Administrator's Guide

Keysight
Licensing

KEYSIGHT

Notices

Copyright Notice

© Keysight Technologies 2000-2022

No part of this manual may be reproduced in any form or by any means (including electronic storage and retrieval or translation into a foreign language) without prior agreement and written consent from Keysight Technologies, Inc. as governed by United States and international copyright laws.

Manual Part Number

5951-5739

Published By

Keysight Technologies
900 S. Taft
Loveland
Colorado

Edition

Edition 3.4, August 2022, November, 2022
USA

Regulatory Compliance

This product has been designed and tested in accordance with accepted industry standards, and has been supplied in a safe condition. To review the Declaration of Conformity, go to http://www.keysight.com/go/conformity.

Warranty

THE MATERIAL CONTAINED IN THIS DOCUMENT IS PROVIDED "AS IS," AND IS SUBJECT TO BEING CHANGED, WITHOUT NOTICE, IN FUTURE EDITIONS. FURTHER, TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, KEYSIGHT DISCLAIMS ALL WARRANTIES, EITHER EXPRESS OR IMPLIED, WITH REGARD TO THIS MANUAL AND ANY INFORMATION CONTAINED HEREIN, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. KEYSIGHT SHALL NOT BE LIABLE FOR ERRORS OR FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH THE FURNISHING, USE, OR PERFORMANCE OF THIS DOCUMENT OR OF ANY INFORMATION CONTAINED HEREIN. SHOULD KEYSIGHT AND THE USER HAVE A SEPARATE WRITTEN AGREEMENT WITH WARRANTY TERMS COVERING THE MATERIAL IN THIS DOCUMENT THAT CONFLICT WITH THESE TERMS, THE WARRANTY TERMS IN THE SEPARATE AGREEMENT SHALL CONTROL.

KEYSIGHT TECHNOLOGIES DOES NOT WARRANT THIRD-PARTY SYSTEM-LEVEL (COMBINATION OF CHASSIS, CONTROLLERS, MODULES, ETC.) PERFORMANCE, SAFETY, OR REGULATORY COMPLIANCE, UNLESS SPECIFICALLY STATED.

Technology Licenses

The hardware and/or software described in this document are furnished under a license and may be used or copied only in accordance with the terms of such license.

U.S. Government Rights

The Software is "commercial computer software," as defined by Federal Acquisition Regulation ("FAR") 2.101. Pursuant to FAR 12.212 and 27.405-3 and Department of Defense FAR Supplement ("DFARS") 227.7202, the U.S. government acquires commercial computer software under the same terms by which the software is customarily provided to the public. Accordingly, Keysight provides the Software to U.S. government customers under its standard commercial license, which is embodied in its End User License Agreement (EULA), a copy of which can be found at http://www.keysight.com/find/sweula. The license set forth in the EULA represents the exclusive authority by which the U.S. government may use, modify, distribute, or disclose the Software. The EULA and the license set forth therein, does not require or permit, among other things, that Keysight: (1) Furnish technical information related to commercial computer software or commercial computer software documentation that is not customarily provided to the public; or (2) Relinquish to, or otherwise provide, the government rights in excess of these rights customarily provided to the public to use, modify, reproduce, release, perform, display, or disclose commercial computer software or commercial computer software documentation. No additional government requirements beyond those set forth in the EULA shall apply, except to the extent that those terms, rights, or licenses are explicitly required from all providers of commercial computer software pursuant to the FAR and the DFARS and are set forth specifically in writing elsewhere in the EULA. Keysight shall be under no obligation to update, revise or otherwise modify the Software. With respect to any technical data as defined by FAR 2.101, pursuant to FAR 12.211 and 27.404.2 and DFARS 227.7102, the U.S. government acquires no greater than Limited Rights as defined in FAR 27.401 or DFAR 227.7103-5 (c), as applicable in any technical data.

Safety Notices

CAUTION

A CAUTION notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a CAUTION notice until the indicated conditions are fully understood and met.

WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

The following safety precautions should be observed before using this product and any associated instrumentation.

This product is intended for use by qualified personnel who recognize shock hazards and are familiar with the safety precautions required to avoid possible injury. Read and follow all installation, operation, and maintenance information carefully before using the product.

WARNING

If this product is not used as specified, the protection provided by the equipment could be impaired. This product must be used in a normal condition (in which all means for protection are intact) only.

The types of product users are:

- Responsible body is the individual or group responsible for the use and maintenance of equipment, for ensuring that the equipment is operated within its specifications and operating limits, and for ensuring operators are adequately trained.
- Operators use the product for its intended function. They must be trained in electrical safety procedures and proper use of the instrument. They must be protected from electric shock and contact with hazardous live circuits.
- Maintenance personnel perform routine procedures on the product to keep it operating properly (for example, setting the line voltage or replacing consumable materials). Maintenance procedures are described in the user documentation. The procedures explicitly state if the operator may perform them. Otherwise, they should be performed only by service personnel.
- Service personnel are trained to work on live circuits, perform safe installations, and repair products. Only properly trained service personnel may perform installation and service procedures.

WARNING

Operator is responsible to maintain safe operating conditions. To ensure safe operating conditions, modules should not be operated beyond the full temperature range specified in the Environmental and physical specification. Exceeding safe operating conditions can result in shorter lifespans, improper module performance and user safety issues. When the modules are in use and operation within the specified full temperature range is not maintained, module surface temperatures may exceed safe handling conditions which can cause discomfort or burns if touched. In the event of a module exceeding the full temperature range, always allow the module to cool before touching or removing modules from chassis.

Keysight products are designed for use with electrical signals that are rated Measurement Category I and Measurement Category II, as described in the International Electrotechnical Commission (IEC) Standard IEC 60664. Most measurement, control, and data I/O signals are Measurement Category I and must not be directly connected to mains voltage or to voltage sources with high transient over-voltages. Measurement Category II connections require protection for high transient over-voltages often associated with local AC mains connections. Assume all measurement, control, and data I/O connections are for connection to Category I sources unless otherwise marked or described in the user documentation.

Exercise extreme caution when a shock hazard is present. Lethal voltage may be present on cable connector jacks or test fixtures. The American National Standards Institute (ANSI) states that a shock hazard exists when voltage levels greater than 30V RMS, 42.4V peak, or 60VDC are present. A good safety practice is to expect that hazardous voltage is present in any unknown circuit before measuring.

Operators of this product must be protected from electric shock at all times. The responsible body must ensure that operators are prevented access and/or insulated from every connection point. In some cases, connections must be exposed to potential human contact. Product operators in these circumstances must be trained to protect themselves from the risk of electric shock. If the circuit is capable of operating at or above 1000V, no conductive part of the circuit may be exposed.

Do not connect switching cards directly to unlimited power circuits. They are intended to be used with impedance-limited sources. NEVER connect switching cards directly to AC mains. When connecting sources to switching cards, install protective devices to limit fault current and voltage to the card.

Before operating an instrument, ensure that the line cord is connected to a properly-grounded power receptacle. Inspect the connecting cables, test leads, and jumpers for possible wear, cracks, or breaks before each use.

When installing equipment where access to the main power cord is restricted, such as rack mounting, a separate main input power disconnect device must be provided in close proximity to the equipment and within easy reach of the operator.

For maximum safety, do not touch the product, test cables, or any other instruments while power is applied to the circuit under test. ALWAYS remove power from the entire test system and discharge any capacitors before: connecting or disconnecting cables or jumpers, installing or removing switching cards, or making internal changes, such as installing or removing jumpers.

Do not touch any object that could provide a current path to the common side of the circuit under test or power line (earth) ground. Always make measurements with dry hands while standing on a dry, insulated surface capable of withstanding the voltage being measured.

The instrument and accessories must be used in accordance with its specifications and operating instructions, or the safety of the equipment may be impaired.

Do not exceed the maximum signal levels of the instruments and accessories, as defined in the specifications and operating information, and as shown on the instrument or test fixture panels, or switching card.

When fuses are used in a product, replace with the same type and rating for continued protection against fire hazard.

Chassis connections must only be used as shield connections for measuring circuits, NOT as safety earth ground connections.

If you are using a test fixture, keep the lid closed while power is applied to the device under test. Safe operation requires the use of a lid interlock.

Instrumentation and accessories shall not be connected to humans.

Before performing any maintenance, disconnect the line cord and all test cables.

To maintain protection from electric shock and fire, replacement components in mains circuits – including the power transformer, test leads, and input jacks – must be purchased from Keysight. Standard fuses with applicable national safety approvals may be used if the rating and type are the same. Other components that are not safety-related may be purchased from other suppliers as long as they are equivalent to the original component (note that selected parts should be purchased only through Keysight to maintain accuracy and functionality of the product). If you are unsure about the applicability of a replacement component, call an Keysight office for information.

WARNING

No operator serviceable parts inside. Refer servicing to qualified personnel. To prevent electrical shock do not remove covers. For continued protection against fire hazard, replace fuse with same type and rating.

PRODUCT MARKINGS:

The CE mark is a registered trademark of the European Community.

Australian Communication and Media Authority mark to indicate regulatory compliance as a registered supplier.

This symbol indicates product compliance with the Canadian Interference-Causing Equipment Standard (ICES-001). It also identifies the product is an Industrial Scientific and Medical Group 1 Class A product (CISPR 11, Clause 4).

South Korean Class A EMC Declaration. This equipment is Class A suitable for professional use and is for use in electromagnetic environments outside of the home. A 급 기기 (업무용 방송통신기자재) 이 기기는 업무용 (A 급) 전자파적합기기로서 판 매자 또는 사용자는 이 점을 주 의하시기 바라 며 , 가정외의 지역에서 사용하는 것을 목적으 로 합니다.

This product complies with the WEEE Directive marketing requirement. The affixed product label (above) indicates that you must not discard this electrical/electronic

product in domestic household waste.

Product Category: With reference to the equipment types in the WEEE directive Annex 1, this product is classified as "Monitoring and Control instrumentation" product. Do not dispose in domestic household waste. To return unwanted products, contact your local Keysight office, or for more information see http://-about.keysight.com/en/companyinfo/environment/takeback.shtml.

This symbol indicates the instrument is sensitive to electrostatic discharge (ESD). ESD can damage the highly sensitive components in your instrument. ESD damage is most likely to occur as the module is being installed or when cables are connected or disconnected. Protect the circuits from ESD damage by wearing a grounding strap that provides a high resistance path to ground. Alternatively, ground yourself to discharge any built-up static charge by touching the outer shell of any grounded instrument chassis before touching the port connectors.

This symbol on an instrument means caution, risk of danger. You should refer to the operating instructions located in the user documentation in all cases where the symbol is marked on the instrument.

This symbol indicates the time period during which no hazardous or toxic substance elements are expected to leak or deteriorate during normal use. Forty years is the expected useful life of the product.

Contents

Overview 9
What Is Keysight Licensing? 10
License Types 11
Recognize Your License Type 13
Setting Up Licenses 17
What License Management Tool Should I Use? 17
Setting Up Floating Licenses 22
Setting Up a New License Server 25
Setting Up an Existing Windows License Server 32
Setting Up an Existing Linux License Server 37
Updating the Keysight Vendor Daemon on a Floating License Server 42
Setting Up Node-Locked and Transportable Licenses 47
Setting Up USB Portable Licenses 48
Setting Up Device Licenses 49
Advanced Licensing Configuration Options 51
Accessing Floating Licenses through a Firewall 51
Creating an Options File 52
Licensing Environment 52
Multiple Server Configurations 53
Setting Up Three-Server Redundancy 54
Keysight Licensing FAQs 57
What Files and Paths are Used By Keysight Licensing? 63
How to Troubleshoot Problems 66
Floating License Problems 74
Flexera Communication Problems 83
Port Number Conflicts 84
Glossary and Abbreviations 86
Appendix: Migrating from Older Versions of Keysight Licensing 89

Overview

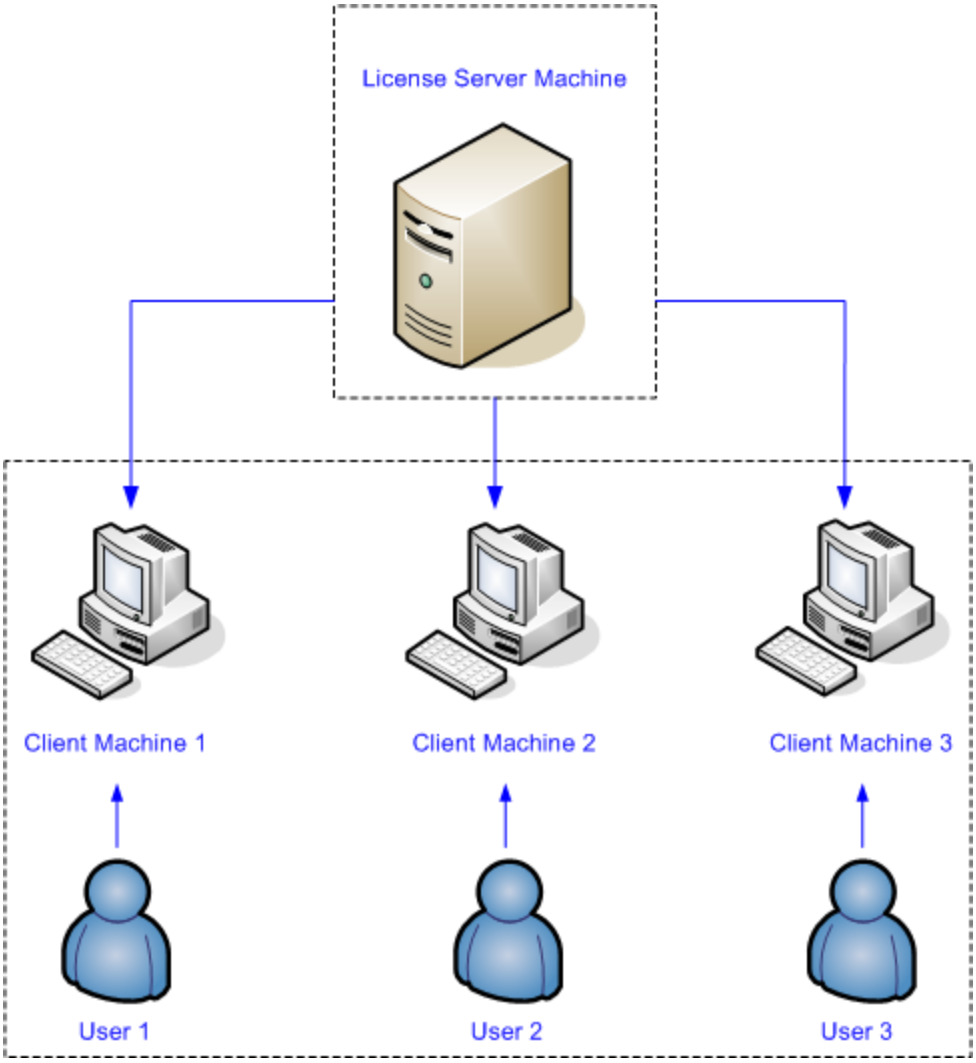
NOTE For the latest published version of this document, see https://www.keysight.com/find/licensingdoc.

This Guide is intended for use by system administrators and end users looking for recommendations and information specific to Keysight licensing, Keysight licensing governs the usage of a Keysight product. Depending on the product, you may purchase one or more licenses to enable you to run a software application on a computer or instrument or in the cloud, or to unlock specific features of an application or instrument. These licenses can be floating, USB portable, node-locked, transportable, and device-locked licenses.

Keysight licensing is based on the FlexNet Publisher licensing solution and supports virtually all of the FlexNet licenses that have been issued by Keysight for its products. For additional information on FlexNet, refer to the FlexNet Publisher License Administration Guide, available at https://www.keysight.com/find/fnpadmin.

In this section

- What Is Keysight Licensing?
- License Types
- Recognize Your License Type



What Is Keysight Licensing?

Keysight Licensing includes these elements that work together to unlock applications and features of Keysight products:

- License files, which contain licenses that unlock your licensed Keysight products
- License management tools to help you install, view, and manage your licenses
- License client software, built into your licensed Keysight product, to manage feature requests
- For floating and counted licenses:
  - The FlexNet license server manager (*lmgrd*) to manage served licenses
  - The Keysight vendor daemon (*agileesofd*) to manage Keysight served licenses.

License files:

- Are identified by the `.lic` suffix
- Contain a unique signature and information that identifies the type and usage of this license; see Recognize Your License Type
- Are obtained from the Keysight Software Manager website, using the certificate you received when you bought your Keysight product
- Are installed on your computer or instrument, or on a floating license server, to enable the use of your licensed product

License management tools:

- Help you to install and view licenses, and to perform various management operations (such as borrowing)
- See What License Management Tool Should I Use? for information on the specific tool(s) appropriate to your Keysight products and licenses.

Licensed client software:

- Requests the use of a license when you try to use a licensed Keysight application or feature
- Lets the application know if it cannot acquire a license

License server manager *lmgrd* :

- Starts and maintains *agileesofd*, the Keysight vendor daemon, and any other vendor daemons listed in the VENDOR lines of the license file(s) used to start *lmgrd*
- Refers license checkouts (requests) to the appropriate vendor daemon

Keysight vendor daemon *agileesofd* :

- Manages Keysight product licenses, mapping feature requests to the appropriate license

License Types

Keysight Licensing provides these types of licenses:

- node-locked
- transportable
- USB portable

- floating
- device-locked

Node-locked, transportable, and USB portable licenses may be **counted** or **uncounted**. Counted licenses enable a specified number of a given capability — for example, a given number of processes in a measurement application. An uncounted license simply unlocks the licensed feature or application on the system where it is installed.

A **node-locked** license permits the licensed software to run on only one machine. Each node-locked license is locked to an instrument or computer: The license is resident on the system that it's locked to, and that system runs the licensed feature or product. **Trial licenses** are node-locked subscription licenses. Trial licenses are issued for a particular instrument or computer and are provided free of charge for you to try out a Keysight product.

A **transportable** license is a type of node-locked license that can be unlocked from one client host and then locked to another client host, via a network-enabled process performed in conjunction with the Keysight Software Manager website, without the need to consult Keysight support. Another way to describe transportable license is to say it is locked to a client host, but can be "traded-in" for an equivalent license on another host at no cost.

A **USB portable** license is locked to a USB dongle (also called a USB key) which is portable between clients. Systems that run the licensed feature or product must have the license file resident, have a dongle driver installed, and have the dongle attached when they run the licensed feature or product.

Floating licenses (network licenses) reside on a license server (a separate computer) and are checked out for use by Keysight products (instruments or applications), then returned (checked in) when no longer needed so that they can be used on another computer or instrument. Floating licenses are *always* **counted**; but not locked to any specific client. You purchase the count of licenses that your users need to be able to use concurrently.

Some floating licenses can also be **borrowed** for a specified number of days. Once you have borrowed a license, you can disconnect the licensed instrument or computer from the license server and continue to use the license offline for the duration of the borrow period. You can distinguish borrowable licenses by the `BORROW` keyword in the license file. Note that a license is considered borrowed by a single *user* of the instrument/computer and is not available across other user accounts on the same machine (an inherent FlexNet Publisher limitation).

A **device-locked** license is always uncounted, is locked to a device (also referred to as a compact or modular instrument) by a Model Number-Serial Number identifier, and is used to enable features or capabilities on that device. The former term "module license" has been deprecated.

