

Sentinel[®]LDK

Sentinel LDK v.7.1
Release Notes



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Sentinel LDK v.7.1 - Release Notes

About This Document

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



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

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

Product Overview

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

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

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

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

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

Sentinel Vendor Keys

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

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

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

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

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

Obtaining Support

You can contact us using any of the following options:

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

Help Us to Improve Sentinel LDK

You can make a difference! We invite you to send us your ideas and opinions, and tell us what you like (and don't like) about Sentinel LDK. Your input can help shape future versions of the product.

Feedback on Sentinel LDK can be sent to: ldkfeedback@safenet-inc.com

What's New in Sentinel LDK v.7.1?

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

Sentinel Cloud Licensing is Now Integrated Into Sentinel EMS

Sentinel Cloud Licensing is an alternative to the LDK licensing solution that is used by Sentinel LDK for protected applications. Sentinel Cloud Licensing provides a cloud-based licensing solution for vendors who want ongoing control over customers' license terms and who want to track the usage of features by the customers.

Sentinel Cloud Licensing is suitable both for SaaS (Software as a Service) applications that are hosted in the cloud and for on-premise applications that are installed at the customer's site.

Using Sentinel Cloud Licensing, you can enable feature-level authorization of your applications and leverage a wide range of feature and product packaging options—ranging from simple subscription to complex usage-based models. In this way, you can maximize return on investment through greater product versatility and simplified operations.

Sentinel Cloud Licensing simplifies your billing process management by providing automated metering and export of usage data for billing.

Sentinel Cloud Run-time provides a common set of APIs that enable you to deploy your applications on cloud without any change in application source code.

Sentinel Cloud Licensing is not installed automatically when you install Sentinel LDK. To install Sentinel Cloud Licensing, contact your SafeNet representative.

Dynamic Memory in Sentinel HL (Driverless Configuration) Keys is Now Accessible

A new type of memory, called *Dynamic memory*, is available in all Sentinel HL (Driverless configuration) keys except for Sentinel HL Basic keys and Sentinel HL Pro keys.

The original memory (*Default memory*) that was available until now continues to be available. However, Dynamic memory provides several advantages over Default memory:

- Dynamic memory is significantly larger than Default memory (typically, 26 KB vs. 6 KB). For more information, see the *Sentinel HL Data Sheet*. Dynamic memory is managed using dynamic memory files (similar to disk files). Each file can be designated as a read-only, read/write, or read/write-once. Each file can be allocated space as required (within the space available on the key).
- Note that dynamic memory space is shared between dynamic memory files and license data (for Features and Products). All space that is not utilized for license data can be used for dynamic memory files.
- Default memory contains two fixed partitions, for read-only and read/write memory. The developer must manage the allocation of space within each partition using offset and length parameters.



In this release of Sentinel LDK, you can only create data files in the free Dynamic memory using Sentinel License Generation API or the ToolBox utility interactive simulation of this API. In future releases, the same functionality will be available in Sentinel EMS.

Support for Virtual Clock for Sentinel HL Keys

Until now, the use of a virtual clock for time-based licenses was only available for applications protected with a Sentinel SL key. Sentinel LDK now supports the use of a virtual clock (*V-Clock*) for applications that are protected using Sentinel HL (Driverless configuration) keys. V-Clock does not provide the same level of protection that can be obtained using Sentinel HL Time or NetTime keys, but it does provide a low-cost alternative that offers significant protection against tampering with the system clock.

V-Clock is not available for Sentinel HL Basic keys. The use of V-Clock for Sentinel HL Pro keys requires the addition of a V-Clock module to the Sentinel Master key. (The use of V-Clock for all other Sentinel HL keys and for Sentinel SL keys does not require any additional Master key module.)



In this release of Sentinel LDK, you can only work with V-Clock using Sentinel License Generation API or the ToolBox utility interactive simulation of this API. In future releases, V-Clock functionality will be available in Sentinel EMS.

Enhancements to AppOnChip Protection

AppOnChip protection in Sentinel LDK Envelope has been enhanced as follows:

- AppOnChip can now be used to protect dynamic-link libraries (DLL files) on a Windows platform.
- When you select **Enable AppOnChip** for an application, Envelope examines all the functions that are compatible with AppOnChip protection and uses heuristics to automatically select those functions that will provide the best increase in security with the least impact on performance.



