

**THALES**

# Sentinel LDK 8.3 with Sentinel LDK-EMS

## RELEASE NOTES



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# Sentinel LDK 8.3 with Sentinel LDK-EMS - Release Notes

## About This Document

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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, Thales recommends that you check the release notes available online to see if any information was added or changed. You can access the latest release notes from this location:

<https://docs.sentinel.thalesgroup.com/ldk/home.htm>

# Product Overview

Sentinel LDK is Thales's industry-leading software protection and licensing solution. It provides cutting edge security technologies for the utmost in copy protection, a range of license models and entitlement fulfillment options, and out-of-the-box tools which facilitate quick integration and deployment. Sentinel LDK supports hardware-based, software-based and cloud-based licensing and includes a range of APIs to allow software vendors to automate and tailor the implementation to their unique business requirements.

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 Developer key and the Sentinel Master 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 only required if you install Sentinel LDK-EMS on premises. It is used in conjunction with Sentinel LDK and is attached to the Sentinel LDK-EMS Server. This 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.

**Important:** The Master key is especially valuable because it is used to generate 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.

# What's New in Sentinel LDK 8.3?

This section describes the main new features and enhancements.

**NOTE** The Sentinel LDK 8.3 release includes all features and enhancements from earlier releases. Details on patches that were released between Sentinel LDK 8.2 and Sentinel LDK 8.3 are also included in this document.

If you are upgrading from a version of Sentinel LDK that is earlier than 8.2, 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.

## Support for High Availability for Cloud Licensing

Sentinel LDK now supports configuring a vendor-hosted cloud license server for high availability.

Sentinel LDK License Managers in the vendor's data center can be configured to store licenses in a common external trusted license storage (a MySQL database cluster).

You can set up License Managers on two license server machines (active and passive). In the event the active License Manager stops responding, an application manager can handle failover from the active License Manager to the passive one. Only one License Manager will serve licenses at any point in time.

For information on setting up high availability for cloud licensing, see the [Sentinel LDK High Availability for Cloud Licensing Configuration Guide](#).

## Release of Sentinel LDK with Sentinel EMS

Until now, Sentinel LDK has always been integrated and released with a dedicated version of Sentinel EMS (now referred to as *Sentinel LDK-EMS*). Sentinel LDK-EMS is available either for installation on the vendor's server (on-premises) or as a service (hosted on a Thales server).

Starting with this release, Sentinel LDK is available for integration with a new, enterprise-level version of Sentinel EMS, hosted on Thales servers. This improved version of Sentinel EMS provides an advanced user interface and REST API to manage resources. Sentinel EMS supports multiple methods of enforcement, including custom and third-party enforcement types.



For this edition of Sentinel LDK, only Sentinel LDK Vendor Suite is installed on the vendor's machine. The advanced version Sentinel EMS is hosted on Thales servers, where it is enhanced continuously with improvements and updates.

For vendors who are currently using Sentinel LDK and Sentinel LDK-EMS, the differences between Sentinel EMS and Sentinel LDK-EMS are summarized in the appendix "Comparison Between Sentinel EMS and Sentinel LDK-EMS" in the [Sentinel LDK Software Protection and Licensing Guide](#).

**NOTE** For this release of Sentinel LDK, the *Sentinel LDK Software Protection and Licensing Guide* has not yet been updated to reflect the differences between Sentinel EMS and Sentinel LDK-EMS. An updated version of the guide will be released soon.

## Sentinel License Manager Service Supports Kubernetes Environment

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A Docker image is now available for vendors to host cloud licensing. Hosting of cloud licenses in Kubernetes environments with the Docker image has been tested.

For more information, see the [Sentinel LDK High Availability for Cloud Licensing Configuration Guide](#).

## Envelope Now Provides Class-Level Protection for Java Applications Under Linux

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You can now use Sentinel LDK Envelope under Windows to provide class-level protection for Java applications that run on a 64-bit Linux Intel machine. (Class-level protection for Java applications that run on a Windows machine was introduced in Sentinel LDK 8.2.)

To provide class-level protection (or class-level *and* method level protection) for a Java application, protect the application using Envelope on a Windows machine. Envelope generates runtime files for both Windows and Linux machines to the specified output folder.

Copy the entire output folder to the target location (whether Windows or Linux).

## Sentinel LDK Envelope Now Supports AppOnChip for .NET

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Sentinel LDK Envelope now supports the use of AppOnChip to protect .NET applications. The applications must be protected using **Method level** or **Method level & Windows Shell** as the protection type.

For this release of Envelope, the support for AppOnChip for .NET does not include the integrated performance profiling mode that is provided when protecting a native Windows application with AppOnChip. Performance profiling must be performed using an external 3rd-party utility. Thales plans to include an integrated performance profiler in one of the coming releases.

The AppOnChip module for the Sentinel LDK Master license is not required for applications that are licensed using Sentinel HL Max, Time, NetTime, Net, and Drive keys. For applications that are licensed using Sentinel HL Basic keys or Sentinel HL Pro keys, an annual or perpetual AppOnChip module must be obtained from Thales.

For more information regarding AppOnChip protection for .NET applications, see the Envelope help system.

## Support for Oracle Java 11 and Open JDK 16

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Sentinel LDK Envelope under Windows now supports the protection of Oracle JDK 11 and Open JDK 16 applications for Windows, Linux, and Mac. This includes applications that use the Java Platform Module System (JPMS).

As part of the protection process, Envelope generates files that contain the command required to execute module-based applications on different platforms. You must modify these files before using them to execute the protected application.

For details, see the help system for Sentinel LDK Envelope.

## Envelope Now Supports Intel CET

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Sentinel LDK Envelope for Linux now support ELF binaries that are compiled with Intel Control-Flow Enforcement Technology enabled.

## Improved Performance for Envelope for Linux

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The performance of Envelope for Linux applications has been significantly improved. Envelope now require much less time to protect applications that have a large number of relocations.

## Customized RTE Installers Now Generated By Master Wizard

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The Master Wizard can now be used to generate customized Run-time Environment installers for Windows, Linux, and Mac. The Master Wizard downloads the latest Run-time Environment installer for each platform and inserts the current Vendor library into each installer. The installer for Windows is also configured to insert the URL for accessing Sentinel LDK-EMS. For more information, see the description of introducing Vendor keys in the [Sentinel LDK Installation Guide](#).

Note that in the current version of Sentinel LDK-EMS, the same Run-time Environment installers can be downloaded from the Developer page (RTE Installer tab). However, this capability is planned to be discontinued in Sentinel LDK-EMS 8.4.

# What's Changed in Sentinel LDK 8.3?

This section describes significant changes to existing functionality or existing documentation in this Sentinel LDK release.

## Dropped Support for Business Studio Server

Sentinel LDK 8.3 no longer supports Sentinel HASP Business Studio Server (BSS) or the Business Studio user interface.

