FLEXERA SOFTWARE™
FlexNet Publisher®

FlexNet Publisher 2016 R2 (11.14.1)
Release Notes

December 2016
Revision 00

Note • *These release notes are not cumulative. If you are upgrading from a release other than the most recent release, consult the release notes that accompany the intermediate releases. You can access the release notes archive from Flexera Software's Product and License Center:*
https://flexerasoftware.flexnetoperations.com.

New Features

FlexNet Publisher 2016 R2 (11.14.1) includes the new features and enhancements in the following sections:

- FlexNet Licensing Service, Virtualization and Performance Improvements
- Extracting client HostID from vendor daemon (VD) callbacks

FlexNet Licensing Service, Virtualization and Performance Improvements

Virtualization detection has previously been performed at the time of the first checkout against a job. As virtualization detection techniques have been incrementally added across FlexNet Publisher releases, this has resulted in a cumulative performance degradation in first-time checkout latency for a job in Linux and Windows platforms (FNP-11324). Consequently, the design change is to have all virtualization attributes extracted and cached via a separate, continuously running process. These changes were delivered for Windows in 11.14.0.1 with modifications to the FlexNet Licensing Service. The related Linux changes are delivered in this release. On Linux, the FlexNet Licensing Service comprises the historic FlexNet Licensing Service executable and a new daemon, the FlexNet Licensing Service daemon. The daemon is launched by the FlexNet Licensing Service executable.

The first-time checkout performance now approximates to that of the FlexNet Publisher 11.8 release. As a result of this change, virtualization detection now only occurs if the FlexNet Licensing Service is installed (FNP-14450).

For producers who want to use virtualization features, best practice is to have the FlexNet Licensing Service started automatically on OS boot, so that virtualization attribute extraction is complete ahead of a first-checkout, ensuring a performant licensing experience. The installanchorservice utility now implements this best practice (Windows only).

The high-level summary for certificate-only producers who do not use FlexNet Publisher virtualization features is that installation of the FlexNet Licensing Service is not required in order to obtain first-checkout performance improvements.

Certificate-only applications have historically not needed to install the FlexNet Licensing Service. While good reasons for installing the FlexNet Licensing Service even for certificate-only applications accumulate (for example, it is needed for the vendor daemon VM Generation ID "nag" message feature), the FlexNet Licensing Service is still unnecessary for certificate-only applications that *do not use virtualization features*. Therefore, in certificate-only applications, installing the FlexNet Licensing Service effectively becomes a switch for enabling virtualization detection.

Note • Future versions of FlexNet Publisher are likely to add further reasons for installing the FlexNet Licensing Service (notably for hostid management), to the point where the FlexNet Licensing Service will inevitably become a required component for certificate-only applications.

This design change requires the FlexNet Licensing Service to regularly poll the system to update virtualization data. Therefore, the FlexNet Licensing Service now runs continuously, whereas previously it would shut down after a period of inactivity. The virtualization poll interval is not configurable, and Flexera Software reserves the right to change it in the future (FNP-14727).

When the Linux FlexNet Licensing Service daemon is not installed and an operation occurs that requires it, a descriptive error is displayed (FNP-15523). For example:

```
./lmhostid -ptype VM -uuid
```

results in

```
lmhostid: The VM Host ID is not available. (-215,14704) - The FlexNet Licensing Service
does not appear to be running.
```

Virtualization behaviour without the FlexNet Licensing Service

Without the FlexNet Licensing Service, the following virtualization behavior now occurs:

- SERVER line hostid keyword VM_UUID is not extracted: the vendor daemon will therefore shut down if this hostid is used when the FlexNet Licensing Service is not installed on the server.

- `lc_virtualstatusget` returns the pre-existing error code -1 instead of 0 (physical) or 1 (virtual).

- `lc_get_attr` (LM_A_VM_FAMILY or LM_A_VM_NAME) returns a null attribute string.

- The server log (SLOG) virtualization entry reports the virtualization status as "Not determined".

- `ls_allow_vm` vendor variable: if the server does not have the FlexNet Licensing Service installed, the behavior is as if the server were on a physical platform.

- VM_PLATFORMS license file keyword: the license server treats clients without the FlexNet Licensing Service installed as physical.

Note • VM_PLATFORMS and `ls_allow_vm` *are first-generation virtualization 'detect-and-deny' features, which now have little value, and are deprecated.*

Producers can perform a pre-emptive check for the FlexNet Licensing Service in their own applications, via the new `lc_fnpservice_present(lm_job)` API, supported on Linux and Windows, which returns a positive integer if the FlexNet Licensing Service is installed (FNP-15525).

Related improvements

While OpenStack is not a tested environment, it does emulate the Amazon EC2 detection interface, by supporting connections to http://169.254.169.254/latest/meta-data/. The OpenStack implementation of this interface is however not optimal, meaning the node responsible for routing these requests can become overloaded if there are large numbers of processes making them (FNP-14059). Moving virtualization detection to the FlexNet Licensing Service limits the number of metadata requests that originate from FlexNet Publisher-based applications running on a machine, improving this situation.

FlexNet Licensing Service on Windows

License administrators administering certificate-only license servers that use virtualization features now need to install the FlexNet Licensing Service. Additionally, when installing the license server as a Windows service, a start-permission DACL needs to be applied to the FlexNet Licensing Service. This allows the

license-server-service to start the FlexNet Licensing Service. This can be done in lmtools by selecting the **FlexNet Licensing Service Required** checkbox, which applies the DACL to a pre-installed FlexNet Licensing Service. lmadmin applies the DACL automatically when installing itself as a service, provided the FlexNet Licensing Service has been pre-installed.

Producers must ensure that the FlexNet Licensing Service is installed before configuration of the license server as a service; neither lmadmin nor lmtools attempt installation of the FlexNet Licensing Service.

Related improvements

In the presence of some anti-virus systems such as Kaspersky or AVG, queries to link-local addresses (169.254.*.*) can result in a WSACleanup delay. This manifested in FlexNet Publisher as a first-time checkout delay of up to 90 seconds. Now, if the FlexNet Licensing Service is set to start automatically, this first-checkout delay is not seen from approximately two to three minutes after OS boot (FNP-14338).

FlexNet Licensing Service on Linux

On Linux, the FlexNet Licensing Service is installed by running `install_fnp.sh` (trusted storage users), or `install_fnp.sh --cert` (certificate-only users). This shell script configures the FlexNet Licensing Service executable to run as a root-privilege setuid process. As the FlexNet Licensing Service daemon needs to run continuously, a further installation step is required to ensure it is started a boot time. Since the FlexNet Licensing Service daemon does not need to run with root privilege, it can be started by adding the following line to a nominated user's crontab:

```
@reboot /usr/local/share/FNP/service64/11.14.1/FNPLicensingService -r 2>&1 >/tmp/fnpd.log
```

Notes

- For the i86_lsb FlexNet Licensing Service daemon, the path is `/usr/local/share/FNP/service/11.14.1/FNPLicensingService`.

- The machine's administrator is free to redirect output as required.

- The machine's administrator may want to add an additional line to the crontab to run the above command at regular intervals to ensure that if the FlexNet Licensing Service daemon gets stopped for some unexpected reason, it will be restarted by the *crond*. The FlexNet Licensing Service daemon itself ensures there is never more than one instance running.

- Typical messages output on running the startup command are "Licensing Service daemon activated" and "Licensing Service daemon already active".

- Rather than using cron, administrators may want to add a boot-script for the FlexNet Licensing Service daemon. The following commands are required:

  To start the FlexNet Licensing Service daemon

  `/usr/local/share/FNP/service64/11.14.1/FNPLicensingService -r`

  To stop the FlexNet Licensing Service daemon

  `/usr/local/share/FNP/service64/11.14.1/FNPLicensingService -k`

Updates from 11.14.0 to 11.14.1

The following table summarises changes in the FlexNet Licensing Service component from 11.14.0 to 11.14.1:

Table 1 • Changes in the FlexNet Licensing Service

	FlexNet Licensing Service 11.14.0	FlexNet Licensing Service 11.14.1
Component Type	setuid executable	• setuid executable • user-privilege daemon
Privilege requirement	Root	Root for setuid executable, user for daemon
Version coupling	FlexNet Publisher version tightly coupled to FlexNet Licensing Service version: FlexNet Publisher 11.14.0 requires FlexNet Licensing Service 11.14.0.	Only the latest FlexNet Licensing Service daemon will be active on a system. Being backwards compatible, it will serve all earlier FlexNet Publisher client versions.

Extracting client HostID from vendor daemon (VD) callbacks

The vendor-defined hostid and client MAC address (aka ETHER) hostid can now be extracted from the vendor daemon's checkout filter (`ls_outfilter`) and other callbacks (`ls_outod_callback`, `ls_inod_callback`, `ls_infilter`, `ls_incallback`) by means of two new server-side attributes: LS_ATTR_CLIENT_HOSTID_VENDOR and LS_ATTR_CLIENT_HOSTID_ETHER, see *machind\ls_attr.h* (FNP-11450, FNP-14211).

The ls_co_ex.c advanced toolkit example demonstrates extraction of both MAC address(es) and vendor-defined hostid of the client requesting feature checkout, via the `s_get_client_hostids` sample function.

