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About this Manual.

This manual describes the installation and configuration of MAXserver System Software, supplied by Xyplex, Inc. It is intended that this manual will be read by network and UNIX system managers.

This manual is organized as follows:

Chapter 1, **Introduction**, contains a description of the available software packages.

Chapter 2, **Software Installation for Load Server Hosts**, describes the procedures that you use to install MAXserver System software on load servers that are UNIX systems.

Appendix A, **Troubleshooting Internet Loading Problems**, describes how to troubleshoot RARP, BOOTP, and TFTP load protocol problems.

Conventions.

The following are conventions that will be used throughout this manual:

1. Keys that you press on the keyboard are represented using left and right angle bracket characters (< and >, respectively). For example, the notation <CTRL> means that you press the CTRL key on the keyboard, <A> means that you press the letter A key, and <RETURN> means that you press the RETURN key on the keyboard.

2. The <CTRL> key on the keyboard provides alternate functions when used with some keyboard keys. Notation such as <CTRL>/<A> indicates that you press both the <CTRL> key and the letter A key at same time. Your terminal will usually echo this control character as ^A.

3. Unless otherwise specified, commands are executed when you press the <RETURN> key on the keyboard.

4. The manual uses the following typographical conventions:

   Monospace Typeface   indicates text displayed at a terminal (i.e., displays, messages, system responses, etc).

   italics   indicates variables in commands and procedures.

5 Throughout this manual, the following default user prompts will be shown (different prompts may be in use at your site):

UNIX/ULTRIX	%
UNIX/ULTRIX "super user"	#

Related Manuals.

Refer to the *Release Notes* supplied with your Xyplex software for a description of the manuals supplied with the Xyplex software packages. These manuals usually contain information that is relevant to the operation of Xyplex-supplied software packages.

Chapter 1

Introduction

1.1   Overview

1.1.1   General

This manual describes the installation and configuration of communication software packages and network management software packages, supplied by Xyplex, Inc, on host systems running the UNIX and DEC Ultrix operating systems. The communication software packages include software for the Xyplex MAXserver family of Ethernet based communication products, which include terminal servers and printer servers, remote and local bridges, routers, and gateway units. These MAXserver products obtain their operating software over the network from the UNIX and DEC Ultrix host computers (similar packages are available for VAX VMS hosts) onto which Xyplex MAXserver System Software has been installed.

The network management software package available is the Xyplex MAXview UNIX Scriptor™ software package. This software package operates on UNIX and DEC Ultrix host computers. (A similar package is available for VAX VMS hosts.) This software is described in section 1.1.5.

1.1.2   Xyplex Terminal and Printer Server Products Supported

Xyplex TCP/IP-LAT Software supports the following Xyplex MAXserver products:

- the MX-TSERV-J8, MX-TSRVM-J8, and MX-2120 Eight Port Terminal Server cards. These cards are options for use in the MAXserver 5500, 5000, and 4500 model Communication Servers. These cards provide 8 ports, and are useful in applications which require modem control signals.

- the MX-TSRVL-J16 Sixteen Port LAT Terminal Server card and MX-TSERV-J16 Sixteen Port TCP/IP-LAT Terminal Server card. These cards are options for use in the MAXserver 5500, 5000, and 4500 model Communication Servers. These cards provide 16 ports, and are useful in applications which do not require modem control signals. The MX-TSRVL-J16 card supports Xyplex LAT software.

- The MX-NPC-P1 Network Printer Card. This card provides shared printer support for a parallel printer, and is available as an option for use in MAXserver 5500, 5000, and 4500 model Communication Servers. This card provides connection to either a Centronics or Dataproducts style parallel port, and one serial port. The card supports TCP/IP-LAT software. (Note that this unit type cannot be loaded from a UNIX load server.)

- the MX-MAX1500-E Sixteen Port Terminal Server. This is a standalone terminal server, which provides 16 ports with modem control signals. The unit supports Xyplex LAT and TCP/IP-LAT software.

- the MX-MAX1100-E and MX-MAX1100T Sixteen Port Terminal Server. This is a standalone terminal server, which provides 16 ports with modem control signals. The MAXserver 1100 is a single protocol unit (i.e., supports Xyplex LAT or TCP/IP software), and can be upgraded to a dual protocol unit (i.e., support Xyplex TCP/IP-LAT software).

- the MX-MAX1800-E Sixteen Port Terminal Server. This is a standalone terminal server, which provides 16 ports with modem control signals. The unit supports Xyplex LAT and TCP/IP-LAT software. The unit also provides data storage via one floppy disk drive that uses high-density "microfloppy" diskettes (1.44 megabyte, 8.9 cm/3.5 inch). The MAXserver 1800 unit, and associated software, provides a means of down-loading Xyplex LAT or TCP/IP-LAT images to Xyplex MAXserver 1000 Series Products, storing dump files, and configuring and managing these units, without a VAX/VMS host in the network.

- the MAXserver 1400 Printer Server. This is a standalone unit, which provides shared printer support for four devices. This unit provides connections for up to two Centronics or Dataproducts style parallel printers, and up to two serial devices.

- the MX-MAN-F2 MAXserver Manager Card. This card is available as an option for use in MAXserver 5500, 5000, and 4500 model Communication Servers. This card, and associated software, provides a means of down-loading images to Xyplex units, storing their parameters and dump files, and configuring and managing these servers, without a VAX/VMS host in the network.

  The MX-MAN-F2 card requires two adjacent MAXserver slots. The card provides data storage via two floppy disk drives that use high-density "microfloppy" diskettes (1.44 megabyte, 8.9 cm/3.5 inch). The MX-MAN-F2 card also provides two ports. One port is a parallel port to which you can connect a parallel printer or other device which supports a Centronics-style parallel interface. A printer connected to this port is used to log management events and messages. The Centronics-style I/O Connector Card supports connections to most Centronics and IBM PC compatible parallel printers. The second port is a serial port to which you can connect a terminal, serial printer, personal computer, or another serial device. The serial port is used to manage the software running at the MAXserver Manager Card, or to log events.

