NISTIR 5956

State of the MEL Computing and Networking Infrastructure

For Internal MEL Use Only

Deborah Nickerson Fowler

U.S. DEPARTMENT OF COMMERCE
Technology Administration
National Institute of Standards
and Technology
Manufacturing Engineering Laboratory
Manufacturing Systems Integration Division
Gaithersburg, MD 20899-0001

NIST

NISTIR 5956

State of the MEL Computing and Networking Infrastructure

For Internal MEL Use Only

Deborah Nickerson Fowler

U.S. DEPARTMENT OF COMMERCE
Technology Administration
National Institute of Standards
and Technology
Manufacturing Engineering Laboratory
Manufacturing Systems Integration Division
Gaithersburg, MD 20899-0001

December 1996

U.S. DEPARTMENT OF COMMERCE
Michael Kantor, Secretary

TECHNOLOGY ADMINISTRATION
Mary L. Good, Under Secretary for Technology

NATIONAL INSTITUTE OF STANDARDS
AND TECHNOLOGY
Arati Prabhakar, Director

Disclaimer

No approval or endorsement of any commercial product by the National Institute of Standards and Technology is intended or implied. Certain commercial equipment, instruments, or materials are identified in this report in order to facilitate understanding. Such identification does not imply recommendation or endorsement by the National Institute of Standards and Technology, nor does it imply that the materials or equipment identified are necessarily the best available for the purpose.

Preface

The intent of this report is to layout the state of the computing and networking infrastructure within MEL as of June 1996. The document is to be used as a foundation for recommendations for possible changes to all areas of MEL's computing and networking infrastructure.

The investigation covered several aspects of the computing and networking infrastructure within MEL. The subject areas chosen for investigation were based on many years of experience in systems and networking administration. Ideas for subject areas also stemmed from conference proceedings from past USENIX Conferences and the Nuclear Regulatory Commission's Strategic Information Technology Plan [NRC]. Sections 2 through 12 correspond to: platform inventory, internal server, network information services, software, backups, printers, networks, the MEL computing and communications laboratories, services from the Information Technology Laboratory (ITL), MEL support staff, and security, respectively. Appendices containing detailed supporting information are provided for reference.

I. Introduction

A project was formed to assess the Manufacturing Engineering Laboratory (MEL) computing and networking infrastructure and to ascertain what problems exist which may inhibit the laboratory from collaborating effectively. The National Advanced Manufacturing Testbed (NAMT) infrastructure project was established to gather and address computing and networking issues pertaining to the projects within the NAMT. While the NAMT infrastructure project focuses on the technical requirements of the NAMT projects, the MEL infrastructure project encompasses most of the issues pertaining to the computing and networking infrastructure for all of MEL. This paper documents the state of the MEL computing and networking infrastructure as of June 1996; this paper does not make recommendations for change. Interviews were conducted with the management of the Office of Manufacturing Programs (OMP), and the deputy division chiefs and systems and networking administrators of each division within MEL: Automated Production Technology Division (APTD), Fabrication Technology Division (FTD), Intelligent Systems Division (ISD), Manufacturing Systems Integration Division (MSID), and Precision Engineering Division (PED).

II. Platform Inventory

2.1 Platform Statistics

#-OS	Lab Office	OMP	APTD	FTD	ISD	MSID	PED	Totals
Unix Workstations	1-Sun 1-SGI	0	2-HP 1-SCO 1-DEC alpha 1-Lynx	1-Sun	47-Sun 9-SGI	60-Sun 3-SGI	5-Sun 3-HP 1-Concurrent	114-Sun 13-SGI 5-HP 1-SCO 1-DEC alpha 1-Lynx 1-Concurrent
Dos/Windows PCs	9	7	45-Win3.X 20-Win95 2-NT	9-Win3.X	0	60	73-Win3.X 17-Win95 5-NT 2-OS2	249
Macintosh	0	1	4	0	45	14	0	64
Totals	11	8	76	10	101	137	106	449
#of FTEs	14	7	46	44	45	56	52	264

TABLE 1. Inventory of MEL Desktop Computers (6/96)

The divisions and offices within MEL use a variety of different platforms. Rough estimates for the number of desktop computers used are shown in Table 1. Table 1 also shows the number of permanent (FTE) employees within the laboratory. There are approximately 10% additional staff who are not FTE status. The platform statistics for the 220 testbed described in section 9 are included under MSID.

#	Lab Office	OMP	APTD	FTD	ISD	MSID	PED	Totals
Unix	0	0	2	0	3	13	1	19
Novell	0	0	3	0	0	0	0	3
Macintosh	0	0	0	0	1	1	0	2
Dos/Windows	0	2	0	0	0	0	0	2
Totals	0	2	5	0	4	14	1	26

TABLE 2. Inventory of MEL Server Computers (6/96)

All of the divisions and offices within MEL have their own servers, with the exception of the laboratory office and FTD. The laboratory office uses the MSID Unix servers. FTD currently uses some services from the MSID Unix servers, but will be using a Unix server in the NAMT facility in late FY96. In addition to their main servers, many of ISD's workstations also provide minimal services. Table 2 shows the number and types of servers within each office/division.

2.2 Inventory Control

All of the divisions and offices use the standard National Institute of Standards and Technology (NIST) property database, a Unisys mainframe running a System 2000 database, for tracking all systems and devices tagged with NIST property stickers. Some divisions use additional methods for tracking their inventory. Data is currently being gathered to establish an internal database for computer equipment in FTD. ISD support staff maintain text files to track their Unix hardware; ISD uses a Microsoft Excel spreadsheet to track its Macintosh hardware. MSID support staff use a home-grown interactive shell for tracking computer system components; furthermore, MSID has a Microsoft Access database to track all MSID property. PED support staff use a WordPerfect tabularized file for tracking the details of their Dos/Windows computer equipment.

2.3 Equipment Plan

Most of the divisions and offices within MEL stated that they do not have a formal plan of equipment refresh. All purchases for computer and network equipment are requested at the beginning of each fiscal year. Internal decisions within each office/division are based on projects requirements for that fiscal year. MSID has formalized the process by instituting a depreciable equipment committee that convenes before the start of each fiscal year to generate and prioritize their "wish" list for new equipment. In addition, MSID's system support staff promote standardization of equipment; configuration recommendations are given for all supported platforms. FTD is in the process of defining upgrade plans for FY97.

III. Internal Servers

3.1 Information Housed on Internally Supported Servers

Information	Lab Office	OMP	APTD	FTD	ISD	MSID	PED
home directories	Yes	Yes	Yes	Future	Yes	Yes	Admin only
project directories	Yes	Yes	Yes	Future	Yes	Yes	Admin only
software	No	No	Yes	No	Yes	Yes	No

TABLE 3. Information Housed on Internal Servers (6/96)

Most of the information housed on the MEL internally supported servers is categorized as home directories, project directories, and software. Home directories are storage areas for users. Project directories are allocated for users of specific projects to share common files. Software directories hold networked applications shared by multiple users. Some servers contain additional information, but those in the table above are the most common. Table 3 shows that most of MEL currently use servers internal to MEL for home and project file storage. FTD and PED are the exception. FTD will use the new MEL NAMT server for home and project file storage when it becomes available late FY96. Only the administrative staff, managers, and secretaries within PED use their internal server. APTD, ISD, and MSID use their internal servers to store network accessible software. For brevity, a detailed list of all services provided by each server was not included in this report.

3.2 Sharing of Information

Level of Access	Lab Office	OMP	APTD	FTD	ISD	MSID	PED
Access to Info	CME	OMP	APTD	N/A	CME	CME	PED Admin

TABLE 4. Internal Server Access (6/96)

Information is shared electronically within MEL in a variety of ways: shared filesystems; electronic mail (email); file transfer protocol (FTP); "sneaker-net"; and the MEL internal web. This section assesses MEL's ability to share files. Statistics on use of electronic mail is summarized in Section 5. APTD, ISD, and MSID have implemented an "anonymous" FTP service on their servers; "anonymous" FTP allows a user that does not have an account on the system to send or retrieve files to and from that system. In addition, ISD and MSID FTP servers have "private" FTP areas for more controlled access. The use of "sneaker-net", information passed via floppy or tape, is small but still exists within MEL. Most the internal web pages are used for disseminating general information to MEL staff; use of the internal web for sharing files is small.

For the most part, information on the MEL internal servers is only shared within each office/division. As shown in Table 4, the laboratory office, ISD, and MSID can easily share information because they are within the same system domain, cme.nist.gov. The

OMP and APTD internal servers are accessible only to those within the OMP and APTD, respectively. PED's internal server provides access only to the administrative staff of PED.

3.3 Downtime

All the support staff of MEL report 99% uptime for their respective internal servers for the last three years. However, APTD's Novell servers have experienced at least one down-times which have lasted more than one week each.

IV. Network Information Services

Information Services	Lab Office	OMP	APTD	FTD	ISD	MSID	PED
User Accounts	Unix-CME (all staff)	no others used	Novell (all staff) Unix (50% of staff)	Unix-CME (2)	Unix-CME (all staff)	Unix-CME (all staff)	Unix (Admin. only)
Universal IDs	100% in use	Not Used	Not Used	All Admin Some technical	65% in use	95% in use	Not Used
Systems Domain	cme.nist.gov	radp.nist.gov	aptd.nist.gov (1) nist.gov	cme.nist.gov-some	cme.nist.gov	cme.nist.gov	nist.gov
Email Interface	Eudora/ Unix mail	Eudora	Eudora	Eudora	Quickmail/ Unix mail	Eudora/ Unix mail	Eudora/ Unix mail
Email Hub	CME/micf	micf/enh	micf, enh, gauss	micf	magog	tribble	enh/ micf(3)

TABLE 5. Network Information Services (6/96)

This section narrows the scope of network information services to the management of: user accounts; universal identification information (ID); system domains; email interfaces and email hubs. Table 5 above summarizes the configuration of these services within the laboratory.

4.1 Management of User Accounts

Different classes of user accounts exist within MEL:

- ITL systems user accounts
- Novell user accounts
- Unix user accounts

Most of the management and administrative support staff use user accounts on the ITL IBM mainframe, *micf*, for NIST mandated administrative and accounting software and data. Some also have ITL user accounts for accessing email on ITL electronic mail server hubs. Only APTD staff use Novell user accounts for accessing data on their Novell file server. Unix user accounts within MEL are grouped by user domains. APTD has a separate user domain for users of its Unix fileservers. PED has a separate user domain for users of its Unix fileserver. Unix user accounts for all of MEL for the MEL calendar database, Synchronize, are under the "cme.nist.gov" user domain. The same cme.nist.gov Unix user accounts are used by all of the laboratory office staff, two of the technical staff of FTD, and all of ISD and MSID to access filesystems under the cme.nist.gov domain. Table 5 shows those user accounts in use other than the ITL user accounts and those under the cme.nist.gov domain for the MEL Synchronize database.