This feature was designed to work with old FlexNet Publisher clients; the oldest tested is v11.12.1. A consequence of this design decision is that a new vendor daemon callback—`ls_client_hostid_callback`—needs to be implemented in a vendor daemon where client hostids are to be extracted in a callback such as `ls_outfilter`. `ls_client_hostid_callback` specifies which client hostids are required (a sample can be found in `examples\advanced\ls_co_ex.c`). The callback ensures that additional message exchanges required to retrieve client hostids occur before `ls_outfilter` is executed. One limitation is that clients performing an early return from a borrowed license will not have their hostids available in checkin callbacks ls_infilter & ls_incallback (FNP-15363).

Producers should be aware that using `ls_client_hostid_callback` increases the number of messages between client and vendor daemon during checkout. In addition, since a client may have multiple MAC address hostids, the server will retrieve up to five from each client. Therefore, if both hostids are specified, a maximum of six additional round-trips occur between the client and vendor

daemon on a client's first checkout. This will negatively affect both vendor daemon scalability and client first-checkout performance. Producers are therefore advised to perform their own performance and scalability testing when using this feature.

Security Updates

OpenSSL Upgrade

OpenSSL has been upgraded from version 1.0.1j to 1.0.2h in lmadmin and the FNPCommsSoap and libFNP shared objects (FNP-14030).

OpenSSL is linked dynamically on all lmadmin platforms except AIX, where it remains statically linked. FNPCommsSoap and libFNP statically link OpenSSL.

The latest OpenSSL shared objects shipped in the lmadmin folder are:

Linux and Solaris

- libcrypto.so.1.0.0

- libssl.so.1.0.0

Mac OS X

- libcrypto.1.0.0.dylib

- libssl.1.0.0.dylib

Windows

- ssleay32.dll

- libeay32.dll

The upgrade to OpenSSL 1.0.2 is partial: a binary search of lmadmin will yield a "1.0.1" OpenSSL version string. This is because lmadmin's embedded Apache webserver has not yet been rebuilt with 1.0.2 OpenSSL headers. The upgrade of OpenSSL will be completed in a future release (FNP-15454).

Notes for Non-Windows

The OpenSSL convention for naming of non-Windows shared objects is to embed the compatibility version (1.0.0) and not the library version (1.0.2) in the filename. The openssl library version can be obtained by calling the SSLeay_version () API.

It may be necessary to set (DY)LD_LIBRARY_PATH to the lmadmin installation directory when installing lmadmin.

Uploading or importing potentially malicious license files

This issue was originally raised as "uploading batch files as license files" (FNP-14465). Previously, it was possible to have lmadmin import a potentially malicious license file (such as one with a .bat extension on Windows) that could separately be run by an adversarial user after being imported. Additionally, in the case of Windows, the act of opening a batch file runs the file, meaning that the Windows vendor daemon

could also inadvertently run the batch file masquerading as a license file. Whilst the impact of this is limited, since the vendor daemon runs at user-level privilege, the following behavior changes have been made:

On Windows: lmadmin will perform file extension checks on license files it imports. All imported license files must be valid; otherwise the entire import fails. The following extensions (checked with case insensitivity) are first checked in a whitelist: '.dat', '.lic', and '.txt'. Extensions not found in the whitelist but found in a blacklist (containing '.bat' amongst other disallowed extensions) will fail to import with an "Invalid License File" message. Best-practice for producers is to enforce use of whitelisted extensions for license files.

On non-Windows: lmadmin will check for execute permission on the license file. If execute permission is found, and lmadmin fails to remove the execute permission, the license file will fail to import.

Neither the whitelist nor the blacklist is configurable.

For consistency, lmgrd will follow similar behavior, using the same white and blacklists as lmadmin. For example, a command such as `lmgrd -c counted.bat` (on Windows) will result in a "Cannot find license file" message in the server log. On non-Windows, this is allowed provided there is no execute permission on counted.bat, or the execute permission can be removed by lmgrd.

Other resolved lmadmin security vulnerabilities

A DoS vulnerability via a specially crafted message to lmadmin was resolved (FNP-14216).

lmadmin help html is no longer cacheable (FNP-10406).

Cookies sent by lmadmin over SSL now have the secure attribute set (FNP-10402).

FlexNet Licensing Service security vulnerability

Previously, when running the Microsoft Attack Surface Analyzer against the FlexNet Licensing Service when performing trusted storage operations, the following security error against multiple registry CLSID entries was generated:

```
The COM control <CLSID> is vulnerable to tampering by multiple non-administrator accounts.
```

This vulnerability has been removed by ensuring registry anchors are now written with the user write privilege removed (FNP-11510).

VCG Updates

Previously, VCG could not be built with Visual Studio 2015, but now can. Oldest tested compiler for VCG is now Visual Studio 2010 (FNP-15122).

i86_lsb VCG is now compatible with XFS filesystems (FNP-15047).

Note • The version of VCG delivered with FlexNet Publisher is now 16.2.1.0.

Dongle Updates

Legacy FLEXID9 HASP4 dongle support

In FNP 11.14.0.0, a client side attribute, LM_A_FLEXID9_HASP4_SUPPORT, and equivalent server-side attribute, ls_flexid9_hasp4_support - set in lsvendor.c, were introduced. By default, these attributes are set to 0 (off), meaning that FLEXID9 hostid is not by default extracted from legacy HASP4 dongles. These attributes were introduced to fix a FLEXID9 latency issue that occurs only with the legacy third-party API required for extracting the hostid from HASP4 dongles (FNP-11619). To continue supporting HASP4 dongles, producers should set these attribute values to 1, but Flexera Software's recommendation is that producers gradually replace HASP4 dongles with the newer HASP HL dongles.

This information was omitted from the 11.14.0.0 release notes and is included here for completeness.

Updated Wibu dongle drivers

Wibu dongle drivers have been updated on Windows, Linux, and Mac OS X platforms from v6.30 to v6.32 (FNP-14459).

Unfortunately, Windows FlexNet Publisher versions earlier than 11.14.0.1 fail to extract FLEXID10 with v6.32 or later dongle drivers. This is because FlexNet Publisher verifies the code signature of the dll provided by Wibu, in order to prevent dll spoofing exploits. Part of that verification involves checking the base issuer of the certificate, which has changed from Verisign (v6.30 and earlier) to Symantec (v6.32 and later). Therefore, an upgrade of the Windows Wibu driver to v6.32 necessarily requires an upgrade of FlexNet Publisher, client or server (FNP-15166).

Prior to release 6.32 of Wibu, Wibu uses libwklin.so and libwklin64.so on Linux. However, starting from release 6.32, Wibu uses libwklin64.so.6 and libwklin.so.6 instead, although libwklin.so and libwklin64.so are also installed. To use an older Licensing Toolkit with the latest drivers, you must copy libwklin.so and libwklin64.so to FLEXID_LIBRARY_PATH.

 Latest kit with older Wibu shared object libwklin.so and libwklin64.so will not work.

The FLEXID10 dongle driver updates are summarized in the following table:

Table 2 • FLEXID10 dongle driver updates

Platform	FlexNet Publisher 11.14.0	Shared objects packaged in 11.14.0	FlexNet Publisher 11.14.1	Shared objects packaged in 11.14.1
Windows	**32-bit:** FLEXID10_Windows_v6_30_i686.zip (Version 6.30) **64-bit:** FLEXID10_Windows_v6_30_x64.zip (Version 6.30)	**32-bit:** wkWin32.dll (Version 6.12) **64-bit:** wkWin64.dll (Version 6.12)	**32-bit:** FLEXID10_Windows_v6_32_i686.zip (Version 6.32) **64-bit:** FLEXID10_Windows_v6_32_x64.zip (Version 6.32)	**32-bit:** wkWin32.dll (Version 6.12) **64-bit:** wkWin64.dll (Version 6.12)

Table 2 • FLEXID10 dongle driver updates

Platform	FlexNet Publisher 11.14.0	Shared objects packaged in 11.14.0	FlexNet Publisher 11.14.1	Shared objects packaged in 11.14.1
Linux	**32-bit:** `WkRt-Lin-6.30.1454-500.i386.rpm` (Version 6.30) **64-bit:** `WkRt-Lin-6.30.1454-500.x86_64.rpm` (Version 6.30)	**32-bit:** `libwklin.so` (Version 6.30) **64-bit:** `libwklin64.so` (Version 6.30)	**32-bit:** `WkRt-Lin-6.32.1504-500.i386.rpm` (Version 6.32) **64-bit:** `WkRt-Lin-6.32.1504-500.x86_64.rmp` (Version 6.32)	**32-bit:** `libwklin.so.6` (Version 6.32) **64-bit:** `libwklin64.so.6` (Version 6.32)
MAC	**Universal:** `FLEXID10_OSX_6.30.502.dmg` (Version 6.30)	**Universal:** `libwkextmac.dylib` (Version 6.30)	**Universal:** `FLEXID10_OSX_6.32.500.dmg` (Version 6.32)	**Universal:** `libwkextmac.dylib` (Version 6.32)

Updated FLEXID9 dongle drivers

The FLEXID9 dongle drivers have been upgraded to the latest version 7.50 on Windows, Linux, and Mac OS X platforms. The shared libraries have also been upgraded on all these platforms to v7.50.

