



Cisco WAE Design 6.4.15 GUI Installation Guide

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WAE Design GUI Installation

The WAE Design GUI is used by WAE Design users and by administrators who are creating plan templates for use in the WAE Live or WAE Design Archive applications.

This chapter provides instructions for installing the WAE Design GUI. You additionally need to install the WAE Design license and if applicable, install the floating license server.

[License Installation](#)—Information on how to install dedicated and floating licenses.

[WAE Design Floating License Server](#)—Procedure for installing and setting up the FlexNet Publisher license server. This is needed only if administering floating licenses.

The installation process does not install any drivers or require any changes to the operating system. You can download and install the files to any folder or directory.

Prerequisites

- A license is required for all features except for the example plan files. If you have questions about obtaining a license, contact your support representative or system administrator.
- Meet the necessary system requirements and package dependencies. For a list of these, see the [System Requirements](#) document.

Windows and Mac Installation

-
- Step 1** Download the Windows or Mac Cisco WAE Planning software package from the [Cisco download site](#).
 - Step 2** Extract the files in a location of your choice.
 - Step 3** Install and verify the license. See [License Installation](#).
-

Linux Installation

The Linux installation installs all planning software, which includes WAE Design.

Installer

An *installer* is an executable that runs a script to install the software in the proper locations. Although multiple packages are installed, they are used only if you have a license for them.

The installer performs the following tasks:

- Verifies:
 - Whether the device has the appropriate system requirements, including proper operating system, disk space, total memory, and required software packages.

If the installer sees that you do not have the appropriate system requirements, it either exits, gives a warning, or prompts you whether to continue. Since the installer might be checking for more than what your specific requirements are, you can press “y” to attempt to continue.
 - Whether there are existing package installations; if there are, they are preserved.
- Provided you use the defaults, installs WAE Design software under `/opt/cariden/software/mate`. If you did not use the default directory, the path is `<installation_directory>software/mate`. It also creates the `/opt/cariden/software/mate/current` symbolic link to the most recently installed package. Throughout the documentation, this is referenced as `$CARIDEN_HOME`.
- Upon logging out and back in, the WAE username and associated permissions are set, and the environment variables are set.
 - For executables, the WAE user has read, write, and execute permissions. Users listed in `/etc/group` have read and execute permissions. All others have read-only permissions.
 - For non-executables, only the WAE user has read and write permissions. All other users have read-only permissions.

Installation

-
- Step 1** Log in to the server as a user with sudo privileges.
- Step 2** Go to the directory where you downloaded the software, extract the .zip file, and execute the installer as root using a bash command. The software package is the installer that automates the installation process.

```
sudo bash <package>.bin
```

Installer Options	Description
<code>sudo bash WAE-Design-k9-<version>.bin</code>	Be prompted through the installation process.
<code>sudo bash WAE-Design-k9-<version>.bin -d <installation_directory></code>	Specify a different installation directory. You are prompted through the remainder of the installation process.
<code>sudo bash WAE-Design-k9-<version>.bin -h</code>	Shows a usage statement for the installer.
<code>sudo bash WAE-Design-k9-<version>.bin -Y</code>	Automatically respond “yes” to all questions without being prompted.

The process verifies the integrity of the installation using checksums. If a checksum fails, error messages appear and the installation process ends.

Depending on what the installation process finds, it might prompt you throughout the process to continue or not.

Step 3 When prompted, enter the following information.

Command Prompt	User Entry/Notes
Choose installation directory	<p>By default, the installation directory is set to <code>/opt/cariden</code>.</p> <p>If this is an upgrade, we recommend that you maintain the same installation directory as in the previous release. If this is a new installation, the recommendation is to keep this default.</p> <p>If the directory you entered does not exist, you are prompted as to whether to create it. If you answer “yes,” an installation directory with root privileges is created.</p>
Enter the WAE username	<p>The default is “cariden” only if that username exists; its existing password remains intact. Otherwise, the default WAE username is “wae” and the password is “ciscowae.” The WAE user is created automatically during installation.</p> <p>We recommend that you keep the default you receive.</p> <p>Note If you have installed the WAE Live datastore (mld), you cannot restart mld unless you start it with the same username used to install it.</p>

Step 4 Once the installation process stops, log out of the device or VM.

Step 5 Log back in using the WAE username.