As a result:

- > The Sentinel LDK installer no longer checks for the presence of the Business Studio Server.
- > The Business Studio Server option has been removed from the Master Wizard.
- > The Sentinel HASP Business Studio Server API (BSS API) is no longer supported.
- > The Sentinel HASP Business Studio Server API for Sentinel EMS is no longer supported.
- > HASPClient and SOAPWS have been removed from Sentinel LDK-EMS.
- > Legacy Business Studio Server folders and files are no longer installed with Sentinel LDK.
- > Legacy Activation API and samples are no longer installed with Sentinel LDK.
- > References to Business Studio Server have been removed from the Sentinel LDK 8.3 documentation.
- > The Business Studio Server migration tool is no longer provided with Sentinel LDK 8.3.

Vendors who want to migrate from Sentinel HASP Business Studio Server to Sentinel LDK can do so by installing and migrating to Sentinel LDK 8.2, and then upgrading to the current version of Sentinel LDK. Sentinel LDK 8.2 will continue to be available for download until further notice.

The guide for migrating from Sentinel HASP Business Studio Server to Sentinel LDK 8.2 will continue to be available from <https://docs.sentinel.thalesgroup.com/ldk/migration.htm>

## Maximum Expiration Date for the Expiration Date License Type has been Extended

The maximum allowed expiration date for a license with the Expiration Date license type has been extended from 2038 to 2091.

## Sentinel LDK Envelope Protects AutoCAD Plugin

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Sentinel LDK Envelope can now protect an AutoCAD plugin (versions 2020, 2021, and 2022).

To protect an AutoCAD plugin, you must select the engine option **Use Windows V3 engine** on the **Advanced** tab in the Sentinel LDK Envelope Settings window. After you change the selected engine, stop and then restart Envelope before you continue working.

## Planned Changes in Upcoming Sentinel LDK Releases

The following changes are planned for upcoming Sentinel LDK releases. If you have any feedback or questions, feel free to contact Thales Support.

- > The default locking type for new Products will be changed from "HL" to "HL or SL (AdminMode or UserMode)." This change will not affect existing Products.
- > The **RTE Installer** tab on the Developer page of Sentinel LDK-EMS will be removed in an upcoming release. The same functionality is now provided by the Sentinel LDK Master Wizard.

# Upgrading From an Earlier Version of Sentinel LDK

Instructions for upgrading from earlier versions of Sentinel LDK can be found in the *Sentinel LDK Installation Guide*.

Considerations when upgrading Sentinel LDK:

- > When upgrading to Sentinel LDK 8.3 from Sentinel LDK v.7.3 through v.7.8, all non-English locales of Customer contacts and Channel Partner contacts in Sentinel LDK-EMS are converted to the English locale. If this issue is applicable to your installation of Sentinel LDK-EMS, make sure to read [this technical note](#) before upgrading to Sentinel LDK 8.3.

**NOTE** You can ignore this issue if all of your Customer contacts and Channel Partner Contacts are set up to use the English locale or if you are not upgrading Sentinel EMS.

- > The procedure for upgrading to Sentinel LDK 8.3 has been tested only for Sentinel LDK v.7.10 and later.

If you plan to upgrade from an earlier version of Sentinel LDK, please contact Technical Support to validate the upgrade scenario. (This applies whether you are upgrading Sentinel LDK Vendor Tools, Sentinel EMS, or both.)

# Installing Linux and Mac Packages

Sentinel LDK files required for Linux and Mac platforms are available on the machine where Sentinel LDK for Windows is installed, under the following path:

*%ProgramFiles(x86)%\Thales\Sentinel LDK\Additional Platforms\*

Alternatively, you can download the relevant packages directly from the Thales website:

- > Linux: [https://supportportal.thalesgroup.com/csm?id=kb\\_article\\_view&sys\\_kb\\_id=1d6107451b05d050f12064606e4bcbb0&sysparm\\_article=KB0021880](https://supportportal.thalesgroup.com/csm?id=kb_article_view&sys_kb_id=1d6107451b05d050f12064606e4bcbb0&sysparm_article=KB0021880)
- > Mac: [https://supportportal.thalesgroup.com/csm?id=kb\\_article\\_view&sys\\_kb\\_id=fc624f891b05d050f12064606e4bcb4e&sysparm\\_article=KB0021881](https://supportportal.thalesgroup.com/csm?id=kb_article_view&sys_kb_id=fc624f891b05d050f12064606e4bcb4e&sysparm_article=KB0021881)

# Security Updates

There are no known security issues in this release, and this release does not resolve any known security issues relating to Sentinel products.

For the latest information regarding any older or newly-discovered issues, see:

<https://cpl.thalesgroup.com/software-monetization/security-updates>

## Reporting a Security Vulnerability

If you think you have found a security vulnerability, please report it to Thales using the links in:

<https://cpl.thalesgroup.com/software-monetization/security-updates>



# Supported Platforms for Sentinel LDK – End Users

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

## Sentinel LDK Run-time Environment and Protected Applications

**Sentinel LDK Run-Time Environment version 8.31** is provided for Windows, Mac, and Linux (Intel and ARM) systems.

To support all of the latest enhancements in Sentinel LDK, and to provide the best security and reliability, end users should receive the latest Run-time Environment (*RTE*).

### NOTE

- > When working with cloud licensing, Thales highly recommends that you always install the latest version of the RTE on the license server machine. (This is applicable for both vendors and customers who are hosting cloud licenses on their license server machine.)
- > Upgrading Sentinel LDK Run-time Environment to version 8.21 or later migrates existing SL AdminMode licenses to a new secure storage. Once this occurs, you cannot downgrade the Run-time Environment to an earlier version. Downgrading the Run-time Environment will make existing SL AdminMode licenses invalid.

For all pre-existing functionality in Sentinel LDK, earlier versions of the RTE are supported as follows:

> **When using customized vendor API libraries v.8.31 - version-restricted option:**

Whenever the RTE is required, Sentinel LDK Run-time Environment v.8.15 or later must be provided.

> **When using customized vendor API libraries v.8.31 - version-unrestricted option:**

The protected application does not check the version number of the RTE. Whenever the RTE is required, the RTE must be from a version of Sentinel LDK that supports the features that you are using to protect and license your applications.

For details, see "Required Version of the Run-time Environment" in the [Sentinel LDK Software Protection and Licensing Guide](#).