The FLEXID9 dongle driver updates are summarized in the following table:

Table 3 • FLEXID9 dongle driver updates

Platform	FlexNet Publisher 11.14.0	Shared objects packaged in 11.14.0	FlexNet Publisher 11.14.1	Shared objects packaged in 11.14.1
Windows	**32-bit:** `FLEXID9_Windows_v7_41_i686.zip` (Version 7.41) **64-bit:** `FLEXID9_Windows_v7_41_x64.zip` (Version 7.41)	**32-bit:** `haspsrm_win32.dll` (Version 7.4) **64-bit:** `haspsrm_win64.dll` (Version 7.41)	**32-bit:** `FLEXID9_Windows_v7_50_i686.zip` (Version 7.5) **64-bit:** `FLEXID9_Windows_v7_50_x64.zip` (Version 7.5)	**32-bit:** `haspsrm_win32.dll` (Version 7.5) **64-bit:** `haspsrm_win64.dll` (Version 7.5)

Table 3 • FLEXID9 dongle driver updates

Platform	FlexNet Publisher 11.14.0	Shared objects packaged in 11.14.0	FlexNet Publisher 11.14.1	Shared objects packaged in 11.14.1
Linux	**32-bit and 64-bit:** `aksusbd-redhatsuse-2.5.1.tar.gz` (Version 2.5.1)	**32-bit:** `libhasp_linux_i686.so` (Version 7.1) **64-bit:** `libhasp_linux_x86_64.so` (Version 7.1)	**32-bit and 64-bit:** `aksusbd-redhatsuse-7.50.tar.gz` (Version 7.5)	**32-bit:** `libhasp_linux_i686.so` (Version 7.5) **64-bit:** `libhasp_linux_x86_64.so` (Version 7.5)
MAC	**Universal:** `FLEXID9_OSX_V6_65.dmg` (Version 6.65)	**Universal:** `hasp_darwin.dylib` (Version 7.1)	**Universal:** `FLEXID9_OSX_V7_50.dmg` (Version 7.5)	**Universal:** `hasp_darwin.dylib` (Version 7.5)

FLEXID9 and Windows Server 2016

At the time of this release, Gemalto has not released official drivers for Windows Server 2016. However, the current version (see above) is compatible with Windows Server 2016 (FNP-15886).

Platform Updates

11.14.1 Updates

Windows

Windows Server 2016 has been tested in this release.

Previously, any application that is prepped (that loads libFNP.dll) might have crashed when performing cleanup or shutdown operations if run under Windows Application Verifier. This applied to both prepped clients and a prepped vendor daemon on shutdown. This issue no longer occurs (FNP-10728).

Linux

We test recent versions of SUSE Enterprise Linux and Red Hat Enterprise Linux (see C/C++ Toolkits for specific versions). We do not test other Linux distributions, but would consider as minimum requirements for potential FlexNet Publisher compatibility on a Linux distribution the following: LSB 4.0 compliance and GLIBC-2.7 and Kernel 2.6.27 (FNP-15725).

Mac OS X

FlexNet Publisher has now been tested on Mac OS X 10.12.

Integrated Products and Tested Versions

Table 4 • Integrated products and their tested versions

Product	Tested Version
FlexNet Operations	FlexNet Operations 2016 R3 16.3.0
FlexNet Manager for Engineering Applications	FlexNet Manager for Engineering Applications 2016 R1 (15.6.0)
FlexNet Operations Cloud	FlexNet Operations Cloud (2016 R4)

11.14.0 Updates

Windows

- Windows 10 has been tested in this release.

- The Microsoft Edge browser has been tested with lmadmin.

- The Visual Studio 2015 compiler has been tested.

- Publishers who build with VS2015 and the Windows 10 Software Development Kit (even after linking statically) may have to redistribute the universal CRT (api-ms-win-crt-stdio-l1-1-0.dll) - refer to this KB article.

Linux

We test recent versions of SUSE Enterprise Linux and Red Hat Enterprise Linux (see C/C++ Toolkits for specific versions). We do not test other Linux distributions, but would consider as minimum requirements for potential FlexNet Publisher compatibility on a Linux distribution the following: LSB 4.0 compliance and GLIBC-2.4 and Kernel 2.6.16 (FNP-15725). i86_lsb is now stable on XFS filesystems (FNP-10296).

Integrated Products and Tested Versions

Table 5 • Integrated products and their tested versions

Product	Tested Version
FlexNet Operations	FlexNet Operations 2016 (16.11.0)
FlexNet Manager for Engineering Applications	FlexNet Manager for Engineering Applications (15.5.0.7)
FlexNet Operations Cloud	FlexNet Operations Cloud (June 2015)

11.13.1 Updates

Windows

- Windows 10 Technical Preview has been tested in this release.

- The Microsoft Edge browser (technical preview) has been sanity tested with lmadmin.

- The Visual Studio 2015 compiler has not been tested. It will fail to build kit makefiles, and there is no workaround. Visual Studio 2015 compatibility will be delivered in a future release (FNP-10512).

- Any application that is prepped (that loads libFNP.dll) may crash when performing cleanup or shutdown operations if run under Windows Application Verifier. This applies to both prepped clients and a prepped vendor daemon on shutdown (FNP-10728).

Linux

- SUSE Enterprise Linux 12 has now been tested.

- We test recent versions of SUSE Enterprise Linux and Red Hat Enterprise Linux (refer C/C++ Toolkits for specific versions). We do not test other Linux distributions, but would consider as minimum requirements for potential FlexNet Publisher compatibility on a Linux distribution the following: LSB 4.0 compliance and GLIBC-2.4 and Kernel 2.6.16.

- Red Hat Enterprise Linux 7, for the first time in RHEL releases, defaults to the XFS file-system instead of the historical 'ext' file system family. Producers' FlexNet Publisher 32-bit Linux processes may exhibit instability when interacting with an XFS file system, especially when more than 2^32 inodes are present. Flexera Software recommends avoiding running 32-bit FlexNet Publisher applications which interact with XFS file systems. (FNP-10269)

LSB 4.0 Compliance Issues

SUSE Enterprise Linux 12 and LSB

On some recent Linux updates, such as SUSE Enterprise Linux 12, the LSB component is not offered as part of the tested distribution. Components in FlexNet Publisher such as lmgrd require the LSB loader. If this is not present, lmgrd will fail to run with a 'file not found' error (FNP-11338, FNP-11353).

From 11.13.1.3, the install_fnp.sh script will issue a warning if LSB is not detected on the host. Additionally, this script supports a new -***nolsb*** parameter, which sets up the symlinks from the LSB loader to the native loader, allowing components such as lmgrd to run (FNP-11338).

LSB 4.0 Compliance Notes for FlexNet Publisher Libraries

Publishers who wish to obtain LSB compliance for applications which have dependencies on FlexNet Publisher static and dynamic libraries should note that all FlexNet Publisher static libraries are LSB compliant except for liblmgr_dongle.a. Applications that need to be fully LSB compliant should link against the stub versions of the dongle library (FNP-9293, FNP-9021).

General LSB 4.0 compliance notes

This release of FlexNet Publisher has the following Linux Standard Base (LSB) compliance limitations:

- LSB checks are limited to those performed by running the LSB appchecker.

- FlexNet Publisher is not validated against the ABI specified by any LSB version (FNP-9024).

- lmutil links in the non-LSB compliant liblmgr_dongle.a.

- The updated Wibu dongle libraries delivered in FlexNet Publisher 11.13.1 are not LSB compliant. Therefore, Linux applications which use the FLEXID10 hostid may not be compatible with Linux distributions not tested by Flexera Software (FNP-11044).

- LSB 4.0 appchecker issues

The following are the errors generated by the LSB 4.0 appchecker against 11.13.1 i86_lsb GA kit.

Table 6 • LSB 4.0 appchecker errors

Component	LSB 4 Failure or Warning
install_fnp.sh	'chattr', 'rpm', 'which' and 'lsmod' are not included in LSB 4.0.
lmadmin-i86_lsb-11_13_0_0.bin (lmadmin installer)	'isNumeric' and 'uncompress' are not included in LSB 4.0.

Table 6 • LSB 4.0 appchecker errors

Component	LSB 4 Failure or Warning
multiple	Warning: the following interfaces are deprecated in LSB 4.0: gethostbyaddr; gethostbyname; gethostbyname_r; and strerror_r (FNP-9498).

Integrated Products and Tested Versions

Table 7 • Integrated products and their tested versions

Product	Tested Version
FlexNet Operations	FlexNet Operations 2014 (12.11.0)
FlexNet Manager for Engineering Applications	FlexNet Manager for Engineering Applications (15.5.0.7)
FlexNet Operations Cloud	FlexNet Operations Cloud (June 2015)
License Generator Toolkit	License Generating Toolkit (11.10.0)

11.13.0 Updates

Windows

Windows 10 Technical Preview (OS Version: 6.4.9841 N/A Build 9841) has been tested in this release (see Known Issues).

Discontinuation of Platforms

The following legacy platforms are no longer available:

- Linux PowerPC (ppc_lsb and ppc64_lsb)
- Linux Itanium (it64_re4)
- Windows Itanium (it64_n)
- Irix (sgi64_u6)

Discontinuation of IPv4-Limited Kits

FlexNet Publisher's dual-stack kits are now fully functional for mixed IPv4 and IPv6 environments. Therefore, kits which are restricted to IPv4 functionality are no longer available.

Resolved Issues

This release of the FlexNet Publisher Licensing Toolkit resolves the following issues. (Numbers in parentheses indicate the Flexera Software issue reference number.)

Resolved issues include the following areas:

- General Issues
- Resolved Virtualization Issues
- Resolved lmadmin, lmgrd, and lmtools Issues
- Java Kit Resolved Issues
- Resolved Issues Specific to License–Based Licensing
- Resolved Issues Specific to Trusted Storage–Based Licensing

General Issues

The following general issues have ben resolved.

lmcrypt fails when '.' is in the folder path

Previously, if '.' was in the folder path of a license file to be crypted, lmcrypt would fail because it tried to create its temporary file in the folder path truncated at the '.' character, which either does not exist or does not have write permission. This has been resolved by ensuring that lmcrypt creates temporary files in the same folder as the uncrypted license file (FNP-11886).

