License Manager's Guide

ArcInfo™ 8

Contents

Introduction

ArcInfo® 8 and ArcSDE™ 8 software require a set of keycodes that unlock the software for your use. These keycodes are managed at each user installation using a network-based license manager. The license manager must be running on your network, and you must have a file containing keycodes to unlock each product and optional extension that your site uses.

The goal of this guide is to help you understand how to perform the tasks involved in administering a license manager and keycode file for your network. This book provides a handy reference when you have a particular license manager task or issue you need to address. The primary audience is the administrator at your site who is responsible for installing and managing the ArcInfo and ArcSDE software on your network.

License Manager Basics

Any supported computer on your network can be configured to use the ArcInfo or ArcSDE software. Their use requires access to the license manager and keycodes that unlock the software for your use.

Your keycode file will have a list of "features" that can be enabled, the number of "seats" available to you, and special keycodes that unlock the software for a number of seats. A keycode file contains information such as:

Feature	No. of users	Keycode
ArcInfo	5	3D189A0518BDEC25C767
ArcSDE Server	1	A45B271B2BEAE50E3EC9
ArcSDE Connects	3	CC0718CB3EC7226EFC52

For example, the first line says that you can have up to five simultaneous ArcInfo users on your network. If five users are using ArcInfo, anyone who tries to start a sixth ArcInfo session will be sent a message that there are no available ArcInfo licenses.

The keycodes that are provided to you by ESRI allow the use of software only on your network. They are based upon a unique identifier for a computer used to generate the keycode. The license manager compares the keycodes in the license file and the unique identifier for a computer to allow access to the software. If the keycode and the unique identifier agree, then software access is granted. If not, the software will not execute.

On UNIX®, the host name and host ID of a selected computer on your network is used to provide this unique identifier. For Windows NT®, no unchangeable host ID is available. Instead, a special hardware key called a "SentinelPro™ Hardware Key" must be installed on one machine on your network. The hardware key provides the unique ID for the license manager.

The license manager is network-based. One machine is used as the license manager server. Any other computer on the network can run the software as long as it is a supported platform. These computers use the license manager across the network to gain access to the ArcInfo and ArcSDE software. In the case of Windows NT, one machine on the network must have the hardware key installed to provide the unique ID for the license manager.

What are the contents of a keycode file?

Keycode files contain the following items:

Feature. Represents specific software capabilities that can be accessed with a keycode. Features may represent core software such as ArcInfo or options that can be purchased (e.g., ARC GRID™, ARC TIN™, and ARC COGO™). Features may also represent specific capabilities such as the number of ArcSDE servers that can be used at any one time, their capacity (i.e., how many simultaneous connections are allowed), enabling map printing, and so forth.

Version. The specific software version of the feature for which the keycode enables the software.

Timeout. The date at which the keycode is no longer valid. Dates of 01-jan-00 represent no timeout. All other dates will stop access to the software on that date.

Seats. The number of simultaneous instances that can be used at any time. Most often, these represent users at their own workstations or terminals. But they may also represent the simultaneous number of servers or connections in use.

License String. The keycode that allows access to the feature for the number of seats. The keycode is based upon a unique identifier provided by a computer or a hardware key on the network. Note that the example below does not represent real keycodes. True keycodes contain two values for the license string.

Checksum. A special verification number used by the license manager.

Figure 1-1 is an example of a license file on NT.

The ESRI Sentinel Key number at the top of the file is a hardware key ID for using ArcInfo on the Windows NT operating system. The hardware key provides a unique identifier on Windows NT networks for the keycodes.

This example also lists some features for ArcInfo and its optional extension products. One of the extensions is ArcSDE

Chapter 2, Managing the License Manager, provides a more complete, technical description of a keycode file and its contents.

Floating Seats and Fixed Seats

With the license manager, you can manage different types of seats on your network. Fixed seats allow software use only on specific machines while floating seats allow you to use the software on any computer on your network. Most ArcInfo seats are floating seats that allow the software to be setup on any machine and used by many users. The number of floating seats limits the use to a number of simultaneous users.

Some ArcInfo seats are fixed seats – referred to as "node-locked" because they are keyed to work only on a particular node on the network. The notion here is that any computer at which the software is used must have a valid license to use the software.

The use of floating and fixed seats is a very common practice used to license the use of software. Typically, you would purchase fewer copies of floating seats than fixed seats to serve your users.

What can you find out about in the rest of this book?

The remainder of this book deals with many important topics that help you configure and manage ArcInfo software at your site. Chapter 1 presents key advanced license manager concepts and describes various methods for running ArcInfo sessions and how they are counted by the license manager. In Chapter 2, you will learn more about license files and their contents, how to install,

Figure 1-1: A sample license file for Windows NT

```
SERVER  test  ESRI_SENTINEL_KEY=37100001  27005
VENDOR  ESRI
FEATURE  ARC/INFO          ESRI  8.01   01-jan-00   10   C205DE4E52F12C39FBBA \
                                 vendor_info="T9LKMLCAD5915TTCLET6"  ck=89
FEATURE  Plotting          ESRI  8.01   01-jan-00    1   0CB75CE80610B7A26267 \
                                 vendor_info="4J7A0P72A1RPNDPECP30"  ck=22
FEATURE  Grid              ESRI  8.01   01-jan-00   10   C06E1E7031DB0DC546AE \
                                 vendor_info="T27HPJ0MH0T6YP5EE073"  ck=41
FEATURE  ArcSdeServer      ESRI  8.01   01-jan-00    2   E18F2308B6CCA4BB5EAC \
                                 vendor_info="JZMPXBMJ53D1CEM9EP65"  ck=28
FEATURE  ArcSdeConnects    ESRI  8.01   01-jan-00  100   BA2A3F2EAB0919A8C931 \
                                 vendor_info="SRY88NK03JRR2Y9M6581"  ck=82
```

start, update, and shut down the license manager process, and how to manage software seats in your organization. Chapter 3 describes advanced tasks such as how to select a license server machine on your network,and how to configure the license manager for multiple applications. In the Appendices, you can find help for troubleshooting your installation, how to interpret various license manager messages, and detailed information about the contents in keycode files.

Once you've obtained your keycode file from ESRI and installed ArcInfo in a multi-user setup, this book will provide useful guidance on managing and maintaining your installation.

License Manager Concepts

A license manager controls access to ArcInfo, ArcSDE and other ArcInfo extensions. It runs on a workstation or server on the network and checks out licenses (called 'seats') when requested by a calling executable.

The workstation or server running the license manager is called the 'license server' for your network. The license server can be any supported UNIX or Windows NT machine and can serve licenses to any UNIX or Windows NT machine on your network.

License management for ESRI software

With ArcInfo 8, ESRI continues to incorporate the network floating license manager FLEXlm®, from GLOBEtrotter® Software, Inc. This means you can use ArcInfo and its extensions all at the same time. Licenses can be distributed across a network (floating seats) as well as locked to specific CPUs on a network (node-locked seats).

ArcInfo 8 supports both UNIX and Windows NT platforms and can share licenses across the UNIX and NT architectures.

New keycodes

ArcInfo 8 takes advantage of the double-encryption keycode functions in FLEXlm. Pre-ArcInfo 8 keycodes will not work with an ArcInfo 8 license server. For this reason, you must acquire new keycodes if you do not already have them. Refer to Chapter 2 of this guide for more information about your ArcInfo 8 license file along with instructions on how to request new keycodes.

Floating seats

The license server distributes seats throughout the network as requested. These are floating seats (or licenses). Anyone on a network can execute ArcInfo and its extensions from their local CPU provided a floating seat is available. If a site has three floating ArcInfo seats, three concurrent users can execute ArcInfo from any workstation console, batch job, or terminal on the network at any one time. A fourth user will receive a message that all ArcInfo licenses are in use.

Floating seats are available for all FLEXlm licensed ESRI software programs on all supported platforms.

Node-locked seats

Node-locked seats are tied to specific UNIX CPUs and are only available on the UNIX workstations to which they are locked.

License features for ArcSDE

ArcSDE is an extension to ArcInfo 8. It has two floating license features: ArcSdeServer and ArcSdeConnects. ArcSdeServer defines the number of ArcSDE servers that may be started on the network. ArcSdeConnects defines the number of ArcSDE connections that may connect to an available ArcSDE server instance.

An ArcSDE server instance consists of a single ArcSDE I/O manager process connected to a DBMS instance. A host machine may have several ArcSDE server instances running on it, but only one may be connected to any DBMS instance. Each ArcSDE server instance uses one ArcSdeServer license.

An ArcSDE connection is made when an application (such as ArcInfo, MapObjects®, or a user-written program) requests a connection to an ArcSDE server and the request is accepted. Mulitple ArcSDE connections from one machine with the same DBMS connection (username and password) use one ArcSdeConnects license. For example, if three ArcSDE client connections exist using Oracle® DBMS, two connected with username and password 'joe' and 'joe'and one with username and password 'oracle' and 'oracle' then two ArcSdeConnects licenses would be used.

Flexible licensing

A network can have both floating and node-locked seats. Node-locked seats are assigned first. When all node-locked seats are in use, the license manager will assign a floating seat if one is available. Floating seats can be checked out by any FLEXlm supported client on a network, which allows users the convenience of working locally or over the network, thereby decreasing the processing bottleneck on one CPU.

License allocation

The license manager server, also known as a license server, allocates seats (or licenses) based on two criteria:

- Whether a session is run locally, remote, or in a batch process.

- Each session is defined by user name, host name and, on UNIX, display. If one of these are changed, the next session will check out another license.

License allocation is not effected by the location of ARCHOME or SDEHOME, nor the location of your working directory.

A local session requires only one license per feature for each user, no matter how many invocations are running. On UNIX, remote sessions require one license per feature for each invocation of ArcInfo or ArcSDE. On Windows NT, a remote Windows Terminal Server (WTS) session requires only one license per WTS desktop, no matter how many invocations are running.

Local session

UNIX

A local session runs on a local UNIX CPU, using the local display device. If you start up an ARC session on your local workstation with the display set locally, you will be running ArcInfo locally and will use only one ArcInfo license no matter how many similar sessions of ARC you start. However, additional licenses will be checked out if the display setting is changed to a different machine.

The same applies to local sessions with X terminals. An X terminal consists of a display device and a CPU that only runs X and it boots off of a host machine where all processes run but X.

If while logged in as one user you then 'su' to another user name, the license manager will use an additional license unless 'xhost' has been enabled for the console on which you are working. To enable 'xhost' on your workstation, use this command:

```
% xhost nodename
```

Systems with multiple display terminals use licenses according to their display configuration. A system with one host and multiple display terminals, each configured as a separate display device, will use as many licenses as there are display devices.

Windows NT

Assigning a license for a local session on Windows NT is defined by a user name and a host name. All ArcInfo or ArcSDE sessions executed by the same user on the same local host check out only one license. For example, if you execute two ARC sessions, one ArcMap session, and one ArcToolbox session on your local computer, you will use only one license.

Remote session

UNIX

If you log in to a remote workstation with either 'rlogin' or 'telnet' to run ARC on it, you use one license per session. Once your display is set, each additional ARC process running in a remote command prompt window takes another license. Any command prompt window executing on a remote host, regardless of where it is being displayed, will use an additional license. For example, suppose your workstation is called geordi. In a local command prompt window, xterm1, you rlogin into the server borg and set your display back to geordi:

```
% rlogin borg
% setenv DISPLAY geordi:0
```

Then you spawn new command prompt windows from xterm1. Each of these, including xterm1, are remote. Each session in each of these command prompt windows will take a license.

If you boot your X terminal locally on a host and you remotely log in to a different workstation and start up ARC, you'll initiate a remote session, thereby taking another license.

If your display is set to a remote machine and you initiate a remote session, you'll take an additional license, even if your ArcInfo session is local, running on your local CPU.

Windows NT

A remote session is possible on Windows NT with the use of Microsoft's Windows Terminal Server (WTS) technology. In a single remote WTS client session, only one license is checked out no matter how many ArcInfo sessions you run within that particular WTS client environment. An additional license will be checked out with each remote WTS client session running ArcInfo.

Batch processes

Processes that run in the background, called batch processes, take one license per ArcInfo session. They include crons, execution of UNIX AT and BATCH commands, and '<' redirect with STDIN (standard input).

If you execute '&system' at an ARC prompt and then start another ARC session you will have started a batch process:

```
% arc

Arc: &system

% arc
```

Same applies to a batch file submitted with the AT command on UNIX or Windows NT. On Windows NT, the following batch job is submitted:

```
C:\> at 8:00 /interactive /every:mwf
C:\users\fred\submit.bat
```

where submit.bat is a batch file that runs ARC every Monday, Wednesday, and Friday. This batch job takes its own license.

The following '&system' calls will not require additional licenses. Each of these is case sensitive and will execute with allowable abbreviations such as '&sys'.

UNIX

```
Arc: &sys arc
Arc: &sys $ARCHOME/bin/arc
Arc: &sys arc info
Arc: &sys info
Arc: &sys $ARCHOME/bin/info
Arc: &sys arc $ARCHOME/bin/info
Arc: &sys $ARCHOME/bin/arc info
Arc: &sys $ARCHOME/bin/arc $ARCHOME/bin/info
Arc: &data arc
Arc: &data $ARCHOME/bin/arc
Arc: &data arc info
Arc: &data info
Arc: &data $ARCHOME/bin/info
Arc: &data arc $ARCHOME/bin/arc info
Arc: &data $ARCHOME/bin/arc $ARCHOME/bin/info
```

Windows NT

```
Arc: &sys arc
Arc: &sys %ARCHOME%\bin\arc
Arc: &sys arc info
Arc: &sys info
Arc: &sys %ARCHOME%\bin\info
Arc: &sys arc %ARCHOME%\bin\info
```

```
Arc: &sys %ARCHOME%\bin\arc info
Arc: &sys %ARCHOME%\bin\arc %ARCHOME%\bin\info
Arc: &data arc
Arc: &data %ARCHOME%\bin\arc
Arc: &data arc info
Arc: &data info
Arc: &data %ARCHOME%\bin\info
Arc: &data arc %ARCHOME%\bin\arc info
Arc: &data %ARCHOME%\bin\arc %ARCHOME%\bin\info
```

On the other hand, if any of the above '&system' calls are executed with redirecting input from a file like this:

```
Arc: &sys arc < 'input_filename'
```

then this is considered a separate batch and will require an additional license.

Ending one of these statements by redirecting the output to a file like this:

```
Arc: &sys arc > 'output_filename'
```

does not require an additional license.

Independent licensing

Each optional extension to ArcInfo is licensed independently, having its own number of licenses and assigned time-out dates. For example, if your site has three ArcInfo node-locked seats, seven ArcInfo floating seats, and one floating seat for ARC GRID™ which is a temporary evaluation purposes, both types of ArcInfo seats will remain active when the ARC GRID evaluation seat expires.

Understanding your installation environment

Your installation may be anything from one standalone workstation to a large network with multiple servers. The following presents some typical configurations. If you have license manager questions outside the scope of this manual, please contact ESRI® Technical Support.

Standalone workstation

A standalone workstation is not connected to any network. The database, ArcInfo and its extensions reside locally, and the license manager is started locally.

Single-server network

On a single-server network, ArcInfo and its extensions reside on a disk on a workstation or server. All users access the executables from this workstation or server, which is also the license manager server.

Multiple-server network

A distributed network environment consists of multiple servers. In this environment, ArcInfo and its extensions are installed on various servers on the network, and you select which server to use. They can share one license server or act independently. If your license server goes down, your UNIX users simply change their ARCHOME or SDEHOME variable to point to an installation on another server, while each of your Windows NT users must uninstall ArcInfo or ArcSDE and reinstall from an alternative server installation. We use this configuration at ESRI.

A redundant backup mechanism can be used in this environment. Refer to 'Redundant server configuration' in Chapter 3 for a detailed discussion.

Mixed configurations

Your installation may have a combination of the configurations presented previously. You may, for instance, have workstations on your network that occasionally need to be configured as standalone. A workstation taken off the network needs to run a local license manager. Suppose your site has purchased ten ArcInfo, five Grid, one ArcSdeServer, and five ArcSdeConnects seats. Your configuration is a single-server network, but workstation A is often removed from the network for demonstrations. In this situation, you should obtain two license files: one for workstation A and one to accommodate the rest of the network. The license file for workstation A will license one ArcInfo and one Grid seat; the license file for the network will license the remaining seats. When workstation A is removed from the network, it will only have access to seats for ArcInfo and Grid, while the remaining license server on your network will have seats for ArcInfo, Grid, ArcSdeServer and ArcSdeConnects.

Another likely configuration is one where multiple servers share the same network but serve different departments. Each department may want to manage its own licensing instead of sharing with the other departments. In this situation, each department should be configured as a separate single-server network.

Managing the License Manager

2

The license manager runs on both UNIX and on Windows NT. These operating systems require different components and management methods. This chapter describes how to:

- Handle license files

- Install, start, update, and shut down the license manager

- Use PC X emulators for UNIX and Windows Terminal Server on NT

- Manage seats on a network

Components of the license manager for UNIX

The license manager consists of a FLEXlm license manager daemon (lmgrd), a vendor daemon (ESRI), a license manager utility (lmutil), and other related files. These are distributed with ArcInfo and its extensions to be installed with the software. Each of these components are installed under the $ARCHOME/sysgen or $SDEHOME/sysgen directories.

The license manager daemon, lmgrd, handles the initial contact with ESRI software applications, passing the connection on to the vendor daemon (ESRI). It also starts and restarts the ESRI vendor daemon after ten minutes.