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
<b>.NET</b>	<p>Sentinel LDK provides support for the following target frameworks:</p> <ul style="list-style-type: none"> <li>&gt; .NET Framework: v2.0 - v4.8</li> <li>&gt; .NET Standard: v2.1</li> <li>&gt; .NET Core: v2.1, v3.1</li> <li>&gt; .NET 5: v5.0</li> </ul> <p>Protected applications that use the supported .NET frameworks are supported on the following platforms:</p> <ul style="list-style-type: none"> <li>&gt; Windows (Win32 and x64)</li> <li>&gt; Linux Intel (x86_64)</li> <li>&gt; Linux ARMHF</li> <li>&gt; Linux ARM64</li> </ul> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p><b>NOTE</b> When protected with Envelope: .NET Core applications with platform-specific functionality such as Windows Forms and Windows Presentation Foundation (WPF) work only on Windows platforms.</p> </div>
<b>Windows</b>	<p>x86 and x64 versions of the following:</p> <ul style="list-style-type: none"> <li>&gt; Windows 8.1 SP1</li> <li>&gt; Windows Server 2012 R2</li> <li>&gt; Windows Server 2016</li> <li>&gt; Windows Server 2019</li> <li>&gt; Windows Server 2022</li> <li>&gt; Windows 10 IoT Enterprise 2019 LTSC</li> <li>&gt; Windows 10 21H2</li> <li>&gt; Windows 11</li> </ul> <p><b>Note:</b> Windows Insider Preview builds are not supported. The latest service packs and security updates must be installed.</p>
<b>Mac</b>	<ul style="list-style-type: none"> <li>&gt; macOS 10.15 Catalina</li> <li>&gt; macOS 11.0 Big Sur</li> <li>&gt; macOS 12.0 Monterey</li> </ul> <p><b>Note:</b> The Sentinel Remote Update System (RUS utility) is not supported for Mac systems in this release. To obtain a fingerprint, use Sentinel Admin Control Center.</p>

System	Supported Versions	
<b>Linux</b>	<b>Linux Intel (x86-64)</b>	<ul style="list-style-type: none"> <li>&gt; OpenSUSE Leap 15.3</li> <li>&gt; Red Hat EL 8.4</li> <li>&gt; Ubuntu Server 20.04</li> <li>&gt; Ubuntu Desktop 20.04</li> <li>&gt; Debian 11</li> <li>&gt; CentOS 8.4</li> </ul> <p>The latest service packs and security updates must be installed.</p>
	<b>Linux ARM 32-bit (armel and armhf)</b>	<p>The following hardware/boards have been validated:</p> <ul style="list-style-type: none"> <li>&gt; BeagleBone Black</li> <li>&gt; Raspberry Pi-4</li> <li>&gt; NI cRIO-9068</li> </ul>
	<b>Linux ARM 64-bit (arm64)</b>	<p>The following hardware/board has been validated:</p> <ul style="list-style-type: none"> <li>&gt; Qualcomm DragonBoard 410c</li> </ul>
	<b>Wine</b>	<p>Sentinel LDK Run-time Environment was tested on Linux platforms with Wine 6.0</p>

System	Supported Versions	
<b>Android</b>	<b>Android ARM (32-bit and 64-bit)</b>	Android 9.x, 10.x, 11 <b>Note:</b> For Android 10.x and 11, APKs compiled with API level 29 and later only support Java protection. If you require native code protection for Android 10.x and later, contact Thales support.
	<b>Android Architecture</b>	The following architectures are supported: <ul style="list-style-type: none"> <li>&gt; armv7</li> <li>&gt; armv7a</li> <li>&gt; arm64</li> </ul>
	<b>Android ABI</b>	Sentinel LDK Envelope supports Android applications designed for the following Android application binary interfaces: <ul style="list-style-type: none"> <li>&gt; armeabi</li> <li>&gt; armeabi-v7a</li> <li>&gt; arm64-v8a</li> </ul>
<b>Note:</b> Data file protection is not supported for Android 7.x and later.		
<b>Virtual Machines</b>	The VM detection and VM fingerprinting capabilities provided by Sentinel LDK have been validated on the following technologies: <ul style="list-style-type: none"> <li>&gt; Parallels Desktop 17 for Mac</li> <li>&gt; VMware Workstation 16</li> <li>&gt; VMware ESXi 6.7, 7.0</li> <li>&gt; Hyper-V Server 2019 (SL only)</li> <li>&gt; Xen Project 4.15</li> <li>&gt; KVM (RHEL 8.4, Ubuntu 20.04 server, Debian 11)</li> <li>&gt; Microsoft Azure</li> <li>&gt; VirtualBox 6.1.x</li> <li>&gt; Docker (Linux) containers, including under Kubernetes</li> <li>&gt; LXC containers</li> </ul>	

## Web Browsers for Sentinel Admin Control Center

- > Microsoft Edge - latest version
- > Mozilla Firefox - latest version

- > Google Chrome - latest version
- > Safari - latest version

# Supported Platforms for Sentinel LDK – Vendors

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

## Sentinel LDK-EMS Service

When installed on premises, Sentinel LDK-EMS Service is supported under the following operating systems:

System	Supported Versions
<b>Windows</b>	<p>x64 versions of the following:</p> <ul style="list-style-type: none"> <li>&gt; Windows Server 2016</li> <li>&gt; Windows Server 2019</li> <li>&gt; Windows Server 2022</li> <li>&gt; Windows 10 21H2</li> <li>&gt; Windows 11</li> </ul> <p><b>Note:</b> Windows Insider Preview builds are not supported. The latest service packs and security updates must be installed.</p>

## Sentinel LDK-EMS Database

When installed on premises, the Sentinel LDK-EMS database is supported as follows:

System	Supported Database Server Software
<b>Windows</b>	<ul style="list-style-type: none"> <li>&gt; Microsoft SQL Server 2016</li> <li>&gt; Microsoft SQL Server 2017 Express</li> <li>&gt; Microsoft SQL Server 2019 Express</li> </ul> <p><b>Note:</b> Microsoft SQL Server 2019 Express Edition can be installed automatically by the Sentinel LDK-EMS Installation wizard. The installer for this version of Microsoft SQL Server is also available on the Sentinel LDK installation drive.</p>

## Web Browsers for Sentinel LDK-EMS

Supported Browser	HTTPS	HTTP
Google Chrome version 80 or later	✓	✓
Mozilla Firefox version 84 or later	✓	✓
Microsoft Edge	✓	✓

**NOTE** The Mac Safari Web browser is *not* supported for Sentinel LDK-EMS (both Vendor Portal and Customer Portal) in this release.

## Sentinel LDK Vendor Tools

**Important!** You must always install the latest version of the Sentinel Run-time Environment on the machines that you use to work with Sentinel LDK Vendor Tools and Sentinel LDK-EMS. (Under Windows, the Run-time Environment is installed automatically as part of the Sentinel LDK installation procedure.)

System	Supported Versions
<b>Windows</b>	<p>x64 versions of the following:</p> <ul style="list-style-type: none"> <li>&gt; Windows Server 2016</li> <li>&gt; Windows Server 2019</li> <li>&gt; Windows Server 2022</li> <li>&gt; Windows 10 21H2</li> <li>&gt; Windows 11</li> </ul> <p><b>Note:</b> Windows Insider Preview builds are not supported. The latest service packs and security updates must be installed.</p> <p><b>Display:</b> Requires a minimum screen resolution of 1280 by 1024 pixels with 24-bit color quality.</p> <p><b>Note for Sentinel LDK Envelope:</b> 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.</p>