1.1.3   Xyplex Gateway Products Supported

Xyplex TCP/IP-LAT Gateway Software supports the following Xyplex MAXserver products:

- the MAXserver 2710 TCP/IP-LAT Gateway card. This card enables DEC Local Area Transport (LAT) users to connect to TCP/IP hosts on an Ethernet network. The Gateway software supports connections to TCP/IP hosts via Telnet or RLOGIN. Similarly, the Gateway enables Telnet users to connect to LAT services that are offered on the network. The Gateway supports up to 24 concurrent connections and up to 104 outbound sessions. Each connection is supported by a virtual port on the Gateway.

- the MAXserver 1710 TCP/IP-LAT Gateway unit. This is a standalone unit, which enables DEC Local Area Transport (LAT) users to connect to TCP/IP hosts on an Ethernet network. The Gateway software supports connections to TCP/IP hosts via Telnet or RLOGIN. Similarly, the unit enables Telnet users to connect to LAT services that are offered on the network. The unit supports up to 24 concurrent connections and up to 104 outbound sessions. Each connection is supported by a virtual port on the Gateway.

1.1.4   Xyplex Remote Bridge Products Supported

Xyplex Remote Bridge Software supports the Xyplex MAXserver 6510 Remote Bridge Card for Xyplex MAXserver 4500, 5000, and 5500 models. This card, and associated software, provides a means of connecting one Ethernet/IEEE 802.3 local area network to another over a wide area network (WAN) synchronous link. Multiple connections can be made to form an arbitrary wide area network configuration. To users all networks appear to be one large network, rather than two or more smaller networks.

Some of the key features of this card include:

- Choice of V.35, RS-423, or RS-422 synchronous link interfaces.

- Xyplex MAXserver "hot swap" technology, to reduce down-time.

- Two MIPS processor and two megabytes of memory for high throughput.

- Can load software either from the local area network or over the WAN link.

Some of the key features of the Xyplex Bridge software used with this card include:

- Compatibility with Vitalink bridges and network management tools

- Support for filtering and forwarding all Ethernet protocol types, including DEC protocols such as LAT, MOP, and DECnet protocols; Internet protocols (IP) such as TCP, Telnet, UDP, BOOTP, and TFTP; and Xyplex protocols.

- Support for Spanning Tree Protocol (STP).

The remote bridge card provides two ports. One port is a WAN port to which you can connect a device which supports a V.35, RS-422, or RS-423 electrical interface. The WAN interface type is specified by the I/O Interface Card inserted into the rear of the MAXserver chassis. The second port is a serial port for managing the card.

1.1.5   Network Management Products Supported

Xyplex, Inc., supplies a network management software package called MAXview Scriptor™ software. UNIX and Ultrix versions of this software operate on Sun Microsystem Workstations running the SunOS UNIX operating system, and DEC VAX computers running the Ultrix operating system. There is also a VMS version of this software.

The software allows a network manager to manage Xyplex units from a central location. Some of the management functions that you can perform include:

- Examine the current status of a Xyplex unit

- Read the current permanent parameters from a Xyplex unit

- Write parameters to a Xyplex unit

- Save/restore the permanent parameters of a Xyplex unit

- Copy the permanent parameters of one Xyplex unit to another unit

- Perform an operation on a user-specified group of manageable objects (for example, multiple units of the same type or ports)

1.2   Compatibility Issues

LAT Compatibility. TCP/IP-LAT Software is compatible with LAT Version 5.1, and it is not compatible with LAT Version 5.0, or earlier versions. LAT Version 5.1 is available with VMS Software Release 4.7, and later releases. For sites running VMS Software Releases 4.4 through 4.6, Digital Equipment Corporation provides support for LAT via a separate layered application product, LATplus.

TCP/IP Compatibility. Chapter 1 of the *User's Guide* for TCP/IP-LAT software lists the Internet Protocols supported in Xyplex TCP/IP-LAT software. One important compatibility issue is that the Xyplex TCP/IP implementation only supports the use of the Berkeley Internet Name Domain Protocol (BIND) for Domain name servers, which map user-specified domain-names to Internet addresses.

Parameter Files. When upgrading from TCP/IP-LAT Software from V1.X or V2.X to V3.0 , the software automatically performs a parameter file conversion. Converted parameter files cannot be used with previous releases of TCP/IP-LAT software.

Xyplex requires that you backup the Version 1.X or V2.X-compatible parameter files before you install V3.0, so that you can revert to the previous release if necessary.

IP Router Compatibility. Xyplex software supports performing directed TFTP load requests via IP routers. The IP router must support the Internet Proxy Address Resolution Protocol (Proxy ARP).

Xyplex has been unable to test the forwarding of Boot protocol (BOOTP) messages over IP routers, which would allow loading of Xyplex units via BOOTP. Support for BOOTP in standalone routers is planned by several vendors, but is not yet available. Xyplex believes that, with a suitable IP router, Xyplex units will load via BOOTP. We would appreciate hearing about any experiences you may have with loading via IP routers that support BOOTP.

Loading Parameters via TFTP Using Backup (.bck) Parameter File. When loading parameters via TFTP, if a unit detects that it has received a corrupted parameter (.prm) file, it will request the backup (.bck) parameter file from the same parameter server. Provided the backup parameter file is not corrupted, the unit loads parameters using the backup file. When this occurs, the SHOW PARAMETER SERVER display shows the Internet address of the parameter server in the "Loaded From" field and also indicates "Status: Failed" and "Reason: Invalid," even though valid parameters were loaded via the .bck file. If this happens, overwrite the .prm file using the .bck file, so that both files will contain the correct information. If you assign new parameter data and re-initialize the unit, before you overwrite the .prm file with the .bck file, the parameters you have assigned will be lost.

1.3 Load/Dump/Parameter Server Issues

Xyplex units obtain operating software and configuration data from one or more host computers on the network. There are three types of hosts involved with operation of Xyplex units that you will need to be familiar with:

- A load server is a unit which stores the executable image that the unit runs. This image is downloaded to the unit whenever the server is powered on or re-initialized. At least one load server is required in the network. Load servers can be VAX/VMS hosts which support the DEC MOP loader, UNIX hosts which support the BOOTP, RARP, and TFTP protocols, or Xyplex MAXserver Managers, which can be either a MAXserver Manager Card (MAXMAN) or a MAXserver 1800.

- A parameter server is a unit which stores unit parameter information (such as configuration information for ports, services available at the unit, etc). Whenever a user changes a "permanent" parameter, the unit stores this information at the parameter servers. The use of parameter servers permits remote and redundant parameter storage. MAXserver 1000 Series Terminal Servers can obtain their parameters either from local storage or from a network parameter server.