Windows lmstrip

Previously, Windows lmstrip would not obfuscate sufficient symbols to allow linking of two static libraries from different producers, both of which link to FlexNet Publisher libraries, into the same application. This has been resolved by introducing a `-t` option on Windows lmstrip, along with the newly packaged `lmstrip-symbol-map.xml` file (FNP-10208).

Example usage

`lmstrip -t lmstrip-symbol-map.xml lmstrip-symbol-new.xml producer_lib_linked_with_lmgr.lib`

For more information, see the *Development Environment Guide*, "lmstrip for Windows" section.

Detection whether FlexNet Licensing Service is installed

In previous version of the Linux toolkit for FlexNet Publisher, it was not possible to detect whether the FlexNet Licensing Service was installed. In FlexNet Publisher 2016 R2 (11.14.1), the function `lc_fnpservice_present` can be used to detect whether the FlexNet Licensing Service is present. This API is supported on Windows and Linux (FNP-10860).

Change in error code displayed when the FlexNet Licensing Service is older than the FlexNet Publisher client (Windows only)

A version of the FlexNet Licensing Service greater than or equal to that of the FlexNet Publisher activation library (<vendor>_libFNP.dll) is required. If the FlexNet Licensing Service is too old, calling flxActCommonLibraryInit or flxActCommonHandleOpen should cause the system error code LM_TSSE_SERVICE_TOO_OLD (10103, refer FlxActSystemError.h) to be set. In 11.14.0.1, this behavior had regressed; these functions failed, but this system error code was not set (FNP-15034). This has now been resolved.

Windows Visual Studio 2015 compatibility

Visual Studio 2015 compatibility was introduced in 11.14.0. The following issues have been resolved:

- Using mixed MD/MT flag variations would result in linker errors. This has been resolved by building the VS2015 compatibility library, libredir_std.lib, with the /Zl (Omit Default Library Name) flag (FNP-14847).

- makefile(.act) will now build with the DEBUG=1 option (FNP-14655).

- Warning C4311 is no longer observed when building makefile(.act) (FNP-14414).

- An instability issue when building—with Visual Studio 2015—a FlexEnabled application that uses dongles (links with lmgr_dongle.lib) has been resolved (FNP-15295).

Resolved Virtualization Issues

Inconsistent results from LM_A_VM_NAME and LM_A_VM_FAMILY

Previously, calling lc_get_attr (LM_A_VM_NAME or LM_A_VM_FAMILY) could produce inconsistent results. This was first seen when testing from a Windows VM on VMware ESXi, but could have manifested with other virtualization stacks (FNP-15007).

AMZN_EIP hostid

Support for AMZN_EIP on the SERVER line is reintroduced in this release (FNP-11880, FNP-15132).

Note • For the time being, AMZN_EIP remains supported without the FlexNet Licensing Service.

Resolved lmadmin, lmgrd, and lmtools Issues

lmgrd behavior if port number is greater 65535

Previously, lmgrd would start when a port number > 65535 was specified on the SERVER line of the license file. Now, lmgrd exits with an "out of valid port range" server log message (FNP-14795).

Selecting stop server on lmtools

Previously, if two license servers were run as Windows services on two different hosts, and the <VENDOR>_LICENSE_FILE environment variable contained paths to both servers, then selecting Stop Server from lmtools for the service on the local host would inappropriately also stop the service running on the remote host (FNP-14797). Now, lmtools will only stop services running on the local host. The only exception to this rule is that lmtools continues to allow stopping of the two remote nodes of a triad of servers.

However, a bug remains where lmtools is used to attempt to stop one of multiple services running on the same host: additional servers not selected to be stopped but running in the default 27000-27009 port range may also be stopped (FNP-15633). Best practice (which avoids this bug) is to run one license server per host; this is easily achieved using virtual machines. An alternative is to use the workaround of having all the license server services on the host run on non-default ports (outside 27000-27009).

Lmtools display of system information

Lmtools now displays (on the **System Settings** tab) both IPv4 and IPv6 addresses, if available (FNP-14234). The CPUID and disk volume serial number are no longer displayed, because they now have no licensing value (FNP-14425).

Running the license server as a service and upgrading FlexNet Licensing Service

If lmgrd or lmadmin is configured as a Windows service, and is dependent on the FlexNet Licensing Service, then one step involved in the configuration is to apply a DACL to the FlexNet Licensing Service which provides permission for the license-server-as-a-service to start the FlexNet Licensing Service. This is done transparently by lmadmin when installing itself as a service, or by lmtools when installing lmgrd as a service, if the **FlexNet Licensing Service Rquired** checkbox is selected. Additionally, the **installs.c** sample provides sample code for applying the DACL. Previously, this DACL was lost when the FlexNet Licensing Service was upgraded. For lmadmin, this manifested as a disappearance of previously available trusted storage licenses. Now, an upgrade of the FlexNet Licensing Service via fnpActSvcInstallWin (as used in the installanchorservice utility) or fnpActSvcInstallForMSI will retain the DACL from the original FlexNet Licensing Service (FNP-11887).

License server Windows service paths may now contain spaces

Previously, when the license server was installed as a Windows service, the service path was not quoted. This meant that service paths containing spaces would not install correctly. Now, installs.exe, lmtools.exe, and lmadmin.exe all quote the service path (FNP-14814).

Java Kit Resolved Issues

Supplying directory as a license source for a Java client

Supplying a directory as a license source works once again, as evidenced by running a command like the following (FNP-14021):

```
java BasicExample f1 1.0 "<license file folder>"
```

Resolved Issues Specific to License–Based Licensing

Calling lc_checkin with flag LM_CI_ALL_FEATURES no longer causes crash

A crash could occur when calling lc_checkin with the flag LM_CI_ALL_FEATURES using the 11.14.0 or 11.14.0.1 toolkit on Windows 10. This has been resolved (FNP-15481).

Behavior when a long-running client's floating license expires

Two improvements have been made in this release for long-running clients:

- Previously, when a client had checked out a served *uncounted* license, and that license expired, the client would (correctly) enter a reconnection state, but would fail to check out any new license that had been made available in the license server via a reread mechanism since the original checkout, and would therefore inappropriately shut down. Now, the client automatically checks out the new license. The fix affects only the license server. (FNP-14750)

- Previously, when a client had checked out a served *counted* license, and that license expired, the client would (incorrectly) fail to enter a reconnection state—that is, it would continue to run with the expired license. Now, the client correctly enters a reconnection state, and will check out a new license if one is available, otherwise it will shut down. The fix affects only the license server. (FNP-14446)

Please also see the section Known issues when a long-running client's floating license expires on page 23.

FreeBSD license server connection limit

Previously, a FreeBSD vendor daemon would not support more than (approximately) one thousand client connections. Now, up to ten thousand client connections are supported, with a theoretical maximum of approximately sixty-five thousand connections (FNP-15220).

Note • FreeBSD is a limited availability and a functional-restricted platform.

3-Server enhancement—determining if a license server is master

The new API `ls_get_status_is_master`, declared in ls_attr.h, can be used from the vendor daemon's `ls_daemon_periodic` callback (and only from that callback) within lsvendor.c to determine if that vendor daemon is master. `ls_get_status_is_master` returns a non-zero integer if the vendor daemon is master (FNP-14630). The API cannot be called from `ls_user_initx` callbacks because this state is unknown at that point.

A limitation is this API works only from vendor daemons started with lmgrd. All of a triad's vendor daemons started with lmadmin will report a non-zero value from `ls_get_status_is_master` (FNP-15005).

Failed checkout with Common Vendor Daemon (CVD) and LM_A_PORT_HOST_PLUS

Previously, a client using a secondary vendor daemon encryption and LM_A_PORT_HOST_PLUS would fail to check out a feature from the CVD. This is now resolved, via a client-side fix (FNP-14437).

Note • *CVD is a deprecated feature.*

Server periodic check for VDH or VM_UUID

Previously, when running on a virtual machine, the vendor daemon would not perform a periodic check for the vendor-defined hostid (VDH) or the VM_UUID, when using one of these as the SERVER line hostid. This has been resolved (FNP-14970).

Certificate borrow resolved issues

The following borrow bugs exist in 11.14.0 and have been resolved in 2016 R2 (11.14.1):

- If two features are borrowable, and one feature name is a substring of the other, then one of the features may fail to return properly, or one of the features may unexpectedly perform a borrow checkout when a normal concurrent checkout is expected. Fix is client-side (FNP-14099, FNP-14331).

- Multiple borrows of a mix of borrowable features may cause extra count to be erroneously deducted from some features (FNP-15064, client-side fix).

- If a feature is borrowed, then returned, then the server restarted, then the same feature borrowed again, a second return may fail (FNP-14352, server-side fix).

- With 11.14.0.0 server, a client of an earlier version may fail a borrow return (FNP-14963, server-side fix).

- If PACKAGE components are borrowed, then returned, and the server restarted, the server will erroneously report the package feature as borrowed again (FNP-13914, server-side fix).

Signing expired licenses with lmcrypt

To enable producer testing of expired-license test cases, lmcrypt will now successfully sign a license file with an expired but otherwise valid license (FNP-14402).