System	Supported Versions
<b>Mac</b>	<ul style="list-style-type: none"> <li>&gt; macOS 11.5 Big Sur</li> <li>&gt; macOS 12.0 Monterey</li> </ul> <p>Applications built on the Cocoa framework are supported.</p> <p><b>Web Browsers for Sentinel Vendor Tools Help Systems:</b></p> <ul style="list-style-type: none"> <li>&gt; Mozilla Firefox</li> <li>&gt; Mac Safari with configuration option <b>Cross-Origin Restriction</b> disabled. (This option can be accessed from the <b>Developer</b> menu.)</li> </ul>
<b>Linux Intel</b>	<p>Sentinel LDK Envelope for Linux and Master Wizard for Linux are supported on the x86-64 version of the following distributions of Linux:</p> <ul style="list-style-type: none"> <li>&gt; OpenSUSE Leap 15.3</li> <li>&gt; Red Hat EL 8.4</li> <li>&gt; Ubuntu Server 20.04 (64-bit only)</li> <li>&gt; Ubuntu Desktop 20.04 (64-bit only)</li> <li>&gt; Debian 11</li> <li>&gt; CentOS 8.4</li> </ul> <p>The latest service packs and security updates must be installed.</p>
<b>Linux ARM</b>	<ul style="list-style-type: none"> <li>&gt; ARM 32-bit</li> <li>&gt; ARM 64-bit</li> </ul> <p>Sentinel LDK Envelope for Linux (on a Linux Intel platform) can protect applications that will run on ARM 32-bit and ARM 64-bit platforms.</p>
<b>Android</b>	Android ARM platforms
<b>Java</b>	Java 8



## Vendor Library Version Dependency

Your customized Vendor libraries (**haspplib\_<vendorID>.\***) are downloaded each time that you introduce your vendor keys to Sentinel LDK. You should re-introduce your vendor keys each time that you upgrade to a new version of Sentinel LDK.

This section describes dependencies for each version of the vendor libraries.

- > **When using the Admin License Manager:** The version of the Run-time Environment should be equal to or later than the version of the customized Vendor library. For example:

Vendor Library Version	Required Run-time Environment Version
7.100	7.100 or later
8.11	8.11 or later
8.13	8.13 or later
8.15	8.15 or later
8.21	8.21 or later
8.23	8.23 or later
8.31	8.31 or later

**NOTE** A given version of the Vendor library is compatible with newer versions of the Run-time Environment. However, to support the enhancements in a given version of the Run-time Environment, the equivalent version of the Vendor library may be required.

- > **When using the External License Manager (hasp\_rt.exe):** The following table indicates the version dependency of the customized Vendor library:

Vendor Library Version	Required External License Manager Version
7.100	23.0
8.11	24.0
8.13	24.2
8.15	24.4
8.21	25.0

Vendor Library Version	Required External License Manager Version
8.23	25.2
8.31	26.0

**NOTE** Make sure that the Vendor library and External License Manager versions are synchronized according to the table.

You can download the latest External License Manager from the **Sentinel LDK Runtime & Drivers** link at: <https://cpl.thalesgroup.com/software-monetization/sentinel-drivers>

- > **When using the Integrated License Manager:** Your customized Vendor library is not required, so there is no version dependency.

## Supported Platforms for Code Samples

The code samples are supported on the same platforms as listed for "[Sentinel LDK Vendor Tools](#)" on page 23.

**NOTE** The **hasp\_net\_windows.dll** provided in the Licensing API vb.net and C# samples for Windows has been compiled with .NET Framework 4.5.

To work with this DLL, .NET Framework 4.5 or later must be installed on your machine.

Prior to Sentinel LDK v.7.4, this DLL was compiled with .NET Framework 2.0, which is now known to contain security vulnerabilities. Because of these vulnerabilities, Thales highly recommends that you upgrade to .NET Framework 4.5 or later.

If you do not want to upgrade your old .NET Framework, you can obtain and use the **hasp\_net\_windows.dll** for Windows from a Sentinel LDK release earlier than v.7.4. To obtain an earlier version of Sentinel LDK, contact Technical Support.

## Tested Compilers for Code Samples

API	Programming Language	Tested Compilers
<b>Licensing API for Windows</b>	AutoCAD	AutoCAD 2020, 2021, 2022
	C	Microsoft Visual Studio 2015, 2017, 2019 C++ Builder Developer Studio 2006
	Visual Basic .NET	Microsoft Visual Studio 2017, 2019
	C#	Microsoft Visual Studio 2017, 2019
	C++	Microsoft Visual Studio 2015, 2017, 2019 C++ Builder Developer Studio 2006 GCC
	Delphi	Delphi XE3
	Java	Oracle Java Developer Kit 1.8 Oracle Java Developer Kit 16 Open JDK 16
	C# - .NET Core	.NET Core 3.1
	C# - .NET	.NET 5
<b>Note:</b> An application linked with <b>libhasp_windows_bcc_vendorId.lib</b> always requires Sentinel LDK Run-time Environment on the machine.		
<b>Licensing API for macOS</b>	Java	Oracle Java Developer Kit 1.8 Oracle Java Developer Kit 16 Open JDK 16
	C	Clang 9.0.0 or later Xcode 9.0 or later

API	Programming Language	Tested Compilers
<b>Licensing API for Linux</b>	Java	Oracle Java Developer Kit 1.8 Oracle Java Developer Kit 16 Open JDK 16
	C	GCC
	C++	GCC
	C# - .NET Core	.NET Core 3.1 .NET 5
<b>Licensing API for Android</b>	Java	Oracle Java Developer Kit 1.8
<b>License Generation API for Windows</b>	C, C#, Visual Basic .NET	Microsoft Visual Studio 2017, 2019
	Java	Oracle Java Developer Kit 1.8 Oracle Java Developer Kit 16 Open JDK 16
<b>License Generation API for Linux</b>	C	GCC
<b>Activation Sample Calling Web Services for Windows</b>	C	Microsoft Visual Studio 2015, 2017, 2019 You may need to convert the provided workspace for the VS version used.
	Java	Oracle Java Developer Kit 1.8 Oracle Java Developer Kit 16 Open JDK 16
<b>Activation Sample Calling Web Services for macOS</b>	Java	Oracle Java Developer Kit 1.8 Oracle Java Developer Kit 16 Open JDK 16
<b>Activation Sample Calling Web Services for Linux</b>	Java	Oracle Java Developer Kit 1.8 Oracle Java Developer Kit 16 Open JDK 16

API	Programming Language	Tested Compilers
<b>Runtime Environment Installer</b>	C	Microsoft Visual Studio 2015, 2017, 2019
	MSI	InstallShield 12 InstallShield 2013 or later
<b>Admin API for Windows</b>	Java	Oracle Java Developer Kit 1.8 Oracle Java Developer Kit 16 Open JDK 16
	C, C#, C++, Visual Basic .NET	Microsoft Visual Studio 2017, 2019
<b>Admin API for Linux</b>	C	GCC
<b>Admin API for macOS</b>	C	Clang 9.0.0 or later Xcode 9.0 or later
<b>Envelope .NET Runtime API</b>	C#	Microsoft Visual Studio 2015, 2017, 2019
<b>Java Envelope Configuration API</b>	Java	Oracle Java Developer Kit 1.8 Oracle Java Developer Kit 16 Open JDK 16
<b>Android Envelope</b>	Java	Oracle Java Developer Kit 1.7, 1.8 Android Studio 3.6

## Current Firmware Version

The table that follows indicates the firmware version on Sentinel HL keys when Sentinel LDK was released.

