



# Sentinel LDK 8.0

## RELEASE NOTES



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# Sentinel LDK 8.0 - 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.

**NOTE** Sentinel LDK 8.0 has been re-released as version 8.0.1 to resolve certain issues in the original release. These release notes include the changes in the release.

The following differences are included in these release notes:

- > The following enhancement has been added: "**Support for Amazon EC2**" on page 11
- > The following section has been added: "**Issues Resolved in Version 8.0.1**" on page 36

Vendors who have installed and successfully operated the initial release of Sentinel LDK 8.0 do not have to install version 8.01. However, if they want to benefit from the improvements provided in version 8.0.1, they can do one of the following:

- > Install Sentinel LDK version 8.0.1 over the existing Sentinel LDK 8.0.
- > Wait for an online update to Sentinel LDK. This update will be issued within a short time after the release of Sentinel LDK 8.0.1.

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.gemalto.com/ldk/home.htm>

## 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

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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. 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.

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

**Important:** Keep these keys safe and allow only trusted personnel to use them. 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.

## Support for Linux and Mac

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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)%\Gemalto Sentinel\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=1d6107451b05d050f12064606e4bcb0&sysparm\\_article=KB0021880](https://supportportal.thalesgroup.com/csm?id=kb_article_view&sys_kb_id=1d6107451b05d050f12064606e4bcb0&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)

## What's New in Sentinel LDK 8.0?

This section describes the main new features and enhancements.

**NOTE** The Sentinel LDK 8.0 release includes all features and enhancements from earlier releases. Details on patches that were released between Sentinel LDK 7.10 and Sentinel LDK 8.0 are also included in this document.

If you are upgrading from a version of Sentinel LDK that is earlier than 7.10, 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.

### Cloud Licensing

The Sentinel Cloud Licensing Add-on for LDK has been replaced with a new cloud licensing solution for distributing licenses. This solution is based on the software-based protection keys, but it provides an extension to the traditional method. The cloud licensing solution provides a simpler mechanism, both for the vendor and for the end user, for distributing and managing licenses.

Using this license model, the vendor generates and installs all required product licenses on a single license server machine. The vendor then generates and distributes a unique license string for each end user. The end users install the protected application and the license string on their machine.

Each end user can then access the license server and consume a license to execute the protected application online or to detach a license and then run the protected application offline.

The new solution was designed as part of Sentinel LDK and does not require the use of a separate API. License consumption and other operations, such memory access and encryption, are fully supported and are performed using the regular Sentinel LDK Licensing API. Unlike the previous solution, applications that use cloud licensing can be protected with the Envelope tool.

References to the previous cloud licensing solution have been removed from the product documentation.

For more information, refer to the *Sentinel LDK Software Protection and Licensing guide*.

**NOTE**

- > While intended primarily for hosting by software vendors, the cloud license model can also be hosted by the vendor's customers for distribution of identity strings within their organization.
- > For either level of implementation, cloud licensing is only available if the vendor has the Cloud Licensing module on their Master key at the time that they generate the SL licenses to be used with identity-based access.
- > If cloud licensing is enabled in Sentinel EMS or Sentinel License Generation API, all license updates to SL keys will enable cloud licensing for the keys and will allow users (in the customer-level implementation) to freely manage their identities. This cannot be blocked later. If you need more control, wait for an upcoming release of Sentinel LDK., in which cloud licensing will include more control, including at the product level.

## Additional Space for Features and Dynamic memory in Driverless HL Key

Sentinel LDK now supports utilizing the additional space in Sentinel HL (Driverless configuration) keys for Features and Dynamic memory. For information on the space available in these keys, refer to the latest *Sentinel HL Data Sheet*.

## Balancing Security and Reliability Against the Convenience of Your Customers

Sentinel LDK now enables you to better balance the security and reliability of your licensed applications against the convenience of your customers.

In Sentinel EMS or Sentinel License Generation API, you set the configuration parameter **Minimum RTE/API Version** to the minimum version of the Run-time Environment and/or Licensing API libraries that are in use by your customer base. As a result, licenses updates generated by Sentinel LDK will only include security and reliability improvements that can be supported by the conditions on your customers' machines.

In Sentinel EMS, the **Minimum RTE/API Version** parameter replaces the **Default Clone Protection Version** parameter. When upgrading Sentinel LDK for this release, the value for **Minimum RTE/API Version** is based on the existing value for the **Default Clone Protection Version** parameter. In Sentinel License Generation API, the `<minimum_rte_api_version>` tag replaces the `version` attribute of the `<clone_protection_ex>` tag.

## Run-time Environment Is Now Supported Under Linux ARM

Sentinel Run-time Environment can now be installed on Linux ARM platforms. As a result, Linux ARM platforms can now support:

- > SL AdminMode key, SL UserMode keys, HL keys (Driverless and HASP), and HASP keys.
- > Concurrency. A protection key with concurrency on a Linux ARM machine can serve licenses to applications on other machines.



## Sentinel LDK Now Supports Android 10.x

Sentinel LDK supports Android 10.x applications, with the following limitations for APK protection:

- > When compiled with Android API level 28 or earlier, protected APKs (both Java and native) are supported.
- > When compiled with Android API level 29, protected APKs (Java only) are supported. Protected APKs (native) are not supported.

## Sentinel LDK EMS Now Uses OpenJDK

Sentinel LDK EMS now uses OpenJDK instead of Oracle JDK. This is due to licensing changes by Oracle.

## Extended .NET Core Support Including Linux Runtime Support

Sentinel LDK now provides extended .NET Core support (Version 3.1 Framework ). This includes Envelope runtime support for Linux.

Protection of the application must be done using Sentinel LDK Envelope on a Windows platform. For more information, see the Sentinel LDK Envelope help system.