Step 6 Stop the services that are automatically started since they are not used by the WAE Design application.

```
service wae-web-server stop
service wae-ni stop
service wae-svcs-dashui stop
service wae-svcs-db stop
service wae-svcs-logagent stop
service wae-svcs-metricsbkr stop
service wae-svcs-metricsd stop
service wae-svcs-mon stop
service wae-svcs-ui stop
```

Step 7 To ensure the above services do not restart upon reboot, use the following `chkconfig` command for each service that you stopped in the previous step.

```
sudo chkconfig <service_name> off
```

Example:

```
sudo chkconfig wae-ni off
```

To verify these services will not start on a reboot, use the following command and confirm these services are listed as off:

```
chkconfig --list | grep -i wae-
```

Step 8 Install and verify the license. See [License Installation](#).

Starting WAE Design

**Note**

New WAE users must log into the WAE System UI to change their password before logging in from WAE Design.

To start WAE Design from the directory in which the WAE Design software is installed, do one of the following:

- On Windows or Linux, double-click the **mate** executable.
- On a Mac, go to **Finder > Applications** and double-click the mate application. Alternately, enter **open/Applications/mate.app** from the **Finder > Utilities > Terminal**.
- From the CLI, enter **mate**.

(Optional) On Windows, you can associate the plan file using the .pln format with the mate executable. Double-clicking a .pln file opens the plan in a new instance of the GUI.



License Installation

A license is required for all features except for sample plan files used in the Cisco WAE Design application. If you have questions about obtaining a license, contact your Cisco support representative or system administrator.

WAE Design Dedicated and Floating Licenses

Dedicated Licenses	Checked Out Floating Licenses	Borrowed Floating
<ul style="list-style-type: none"> • Each license is unique to a specific device. • Always available (until expiration). • No network connectivity is required. • Must be downloaded to an accessible device. 	<p>The FlexNet Publisher license server must be set up (usually by a system administrator). For information on setting up this license server, see WAE Design Floating License Server.</p> <ul style="list-style-type: none"> • A single license is shared amongst users who have permission from the license server. • You must have connectivity to the license server. • There are a maximum number of licenses, and you cannot check out one if they are all in use. • You must either download the floating license to an accessible device, or know the hostname and MAC address of the license server. To connect to a different port, you need to know the license server's port number. • Regardless of the method used, you must install the license one time. Thereafter, it is automatically checked out from the server when starting the GUI or any CLI tool. When the GUI is closed or the tool stops, the license is checked in to the license server for use by others. 	<ul style="list-style-type: none"> • Users borrow licenses that are stored on the license server for a user-specified number of days. Other users cannot use the borrowed license. • You must install the license one time. Thereafter, it is available for borrowing. • After borrowing the license file once, it is available until you return it or until the number of days for which it is borrowed expires. If you do not return it, the license expires. • Connectivity to the license server is required to borrow a license, but is not required when using a borrowed license. You must also have connectivity if returning a borrowed license prior to its expiration date. • You cannot borrow a license if a dedicated license is already installed.

Dedicated and Floating License Location Restrictions

The CLI gives you the option to store traditional license files in one of three locations:

- `$HOME/.cariden/etc`
- `/opt/cariden/etc`
- `/opt/cariden/software/mate/<package>/etc`

Both the WAE Design GUI and the web UI put licenses only in `$HOME/.cariden/etc`.

- If installing dedicated licenses for both WAE Core and non-WAE Core, you must install the licenses in the same directory and merge both license files into a single license.
- If installing a dedicated license for WAE Core and a floating license for WAE Design on the same server, you must install the licenses in different directories.
- You cannot install both a WAE Design dedicated and a WAE Design floating license.

Installing Licenses from WAE Design

To use the WAE Design GUI, you need either a dedicated license, floating license, or a Smart License subscription. **Regardless of the license type or method of installation, you need only install it one time.** If it is a floating license, thereafter when you start WAE Design, the floating license will be available for checking out or borrowing.

To verify a license and its features, choose **File > License > Check**.



Note

If you have installed a license for use by the WAE Core modules, do not use the overwrite option when installing a WAE Design license.

Installing a License

Before You Begin

- Confirm that you have the license on an accessible device.
- For floating licenses, the FlexNet Publisher license server must be set up (usually by a system administrator). For information on setting up this license server, see [WAE Design Floating License Server](#).

Step 1 From the WAE Design, choose **File > License > Install**.

