

Sentinel LDK – v.7.5

Release Notes

Revision History

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Contents

Sentinel LDK v.7.5 - Release Notes	5
About This Document	5
Product Overview	5
Sentinel Vendor Keys	6
Obtaining Support	6
Documentation Feedback	6
What's New in Sentinel LDK v.7.5?	7
New Clone Protection Scheme for Virtual Machines	7
Clone Detection Can Now Be Cleared for All Types of Sentinel SL Keys	7
Sentinel EMS Now Manages Dynamic Memory Files	7
Enhancements to Sentinel License Manager	8
Data File Protection Plugin Enhanced	9
Enhancements for Linux	9
Enhancements for Android	9
Unlocked Products Now Support the Execution-Count License Type	10
Accessing Sentinel License Manager Located on a Different Subnet	11
Sentinel Licensing API Supports Consumption of Multiple Executions in a Single Call	11
Added Support for Fallback to V-Clock	11
What's Changed in This Release?	12
"SafeNet" is Now "Gemalto"	12
Change to Handling for Feature ID 0 for Unlocked Products	13
Online Activation Is No Longer Available for Sentinel SL UserMode Keys	13
Correction to Documentation for Data Protection (Version 2 Mode) for Android	13
Change to Documentation for Sentinel LDK Envelope for Java Applications	14
Disabling the "Depleted Battery" Warning for Developer Keys	14
Supported Platforms for Sentinel LDK – End Users and Vendors	14
Supported Platforms for End Users	15
Supported Platforms for Vendors	17
Supported Versions for Windows CE	19
Supported Platforms for Code Samples	20
Tested Compilers for Code Samples	20
Supported Platforms for Sentinel Cloud Licensing	22
Current Firmware Version	23
Dropped Support	24
Platforms for Developers and End Users	24
Sentinel LDK Documentation	24
Documents	24
Sentinel Cloud Licensing Documents	26
Getting Started Guides	26
Help Systems - Sentinel LDK and Sentinel EMS User Interfaces	27
Online Help Systems – Sentinel LDK APIs	28

Instructional Videos	28
Software and Documentation Updates	29
Known Issues and Workarounds	29
Sentinel LDK Installation	29
Sentinel EMS	30
Sentinel Cloud Licensing	30
End Users, Sentinel LDK Runtime Environment, License Manager, and Customer Tools ...	30
Sentinel LDK Envelope for Windows Platforms	32
Sentinel LDK Envelope and Data Encryption for Mac OS X	33

Sentinel LDK v.7.5 - Release Notes

About This Document

This document contains information about the latest release of the Sentinel LDK product, including new features, changes to the product, documentation, and known issues and workarounds.



These release notes are subject to change. If you are reading the release notes that were installed with the product, Gemalto recommends that you check the release notes available from the Sentinel Community web site to see if any information was added or changed. You can access the latest release notes from this location:

http://sentinelcustomer.safenet-inc.com/Documentation_Information.aspx

Product Overview

Sentinel LDK (*Sentinel License Development Kit*) provides software publishers with strong anti-piracy and intellectual property protection solutions, offering unmatched flexibility in assisting you to protect your revenue and increase sales. The Sentinel system prevents unauthorized use of software, protects software copyrights and intellectual property, and offers multiple licensing models.

The strength, uniqueness, and flexibility of Sentinel LDK are based on two primary principles:

- *Protect Once—Deliver Many—Evolve Often™* — this unique design philosophy enables you to fully separate your business and Protection (engineering) processes in order to maximize business agility while ensuring optimum use of your employee time and core competencies, resulting in faster time to market.
- *Cross-Locking™* — the technology that supports the *Protect Once—Deliver Many—Evolve Often* concept, enabling a protected application to work with a Sentinel hardware key or a Sentinel License Certificate (software key).

All commercial decisions, package creation and license definitions are executed by product or marketing managers after the protection has been implemented.

This workflow model provides you with greater flexibility and freedom when defining new sales and licensing models, including feature-based and component licensing, evaluation, rental, floating, subscription, trialware, pay-per-use, and more, enabling you to focus on revenue growth.

Sentinel Vendor Keys

When you purchase Sentinel LDK, you are provided with two Sentinel Vendor keys—the Sentinel Master key and the Sentinel Developer key.

The Sentinel Developer key is used by your software engineers in conjunction with the Sentinel LDK protection tools to protect your software and data files.

The Sentinel Master key is used in conjunction with Sentinel LDK and is attached to the Sentinel EMS Server. The key is used by your production staff to create licenses and lock them to Sentinel protection keys, to write specific data to the memory of a Sentinel protection key, and to update licenses already deployed in the field.

Every Sentinel EMS Server computer must have a Sentinel Master key connected.

Important: Keep these keys safe and only allow trusted personnel to use them. The Master key is especially valuable because it allows the generation of licenses. Both vendor keys contain secrets and enable the use of tools and API libraries which can access the memory of user keys and use of the cryptographic functionalities.

Obtaining Support

You can contact us using any of the following options:

- **Business Contacts** - To find the nearest office or distributor, use the following URL:
<https://sentinel.gemalto.com/contact-us-sm/>
- **Technical Support** - To obtain assistance in using Gemalto products, feel free to contact our Technical Support team:
 - Phone: 800-545-6608 (US toll free), +1-410-931-7520 (International)
 - Regional Support Contact Information: <https://sentinel.gemalto.com/technical-support-sm/>
 - E-mail: support@safenet-inc.com
 - URL: <https://sentinel.gemalto.com/technical-support-sm/>
- **Downloads** - You can download installers and other updated components using this URL:
<https://sentinel.gemalto.com/technical-support-sm/>

Documentation Feedback

To help us improve future versions of the documentation, we want to know about any corrections, clarifications, or further information you would find useful. When you contact us, please include the following information:

- The title, part number (if applicable), and version of the document you are referring to
- The version of the product you are using
- Your name, company name, job title, phone number, and e-mail ID

Send us e-mail at: support@safenet-inc.com

What's New in Sentinel LDK v.7.5?

This section describes the main features and enhancements that are introduced in this release of Sentinel LDK.



If you are upgrading from a version of Sentinel LDK that is earlier than v.7.4, be sure to review the release notes for all intervening versions. Significant enhancements and changes are introduced in each version of Sentinel LDK. You can [download a zip file](#) that contains all Sentinel LDK release notes from the Sentinel Customer Community download page.

New Clone Protection Scheme for Virtual Machines

A new clone protection scheme is now available for protected applications that are operated on virtual machines.

The **VMType2** scheme prevents attacks (again a protected application) that are based on virtual machine rollback snapshots. The scheme enables the protected application on a virtual machine to detect that a time shift event may have occurred.