Resolved Issues Specific to Trusted Storage–Based Licensing

Enterprise License Server - automatic re-read

In some circumstances it was possible that a change in Trusted Storage (e.g. return and new activation) may not be actioned by the license server on automatic re-read. This includes but may not be limited to the case where two changes occur in the same interval between re-reads. This bug has been present since the introduction of ls_ts_update_poll_interval, but is now resolved (FNP-11058).

Vendor daemon activation memory leak

In FlexNet Publisher 11.13.0, a memory leak was introduced in the vendor daemon. This leak occured only when servicing activation requests from clients, and therefore applies only to a vendor daemon serving licenses from trusted storage. Every activate & return pair of transactions would previously cause a memory leak of approximately 70 Kb (FNP-10620). This leak was reduced in 11.14.0 (to ~0.06 Kb per activate & return pair of transactions) and has been eliminated in 11.14.1 (FNP-10984).

Detection whether activation is enabled on Linux

In previous versions, on Linux machines `lc_flexinit` would not return an error status indicating that activation was not enabled. In FlexNet Publisher 2016 R2 (11.14.1), `lc_flexinit` fails with error 20 if activation is not enabled on a Linux machine (FNP-11821).

lmstat reporting of licenses signed with legacy license keys

Previously, if multiple fulfilments using the same ActivationID were activated to server trusted storage, and each fulfillment's INCREMENT lines were signed with legacy license keys, then lmstat would report an incorrect count for those features. A fix for lmgrd based license servers, but not for lmadmin based license servers, has been delivered (FNP-14378). This issue will not be fixed for lmadmin. Producers are reminded that license keys are weak signatures and are deprecated.

appactutil sample activation application

Previously for enterprise license server activations, if the server name was "@localhost" and no expiration was specified, then a default expiration of 31-Dec-2020 was used. This resulted in the activation failing if the server fulfillment expires earlier than that.

Now, if no expiration date is specified, the expiration of the server fulfillment is used (FNP-14200).

Re-using a composite transaction stored request

Composite requests are stored in trusted storage until the activation transaction is complete or until the requests are deleted. A request can be re-used if the initial attempt to complete a transaction with the backoffice failed, for example due to a network outage (FNP-15056).

Requests are automatically re-used when appcomptranutil is run to create a request with identical attributes to one that is already stored.

Stored requests can also be used explicitly.

`appcomptranutil -l` lists stored requests, including their sequence number.

A stored request can be re-used by specifying the `-stored` parameter with comptranutil. If there is more than one stored request, the sequence number should also be specified:
`-stored request=<sequence number>`

Previously, usage of a stored request was broken and would result in an "unexpected fatal API error". This has now been resolved (FNP-15029, FNP-15011).

Recovering from broken communications during an online transaction

Previously, when using the sample compTranUtil utility it was possible to time the breaking of a network connection for an online return transaction such that a license was returned to FlexNet Operations but remained present and enabled in trusted storage. This has been resolved by always requiring a second attempt of the return request if communication is broken before a return response is received from FlexNet Operations by comptranutil. The fulfillment record remains disabled until a subsequent transaction attempt completes successfully (FNP-15056).

Cancelling a pending short code request

Previously, an attempt to cancel a pending short code request via a command such as
`./appcomptranutil  shortcode publisher/xml/ShortCode2016High.asr -cs`
would terminate without success. This has now been resolved in the comptranutil sample utilities (FNP-14528).

Short codes with the high response signing strength option

On some Linux machines the processing of a response using high signing strength short code ASRs did not verify a valid response signature, generating a 50058 error. This has now been resolved (FNP-14528).

Known Issues

Dongle Issues

FLEXID10 memory leak

A cumulative memory leak on license server which is node locked to FLEXID 10 may occur on every heartbeat from the server, or at the client side on every checkout request (FNP-13944).

lmadmin Issues

lmadmin Silent Installer Not Displaying Required Error Message

When a non-root user attempts to install `lmadmin` in the default location, the installer can hang (FNP-6942).

Installing lmadmin as a service on Windows with multibyte characters in the install path

lmadmin may not run correctly if installed as a service to a path with multibyte characters (FNP-11879).

Issues Specific to License–Based Licensing

lmdiag displaying incorrect output in case of multiple vendors

If multiple vendor daemons are served by a single license server manager (such as lmgrd), lmdiag shows an incorrect error message "No such feature exists" for features that are served by one of the valid daemons (FNP-15661).

lmstat and the linger period displayed for a component of a package

An issue can occur in a package license such as the following:

```
PACKAGE pkg1 demo 1.0 COMPONENTS="f1 f2" OPTIONS=SUITE_RESERVED SIGN=
INCREMENT pkg1 demo 1.0 permanent 2 SUITE_DUP_GROUP=U BORROW SIGN=
```

On successful return of a borrowed f1, lmstat can inappropriately show an active linger period for f1. No effective workaround recommended yet (FNP-14398).

Known issues when a long-running client's floating license expires

Three issues exist with long running clients:

- For served licenses that are borrowable: when a client borrows the floating license and the borrow period expires, it should but does not enter a reconnection state. This will require a client-side fix. (FNP-15023, FNP-15153, FNP-14197)

- The following license file snippet serves as an example:

```
INCREMENT f1 demo 1.0 20-dec-2016 1 SIGN=
INCREMENT f1 demo 1.0 10-dec-2016 1 SIGN=
```

The two counts of f1 are in the same license pool, and occur in the license file in decreasing order of expiry date. A client checks out both instances of f1 on the morning of 10 December. At midnight the client should, but does not, enter a reconnection state for the single expiring license. However, if the INCREMENT lines are sorted in order of increasing expiry date, the client will correctly enter a reconnection state at midnight on 10 December which could be obtained with the use of the sort attribute, for example:

```
INCREMENT f1 demo 1.0 20-dec-2016 1 sort=2 SIGN=
INCREMENT f1 demo 1.0 10-dec-2016 1 sort=1 SIGN=
```

This issue does not occur for instances of f1 in different license pools, as would be the case with a version change (FNP-15883).

- When a client checks out a license using the COAVAIL checkout flag from a pool with multiple licenses, and if one of the feature lines in the license pool expires on the server and is replaced by a feature definition line with a newer license, the client reconnects as expected but may consume more licenses than expected. (FNP-15862)

Issues Specific to Trusted Storage–Based Licensing

Composite transaction returns and repairs from virtual platforms fail against FlexNet Operations

Return or repair composite transaction (as generated by appcomptranutil or servercomptranutil) made from a virtual platform may be denied, and processing of the response may additionally fail with a 51412 error.

This issue was introduced in FlexNet Operations 2014 SP2 as a consequence of deprecating virtualization transaction keys (FNO-13426), but is resolved in a FlexNet Operations 2014 SP2 Hotfix. Customers performing composite transaction returns and repairs from virtual platforms should request the FNO-15650 hotfix of FlexNet Operations 2014 SP2 (FNP-11055, FNO-15597, and FNO-15650).

Vendor data in short-code responses

Although this is supported by FlexNet Publisher, users of FlexNet Operations should check for the resolution of issue FNO-19064 (custom attributes cannot be added to short code responses at fulfillment time).

Borrow activation to a Linux client causes crash

The **flxActBorrowActivate** function crashes when server Trusted Storage contains an INCREMENT line before a PACKAGE line (FNP-10437).

Note • Only producer-customized back offices can provide licenses with this configuration.

Java Issues

Limitation of Queuing in Java Clients

When a Java client is set to queuing with `Synch_queue` option, the clients get queued even when there are no licenses available while it waits for `SOCKET_READ_TIMEOUT` for 20 seconds. The licenses get dequeued incase there is no response from the server, then exits throwing `LM_CANTRECEIVE FlexlmException` (FNP-11414).

System Requirements

Tested Platforms

The following sections describe the platforms tested with the FlexNet Publisher 2016 R2 (11.14.1) Licensing Toolkits.

- C/C++ Toolkits

- Java Toolkits

- Detailed Platform Information

- Toolkits That Support Prepped Trusted Configuration

- Virtualization

- Tested Cloud Environments

A list of supported platforms can be found here:
http://www.flexerasoftware.com/support/additional-support/end-of-life/flexnet-publisher.html

C/C++ Toolkits

The following platforms are tested. See the Detailed Platform Information section for more information about each platform.

Table 8 • Tested C/C++ Toolkit platforms

Platform Type	Hardware Type	Operating System
AIX 32-bit	PowerPC	AIX 6.1 ML 006 AIX 7.1 ML 000
AIX 64-bit	PowerPC	AIX 6.1 ML 006 AIX 7.1 ML 000
HP-UX 64-bit	Intel Itanium	HP-UX B.11.31ia64
Linux 32-bit	x86	Certified with the following: RedHat Enterprise Linux 6 and 7 SUSE Linux Enterprise 11 and 12

Table 8 • Tested C/C++ Toolkit platforms

Platform Type	Hardware Type	Operating System
Linux 64-bit	x86-64	Certified with the following: RedHat Enterprise Linux 6 and 7 SUSE Linux Enterprise 11 and 12
Apple OS X 32-bit and 64-bit	x86 x64	Apple OSX 10.12 Apple OSX 10.11 Apple OSX 10.10 Apple OSX 10.9
Microsoft Windows 32-bit	x86	Windows 10 Windows 8.1 Windows 7 SP1 Windows Server 2016 Windows Server 2012 R2 Windows Server 2012 It is a best practice to run license servers on a server-based OS.
Microsoft Windows 64-bit	x64	Windows 10 Windows 8.1 Windows 7 SP1 Windows Server 2016 Windows Server 2012 R2 Windows Server 2012 It is a best practice to run license servers on a server-based OS.
Solaris 32-bit	SPARC 32-bit	Solaris 10 and 11
Solaris 32-bit	x86	Solaris 10 and 11
Solaris 64-bit	SPARC 64-bit	Solaris 10 and 11
Solaris 64-bit	x86-x64	Solaris 10 and 11

Java Toolkits

The following platforms have been tested. See Java Standard Edition in Detailed Platform Information for more information about this platform.