4.2 Universal Identification Information (ID)

For multiuser systems, files have an associated concept of ownership. Every file has an owner, or user. The Information Technology Laboratory (ITL) instituted the assignment of universal identification information (ID) for user accounts to enable the sharing of files among servers within NIST. Upon request, a unique set of identifiers is assigned. The set of identifiers include: a username, userID (UID), groupname, and groupID (GID). To protect mounted filesystem data, UIDs and GIDs must be unique across all machines that share filesystems. If a user mounted a filesystem from outside his/her user domain and had the same userID as another individual from the domain which the filesystem was mounted, data on the mounted filesystem assigned to that userID could be read, altered, removed, and created. Duplication of GIDs can also result in the above security problems. When universal identification information is implemented on all systems that share filesystems, no duplication of UIDs and GIDs exists and file ownerships stay intact. MEL support staff are currently establishing universal user IDs for their clients. 100% of the laboratory office, 95% of MSID, 65% of ISD, 25% of FTD have universal IDs in use. APTD, OMP, and PED do not use universal userIDs for access to MEL internal server filesystems.

4.3 Systems Domain

Groups of systems (hosts) form system domains. Different system domains exist within MEL:

- cme.nist.gov
- radp.nist.gov
- aptd.nist.gov
- nist.gov

As shown in table 5, the domain for the laboratory office, ISD, and MSID systems is cme.nist.gov. The systems on the FTD managed 10BaseT network are also under the cme.nist.gov system domain. The systems in the OMP are under the rapd.nist.gov system

domain. All APTD systems are under the aptd.nist.gov system domain except one system that is under nist.gov. All PED systems are under the nist.gov systems domain.

4.4 Email Hub

Most of the staff within MEL receive email with the exception of FTD. Only the administrative and a few of the technical staff within FTD have email accounts. Those within FTD who receive email do so from *micf*. About half of the laboratory receive their email from MEL internal email hub servers. *Tribble* is the email hub for MSID and the laboratory office. A few of the laboratory office staff use *micf*. ISD's server is *magog*. For those within ISD using QuickMail for the Macintosh, their email is forwarded from *magog* to ISD's Macintosh server. Half of APTD use *gauss*, and the other half use *micf* and another ITL server, *enh*. Most of PED receive their email from *enh*; three use *micf*. All in OMP use *micf* except one which uses *enh*.

V. Software

Only those applications that currently span or have the potential to span divisions and offices are addressed here. Although they span all offices and divisions in the laboratory, administrative and accounting software that is mandated by NIST and/or Department of Commerce management is not part of this assessment. This may include but is not limited to: Informs; Financial Information System (FIS); Quick Purchasing Systems (QPS); and Time and Attendance (T+A). Also not included are the Commerce Administrative and Management System (CAMS) and the Travel Manager Plus software. For brevity, technical applications were also not included.

5.1 Email, Calendar, Web Browsers

%staff use	Lab Office	OMP	APTD	FTD	ISD	MSID	PED
Email	100%	100%	100%	25%	100%	100%	100%
Calendar (Synchronize)	90%	100%	20%	25%	100%	100%	60%
Web Browser (Netscape)	100%	100%	50%	25%	100%	100%	100%

TABLE 6. Email, Calendar, Web Browsers (6/96)

Table 6 shows the percentage of staff who use email, calendar, and web browsers. Most of the Dos/Windows PC users within MEL use Eudora for their email interface. The Unix users use a variety of Unix mail tools: Openwindows Mailtool; elm; vm; etc. Macintosh users use QuickMail, Eudora, or any of the Unix mail tools through an XWindow application. Although some may use other calendars and web browsers, percentages were estimated for the standard NIST calendar, Synchronize, and web browser, Netscape.

5.2 Network Environment Software

%staff use	Lab Office	OMP	APTD	FTD	ISD	MSID	PED
eXceed (PC&Mac)	none	none	none	none	none	10%	none
Chameleon NFS (PC)	15%	none	none	none	none	10%	none
MacX (Mac)	none	none	none	none	100%	25%	none
MacTCP (Mac)	none	none	none	none	100%	75%	none
NFS/ Share (Mac)	none	none	none	none	none	100%	none
PCNFS (PC)	100%	none	none	20%	2%	55%	none
OnNet (PC)	none	100%	80%	none	2%	none	100%
NCSA (PC)	80%	60%	2%	5%	none	4%	none
Win95 TCP/IP (PC)	none	none	20%	none	none	none	none
Open Transport (Mac)	none	none	none	none	100%	25%	none
TCP/ConnectII (Mac)	none	none	none	none	none	25%	none

TABLE 7. Network Environment Software (6/96)

Table 7 shows the variety of network environment software used within MEL and the percentage of staff who use which package. Because Unix systems have networking software packaged within the operating systems, only Dos/Windows and Macintosh software are shown.

5.3 Word Processing/ Document Publishing Software

%staff use	Lab Office	OMP	APTD	FTD	ISD	MSID	PED
FrameMaker	none	15%	none	none	100%	40%	8%
TeX/LaTex	none	none	none	none	24%	20%	none
Word	none	45%	35%	none	30%	20%	30%
WordPerfect	100%	30%	65%	10%	20%	50%	70%

TABLE 8. Word Processing/ Document Publishing Software (6/96)

The word processing and document publishing software used within the lab varies greatly. Because the word processor of choice by NIST's administration was WordPerfect, all administrative staff within MEL use this software. Since the time of the survey, the NIST administrative document standard has changed to Microsoft Word. The technical staff use a variety of other applications. Table 8 shows the different word processing and document publishing packages in use within MEL.

5.4 Spread Sheet Software

%staff use	Lab Office	OMP	APTD	FTD	ISD	MSID	PED
Excel	25%	30%	12%	0%	100%	10%	30%
Lotus	15%	none	1%	2%	none	none	none
Quatro Pro	none	none	9%	none	none	2%	20%

TABLE 9. Spread Sheet Software (6/96)

Table 9 reveals what spreadsheet software is used within MEL.

5.5 Graphic/ Presentation Software

%staff use-platform	Lab Office	OMP	APTD	FTD	ISD	MSID	PED
Adobe Illustrator	80%	none	7%	none	5%	20%	none
Adobe Photoshop	none	15%	7%	none	100%	none	10%
DrawPerfect	none	none	1%	none	none	none	none
Graphtool	none	none	7%	none	none	none	none
Harvard Graphics	80%	none	4%	none	none	20%	10%
MacDraw	none	none	1%	none	75%	25%	none
Pagemaker	none	15%	none	none	none	10%	none
Paint Shop Pro	none	none	none	none	none	20%	none
Powercurve	none	none	6%	none	none	none	none
PowerPoint	80%	100%	15%	2%	14%	75%	30%

TABLE 10. Graphic/ Presentation Software (6/96)

Table 10 shows the different graphic and presentation software used by MEL staff.

5.6 Software Maintenance Contracts

APTD	ISD	MSID	PED
Novell Operating Systems	Sun Operating Systems	Sun Operating Systems	Sun Operating Systems
Sun Operating Systems	IRIX Operating System	IRIX Operating System & NFS	Concurrent Operating System
eXceed	Pro Engineer	Pro Engineer	
PC/TCP	FrameMaker	FrameMaker	
	CenterLine Objectcenter	CenterLine ObjectCenter	
	VXWorks	Cygnus GNU Development Env	
	Telegrip	Legato Networker	
	GatorCare	PCNFS	
	Allegro Common Lisp	SunPC	
		SPARCworks Development Env	
		SunNet Manager	
		SGI compilers	
		Intercon (Mac network s/w)	
		eXceed	
		Chameleon NFS	

TABLE 11. Software Maintenance Contracts (6/96)

Table 11 shows the software maintenance contracts managed by the MEL support staff. All the software maintenance contracts include media upgrades; some include vendor contact support. OMP and FTD do not have software maintenance contracts. Laboratory office software under support is maintained by MSID support staff.

VI. Backups

% of platforms	Lab Office	OMP	APTD	FTD	ISD	MSID	PED
UPS backup	10%	100%	10%	none	5%	50%	40%
spike suppressor	90%	none	55%	none	60%	none	40%
wall power only	none	none	35%	100%	35%	50%	20%

TABLE 12. Power Protection (6/96)

6.1 Power Protection

As shown in table 12, very few systems within MEL are protected with uninterruptible power systems (UPS). All MEL servers are backed up with UPS protection. For those not UPS protected, roughly half are plugged into spike suppressors and half directly into wall

power. A UPS provides battery backup power to protect against all power disturbances. Spike suppressors provide protection against short duration voltage increases or high frequency surges.

6.2 Data Backups

All the data on the servers within MEL is regularly backed up by the MEL support staff. The policy on backups for desktop systems varies by platform and organization.

6.2.1 Laboratory Office (820)

Most of the laboratory office use their home and project directories on the MSID servers for non-sensitive data. Most of the laboratory staff use a standard application suite of software that can be installed easily if a problem arises. Some staff periodically backup their own systems; otherwise, no regular backups of the Dos/Windows systems are performed. Regular backups are performed for the Sun and SGI systems by MSID and ITL, respectively.

6.2.2 OMP (820)

All desktop systems within OMP have tape peripherals; it is the responsibility of the primary user to backup his/her system. It is the perception of the OMP management that few systems are backed up regularly.

6.2.3 APTD (822)

Regular data backups are performed for the Novell, Sun, and SCO servers. The primary users of the all desktop systems are responsible for backing up their own systems. The perception of the system administration staff is that few of the systems have a regular backup schedule. Most of the staff store their data on the servers, which gets backed up nightly.

6.2.4 FTD (825)

The desktop systems of the administrative officer and the system administrator are backed up nightly with the Conner Tape backup software. Most of the other systems within FTD are rarely backed up, if at all.

6.2.5 ISD (823)

All Macintosh and Unix systems within ISD are regularly backed up. The Computer Maintenance project uses Retrospect to backup all their Macintosh systems. The support staff use two backup methods for the Unix systems, ITL's Epoch system and a public domain shell script. ISD has a couple of Dos/Window systems; the primary users of these systems are responsible for backing up their systems.

6.2.6 MSID (826)

The GSS staff backup all Macintosh and Unix systems. Retrospect is used for backing up all Macintosh systems. For all the Unix systems, Legato Networker is used. The primary users of the Dos/Windows systems are responsible for backing up their systems; most users use the servers to store information that they don't want to lose. The perception is that most Dos/Windows users do not backup their systems regularly.

6.2.7 PED (821)

The administrative staff of PED use the server for backing up non-sensitive data. All Dos/Windows systems are set up with local tapes; it is the responsibility of each user to backup their own system. Some of the Unix systems are backed up with Legato Networker. One of the Unix system users backs up his system with ITL's Epoch system.