If a time-critical function is protected with AppOnChip, there may be a significant drop in performance for your application. The assessment of functions to select for AppOnChip protection can only be made by a developer who is familiar with the application code. Be sure to review the functions that are selected for protection to ensure that only appropriate functions are chosen.

AppOnChip protection continues to be available at no additional cost for applications that are licensed using Sentinel HL Max, Time, NetTime, Net, and Drive keys. For applications that are licensed using Sentinel HL Basic or Pro keys, an annual or perpetual AppOnChip module license must be obtained from SafeNet. The AppOnChip module can be placed on your Sentinel Developer key or Sentinel Master key. The Developer or Master key that contains the AppOnChip module must be accessible to Sentinel LDK Envelope at the time that you apply AppOnChip protection to your application.

AppOnChip protection continues to be available for use with all Sentinel HL keys with the DEMOMA Batch Code.

Data Encryption Facility No Longer Requires the Run-time Environment

Under Windows, protected applications that use the Data Encryption facility to read and write encrypted data to an external file no longer require the Run-time Environment. Sentinel LDK Envelope has been enhanced to integrate the required library in the protected application.

As a result, applications that are protected with the latest version of Envelope and licensed using SL-UserMode keys, Driverless HL keys, remote network keys, or remote SL-AdminMode keys do not require installation of the Run-time Environment even if they use the Data Encryption facility. Encrypted files remain compatible the Data Encryption facility regardless of whether or not the Run-time Environment is present on the machine.

IEEE Taggant Support

Certain Sentinel LDK components for protected applications are signed using the IEEE Software Taggant system and are therefore more transparent to anti-virus systems. This significantly reduces the number of false positive alerts triggered by the installation of protected applications.

Generic Support for Sentinel SL Under VM Live Migration Solutions

Sentinel LDK 7.1 introduces a solution for VM live migration, allowing the guest VM to freely migrate between different physical hosts, while allowing accurate license enforcement to continue. Unlike other software-based solutions, VM live migration will not cause the license to be incorrectly marked as cloned (and thus disabled).



In this release of Sentinel LDK, this support is only available using Sentinel License Generation API or the ToolBox utility interactive simulation of this API. In future releases, the solution for VM live migration will be available in Sentinel EMS.

Improvements to User Interfaces

The following improvements to Sentinel LDK user interfaces have been implemented:

- Master Wizard now requires fewer steps to complete, and can handle a longer period of inactivity without timing out.
- Vendor Suite Launcher now provides access to additional tools and documents.
- The Sentinel LDK Installation Wizard now provides helpful information during installation, as well as a link to the *Sentinel LDK Installation Guide*. The Wizard has also been updated with a new design.

Mac OS X 10.9.2 is Now Supported

Sentinel LDK now supports Mac OS X 10.9.2 for the Vendor Tools, Run-time Environment, and code samples.

What's Changed in This Release?

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

Sentinel LDK Now Supports Clearing the Cloned State for SL-Legacy Licenses

Sentinel License Generation API now provides a new license type called `SNTL_LG_LICENSE_TYPE_CLEAR_CLONE`. When this type of license is applied to an SL-Legacy license for which cloning was detected, the "cloned" state of the SL-Legacy license is cleared, and the state of the license is restored to its previous value. This new license type makes it easier for vendors to migrate to Sentinel LDK while continuing to support customers with SL-Legacy licenses.



In this release of Sentinel LDK, you can only perform this function using Sentinel License Generation API or the ToolBox utility interactive simulation of this API. In future releases, the same functionality will be available in Sentinel EMS.

Logout for Features No Longer Performs Write Cycles

In earlier versions of Sentinel LDK, the Licensing API functions to log out of a Feature would perform a write cycle to the protection key. This was relevant for Sentinel HL keys because hardware keys are certified to withstand a specific number of write cycles.

Starting with the License Managers provided with Sentinel LDK v.7.0 (Run-time Environment version 6.6.0), the logout function no longer performs a write cycle to the protection key.

Remote Connection of Vendor Keys

Sentinel Master keys and Developer keys can be connected remotely using available third-party solutions. These solutions can be used in cases where a physical key cannot be connected due to the lack of a USB port or inability to physically access the machine. You can connect your Master or Developer keys to an over-the-network USB solution and access them from any physical or virtual machine as if they were connected locally.