## Generate a Fingerprint for SL Keys Using Admin Control Center

An end user can now use Sentinel Admin Control Center (local or remote) to generate a fingerprint of the local machine as part of the process of receiving an SL license. For Windows machines, this capability provides an alternative to the RUS utility. For Linux or Mac (where Admin Control Center is available), only SL AdminMode fingerprints can be generated.

When Admin Control Center version 7.103 or later detects a vendor library on the user's machine AND no SL key for that Batch Code exists on the machine, an SL key placeholder is displayed on the Sentinel Keys page. If multiple vendor libraries exist, a placeholder may be generated for each Batch Code. The user can click the **Fingerprint** action on a placeholder to generate a fingerprint file for the relevant Batch Code.



### Sentinel Admin Control Center

Options

Sentinel Keys

Products

Features

Sentinel Keys Available on bei-4ztwdc2

#	Location	Vendor	Key ID	Key Type	Configuration	Version	Sessions	Actions
1	Local	Demo MB (37517)		Reserved for New SL Key	SL	7.100	-	Fingerprint

Vendor libraries are only included in the Run-time Environment installer when you generate a customized installer using Sentinel EMS.

If no vendor libraries are found on the machine, a placeholder for the DEMOMA batch code is displayed.

## Event Logging API for NET Core 2 Applications

NET Core 2 under Linux does not support Windows Forms. This creates limitations in generating messages to the end user for protected applications developed using .NET Core 2 on a Linux platform. By default, messages are only transmitted using the default method, which is printing the message to the console. In many instances (for example: server apps), the console is not available.

The .NET Envelope Event Logging API enables you to generate message to the end user for these applications when the application is protected using Sentinel LDK Envelope.

This API intercepts all messages and transmits them to the end user using any of several possible methods. For example, messages can be saved to a file, sent to any logging system, or sent through e-mail.

For more information, see the description of the Event Logging API in *Samples\Envelope\DotNET\NET\_Envelope\_Runtime\_API.html* in the Sentinel LDK installation for Windows.

## Envelope Now Supports Background Check for Android Applications

Android applications protected by Sentinel LDK Envelope can now perform periodic background checks for the required protection key. This feature is available for APK and AAR libraries. The feature is not supported for SO-only protection.

Note that threads are not suspended when a background check is triggered from the Java Envelope runtime (unlike the Envelope runtimes for other platforms). However, the **Abort** and **Retry** buttons are displayed when a required license is not found.

For more information, see the Sentinel LDK Envelope help system.

## Support for Oracle Java 11

Sentinel LDK Envelope under Windows now supports the protection of Oracle JDK 11 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.

Envelope does not support the protection of Multi-Release JARs (MRJAR) to target multiple versions of Java.

For more information, see the help system for Sentinel LDK Envelope.

## Sentinel LDK Product Improvement Program

Thales has implemented a program to collect data on the ways that Sentinel LDK is used by vendors to protect their software applications. This information enables us to understand the types of applications that vendors are protecting and which features are used most frequently. As a result, Thales will be better understand which features are most important to vendor and where to allocate resources to improve the Sentinel LDK product.

At the current time, information is collected by Sentinel LDK Envelope. The information accumulated is stripped of identifying elements before transmission to Thales.

You have the option to discontinue your participation in this program by clearing the **Participate in Product Improvement Program** check box in the Settings screen in Sentinel LDK Envelope.

## Option to Check License Expiration Date More Frequently

Until now, the expiration date of a Feature in protected application was only checked when the application logs in to the Feature. If the application was allowed to run continuously, the Feature could continue to be used even if its expiration date had passed.

You now have the option to set an attribute called **die\_at\_expiration** in the LoginScope function in Sentinel Licensing API. When enabled, this attribute causes the expiration date to be checked each time the Encrypt or Decrypt function is called by the application. If the function discovers that the expiration date of the Feature has passed, the session is interrupted and status code HASP\_FEATURE\_EXPIRED is returned.

For more information, see the topic "Checking the License Expiration Date of a Feature" in Sentinel Licensing API documentation.

## Support for Amazon EC2

When using cloud licensing, the license server can be located on an Amazon EC2 platform (Windows or Linux). Thales recommends that you select the **Platform Default** clone protection scheme for licenses on this server.

## Enhancements Introduced in Vendor Suite Patch KB0020220

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The following enhancements were introduced in Vendor Suite Patch KB0020220 for Sentinel LDK 7.10 and are included in the current release of Sentinel LDK.

### Support for Protection of Android Libraries

Sentinel LDK Envelope now enables you to protect Android library (AAR) files. Method-level protection is provided.

Certain restrictions apply. For more information, see the description of Android considerations in the Sentinel LDK Envelope help system.

### Support for Custom Actions for a Failed Background Check in .NET Applications

Under certain circumstances, you may want to perform custom actions if a background check for the required product license returns a failed status. For example: For server applications, there may not be a user to see and respond to an error message regarding a failed background check.

The .NET Envelope Runtime API now enables you to provide alternative methods to notify users regarding a failed background check. For example, you can write a handler to generate an entry to a log or send an email alert.

For GUI-based applications, custom background checking is also useful. For example, your handler can display a custom alert, save all unsaved data and exit from the application.

For more information, see *Samples\Envelope\EnvelopeRuntime.NET\NET\_Envelope\_Runtime\_API.html* in the Sentinel LDK installation.

## Enhanced Protection for Python Applications Using Cython

Sentinel LDK Envelope now provides enhanced protection for Python applications by using Cython in the protection process. This works by first translating your sensitive Python modules into native modules (PYD/SO files), which are then protected using Sentinel Envelope.

This method provides a higher level of security because the additional compilation step lowers the code's abstraction level and enables Sentinel LDK Envelope to protect the application as code and not just as data. This results in more sophisticated protection measures.