Sentinel LDK Version	Firmware Version on...		
	Sentinel HL (Driverless Configuration) Keys	Sentinel HL (HASP Configuration) Keys	(Legacy) Sentinel HASP Keys
8.2, 8.3	4.x Firmware keys: 4.60 4.x Firmware keys with microSD: 4.61 6.x Firmware keys: 6.09	4.x Firmware keys: 4.35 6.x Firmware keys: 6.09	3.25

Sentinel LDK Version	Firmware Version on...		
	Sentinel HL (Driverless Configuration) Keys	Sentinel HL (HASP Configuration) Keys	(Legacy) Sentinel HASP Keys
8.0	4.x Firmware keys: 4.60 4.x Firmware keys with microSD: 4.61 6.x Firmware keys: 6.08	4.x Firmware keys: 4.35 6.x Firmware keys: 6.08	3.25
7.8, 7.9, 7.10	4.54	4.33	3.25
7.6, 7.7	4.53	4.33	3.25
7.5	4.27	4.27	3.25

To determine 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. View the list of keys in Admin Control Center.

- If the firmware version on a given Sentinel HL (HASP configuration) key is earlier than 4.60, the firmware is automatically upgraded when you upgrade the key to Sentinel HL (Driverless configuration). The firmware is upgraded to the latest version (based on the version of the License Generation libraries in use).

This upgrade affects the firmware only—Sentinel LDK functionality remains unchanged. This upgrade is not relevant for HL Drive microSD keys.

- If the firmware on a Sentinel HL (Driverless configuration) key is earlier than 4.27, then the first time you assign concurrency to a license on the key, the firmware on the key is automatically upgraded to the latest version (based on the version of the License Generation libraries in use).

## Dropped Support

This section lists platforms and compilers that were supported in the past, but have not been tested with (or are no longer supported by) Sentinel LDK 8.3. Thales will continue to accept queries for issues related to these platforms and compilers, and will attempt to provide information to resolve related issues.

### Dropped Support for Internet Explorer

The Microsoft Internet Explorer Web browser is no longer supported for Sentinel LDK-EMS (Vendor Portal or Customer Portal) or for Sentinel Admin Control Center.

### Dropped Support for Windows 7

Windows 7 is no longer supported for protected applications and for Vendor Tools.

# Sentinel LDK Documentation

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

Most Sentinel LDK documentation can be found online at:

<https://docs.sentinel.thalesgroup.com/ldk/home.htm>

## Documents

Sentinel LDK documents can be found:

- > where Sentinel LDK is installed, under:  
**%ProgramFiles(x86)%\Thales\Sentinel LDK\Docs\**
- > where Sentinel LDK-EMS is installed, under:  
**%ProgramFiles(x86)%\Thales\Sentinel LDK-EMS\EMSServer\webapps\ems\Docs\**

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

Document	Description
Sentinel LDK Software Protection and Licensing Tutorials	<p>Familiarize you with the Sentinel LDK applications and their functionality.</p> <ul style="list-style-type: none"> <li>&gt; The Demo Kit tutorial is for vendors that want to evaluate Sentinel LDK.</li> <li>&gt; The Starter Kit tutorial is for vendors that have already purchased Sentinel LDK.</li> </ul> <p>Two versions of each tutorial are provided – one for working with Sentinel LDK-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.
Sentinel LDK-EMS Configuration Guide	Provides information on setting up and configuring Sentinel LDK-EMS to satisfy the requirements of your organization.
Sentinel LDK-EMS User Guide	Provides the Sentinel LDK-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 LDK-EMS Web Services Guide	Provides the developer with an interface for integrating Sentinel LDK-EMS functionality into the vendor's existing back-office systems.
Integrating Sentinel LDK-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 LDK-EMS Server.

## 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 where Sentinel LDK is installed, under: **%ProgramFiles(x86)%\Thales\Sentinel LDK\Additional Platforms\Linux\**

## macOS

The *Getting Started Guide for macOS* can be found in the Mac download or where Sentinel LDK is installed, under: **%ProgramFiles(x86)%\Thales\Sentinel LDK\Additional Platforms\MacOS\**

## Android

The *Getting Started Guide for Android* can be found where Sentinel LDK is installed, under: **%ProgramFiles(x86)%\Thales\Sentinel LDK\Additional Platforms\Android\**

# Help Systems - Sentinel LDK and Sentinel LDK-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 LDK-EMS	Provides the Sentinel LDK-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.

Online Help System	Description
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.

## Help Systems – Sentinel LDK APIs

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

- > On the Sentinel Customer Community web site, at:  
<https://docs.sentinel.thalesgroup.com/ldk/home.htm>
- > where Sentinel LDK is installed, under:  
**%ProgramFiles(x86)%\Thales\Sentinel LDK\API\**

Sentinel LDK API	Description
<b>Licensing API Reference (formerly Run-time API)</b>	Provides the developer with an interface to use the licensing and protection functionality available in the Sentinel LDK Run-time Environment.
<b>Run-time Installer API</b>	Provides the developer with an interface for integrating installation of the Run-time Environment into the installation of the vendor's protected application.
<b>Sentinel LDK-EMS Web Services</b>	Provides the developer with an interface for integrating Sentinel LDK-EMS functionality into the vendor's existing back-office systems. (Documentation is available from the <b>index.html</b> menu under <b>%ProgramFiles(x86)%\Thales\Sentinel LDK-EMS\EMSServer\webapps\ems\Docs\</b> )
<b>License Generation API Reference</b>	Provides access to the power and flexibility of Sentinel protection keys without the need to employ the full Sentinel LDK-EMS system. The developer can call functions in this API to generate and update licenses for Sentinel protection keys.
<b>Admin API Reference</b>	Provides the functionality available in Admin Control Center and Sentinel License Manager in the form of callable API functions.

## Resolved Issues

This section describes issues that were reported by vendors and that have been resolved in this release of Sentinel LDK.

Reference	Resolved Issue	Components
SM-84417	Documentation regarding extending a time-period-based license has been clarified. Documentation now states that a license with an <b>Expiration Date</b> license type can be extended. The expiration date for a license with the <b>Time Period</b> license type cannot be modified. For details, see the <a href="#">Sentinel LDK Software Protection and Licensing Guide</a> .	Documentation
SM-103456	When available activations were increased by editing the Product key, Sentinel LDK-EMS also increased the value of Previous Activations by the same amount. As a result, Remaining Activations would remain 0.	LDK-EMS
SM-108144	Under certain circumstances, when more than 15 dynamic memory files were defined, it was not possible to add more dynamic memory files when creating product.	LDK-EMS
SM-106179	When generating a license that contains dynamic memory files with maximum size 65,535, an error would be returned.	License Generation API
SM-105804	When deploying licenses on an Android device, an error message similar to the following was sometimes returned: "Could not generate the license because: The host machine fingerprint is invalid."	Licensing API

## Resolved Issues in Patches

The following issues were resolved in Patches 8/2020, 10/2020, and 12/2020 for Sentinel LDK 8.2 and are also resolved in this release.