Certain restrictions apply for this detection scheme. For more information, see the *Sentinel LDK Software Protection and Licensing Guide*.

Clone Detection Can Now Be Cleared for All Types of Sentinel SL Keys

Until now, Sentinel LDK supported clearing the "cloned" status of a Product only when the Product was licensed with an SL Legacy key. Starting with Sentinel LDK v.7.5, you can use Sentinel License Generation API to clear this status for any type of Sentinel SL key.

This enhancement is applicable for Product licenses that are generated and maintained using Sentinel EMS and using Sentinel License Generation API.

Sentinel EMS Now Manages Dynamic Memory Files

Access to dynamic memory in Sentinel HL (Driverless configuration) keys was introduced in Sentinel LDK v.7.1. However, this access was only available when working with Sentinel License Generation API.

In this release of Sentinel LDK, you can now create and manage dynamic memory files using Sentinel EMS:

- The Catalog pane now contains a new tabbed page labeled **Dynamic Memory**. You use this page to create and manage a collection of dynamic memory files for each Batch Code

that you employ. Each dynamic memory file can contain a number of memory segments. For a given dynamic memory file, you can:

- Enter data directly in the Sentinel EMS interface.
- Import data from an external data file.
- Specify that the data will be provided as part of entitlement for a Product
- For each Product in the Catalog, the **Memory** tabbed page can be set to work with default memory or dynamic memory. For dynamic memory, you can select an existing dynamic memory file to be added to the Product.

Enhancements to Sentinel License Manager

Sentinel License Manager has been enhanced as follows:

- The Integrated License Manager is now supported on Linux platforms. The Integrated License Manager is included in protected applications. As a result, in many situations, it is no longer necessary to install the Run-time Environment. The Integrated License Manager must be configured manually.
- Sentinel Admin API is now supported on Linux Intel and Mac platforms, in addition to Windows. (However, Admin API can be used to manage an Integrated License Manager only on a Windows platform.)
- A chapter that provides more complete documentation for Sentinel License Managers has been added to the *Software Protection and Licensing Guide*.

The table that follows summarizes how the various License Managers are supported on each type of platform.

	Admin LM	Integrated LM	External LM
Windows	Supported. Available tools are: Admin Control Center, Admin API	Supported. Available tools are: Admin API	Supported. Available tools are: Admin API
Linux Intel	Supported. Available tools are: Admin Control Center, Admin API	Supported. No License Manager tools are available (configure manually)	Not supported.
Linux ARM	Not supported	Supported. No License Manager tools are available (configure manually)	Not supported.
Mac	Supported. Available tools are: Admin Control Center, Admin API	Not supported.	Not supported.
Android	Not supported.	Supported. No configuration is required	Not supported.

Data File Protection Plugin Enhanced

The Data File Protection plugin now supports MP4 files played with HTML5. A sample file can be found in `%ProgramFiles(x86)%\Gemalto Sentinel\Sentinel LDK\VendorTools\VendorSuite\samples\DataProtection\mp4\`.

Enhancements for Linux

- Support for protection keys for Linux platforms has been enhanced as follows:
 - Sentinel Licensing API is now supported under Linux ARM. (Sentinel LDK Envelope is not currently supported for Linux ARM. However, a standalone tool that protects applications for Linux ARM is available. For more information, contact Technical Support.)
 - Sentinel SL UserMode protection keys are now supported under Linux ARM and Linux Intel. (This is applicable for applications that are protected using only Sentinel Licensing API. The applications cannot be protected using Sentinel LDK Envelope.)
 - Sentinel HL (Driverless configuration) keys are now supported for Sentinel LDK under Linux ARM. (Previously, these keys were supported for Linux ARM only with Sentinel LDK Embedded 7.3).
 - All remote protection keys are now supported under Linux ARM if the remote protection key supports concurrency and the key is supported on the machine where it is located.



All the functionality available in LDK Embedded 7.3 is now available in Sentinel LDK 7.5, using regular HVC instead of full HVC.

For a complete table of support for Sentinel protection keys, see the **Protection Keys Attributes** table in the *Sentinel LDK Software Protection and Licensing Guide*.

- An application that executes on a Linux Intel platform no longer requires the installation of Sentinel Run-time Environment when:
 - The application is licensed with a local Sentinel HL (Driverless configuration) key.
 - The application is licensed with an SL UserMode key.
 - The applications is licensed with a protection key on a remote machine.

The application uses the Integrated License Manager to handle communication with the local key or with the Admin License Manager on a remote license server machine.

For protected Windows applications that run under Wine, the Run-time Environment is still required.

Enhancements for Android

- The Sentinel Licensing API for Android applications is now supported under Android x86 32-bit as well as Android ARM.

- Sentinel LDK Envelope can now protect native 32-bit Android libraries for both ARM and x86 platforms.
- You now have the option in Sentinel LDK Envelope to protect only Java components or only native components for an application.

In earlier version of Sentinel LDK, the default locking type for Android application was **HL or SL-Usermode**.

With the introduction of the **Protection Type** ("All", "Java Only" and "Native Only") in this version, the default locking type has changed. This is because **All** and **Native Only** only support SL-Usermode.



Due to this change, when you open an older Envelope project file with Envelope v.7.5, the locking type is changed to **SL-Usermode**, because the **Protection type** is set to **All** by default.

Be sure to check the locking type the first time you open an older Envelope project for the first time with Envelope V.7.5, and modify the locking type as necessary.

- Import tables are now protected.
- The Android binary is now encrypted.
- Both BFD and the gold linker are now supported.

Unlocked Products Now Support the Execution-Count License Type

You can now define an Unlocked Product that contains Features with the Execution-Count license type. This allows you, for example, to distribute trialware applications whose usage is limited to a given number of executions rather than limited by time.



In this release of Sentinel LDK, this capability is only available when working with Sentinel License Generation API. In future releases, defining an Unlocked Product that contains Features with the Execution-Count license type will be available in Sentinel EMS.

The number of executions that you can define for any Feature in an Unlocked Products depends on the Modules you have purchased for your Sentinel Master key. The table that follows indicates the maximum values that can be assigned to any Feature in an Unlocked Product.

License Type Limitation	Modules on Master Key	
	Unlocked Trialware	Unlocked Unlimited (With or Without Unlocked Trialware)
Maximum duration of Time Period license	90 days from first execution	3,650 days from first execution
Maximum duration of Expiration Date license	90 days from current date	18-Jan-2038
Maximum number of executions for Execution Count license	30	16,777,215
Availability of Perpetual license	Not available	Available

Feature ID 0 in an Unlocked Product is automatically assigned the maximum duration of a Time Period license as permitted by the modules on the Master key, regardless of the License Type of the Product.