Step 2 Do one of the following:

- If you are installing a dedicated license, choose **From license file**. Click **Browse** to navigate to the location or enter the name of the license file (.lic extension).
- If you are installing a floating license from the license server (that is, you do not have the license file), choose **Specify license server**. Enter both the hostname and the MAC address of the license server. The MAC address must be a 12-digit hexadecimal number without any colon (:) separators.

If the port is not specified, ports 27000-27009 are scanned to find the license server port and connect to it. Optionally, you can enter the license server's TCP port number using a range of 1024 to 65535. The default license server port is 27000.

**Note**

The Specify smart license service information option applies only to WAE server installation setups where Smart Licensing has been enabled on the server. For more information, see [Cisco Smart Licensing](#)

Step 3 Click **OK** to confirm the license installation.

Borrow and Return Floating Licenses

If you have installed a floating license, you can borrow a license from the server for up to 30 days. The license is automatically returned to the license server at 11:59 p.m. on the last day (based on the local time on the floating license server).

You must have connectivity to the floating license server to borrow a license or to return it prior to the specified date. Connectivity is not required, however, during the period of time for which you are borrowing the license.

The number of remaining available days for the license is listed under **File > License > Borrow**. To determine the exact date on which the license will expire, choose **File > License > Check**.

To borrow a license, follow these steps.

Step 1 From WAE Design, choose **File > License > Borrow**.

Step 2 Enter the number of days you want to borrow the license (integer from 1 to 30), and click **OK**.

To return a borrowed license, follow these steps.

Step 1 From WAE Design, choose **File > License > Return**.

Step 2 Click **OK** in the confirmation message.

Installing a License from the CLI

You can use the CLI to install licenses for all products. For each license you are installing, run the `license_install` tool.

**Note**

If you are installing both a WAE Core and a non-WAE Core license, you must use the default method that merges the licenses. You are given an option on where to put the license. Choose the same location for both licenses.

Installing a Dedicated License

If you are installing a dedicated license, pass the name of the license file (.lic extension). By default, the tool merges the features granted by the new license with those in an existing license.

```
license_install -file <path>/<filename>.lic
```

When prompted, enter the number associated with the directory in which you want to install the license.

By default, when using `license_install -file`, the tool merges the features granted by the new license with those in an existing license. If you are using only non-WAE Core licenses, you can overwrite the existing license using the `-existing-lic overwrite` option. Before executing this option, be certain that the new license contains all the necessary features because previous features will no longer be available. Do not use this overwrite option if installing licenses for both non-WAE Core and WAE Core.

```
license_install -file <path>/<filename>.lic -existing-lic overwrite
```

For example:

```
license_install -file acme/setup/MATEDEDICATED12345678910111213.lic -existing-lic
overwrite
```

Installing a Floating License

If you are installing a floating license from the license server (that is, you do not have the license file), use both the `-server-host` and `-server-mac` options. The MAC address must be a 12-digit hexadecimal number without any colon (:) separators.

```
license_install -server-host <license_server_hostname> -server-mac
<license_server_MAC_address>
```

If the `-server-port` option is not specified, ports 27000-27009 are scanned to find the license server port and connect to it. Optionally, you can enter the license server's TCP port number using a range of 1024 to 65535. The default license server port is 27000.

For example:

```
license_install -server-host lic.cisco.com -server-mac 1a2b3c4d5e6f -server-port 27000
```

To borrow a license, use the `license_borrow` command and specify the number of days (integer from 1 to 30). Example:

```
license_borrow -num-days 23
```

To return a license, use the `license_return` command. There are no required or optional options.

Verifying Licenses

Run the `license_check` tool. To see descriptions of the license features, use the `-detail` option (which defaults to `true`).

For example:

```
license_check -detail
```

To determine the number of days before the license expires and the exact date on which the license expires, use the `license_check` command.

Installing Dedicated and Floating Licenses from the Web UI



Note Do not use the web UI for WAE Core licenses or standalone WAE Design installations.

Step 1 Start the web server if it is not running.

```
service wae-web-server start
```

Step 2 Choose **System > Licenses**.

Step 3 Click **Upload Licenses**.

Step 4 Click **Select Licenses**.

- a. Browse to the location or enter the name of the license file (.lic extension), and click **Open**.
- b. If there is already a license installed, the default is to overwrite the existing license. To merge the two licenses instead, select the merge option. If you are uncertain whether you have a complete set of desired features in the new license, best practice is to merge the licenses.
- c. Click **Upload License**.