Licenses can remain valid for a defined period of time; one common example is a 30-day trial license. A **perpetual** license never expires (Flexnet Publisher uses the term "permanent," which means the same thing, i.e. having no expiration date). Independent of license expiration, all types of licenses have a **support subscription** expiration date. While a permanent license never expires, if the support

subscription has expired, then the license only enables versions of the application which were released during the time the support subscription was active.

See also

Recognize Your License Type

Recognize Your License Type

These examples illustrate some of the important differences among license types, and some of the important properties of Keysight licenses. Your licenses may look similar to these, or quite different, depending on the licensed product, time of issue, and other factors.

- Example 1: Node-locked license (uncounted, perpetual)
- Example 2: Served, counted node-locked license
- Example 3: Transportable license (uncounted)
- Example 4: USB portable license (uncounted, subscription)
- Example 5: Floating license (borrowable)
- Example 6: Floating license (not borrowable)
- Example 7: Trial license

Example 1: Node-locked license (uncounted, perpetual)

```
FEATURE MYFEATURE1 agileesofd 2022.0910 permanent uncounted \
    VENDOR_STRING=005056905d85 HOSTID=005056905d85 \
    vendor_info="DESCRIPTION=MyProduct, node locked, permanent \
    license (MYFEATURE1)" \
    ISSUER=LICENSEID=3351795,PRODUCTID=myprod\
    ISSUED=11-sep-19 NOTICE=ORDER=I1001393228,PRODUCT=KALF101-1FP \
    START=11-sep-19 TS_OK SIGN="009C 5C2E 6CDF E5EC 6E47 9630 D6BB \
    A5A3 6C74 820C 3D01 17BE 60AB A093 CB6E A39B 78E3 9346 E1D2 \
    D591 9832"
```

In an unserved, uncounted node-locked license, there is no `SERVER` line, and there is a `FEATURE` line rather than an `INCREMENT` line. This license is used locally without a license server process. The `uncounted` keyword indicates that this license is unlimited; it does not provide a number of counts of the feature.

This license does not expire, as indicated by `permanent` on the first (`FEATURE`) line.

Example 2: Served, counted node-locked license

```
SERVER this_host 005056905d85 27009
VENDOR agileesofd
USE_SERVER
#Product: MyProduct  Expires:  permanent
INCREMENT MYFEATURE1 agileesofd 2022.0910 permanent 5 \
    VENDOR_STRING=005056905d85 HOSTID=005056905d85 \
    vendor_info="DESCRIPTION=MyProduct, node locked, permanent \
    license (MYFEATURE1)" \
    ISSUER=LICENSEID=3351774,PRODUCTID=myprod\
    ISSUED=11-sep-19 NOTICE=ORDER=I1001393225,PRODUCT=KALP105-1FP \
    START=11-sep-19 TS_OK SIGN="014D 92B2 4F4D 73F8 1DC2 7A8A C19D \
    FB1D DBD9 E503 6002 1C87 2298 FEC2 3D38 F608 7D3F 5F5A C2DC \
    5445 7060"
```

In the example above, the presence of `HOSTID=005056905d85` indicates that this license is tied to the host ID `005056905d85`. The presence of a `SERVER` line indicates that this is a *served* license. To use this node-locked license, you'll need to have a license server process running locally on the machine where you will use the license. (The server process is typically started by the license manager.)

The fourth line of this license, beginning with `#Product:`, is a comment. All lines beginning with `#` are human-readable comment lines; there may be any number of these in your license.

Example 3: Transportable license (uncounted)

```
FEATURE MYFEATURE1 agileesofd 2022.0910 permanent uncounted \
    VENDOR_STRING=005056905d85 HOSTID=005056905d85 \
    vendor_info="DESCRIPTION=MyProduct, Transportable, \
    permanent license (MYFEATURE1" \
    ISSUER=LICENSEID=3351797,PRODUCTID=myprod\
    ISSUED=11-sep-19 \
    NOTICE=ORDER=I1001393228,PRODUCT=KALF101-1TP,TRANSPORTABLE=Y \
    START=11-sep-19 TS_OK SIGN="0057 567C D705 773A C454 C188 BC60 \
    0984 D19D 2614 9803 062B 1A59 EE08 5696 4642 4492 786E 533C \
    8E3C 3BF5"
```

The presence of `TRANSPORTABLE=Y` indicates that this license can be transported (moved to a different machine via a customer-driven process).

Example 4: USB portable license (uncounted, subscription)

```
FEATURE MYFEATURE1 agileesofd 2022.0911 25-sep-2022 uncounted \
    VENDOR_STRING=10-0bebf1c2 HOSTID=FLEXID=10-0bebf1c2 \
    vendor_info="DESCRIPTION=KAL Unit Test, USB portable, 36 \
    months license (KALFEATURE1)" \
    ISSUER=LICENSEID=3352211,PRODUCTID=myprod\
    ISSUED=12-sep-19 NOTICE=ORDER=I1001393362,PRODUCT=KALF101-1UY \
    START=12-sep-19 TS_OK SIGN="0386 5188 0054 DE5C 14F2 CAE6 5598 \
    831D C367 98A9 9A00 1732 70EB 2194 1357 5685 C821 71E1 8CD5 \
    F812 F053"
```

A USB portable license is tied to a USB key (dongle) rather than to a computer. The host ID `FLEXID=10-0b3bf1c2` identifies the USB key to which this license is tied. You can use this license on any computer by installing the license file and a dongle driver on that computer and plugging the corresponding USB key in to that computer.

This license expires on `25-sep-2022`.

Example 5: Floating license (borrowable)

```
SERVER this_host 005056905d85 27009
VENDOR agileesofd
USE_SERVER
#Product: MyProduct  Expires:  permanent
INCREMENT MYFEATURE1 agileesofd 2022.0910 permanent 1 \
    VENDOR_STRING=005056905d85 vendor_info="DESCRIPTION=MyProduct, floating, permanent license
(MYFEATURE1 coun" \
    ISSUER=LICENSEID=3351792,PRODUCTID=myprod\
    ISSUED=11-sep-19 BORROW=8760 \
    NOTICE=ORDER=I1001393228,PRODUCT=KALF101-1NP START=11-sep-19 \
    TS_OK SIGN="00C8 730F 83C7 2282 01C5 174C FE59 12C2 5792 D75B \
    2D01 57BE 728E C1C9 8027 167E EEED E28D 7904 846D C64F
```

As shown above, the `INCREMENT` line with no `HOSTID` indicates that this is a floating license. It is tied to the license server whose host ID is `005056905d85`, and uses port `27009`, as indicated in the `SERVER` line. The `BORROW` keyword indicates that this license can be borrowed (taken offline to be used for a limited time). In this case, the license can be borrowed for up to 8760 hours (365 days).

Example 6: Floating license (not borrowable)

```
SERVER this_host 005056905d85 27009
VENDOR agileesofd
USE_SERVER
#Product: MyProduct  Expires:  permanent
INCREMENT MYFEATURE1 agileesofd 2022.0910 permanent 5 \
    VENDOR_STRING=005056905d85 vendor_info="DESCRIPTION=MyProduct, floating, permanent license
(KALFEATURE1 coun" \
    ISSUER=LICENSEID=3351766,PRODUCTID=myprod\
    ISSUED=11-sep-19 NOTICE=ORDER=I1001393225,PRODUCT=KALP105-1NP \
    START=11-sep-19 TS_OK SIGN="036F 1108 7E1F 1E07 A72B 780E 5B9A \
    5658 3C50 B14E 5302 E249 78B6 DE9A 3C89 C44D D12D 2B3B B460 \
    1E2F B009"
```

The floating license shown above does not have the `BORROW` keyword, indicating that it cannot be borrowed.

Example 7: Trial license

```
FEATURE MYFEATURE1 agileesofd 2022.0910 22-may-2020 uncounted \
    VENDOR_STRING=005056905d85 HOSTID=005056905d85 \
    vendor_info="DESCRIPTION=MyProduct, 30 day trial \
    license (MYFEATURE1)" \
    ISSUER=LICENSEID=3351796,PRODUCTID=kaltest \
    ISSUED=21-apr-2020 NOTICE=ORDER=I1001393228,PRODUCT=KALF101-1FY \
    START=21-apr-2020 TS_OK SIGN="036F 4CED AAC2 B63A A275 D539 E905 \
    BF2E F508 35CC 9402 82CA 9C6D ADCB BE72 6207 497F 1B50 B69D \
    0313 1C56"
```

This is a trial license. Typically, you can use a Keysight trial license for 30 days after you receive it. It is implemented simply as a node-locked subscription license; in this case, the expiration date is `22-may-2020`.

Setting Up Licenses

This section describes how to set up Keysight Licensing, including licenses tied to an instrument or computer (via host ID), to a USB dongle (USB key), or to a PXI modular instrument, as well as floating licenses (tied to a networked license server). These setup instructions apply to both permanent and subscription (including trial) licenses.

No matter what kind of licenses you have, you'll first need to obtain your license file(s) and install the appropriate tools. Specific tools and additional setup steps vary depending on what Keysight product (s) you are licensing and on the type of licenses you are using: See What License Management Tool Should I Use?

In this section:

- What License Management Tool Should I Use?
- Setting Up Floating Licenses
- Setting Up Node-Locked and Transportable Licenses
- Setting Up USB Portable Licenses
- Setting Up Device Licenses

What License Management Tool Should I Use?

Refer to your Keysight product documentation to determine which of the following license management applications are appropriate for your product(s). In many cases, the appropriate license management application is included in the installation of your Keysight product, or is preinstalled on your Keysight instrument.

You can also use the Flexera license management tools for many licensing tasks. These tools and the FlexNet Publisher License Administration Guide, which describes their use, are included in the Keysight License Server download as well as in several of the license management tool downloads.

License Management Tool Comparison

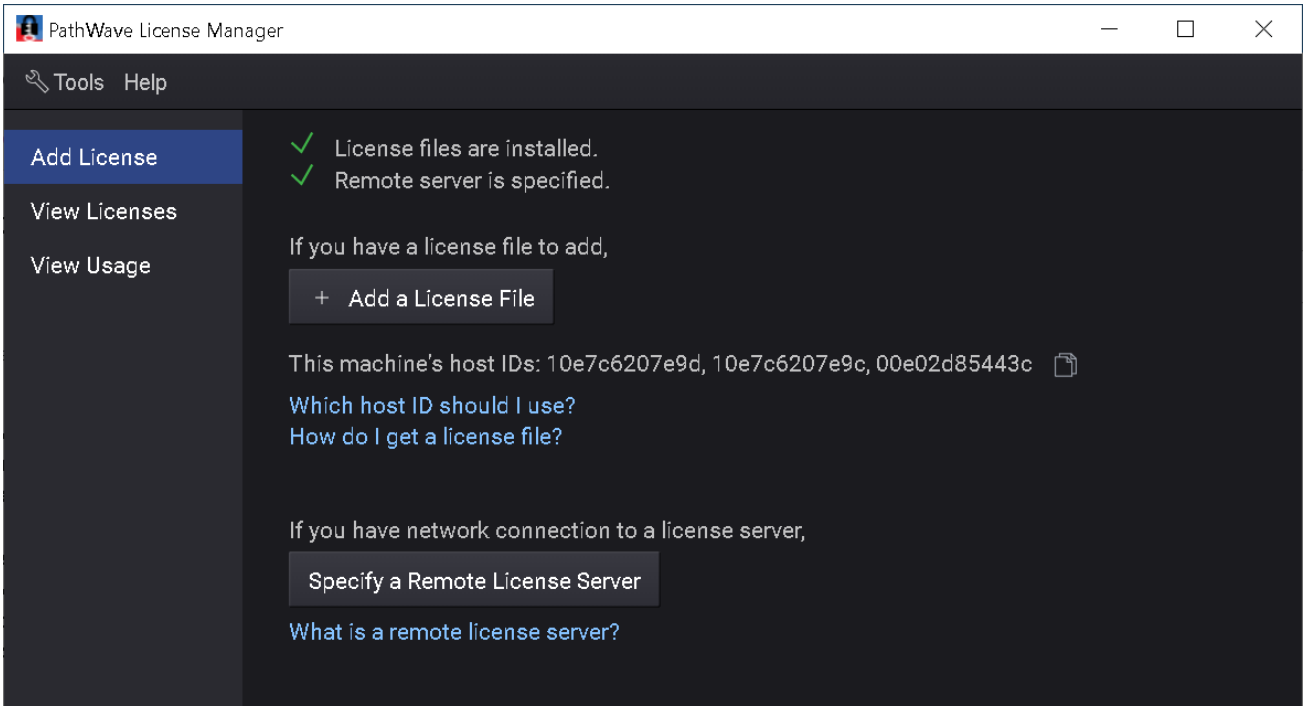
The vendor name is found on the FEATURE or INCREMENT line of each license. Keysight licenses may have either *agileesofd* or *agilent* as the vendor name, depending on the licensed product and when the license was issued.

NOTE Different tools can see and act on different licenses, depending on the vendor name and other particulars of the license. Again, refer to your Keysight product documentation to ensure you are using the best tool to manage your licenses.

	Node-locked licenses	Transportable licenses	USB portable licenses	Floating licenses
Keysight PathWave License Manager	Install (*agileesofd* only*), view *(agileesofd* and *agilent)*	View *(agileesofd* and *agilent)* Install, transport (*agileesofd* only*)	Install, view	Remote view, borrow
Keysight License Manager 6	counted node-locked (*agileesofd*) only: install, view, delete	Not supported	Install, view, delete	Remote view, borrow
Keysight License Manager 5	Install, view, delete (*agilent* only)	Install, view, delete, transport (*agilent* only)	not supported	not supported
Keysight Floating License Manager for EEsof EDA Products	Install, view, delete (*agileesofd* only)	Not supported	Install, view, delete	Install, view, delete
Keysight License Server (includes the Revenera tools lmgrd, lmtools, lmutil, lmadmin)	Revenera tools (e.g. lmadmin) can be used to perform some management functions, but Keysight recommends using them only for floating license server setup and administration.			Administer floating licenses

*PathWave License Manager provides you with a way to start License Manager 5, when needed, to install or transport *agilent* licenses.

Keysight PathWave License Manager

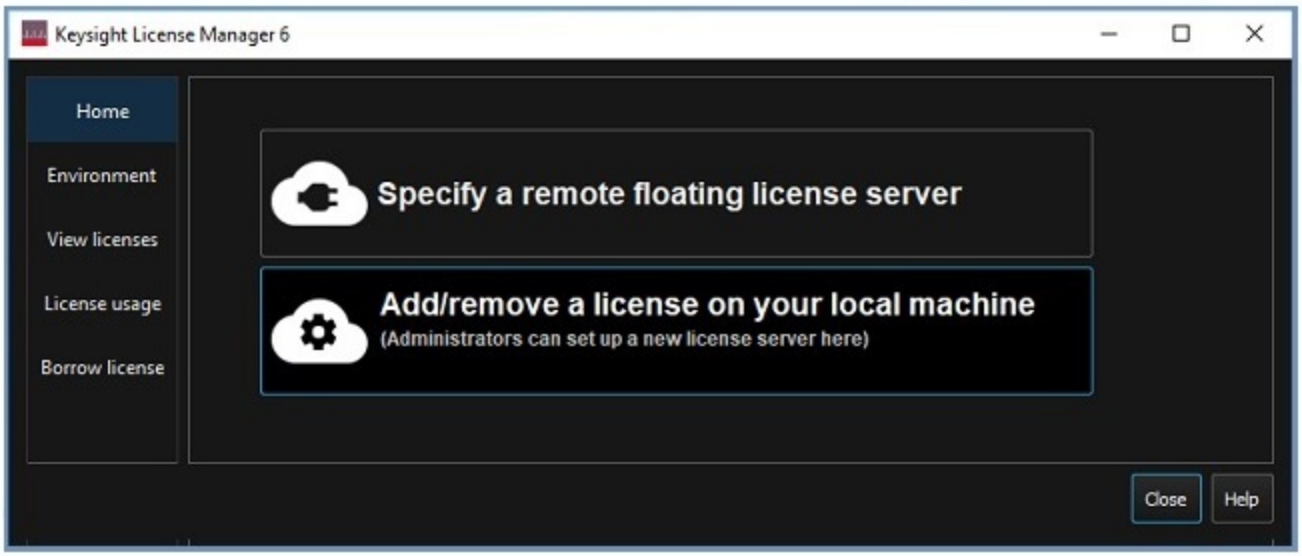


PathWave License Manager can install, view, and manage many of the latest Keysight product licenses.

You can download PathWave License Manager from https://www.keysight.com/find/PLM.

Keysight License Manager 6

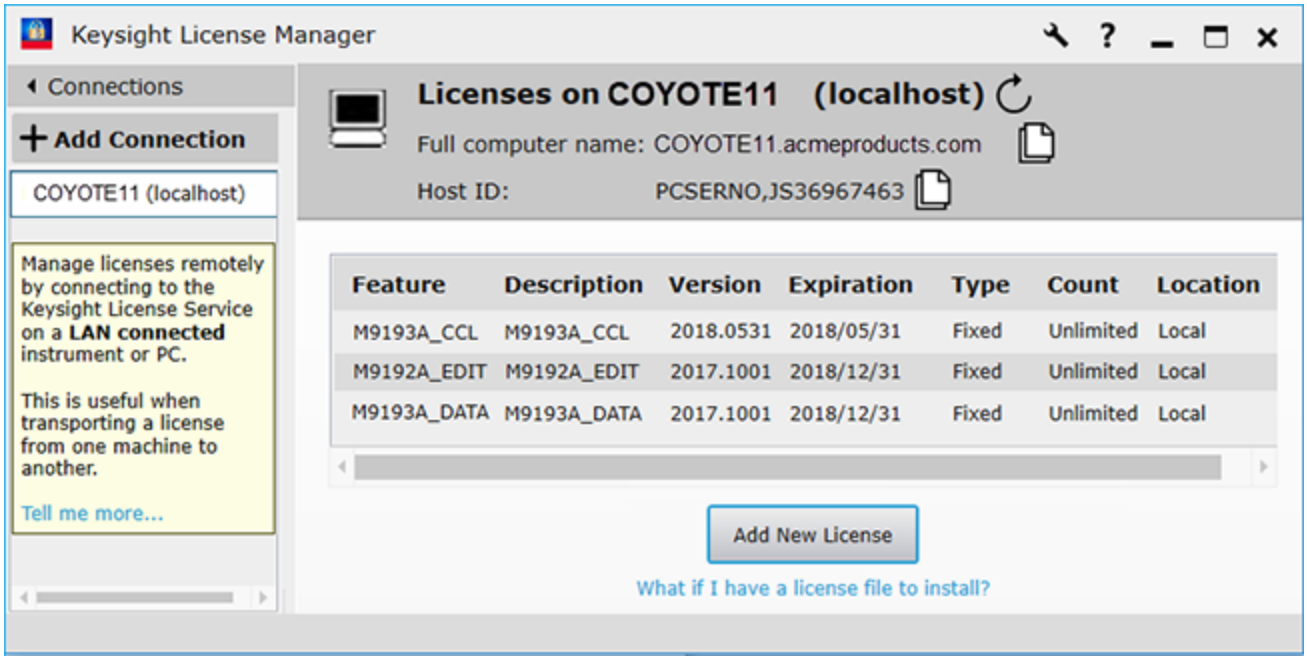
NOTE You can use PathWave License Manager (above) as a full replacement for Keysight License Manager 6.