Table 9 • Tested Java Toolkit platforms

Platform Type	Hardware Type	Version
Oracle Java Development Kit	• Solaris SPARC 32-bit • Solaris SPARC 64-bit • Solaris x86 • Solaris x64 • Windows x86 • Windows x64 • Linux x86 • Linux x64	Java Standard Edition 1.8

Detailed Platform Information

The following sections list the operating systems and their associated hardware platforms tested with FlexNet Publisher 2016 R2 (11.14.1). Each platform entry contains the following information:

- **Platform name**—The name that identifies this platform when used with the PLATFORMS keyword in a license file.

- **Package identifier**—The name of the toolkit package on Flexera Software's download site.

- **Tested compiler**—The compiler and version with which this package was tested. Choose a compiler for your development and build environment that is compatible with the one listed.

- **Notes**—Additional platform-specific notes that are useful for developing your FlexEnabled product.

- **Security functionality**—Denotes the level of security functionality your toolkit supports. This information is useful when you implement trusted storage-based licensing in your product. See *Programming Reference for Trusted Storage–Based Licensing* for details.

- Click a link to access platform details:

AIX 32-bit	Linux 32-bit	Solaris 32-bit
AIX 64-bit	Linux 64-bit	Solaris 64-bit
Apple OS 32-bit and 64-bit	Microsoft Windows 32-bit	HP-UX 64-bit
Java Standard Edition	Microsoft Windows 64-bit	

AIX 32-bit

The following table lists information about the AIX 32-bit systems tested with the FlexNet Publisher Licensing Toolkit:

Platform Name	ppc_u
Package Identifier	ppc_u5 (on PowerPC™)
Tested Compiler	PowerPC cc (IBM XLC): 9.0 (AIX 6.1) and 11.1 (AIX 7.1)
Notes	• lmadmin is supported in this toolkit. • Short-code transactions are not supported. • Prepped Trusted Configuration is not supported. • The AIX FlexNet Publisher client libraries are PIC by default; therefore, only one version of these libraries is provided in the toolkit. • Java SDK is not supported.
Toolkit Functionality	Licensing based on license files or trusted storage.
Security Functionality	No support for tamper-resistant applications. The toolkit is labeled as *notr*.

AIX 64-bit

The following table lists information about the AIX 64-bit systems tested with the FlexNet Publisher Licensing Toolkit:

Platform Name	rs64_u
Package Identifier	rs64_u5 (on PowerPC™)
Tested Compiler	PowerPC cc (IBM XLC): 9.0 (AIX 6.1) and 11.1(AIX 7.1)
Notes	• lmadmin is supported using its 32-bit binary. (No lmadmin 64-bit binary is available.) • Short-code transactions are not supported. • Prepped Trusted Configuration is not supported. • You must use ar -X64 and strip -X64 on this platform. • The AIX FlexNet Publisher client libraries are PIC by default; therefore only one version of these libraries is provided in the toolkit. • Java SDK is not supported.

Toolkit Functionality	Licensing based on license files or trusted storage.
Security Functionality	No support for tamper-resistant applications. The toolkit is labeled as *notr*.

HP-UX 64-bit

The following table lists information about the HP-UX 64-bit systems tested with the FlexNet Publisher Licensing Toolkit:

Platform Name	it64_hp (on Intel® Itanium®)
Package Identifier	it64_hp11i (on Intel Itanium)
Tested Compiler	Intel Itanium HP aC++/ANSI C B3910B A.06.05

Notes	• `lmadmin` has not been tested in this toolkit.
	• On Intel Itanium, use `lmhostid` utility to determine the hostid. This returns the machine identification and is equivalent to the identification returned by the HP_UX command `getconf CS_PARTITION_IDENT`. For example:
	
	`>lmhostid`
	`>The FlexNet Licensing host ID of this machine is "ID_STRING=9c788319-db72-d411-af62-0060b05e4c05"`
	Older methods of obtaining the hostid that return the Ethernet address are still supported, but may fail on some systems. The older methods include:
	
	`>uname -i (returns decimal hostid)`
	`>lmhostid -long (returns hexidecimal hostid)`
	• Multi-threaded licensing libraries are available on Intel Itanium.

Toolkit Functionality	Licensing based on license files.

Java Standard Edition

The following table lists information about the Java Standard Edition systems tested with the FlexNet Publisher Licensing Toolkit:

Platform Name	java
Package Identifier	Not applicable
Tested Compiler	JDK 1.8

Notes	- Implements the FlexNet Licensing for Java client library only. - Requires a C development environment. - Requires tamper-resistant licenses (TRL) to be enabled.
Toolkit Functionality	Licensing based on license files or trusted storage.
Security Functionality	No support for tamper-resistant applications. The toolkit is labeled as *notr*.

Linux 32-bit

The following table lists information about the Linux 32-bit systems tested with the FlexNet Publisher Licensing Toolkit:

Platform Name	i86_lsb (on x86)
Package Identifier	i86_lsb (on x86)
Tested Compiler	For x86: - gcc 4.4.4 (RHEL 6.0) - gcc 4.1.2 (SUSE 11) - gcc 4.3.4 (SUSE 11) - gcc 4.8.3 (SUSE 12)
Notes	- lmadmin is supported on x86 only. - Multiple Ethernet hostids are supported. - Short-code transactions are supported. - Prepped Trusted Configuration is supported. - Tested virtual machine platforms include: VMware ESXi 5.5, 6.0 VMware Workstation 11 and 12 Microsoft Windows Server 2012 R2 Hyper-V Microsoft Windows 10 Hyper-V Citrix XenServer 6.2, 6.5, and 7.0 Oracle Virtual Box 5.0.24 QEMU-KVM (Host OS: CentOS 7.1) - Hypervisor: qemu-kvm-ev-2.3.0-31 - Hypervisor Services: libvirt-daemon-kvm-1.2.17-13 - Virtual Machine Manager: vmm v1.2.1-8 Parallels Desktop 11.2.2 for MAC 10.9.5

Toolkit Functionality	Licensing based on license files or trusted storage.
Security Functionality	Support for tamper-resistant applications. The toolkit is labeled as *standard*.

Linux 64-bit

The following table lists information about the Linux 64-bit systems tested with the FlexNet Publisher
Licensing Toolkit:

Platform Name	x64_lsb (on x64)
Package Identifier	x64_lsb (on x64)
Tested Compiler	For x64: ● gcc 4.4.4 (RHEL 6.0) ● gcc 4.1.2 (SUSE 11) ● gcc 4.3.4 (SUSE 11) ● gcc 4.8.5 (RHEL7) ● gcc 4.8.3 (SUSE 12)
Toolkit Functionality	Licensing based on license files or trusted storage.
Security Functionality	Support for tamper-resistant applications. The toolkit is labeled as *standard*.

Notes	• For the x64_lsb toolkit, lmadmin is supported using its 32-bit binary. (No lmadmin 64-bit binary is available.)
	• As a requirement, manually install the Linux 32-bit libraries on RHEL 6.0 (64-bit) or RHEL 7.0(64-bit). (They are not automatically installed with the operating system.) Certain FlexNet Publisher components, such as lmadmin, require these libraries. Refer to the RedHat Enterprise Linux documentation for details.
	• Multiple Ethernet hostids are supported.
	• Short-code transactions are supported.
	• Prepped Trusted Configuration is supported (x64_lsb only).
	• Tested virtual machine platforms include:
	  VMware ESXi 5.5, 6.0
	  VMware Workstation 11 and 12
	  Microsoft Windows Server 2012 R2 Hyper-V
	  Microsoft Windows 10 Hyper-V
	  Citrix XenServer 6.2, 6.5, and 7.0
	  Oracle Virtual Box 5.0.24
	  QEMU-KVM (Host OS: CentOS 7.1)
	    • Hypervisor: qemu-kvm-ev-2.3.0-31
	    • Hypervisor Services: libvirt-daemon-kvm-1.2.17-13
	    • Virtual Machine Manager: vmm v1.2.1-8
	  Parallels Desktop 11.2.2 for MAC 10.9.5

Toolkit Functionality	Licensing based on license files or trusted storage.
Security Functionality	Support for tamper-resistant applications. The toolkit is labeled as *standard*.

Apple OS 32-bit and 64-bit

The following table lists information about the Apple OS 32- and 64-bit systems tested with the FlexNet Publisher Licensing Toolkit:

Platform Name	• x86 - i86_mac • x64 - x64_mac
Package Identifier	• universal_mac10 (on x86 and x64) • universal_mac10_applelibcpp

Tested Compiler	• Xcode 7.0.1
	• Xcode 6.0.1
	• Xcode 5.1.1
	• gcc 4.2.1
	• For 10.9 Apple LLVM version 5.0 (clang-500.2.79) (based on LLVM 3.3svn)
	• Apple LLVM version 7.0.0 (clang-700.0.72)
	• Apple LLVM version 8.0.0 (clang-800.0.38)
Notes	• `lmadmin` runs under both the x86 and the x64 Apple architectures using its 32-bit binary. (No `lmadmin` 64-bit binary is available.)
	• Multiple Ethernet hostids are not supported.
	• Short-code transactions are supported.
	• Prepped Trusted Configuration is supported.
	• For building requirements, see Requirements for Building the Apple OS X Licensing Toolkit.
Toolkit Functionality	Licensing based on license files or trusted storage.
Security Functionality	Support for tamper-resistant applications. The toolkit is labeled as *standard*.