The ESRI vendor daemon keeps track of how many licenses are checked out, and who has them. ESRI software applications communicate with the ESRI vendor daemon through TCP/IP. If your ESRI vendor daemon terminates for any reason, all of your users will lose their licenses; this does not mean the ESRI applications suddenly stop running. Normally, your users will regain their licenses automatically when lmgrd restarts the ESRI vendor daemon.

The license manager utility, lmutil, is used by your license administrator to help manage the licensing activities on your network. It has eight options:

- lmdown—shuts down the license and vendor daemons
- lmdiag—diagnoses a problem when a license cannot be checked out
- lmhostid—returns the FLEXlm hostid of a workstation
- lmremove—removes seats and returns them to the license pool
- lminstall—used to install the license file
- lmreread—informs the license daemon of changes in the license file

- lmstat—reports on the status of the daemons and the seat usage
- lmver—displays the version of a licensed executable

The license file

The license file, license.dat, contains the information the ESRI vendor daemon reads to manage the seats on your network:

- The license server nodes (host names) and hostids
- The vendor daemon
- The software licensed at your site with keycodes for each

This information is found within the four supported line types: SERVER, VENDOR, FEATURE, and UPGRADE.

The SERVER line identifies the host name and hostid of the node on the network that will be the license manager server along with the TCP/IP port number through which it communicates. The host name is the name of the computer. The hostid on UNIX is the unique CPU ID.

At the end of the SERVER line is the TCP/IP port number, '27005'. Setting the port number in the license file is optional. However, we set the default port to 27005 for two reasons:

- To reduce port number conflict with other software vendors.
- To allow you to set the <port>@<host> argument with the ESRI_LICENSE_FILE variable, thereby permitting you to share licenses across all supported architectures. Refer to the 'Advanced license manager' chapter for more details on <port>@<host>.

If the TCP/IP port number is not set in the license file, FLEXlm will default to an open port within the 27000 through 27009 range.

The VENDOR line identifies the vendor daemon, ESRI.

The FEATURE line defines what ESRI software features you are licensed for, how many seats you will have access to and the length of time they will be available. It contains:

• The feature information for ArcInfo and other optional extensions licensed at your site

• The ESRI vendor daemon which manages each software program

• The software version

• The time-out date

• The number of seats licensed

• A hexadecimal-encrypted keycode string

• The vendor_string="" encrypted string

• A checksum

ArcInfo 8 uses a double-encryption keycode technique. Hence, pre-ArcInfo 8 keycodes will not work with an ArcInfo 8 license manager server. Only keycodes containing double-encryption will work with the ArcInfo 8 software. Refer to the Requesting keycodes section of this chapter for information about how to acquire your ArcInfo 8 keycodes.

For UNIX node-locked seats, the hostid of the node to which the seats are locked is added at the end of the FEATURE line, and the FEATURE has an asterisk directly after its name (e.g., ARC/INFO*).

Figure 2-1 is an example of a UNIX license file. The first FEATURE line listed has node-locked seats locked to a workstation with a hostid of 124b2d31. Note that the ARC/INFO feature name is followed by *124b2d31.

Note: 8.01 is the software version for ArcInfo 8 while 7.21 is the version for ArcInfo 7.x.

The UPGRADE line allows you to upgrade some of the seats associated with a particular FEATURE line to a newer software

Figure 2-1: A sample license file for UNIX

```
SERVER picard 325a2b57 27005
VENDOR ESRI
FEATURE ARC/INFO*124b2d31 ESRI  8.01  01-jan-00  10 EBE68031B95FE21231B8 /
                   vendor_info="19AA0708S0AED0PDXT58" ck=12
FEATURE ARC/INFO*325a2b57  ESRI  7.21   01-jan-00  6 6D0A1E1B82123D21B95F /
                   vendor_info="F086T58L0PDPBFS0AEDX" ck=12
UPGRADE ARC/INFO*325a2b57  ESRI   7.21   8.01  01-jan-00  3 B951B8EBE682123031FE /
                   vendor_info="A0XT708PD5S019AAED08" ck=56
FEATURE ARC/INFO          ESRI   7.21   01-jan-00  5 0B06D0A1D2E928A7D321 /
                   vendor_info="08S058PDXT78CASRLBHP" ck=45
UPGRADE ARC/INFO          ESRI   7.21   8.01   01-jan-00  3 1B8E10717057F3FB75BD \
                   vendor_info="5ZHFNFF086LPBF3SE037" ck=215
```

version. It defines which ESRI software programs to upgrade, how many seats, and for how long. It contains:

- The licensed feature you have upgraded
- The ESRI vendor daemon
- The older software version stated in the associated FEATURE line
- The newer, upgraded software version
- The time-out date
- The number of seats upgraded
- A hexadecimal-encrypted keycode string

- The vendor_string="" encrypted string
- A checksum

The sample license file shown in Figure 2-1 lists two examples of UPGRADE lines. One upgrades three node-locked seats for the ARC/INFO*325a2b57 feature, and another upgrades three seats for the ARC/INFO floating feature. Both examples have the time-out date of 01-jan-00 (e.g., the no time-out date).

A listing of all ESRI licensed software features on UNIX and their keywords for both floating and node-locked seats can be found in Table 2-1.

Table 2-1: All ESRI licensed Features for UNIX

Software	Features	Floating keyword	Node-locked keyword
ArcInfo	ARC/INFO	ARC/INFO	ARC/INFO*\<lmhostid\>
	ArcExpress	ArcExpress	ArcExpress*\<lmhostid\>
	ArcPress	ArcPress	Not applicable
	ArcScan	ArcScan	ArcScan*\<lmhostid\>
	ArcSdeConnects	ArcSdeConnects	Not Applicable
	ArcSdeServer	ArcSdeServer	Not Applicable
	ArcSdl	Not Applicable	ArcSdl*\<lmhostid\>
	ArcStorm	ArcStorm	Not applicable
	ArcStormEnable	ArcStormEnable	Not applicable
	COGO	COGO	COGO*\<lmhostid\>
	GeoStats	GeoStats	Not applicable
	Grid	Grid	Grid*\<lmhostid\>
	Network	Network	Network*\<lmhostid\>
	Plotting	Plotting	Plotting*\<lmhostid\>
	TIFFLZW	TIFFLZW	Not applicable
	TIN	TIN	TIN*\<lmhostid\>

Note: ArcStormEnable and Plotting are not licensed extensions. ArcStormEnable is required for ArcStorm to function properly. A seat is automatically issued to all sites receiving ArcStorm keycodes. Plotting is required to enable plot conversion at your site. All sites receive a plotting seat.

A complete description of the license file format and command references for license manager executables is included in Appendix B of this guide.

Time out dates and the next century

The 'no time-out' date for ESRI keycodes is '1-jan-00'. Licenses associated with a FEATURE or UPGRADE line containing '1-jan-00' will never time-out, even past January 1, 2000. Any other time-out date will time out on that date, (e.g., 04-apr-2000 will time out on April 4th, 2000).

A combined license.dat file

The vendor daemon, ESRI, can only be started on a server node once. If your site has installed several ESRI software programs on the same workstation or server, this daemon cannot be started for each of the applications. The solution is to combine license files.

You can create a single UNIX license.dat file by combining license files for all of the applications requiring the FLEXlm license manager. Only the VENDOR and FEATURE lines from any one host can be combined into a single license.dat file. The SERVER line also contains the unique hostid. All FEATUREs are tied to this unique hostid.

For UNIX, the license file is located in the $ARCHOME/sysgen (ArcInfo) and $SDEHOME/sysgen (ArcSDE, an ArcInfo extension) directories, and it is installed as the license.dat file. To run ArcInfo in the combined configuration, the same

Figure 2-2: Combined UNIX license file

```
SERVER picard 325a2b57 27005
VENDOR ESRI
FEATURE ARC/INFO     ESRI 7.21 01-jan-00 20 3BDEA05185CC2D189767 /
                     vendor_info="8CASRLBHPPDXT708S058" ck=57
FEATURE Plotting     ESRI 7.21 01-jan-00  1 FB3E009124469CF7F108 /
                     vendor_info="XALP200EFXNPP245F002" ck=35
UPGRADE ARC/INFO     ESRI 7.21 8.01 01-jan-00 10 3BDEA05185CC2D189767 /
                     vendor_info="CB5EF051399A9BA1B7D6" ck=70
UPGRADE Plotting     ESRI 7.21 8.01 01-jan-00  1 TT3SGKHSTM7C5HARR022 /
                     vendor_info="XALP200EFXNPP245F002" ck=22
FEATURE Grid         ESRI 8.01 01-jan-00 20 CB5EF051399A9BA1B7D6 /
                     vendor_info="TT6ZR2P3PP06RJZTN019" ck=242
FEATURE ArcSdeServer ESRI 8.01 1-jan-00   3 CB5EF051399A9BA1B7D6 /
                     vendor_info="TT6ZR2P3PP06RJZTN019" ck=192
FEATURE ArcSdeConnects ESRI 8.01 1-jan-10  30 FB3E009124469CF7F108 /
                     vendor_info="XALP200EFXNPP245F002" ck=63
```

license.dat file must be located each respective /sysgen directory. Any copy can be used to start up the license manager.

In Figure 2-2, this combined license file contains ArcInfo 7.21 licenses, ArcInfo 8.01 upgrade licenses, and 8.01 licenses for both the ArcSDE and Grid extensions. All licenses in each of the FEATURE and UPGRADE lines are tied to the same server and they all rely on the same ESRI vendor daemon. Hence, only one VENDOR line is needed in the file. When different software applications use different daemons, each daemon must be included in the combined license file.

Adding new software or licenses to the UNIX license file

When new software is licensed at your site or additional seats are purchased, the license file must be edited to reflect these changes. A new FEATURE or UPGRADE line may be added if new software is purchased. If the number of seats for an existing FEATURE or UPGRADE line has been changed, these lines can be replaced with new ones provided by ESRI Customer Service or your international distributor. In either case, the license manager daemons must be informed of the changes before they can be made available. Refer to the section on 'Updating the license manager daemons' in this chapter for more details.

Requesting keycodes

Keycodes to unlock ESRI software using the FLEXlm license manager are contained in the license.dat file.

Domestic sites

Go to this web site to request your keycodes:

//www.myESRI.com

Enter all required information, including the unique host name and hostid for each workstation or server you intend to use as your license server(s).

If you experience any problems with this web site, contact ESRI Customer Service directly at 1-888-377-4575.

International sites

Contact your local ESRI software distributor for keycode information. ESRI-Redlands cannot respond to requests for keycodes received directly from international users.

Getting the host name of a workstation

1. Execute HOSTNAME at a command prompt.

2. Use the returned hostname in your keycode request.

1 `% hostname`

Getting the FLEXlm hostid of a workstation

1. Install ArcInfo or ArcSDE.

2. Set the appropriate system variables described in your Installation Guide.

3. Change directory into the $ARCHOME/sysgen or $SDEHOME/sysgen directory.

4. Execute LMUTIL LMHOSTID at a command prompt.

5. Use the returned hostid in your keycode request.

3
```
% cd $ARCHOME/sysgen
OR
% cd $SDEHOME/sysgen
```

4 `% ./lmutil lmhostid`

Installing the license file on UNIX

Once you receive your license.dat file containing your keycodes, install it as a file on disk.

Installing a license file

1. Save the license file to disk as license.dat.

2. Copy it into the appropriate /sysgen directory.

   $ARCHOME/sysgen or $SDEHOME/sysgen

2
```
% cp license.dat $ARCHOME/sysgen/
license.dat
```

OR

```
% cp license.dat $SDEHOME/sysgen/
license.dat
```

Running the license manager on UNIX

Starting the license manager

Before starting the license manager on a UNIX workstation, you need to determine whether this workstation will serve licenses for a single or multiple ESRI software programs.

Starting the license manager for a single ESRI software program requires that the license file be correct and located under the appropriate /sysgen directory.

ArcInfo and ArcSDE may use different license servers. For example, ArcSDE may be installed and managed from Server A while ArcInfo is installed and managed from Server B. In this case, separate license files are required, one for each distinct license server.

Alternatively, the license manager can be used by ArcInfo and ArcSDE concurrently. Suppose your site has installed and received license files for ArcInfo and ArcSDE. These applications are likely to use the same node as their license server although the license file for each of these applications will be located in their respective installation directories.

Before starting the license manager for multiple ESRI software programs on a single UNIX workstation, you should consider these points:

- A combined license file (license.dat)
- ESRI_LICENSE_FILE variable
- Multiple vendor daemons (ESRI and non-ESRI software vendor daemons)

A combined license file

You can centralize all of your ESRI software licenses onto a single UNIX license server by combining multiple license files into a single file.

Combining UNIX license files was discussed previously in `The UNIX license file' discussion in this chapter. Refer to this discussion for more information.

ESRI_LICENSE_FILE variable

Using the ESRI_LICENSE_FILE variable provides additional flexibility. It allows you:

- To take advantage of licenses from any ESRI supported license server (UNIX or Windows NT) on your network.
- To explicitly state pathnames to various UNIX license servers.

This variable is set on the client side, in each client's .login file.

Refer to 'Environment variables: ESRI_LICENSE_FILE and LM_LICENSE_FILE' in Chapter 3 for more details on how to set and use this variable.

Multiple vendor daemons (ESRI and non-ESRI software)

The license manager can support vendor daemons of different software manufacturers on a single license server. To do this, the license files must be combined. Refer to 'Combining license files on UNIX from more than one vendor' in Chapter 3 for more details.

Remember, only one ESRI daemon can run at a time on a single license server. If ArcInfo and ArcSDE are used on a single license server, you have two ways to serve them. You can either combine the license.dat files or start lmgrd with multiple license files using multiple '-c <license file>' strings where <license file> is the pathname to a license.dat file.

FLEXlm version requirements

For multiple software programs to rely on a single license manager, you must use the newest version of FLEXlm to

administer your licenses. Listed in Table 2-2 are the versions of FLEXlm used in ESRI UNIX software.

Table 2-2: Versions of FLEXlm in ESRI software (UNIX)

FLEXlm	ESRI Software on UNIX
6.1f	ArcInfo 8.01 ArcSDE 8.01
6.0b	ArcInfo 7.2.1 ArcView GIS 3.1 & 3.2 ArcSDE 3.0.1/3.02
4.1	ArcInfo 7.1.x series ArcView GIS 3.0 series ArcSDE 3.0
2.4	ArcInfo 7.0x series ArcView GIS 2.x series

Suppose your site uses ArcInfo 8.0.1 along with ArcView GIS 3.2. You must use the ArcInfo 8.0.1 license manager to administer your ArcInfo and ArcView GIS licenses.

Starting the license manager on UNIX

Although the license manager can be started by any user account, it should be installed and started from a restricted, administrative account.

After confirming that neither the lmgrd nor the ESRI daemons are running, you can start the license manager from either the ArcInfo or the ArcSDE installation directory.

The FLEXlm license manager can be used to administer licenses for a single or multiple ESRI software programs.

Tip

Starting the license manager for multiple ESRI software programs

A combined license file is used in this instance and it is found under the $ARCHOME/sysgen and $SDEHOME/sysgen directories.

Starting the license manager for one ESRI software program

1. RLOGIN to your license server as the administrator account who started the license manager daemons.

2. Change directory into your $ARCHOME/sysgen or $SDEHOME/sysgen directory.

3. Execute LMGRD at the command prompt while redirecting the output to the local console.

   Or start the license manager while redirecting output to a file.

4. Verify the license manager has started and is running properly. Start up the application.

   Or execute LMUTIL LMSTAT at the command prompt.

1   `% rlogin <license_server>`

2   `% cd $ARCHOME/sysgen`
    OR
    `% cd $SDEHOME/sysgen`

3   `% ./lmgrd -c license.dat > /dev/console`
    OR
    `% ./lmgrd -c license.dat > license.log`

4   `% arc`
    OR
    `% ./lmutil lmstat -a -c license.dat`

Starting the license manager for multiple ESRI software programs

1. RLOGIN to your license server as the administrator account who started the license manager daemons.

1   `% rlogin <license_server>`

2. Change directory into your $ARCHOME/sysgen or $SDEHOME/sysgen directory.

2
```
% cd $ARCHOME/sysgen
OR
% cd $SDEHOME/sysgen
```

3. Confirm that the combined license file is present and contains licenses for the appropriate ESRI software programs.

   Each licensed FEATURE should be present in the license file.

3
```
% more license.dat
```

4. Execute LMGRD at the command prompt while redirecting the output to the local console.

   Or start the license manager while redirecting output to a file.

   Or start the license manager with multiple license files.

4
```
% ./lmgrd -c license.dat > /dev/console

OR

% ./lmgrd -c license.dat > lmgrd.log

OR

% ./lmgrd -c <path to ArcInfo license.dat>
   -c <path to ArcSDE license.dat>
```

5. Verify that the license manager has started properly. Execute LMUTIL LMSTAT at the command prompt.

   Or start up the application.

5
```
% ./lmutil lmstat -a -c license.dat

OR

% arc
```

Updating the license manager on UNIX

When new software is licensed at your site or additional seats are purchased, the license file must be edited to reflect these changes. A new FEATURE or UPGRADE line may be added if new software is purchased. If the number of seats for an existing FEATURE or UP-GRADE line has been changed, these lines can be replaced with new ones provided by ESRI Customer Service or your international distributor. In either case, the license manager daemons must be informed of the changes before they can be made available.

Use the lmreread option to the licensing utility, lmutil, to inform the license manager daemons of these changes. The lmreread option does not shut down the daemons and thus can be executed at any time. Once the licence file has been edited, save your file and then execute lmutil lmreread.

