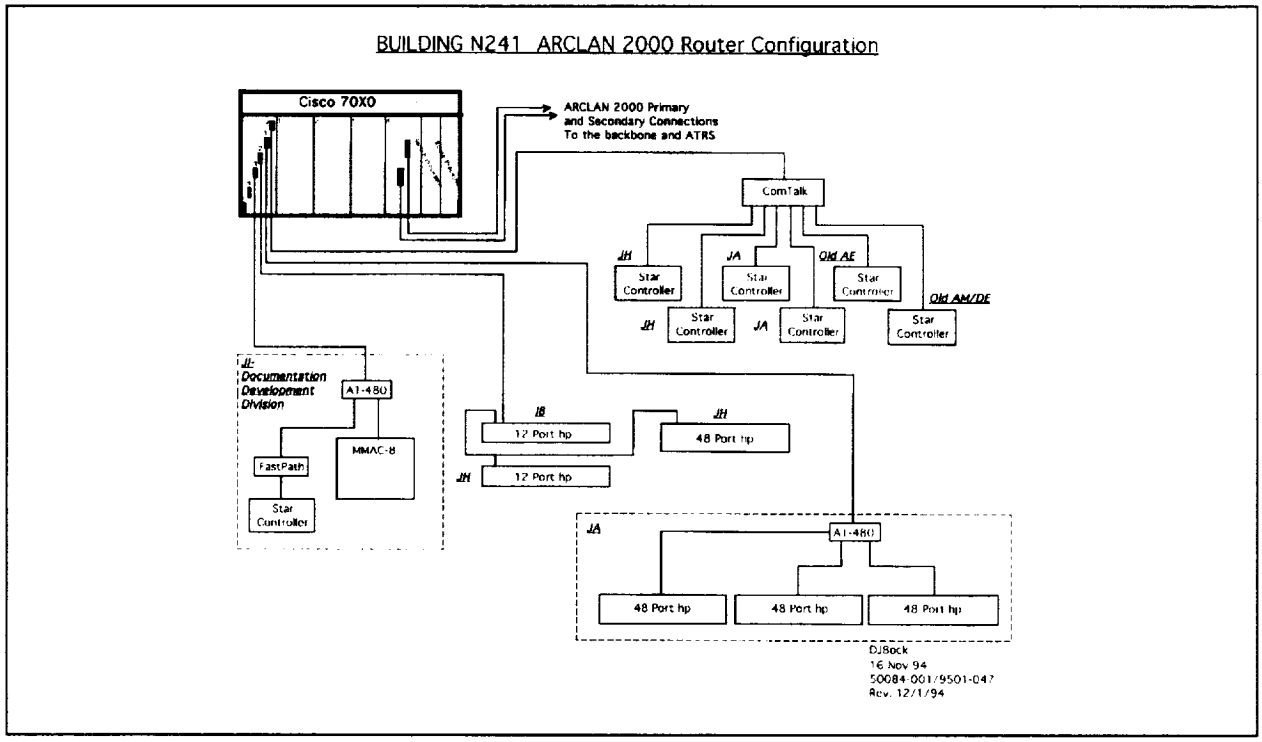


Figure 3 - 7. ARC EDD interface to ARCLAN 2000.

STI EDD Configuration—LaRC

There are 2 input methods for reports into LTRS. The first is formal reports (4-digit TMs and TPs) are input directly from RPPB. The RPPB is in a transition period from using TeX for preparation

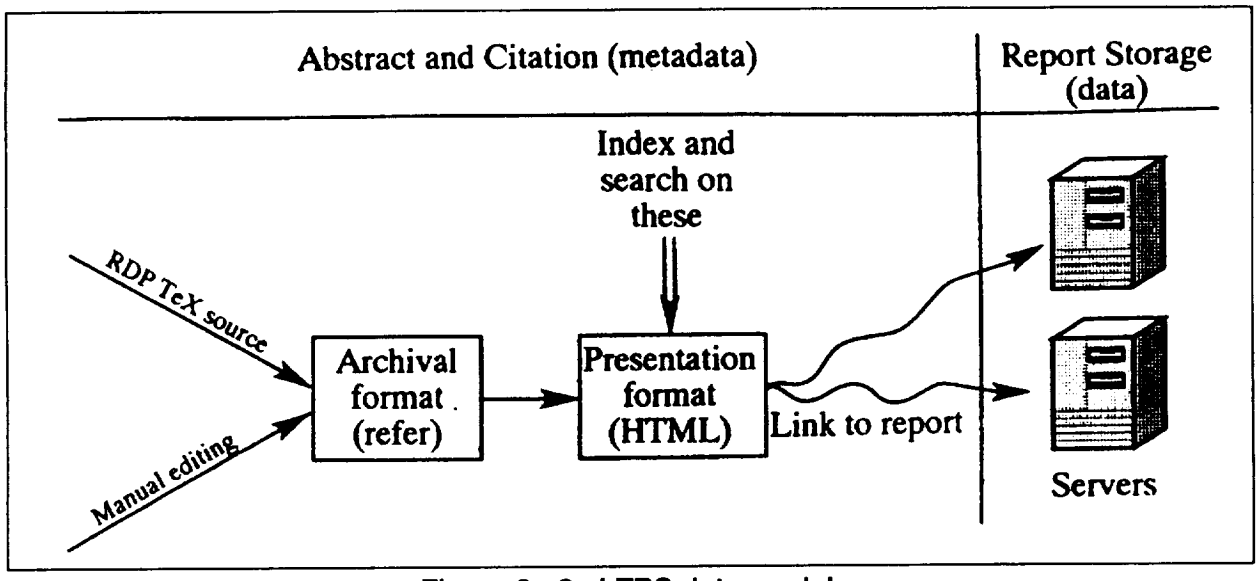


Figure 3 - 8. LTRS data model.

to using FrameMaker. All unclassified, unlimited formal reports starting in 1992 are available. The second input method is for the researchers themselves to input their conference papers, journal articles, etc. An array of word processing packages are used across the center. Because of this, input accepted from both RPPB and the researchers is HTML, if available, and PostScript otherwise.

The RPPB uses mostly UNIX workstation for report preparation, and the researchers use a variety of PC, MAC, and UNIX configurations for report preparation. All of this is filtered through a single UNIX workstation to serve the customer.

STI EDD Configuration—CASI

The NASA Center for AeroSpace Information (CASI) houses the STI Program's main database containing *more than three million* bibliographic citations to publicly available AeroSpace reports, journal articles, conference proceedings, and open literature from around the world. Most cover NACA and NASA R&D activities from 1915 through the present. New STI arrives -- currently as either paper, microfiche or computer tape -- from a variety of sources, including NASA Headquarters, Centers and contractors, universities, other government agencies, foreign sources, the AeroSpace industry, and the public.

The CASI Technical Report Server (CASITRS) currently provides access to approximately ½ million bibliographic citations and abstracts, representing a selected portion of the NASA STI database. This coverage includes NASA-produced technical reports and AeroSpace-related open literature from 1987 through the present. The CASITRS database is divided into three main series:

Scientific and Technical AeroSpace Reports, Open Literature, and NACA. This database can be searched in its entirety, by individual series, or in combination.

The CASITRS database is on a WAIS server using the WAIS search engine. Access is available through several popular clients including NCSA Mosaic and Netscape using a WAIS gateway, and through Gopher. Searching can be done as natural language, literal strings, and/or Boolean queries. Fielded searches are for clients accessing through the WAIS gateway.

The NASA STI Office has directed NASA CASI to modernize their document management process for handling, producing, and disseminating information through implementation of an Electronic Document Management System (EDMS). The EDMS project, currently in the acquisitions phase, is part of the CASI infrastructure upgrade and modernization effort under way.

NASA CASI is responsible for the acquisition, processing, and capture of this information via both electronic and traditional paper copy, and its dissemination to the NASA and scientific communities. The NASA CASI infrastructure for obtaining, processing, capturing, and storing scientific and technical documents has not substantially changed in the past 30 years. Availability of STI must migrate from the current reliance on physical transport of paper and microfiche to electronic dissemination of material. Document processing and capture must move to image capture and manipulation rather than the current data entry and microfiche creation systems.

An integrated EDMS will transform paper, microfiche, and machine-readable documents into digital files. Bibliographic citations will be created by converting the text of the digital image to full text with optical character recognition technology, processing the citations, and making the resulting electronic document available for searching and automated electronic printing or image transfer. Documents contributed electronically will be accepted, processed, and stored.

The EDMS will provide NASA CASI with opportunities to effectively redesign its workflow, moving from a paper-based operational environment to one of working with digital images to build the NASA STI Database and service the STI community. Manual processes will be significantly reduced, thereby providing the end-user almost instant access to the full document image of STI acquired and archived by the CASI.

Using one of several popular clients, a user will be able to search the citations on the CASITRS, identify a document that has an associated image, and get on-demand display through a hypertext link; print, using either local or remote digital printing facilities; or electronic dissemination of that document. The digital document database will be accessible through both the CASITRS and the new RECONplus system. Figure 3 - 9 provides a functional overview of the CASI configuration.

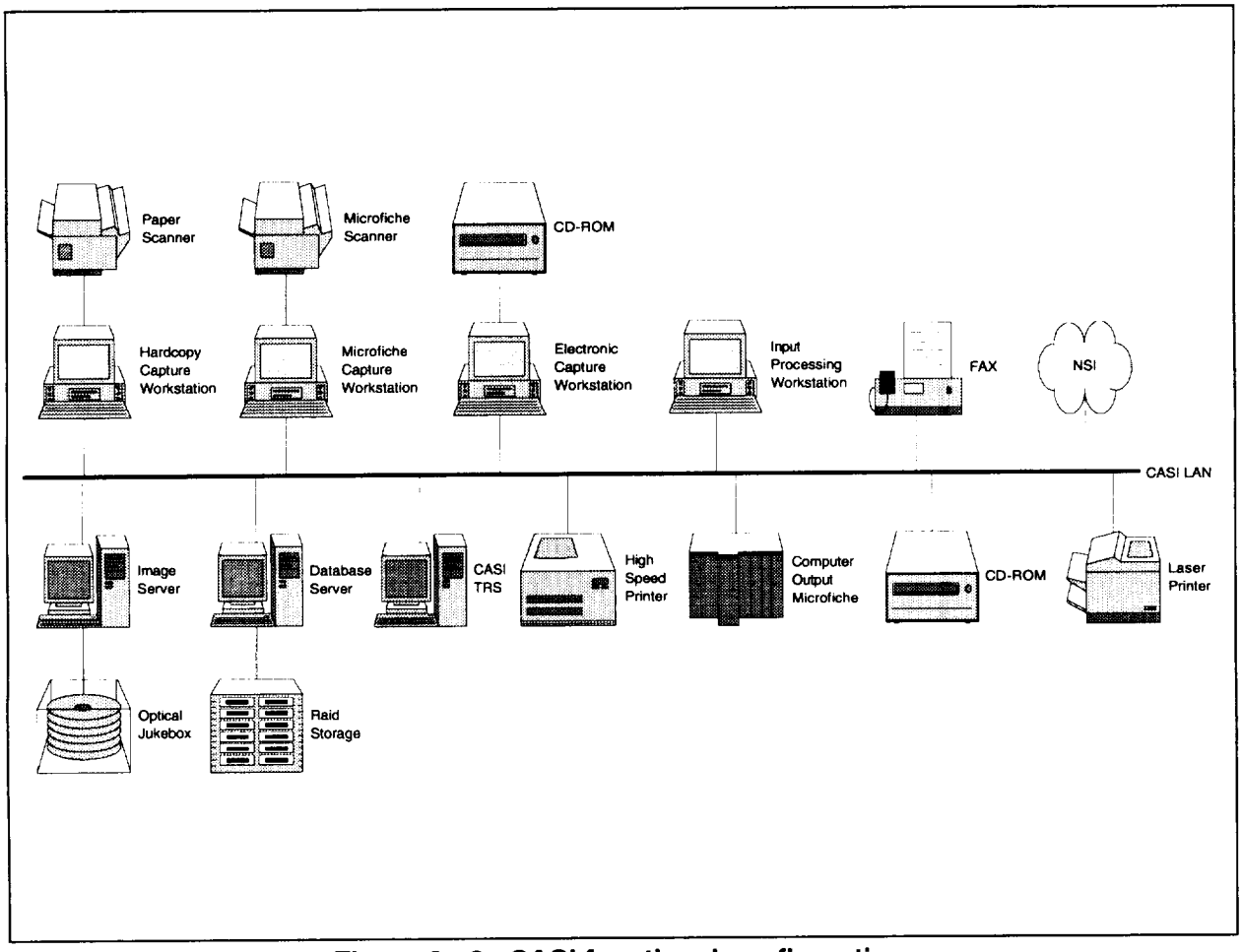


Figure 3 - 9. CASI functional configuration.

STI EDD Configuration—JPL

The JPL EDD configuration comprises four subsystems: electronic document publishing, network publishing, TRS, and NASAwide communications. These systems are described in more detail below and as displayed by Figure 3 - 10.

1. Electronic Document Publishing Subsystem

JPL's STI publications branch (Technical Information) submits publications and information packages that have been approved for external release. These publications have been prepared in a variety of formats on MacIntosh, PC, or UNIX workstations. The majority of documents are prepared on MacIntosh or PC computers, using desktop publishing software such as Microsoft Word, WordPerfect, PageMaker, or TeX. More and more documents are being prepared directly and exclusively for Internet publication. These documents are prepared in either HTML or SGML, or are prepared in a desktop publishing software and then converted to HTML, SGML, PostScript, or Adobe PDF.