Reference	Resolved Issue	Components
SM-90271	<p>Documentation for Sentinel License Generation API has been corrected as follows:</p> <ul style="list-style-type: none"> <li>&gt; Placement of the &lt;minimum_rte_api_version&gt; tag has been moved from the Product level of the XML code to the protection key level. This parameter relates to all the Products in the protection key, not to a specific Product.</li> <li>&gt; Documentation for the &lt;rehost&gt; tag has been updated to indicate that the &lt;minimum_rte_api_version&gt; tag (if used), must be placed before the &lt;rehost&gt; tag in the XML code.</li> </ul>	Documentation
SM-90954	.NET Engine would fail when adding a sample with an excessively long class name.	Envelope
SM-90780	A .ctor issue with Envelope.Net was resolved.	Envelope
SM-88548	Envelope would crash when adding .NET App.	Envelope
SM-86349	Applications protected with Envelope were not logging errors properly.	Envelope
SM-83026	Sentinel LDK Envelope 8.0 would fail while adding or protecting a .NET Core file.	Envelope
SM-82167	Under certain circumstances, when CodeObfuscation is set to <b>True</b> , Envelope would fail when protecting an application.	Envelope
SM-81865	<p>When a debugger is in use, an application protected with AppOnChip would display the message <b>Debugger detected</b>. When the user dismissed the message box, the application would exit.</p> <p>Now, under the same circumstances, the message box displays a warning. The message can be dismissed without terminating the application.</p>	Envelope

Reference	Resolved Issue	Components
SM-80815	When using AppOnChip, Envelope would fail during startup on old Intel processor platforms (Atom/Core2).	Envelope
SM-80748	The PE checksums for executables were calculated incorrectly after protection with Envelope.	Envelope
SM-86459	An issue in the External License Manager has been resolved	External License Manager
SM-80548	Under certain circumstances, when using Sentinel LDK Toolbox to generate a license update to enable Remote Desktop, the License Generation would fail with error 5009 ("License definition is invalid").	License Generation API
SM-79715	For the <b>VMType4</b> clone protection scheme, Generating a <b>Clear Clone</b> license would use CPU_UID instead of CPU for the fingerprint.	License Generation API
SM-82498	Under certain circumstances, the License Generation DLL would crash when generating a clearClone V2C.	License Generation API
SM-82026 SM-82827	Resolve a compatibility problem for PMType3 SL UserMode license definition.	License Generation API
SM-86082	(Linux) The upper limit for the number of sockets was too low, resulting in a login error in certain circumstances.	Licensing API
SM-83787	(Linux) Login calls would fail on Linux ARM64 platform. Output was "Bus error".	Licensing API
SM-83674	Failed to call integrated Admin API without the vendor code.	Licensing API
SM-82050	Android sample would fail on Android 11 emulator/real device.	Licensing API
SM-77887	(Linux) SSH session was not detected if the customer runs an application using sudo or su. Licensing API	Licensing API
SM-90482	Calling Web Service update protection key with action of ConvertV2CToExe would result in a memory leak.	Sentinel EMS
SM-89552	Descriptive text for warning 2044 has been provided.	Sentinel EMS
SM-83309	When Sentinel EMS 8.0.1 is installed with Java 8 Update 261, Sentinel EMS would start correctly, but the login page was blank.	Sentinel EMS

Reference	Resolved Issue	Components
SM-83050	<p>Given the following circumstances:</p> <ul style="list-style-type: none"> <li>&gt; In the Sentinel EMS Administration Console, Sentinel EMS is configured to generate V2C files using the customer name in the name of the V2C file.</li> <li>&gt; The name of a customer in Sentinel EMS contains a comma (for example: <b>test, name</b>).</li> <li>&gt; An entitlement is generated for the above customer.</li> </ul> <p>The resulting V2C file could not be downloaded.</p>	Sentinel EMS
SM-82260	<p>Given the following circumstances:</p> <ol style="list-style-type: none"> <li>1. In Sentinel EMS, copy an entitlement that has already been produced.</li> <li>2. Add Products to the copied entitlement.</li> </ol> <p>The <b>Exclude All</b> button for Features is not accessible. Features must be individually excluded from the Entitlement.</p>	Sentinel EMS
SM-80400	<p>On the Entitlements page in Sentinel EMS: When performing a search using <b>Customer Name</b> and then sorting the results by <b>Ref ID 2</b>, an internal error would occur.</p>	Sentinel EMS
SM-78585	<p>The status value of product key should not be changed if relevant entitlement is disabled.</p>	Sentinel EMS
SM-73900	<p>Login would fail with error code 500 while running the EMS web service demo.</p>	Sentinel EMS

# Known Issues and Workarounds

The known issues in Sentinel LDK 8.3 that are likely to have the most significant impact on users are listed below, according to component.

Additional, less-common issues can be found [here](#).

## 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><b>Workaround:</b> 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>
SM-35287	<p>When upgrading from Sentinel LDK v.7.3 through v.7.8 to Sentinel LDK v.7.10, all non-English locales of Customer contacts and Channel Partner contacts in Sentinel EMS are converted to the English locale.</p> <p><b>Note:</b> You can ignore this issue if all of your Customer and Channel Partner contacts are set up to use the English locale or if you are not upgrading Sentinel EMS.</p> <p><b>Workaround:</b> A solution for this issue is provided in the technical note available <a href="#">here</a>.</p>

## Sentinel LDK-EMS

Ref	Issue
SM-12832	<p>When a user clicks the link provided in an email (that is sent by Sentinel EMS) to display a scheduled report, the report is not displayed when the DNS server cannot resolve the server hostname present in the link. Instead, the message "This page can't be displayed" is shown.</p> <p><b>Workaround:</b> In the <b>etc/host</b> file on the user's machine, add an entry that contains the hostname and IP address of the Sentinel EMS machine.</p>

Ref	Issue
SM-19045	<p>Customers who were associated with a channel partner prior to Sentinel LDK 7.7 will not be visible in Sentinel EMS to the relevant Channel Partner user. However, the Channel Partner user will not be able create a new entry for an existing customer with the same email address as already exists in the EMS database. In this situation, the Channel Partner user will not be able to fulfill an entitlement for the customer.</p> <p><b>Workaround:</b> If the Channel Partner user cannot create the required customer in Sentinel EMS, the software vendor should handle the fulfillment of the entitlement for the customer.</p>
SM-52262	<p>After you introduce or update a Master Key, you must notify all Sentinel LDK-EMS users to log off and log on again to get the latest changes.</p>
SM-68428	<p>When you generate a product key entitlement in Sentinel EMS, the customer does not receive the entitlement certificate email if the customer contact locale is not specified.</p> <p><b>Workaround:</b> Specify the locale for the customer.</p>