This license management application allows you to manage floating and USB portable licenses for a variety of software products and instruments. This application runs on Windows only.

You can download Keysight License Manager 6 from https://www.keysight.com/find/KLM6, or use the newer PathWave License Manager instead (https://www.keysight.com/find/PLM).

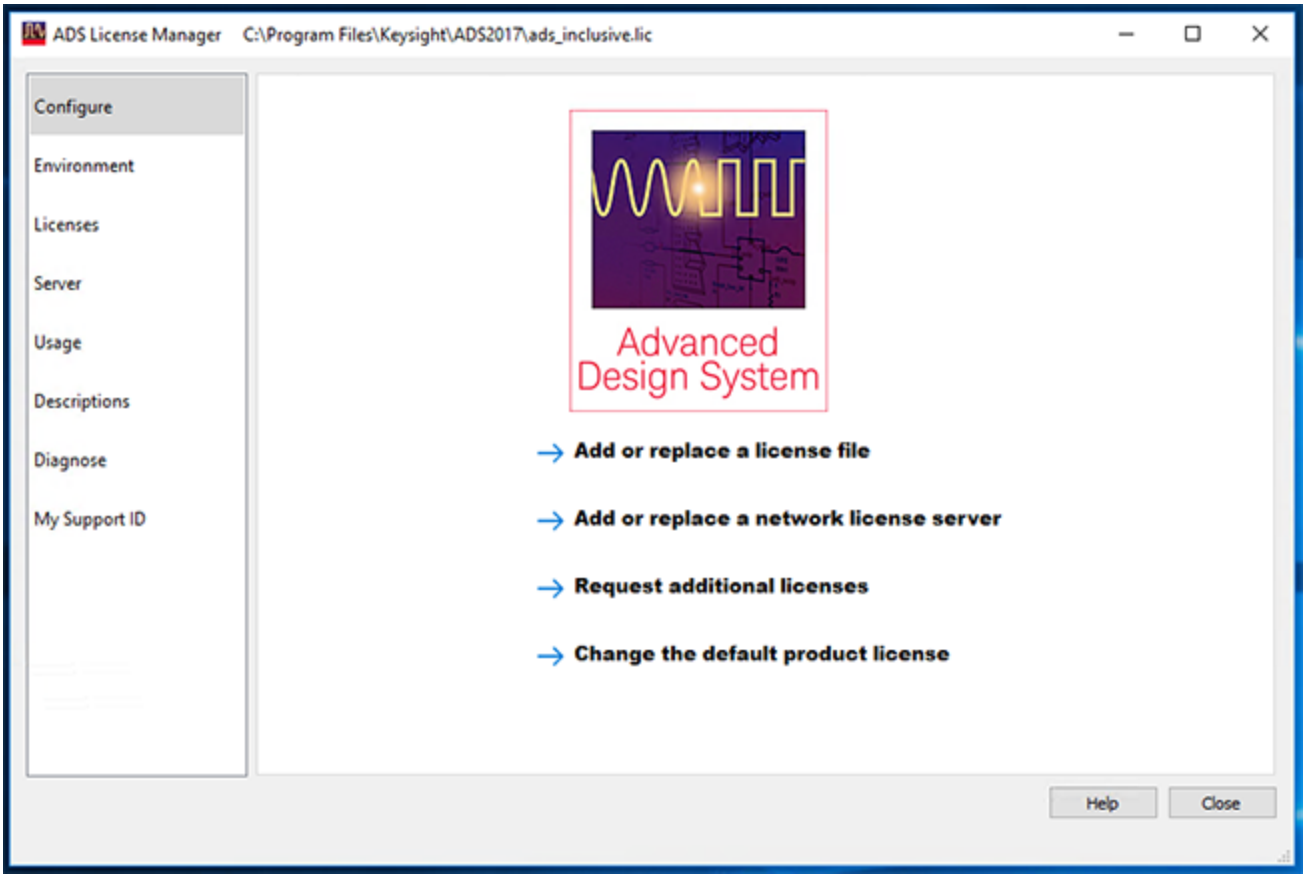
Keysight License Manager 5



This license management application allows you to manage node-locked and transportable licenses for a variety of software products and instruments. This application runs on Windows only.

You can download Keysight License Manager 5 from https://www.keysight.com/find/KLM5.

Keysight Floating License Manager for EEsof EDA Products



This license management application allows you to manage many types of licenses, primarily for EEsof EDA products.

You can download Keysight Floating License Manager for EDA from https://www.keysight.com/find/eesof-flexnet-downloads.

Related Links

- Keysight Licensing Overview, Terms, and Types
- Keysight Software Manager Overview
- Keysight Licensing Tools Overview
- Keysight License Manager 5 Download

- Keysight License Manager 6 Download
- Keysight EDA Knowledge Center

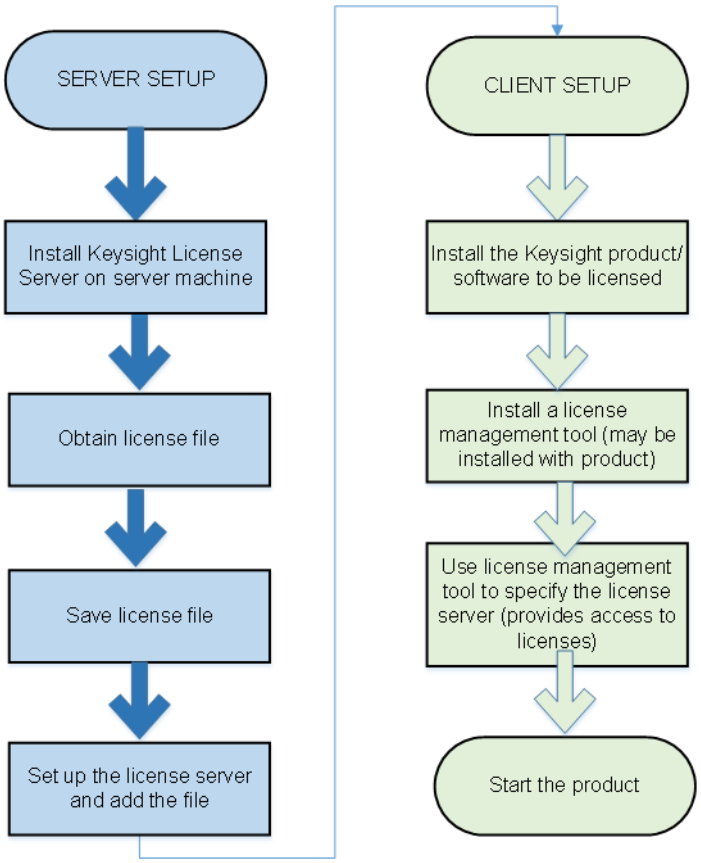
Setting Up Floating Licenses

This section describes the high-level setup process for floating licenses (tied to a networked license server). The details depend on your license management tool; see What License Management Tool Should I Use? These setup instructions apply to both permanent and time-limited licenses. If you have already set up your license server, and just need to add a new license, go to Add a Floating License, below.

Your product documentation, license manager help, or Keysight support can tell you if you need to update your existing license server to support all your Keysight licenses and utilize all their available features. See Updating the Keysight Vendor Daemon on a Floating License Server for instructions to do so.

Floating License Setup: First Time

To set up floating licensing, you'll need to configure the license server and the client (the instrument or computer running the licensed Keysight product). The first time you configure a particular license server machine, you'll need to install server software and configure the license server process on the server machine.



You'll first need to choose a license server machine, install the Keysight License Server software on that machine, install at least one license, and start the server process. For details of initial license server setup, see:

- Setting Up a New License Server if this machine has never been used as a license server.

If the machine has been used in the past to serve Keysight's and/or other companies' licenses, see:

- Setting Up an Existing Windows License Server
- Setting Up an Existing Linux License Server

Then, you'll need to go to the client machine (the machine where the licensed Keysight software will be used), install the licensed software and license management tool, and configure it to get its licenses from the license server machine you just set up. For details of client setup, see the Help for your license management tool.

Floating License Setup: Add a Floating License

To add a floating license to your license server:

Step 1: Obtain a license file

a. If you have ordered a licensed Keysight product, you'll receive (typically by email) a license certificate. Note the order number and certificate number.

b. Determine the license server's host ID or the USB dongle ID in one of these ways:

- On the server machine, execute `lmutil lmhostid` to get the FlexNet host ID directly.
- On the server machine, execute `getmac /v /fo list`. Your host ID is listed as the Physical Address of the Network Adapter.
- If you want the license tied to a dongle, read the dongle ID directly from the key or, with the dongle connected to your computer, execute `lmutil lmhostid -flexid.`

c. Go to http://www.keysight.com/find/softwaremanager to obtain your license file. Follow the instructions on screen to enter your order number, certificate number, and host ID.

NOTE If you haven't done this before, you may need to create an account and add the Software Manager capability.

d. Follow additional instructions to request a license file, which will be emailed to you.

Step 2: Save the license file on the license server machine

If your license management tool supports license server setup (see What License Management Tool Should I Use?), see your tool's Help for license installation instructions. Otherwise, do the following:

a. Ensure that your intended usage conforms to your purchased license types. Your floating licenses may be single site, single region, or worldwide licenses; you can find this information in the license files.

b. Make a copy of the license file on your hard disk, either:

- to the location where you have installed past license files, or
- if you do not have an existing location, in `C:\ProgramData\Keysight\Licensing\Licenses\Server` (Windows), `/opt/keysight/licensing/licenses/server` (Linux), or `/Library/Application Support/Keysight/Licensing/Licenses/Server` (macOS).

c. Open or view the license files in the directory to ensure they all specify the same port value (between 27000 and 27009, inclusive) in their SERVER statements. If not, edit them to have

the same port value. You will experience licensing failures if the licenses have conflicting port numbers. See Port Number Conflicts for more information.

Step 3: Restart the license service

- Windows: In the Windows Services app, **Restart** the license server service (such as **EEsof EDA License Server**).
- Linux:
  - Stop *lmgrd* and *agileesofd*:
    ```
    ./lmutil lmdown -c "/var/opt/keysight/licensing/licenses/server"
    ```
  - Restart *lmgrd* (which starts *agileesofd):*
    ```
    ./lmgrd -c /var/opt/keysight/licensing/licenses/server -l
    /var/opt/keysight/licensing/log/license-server.log
    ```
- macOS:
  - Stop *lmgrd* and *agileesofd:*
    ```
    ./lmutil lmdown -q -force
    ```
  - Restart *lmgrd* (which starts *agileesofd*):
    ```
    ./lmgrd -c <license file path> -l <license debug log file path
    ```

Setting Up a New License Server

NOTE This procedure describes setting up a license server that has no previous licenses or licensing software installed. If you have an existing license server and wish to upgrade or add to it, see Setting Up an Existing Windows License Server or Setting Up an Existing Linux License Server.

The following steps describe license server setup using the Keysight License Server download and manual steps. Keysight recommends using these processes and **not** installing any Keysight license manager application (e.g. PLM) when setting up a network license server for Keysight floating licenses.

Ensure that your chosen license server conforms to your purchased license types. Your floating licenses may be single-site, single-region, or worldwide licenses; you can find this information in the license files. For additional help on choosing a license server, see the FlexNet Publisher License Administration Guide .

Follow these steps to set up a new license server:

- Prerequisite: Select a license server machine
- Step 1: Install Keysight License Server on the license server machine
- Step 2: Obtain a license file
- Step 3: Save the license file on the license server machine
- Step 4: Manually start the license server manager to verify your setup
- Step 5: Automate the startup of the license server manager
- Step 6: Reboot to test the new license server

Prerequisite: Select a license server machine

- See http://www.keysight.com/find/licenseserver for supported operating systems.
- See Multiple Server Configurations for important considerations when setting up redundant servers.
- For more information, see Selecting a License Server Machine in https://www.keysight.com/find/fnpadmin

Step 1: Install Keysight License Server on the license server machine

a. On your license server machine, open your web browser and navigate to http://www.keysight.com/find/licenseserver.

b. Download the appropriate package for your platform.

> NOTE The Keysight License Server must be version 2019.05.17 or greater to be compatible with clients that use PathWave License Manager. (See What License Management Tool Should I Use? for more information about PathWave License Manager.)

c. Extract the files to the following folder (you may need to create the folder using `mkdir -p <path-name>`):

- Windows: `C:\Program Files\Common Files\Keysight\Licensing Daemon\bin`
- Linux: `/opt/keysight/licensing-daemon/bin`

Step 2: Obtain a license file

a. If you have ordered a licensed Keysight product, you'll receive (typically by email) a license certificate. Note the order number and certificate number.

b. Determine the license server's host ID or the dongle ID in one of these ways:
   - On the server machine, execute **`lmutil lmhostid`** to get the FlexNet host ID directly.
   - On the server machine:
     - Windows: execute **`getmac /v /fo list`** . Your host ID is listed as the Physical Address of the Network Adapter.
     - Linux: execute **`/sbin/ifconfig -a`** . Examine the ifconfig results to find your Ethernet interface (often called eth0) and use its hardware address (HWaddr), removing the colons to create the alphanumeric host ID
   - If this is a USB portable (dongle) license, read the dongle ID directly from the key or, with the dongle connected to your computer, execute **`lmutil lmhostid -flexid`**

c. Go to http://www.keysight.com/find/softwaremanager to obtain your license file. Follow the instructions on screen to enter your order number, certificate number, and host ID.

   NOTE If you haven't used Keysight Software Manager before, you may need to create an account and add the Software Manager capability.

d. Follow the website's instructions to request a license file. The license file will be emailed to you.

Step 3: Save the license file on the license server machine

The port number is typically specified in the license file, and is usually 27009. See Port Number Conflicts for what to do if your license files have different port numbers, or if some do not have port numbers.

a. Make a copy of the license file on your hard disk in:
   - Windows: `C:\ProgramData\Keysight\Licensing\Licenses\Server`
   - Linux: `/var/opt/keysight/licensing/licenses/server`

b. If the license is tied to a USB dongle, you must install a dongle driver: see Setting Up USB Portable Licenses.

Step 4: Manually start the license server manager to verify your setup

This is to verify that there are no networking, host name resolution, or other issues that prevent the license server manager from starting.

a. From the install folder for *lmgrd*, execute the following command (entered on a single line without line breaks):

   Windows: `lmgrd -c C:\ProgramData\Keysight\Licensing\Licenses\Server -l`

`C:\ProgramData\Keysight\Licensing\Log\LicenseServer.log`
Linux: `./lmgrd -c /var/opt/keysight/licensing/licenses/server -l /var/-opt/keysight/licensing/log/license-server.log`

b. Verify that the server is UP and has licenses: `./lmutil lmstat -a`

Step 5: Automate the startup of the license server manager

NOTE You must install a license (Step 3 above) before you can set up automated startup of the license server manager and the vendor daemon.

On Windows

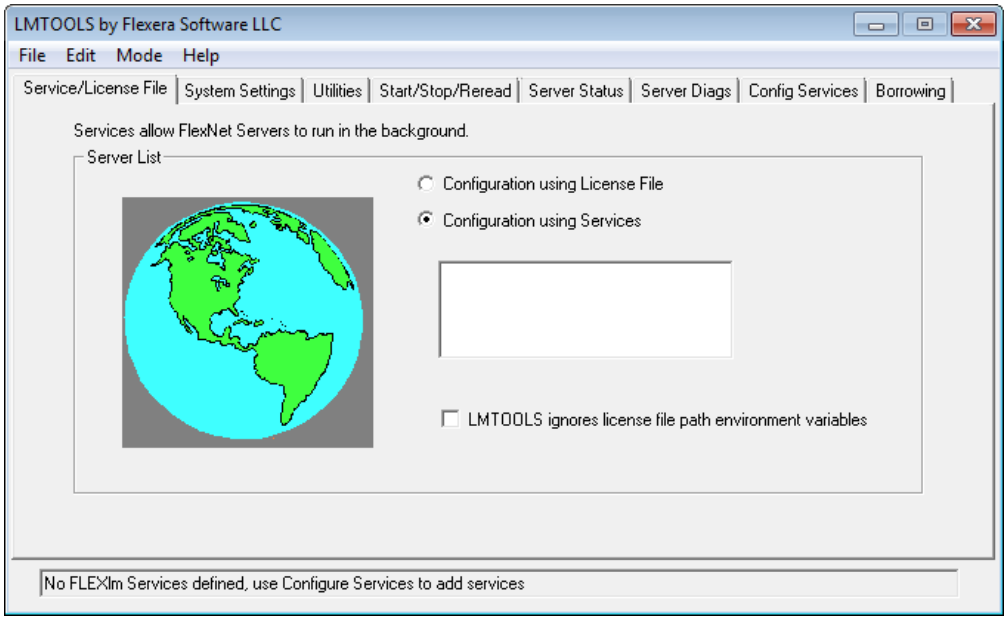
To start the FlexNet license server manager (*lmgrd*) and vendor daemon (*agileesofd*) and automate their restart upon PC reboot, configure a Windows service as follows:

NOTE You must have administrator privileges to configure a Windows service. The service will run under the local system account as the special *Local Server* user, which does not have special system privileges. This means you should consider the following:

- The log file must be in a location that is writable by all users. If you specify a log file location that is not writable, the service will immediately exit, and will not indicate any errors (it returns an exit code of 0 even though it encountered an error). Since the log file was not writable, you will have no error message anywhere to indicate what went wrong, or even that there was a problem.
- The license files must be in a location that is readable by all users. If you specify a location that isn't readable, the log file will contain an error indicating that the license file couldn't be found.

a. Run *lmtools.exe* from `C:\Program Files\Common Files\Keysight\Licensing Daemon\Agileesofd`. The LMTOOLS window is displayed.

b. In the **Service/License File** tab, select the **Configuration using Services** option.



c. Click the **Config Services** tab and enter the following details. See the NOTE above for additional information about paths.

   i. **Service Name**: For compatibility with Keysight EDA products, use the name **EEsof EDA License Server**.

   ii. **Path to the lmgrd.exe file**: Click **Browse** and specify the path to the *lmgrd.exe* file on the license server (for example, `C:\Program Files\Common Files\Keysight\Licensing Daemon\Agileesofd\lmgrd.exe`).