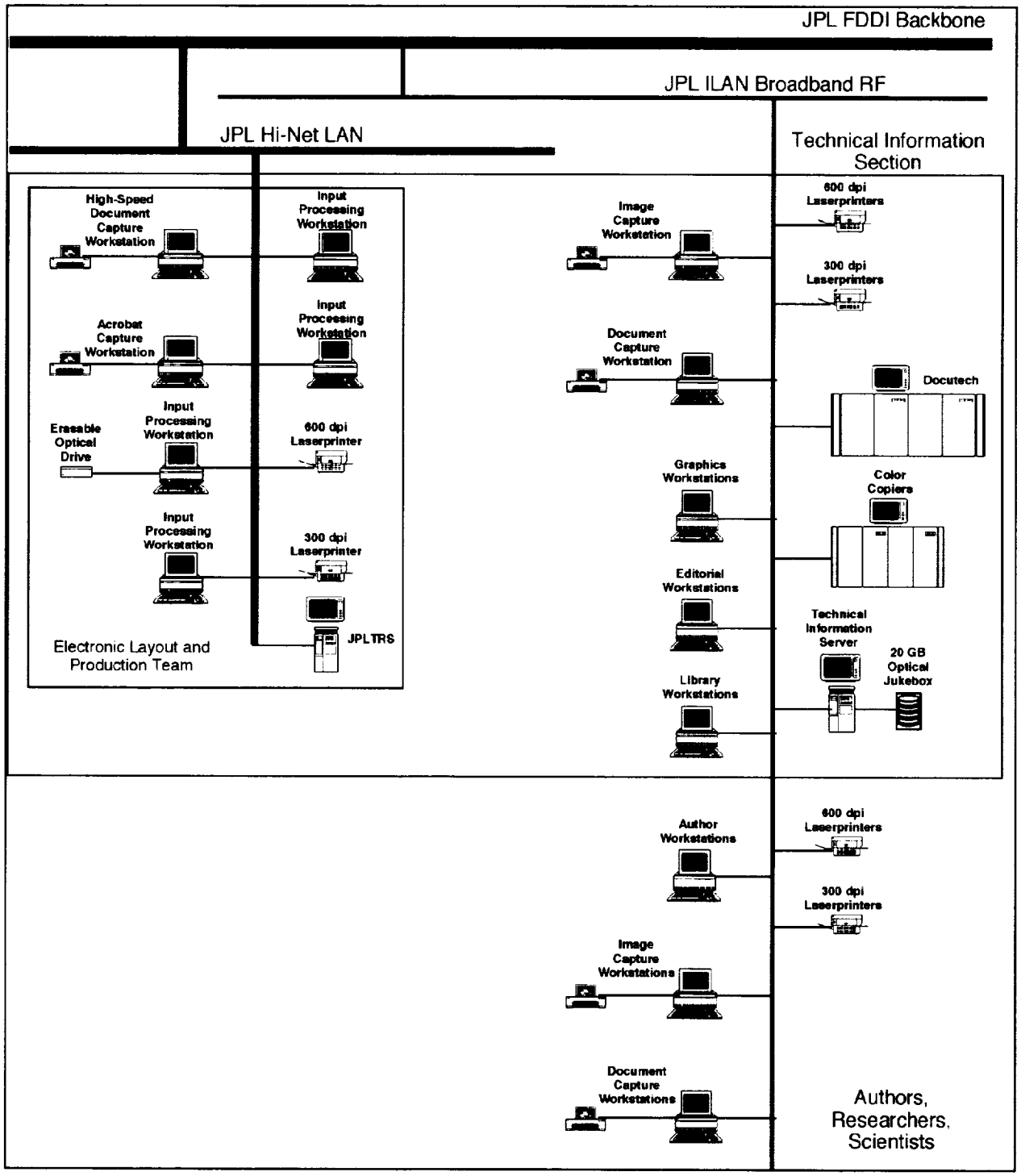


Figure 3 - 10. JPL EDD configuration.

Occasional documents (primarily foreign submissions for proceedings or meetings) are received in hard copy only. These documents, if intended for Internet distribution or for the TRS, are scanned and prepared as PostScript and PDF files.

2. Network Publishing Subsystem

Document output is accomplished with a Xerox DocuTech Network Publisher and two network color copiers (Figure 2 - 7). An in-house program, written in Paradox, acts as a job ticketing and tracking source for incoming documents for output. The tracking software enables duplicating personnel to manage network jobs for all three output devices. An overview screen displays all requests with requester name, date, and time required; pages and copies requested; and printing status. Each record can be selected to view the electronic job ticket filled out by the requester. Detailed information is displayed on the ticket. The ticket can be edited to correct data such as incorrect file name or IP address that would prevent the job from printing.

Documents are created within the requester's application by selecting a compatible driver such as the Apple LaserWriter II NTX. The color copiers require their own drivers to assure quality output. A PostScript PDL is printed to file and saved on a resident server within a public domain. The server is selected by the requester. The electronic job ticket is then filled out by the requester with pertinent information regarding the document and the requirements for output. Information for accessing the document such as IP address, host name, password, and path/file name is also filled out on the ticket. The ticket (not the document) is then forwarded via cc:Mail to a duplicating mail address (jpl-copiers).

From the job ticketing and tracking workstation located near the DocuTech, the ticket will be reviewed. Requirements and schedule will be determined at this time. Duplicating personnel will select to print from this workstation. The ticketing application will then retrieve the document from the requester's server and bring it through to the DocuTech Network Server, Print Job Manager, and DocuTech for printing. On-line finishing capabilities consist of stapling, tape binding, and set labeling.

Documents can be labeled electronically using Set Labeling software on the DocuTech. Electronic document distribution lists are stored, updated, and managed on a separate workstation. Lists are stored and indexed by assigned numbers. Electronic lists are forwarded using FTP to the DocuTech, bypass the ticketing application, and are merged and applied to documents while in production. The label information usually consists of the recipient's name, section, and mail stop. The time-consuming task of hand labeling has been eliminated for many of the jobs, and the end results are faster turnaround time and significant cost savings.

3. Technical Report Server Subsystem

The JPLTRS will physically reside in the Technical Information Section, Electronic Layout and Production Team area.

The JPL TRS database is on a WAIS server using the WAIS search engine. Users can search in a variety of fields in natural language, literal strings, or Boolean queries using Mosaic, Netscape, or Panorama Pro. The metadata is entered into the Refer format in ASCII, which is then used to generate an HTML citation and abstract file for the JPLTRS.

The TRS serves as the platform (client server) for the HTML, PostScript, and PDF files, as well as for the WAIS, World Wide Web, and Mosaic, Netscape, or Panorama Pro software.

5. NASAwide Communications Subsystem

JPL's LAN and WAN serve as the communications connection from the user's workstation to the document server. JPL is reconfiguring all offices into an ILAN-FOS FDDI and ATM configuration, called the HiNet. The HiNet will provide a multigigabit digital network. The Electronic Layout and Production Team area (where the TRS will be placed) is already on the HiNet.

JPL is utilizing NSI as the communications connection from the user's workstation to other centers' TRS components. JPL is using the Internet to serve as the communications connection from the user's workstation to the outside world.

STI EDD Configuration—DFRC

The DFRC computer environment (Figure 3 - 11) in which technical documents are created and used is a multiplatform one.

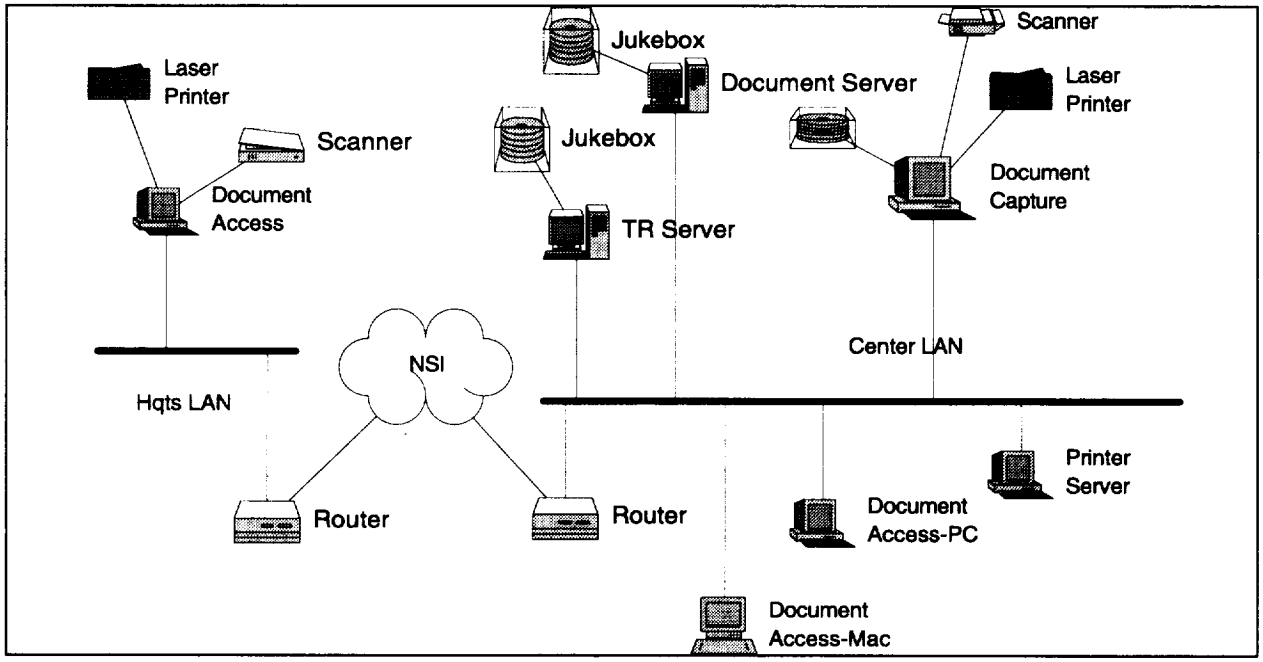


Figure 3 - 11. DFRC EDD configuration.

1. Center Desktop Publishing Subsystem

Engineers prepare document text and figures on their workstations. Files are retrieved via the network by Dryden STI group and formatted into FrameMaker. Completed documents are currently printed in the Reproduction Shop.

Researchers prepare draft of manuscript text and figures on their workstations (UNIX, Mac, or DOS based). Currently, files are given to Dryden STI editors on disk and in hard copy or transferred over the network. Microsoft Word is the preferred software at this time.

The files are formatted into a FrameMaker document on MacIntosh Quadra computers. Any photographs used are scanned in at 300 dpi on XXXXXXX by the Imaging Technology department and placed on the appropriate file server.

The Graphics department also uses MacIntosh Quadras. Software includes Adobe Photoshop, Adobe Illustrator, Canvas, and XXXXX. Proof copies are printed out by the Agfa Compugraphic 9400 Imagesetter, Apple LaserWriter Pro XX, or XXXXX.

Technical typists import the final graphics and scanned photos into the FrameMaker document. Completed documents are placed in the DTRS. To satisfy current regulations, hard copies are printed in the Reproduction Services department, on Xerox 99999 machines.

2. Network Publishing Subsystem

Not applicable, since duplicating volume does not justify installation of a network publishing system such as the networked DocuTech.

3. Technical Report Server Subsystem

Provides host for HTML and PostScript files, WAIS, WWW, and web browser software.

4. NASAwide Communications Subsystem

Dryden's LAN serves as connection from user workstation to document server. A T1 connection is available between Dryden LAN to NSI net.

STI EDD Configuration—JSC

At JSC technical documents are created primarily on PC/Windows and MacIntosh workstation. By far, the majority of authors/originators preparing draft manuscripts use Microsoft Word for MacIntosh or Windows. Until recently, the majority of our work was on the MacIntosh. Because of a push to standardize platforms at JSC, more of our work is coming in PC/Windows format. This trend is expected to significantly increase over the course of the next few years.

The Publications and Graphics group works primarily on MacIntosh computers (I, Quadras and Power Mass) using the latest system software, including Word, PageMaker, Canvas, Photoshop, and others depending on the particular document or graphic. Several editors and word processing personnel are currently working on 386 PAS, but are soon to be upgraded to 486 models. Both the Publications and Graphics Lead and the Publications Coordinator use 386 PAS.

The final Word or PageMaker versions of documents are printed on the DocuTech for hard copy requirements. Because of special print requirements, few documents are sent to GPO for final production. Where feasible, files are submitted to GPO electronically. We have had the most success with sending large PostScript files on a compact diskette (CD.) All electronically available documents will be placed on the JTRS as either native Word or portable data file (PDF) files. The EDD configuration is shown in Figure 3 - 12.

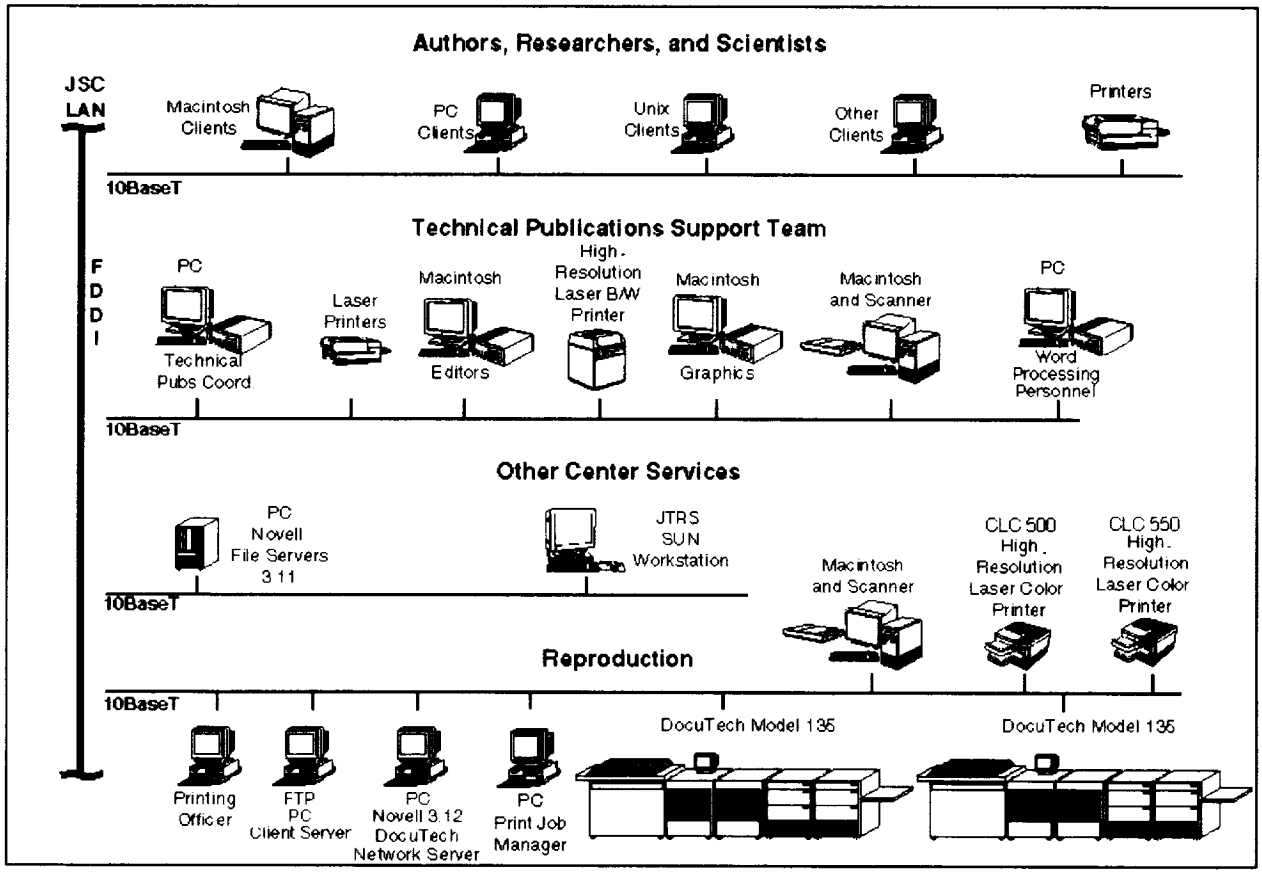


Figure 3 - 12. JSC EDD configuration.

STI EDD Configuration—MSFC

The MSFC computer environment in which technical documents are created and used is a multiplatform one, including primarily PC/Windows, MacIntosh, and UNIX. Authors preparing draft manuscripts at their workstations use a variety of software packages and versions, but more than 80 percent of employees centerwide have access to electronic mail capabilities and access to Microsoft Word as a standard application on Workstation Presentation Services (WPS), the center's management information system, which facilitates communications and computer interoperability.