Updating the license manager daemons

1. rlogin to your license server as the administrator account who started the license manager daemons.

2. Change directory into your $ARCHOME/sysgen or $SDEHOME/sysgen directory.

3. Execute LMUTIL LMREREAD at the command prompt to tell the license daemons what's been changed in the license file.

1 `% rlogin <license_server>`

2 `% cd $ARCHOME/sysgen`
OR
`% cd $SDEHOME/sysgen`

3 `% ./lmutil lmreread -c license.dat`

Shutting down the license manager on UNIX

Use the lmdown option of the licensing utility, lmutil, to shut down the license manager daemons. If the license manager is not shut down properly, you may experience problems restarting it. Shut down the license manager as the administrator account who started it.

Shutting down the license manager daemons

1. RLOGIN to your license server as the administrator account who started the license manager daemons.

2. Change directory into your $ARCHOME/sysgen or $SDEHOME/sysgen directory.

3. Execute LMUTIL LMDOWN at the command prompt.

   You will be prompted to confirm shut down. To suppress this confirmation dialog, execute LMUTIL LMDOWN with the quiet option, '-q'.

1
```
% rlogin <license_server>
```

2
```
% cd $ARCHOME/sysgen
```
OR
```
% cd $SDEHOME/sysgen
```

3
```
% ./lmutil lmdown -c license.dat
```
OR
```
% ./lmutil lmdown -q -c license.dat
```

Components of the license manager for Windows NT

The license manager consists of a FLEXlm license daemon (lmgrd), a vendor daemon (ESRI), two license manager utilities (lmtools and lmutil), and other related files. These are distributed on the release media for ArcInfo and its extensions, and are automatically installed with the software. Each of these components reside under <SystemDrive>:\Program Files\ESRI\License.

The license manager daemon, lmgrd, handles the initial contact with ESRI software applications, passing the connection on to the vendor daemon (ESRI). It also starts and restarts the ESRI vendor daemon.

The ESRI vendor daemon keeps track of how many licenses are checked out, and who has them. ESRI software applications communicate with the ESRI vendor daemon through TCP/IP. If your ESRI vendor daemon terminates for any reason, all of your users will lose their licenses; this does not mean the ESRI applications suddenly stop running. Normally, your users will regain their licenses automatically after 10 minutes when lmgrd restarts the ESRI vendor daemon.

The license manager utilities, lmtools and lmutil, are used by your license administrator to help manage the licensing activities on your network. Although both tools are based on the same functionality, one has a graphical user interface (lmtools) and the other is command line driven (lmutil). Each provide eight different options:

- lmdown—shuts down the license and vendor daemons
- lmdiag—diagnoses a problem when a license cannot be checked out
- lminstall—used to install the license file
- lmremove—removes seats and returns them to the license pool

- lmreread—informs the license daemon of changes in the license file
- lmstat—reports on the status of the daemons and the seat usage
- lmver—reports on the version of a FLEXlm licensed executable

Other related items residing under <SystemDrive>:\Program Files\ESRI\License are:

- esrihostid.exe — reports the hostid
- REBOOTNT.EXE — reboots your system after installation
- drivers directory — contains SentinelPro™ Hardware key driver executables
- services directory — contains the FLEXlm License Manager service installer
- license files — created during installation.

The lmtools utility for Windows

FLEXlm offers the lmtools license manager utility. It is a 32-bit Windows application with a graphical user interface (GUI) to all of the functions provided in lmutil. We provide a shortcut to this utility at Start > Programs > ArcInfo > License Manager > License Manager Tools.

This utility allows you to manage a local license manager server or one on the network. To use this tool, you must first define which license manager server you want to manage. The tools available within this GUI utility are based on your selecting a local or network license manager server.

To select a license manager server, you must define a license file (local or on the network) or a local Service. This is done by selecting one of two radio buttons: Configuration using License

File or Configuration using Services. These are shown in Figure 2.3. If you choose 'Configuration using License File', you can enter the path to a license file (local or on the network), browse for a license file (local or on the network), or enter a <port>@<host> value. Conversely, if you choose Configuration using Services, each FLEXlm service on your local machine will be listed. You then select the service you want to administer (ESRI License Manager).

When your selection is based on a license file, the assumption is the license file is on a remote server. In this case, the functions provided under each tab in the GUI are defined based on what can be executed on a remote license server. They are as follows:

- Systems Settings— provides the hostid and time settings for your license manager server

- Utilities—provides check sum validation of the license file and version information for any FLEXlm file specified

- Stop/Reread—lists the specified server, and allows you to shut down the license manager server or reread the license file

- Switch Report Log—allows you to switch the report log file location

- Server Status—allows you to monitor the license manager server status or to examine an individual daemon, feature, or server

- Server Diagnostics—helps diagnose problems when you're unable to get a license

Figure 2.3: The main menu in LMTOOLS
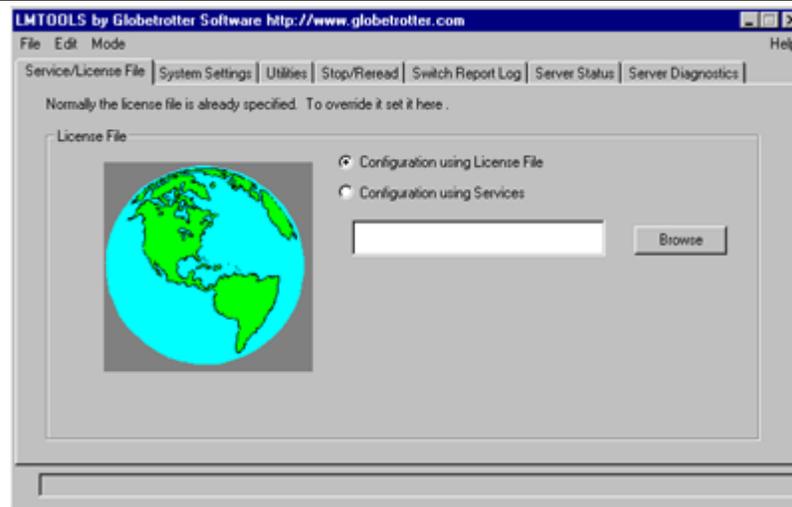
When your selection is based on a service, the assumption is the service is local. In this case, these are the available tabs and their functions:

- Systems Settings— provides the hostid and time settings for your license manager server

- Utilities—provides check sum validation of the license file and version information for any FLEXlm file specified

- Start/Stop/Reread—lists all license manager services, along with allowing you to start up a listed service, shut one down, or update it by rereading a license file

- Server Status—allows you to monitor the license manager server status or to examine an individual daemon, feature, or server

- Server Diagnostics—helps diagnose problems when you're unable to get a license

- Configure Services—allows you to remove a license manager service, change the path to the lmgrd executable, change the path to the license file, set or change the path to the debug log file, and set the service start up time at boot up.

The license files

A license file exists for each ESRI software feature you have keycodes for. For example, if you installed ArcInfo Workstation with keycodes for ARC/INFO, Grid and Network, three separate license files will exist: ARCINFO.lic, Grid.lic, and Network.lic.

Each license file contains the information the daemons read to manage the seats on the network:

- List of license server nodes (host names) and hostid

- The vendor daemon and its location

- List of software licensed at the site and the keycode for each

This information is found within the four supported line types: SERVER, VENDOR, FEATURE, and UPGRADE .

The SERVER line identifies the host name and hostid of the node on the network that will be the license manager server along with the TCP/IP port number through which it communicates. The host name is the name of the computer. The hostid on Windows NT is the number assigned to your SentinelPro Hardware key. This number is printed on the key, prefaced with ESRI_SENTINEL_KEY.

At the end of the SERVER line is the TCP/IP port number, '27005'. Setting the port number in the license file is optional. However, we set the default port to 27005 for two reasons:

- To reduce port number conflict with other software vendors.

- To allow you to set the <port>@<host> argument with the ESRI_LICENSE_FILE variable, thereby permitting you to share licenses across all supported architectures. Refer to the 'Advanced license manager' chapter for more details on <port>@<host>.

The VENDOR line identifies the vendor daemon, ESRI.

The FEATURE line defines what ESRI software features you are licensed for, how many seats you will have access to and the length of time they will be available. It contains:

- The feature information for ArcInfo and other optional extensions licensed at your site

- The ESRI vendor daemon which manages each software program

- The software version

- The time-out date

- The number of seats licensed

- A hexadecimal-encrypted keycode string

- The vendor_string="" encrypted string

- A checksum

ArcInfo 8 uses a double-encryption keycode technique. Hence, pre-ArcInfo 8 keycodes will not work with an ArcInfo 8 license manager server. Only keycodes containing double-encryption will work with the ArcInfo 8 software. Refer to the Requesting keycodes section of this chapter for information about how to acquire your ArcInfo 8 keycodes.

The UPGRADE line allows you to upgrade some of the seats associated with a particular FEATURE line to a newer software version. It defines which ESRI software features to upgrade, how many seats, and for how long. It contains:

- The licensed feature you have upgraded

- The ESRI vendor daemon

- The older software version stated in the associated FEATURE line

- The newer, upgraded software version

- The time-out date

- The number of seats upgraded

- A hexadecimal-encrypted keycode string

- The vendor_string="" encrypted string

- A checksum

Figure 2-4 is an example of a Windows NT license file. It has both FEATURE and UPGRADE lines for the ARC/INFO, Plotting and Grid software programs. 8.01 is the software version for ArcInfo 8 while 7.21 is the version for ArcInfo 7.x.

Table 2-3 lists all ESRI licensed software features available on Windows NT. Although ArcStormEnable and Plotting are listed, they are not licensed extensions. Instead, they are required to

Figure 2-4: A sample license file for Windows NT

```
SERVER x ESRI_SENTINEL_KEY=37100001 27005
VENDOR ESRI
FEATURE ARC/INFO       ESRI 7.21  01-jan-00   5 271E4AA1B5EA018B9FF5 \
                  vendor_info="7ALC1RNE10JEZB6ED061" ck=21
FEATURE Plotting       ESRI 7.21  01-jan-00   1 FE00912446B39CF7F108 \
                  vendor_info="XALXNPP245F00P200EF2" ck=17
FEATURE Grid           ESRI 7.21  01-jan-00   5 DB8ACBEF0315D6B4AE9F \
                  vendor_info="EJDJHE7HTK0C3H5B7P39" ck=67
UPGRADE ARC/INFO       ESRI 7.21 8.01  01-jan-00   3 1B1E27BBDC7850412EE3 \
                  vendor_info="5ZZZB6H1ED6EAAST6024" ck=99
UPGRADE Plotting       ESRI 7.21 8.01  01-jan-00   1 211F95BCEC011053C4AA \
                  vendor_info="7A61CP6D4LMSMNL43201" ck=100
UPGRADE Grid           ESRI 7.21 8.01  01-jan-00   3 4B853EE48432E20310C4 \
                  vendor_info="9FFTE9LMY9BZG5G03170" ck=201
```

Table 2-3: All ESRI licensed features for Windows NT

Software	Features
ArcInfo	ARC/INFO
	ArcPress
	ArcScan
	ArcSdeConnects
	ArcSdeServer
	ArcStorm
	ArcStormEnable
	COGO
	GRID
	NETWORK
	TIFFLZW
	TIN
	Plotting

enable ArcStorm or plot conversion, respectively. All sites receive a Plotting seat while only those sites who have purchased ArcStorm receive an ArcStormEnable seat.

Adding new software or licenses to the Windows NT license file

When additional seats are purchased or new software is licensed at your site, the license file must be updated to reflect the changes. A new FEATURE may be added if new software is purchased, or the number of seats for an existing FEATURE may be increased. In either case, the license manager daemons will have to be informed of the changes before FEATUREs can be made available.

Requesting keycodes

You should acquire your site's license file before installing ESRI software on Windows NT. This file contains your site's keycodes, which unlock ESRI software using the FLEXlm license manager.

Domestic sites

You can request your keycodes on the web at this location:

//www.myESRI.com

Enter all required information, including the unique host name and ESRI_SENTINEL_KEY ID for each workstation or server you intend to use as your license server(s).

If you experience any problems with this web site, contact ESRI Customer Service directly at 1-888-377-4575.

International sites

Contact your local ESRI software distributor for keycode information. ESRI-Redlands cannot respond to requests for keycodes received directly from international users.

Getting the host name of your NT workstation

1. Open the Control Panel and click on Network.

2. Click on the Protocols tab.

3. Select TCP/IP and click on Properties.

4. Click on the DNS tab.

5. Use the host name stated in the Host Name box.

Getting the ESRI_SENTINEL_KEY ID

1. Look for the 8-digit number starting with '371' printed on one side of your SentinelPro Hardware key.
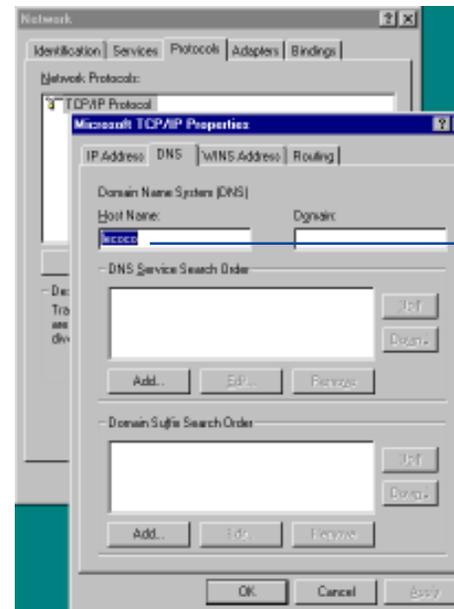
Running the license manager on Windows NT

Installing the license manager

The license manager should be installed when ESRI software programs requiring the FLEXlm license manager are installed. You must have valid ArcInfo 8 keycode information before you install software.

If you do not have valid keycodes, the installation will allow you to point to an existing ArcInfo 8 license manager server on your network.

To accommodate multiple ESRI software programs on Windows NT, the license manager is installed at <SystemDrive>:\Program Files\ESRI\License. This allows the license manager to operate autonomous to ESRI software. The vendor daemon (ESRI) need only be started once on a single license server. In this scenario, you must use the newest version of FLEXlm to administer your licenses. After rebooting, the license manager service—ESRI License Manager—will administer licenses to new and old installations of ESRI software.

Listed in Table 2-4 are the versions of FLEXlm embedded in ESRI software on Windows NT.

Table 2-4: Versions of FLEXlm in ESRI software (Windows NT)

FLEXlm	ESRI Software on Windows NT
6.1f	ArcInfo 8.01 ArcSDE 8.01
6.0i	ArcInfo 7.2.1 ArcSDE 3.0.1
4.1	ArcInfo 7.1.x series

Installing with a new or preexisting license file

Valid keycode information can be found in your license file. A new license file is what you receive from ESRI Customer Service or an International Distributor when you request keycodes. You should receive this file via e-mail. If you do not have e-mail, you should receive it by way of FAX.

A preexisting license file is the file created and written to disk during a previous ArcInfo 8 installation. This file is found under <SystemDrive>:\Program Files\ESRI\License as <feature>.lic. The installation program reads these files as is. Do not alter these files as doing so will invalidate their contents.

The installation allows you to install keycode information digitally or manually. To import digital keycodes, use the keycode information sent to you via e-mail by ESRI Customer Service or your international distributor. Save it to disk as a text (.txt) file. The installation will allow you to browse for this file on disk and will confirm the validity of its contents.

To import your keycode information manually, use the 'Create' option in the 'Import License Information' menu during the installation. Manual input is required if your keycode information is not digital. This would be the case if you received your keycode information by way of FAX.

Installing on a preexisting license manager installation

The ArcInfo 8 installation program will overwrite a previously installed license manager thereby upgrading the contents in the <SystemDrive>:\Program Files\ESRI\License directory.

You needn't alter preexisting installations of an ArcInfo 7.2.1 or ArcSDE 3.0 license manager because the ArcInfo 8.0.1 and ArcSDE 8.0.1 installation programs recognize the license manager location as <SystemDrive>:\Program Files\ESRI\License.

Multiple ESRI software programs using multiple license servers

ESRI software may use different license manager servers. For example, ArcInfo may be installed and managed from Server A while ArcSDE is installed and managed from Server B. In this case, separate license files are required, one for each license manager server. The SERVER line in each file is specific to a particular server. Each license server will also require a hardware key.

Starting the license manager on NT

The license manager is run as a service (ESRI License Manager) on NT. You can start this service different ways once the license manager is installed. The first method is recommended.

- Reboot your machine
- Use the License Manager Tools utility under the ArcInfo > License manager group folder
- Use the Services utility in the Control Panel
- Execute lmgrd.exe from the command prompt.