VII. Printers

Printers	Lab Office	OMP	APTD	FTD	ISD	MSID	PED	Totals
Personal Only	~12	~8	~12	~9	none	~35	~115	~191
Network Accessible	1-B/W 1-color	2-B/W 1-color	5-B/W 3-color	none	~23 B/W 2-color	9-B/W 1-color	1-color	40-B/W 9-color

TABLE 13. Printer Configurations (6/96)

Table 13 shows the approximate numbers of personal and network accessible printers within MEL. Personal printers are those printers installed on a system and are not accessible via the network. Most of the network accessible printers are only accessible by systems installed on the same local network. All the network printers installed on the laboratory office, ISD, MSID local networks can be accessed by all cme.nist.gov domain hosts.

VIII. Networks

Most of the local networks within MEL are managed by the MEL support staff. APTD, FTD, ISD, and MSID maintain their own cable plants. OMP contracts support out as needed. PED uses the ITL maintained PEPnet. Appendix C shows a logical topology of the MEL networks. Appendixes D-K detail the cable plants for all MEL managed networks.

IX. The MEL Computing and Communications Laboratories

The laboratory in building 220 was created to provide an infrastructure to support NIST's Systems Integration for Manufacturing Applications (SIMA) program [NIST1]. The laboratory serves, in general, any NIST program or project working to develop enabling technologies and standards for the U.S. manufacturing community. MEL laboratories provide

the computing hardware, software, communications network, and facility that enables NIST scientists to work with industry on technologies and evolving standards required to support future U.S. manufacturing competitiveness [NIST2]. The MEL laboratories are used for standards development activities, briefings, training, technology evaluations, and demonstrations. The flexibility of the 220 laboratory and the diversity of the capabilities that it supports makes it a valuable resource enabling the development of standards and technology for the U.S. manufacturing industry. The initial laboratory depicted in figure 1 is located in the Metrology building (220). Another laboratory is currently under construction in the Shops building (304); the focus of this laboratory will be in support of the National Advanced Manufacturing Laboratory (NAMT) program [NAMT]. Appendix A illustrates the design of the second laboratory.

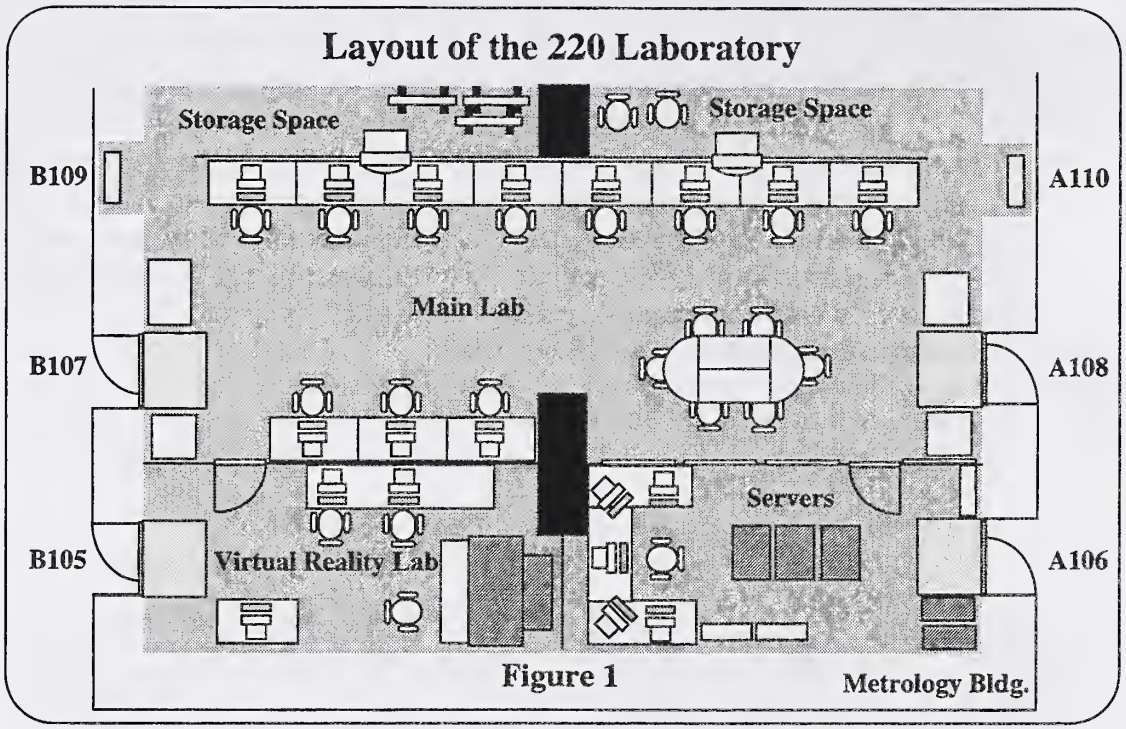


Figure 1

With the completion of the initial laboratory, the first phase of the network was implemented. Figure 2 illustrates the first phase of the network. Appendix B illustrates the expansion of the network in support of the second laboratory for NAMT.

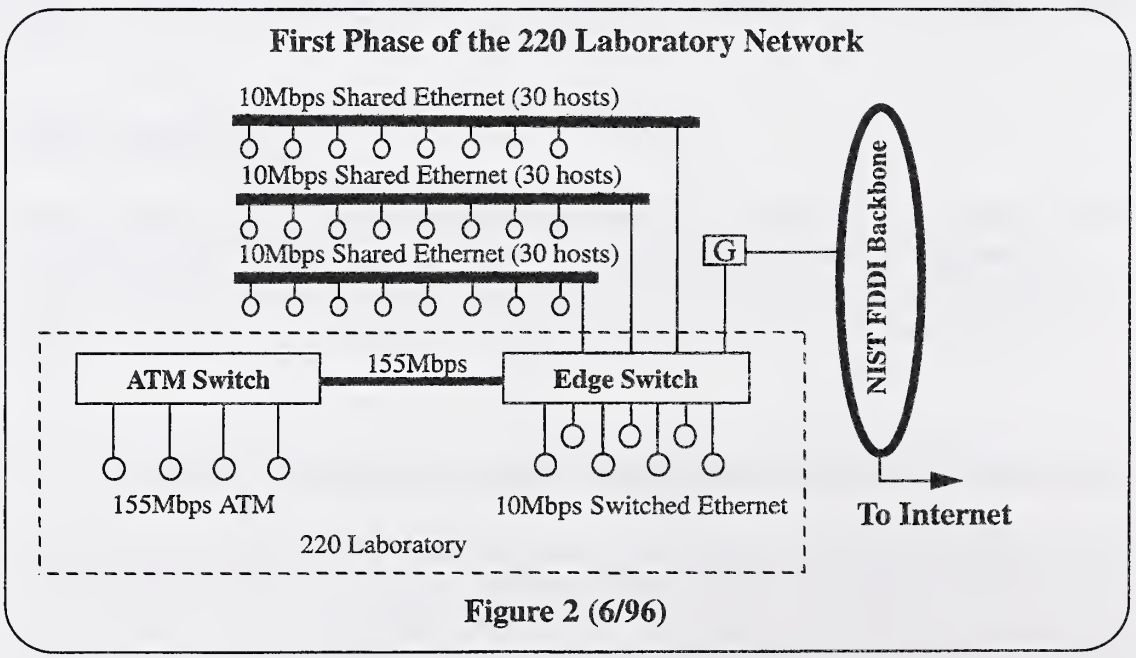


Figure 2 (6/96)

X. Services from ITL

staff use of Services	Lab Office	OMP	APTD	FTD	ISD	MSID	PED
Acrobat SW	none	none	none	none	none	15%	none
Data Backups	none	none	none	none	54%	none	2%
Email Hubs	50%	100%	50%	25%	none	none	100%
ANSYS Finite Element SW	none	none	none	none	some	none	none
"netmedia" SW (mount)	none	none	none	none	none	15%	none
Omniware SW	none	none	none	none	none	15%	none
PC Assistance	yes	yes	yes	yes	none	yes	yes
PC Maintenance	thru MSID GSS	yes	yes	consult only	none	some	yes
PEPnet	none	none	2%	none	none	none	100%
PVWave SW	none	none	none	none	none	none	some
Tiber	none	none	4 users	none	none	none	none
Web Services	100%	100%	100%	100%	2%	20%	100%

TABLE 14. Services Received from ITL (6/96)

10.1 Services Used From ITL

All the divisions and offices within MEL use the following services from ITL:

- Network backbone
- Dialup and Slip modems (Some use ISDN modems, statistic not collected)
- NIST standard administrative and financial applications and databases
- Synchronize technical support and updates

Table 14 shows those ITL managed services used by MEL staff not included above.

As a special service to all laboratory directors, ITL provided an SGI with systems support to the MEL director.

10.2 Perceived Quality of Service

The MEL system administration staff perceive that ITL provides quality support for those services listed. Most of the divisions/offices use the services provided by the PC Maintenance group. While the quality of service performed is high, the downtime associated awaiting equipment repairs and response is also high.

XI. MEL Support Staff

Division/ Office	Support Staff	%of time	Area of Expertise	Experience (Years in area of expertise)
Lab Office	Deborah Fowler	100%	Unix Desktop and Server, Infrastructure, Network	BSCS; (8)
APTD	Karen Allen	100%	Novell Server, Desktop PC, Network	Some college; (8)
FTD	Nancy Jones	85%	Desktop PC	(9)
ISD	Jim Gilsinn	30% Officially 60% Unofficially	Mac Desktop	BSEE; (4)
ISD	Mike Strawbridge	100%	Unix Desktop and Server, Infrastructure, Network	MS Mathematics; (9)
MSID	Steve Barber (GSS)	100%	Unix Desktop and Server, Network, Infrastructure	BSCS; (5)
MSID	Robert Densock (AMSANT)	100%	Network, Desktop PC, Unix Desktop and Server, Infrastructure	BSCS; (9)
MSID	Cristal Perpignan (GSS)	100%	Desktop PC	MSCS; (3)
MSID	Carolyn Rowland (GSS)	100%	Unix Desktop and Server, Mac Desktop, Infrastructure	BSCS; (5)
MSID	Level II Contractor or equivalent	100%	Desktop PC	Varies
PED	Leon Carroll	10% Officially 40% Unofficially	Desktop PC	Some college; (2) HP1000 sys admin; (4) Perkim Elmer sys admin; (11) PC sys admin; Retiring Oct 97
PED	Jay Jun	25%	Unix Server and Desktop	Ph.D. Physics
PED	Brian Reneger	2%	Desktop PC	No Data Submitted
PED	David Ward	5%	Security	BS Business; 3 Associate Degrees in Engineering: Mechanical, Manufacturing, and Quality

TABLE 15. Support Staff for Computers and Networks (6/96)

11.1 Computer and Network Support Staff

Table 15 shows the members of the MEL system administration team. All of MEL have some level of support within their organization. The laboratory office contracts out to the MSID GSS project for support, but some of the staff also support themselves. Deborah

Nickerson Fowler is on assignment at the laboratory office to address lab-wide computing infrastructure issues in addition to design and implementation of the new laboratory for the NAMT program. OMP does not have a formal support structure; Merrill Hessel and Dave Stieren support the servers and their group office machines. APTD has one full-time support person for its Novell servers, Dos/Windows platforms and the Network, Karen Allen. Unofficially, Lisa Fronczek manages the rest of APTD's systems. Nancy Jones supports all the Dos/Windows systems used by the FTD administrative staff and the 10BaseT network connecting them. Under ISD's Computer Maintenance project, Jim Gilsinn supports the Macintosh systems and Mike Strawbridge supports the Unix systems; both maintain the ISD local network. Other ISD personnel provide help as needed: Tom Wheatley; Steve Legowik; Sandor Szabo; and John Michaloski. Within MSID's Global Systems Support (GSS) project, Steve Barber and Carolyn Rowland provide support for MSID's local network and Unix servers and desktops. Carolyn also provides support for their Macintosh systems. Cristal Perpignan and a contractor provide support for the MSID Dos/Windows systems. Under MSID's SIMA program, Robert Densock is the manager of the 220 laboratory, technical lead on design and implementation of laboratories for the NAMT program, and MEL's networking consultant. The computer support group within PED consists of: Leon Carroll and Brian Reneger, Dos/Windows support, Jay Jun, Unix support, and David Ward, security.