  One parameter server is required in networks which contain Xyplex units, other than MAXserver 1000 Family Servers; additional parameter servers can be used for backup and load balancing purposes. Parameter servers can be VAX/VMS hosts which support the DEC MOP loader, UNIX hosts which support the BOOTP/TFTP protocols, or a MAXserver Manager Card (MAXMAN).

- A dump server is a unit which accepts a "memory dump" over the network from a server which has experienced a failure. A dump server is not required, however. Dump servers can be VAX/VMS hosts which support the DEC MOP loader, UNIX hosts which support the BOOTP/TFTP protocols, or a MAXserver Manager Card.

When loading an image or parameter file, the ROMs of a Xyplex unit perform the following steps until the file is successfully loaded. You can bypass this process and designate a specific TFTP load/parameter server by performing a directed TFTP request, which is described in section 1.3.3.

1. The ROMS broadcast a Xyplex protocol load request. The ROMs wait 4 seconds for responses and then process all Xyplex responses that have merit values greater than the MOP merit value (a fixed value).

2. If Step 1 is not successful (e.g., no response is received within 4 seconds), the ROMs broadcast a BOOTP information request. The ROMs wait 4 seconds for responses and then determine which BOOTP server to use based on the merit value of each responding server. (Refer to section 1.3.4 for more information.)

3. If Step 2 is not successful (e.g., no response is received within 4 seconds), the ROMs broadcast a MOP load request. The ROMs wait 8 seconds for responses and then determine which MOP server to use based on the merit value of each responding server.

4. If Step 3 is not successful (e.g., no response is received within 8 seconds), the ROMs broadcast an RARP (Reverse Address Resolution Protocol) message to find the unit's Internet address. Upon learning the Internet address, the ROMs broadcast a TFTP message looking for the file name x*nnnnnn*.img (for a load file) or x*nnnnnn*.prm (for a parameter file), where "*nnnnnn*" represents the lower three bytes of the unit's Ethernet address.

   If the file is not found, another TFTP message is broadcast, this time looking for the file name type*nn*.img (where *nn* represents the hardware type) or x*nnnnnn*.bck. If this is not successful, the process is repeated beginning with Step 1.

NOTE
For Xyplex units which have ROMs version Q or earlier, these units made all TFTP file accesses using the relative path name XYPLEX/*filename* (where *filename*

represents a load image or parameter file name in the form x*nnnnnn*.img or x*nnnnnn*.prm, etc).

The following sections discuss issues pertaining to load, parameter, and dump service via Internet Protocols.

1.3.1   Loading via Internet Protocols

The TCP/IP-LAT software implements three Internet protocols: the Bootstrap Protocol (BOOTP), Trivial File Transfer Protocol (TFTP), and Reverse Address Resolution Protocol (RARP), to enable UNIX hosts to load images, load and serve parameters, and to receive server memory dumps. Support for these protocols also enables servers to receive load images and parameters, and to dump memory contents, via an Internet router. These capabilities are illustrated in Figure 3-1:

Local Network

Internet Router

Network A

VAX/VMS Host

UNIX Host

Terminal Server -- Can receive load and parameter files from, and send dump and parameter files to, the UNIX hosts on Networks A and B. The terminal server cannot send dump and parameter files to, or receive load or parameter files from, the VAX/VMS host on Network A.

Remote Communications Server

Network B

UNIX Host
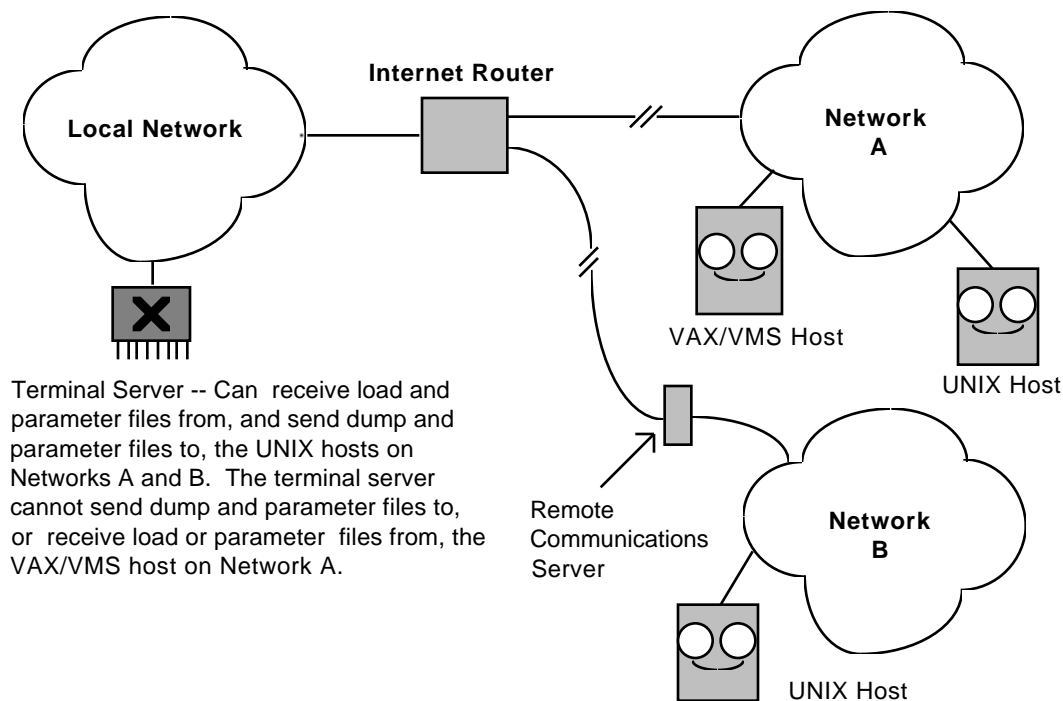
Figure 3-1. Loading via Internet Router

Xyplex units use BOOTP to find:

- The unit's Internet address

- The Internet address of a node that can serve as a load, dump, or parameter server

- The name of the file to load

- Potential parameter servers

Xyplex units use TFTP to:

- Copy load images and parameter files to the unit

- Write parameters to parameter servers

- Dump Memory

1.3.2 Configuring Protocols on Servers with NVR

On units with NVR, you can use the Configuration menu (described in the hardware documentation supplied with the unit) to select one or more of the following load protocols:

- Xyplex protocol

- MOP protocol

- BOOTP protocol

- RARP protocol

For example, you could select both BOOTP and RARP. In this case Steps 2 and 4 in Section 1.3.2 would be performed.