Rebooting your machine

1. Click on the Start menu, then Shut Down.

2. Select 'Restart your computer' in the Shut Down Windows menu.

3. Click on Yes.
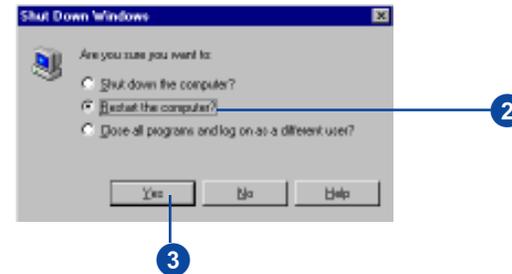
Using the License Manager Tools utility

1. Open the License Manager Tools utility in Start > Programs > ArcInfo > License Manager.

2. Select Configuration using Services in the Service/License File tab.

3. Select ESRI License Manager.

4. Click on the Start/Stop/Reread tab.

5. Click on Start Server.
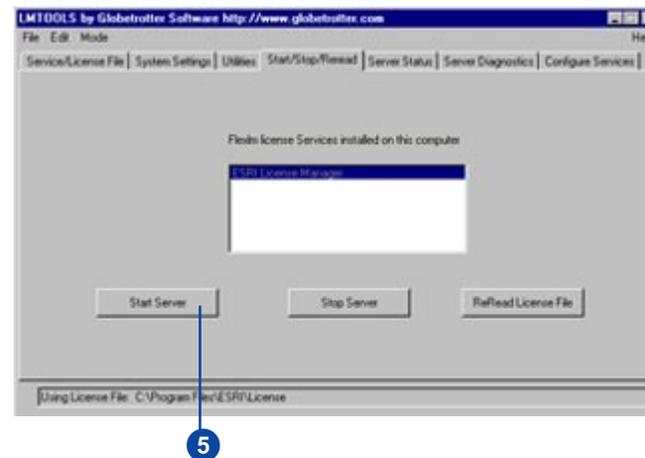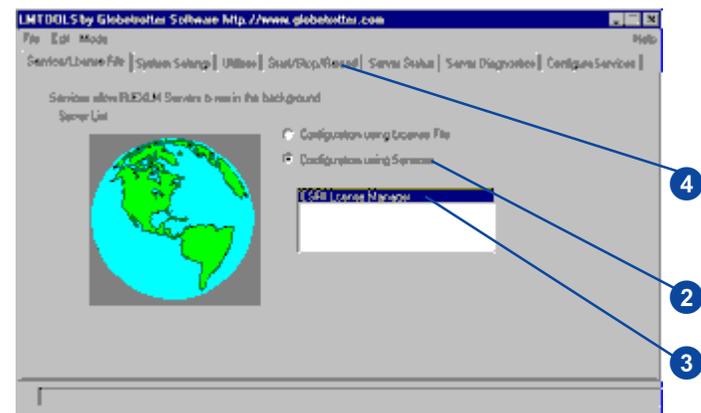
Using Control Panel > Services

1. Open the Control Panel and click on Services.

2. Scroll to the 'ESRI License Manager' service and select it.

3. Click on Start.
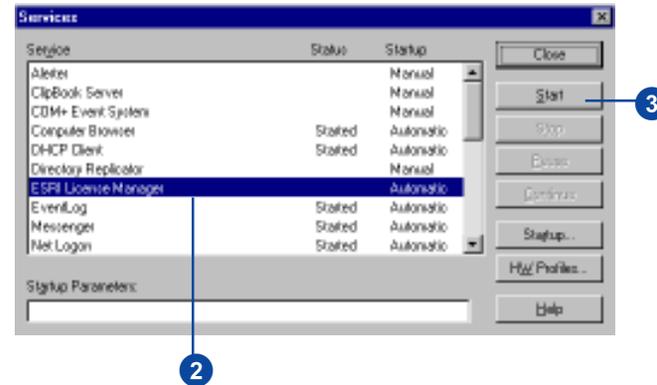
Tip

Keeping the command window open

When starting the license manager in a command window, whether through the license administration tools or at a command prompt, the command window must remain open. Closing it will stop the license manager service.

Executing LMGRD.EXE from the command prompt

1. Open an MS–DOS® window.

2. Change directory into <SystemDrive>:\Program Files\ESRI\License, where <SystemDrive> is a system variable setting.

3. Execute LMGRD at the command prompt to start the ESRI license service.

    Use the -APP and -C . switches along with " ." which indicates all files with a .LIC extension.

2 `> cd /d <SystemDrive>:\Program Files\ESRI\License`

3 `> lmgrd -app -c .`

Updating the license manager service on NT

When additional seats are purchased or new software is licensed at your site, the license files and license manager service must be updated to reflect the changes.

Once the license files have been edited then saved, apply one of these three methods to update the license manager service. The first method is recommended.

- Use the License Manager Tools utility under the ArcInfo > License manager group folder

- Use the Services utility in the Control Panel

- Execute 'lmutil lmreread' from the command prompt

Each of these methods are based on lmreread option of the lmutil command. This option communicates changes in the license file to the license manager daemons. The lmreread option does not shut down the daemons and thus can be executed at any time.

Refer to the lmutil command reference for more information on the lmreread option.

Using the License Manager Tools utility

1. Open the License Manager Tools utility in Start > Programs > ArcInfo > License Manager.

2. Select Configuration using Services in the Service/License File tab.

3. Select ESRI License Manager.

4. Click on the Start/Stop/Reread tab.

5. Click on Reread License File.
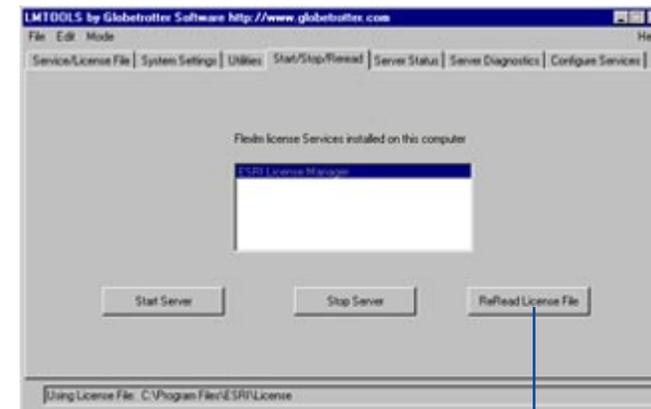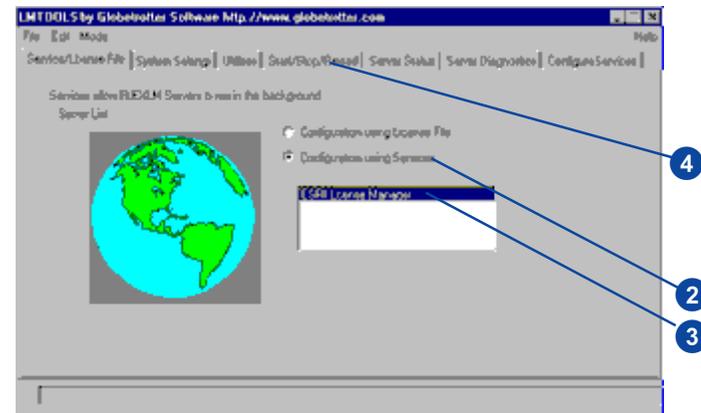
Using Control Panel > Services

1. Open the Control Panel and click on Services.

2. Scroll to the 'ESRI License Manager' and select it.

3. Click on Stop.

4. Click on Start.
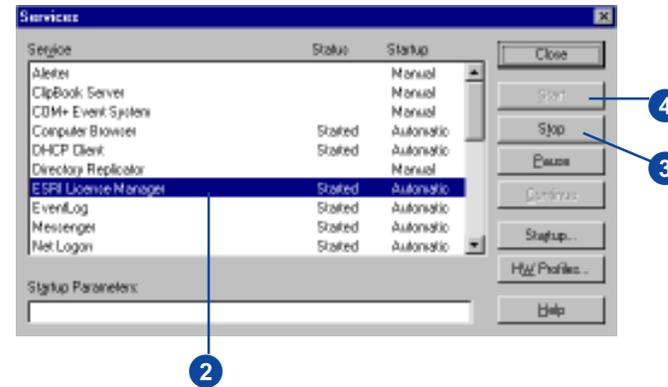
Executing LMUTIL LMREREAD from a command prompt

1. Open an MS–DOS window.

2. Change directory into <SystemDrive>:\Program Files\ESRI\License, where <SystemDrive> is a system variable setting.

3. Execute LMUTIL LMREREAD at the command prompt to update the ESRI license service.

   Use the -C . switch where . indicates all files with a .LIC extension.

2 `>  cd /d <SystemDrive>:\Program Files\ESRI\License`

3 `>  lmutil lmreread -c .`

Shutting down the license manager service on NT

There are three ways to shut down the license manager service. The first method is recommended.

- Use the License Manager Tools utility under the ArcInfo > License manager group folder

- Use the Services utility in the Control Panel

- Execute 'lmutil lmdown' from the command prompt

Using the License Manager Tools utility

1. Open the License Manager Tools utility in Start > Programs > ArcInfo > License Manager.

2. Select Configuration using Services in the Service/License File tab.

3. Select ESRI License Manager.

4. Click on the Start/Stop/Reread tab.

5. Click on Stop Server.
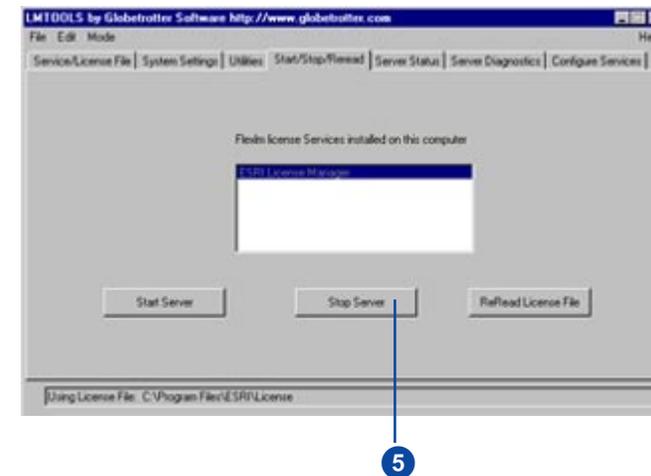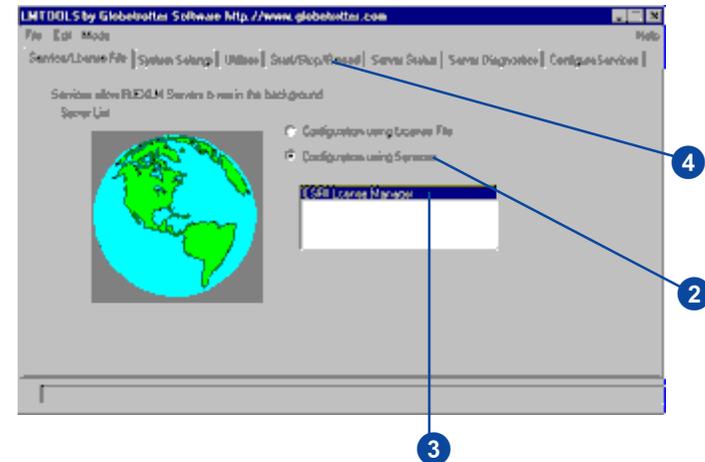
Using Control Panel > Services

1. Open the Control Panel and click on Services.

2. Scroll to the 'ESRI License Manager' and select it.

3. Click on Stop.
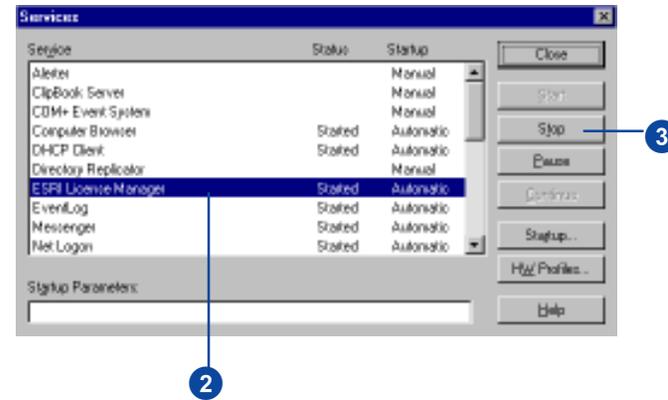
Executing LMUTIL LMDOWN from the command prompt

1. Open an MS–DOS window.

2. Change directory into <SystemDrive>:\Program Files\ESRI\License, where <SystemDrive> is a system variable setting.

3. Execute LMUTIL LMDOWN at the command prompt to shut down the license manager service.

   Use the -C . switch where . indicates all files with a .LIC extension.

2 `>  cd /d <SystemDrive>:\Program Files\ESRI\License`

3 `>  lmutil lmdown -c .`

Removing the license manager on NT

You may find it necessary to remove the ESRI License Manager and SentinelPro Hardware key device drivers from your NT workstation.

To do this, you must

- Shut down the license manager service

- Shut down the SentinelPro hardware key device

- Remove the SentinelPro hardware key device drivers

- Remove the ESRI License manager service

Shutting down the license manager service

1. Refer to the previous section, Shutting down the license manager service on NT, for instructions.

Shutting down the Sentinel device

1. Open the Control Panel and click on Devices, once the license manager service is shut down.

2. Scroll to the 'Sentinel' device and select it.

3. Click on Stop.
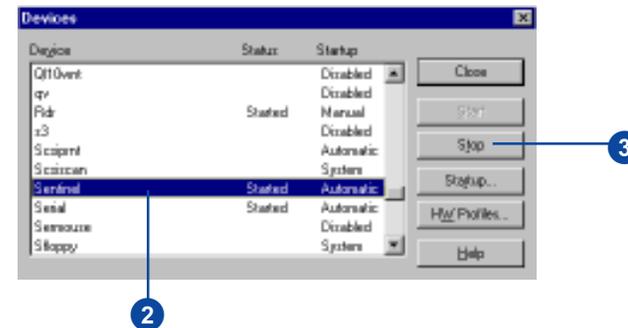
Removing the hardware key device drivers

1. Open an MS–DOS window.

2. Change directory into the \drivers directory.

3. Execute the SETUPX86 at the command prompt.

   On Compaq Alpha NT, execute SETUPAXP.EXE.

4. Select Remove Sentinel Driver from the Function pulldown menu in the Rainbow Technologies Sentinel window.

5. Click OK in the Sentinel Remove menu to confirm removal of the device driver.

② `> cd /d C:\Program Files\ESRI\License\drivers`

③ `> setupx86`
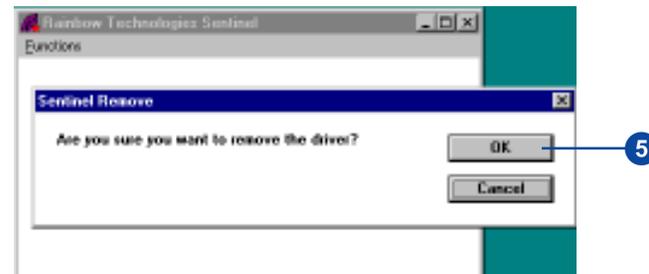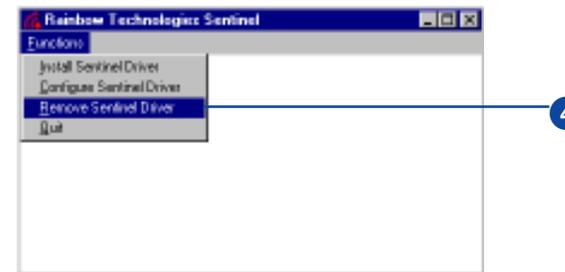
Removing the license manager service

1. Open an MS–DOS window.

2. Change directory to <SystemDrive>:\Program Files\ESRI\License\services, where <SystemDrive> is a system variable setting.

3. Execute INSTALLS at the command prompt to remove the ESRI License Manager service.

② `> cd /d <SystemDrive>:\Program Files\ESRI\License\services`

③ `> installs -n "ESRI License Manager" -r`

Additional System Information

Memory

The FLEXlm daemons use little memory. Typically, lmgrd uses approximately 2020 KB and each application's daemon (ESRI) uses approximately 1380 KB.

TCP/IP ports

The license manager daemons use TCP/IP ports to manage the license requests on the network. The TCP/IP port number is identified on the SERVER line of the license file. We have defined the default port number to be 27005 for both UNIX and Windows NT. The port number, however, is changeable. If another FLEXlm application on your system is already using the TCP/IP port 27005, there will be a conflict, and when the license manager is started you will get one of the following messages:

```
license manager: socket bind: Permission denied
license manager: socket bind: Address in use
```

The license file can be edited and another TCP/IP port number can be selected for the license manager. GLOBEtrotter owns port number 27000 through 27009. We strongly recommend that you use a port number within this range. We now assign port '27005' by default, which significantly reduces port conflict with other software vendors.

With UNIX, the TCP/IP port number for the license manager can be set in the /etc/services file on the license server. If the network is running yellow pages, then edit the yellow pages master file /etc/services.

For Windows NT, the %SystemRoot%\system32\drivers\etc\services can be edited to change TCP/IP information.

Add the following line to /etc/services:

```
license 27005/tcp
```

This will reserve port number 27005 as the license manager port.

Note: Since the license manager uses Ethernet® to function, TCP/IP must be enabled even on a standalone system.

Environments

Listed in Table 2-5 are the UNIX shell environments which have been tested with the local, remote, and batch scenarios.

Table 2-5: Supported UNIX shell environments

Compaq Tru64 UNIX: xterm, dxterm

HP®: xterm, hpterm, dtterm

IBM® : xterm, dtterm, aixterm

SGI: xterm, exterm

Sun™: cmdtool, xterm, shelltool

Listed in Table 2-6 are the Windows NT environments which have been tested with the local, remote, and batch scenarios.

Table 2-6: Supported Windows NT environments

DEC™ Alpha NT®: Windows NT 4.0

Intel® NT : Windows NT 4.0

PC X emulators for UNIX

PC X emulation software is required to establish the proper working environment between a PC terminal and UNIX server configuration. This configuration, however, has a limitation.

Because most, if not all, PC X emulators utilize either rlogin or telnet to establish the connection between a PC and its UNIX server, all ArcInfo or ArcSDE sessions will be either remote or batch. Therefore, each ArcInfo or ArcSDE session will take one seat.