The STI Technical Publications section and its contractor support editors work on MacIntosh computers using the latest system software, including Microsoft Word, PageMaker, and other software applications as needed. The graphics specialists have MacIntosh computers (various FX models, Quadra 800s, 950s, and Power Mac 8100s) with software that includes Microsoft Word, PageMaker, Adobe Illustrator, Photoshop, MacDraw Pro, and others as required for a particular task. Conversion capability to various graphic formats is available. High-resolution printers are used to produce camera-ready art.

The final Word or PageMaker version of documents can be printed on several high-resolution printers for hard-copy requirements. The documents can be output in PostScript and portable data file (PDF) format and provided to the Technical Publications section for use on the MTRS or transfer to the Printing Officer for DocuTech or other printing phase requirements. Figure 3 - 13 displays

MSFC network logical EDP configuration.

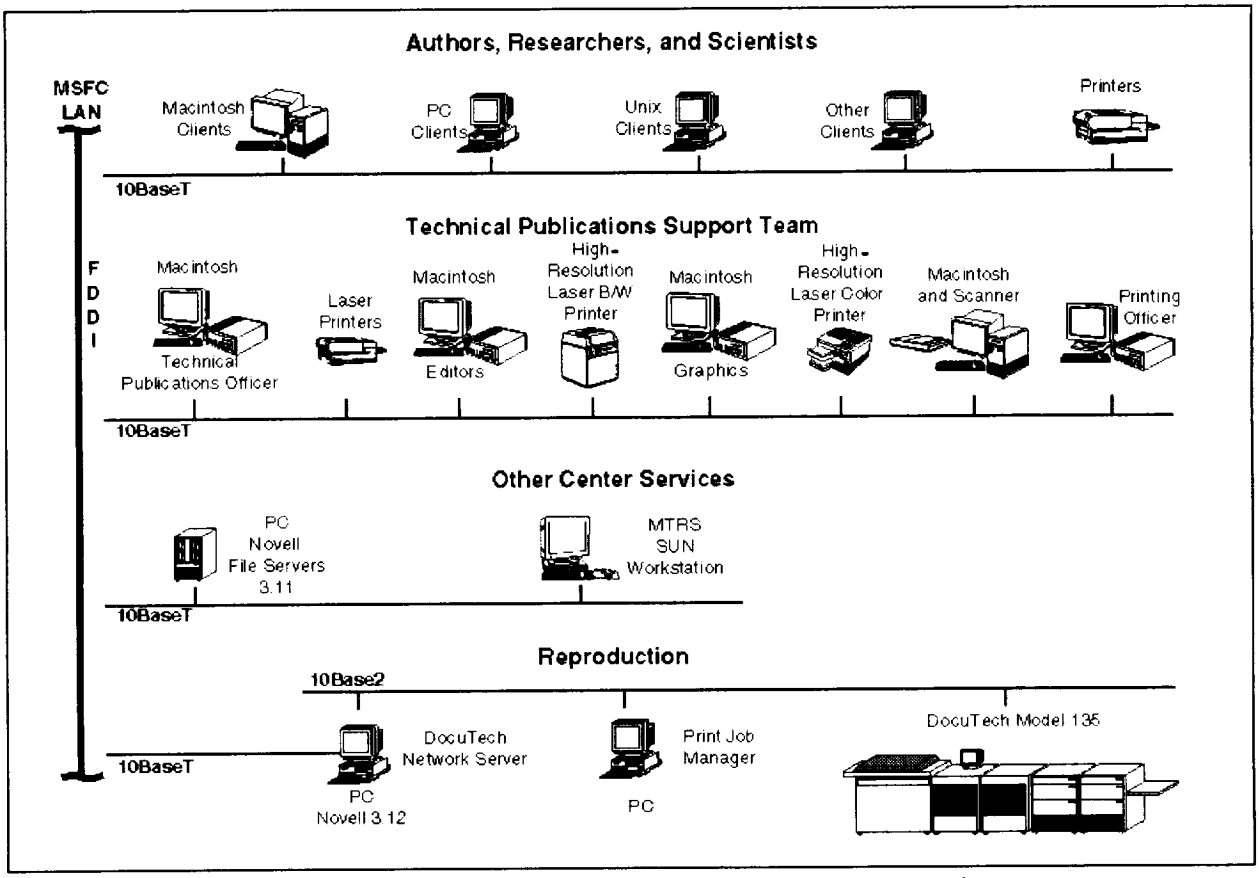


Figure 3 - 13. MSFC network logical EDP configuration.

STI EDD Configuration—KSC

KSC's EDD network logical EDP configuration is displayed in Figure 3 - 14. KSC provides for Technical Report Server preprocessing of STI documents submitted by local authors in hard-copy or in electronic form. This support is coordinated by the KSC Graphics and Publications Facility, operated by Sherikon Space Systems, Inc. Hard-copy documents are processed using a Relisys flat bed color scanner with a resolution capability of 1200 DPI (dots per inch). Electronic documents are accepted in Microsoft Word, WordPerfect, ASCII text, Rich Text Format, or Windows Write format on disk or via network transmission to designated file directories on the Design Engineering (DE) Directorate VAX. The files can then be reviewed by the Graphics and Publications Facility and placed into PageMaker desktop publishing conversion software. Photos and line art are scanned and merged into PageMaker. The completed document is converted into PostScript and Portable Data File (PDF) for placement onto the KTRS (Kennedy Technical Report Server), or transfer to the Print Plant Docutech file server for subsequent printing.

Assistance for document design and layout is available to NASA organizational elements from the KSC Graphics and Publications Facility. Macintosh Power Mac 8100 workstations with software that includes PageMaker, Adobe PhotoShop, and Adobe Acrobat are used to accommodate these requirements. Contractor organizations provide the necessary graphics preparation support for their contributing authors.

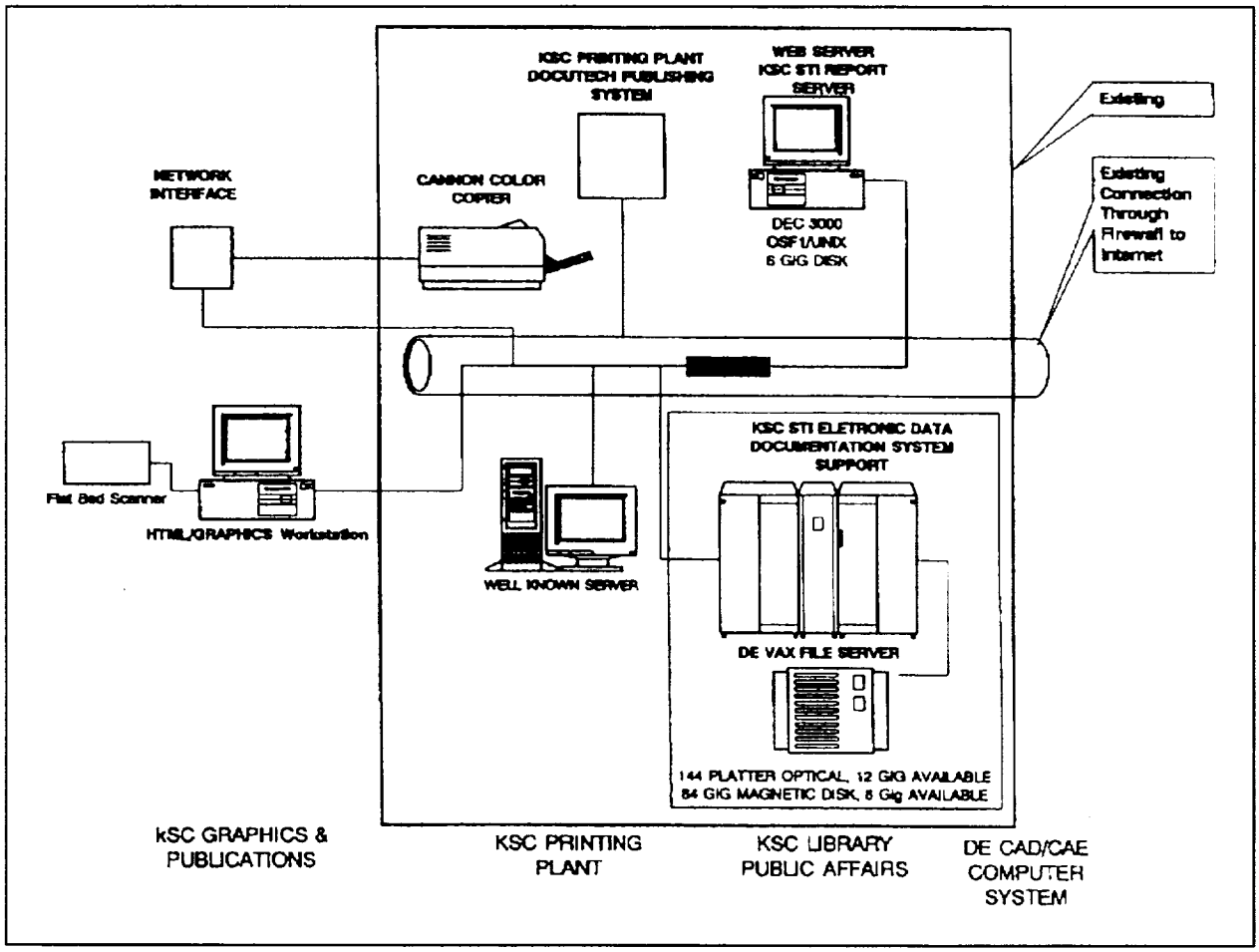


Figure 3 - 14. KSC EDD configuration.

The Kennedy Technical Report Server (KTRS), resides on the Design Engineering Directorate CAD/CAE Computer System. The KSC Library, operated by Sherikon Space Systems, Inc., is responsible for preparation of Report Document Pages (RDP's) in HTML format and for the KTRS document integrity. Upon request from customers, the library also retrieves documents from any NASA technical report server and arranges for Docutech printing. KSC Public Affairs is responsible for the integrity of documents placed on the Kennedy Public Affairs Information Server (KPAIS), and receives document preparation support from the Sherikon Space Systems, Inc. Media Reference Librarian and writing staff. The EG&G CAD/CAE computer system support contractor has hardware and software maintenance responsibility for both of these report servers.

Hardcopy production is supported by the KSC Print Plant with a network of two Docutech model 135 Publishing Systems and a Canon CLC 500 color printer with Fiery interface. Documents are transferred from pre-assigned DE VAX file server directories to the Docutech network server for printing as required by customers. The current use of E-mail to identify print requirements will be replaced by an electronic workorder system once the NASA-wide Electronic Forms Program is implemented.

STI EDD Configuration—SSC

At SSC, technical documents are primary developed on a PC/MAC platform environment. Technical reports are using created using the SSC standard office automation tools of WordPerfect, Lotus, Powerpoint, and M/S Project. These products augmented with the SSC's Email systems comprise the SSC Desktop Services (SDS) environment. All users are provided this capability as a minimum configuration. Higher capability desktop publishing software is provided only if there are special requirements. Authors will prepare drafts of their manuscripts and then, using the SSC e-mail system, route copies to the appropriate individuals for peer review and then for publication authorization signatures. Figure 3-15 shows the SSC EDD configuration.

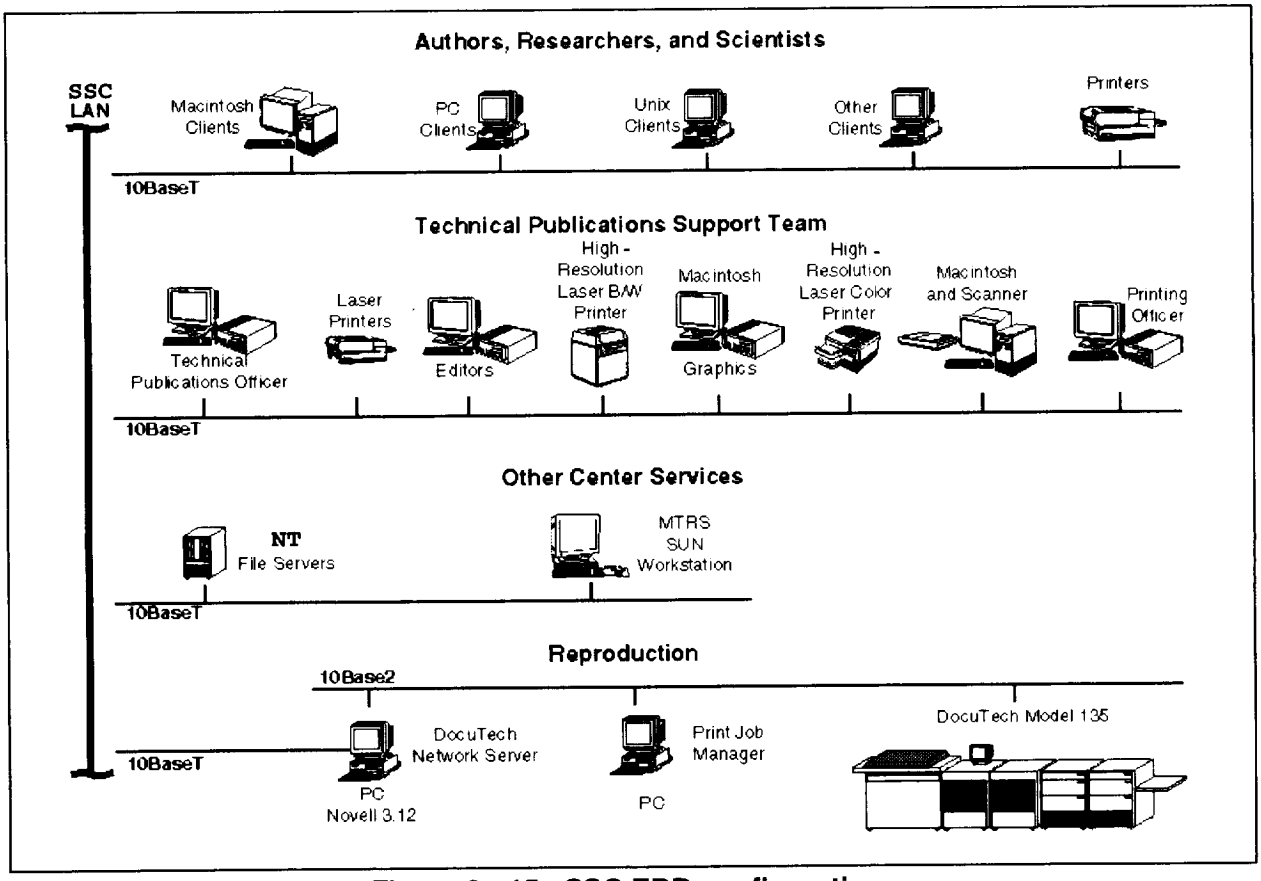


Figure 3 - 15. SSC EDD configuration.

Users within the SDS environment also have a number of networked services available to them such as high-resolution color, laser, ink-jet printers, plotters, CD-ROM services, scanners, digital camera interfaces, and access to WEB based information servers. Once, the SSC Graphics

Lab technology upgrade is completed in FY95, users will have electronic access to those personnel for technical editing, layout, and reproduction.