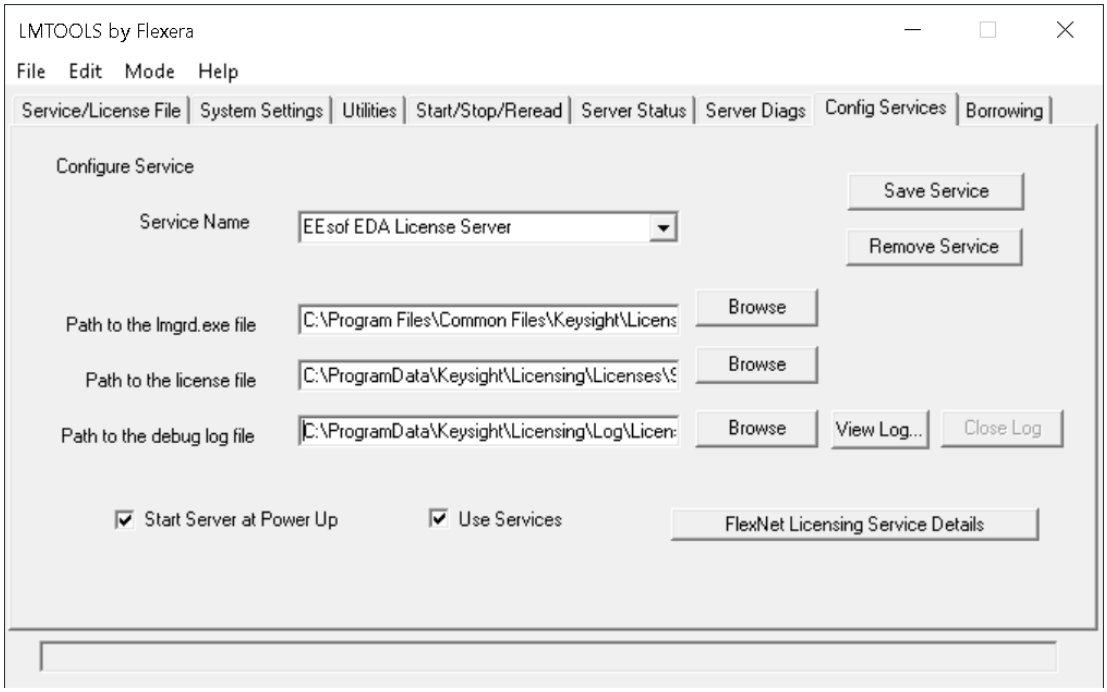
   iii. **Path to the license file**: Click **Browse** and specify the path to the license directory on the license server (for example, `C:\ProgramData\Keysight\Licensing\Licenses\Server`). Generally, it is best to make this a path to a directory. If you know you need to specify individual license file(s) instead of a directory, you can do so (for example, `C:\ProgramData\Keysight\Licensing\Licenses\Server\license.lic`).

   iv. **Path to the debug log file**: Click **Browse** and specify the path to the debug log file on the license server (for example, `C:\ProgramData\Keysight\Licensing\Log\LicenseServer.log`).

d. Select the **Use Services** option.

e. Select the **Start Server at Power Up** option.

f. Click **Save Service**. The following figure shows the configured services in the **LMTOOLS** window.



g. Click the **Start/Stop/Reread** tab and observe that your service shows up in the **FlexNet license services installed on this computer** list.

h. To start the service, on the **Start/Stop/Reread** tab, select your service and click **Start Server**.

NOTE To verify that the license server manager and the vendor daemon are running, click the **Config Services** tab again and click **View Log**. A log window appears that indicates whether *lmgrd* and *agileesofd* are up and running.

If you need to stop the license server, execute the following (substituting your license location if it is different):

```
lmutil lmdown -c C:\ProgramData\Keysight\Licensing\Licenses
```

On Linux

To run *lmgrd* manually once:

a. Change directory to `/opt/keysight/licensing-daemon/bin`

b. Run the following command to start *lmgrd:*

```
./lmgrd -c  /var/opt/keysight/licensing/licenses/server  -l /var/-
opt/keysight/licensing/log/license-server.log
```

NOTE If you see one of these errors when you start *lmgrd*:

```
lmgrd: /lib64/ld-lsb-x86-64.so.3: bad ELF interpreter: No such file or directory
```

```
lmgrd: No such file or directory
```

then you need to install the Linux Standard Base library . Use **`yum`** to install **`redhat-lsb`** .

If you need to stop the license server manually, execute the following (substituting your license location if it is different):

```
lmutil lmdown -c /var/opt/keysight/licensing/licenses
```

To automate the license server manager's startup upon system reboot

a. Navigate to: `cd /etc/systemd/system`

b. Configure a service: `sudo touch keysight-lmgrd.service`

c. Open keysight-lmgrd.service in an editor: `sudo gedit keysight-lmgrd.service`

d. Add code similar to the following sample (check the paths to lmgrd, your licenses file(s), and the server log file, on your machine and modify paths in the script if they differ from your configuration):

```
[Unit]
Description=Keysight License Server
Wants=network-online.target
After=network-online.target
[Service]
ExecStart=/opt/keysight/licensing-daemon/bin/lmgrd -c
/var/opt/keysight/licensing/licenses/server -l /var/opt/keysight/licensing/log/license-server.log -reuseaddr -z
[Install]
WantedBy=multi-user.target
```

e. Execute the following commands:

```
systemctl start keysight-lmgrd # to start this boot
systemctl enable keysight-lmgrd.service # to start at boot
```

f. Check the service status with:

```
systemctl status keysight-lmgrd.service
```

Step 6: Reboot to test the new license server

a. Configure your client machines to get their licenses from the new license server, as shown in Setting Up Floating Licenses.

b. Then, restart the server machine to test the automated startup of the license server manager. Note that it can take a few minutes for the license server manager to start up after the machine is rebooted.
c. Once a few minutes have passed, check to make sure you can use the floating licenses on your client machines.

Setting Up an Existing Windows License Server

The following steps describe license server setup using the Keysight License Server download and manual steps. Keysight recommends using these processes and **not** installing any Keysight license manager when setting up a network license server for Keysight floating licenses. If the server machine you are setting up has never had licenses nor licensing software installed on it, you may use the simpler instructions for Setting Up a New License Server.

Ensure that your chosen license server conforms to your purchased license types. Your floating licenses may be single site, single region, or worldwide licenses; you can find this information in the license files. For additional help on choosing a license server, see the FlexNet Publisher License Administration Guide .

Repeat the following steps on each license server:

- Step 1: Determine your executable and license locations and stop any existing server process.
- Step 2: Install Keysight License Server on the license server machine
- Step 3: Obtain a license file
- Step 4: Save the license file on the license server machine
- Step 5: Automate the startup of the license server manager
- Step 6: Reboot to test the new license server

Step 1: Determine your executable and license locations and stop any existing server process.

a. Check whether there is already an *agileesofd* process running on your license server.
   - Windows: Run Task Manager and locate the *agileesofd.exe* process on the Details tab.
b. If you find such a process, determine the path to its executable:
   i. Right-click the process in Task Manager.
   ii. Select **Properties**.
   iii. Make note of the full path, shown in the **Location** field, and the version shown in the **File version** and **Product version** fields.
c. Before stopping the server, return any borrowed licenses on all clients.

d. Open a command prompt, go to the executable path, and run *lmtools.exe*.
e. In the LMTOOLS window, go to the Config Services tab and take note of the **Path to the license file**. This is where you'll put your new licenses.
f. Go to the Start/Stop/Reread tab and click **Stop Server**.
g. Close LMTOOLS.

Step 2: Install Keysight License Server on the license server machine

a. On your license server machine, open your web browser and navigate to http://www.keysight.com/find/licenseserver.
b. Locate the appropriate download for your platform. Check the Operating System section of the download page to ensure your Windows version is supported.
c. Download the *agileesofd-<version>-<platform>.zip* archive.

NOTE The Keysight License Server must be version 2019.05.17 or greater to be compatible with clients that use PathWave License Manager. (See What License Management Tool Should I Use? for more information about PathWave License Manager.)

d. Extract the files, either:
   - to the executable location from Step 1 above, or
   - if you do not have an existing location, to `C:\Program Files\Common Files\Keysight\Licensing Daemon\Agileesofd`.

Step 3: Obtain a license file

a. If you have ordered a licensed Keysight product, you'll receive (typically by email) a license certificate. Note the order number and certificate number.
b. Determine the license server's host ID or the dongle ID in one of these ways:

   - On the server machine, execute **`lmutil lmhostid`** to get the FlexNet host ID directly.
   - On the server machine, execute **`getmac /v /fo list`** . Your host ID is listed as the Physical Address of the Network Adapter.
   - If this is a USB portable (dongle) license, read the dongle ID directly from the key or, with the dongle connected to your computer, execute **`lmutil lmhostid -flexid.`**

a. Go to http://www.keysight.com/find/softwaremanager to obtain your license file. Follow the instructions on screen to enter your order number, certificate number, and host ID.

NOTE If you haven't used Keysight Software Manager before, you may need to create an account and add the Software Manager capability.

b. Follow the website's instructions to request a license file. The license file will be emailed to you.

Step 4: Save the license file on the license server machine

a. Make a copy of the license file on your hard disk, either:
   - in the license file directory from Step 1 above, or
   - if you do not have an existing location, in `C:\ProgramData\Keysight\Licensing\Licenses\Server`.

   The license files must be in a location that is readable by all users.

b. Open or view the license files in the directory to ensure they all specify the same port value (between 27000 and 27009, inclusive) in their SERVER statements. If not, edit them to have the same port value. You will experience licensing failures if the licenses have conflicting port numbers. See Port Number Conflicts for more information.

c. If you want the license to be served from multiple servers, put a copy of the license file on each server machine.

d. If the license is tied to a USB dongle, you must install a dongle driver: see Setting Up USB Portable Licenses.

Step 5: Automate the startup of the license server manager

NOTE You must install a license (Step 3 above) before you can start the license server manager and the vendor daemon.

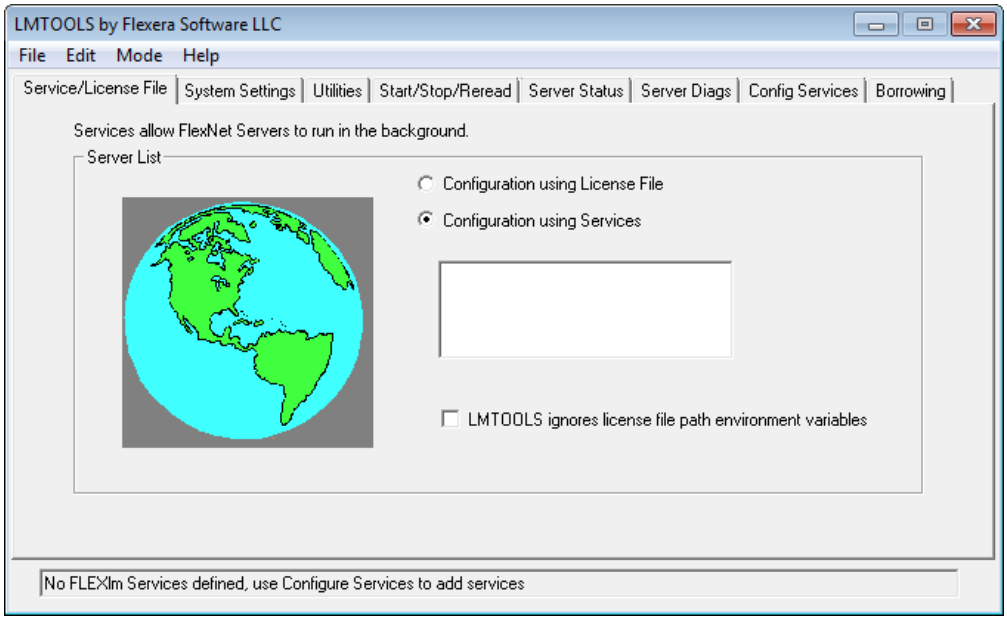
To start the FlexNet license server manager (*lmgrd*) and vendor daemon (*agileesofd*) and automate their restart upon PC reboot, configure a Windows service as follows:

NOTE You must have administrator privileges to configure a Windows service. The service will run under the local system account as the special *Local Server* user, which does not have special system privileges. This means you should consider the following:

- The log file must be in a location that is writable by all users. If you specify a log file location that is not writable, the service will immediately exit, and will not indicate any errors (it returns an exit code of 0 even though it encountered an error). Since the log file was not writable, you will have no error message anywhere to indicate what went wrong, or even that there was a problem.
- The license files must be in a location that is readable by all users. If you specify a location that isn't readable, the log file will contain an error indicating that the license file couldn't be found.

a. Run *lmtools.exe* from `C:\Program Files\Common Files\Keysight\Licensing Daemon\Agileesofd`. The **LMTOOLS** window is displayed.

b. In the **Service/License File** tab, select the **Configuration using Services** option.



c. Click the **Config Services** tab and enter the following details. See the NOTE above for additional information about paths.

   i. **Service Name**: For compatibility with Keysight EDA products, use the name **EEsof EDA License Server**.

ii. **Path to the lmgrd.exe file**: Click **Browse** and specify the path to the *lmgrd.exe* file on the license server (for example, `C:\Program Files\Common Files\Keysight\Licensing Daemon\Agileesofd\lmgrd.exe`).

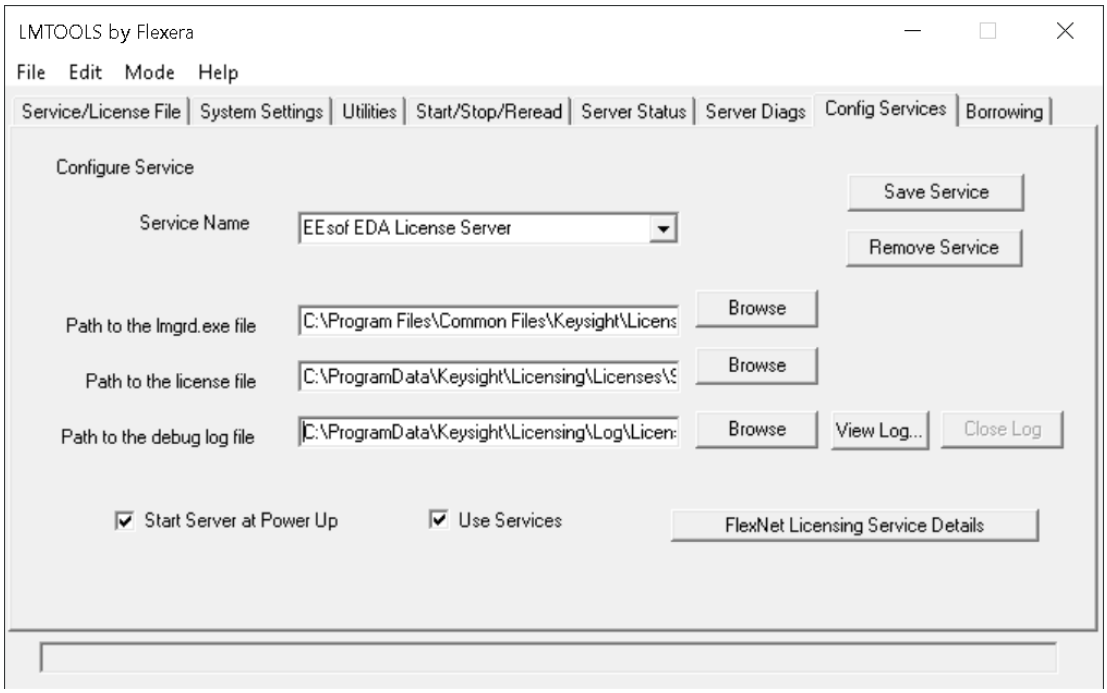
iii. **Path to the license file**: Click **Browse** and specify the path to the license directory on the license server (for example, `C:\ProgramData\Keysight\Licensing\Licenses\Server`). Generally, it is best to make this a path to a directory. If you know you need to specify individual license file(s) instead of a directory, you can do so (for example, `C:\ProgramData\Keysight\Licensing\Licenses\Server\license.lic`).

iv. **Path to the debug log file**: Click **Browse** and specify the path to the debug log file on the license server (for example, `C:\ProgramData\Keysight\Licensing\Log\LicenseServer.log`).

d. Select the **Use Services** option.

e. Select the **Start Server at Power Up** option.

f. Click **Save Service**. The following figure shows the configured services in the **LMTOOLS** window.



g. Click the **Start/Stop/Reread** tab and observe that your service shows up in the **FlexNet license services installed on this computer** list.

h. To start the service, on the **Start/Stop/Reread** tab, select your service and click **Start Server**.

NOTE To verify that the license server manager and the vendor daemon are running, click the Config Services tab again and click View Log. A log window appears that indicates whether *lmgrd* and *agileesofd* are up and running.

If you need to stop the license server, execute the following (substituting your license location if it is different):

```
lmutil lmdown -c C:\ProgramData\Keysight\Licensing\Licenses
```

Step 6: Reboot to test the new license server

a. Configure your client machines to get their licenses from the new license server, as shown in Setting Up Floating Licenses.
b. Then, restart the server machine to test the automated startup of the license server manager. Note that it can take a few minutes for the license server manager to start up after the machine is rebooted.
c. Once a few minutes have passed, check to make sure you can use the floating licenses on your client machines.

Setting Up an Existing Linux License Server

The following steps describe license server setup using the Keysight License Server download and manual steps. Keysight recommends using these processes and **not** installing any Keysight license manager when setting up a network license server for Keysight floating licenses. If the server machine you are setting up has never had licenses nor licensing software installed on it, you may use the simpler instructions for Setting Up a New License Server.

Ensure that your chosen license server conforms to your purchased license types. Your floating licenses may be single site, single region, or worldwide licenses; you can find this information in the license files. For additional help on choosing a license server, see the FlexNet Publisher License Administration Guide.

Repeat the following steps on each license server:

- 1.1.1. Step 1: Determine your executable location
- 1.1.2. Step 2: Install Keysight License Server on the license server machine
- 1.1.3. Step 3: Obtain a license file
- 1.1.4. Step 4: Save the license file
- 1.1.5. Step 5: Stop the license server manager
- 1.1.6. Step 6: Start the license server manager
  - 1.1.6.1. To automate the license server manager's startup upon system reboot
- 1.1.7. Step 7: Configure your client machines to get their licenses from this license server
- 1.1.8. Step 8: Reboot to test the license server

1.1.1. Step 1: Determine your executable location

a. First, run **`ps -ef | grep agileesofd`** to see whether there is already an *agileesofd* process running on your license server.

b. If you find such a process, determine the path to its executable by executing **`readlink -f /proc/<pid>/exe`** . Make note of this path.

1.1.2. Step 2: Install Keysight License Server on the license server machine

a. On your license server machine, open your web browser and navigate to http://www.keysight.com/find/licenseserver.

b. Locate the appropriate download for your platform. Check the Operating System section of the download page to ensure your Linux distribution and version is supported.

c. Download the *agileesofd-<version>-<platform>.tar.gz* archive.

> NOTE The Keysight License Server must be version 2019.05.17 or greater to be compatible with clients that use PathWave License Manager. (See What License Management Tool Should I Use? for more information about PathWave License Manager.)

d. Untar the files, either:

- to the executable location from Step 1 above, or
- if you do not have an existing location, execute the command **`mkdir -p /opt/keysight/licensing/agileesofd/`** to create a location for the untarred files.
- Example: **`tar zxvf agileesofd_2019.05.17_rhel64.tar.gz -C /opt/keysight/licensing/agileesofd`**

1.1.3. Step 3: Obtain a license file

a. If you have ordered a licensed Keysight product, you'll receive (typically by email) a license certificate. Note the order number and certificate number.

b. Determine the license server's host ID in one of these ways:

- On the server machine, execute `./lmutil lmhostid` to get the FlexNet host ID directly.

  NOTE If you see a `No such file or directory` error when you try to run `lmutil`, then you need to install the Linux Standard Base library.