There are several such solutions, both software-based (installable on any PC with a USB port) and dedicated devices. Among the dedicated devices, SafeNet recommends myUTN-80 by SEH Technology. This device was tested with various SafeNet protection keys, from Sentinel SuperPro to Sentinel HL, and is backed by partnership between SEH Technology and SafeNet.

Supported Platforms for Sentinel LDK - End Users and Vendors

Supported Platforms for End Users

Sentinel LDK Run-time Environment, Protected Applications

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

System	Run-time Environment Version
Windows	Version 6.61 Sentinel LDK Run-time Environment has been certified by Microsoft as “Compatible with Windows 8” (x86 and x64).
Mac	Version 7.1
Linux	Version 2.4.1



To support all the latest enhancements in Sentinel LDK 7.1, end users should be provided with the latest Run-time Environment. However, for all pre-existing functionality in Sentinel LDK, respective earlier versions of Sentinel Run-time Environment are supported.

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

System	Supported Versions
Windows	<ul style="list-style-type: none"> ■ Windows (x86) XP SP3, Windows (x64) XP SP2, Windows Vista SP2, Windows 7 SP1, Windows 8.1, Windows Server 2003 SP2, Windows 2008 SP2, Windows 2008 R2 SP1, Windows Server 2012 R2 The latest service packs and security updates must be installed. ■ (x86 only) Windows XP Embedded standard ■ (x86 only) Windows 7 SP1 Embedded standard
Mac	<ul style="list-style-type: none"> ■ Mac OS X 10.6.8 (32-bit and 64-bit) ■ Mac OS X 10.7.5 ■ Mac OS X 10.8.5 ■ Mac OS X 10.9.2
Linux	<ul style="list-style-type: none"> ■ OpenSUSE 12.3 (x86 and x86_64) ■ Red Hat EL 5.10, 6.5 (x86 and x86_64) ■ Ubuntu Server 10.04.4, 12.04.3 (x86 and x86_64) ■ Ubuntu Desktop 12.04.3 (x86 and x86_64) ■ Debian 6.0.8 (x86 and x86_64) ■ CentOS 6.5 (x86 and x86_64) <p>The latest service packs and security updates must be installed.</p>

System	Supported Versions
Virtual Machines	<p>The VM detection and VM fingerprinting capabilities provided by Sentinel LDK have been validated on the following technologies:</p> <ul style="list-style-type: none"> ■ Virtual Box 4.3.2 ■ Parallel Desktop 9 for Mac ■ VMware Player 5.0.2 ■ Hyper-V Server 2012 R2 (SL only) ■ VMware Workstation 10 ■ VMware ESXi 4.x (Note: This has been tested with Windows XP and Windows 7 Guest operating systems only.) ■ VMware ESXi 5.1 ■ XEN 4.3 ■ KVM (RHEL 6.5, Ubuntu 12.04 server, Debian 6.xa)
Wine	Sentinel LDK Run-time Environment was tested on Linux platforms with Wine 1.4.1.
Linux ARM	<p>Sentinel LDK Embedded supports the Linux ARM platform. Visit the SafeNet website to learn more and to download a free trial:</p> <p>http://www.safenet-inc.com/software-monetization/sentinel-embedded-solutions/</p>

Web Browsers for Sentinel Admin Control Center


- Microsoft Internet Explorer (32-bit) versions 8, 9, 10
- Mozilla Firefox (32-bit) version 22
- Google Chrome (32-bit) version 23 or later
- (Mac) Safari 5.0, 6.0

Supported Platforms for Vendors

Sentinel EMS Service

System	Supported Versions
Windows	Windows (x86) XP SP3, Windows (x64) XP SP2, Windows Vista SP2, Windows 7 SP1, Windows 8.1, Windows Server 2003 SP2, Windows 2008 SP2, Windows 2008 R2 SP1, Windows Server 2012 R2