Accessing Sentinel License Manager Located on a Different Subnet

When a Windows application that is protected with Sentinel LDK v.6.0 or later is located on a different subnet than Sentinel License Manager and the Sentinel protection key, you must create a **hasp_vendorID.ini** configuration file to enable the application to find the License Manager.

Until now, for desktop applications, it was necessary to create a separate configuration file for each user on a given machine. Effective with LDK 7.5, you can create a single configuration file and place it in the directory in which the protected application is installed. This file can serve all users who operate the protected application on the machine.

Sentinel Licensing API Supports Consumption of Multiple Executions in a Single Call

The tag `<execution_count_to_consume>` can now be used to set the scope to log in to a protection key. This tag enables you to specify that multiple executions should be consumed by a single `hasp_login_scope()` API call.

A typical usage for this feature is to assign a different "cost" in executions for the different actions that an application can perform. All the executions would be consumed from a single pool of executions. For example, the customer could be charged one execution for a **save** operation and three execution for a **print** operation. This provides an alternative to the method of assigning a different Feature ID and providing a separate executions pool for each action. With different Feature IDs, the customer might deplete all the executions for one Feature while unused executions remain for other Features.

This operation is supported by all license types with exception of the SL Legacy license.

Added Support for Fallback to V-Clock

Sentinel HL (Driverless configuration) Time and NetTime keys contain a battery to operate the on-board real-time clock. This battery has a life expectancy of seven year. Protected applications with time-based licenses will stop working when the battery becomes depleted.

When working with Sentinel License Generation API, you can define licenses that enable the key to switch automatically to a virtual clock (V-Clock) in the event that the battery becomes depleted. This is done using the `<fallback_to_vclock>` attribute.

Support for the `<fallback_to_vclock>` attribute has been enhanced in this release as follows:

- The current setting for `<fallback_to_vclock>` can now be examined in the output generated by the `sntl_lg_decode_current_state()` function. (This enhancement is only available when the License Manager on the machine where the HL key is connected is from Sentinel LDK 7.5 or later.)
- In the previous release of Sentinel LDK, it was possible to enable `<fallback_to_vclock>`, but it was not possible to disable `<fallback_to_vclock>` after it was enabled. In the current

release, <fallback_to_vclock> can be disabled as long as the battery on the key is not depleted.

What's Changed in This Release?

This section describes significant changes to existing functionality that have occurred in this release of Sentinel LDK.

"SafeNet" is Now "Gemalto"

With the acquisition of SafeNet, Inc. by Gemalto, the SafeNet Sentinel LDK product is being rebranded to Gemalto Sentinel LDK. Most "SafeNet" pathnames and menu options have been renamed to "Gemalto." The table below provides details of the high-level changes that are implemented in this release.

Start Menu

Version 7.4	Version 7.5
Start > (All) Programs > SafeNet > Sentinel LDK	Start > (All) Programs > Gemalto Sentinel > Sentinel LDK

Path Names - Developer Machine

Version 7.4	Version 7.5
%ProgramFiles(x86)%\SafeNet Sentinel\Sentinel LDK	%ProgramFiles(x86)%\Gemalto Sentinel\Sentinel LDK
%ProgramFiles%\SafeNet Sentinel\Sentinel LDK	%ProgramFiles%\Gemalto Sentinel\Sentinel LDK
%ProgramFiles(x86)%\Common Files\Aladdin Shared\	Not changed
%ProgramFiles%\Common Files\Aladdin Shared\	Not changed
%UserProfile%\Documents\Aladdin\	%UserProfile%\Documents\Gemalto\
%HomePath%\Documents\SafeNet\Sentinel LDK 7.4\VendorTools\VendorSuite\Protected	%HomePath%\Documents\Gemalto\Sentinel LDK 7.5\VendorTools\VendorSuite\Protected

Path Names - End User Machine

Version 7.4	Version 7.5
%UserProfile%\Local Settings\Application Data\SafeNet Sentinel\	%UserProfile%\Local Settings\Application Data\Gemalto Sentinel\
%LocalAppData%\SafeNet Sentinel\Sentinel LDK\	%LocalAppData%\Gemalto Sentinel\Sentinel LDK\

Version 7.4	Version 7.5
%CommonProgramFiles(x86)%\Aladdin Shared\	Not changed
%CommonProgramFiles%\Aladdin Shared\	Not changed

Change to Handling for Feature ID 0 for Unlocked Products

Each Product license automatically contains Feature ID 0; there is no need to define this Feature.

In earlier versions of Sentinel LDK, the duration of Feature ID 0 for Unlocked Products depended on a number of factors. Effective with the current version of Sentinel LDK, the duration of Feature ID 0 for Unlocked Products is as follows:

Modules on Master Key	Duration of Feature ID 0
Unlocked Trialware	Time period of 90 days
Unlocked Unlimited	Unlimited (Perpetual)
Unlocked Trialware and Unlock Unlimited	Unlimited (Perpetual)

For Locked Products, the duration of Feature ID 0 is unlimited (perpetual) with no dependency on the modules on the Master key.

Online Activation Is No Longer Available for Sentinel SL UserMode Keys

To activate an SL key using online activation in the Sentinel EMS Customer Portal, an end user required at least one of the following:

- A Web browser that supports Java Applets
- Sentinel LDK Run-time Environment

Sentinel SL UserMode keys are used in order to avoid the need to install Sentinel LDK Run-time Environment. Since major Web browsers no longer support Java Applets, it may no longer be possible to perform online activation of SL UserMode keys.

Activation of an SL UserMode key can be accomplished by one of these methods:

- Use a Product key and the **Offline Activation** option in Sentinel EMS Customer Portal. This option directs the user to activate the SL UserMode key using the RUS utility.
- Generate an entitlement in Sentinel EMS using the **Protection Key Update** option and then direct the user to use the RUS utility to activate the SL UserMode key.

Correction to Documentation for Data Protection (Version 2 Mode) for Android

Documentation for Sentinel LDK v.7.4 states that a data file that is protected with **Version 2** data protection mode can be read and modified by the protected application on the end user's machine. This statement is partially incorrect. Documentation has been corrected to state as follows:

- Under Windows and .NET (Windows shell), data files protected with **Version 2** data protection mode can be read and modified by the protected application.

- Under Android, data files protected with **Version 2** data protection mode should be regarded as read –only. If a protected data file is modified or overwritten by the protected application on the end user's device, the file is written in clear text (decrypted).

Change to Documentation for Sentinel LDK Envelope for Java Applications

The Help file for Sentinel LDK Envelope has been modified to add the following limitation for protection of Java applications:

Sentinel LDK Envelope does not support protection of the types of methods listed below. Be sure to unselect these methods before you protect your Java application.

