these files are only registered when the daemon starts, so you will have to kill the daemon and restart it whenever you make changes.

1.6.6 Network-based ViewStation Operation

The ViewStation can load its server code from ROM (or hard disk) or it can start by loading its server code from the network, either from a BOOTP-specified location or from a location specified internally. This internal specification can either be from Monitor Mode, or set in the Setup Mode, Startup Options menu.

In its factory configuration the HDS ViewStation uses its download (network-based) operating mode. This download operation has two basic parts:

- Determine the ViewStation's IP address from the network (using the BOOTP or RARP techniques described above)
- Load the server code (using the BOOTP protocol to identify the server’s software file or from the internal path and filename specification). The actual loading is accomplished by a TFTP file transfer.

Optionally, you can also load the ViewStation’s configuration from a remote configuration file. These three elements are independent of each other, though they are often used together.

These settings are all selected on the Setup Mode Startup Options menu, which is described in detail in Section 1.5.6.6.

checks the */etc/ethers* file to match that hardware address to a name, then checks that name in the */etc/hosts* file to get the IP address to return to the broadcast source. Correct operation of the RARP protocol obviously requires that the information for the ViewStation be entered correctly, particularly that the names used are identical (most systems don't have a rigid syntax for the names, but whatever is used must be used consistently). Changes to these files are registered only when the RARP daemon starts, so you will have to shut it down and restart it whenever you change the files.

1.6.5.4 Sun NIS IP Addressing

Recent versions of the SUN operating system use NIS, Network Information Service (formerly called SUN Yellow Pages), instead of RARP. Refer to the SUN documentation for details on NIS operation, but note that the */etc/ethers* and */etc/hosts* files are replaced by NIS maps. These maps can be created automatically from the RARP files with SUN conversion routines, usually found in */var/yp*.

1.6.5.5 RARP Protocol Example

This example deals with one particular system of network operation. Each system is different, with different host configurations, network arrangements, and operating system variables. Check your system carefully to see what its names, configurations, and requirements are. Use the **man** command to look at your online documentation to see what the arguments for the commands are and the syntax for the required files. Refer also to the section of your documents called "Networking Services", or something like that, for additional information.

The RARP protocol requires two files, one to match the hardware address to a name, called */etc/ethers*, and one to match the name with an IP address, called */etc/hosts*. These two files are shown below:

The ethernet file is */etc/ethers*. Its form is as follows:

```
<Ethernet hardware address>  <white space>  <host name>
```

or, specifically:

```
00:80:96:00:44:a5          hds12
```

The hosts file is */etc/hosts*. Its form is as follows:

```
<IP address>   <white space>   <host name>
```

or, specifically:

```
128.91.4.12                hds12
```

The host name, for this example, has no definite syntax, but must be identical to the entry in the */etc/ethers* file. The syntax and punctuation of the addresses may also vary from system to system.

The RARP daemon must also be configured in a similar way, with files such as a *rarp.rc* and/or an *rarp.ifconfig*. The RARP daemon, in this example, is found in */usr/etc/rarpd.* These names and locations depend on your system. Changes to for setting the IP addresses and for controlling the configuration through the ViewStation's configuration files. Passwords can also be controlled from BOOTP.

The only disadvantage to BOOTP is the effort required to start and maintain it, which is a small effort for experienced personnel in administering a large system.

1.6.4.3 Monitor Mode Benefits

Monitor mode has the advantage of guaranteed starting in any situation. Its only disadvantages are that it cannot be done remotely, and that it has a limited user interface.

1.6.5 Determining the IP Address

An important consideration about starting the ViewStation is determining its IP address. This is a major concern for system administrators and there are several methods available to control this process.

The ViewStation's Setup Mode, Startup Options menu, selects the method of IP address determination, either Setup, BOOTP, or RARP.

1.6.5.1 Setup Mode IP Address Selection

The simplest way to set the IP address is through Setup Mode in the HDSware menu, or by Monitor Mode. In both these cases the IP address is stored in NVM. This relies on the user obtaining a unique, correct address and entering it manually.