Sentinel EMS Database


System	Supported Database Server Software
Windows	<ul style="list-style-type: none"> ■ Microsoft SQL Server 2005 x86/x64 ■ Microsoft, SQL Server 2005 Express Edition (must be enabled for remote connections) x86/x64 ■ Microsoft SQL Enterprise 2008 x86/x64 ■ Microsoft SQL Enterprise 2008 R2 x86/x64 <div>  Microsoft SQL Server 2008 R2 Express Edition can be installed automatically by the Sentinel EMS Installation wizard. The installer for this version of Microsoft SQL Server is also available on the Sentinel LDK installation DVD. </div>

Web Browsers for Sentinel EMS

- Microsoft Internet Explorer versions 8, 9, 10
- Mozilla Firefox (32-bit) version 22
- Google Chrome (32-bit) version 23 or later


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

Sentinel LDK Vendor Tools

System	Supported Versions
Windows	<ul style="list-style-type: none"> ■ Windows (x86) XP SP3, Windows (x64) XP SP2, Windows Vista, Windows 7, Windows 8.1, Windows Server 2003, Windows 2008, Windows 2008 R2, Windows Server 2012 R2 <p>Requires screen resolution 1280 by 1024 pixels with 24 bit color quality</p> <div>  For Sentinel LDK Envelope: To protect and execute the provided .NET sample application under Windows 8 or Windows Server 2012 R2, you must install Microsoft .NET Framework 3.5. </div>
Mac	<ul style="list-style-type: none"> ■ Mac OS X 10.6.8 (32-bit and 64-bit) ■ Mac OS X 10.7.5 ■ Mac OS X 10.8.5 ■ Mac OS X 10.9.2

System	Supported Versions
Linux	<ul style="list-style-type: none">■ OpenSUSE 12.3 (x86 and x86_64)■ Red Hat EL 5.9, 6.4 (x86 and x86_64)■ Ubuntu Server 10.04 (x86 and x86_64)■ Ubuntu Desktop and Server 12.04 (x86 and x86_64)■ Debian 6.0.x (x86 and x86_64)■ CentOS 6.5 (x86 and x86_64) <p>The latest service packs and security updates must be installed.</p>

Code Samples

Sample	Support Considerations	
Sentinel Licensing API Sample	Programming Language	Tested Compilers
	AutoCAD	AutoCAD 2014, AutoCAD 2010
	C	Visual Studio 2013 Visual Studio 2008 Visual Studio 2005 C++ Builder Developer Studio 2006
	C++	Visual Studio 2013 Visual Studio 2010 Visual Studio 2008 Visual Studio 2005 C++ Builder Developer Studio 2006 <div>  <p>To compile the 64-bit samples using VS 2008, ensure that the 64-bit compiler package is installed when you install VS.</p> </div>
	C#	Visual Studio 2013 Visual Studio 2010 Visual Studio 2008, Visual Studio 2005
	Delphi	Delphi 2007 Developer Studio 2006
	Java	Java Developer Kit 1.7 Java Developer Kit 1.6 Java Developer Kit 1.5
	Visual Basic .NET	Visual Studio 2013 Visual Studio 2010 Visual Studio 2008 Visual Studio 2005
	4D	4D v11 for Mac OS and Windows
Sentinel Licensing API – C Sample for Mac OS X	Operating Systems supported: <ul style="list-style-type: none"> ■ Mac OS X 10.6.8 ■ Mac OS X 10.7.5 ■ Mac OS X 10.8.5 ■ Mac OS X 10.9.2 	