11.2 Help Request Management

Most of the management of help requests for system and network support within MEL is informal. For most divisions and offices, the popular mechanisms for requesting help are electronic mail and the telephone. MSID and ISD have formalized their method of requesting for help; clients are requested to ask for help by sending email to an online help system. MSID and the laboratory office use a customized version of the Massachusetts Institute of Technology (MIT) Project Athena Online Consultant (OLC) system for help request management. ISD uses Northeastern University "Req" software for tracking help requests.

11.3 Support Costs

$ spent on support	FY95 Labor	FY95 OO	FY96 Projected Labor	FY96 Projected OO
Lab Office	37K	No Data Available	57K	No Data Available
OMP	10K*	No Data Available	10K*	No Data Available
APTD	45K*	No Data Submitted	45K*	No Data Submitted
FTD	51K	none	51K	none
ISD	84.6K	121.5K	250K	138K
MSID (w/o Lab office)	622K	OO Data Folded into labor	467K	243K
PED	46K*	No Data Available	46K*	No Data Available
Totals	895.6K	Insuffi-cient Data	926K	Insuffi-cient Data

TABLE 16. Money Spent on Computer and Network Support (6/96)

Most of the computer support within MEL is paid from MEL STRS overhead. Since computer support is performed informally within OMP, time spent on computer support is not charged separately. APTD computer support is charged out of the division overhead STRS cost center. FTD's computer support is paid from NIST STRS overhead. ISD establishes an STRS cost center each year for its Computer Maintenance project. MSID uses a "credit" cost center to charge costs associated with its GSS project; the clients of the project receive a quarterly bill based on types and numbers of hosts per client group. PED computer support group is paid from division STRS overhead; each group within PED assigns personnel to help with computer support and/or administrative support. Table 16 shows the costs of MEL managed computer and network support. Amounts with a single asterix (*) indicate estimates based on the labor percentages in Table 15. Labor costs for Robert Densock and Deborah Nickerson Fowler are not included in Table 16. ISD includes all purchases of computing and networking equipment in its other objects for the Computer Maintenance project. Costs associated with managerial supervision are not included in Table 16.

11.4 Training of Support Staff

Training/Conf	Lab Office	OMP	APTD	FTD	ISD	MSID	PED
Regularly Planned	N/A	N/A	1 conference; All training desired	No Schedule	1 event per FTE	2 events per FTE	No Schedule

TABLE 17. Training and Conferences (6/96)

Most of the computer and network support staff within MEL do not receive regular training. APTD support staff are permitted one conference each year and can request all the training desired by the employee. FTD and PED support staff do not have a regular training schedule established in their performance agreements. ISD staff are permitted to attend one event each year. An event is either a conference and/or class. In their performance agreements, MSID computer and network staff can request attendance at two events each year. Lack of time usually prohibits training for the MEL support staff.

11.5 Client Survey and Feedback

There are no formal feedback mechanisms in place for most of the MEL computer and network support staff to receive comments from the clients that they support. Only the MSID GSS project conducts an annual seminar with its clients to review its yearly plan and to receive comments. ISD does not have a formal project plan for its Computer Maintenance project, but the project does conduct yearly reviews with its clients. ISD and MSID staff receive comments from clients via their online help systems. MSID GSS clients can also make comments through the GSS web page.

11.6 What is Supported by the MEL Systems Administration Team

Most of the support staff within MEL do not have a formal project plan describing what they support.

11.6.1 OMP (820)

The management of the office supports OMP servers and the office systems. The support provided includes:

- administration of approximately 2GB of disk space on its servers
- support for Dos/Windows systems to include maintenance and installation of hardware, operating system, and all software

OMP is responsible for its connections to the Radiation Physics thin-net backbone, but maintenance of their connections is usually contracted out. See appendix D for network connection details. OMP contracted MSID GSS to provide network installation and Synchronize and eXceed software installation support.

11.6.2 APTD (822)

The support provided by the APTD systems administrator includes:

- maintenance of the aptd.nist.gov subnet (see appendix E for details)
- hardware and operating system support for the Novell servers
- hardware and operating system support for the Dos/Windows systems
- administration of approximately 22GB of disk space on the servers
- regular backups of the servers
- maintenance of the network printers
- maintenance of the UPSs on the servers
- installation and maintenance of networked software for Dos/Windows systems
- management of contracts listed in table 11 and the hardware maintenance contract for Novell servers

Some informal support is provided for the Unix systems by other division staff. Operating system support is provided for the Sun server systems, SCO OpenDesktop system, and the Alpha system; other Unix systems are managed by their primary users. A support contract is in place for hardware and operating system maintenance for the Sun systems. There is also an informal support group to help with Macintosh problems.

11.6.3 FTD (825)

The support provided by the FTD systems administrator includes:

- hardware and operating system support for administrative Dos/Windows systems
- maintenance of the 10BaseT network connecting the administrative systems (see appendix F for details)
- installation of all software on administrative Dos/Windows systems
- guidance on all aspects of computer use for the proficient user down to the novice

ISD provides hardware and operating system support for the FTD Unix system.

11.6.4 ISD (823)

ISD's Computer Maintenance Project provides support for:

- maintenance of the (.35.) subnet in building 220, the shop floor segment of the (.34.) subnet in building 304, and a segment of the (.67.) subnet in building 202 (see appendices G, H, and I for details)
- hardware and operating system support for Unix servers and desktop systems
- hardware and operating system support for the Macintosh systems

- management of the ISD portion of the cme.nist.gov user and system domain network information services
- electronic mail list management
- administration of 39GB of disk space on the Unix servers
- regular backups of all Unix and Macintosh systems
- maintenance of all UPSs for all systems that have them
- administration of anonymous ftp
- installation and maintenance of most Unix software and all networked Macintosh software
- management of hardware maintenance contracts for all Unix systems and software contracts listed in Table 11

11.6.5 MSID (826)

The MSID GSS project has a detailed project plan on a NIST internally accessible web page [NIST3]. The plan encompasses daily support, deliverables, and project administration tasks. Support is provided for:

- maintenance of the (.32.) subnet in building 220 and the MSID segment of the (.34.) subnet in building 304 (see appendices J and K for details)
- backup support for the network in the MEL laboratory in building 220
- hardware and operating system support for Unix servers and desktop systems
- hardware and operating system support for the Macintosh systems
- hardware and operating system support for the Dos/Windows systems
- maintenance of the cme.nist.gov user and system domain network information services
- electronic mail list management
- administration of approximately 126GB of disk space on Unix servers
- maintenance of the MEL synchronize calendar database
- administration of cme.nist.gov domain electronic mail hub
- regular backups of all Unix filesystems and Macintosh systems
- administration of private and anonymous ftp
- maintenance of network printers and consultant support for personal printers
- maintenance of UPS for servers and consultant support for UPS on desktop systems
- monitoring systems for security problems and addressing security issues as they arise
- maintenance of GSS home page
- management of hardware support contracts for Unix systems, network printers, and the software contracts listed in Table 11

- installation and maintenance of most software for all platforms (level of support provided indicated in GSS project plan)
- research future directions for MSID's computing environment

11.6.6 PED (821)

The PED computer support staff provide support for:

- hardware and operating system support for all Dos/Windows systems
- hardware and operating system for the Unix server, 4 Sun systems, and the Concurrent system
- administration of 1.5GB of disk space on the Unix server
- regular backups of the server
- management of the hardware and operating system contracts for 2 Sun systems and the Concurrent system
- installation and maintenance of the standard division software on the Dos/Windows systems
- installation and maintenance of the software installed on the Unix server
- maintenance of the networked color printer

11.6.7 The MEL Computing and Communications Laboratories

The SIMA program provides administrative support for the 220 laboratory to include scheduling, maintenance of audiovisual equipment, and maintenance of all networking equipment located in the 220 laboratory. GSS provides support for the servers and desktop systems located in most of the laboratory. The ISD Computer Maintenance project provides support for the virtual reality lab.

Support for the second laboratory for NAMT is to be determined. Initially, the lab will be supported by the designers Robert Densock and Deborah Nickerson Fowler.

XII. Security

The laboratory office depends on the MSID GSS staff to be aware of and resolve security problems for their systems. OMP doesn't perceive that they have any security risks. The APTD, FTD, and PED computer support staff don't have formal training on computer and network security. MSID and ISD computer support staff have formal training, implement system safeguards (user and system passwords, file and filesystem permissions, system wrappers, filters, vendor patches, and logging), and try to maintain an awareness of current security problems, but they have limited resources to analyze and address security effectively. All DOS/Windows and Macintosh platforms within MEL run virus checking software. Most of the MEL computer support staff are counting on the proposed NIST Firewall to resolve most of the security risks. Most of the system administration staff

receive security announcements through the NIST "lan_group" mail list or newsgroup. In addition, some receive security announcements through a variety of vendors and security organizations mailing lists.

Acknowledgments

This document reflects an abundant amount of information that was given during many interviews with the MEL system administration team: Robert Densock; Carolyn Rowland; Steve Barber; Cristal Perpignan; Mike Strawbridge; Jim Gilsinn; Nancy Jones; Manfred Osti; Leon Carroll; Jay Jun; Karen Allen; Lisa Fronczek; Dave Stieren; and Merrill Hessel.

References

[NRC] "Strategic Information Technology Plan," James Taylor, U.S. Nuclear Regulatory Commission, SECY-93-198 (Internal Document), July 1993.

[NIST1] "Technical Program Description, Systems Integration for Manufacturing Applications (SIMA)," Howard M. Bloom, NIST, Technology Administration, U.S. Department of Commerce, NISTIR 5476, July, 1994.