- Dynamic methods.
- Reflection methods.
- Deserialize or typecasting methods.

Disabling the "Depleted Battery" Warning for Developer Keys

Each of your Vendor keys (Master key and Developer key) contains a battery to power the real-time clock on the key. Typically, this battery has a life expectancy of approximately seven years.

Sentinel EMS now displays a warning when a Master key whose battery is nearly depleted is detected. Several Vendor Tool applications (ToolBox, Envelope, Master Wizard) display a warning by default when a Developer key whose battery is nearly depleted is detected. These messages contain information on how to replace the key.

You have the option to suppress the warning message for the Developer key in each Vendor Tool application. In the settings for the application, clear the check box for **Show warning for depleted battery**.

If the battery in your Master key or Developer key is fully depleted, you may be blocked from performing important functions in Sentinel LDK.

Supported Platforms for Sentinel LDK - End Users and Vendors


The operating system versions listed in this section were tested by Gemalto and verified to be fully compatible with Sentinel LDK. Older operating system versions are likely to be fully compatible as well, but are not guaranteed. For reasons of compatibility and security, Gemalto recommends that you always keep your operating system up to date with the latest fixes and service packs.

Supported Platforms for End Users

Sentinel LDK Run-time Environment, Protected Applications

The following Sentinel LDK Run-time Environments are provided with this release of Sentinel LDK:

System	Run-time Environment Version
Windows	Version 7.51
Mac	Version 7.51
Linux Intel	Version 7.51

 To support all the latest enhancements in Sentinel LDK, end users should be provided with the latest Run-time Environment. However, for all pre-existing functionality in Sentinel LDK, respective earlier versions of Sentinel Run-time Environment are supported.

The Sentinel LDK Run-time Environment, and protected applications (with or without the Run-time Environment), can be installed under the following systems:

System	Supported Versions
Windows	<ul style="list-style-type: none"> ■ Windows (x86) XP SP3 ■ Windows (x64) XP SP2 ■ Windows Vista SP2 ■ Windows 7 SP1 ■ Windows 8.1 SP1 ■ Windows Server 2003 SP2 ■ Windows Server 2008 SP2 ■ Windows Server 2008 R2 SP1 ■ Windows Server 2012 R2 ■ Windows 10 Version 1607 (Device Guard must not be enabled) <p>The latest service packs and security updates must be installed.</p>
Windows Embedded	<ul style="list-style-type: none"> ■ (x86 only) Windows XP Embedded standard ■ (x86 only) Windows 7 SP1 Embedded standard
Mac	<ul style="list-style-type: none"> ■ Mac OS X 10.9.5 ■ Mac OS X 10.10 ■ Mac OS X 10.11

System	Supported Versions	
Linux	Linux Intel (x86 and x86_64)	<ul style="list-style-type: none"> ■ OpenSUSE 12.3, 13.2 ■ Red Hat EL 6.7, 7.2 ■ Ubuntu Server 14.04, 16.04 ■ Ubuntu Desktop 16.04 ■ Debian 8.1 ■ CentOS 7.1, 7.2 <p>The latest service packs and security updates must be installed.</p>
	Linux ARM (armel and armhf)	<p>The following hardware/boards have been validated:</p> <ul style="list-style-type: none"> ■ BeagleBoard-xM Rev C ■ BeagleBone Black ■ Raspberry Pi-2 ■ PandaBoard ES Rev B3_ ■ NI cRIO-9068
	Wine	Sentinel LDK Run-time Environment was tested on Linux platforms with Wine 1.7.28.
Android	Android ARM (32-bit) Android x86 (32-bit)	Android 4.4.2, 5.1.1, 6.x
	Android Architecture	<p>The following architecture is supported:</p> <ul style="list-style-type: none"> ■ armv7 ■ armv7a ■ x86
	Android ABI	<p>Sentinel LDK Envelope supports Android applications designed for the following Android application binary interfaces:</p> <ul style="list-style-type: none"> ■ armeabi ■ armeabi-v7a ■ x86

System	Supported Versions
Virtual Machines	<p>The VM detection and VM fingerprinting capabilities provided by Sentinel LDK have been validated on the following technologies:</p> <ul style="list-style-type: none"> ■ Parallel Desktop 11 for Mac ■ VMware Player 6.0.3 ■ VMware Workstation 12.0 ■ VMware ESXi 5.5, 6.x ■ Hyper-V Server 2012 R2 (SL only) ■ Xen 4.6 ■ KVM (RHEL 7.2, Ubuntu 14.04 server, Debian 8.x) ■ Microsoft Azure <ul style="list-style-type: none"> Note: Azure stop/start is not supported at this stage and will cause the license to be flagged as cloned. ■ VirtualBox 4.3.28 <ul style="list-style-type: none"> Note: An application that has been protected for performance profiling (with AppOnChip) will not work correctly with Virtual Box versions prior to 4.3.28.

Data File Protection Plugin for Internet Explorer

The Data File Protection plugin (MSI file) is compatible with the following versions of Microsoft Internet Explorer:

- Versions 8 through 11



The Data File Protection plugin cannot be installed on a virtual machine.

Web Browsers for Sentinel Admin Control Center


- Microsoft Internet Explorer (32-bit) versions 8, 9, 10, 11
- Microsoft Edge
- Mozilla Firefox (32-bit) - latest version
- Google Chrome - latest version
- (Mac) Safari - latest version

Supported Platforms for Vendors

Sentinel EMS Service

System	Supported Versions
Windows	See supported Windows platforms for Sentinel LDK Run-time Environment (above).

Sentinel EMS Database



System	Supported Database Server Software
Windows	<ul style="list-style-type: none"> ■ Microsoft SQL Server 2005 x86/x64 ■ Microsoft, SQL Server 2005 Express Edition (must be enabled for remote connections) x86/x64 ■ Microsoft SQL Enterprise 2008 x86/x64 ■ Microsoft SQL Enterprise 2008 R2 x86/x64 ■ Microsoft SQL Server 2012 x86/x64 ■ Microsoft SQL Server 2012 R2 x86/x64 ■ Microsoft SQL Server 2014 x86/x64 <p>Microsoft SQL Server 2008 R2 Express Edition can be installed automatically by the Sentinel EMS Installation wizard. The installer for this version of Microsoft SQL Server is also available on the Sentinel LDK installation DVD.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;">  <p>MSQL Server 2008 R2 Express Edition is not supported under Windows 10. For detailed instructions on how to install and configure MSQL Server 2012 for Sentinel EMS, see the Technical Note available here.</p> </div>

Web Browsers for Sentinel EMS

- Microsoft Internet Explorer versions 8, 9, 10, 11
- Mozilla Firefox (32-bit) version 40 or later
- Microsoft Edge
- Google Chrome version 53 or later

You must use a 32-bit Web browser for any action in Sentinel EMS that accesses a protection key applet (such as burn, recycle, check in key, or online activation). You can perform all other actions in Sentinel EMS using a 32-bit or 64-bit Web browser.