  - Ubuntu: Use `sudo apt update && sudo apt install lsb-core -y`
  - RedHat (RHEL): Use `yum` to install `redhat-lsb`

- Alternatively (for example, if you cannot find *lmutil*): On the server machine, execute `/sbin/ifconfig -a`

  Examine the `ifconfig` results to find your Ethernet interface (often called `eth0`) and use its hardware address (`HWaddr`). For example, in the `ifconfig` output shown below, the host ID is `00:0c:29:c0:06:65`.

```
eth0 Link encap:Ethernet  HWaddr 00:0c:29:c0:06:65
      inet addr:156.140.113.178  Bcast:156.140.113.255  Mask:255.255.254.0
      inet6 addr: fe80::20c:29ff:fec0:665/64 Scope:Link
      UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
      RX packets:36522 errors:0 dropped:0 overruns:0 frame:0
      TX packets:10160 errors:0 dropped:0 overruns:0 carrier:0
      collisions:0 txqueuelen:1000
      RX bytes:38094114 (38.0 MB)
      TX bytes:695114 (695.1 KB)
```

2. Go to http://www.keysight.com/find/softwaremanager to obtain your license file. Follow the instructions on screen to enter your order number, certificate number, and host ID.

   NOTE If you haven't used Keysight License Manager before, you may need to create an account and add the Software Manager capability.

3. Follow the website's instructions to request a license file. The license file will be emailed to you.

1.1.4. Step 4: Save the license file

To save the license file on the server machine for use by Keysight licensing:

a. Copy the license file you received from Keysight onto your server machine.
   - Save the file to the directory where you have saved past license files.
   - If you do not have an existing license file directory, execute **`mkdir -p /var/-opt/keysight/licensing/licenses/server`** .and save the license file there.

b. Open or cat the license files in the directory to ensure they all specify the same port value (between 27000 and 27009, inclusive) in their SERVER statements. If not, edit them to have the same port value. You will experience licensing failures if the licenses have conflicting port numbers. See Port Number Conflicts for more information.

c. Set the file permissions so that it can be read by *lmgrd*. For example:
   `chmod a+r <filename.lic>`
   This example gives all users read access to the license.

1.1.5. Step 5: Stop the license server manager

a. Before stopping the server, return any borrowed licenses on all clients.

b. Stop any currently running license server:

```
./lmutil lmdown -c @localhost
```

1.1.6. Step 6: Start the license server manager

NOTE You must install a license (Step 3 above) before you can start the license server.

To run *lmgrd* manually:

a. Change directory to the location of your executable files (for example, `/op-t/keysight/licensing/agileesofd`).

b. Run the following command to start *lmgrd:*

```
./lmgrd -c <license file path> -l <license log file path>
```

where:

<license file path> specifies one or more full path names to license file(s) and/or folder(s) containing license files (for example: `/var/-opt/keysight/licensing/licenses/server)`

<license log file path> is the full path name to the debug log file (for example: `/var/-opt/keysight/licensing/log/license-server.log)`.

NOTE If you see one of these errors when you start *lmgrd*:

```
lmgrd: /lib64/ld-lsb-x86-64.so.3: bad ELF interpreter: No such file or directory

lmgrd: No such file or directory
```

then you need to install the Linux Standard Base library. Use **`yum`** to install **`redhat-lsb`**.

If you need to stop the license server manually, execute the following (substituting your license location if it is different):

```
lmutil lmdown -c /var/opt/keysight/licensing/licenses/server
```

1.1.6.1. To automate the license server manager's startup upon system reboot

a. Navigate to: `cd /etc/systemd/system`

b. Configure a service: `sudo touch keysight-lmgrd.service`

c. Open keysight-lmgrd.service in an editor: `sudo gedit keysight-lmgrd.service`

d. Add code similar to the following sample (check the paths to lmgrd, your licenses file(s), and the server log file, on your machine and modify paths in the script if they differ from your configuration):

```
[Unit]
Description=Keysight License Server
Wants=network-online.target
After=network-online.target
[Service]
ExecStart=/opt/keysight/licensing-daemon/bin/lmgrd -c
/var/opt/keysight/licensing/licenses/server -l /var/opt/keysight/licensing/log/license-server.log -reuseaddr -z
[Install]
WantedBy=multi-user.target
```

e. Execute the following commands:

```
systemctl start keysight-lmgrd # to start this boot
systemctl enable keysight-lmgrd.service # to start at boot
```

f. Check the service status with:

```
systemctl status keysight-lmgrd.service
```

1.1.7. Step 7: Configure your client machines to get their licenses from this license server

For details of client setup, see the Help for your license management tool.

1.1.8. Step 8: Reboot to test the license server

a. Then, restart the server machine to test the automated startup of the license server manager. Note that it can take a few minutes for the license server manager to start up after the machine is rebooted.

b. Once a few minutes have passed, check to make sure lmgrd and agileesofd are running using:

```
/<path_to_your_license_server>/lmutil lmstat - a -c <path_to_your_license_file>
```

Updating the Keysight Vendor Daemon on a Floating License Server

This section guides you through the steps to update to a new version of Keysight license server software, including a new *agileesofd* vendor daemon, on an existing license server. If you need to set up a new floating license server, see Setting Up Floating Licenses.

Your product documentation, license manager help, or Keysight support can tell you if you need to update your license server machine to support all your Keysight licenses and utilize all their available features.

The steps to update a license server are:

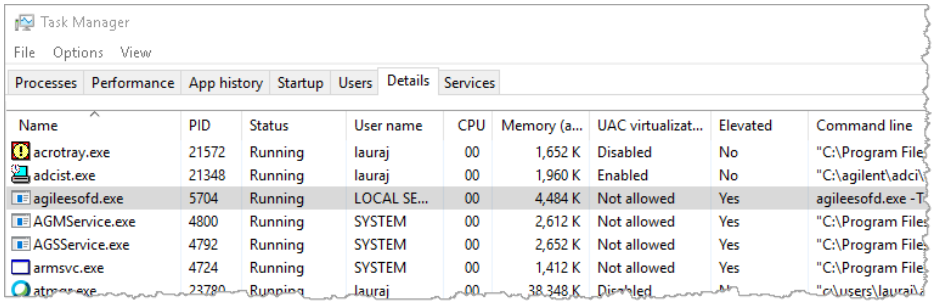
- 1. Step 1: Determine your existing vendor daemon location and version
- 2. Step 2: Determine the vendor daemon version that you need
- 3. Step 3: Return all borrowed licenses
- 4. Step 4: Stop the license server
- 5. Step 5: If there is no existing agileesofd OR the version is not as needed, install Keysight License Server on the license server machine
- 6. Step 6: Restart the license server manager

1. Step 1: Determine your existing vendor daemon location and version

Keysight's vendor daemon is called *agileesofd*. This vendor daemon processes all license requests for Keysight licenses.

a. First, check to see whether there is already an *agileesofd* process running on your license server.

- Windows: Run Task Manager to look for any *agileesofd* process. It may be listed as **agileesofd.exe** or as **VendorDaemon agileesofd**.



- Linux: `ps -ef | grep agileesofd`
- macOS: Run **Activity Monitor** (in the **Applications** > **Utilities** folder) and search on **agileesofd**.

b. If there is no such process, skip to Step 2 below.

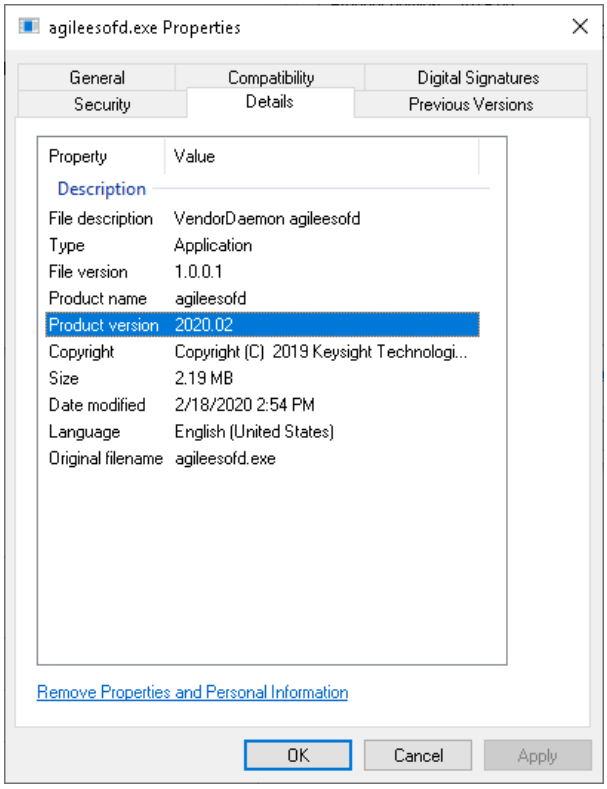
c. If you find a running *agileesofd* process, determine the path to its executable as follows:

- Windows: Right-click the process in Task Manager. Select **Properties**. The path is shown in the **Location** field.
- Linux: `readlink -f /proc/<pid>/exe`
- macOS: Double-click on the **agileesofd** process that is listed; in the **Open Files and Ports** tab the path is given, for example `/Applications/Keysight/Licensing Daemon/bin/agileesofd`

d. Take note of this path to use in the steps below.

e. Determine the current version of the *agileesofd* vendor daemon:

- Windows: In Task Manager, right-click *agileesofd.exe* and choose **Properties**. Select the **Details** tab and locate the **Product version**. (Note that the Properties dialog box does not refresh while it is open. Close the dialog box before you update the server, and then re-open it to check the results of the update.)



- Linux: `strings ./agileesofd | grep "^20[0-9][0-9].[0-9][0-9]$"`
- macOS: Using the path you took note of in Step d above, navigate to the **agileesofd** file in Finder, right click on it, and select **Get Info**. The version is listed in the pop-up window that displays.
- Note that `agileesofd --version` does *not* give you the daemon version, only the FlexNet version. The version should look like the product versions in the table below (e.g., 2020.02).

2. Step 2: Determine the vendor daemon version that you need

Consult your product documentation, license manager help, or Keysight support (https://www.keysight.com/find/contactus) to determine the necessary version to support all your Keysight licenses and utilize all their available features. Note that different Keysight products may have different version recommendations; contact Keysight support if you are not certain of the best version for your server.

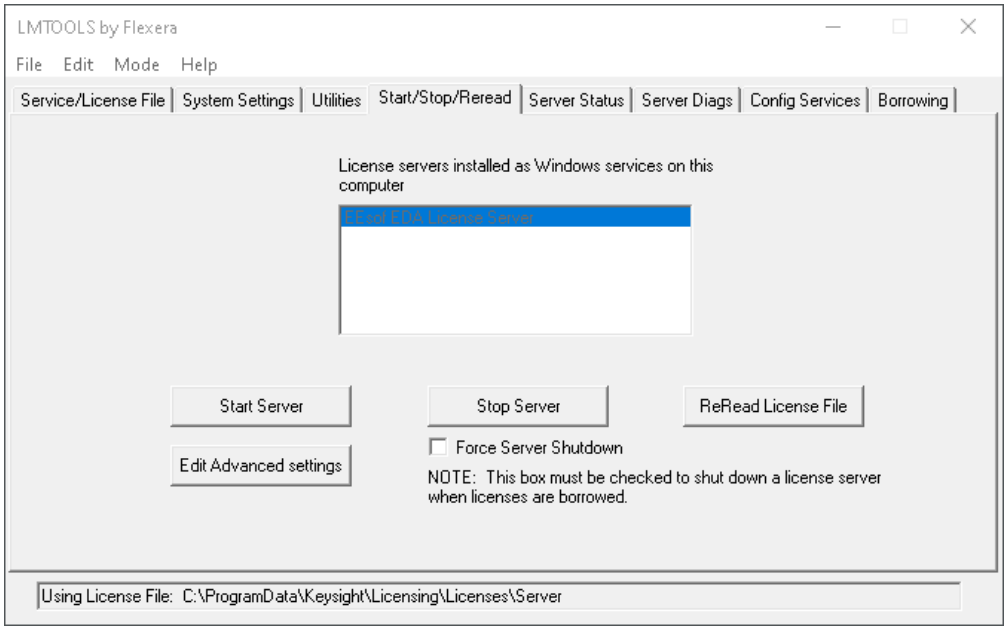
If the version you have (found in Step 1) is appropriate for your needs, you are finished! If not, continue with Step 3, below.

3. Step 3: Return all borrowed licenses

Return all borrowed licenses on all clients before stopping the server. The server normally does not allow a shutdown without returning borrowed licenses. The server can be forcibly shut down with borrowed licenses unreturned but this can lead to an unpredictable state of borrowed licenses when the server restarts.

4. Step 4: Stop the license server

a. Windows: Run LMTOOLS, select **Start/Stop/Reread**, then click **Stop Server**.



b. Linux: Kill any running *lmgrd* processes. (This will automatically end *agileesofd* also.)
Note: *lmgrd* is the license server manager. The license server manager is one of the components that constitute a license server (the other being *agileesofd*).

c. macOS: Run **Activity Monitor** (in the **Applications** > **Utilities** folder) and search on *lmgrd* and select it. Click the **Stop** 'x' button in the top-left of the Activity Monitor window, then choose **Quit**.

5. Step 5: If there is no existing agileesofd OR the version is not as needed, install Keysight License Server on the license server machine

a. If your Keysight support representative has provided you with an installation package, skip to (d) below.

b. On your license server machine, open your web browser and navigate to http://www.keysight.com/find/licenseserver

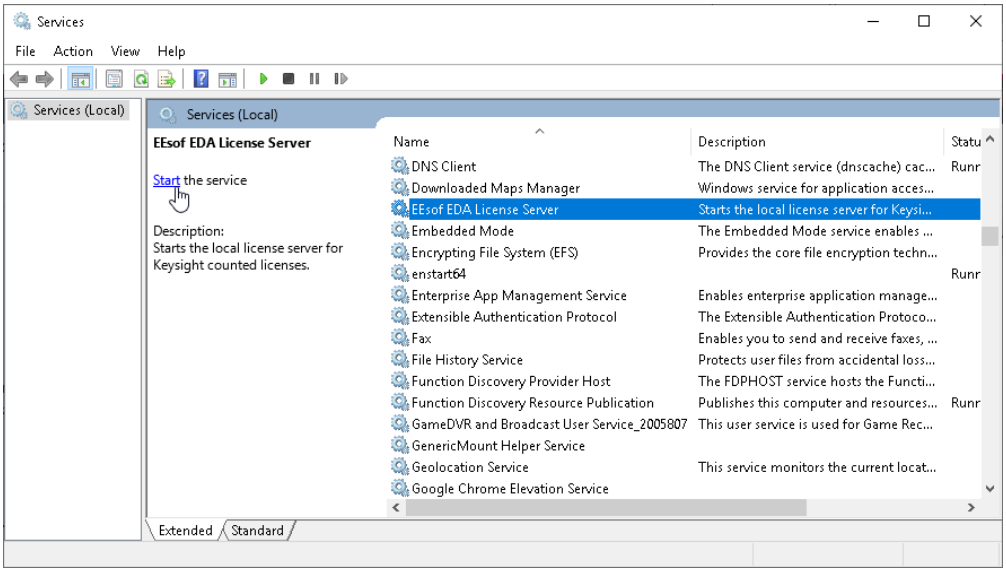
c. Download the appropriate server package for your version and platform.

d. Unpack the files or run the installer (provided format depends on the version you are installing):

- If you have a license server already, unpack/install to the executable location from Step 1 above.
- If you do not have an existing location, use:
  - Windows: `C:\Program Files\Common Files\Keysight\Licensing\License Server`
  - Linux: `/opt/keysight/license-server`
  - macOS: `/Applications/Keysight/Licensing Daemon/Agileesofd`

6. Step 6: Restart the license server manager

Windows: To start the FlexNet license server manager (*lmgrd*) and vendor daemon (*agileesofd*), restart the Windows service (typically named **EEsof EDA License Server**). If you do not have a windows service, you can start the server using LMTOOLS.



Linux: Start the license server manager (*lmgrd*) and vendor daemon (*agileesofd*) on the machine to which the license is tied as follows:

a. Change directory to the location of your server files (for example on Linux, `/opt/keysight/licensing-daemon/agileesofd` or macOS, `/Applications/Keysight/Licensing Daemon/Agileesofd`).

b. Run the following command to start *lmgrd:*

```
./lmgrd -c <license file path> -l <license log file path>
```

where:

<license file path> specifies one or more full path names to license file(s) and/or folder(s) containing license files.

<license log file path> is the full path name to the debug log file.

Setting Up Node-Locked and Transportable Licenses

This section provides a high-level description of how to set up node-locked licenses (tied to a specific computer or instrument). For specific setup information, see the help for your license management tool.

To set up node-locked or transportable licenses, perform all the following steps on your local machine (the instrument or computer on which you plan to run the licensed Keysight product).

Step 1: Install the licensed Keysight software and the licensing software

Your Keysight product will usually install the necessary licensing tool(s). If not, see http://www.keysight.com/find/licensingtools for free, downloadable licensing tools.

Step 2: Obtain a license file

a. If you have ordered a licensed Keysight product, you'll receive (typically by email) a license certificate. Note the order number and certificate number.

b. Determine your local machine's host ID, using the instructions in the email you received with the license, or in your license manager's help.

c. Go to http://www.keysight.com/find/softwaremanager to obtain your license file. Follow the instructions on screen to enter your order number, certificate number, and host ID.

NOTE If you haven't used Keysight Software Manager before, you may need to create an account on Keysight and add the Software Manager capability.

d. Follow the website instructions to request a license file. The license file subsequently will be emailed to you.

Step 3: Save the license file

Make a copy of the license file on your local machine in a location that is readable by all users (for example, `C:\Users\Public`).

Step 4: Add your license(s)

See the Help for your license management tool.

Setting Up USB Portable Licenses

To set up USB portable licenses (Windows and RHEL only), perform the following steps:

Step 1: Install the licensed Keysight software and the licensing software

Your Keysight product may install the necessary licensing tool(s). If not, see http://www.keysight.com/find/licensingtools for free, downloadable licensing tools.

Install the software on each machine on which you plan to use the Keysight product and the USB portable license:

Step 2: Install dongle drivers

Repeat these steps on each machine on which you plan to use the USB portable license:

a. If installing the driver onto a Keysight instrument, make sure you are logged in as Administrator.

b. Download the FLEXID10 USB Dongle Driver package for your platform from http://www.keysight.com/find/LicensingUsbDriver.

c. The driver files are provided in an archived format (.zip for Windows and .rpm for RHEL). Extract the files to a convenient location on the machine.

d. Execute the extracted *Setup64.exe* (on 64-bit Windows) or *Setup32.exe* (on 32-bit Windows).

e. Follow the installer prompts, accepting the default values.

For more information and detailed instructions, see the *FlexNet Publisher Driver Installation Guide for FlexNet ID Dongles,* available from https://flexeracommunity.force.com/customer/CCDocumentation (login required).

Step 3: Obtain a license file

Do this on any machine with an internet connection:

a. If you have ordered a licensed Keysight product with a USB portable license, you'll receive a license certificate (paper or email) and you will have the option of ordering a USB hardware key (dongle). If you don't order a new dongle, you will use one you already have to perform the following steps. Note the order number and certificate number from the paper or emailed certificate.

   To determine your dongle ID, either read the dongle ID directly from the key or, with the dongle connected to your computer, execute `lmutil lmhostid -flexid.`

b.

This dongle's ID is 10-0RESF13B.

c. Go to http://www.keysight.com/find/softwaremanager to obtain your license file. Follow the instructions on screen to enter your order number, certificate number, and dongle ID.

NOTE If you haven't done this before, you may need to create an account on Keysight and add the Software Manager capability.

d. Follow additional instructions to request a license file, which will subsequently be emailed to you.