This method of protecting your Python applications is available under Windows and Linux. For more information, see the Sentinel LDK Envelope help system for Windows or the *Sentinel LDK Envelope for Linux User Guide*.

**NOTE** When using Sentinel LDK Envelope with Cython to protect Python applications, certain unusual configurations of Python may generate errors. For example:

- > Python2 and Python3 installed on one machine
- > Python 32-bit and 64-bit versions installed on one machine
- > Using an old version of Python 2.7 (for example, 2.7.13 instead of the latest 2.7.16)

## Enhancements Introduced in Sentinel LDK-EMS Patch KB0020569

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The following enhancements were introduced in Sentinel EMS patch KB0020569 for Sentinel LDK 7.10 and are included in the current release of Sentinel LDK.

### Sentinel EMS Now Supports Product Keys With Unlimited Activations

In an entitlement, you can now set product key activations to **Unlimited**. This alternative monetization method lets you use a single product key to distribute protected software via a third-party product. For example, suppose you are licensing an SDK to an integrator who will include the SDK in a product that is sold to the integrator's customers. All end users who buy the integrator's product can activate the license for your SDK using the same product key. For each billing period, you would then generate a report listing the number of times that the product key was used to activate the license and bill the integrator accordingly.

For more information, see the description of the "Unlimited Activations for Integrators" licensing model in the *Sentinel LDK Software Protection and Licensing Guide*.

## Adding Concurrency to a Modification Product

In a Modification Product, if you add concurrency to the license terms by clicking **Modify** and specifying **0** in the **Add/Subtract Concurrent Instances** box, one network seat will become available for consumption in the following circumstances:

- The original license did not contain this Product, or
- The original Product on which the Modification Product is based did not contain any Features (for example, a memory-only Product), or
- The original Feature license terms were defined for local use only (no concurrency).

Depending on the type of key, this network seat will be consumed from either the SL Pool of Seats or HL Pool of Seats on the Master key and will be added to the Sentinel SL key or Sentinel HL (Driverless configuration) key. (Not relevant for Net or NetTime keys)

## Renewing Expired Licenses

You can now extend the validity of an expired license. For example, suppose an end user purchased a 30-day license, and, three months after the license expires, the end user contacts you and asks to renew the license, you can now extend the existing, expired license instead of creating a new license. The start date for the renewed license is based on the renewal—not on the expired license's start date. The new expiration date is the current date in the master key plus the number of days to add. (When renewing a non-expired license, the expiration date is the current expiration date plus the number of days to add.)

## Pending Updates Returned for FORMAT, CLEARCLONE, and CLEARTIMETAMPER

Sentinel EMS Web Services now returns pending updates for FORMAT, CLEARCLONE, and CLEARTIMETAMPER. These updates are included with the V2CP file provided when re-enabling HL keys in the Sentinel EMS user interface.

## Updated Email Templates

This release includes the following updated email templates:

- > **Protection key updates.** This email template now includes a link the EMS Customer Portal where end users can install all pending updates with a single click.
- > **Online updates.** This email template includes improved instructions for activating and managing an entitlement via the EMS Customer Portal.

If your organization uses customized templates, make sure to customize these new templates accordingly. You can find your previous templates in the template backup folder.

## Documentation Updates

Important updates were applied to the following sections in the Sentinel LDK-EMS User Guide:

Section Title	Description
Checking in C2V File	Added a note explaining that if the C2V file contains dynamic memory data, the dynamic memory file is displayed with Base64 encoding in the Content column of the Dynamic Memory tab. To view this data, you use a Base64 decoder.
Creating a Sentinel LDK Product	In step 2, updated the Locking Type description for improved clarity.
Defining License Terms for a Sentinel LDK Product	In addition to improving this section, in step 3, added a note about changes to concurrency when modifying a Modification Product. For details, see <a href="#">"Adding Concurrency to a Modification Product" on the previous page</a> .
Defining Entitlement Type and Other Details	In the Product Key section, added information about the new <b>Unlimited</b> check box under <i>Activations per Product Key</i> . For details, see <a href="#">"Enhancements Introduced in Sentinel LDK-EMS Patch KB0020569" on page 12</a> .

## Enhancements Introduced in Admin API Patch KB0020586

The following enhancement was introduced in Admin API patch KB0020586 for Sentinel LDK 7.10 and is included in the current release of Sentinel LDK.

### Support for HTTPS Communication with a Remote Admin License Manager

Sentinel Admin API for C now supports the use of HTTPS for communication with Admin License Manager on a remote license server machine.

To implement this capability, you must do the following:

1. Install Sentinel LDK Run-time Environment 7.103 or later on the license server machine
2. Use Admin Control Center on the license server machine to configure an HTTPS certificate (CA certificate or Server certificate) and a private key.
3. Use Admin Control Center or Admin API on the license server machine to change the configuration of the License Manager to allow a remote Admin API to access the local License Manager.