Parameters can be loaded from NVR or disk (on units that have a diskette drive), or from a network parameter server via the same protocol that is used to obtain the load image.

1.3.3 Directed TFTP Request

If a unit does not have NVR, you cannot configure load protocols. However, you can designate a specific TFTP load/parameter server by performing a directed TFTP request. You must use this procedure each time you initialize the unit. If you do not use this procedure, the load/parameter server is selected according to the process described in Section 1.3.2. Follow these steps:

1. AUTOBAUD your terminal.

2. Type "ACCESS".

3. Supply the following information:

    - Internet address of your unit

    - Internet address of the load/parameter server

    - If the load/parameter server is not on the same network as the unit, the name of a gateway

    - Name of the file to load

1.3.4 Merit Value of Responses

After broadcasting a load request message, the ROMs wait a fixed interval for responses from available load servers. The ROMs then determine which server to use based on the merit value of each response. (For BOOTP/TFTP purposes, the ROMs check the vendor-specific extension to determine the merit value.) If multiple responses have the same merit value, the one that was received first is used.

1.3.5   Filenames in NVR

Several forms of file names can be stored in NVR. A file name can be a name without an extension, in which case a default extension is appended. For a load image the default extension is ".img". If a file name does not include a path, a default directory, XYPLEX/, is used.

1.3.6   Eliminating TFTP Broadcasts

Units With NVR

You can eliminate TFTP broadcasts that occur while the server is running by disabling parameter server checks at the unit. Rather than broadcasting a TFTP message and waiting for responses, you can create a static list of parameter servers via the DEFINE/SET PARAMETER SERVER command. Each parameter server in the list will be queried, via TFTP, to determine whether a parameter file exists, what version it is, and other appropriate information.

To eliminate TFTP broadcasts during loading, you can configure the loading protocol as Xyplex or MOP, or perform a directed TFTP request.

Units Without NVR

You can eliminate TFTP broadcasts that occur while the server is running by disabling parameter server checks at the unit. (Use the DEFINE/SET SERVER PARAMETER SERVER DISABLED command.) Rather than broadcasting a TFTP message and waiting for responses, you can create a static list of parameter servers via the DEFINE/SET PARAMETER SERVER command. Each parameter server in the list will be queried, via TFTP, to determine whether a parameter file exists, what version it is, and other appropriate information.

To eliminate TFTP broadcasts during loading, you can provide a Xyplex, BOOTP, or MOP server or perform a directed TFTP request.

1.3.7   Saving Parameters in Permanent Database

The TFTP and XYPLEX protocols are supported for parameter saving. The unit always attempts to save parameters via the Xyplex protocol. If parameter server checking is enabled (the SERVER PARAMETER SERVER CHECK characteristic is set to ENABLED command), the unit will also attempt to save parameters via TFTP. When updating parameter servers, the unit only updates the parameter servers in the local list, if one is available. If a parameter server uses the TFTP protocol, the parameters are written into a .prm file. If this operation is successful, the parameters are also written to a .bck (backup) file.

1.3.8   Dump Transmission

Dumped memory contents and load files are transmitted in a similar manner. The same protocols are supported and the process for selecting a protocol is the same.

1.3.9 Associated Commands

The following Xyplex commands enable you to assign, delete, and view information associated with loading, dumping, and parameter service via Internet protocols. For instructions on using these commands, refer to the standard documentation set provided with the software you intend to install.

DEFINE/SET PARAMETER SERVER -- Provides an INTERNET ADDRESS option that enables you to assign an Internet address to a parameter server. Additionally, DEFINE PARAMETER SERVER enables you to create a static list of parameters that are used when NVR is configured to use the BOOTP protocol and the unit has BOOTP disabled.

PURGE PARAMETER SERVER -- Enables you to remove a parameter server from the list of parameter servers that the unit maintains.

SHOW/LIST PARAMETER SERVER -- Enables you to view both Xyplex and BOOTP/TFTP parameter servers.

SHOW SERVER STATUS -- Enables you to view the IP Load and Dump addresses when the BOOTP/TFTP protocol is used to load a unit.

DEFINE/SET SERVER TIMEZONE -- Enables the unit, after being loaded via TFTP, to determine the local time based on the Universal Time (formally Greenwich Mean Time) obtained via network query. If the server does not have a real-time battery-backed-up clock, the local time must be calculated from universal time based on your time zone. (The MAXserver Manager (MAXMAN) card and the MAXserver units have real-time clocks.)

Chapter 2

Software Installation for Load Server Hosts

2.1   General

This chapter describes the procedures you use to install and configure the System Software on UNIX systems. These systems will serve as load servers and parameter servers for units in the network. You can also use these procedures when re-loading System Software.

Proper planning is the key to a smooth software installation. You should read and thoroughly understand the procedures you will perform before you begin the installation.

2.2   Requirements

2.2.1   Software Prerequisites

The host system must be running the following software:

>   Bootstrap Protocol (BOOTP) and Trivial File Transfer Protocol (TFTP)

or

>   Reverse Address Resolution Protocol (RARP) and TFTP

2.2.2   Distribution Media

For UNIX installations, the software is supplied on 6.35 mm (0.25 inch) cartridge in QIC11 and QIC24 tape formats, or a TK50 cartridge. Files are copied onto UNIX media kits using the UNIX tar facility.

2.2.3   Disk Space Requirements

There should be 2.5 megabytes of disk space available for the installation. After the installation, you can delete unnecessary load images to recover disk space. Additionally, 44 kilobytes per unit are required for parameters. Should problems arise, an additional Megabyte might be required for each dump file from a unit.

2.2.4   Directory Requirements

All software load images and parameter files are downloaded to units via the TFTP protocol. Typically, UNIX systems require that you locate all files that TFTP will transfer on the network in the TFTP "home directory" of your UNIX system. Most UNIX systems provide some mechanism that allows you to specify the TFTP home directory or use a default home directory. The default TFTP home directory varies from system to system. You will need to follow the configuration instructions for the TFTP daemon (tftpd) that are contained in the system documentation (e.g., MAN pages, etc) to determine how to locate the TFTP home directory.