Step 5: Save the license file

Make a copy of the license file on each machine on which you plan to use the USB portable license, in a location that is readable by all users (for example, `C:\Users\Public`).

Step 6: Add your license(s)

Perform the following steps on each machine on which you plan to use the USB portable license:

a. Connect the dongle to a USB port.

b. See the Help for your license management tool for instructions to add/install the license file. If the dongle is not connected to the machine where you are adding the license file, you may see a warning indicating that the host ID of the license is not valid. That's okay--proceed with the installation. You must connect the dongle in order to use the license, and when connected, the host ID will be valid.

c. You will not be able to add a license if it specifies a different port number from Keysight licenses already installed on this machine. You will need to edit your license file(s) to specify the same port number. See Port Number Conflicts for details.

Setting Up Device Licenses

This section provides a high-level description of how to set up device or device-locked licenses (tied to a compact or modular instrument that is connected to a PC). For specific setup information, see the Help for your license management tool.

To set up device licenses, perform all the following steps on your local machine (the instrument or computer to which the licensed Keysight device is connected).

Step 1: Install the licensed Keysight device, its accompanying software, and the licensing software

In the majority of cases, installing a device is accomplished by plugging in its USB cable. Your Keysight product may install the necessary licensing tool(s). If not, see http://www.keysight.com/find/licensingtools for free, downloadable licensing tools.

Step 2: Obtain a license file

a. If you have ordered a licensed Keysight product, you'll receive (typically by email) a license certificate. Note the order number and certificate number.

b. Your device identifier is the device model number and device serial number, separated by a hyphen, resulting in an alphanumeric string (e.g. X12345A-US10002345).

c. Go to http://www.keysight.com/find/softwaremanager to obtain your license file. Follow the instructions on screen to enter your order number, certificate number, and device ID.

NOTE If you haven't used Keysight Software Manager before, you may need to create an account on Keysight and add the Software Manager capability.

d. Follow additional instructions to request a license file, which subsequently will be emailed to you.

Step 3: Save the license file

Make a copy of the license file on your local machine in a location that is readable by all users (for example, `C:\Users\Public`).

Step 4: Add your license(s)

Follow the instructions in the letter included with your emailed license. Additional information is in the Help included with your license management tool.

Advanced Licensing Configuration Options

This section provides information on various advanced licensing configuration options:

Accessing Floating Licenses through a Firewall

Creating an Options File

Licensing Environment

Multiple Server Configurations

Setting Up Three-Server Redundancy

Accessing Floating Licenses through a Firewall

You can access (check out) Keysight licenses through a firewall (or router) as per your license agreement. To enable license checkout, configure your firewall to allow TCP/IP communication through the TCP ports used by *lmgrd* and *agileesofd*.

Step 1. Specify TCP port numbers

On the license server machine, specify a TCP port number for *lmgrd* on the SERVER line of your license file, and for *agileesofd* on the VENDOR lines. Stop and restart the license servers after you modify the port numbers.

NOTE The port numbers must be the same for all licenses on one server. *lmgrd* will fail if license files have conflicting port numbers.

If no port is specified on the SERVER line, one of the default ports in the range 27000 to 27009 is used. If no port is specified on the VENDOR line, a port is chosen by the operating system at runtime; this may not work if a firewall is in place and the port used is not opened in the firewall.

Example

```
SERVER myserver 00809AC7123F8 27009
VENDOR agileesofd "C:\Program Files\Common Files\Keysight\Licensing\Agileesofd\agileesofd.exe"
port=1705
```

Step 2. Configure the firewall

On both the license server and license client machines, configure your firewall (or router) to allow TCP communication through the TCP ports you specified in Step 1.

Step 3. Edit the licensing configuration to include the port number

On the client side, use your Keysight license management tool (such as PathWave License Manager) to modify the specified license server to include the port number: for example, `27009@myserver.myDomain.`

After you do this, clients outside of the firewall will be able to access licenses from your server.

NOTE Some clients may time out before they can connect to a license server through a firewall. The default timeout period is 3 seconds. If you need a longer timeout period, you can modify the environment Variable `FLEXLM_TIMEOUT` to a larger value. Refer to FlexNet documentation for details.

Creating an Options File

An *options file* allows administrators to control licensing parameters of FlexNet floating licensing:

- Restricts and/or reserves the use of features based on user, hostname, or display name.
- Controls the level of information logged about license usage.
- Controls parameters of borrowing, including the "low water" level (number of licenses that cannot be borrowed), users to be included or excluded from borrowing, maximum borrow period

NOTE
- You can create an options file using any text editor.
- Ideally, you should keep this file in the same directory as your license files.

For details of how to create an options file and of the options that can be defined, refer to the FlexNet Publisher License Administration Guide, included in the Keysight License Server download and available online at https://www.keysight.com/find/fnpadmin.

Licensing Environment

This table describes the environment used by Keysight licensing. These may be Windows registry keys, the Linux *~/.eesoflic* file, or environment Variables.

Working with the licensing environment

Some values may be stored in either Windows registry keys, the Linux *~/.eesoflic* file, or environment Variables. To examine their values:

- If you are using PathWave License Manager, select **Tools > Create Diagnostic Report** and examine the report.
- If you are using Keysight License Manager 6 or a Keysight Floating License Manager for EEsof EDA Products, select **Environment**.

Variables and registry keys

Variable/Key Name	Description
`<PRODUCT>_LICENSE_FILE`	Specifies the list of license files/servers to search when a license is requested by a particular Keysight product. Each Keysight product has a dedicated Variable or registry entry to serve this purpose. Normally, these Variables are set by Keysight Licensing, using information provided by each product's installation.
`AGILEESOFD_DEBUG_MODE`	Turns on the debug mode in the *agileesofd* vendor daemon when this Variable is set to anything other than 0, **no**, or **off**. Since this Variable is only read at server startup, you need to stop and restart the license server to allow this setting to take effect.
`AGILEESOFD_SERVER_LOGFILE`	The log file used by *agileesofd*. This file records general information at all times, and debug information when `AGILEESOFD_DEBUG_MODE` is on.
`AGILEESOFD_SERVER_CONFIG`	The search path used by *lmgrd* and *agileesofd* to find licenses to serve.

Multiple Server Configurations

If you plan to use multiple license servers to provide redundancy in case of server or network down-time, there are two ways to do this.

- **Redundancy using the license search path** requires setting up two or more license servers and configuring each client to use both/all of them.

  - This is the simplest solution and is adequate for many needs.
  - Each client can specify any number of servers in priority order; each client can have different servers in a different order.
  - You'll need to purchase enough licenses to install some on each server.
  - If a server is down or unavailable, that server's licenses will be unavailable.
  - Depending on the details of an application's use of licensing, once the application has successfully checked out a license from a particular license server, it may expect to get all subsequent licenses from the same server. If that server runs out of licenses, or goes down while the application is running, the application may not be able to obtain needed licenses from another server, at least until you stop and restart that application.

- **Three-server redundancy** requires setting up three servers as described in Setting Up Three-Server Redundancy.
  - The three servers **must** be colocated.
  - You'll install the same licenses on each server; you must specify all three servers' host IDs when requesting your licenses from Keysight.
  - When one server goes down or becomes unavailable, applications will seamlessly receive their licenses from another server in the three-server configuration.
  - If *two* servers go down or become unavailable simultaneously, applications will not be able to receive licenses.
  - The license server manager (*lmgrd* or *lmadmin*) cannot start vendor daemons from multiple software publishers when configured for three-server redundancy. In this configuration, the license server manager can only manage one vendor daemon.

For much more information on multiple-server configurations, refer to the FlexNet Publisher License Administration Guide's chapter on Ensuring License Availability.

Specific instructions for triple-redundant servers are available in Setting Up Three-Server Redundancy.

Setting Up Three-Server Redundancy

Configuring three-server redundancy (also called triple-redundant servers) allows your licensed products to continue to operate even if one of the three servers goes down. To configure three-server redundancy, you *must* have license files issued for the three redundant servers.

Considerations

Before you decide on your license server configuration, consider the following:

- Revenera and Keysight only support three-server redundancy with **colocated servers** (all three servers on the same site). Three-server redundancy with distributed servers can cause extremely poor performance and instability.
- Your needs may be better served by implementing redundancy using the license search path. See Multiple Server Configurations for a comparison.

To configure three-server redundancy

1. Start by reviewing Chapter 14, "Ensuring License Availability", in the FlexNet Publisher License Administration Guide.
2. Follow the instructions in the section of Chapter 14, "Configuring License Servers for Three-Server Redundancy".

Tips for setting up servers

- The license files must have been issued for three redundant servers and must contain `SERVER` lines for each of the servers, as shown in the following example:

```
SERVER firstHost D0BF9C261574 27009 PRIMARY_IS_MASTER HEARTBEAT_INTERVAL=10
SERVER secondHost B88A6060903C 27009
SERVER thirdHost 000C29078EBE 27009
USE_SERVER
VENDOR agileesofd
INCREMENT myFeature agileesofd 2018.09 21-sep-2018 1 …
```

- The license files installed on each of the three servers must be identical to each other.
- The host name for each server (e.g. firstHost in above example) must be defined in `SERVER` lines. You can edit the host names; you *cannot* edit the host IDs. If your license specifies `this_host` instead of specific host names, edit it to include the specific host names.
- The TCP/IP port value used by each server (e.g. 27009 in the above example) must be defined in the `SERVER` lines. You can edit the port values (again, you *cannot* edit the host IDs).
- Start up the license servers in the same order that they are designated: primary, then secondary, then tertiary servers (that is, in the same order as they appear in the license files). This will ensure that your designated primary server takes the role of master.
- Ensure that the license search path registry entry or environment Variable (`<PRODUCT>_LICENSE_FILE`) on the client includes all three servers in the same order as specified in the license files. This ensures that checkout requests are satisfied efficiently in the minimum possible time.
- The delimiter between the three server values in the license search path is a comma, rather than the typical semicolon used between values for multiple single servers. Example:

```
KAL_LICENSE_FILE=27009@firstHost,27009@secondHost,27009@thirdHost
```

Three-server redundancy and borrowing

Three-server redundancy is not compatible with license borrowing, because the information that identifies the state of a borrowed license can persist only on the license server that provided the borrowed licenses, and cannot be transferred to another license server when a failure occurs.

Multiple vendor daemons

Be aware that the license server manager (*lmadmin* or *lmgrd*), when configured for three-server redundancy, cannot start and manage multiple vendor daemons. If you need to use multiple vendor daemons on a three-server redundant system, you must run separate instances of the license server manager on that system to support each vendor daemon. Make sure you use a different port number for each instance.

Tips for troubleshooting

- When each of the redundant servers starts up, it will continually try to contact the other two servers. In the log files you'll see several "Connection attempt" and "Failed to connect" messages until the servers establish communication and a quorum (two out of three) is reached. Once a quorum is reached, the licenses being served will be shown as available in the primary server's log file.
- If you start and stop a server multiple times in quick succession while configuring the three redundant servers, it is possible that the TCP/IP port may not get released between a stop and the next start. This may result in the error "`Fail to open the TCP port number in the license.`" You can check to see if port is still in use by running **`netstat -n -b`** at the command line (this requires your console to have administrator privileges). If the port is not released in a reasonable amount of time, you may need to restart the computer.
- If you experience `lmgrd` startup problems, check your license file to see if it specifies `this_host` instead of specific host names. If so, edit it to include the specific host names.

Keysight Licensing FAQs

The following table lists frequently asked questions about Keysight Licensing.

<table>
<tr><th>Question</th><th>Answer</th></tr>
<tr><td>What files and folders are used by Keysight Licensing?</td><td>See What Files and Paths are Used By Keysight Licensing?</td></tr>
<tr><td>How can I manually start the license server?</td><td>
To start the FlexNet license server manager and vendor daemon (lmgrd and agileesofd), go to the directory where your licensing tools are installed, and do either of the following:

1. Run LMTOOLS, select Start/Stop/Reread, select the existing service and Start Server.

2. Specify the full path and location of the license file and the license log file, respectively, by typing the following command
<code>lmgrd.exe -c <license file path> -l <license log file path></code>
where:
• <license file path> specifies one or more fully-qualified directory names or full path names of the license file(s)
• <license log file path> is the full path name to the debug log file

NOTE If there are spaces in your path names, use double quotes around the path names.

Example
<pre>lmgrd.exe -c " C:\ProgramData\Keysight\Licensing\Licenses\Server;
  C:\ProgramData\Keysight\Licensing\Licenses\Other"
  -l "C:\ProgramData\Keysight\Licensing\Log\PC1_server_log.txt"</pre>
NOTE If you see one of these errors when you start lmgrd on Linux:
<pre>lmgrd: /lib64/ld-lsb-x86-64.so.3: bad ELF
interpreter: No such file or directory

lmgrd: No such file or directory</pre>
then you need to install the Linux Standard Base library . Use yum to install redhat-lsb .
</td></tr>
</table>

How can I stop the license server?	To stop *lmgrd* and *agileesofd*, go to the directory where your licensing tools are installed, and do either of the following:
	1. Run LMTOOLS, select **Start/Stop/Reread**, select the service and **Stop Server**.
	2. Execute (on Windows):
	`lmutil lmdown -c " C:\ProgramData\Keysight\Licensing\Licenses\Server; C:\ProgramData\Keysight\Licensing\Licenses\Other"`
	or (Linux)
	`lmutil lmdown -c "/var/opt/keysight/licensing/licenses/server; /var/opt/keysight/licensing/licenses/other"`
	or (macOS)
	`./lmutil lmdown -c "/Library/Application\ Support/Keysight/Licensing/Licenses/Server; /Library/Application\ Support/Keysight/Licensing/Licenses/Other"`

Can I change the port number in my license file?	You will not normally need to modify the SERVER line of your local node-locked license file. Licenses provided by the Keysight Software Manager (KSM) will have a port number of 27009 on the SERVER line. If you do want to use a different port number, then you need to modify all of your license files for a given license server to have the same port number in order for the license sever to recognize them and start properly. If you need to access licenses through a firewall, you may need to modify the port number on the VENDOR line of your license file(s). Refer to Accessing Floating Licenses through a Firewall.
What are the default SERVER and VENDOR ports?	Licenses provided by the Keysight Software Manager (KSM) typically have a port number of 27009 on the SERVER line; if no port is specified on the SERVER line, one of the default ports in the range 27000 to 27009 is used. If no port is specified on the VENDOR line, a port is chosen by the operating system at runtime. (This will not work if a firewall is in place; see Accessing Floating Licenses through a Firewall.)

Why am I getting a license denial message?	If your Keysight product cannot obtain a floating license, that usually means that other users have all the licenses in use. Some licenses may be borrowed (i.e., reserved for a period of time to be used offline). If the license in question is local (locked), but counted, you may have a background process or minimized application on your local machine holding onto a license. Check the View Usage tab of PathWave License Manager (or equivalent view in Keysight License Manager 6 or EEsof Floating License Manager) to see how many license counts are in use. Your license may have expired. The list of licenses in your license manager will show expiration status and/or expiration dates. Occasionally you may receive a license denial message unexpectedly. When that happens, check to see if there are any "runaway" Keysight processes that need to be killed, as they might be holding on to a license.
When should I change `FLEXLM_TIMEOUT`?	Keysight recommends using a port number and not changing `FLEXLM_TIMEOUT`. This timeout is used by Flexera software when connecting to a license server. The default value of 3 seconds (3000000 microseconds) is sufficient to allow remote connections with typical latencies. You generally will not need to change it. This value is also used when scanning for ports, when no port is specified in the license file or in the server string. If you know that there are no latency issues with a server, you can reduce the value of `FLEXLM_TIMEOUT` using the options file. The minimum possible value is 200 milliseconds (200000 microseconds).
Do I need to explicitly specify a TCP/IP port?	If you do not specify the TCP/IP port for the license server during license setup, you may experience checkout delays, unexpected behavior, and/or license checkout failure on the Windows platform. Therefore, it is highly recommended that you always explicitly specify the TCP/IP port associated with each license server.
What can I do to clean my existing license setup?	On a Windows license server machine or on a client machine that uses locked counted licenses, when you suspect that your license setup is outdated or behaving strangely, run `lmtools` , then go to the Start/Stop/Reread tab and restart the Windows service related to Keysight Licensing.

How do I find the Flex ID of my hardware key (USB dongle)?	You need the ID of your USB key (also called a dongle, sold separately) to get licenses from Keysight. You may also need this information when you contact Keysight Technical Support. There are two ways to find this ID: • Before you install (plug in) the USB key on your PC, you can read the ID directly from the key. • If you have installed the hardware key on your PC, and have also already installed your licenses and the FlexNet software, go to your licensing tools directory and enter the following command to check the ID: `lmutil lmhostid -flexid` This ID is a valid USB key serial number: 9 or 10, a dash, and 8 hexadecimal characters. Examples: 9-1234abcd or 10-1234abcd.

How do I find my host ID?	There are several ways to determine the host ID of your local system (computer or instrument):
	• From the directory containing your licensing tools, execute
	`lmutil lmhostid`
	to get the FlexNet host ID directly.
	• On Windows, execute
	`getmac /v /fo list`
	Your host ID is listed as the Physical Address of the physical Network Adapter.
	• On Linux, execute
	`/sbin/ifconfig -a eth0`
	Examine the `ifconfig` results to find your Ethernet interface (often called `eth0`) and use its hardware address (`HWaddr`).
	• On macOS, navigate from the Apple menu > System Preferences >Network > Ethernet > Advanced > Hardware.

How can I borrow a floating license to use offline?	Many Keysight floating licenses can be borrowed for up to 365 days. Once you have borrowed a license, you can disconnect from the network and continue to use the license until its return date, or until you explicitly return it. • You can determine whether your license can be borrowed by looking in the license file (*.lic*) for the BORROW keyword, or by attempting to borrow it as described below. • Keysight PathWave License Manager and Keysight License Manager 6 have license borrow and early return capabilities. Consult the Help for those tools. • If you don't return a borrowed license explicitly, it will revert to the server at midnight (23:59:59) on the return date that you specified when you borrowed it. This means it will no longer be available to your offline machine, and will be available to other clients to be checked out from the server. NOTE Keysight recommends that you always use a license management tool or the menus of your Keysight product to borrow licenses. Due to a FlexNet limitation, it is possible for early returns to be attributed to the wrong user if you use the Flex tools (`lmutil lmborrow`) or environment Variable (`LM_BORROW`) .
I used Keysight License Manager 6 to set up a license for one of my Keysight products, and now I want to use it to set up a different product's license. How can I do that?	Once you have chosen a product (from the list presented at various points in the setup flow, depending on what you are doing), if you want to select a different product, you must close Keysight License Manager 6 and re-open it. If you started Keysight License Manager 6 from a menu of your Keysight product, that product will be selected automatically; you will need to open Keysight License Manager 6 from your Start menu to open it with no product selected.
When does my subscription license stop working? On the expiration date, or on the next day?	Your subscription license stops working immediately AFTER the expiration date in the license file. If your license file specifies an expiration date of `28-jul-2018`, the licensed feature will work on July 28, but will not work on July 29.