Sample	Support Considerations	
Sentinel LDK Run-time Environment Installer API Sample	Programming Language	Tested Compilers
	MSC	Visual Studio 2008, Visual Studio 2005, Visual Studio 2010, Visual Studio 2012
	MSI	Wise Installer 7, Wise Installer 6.2 InstallShield 12 InstallShield 2013 Spring Note: The provided solution can only be used with InstallShield 2013 Spring or later.
Sentinel Activation API Sample	Programming Language	Tested Compilers
	C	Visual Studio 2003, Visual Studio 2005, Visual Studio 2008, Visual Studio 2010, Visual Studio 2012 Provided workspace may need to be converted for the VS version used.
Sentinel LDK Run-time Environment Installer for Mac OS X	Operating Systems supported: <ul style="list-style-type: none"> Mac OS X 10.6.8 (32-bit and 64-bit) Mac OS X 10.7.5 Mac OS X 10.8.5 Mac OS X 10.9.2 	
Sentinel LDK Licensing API – 4D Sample for Mac OS X	Operating Systems supported: <ul style="list-style-type: none"> Mac OS X 10.6.8 (32-bit and 64-bit) Mac OS X 10.7.5 Mac OS X 10.8.5 Version of 4D supported: <ul style="list-style-type: none"> 4D v11 SQL 	
Sentinel LDK Licensing API – 4D Sample for Windows	Version of 4D supported: <ul style="list-style-type: none"> 4D v11 SQL 	
Sentinel Activation API	Operating Systems supported: <ul style="list-style-type: none"> Windows XP, Windows Server 2003, Windows Vista, Windows Server 2008, Windows 7 (32-bit and 64-bit) Windows 2000 (32-bit) 	
Sentinel Activation API for Mac	Operating Systems supported: <ul style="list-style-type: none"> Mac OS X 10.6.8 (32-bit and 64-bit) Mac OS X 10.7.5 Mac OS X 10.8.5 	
Sentinel Activation Sample for Java	Java version supported: JDK 1.6	

Supported Versions for Windows CE

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

Supported Platforms for Sentinel Cloud Licensing

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

Sentinel Cloud Run-time Interface	Platforms	Run-time Environment	Web Server
Java	<ul style="list-style-type: none"> Windows 7 Windows Server 2008 Windows XP 	JRE 6	Tomcat 6.26
.NET	<ul style="list-style-type: none"> Windows 7 Windows Server 2008 Windows XP 	.NET Framework 2.0 and 3.5	IIS 6.0 and 7.0
C (32-bit and 64-bit)	<ul style="list-style-type: none"> Windows 7 Windows Server 2008 Windows XP 		
C Linux (32-bit and 64-bit)	<ul style="list-style-type: none"> Ubuntu 10.04 CentOS 5.4 		

Dropped Support

This section lists platforms which were supported in the past, but have not been tested with Sentinel LDK v.7.1. SafeNet will continue to accept queries for issues related to these platforms and will attempt to provide information to resolve related issues.

Visual Basic Code Samples for Sentinel Licensing API

Visual Basic code samples for Sentinel Licensing API are no longer included in Sentinel LDK.

Sentinel LDK Documentation

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

Documents

Sentinel LDK documents (PDF files) can be found:

- on the Sentinel LDK Installation DVD, under: **\Windows\Installed\Docs**
- where Sentinel LDK is installed, under:
...\Program Files (x86)\SafeNet Sentinel\Sentinel LDK\Docs
- where Sentinel EMS is installed, under:
...\Program Files (x86)\SafeNet Sentinel\Sentinel EMS\EMSServer\webapps\ems\Docs
 (For Win32, under **\Program Files\...**)

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>Guide you through the basic procedures of Sentinel LDK to familiarize you with the applications and their functionality.</p> <ul style="list-style-type: none"> • The Demo Kit tutorial is for vendors who wish to evaluate Sentinel LDK. • The Starter Kit tutorial is for vendors who have just purchased Sentinel LDK. <p>Two versions of each tutorial are provided – one for working with Sentinel EMS as the back office system, and one for vendors who want to provide their own back office system and only use the Sentinel LDK APIs to handle licensing and protection.</p>
Sentinel LDK Quick Start Guides	Provides a short and simple demonstration of how you can easily protect your software using Sentinel HL keys. Separate Demo Kit and Starter Kit guides are provided.

Document	Description
Sentinel HL Drive Flash Partitioning Utility – User Guide	Describes how to use the Sentinel HL Drive partitioning utility and API to load your Sentinel LDK-protected applications and data onto the CD-ROM partition of a Sentinel HL Drive, and ship it to your customers. Your customers can save files to Sentinel HL Drive or load additional software on it, and thus utilize the convenience of USB flash drive functionality.
Migration Guide: Sentinel HASP to Sentinel LDK	Describes how to migrate from Sentinel HASP to Sentinel LDK. Describes how to migrate your Business Studio Server database to a Sentinel EMS database. This guide also describes the Business Studio Server API for Sentinel EMS.
Additional Guides for Migrating to Sentinel LDK	These guides describe how to migrate to Sentinel LDK from: <ul style="list-style-type: none"> - Hardlock - SmartKey - Sentinel SuperPro - HASP HL - HASP4 - Sentinel Hardware Keys
Integrating Sentinel EMS Server into Your Existing Back-Office Systems	Outlines the many ways that software vendors can maximize the potential of their existing back-office systems, such as ERP, CRM, and business intelligence systems, through seamless integration with Sentinel EMS Server.
Sentinel EMS Configuration Guide	Provides information on setting up and configuring Sentinel EMS to satisfy the requirements of your organization.
Sentinel EMS User Guide	Provides the Sentinel EMS user with detailed directions on how to set up license entities and how to handle entitlements, production, and support for Sentinel HL and SL keys. (This information is also provided in online help for the Sentinel EMS user interface.)
Sentinel EMS Web Services Guide	Provides the developer with an interface for integrating Sentinel EMS functionality into the vendor's existing back-office systems.