Document publishing to a "hard-copy" media is provided using a Xerox DocuTech printer and various networked color printers located within the graphics department and throughout the center. These documents will be in a PostScript format. A ticketing program similar to that implemented at JSC will be used for work control and accounting.

STI EDD Configuration—Headquarters

In mid-December 1995, it was decided to omit Headquarters as a node in the STI EDD project. Headquarters' requirements for this capability will be satisfied by the Center for AeroSpace Information.

Chapter 4—STI EDD Network Topology

Chapter 4 of the NASAwide Electronic Publishing System — STI Electronic Document Distribution covers each participating center's network topology by diagramming its local area network, wide area network, and NASA Internet connections to routers, bridges, and hardware input/output devices. Speeds for those lines that the STI EDD publications will traverse from point to point (workstation to file servers, print servers, workstations, etc.) will be identified.

GSFC Network Topology

The Goddard Center Network Environment (CNE) is logically divided into three backbones, reference Figure 4 - 1. The Goddard Campus, the Metropolitan Area Network (MAN), and Wide Area Network (WAN). On the Goddard Campus, most buildings are connected either by thin Ethernet (10 mega bits per second (Mbps)) or FDDI (fiber optics at 100 Mbps). The Goddard network is protected

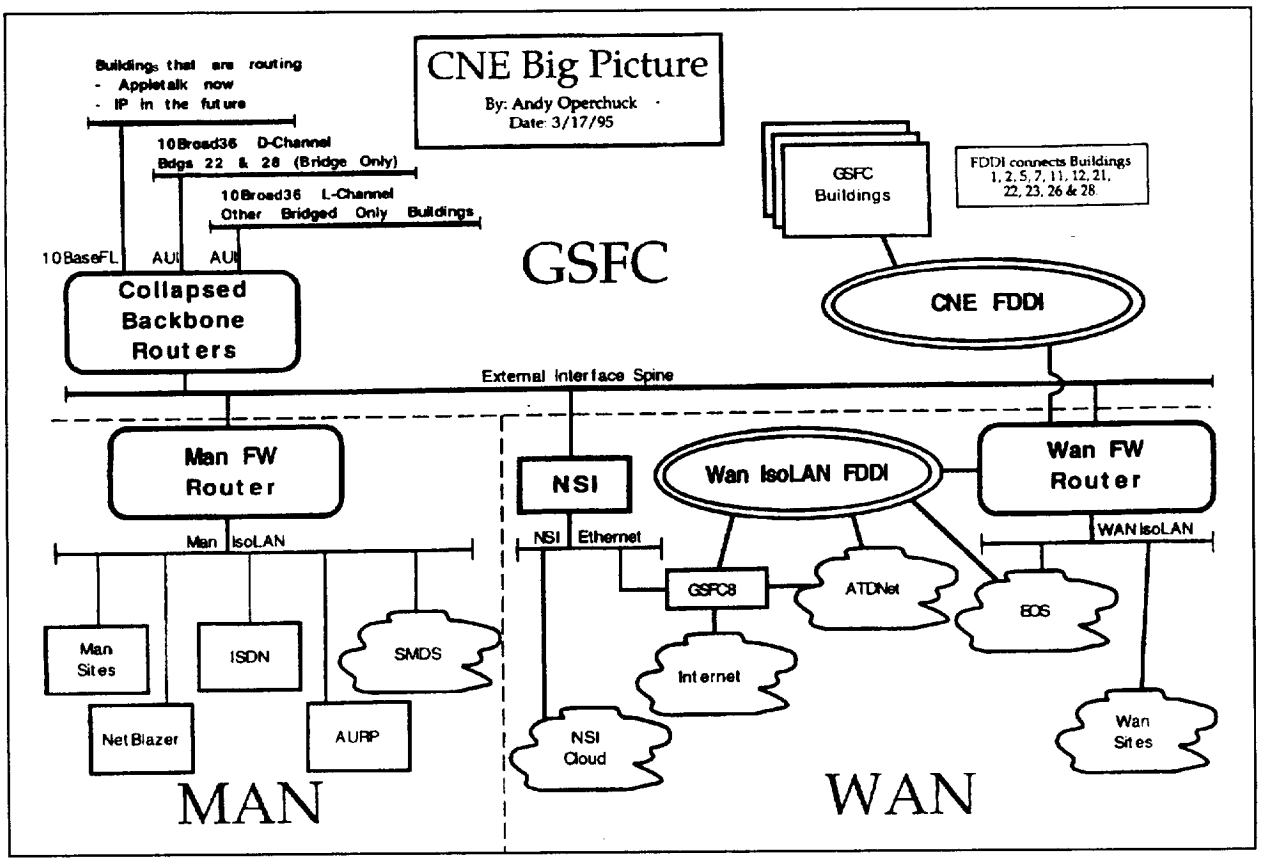


Figure 4 - 1. GSFC network topology.

from the MAN and WAN sites by using firewall routers. These assure that only authorized traffic will go in and out of the Goddard campus.

LeRC Network Topology

The Lewis Technical Report Server (LeTRS) provides the general public access (via the World Wide Web) to general distribution technical reports published by Lewis authors. The hardware platform used, for the technical report server is a Sun workstation. Figure 4 -2 shows the broad overview of the network topology with a connection to the NASA Headquarters LAN. In the near future a different Sun workstation will be used, dedicated only for the task of a technical report server. The software components of LeTRS include a World Wide Web server, a freeWAIS server, a WAIS-Web gateway and some custom Perl scripts.

The technical reports available on the server currently only contain report citations similar in format to the report RDPs. In the future these citations will contain links to the actual reports which will possibly be available in multiple formats. There are currently more than 1100 citations available.

The process of adding citations to the report server has been automated. Much of the report RDP information is converted to an ASCII text format that is easy for computers and humans to read. A batch of such ASCII files is copied into a "need to be processed" directory, and a program is activated which adds HTML formating tags to these files and places them into a "processed" directory. These files are then added to the WAIS database by activating the WAIS indexing program. Once the citations have been processed, they are available on the World Wide Web via the Web server. Users can access the citations by browsing through a sorted list of titles for a given year or by searching for keywords through the WAIS database interface.

ARC Network Topology

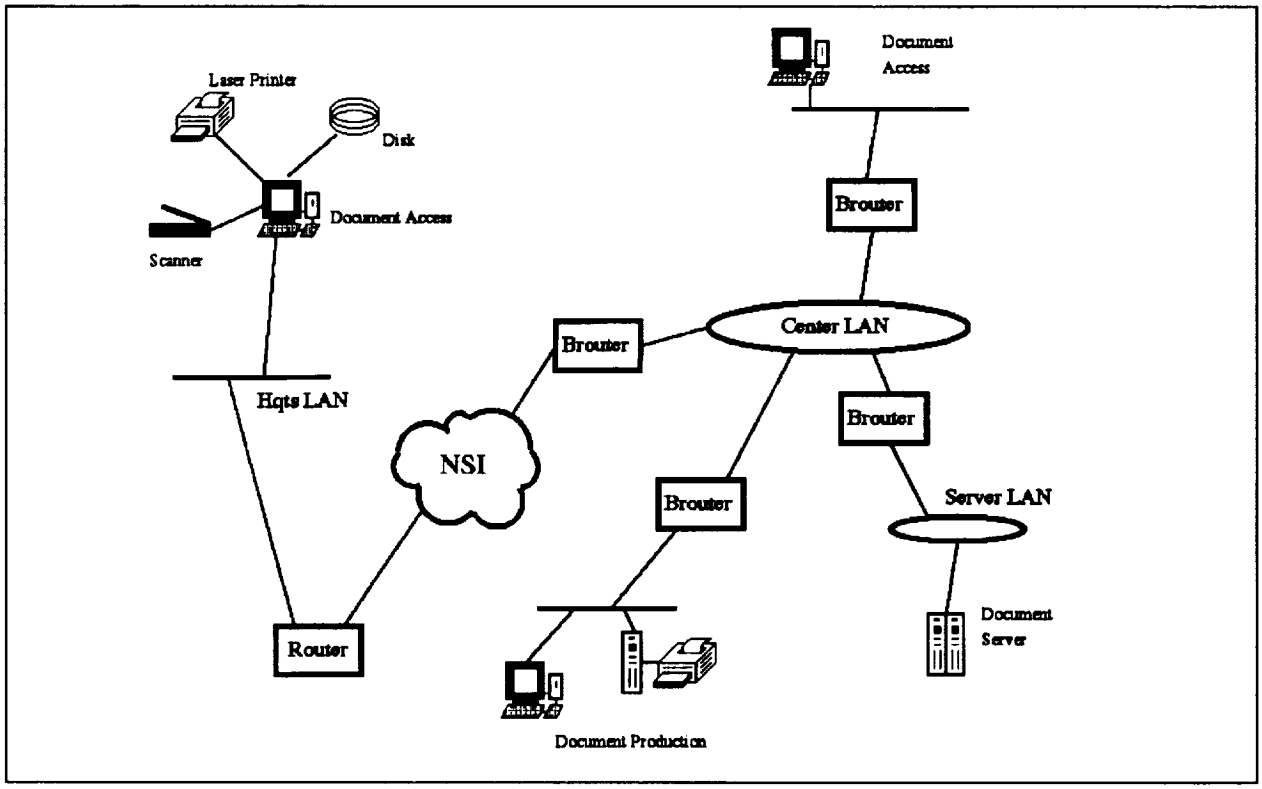


Figure 4 - 2. LeRC network topology.

The STI EDD publishing system is identified by N241and is displayed with additional detail in Figure 3 - 7. The ATRS is identified by N233, and access by the STI EDD configuration is accomplished by Routers at N241 and N233 with a Concentrator and Ethernet backup. Primary fiber optic cable connects the routers to the concentrator. Line speeds in mega bits per second (Mbps) are

1.	Ethernet	100 Mbps
2.	Primary Fiber Optic	100 Mbps
3.	Dual Fiber Optic	200 Mbps
4.	FDDI	100 Mbps

The external gateway facility is identified by N254 for ARC to the Internet.

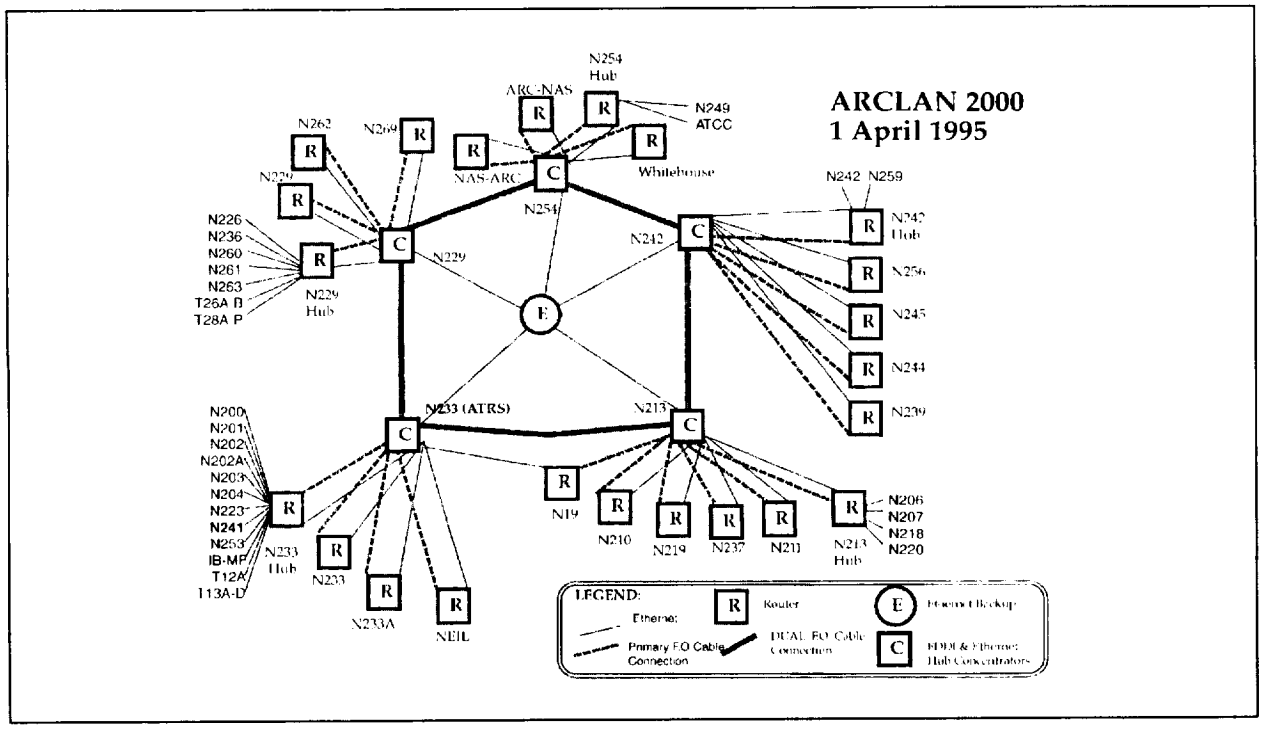


Figure 4 - 3. ARC network topology.

LaRC Network Topology

The Langley Research Center's network, as shown by Figure 4 - 4, identifies a T1 connection to SURANET, which connects LaRC to the World Wide Web. NAS (via AERONET) has a T3 connection, while on site, there is an FDDI backbone which connects the buildings centerwide. Some users have FDDI straight to their desktop workstation; however, most users have Ethernet connections. Line speeds are

1.	T1	1.544 Mbps
2.	T3	44.376 Mbps
3.	FDDI	100 Mbps
4.	Ethernet	10 Mbps

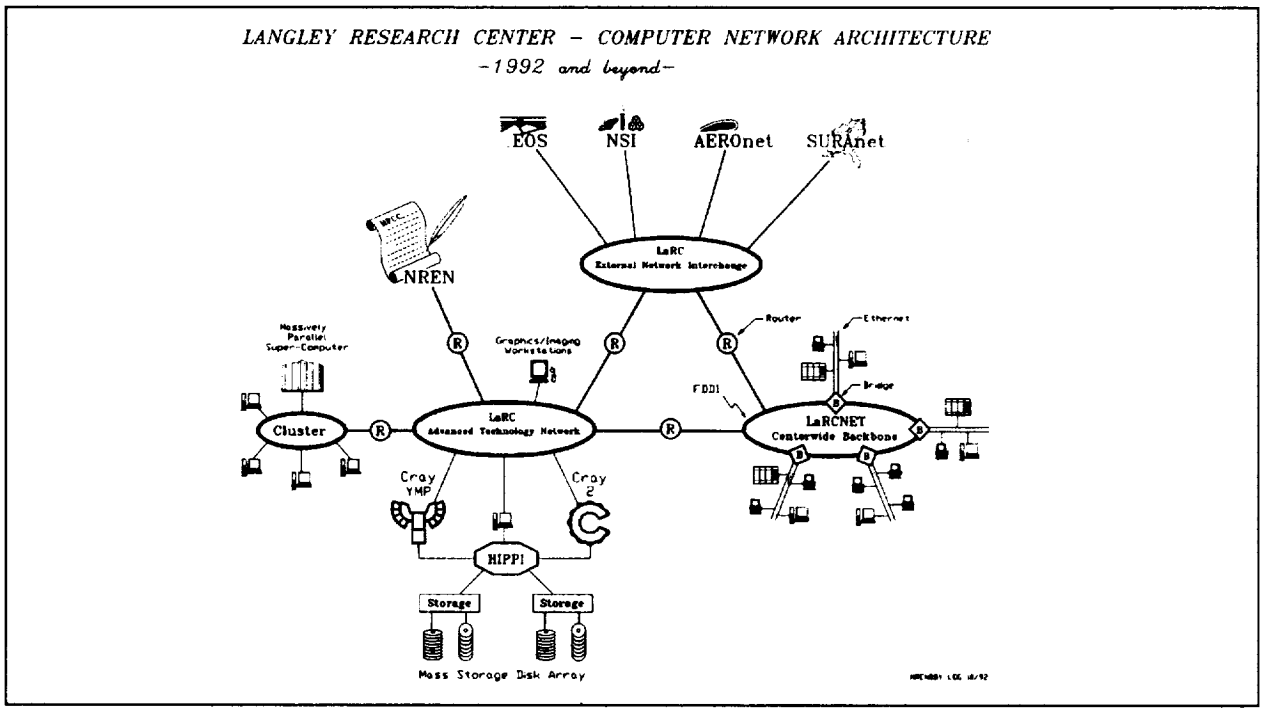


Figure 4 - 4 LaRC network topology.