Requirements for Building the Apple OS X Licensing Toolkit

When building the FlexNet Publisher Licensing Toolkit on Apple OS X platforms, use the appropriate Apple development environment:

- For OS X 10.9, use Xcode 5.0.2

- For OS X 10.10, use Xcode 6.0.1

- For OS X 10.11, use Xcode 7.0.1

- For OS X 10.12, use Xcode 8.0

The supplied makefiles build a universal Licensing Toolkit that can be used to produce FlexEnabled applications of the following types (all contained within a single FAT binary):

- 32-bit Intel—Runs on OS X 10.9 or later on Intel platforms

- 64-bit Intel—Runs on OS X 10.9 or later on Intel 64-bit platforms

Required Apple SDKs

The SDK appropriate to the Apple OS X version must be available on the machine where you are building the Licensing Toolkit:

- For OS X 10.9, use `xcode-select --print-path` to obtain the correct path and choose 10.8 or 10.9 SDK path

- For OS X 10.10, use **`xcode-select --print-path`** to obtain the correct path and choose 10.8, 10.9, or 10.10 SDK path
- For OS X 10.11, use **`xcode-select --print-path`** to obtain the correct path and choose 10.11 SDK path
- For OS X 10.12, use **`xcode-select --print-path`** to obtain the correct path and choose 10.12 SDK path

Microsoft Windows 32-bit

The following table lists information about the Microsoft Windows 32-bit systems tested with the FlexNet Publisher Licensing Toolkit:

Platform Name	i86_n
Package Identifier	i86_n3
Tested Compiler	- Visual Studio 2015 - Visual Studio 2013 - Visual Studio 2012 - Visual Studio 2010 Professional Edition
Notes	`lmadmin` is supported in this toolkit. - Multiple Ethernet hostids are supported. - Short-code transactions are supported. - Prepped Trusted Configuration is supported. - Tested virtual machine platforms include: VMware Workstation 11 and 12 VMware ESXi 5.5, 6.0 Microsoft Windows Server 2016 Hyper-V Microsoft Windows Server 2012 R2 Hyper-V Microsoft Windows 10 Hyper-V Citrix XenServer 6.2, 6.5, and 7.0 Oracle Virtual Box 5.0.24 QEMU-KVM (Host OS: CentOS 7.1) - Hypervisor: qemu-kvm-ev-2.3.0-31 - Hypervisor Services: libvirt-daemon-kvm-1.2.17-13 - Virtual Machine Manager: vmm v1.2.1-8 Parallels Desktop 11.2.2 for MAC 10.9.5
Toolkit Functionality	Licensing based on license files or trusted storage.

Security Functionality	Support for tamper-resistant applications. The toolkit is labeled as *standard*.

Microsoft Windows 64-bit

The following table lists information about the Microsoft Windows 64-bit systems tested with the FlexNet Publisher Licensing Toolkit:

Platform Name	x64_n
Package Identifier	x64_n6
Tested Compiler	- Visual Studio 2015 - Visual Studio 2013 - Visual Studio 2012 - Visual Studio 2010 Professional Edition
Notes	- lmadmin is supported using its 32-bit binary. (No lmadmin 64-bit binary is available.) - Multiple Ethernet hostids are supported. - Short-code transactions are supported. - Prepped Trusted Configuration is supported. - The lmtools utility cannot interact with the license server manager (lmgrd) when lmgrd is run as a service. - Tested virtual machine platforms include: VMware Workstation 11 and 12 VMware ESXi 5.5, 6.0 Microsoft Windows Server 2016 Hyper-V Microsoft Windows Server 2012 R2 Hyper-V Microsoft Windows 10 Hyper-V Citrix XenServer 6.2, 6.5, and 7.0 Oracle Virtual Box 5.0.24 QEMU-KVM (Host OS: CentOS 7.1) - Hypervisor: qemu-kvm-ev-2.3.0-31 - Hypervisor Services: libvirt-daemon-kvm-1.2.17-13 - Virtual Machine Manager: vmm v1.2.1-8 Parallels Desktop 11.2.2 for MAC 10.9.5
Toolkit Functionality	Licensing based on license files or trusted storage.
Security Functionality	Support for tamper-resistant applications. The toolkit is labeled as *standard*.

Solaris 32-bit

The following table lists information about the Solaris 32-bit systems tested with the FlexNet Publisher Licensing Toolkit:

Platform Name	• x86_sol (on x86) • sun4_u (on SPARC 32-bit)
Package Identifier	• x86_sol10 (on x86) • sun4_u10 (on SPARC 32-bit)
Tested Compiler	For x86: • cc (Sun C) 5.8 • cc (Sun C) 5.10 • cc (Sun C) 5.12 • cc (Sun C) 5.13 For SPARC 32-bit: • cc (Sun C) 5.8 • cc (Forte Dev 7) 5.4 • cc (Sun C) 5.12 • cc (Sun C) 5.13
Notes	• `lmadmin` is supported in this toolkit. • Synchronous I/O multiplexing, via select, is supported for up to 65,535 file descriptors. • The number of system semaphore arrays can become exhausted. • Shared objects might not run when compiled with gcc on SPARC 32-bit. • Multiple Ethernet hostids are not supported. • Short-code transactions are not supported. • Prepped Trusted Configuration is supported.
Toolkit Functionality	Licensing based on license files or trusted storage.
Security Functionality	Support for tamper-resistant applications. The toolkit is labeled as *standard*.

Solaris 64-bit

The following table lists information about the Solaris 64-bit systems tested with the FlexNet Publisher Licensing Toolkit:

Platform Name	- x64_sun (on x64) - sun64_u (on SPARC 64-bit)
Package Identifier	- x64_sun10 (on x64) - sun64_u10 (on SPARC 64-bit)
Tested Compiler	For x86-64: - cc (Sun C) 5.8 - cc (Sun C) 5.10 - cc (Sun C) 5.12 - cc (Sun C) 5.13 For SPARC 64-bit: - cc (Sun C) 5.8 - cc (Sun C) 5.12 - cc (Sun C) 5.13
Notes	- lmadmin is supported using its 32-bit binary. (No lmadmin 64-bit binary is available.) - Shared objects might not run when compiled with gcc on SPARC 64-bit. - Multiple Ethernet hostids are not supported. - Short-code transactions are not supported. - Prepped Trusted Configuration is supported.
Toolkit Functionality	Licensing based on license files or trusted storage.
Security Functionality	Support for tamper-resistant applications. The toolkit is labeled as *standard*.

# Toolkits That Support Prepped Trusted Configuration

Toolkit platforms that support prepped Trusted Configuration (and therefore server-side local trial ASRs) include the following:

- i86_lsb
- i86_n3
- sun4_u10

- x64_lsb
- x64_n6
- x64_sun10

- sun64_u10
- x86_sol10
- universal_mac10

Virtualization

The following picture illustrates how the FlexNet licensing server or a FlexEnabled application operates within a Virtualization stack. The table below the picture lists the Virtualization stacks that have been tested with FlexNet Publisher.
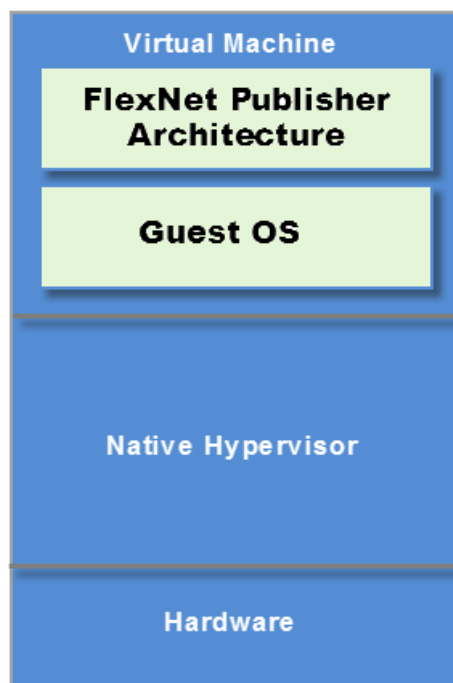
Use the following table to determine the tested Virtualization stacks.