1.6.5.2 IP Addressing with BOOTP

The BOOTP protocol sets the IP address based on entries in its *bootptab* file by matching the hardware address sent by the ViewStation in its bootp request. This permits the system administrator to control IP addresses remotely. Since the hardware address for each ViewStation is built into its serial number (see Section 1.1.12.1 of this manual), the system administrator could add entries to the bootptab file simply by looking at the shipping documents, and the IP address would be correctly assigned even if the ViewStation in question was started at a remote location.

1.6.5.3 IP Addressing with RARP

The RARP (Reverse Address Resolution Protocol) is another mechanism to set the IP address. RARP doesn't have the capability to specify a boot file. (If you want to use the download option, you should use the BOOTP daemon for both IP address resolution and the boot file location. If you just want to download the server code, you can use the Startup Options menu directly without using BOOTP at all.)

The RARP (Reverse Address Resolution Protocol) daemon needs two files, one to match the hardware address to a name and another to match the name to an assigned IP address. (In the example below, these files are named */etc/ethers* and */etc/hosts* respectively. These file names may be different on your system.)

When you turn the ViewStation on, it sends a broadcast message containing its hardware address out on the network. The RARP daemon receives this message,

```
:ha=00809600015d:\
:ip=128.91.5.13:
```

This sample file has sample entries for Bootp. Note that the vendor tag fields are present and that the configuration file called for the marketing#2 unit is test.3.cfg.

When you use BOOTP to specify the download of the boot file (server code), several different combinations of bootp fields can be used to attempt the download process. These combinations are listed below in the order they are tried, with the bootp field names shown in bold:

1. **T130** and **T129**
2. **T130** and hds.setup
3. **hd** and **T129** (if there is no T130 field)
4. path of **hd** and **hds.setup** (if there are no T129 or T130 fields)

1.6.4 Startup Considerations

There are a number of considerations involved with your choice of starting the ViewStation. One consideration is convenience, another is central control and system administration. Some of these questions are discussed below.

1.6.4.1 Local storage Benefits

There are two types of local storage on the HDS ViewStation, ROM storage and hard disk storage, with several size options for each. Its advantage is convenience, its disadvantage is cost, which is relatively small except in large installations.

ROM Storage

The ViewStation's flashPROM storage is typically 2 MB, with 1.75 MB allocated for server code and .25 MB allocated for the bootprom code. The bootprom may also be present as a PLCC chip on the main circuit board. The FlashPROM is reprogrammable so you can always update your HDSware versions.

ROM storage is also available with the PCMCIA board option, with ROM cards in 2.5 MB and 5.0 MB storage capacity available.

Hard Disk Storage

The PCMCIA board can also use hard disks, with both 20 MB and 40 MB capacity available. These disks are shipped with the HDSware already installed. This means that the ViewStation has all its software resident, including server code, local clients, fonts, and so on. This is especially useful for ViewStations without Ethernet connections to a host computer, such as ViewStations using a PPP connection from a remote site. This permits the ViewStation to boot, load its clients, and load fonts without burdening the PPP line.

1.6.4.2 BOOTP Benefits

The BOOTP protocol has a number of benefits, especially in a large installation with central administration. BOOTP offers the advantage of central control, both

If you have problems or questions about starting BOOTP, refer to Section 3.2.

1.6.3.3 Sample *bootptab* File

This file would normally be located in */etc/bootptab*. Note that lines marked # are comment lines. Note also that the passwords shown here are in clear text, since the bootp table can be read-protected on the system. (A configuration file specified by BOOTP cannot be read-protected, since it must be readable by TFTP, and so passwords occuring there must be encrypted. Configuration files loaded directly by the ViewStation can be read-protected, and so can use clear-text passwords.) The configuration file is loaded from the host which sent the bootp response. This security issue is discussed in Section 1.11.1.5 of this manual.