Sentinel Cloud Licensing Documents

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

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

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.

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.

Online Help Systems - Sentinel LDK APIs

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

- on the Sentinel LDK Installation DVD, under: **\Windows\Installed\API**
- where Sentinel LDK is installed, under:
...\Program Files (x86)\SafeNet Sentinel\Sentinel LDK\API

(For Win32, under \Program Files\...)

Sentinel LDK API	Description
Activation API Reference	Together with various Licensing API functions, this API assists the developer in communicating with the Sentinel EMS Server.
Licensing API Reference (formerly Run-time API)	Provides the developer with an interface to use the licensing and protection functionality available in the Sentinel LDK Run-time Environment.
Run-time COM API	Provides the developer with access to Sentinel HASP Run-time Environment functionality, through an interface written for the Microsoft Component Object Model (COM).
Run-time Installer API	Provides the developer with an interface for integrating installation of the Run-time Environment into the installation of the vendor's protected application.
Sentinel EMS Web Services	Provides the developer with an interface for integrating Sentinel EMS functionality into the vendor's existing back-office systems. (Documentation is available from the index.html menu under ...\Program Files (x86)\SafeNet Sentinel\Sentinel EMS\EMSServer\webapps\ems\Docs\ (For Win32, under \Program Files\...)

Sentinel LDK API	Description
License Generation API Reference	Provides access to the power and flexibility of Sentinel protection keys without the need to employ the full Sentinel EMS system. The developer can call functions in this API to generate and update licenses for Sentinel protection keys.
Admin API Reference	Provides the functionality available in Admin Control Center and Sentinel License Manager in the form of callable API functions.

Software and Documentation Updates

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

Known Issues and Workarounds

The known issues in Sentinel LDK v.7.1 that are likely to have the most significant impact on users are listed below, according to component.

Sentinel Vendor Suite Installation

Ref	Issue
133240	<p>When Installing Sentinel Vendor Suite under Windows 2003, the installation may fail with an internal error or with error messages similar to the following:</p> <p style="padding-left: 40px;">Error 1718. File <i>fileName</i> was rejected by digital signature policy. Installation ended prematurely because of an error.</p> <p>This problem is caused by a known issue in Windows 2003. To resolve this problem, go the following Microsoft URL: http://support.microsoft.com/kb/925336</p>
171812	<p>In a machine with an Nvidia graphics card and AMD64 processor, installation of Sentinel EMS may stop responding after the installer displays the "installed successfully" screen. At this point, installation of Sentinel EMS has succeeded, but the Finish button is not displayed, and the installer cannot continue with the installation of Sentinel Vendor Suite (if you requested to install it).</p> <p>Workaround: Perform the installation using a remote desktop. Alternatively, cancel the installation wizard when the "installed successfully" screen is displayed, and then run the installation wizard a second time and select only the Vendor Suite for installation.</p>
172141	<p>On a machine with a localized operating system, installation of Sentinel EMS in a directory whose name contains localized characters fails with "Error 1324".</p> <p>Workaround: Install Sentinel EMS in a directory whose name does not contain localized characters.</p>
180267 180270	<p>When Sentinel LDK is installed on a machine that connects to the Internet using a proxy, the update download may fail or may show incorrectly that updates are not available. This issue should resolve itself when the Software Manager application is automatically updated. Until this occurs, SafeNet recommends that you periodically check Sentinel Customer Community website for information on new available downloads.</p>