Step 5 Verify the license installed correctly by locating it on the **System > Licenses** page.



WAE Design Floating License Server

The FlexNet Publisher license server must be set up if WAE Design users are to use floating licenses. Using this server, you can control access to the licenses, monitor who has them checked out, and check log activity.

The FlexNet Publisher license server has two interfaces. One is a CLI, which requires that you start an `lmgrd` daemon so all users can access the floating licenses. The other is a web UI, wherein you must install and configure an `lmadmin` tool. Best practice is to use only one or the other interface (CLI or web) to administer the license server.



Note

For information about FlexNet Publisher and for more details on all FlexNet Publisher CLI commands and GUI, refer to the *FlexNet Publisher License Administration Guide* (`FlexLM_EndUser_LicAdmin.pdf`). This is located in `$CARIDEN_HOME/docs`, which by default is `/opt/cariden/software/mate/current/docs`. This chapter includes some FlexNet Publisher instructions for both the CLI and GUI that could change without Cisco's knowledge.



Note

All instructions and examples assume you used `/opt/cariden` as the default installation directory. If you did not, substitute your installation directory for `/opt/cariden`.

Prerequisites

- You must have the required packages installed. For a list of package dependencies, see the [System Requirements](#) document.
- You must have a WAE Design floating license installed on the same device or VM as the FlexNet Publisher floating license server, which means you must have WAE Design installed. Contact your Cisco representative for this license, and see [License Installation](#) to install this license.

Best Practices

- If you are also installing a WAE package that requires servers, then install this first and install it on the same device as the FlexNet Publisher license server. Doing so simplifies administration tasks.
- Update the WAE user's `PATH` variable so you can invoke FlexNet commands without having to specify the full path.

Example: Edit `~/ .profile`.

```
export PATH=$PATH:$CARIDEN_ROOT/software/flexlm/current/bin
export PATH=$PATH:$CARIDEN_ROOT/software/flexlm/current/bin
```

Pre-Installation



Note

If you are installing the FlexNet Publisher license server **on a different Linux device** than the one on which a WAE server installation resides, follow steps 1-4. Otherwise, skip to step 5. Follow all steps on the device where the FlexNet Publisher license server resides.

-
- Step 1** Log in to the FlexNet Publisher license server as root or as a user with administrative capabilities.
- Step 2** Create a lowercase, alphanumeric username where the first letter is an alphabetical character.
- ```
/usr/sbin/useradd <username>
```
- Step 3** Set a password.
- ```
passwd <username>
```
- Step 4** Create an installation directory that has root privileges. The best practice is to use the default installation directory, which is `/opt/cariden`.
- ```
cd ~/
mkdir -p /opt/cariden
```
- Step 5** Change the owner of the installation directory to the newly created user.
- ```
chown <username> /opt/cariden
```



Note

Throughout this chapter, `bin` is `/opt/cariden/software/flexlm/current/bin`.

- Step 6** Ensure there are no local firewalls blocking the services. This step is beyond the scope of these instructions, though following is an example. For a list of ports used, see the [System Requirements](#) document.

Example: This shows how to disable the iptables firewall as root.

```
service iptables save
service iptables stop
sudo chkconfig iptables off
```

- Step 7** If you already have a license server installed and running, gracefully stop it.

```
bin/lmdown -c <license_file>
```

Or

```
bin/lmdown -all
```

If the server is distributing borrowed licenses, use the `-force` option.

```
bin/lmdown -c <license_file> -force
```

Or

```
bin/lmdown -all -force
```


- Step 8** Download the License Server package from the [Cisco download site](#). Navigate to **Routers > Service Provider Infrastructure Software > WAN Automation Engine (WAE) > WAE Planning > 6.4.x** to download the License Server Software `WAE_License_Server-2.0-Linux-x86_64.sh`.

To enable borrowed licenses:

- You must download a new license package regardless of whether this is an upgrade or a new installation.
- If you have a floating license that was generated prior to May 2015, you must acquire a new floating license.

- Step 9** The WAE Design license file's `SERVER` statement must be the same hostname as the output from the `hostname` CLI command.

- a. Determine the hostname.

```
hostname
```

- b. Edit the `/etc/sysconfig/network` file to include the hostname returned in the preceding step.

```
HOSTNAME=<hostname>
```

- Step 10** Ensure the `/etc/hosts` file on the client devices contains the same hostname as identified in Step 4. (Client devices are the devices that will be checking the licenses in and out of the server.)