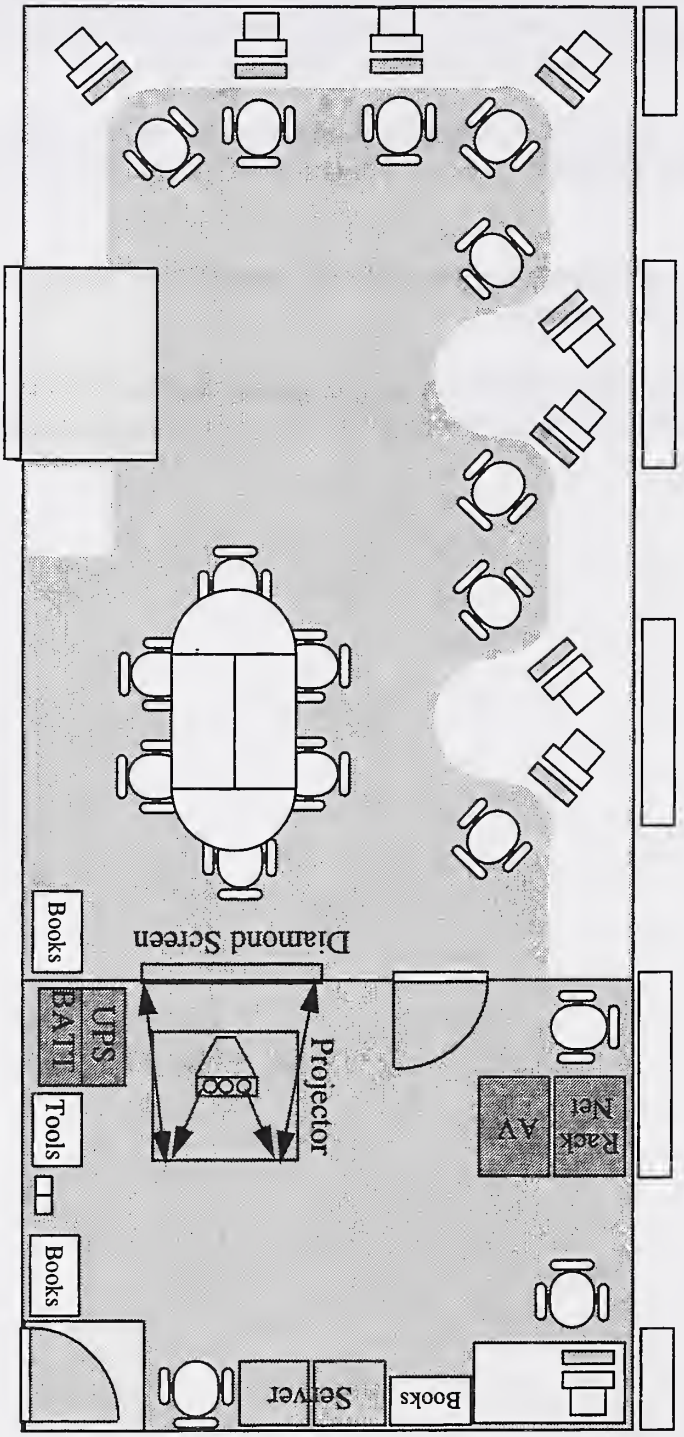
[NIST2] "The Advanced Manufacturing Systems and Networking Testbed - An Overview", Robert Densock, Deborah Nickerson Fowler, Neil Christopher, NISTIR XXX, 1996.

[NIST3] "1996 Project Plan for Global Systems Staff," MSID internal home page: http://www-i/internal/projs/gss/.

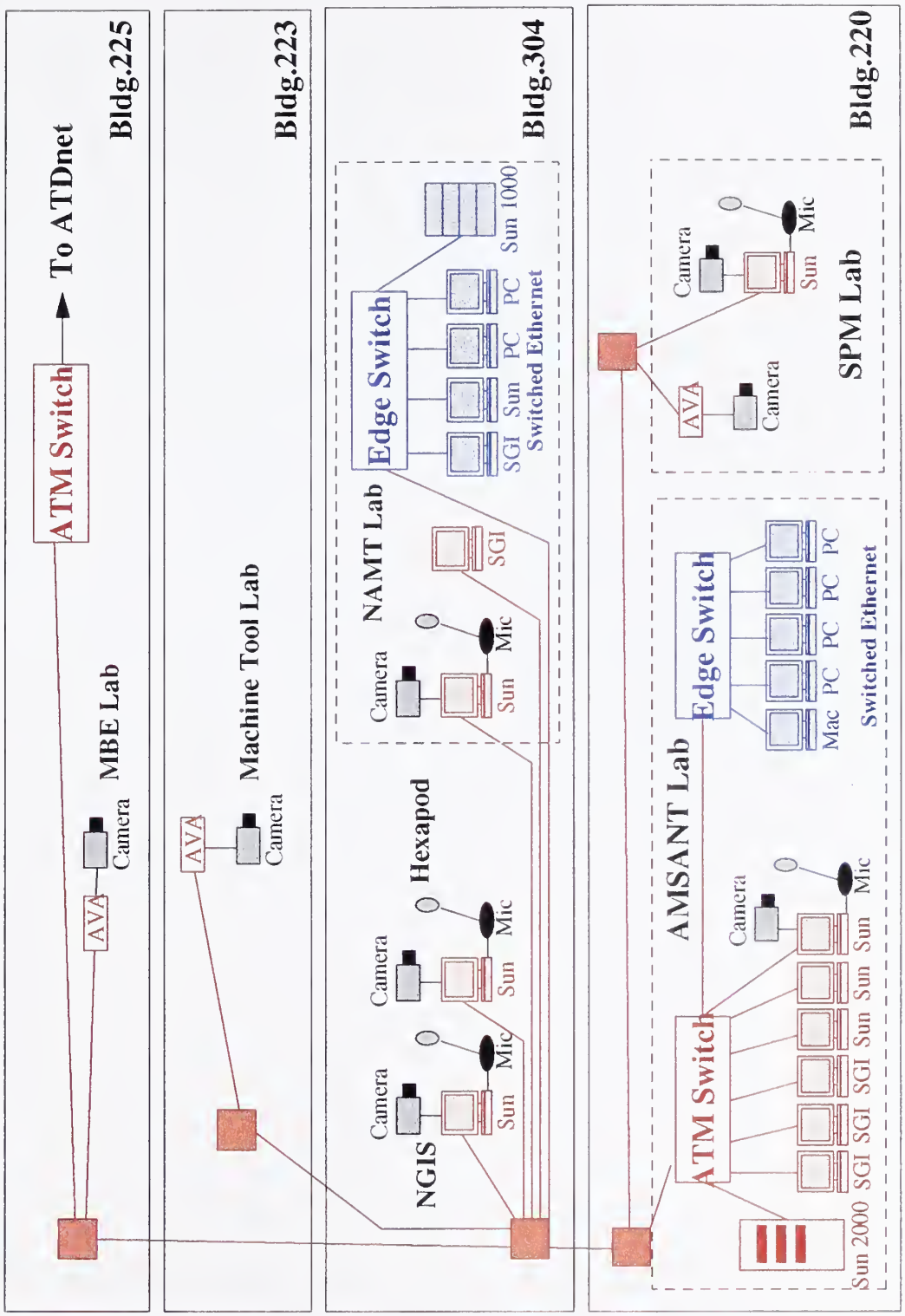
[NAMT] "The National Advanced Manufacturing Testbed: Toward 21st Century Information-Based Manufacturing," Manufacturing Engineering Laboratory, NIST, 1997.