For example, on Sun Workstations, the MAN page for tftpd says that the home directory is specified in the /etc/inetd.conf file, and that the factory default home directory is /tftpboot. Therefore, you would examine the tftp entry in the /etc/inetd.conf file to see if the host is using the default home directory or a user-specified home directory. Place the software load images and/or parameter files in the home directory.

For Xyplex units which have ROMs version Q or earlier, these units make all TFTP file accesses using the relative path name of XYPLEX/*filename* (where *filename* represents a load image name or a parameter file name). Therefore, there must be a link from the XYPLEX directory to the TFTP home directory, in order for the TFTP daemon to know where to locate the load image or parameter files. Create this link and give it appropriate file permissions using commands in the form (note, you must be superuser):

        # cd *tftp-home-directory*
        # ln -s *tftp-home-directory* XYPLEX
        # chmod 777 XYPLEX

For example, on Sun Workstations, using the default TFTP home directory, /tftpboot, you would use the commands:

        # cd /tftpboot
        # ln -s . XYPLEX
        # chmod 777 XYPLEX

You should be aware of any TFTP security mechanisms available on your UNIX system. Some TFTP implementations have no method of limiting the directories that TFTP has access to, which can present a security risk at some sites. Other implementations do have a method of limiting TFTP to certain directories, which means that you must place all files in a particular home directory, or in a sub-directory of the home directory. If the files are not located there, TFTP will not be able to find them. For example, SunOS (and some others) uses a TFTP daemon -s option (-s for secure) that restricts TFTP to having access to a particular directory and its sub-directories. Sun Workstations are normally configured with this option enabled. If you examine the /etc/inetd.conf file, you will see an entry similar to "-s /tftpboot" in the tftpd entry. Other vendors may use a different method. You should read the MAN page on tftp, tftpd, and inetd.conf to find out directory/security requirements on your UNIX system.

2.2.5   UNIX TAR Archives Available

Xyplex supplies the following types of UNIX kits:

*   MAXserver System Software kits contain the latest available load images for all product families (i.e., V4.0 terminal server, V1.0 remote bridge, V1.0 TCP-LAT gateway, etc), and the Scriptor control files which correspond to these load images. For ease of use and faster installation, all images for a given product family release are stored on the distribution media in individual UNIX TAR archives. Similarly, all Scriptor control files for a given product family release are stored on the distribution media into individual UNIX TAR archives. For example, there is one UNIX TAR archive for terminal server load images and another for terminal server control files. Installation of load image archives is described in this chapter. Chapter 3 describes the installation procedures for the Scriptor control file archives on this kit.

*   Scriptor kits contain the latest version of all Scriptor executables (e.g., transform, rconsole, iterate) and command scripts (e.g., save_unit, scriptor, etc). The kit also contains all control files for all releases of Scriptor-manageable products (e.g., V2.0, V2.1, V2.2, and V3.0 of TCP/IP-LAT terminal server software; V1.0 of remote bridge, etc). Refer to Chapter 3 for the installation procedures for this type of kit.

Refer to the *Software Kit Information* provided with your Xyplex Software Kit for a list of UNIX TAR archives available in the kit.

2.3   Pre-Installation Activities

Complete the following steps before you begin the software installation on a UNIX host:

1. Determine the UNIX host system(s) on which you want to install the software. You can use multiple hosts for backup and load-balancing. (These can be a combination of UNIX and VAX/VMS systems.)

2. Determine the protocols (BOOTP/TFTP or RARP/TFTP) that your host systems are using to load software. Make sure that the protocols are installed and configured on the UNIX host, using tools that are specific to the operating system you are using. For example, on UNIX and ULTRIX hosts, you will usually need to edit the etc/services file and make sure that the BOOTP and TFTP services are operating. Refer to the system documentation supplied with your operating system for specific instructions.

3. Verify that there is sufficient space available on the target disk. Refer to section 2.2.3.

4. Make sure you are satisfied with the backup of the target disk(s).

5. Determine which UNIX TAR archives you wish to install. Refer to the *Software Kit Information* (or *Release Notes*) supplied with your kit.

6. Read through the description of the installation procedure that follows. Make sure you know the Ethernet addresses and Internet addresses or Domain names of all units.

2.4   Software Installation Procedure

To install the System Software on a UNIX host, complete the following steps. Refer to section 2.7 for a sample installation using a SUN host system.

a. Change to the TFTP home directory, using a command of the form:

        % cd /*tftp-home-directory*

For example, on Sun Workstations using the default TFTP home directory, /tftpboot, use the command:

        % cd /tftpboot

b. Load the distribution tape onto a tape drive, then copy the desired UNIX TAR archive from the distribution tape to the TFTP home directory using a "tar" command of the form:

        % tar xfv /dev/*(your tape drive name) tar-archive-name*

Note
For nine-track tapes, make sure that you use the correct *tape-drive-device-name* to match the format (QIC11 or QIC24) of the tape.

Refer to the *Software Kit Information* for a list of *tar-archive-names.*

For example, on Sun Workstations to extract the UNIX TAR archive named xyp_i1_2_015 from a QIC24 tape, use the command:

        % tar xfv /dev/rst8 xyp_i1_2_015

c. Extract the load images from the UNIX TAR archive(s) copied from the distribution tape to the TFTP home directory (in step b, above), using a "tar" command of the form:

```
% tar xfv tar-archive-name
```

For example, on Sun Workstations to extract the load images contained in the UNIX TAR archive named xyp_i1_2_015, use the command:

```
% tar xfv xyp_i1_2_015
```

You can delete the TAR archive from the TFTP home directory when you have completed extracting the load images from it.

d. Copy default.dmp to a file named loaderr.dmp in the TFTP home directory. This file will be used to store the "mini-dump" that a unit generates when it cannot be loaded. For example:

```
% cp default.dmp loaderr.dmp
```

e. Configure each unit on the UNIX host, as described in section 2.5.