Install License Server

The installer runs `/lmdadmin-i86_lsb-11_11_1_1.bin` from the installed folder (`/opt/cariden/software/wae-license-server`).

If you want to run the license server web UI, run `/lmdadmin-i86_lsb-11_11_1_1.bin` from the `/opt/cariden/software/wae-license-server/bin` directory.

Although the default is to install `lmdadmin` into `/opt/FNPLicenseServerManager`, the best practice is to install it into `/opt/cariden/software/flexlm/current/web`.

```
chmod 755./<lmdadmin_package>.bin;./<lmdadmin_package>.bin
```

Example:

```
chmod 755./lmdadmin-i86_lsb-11_11_1_1.bin;./lmdadmin-i86_lsb-11_11_1_1.bin
```

Configure License Server Ports

To check out or borrow a floating license, client devices must establish two TCP connections to the license server. One connection is to the floating license server daemon. Unless otherwise configured, this daemon listens on the first available port in the range of 27000 and 27009. The other connection is to the Cisco daemon, which the license server randomly selects from the ephemeral range (which often ranges from 49152 to 65535).

If firewall policies block the above ports, you can change the ports by adding the port information to the floating license server's license file. By default, the file contains the following information:

```
SERVER <hostname> <MAC address>
VENDOR Cisco
```

Modify the preceding lines as follows to change the ports that these daemons use.

Port Type	Syntax	Example
Server daemon	SERVER <hostname> <MAC address> <port>	SERVER Centos10 525400232200 5053
Cisco daemon	VENDOR cisco PORT=<port>	VENDOR cisco PORT=27010

Start License Server



Note

The following instructions are for using either the CLI or license web server, but not both. The recommended practice is to install and use one or the other.

To start the license server, you must have access to its license file. Note that this is not the same as the WAE license.

Download the floating license server file (.lic extension) to a directory of your choice on the device where the license server will be installed. Best practice is to put it in /opt/cariden/etc.

CLI

To start the license server daemon (lmgrd) and specify the lmgrd log file name and location, enter the following from /opt/cariden/software/flexlm/current/bin.

```
./lmgrd -c <license_filename> -l <log_path_filename>.log
```

Example:

```
/lmgrd -c /opt/cariden/etc/MATE_Floating.lic -l /opt/cariden/logs/lmgrd.log
```

Web UI

Step 1 Create a backup of the Cisco daemon file so that it can be easily restored in case of failure.

```
cp /opt/cariden/software/flexlm/current/bin/cisco
/opt/cariden/software/flexlm/current/bin/cisco.bak
```

Step 2 Copy the Cisco daemon files to the flexlm/web directory.

```
cp /opt/cariden/software/flexlm/current/bin/cisco /opt/cariden/software/flexlm/web/cisco
```

Step 3 To start the license server using the web UI, first configure the following parameters from the /opt/cariden/software/flexlm/web directory. For more information, see lmadm -help.

- a. By default, the lmadm server has a user named “admin” with a password of “admin.” If needed, add another user to this lmadm server.

```
./lmadm -useradd <username> - pass <password>
```

- b. Import the WAE Design license file that was installed.

```
./lmadm -import <path>/<license_filename>
```

Example:

```
lmadmin -import ~/.cariden/etc/MATE_Floating.lic
```

- c. Start the `lmadmin` process with its default settings.

```
./lmadmin
```

Step 4 Start the license server web UI, which by default uses a non-secure port of 8090. By entering the following in a web browser, you are redirected to the secure port.

```
http:<server_hostname>:8091
```

Step 5 Click the **Administration** link, and log in using the an administrative username and password. Both have a default of “admin.”

Step 6 Click the **Vendor Daemon Configuration** tab, click the **Administer** link, and then click **Start**.

Post-Installation

Log Files

By default, the `lmadmin` logs are in `/opt/cariden/software/flexlm/web/logs`.

The `lmgrd` log files are located wherever you specified the `<log_path_filename>.log` when starting the `lmgrd` daemon (`lmgrd -l <log_path_filename>.log`).

Port Verification

To verify the ports, you can use any of several methods, as follows.

- Verify the license server daemon port is running. For example, you can telnet to this port to verify that it is running.

```
telnet <license_server_IP_address> <license_server_daemon_port>
```

Example:

```
telnet 127.0.0.1 27000
```

- Verify the license server is listening to the specified port.