This sample file contains a section for global settings, which would apply to everything on the system and/or also a subnet entry, which would apply to smaller divisions of the entire system. The entries for individual machines are entered last. Refer to the RFC documents and your system documents for the specific details of *booptab* file syntax. This is sometimes a difficult problem; for instance, some systems require the boot file name to have a leading slash, others refuse to read it with the leading slash, and some allow :hd and :bf on the same line, others do not, etc.

```
# First, we define a system entry (such as subnet2) which
# specifies the things every host on that subnet uses.

subnet2.default:\

:hd=/home/HDSware/hds-fx/image:\

:bf=V30-D.hds:\

:T128="Galahad":\

:T129="test.3.cfg":\

:T130="/home/hdssun1/boot":

# Now come the individual ViewStations

marketing#1:\

:tc=subnet2.default:\

:ht=ethernet:\

:ha=008096000167:\

:ip=128.91.5.68:

marketing#2:\

:tc=subnet2.default:\

:hd=:bf=/home/HDSware/hds-fx/image/V30.hds:\

:ht=ethernet:\
```

:gw=	gateway address example: :gw=128.91.2.5:\
:sm=	subnet mask example: :sm=255.255.0.0:\
:hn=	ViewStation’s name (from Comm. menu in Setup)
:ds=	domain nameserver (entry is one or two addresses separated by a space) example: :ds=128.91.3.12 128.91.3.1:\ more than two entries are ignored; if only one is used, secondary is zero
:T128=	(vendor tag) configuration password example: :T128="ApollO":\
:T129=	(vendor tag) configuration filename example: :T129="config.fx":\
:T130=	(vendor tag) configuration directory example: :T130="/HDSware/hds-fx/config":\

BOOTP may be used to load the configuration file (containing Setup Mode values) or load only the ViewStation’s IP address and boot file entry (containing the server code) or both. Do not confuse these functions.

These entries and values, along with any other BOOTP fields your system may use, are retrieved from the bootp table and sent to the ViewStation in the bootp response. The configuration path and filename are also sent if the vendor tag fields are set. This configuration file contains individual resources and values for Setup Mode fields, which are given in detail in a later section.

When you turn on the ViewStation, it sends the BOOTP request automatically. BOOTP then sets the IP address for the ViewStation and loads the software file. You have a root window with the Setup icon in the lower right corner.

1.6.3.2 Problems with BOOTP Starting

If there is a problem with Bootp, try Monitor Mode, or look for these things:

- Verify that BOOTP is running on your system.
- Verify that your entries in the bootptab file are correct; verify the file syntax and the paths and filenames.
- Verify that the file transfer protocol, TFTP by default, is running so the file can be transferred correctly.
- If you are running TFTP in secure mode, remember that this changes the root directory to */tftpboot* and this must be reflected in your hd and T130 entries, which should then start with */tftpboot*.
- Note that there is a 64 byte limit (actually 60 bytes) on “vendor” fields, which includes T128, T129, T130, gw, sm, and ds.

Set the host type to VMS:	**set** HDSsetup.FXUtilities.hosttype: VMS

If needed, you can also set the file transfer protocol to FTP, including the entry of a username and password with the "set" command with the appropriate configuration resource names.

Select the FTP protocol:	**set** HDSsetup.FXUtilities.protocol: FTP
Set the username (for FTP):	**set** HDSsetup.FXUtilities.username: <username>
Set the password (for FTP):	**set** HDSsetup.FXUtilities.password: <password>

When all of these settings are made, you can boot the ViewStation.

Boot the ViewStation:	**boot**

This boots the ViewStation by loading the server code file, whose location is specified in the configuration file, by means of the file transfer protocol you specified. Both of these conditions must be met - that is, the file must be in the location entered (the configuration file knows the correct location unless the HDSware tree has been modified), and the file transfer protocol (TFTP, FTP, or NFS) must be running and have access to that location.