Windows Terminal Server

Microsoft's Windows Terminal Server is an altered version of the Windows NT operating system that provides Windows-based terminal support for thin-clients such as Windows 95, Windows NT, Win16, Macintosh, and UNIX. This technology is available as an add-on release to NT Server 4.0. In a remote WTS client session, only one license is checked out when running one or more ArcInfo or ArcSDE sessions. Running ArcInfo or ArcSDE in an additional WTS client session will check out an additional license.

Debug Log file

The license manager output can be redirected to a debug log file. When a user starts up ArcInfo or ArcSDE, a seat request will be processed by the license manager daemons. An available seat will be checked out and assigned to the user who requested it. When the user terminates their ArcInfo or ArcSDE session, the seat will be checked back in. Seats for extensions such as ARC TIN and ARC GRID will also be checked out and in. The 'IN' and 'OUT' information will be sent to the output device identified when the license manager was started. You may wish to track information such as who is using the software, the node from which they are using it, the software they are using, and requests for unlicensed software. If you have a lot of license activity, the log file will grow very large. You will need to consider where to put this file and how often to delete or shorten it.

On Windows NT, redirecting output to a debug log file can be done using the License Manager Tools utility found under Start > Program > ArcInfo > License Manager. In the Configure Services tab, you can set the path to the debug log file by manually typing in the location or by using the Browse function. With FLEXlm v6.1, a debug log file is not created by default.

On UNIX, the syntax to redirect the license manager output to a debug log file is this:

```
% lmgrd -c license.dat > lmgrd.log
```

If you start the license manager and create a debug log file with this method, the debug log file cannot be renamed because there are several processes in a parent-child hierarchy sharing the same file pointer.

Warning! If you elect to use a debug log file, it can grow quite large and fill your hard disk. For this reason we strongly suggest that you use a debug log file only when troubleshooting the license manager.

FLEXlm on Windows NT also creates the C:\flexlm directory by default, which contains the ESRI and lmgrd.<pid> files. These files should not be altered or deleted while the license manager is running.

Managing seats on the network

Two ARC commands are available to help manage the seats on your network. The PRODUCT command will allow users to reserve or disable ArcInfo's extensions during an ArcInfo session.

The PRODUCTINFO command will display the list of ArcInfo software currently licensed, as well as the total number of licensed seats for each extension (except ArcSDE), the number of seats currently in use, and the time-out date.

Both of these commands are specific to ArcInfo.

Advanced License Manager

3

This chapter covers additional license manager topics than the preceding chapters. Topics such as:

• Selecting the most appropriate computer on your network to act as your license manager server node

• Manipulating license files to deal with multiple software applications from different software vendors

• Sharing licenses across UNIX and Windows NT architectures

Selecting your server nodes

Use a machine that is reliable and runs continually as your license server. Avoid a machine that is frequently rebooted or taken off the network. A license server does not necessarily have to be a high-end machine; reliability is far more important.

If you are exchanging messages with the server, or if you have a lot of checkout and checkin activity (hundreds per second), the amount of CPU time consumed by the server may become significant. In this case, you need to ensure that the server you select will have enough CPU cycles to spare.

Starting the license manager automatically

For UNIX, once you have installed and started the license manager on your network, we recommend you have the license manager start automatically when the system boots even though it is not required.

Platform specific instructions for this operation on UNIX are found in the license.boot file located under $ARCHOME/ sysgen or $SDEHOME/sysgen.

To start an ArcInfo 8 license manager server automatically at boot time, you must use the ArcInfo 8 license.boot file and you will need to modify it to reflect your system information.

For Windows NT, the license manager starts automatically once the installation has completed installing the software and FLEXlm, and your system has rebooted. The license.boot file does not exist on Windows NT.

Redundant server configuration

With a flexible license manager, you can set up redundant license servers to operate as a single logical license server. This feature is controlled solely by the SERVER lines in the license file. This configuration is supported on UNIX only.

A redundant server designates a set of three nodes to serve the same license file. The license file then has three SERVER lines and lmgrd is started on all three nodes. One of the servers functions as the master and issues licenses. If it goes down, another server becomes master. Redundant servers require a quorum of two servers to be up or no licenses are served.

It is important to note that redundant servers are not a failover configuration. When one or more of the redundant servers go down, the same manual administration is required as when one or more independent license server goes down. You will have to reroute your end-users to alternative servers for ESRI software and data. To reroute end-users on UNIX, you must change the location of their variable settings of $ARCHOME and $SDEHOME. On Windows NT, each end-user will have to uninstall their installation of ArcInfo and ArcSDE, and rerun the installation from an alternative server.

This is the reason ESRI strongly discourages the use of the redundant server configuration, as does GLOBEtrotter, the manufacturer of FLEXlm software. We at ESRI do not use the redundant server configuration. Instead, we split licenses and data among independent servers.

If, however, you decide to use this configuration, you must load ArcInfo, ArcSDE, and other optional extensions on each redundant server along with all pertinent data your site requires for operations. We strongly recommend that a system administrator be available. When a redundant license server goes down you will still have the administrative overhead of rerouting your users to an alternative $ARCHOME or $SDEHOME.

When one server goes down, there are suddenly two potential points of failure. With two servers up, if either goes down, licenses are denied. In this state, the mathematical reliability of

the system is twice as bad as it would be without redundant servers, where only one of those two nodes would cause failure, the two remaining servers. Therefore, it is the administrator's job to detect when one or more of the three servers are down and bring it or them back up as soon as possible.

You can not use this configuration when the software itself only relies on a single host server.

Alternatively, you can split up your licenses among multiple independent servers. This is simpler to administer and still allows you to have a portion of the licenses available when one server goes down.

To set up redundant servers, you must provide ESRI Customer Service with the hostids for all three servers. You will get three SERVER lines to place in your license file. Make sure that the license daemons, lmgrd and ESRI, and the license file are available on all of the server machines. Then start lmgrd on each of the server machines. In a redundant server configuration, no licenses are available until there is a quorum of servers. The master redundant server is selected as the first of two servers to connect with each other. From these two servers, the master is always the server listed first in the license file.

Configuring for multiple applications

When you are running FLEXlm-licensed software from multiple vendors, you may need to prevent licensing conflicts.

The license file controls which nodes the license servers run on for each software program. This is specified by the SERVER line (or lines) in the license files. If the license files for two or more software programs contain identical SERVER lines and there is no conflict with the lmgrd daemon, then the license manager for those software programs can run on the same server node.

Using the same server node

If you have software other than ArcInfo or ArcSDE whose license servers run on the same node (as specified by the SERVER lines in the license files), you should combine the license files into a single file.

Combining license files on UNIX

If the SERVER lines in those files are identical and the hostid fields in each SERVER line match between files, you can combine them.

If the SERVER lines are not identical, then you must keep the license files separate.

You may find files incompatible because

• License files are set up to run on different server nodes and so have different hostids.

• One file is set up for single server (has only one SERVER line); the other is set up for redundant servers (has multiple SERVER lines).

If the license files are not compatible, you must keep them separate and run separate lmgrd daemons for each license server. If your license files are compatible, then you may combine license files and run a single lmgrd daemon, as described in the following section.

Combining license files on UNIX from more than one vendor

If your license files from different vendors are licensed for the same server, you can combine them. To combine license files, read all of the compatible license files into one file, then edit out SERVER lines until only one remains. Each vendor daemon needs

its own VENDOR line. Then write this data to the license.dat file. If this file is written to the default location, you will not need to set the ESRI_LICENSE_FILE or LM_LICENSE_FILE environment variable. If written elsewhere, or if you were not able to combine all of your license files, then you will need to set either of these variables (or use whichever method your application requires to find the license.dat file). Refer to the 'ESRI_LICENSE_FILE environment variable' section later in this chapter before attempting this.

If you run ArcInfo, ArcSDE, and other optional ArcInfo extensions on multiple nodes, you must make your license.dat file available on all the machines. You can do this either of two ways:

• Place the license.dat file in a partition that is available via NFS® to all nodes on the network that need the file.

• Copy the license.dat file to all of the necessary 'sysgen' directories.

Since the ESRI daemon keeps track of license usage, and since the license.dat file contains encrypted data to protect it against modification, you can move and copy the license file as much as you want.

Note: If you are running redundant servers, you should have one copy of the license.dat file (as well as copies of the lmgrd, the ESRI daemon, and other application daemons) on each server node.

When you combine license files for two different FLEXlm-licensed software programs from different vendors, these programs might not use the same version of FLEXlm. FLEXlm can handle this situation. Remember:

• A newer lmgrd can be used with an older application daemon, but a newer application daemon might not work with an older lmgrd.

Therefore:

• Always use the newest version of lmgrd and the newest version of each application daemon.

• If you have FLEXlm v6.1f or higher, use it. Otherwise, use the newest version of the utility (such as lmutil); it can be downloaded from www.globetrotter.com.

Files with .lic extensions

On Windows NT, the standard license file extension is .lic. This naming convention was introduced into ESRI software programs using FLEXlm v6.1. A license file will exist for each licensed ESRI software feature on Windows NT. For example, if you have licenses for ARC/INFO, Grid and Network, three separate .lic files will exist after installing ArcInfo: ARCINFO.lic, GRID.lic and NETWORK.lic.

If the SERVER lines in those files are identical and the hostid fields in each SERVER line match between files, lmgrd recognizes files with .lic extensions and combines them on the fly. The files must reside where lmgrd is located under <SystemDrive>:\Program Files\ESRI\License.

Using a different server node

If you have non-ESRI software whose license servers run on a different server node than that of your ESRI software, you need separate license files and installations of the license manager for each node.

Environment variables: ESRI_LICENSE_FILE and LM_LICENSE_FILE

The ESRI_LICENSE_FILE and LM_LICENSE_FILE variables provide each ArcInfo or ArcSDE client the ability to define one or more license servers to rely on. Historically, only the

LM_LICENSE_FILE variable was available, but as more software vendors incorporated FLEXlm into their software, collision problems using this variable began to occur. At FLEXlm v4.1, GLOBEtrotter Software Inc. (GSI) introduced the vendor specific environment variables such as ESRI_LICENSE_FILE. Hence, we strongly suggest ESRI software clients use the ESRI_LICENSE_FILE variable rather than LM_LICENSE_FILE when defining their ArcInfo or ArcSDE license server(s).

When ESRI_LICENSE_FILE is set, Arc/Info looks to this variable to determine the total number of ArcInfo licenses available from the currently assigned server.

Note: The search order for the license server information used by ArcInfo and its extensions has changed to accommodate our ESRI specific variable. On UNIX, the search order is:

1. ESRI_LICENSE_FILE

2. LM_LICENSE_FILE

3. The sysgen directory in ARCHOME or SDEHOME.

On Windows NT, the search order is:

1. ESRI_LICENSE_FILE

2. LM_LICENSE_FILE

3. LICENSE_SERVER registry entry found under:
   HKEY_LOCAL_MACHINE>SOFTWARE>ESRI>ArcInfo>Desktop>8.0
   HKEY_LOCAL_MACHINE>SOFTWARE>ESRI>ArcInfo>Workstation>8.0

There are two methods to define your license server: 1) by defining the path to one or more license files or 2) by defining one or more license servers with <port>@<host>. The next two sections in this guide cover these two topics, respectively. Figure 3.2 shows examples of these two methods.

There is a limitation to defining multiple license servers. Once an ArcInfo or ArcSDE session is started, that client session is assigned to the specific license server from which its initial license was checked out. From there on out, the only extension licenses available to that particular session are those available on from the license server it is assigned to. A client cannot connect to multiple license servers concurrently.

For example, you defined your ESRI_LICENSE_FILE variable to point to server A then server B. Server A has ArcInfo and ARC

Figure 3.2: Example of path definition to one or more license files

```
UNIX:
setenv  ESRI_LICENSE_FILE  /machine1/arcexe80/sysgen/license.dat:/machine2/sdeexe80/sysgen/license.dat
setenv  ESRI_LICENSE_FILE  $ARCHOME/sysgen/license.dat:$SDEHOME/sysgen/license.dat
setenv  ESRI_LICENSE_FILE  27005@geo:27005@atlas
setenv  ESRI_LICENSE_FILE  @atlas:@geo

NT:
set  ESRI_LICENSE_FILE=C:\Program Files\ESRI\License
set  ESRI_LICENSE_FILE=27005@geo;27005@atlas
set  ESRI_LICENSE_FILE=@atlas;@geo
```

GRID licenses while server B has only ArcInfo licenses. While starting your ArcInfo session, your client session determines there are no ARC/INFO licenses available on server A, so your client session checks out an ARC/INFO license from server B. Next, you decide to start ARC GRID but you get an error message when doing so. This is because your session is assigned to server B where no ARC GRID licenses exist.

Defining the path to one or more license files

You can define your license servers by defining the path to one or more license files. However, this method is limited by architecture because the UNIX and Windows NT license files are a bit different. These differences cannot be reconciled functionally by a license manager of an opposing architecture.

The differences in these files are in the SERVER and FEATURE lines. The difference in the SERVER line is the host ID. The UNIX license file contains the unique CPU hostid while the Windows NT file contains the SentinelPro Hardware key ID. An example of a SERVER line for each architecture can be seen in Figure 3.1.

Figure 3.1: SERVER line examples for UNIX and NT

```
UNIX: SERVER picard 325a2b57 27005
NT:   SERVER x ESRI_SENTINEL_KEY=37100001 27005
```

The difference in the FEATURE lines is related to node-locked licenses as this license type is supported on UNIX only. A node-locked FEATURE line on UNIX has the hostid of the node to which the seats are locked added at the end of the FEATURE line, and the FEATURE has an asterisk and hostid directly after its name (e.g., ARC/INFO*124b2d31). An example node-locked FEATURE line can be found in Figure 2-1 in Chapter 2 of the guide.

When defining one or more license files using the ESRI_LICENSE_FILE variable, you can state the absolute paths, the variable paths (UNIX only), or both.

Defining <port>@<host> to one or more license servers

You can define your license servers by using the <port>@<host> function. This method is not constrained by architecture because a license server defined by <port>@<host> communicates directly to the ESRI daemon through the specified TCP/IP port, working around the limitation of architecture specific license files.

Sharing Licenses Across Architectures

Sharing licenses across UNIX and Windows NT architectures is possible using the <port>@<host> functionality available in FLEXlm v6.0 (and higher). This functionality relies on TCP/IP protocol for direct communication with the license server daemon (ESRI) on a heterogeneous network.

Setting the ESRI_LICENSE_FILE environment variable enables the <port>@<host> functionality. This variable is set in a client's environment, not on the server side. Both <port> and <host> are found in the SERVER line of your license file. The TCP/IP <port> is indicated at the end of the SERVER line. The host name, <host>, is the second item listed in the SERVER line.

Examples of ESRI_LICENSE_FILE set to <port>@<host> for both UNIX and Windows NT are shown in Figure 3.2.

Additionally, <port>@<host> can be abbreviated as simply @<host> as long as the port number in the license file falls within the range of 27000 through 27009 (inclusive). An example of this is shown in Figure 3.2.

One advantage of using the <port>@<host> method of defining your license server is the disk containing the license file need not be shared as the lmgrd daemon is recognized on the network through the predefined TCP/IP port. This is significant on Windows NT because the license manager is installed on the <SystemDrive>, which is normally the root partition, a partition most system administrators do not want shared for security reasons.

Appendix A: Troubleshooting

IN THIS APPENDIX

- **Debugging the license manager on UNIX**

- **Debugging the license manager on Windows NT**

- **Contacting ESRI Technical Support**

Debugging the license manager on UNIX

Installing and using the license manager should proceed without a hitch. But things do occasionally go wrong. We have implemented long error messages to help you debug any license manager problems. Any time there is a problem starting the license manager, an error message states the problem, and gives an error code, and one or more solutions. We recommend you use the error messages for debugging a license manager problem. If you are unable to solve the problem after attempting the solution provided in the error message, you should use the debug log file.

To use a debug log file, you need to direct the output to a debug log file when you start the lmgrd license daemon. The debug log file often contains useful information. You should examine it when you have a problem.

When the license manager is functioning properly, the contents of the debug log file look something like this:

```
<time> (ESRI) Logfile switched from stdout
<time> (ESRI) Server Started on the hostname for : ARC/INFO
<time> (ESRI) Plotting TIN COGO Network Grid
<time> (ESRI) ArcScan ArcPress ArcExpress
```

The following sections cover the following problems.

Errors in the debug log file

• No features listed

• Incorrect clock setting

• Invalid hostname

• Invalid license key

• Invalid hostid

Errors at a command prompt

• Encryption code in license file is inconsistent

• Not recognizing changes to the license file

• No available licenses

• Product not licensed

• Socket address in use

• Cannot connect to license server

• Cannot find license file

• Invalid returned date from license server

No features listed

Each license.dat file must contain at least one SERVER line, a VENDOR line, and one or more FEATURE lines.

If you get this message, you have no valid ARC/INFO FEATURE in your license.dat file and possibly no other FEATUREs either.

Use LMUTIL LMCKSUM to verify the contents of your license.dat file, and correct any problems.

Error in log file

```
<time> (ESRI) No features to serve, exiting
<time> (lmgrd) ESRI daemon found no features.  Please correct
<time> (lmgrd) license file and re-start daemons
<time> (lmgrd)
<time> (lmgrd) This may be due to the fact that you are using
<time> (lmgrd) a different license file from the one you expect.
<time> (lmgrd) Check to make sure that:
<time> (lmgrd) license.dat
<time> (lmgrd) is the license file you want to use.
<time> (lmgrd)
```

Error from command prompt

```
FLEXlm Error: Invalid license file syntax
Feature:       ARC/INFO*872e8b3c
License path: /test_machine/arcexe80/sysgen/license.dat
FLEXlm error: -2,413
Program not run.
```

Verifying the license file contents

1. Change directory into your $ARCHOME/sysgenor $SDEHOME/sysgen directory.

   ① ```
   % cd $ARCHOME/sysgen
   ```
   OR
   ```
   % cd $SDEHOME/sysgen
   ```

2. Execute LMUTIL LMCKSUM at a command prompt.

   ② ```
   % lmutil lmcksum -c license.dat
   ```

3. Correct all

Incorrect clock setting

You could get this message in the log file for any of three reasons:

- The system date, time, or time zone are set incorrectly
- The files on your system have a newer creation date than the current time
- The TZ (time zone) variable is set incorrectly on those platforms which support it

This is a very common problem with those systems used for Year 2000 (Y2K) testing.