Example:

```
netstat -a | egrep '27000[0-9]'
```

tcp	0	0	*:27000	*.*	LISTEN
tcp	0	0	localhost:48245	localhost:27000	ESTABLISHED
tcp	0	0	localhost:27000	localhost:48245	ESTABLISHED

- View the `lmgrd` log file, which indicates on which ports the license server and Cisco daemons are listening.

Example:

```
13:00:14 (lmgrd) lmgrd tcp-port 27001
13:00:14 (lmgrd) cisco using TCP-port 42207
```

- For `lmadmin`, go to the admin page.
 - To verify the server daemon's port, choose **Administration > Server Configuration > License Server Configuration**.
 - To verify the Cisco daemon's port, choose **Administration > Server Configuration > Vendor Daemon Configuration**.

Distribute Information to Clients

Either distribute the same floating `.lic` file that you installed to all WAE Design users who need it, or give them both the MAC address and hostname for the license server. Having users install licenses via the MAC address and port is the recommended practice since it eases administration.

After end users install the floating license once, the license is automatically validated from the server each time the user opens the WAE Design GUI or runs the CLI tools.

Set Up Access Control List for Web Server

If you are using the web server to administer licenses, you can set up an access control list. This is optional, but doing so can improve the security of who can access the web server, as well as give you an easily maintainable list of license users. To do this, you need to know the user ID for all users who are checking out licenses from the license server. The user ID is what they use to log in to their operating systems.

Step 1 Create and open a file named `cisco.opt` in `/opt/cariden/software/flexlm/current/bin`.

Step 2 Create groups to make it easier and faster to configure inclusions and exclusions. You can then use these groups, rather than specifying individual users.

```
GROUP group_name user_name1 user_name2 user_username3..
```

Example: The group name is `akdevops`, and each name following it is a user.

```
GROUP akdevops theresa lone loretta byron patrick sharon
```

Step 3 For each user or group that you want to grant license access, add an `INCLUDEALL` line.

```
INCLUDEALL type {user_name | group_name}
```

Example:

```
INCLUDEALL GROUP akdevops
INCLUDEALL USER gbd456
INCLUDEALL USER odd789
```

Step 4 For each user or group you want to exclude from accessing the license server, add an `EXCLUDEALL USER` line.

```
EXCLUDEALL type {user_name | group_name}
```

Example:

```
EXCLUDEALL GROUP region_fea
EXCLUDEALL USER rgu456
EXCLUDEALL USER ilt789
```

Step 5 Save the file.

Configure Borrowing Parameters



Note If you have a floating license that was generated prior to May 2015, you must acquire a new one to enable borrow licenses.

Step 1 Configure the `/opt/cariden/bin/cisco.opt` file to define who is permitted to borrow licenses. Anyone not in an `INCLUDE_BORROW` statement is not permitted to borrow licenses. Thus, it is easier to use groups than user names.

The inclusion format is as follows. You must specify a line item for each feature. For a list of these features, use the `license_check` tool.

```
INCLUDE_BORROW feature type {user_name | group_name}
```

Example:

```
INCLUDE_BORROW MD_Layer1 USER ohara
INCLUDE_BORROW MD_SegmentRouting GROUP akdevops
```

Step 2 You can refine this `INCLUDE_BORROW` list by excluding users. The `EXCLUDE_BORROW` has precedence over the `INCLUDE_BORROW` statements such that if a user or group is identified in both lists, that user or group will be excluded as specified.

```
EXCLUDE_BORROW feature type {user | group_name}
```

Example:

```
EXCLUDE_BORROW MD_VPN USER diana
EXCLUDE_BORROW MD_BGP GROUP acme
```

Step 3 Optional: Specify the number of licenses for a feature that cannot be borrowed. This is useful for ensuring that users who need to check out licenses will have them available.

```
BORROW_LOWWATER feature number
```

Example: Save 23 `MD_Sim` licenses for use by those who are not borrowing licenses.

```
BORROW_LOWWATER MD_Sim 23
```

Verify Licenses in Use

Use the `lmstat` command to summarize how many licenses are in the original license file and how many are in use.

```
lmstat -a
```

The results show how many licenses are checked out and borrowed. The output contains *_Users entries and entries for each feature. The *_Users is determined by the users who have access to the license. Each feature lists a set of licenses checked out for that feature.