Sentinel LDK Vendor Tools

System	Supported Versions
Windows	<ul style="list-style-type: none"> ■ See supported Windows platforms for Sentinel LDK Run-time Environment (above). <p>Requires screen resolution 1280 by 1024 pixels with 24-bit color quality</p> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">  For Sentinel LDK Envelope: To protect and execute the provided .NET sample application under Windows 8.1 or Windows Server 2012 R2, you must install Microsoft .NET Framework 3.5. </div> <div style="border: 1px solid black; padding: 5px;">  For Sentinel LDK Master Wizard: Your customized Data File Protection plugin for Internet Explorer (to display certain types of protected multimedia files) is generated when you introduce the Master Key. If you plan to use this plugin, .NET Framework 3.5 or later must be present on the machine where you run the Master Wizard. </div>
Mac	<ul style="list-style-type: none"> ■ Mac OS X 10.10 ■ Mac OS X 10.11 <p>Applications built on the Cocoa framework are supported.</p>
Linux Intel	<ul style="list-style-type: none"> ■ OpenSUSE 12.3 (x86 and x86_64) ■ Red Hat EL 7.2 (x86 and x86_64) ■ Ubuntu Server 16.04 (x86 and x86_64) ■ Ubuntu Desktop 16.04 (x86 and x86_64) ■ Debian 8.x (x86 and x86_64) ■ CentOS 7.1, 7.2 (x86 and x86_64) <p>The latest service packs and security updates must be installed.</p>
Android	<p>Sentinel Envelope supports Android applications designed for the following versions: 4.4.2, 5.1.1, 6.x</p> <p>Android ARM and x86 platforms are supported. (MIPS platform is not supported.)</p>


Supported Versions for Windows CE

The Sentinel LDK Run-time Environment (version 5.95) and Envelope deliverables are supported for Windows CE versions 5.0 and 6.0.

Supported Platforms for Code Samples

Provided code samples are supported on the same platforms as listed above for Sentinel LDK Vendor Tools.

Tested Compilers for Code Samples

API	Programming Language	Tested Compilers
Licensing API for Windows	AutoCAD	AutoCAD 2009, 2010, 2014
	C	Microsoft Visual Studio 2005, 2008, 2010, 2013*, 2015 C++ Builder Developer Studio 2006
	Visual Basic .NET	Microsoft Visual Studio 2013*, 2015
	C#	Microsoft Visual Studio 2013*, 2015
	C++	Microsoft Visual Studio 2005, 2008, 2010, 2013*, 2015 <div data-bbox="829 905 1393 1031" style="border: 1px solid black; padding: 5px; margin: 5px 0;">  To compile the 64-bit samples using VS 2008, ensure that the 64-bit compiler package is installed when you install VS. </div> C++ Builder Developer Studio 2006 gcc
	Delphi	Delphi 2007 Developer Studio 2006 Delphi XE3
	Java	Java Developer Kit 1.7,1.8
	4D	4D v11 SQL
Licensing API for Mac OS X	Java	Java Developer Kit 1.6
	4D	4D v11 SQL
	C	gcc, Xcode
Licensing API for Linux	Java	Java Developer Kit 1.6
	C	gcc
	C++	gcc
Licensing API for Android	Java	Java Developer Kit 1.8
License Generation API	C, C#, Visual Basic .NET	Microsoft Visual Studio 2013*, 2015
	Java	Java Developer Kit 1.8

API	Programming Language	Tested Compilers
Activation API for Windows	C	Microsoft Visual Studio 2003, 2005, 2008, 2010, 2012 Provided workspace may need to be converted for the VS version used.
	Java	Java Developer Kit 1.6
Activation API for Mac OS X	Java	Java Developer Kit 1.6
Activation API for Linux	Java	Java Developer Kit 1.6
Runtime Environment Installer	C	Microsoft Visual Studio 2005, 2008, 2010, 2012
	MSI	Wise for Windows Installer 7.1 InstallShield 2012 Spring or later Note: The provided solution can only be used with InstallShield 2013 Spring or later.
Admin API for Windows	Java	Java Developer Kit 1.8
	C, C#, C++, Visual Basic .NET	Microsoft Visual Studio 2013*, 2015
Admin API for Linux	C	gcc
Admin API for Mac OS X	C	gcc, Xcode
Envelope Runtime API	C#	Microsoft Visual Studio 2013*, 2015
* Visual Studio 2015 *.sln should be imported to use in Visual Studio 2013.		

Supported Platforms for Sentinel Cloud Licensing

Sentinel Cloud Run-time has been tested on the following platforms:

Run-time	Run-time Interface	Platforms Tested	Run-time Environment	Web Server
Cloud	Java	Windows <ul style="list-style-type: none"> ■ Windows 2012 ■ Windows 8 ■ Windows 8.1 ■ Windows 7 ■ Windows Server 2008 Linux <ul style="list-style-type: none"> ■ Ubuntu 14 ■ CentOS 5.4 ■ Red Hat Enterprise Linux (RHEL) 6.3 ■ SLES 12.1 	JRE 7.0	Tomcat 7
	.NET	Windows <ul style="list-style-type: none"> ■ Windows 2012 ■ Windows 8 ■ Windows 8.1 ■ Windows 7 ■ Windows Server 2008 	.NET Framework 2.0 and 3.5	IIS 6.0 and 7.0
	C	Windows <ul style="list-style-type: none"> ■ Windows 2012 (64-bit) ■ Windows 8.1 (64-bit) ■ Windows 8 (64-bit) ■ Windows 7 (32-bit and 64-bit) ■ Windows Server 2008 (32-bit and 64-bit) Linux (32-bit and 64-bit) <ul style="list-style-type: none"> ■ Ubuntu 14 ■ CentOS 5.4 ■ Red Hat Enterprise Linux (RHEL) 6.3 ■ SLES 12.1 	-	-