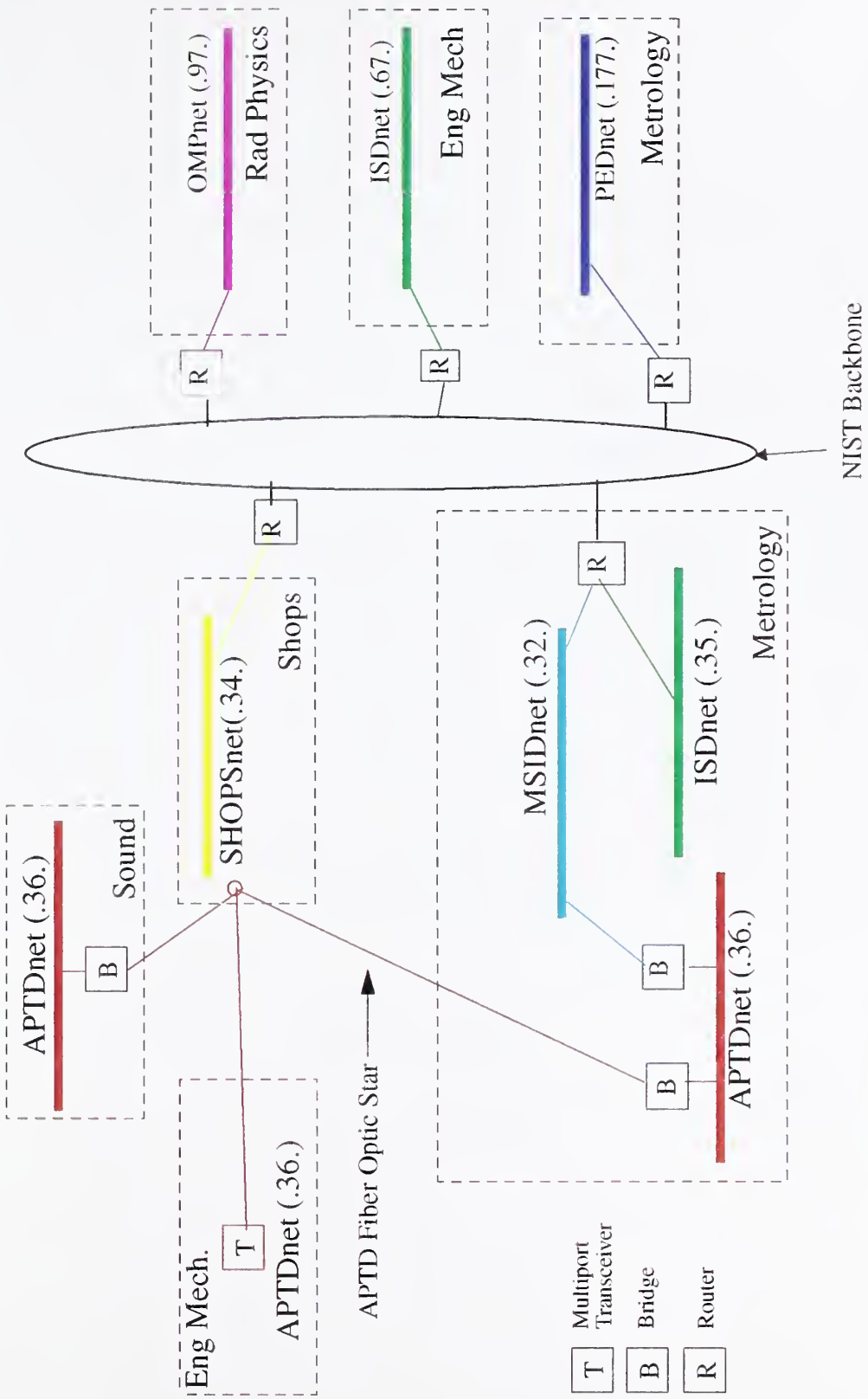
Appendix A: Laboratory for NAMT

Shops Bldg (304)/ Rms 140-143

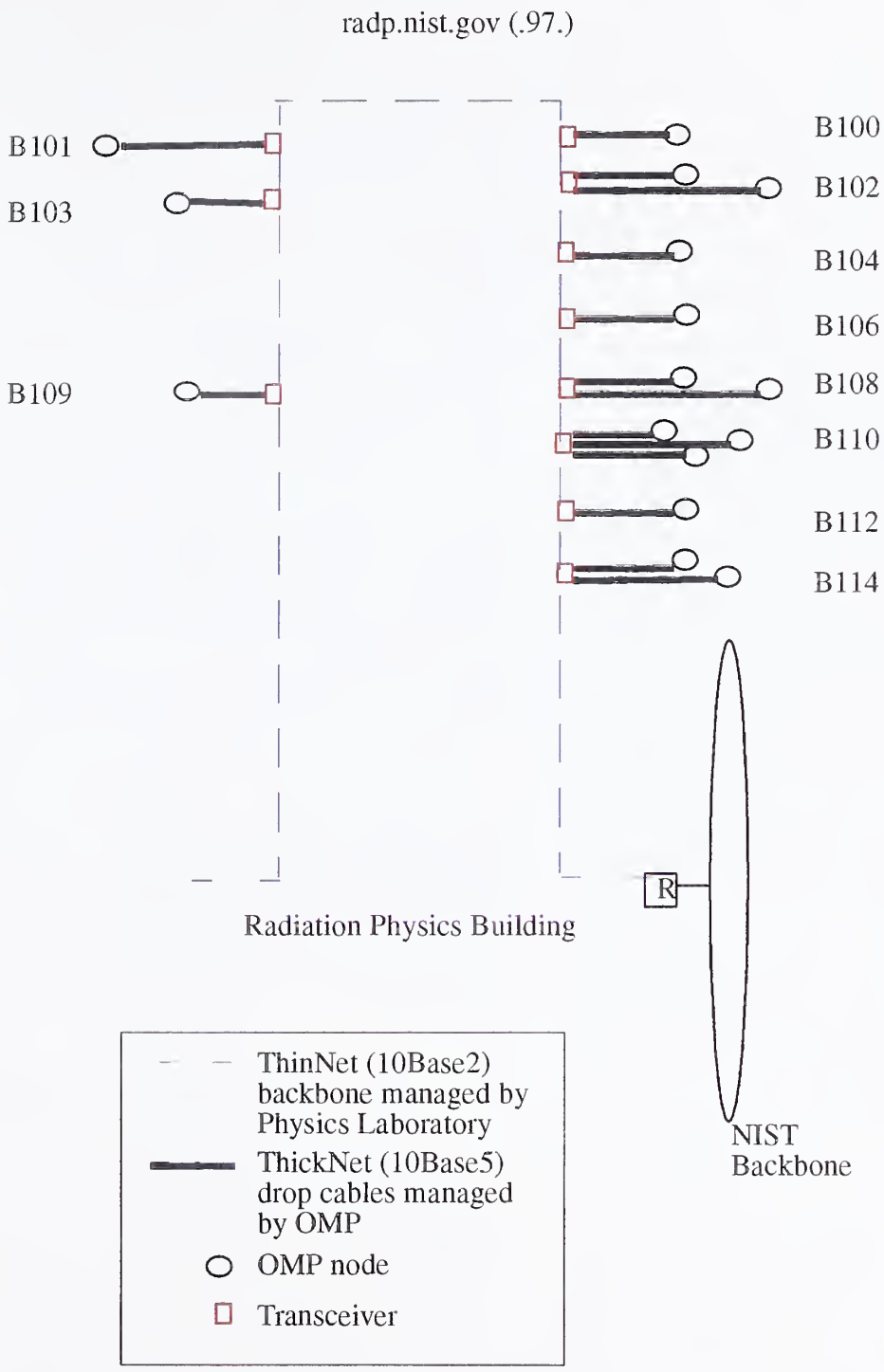


Appendix B: 220 Laboratory High-Speed Network (6/96)



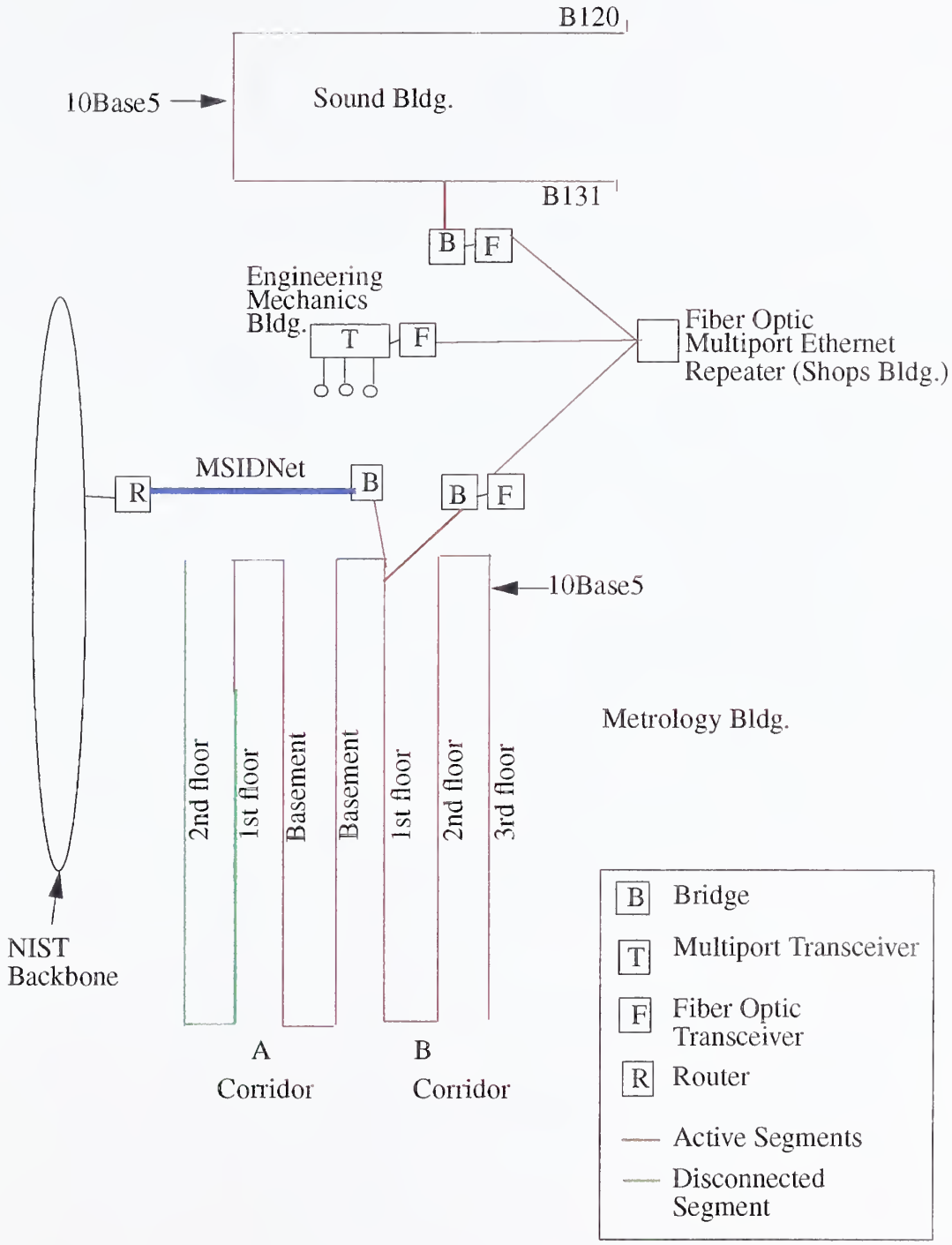

OMPnet (.97.)
Rad Physics
ISDnet (.67.)
Eng Mech
PEDnet (.177.)
Metrology
R
R
R
NIST Backbone
R
SHOPSnet(.34.)
Shops
APTDnet (.36.)
B
Sound
MSIDnet (.32.)
ISDnet (.35.)
Metrology
B
B
APTDnet (.36.)
APTD Fiber Optic Star
Eng Mech.
T
APTDnet (.36.)
T Multiport Transceiver
B Bridge
R Router

Appendix D: OMP Network (6/96)

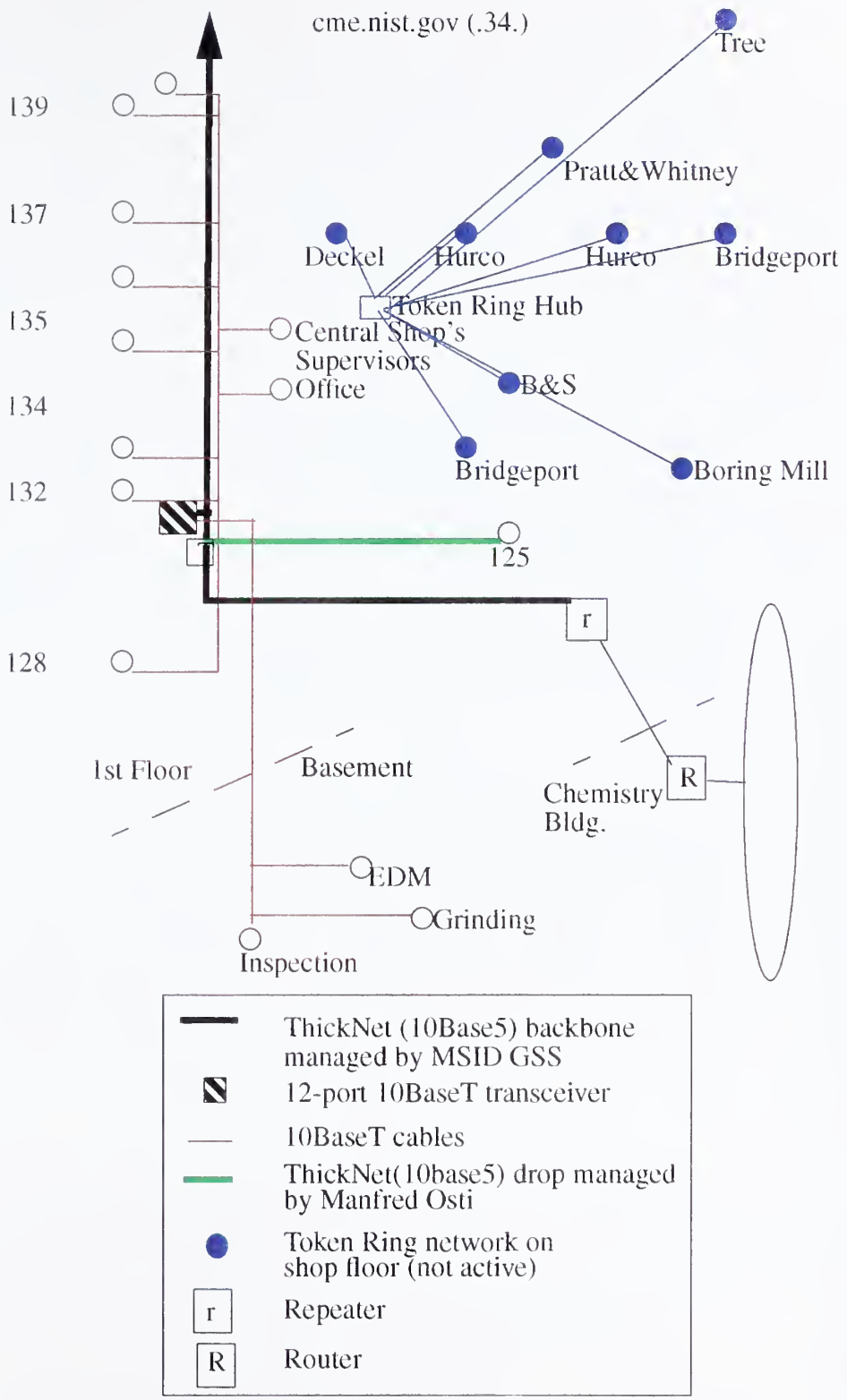


Appendix E: APTD Network (6/96)

aptd.nist.gov (.36.)