To establish an HTTPS context between Admin API on a remote machine and the License Manager on the local license server machine, Admin API must specify the same HTTPS certificate that is configured on the local license server machine. For example, you can use the following XML input for the **ContextNewScope()** function to specify the certificate in Admin API:

```
<?xml version="1.0" encoding="UTF-8" ?>
<haspscope>
  <host>localhost</host>
  <certificate>-----BEGIN CERTIFICATE-----
MIIDizCCAnOgAwIBAgIJAOoF2ZIk40+cMA0GCSqGSIb3DQEBCwUAMFwxCzAJBgNV
BAYTAklUMQ4wDAYDVQQIDAVJdGFseTEQMA4GA1UEBwwHQmVyZ2FtbzEUMBIGAlUE
CgwLU2VudGluZWwgQ0ExFTATBgNVBAMMDGxvY2FsaG9zdCBDQTAeFw0xOTEwMDMx
MjI3MjRaFw00NzAyMTgxMjI3MjRaFwxCzAJBgNVBAYTAklUMQ4wDAYDVQQIDAVJ
dGFseTEQMA4GA1UEBwwHQmVyZ2FtbzEUMBIGAlUECgwLU2VudGluZWwgQ0ExFTAT
BgNVBAMMDGxvY2FsaG9zdCBDQTCASiwdQYJKoZIhvcNAQEBBQADggEPADCCAQoC
ggEBAM1WIkTMEy/D8NIDMU029y0vQCu58Ff3L+ktN/cPGtcJjszLHn/EBfQED/gR
e5hCh+LkBuXVqcNeWY21oOF23OUM3CreHUz17ElG0IwUxPvD9wwHDFuoOJWpsYD6
dXzTizhixNvSch2D09/8x6Y7HZdUpejgkNlKkklwdWjAV8MiE9368X/g2taYZ2MM
+z0xIhLFPQ+RKdFiV75Yws47cdGnp9qRos27gd3WycavK70X295IHANw7oF1GHRi
oQiU2grTQ814SWXw9nnM+oJlA5zyJHOGopbIbehf602B9ALP5MdZ8BHFw9NBxbgu
DKmmdp02s+KqC1QIJ+qeCD013h8CAwEAAANQME4wHQYDVROBBYEFDUiS6Mtv8N6
3WalNf2aRlWmcK10MB8GA1UdIwQYMBaAFDUiS6Mtv8N63WalNf2aRlWmcK10MAwG
AlUdEwQFMAMBAf8wDQYJKoZIhvcNAQELBQADggEBAG1t19AAm6ntYvMLT80JZdH0
aDB9p99GF/2YjCmjGsPkordVsM2RcjPnENZV9txllmIvQ6MmxP1Sw0ZG/3Q0GejX
XNt6W3I0DM3RJw0/NLg5n0HoOTZtwqbPOfqMaZryvJ8ogxaR4GWPBQg6u3SYy9S5
CmKgB7FtmUh0EKtd1h39qNfaK+pi2S1GbmQhmSdVXRv71LrAg0jTEx4TUExyY0oKO
C84Blk2U5fde+qAgOw/coRTPiGxHdY3X6JvsfOJh2Pf8rz8FX00YsPYGfsdPe8X
uwgUNRDWZTC8vVQMe7s6SEZTFDZxKWBhzKWY/6I1056yXLSqBrSq33ny/KfEmD4=
-----END CERTIFICATE-----
  </certificate>
</haspscope>
```

For more information, see the description of the ContextNewScope function in the Admin API help file.

To help support this functionality, the following error codes have been added to Admin API:

- > 6035 SNTL\_ADMIN\_ENTROPY\_SOURCE\_FAILED
- > 6036 SNTL\_ADMIN\_INV\_CERT
- > 6037 SNTL\_ADMIN\_CERT\_VERIFY\_FAILED

These error codes are described in the Admin API help file.

## What's Changed in Sentinel LDK 8.0?

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

### Replacement of HaspBusinessStudioServer.dll in Business Studio Server Sample

The **HaspBusinessStudioServer.dll** provided in this release in the Business Studio Server sample has been compiled with .NET Framework 4.5. Prior to Sentinel LDK v.8.0, this DLL was compiled with .NET Framework 2.0. As a result, vendors who want to work with the provided DLL must upgrade to .NET Framework 4.5 or later.

## Sentinel EMS Now Uses Tomcat Version 8.5.51

The installation and upgrade procedures for Sentinel EMS now install Tomcat version 8.5.51.

## Envelope for Linux No Longer Supports Applications for Intel 32-bit

Sentinel Envelope for Linux can no longer be used to protect applications for Intel 32-bit platforms.

Envelope can be used to protect 32-bit and 64-bit applications for Linux ARM platforms and 64-bit applications for Linux Intel platforms.

If you still need to protect 32-bit applications for Linux Intel, you can use Sentinel Envelope for Linux from Sentinel LDK 7.10 or earlier.

## Sentinel LDK Envelope for Mac - Help System

The topic "Signing a Protected Application" has been updated with corrections that were described in the *Sentinel LDK 7.10 Release Notes*.

See step 4 in the procedure "How to manually sign an application after you protect it with Envelope".

## Sentinel Licensing API for Java - Deprecated Function

In the Sentinel Licensing API for Java, **finalize()** has been deprecated and will be discontinued. After using the Hasp object, the invoker should call **logout()**.

## Data File Protection Limitation on Windows Machines

Given the following circumstances:

1. You are using Envelope to protect a Windows application.
2. In Envelope, you select the option Enable data file protection.

In the protected application, the **Send To** menu item is removed from the Windows **Save As** dialog box.

## Sentinel LDK Installation Drive Has Been Reorganized

The structure of the Sentinel LDK Installation Drive has been changed. As a result, Sentinel LDK files and documentation are no longer accessible directly from the Installation Drive. Files and documentation are only available from the Windows machine where you install Sentinel LDK . This includes Linux and macOS files and documents.

Linux and macOS files and documents can also be downloaded separately from Thales. For more information, see ["Support for Linux and Mac" on page 6](#).



## Planned Changes in Upcoming Sentinel LDK Releases

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

- > The 32-bit version of Sentinel LDK EMS will be moved to End-of-Development status. Future enhancements and support for new platforms will be provided for the 64-bit version, which will remain in General Availability status.

## Upgrading From an Earlier Version of Sentinel LDK

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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 8.0 from Sentinel LDK v.7.3 through v.7.8, all non-English locales of Customer contacts and Channel Partner contacts in Sentinel EMS are converted to the English locale. If this issue is applicable to your installation of Sentinel EMS, make sure to read [this technical note](#) before upgrading to Sentinel LDK 8.0.