Error in log file

```
<time> (ESRI) Logfile switched from stdout
<time> (ESRI) The System Clock has been set back to the past.
<time> (ESRI) This is not allowed!
<time> (ESRI) daemon shutdown requested - shutting down
```

Checking your system's date, time, or time zone

1. Execute DATE at a command prompt.

Checking files on your system

1. Search through your hard drive for files with newer dates or times than the current date or time.

Checking the TZ variable

1. Look in your man pages to see if your operating system supports the TZ variable.

2. Type TZ at a command prompt if TZ is supported.

3. Correct the time zone.

If the log shows the message about incorrect clock setting and starting Arc gives this additional error, the server and client workstations may not have the same date or time. They must be in sync with Greenwich Mean Time.

Up to four hours difference is allowed between the license server and client machines.

Errors from command prompt

```
FLEXlm Error:  cannot connect to license server (15)
Program not run.
```

```
FLEXlm Error: Clock difference too large between client and server
```

Checking the sync time between server and client

1. Execute DATE at the command prompt.

2. If your system is not set to 24-hour time, make sure that AM or PM is set properly. Also check time and time zone.

Invalid hostname

This error message reveals that someone has tried to use 'picard' as the license server, in defiance of the fact that only 'swami' can be so used. 'swami' is the host name listed in the license file and so all license information is associated with it. Run the license manager on 'swami' or get yourself some keycodes from ESRI Customer Service so you can use 'picard' as an alternate license server.

Error in log file

```
<time> (lmgrd) "picard": Not a valid server hostname, exiting.
<time> (lmgrd) Valid server hosts are: "swami"
<time> (lmgrd) Using license file "license.dat"
```

Invalid license key

If the debug log file has this error and starting Arc gives the additional error at the command prompt, the content in the FEATURE lines of the license file (/test_machine/arcexe80/sysgen/license.dat) is incorrect.

Verify the contents in your license.dat file and correct any problems. Use LMUTIL LMCKSUM to verify your file.

Error in log file

```
<time> (ESRI) Invalid license key (inconsistent encryption code for "ARC/
INFO")
<time> (ESRI) Invalid license key (inconsistent encryption code for
"Plotting")
<time> (ESRI) Invalid license key (inconsistent encryption code for "TIN")
<time> (ESRI) Invalid license key (inconsistent encryption code for "COGO")
<time> (ESRI) Invalid license key (inconsistent encryption code for
"ArcView3")
<time> (ESRI) Invalid license key (inconsistent encryption code for
"AVNetwork1")
<time> (ESRI) Invalid license key (inconsistent encryption code for
"SdeServer")
<time> (ESRI) Invalid license key (inconsistent encryption code for
"SdeClient")
```

Error from command prompt

```
FLEXlm Error: Invalid (inconsistent) license key
 The license-key and data for the feature do no match.
 This usually happens when a license file has been altered
Feature:        ARC/INFO
License path:  /test_machine/arcexe80/sysgen/license.dat
FLEXlm error:  -8,130
Program not run.
```

Verifying the license file content

1. Change directory into your $ARCHOME/sysgen or $SDEHOME/sysgen directory.

   1 `% cd $ARCHOME/sysgen`

   OR

   `% cd $SDEHOME/sysgen`

2. Execute LMUTIL LMCKSUM at a command prompt.

   2 `% lmutil lmcksum -c license.dat`

Invalid hostid

The hostid is incorrect in your license.dat file. Your file contains hostid 904a6b1c, but the actual hostid of your server is 605c4c2a.

You need to get a new license.dat file from ESRI Customer Service that contains the correct hostid.

Error in log file

```
<time> (ESRI) Server started on swami
<time> (ESRI) Wrong hostid on SERVER line for license file:
<time> (ESRI)          license.dat
<time> (ESRI) SERVER line says 904a6b1c, hostid is 605c4c2a
<time> (ESRI) Invalid hostid on SERVER line
```

Encryption code in license file is inconsistent (8)

If Arc gives this error, the keycode, which is the encrypted portion of the FEATURE line in the license file, does not match the information for the rest of the line.

Verify the contents in your license file and correct any problems. Use LMUTIL LMCKSUM to verify your license file. If your file contains incorrect encryption information, you'll need to get a new license.dat file from ESRI Customer Service.

Error from command prompt

```
FLEXlm Error: encryption code in license file is inconsistent (8)
Program not run.
```

Confirming the license file content

1. Change directory into your $ARCHOME/sysgen directory.

   1 `% cd $ARCHOME/sysgen`

2. Execute LMUTIL LMCKSUM at a command prompt.

   2 `% lmutil lmcksum -c license.dat`

Not recognizing changes to the license file

The license manager reads the license file on startup or upon execution of the LMUTIL LMREREAD command.

Therefore any changes done to the license file after the license manager is running are not acknowledged.

You can either stop and restart the license manager or execute LMUTIL LMREREAD.

Error from command prompt

No error message exists for this instance.
Rather, you will notice that the license server does not acknowledge recent changes to the license file.

Stopping and restarting the license manager

1. Change directory into your $ARCHOME/sysgen or $SDEHOME/sysgen directory.

2. Stop the license manager.

3. Restart the license manager.

1
```
% cd $ARCHOME/sysgen
OR
% cd $SDEHOME/sysgen
```

2 `% ./lmutil lmdown -c license.dat`

3 `% ./lmgrd -c license.dat > /dev/null`

Rereading the license file

1. Change directory into your $ARCHOME/sysgen or $SDEHOME/sysgen directory.

2. Execute LMUTIL LMREREAD at the prompt.

3. Shut down and restart the license manager if LMUTIL LMREREAD does not read the license.dat file correctly.

1
```
% cd $ARCHOME/sysgen
OR
% cd $SDEHOME/sysgen
```

2 `% ./lmutil lmreread -c license.dat`

No available licenses

There are seven reasons why you might get this error message when attempting to use multiple seats while on one console. The first is that all of your licenses may in fact be in use. You can check this by executing LMUTIL LMSTAT.

However, if this is not the case these are other possible reasons.

- xhost is not enabled.

- You are remotely logged in another machine, consuming one license per session.

- You are spawning a back-ground job that executes ARC. Each background job is seen as a new terminal, which requires a new seat.

- Someone is logged in elsewhere and is using all the ArcInfo licenses.

Error from command prompt

`All ARC licenses in use.`

Enabling xhost

1. SU to another user to fix the Xnews server problem.

2. Execute XHOST the a command prompt.

   This message should appear:

   `hostname being added to access control list`

1 `% su - <another_user>`

2 `% xhost '<hostname>'`

Checking a remote login

1. Execute HOSTNAME at a command prompt.

   You are remotely logged in if the hostname is anything other than the machine you are sitting at.

1 `% hostname`

Checking your active end-users

1. Change directory into your $ARCHOME/sysgen or $SDEHOME/sysgen direc-tory.

2. Execute LMUTIL LMSTAT -A -C LICENSE.DAT at the command prompt.

   This will print a report of the status of all seats for all features and the names of the users who checked out the seats.

1 `% cd $ARCHOME/sysgen`
OR
`% cd $SDEHOME/sysgen`

2 `% ./lmutil lmstat -a -c license.dat`

Product not licensed

If this error appears after you type ARC at the system prompt, or you connect to ArcSDE, then the FEATURE for that software or extension did not start properly.

These are reasons for this problem:

- You may not be using the license file for Arc and ArcSDE.

- You may have another software program that uses the FLEXlm license manager. Make sure the environment variables ESRI_LICENSE_FILE or LM_LICENSE_FILE are set properly.

- Other environment variables need to be changed. Check your FLEXlm documentation for more details.

- Your license.dat file may have an error in it. Verify the contents of the license.dat file.

- Your ArcInfo or ArcSDE licenses may not have started up properly.

  Verify this by using LMUTIL LMSTAT which will display a list of licensed

Error from command prompt

`Product not licensed.`

Checking the ESRI_LICENSE_FILE or LM_LICENSE_FILE variable

1. Edit your .cshrc file to set the appropriate ESRI software value.

   1 `setenv ESRI_LICENSE_FILE $ARCHOME/sysgen/license.dat`

   OR

   `setenv ESRI_LICENSE_FILE $SDEHOME/sysgen/license.dat`

Verifying the license.dat file

1. Change directory into your $ARCHOME/sysgen or $SDEHOME/sysgen directory.

   1 `% cd $ARCHOME/sysgen`

   OR

   `% cd $SDEHOME/sysgen`

2. Execute LMUTIL LMCKSUM at a command prompt.

   2 `% lmutil lmcksum -c license.dat`

Verifying license start up

1. Change directory into your $ARCHOME/sysgen or $SDEHOME/sysgen directory.

   1 `% cd $ARCHOME/sysgen`

   OR

   `% cd $SDEHOME/sysgen`

2. Execute LMUTIL LMSTAT at the command prompt.

   2 `% lmutil lmstat -a -c license.dat`

software and extensions, and the number of licenses available. If the ArcInfo FEATURE line says:

```
0 licenses available
```

there is a problem with the FEATURE line in the file.

Contact ESRI Customer Service to get a new FEATURE line or ESRI Technical Support for help.

- You may have capital letters in the UNIX paths to /arcexeXX or /sdeexeXX. Capital letters are not allowed.

Socket address in use

Another ESRI daemon may be running or the TCP/IP port (27005) identified in the license file is being used by another application. The port number can be changed to another number within this range, 27000-27009.

If no other lmgrd or ESRI processes are running, simply change the socket address in the license.dat file to an unused socket, such as 27006 (the socket address, which defaults to 27005, is the last entry on the SERVER line). Check /etc/ services to get a list of the ports already in use. Once the new socket address is in place in the license.dat file, restart the license manager.

Error from command prompt

```
license manager:  socket bind:  Permission denied
license manager:  socket bind:  Address in use
retrying, socket address in use
  ARC cannot run.
```

or

```
license manager:  socket bind:  Permission denied
license manager:  socket bind:  Address in use
retrying, socket address in use
  ARCVIEW cannot run.
```

Checking for another ESRI daemon

1. Look for an ESRI and lmgrd process.

   ①
   ```
   % ps -ef | grep lmgrd
   % ps -ef | grep ESRI
   ```

Changing the socket address

1. Change directory into your $ARCHOME/sysgen or $SDEHOME/sysgen directory.

   ①
   ```
   % cd $ARCHOME/sysgen
   ```
   OR
   ```
   % cd $SDEHOME/sysgen
   ```

2. Open your license.dat file in a text editor.

   ②
   ```
   % vi license.dat
   ```

3. Change the TCP/IP address at the end of the SERVER line to a number within 27000-27009.

Cannot connect to license server (15)

There are several possible reasons for this error message:

- The license server may not be running.

- The license manager was started improperly.

- Server and client workstations may not have the same date or time (which must be in sync with Greenwich Mean Time). If you're not set to 24-hour time, make sure that AM or PM is set properly along with the time and time zone.

- The FLEXlm hostid in the license file may not match the FLEXlm hostid of the workstation where the license manager resides.

- The host name in the license file may not match the hostname of the workstation where the license manager resides.

- The environment variables, ESRI_LICENSE_FILE or LM_LICENSE_FILE, may be set improperly.

  If no other software package uses the FLEXlm license manager, these variables

Error from command prompt

```
FLEXlm Error:  cannot connect to license server (15)
Program not run.
```

Checking the license server

1. Change directory into your $ARCHOME/sysgen or $SDEHOME/sysgen directory.

2. Execute LMUTIL LMSTAT for the status of the license server.

1 `% cd $ARCHOME/sysgen`

OR

`% cd $SDEHOME/sysgen`

2 `% ./lmutil lmstat -a -c license.dat`

Restarting the license manager

1. Change directory into your $ARCHOME/sysgen or $SDEHOME/sysgen directory.

2. Shut down the license manager.

3. Restart the license manager.

1 `% cd $ARCHOME/sysgen`

OR

`% cd $SDEHOME/sysgen`

2 `% ./lmutil lmdown -c license.dat`

3 `% ./lmgrd -c license.dat > /dev/null`

Checking the date/time between machines

1. Execute DATE at a command prompt.

1 `% date`

should point to these UNIX locations: $ARCHOME/sysgen/license.dat or $SDEHOME/sysgen/license.dat.

- The permissions on the license.dat file may be incorrect. They should be rwxr-xr-x (also known as 755).

- You might be using a pre-ArcInfo 8 license.boot file, in which case lmgrd will not recognize the ESRI vendor daemon when the license manager is started from a location other than $ARCHOME/sysgen or $SDEHOME/sysgen. The ArcInfo 8 license.boot file handles this recognition problem.

- You might be using an old license file, pre-dating ArcInfo 8. Refer to 'Requesting keycodes' in Chapter 2 for information about requesting ArcInfo 8 keycodes.

- TCP/IP may not be enabled. If the problem is not any of the above, it is most likely network related.

Checking the FLEXlm hostid and hostname

1. Look at the console or in the log file for an error indicating the 'wrong hostid'.

2. RLOGIN to your license server if your X session is not already there.

3. Change directory into your $ARCHOME/sysgen or $SDEHOME/sysgen directory.

4. Execute LMUTIL LMHOSTID on your license server.

5. Execute HOSTNAME at the command prompt.

1 `9/21 17:45 (ESRI)  Wrong hostid, exiting`

2 `% rlogin <license_server>`

3 `% cd $ARCHOME/sysgen`
OR
`% cd $SDEHOME/sysgen`

4 `% ./lmutil lmhostid`

5 `% hostname`

Checking environment variables

1. Execute ECHO with the environment variable at a command prompt.

2. Note the location.

3. Correct the variable if it does not point to the correct license file.

1 `% echo $ESRI_LICENSE_FILE`
OR
`% echo $LM_LICENSE_FILE`

Checking permissions on the license.dat file

1. Change directory into your $ARCHOME/sysgen or $SDEHOME/sysgen directory.

1 `% cd $ARCHOME/sysgen`
OR
`% cd $SDEHOME/sysgen`

2. Execute LS -L at the command prompt.

2 `% ls -l`

3. Change the permissions to '755' (also known as rwxr-xr-x') if not already set.

3 `% chmod 755 license.dat`

Checking the network

1. Execute PING and the license server name at a command prompt.

1 `% ping <license_server>`

2. TELNET to the license server

2 `% telnet <license_server>`

3. If the problem is with the network, ask your system administrator to set up your workstation.

3 `<license_server> is alive`

OR

`0% packet loss`

Cannot find license file

The license manager can't find the license.dat file when entering ARC or LMUTIL LMSTAT at a command prompt.

There are four reasons you could get this error message:

- LMGRD was started without the '-C LICENSE.DAT' argument.

- The license file does not exist in the directory.

- The name of the license file is mistyped.

- The environment variables $ARCHOME, $SDEHOME, ESRI_LICENSE_FILE, or LM_LICENSE_FILE may be set improperly.

- There may be capital letters in the path to the '../arcexeXX' or '../sdeexeXX' directories.

Error from command prompt

`license manager: can't initialize: cannot find license file`

Restarting the license manager

1. Change directory into your $ARCHOME/sysgen or $SDEHOME/sysgen directory.

2. Stop the license manager.

3. Restart the license manager.

1 `% cd $ARCHOME/sysgen`

OR

`% cd $SDEHOME/sysgen`

2 `% ./lmutil lmdown -c license.dat`

3 `% ./lmgrd -c license.dat > /dev/null`

Checking the license file

1. Change directory into your $ARCHOME/sysgen or $SDEHOME/sysgen directory.

2. Execute LS -L at the command prompt.

3. Make sure the license.dat file is there.

3. Correct any spelling errors in its file name.

1 `% cd $ARCHOME/sysgen`

OR

`% cd $SDEHOME/sysgen`

2 `% ls -l`

Checking environment variables

1. Execute ECHO with each environment variable at a command prompt.

1 `% echo $ARCHOME`

OR

`% echo %SDEHOME`

2. Correct any errors in the environment variables.

AND

```
% echo $ESRI_LICENSE_FILE
```

OR

```
% echo $LM_LICENSE_FILE
```

Invalid returned data from license server (12)

This error indicates that you are running the FLEXlm version distributed with the ArcInfo Version 6 series or earlier. When using several ESRI software products that contain the FLEXlm license manager, you must run all of them under the most recent release of FLEXlm. No version of ArcInfo or ArcSDE will run with an earlier version of FLEXlm than that of its particular release. Refer to the 'Requirement of newest FLEXlm version' section in 'Starting the License Manager on UNIX' or 'Starting the License Manager on Windows NT' for ESRI software and FLEXlm version information.

Error from command prompt

```
FLEXlm error: invalid returned data from license server(12)
Program not run
```

Debugging hints license manager on Windows NT

Installing and using the license manager should proceed without a hitch. But things do occasionally go wrong. To help you debug any license manager problems, we have implemented long error messages. Any time there is a problem starting the license manager, an error message will state the problem, an error code and one or more possible solutions. We recommend using error messages debugging a license manager problem. If you are unable to solve the problem after attempting the solution provided in the error message, use the checklist provided in the following section for common license manager problems. If suggestions on the checklist do not solve the problem, use a debug log file.