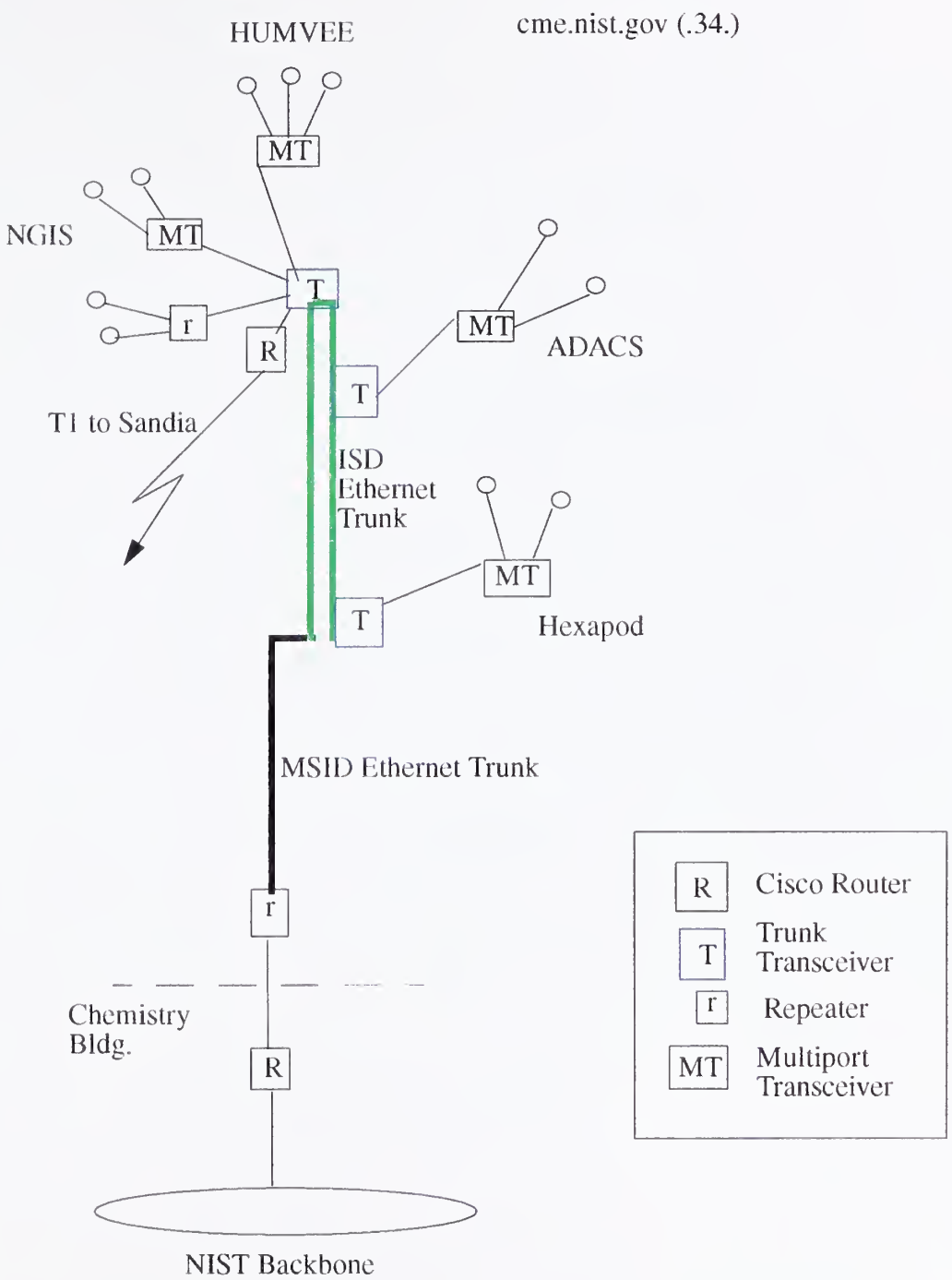


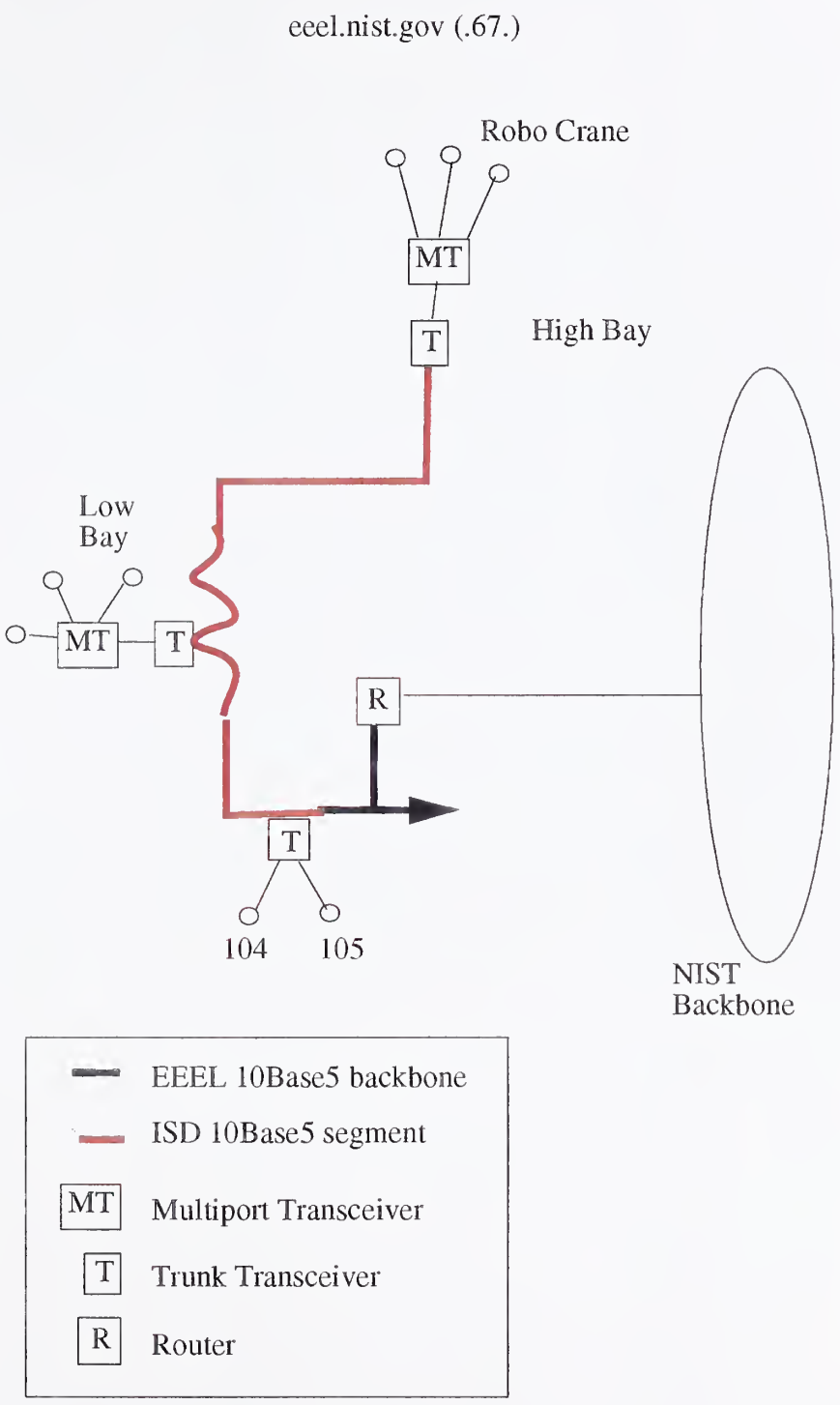
Appendix F: FTD Network (6/96)