1.6.3 Starting with BOOTP

BOOTP is a network service program (refer to Section 3.2 of this manual and RFC 951, RFC 1048, and RFC 1084 for specific details) running on your host computer that listens for startup or boot requests. The ViewStation will respond to bootp messages from either an Ethernet or a Token Ring network. When the host receives a boot request, it looks in the bootp table (a file called */etc/bootptab*) for information about the machine making the request.

The fields in this file have an abbreviation for the entry name (such as **ha** for hardware address, and **ip** for IP address, etc.) and an associated value. These values are sent with the bootp response and received by the ViewStation to start its boot process. Check the syntax for these files on your particular system.

1.6.3.1 BOOTP Command Fields

The BOOTP response is limited to 1024 bytes. The ViewStation uses the following Bootp fields:

:ha=	hardware address example: :ha=008096006a5c:\
:ip=	IP address example: :ip=128.91.6.15:\
:hd=	home directory example: :hd=/usr/HDSware/hds-fx/image:\
:bf=	bootfile < *filename (limited to 128 chars)* > example: :bf=V303-D.hds:\

1. Turn on the ViewStation and go into Monitor Mode (press "m" when the white screen says "Initializing").

2. If you have HDSware version 3.2, use the configuration file:
   ./hds-fx/config/config.4m

If you don't have HDSware 3.2, edit your configuration file (usually /FXUtilities/hds-fx/config/config.fx) with this line for the server code file:

HDSsetup.ServerCode.file: /FXUtilities/hds-fx/image/V31.hds *[use the appropriate version number]*

3. Enter these values in Monitor Mode:

factory *[this resets the ViewStation to factory defaults]*

ip nnn.nnn.nnn.nnn *[this sets the ViewStation's IP address which is assigned by your system administrator]*

hh nnn.nnn.nnn.nnn *[this sets the HDSware IP address]*

hd <directory path> *[this sets the HDSware directory path]*

boot *[this saves these values and boots the ViewStation]*

This reads the edited configuration file with the V31.hds image file. If you have HDSware version 3.2, enter the values above and include a configuration file line before the boot command:

cf /FXUtilities/hds-fx/config/config.4m

4. These steps boot the ViewStation with the smaller server code file and you will see the root window with the Setup icon.

1.6.2.6 Booting the ViewStation from a VMS Host

If you want to boot the ViewStation from a VMS host, you must first load the HDSware on the host, as in Section 4.3. You must have HDSware version 3.0.4 or higher (in both server code and bootprom) to use this VMS booting procedure.

Use of NFS file transfer is recommended for VMS systems. This is discussed in Section 4.3.4 of this manual.

When you start the ViewStation, press "m" at the beginning of the white screen to enter Monitor Mode. In Monitor Mode, make these settings:

Set the ViewStation's IP address:	**ip** *nnn.nnn.nnn.nnn* also set the netmask and gateway addresses, if needed
Set the HDSware VMS host address:	**hh** *nnn.nnn.nnn.nnn*
Set the HDSware path, VMS syntax:	**hd** <*directory name*> such as: **hd** HDS$HOME
Set the Configuration file:	**cf** /FXUtilities/[hds-fx.config]config.fx note that "FXUtilities" is an abbreviation for the path: **hh** + **hd**

The **ip** entry is the network address assigned by your system administrator; it must be a unique address and it must be appropriate for your local network. It will have four fields of numbers between 0-255 separated by periods.

ip 128.92.61.144

The **hh** entry is the host address where you loaded the HDSware tape. Its form is the same as the IP field.

hh 128.92.60.100

The **hd** entry is the path on the HDSware host to the top of the HDSware directory tree. This is the directory where you loaded the tape. This might be any directory location, but the path should be root-based and go to the /hds-fx directory level. The path might be:

/home/HDSware or */usr2/HDStape or /usr/lib/X11/HDSware*

The important thing to realize is that the ViewStation will add these entries to each other to create a full path, as follows:

/<hh host>/<hd path>/<HDSware directory tree>

Make sure that the paths are complete and don't overlap or the boot procedure will fail.