Use a debug log file by starting up the License Manager Tools utility located in Start > Programs > ArcInfo > License Manager, selecting 'Configuration using Services' along with 'ESRI License Manager' in the Service/License file tab, clicking on the 'Configure Services' tab, and entering the path to the debug log file in the appropriate text field. Then restart the ESRI License Manager service in Control Panel > Services or reboot your machine. The log file often contains useful information.

When the license manager is functioning properly, the contents look something like this:

```
<time> (ESRI) Logfile switched from stdout
<time> (ESRI) Server Started on the hostname for : ARC/INFO
<time> (ESRI) Plotting TIN COGO Network Grid
<time> (ESRI) ArcScan ArcPress ArcExpress
```

where each licensed FEATURE in your license files are is listed.

The sections that follow provide solutions to these problems:

Errors in the debug log file

- Debugging checklist

- Cannot connect to license server

- No features listed

- Empty log file

- Driver not installed

- Hardware key not installed

- Incorrect hostid

- Incorrect clock setting

- Invalid hostname

- Invalid hostname - "host"

- Incorrect IP address

Errors at a command prompt

- License file does not support this feature

Debugging checklist

Following are debugging tips used outside of the lmgrd.log file.

When you reboot your system, the license manager should start up automatically. If it does not, use the diagnose function within the License Manager Tools utility to diagnose the problem.

Next, check your system's services.

Finally, confirm that these four requirements are met:

- A TCP/IP address is required to run the FLEXlm license manager. This is shown in the IP Address box with a Subnet Mask in your network configuration.

- Either a network card and its drivers or a MS Loopback adapter must be installed for the license manager to function.

- The Host name in the DNS Configuration window must be the same as the Computer name in the Network settings window.

Use the License Manager Tools utility

1. Open the License Manager Tools utility in Start > Programs > ArcInfo > License Manager.

2. Select Configuration using Services in the Service/License File tab.

3. Select ESRI License Manager.

4. Click on the Server Diagnostics tab.

   Click on Perform Diagnostics and check for errors in the description window..

5. Click on the Configure Services tab.

   Enter a path to a debug log file.

6. Stop and restart the ESRI License Manager service in the Stop/Start/Reread tab.
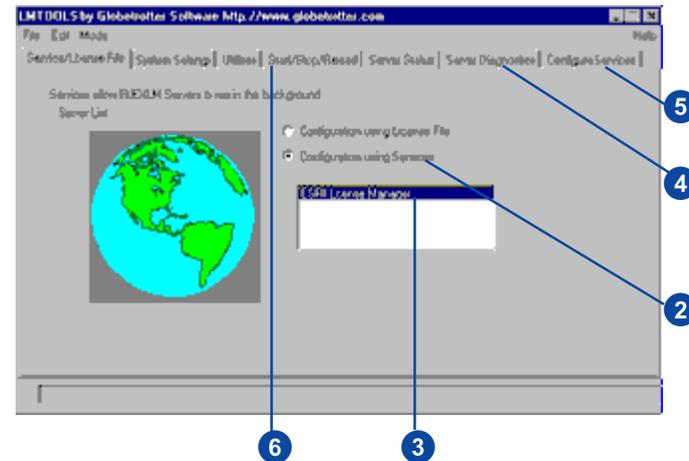
Check your system's Services

1. Open the Control Panel and click on Services.

2. Scroll to the 'ESRI License Manager' service and select it.

   Status should be 'Started'. Startup should be 'automatic'.

   If Status is empty, the license
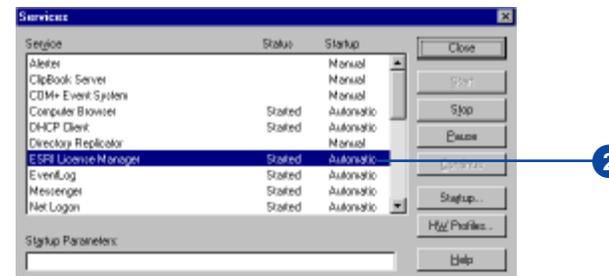
- %ARCHOME% variable must be set properly. (The error message 'Unable to load usage file' suggests that your %ARCHOME% variable is set improperly.)

Ensure that there is no hardware conflict. Hardware conflicts can occur when a Sentinel-protected application or Sentinel system drivers access a Port address used by another hardware device. Some hardware devices other than parallel ports can be set up to use an I/O address range that overlaps a parallel port address (378, 3BC and 278). Network cards are the most common hardware devices to cause conflicts.

If this conflict occurs, the system will hang or the other hardware device will cease to function until the system is rebooted.

Examples of conflicts:

- Network card set to I/O address range 260-27F (hex).

  Result: Card stops functioning.

- Network card set to I/O address 360 (hex).

  Result: System hangs.

To correct a hardware conflict, change hardware device's I/O address range so it does not

manager did not start up properly when your Windows NT was last rebooted.

Check for a TCP/IP address problem

1. Open the Control Panel and click on Network.

2. Click on the Protocols tab.

3. Select TCP/IP and click on Properties.

   If TCP/IP Protocol is not listed, it is not installed.

4. Confirm the IP address listed in the IP Address tab.

Check the Network card

1. Open the Control Panel and click on Network.

2. Click on the Adapters tab.

   If a network board is present, it will be listed in the Adapter scrolling list.

Check the Host Name

1. Open the Control Panel and click on Network.

2. Note the Computer Name listed in the Identification tab.

3. Click on the Protocols tab.

5. Select TCP/IP and click on Properties.

7. Click on the DNS tab.

overlap port addresses 378, 3BC, and 278 (hex).

8. See if the Host Name is the same as the Computer Name.

Check that your environment variables are set properly

1. Open an MS–DOS window.

2. Execute SET | MORE at the prompt.

3. Confirm these variables are set properly:

```
ARCHOME=<drive>:\<arcinfo_location>\arcexe80
Path=<drive>:\<arcinfo_location>\arcexe80\lib;\<arcinfo_location>\arcexe80\bin
```

4. Correct your variables if they're not set properly. Refer to your Installation Guide for information about setting these variables.

5. Open the Control Panel and click on System.

6. Click on the Advanced tab.

7. Update your system variables to reflect the correct installation location.

Correct a hardware conflict

1. Refer to the documentation provided with your hardware device to change the I/O address range.

Cannot connect to license server (15)

There are several possible reasons for this error message:

- The license manager service may not be running.

- The license manager was started improperly.

- You might be using an old license file, pre-dating ArcInfo 8. To request new keycodes, refer to 'Requesting keycodes' in Chapter 2.

- The ESRI_SENTINEL_KEY number in the license file may not match the number on your SentinelPro hardare key plugged into the back of your license manager server.

- The host name in the license file may not match the host name of the workstation where the license manager resides.

- The environment variables, ESRI_LICENSE_FILE or LM_LICENSE_FILE, may be set improperly.

  If no other software package uses the FLEXlm license manager, these variables should be set to one or both of these locations:

Error from command prompt

```
FLEXlm Error:  cannot connect to license server (15)
Program not run.
```

Checking the license manager service

1. Open the Control Panel and click on Services.

2. Scroll to the 'ESRI License Manager' service.

3. Check its status.

4. If 'Started', click on Stop

5. Click on Start.

Checking your license files

1. Open Notepad.

2. Navigate to and open your license files, <feature>.lic. They are located under <SystemDisk>:\Program Files\ESRI\License (where SystemDisk is the operating system disk).

3. Make sure your license files are ArcInfo 8 license files.

   They must contain SERVER, VENDOR and FEATURE lines. They may contain UPGRADE lines.

   The VENDOR line contains this statement:
     VENDOR ESRI
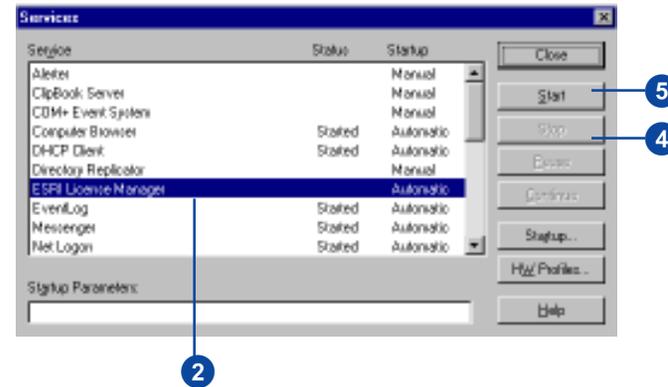
<SystemDrive>:\Program Files\ESRI\License\<feature>.lic (where 'SystemDisk' is the operating system disk and 'feature' is a licensed ArcInfo features.)

<port>@<host> (where port is the TCP/IP port number in the SERVER lien of your license file, and host is the host name of your license manager server.)

- TCP/IP may not be installed properly or you may have problems with your network.

while all FEATURE and UPGRADE lines must have two encryption strings.

Checking the ESRI_SENTINEL_KEY number

1. Click on the 'Display Hardware Key Status' icon under Start > Programs > ArcInfo > License Manager.

2. Compare the number returned with the number stated in license file.

    Open Notepad. Navigate to and open your license files, <feature>.lic. They are located under <SystemDisk>:\Program Files\ESRI\License (where SystemDisk is the operating system disk).

    The ESRI_SENTINEL_KEY number is in the SERVER line.

3. If these numbers do not match, contact ESRI Customer Service to request keycodes for your SentinelPro hardware key.

Checking environment variables

1. Open an MS—DOS command prompt.

2. Type in 'set'.

① Display Hardware Key Status

3. Examine the ESRI_LICENSE_FILE and LM_LICENSE_FILE variables. Make sure they are set to the appropriate license file or <port>@<host> address.

Checking your TCP/IP installation

1. If you're on a network, attempt to PING another computer on your network.

2. If you cannot, reinstall TCP/IP.

No features listed

If no FEATURE information is listed in the debug log file output, then maybe there is no FEATURE information in the license file.

Check this by looking at the contents of your license file. There should be one or more FEATURE lines listed in the license file.

Error in log file

```
<time> (lmgrd) FLEXlm (v6.1f) started on HOST (pc) (date)
<time> (lmgrd) FLEXlm Copyright 1988-1994, Globetrotter Software, Inc.
<time> (lmgrd) License file(s): "C:\Program Files\ESRI\License\arcinfo.lic"
<time> (lmgrd) lmgrd TCP-port 27005
<time> (lmgrd) Starting vendor daemons ...
```

Error at command prompt

```
Could not start the FLEXlm License Server service on \\HOST
Error 1067: The process terminated unexpectedly
```

1. Open an MS–DOS window.

2. Change directory into
   <SystemDrive>:\Program
   Files\ESRI\License (where
   SystemDrive is the operating
   system disk).

   2 `> cd /d <SystemDrive>:\Program Files\ESRI\License`

3. Shut down license manager.

   3 `> lmutil lmdown -c .`

4. Restart the license manager.

   When executing LMGRD, you
   must use the -APP and
   -C . where . indicates all files
   with the .lic extension in that
   particular directory.

   4 `> lmgrd -app -c .`

5. If you get the command
   prompt error in step 4, check
   that the FEATURE informa-
   tion is present in the license
   file.

Empty log file

An empty log file may mean that the ESRI_LICENSE_FILE (or LM_LICENSE_FILE) variable is set improperly.

Review your system variables to see if either of these are set. If you reset either of them, make sure your changes took.

Reviewing your system variables

1. Open an MS–DOS window.

2. Execute SET at the prompt to list all system variables.

   ESRI_LICENSE_FILE could be set two ways:

   • A license file under <SystemDrive>:\Program Files\ESRI\License (where SystemDrive is the operating system disk)

   • <port>@<host>

Correcting a licensing variable

1. Open the Control Panel and click on System.

2. Click on the Advanced tab.

3. Click on System Settings.

4. Select ESRI_LICENSE_FILE or LM_LICENSE_FILE and correct it.

6. Click on Apply then OK.

7. Open a new MS–DOS window and review your system variables.

Driver not installed

You might have gotten this message because the SentinelPro hardware key is not plugged into the LPT1 port properly or the SentinelPro hardware key driver might not be installed.

In each case, your system will not recognize the hardware key.

If the error message persists in the debug log file, even after 'Display Hardware Key Status' has confirmed that the driver is installed, then there may be a driver acquisition time-out problem.

Error in log file

```
<time> (ESRI) Logfile switched from stdout
<time> (ESRI) The SuperPro Driver is not installed on this system
<time> (ESRI) daemon shutdown requested - shutting down
```

Error at command prompt

```
The SuperPro driver is either not installed on this system or
this machine has not been rebooted since it was installed.
```

```
If the installation of ArcInfo was successfully installed by
a user with administrative privileges, you must reboot in order
for the Sentinel driver to become active.
```

Checking the hardware key

1. Check the pins in the hardware key. Bent pins can render a hardware key inoperable.

2. Make sure the key was plugged into LPT1.

3. Check the 'Display Hardware Key Status' program in Start> Programs >ArcInfo> License Manager.

   This message will be returned if the key is plugged in properly:

   ```
   The Sentinel driver is installed and running.
   ESRI_SENTINEL_KEY=371xxxxx
   ```

Checking the SentinelPro driver

1. Check the 'Display Hardware Key Status' program in Start > Programs > ArcInfo > License Manager.

If the SentinelPro driver is not installed on this system or this machine has not been rebooted since it was installed, then the command prompt error will appear.

Installing the Sentinel Driver

1. Open an MS–DOS window and change directory to <SystemDrive>:\Program Files\ESRI\License (where SystemDrive is the operating system disk).

2. Execute SETUPX86 at the command prompt. This will open the Sentinel Driver Setup Program.

   On Compaq Alpha NT, execute SETUPAXP.EXE.

3. Select Install Sentinel Driver from the Functions pulldown menu. This will pop open a Sentinel Install window.

4. Click OK.

5. Restart the system.

Checking the driver acquisition time-out

1. Try to start the license manager using 'Start License Manager in a Command Window' in Start > Programs > ArcInfo > License Manager.

If the license manager starts
with this option, but doesn't
start automatically after
rebooting, then there is a
acquisition time-out problem.

Correcting a driver acquisition time-out problem

1. Open an MS–DOS window.

2. Change directory to
   <SystemDrive>:\Program
   Files\ESRI\License (where
   SystemDrive is the operating
   system disk) .

3. Execute SETUPX86 at the
   command prompt. This opens
   the Sentinel Driver Setup
   Program.

   On Compaq Alpha NT,
   execute SETUPAXP.EXE.

3. Select Configure Sentinel
   Driver from the Functions pull
   down menu. This will open
   the Sentinel Driver window.

4. Click on Edit.

5. Uncheck Auto under 'Port
   Ownership Method' from the
   Configure Port window.
   'System' and 'Raise Priority'
   will become active.

6. Set the Acquisition Timeout
   to -1.

7. Click OK to save the settings.

8. Reboot your computer.

9. Check the debug log file for changes in status or any other problems.

Hardware key not installed

If you get this message in your debug log file, check the pins on your hardware key, first. They may be bent.

Then check the parallel port, which may not be functioning properly.

Other devices connected to or piggybacked on the SentinelPro hardware key in the LPT1 port, like a printer, plotter, or an additional hardware key, may be interfering.

Lastly, your hardware may be newer than what is supported in the installed hardware key driver. Rainbow Techonoliges updates their SentinelPro hardware key drivers regularly to accommodate newer hardware technology. You may need the most current drivers.

If the key continues to cause problems, download the latest Sentinel Driver from www.rainbow.com.

Error in log file

```
<time> (ESRI) Logfile switched from stdout
<time> (ESRI) The SuperPro hardware key is not installed on this system
<time> (ESRI) daemon shut down requested - shutting down
```

Checking for bent pins

1. Uplug your hardware key and take a look at the pins.

Checking the parallel port

1. Unplug the SentinelPro hardware key. Then plug in a printer.

2. After configuring your system to print, print a document to test the port.

Checking other devices connected to the parallel port

1. Check the 'Display Hardware Key Status' program in Start > Progarms > ArcInfo > License Manager. This may report other related problems.

2. Unplug any other devices plugged into the SentinelPro hardware key or LPT1 port.

3. Plug them in one in at a time to see which is the culprit.

Download the newest hardware key driver

1. Open your web browser and go to www.rainbow.com.

2. Search for the newest drivers for the SentinelPro Hardware key and download them.

Incorrect hostid

This message appears when the ESRI_SENTINEL_KEY number in the license file and the hardware key plugged into the parallel port don't match.

You need to replace the key that's plugged into the parallel port with the one that's expected. If you don't have that hardware key, you must first confirm the ESRI_SENTINEL_KEY number of the hardware key you do have and then contact ESRI Customer Service for the appropriate keycodes.

Error in log file

```
<time> (ESRI) Logfile switched from stdout
<time> (ESRI) Wrong hostid, exiting (expected ESRI_SENTINEL_KEY=37101174,
         got ESRI_SENTINEL_KEY=37100548).
```

Three ways to confirm your hardware key number

1. Check the 8-digit number starting with '371' that is printed on one side of the hardware key.

2. Click on the 'Display Hardware Key Status' icon in Start > Programs > ArcInfo > License Manager.

   ② 🖼 Display Hardware Key Status

3. Open an MS–DOS window and change directory to <SystemDrive>:\Program Files\ESRI\License (where SystemDrive is the operating system disk).

   Execute ESRIHOSTID at the command prompt.