Run-time	Run-time Interface	Platforms Tested	Run-time Environment	Web Server
On-premise	Java	Windows <ul style="list-style-type: none"> ■ Windows 2012 (64-bit) ■ Windows 8.1 (64-bit) ■ Windows 8 (64-bit) ■ Windows 7 (32-bit and 64-bit) ■ Windows Server 2008 (32-bit and 64-bit) Linux <ul style="list-style-type: none"> ■ Ubuntu 14 ■ CentOS 5.4 ■ Red Hat Enterprise Linux (RHEL) 6.3 ■ SLES 12.1 	JRE 7	Tomcat 7
	.NET	Windows <ul style="list-style-type: none"> ■ Windows 2012 ■ Windows 8 ■ Windows 8.1 ■ Windows 7 ■ Windows Server 2008 	.NET Framework 2.0 and 3.5	IIS 6.0 and 7.0
	C (32-bit and 64-bit)	Windows <ul style="list-style-type: none"> ■ Windows 2012 (64-bit) ■ Windows 8.1 (64-bit) ■ Windows 8 (64-bit) ■ Windows 7 (32-bit and 64-bit) ■ Windows Server 2008 (32-bit and 64-bit) Linux (32-bit and 64-bit) <ul style="list-style-type: none"> ■ Ubuntu 14 ■ CentOS 5.4 ■ Red Hat Enterprise Linux (RHEL) 6.3 ■ SUSE 12.1 	-	-

Current Firmware Version

The version of the firmware on Sentinel HL keys that are delivered at the time of the release of Sentinel LDK v.7.5 is 4.27.

To view the version of the firmware for any given Sentinel HL key, connect the key to a computer where Sentinel LDK Run-time Environment is installed and open Admin Control Center.

Dropped Support

This section lists platforms which were supported in the past, but have not been tested with Sentinel LDK v.7.5. Gemalto will continue to accept queries for issues related to these platforms and will attempt to provide information to resolve related issues.

Platforms for Developers and End Users

Testing for the following platforms has been discontinued:

Platform	Discontinued For
Mac 10.7.5, 10.8.5	Vendor and end users
Mac 10.9.5	Vendors
Ubuntu 14.04 Desktop	Vendor and end users
Ubuntu 12.04.3 Desktop and Server	Vendor and end users
Ubuntu 14.04 Server Edition	Vendors

Testing for the following virtual machine has been discontinued:

- Parallel Desktop v9

Sentinel LDK Documentation

The documents and online help systems described below are provided in this release of Sentinel LDK.

Documents

Sentinel LDK documents (PDF files) can be found:

- on the (physical) Sentinel LDK Installation DVD, under: **\Windows\Installed\Docs**
- where Sentinel LDK is installed, under:
%ProgramFiles(x86)%\Gemalto Sentinel\Sentinel LDK\Docs
- where Sentinel EMS is installed, under:
%ProgramFiles(x86)%\Gemalto Sentinel\Sentinel EMS\EMSServer\webapps\ems\Docs

(For Win32, under: **%ProgramFiles%\...**)

Document	Description
Sentinel LDK Installation Guide	Details the prerequisites and procedures for installing Sentinel LDK Vendor Tools, Sentinel EMS Server, and the Run-time Environment.

Document	Description
Sentinel LDK Software Protection and Licensing Guide	Provides in-depth information about the logic of the applications and best practices for maximizing your software protection and licensing strategies. Describes a wide range of licensing strategies and models that you can implement, and can serve as the basis for elaboration and for creating new, tailor-made licensing models.
Sentinel LDK Software Protection and Licensing Tutorials	<p>Guide you through the basic procedures of Sentinel LDK to familiarize you with the applications and their functionality.</p> <ul style="list-style-type: none"> • The Demo Kit tutorial is for vendors who wish to evaluate Sentinel LDK. • The Starter Kit tutorial is for vendors who have just purchased Sentinel LDK. <p>Two versions of each tutorial are provided – one for working with Sentinel EMS as the back office system, and one for vendors who want to provide their own back office system and only use the Sentinel LDK APIs to handle licensing and protection.</p>
Sentinel LDK Quick Start Guides	Provides a short and simple demonstration of how you can easily protect your software using Sentinel HL keys. Separate Demo Kit and Starter Kit guides are provided.
Migration Guide: Sentinel HASP to Sentinel LDK	Describes how to migrate from Sentinel HASP to Sentinel LDK. Describes how to migrate your Business Studio Server database to a Sentinel EMS database. This guide also describes the Business Studio Server API for Sentinel EMS.
Additional Guides for Migrating to Sentinel LDK	<p>These guides describe how to migrate to Sentinel LDK from:</p> <ul style="list-style-type: none"> - Hardlock - SmartKey - Sentinel SuperPro - HASP HL - HASP4 - Sentinel Hardware Keys
Integrating Sentinel EMS Server into Your Existing Back-Office Systems	Outlines the many ways that software vendors can maximize the potential of their existing back-office systems, such as ERP, CRM, and business intelligence systems, through seamless integration with Sentinel EMS Server.
Sentinel EMS Configuration Guide	Provides information on setting up and configuring Sentinel EMS to satisfy the requirements of your organization.

Document	Description
Sentinel EMS User Guide	Provides the Sentinel EMS user with detailed directions on how to set up license entities and how to handle entitlements, production, and support for Sentinel HL and SL keys. (This information is also provided in online help for the Sentinel EMS user interface.)
Sentinel EMS Web Services Guide	Provides the developer with an interface for integrating Sentinel EMS functionality into the vendor's existing back-office systems.

Sentinel Cloud Licensing Documents

The documentation in the table that follows describes how to work with Sentinel Cloud Licensing. This documentation is provided with the Sentinel Cloud Licensing installer.

Document	Description
Sentinel Cloud Run-time Guide	Sentinel Cloud Run-time API reference (Java, .NET, and C)
Sentinel Cloud - Quick Start Guide	Document to help you quickly start with Sentinel Cloud
Sentinel Cloud Services Installation Guide	Describes how to install Sentinel Cloud Services
Sentinel Cloud Connect Web Services Guide	Reference for using the Sentinel Cloud Connect Web services
Sentinel Cloud Run-time Java Demo Application ReadMe	Explains how to use the Sentinel Cloud Services Demo Application
Sentinel Cloud Run-time .NET Reference Application ReadMe	Sample for using the Cloud Runtime APIs written in .NET
Sentinel Cloud Run-time C Reference Application ReadMe	Sample for using the Cloud Runtime APIs written in C
Sentinel Cloud Connect Web Services Python Sample ReadMe	Sample for integrating Sentinel Cloud Connect Web services in Python application

Getting Started Guides

Getting Started Guides for other operating systems can be found as follows:

Linux

The *Getting Started Guide for Linux* can be found in the Linux download or on the Sentinel LDK Installation DVD, under: **\Linux**

MacOS

The *Getting Started Guide for MacOS* can be found in the Mac download or on the Sentinel LDK Installation DVD, under: **\MacOS**

Android

The *Getting Started Guide for Android* can be found:

- on the (physical) Sentinel LDK Installation DVD, under: **\Android**
- where Sentinel LDK is installed, under:
%ProgramFiles(x86)%\Gemalto Sentinel\Sentinel LDK\Additional Platforms\Android
 (For Win32, under: **%ProgramFiles%\...**)

Help Systems - Sentinel LDK and Sentinel EMS User Interfaces

The documentation described in the table that follows can be accessed from the user interface for the relevant Sentinel LDK component.