CASI Network Topology

The NASA Center for AeroSpace Information (CASI) Local Area Network (LAN) is based upon an Ethernet 10BaseT (10MB per second) topology utilizing Novell's Netware 3.11 Network Operating System (NOS). See Figure 4 - 5 Lotus cc:Mail for DOS and Windows provide electronic-mail (e-mail) support. Wide area e-mail support is provided by a cc:Mail SMTP (Simple Mail Transport Protocol) gateway to the TCP/IP (Transmission Control Protocol/Internet Protocol) based Internet.

The 10BaseT-based CASI LAN uses a HUB (concentrator) manufactured by Networth. All office locations are connected to the HUB using level 4 or level 5 4-pair unshielded twisted pair (UTP) cable with RJ45 connectors. Novell NetWare server(s) provide support for administrative, mission activities, and applications development.

Internet services, including World Wide Web and WAIS applications such as the CASI

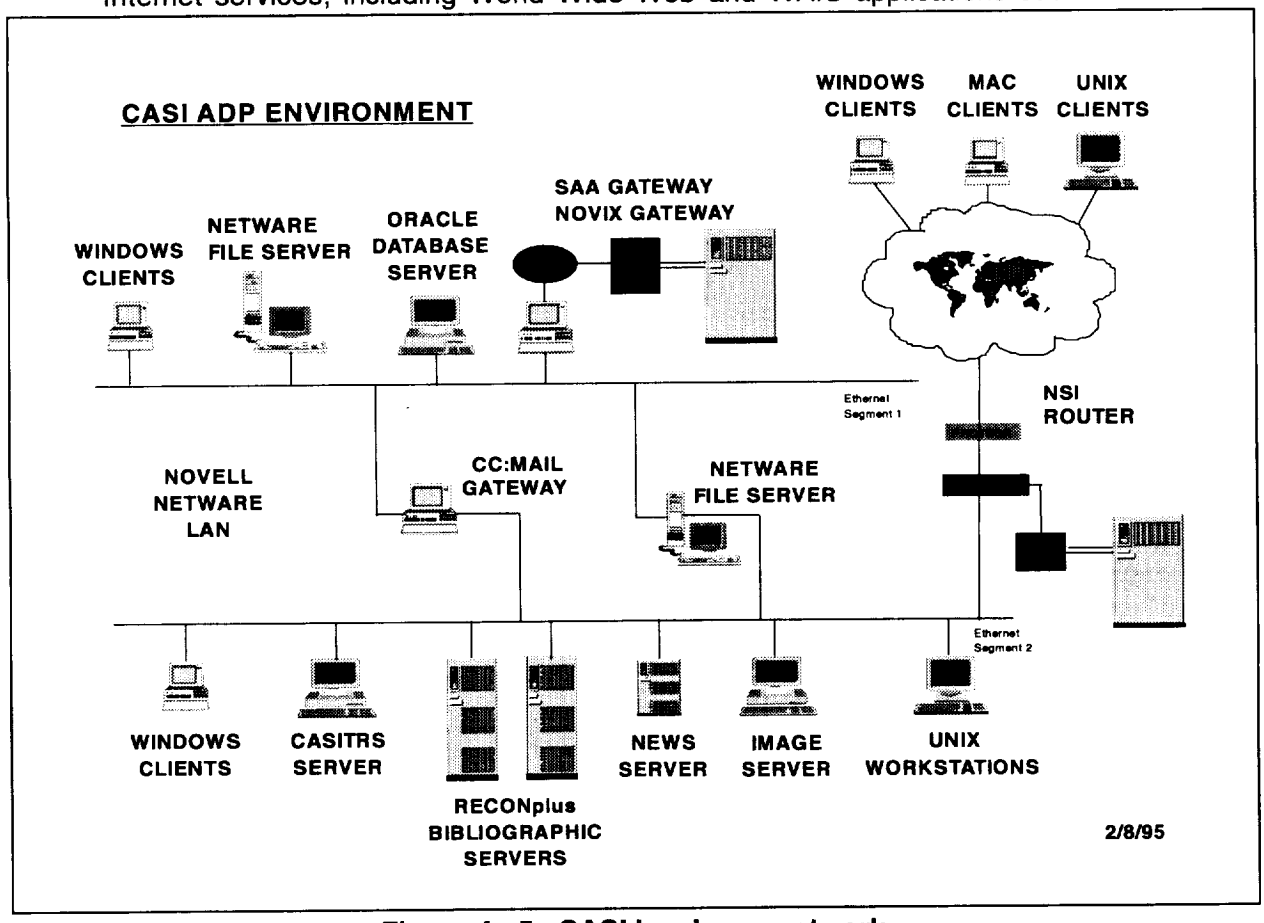


Figure 4 - 5. CASI local area network.

Technical Report Server, are supported on a SUN SPARCserver. Line speeds are T1 to CASI or 1.5 Mbps.

JPL Network Topology

JPL is restructuring its internal network topology. Figure 4 - 6 illustrates JPL's current local area network structure, including a broadband RF and FDDI connections.

Figure 4 - 7 shows the anticipated structure for 1996 and 1998. The broadband RF will be

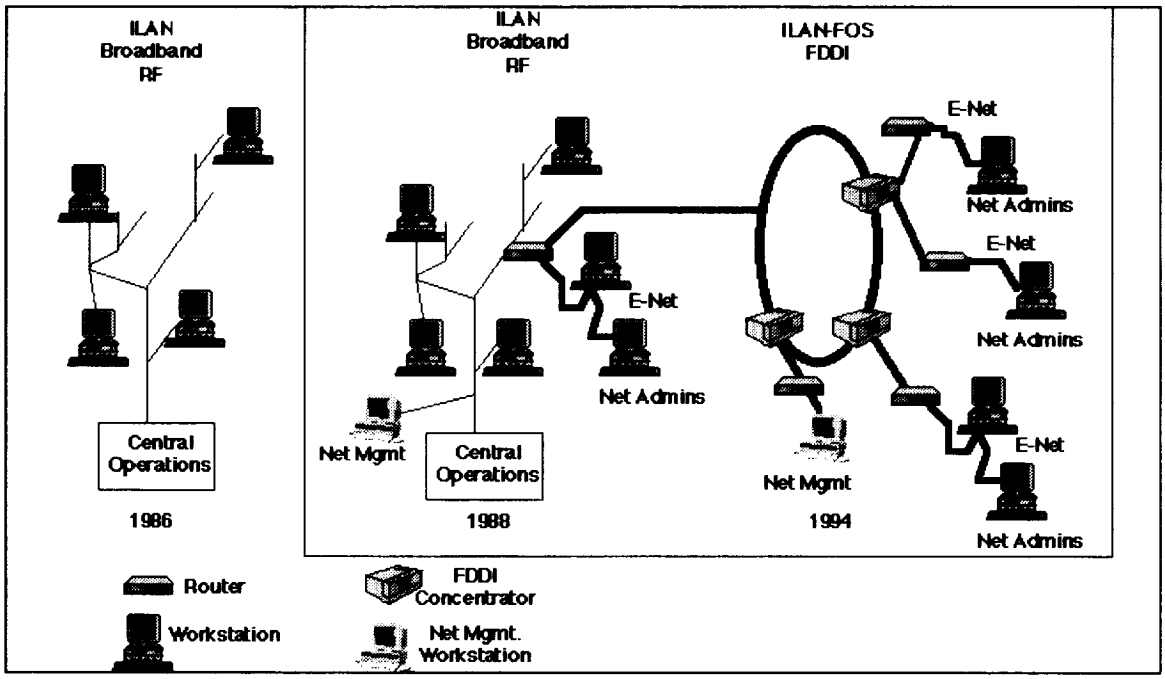


Figure 4 - 6. JPL's current LAN.

phased out in favor of an ILAN-FOS FDDI and ATM configuration. Figure 4 - 8 details sample cabling within a building for the new HiNet structure. HiNet will provide a multigigabit digital network with standard wall socket outlets in every JPL office, laboratory, and conference room. The bandwidth can be tailored to user's needs to provide integrated data, voice, and video services. This robust, standards-based architecture will accommodate and take advantage of unforeseen changes in technology.

The reconfiguration has already begun, and the Electronic Layout and Production area (home to the TRS) has been placed onto HiNet.

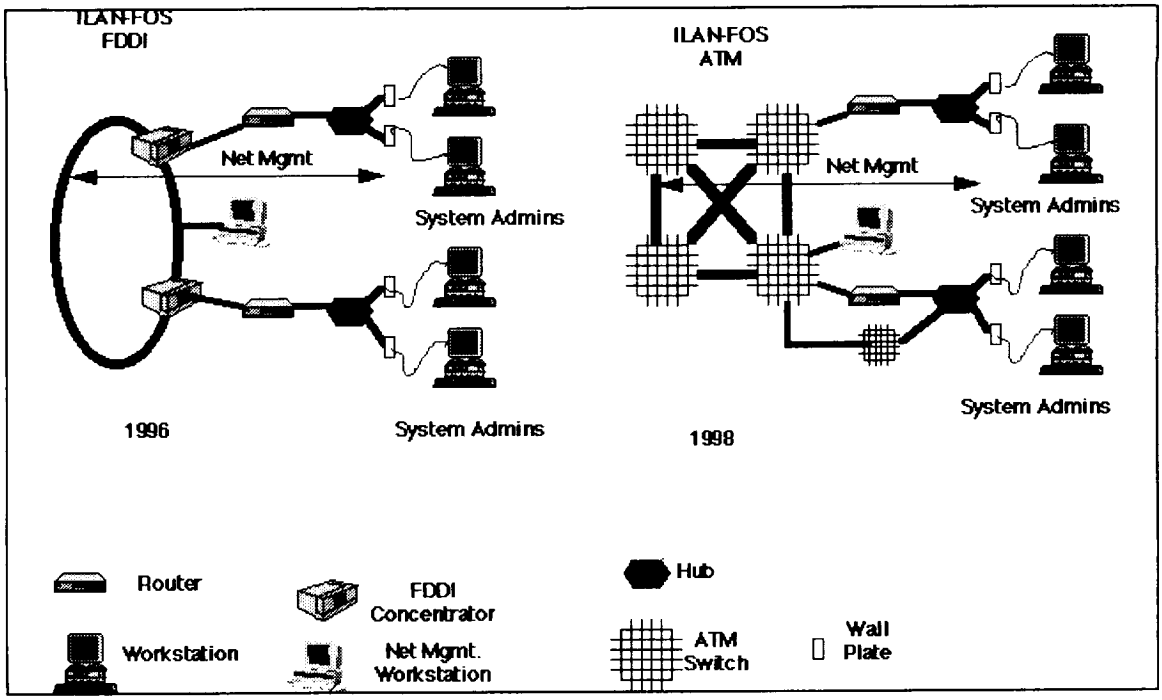


Figure 4 - 7. JPL's proposed HiNet for 1996.

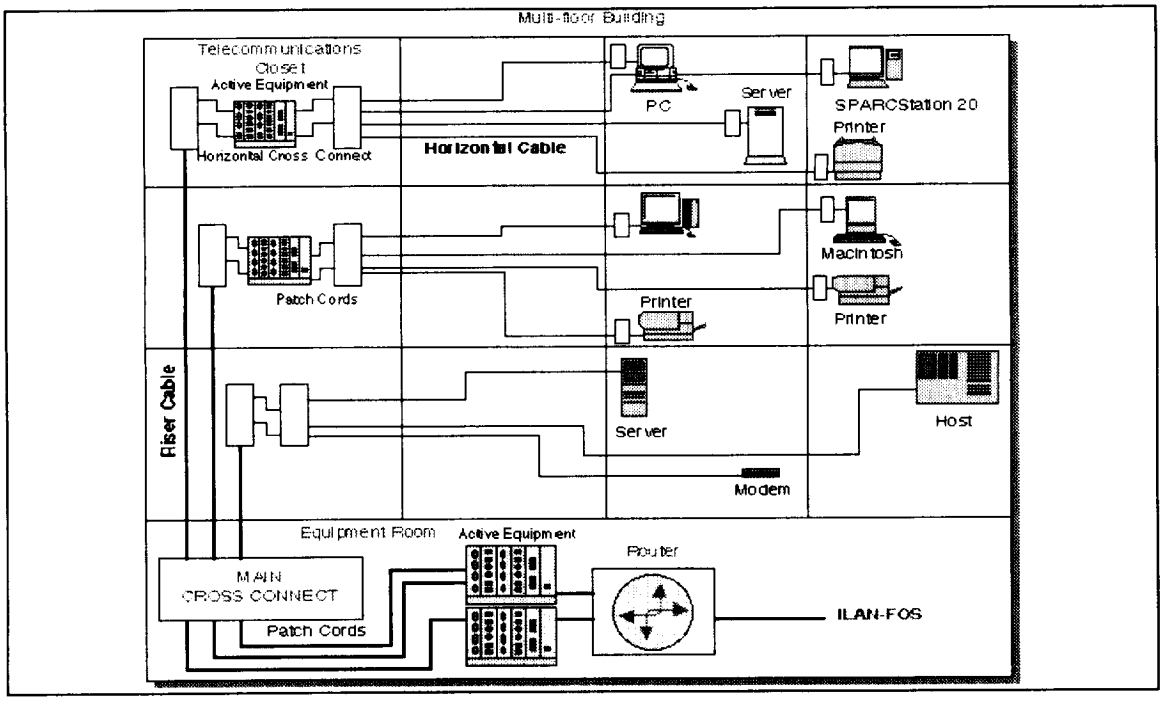


Figure 4 - 8. HiNet cabling sample JPL.

DFRC Network Topology

A simplified DFRC network topology is shown in Figure 4 - 9. The DFRC network (DryNet) is a "star" network branching out from a central 500 Mbps router via fiber connections. Network connectivity is provided to all Dryden permanent facilities and most temporary facilities on the campus.