Table 10 • Tested Virtualization stacks

FlexNet Publisher Architecture	Guest OS	Hypervisor	Host ID
i86_n, x64_n	Windows 8.1	VMware ESXi 5.5, 6.0	`VM_UUID`
		Citrix XenServer 6.2, 6.5, and 7.0	`ETHER`
			`VM_GENID`
		VMware Workstation 11 and 12	
i86_n, x64_n	Windows 8.1	PARALLELS	`ETHER`

Table 10 • Tested Virtualization stacks

FlexNet Publisher Architecture	Guest OS	Hypervisor	Host ID
i86_n, x64_n	Windows 8.1	QEMU-KVM	VM_UUID ETHER
i86_n, x64_n	Windows 7 SP1	VMware ESXi 5.5, 6.0 Citrix XenServer 6.2, 6.5, and 7.0 VMware Workstation 11 and 12 Oracle VirtualBox 5.0.24 QEMU-KVM	VM_UUID ETHER
i86_n, x64_n	Windows 7 SP1	PARALLELS	ETHER
i86_n, x64_n	Windows Server 2012	VMware ESXi 5.5, 6.0 Citrix XenServer 6.2, 6.5, and 7.0	VM_UUID ETHER VM_GENID
i86_n, x64_n	Windows Server 2012	PARALLELS	ETHER
i86_n, x64_n	Windows Server 2012	QEMU-KVM	VM_UUID ETHER
i86_n, x64_n	Windows 10	VMware ESXi 5.5, 6.0 Citrix XenServer 6.2, 6.5, and 7.0 VMware Workstation 11 and 12 Oracle VirtualBox 5.0.24	VM_GENID ETHER
i86_n, x64_n	Windows 10	QEMU_KVM	VM_UUID ETHER
i86_n, x64_n	Windows 10	PARALLELS	ETHER

Table 10 • Tested Virtualization stacks

FlexNet Publisher Architecture	Guest OS	Hypervisor	Host ID
i86_n, x64_n	Windows 10 Windows 8.1 Windows 7 SP1	Microsoft Windows Server 2016 Hyper-V Microsoft Hyper-V from Windows Server 2012 R2 Microsoft Hyper-V from Windows 10 Pro Microsoft Hyper-V from Windows Server 2012	VM_GENID ETHER
i86_n, x64_n	Windows Server 2012 R2 Windows Server 2012	Microsoft Windows Server 2016 Hyper-V Microsoft Hyper-V from Windows Server 2012 R2 Microsoft Hyper-V from Windows 10 Pro Microsoft Hyper-V from Windows Server 2012	VM_GENID ETHER
i86_lsb, x64 _lsb	RedHat Enterprise Linux 6 SUSE Linux Enterprise 11 and 12	VMware ESXi 5.5, 6.0 VMware Workstation 11 and 12 Citrix XenServer 6.2, 6.5, and 7.0 QEMU-KVM	VM_UUID ETHER
x64_lsb	RedHat Enterprise Linux 7	VMware ESXi 5.5, 6.0 VMware Workstation 11 and 12 Citrix XenServer 6.2, 6.5, and 7.0 QEMU-KVM	VM_UUID ETHER

Table 10 • Tested Virtualization stacks

FlexNet Publisher Architecture	Guest OS	Hypervisor	Host ID
i86_lsb, x64 _lsb	RedHat Enterprise Linux 6 SUSE Linux Enterprise 11 and 12	Microsoft Hyper-V from Windows Server 2012 R2 Microsoft Hyper-V from Windows 10 Pro Microsoft Hyper-V from Windows Server 2012 PARALLELS	ETHER
x64_lsb	RedHat Enterprise Linux 7	Oracle VirtualBox 5.0.24 QEMU-KVM	VM_UUID ETHER

Note • VM_GENID is available from the lc_hostid API, but is not available as a hostid keyword on the SERVER or FEATURE line

Tested Cloud Environments

Use the following table to determine guest operating systems and hostids that have been tested with FlexNet Publisher in an Amazon EC2 environment.

Table 11 • Tested Cloud environments

FlexNet Publisher Architecture	Tested OS	Cloud Platform	Host ID
i86_n, x64_n	• Windows Server 2012 R2 • Windows Server 2012 • Windows 10	Google cloud Microsoft Azure	License servers: VM_UUID FlexEnabled clients: ETHER

Table 11 • Tested Cloud environments

FlexNet Publisher Architecture	Tested OS	Cloud Platform	Host ID
i86_n, x64_n	• Windows Server 2012 R2 • Windows Server 2012 • Windows 10	Amazon EC2	License servers: `VM UUID` (previously `AMZN_IID`) `AMZN_EIP` FlexEnabled clients: `VM_UUID` (previously `AMZN_IID`)

i86_lsb (on x86), x64_lsb (on x64)	• RedHat Enterprise Linux 6 and 7
	• SUSE Linux Enterprise 11 and 12
		Google cloud
		
		Microsoft Azure
			License servers:
			
			`VM_UUID`
			
			FlexEnabled clients:
			
			`ETHER`

Note •

- *Google Cloud is an experimental feature, and is detected as GOOGLE COMPUTE*
- *Google Cloud, Amazon EC2 and Microsoft Azure can all use VM_UUID. VM_UUID is equivalent to AMZN_IID on EC2, Google Instance ID on Google and SMBIOS UUID on Azure*
- *For Linux certificate applications, the Linux FlexNet Licensing Service needs to be installed for Azure detection to occur.*

i86_lsb (on x86), x64_lsb (on x64)	• RedHat Enterprise Linux 6 and 7
	• SUSE Linux Enterprise 11 and 12
		Amazon EC2	License servers:
			
			`AMZN_EIP` or `VM_UUID`
			
			FlexEnabled clients:
			
			`VM_UUID`

System Requirements for lmadmin

The following sections describe tested platforms and requirements for `lmadmin`:

- Tested Platforms

- Additional System Requirements

- Tested Browsers

Note • lmadmin installers are no longer packaged within FlexNet Publisher kit archives, and must be downloaded separately.

Tested Platforms

lmadmin can be run on the following platforms.

Table 12 • Tested platforms for lmadmin

Platform Architecture	Processor Type	Operating System
AIX 32-bit	PowerPC	AIX 6.1 and 7.1
AIX 64-bit	PowerPC	AIX 6.1 and 7.1
Linux 32-bit	x86	Certified with the following: • RedHat Enterprise Linux 6 and 7 • SUSE Linux Enterprise 11 and 12
Linux 64-bit	x86-64	Certified with the following: • RedHat Enterprise Linux 6 and 7 • SUSE Linux Enterprise 11 and 12
Microsoft Windows 32-bit	x86	• Windows 10 • Windows 8.1 • Windows 7 • Windows Server 2016 • Windows Server 2012 R2
Microsoft Windows 64-bit	x64	• Windows 10 • Windows 8.1 • Windows 7 • Windows Server 2016 • Windows Server 2012 R2
Apple OS 32-bit	x86	Apple OS X 10.9, 10.10, 10.11, and 10.12
Apple OS 64-bit	x64	Apple OS X 10.9, 10.10, 10.11, and 10.12
Solaris 32-bit	• x86 • SPARC 32-bit	Solaris 10, and 11

Table 12 • Tested platforms for lmadmin

Platform Architecture	Processor Type	Operating System
Solaris 64-bit	● x64 ● SPARC 64-bit	● Solaris 10 and 11 (on SPARC 64) ● Solaris 10 and 11 (on x64)

Note • For non-Windows 64-bit platforms use the 32-bit lmadmin installers provided in the lmadmin folder of the toolkits. For Windows 64-bit, use the 64-bit Windows lmadmin installer.

Additional System Requirements

lmadmin has these additional requirements:

- Linux 32-bit libraries, required by `lmadmin`, are not automatically installed with RedHat Enterprise Linux 6 (64-bit). You must manually install these libraries on this operating system. Refer to the RedHat Enterprise Linux documentation for details.

- To use `lmadmin` on Windows platforms, the Microsoft Visual C++ 2008 Redistributable Package (x86) must be installed. You have an option to install this package during the FlexNet Publisher License Server Installer process.

Tested Browsers

`lmadmin` is tested on the following Web browsers:

- On RedHat Linux, Mozilla Firefox 10, 12 and 18.x, Google Chrome 24.x

- On Windows, Microsoft Internet Explorer 11

- On Apple OS X, Apple Safari 5.0 and 5.1.7

- Microsoft Edge

Deprecated Features and Commands

Table 13 • List of deprecated features and commands

Deprecated Features and Commands	Comments
License Generator toolkit	License Generator toolkit is deprecated. Instead, the responsegen shared object API has been exposed; see the example `.\examples\activation\responsegen\ResponseGenApi.c`.
VM_PLATFORMS keyword and ls_allow_vm vendor variable	These are deprecated.
AMZN_IID, HPV_UUID, VMW_UUID	Replaced by VM_UUID
lmbind & LMB_* hostids	lmbind is no longer packaged with FlexNet Publisher archives. lmbind sections have been removed from 11.13.0 documentation
VMW_*, HPV_ & PHY_* hostids	It is better to have a hostid that is effective in both Physical and virtual systems. As an example, we would recommend ETHER instead of VMW_ETHER (on VMware guests), or HPV_ETHER (on Hyper-V guests), or PHY_ETHER (requiring a physical platform)
Non trial-id trial ASRs	ASRs which do not use a trial-id are subject to an issue where deleting trusted storage means no further (non trial-id) ASRs can be loaded. Trial-id ASRs were invented to solve this issue.
License keys and default strength signatures	License keys have been documented as obsolete for several years. Signatures of type LM_STRENGTH_LICENSE_KEY and LM_STRENGTH_LICENSE_DEFAULT are easily cracked. Flexera Software strongly recommends that new license files use TRL-strength signatures and that updated clients link with the 'trl-only' (lmgr_trl.lib) library.
CVD (Common Vendor Daemon)	Other than for producers who have legacy licensing applications using CVD, this feature is no longer supported. Consequently CVD sections have been removed from 11.13.0 documentation.

Table 13 • List of deprecated features and commands

Deprecated Features and Commands	Comments
Decimal licenses and lc_convert API	Decimal licenses are deprecated. Consequently sections on decimal licenses and the **lc_convert** API have been removed from 11.13.0 documentation.

Legal Information

Copyright Notice

Copyright © 2016 Flexera Software LLC. All Rights Reserved.

Intellectual Property

For a list of trademarks and patents that are owned by Flexera Software, see http://www.flexerasoftware.com/intellectual-property. All other brand and product names mentioned in Flexera Software products, product documentation, and marketing materials are the trademarks and registered trademarks of their respective owners.

Restricted Rights Legend