Why do I see delays when using floating licenses?	There are several factors that can lead to slow license checkouts when you are using floating licenses; you will experience this as delays in your Keysight application when it starts up or when you try to use a licensed feature of the software. The same factors can also cause slow refresh of the list of licenses when viewed in your license management tool. • If you have multiple floating license servers in a product's search path, checkouts can be slow for that product's licenses. Check your configuration for unused license servers, and if you have multiple servers for different products, make sure you configure each server only for the products that need that server. See Setting Up Floating Licenses and Licensing Environment. • If your floating license server is on a different site from your client machine, checkouts may be slow. • If your overall network performance is poor, your floating license checkouts will be slow.
Where can I find more information on my license management tool?	Each Keysight license management tool has a Help menu or Help button with information on specific task steps, tool-specific troubleshooting, supported license types, and more.

What Files and Paths are Used By Keysight Licensing?

These are some of the directories and files used by Keysight licensing and by various license management tools. These are default paths; in some cases you may be able to change the installation path when installing your software.

Directory	Files / File Types	Use
Windows: Subdirectories of • `C:\Program Files\Common Files\Keysight` • `C:\Program Files\Keysight` • `C:\Program Files (x86)\Agilent` Linux: Subdirectories of • `/var/opt/keysight` • `/opt/keysight` macOS: Subdirectories of • `/Library/Application Support/Keysight` • `/Applications/Keysight`	various	License management tools
Installed with your Keysight licensing software at one of these locations: • Windows: – `C:\Program Files\Common Files\Keysight\License Server` – `C:\Program Files\Common Files\Keysight\License Manager 6` – `C:\Program Files\Common Files\Keysight\Licensing\Agileesofd` • Linux: – `/opt/keysight/licensing-daemon` – `/opt/keysight/licensing-daemon/agileesofd` • macOS: – `/Applications/Keysight/Licensing Daemon`	*LicensingAdminGuide.pdf* *fnp_LicAdmin.pdf*	Keysight Licensing Administrator's Guide (this manual) FlexNet Publisher License Administration Guide

Windows: • `C:\ProgramData\Keysight\Licensing\Licenses:` – *Server* subdirectory for counted, served licenses – *Other* subdirectory for uncounted, unserved licenses • `C:\Program Files\Agilent\licensing` Linux: `/var/opt/keysight/licensing/licenses`: • *server* subdirectory for counted, served licenses • *other* subdirectory for uncounted, unserved licenses macOS: `/Library/Application Support/Keysight/Licensing/Licenses` • *server* subdirectory for counted, served licenses	*.lic*	Installed license files
Windows: `C:\ProgramData\Keysight\Licensing\Log` Linux: `/var/log/keysight/licensing/log` macOS: `/Library/Application Support/Keysight/Licensing/Log`	*.txt*	Licensing log files

How to Troubleshoot Problems

This section lists troubleshooting steps that can help you resolve common problems with Keysight licensing.

Before you start

Consider rebooting the machine

A restart will often quickly and easily resolve transient problems caused by software or hardware changes.

Follow these test steps

Test 1: Operating system...

Are you using an unsupported platform?

Ensure that you're using a supported operating system: Consult the documentation for your license management tool and/or the License Server page for the version you are using.

Note that virtual machines (such as VMWare) are not supported.

Test 2: License file (*.lic*) exists

Inspect the active license directory

List the files

Windows	`dir C:\ProgramData\Keysight\Licensing\Licenses\Server` `dir C:\ProgramData\Keysight\Licensing\Licenses\Other`
Linux	`ls -al /var/opt/keysight/licensing/licenses/server` `ls -al /var/opt/keysight/licensing/licenses/other`
macOS	`ls -al /Library/Application Support/Keysight/Licensing/Licenses/Server` `ls -al /Library/Application Support/Keysight/Licensing/Licenses/Other`

Verify...

- A license file exists in the expected location.
- The license file has an *.lic* extension.
- Only license files are in the directory. Remove any files that do not have a *.lic* extension.
- All license files in the server directory use the same port. Open or view the .lic files and determine whether they all specify the same port value (between 27000 and 27009, inclusive) in their SERVER statements. If not, edit them to have the same port value. You will experience licensing failures if the licenses have conflicting port numbers. See Port Number Conflicts for more information.

Linux only:

- Verify the license file has read permissions for all users.
  To fix permissions, execute:

```
chmod a+r /var/opt/keysight/licensing/licenses/server/*
chmod a+r /var/opt/keysight/licensing/licenses/other/*
```

Need a license file? See Setting Up Licenses.

If you're using a USB dongle, Test 3: FLEXID is correct

Run: `lmutil lmhostid -flexid`

A. Run `lmutil lmhostid` -flexid to determine the FlexNet ID of the connected dongle.

```
lmutil - Copyright (c) 1989-2015 Flexera Software LLC. All Rights Reserved.
The FlexNet host ID of this machine is "FLEXID=10-0bebf3bd"
```

- If `missing dongle driver` is reported, follow the dongle driver installation instructions in Setting Up USB Portable Licenses to install it.
- If `The FlexNet host ID of this machine is ""` , check to see if the dongle is plugged in appropriately.

B. Open your license file in your preferred text editor (notepad, gedit, etc).

C. Find the host ID. Here's an example .lic file with the host ID `FLEXID=10-0bebf3bd.`

```
#
# For a Keysight Licensing overview and detailed instructions,
# see http://www.keysight.com/find/Licensing
#
# Use of this license constituted acceptance of the Keysight end-user
# license agreement at http://www.keysight.com/find/sweula
#
SERVER this_host FLEXID=10-0bebf3bd 27009
USE_SERVER
VENDOR agileesofd
# Product: N7640APPC-1FL   LMR, PC application, node-locked 12 month license Expires: 16-OCT-
2018
INCREMENT b_sigstu_x_lmr agileesofd 2018.1016 16-oct-2018 1 VENDOR_
STRING="40b0341a9df1P=#1003D=#Signal_Studio_X_for_LMR : RFZ2AQN D2HWSGS X1J2HXG JWEJWVY 2BHAHBG
2CELGBJ XJLCRXF TGRAM" HOSTID=FLEXID=10-0bebf3bd SIGN="0029 81D7 708F 2B79 95CB 64A2 6227 6D0E
72B4 3902 E301 F3E4 900B A504 7731 25AF A34C 9A70 8626 7F31 4DBB"
```

Verify...

- The FLEXID in the active license file matches the FLEXID of the connected dongle.

NOTE **Need a license?** See Setting Up Licenses

otherwise, Test 3: Host ID is correct

Run: `lmutil lmhostid`

A. Run **`lmutil lmhostid`** to determine the host ID of the machine. (There may be multiple host IDs.)

```
lmutil - Copyright (c) 1989-2015 Flexera Software LLC. All Rights Reserved.
The FlexNet host ID of this machine is "480fcf62402c"
```

B. Open your license file in your preferred text editor (notepad, gedit, etc).

C. Find the host ID. Here's an example .lic file with the host ID `40b0341a9df1.`

```
# Use of this license constituted acceptance of the Keysight end-user
# license agreement at http://www.keysight.com/find/sweula
#
SERVER this_host 40b0341a9df1 27009
USE_SERVER
VENDOR agileesofd
# Product: N7640APPC-1FL  LMR, PC application, node-locked 12 month license Expires: 16-OCT-2018
INCREMENT b_sigstu_x_lmr agileesofd 2018.1016 16-oct-2018 1 VENDOR_
STRING=&amp;quot;40b0341a9df1P=#1003D=#Signal_Studio_X_for_LMR : RFZ2AQN D2HWSGS X1J2HXG JWEJWVY
2BHAHBG 2CELGBJ XJLCRXF TGRAM&amp;quot; HOSTID=40b0341a9df1 SIGN=&amp;quot;0029 81D7 708F 2B79 95CB 64A2
6227 6D0E 72B4 3902 E301 F3E4 900B A504 7731 25AF A34C 9A70 8626 7F31 4DBB&amp;quot;
```

Verify...

- The host ID in the active license file matches a host ID of the machine. (If your machine has multiple host IDs, the license file may match any one of them.)

  Recommendation: Remove any files that have the wrong host ID. They shouldn't cause problems, but they are confusing and unnecessary.

  NOTE **Need a license?** See Setting Up Licenses

Before you proceed: Do you have SERVER license files?

Several of the troubleshooting steps require you to understand whether the license server manager (*lmgrd.exe*) and vendor daemon (*agileesofd.exe*) — sometimes referred to collectively as the license server process — should be running as a part of your licensing configuration.

The license server process is needed:

- if your machine is acting as a license server, serving floating licenses to other computers
- *or* if your machine is utilizing *counted* licenses that are not floating — for example, if you are using a Keysight product with a per-process licensing model. In this configuration, your machine needs to run a *local license server process*.

You can tell whether your machine needs a license server process by examining the installed licenses.

- If there is at least one license file in `C:\ProgramData\Keysight\Licensing\Licenses\Server` (on Windows) or `/var/opt/keysight/licensing/licenses/server` (on Linux) or `/Library/Application Support/Keysight/Licensing/Licenses/Server` (on macOS), then you need the license server process. **Proceed with Test 4: Inspect your SERVER files.**
- If not, **skip to Test 10: Repeated entries in LICENSE_PATH Variables.**

Test 4: Inspect your SERVER files

A. Open a command line interpreter:

- Windows: command prompt
- Linux: terminal window **as root user**
- macOS: Terminal window

B. Change directory to the location for server license files:

Windows	`cd C:\ProgramData\Keysight\Licensing\Licenses\Server`
Linux	`cd /var/opt/keysight/licensing/licenses/server`
macOS	`cd /Library/Application Support/Keysight/Licensing/Licenses/Server`

C. Examine each license file in that location.

Verify...

- Each license file contains a `SERVER` line
- The server line contains a host ID (example: `10e7c61be28e`) that matches this machine
- The license file contains `VENDOR agileesofd`

Test 5: Flexera software version

Run: `lmutil lmstat -v`

Flexera utilities, run from the command line, are a fundamental tool used in the license troubleshooting process.

A. Change directory to the location for Flexera utilities:

Windows	Typically one of the following:
	`cd C:\Program Files\Common Files\Keysight\License Server\bin`
	`cd C:\Program Files\Common Files\Keysight\License Manager 6\bin`
	`cd C:\Program Files\Common Files\Keysight\Licensing\Agileesofd`

Linux	Typically one of the following:
	`cd /opt/keysight/licensing-daemon/server`
	`cd /opt/keysight/licensing-daemon/agileesofd`

macOS	Typically one of the following:
	`cd /Applications/Keysight/Licensing Daemon`
	`cd /Applications/Keysight/Licensing Daemon/Agileesofd`

Don't have the directory? Install Keysight Licensing from http://www.keysight.com/find/LicensingTools.

B. Run `lmstat` to view the Flexera software version.

Windows	`lmutil lmstat -v`
Linux	`./lmutil lmstat -v`
macOS	`./lmutil lmstat -v`

Note the version: it must be v11.13.1.4 or better.

```
lmutil - Copyright (c) 1989-2015 Flexera Software LLC. All Rights Reserved.
lmstat v11.13.1.4 build 179569 x64_n6
```

Is Linux showing **`lmutil: No such file or directory`**? Install the Linux Standard Base library. On RHEL, it's **redhat-lsb**, which is installed through yum.

Is your Flexera software version out of date? Install a newer version of Keysight Licensing: http://www.keysight.com/find/LicensingTools or http://www.keysight.com/find/licenseserver.

NOTE If you're using a floating (network) license, go to Floating License Problems.

Test 6: License manager status

Run: **`lmutil lmstat -lm`**

Run `lmstat` to see license manager status:

Windows	`lmutil lmstat -lm -c @localhost`
Linux	`./lmutil lmstat -lm -c @localhost`
macOS	`./lmutil lmstat -lm -c @localhost`

```
lmutil - Copyright (c) 1989-2015 Flexera Software LLC. All Rights Reserved.
Flexible License Manager status on Mon 4/23/2018 14:03
[Detecting lmgrd processes...]
License server status: 27009@PC1
    License file(s) on PC1:C:\ProgramData\Keysight\Licensing\Licenses\Server\>941784_
1001302725.lic
    PC1: license server UP (MASTER) v11.13.1
```

Verify...

- The license file (.lic) is listed
- The license server is UP
  lmgrd not running? Skip to Test 8: Inspect License Log

Test 7: Keysight license daemon status

Run: `lmutil lmstat -c @localhost -S agileesofd`

Run `lmstat` to see the vendor daemon status.

Windows	`lmutil lmstat -c @localhost -S agileesofd`
Linux	`./lmutil lmstat -c @localhost -S agileesofd`
macOS	`./lmutil lmstat -c @localhost -S agileesofd`

```
lmutil - Copyright (c) 1989-2015 Flexera Software LLC. All Rights Reserved.
Flexible License Manager status on Mon 10/23/2017 14:19
[Detecting lmgrd processes...]
License server status: 27009@PC1
    License file(s) on PC1:
C:\ProgramData\Keysight\Licensing\Licenses\Server\941784_1001302725.lic:
PC1: license server UP v11.13.1
Vendor daemon status (on PC1):
agileesofd: UP v11.13.1
Feature usage info:
Users of b_sigstu_x_lmr:  (Total of 1 license issued;  Total of 0 licenses in use)
```

Verify...

- The vendor daemon (*agileesofd*) is UP.
  There could be several causes of a problem with the vendor daemon. You should consider...
  - Restarting the machine
  - Re-installing the licensing software: See Setting Up Licenses.
  - ...Or proceed to Test 8: Inspect License Log
- The version of *agileesofd* is 6.0 or greater.
  Examine the properties of *agileesofd.exe* to find its version. Versions earlier than 6.0 do not support early return of borrowed licenses.

Test 8: Inspect log files

Inspect the license log files

The license manager (*lmgrd*) and its vendor daemon (*agileesofd*) append text to a log file for most license actions. The log file is a timestamped record of most licensing activities. In addition, PathWave License Manager can create a diagnostic report with additional information.

NOTE Most licensing operations add entries to the log file.

Frequently refresh your editor to see the most recent entries (messages since you opened the log file).

A. Open the log file with your preferred text editor.

- If you are using PathWave License Manager, click Tools > Create Diagnostic Report. This report goes to `C:\ProgramData\Keysight\Licensing\Log` or `/var/log/keysight/licensing/log` or `/Library/Application Support/Keysight/Licensing/Log.`
- If you are using Keysight License Manager 6, find the location of the log file by selecting **Environment** and locating the `AGILEESOFD_SERVER_LOGFILE` . The file name in the Keysight License Manager 6 window is a clickable link to open the log file in a text editor.
- If you are using another tool, try the typical locations below or consult the help for your tool.

Typical locations for log files are:

Windows	`C:\ProgramData\Keysight\Licensing\Log`
Linux	`/var/log/keysight/licensing/log`
macOS	`/Library/Application Support/Keysight/Licensing/Log`

B. Search the log for these keywords to find common problems:

Find...	Problem
EXPIRED	License has expired
agileesofd exited	vendor daemon shut down. (Reason will be described on next line of log file.)
Failed to open the TCP port number in the license.	There is another version of lmgrd running, that needs to be stopped. In certain cases on Linux, lmgrd will refuse to use a port number until the machine has been restarted.
EESOF	Verify that the vendor daemon version is 2018.06 or higher. This will appear as something like: `(agileesofd) EESOF 2018.06 (06/07/2018)`

Test 9: Unexpected background processes

Windows	`tasklist | FIND "lm"`
Linux	`ps -ef | grep lm`
macOS	`ps -ef | grep lm`

Verify:

- There are not any unexpected Flexera software tools running.

Test 10: Repeated entries in license search paths

Examine the `<PRODUCT>_LICENSE_PATH` values. You can find these in PathWave License Manager's Diagnostic Report (**Tools > Create Diagnostic Report**) or on the Environment tab in Keysight License Manager 6.

Verify:

- No `<PRODUCT>_LICENSE_PATH` value includes the same directory or server multiple times.
- No `<PRODUCT>_LICENSE_PATH` value includes invalid directories or servers (for example, outdated entries for license servers that no longer exist).

Repeated or invalid values in these Variables can cause licensing performance problems.

Still having problems?
Restart your machine *or* follow Flexera Communication Problems.

Floating License Problems

NOTE **Consider rebooting the server and or client machine.**
A restart will often quickly and easily resolve transient problems caused by software or hardware changes.

This section provides troubleshooting options that may help you resolve issues with floating licenses. Details are provided below.

- If you see unexpected behavior of borrowed licenses
- Verify the license server
  - Server Test 1: License server log
  - Server Test 2: Is the license server UP?
- Verify the license client
  - Client Test 1: Can the client reach the server?
  - Client Test 2: License server status, as seen from the client
  - Client Test 3: Can the feature be checked out?
  - Client Test 4: Is the remote license server correctly specified?
  - Client Test 5: Clean license folder

If you see unexpected behavior of borrowed licenses

NOTE Keysight recommends that you always use a license management tool or the menus of your Keysight product to borrow licenses. Due to a FlexNet limitation, it is possible for early returns to be attributed to the wrong user if you use the Flex tools (`lmutil lmborrow`) or environment Variable (`LM_BORROW`) .

Verify the license server

Do the following tests on the license server machine.

NOTE The typical directory for FlexNet tools on a license server is:

- `C:\Program Files\Common Files\Keysight\Licensing\Agileesofd` (or `...\bin`)

or wherever you extracted the Keysight License Server files. However, depending on your installed software and your server's history, it may be one of the following:

- `C:\Program Files\Common Files\Keysight\License Server`
- `C:\Program Files\Common Files\Keysight\License Manager 6\bin`

The equivalent Linux paths are located under `/opt/keysight/licensing-daemon/bin`
Under macOS they are located at `/Applications/Keysight/Licensing Daemon/bin`

Server Test 1: License server log

Check the license server's log file for errors or warnings:

Windows	`notepad \ProgramData\Keysight\Licensing\Log\LicenseServer.log`
Linux	`more /var/opt/keysight/licensing/log/LicenseServer.log`
macOS	`more /Library/Application\ Support/Keysight/Licensing/Log/LicenseServer.log`

Server Test 2: Is the license server UP?

Follow these steps to run `lmutil lmstat -a`

A. Log in to the license server machine.

If you do not have permission to use the license server machine, proceed to Verify the license client, below.

B. Open a command line interpreter and change directory to the location for Flexera utilities.

Windows	`cd C:\Program Files\Common Files\Keysight\Licensing Daemon\bin`
Linux	`cd /opt/keysight/licensing-daemon/bin`
macOS	`cd /Applications/Keysight/LIcensing\ Daemon/bin`

C. Use `lmstat` to see the license server status.

Windows	`lmutil lmstat -a`
Linux	`./lmutil lmstat -a`
macOS	`./lmutil lmstat -a`

Example output:

```
lmutil - Copyright (c) 1989-2015 Flexera Software LLC. All Rights Reserved.
Flexible License Manager status on Thu 10/26/2017 13:19
License server status: 27009@server1.com
    License file(s) on computer1.com.com: /var/opt/keysight/licensing/licenses/server/942839_
1001301945.lic:
server1.com: license server UP (MASTER) v11.13.1
Vendor daemon status (on server1.com):
agileesofd: UP v11.13.1
Feature usage info:
Users of b_sigstu_x_lmr:  (Total of 1 license issued;  Total of 0 licenses in use)
```

Verify

- There is only one *lmgrd* (not multiple at different ports)
- license server UP (MASTER)
- *agileesofd*: UP
- The necessary licenses are available for checkout. (Example: Total of 1 license issued; Total of 0 licenses in use)

Take note of the `<port>` and `<server-name>` of the license manager (in this example, `27009@server1.com)`. This will be used for license client tests (below).