**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 8.0 has been tested only for Sentinel LDK v.7.6 through 7.10. 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.)

Migrating from Sentinel HASP to Sentinel LDK 8.0 continues to be supported. For details, see the *Sentinel HASP to Sentinel LDK Migration Guide* provided with Sentinel LDK 8.0.

## Security Updates

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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 Gemalto 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, Gemalto recommends that you always keep your operating system up to date with the latest fixes and service packs.

### Sentinel LDK Run-time Environment, Protected Applications

**Sentinel LDK Run-Time Environment version 8.11** is provided for Windows, Mac, and Linux Intel 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*). However, for all pre-existing functionality in Sentinel LDK, earlier versions of the RTE are supported as follows:

> **When using customized vendor API libraries v.8.11 - version-restricted option:**

Whenever the RTE is required, Sentinel LDK Run-time Environment v.7.90 or later must be provided.

> **When using customized vendor API libraries v.8.11 - 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
Windows	<ul style="list-style-type: none"> <li>&gt; Windows 7 SP1</li> <li>&gt; Windows 8.1 SP1</li> <li>&gt; Windows Server 2008 R2 SP1</li> <li>&gt; Windows Server 2012 R2</li> <li>&gt; Windows Server 2016</li> <li>&gt; Windows Server 2019</li> <li>&gt; Windows 10 IoT Enterprise 2019 LTSC</li> <li>&gt; Windows 10 Version 2004 (See Technical Note in <a href="#">KB0021742</a>)</li> </ul> <p><b>Note:</b> Windows 10 Insider Preview builds are not supported. The latest service packs and security updates must be installed.</p>

System	Supported Versions	
Mac	<ul style="list-style-type: none"> <li>&gt; macOS 10.13.6 High Sierra</li> <li>&gt; macOS 10.14 Mojave</li> <li>&gt; macOS 10.15 Catalina</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>	
Linux	<b>Linux Intel (x86-64)</b>	<ul style="list-style-type: none"> <li>&gt; OpenSUSE Leap 15.1</li> <li>&gt; Red Hat EL 7.7, 8.1</li> <li>&gt; Ubuntu Server 16.04, 18.04</li> <li>&gt; Ubuntu Desktop 18.04</li> <li>&gt; Debian 10.3</li> <li>&gt; CentOS 8.1</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 5.0</p>

System	Supported Versions	
Android	<b>Android ARM (32-bit and 64-bit)</b>	Android 8.x, 9.x, 10.x <b>Note:</b> For Android 10.x, APKs compiled with API level 29 only support Java protection.
	<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>	<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"> <li>&gt; Parallels Desktop 15 for Mac</li> <li>&gt; VMware Player 6.0.3 (Free for non-commercial use)</li> <li>&gt; VMware Workstation 15</li> <li>&gt; VMware ESXi 6.5, 6.7</li> <li>&gt; Hyper-V Server 2019 (SL only)</li> <li>&gt; Xen Project 4.12</li> <li>&gt; KVM (RHEL 7.7, Ubuntu 18.04 server, Debian 10.x)</li> <li>&gt; Microsoft Azure</li> <li>&gt; VirtualBox 6.1.x</li> <li>&gt; Docker (Linux)</li> </ul>	

## Data File Protection Plugin for Internet Explorer

The Data File Protection plugin (MSI file) is compatible with Microsoft Internet Explorer version 11.

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

## Web Browsers for Sentinel Admin Control Center

- > Microsoft Internet Explorer (32-bit) version 11
- > Microsoft Edge
- > 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 Gemalto 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, Gemalto recommends that you always keep your operating system up to date with the latest fixes and service packs.

### Sentinel EMS Service

System	Supported Versions
<b>Windows</b>	<p>32-bit and 64-bit versions of the following:</p> <ul style="list-style-type: none"> <li>&gt; Windows 7 SP1</li> <li>&gt; Windows 8.1 SP1</li> <li>&gt; Windows Server 2008 R2 SP1</li> <li>&gt; Windows Server 2012 R2</li> <li>&gt; Windows Server 2016</li> <li>&gt; Windows Server 2019</li> <li>&gt; Windows 10 Version 2004 (See Technical Note in <a href="#">KB0021742</a>)</li> </ul> <p><b>Note:</b> Windows 10 Insider Preview builds are not supported.</p> <p>For all Windows versions, the latest service packs and security updates must be installed.</p>

## Sentinel EMS Database

System	Supported Database Server Software
Windows	<ul style="list-style-type: none"> <li>&gt; Microsoft SQL Server 2014 x86/x64</li> <li>&gt; Microsoft SQL Server 2014 Express</li> </ul> <p><b>Note:</b> Microsoft SQL Server 2014 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 drive.</p> <ul style="list-style-type: none"> <li>&gt; Microsoft SQL Server 2016</li> <li>&gt; Microsoft SQL Server 2017 Express</li> </ul>

## Web Browsers for Sentinel EMS

Supported Browser	Notes
Microsoft Internet Explorer version 11	Some functionality in Sentinel EMS does not work if Sentinel EMS is added to <b>Compatibility View</b> in Internet Explorer.
Mozilla Firefox version 73 or later	RUS customization is not supported with Firefox due to changes in this browser. For details, see <a href="#">"SM-26872" on page 38</a> .
Google Chrome version 80 or later	RUS customization is not supported with Chrome due to changes in this browser. For details, see <a href="#">"SM-26872" on page 38</a> .
Microsoft Edge	<p>Certain actions in Sentinel EMS that access protection keys (including burning HL keys and online activation of SL keys) do not work by default in Edge under Windows 32-bit. This is due to a bug in Microsoft Edge. To perform the required actions, you can do one of the following:</p> <ul style="list-style-type: none"> <li>• Use one of the other supported Web browsers.</li> <li>• Enter the command to create an exclusion for Edge on your machine. This enables Edge to work correctly with Sentinel EMS. For details, see <a href="#">"SM-11279" on page 38</a>.</li> </ul>

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

For more details regarding supported Web browsers for working in Sentinel EMS with HTTPS mode versus HTTP mode, see "Supported Web Browsers for Sentinel EMS" in the *Sentinel LDK-EMS User Guide*.