2.5   Configuring Units on UNIX Hosts

This section describes the procedure that you use to configure individual units so they will be loaded by the UNIX host. You can use this procedure whenever you add a new unit to the network or when you re-configure an existing unit. To configure units on a UNIX host, complete the following steps:

a. For each unit, copy the default parameter file, default.prm, to files named x*nnnnnn*.prm and x*nnnnnn*.bck in the TFTP home directory ("*nnnnnn*" represents the last six hexadecimal digits of the unit's Ethernet address). For example, if a unit has the Ethernet address 08-00-87-00-45-EF, use the commands:

```
% cp default.prm x0045ef.prm
% cp default.prm x0045ef.bck
```

Note
You do not need to perform this step for MAXserver standalone units which are configured to store parameters in local storage. You must perform this step for MAXserver LANBUS chassis cards.

b. For each unit, copy default.dmp to a file named x*nnnnnn*.dmp in the TFTP home directory, where "*nnnnnn*" represents the last six hexadecimal digits of the unit's Ethernet address. This file will be used for dump storage. For example, if a unit has the Ethernet address 08-00-87-00-45-EF, use the command:

```
% cp default.dmp x0045ef.dmp
```

c. Depending on the protocols that you will be using (i.e., BOOTP/TFTP or RARP/TFTP), you will need to specify the load image name for each unit as follows:

RARP/TFTP Protocols

For each unit, create a link between the load image name copied from the distribution tape (refer to the *Software Kit Information* for a list of available load image names) and a unit-specific load image name. The reason for using a link (which creates another name for the same file) is to save disk space, since load images are large files, and to simplify upgrading software. The unit-specific load image name can be in one of two formats:

- x*nnnnnn*.img, where "*nnnnnn* "represents the last six digits of the unit Ethernet address
- type*nn*.img, where "*nn* " indicates the hardware device type of the unit. Refer to the *Software Kit Information* for a current list of device types.

For example, using the Ethernet address format (this must be done for each unit) -- to load the image tsmj8lt on a single MX-TSRVM-J8 unit which has the Ethernet address 08-00-87-00-45-EF, use the command:

```
% ln -s tsmj8lt x0045ef.img
```

Similarly, using the xtype*nn*.img format -- to load the image tsmj8lt on all MX-TSRVM-J8 (which has a device type of 42) units, use the command:

```
% ln -s tsmj8lt type42.img
```

BOOTP/TFTP Protocols

For each unit, add the following information to the BOOTP Server Table (for example, the etc/bootptab file) on the UNIX host:

- Ethernet address of the unit
- Internet address of the unit
- Name of the unit's load image (refer to the *Software Kit Information* sheet for a list of available load image names).

d. Make sure that all parameter files, backup files, and unit-specific load image names have the correct file permissions. Use the commands:

```
% chmod 666 *.prm *.bck
% chmod 444 x*.img
```

or

```
% chmod 666 *.prm *.bck
% chmod 444 type*.img
```

e. Configure each unit to operate as an Internet node (i.e., assign each unit an Internet address and Internet name) using tools that are specific to the operating system you are using. For example, on UNIX and ULTRIX hosts, you need to edit either the etc/rc.hosts or etc/hosts file and add the appropriate initialization information. Refer to the system documentation supplied with your operating system for specific instructions.

f. Specify the correlation between unit Ethernet addresses and the unit Domain Name or Internet Address, using tools that are specific to the operating system you are using. For example, on UNIX and ULTRIX hosts, you will usually need to edit the etc/ethers file. Refer to the system documentation supplied with your operating system for specific instructions.

2.6 Post-Installation Activities - UNIX Systems

Complete the following steps after you have completed the software installation on a UNIX host:

1. Delete any load images and shared printer files that you do not need from the TFTP home directory. The TFTP home directory will contain UNIX shared printer files. One of the files is used only by BSD UNIX and one is used only by AT&T UNIX. Delete the file that your system will not be using.

    BSD UNIX --   printcap_bsd

    AT&T UNIX --   interface_sys5

2. Initialize each unit. (Refer to Appendix A if the units fail to initialize.)

3. Store the distribution media in a safe place for future use.

4. **Loading the Bridge over a WAN link.** When you configure a MAXserver Bridge to load over a WAN link, you must specify a second Ethernet address; an Ethernet address corresponds to each link. For example, when you configure Ethernet addresses for RARP and BOOTP, you must configure both Ethernet addresses to a single Internet address.

    The Ethernet address of the LAN link is the address of the card itself, which is determined by the slot in which the card resides. Determine the Ethernet address of the WAN link by logically OR-ing the value 80 to the fourth byte of the LAN link Ethernet address.

    For example, if the Ethernet address of the LAN link is 08-00-87-00-D5-76, the Ethernet address of the WAN link is 08-00-87-80-D5-76.

2.7 Example Installation of Load Images on a Load Server

The following is an example of the commands that you type and the messages that are displayed during installation of MAXserver System Software on a UNIX host.

```
% cd /tftpboot
/tftpboot
% tar xfv /dev/rst0 xyp_i1_2_015

x xyp_i1_2_015, 1433600 bytes, 2800 tape blocks
% tar xfv_i1_2_015

x mx1500.sys, 561280 bytes, 1097 tape blocks
x mx1400.sys, 366464 bytes, 716 tape blocks
x tsmj8lt.sys, 456960 bytes, 893 tape blocks
x default.prm, 64 bytes, 1 tape blocks
x default.dmp, 0 bytes, 0 tape blocks
x xyp_ptyd.c, 19911 bytes, 39 tape blocks
x xyp_filter.c, 13691 bytes, 27 tape blocks
x printcap_bsd, 339 bytes, 1 tape blocks
x interface_sys5, 1081 bytes, 3 tape blocks
%
% cp unix_default.dmp loaderr.dmp
```

After the software has been loaded on the UNIX host, you must issue commands to configure each server. For example, to configure an MX-TSRVM-J8 server which has the Ethernet address 08-00-87-00-45-ef to load via RARP/TFTP, you could could use commands similar to:

```
% cp unix_default.dmp x0045ef.dmp
% cp unix_default.prm x0045ef.prm
% cp unix_default.prm x0045ef.bck
% ln -s tsmj8lt x0045ef.img
% chmod 666 *.prm *.bck
% chmod 444 x*.img
%
```

Appendix A

Troubleshooting Internet Loading Problems

A.1   Overview to Troubleshooting

Following software installation, you should attempt to initialize all units so that they load the new release of software. If the loading process fails, the most likely reasons are:

1. BOOTP or RARP is not properly configured or are not running at the UNIX load host.

2. TFTP is not properly configured or is not running at the UNIX load host.

3. There is a problem with UNIX file protections or ownership for either the load image or the parameter file.

The fastest way to identify the cause of the loading failure is to initialize a unit which has a terminal connected to a serial port, wait until it passes self-test diagnostics, and then repeatedly press the <RETURN> key in order to observe the messages that are displayed during the loading sequence. You can then isolate the loading problem by observing how far the unit gets in the loading process. The following is a description of the messages you will see during the loading process, and a description of the likely problem you have encountered. Sections A.2 through A.5 describe how to resolve the specific problems you may encounter.

a. After you initialize the unit, and it completes self-test diagnostics, press the <RETURN> key, once every few seconds. You will observe a message similar to the following one:

```
Terminal Server, Type 34, Rev C.00.02
Ethernet address 08-00-87-00-46-DD, Port 1
Initializing...
```

This message appears for approximately 10 seconds. The ROM revision level is listed on the first line of each message. (Your ROM revision level, Ethernet address, hardware type, port number, etc, will be different.) Take note of the ROM revision level for your unit.

b. Next observe a message similar to the following one:

```
Terminal Server, Type 34, Rev C.00.02
Ethernet address 08-00-87-00-46-DD, Port 1
Requesting network load service
```

The last line changed. This message lasts for approximately 20 seconds (50 seconds after power up).

c. Next observe a message similar to the following one:

```
Terminal Server, Type 34, Rev C.00.02
Ethernet address 08-00-87-00-46-DD, Port 1
Evaluating service offers
```

If you don't observe this message, after the 50 second period (mentioned in step b) has elapsed, the most likely reason for loading failure is that BOOTP or RARP is not properly configured or running at the UNIX host. Refer to section A.2 or A.3 to troubleshoot this problem.

d. Next, observe several messages similar to the following:

```
Terminal Server, Type 34, Rev C.00.02
Ethernet address 08-00-87-00-46-DD, Port 1, IP address 192.12.119.26
Loading file /XYPLEX/tsj8lt.sys
Loading over Link L1 from server UNIXHOST, IP address 192.12.119.20, message 55
```

(Your unit's Ethernet address and Internet address, load file name, and load server name and Internet address will be different.) This message indicates that the unit has been informed by the host of its Internet address (i.e., BOOTP or RARP is running), and which load image it will receive. If the unit subsequently times out, without getting to any additional loading messages, either TFTP is not configured or running at the load host, or there is a problem with the file protections for the load images at the UNIX host. If the unit subsequently crashes, the most likely cause is that it is attempting to load the wrong image. Refer to sections A.4 and A.5 to troubleshoot these problems.

e. Next, observe a messages similar to the following:

```
Terminal Server, Type 34, Rev C.00.02
Ethernet address 08-00-87-00-46-DD, Port 1
Requesting parameter load service
```

```
Terminal Server, Type 34, Rev C.00.02
Ethernet address 08-00-87-00-46-DD, Port 1
Evaluating service offers
```

These messages are an indication that file protections for the load image are correct and that TFTP is running.

Note

If the unit is configured to load parameters from local storage, you will not see this message or the next one. Go to step g.

f. Next, observe a message similar to the following one:

```
Terminal Server, Type 34, Rev C.00.02
Ethernet address 08-00-87-00-46-DD, Port 1, IP address 192.12.119.26
Loading file /XYPLEX/x0046dd.sys
Loading from server UNIXHOST, IP address 192.12.119.20, message 554
```

This message indicates that the unit is requesting the parameter file from the host. If the unit subsequently times out, without getting to the next message, check the file protections for the parameter files at the UNIX host (refer to section A.5 to troubleshoot this problem).

g. Following the completion of the above messages, the welcome message or logon prompt for the unit is displayed. You have successfully loaded the unit.

A.2   Troubleshooting RARP Problems

Use the following procedure to determine if RARP is properly configured and running at the UNIX host:

Verify that the rarp daemon (rarpd) is running. Use the command:

```
% ps -aux | grep rarpd
```

Look for rarpd in the right hand column of the resulting display. Figure A-1 shows the display on a SUN Workstation.

```
% ps -aux | grep rarpd

root     258  0.0  0.0   56    0 ?  IW    Sep 10 0.00  /urs/etc/rarpd le0 unixhost
sysmgr  1620  0.0  2.9   40  200 p3 S     17:05   0:00 grep rarpd
```

Figure A-1. Example ps Display.

If rarpd is not running, the only process that you will see listed will be the "grep rarpd" process. If the display indicates that rarpd is not running, restart the rarp daemon manually, or reboot the system. To start rarpd manually, you will need to know the name of the Ethernet interface. Use the command:

```
% netstat -i
```

Figure A-2 shows an example of the resulting display.

```
% netstat -i
Name  Mtu   Net/Dest    Address      Ipkts    Ierrs Opkts   Oerrs Collis Queue
le0   1500  192.12.119  unixhost     309494   2     62698   0     1014   0
lo0   1536  loopback    127.0.0.1    487350   0     487350  0     0      0
%
```

Figure A-2. Example netstat Display.

Check the left hand column of this display for the name(s) of the available interface(s). Then, to start rarpd type a command in the form:

```
% /usr/etc/rarpd interface-name `hostname`
```

where *interface-name* is the name of the Ethernet interface obtained from the netstat display, and `hostname` specifies to the rarp daemon that it must translate this variable to use the correct node name. Make sure that you use back quotation marks in `hostname`. In the above example, you would type the command:

```
% /usr/etc/rarpd le0 `hostname`
```

If it still does not appear that RARP is working properly, check the entries in the files /etc/ethers and /etc/hosts. (The /etc/ethers file lists Ethernet addresses and host names, but not Internet addresses. The /etc/hosts file lists Internet addresses and host names, but not Ethernet addresses.) These files allow RARP to translate the request for an Internet address from the Ethernet address supplied by the unit. RARP looks up the Ethernet address in /etc/ethers file to obtain a host name, then uses the UNIX function gethostbyname() to obtain the Internet address which it sends back to the requesting unit.

What gethostbyname() actually does is dependent on host configuration. If you are not running a name server, gethostbyname() simply looks up the name in /etc/hosts. If you are using a domain name server, gethostbyname() makes the request to the domain name server (and usually will fall back to the /etc/hosts file

if it does not receive an answer). If you are running Yellow Pages, gethostbyname() makes the request to the Yellow Pages system.