Online Help System	Description
Sentinel LDK Admin Control Center	Documentation for the end user, describing the Admin Control Center and providing instructions for performing the various functions such as updating or attaching licenses.
Sentinel EMS	Provides the Sentinel EMS user with detailed directions on how to set up license entities and how to handle entitlements, production, and support for Sentinel HL and SL keys.
Sentinel LDK Data Encryption Utility (Separate versions for Windows and for Mac)	Provides the developer with a description of the Sentinel LDK Data Encryption utility (formerly DataHASP utility), used for protecting data files that are accessed by Sentinel LDK Envelope.
Sentinel LDK Envelope (Separate versions for Windows and for Mac)	Describes how to employ Sentinel LDK Envelope to automatically wrap your programs with a protective shield. The application provides advanced protection features to enhance the overall level of security of your software.
Sentinel LDK ToolBox	Describes how to work with the ToolBox user interface for the Licensing API, License Generation API, and Admin API. Using Sentinel LDK ToolBox, the developer can experiment with the individual functions that are available in each API and can generate programming code for insertion in the developer's own program. Provides full documentation for each of the included APIs.

Online Help Systems - Sentinel LDK APIs

Documentation for the Sentinel LDK APIs described below can be found:

- on the Sentinel LDK Installation DVD, under: `\Windows\Installed\API\`
- where Sentinel LDK is installed, under:
`%ProgramFiles(x86)%\Gemalto Sentinel\Sentinel LDK\API\`

(For Win32, under: `%ProgramFiles%\...`)

Sentinel LDK API	Description
Activation API Reference	Provides function calls that can be used to simplify the process of SL key activation at the customer site. (Deprecated – replaced by Sentinel EMS Web Services.)
Licensing API Reference (formerly Run-time API)	Provides the developer with an interface to use the licensing and protection functionality available in the Sentinel LDK Run-time Environment.
Run-time COM API	Provides the developer with access to Sentinel HASP Run-time Environment functionality, through an interface written for the Microsoft Component Object Model (COM).
Run-time Installer API	Provides the developer with an interface for integrating installation of the Run-time Environment into the installation of the vendor's protected application.
Sentinel EMS Web Services	Provides the developer with an interface for integrating Sentinel EMS functionality into the vendor's existing back-office systems. (Documentation is available from the index.html menu under %ProgramFiles(x86)%\Gemalto Sentinel\Sentinel EMS\EMSServer\webapps\ems\Docs\ (For Win32, under %ProgramFiles%...)
License Generation API Reference	Provides access to the power and flexibility of Sentinel protection keys without the need to employ the full Sentinel EMS system. The developer can call functions in this API to generate and update licenses for Sentinel protection keys.
Admin API Reference	Provides the functionality available in Admin Control Center and Sentinel License Manager in the form of callable API functions.

Instructional Videos

A library of instructional videos for Sentinel LDK is available at:

<http://sentinelvideos.safenet-inc.com/>

Software and Documentation Updates

Gemalto recommends that you frequently visit the [Sentinel downloads page](#) to ensure that you have the most recent versions of Sentinel LDK software and documentation, and for documentation in other languages.


Known Issues and Workarounds

The known issues in Sentinel LDK v.7.5 that are likely to have the most significant impact on users are listed below, according to component.

Additional, less-common issues can be found in the Gemalto Knowledgebase at:

<https://www.safenet-inc.com/ldk-known-issues>

Sentinel LDK Installation

Ref	Issue
EMSLDK-5860	<p>Installation of Sentinel LDK on a virtual machine may hang before completion of the installation process.</p> <p>Workaround: Interrupt and then restart the installation. If the problem occurs again, interrupt the installation. Enable 3D acceleration and increase the video memory of the virtual machine. Rerun the installation.</p>
LDK-12131	<p>When the schedule for checking for updates in Sentinel LDK Software Manager is set to "Manual", the setting is not saved. Instead, Software Manager reverts to the default setting (every 3rd Wednesday at 15:00).</p>
EMSLDK-7448	<p>Sentinel EMS fails to install correctly on a machine where JRE 8 and earlier versions of JRE coexists.</p> <p>If a machine contains an earlier version of JRE, and you manually install JRE 8, then:</p> <ol style="list-style-type: none"> 1. When installing Sentinel EMS, the Installer generates the error "Kindly Start the Service -SQLServer(EMSDATABASE) and then click OK". 2. When you click OK, the installation fails with multiple errors. <p>The reason for this is as follows: While upgrading to JRE 8, the Java installer does not replace earlier JRE files from the System32 directory.</p> <p>Workaround: Uninstall the earlier versions of JRE from your machine, and restart the Sentinel EMS installation.</p> <div style="border: 1px solid black; padding: 10px; margin-top: 10px;"> <ul style="list-style-type: none">  When upgrading to JRE 8, the Java installer also recommends that you uninstall earlier the version of JRE from your machine due to security concerns. For more information, see: https://bugs.openjdk.java.net/browse/JDK-8073939 ■ This issue does not occur when your machine contains earlier versions of JRE, and the Sentinel EMS installation installs bundled JRE 8 reference. </div>

Ref	Issue
EMSLDK-7806	<p>If you accept the default SQL server (Microsoft SQL Server 2008 R2 Express Edition) provided by the Sentinel EMS installer, the installation fails under Windows 10 because this SQL server is not supported under Windows 10.</p> <p>Workaround: Before you install Sentinel EMS, install Microsoft® SQL Server® 2012 Service Pack 2 (SP2) Express. For detailed instructions on how to install and configure MS SQL Server 2012 for Sentinel EMS, see the Technical Note available here.</p>
LDK-16617	<p>When the Windows Installer on the machine is version 4.0, the Sentinel EMS installation wizard fails to install SQL server 2008.</p> <p>Workaround: Restart the machine and start Sentinel EMS installation again.</p>

Sentinel EMS

Ref	Issue
EMSLDK-5168	<p>When packaging a Run-time Environment installer with a V2C file for one or more Products in Sentinel EMS, you cannot include a Product that only has the locking type SL UserMode. An attempt to install such a package will fail with the message "V2C unknown HASP API 49 Error". Sentinel EMS does not currently prevent you from creating such a package.</p> <p>Workaround: When generating the RTE installer in Sentinel EMS, use the locking type SL-AdminMode for Products.</p>