**Java applets:** 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

**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 EMS. (Under Windows, the Run-time Environment is installed automatically as part of the Sentinel LDK installation procedure.)

System	Supported Versions
Windows	<p>Same as supported Windows platforms for <b>"Sentinel EMS Service" on page 21</b>. Requires a minimum screen resolution of 1280 by 1024 pixels with 24-bit color quality.</p> <p><b>Note:</b></p> <ul style="list-style-type: none"> <li>&gt; <b>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.</li> <li>&gt; <b>Sentinel LDK Master Wizard:</b> 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 installed on the machine where you run the Master Wizard.</li> </ul>
Mac	<ul style="list-style-type: none"> <li>&gt; macOS 10.14 Mojave</li> <li>&gt; macOS 10.15 Catalina</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>

System	Supported Versions
<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 15.1</li> <li>&gt; Red Hat EL 8.1</li> <li>&gt; Ubuntu Server 18.04</li> <li>&gt; Ubuntu Desktop 18.04</li> <li>&gt; Debian 10.3</li> <li>&gt; CentOS 8.1</li> </ul> <p>The latest service packs and security updates must be installed.</p>
<b>Linux ARM</b>	Sentinel LDK Envelope for Linux (on a Linux Intel platform) is required to protect applications that will run on ARM 32-bit and ARM 64-bit platforms.
<b>Android</b>	Android ARM platforms
<b>Java</b>	Java 8

## Supported Platforms for Code Samples

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

**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
Licensing API for Windows	AutoCAD	AutoCAD 2009, 2010, 2014
	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 11
	C# - .NET Core	.NET Core 3.1
	<b>Note:</b> An application linked with <b>libhasp_windows_bcc_vendorId.lib</b> always requires Sentinel LDK Run-time Environment on the machine.	
Licensing API for macOS	Java	Oracle Java Developer Kit 1.8 Oracle Java Developer Kit 11
	C	Clang 9.0.0 or later Xcode 9.0 or later
Licensing API for Linux	Java	Oracle Java Developer Kit 1.8 Oracle Java Developer Kit 11
	C	GCC
	C++	GCC
	C# - .NET Core	.NET Core 3.1

API	Programming Language	Tested Compilers
<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 11
<b>License Generation API for Linux</b>	C	GCC
<b>Activation API 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 11
<b>Activation API for macOS</b>	Java	Oracle Java Developer Kit 1.8 Oracle Java Developer Kit 11
<b>Activation API for Linux</b>	Java	Oracle Java Developer Kit 1.8 Oracle Java Developer Kit 11
<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 11
	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

API	Programming Language	Tested Compilers
Envelope .NET Runtime API	C#	Microsoft Visual Studio 2015, 2017, 2019
Java Envelope Configuration API	Java	Oracle Java Developer Kit 1.8 Oracle Java Developer Kit 11
Android Envelope	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
8.0	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.

## Dropped Support

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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 8.0. Thales will continue to accept queries for issues related to these platforms and compilers, and will attempt to provide information to resolve related issues.

### Platforms for Protected Applications for End Users

Support for the following platforms has been discontinued for protected applications:

- > Android 7.x
- > Linux Intel 32-bit

### Platforms for 32-bit Linux Vendor Tools, APIs, and Sample

The following Sentinel LDK components for Linux are no longer supported on 32-bit Linux Intel platforms:

- > Sentinel LDK Envelope for Linux
- > Sentinel LDK Master Wizard
- > Sentinel Licensing API
- > Samples

## Sentinel LDK Documentation

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

**NOTE** Most major Sentinel LDK documentation can be found online at:  
<https://docs.sentinel.gemalto.com/ldk/home.htm>

### Documents

Sentinel LDK documents (PDF files) can be found:

- > 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\**

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.
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>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 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 and 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"> <li>&gt; Hardlock</li> <li>&gt; SmartKey</li> <li>&gt; Sentinel SuperPro</li> <li>&gt; HASP HL</li> <li>&gt; HASP4</li> <li>&gt; Sentinel Hardware Keys</li> </ul>

Document	Description
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 LDK-EMS Configuration Guide	Provides information on setting up and configuring Sentinel EMS to satisfy the requirements of your organization.
Sentinel LDK-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 LDK-EMS Web Services Guide	Provides the developer with an interface for integrating Sentinel EMS functionality into the vendor's existing back-office systems.

## 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)%\Gemalto Sentinel\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)%\Gemalto Sentinel\Sentinel LDK\Additional Platforms\MacOS\**

### Android

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

## 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.

## 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.gemalto.com/ldk/home.htm>
- > where Sentinel LDK is installed, under:  
**%ProgramFiles(x86)%\Gemalto Sentinel\Sentinel LDK\API\**

Sentinel LDK API	Description
<b>Activation API Reference</b>	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.)

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 COM API</b>	Provides the developer with access to Sentinel HASP Run-time Environment functionality, through an interface written for the Microsoft Component Object Model (COM).
<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 EMS Web Services</b>	Provides the developer with an interface for integrating Sentinel EMS functionality into the vendor's existing back-office systems. (Documentation is available from the <b>index.html</b> menu under <b>%ProgramFiles(x86)%\Gemalto Sentinel\Sentinel 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 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.