Sentinel EMS

Ref	Issue
EMSLDK-87 143768	<p>If Sentinel EMS is configured to work with a remote database that uses a password that contains non-English letters, Sentinel EMS Service fails to log in successfully to the remote database.</p> <p>Workaround: Change the password for the database so that it does not contain non-English letters.</p>

Ref	Issue
167309	In the RUS Branding screen, the list field for selecting the font does not work correctly in the Google Chrome browser. Workaround: Use a different browser to edit the RUS Branding screen.
182566	If you are viewing previous activations for “Protection Key Update Entitlement” and attempt to download V2C files for all the activations in that entitlement, the download will not succeed if more than 1,000 V2C files must be downloaded.
EMSLDK-4265	On MAC machines with default settings, the Run-time Environment (RTE) Installer generated from Sentinel EMS does not work. Workaround: <ul style="list-style-type: none"> ■ The end user needs to reduce the overall security of the MAC machine before using this RTE installer. OR <ul style="list-style-type: none"> ■ Sign the RTE installer (see ‘Signing the RTE Installer’ in the <i>Sentinel EMS User’s Guide</i>).

Sentinel Cloud Licensing

Ref	Issue
EMSLDK-4810	For Sentinel Cloud Licensing: If the fingerprint of the customer's machine does not contain the motherboard UID tag, the Cloud On-premise mode will not work on machine.
EMSLDK-5193	For on-premise deployment: If a user accesses an application that uses Entitlement Level caching, that user cannot access any additional applications that also use Entitlement Level caching from the same computer.

Installer

Ref	Issue
	When you upgrade to a higher version of Cloud Services, the installer uninstalls the SDK from the custom location and does the installation at the default location. SafeNet recommends that you uninstall the earlier versions before you install a latest version of Cloud Services.

Billing

Ref	Issue
	The billing data provided in the customer login is the partially processed data. This data is used to produce the final bill, and should not be considered as the final bill.
	Any exception encountered while retrieving billing details are logged in the Billing.xml file, but not displayed in Sentinel Cloud EMS GUI.

Sentinel LDK Master Wizard

Ref	Issue
139726	<p>Under some versions of OpenSUSE Linux, when the Master Wizard is run as root, the application hangs with the following output:</p> <pre>qctest@linux-g09j:~/Desktop/Linux/VendorTools/VendorSuite> su Password: linux-g09j:/home/qctest/Desktop/Linux/VendorTools/VendorSuite # ./masterhasp ** Glib-GIO:ERROR:gdbusconnection.c:2279:initable_init: assertion failed: (connection->initialization_error == NULL) Aborted</pre> <p>This appears to be the result of a known issue in OpenSUSE.</p> <p>Workaround: Enter the following commands to run the Master Wizard:</p> <pre>su - ./masterhasp</pre> <p>(Note the syntax: "su -")</p>
172697	<p>When the Master Wizard is run from the console under Debian 6.0, the following warning is displayed:</p> <pre>Qt: Session management error: None of the authentication protocols specified are supported</pre> <p>This message can be ignored. The Master Wizard performs its function correctly.</p>

Sentinel LDK Runtime Environment, License Manager and Customer Tools

Ref	Issue
12506	Sentinel LDK communicates via TCP and UDP on port 1947. This port is IANA-registered exclusively for this purpose. At the end user site, the firewall must be configured so that communication via this port is not blocked.
140898	Under the Linux operating system, Sentinel License Manager does not support the IPV6 network protocol.