The **sc** entry is the server code location. This must be a full path specification.

sc /128.92.60.100/home/HDSware/hds-fx/image/V30-D.hds

Note the leading slash and the slash separators. This is the hh host field, the hd path field, and the HDSware location of the boot file. This is the full specification of the server code file location.

Note that a potential problem remains which might prevent ViewStation booting. Monitor mode may correctly specify a path but the file transfer protocol (TFTP) may not be running on your host or it may have some security restriction that would prevent the file being transfered to the ViewStation for booting. This problem and some suggested solutions are discussed in the *HDS ViewStation Owner's Manual*.

1.6.2.5 Booting ViewStations with 4 MB Memory

If you have a ViewStation with only 4MB of memory installed, your ViewStation may not boot with the default settings but show a dark screen with periodic flashing after the white boot screens. Sometimes it may boot correctly and give you a root window with the Setup icon, but it will have so little memory available that you get memory warning messages when you try to start anything.

To boot the 4 MB ViewStation you must use the server code version V32.hds *(with the appropriate version number, but not the V32-D.hds version)*. The Vnn.hds version does not use downloadable clients. This is a fully-functional server with Telnet but does not offer HDSterm (Telnet with VT320 emulation), local window managers, or other HDSperx local clients. These clients can be run from the host computer rather than from the ViewStation.

cf <*filename*>	This sets the configuration file as: </hostIP/path/configfile>
set <*resource value*>	This sets the configuration resource specified
show <*resource value*>	This displays the configuration resource specified
tftp	This selects the TFTP file transfer protocol (default)
ftp	This selects anonymous FTP as the file transfer protocol
nfs	This selects the NFS file transfer protocol
thin	This sets the Ethernet type to "ThinWire" (default)
thick	This sets Ethernet type to "ThickWire" (default = ThinWire)
factory	This resets NVM to Factory Default settings
boot	This saves your settings in NVM; reboots the ViewStation

These commands let you select important ViewStation settings and control the boot process. Note that if you are running on a Token Ring network with a Token Ring interface card installed in the ViewStation, the IP and netmask fields accept Token Ring addresses (such as *ip tr1 nnn.nnn.nnn.nnn*), refer to Section 1.4.3.1 for more details on Token Ring settings.

Other settings can be made in the same way. Monitor Mode is not intended to substitute for Setup Mode, but to provide a way for starting your ViewStation if flashPROM or BOOTP aren't available. Other variables may be necessary for your system, such as a gateway address and netmask setting, or a configuration file location. If you are working with a unit that already has data in NVM (Non-Volatile Memory), you can clear the NVM with the "factory" command.

The "show" and "set" commands let you set any configuration resource, such as:

show HDSsetup.ipaddress

and the ViewStation will report the current HDSsetup.ipaddress setting.

In the same way, you can set any configuration resource, such as:

set HDSsetup.config.file /128.92.1.3/usr/lib/X11/HDSware/hds-fx/config/config.fx

If you are working with a ViewStation that already has data in NVM (Non-Volatile Memory), you can clear the NVM with the "factory" command.

1.6.2.4 Monitor Mode Sample Entries

The syntax of these commands is very important. Spelling and upper/lowercase letters are important.

```
   Command Summary:

   ip xxx.xxx.xxx.xxx - set ViewStation IP address

   gw xxx.xxx.xxx.xxx - set ethernet gateway address

   nm xxx.xxx.xxx.xxx - set ethernet netmask

   hh address - set HDSware host address

   hd directory - set HDSware directory

   sc filename - set Server Code file

   cf filename - set Configuration file

   set resource value - set configuration resource

   show resource- display configuration resource

   tftp or ftp or NFS - use TFTP or anonymous FTP or NFS

   for default file accesses

   thin or thick - set Thin or Thick ethernet

   factory - reset NVM to factory defaults

   boot - save settings in NVM and reboot
:
```

You can start your ViewStation with just three entries - **ip**, **hh**, and **hd**; other commands are optional, but may be necessary in your environment. This minimal boot procedure is recommended, since other settings, such as entries in the configuration file, will override these entries and may prevent booting by giving conflicting settings. If you have not modified the configuration file, you can enter the **hh** and **hd** values (this will automatically load the configuration file), and the correct paths to this file will be found.