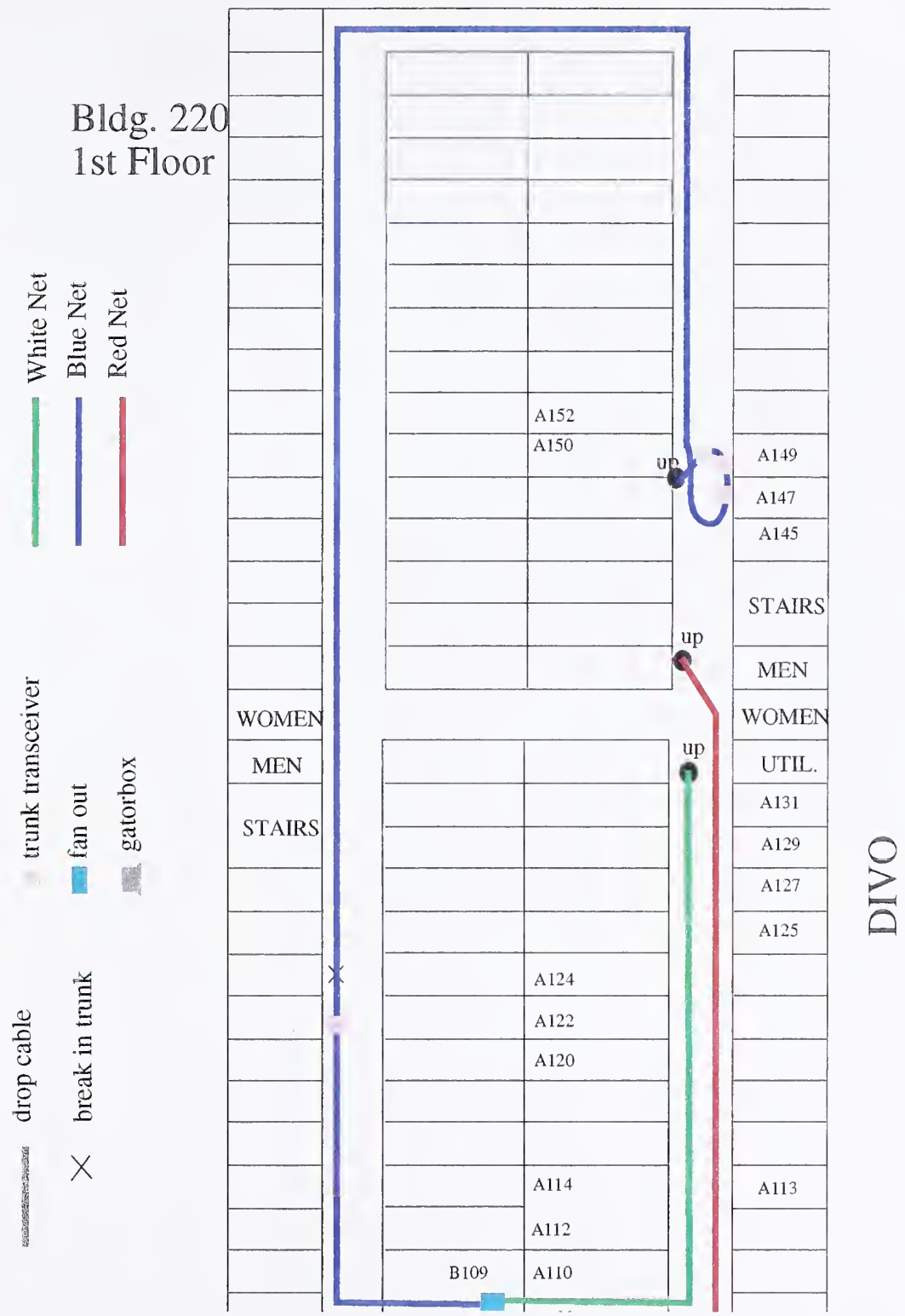
Appendix G: ISD Network in 220 cme.nist.gov (.35.) (6/96)

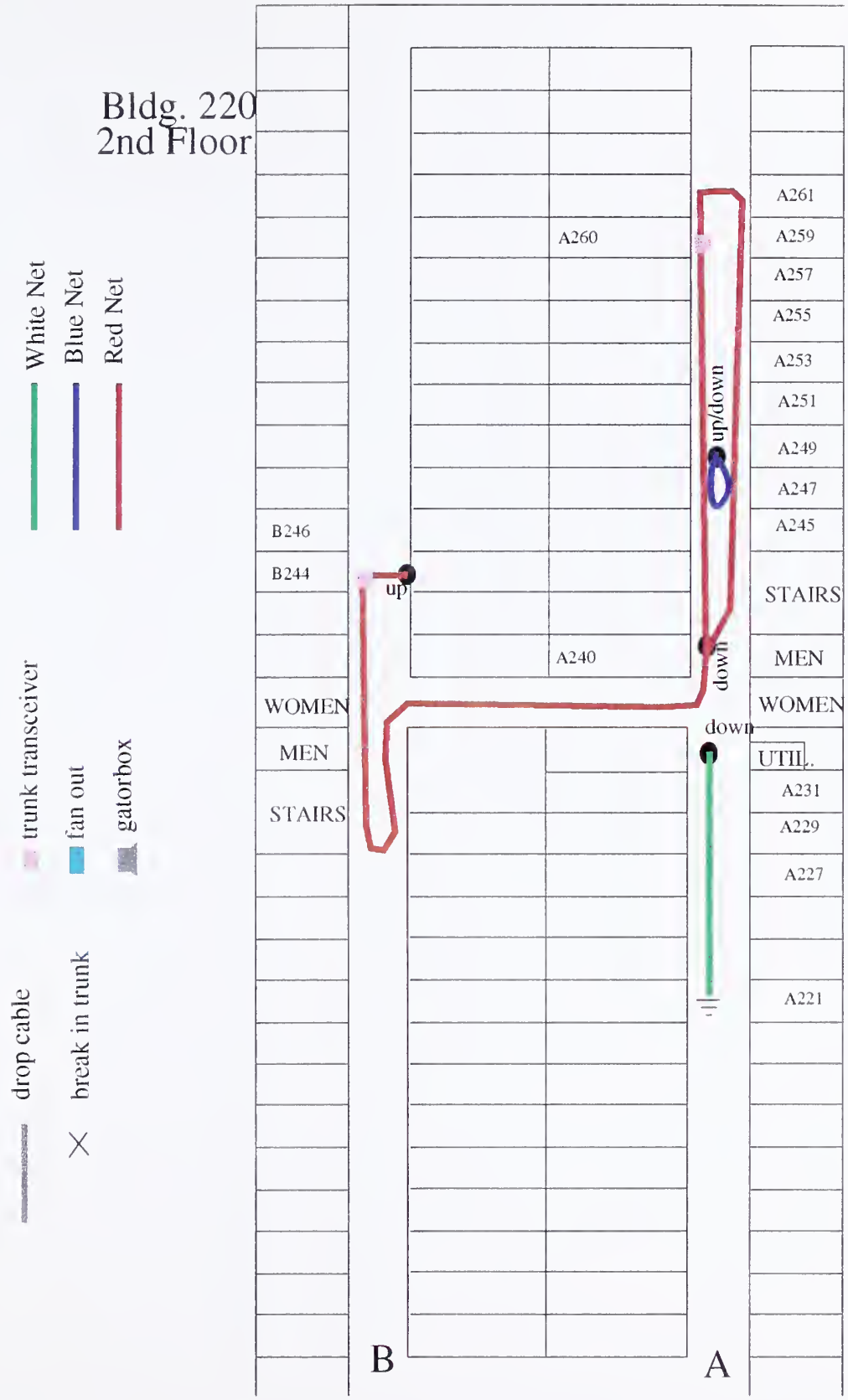
Appendix H: ISD Network in the Shops Bldg. (6/96)

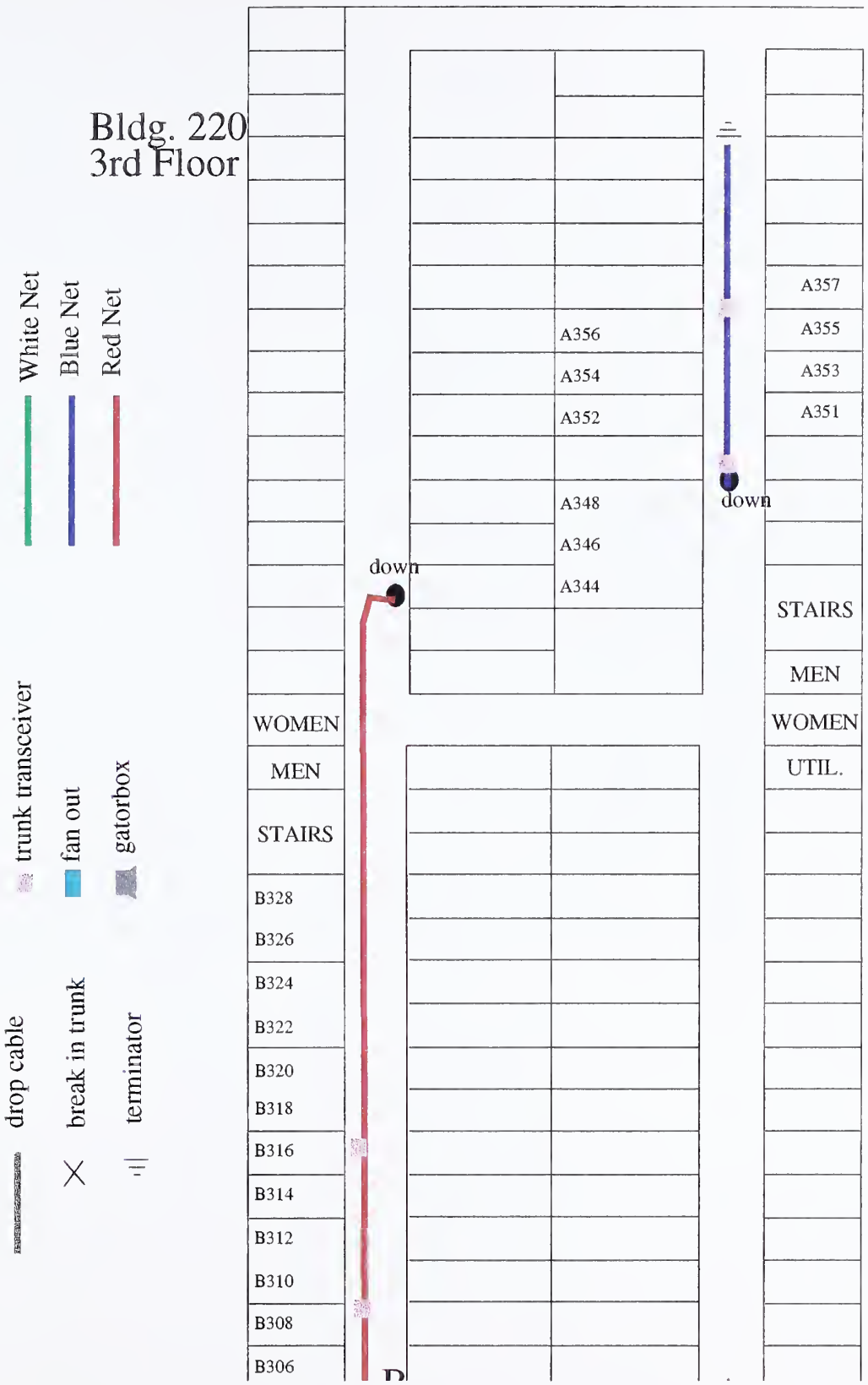



eeel.nist.gov (.67.)
Robo Crane
MT
T
High Bay
Low
Bay
MT
T
R
T
104
105
NIST
Backbone
EEEL 10Base5 backbone
ISD 10Base5 segment
MT
Multiport Transceiver
T
Trunk Transceiver
R
Router

Appendix J: MSID Network cme.nist.gov (.32.). (6/96)




Bldg. 220
2nd Floor
White Net
Blue Net
Red Net
trunk transceiver
fan out
gatorbox
drop cable
break in trunk
A261
A260
A259
A257
A255
A253
A251
A249
A247
A245
B246
B244
up
STAIRS
A240
MEN
down
WOMEN
WOMEN
down
MEN
UTIL.
STAIRS
A231
A229
A227
A221
up/down
B
A


Bldg. 220
3rd Floor
White Net
Blue Net
Red Net
trunk transceiver
fan out
gatorbox
drop cable
break in trunk
terminator
A357
A355
A353
A351
A356
A354
A352
A348
A346
A344
down
down
WOMEN
MEN
STAIRS
B328
B326
B324
B322
B320
B318
B316
B314
B312
B310
B308
B306
STAIRS
MEN
WOMEN
UTIL.

Appendix K: MSID Network in the Shops Bldg. (6/96)

cme.nist.gov (.34.)