Connectivity to the other NASA centers and the rest of the Internet is currently provided via a single T1 connection, eventually to be upgraded to multiple T1 lines or a T3 connection. The Data

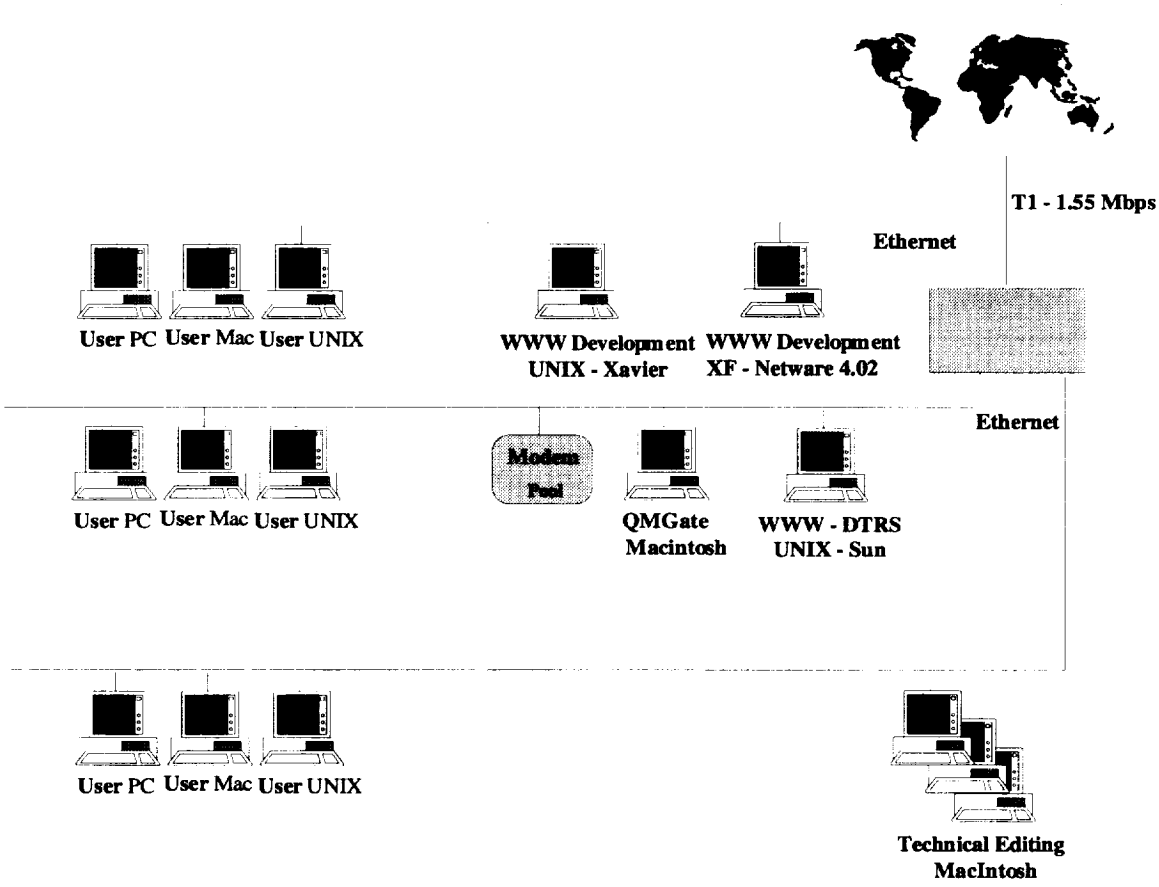


Figure 4 - 9. DFRC local area network.

Analysis Facility (DAF) provides network services management and maintenance at DFRC. Computer access and data security is provided via firewalls, routers, and network isolation.

Supported connection speeds include standard Ethernet 802.3 (10BaseT and 10Base2) at 10 Mbps, Apple LocalTalk, FDDI, and fast Ethernet (100BaseT) at 100 Mbps. Routed protocols include TCP/IP, Appletalk phase 2, and Novell SPX/IPX.

JSC Network Topology

JSC provides a single centerwide LAN-based computing environment. The connectivity to NASA and other off-center networks is managed through implementation of isolation LANs. Wiring of the facility is provided with standard wiring methods to serve the buildings and end-user work areas. The LAN design is a multiple manufacturer and vendor, Institute of Electrical and Electronic Engineers (IEEE) Standard 802.3-compliant network for many JSC electronic services. The Information Systems Directorate manages the consolidated network at JSC.

Because of the size and complexity of the JSC network, an abbreviated topology is shown in Figure 4 - 10 that highlights the major points of the EDD configuration.

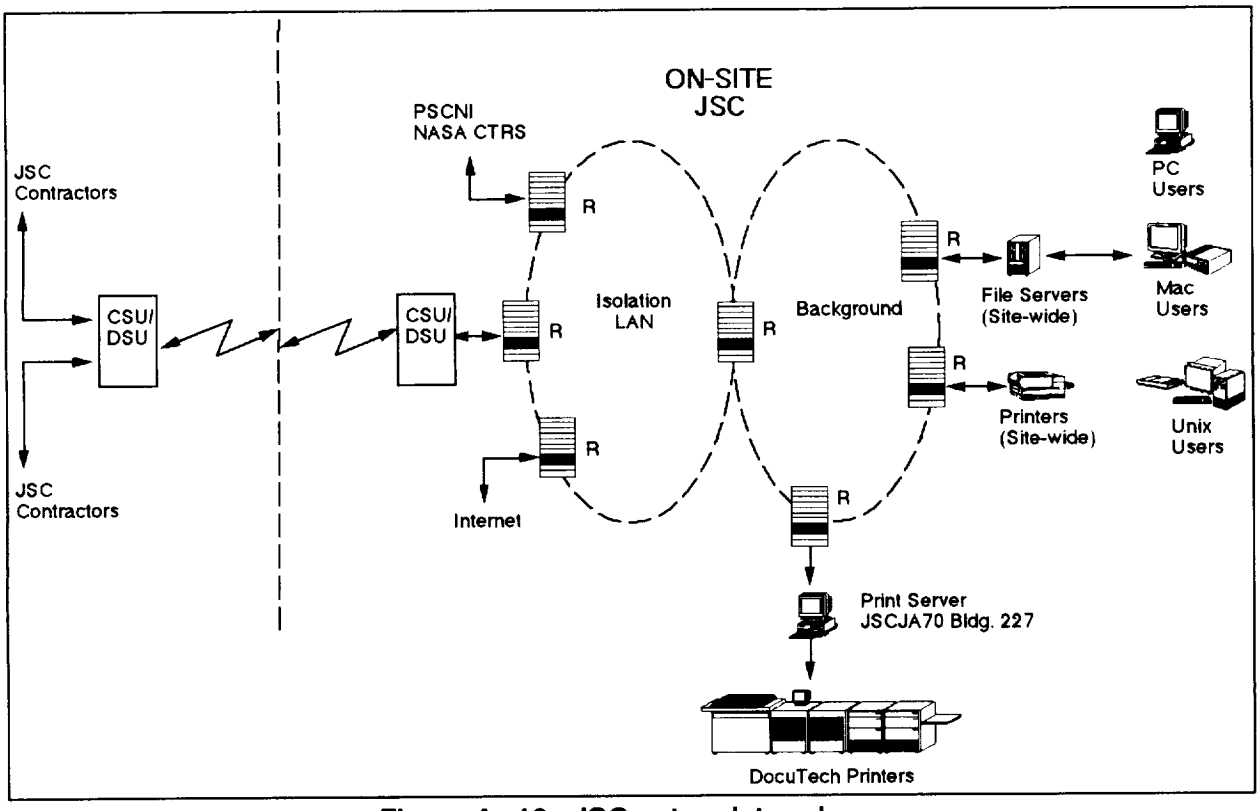


Figure 4 - 10. JSC network topology.

Line speeds in bits per sec (bps) are represented by the following:

1. The vertical line between the two CSU/DSU's represents a variety of line speeds, including everything from dial-in modems to microwave links. Speeds vary from 2400 bps to 10 Mbps.

2. The Isolation Lan and Background are 100 Mbps.

3. All other lines are 10 Mbps.

MSFC Network Topology

Marshall Space Flight Center provides a single centerwide Local Area Network-based computing network. The connectivity to NASA and other off-center networks is managed through implementation of isolation LANs. Wiring of the facility is being provided with standard wiring methods to serve the buildings and end-user work areas. The LAN design is a multiple manufacturer and vendor, IEEE Standard 802.3-compliant network for many MSFC electronic services. The center provides a consolidated network management system to manage the activity on the logical network.

Because of the size and complexity of the MSFC network architecture, a logical abbreviated topology is provided in Figure 4 - 11 to show the major points that are part of the EDD configuration.

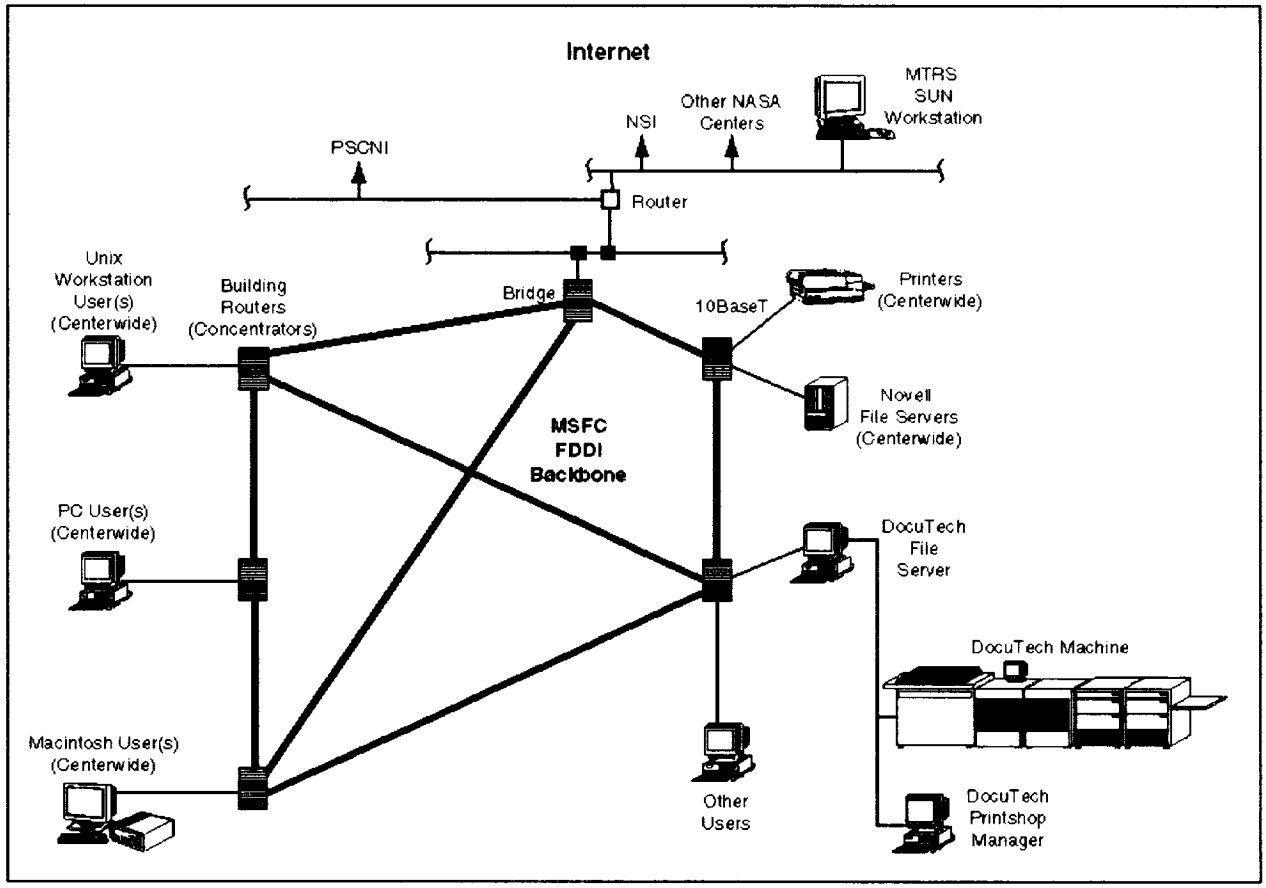


Figure 4 - 11. MSFC logical network topology.

KSC Network Topology

The Kennedy Space Center Network Environment (Figure 4 - 12) consists of the following elements:

1. Kennedy Data Network (KDN), operated by the base Operations Contractor (BOC)
2. Payload Operations Network (PON), operated by the Payload Ground Operations Contractor (PGOC)
3. Shuttle Operations Data Network (SODN), operated by the Shuttle Processing Contractor (SPC)
4. KSC Metropolitan Area Network (KMAN), the central link between the Kennedy Instititional Networks; KMAN also links with the KSC Wide Area Network (KWAN) interface
5. KWAN Interface provides access to other NASA centers and facilities through the Program Support Communications Network Interface (PSCNI) and NASA Science Internet (NSI)

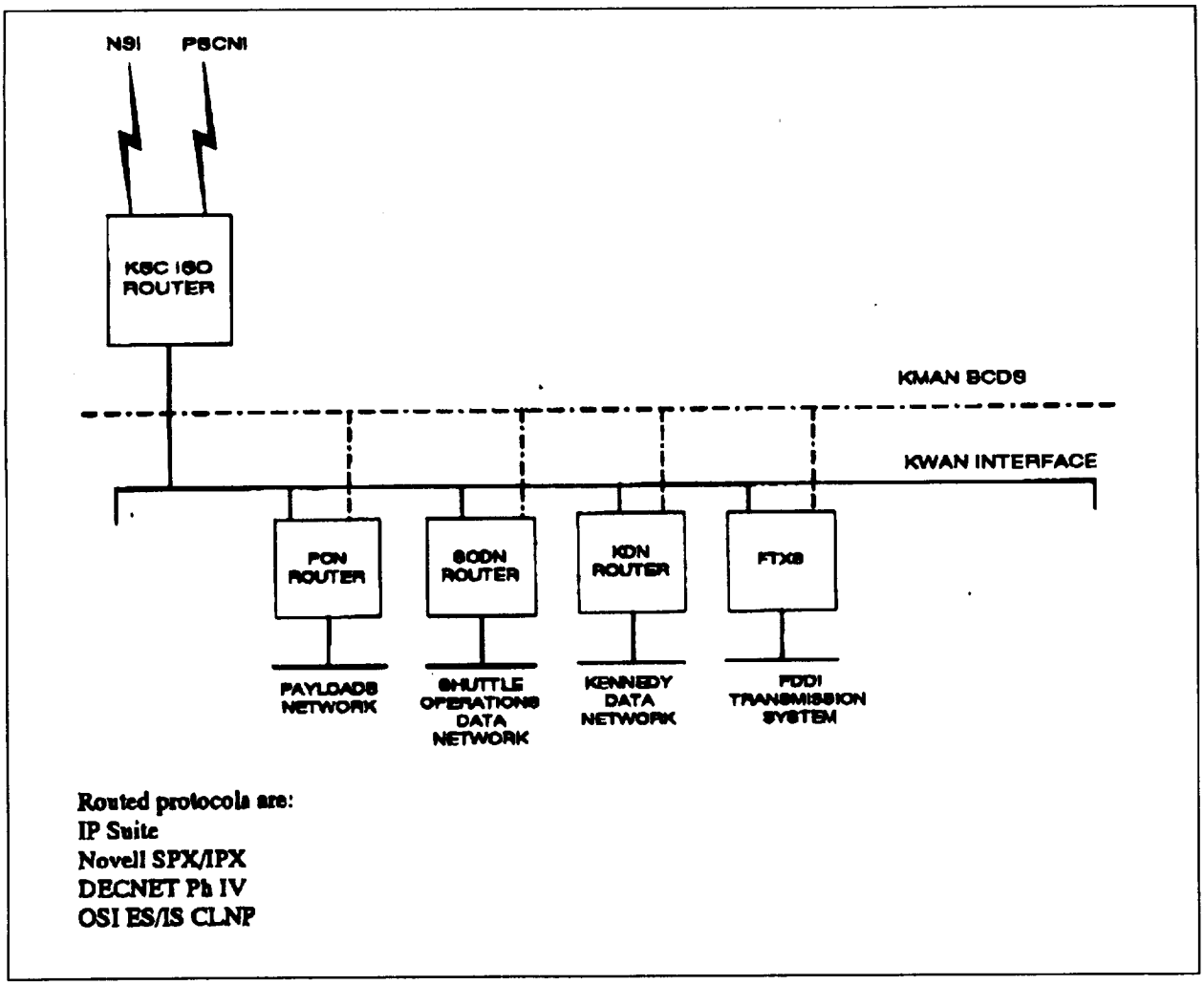


Figure 4 - 12. KSC network topology.