## 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.

## Resolved Issues

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



Reference	Resolved Issue	Components
SM-44945	Prior to this release, Sentinel LDK Envelope would always use the default Feature (Feature ID 0) in the AppOnChip runtime, regardless of the Feature ID specified when protecting the application. This caused an issue when using an AppOnChip-protected application with a standalone/local key on a remote desktop. Sentinel LDK Envelope has been enhanced so that it now uses the selected Feature ID in AppOnChip protection. As a result, an application that uses a non-zero Feature ID and is protected with AppOnChip can be used on a remote desktop.	Envelope
SM-52429	An application would crash after protection by Windows Envelope if its size is greater than 500 MB.	Envelope
SM-56178	(Linux) Under certain circumstances, a protected executable would throw an "illegal instruction" or "segmentation fault" error.	Envelope
SM-57232	(Linux ARM) Under certain circumstances, a protected application would return a segmentation fault error during execution.	Envelope
SM-60133	A guest on Hyper-V was recognized by Admin Control Center as a virtual PC rather than as a Hyper-V guest.	License Manager
SM-60703	(.NET) SNK files were added for all .NET apps including in circumstances where they should not have been added.	Envelope
SM-60983	(Android) Under certain circumstances, protected APK files failed to execute.	Envelope
SM-61170	Sentinel EMS would return "error parsing key XML info" for any operation on an SL Legacy key if the product name contains special characters.	EMS-Data Migration Tool
SM-62538	When migrated from BSS to Sentinel EMS, a local product would be changed to unlimited concurrency if the concurrency count was set to any value other than <b>Station</b> .	EMS-Data Migration Tool
SM-62734	SL UserMode license state would not refresh after an external modification if a license was already in use	Licensing API
SM-63063	Envelope GUI: Multiple selection modification was not supported under certain circumstances.	Envelope

Reference	Resolved Issue	Components
SM-63276	Allocation of network seats from a remote License Manager with duplicate Features has been optimized.	License Manager
SM-63540	Multiple desktop detection would fail on a recent Ubuntu distribution	Licensing API
SM-64297	If a data file is encrypted using Version 2 protection, and at runtime the file is overwritten and edited, then the file was changed to clear text.	Envelope
SM-64570	Documentation that explains the number of concurrent instances allowed by various license settings has been improved.	Documentation
SM-64596	hasp_get_info functions in different version of Licensing API would return different key IDs from a given SL UserMode license	Licensing API
SM-64942	Under certain circumstances, when adding a Product to an entitlement, an internal error would occur.	LDK-EMS
SM-65243	(.NET) An issue with protected application using 3rd party Newtonsoft application has been resolved.	Envelope
SM-65541	When editing a Modification Product that contains a canceled Feature, the license terms of the canceled Feature would change.	LDK-EMS
SM-66153	The hasp_encrypt/decrypt functions did not support up to 4 GB of memory	Licensing API
SM-66282	The user name <unknown> would cause Admin API results to have incorrect XML.	Licensing API
SM-66296	When an application is protected in Envelope using .NET method-level protection combined with background check, an additional session would be consumed. If the application is protected using Windows Shell protection, an additional execution would be consumed.	Envelope
SM-66296	When an application is protected in Envelope using .NET method-level protection combined with background check, an additional session would be consumed.	Envelope
SM-66792	(Linux) An application that was killed after an H0007 error would leave the child process that was displaying the error.	Envelope
SM-66982	Windows 32-bit Licensing API was using SSE instructions	Licensing API

Reference	Resolved Issue	Components
SM-68399	Android fingerprints were missing certain information	Licensing API
SM-69084	An SL AdminMode license would not be recognized after a system crash in certain circumstances.	Licensing API
SM-69841	When modifying customer information using a Web Service call, the value 200 and STATUS is OK would be returned, but the customer information was not updated in the database.	LDK-EMS
SM-69845	When retrieving customer information using a Web Services call, the error "400 BAD_REQUEST" would be returned in some situations.	LDK-EMS
SM-69901	Certain hexadecimal values could not be updated correctly in the Memory map.	EMS-Catalog
SM-70610	If a .NET application is protected using Windows Shell protection, then at runtime the following error was generated: "The module was expected to contain an assembly manifest"	Envelope
SM-71344	(Linux) Under certain circumstances, an internal error would occur when encrypting SO files.	Envelope
SM-71391	Sentinel HL (Driverless configuration) keys were not accessible through API calls in WSL	Licensing API
SM-71487	(.NET engine) "obfuscate symbols" setting would cause the protected application to crash.	Envelope
SM-71489	A .NET application protected using Envelope 7.10 SP1 would crash when using method level protection.	Envelope
SM-71776	When an update to a 6.x Firmware key contains a large number of Features, a timeout would occur.	License Manager
SM-71823	When viewing users in the Sentinel EMS Admin Portal, users were not always displayed correctly.	LDK-EMS
SM-73052	When an admin user for a given Batch Code is logged in to the Admin Portal, the user was able to see the super user when search for users user by the super user role	LDK-EMS
SM-73072 SM-73074	"Denial of Service" vulnerabilities were resolved.	License Manager

## Issues Resolved in Version 8.0.1

The following issues were resolved in Sentinel EMS 8.0.1

Reference	Resolved Issue	Components
SM-78725	Sentinel EMS would fail to generate HL and SL UserMode licenses when the configuration option Cloud Licensing was enabled. The following error message was displayed: <i>Could not generate the license because: XML schema validation failure occurred. no declaration found for element 'cloud_licensing'. The line number of the end of the text where the exception occurred is 15.</i>	LDK-EMS
SM-79148 SM-79207	The customized RTE for Linux generated by Sentinel EMS did not contain the 32-bit haspplib.	LDK-EMS
SM-79150	After upgrading to Sentinel EMS 8.0: When creating a Product with read-only memory and with no text, Sentinel EMS would calculate string length the memory incorrectly. When text was written to the memory afterward, the following message was displayed: <i>The memory segment is too small to contain this text. Make the text shorter.</i>	LDK-EMS
SM-78970	Sentinel EMS 8.0 would not operate correctly when installed under a non-English version of Windows.	LDK-EMS