   ③
   ```
   > cd /d <SystemDrive>:\Program
   Files\ESRI\License

   > esrihostid
   ```

Incorrect clock setting

You'll get this message in the debug log file, if the system date, time, or time zone are set incorrectly, if the files on your system have a newer creation date than the current time, or if the TZ (time zone) variable is set incorrectly on those platforms which support it.

Error in log file

```
<time> (ESRI) Logfile switched from stdout
<time> (ESRI) The System Clock has been set back to the past.
<time> (ESRI) This is not allowed!
<time> (ESRI) daemon shutdown requested - shutting down
```

Checking your system's date, time or time zone

1. Open Control Panel and click on Date/Time.

2. Click on the Date & Time tab.

3. Confirm that the date and time are set properly.

4. Click on the Time Zone tab.

5. Confirm that the correct time zone is selected.

6. Click on OK to exit.

Checking files on your system

1. Search through your hard drive for files with newer dates or times than the current date or time.

Checking the TZ variable

1. Open an MS–DOS window.

2. Execute SET | MORE at the command prompt.

   2   `> set | more`

   If the TZ variable is set, make sure it agrees with the Date/ Time settings in the Control Panel.

Invalid host name

This error message is normally associated with your TCP/IP Networking Protocol installation, your network card, or the MS Loopback Adapter.

Make sure TCP/IP Networking Protocol is installed properly. TCP/IP requires a network card or MS Loopback to be installed. Instructions to install TCP/IP associated with a particular network card adapter or MS Loopback adapter can be found in Microsoft's online documentation.

If you have a network card and have installed TCP/IP Protocol, check its properties.

The property fields are not case sensitive.

You might also need to update your LMHOST file if it is out of date.

Error in log file

```
<time> (lmgrd) "g" not a valid server hostname, exiting
<time> (lmgrd) Valid server hosts are: "hostname"
<time> (lmgrd) Using license file "C:\Program Files\ESRI\License\arcinfo.lic"
```

Checking TCP/IP properties

1. Open the Control Panel and click on Network.

2. Click on the Protocols tabs.

3. Select TCP/IP and click on Properties.

2. Confirm that a TCP/IP address is listed, along with a Subnet Mask.

   An example of a TCP/IP address is 100.100.100.100, and a Subnet mask is 255.255.255.0.

3. Confirm that a network card 'Adapter' is listed.

4. Make sure the Host name is the same as the Computer Name.

Checking the LMHOST file

1. Open <drive>:\winnt\system32\etc\lmhost with a text editor.

2. Update this file if it contains an incorrect TCP/IP address for your license server.

Laptop Users

If you are on a laptop and often disconnect from your network, the IP address can be used in place of the host name in your license file as long as your MSLoopback Adapter or ethernet card driver is listed first in the network binding protocols found under Control Panel > Network > Bindings > Show Bindings > TCP/IP Protocol.

3. Reboot your license server.

4. If the license manager is not functioning properly, use the PING command at an MS–DOS prompt.

5. Reinstall TCP/IP if this error message is returned with PING:

"`<hostname>:Bad IP address`", something is wrong with `TCP/IP`.

Invalid host name - "host"

These error messages indicate that the host name on the SERVER line of your license files — <feature>.lic — is not correct.

Error in log file

```
<time> (lmgrd) "host" not a valid server hostname, exiting.
<time> (lmgrd) Valid server hosts are: "hostname"
<time> (lmgrd) Using license file "C:\Program Files\ESRI\License\sde.lic"
```

Error at command prompt

```
Could not start the FLEXlm License Server service on \\HOST
Error 1067: The process terminated unexpectedly.
```

Checking the HOSTNAME

1. Open an MS–DOS window.

2. Execute HOSTNAME at the command prompt.

Correcting the host name

1. Open your license files located under <SystemDisk>:\Program Files\ESRI\License (where SystemDisk is the operating system disk) with a text editor.

2. Change the SERVER name in your license files to that output by the HOSTNAME command.

1

```
> cd /d <SystemDisk>:\Program
Files\ESRI\License

> notepad <feature>.lic
```

Incorrect IP address

The IP address is incorrect.

The IP address of a machine should not contain 0s, 127s, or 255s as these numbers are reserved. The Subnet Mask will, however, use 0s and 255s in its address.

Error in log file

```
<time> (ESRI) Vendor daemon can't talk to lmgrd (Cannot connect to license server
(-15,11:10060) WinSock error code)
<time> (lmgrd) Vendor daemon died with status 241
<time> (lmgrd) Since this is an unknown status, lmgrd will
<time> (lmgrd) attempt to re-start the vendor daemon.
<time> (lmgrd) Restarted ESRI <internet tcp_port 0 pid <number>
... (this message is repeated several times.)
```

Checking TCP/IP properties

1. Open the Control Panel and click on Network.

2. Click on the Protocols tabs.

3. Select TCP/IP and click on Properties.

2. Confirm that a TCP/IP address is listed along with a Subnet Mask.

   An example of a TCP/IP address is 100.100.100.100, and a Subnet mask is 255.255.255.0.

3. Confirm that a network card 'Adapter' is listed.

4. Confirm the Host name is the same as the Computer Name.

License file does not support this version

This error message is normally associated with you having pre-ArcInfo 8 license files saved under under the <SystemDisk>:\Program Files\ESRI\License directory (where SystemDisk is the operating system disk).

When the ESRI License Manager service is started either at boot time or through Control Panel > Services, all files ending in .LIC are read by the license manager and their contents are put into memory. Files are read by filename in alphanumeric order, first 0(zero) through 9, then A through Z. While these files are read, all duplicate FEATURE and UPGRADE information is disregarded. Therefore, if the ArcInfo FEATURE information is first read from a pre-ArcInfo 8 file, all subsequent ArcInfo 8 FEATUREs will be disregarded.

The solution is to either delete all pre-ArcInfo 8 .LIC files or rename them with an extension other than .LIC.

Error from command prompt

```
FLEXlm Error: License file does not support this version
 Feature:       ARC/INFO
 Application version > License version: 8.01 > 7.21
 License path:  @lecoco;@marin
 FLEXlm error:  -21,126
 Program not run.
```

Checking your license file

1. Open an MS—DOS command prompt.

2. Navigate to <SystemDisk>:\Program Files\ESRI\License (where SystemDisk is the operating system disk).

3. Execute a DIR *.LIC to list all license files.

4. 'Type' each file to confirm content.

   All ArcInfo 8 license files contain SERVER, VENDOR and FEATURE lines. UPGRADE lines are optional.

   The VENDOR line should contain this statement:
       VENDOR ESRI
   while all FEATURE and UPGRADE lines must have two encryption strings.

Contacting ESRI Technical Support

There are standard methods you can use to debug license manager problems. Before contacting ESRI Technical Support, try to debug the problem following these steps. If you cannot, be prepared to provide your findings to ESRI Technical Support.

- Attempt to start ArcInfo or ArcSDE. Read the error message and try the proposed solution.

- Examine your debug log file for error messages.

- For UNIX, get the license manager status by running LMUTIL LMSTAT -A from $ARCHOME/sysgen or $SDEHOME/sysgen. Examine the output for problems.

- For Windows NT, get the license manager status by running LMUTIL LMSTAT -A -C . at a command prompt from <SystemDisk>:\Program Files\ESRI\License (where SystemDisk is the operating system disk). Examine the output for problems.

These are additional questions you will be asked when contacting ESRI Technical Support for assistance:

- What kind of machine and operating system is your lmgrd running on?

- If the application and license manager are running on different machines, what type of machine and operating system is each running on?

- What version of FLEXlm does the program use? (LMUTIL LMVER LMGRD or LMUTIL LMVER ESRI)

- What error or warning messages appear in the debug log file? Did the server start correctly? Look for a message like this one:

  `server xyz started for: feature1 feature2.`

- Are you running other software also licensed by FLEXlm? If so, are you using a combined or separate license file configuration?

- Are you using redundant servers (multiple SERVER lines in your license file)?

Appendix B: License Manager Files

The license file

The license file, license.dat, contains the information the ESRI vendor daemon reads to manage the seats on your network:

• The license server nodes (host names) and hostids

• The vendor daemon

• The software licensed at your site with keycodes for each

This information is found within the four supported line types: SERVER, VENDOR, FEATURE, and UPGRADE.

The SERVER line identifies the host name and hostid of the node on the network that will be the license manager server along with the TCP/IP port number through which it communicates.

The host name is the name of the computer. This is chosen by your site administrator. Your site administrator can change the node name, as long as the hostid does not change. On sites with multiple redundant servers, one of the servers is selected as the master node. If the order of the server lines is the same in the license files for all of the redundant servers, then the first server to start the license manager will be the master. If the master fails, the server whose name is alphabetically first will be the master.

The hostid noted on the SERVER line is encrypted into the FEATURE lines, so the server node cannot be changed by your site administrator. The hostid on UNIX is the unique CPU ID while on Windows NT it is the number assigned to your SentinelPro Hardware key. This is an eight digit number starting with '371'.

At the end of the SERVER line is the TCP/IP port number, '27005'. Setting the port number in the license file is optional. However, we set the default port to 27005 for two reasons:

• To reduce port number conflict with other software vendors.

• To allow you to set the <port>@<host> argument with the ESRI_LICENSE_FILE variable, thereby permitting you to share licenses across all supported architectures. Refer to the 'Advanced license manager' chapter in ths guide for more details on <port>@<host>.

If the TCP/IP port number is not set in the license file, FLEXlm will default to an open port within the 27000 through 27009 range.

The VENDOR line identifies the vendor daemon and looks this:

`VENDOR vendor_daemon_name [options_file]`

The 'vendor_daemon_name' for ESRI software is ESRI.

The 'options_file' field contains the pathname to the license.opt file. Refer to the next section regarding the license.opt file for more details.

The FEATURE line defines what ESRI software features you are licensed for, how many seats you will have access to and the length of time they will be available. It contains:

• The feature information for ArcInfo and other optional extensions licensed at your site

• The ESRI vendor daemon which manages each software program

• The software version

• The time-out date

• The number of seats licensed

• A hexadecimal-encrypted keycode string

• The vendor_string="" encrypted string

• A checksum

ArcInfo 8 uses the double-encryption keycode technique. Hence, pre-ArcInfo 8 keycodes will not work with ArcInfo 8 software. Refer to 'Requesting keycodes' in Chapter 2 of this guidefor information about how to acquire your ArcInfo 8 keycodes.

Figure B-1 is an example of a Windows NT license file. It has both FEATURE and UPGRADE lines for the ARC/INFO, Plotting and Grid software programs.

Note: 8.01 is the software version for ArcInfo 8 while 7.21 is the version for ArcInfo 7.x.

For UNIX node-locked seats, the hostid of the node to which the seats are locked is added at the end of the FEATURE line, and the FEATURE has an asterisk and the node-locked hostid directly after its name (e.g., ARC/INFO*124b2d31).

Figure B-2 is an example of a UNIX license file. The first FEATURE line listed has node-locked seats locked to the workstation with hostid 124b2d31. Note that the ARC/INFO feature name is followed by *124b2d31.

The UPGRADE line allows you to upgrade some of the seats associated with a particular FEATURE line to a newer software version. It defines which ESRI software programs to upgrade, how many seats, and for how long. It contains:

- The licensed feature you have upgraded

- The ESRI vendor daemon

- The older software version stated in the associated FEATURE line

- The newer, upgraded software version

- The time-out date

- The number of seats upgraded

- A hexadecimal-encrypted keycode string

- The vendor_string="" encrypted string

- A checksum

A listing of all ESRI licensed software features on UNIX and their keywords for both floating and node-locked seats can be found in Table B-1.

Figure B-1: A sample license file for Windows NT

```
SERVER  x  ESRI_SENTINEL_KEY=37100001  27005
VENDOR  ESRI
FEATURE  ARC/INFO          ESRI  7.21   01-jan-00    5 271E4AA1B5EA018B9FF5 \
                        vendor_info="7ALC1RNE10JEZB6ED061"  ck=21
FEATURE  Plotting          ESRI  7.21   01-jan-00    1 FE00912446B39CF7F108 \
                        vendor_info="XALXNPP245F00P200EF2"  ck=17
FEATURE  Grid             ESRI  7.21   01-jan-00    5 DB8ACBEF0315D6B4AE9F \
                        vendor_info="EJDJHE7HTK0C3H5B7P39"  ck=67
UPGRADE  ARC/INFO          ESRI  7.21 8.01  01-jan-00    3 1B1E27BBDC7850412EE3 \
                        vendor_info="5ZZZB6H1ED6EAAST6024"  ck=99
UPGRADE  Plotting          ESRI  7.21 8.01  01-jan-00    1 211F95BCEC011053C4AA \
                        vendor_info="7A61CP6D4LMSMNL43201"  ck=100
UPGRADE  Grid             ESRI  7.21 8.01  01-jan-00    3 4B853EE48432E20310C4 \
                        vendor_info="9FFTE9LMY9BZG5G03170"  ck=201
```

Figure B-2: A sample license file for UNIX

```
SERVER picard 325a2b57 27005
VENDOR ESRI
FEATURE ARC/INFO*124b2d31  ESRI   8.01   01-jan-00  10 EBE68031B95FE21231B8 /
                           vendor_info="19AA0708S0AED0PDXT58" ck=12
FEATURE ARC/INFO*325a2b57  ESRI   7.21   01-jan-00  6 6D0A1E1B82123D21B95F /
                           vendor_info="F086T58L0PDPBFS0AEDX" ck=12
UPGRADE ARC/INFO*325a2b57  ESRI   7.21   8.01   01-jan-00  3 B951B8EBE682123031FE /
                           vendor_info="A0XT708PD5S019AAED08" ck=56
FEATURE ARC/INFO           ESRI   7.21   01-jan-00  5 0B06D0A1D2E928A7D321 /
                           vendor_info="08S058PDXT78CASRLBHP" ck=45
UPGRADE ARC/INFO           ESRI   7.21   8.01    01-jan-00  3 1B8E10717057F3FB75BD /
                           vendor_info="5ZHFNFF086LPBF3SE037" ck=215
```

Required command line options

When starting the license manager at a command prompt there are required options related to the license file. For UNIX, use the command line switch '-c' to read the license.dat file at its locations:

• $ARCHOME/sysgen/license.dat

• $SDEHOME/sysgen/license.dat

This switch is required because this file is not located at /usr/local/flexlm/licenses/license.dat where the default read of FLEXlm is located.

For Windows NT, use the command line option '-app -c .' to read all of your license files.

Table B-1: All ESRI licensed Features

	ESRI Software	Floating keyword	Node-locked keyword††
ArcInfo	ArcInfo	ARC/INFO	ARC/INFO*<lmhostid>
	ArcExpress††	ArcExpress††	ArcExpress*<lmhostid>
	ArcPress	ArcPress	
	ArcScan	ArcScan	ArcScan*<lmhostid>
	ArcSdeConnects	ArcSdeConnects	
	ArcSdeServer	ArcSdeServer	
	ArcSdl	ArcSdl†	ArcSdl*<lmhostid>
	ArcStorm	ArcStorm	
	ArcStormEnable	ArcStormEnable	
	Arc COGO	COGO	COGO*<lmhostid>
	ARC GRID	Grid	Grid*<lmhostid>
	GeoStats†	GeoStats	
	ARC NETWORK	Network	Network*<lmhostid>
	ARC TIN	TIN	TIN*<lmhostid>
	Plotting	Plotting	Plotting*<lmhostid>

† Available on Windows NT only
†† Available on UNIX only

Note: ArcStormEnable and Plotting are not licensed extensions.
ArcStormEnable is required for ArcStorm to function properly. A
seat is automatically issued to all sites receiving ArcStorm
keycodes. Plotting is required to enable plot conversion at your
site. All sites receive a plotting seat.

The license.opt file

The license.opt file is an optional file that is created by your license manager administrator. It contains information used to tailor the behavior of the license daemons.

The file lets you:

- Allow the use of FEATUREs based on user, hostname, display name, or IP address

- Deny the use of FEATUREs based on user, hostname, display name, or IP address

- Reserve FEATURE licenses based on user, hostname, display name, or IP address

- Control the amount of information logged about licenses

Store this file at this location for UNIX:

- $ARCHOME/sysgen/license.opt

- $SDEHOME/sysgen/license.opt

and this location for Windows NT:

- <SystemDrive>:\Program Files\ESRI\License\<feature>.opt where <SystemDrive> is the disk containing the operating system and <feature> is a licensed ArcInfo feature.

This file allows you, the license administrator, to be as secure as you like. See the FLEXlm End User's Manual at www.globetrotter.com for information on the format of the options file.

Note: ESRI does not implement the TIMEOUT or TIMEOUTALL options.

Lines in the options file are limited to 2048 characters. The `\' character can be used as a continuation character in options file lines.

You can include comments in your options file by starting each comment line with a pound sign `#'. Everything in an options file is case sensitive. Be sure that user names and feature names, for example, are entered correctly.

Table B-2: Supported functions for the license.opt file

EXCLUDE—deny a user access to a feature.

EXCLUDEALL—deny a user access to all features served by this vendor daemon.

GROUP—define a group of users for use with any options.

HOST_GROUP—define a group of hosts for use with any options.

INCLUDE—allow a user to use a feature.

INCLUDEALL—allow a user to use all features served by this vendor daemon.

LINGER—cause licenses to be held by the vendor daemon for a

period after the application checks them in or exits.

MAX—limit usage for a particular feature/group - prioritizes usage among users.

MAX_OVERDRAFT—limit overdraft usage to less than the amount specified in the license.

NOLOG—turn off logging of certain items.

REPORTLOG— specify that a logfile be written suitable for use by the FLEXadmin End-User Administration Tool.

RESERVE—reserve licenses for a user.

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