Example output:

```
Users of MD_Users: (Total of 300 licenses issued; Total of 295 licenses in use)
"MD_Users" v5, vendor:cisco
```

Checked-out licenses are only displayed for *_Users, whereas borrowed licenses are shown for *_Users, as well as for individual features.

The output uses the following format, where <time> is the time at which the license was checked out or borrowed. The <license_handle> is a unique ID for the license. If a user has the same license checked out twice, for example, each instance has a unique <license_handle>.

```
<feature> <version> <vendor>
<username> <user_hostname> <display> (<license>/<port> <license_handle>) <time>
```

Example checked-out license:

```
dusan md1 /dev/pts/0 (v5) (matelic.cisco.com/27000 37337), start Wed 5/20 11:50
```

Licenses that are borrowed are listed with a (linger: #) notation, where # is the number of seconds for which the license is borrowed.

```
<username> <user_hostname> <display> (<license>/<port> <license_handle>) <time> <linger>
```

Example borrowed license:

```
obi obi-mbpr /dev/pts/18 (v5) (matelic.cisco.com/27000 18848), start Fri 5/8 16:26
(linger: 2532780)
```

Reclaim Unused Licenses

You can reclaim licenses that have been checked out or borrowed. This feature is useful when a license remains idle, such as when an employee is on vacation or accidentally has the license running on two devices.

Reclaiming licenses is only valid through the CLI `lmremove` command.

Use the `lmstat -a` command described in the [Verify Licenses in Use](#) section to identify the required inputs to the `lmremove` command.

lmstat -a Output for Examples

In the next two sections, examples use the following `lmstat -a` output as their starting point. Compare the results of these examples to this output to see the differences between the two.

```
bin/lmstat -a
"MD_Users" v5, vendor:cisco
obi obi-mbpr /dev/pts/18 (v5) (matelic.cisco.com/27000 18848), start Fri 5/8 16:26
(linger: 2532780)
dusan md1 /dev/pts/0 (v5) (matelic.cisco.com/27000 37337), start Wed 5/20 11:50
dusan md1 /dev/pts/0 (v5) (matelic.cisco.com/27000 42295), start Wed 5/20 11:51
llonned woql077 /dev/tty (v5) (matelic.cisco.com/27000 50668), start Thu 5/14 13:53
(linger: 554760)
```

Reclaim All Licenses for Specific User

To reclaim all licenses for a specific user, enter this command:

```
bin/lmremove <feature> <user> <user_host> <display>
```

Example: This example reclaims all licenses for the user named “dusan.”

```
bin/lmremove MD_Users dusan md1 /dev/pts/0
```

The `lmstat -a` command now shows dusan removed as a user.

```
obi obi-mbpr /dev/pts/18 (v5) (matelic.cisco.com/27000 18848), start Fri 5/8 16:26
(linger: 2532780)
llonned woql077 /dev/tty (v5) (matelic.cisco.com/27000 50668), start Thu 5/14 13:53
(linger: 554760)
```

Reclaim License for a Specific Feature

To reclaim a license for a specific feature, enter this command:

```
bin/lmremove <feature> <server_host> <port> <license_handle>
```

Example: This example reclaims a single license from the user named “dusan.”

```
bin/lmremove MD_Users matelic.cisco.com 27000 37337
```

The `lmstat -a` command now shows the license 37337 removed for the user named dusan, though dusan still has use of license 42295.

```
obi obi-mbpr /dev/pts/18 (v5) (matelic.cisco.com/27000 18848), start Fri 5/8 16:26
(linger: 2532780)
dusan md1 /dev/pts/0 (v5) (matelic.cisco.com/27000 42295), start Wed 5/20 11:51
llonned woql077 /dev/tty (v5) (matelic.cisco.com/27000 50668), start Thu 5/14 13:53
(linger: 554760)
```




Cisco Smart Licensing

Cisco offers Smart Licensing, which enables you to monitor Cisco WAE software licenses and endpoint license consumption easily and efficiently through a simple registration and license consumption reporting process instead of having to install node-locked license files. Details of all Cisco products and licenses that you have purchased are maintained in a centralized database called the Cisco Smart Software Manager (CSSM). For more information, refer to the [Cisco Smart Licensing Overview](#) on Cisco.com. To enable Smart Licensing in WAE Design, you must install the WAE server with the Smart Licensing feature enabled. Follow the steps outlined in the “Cisco Smart Licensing” section in the *Cisco WAE Server Installation Guide*.