## Known Issues and Workarounds

The known issues in Sentinel LDK 8.0 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>

Ref	Issue
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> <ul style="list-style-type: none"> <li>&gt; When installing Sentinel EMS, the Installer generates the error "Kindly Start the Service -SQLServer(EMSDATABASE) and then click OK".</li> <li>&gt; When you click OK, the installation fails with multiple errors.</li> </ul> <p>This occurs because while upgrading to JRE 8, the Java installer does not replace earlier JRE files from the <b>System32</b> directory.</p> <p><b>Workaround:</b> Uninstall the earlier versions of JRE from your machine, and restart the Sentinel EMS installation.</p> <p><b>Note:</b></p> <ul style="list-style-type: none"> <li>&gt; 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 details, see:  <a href="https://bugs.openjdk.java.net/browse/JDK-8073939">https://bugs.openjdk.java.net/browse/JDK-8073939</a></li> <li>&gt; This issue does not occur when your machine contains earlier versions of JRE, and the Sentinel EMS installation installs bundled JRE 8 reference.</li> </ul>
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 EMS

Ref	Issue
SM-11279	<p>Certain actions in Sentinel EMS that access protection keys (including burning HL keys and online activation of SL keys) do not work by default in Edge under Windows 32-bit. This issue is caused by a bug in Microsoft Edge. For details, see: <a href="https://developer.microsoft.com/en-us/microsoft-edge/platform/issues/10082889/">https://developer.microsoft.com/en-us/microsoft-edge/platform/issues/10082889/</a></p> <p><b>Workaround:</b> Create an exclusion for Edge to allow localhost loopback as follows:</p> <ol style="list-style-type: none"> <li>1. Move the cursor to the bottom-left corner of your screen, and right-click the Windows icon.</li> <li>2. In the resulting menu, select <b>Command Prompt (Admin)</b>. The Command Prompt (Admin) window is displayed.</li> <li>3. Copy and paste the following command to the Command Prompt window, and press Enter:  <pre>CheckNetIsolation LoopbackExempt -a -n="Microsoft.MicrosoftEdge_8wekyb3d8bbwe"</pre> </li> </ol> <p>Edge will now work correctly with Sentinel EMS.</p>
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>
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-26872	<p>When working with Firefox version 57.0.3 or later or with Chrome, you cannot provide custom text while creating a branded version of the RUS utility from the <b>RUS Branding</b> tab in Sentinel EMS.</p> <p><b>Workaround:</b> Use Internet Explorer 11. This will allow you to provide text while creating a branded version of the RUS utility.</p>

Ref	Issue
SM-52262	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.
SM-68428	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. <b>Workaround:</b> Specify the locale for the customer.

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

Ref	Issue
	The Sentinel Remote Update System (RUS utility) is not supported for Mac systems in this release. <b>Workaround:</b> To obtain a fingerprint, use Sentinel Admin Control Center.
LDK-8480	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.) <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 hasp_update().
LDK-9044	Given the following circumstances: 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. 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.) <b>Workaround:</b> Switch the USB controller to USB 2.0 mode.
LDK-10670	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. This issue has been reported to Razer.

Ref	Issue
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><b>Workaround:</b> 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><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-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-15991	<p>When working in Internet Explorer with <b>Enable Protected Mode</b> selected and with <b>Enable Enhanced Protected Mode</b> selected, the Data File Protection plugin cannot open encrypted flv/swf/mp4 files because the plugin cannot locate the license. If only <b>Enable Protected Mode</b> is enabled, the plugin cannot locate an SL UserMode license.</p> <p><b>Workaround:</b> 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>



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>
SM-10843	<p>The FLV player (flvplayer.swf) under %ProgramFiles(x86)%\Gemalto Sentinel\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>
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-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-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>

## 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>
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. Gemalto 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>
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>

**.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           <div style="text-align: center;"> <b>CultureInfo.DefaultThreadCurrentCulture = new CultureInfo(...)</b> </div>           instead of           <div style="text-align: center;"> <b>Thread.CurrentThread.CurrentCulture = new CultureInfo(...).</b> </div> </li> </ol>
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()     .GetModules()[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>

Ref	Issue
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.

## Sentinel LDK Envelope and Data Encryption for Linux

Ref	Issue
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> Gemalto 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 one RUS from the APK file.</li><li>3. Protect the application with Envelope.</li></ol>

## Support Contacts

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You can contact us using any of the following options:

### Business Contacts

To find the nearest office or distributor, go to:

<https://cpl.thalesgroup.com/software-monetization/contact-us>

### Support

To obtain assistance in using Sentinel products (<https://cpl.thalesgroup.com/software-monetization/all-products>), feel free to contact our Thales Support team:

- > **Customer Support Portal** (preferred):  
<https://supportportal.thalesgroup.com/csm?id=sentinel>
- > **Support Essentials** (contact details, support plans, and policies):  
[https://supportportal.thalesgroup.com/csm?id=support\\_essentials](https://supportportal.thalesgroup.com/csm?id=support_essentials)
- > **For Issues Related to Using the Portal:** [portal.support.DIS@thalesgroup.com](mailto:portal.support.DIS@thalesgroup.com)
- > **Phone:**
  - In North America, call 800-545-6608 (US toll free).
  - Internationally, call +1-410-931-7520.
  - For a list of regional numbers, go to:  
<https://supportportal.thalesgroup.com/csm?id=sentinel>  
→ Click **Contact Us** in the top-right corner of the page.

### Downloads

You can download installers and other updated components from:

<https://cpl.thalesgroup.com/software-monetization/sentinel-drivers>