## End Users, Sentinel LDK Run-time Environment, License Manager, and Customer Tools

Ref	Issue
	<p>The Sentinel Remote Update System (RUS utility) is not supported for Mac systems in this release.</p> <p><b>Workaround:</b> To obtain a fingerprint, use Sentinel Admin Control Center.</p>
SM-94994	<p>Given the following circumstances:</p> <ul style="list-style-type: none"> <li>&gt; An RTE without legacy drivers is installed on a new machine.</li> <li>&gt; An RTE with legacy drivers is installed afterward on the machine.</li> </ul> <p>An application that requires an RTE with legacy drivers will not operate successfully. During installation of the RTE with legacy drivers, no warning or error is generated.</p> <p><b>Workaround:</b> Using Admin Control Center, generate a diagnostic report, and contact Thales Technical Support.</p>



Ref	Issue
SM-82475	<p>Given the following situation:</p> <ul style="list-style-type: none"> <li>&gt; When the current state of an SL key is decoded (using SL License Generation API), the status of the container is shown as <b>Secure Storage Id Mismatch</b> in the <b>Key ID</b> column.</li> <li>&gt; The key contains a Product that is rehostable or detachable OR the Product license type is <b>Executions</b> or <b>Expiration Date</b>.</li> </ul> <p>If the SSID (secure storage ID) of the container changes (for example, the container becomes corrupted or is deleted), the Product will be marked as <b>Cloned</b> and become unusable. In any other situation, the status <b>Secure Storage Id Mismatch</b> has no significance and can be ignored.</p>
SM-76660	<p>Given the following circumstances:</p> <ol style="list-style-type: none"> <li>1. Windows is installed on a Mac machine with Boot Camp.</li> <li>2. An SL license is installed in the Windows system.</li> </ol> <p>The Secure Storage ID may change and cause Feature ID 0 to be flagged as "cloned".</p> <p><b>Workaround:</b> Do not install the SL license in the Windows system. Have your application consume a network seat from a cloud license.</p>
SM-70131	<p>The Sentinel LDK License Manager (process hasplms.exe) hangs intermittently and reaches a very high CPU utilization (approximately 1.9 GB).</p> <p><b>Workaround:</b> Protect the application using the latest API libraries and, if the RTE is required on the end user's machine, upgrade to the most recent RTE.</p>
SM-59868	<p>An application linked with <b>libhasp_windows_bcc_vendorId.lib</b> requires Sentinel LDK Run-time Environment on the machine.</p>
SM-10843	<p>The FLV player (flvplayer.swf) under %ProgramFiles(x86)%\Thales\Sentinel LDK\VendorTools\VendorSuite\samples\DataProtection\flv\local no longer plays local FLV files in Microsoft Internet Explorer with Adobe Flash Player version 23 and later. The player can be used:</p> <ul style="list-style-type: none"> <li>&gt; to play local FLV files in IE with Adobe Flash Player version 22 and earlier.</li> <li>&gt; to play network FLV files in IE with all versions of Adobe Flash player.</li> <li>&gt; to play local FLV files in all versions of desktop Adobe Flash player software.</li> </ul>

Ref	Issue
SM-546	<p>Given the following circumstances:</p> <ul style="list-style-type: none"> <li>&gt; A protected application was created using Visual Studio 2015</li> <li>&gt; Control Flow Guard is explicitly enabled in Visual Studio.</li> <li>&gt; The application links statically or dynamically with Sentinel Licensing API.</li> <li>&gt; The External License Manager (hasp_rt.exe) is not used.</li> <li>&gt; The application is run under Windows 10, or Windows 8.1 Update (KB3000850). (Not all Windows 8.1, only recent ones)</li> </ul> <p>The protected application may fail.</p> <p><b>Workaround:</b> Include the External License Manager (hasp_rt.exe) with the protected application.</p>
LDK-14971	<p>Given the following circumstances at a customer site:</p> <ul style="list-style-type: none"> <li>&gt; One machine has Run-time Environment version 7.51.</li> <li>&gt; A second machine has a version of Run-time Environment that is earlier than v.7.51.</li> <li>&gt; The customer performs rehost of a license repeatedly between the two machines.</li> <li>&gt; An update is applied to the license on either of these machines.</li> </ul> <p>A rehost operation may fail with the message HASP_REHOST_ALREADY_APPLIED.</p> <p><b>Workaround:</b> 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-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><b>Workaround:</b> When you protect the application using Envelope, disable <b>User debugger detection</b> for the application. (Note that disabling debugger detection reduces the overall security of the application.)</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>

Ref	Issue
LDK-9044	<p>Given the following circumstances:</p> <p>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> <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><b>Workaround:</b> Switch the USB controller to USB 2.0 mode.</p>
LDK-8480	<p>With some new USB chipsets, it is possible that the <b>hasp_update()</b> API call, used to update the firmware of Sentinel HL keys to version 3.25, will generate the HASP_BROKEN_SESSION 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><b>Workaround:</b> 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>

## Sentinel LDK Envelope and Data Encryption for Windows Platforms

### General

Ref	Issue
LDK-11727	<p>Debugger detection is not provided for .NET applications.</p> <p><b>Workaround:</b> Implement debugger detection mechanism in the application code, and use Envelope to protect the methods that call these functions.</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>

Ref	Issue
SM-58676	<p>Given the following circumstances:</p> <ol style="list-style-type: none"> <li>1. Install SL AdminMode licenses on your local machine.</li> <li>2. Run IObit Advanced SystemCare Ultimate 12 to clean and optimize your machine.</li> <li>3. Restart your machine.</li> </ol> <p>Local SL AdminMode licenses may be missing or may be identified as cloned licenses. This is an issue with the IObit product. Thales has reported this issue to IObit and it is currently under investigation.</p> <p><b>Workaround:</b> Do not use the current version of the IObit product, <i>OR</i> do not use SL AdminMode licenses until this issue is resolved. (You can use SL UserMode licenses.)</p>
SM-65381	<p>Under Windows, execution of a Python application that is protected with DFP sometimes fails with the "Bad magic number" error if <b>hasp_rt.exe</b> is not present in the protected folder.</p> <p><b>Workaround:</b> Ensure that <b>hasp_rt.exe</b> is present in the protected folder.</p>

## Java

Ref	Issue
LDK-11195	<p>When protecting a Java application, Envelope fails with the message "Serious Internal Error (12)".</p> <p><b>Workaround:</b> If this error occurs, protect the Java application using either of the following techniques:</p> <ul style="list-style-type: none"> <li>&gt; 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.</li> <li>&gt; 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.</li> </ul>
LDK-11418	<p>For a Java 7 or 8 application that is protected with Envelope, the end user must use the following command line syntax to launch the protected application:</p> <ul style="list-style-type: none"> <li>&gt; Java 7: Specify <code>java -UseSplitVerifier -jar ProtectedJar.jar</code></li> <li>&gt; Java 8 and later: Specify <code>java -noverify -jar ProtectedJar.jar</code></li> </ul> <p>If the appropriate flag is not specified, the application may throw <b>java.verifyerror</b> when launched.</p>