When using NIS (or any other name server), you generally have one host configured to be the name server for the entire network, and you only add names on that host. NIS has a set of utilities for updating its database. (Read the MAN page on ypmake for more information.) A problem will occur when the /etc/hosts file is updated, but NIS has not been notified of the changes, so when rarpd calls gethostbyname(), NIS will not answer).

A sample entry in the /etc/ethers file for a Sun system would look like:

```
08:0:87:0:12:9a my-server
```

The name "my-server" has a matching entry in the /etc/hosts or /etc/rc.hosts file. A sample entry in the /etc/hosts file for a Sun system would look like:

```
192.12.119.18 my-server
```

A.3   Troubleshooting BOOTP Problems

Use the following procedure to determine if TFTP is properly configured and running at the UNIX host:

Verify that BOOTP is running. Use the command:

```
% netstat -a
```

Figure A-3 shows an example of a portion of the resulting display on a Sun Workstation. Look for a line that lists *.bootps. If this line is not listed, BOOTP may not be configured.

```
netstat -a

udp       0      0  *.bootps           *.*                 LISTEN
udp       0      0  *.tftp             *.*                 LISTEN
```

Figure A-3. Example netstat -a Display.

To verify that BOOTP is configured, check the /etc/services file for a BOOTP entry. Use the command:

```
% grep bootp /etc/services
```

For example, on a Sun Workstation, this entry will look like:

```
bootp 67/UDP
```

If there is no entry in the etc/services file, add one. If there is an entry, check for a bootp entry in the /etc/inetd.conf file. Use the command:

```
% grep bootp /etc/inetd.conf
```

There should be a line in the /etc/inetd.conf file which contains bootp in it, and that is not treated as a comment (# is the comment character). For example, on a Sun Workstation, this entry will look like:

```
bootp    dgram    udp    wait    root    /usr/etc/in.bootpd        in.bootpd -s
```

If there is no entry for bootp in the /etc/inetd.conf file, add one. If there is an entry, but it begins with the comment character, remove the character.

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A.4   Troubleshooting TFTP Problems

Use the following procedure to determine if TFTP is properly configured and running at the UNIX host:

To verify that TFTP is properly running at the load server, use TFTP to get a file from the TFTP home directory. To do this, first change to a directory other than the directory where the load images and parameter files are stored. For example:

```
% cd /usr
```

Then type a command of the form:

```
% tftp load-server-internet-address
```

where *load-server-internet-address* represents the Internet address of the host where the load images and parameter files are located (you can do this from the same host). TFTP will respond with a tftp> prompt. Type the command:

```
tftp> get tftp-home-directory/default.prm
```

If your site has units which have ROMS with a revision P, or earlier, you should also try the command:

```
tftp> get XYPLEX/default.prm
```

If the get operation is successful, then TFTP is configured properly on the UNIX load server host. (You can delete the copied default.prm file.) If the get operation is not successful, try to get another file (for example, /etc/inetd.conf) to see if the problem is with the way TFTP is configured, or if there is simply a problem with the ability of TFTP to locate or access files from the TFTP home directory. If the second get operation is not successful, then TFTP is not configured properly on the load server and you must create a link to the XYPLEX directory. Create this link and give it appropriate file permissions using commands in the form (you must be superuser):

```
# cd tftp-home-directory
# ln -s tftp-home-directory XYPLEX
# chmod 777 XYPLEX
```

For example, on Sun Workstations, using the default TFTP home directory, /tftpboot, you would use the commands:

```
# cd /tftpboot
# ln -s . XYPLEX
# chmod 777 XYPLEX
```

To verify that TFTP is configured, check the /etc/services file for a TFTP entry. Use the command:

```
% grep tftp /etc/services
```

For example, on a Sun Workstation, this entry will look like:

```
tftp 69/UDP
```

If there is no entry in the etc/services file, add one. If there is an entry, check for a tftp entry in the /etc/inetd.conf file. Use the command:

```
% grep tftp /etc/inetd.conf
```

There should be a line in the /etc/inetd.conf file which contains tftp in it, and that is not treated as a comment (# is the comment character). For example, on a Sun Workstation, this entry will look like:

```
tftp    dgram   udp     wait    root    /usr/etc/in.tftpd       in.tftpd -s /tftpboot
```

If there is no entry for tftp in the /etc/inetd.conf file, add one. If there is an entry, but it begins with the comment character, remove the character. If there is an entry that does not begin with the comment character, the most likely problem is with the location, file protection or file ownership for the directory which contains the load images and parameter files. Refer to section A.5 to troubleshoot this problem.

A.5   Troubleshooting TFTP Directory or File Problems

TFTP directory and file problems generally fall into the following categories

> files located in an incorrect directory
> incorrect file permissions
> incorrect file ownership

Section 2.2.4 describes how to identify the correct TFTP home directory. Use the following guidelines to troubleshoot the remaining problems:

File Permission

All load images and parameter files must have read permissions. Parameter files must also have write permissions, so that TFTP can store any changed permanent parameters. Load images are usually copied off the distribution media with the correct permissions. Parameter files (and their corresponding backup files), however, are a copy of a default file that is on the media. When you create a default parameter file and backup parameter file for a unit, the new files may not have the correct permissions, so you may need to manually assign the correct permissions. Use the following command to make sure the parameter files and backup files have read and write permissions:

```
% chmod 666 *.prm *.bck
```

For RARP loading, make sure that all unit-specific load image names have the correct file permissions. Use the commands:

```
% chmod 444 x*.img
```

For Xyplex units which have ROMs with a version Q or earlier, these units make all TFTP file accesses using the relative path name of XYPLEX/*filename* (where *filename* represents a load image name or a parameter file name). Make sure that the link has appropriate file permissions using the command:

```
% chmod 777 /tftpboot/XYPLEX
```

File Ownership

It is also important to understand the file ownership requirements for files that will be loaded via TFTP. Typically, TFTP implementations require that all files in the TFTP home directory have the same owner as the TFTP daemon (tftpd) in order for TFTP to have access to the files. For example, while many implementations require the files to be owned by root, on Sun Workstations the default owner is the special user id "nobody (-2 -2)".

To determine if there is a file ownership problem, check the owner of the files with the command:

```
% ls -la
```

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If the owner of the file does not match, use the chown command on the directories to make their owner whatever tftp is running as (e.g. - "nobody"). For example, on a Sun Workstation you would use the command:

```
% chown nobody *.prm *.bck *.img
```