To start the server if it is not UP:

Windows	`cd C:\Program Files\Common Files\Keysight\Licensing Daemon\bin` `lmgrd -c C:\ProgramData\Keysight\Licensing\Licenses\Server`
Linux	`cd /opt/keysight/licensing-daemon/bin` `./lmgrd -c /var/opt/keysight/licensing/licenses/server`
macOS	`cd /Applications/Keysight/Licensing\ Daemon/bin` `./lmgrd -c /Library/Application\ Support/Keysight/Licensing/Licenses/Server`

NOTE **`Can't make directory /usr/tmp/.flexlm, errno: 2(No such file or directory).`**

This error occurs if the directory */usr/tmp,* used by the license manager, is missing on your Linux system.
This error doesn't prevent the license manager from checking out licenses.

Solution: Create a symbolic link */usr/tmp* that points to */tmp.* For example:

```
sudo -ln -s /tmp /usr/tmp
```

Similarly, on Windows, you may see a similar error: **`Can't make directory C:\flexlm`**

In this case, you'll need to create or map a C: drive so that the license manager can create the directory.

License server will not start and the debug log shows an error **`Not a valid server hostname, exiting`**

The license server will not start when the server hostname in the license file does not match the server's actual host name.

Solution: If only the server hostname is incorrect, you can manually correct it in the license file by editing the license file in Notepad and changing the server hostname in the `SERVER` line. If the MAC address has also changed, the license file will need to be regenerated with the new information: contact support for a new license file (http://www.keysight.com/find/contactus).

Verify the license client

Do the following tests on the client machine (the machine that needs to use the floating licenses). Different clients may yield different results, depending on configuration, installed software, operating system, etc.

NOTE The typical directory for FlexNet tools on a license server is:

- `C:\Program Files\Common Files\Keysight\License Server`

However, depending on your installed software and your server's history, it may be one of the following:

- `C:\Program Files\Common Files\Keysight\License Manager 6\bin`
- `C:\Program Files\Common Files\Keysight\Licensing\Agileesofd`

The equivalent Linux paths are located under `/opt/keysight/licensing`.

Client Test 1: Can the client reach the server?

Follow these steps to ping the license server:

A. Log in to the license client machine.

B. Open a command line interpreter.

C. Ping the remote license server to ensure it is on the network:

```
ping <server-name>
```

For <server-name>, use the value found on the server in Server Test 2.

Example: `ping server1.site.com`

Verify that **`ping`** can successfully transmit packets from the client to the license server.

NOTE Flexera supports multiple ways of identifying your server. Examples are:

- 156.140.113.7
- server1.site.com
- server1

Client Test 2: License server status, as seen from the client

To run license server diagnostics:

Windows	`cd C:\Program Files\Common Files\Keysight\Licensing Daemon\bin` `lmutil lmdiag -a -c <license-server>`
Linux	`cd /opt/keysight/licensing-daemon/bin` `./lmutil lmdiag -a -c <license-server>`
macOS	`cd /Applications/Keysight/Licensing\ Daemon/bin` `./lmutil lmdiag -a -c <license-server>`

Example: `lmutil lmdiag -a -c server1.site.com`

```
lmutil - Copyright (c) 1989-2015 Flexera Software LLC. All Rights Reserved.
FlexNet diagnostics on Mon 10/30/2017 13:15
-----------------------------------------------------
License file: 27009@server1.site.com
-----------------------------------------------------
"b_sigstu_x_lmr" v2018.1025, vendor: agileesofd, expiry: 1-jan-0
  License server: 156.140.113.7
  floating license  starts: 1-jan-1990,  no expiration date
This license can be checked out
-----------------------------------------------------
```

Verify

- The license server and *agileesofd* are UP
- The licenses are floating licenses and are not in use by other users.
- No errors are reported

Note the port that is in use on the server. You will need this port number for the next test.

NOTE Error: `Can't fetch the requested information!!`

Perform Server Test 2: License Server UP (above).
If the server is running, then FlexNet communications might be blocked. See Flexera Communication Problems.

Client Test 3: Can the feature be checked out?

In some instances, the license server is working, the client setup is correct, licenses are available for use (not in use by others), license versions are correct, and the licenses are not expired, but a license still cannot be checked out. This can be caused by accidental installation of a node-locked license file tied to the host ID of the machine intended to be the floating (network) license server. If you know the name of the feature you need to use, you can specifically check for it by following these steps:

Windows	`cd C:\Program Files\Common Files\Keysight\Licensing Daemon\bin` `lmutil lmdiag -c <port>@<server-name> <feature name to be checked>`
Linux	`cd /opt/keysight/licensing-daemon/bin` `./lmutil lmdiag -c <port>@<server-name> <feature name to be checked>`
macOS	`cd /Applications/Keysight/Licensing\ Daemon/bin` `./lmutil lmdiag -c <port>@<server-name> <feature name to be checked>`

Example: `lmutil lmdiag -c 27009@server1.site.com b_sigstu_x_lmr`

```
lmutil - Copyright (c) 1989-2015 Flexera Software LLC. All Rights Reserved.
FlexNet diagnostics on Mon 10/30/2017 13:15
-----------------------------------------------------
License file: 27009@server1.site.com
-----------------------------------------------------
"b_sigstu_x_lmr" v2018.1025, vendor: agileesofd, expiry: 1-jan-0
  License server: 27009@server1.site.com
  floating license  starts: 1-jan-1990,  no expiration date
This license can be checked out
-----------------------------------------------------
```

Verify that the license can be checked out. This confirms that the server has a valid network license.

Client Test 4: Is the remote license server correctly specified?

In this test, we are verifying that the search path for the selected product's license files has been correctly set.

See What License Management Tool Should I Use? if you are not sure which tool to use for the test. There may be different tools installed for different products.

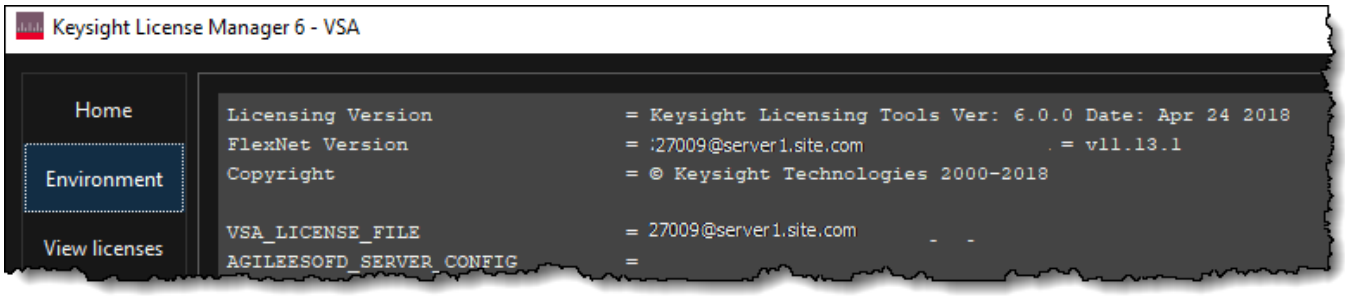
If this product uses PathWave License Manager

A. Start PathWave License Manager
B. Click **Specify a Remote License Server**
C. Choose the product that needs to use the license
D. Verify that the specified port@host matches the value used in Client Test 2.

If this product uses Keysight License Manager 6

A. Check the value of the Variable/registry key

To find this value, run Keysight License Manager 6 and select the **Environment** tab. Locate the entry that corresponds to your Keysight product's name: for example, `VSA_LICENSE_FILE` for the VSA product.



B. Run **`lmutil lmdiag -c`**

Type the value you found in the previous step. Example: **`lmutil lmdiag -c 27009@server1.site.com`**

```
lmutil - Copyright (c) 1989-2015 Flexera Software LLC. All Rights Reserved.
FlexNet diagnostics on Mon 10/30/2017 13:15
-------------------------------------------------------
License file: 27009@server1.site.com
-------------------------------------------------------
"b_sigstu_x_lmr" v2018.1025, vendor: agileesofd, expiry: 1-jan-0
  License server: 27009@server1.site.com
  floating license  starts: 1-jan-1990,  no expiration date
This license can be checked out
-------------------------------------------------------
```

C. Verify...

- The `<port>@<server-name>` value of `<PRODNAME>_LICENSE_FILE` matches values from the previous test (Client Test 2)
- Output from *lmdiag* matches output from the previous test (Client Test 2)

Client Test 5: Clean license folder

Remove expired or invalid license files

Avoid unexpected problems by cleaning up the license folders.

Use `lmdiag` to view the license folders

Windows	`lmutil lmdiag -c C:\ProgramData\Keysight\Licensing\Licenses\Server` `lmutil lmdiag -c C:\ProgramData\Keysight\Licensing\Licenses\Other`
Linux	`lmutil lmdiag -c /var/opt/keysight/licensing/licenses/server` `lmutil lmdiag -c /var/opt/keysight/licensing/licenses/other`
macOS	`lmutil lmdiag -c /Library/Application\ Support/Keysight/Licensing/Licenses/Server` `lmutil lmdiag -c /Library/Application\ Support/Keysight/Licensing/Licenses/Other`

If licenses are found, consider removing them if they are expired or unnecessary.

If you are using .lic files instead of the environment to redirect:

A. Open your license file in your preferred text editor (notepad, gedit, etc) .

B. Find the SERVER line.

The format of the `SERVER` line is:

```
SERVER host hostid [port]
```

Example:

```
SERVER server1.site.com 40b0341a9df1 27009
```

Verify...

- The **`host`** matches the `<server-name>` from Test 1.3 (above)
- The **`hostid`** matches the host ID of the license server machine.
- The **`port`** matches the `<port>` of the license server machine from Test 1.3 (above)

Flexera Communication Problems

Third-party programs may block or interfere with Flexera communications. This section addresses how to resolve these issues. FlexNet communication blockage and/or interference is most typically due to firewalls, and less often to antivirus software; these causes are covered here. However, it can also be caused by VPN tunnel programs or other third-party programs. Blockage/interference from those programs is beyond the scope of this document.

Since firewall and antivirus software are typical causes of FlexNet communication problems, you should investigate these possibilities first. The quickest way to investigate is to temporarily disable your firewall and antivirus software.

NOTE Ensure that disabling any security software (such as firewall or antivirus) is done in such a manner that it does not cause harm to your system. Keysight cannot be held responsible for any harm caused. Keysight recommends that you work with your local IT support professional.

Perform this test by methodically running `lmutil lmstat -c @<server-name>` across different permutations of disabling firewall and antivirus software. When `lmstat` reports a correct license path and reports *lmgrd* and *agileesofd* UP after a firewall or antivirus is disabled, this is a positive test result (implicating the disabled software). The `lmstat` result when there is no communications blockage will be similar to this:

```
lmutil - Copyright (c) 1989-2015 Flexera Software LLC. All Rights Reserved.
Flexible License Manager status on Thu 10/26/2017 13:19
[Detecting lmgrd processes...]
License server status: 27009@server1.com
    License file(s) on server1.com: /var/opt/keysight/licensing/licenses/server/942839_
1001301945.lic:
server1.com: <mark>license server UP (MASTER) v11.13.1</mark>
Vendor daemon status (on server1.com):
agileesofd: UP v11.13.1
```

Below is an example test matrix. Keysight recommends you start by disabling your firewall.

	Client Firewall	Server Firewall	Client Antivirus	Server Antivirus
Test 1	off	on	on	on
Test 2	on	off	on	on
Test 3	off	off	on	on
Test 4	off	off	off	on
Test 5	off	off	off	off

If both firewall and antivirus on server and client machines are simultaneously disabled (in other words, all security software on both license client and server is turned off) and `lmstat` does not give a positive result, then some other third-party software might be causing the issue. Consult with your IT professional.

If, after running the above tests, you identify an interfering firewall and/or antivirus, then you must configure exceptions in these tools so that the FlexNet software functions properly. The steps to do this are covered here; however, due to the wide variation in firewall and antivirus user interfaces and use models, only generic instructions are provided.

1. Edit the current license file on the license server machine. Add a port number for both *lmgrd* and *agileesofd* as shown below:

   ```
   SERVER this_host B8AC6F80C09D 27005
   VENDOR agileesofd PORT=5346
   #
   INCREMENT b_hb_layout_momentum agileesofd 2.9 31-mar-2013 1 VENDOR_STRING...
   ```

   Stop and restart the license server so that these changes can take effect.

2. Firewall and antivirus exclusions:
   a. Firewall: Specify TCP port numbers 27005 and 5346 to be allowed through the firewall on both license server and license client machines.
   b. Firewall and/or antivirus: Configure the following executables as exclusions (both are typically installed in `C:\Program Files\Common Files\Keysight\License Manager 6\agileesofd\`):
   agileesofd.exe
   lmgrd.exe

Port Number Conflicts

All the Keysight *agileesofd* (vendor daemon) licenses on your system must use the same port. If license files have conflicting port numbers, or if some licenses have port numbers and others do not, you will experience licensing failures.

To check and correct the port numbers in your license files, do the following **on the license server machine**.

First list the files in your licensing directories:

Windows	`dir C:\ProgramData\Keysight\Licensing\Licenses\Server` `dir C:\ProgramData\Keysight\Licensing\Licenses\Other`
Linux	`ls -al /var/opt/keysight/licensing/licenses/server` `ls -al /var/opt/keysight/licensing/licenses/other`
macOS	`ls -al /Library/Application Support/Keysight/Licensing/Licenses/Server` `ls -al /Library/Application Support/Keysight/Licensing/Licenses/Other`

Open or view each .lic file to determine whether they all specify the same port value (between 27000 and 27009, inclusive) in their SERVER statements. The format of the SERVER statement is:

```
SERVER host hostid [port] [PRIMARY_IS_MASTER] [HEARTBEAT_INTERVAL=seconds]
```

For example, a license file with port 27009 might have the following SERVER statement:

```
SERVER my_server 17007ea8 27009
```

With no port number specified, the file might look like this:

```
SERVER my_server 17007ea8
```

If your license files have different port numbers, or if not all your license files have port numbers, choose a single port number to use (between 27000 and 27009, inclusive). Then open each license file in your preferred text editor (notepad, gedit, etc.) and modify it to specify that port number.

When you add a new license to a machine, if its port number does not match others already installed, the license installation may fail; or, when you attempt to restart the license server process, it may fail. Either at installation time or when you try to start the server process, you may see an error message explaining that the port numbers do not match. If this happens, edit the port numbers to match, as described above, then try again.

Glossary and Abbreviations

The following table lists commonly used licensing terms and abbreviations in Keysight Licensing.

Term	Definition
Device-locked license	A device-locked license is locked to a device (also referred to as a compact or modular instrument) by a **Model Number-Serial Number** identifier (where the two components are separated by a hyphen) and is used to enable features or capabilities on that device. Note that the former term "module license" has been deprecated.
Dongle	A serialized hardware key that can be attached to a USB port of a computer to limit or lock software access to whoever has the dongle attached to his/her system via the associated Keysight license file. A license dongle always has a unique ID called the FlexNet ID.
Dongle Device Drivers	These drivers must be installed before the dongle device can serve as the locking device for a license. Get them from http://www.keysight.com/find/LicensingUsbDriver.
Expiration Date	Licenses have two expiration dates, namely (1) "license expiration date" which refers to the time limit (if any) that the license can unlock product usage, and (2) "subscription expiration date" which refers to the last active day for the support subscription service. A perpetual or permanent license has no license expiration date, but does have a subscription expiration date. See also the related entry for **Support Subscription** below.
Feature	A licensed capability.
FlexNet Publisher	The third-party licensing technology that the Keysight Licensing scheme is based on.
Floating (Network) License	A license that can be shared among multiple users across a network. It is installed on a license server to fulfill the license requests from one or more client machines. Floating license support is provided for single and multiple servers (including distributed product servers, peak servers, and redundant servers).
Host ID	Specifies the unique ID of a machine. There are various types of host ID, but often the host ID is the MAC address, physical address, or CPU ID of the computer system.
License File	Each Keysight license is stored in a file. The license file must be installed on a PC, instrument, or floating license server before it can be used.
License Pool	A collection of purchased licenses for the same feature or capability.

License Server Manager (*lmgrd*)	One of the components of FlexNet technology. *lmgrd* is the license daemon process running on the license server system to manage vendor daemon processes (such as *agileesofd*) that govern the use of licensed features.
Node-Locked License	Node-locking means that the application can be used only on a specific host or on a host that has a specific dongle physically connected. It allows a single instance of a Keysight product to be used on a single computer with a single display. The user, license, and computer must be physically co-located.
Perpetual vs Permanent	These terms are used interchangeably with regard to licenses that have no license expiration date; *perpetual* is used by Keysight, whereas *permanent* is the term used by FlexNet Publisher,
Transportable License	A transportable license is a type of node-locked license, which can be unlocked from one client host and then locked to another client host, via a network enabled process where the customer interacts with the Keysight Software Manager website.
Support Subscription	A support subscription entitles a customer to receive product support and software updates for no cost during the time the subscription is active. A support subscription has a **Support Expiration Date**.
UDH	User, Display, and Host. Keysight licenses are typically tied to a single user, single display, and single host.
USB Portable License	A license that is locked to a USB hardware key (dongle) so that it can be used on any of a number of computers, but only when the dongle is connected to that computer.
Vendor Daemon (*agileesofd* or *agilent*)	The vendor daemon partners with ***lmgrd*** to perform license usage policing for the licenses issued by Keysight. Keysight Licensing uses the ***agileesofd*** vendor daemon.

Appendix: Migrating from Older Versions of Keysight Licensing

This table describes the differences and equivalencies of Keysight license management tool versions, as well as actions you can take to minimize headaches when using different generations of Keysight licenses together.

PathWave License Manager	Keysight License Manager 6	Keysight Floating License Manager	EDA License Manager	Function
Add License	Home	Configure	Configure	Takes you to the "home" initial screen of the tool.
Add a License File	Add/remove a license on your local machine	Start a floating license server with a license file (or "Change floating license server files" if the server is already running)	Add or replace a license file	Installs a license on the machine where the tool is running and (if necessary) starts a license server process
Specify a Remote License Server	Specify remote license server (s)	Connect to a floating license server	Add or replace a network license server	Allows you to configure where your licensed product will look to find floating licenses.
View Licenses	View licenses	Licenses	Licenses	Displays a list of available licenses.
View Usage	License usage	Usage	Usage	Displays the usage of served licenses.
Tools > Create Diagnostic Report	Environment	Environment	Environment	Displays environment Variables and other system configuration information.
Borrow Licenses (under View Licenses > Floating Licenses)	Borrow license	Not in this tool	Not in this tool	Allows you to use a floating (network) license offline for an extended period of time.
Close button	Close button	I will do this later	Close button	Closes the tool without making any changes to your licensing.
Not in this tool	Not in this tool	Not in this tool	Request additional licenses	Takes you to the Keysight Software Manager web site.

Not in this tool	Not in this tool	Not in this tool	Change the default product license	When there are multiple licenses available for the same product/feature, but in different bundles, this option allows you to choose which one is preferred.

This information is subject to change without notice.
© Keysight Technologies 2000-2022
Edition 3.4, August 2022, November, 2022
USA

5951-5739
www.keysight.com