The KDN, PON, and SODN networks consist of multiple LAN segments transported to a major hubbing system via assigned Broadband Cable Distribution System (BCDS) channels, fiber optic links, KSDN Bridged Network links, and T-carrier links. The major hubbing system, known as the Admin Hub (ADMHUB), consist of a multiprotocol, multi-interface routing system. The ADMHUB routs traffic between the backbone links that join LANs within KDN. KDN utilizes the KWAN interface to link with NSI and PSCNI through the BCDS channels known as the KSC Metropolitan Area Network (KMAN) Interface and the KSC Wide Area Network (KWAN) Interface.

Routed protocols are

1. IP Suite
2. Novell SPX/IPX
3. DECNET Ph IV
4. OSI ES/IS CLNP
5. SNA
6. XEROX XNS
7. APPLETALK Phase II

SSC Network Topology

The SSC network is shown in Figure 4 -13. SSC's network is currently a "bridged" Ethernet topology, but it is being upgraded to an ATM topology with an Ethernet redundant backbone. Most SSC users are Ethernet-based with a 10Mb connection capability to the backbone. Users in remote locations may be connected using the center's communications system with a bandwidth capability of 1 Mb. IP is the center's standard protocol, and Appletalk is being used within LANS. All SSC/NASA external connections use the PSCNI. Since NASA is the host agency for SSC, we must support other

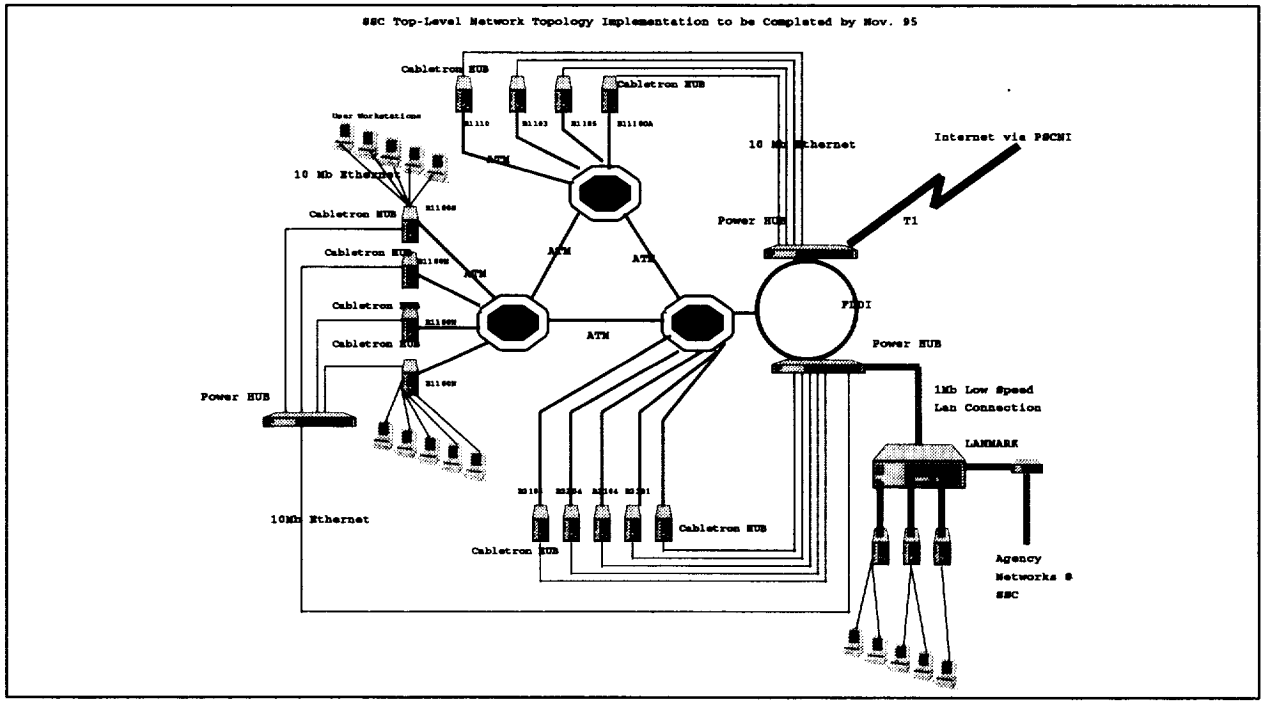


FIGURE 4 - 13 SSC network topology.

protocols and other external connections which are isolated from NASA traffic via firewall routers or partitioning.

SSC has a backbone "star" topology using fiber connectivity to most permanent buildings/facilities, with a central communications building as the HUB. A migration to a "star" topology using "twisted pair Category 5" wiring is being implemented within each building. Line speeds are

1. Ethernet 10Mbps
2. LANMARK 1 Mbps
3. ATM 155 Mbs (OC3)
4. FDDI 100 Mbs
5. T1 1.544 Mbps

Headquarters Network Topology

In mid-December 1995, it was decided to omit Headquarters as a node in the STI EDD project. Headquarters requirements for this capability will be satisfied by the Center for AeroSpace Information.

Chapter 5—Lessons Learned

Comments From EDD Project Coordinator

Electronic File Transfer

1. Transfer of electronic file size to the document repository by editorial staff workstations, i.e., MacIntosh, PC, and UNIX base should be confirmed with further validation by the document repository operator to ensure that file integrity was not contaminated during the transfer.

2. With the ability for the document repository to view, delete, and replace stored files on the DocuTech Print Server, the document repository operator will need to pay specific attention to the network drives that he/she may be transferring files to.

3. When electronic connection to a DocuTech is not available for printing a large PostScript publication, it is recommended that an interim procedure be used. The backupof the PostScript file should be compressed and decompressed to reduce the number of diskettes to be physically transported from the user's workstation and the DocuTech Print Server. Use pkzip and pkunzip, e.g.:

Zipped File:	pkzip -ex b:'name of zipped file' s:'name of file to be zipped'
Unzipped File:	pkunzip b:'name of zipped file'

Data Conversion

1. The easiest word processing document to convert is the one with the least formatting. Keep the original document simple, and make sure the receiving application supports the same features. Use standard, not decorative fonts. Keep margins and tabs simple, avoid complex headers, page number schemes, and footnotes. Specialty formatting, such as word wrapping and graphics positioning, are subject to conversion errors.

2. Don't expect embedded objects to convert properly. Instead of using object link entry (OLE) to embed a fancy spreadsheet table in a word processing document, enter the data directly into your document, separated by tabs. Table formatting is easier than fighting the translation of an embedded table.

3. Save your original document before you perform the conversion.

4. Handling graphics is the worst problem in document conversion. The best way to handle this is to take the graphic out and convert it separately, then reinsert it later.

5. Refer to your manual that came with the software; for example, LOTUS includes an appendix filled with caveats and tips about working with Paradox and dBase formats in Approach.

6. Window's Clipboard provides the ability to gather multiple sections of text to its internal clipboard, called the Spike (Ctrl+F3 to cut and Ctrl+Shift+F3 to paste). This may be all that is needed.

7. Commercial software conversion packages are available to iron out complex formatting issues. Some available programs are

Graphics:	DoDOT 4.0 from Halcyon Software, 408-378-9898 Hijaak Pro from Inset Systems, 203-740-2400 Pizazz Plus from Application Techniques, 508-433-5201
MAC to PC	Conversions Plus 3.0, DataVIz, 203-268-0030
Text, DB, SprdShts	Word for Word, Mastersoft, 602-948-4888
Databases	OpenExchange Pro 1.5, Innovative Solutions and Technologies, 417-781-3282

Graphics Performance On Server

1. Interlaced gifs - normally when a gif opens on a Web browser, the image is displayed from top to bottom as the file loads. Some browsers load the entire gif into memory before displaying it. An interlaced gif saves the graphical information in a different order within the file; thus, when read by a compatible browser, the graphic fills in evenly in several passes, becoming more legible with each pass. One program for creating interfaced GIFs in Windows is Paint Shop Pro. Although an interlaced gif may seem faster, interlaced gifs take just as long as regular gifs to come to full resolution.

2. Gif versus Joint Photographic Experts Group (JPEG) - Some browsers, such as, Netscape, support the use of JPEG-compressed images as well as gif. These images are often smaller than gifs.

3. Indexed Color - Gif format is usually created in 256 colors or true color (24-bit color). Since 24-bit color images are extremely large, they should be use only when absolutely necessary, e.g., an online photo gallery. Photoshop can create an adaptive color palette for a graphic that only contains the actual colors you are using, hence making the image file smaller without losing any resolution.

4. Experiment - This is probably the best way to optimize your server; i.e., spend some time trying out the different formats, go in with a browser and see how it performs.

Document Scanning

1. During the scanning of designated graphical images, photos, art work, etc., whenever the image is saved as a tag image file (TIF) file, the TIF file must be able to be imported into a word processor or desktop software package used by a MacIntosh, PC, or UNIX-based workstation.

Networked DocuTech

1. With the availability of concurrence offered by the networked DocuTech, attention needs to be paid to the scheduling of the workload to provide a maximum throughput with the least amount of effort. The optimal mix will be achieved as the DocuTech operator becomes familiar with the networked jobs, along with the hard-copy jobs, to be scanned. That is, production jobs that require single stitching, dual stitching, taping, set labeling, slip sheets, cut and paste, and tabs need to be grouped together to achieve maximum production.

Minimizing the amount of setup by the DocuTech Operator will increase the production and reduce the overall costs of the Technical Information Services Branch.

2. Production jobs for the booklet maker need to be grouped and scheduled to avoid the necessity to reset the booklet maker for saddle stitch jobs requiring 5.5-inch x 8.5-inch finishing versus those jobs requiring 8.5-inch x 11-inch finishing. The adjustment to the booklet maker takes approximately 20 to 30 minutes each time a change in the size of the finishing is required.

3. The number of jobs using the signature booklet maker needs to be minimized. The production throughput rate is significantly slower using the signature booklet maker versus finishing by single stapling, double stapling, or thermal taping of publications.

4. Whenever possible, the submission of completed electronic files that have completed the clearance procedure by the Technical Information Services Branch is the desired mode of operation. Use of the document repository for cut and paste, assembly, and duplicating requirements (electronic job ticketing) is the recommended mode of operation.

Cross Organizational Technical Coordination

1. Involve the network organization during the initial implementation to ensure that communication connections between the networked DocuTech, document repository, and the user community are operational for MacIntosh, Personal Computer, and UNIX workstations. Check packet transmission sizes, if document repository hardware/software locks up during a file transfer.

GSFC Input

The EDD Team has been evaluating the Xerox Documents on Demand workstation for several EDD functions.

1. The EDD has found that the XDOD is not robust enough to function as a file server for publications work or as the location of the GTRS. It is not designed to handle the heavy traffic that is expected. On the other hand, the XDOD has an excellent production scanner which is essential to converting already printed material to TIF or other file format for the GTRS. Even with that in mind, the strengths of this workstation, while many, are not very relevant to the work that is being done on the EDD and in the Publications Group.

2. The Publications Group, responsible for producing NASA Technical Reports, feels strongly that they should not begin the GTRS with incomplete documents where photos or diagrams are missing or not associated with the text. The document must be the exact replica of the printed document or it is not that document. Stringent controls should be maintained on the formal document portion of this report server, or it is meaningless. If we were to include documents in draft form or missing photos or illustrations, they should be clearly marked as such. They should not carry TM, CP, or other numbers. Thus we can preserve the integrity of the formal document series.

   The EDD may decide there is a place for drafts or works-in-progress or other types of entries, but a separate category of the GTRS should be established for them.

Also the hierarchy of database categories should be the same for all centers and CASI (as provided by Dick Tuey) so the structure will be similar for users, regardless of which TRS they are searching. It is an understood and familiar structure.

3. The EDD team needs to reexamine what types of formal documents should reside in the TRS full text. Perhaps Conference Proceedings and Journal Articles should be looked at in more depth. The TRS can refer users to the appropriate repository of resources for those formal document types not contained in the TRS database.

LaRC Input

1. The EDD team needs to continue to work together and define standards and take advantage of the latest technology for the electronic document dissemination system so that NASA customers can continue to use a consistent single interface to access and search NASA information.

2. The EDD team needs to continue to increase the quantity, as well as to improve the quality of the abstracts and publications on the technical report servers. The team also needs to consider adding reports from previous years.

3. The EDD team needs to encourage the STI publications branch and researchers to provide documents in complete electronic format so that NASA customers can have on-line access to the complete reports, not just the abstracts.

CASI Input

1. Don't use a .0 release of any product.

2. CASI has heard that the free WAIS will not handle greater than 16MB of data.

3. There seems to be a performance tradeoff between having (1) multiple data files with a single index file and (2) a single data file with multiple index files. Search is faster with slower data retrieval in (1) and search is slower with faster data retrieval in (2).

4. The need for more data elements is a function of providing the user with the capability of fine-tuning his/her searches.

LeRC Input

Photographs and others images that must be scanned cause large document sizes and sometimes difficulties with various output devices, e.g., the DocuTech for internal printing, other imaging devices for external printing by commercial printers, and the various user monitors and printers for electronic dissemination. Both the scanning process and the placement into the final layout are time-consuming. This has an effect on timeliness. However, the cost and time savings of total electronic format in later stages of the printing cycle are great. For example, we regularly produce small brochures in a fully electronic format, even full color, to our GPO-contracted printers. For some simpler, more routine jobs, this has eliminated the need for printer's proofs.