Sentinel Cloud Licensing

Ref	Issue
EMSLDK-5934	<p>Entitlement-level Caching: Sentinel Cloud Licensing is unable to consume a license if the end user machine contains multiple hard disk drives. Error 1021 is generated.</p>

End Users, Sentinel LDK Runtime Environment, License Manager, and Customer Tools

Ref	Issue
LDK-8480	<p>With some new USB chipsets, it is possible that the API <code>hasp_update()</code> call, used to update the firmware of Sentinel HL keys to version 3.25, will generate the <code>HASP_BROKEN_SESSION</code> return code, even if the firmware is correctly updated. (This issue does not occur with Sentinel HL Driverless keys with firmware version 4.x.)</p> <p>Workaround: Install the latest Run-time Environment. The automatic firmware update feature of the License Manager will automatically update the firmware of the key the first time that the key is connected, without the need to call <code>hasp_update()</code>.</p>

Ref	Issue
LDK-9044	<p>Given the following circumstances:</p> <ul style="list-style-type: none"> ■ A Sentinel HL (Driverless configuration) key is connected to a USB host controller in default mode on QEMU emulator version 2.0.0 and Virtual Machine Manager version 0.9.5. <p>When the key is disconnected, the key continues to be displayed in Admin Control Center as a connected key. (However, a protected application whose license is located in the key does not execute after the key is disconnected.)</p> <p>Workaround: Switch the USB controller to USB 2.0 mode.</p>
LDK-10670	<p>After a user connects a Razer Abyssus mouse and installs Razer drivers on a computer, the device manager on the computer does not recognize a Sentinel HL key if the key is connected to the same USB port where the mouse was previously connected.</p> <p>This issue has been reported to Razer.</p>
LDK-12172	<p>The Data File Protection plugin is installed in both 32-bit and 64-bit Internet Explorer. However, the plugin is not functional in 64-bit Internet Explorer.</p> <p>Workaround: Use the 32-bit Internet Explorer to view protected data files.</p>
LDK-12547	<p>Under Linux, if the user is running a Windows 64-bit protected application using Wine with default options, Linux may return a "debugger detected" error.</p> <p>Workaround: When you protect the application using Envelope, disable User debugger detection for the application.</p>
LDK-14971	<p>Given the following circumstances at a customer site:</p> <ul style="list-style-type: none"> ■ One machine has Run-time Environment version 7.51. ■ A second machine has a version of Run-time Environment that is earlier than 7.51. ■ The customer performs rehost of a license repeatedly between the two machines. ■ An update is applied to the license on either of these machines. <p>A rehost operation may fail with the message HASP_REHOST_ALREADY_APPLIED.</p> <p>Workaround: Obtain a new SL license from the software vendor for the protected application on the target machine. Before attempting any additional rehost procedure, install the latest Run-time Environment on both machines.</p>
LDK-15991	<p>When working in Internet Explorer with Enable Protected Mode selected and with Enable Enhanced Protected Mode selected, the Data File Protection plugin cannot open encrypted flv/swf/mp4 files since the plugin cannot locate the license. If only Enable Protected Mode is enabled, the plugin cannot locate an SL UserMode license.</p> <p>Workaround: Start Internet Explorer as an administrator. the Data File Protection plugin will locate any type of license regardless of the state of Protected Mode and Enhanced Protected Mode.</p>

Sentinel LDK Envelope for Windows Platforms

General

Ref	Issue
LDK-6235	<p>If a protected DLL is launched by an unprotected console application, and the DLL code is in sleep() mode, the DLL does not detect if a debugger is attached to the console application.</p> <p>Workaround: Ensure that the console application is also protected.</p>
LDK-11727	<p>Debugger detection is not provided for .NET applications.</p> <p>Workaround: Implement debugger detection mechanism in the application code, and use Envelope to protect the methods that call these functions.</p>
LDK-3424	<p>Although a Win32 DLL file can be protected with debug detection enabled, the C# application that calls the DLL can run successfully in debug mode.</p> <p>However, the C# application uses a CLI debugger. This debugger cannot debug x86 DLL code. Therefore, this debugger is not detected for the protected Win32 DLL file.</p>
LDK-11191	<p>When a protected application is run under Novell ZENworks Agent, the application may generate "Debugger Detected" errors and may fail to run. This is because ZENworks Agent attaches to the started application as a debugger in order to monitor different events.</p>
LDK-6695	<p>When a "Debugger Detected" error is generated, it is not possible for the protected application to determine which process is regarded as a debugger.</p>
LDK-8850	<p>When a protected application detects that a debugger is attached, the application may generate multiple "Debugger Detected" message windows.</p>
LDK-12377	<p>Given the following circumstances:</p> <ul style="list-style-type: none"> ■ The message output mode for a protected application is set to 2 (eventlog). ■ hasp_rt.exe is included with the protected application. ■ The application does not find the required HL key when it performs the periodic background check (for example, the HL key was temporarily disconnected). <p>The application does not continue when the HL key is reconnected.</p> <p>Workaround: Do not set the message output mode to 2 or do not include hasp_rt.exe with the protected application.</p>

Java

Ref	Issue
LDK-11195	<p>When protecting a Java application, Envelope fails with the message "Serious Internal Error (12)".</p> <p>Workaround: If this error occurs, protect the Java application using either of the following techniques:</p> <ul style="list-style-type: none"> ■ If the application contains JARs within a JAR/WAR executable, remove those JARs when protecting the executable with Envelope. You can add the JARs to the JAR/WAR executable after protection is complete. ■ Create a JAR/WAR executable using only those classes that you want to protect. After applying protection, you can add other classes or JARs, or any other dependencies in the protected JAR/WAR executable.
LDK-11418	<p>For a Java 7 or Java 8 application that is protected with Envelope, the end user must use the following flag when launching the protected application:</p> <ul style="list-style-type: none"> ■ For Java 7: Specify <code>-usesplitverifier</code> ■ For Java 8: Specify <code>-noverify</code> <p>If the appropriate flag is not specified, the application may throw java.verifyerror when launched.</p>

Sentinel LDK Envelope and Data Encryption for Mac OS X

Ref	Issue
LDK-11655	<ul style="list-style-type: none"> ■ When running Envelope in a VMware Fusion 7.1.1 virtual machine on a Mac machine, if you save the protected application to a HGFS (Host Guest File System) volume, the application file is corrupted. ■ When you run a protected application on a VMware Fusion virtual machine from an HGFS share, if the application requires write access, the error "unable to write to file" is generated.