Ref	Issue
SM-10890	<p>Given the following circumstances:</p> <ul style="list-style-type: none"><li>&gt; An Envelope project was created with Envelope version 7.3 or earlier.</li><li>&gt; The project contains settings for a Java application.</li><li>&gt; On the <b>Protection Settings</b> tabbed page for the Java application, you select the option to overwrite default protection settings.</li></ul> <p>The <b>Allows grace period after failed license check</b> check box should be modifiable. However, the check box cannot be changed.</p> <p><b>Workaround:</b> On the <b>Advanced</b> tabbed page, make any change to the MESSAGE_OUTPUT_MODE property, and then change it back. This forces Envelope to load an internal data structure that then makes the <b>Allows grace period after failed license check</b> check box modifiable.</p> <p><b>Note:</b> This grace period is not supported for Web applications.</p>
SM-10969	<p>Due to a known limitation in Java, if a background check thread becomes non-EDT, the background check (<b>Abort/Retry/Ignore</b>) dialog box may not appear. Envelope has been modified so that the error dialog prompted by the protected method in the protected application takes precedence. This has reduced the occurrence of the problem, but it has not eliminated the problem entirely.</p>
SM-98384	<p>A protected WAR does not run successfully on WildFly Server 23.</p>
SM-110174	<p>Java class level protection and Data File protection in Windows Envelope for 64-bit applications are not supported under Wine.</p>

**.NET**

Ref	Issue
SM-554	<p>For apps that target the .NET Framework version 4.6 and later, <b>CultureInfo.CurrentCulture</b> and <b>CultureInfo.CurrentUICulture</b> are stored in a thread's <b>ExecutionContext</b>, which flows across asynchronous operations. As a result, changes to the <b>CultureInfo.CurrentCulture</b> and <b>CultureInfo.CurrentUICulture</b> properties are reflected in asynchronous tasks that are launched subsequently.</p> <p>If the current culture or current UI culture differs from the system culture, the current culture crosses thread boundaries and becomes the current culture of the thread pool thread that is executing an asynchronous operation.</p> <p>When protecting a sample application implementing above behavior with protection type as "Dot Net Only", then the application behaves as expected. However, with protection type "Dot Net and Windows Shell" or "Windows Shell Only", the thread uses the system's culture to define behavior.</p> <p><b>Workaround:</b> Do the following:</p> <ol style="list-style-type: none"> <li>1. Use .NET Framework 4.5.</li> <li>2. Use           <pre>CultureInfo.DefaultThreadCurrentCulture = new CultureInfo(...)</pre>           instead of           <pre>Thread.CurrentThread.CurrentCulture = new CultureInfo(...).</pre> </li> </ol>

Ref	Issue
SM-25875	<p>Given the following circumstances:</p> <ol style="list-style-type: none"> <li>1. A .NET application is protected with Envelope.</li> <li>2. The protection type includes Windows Shell (with or without the method level).</li> <li>3. The application attempts to get a module handle using the following method:</li> </ol> <pre>IntPtr hMod = Marshal.GetHINSTANCE(Assembly.GetExecutingAssembly() .Modules()[0])</pre> <p>The handle returned may not be correct, and as a result, an error will be generated.</p> <p><b>Workaround:</b> You can call the GetModuleHandle system API of the Kernel32.dll to get the module handle.</p> <p>For example:</p> <pre>[DllImport("kernel32.dll", CallingConvention = CallingConvention.StdCall, CharSet = CharSet.Auto)] private static extern IntPtr GetModuleHandle(IntPtr lpModuleName); IntPtr hMod = GetModuleHandle(Process.GetCurrentProcess() .MainModule.ModuleName);</pre>
SM-26578	<p>If a .NET application protected with Windows Shell sets the exit code to <b>ExitEventArgs</b> such as "e.ApplicationExitCode = 1" when the application exits, the exit code cannot be retrieved by an external process.</p> <p><b>Workaround:</b> Call "Environment.Exit(1)" to exit the process.</p>

## Android

Ref	Issue
SM-38233	Data File Protection is not currently supported for Android 7 and later devices.
SM-96242	Envelope does not support command line executables on an ADB shell. This is because the license is installed in the application sandbox and permissions are elevated in androidmanifest file.

## Sentinel LDK Envelope and Data Encryption for Linux

Ref	Issue
SM-28403	<p>Given the following circumstances:</p> <ul style="list-style-type: none"> <li>&gt; A Linux application is protected with Envelope, with protection against debugging.</li> <li>&gt; The application calls the <code>wait(&amp;status)</code> system call. This is equivalent to:           <pre>waitpid(-1, &amp;status, 0)</pre> </li> </ul> <p>The application may hang.</p> <p><b>Workaround 1:</b> Call <code>waitpid</code> for a specific child process pid (<code>pid &gt; 0</code>).</p> <p><b>Workaround 2:</b> Disable the anti-debugging feature in Envelope. <b>Note:</b> This workaround significantly reduces the security of the protected application. Thales recommends that you consult with Technical Support before choosing this workaround.</p>
SM-69080	<p>A protected application may not handle signals properly when:</p> <ul style="list-style-type: none"> <li>&gt; Background check is enabled, and</li> <li>&gt; Signal handlers are registered by a thread created by the application.</li> </ul> <p><b>Workaround:</b> Do one of the following:</p> <ul style="list-style-type: none"> <li>&gt; Disable both background check and anti-debugging. (You can do this by specifying the following line command flags: <code>-b:0 --debug --memdump</code>)</li> <li>&gt; (Preferred workaround) Register the signal handler in a main thread instead of a thread function. Thread function is one of the following:           <ul style="list-style-type: none"> <li>• A function passed to <code>pthread_create</code> as <code>start_routine</code></li> <li>• A function called from <code>start_routine</code>.</li> </ul> </li> </ul>

## Sentinel LDK Envelope, Data Encryption, and Licensing API for macOS

Ref	Issue
LDK-11655	<ul style="list-style-type: none"> <li>&gt; When running Envelope in a VMware Fusion 7.1.1 virtual machine on a Mac machine, if you save the protected application to an HGFS (Host Guest File System) volume, the application file is corrupted.</li> <li>&gt; 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.</li> </ul>



Ref	Issue
SM-57838	The command line Envelope tool (envelope_darwin) now only works if Envelope.app (UI bundle) is in the same folder. To use the command line tool, copy Envelope.app to the folder that contains the command line tool.
SM-57024	Dark Mode has been introduced by Apple in macOS 10.14 but is not supported yet by the Envelope GUI. You should disable Dark Mode to have a proper user experience.
SM-51456	<p>Due to reliability enhancements in Sentinel LDK under macOS, there is some performance impact in protected applications under macOS 10.13.</p> <p>A technical note will be issued in August 2019 that describes this issue and the option to disable these enhancements in favor of higher performance.</p>

## Sentinel LDK Envelope for Android

Ref	Issue
SM-57733	<p>An Android application that is protected using both Envelope and Licensing API fails on an Android gaming console. Envelope embeds the RUS utility in the application. Using the Licensing API also adds the RUS utility. This results in two RUS utility calls in the protected application and duplicate symbol names.</p> <p><b>Workaround:</b> Thales recommends that you not protect an Android application with both Envelope and Licensing API. If you want to use both tools to protect an application, do the following:</p> <ol style="list-style-type: none"> <li>1. Protect the application using Licensing API.</li> <li>2. Remove RUS from the APK file.</li> <li>3. Protect the application with Envelope.</li> </ol>