You enter commands from the keyboard and they are displayed at the “:” prompt at the bottom of the screen. As you enter values, they appear in the “Current Settings:” block at the top so you can see your entries. When you are finished, type “boot” to save the settings in NVM and reboot the ViewStation.

1.6.2.3 Monitor Mode Commands

This is a list of Monitor Mode commands and their operations.

ip *nnn.nnn.nnn.nnn*	This sets the ViewStation IP address
gw *nnn.nnn.nnn.nnn*	This sets the ViewStation gateway address
nm *nnn.nnn.nnn.nnn*	This sets the ViewStation netmask address
hh *nnn.nnn.nnn.nnn*	This sets the HDSware host address
hd <*path*>	This sets the path to the HDSware directory
sc <*filename*>	This sets the server code file as: </hostIP/path/servercodefile>

1.6.2 Starting from Monitor Mode

If you don’t have local memory for booting your ViewStation and you don’t have the BOOTP network service running, it is convenient to start the ViewStation with Monitor Mode. At the bottom of the white startup screen a message appears: “Press any key to retry or press m to enter Monitor Mode”. When you press “m”, you enter Monitor Mode and a screen appears with a list of Monitor Mode commands. Follow this example to see how Monitor Mode operates.

1.6.2.1 Monitor Mode Key Mappings

When you first turn on the ViewStation, the white screen you see is called the Boot Monitor. If you want to go directly to Monitor Mode to make your settings, you can press the “m” key while the “Initializing” message is displayed (3 seconds); otherwise you have to wait until the boot process finishes in order to get into Monitor Mode.

There are two other keystrokes that can be useful, a “Pause” function to pause (and resume) the boot process, and a “Debug message” function to display more detailed messages (two levels of debug messages, activated with one or two keypresses).

Function	IBM kybd	DEC kybd	Sun4 kybd	Sun5 kybd
Pause (Resume)	Pause	F1 (Hold)	Pause	Pause
Debug mess. (1x or 2x)	PrntScrn	Help	PrSc	PrintScreen

1.6.2.2 Monitor Mode Screen

Monitor Mode is a special ViewStation utility to help you get started. When you enter Monitor Mode a screen appears with a list of Monitor mode commands:

```
HDS ViewStation Boot Monitor


Current Settings:

ViewStation IP Address:1.1.1.1

Gateway: 0.0.0.0

Netmask: 0.0.0.0

HDSware Host Address: 0.0.0.0

HDSware Directory:

Server Code File:

Configuration File: /FXUtilities/hds-fx/config/config.fx

Default File Protocol: TFTP

Ethernet Type: Thin
```

HDS ViewStation:
Starting the ViewStation

This chapter discusses various methods of starting the ViewStation and some common problems sometimes encountered with starting the ViewStation.

Section 1.0 - HDS ViewStation

1.6 Starting the ViewStation

There are three ways to start the ViewStation These are discussed in the *HDS ViewStation Series Owner's Manual*, Chapter 3. These starting methods use:

- Local Storage (flashPROM or internal hard disk)
- Monitor Mode
- BOOTP (network service on your host)

These methods and related considerations are discussed below. ViewStations with 4 MB of memory boot with a special configuration file, see Section 1.6.2.5. Booting from VMS hosts is discussed in Section 1.6.2.6.

1.6.1 Starting from Local Storage

If your ViewStation has a flashPROM card or a disk drive installed, all you have to do is turn on the ViewStation and the monitor. The ViewStation's software is stored in the local memory and is loaded automatically. You will see boot information on a white startup screen and then the root window with the Setup icon in the lower right corner.

1.6.1.1 Starting from a ViewStation Hard Disk

If you have an HDS ViewStation with an internal hard disk drive, your startup procedure is the same as with a flashPROM card.