DFRC Input

1. Copies of CF-427s are required for each NASA series report put on line. Past experience with a project suddenly put back into "proprietary" status by NASA Headquarters left us vulnerable to questions (how did that document get put on line in the first place, etc.).

   Cooperation is needed across department lines, as well as between contractors and civil servants. If contractors prepare the research reports, check with the appropriate contracting officer's technical representative (COTR) to make sure the statement of work allows the contractors to convert files into an electronic format.

2. All parties involved in the production of electronic documents must be trained. Researchers, engineers, technical editors, technical typists, visual information specialists, and graphic artists must understand the procedures and reasons behind the requirements (no hand paste items, etc.).

   One example of time wasted because of old methods follows:

   To produce one halftone:

   a. Author must product the photo number and/or copy of the photograph.
   b. Work order must be created and sent to Imaging Technology, which requires a minimum of 6 days to make the halftone.
   c. Halftone must be hand-pasted by the tech typist.
   d. Page with pasted halftone must have a camera-ready copy made (another work order). Any pasted page means the document is not truly electronic, and blank spaces result.

ARC Input

1. Forms Support Delayed - Building common gateway interface (cgi) scripts to capture data has been delayed because of computer staffing constraints. Because of downsizing and organizational uncertainties, it is not currently possible to rely on 100% dependable access to technical support. The Documentation Technology Branch is developing some scripts without the aid of the Applied Technology Information Division, but this requires a slow learning curve for nontechnical staff.

2. HTML Full - The original concept of accessing full text electronically via WWW browsers is proving to be impractical. Long documents with embedded images require high bandwidth. It is labor intensive to create HTML versions of published technical reports. To overcome this, we are considering providing citations and abstracts via WAIS, and we are pursuing Acrobat as a more practical means of putting technical reports on line from an FTP environment.

3. ATRS progress has been delayed as a result of the previously mentioned challenges. Because the task requires dependable technical support, it is very hard to succeed without dependable technical capabilities. If Code JIT is to continue development and eventually the maintenance of a Technical Reports Server, then we must be able to house the required technical components within our organization. This would require both hardware (a UNIX-based Server) and personnel for System Administration.

Chapter 6—STI EDD Standards and Guidelines

Interoperability is a major tenet of the STI EDD Project. Therefore, national and international standards that support this objective are endorsed. This chapter includes standards applicable to the STI EDD Project. It is recognized that a few of these standards are themselves evolving with rapidly changing electronic information technology. Although they may not yet be fully implemented within the project, their future implementation is a project goal.

Electronic Exchange Standards

CALS Standards

MIL-STD-1840, "Automated Interchange of Technical Information"
MIL-D-28000, "Digital Representation for Communications of Product Data: IGES"
MIL-D-28001, "Markup Requirements and Generic Style Specification for Electronic Printed Output and Exchange of Text"
MIL-R-28002, "Raster Graphics Representation in Binary Format"
MIL-D-28003, "Digital Representation for Communication of Illustration Data: CGM Application Profile"
MIL-M-38784C, "Manuals, Technical: General Style and Format Requirements"

Federal Information Processing Standards

FIPS PUB 127, "Database Language-Standard Query Language"
FIPS PUB 146-2, "Profiles for Open Systems Internetworking Technologies (POSIT)"
FIPS PUB 152, "Standard Generalized Markup Language International Standards"
FIPS PUB 179-1, "Government Network Management Profile (GNMP)"

International Standards

ISO 8879:1986, "Standard Generalized Markup Language (SGML)"
ISO 9069SGML, "Document Interchange Format (SDIF)"
ISO 9070, "Registration Procedures for SGML Public Text Owner Identifiers"
ISO/IEC 9541, "Font Information Interchange, Parts 1 and 2, Architecture and Interchange Format"
ISO/IEC 10036, "Procedure for Registration of Glyph and Glyph-Collection Identifiers"
ISO 646:1983, "Seven-bit Coded Character Set for Information Exchange"
ISO 8824,8825, "Abstract Syntax Notation One (ANS.1) and Encoding Rules"
ISO 8632:1987, "Computer Graphics-Metafile for the Storage and Transfer of Picture Description Information"
ISO TR 9573, "Techniques for Using SGML"
ISO/IEC 10744, "Information Technology—Hypermedia/Time-Based Structuring Language (HyTime)"
ISO 12083, "Electronic Manuscript Preparation and Markup"

ANSI Standards

ANSI Z39.18-1987, "Scientific and Technical Reports—Organization, Preparation, and Production"
ANSI Z39.59-1988, "Electronic Manuscript Preparation and Markup"
ANSI Z39.39-1990, "Standard Technical Report Number (STRN) Format and Creation"
ANSI Z39.50-1992, "Information Retrieval Application Service-Definition and Protocol Specification For Open System Interconnection"

Internet Standards

Those formats/protocols owned by companies, e.g., Adobe, Microsoft, etc. are specifications and those owned by standards organizations, e.g., ISO, IETF, etc. are standards. Internet standards are governed by items known as Internet Request for Comments (RFCs). Applicable RFCs are available from http://info.internet.isi.edu/1/in-notes/rfc and specific RFCs:

FTP:	RFC 414	(A.K. Bhushan)
TCP/IP:	RFC 1180	(T.J. Socolofsky, C.J. Kale) - Tutorial
FTP:	RFC 959	(J. Postel, J.K. Reynolds) - October 1, 1985
IP:	RFC 791	(J. Postel) - September 1981
URL:	RFC 1178	(Tim Berners-Lee)
HTML: Draft		(Tim Berners-Lee, Roy Fielding, Henrik-Frystyk)

HTML standards are developed by the Internet Engineering Task Force (IETF) and can be found at:

http://www.w3.org/hypertext/WWW/MarkUp/MarkUp.html

Gif is a format defined by Compuserve, Inc, and, as such, represents a specification.

JPEG is a format defined by joint photographers engineering group, and, as such, represents a defacto standard.

Interoperability Requirements

The NASAwide STI EDD Project Team recognizes that the CIO-proposed minimum hardware configuration for NASA (486DX4/100Mhz, 16 MB RAM, 850 MB HD, 256KB cache, 1MB Video RAM, Mouse, Keyboard, EPA Energy Star, Ethernet Network Interface Card, and 14" Monitor) may not satisfy the functional requirements for electronic document management functions (i.e., image capture and display, publication preparation, graphical display via the Internet, etc.). Configurations to support the processing requirements for each of the functions must be considered on a case-by-case basis in accordance with NASA CIO policy.

For the STI EDD project, the minimum requirements for software interoperability within and between the NASA centers are recommended in Table 6 - 1. To avoid being vendor specific, the NASAwide STI EDD Project Team took a functional approach in categorizing interoperability requirements. Table 6 - 1 consists of three columns. Column 1 identifies the functional software component, Column 2 identifies the current input and output formats that need to be supported by the current software in order to ensure software interoperability, and Column 3 identifies the future input and output formats that the STI EDD anticipates will be required to remain interoperable in the near future.

Table 6 - 1. Interoperability Requirements

Components	Current Formats	Future Formats
Document Composition/Processor (Presentation/Graphics)	Inputs: Bitimage files (GIF,BMP, TIF, JPEG) ASCII RTF Object-Oriented (CGM, EPS) Output: HTML PostScript PDF HPPCL	Current + UNICODE HTML SGML Tex/LATEX PDF Current + SGML
Spreadsheets	Input: .XLS, .WRX, .DBF Delimited ASCII Objects Output: Input + Word Processor	Hot Java (Spreadsheet Only) HTML 3.0 UNICODE
Document Exchange	Network/Email/FTP/HTTP (ICCN Standards) Portable Media	Network
Networks	TCP/IP, HTTP, FTP Socket Based (Telenet/WAIS)	
Forms	PDF PostScript HPPCL Delimited ASCII	Security/Electronic Signature

To ensure interoperability with the NTRS and NPAIS, all years of data must be accessible via a single WAIS server. NTRS and NPAIS also need to be able to communicate with the WAIS server software directly. The NASAwide STI EDD Project Team recommends the acquisition of Commericial WAIS for those centers who do not now have this software.

Chapter 7—Recommendations - STI EDD Practices and Procedures

Introduction

For the United States to remain an international leader in aerospace and research development, NASA must perform state-of-the-art research relevant to U.S. industry. Moreover, NASA must disseminate that research and do so in the most cost-effective manner possible.

The prototype STI Electronic Document Distribution Technical Reports Server (TRS) system is a viable means for providing the widest practicable dissemination of NASA research to the scientific and technical community. To promote NASA's research to a broader audience, the TRS system can be linked with NASA's Public Affairs Information Server (PAIS) system. The PAIS contains general information about NASA and its projects and can refer the reader to more detailed information contained within the TRS system.

The participants in the STI EDD Pilot Project recommend the following practices and procedures regarding the TRS/PAIS system applications. Once the TRS/PAIS systems are fully functional, responsibility for maintenance, support, enhancements, and promotion of an individual center's TRS/PAIS is recommended to lie within the appropriate functional areas within that center. It is also recommended that each center's TRS/PAIS be represented on an Agencywide TRS/PAIS steering team. This team will ensure consistency across networked TRS/PAIS systems.

Copyright

Information released on a TRS will adhere to policies and guidelines stated in NHB 2200.2, "NASA Scientific and Technical Information Handbook" and United States Copyright Law.

Distribution

Proper handling of restricted information necessarily requires that some level of difficulty in obtaining data be imposed. The electronic document distribution system is patterned after the current paper system to preclude foreign access to restricted information. Currently, with the open Internet environment, restricted (classified, limited, commercially sensitive) information is not included for electronic dissemination.

Electronic Document Storage

Because of the large volume of documents published within NASA annually, a distributed electronic document storage environment became necessary throughout the Agency. Each center shall have responsibility for maintenance and technical support of its electronic document distribution system (known as xTRS). The burden of obtaining and integrating WWW software and associated system management tools shall lie with each center. The end-user shall be responsible for the software suite operating on the client workstation. To ensure continuity and availability of publications, each center's operating units and contractors shall provide, via the TRS, electronic versions of any submitted documents.

Preliminary Release of Formal Reports

If a center EDD committee has determined that preliminary release shall be permitted, an author of a NASA formal report shall have the option of seeking center approval for electronic

release of the preliminary document. If approval is granted, the document shall be clearly marked that it is a preliminary draft, cleared for release with respect to technical content, but not yet meeting NASA's editorial requirements. The document shall also bear the date of that release with an estimate of when the final draft will be available. Each center's STI EDD team decides whether or not to allow this practice. Furthermore, each center's STI EDD team shall establish a procedure for accepting and displaying preliminary releases of formal reports. This procedure shall assure that, once prepared and cleared for release, the final version of the report will replace the preliminary draft on the file server.

Publication Specifications for Electronic Documents

Wherever practicable, the standards and requirements set forth in the STI publications handbook should be followed for electronic documents as well.

The NASAwide STI EDD committee shall identify and recommend file and compatibility standards for electronic versions of NASA documents. In making these recommendations, the committee should consider current best practice, Agency requirements for interoperability, customer requirements and capabilities, and cost effectiveness, as well as emerging technologies and standards.

Electronic documents created before the establishment of the standards may be accepted for posting to an XTRS provided they are significantly complete; that is, they contain full text with sufficient figures and tables to be useful. The document must be formatted, so that the absence of any data, photographs, figures, or tables is obvious, and/or marked in a "notice," (see STI Handbook), explaining that some data are missing and alerting the reader to the availability of the full printed document from CASI.

Responsibility for assessing the desirability and cost effectiveness of completing electronic versions of existing documents (e.g., via scanning photographs, figures, etc.) shall lie with each center's STI function.

Practices

This section documents and describes the practices that each NASA center should follow to ensure that during the implementation of the NASAwide STI EDD, problems are minimized.

Tags

1. HTML tags for document layout should be used so as to maintain a consistent "look and feel" with the other XTRSs. If the document layout does not meet the needs of a NASA center, a new layout will be implemented. New layouts should be coordinated with the NASAwide STI EDD committee to ensure consistency.

   When implementing fields in the WAIS database, the participating centers should base their fields around the "CASITRS searchable fields," as described in Chapter 2. If a specific field does not meet the needs of the NASA center, a new field will be implemented. New fields should be coordinated with the NASAwide STI EDD committee to ensure duplication of fields does not occur.

Directory Structure (Layout)

2. All NASA centers participating in the STI EDD should follow the directory structure as described in the Introduction section on "Home Page and Directory Structure." Interoperation with NTRS does not depend on directory structure, but following the above guideline will aid the center in maintaining the 'x'TRS data. As such, the directory structure is flexible. If the directory structure does not meet the needs of the center, a new directory may be added. For example, a directory for "Papers Cleared for Presentations" currently does not exist in the list of names for directories, a possible addition for describing this category could be "PP."

Procedures

This section documents and describes the procedures in the handling of issues that are not specifically addressed in the NASA STI Handbook or internal center procedures.

X Document

1. For reasons of security and confidentiality "X" document abstracts should not be included in the center's TRS.

PAIS Numbering Assignments

A unique numbering assignment to each Fact Sheet and Information Summary was developed to ensure that no duplicate assignments were made. As described in Chapter 1 of the Joint Technical Memorandum, the following numbering schema is being used by DFRC for its and Headquarters' Fact Sheets. By following the same schema and using the two-letter mnemonic directory structure for the Public Affairs Information Server, a universal unique assignment can be used for all NASA nonformal publications. The numbering schema is described below:

Type:	EB, EG, ET, EP, EW, LG, FS, NP, NW, and IS
Year:	1995, 1996, 1997, 1998, 1999, 2,000, etc.
Month:	01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, and 12
Sequence #:	xxxxxx
Center:	HQ, ARC, DFRC, LaRC, LeRC, GSFC, JSC, MSFC, KSC, SSC, and JPL

Giving as an example: FS-1995-05-01-HQ for Headquarters generated Fact Sheet with sequence number 01 and prepared in May 1995.

In addition, if a copy of the document is made available electronically, the following data will be added to the Document Title and/or search critieria to enable efficient and accurate search and retrieval: Report Number, Performing Organization, and Report Date (Month and Year). A printed document and its electronic version shall have the same publication number.

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13. ABSTRACT *(Maximum 200 words)*

This evaluation report contains an introduction, seven chapters, and five appendices. The Introduction describes the purpose, conceptual frame work, functional description, and technical report server of the STI Electronic Document Distribution (EDD) project. Chapter 1 documents the results of the prototype STI EDD in actual operation. Chapter 2 documents each NASA center's post processing publication processes. Chapter 3 documents each center's STI software, hardware, and communications configurations. Chapter 7 documents STI EDD policy, practices, and procedures. The appendices, which are contained in Part II of this document, consist of A) STI EDD Project Plan, B) Team members, C) Phasing Schedules, D) Accessing On-line Reports, and E) Creating an HTML File and Setting Up an xTRS. In summary, Stage 4 of the NASAwide Electronic Publishing System is the final phase of its implementation through the prototyping and gradual integration of each NASA center's electronic printing systems, desktop publishing systems, and technical report servers to be able to provide to NASA's engineers, researchers, scientists, and external users the widest practicable and appropriate dissemination of information concerning its activities and the result thereof to their work stations.

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