Ref	Issue
180256	When a computer names contains UTF-16 characters, Admin Control Center displays the short name for the computer (similar to Windows Explorer). Similarly, the sntl_admin_get function in Admin API returns the short name.
182646	<p>After Windows 7 is upgraded to Windows 8, the user may not be able to use existing SL licenses or to install new SL licenses.</p> <p>Workaround:</p> <p>After you upgrade from Windows 7 to Windows 8, reinstall the Run-time Environment</p>
LDK-2471	<p>Sentinel Licensing API: On a computer with the Nvidia chip set GeForce 7025/nForce 630a, and where the CPU is AMD Athlon 64 X2, the hasp_read and hasp_encrypt functions may fail with error 39, HASP_BROKEN_SESSION. This problem only exists with Sentinel HL keys with Firmware version 3.25.</p> <p>Workaround 1: On the computer described above, when error 39 is returned, call the hasp_read or hasp_encrypt function again. It is not necessary to call hasp_login again.</p> <p>Workaround 2: Use Sentinel HL keys with Firmware version 4.2x.</p>
LDK-4782	<p><writeconfig> in Sentinel Admin API automatically writes values for many parameters to the INI file that are not relevant for the Integrated License Manager. When the Integrated License Manager processes the INI file, it rejects these parameters and creates an error log for each irrelevant entry.</p> <p>Workaround: These errors are normal and should be ignored.</p>
LDK-4867	<p>Given the following circumstances:</p> <ul style="list-style-type: none"> ◦ A Sentinel HL (Driverless configuration) key is connected to one of the following: <ul style="list-style-type: none"> ▪ a USB host controller in USB 3.0 compatibility mode on a VMware Workstation 9.0.2 or 10.0.1 platform ▪ a USB host controller in "xHCI" mode on a VMware ESXI 5.1 platform ◦ A protected application is started on the VMware platform. <p>The protected application does not execute, and an error message is displayed.</p> <ul style="list-style-type: none"> ◦ If the Run-time Environment is present on the VMware platform, the error message "Sentinel Session is broken (H0039)" is displayed. ◦ If the Run-time Environment is not present on the VMware platform, the error message "Feature not found" is displayed. <p>In either case, the HID key is shown as "USB Input Device" in the Device Manager (under "Human Interface Devices").</p> <p>Workaround:</p> <ul style="list-style-type: none"> ◦ For VMware Workstation 9.0.2 or 10.0.1: Switch the USB controller to USB 2.0 compatibility mode. ◦ For VMware ESXI 5.1: Switch the USB controller to "EHCI+UHCI" mode.

Ref	Issue
LDK-5798	<p>A warning message is displayed when you attempt to open the haspds.msm merge module in Wise 7.0 SP2 or Wise Installation Studio 7.0. The message states: This merge module does not meet the Windows Installer SDK merge module naming convention. Do you want to fix it automatically? (Yes or No)</p> <p>Workaround: Do one of the following:</p> <ul style="list-style-type: none"> ◦ Dismiss the warning by selecting the “No” option. ◦ Avoid the warning. Build the haspds.msm file using the haspds.wsm project that is available on the Installation DVD.
LDK-2827	(Linux) Under OpenSUSE, it may be necessary to manually install the libpng library in order to run the linux_bounce sample application.
10055	<p>(Linux) When launching the C binary sample: If an error message is displayed, stating that shared libraries are not found, copy the HASP .so library to usr/lib or usr/local/lib. Alternatively, force the search for the library in the current directory when you run the sample, by using the command: <code>LD_LIBRARY_PATH=. ./hasp_demo</code></p> <p>Note: When using the command above, ensure that you insert a space between <code>LD_LIBRARY_PATH=.</code> and <code>./hasp_demo</code></p>
10109	<p>(Linux) When running the Master wizard in Red Hat EL 5.1: If the wizard displays an error message stating that libssl.so.0.9.8 was not found, create the following symbolic links:</p> <pre>ln /usr/lib/libssl.so /usr/lib/libssl.0.9.8 ln /usr/lib/libcrypto.so /usr/lib/libcrypto.0.9.8</pre>
10309	(Linux) When using Sentinel LDK Envelope, ELF executables that contain a GNU_RELRO segment cannot be protected unless the executable is linked using the linker switch: <code>-z norelro</code>
11138	(Linux) If the application to be protected uses <code>wprintf</code> for its output, the Envelope switch <code>--wchar (console_configuration=2)</code> must be used.
142107	(Linux) The Linux activation demo fails to run under Red Hat EL 5.4 x86_64.

Sentinel LDK ToolBox

Ref	Issue
183073	In the current release, Sentinel LDK ToolBox does not support the new <code>sntl_admin_context_new_scope()</code> function in the Admin API. However, the function appears in the Help system for Sentinel LDK ToolBox, and the function is supported by the Admin API.

Sentinel LDK Envelope for Windows Platforms

General

Ref	Issue
92503	<p>If you move an Envelope project file from its original location to a different location, then the next time you open the project, Envelope displays an incorrect path for the output (protected) file.</p> <p>You can use either of these workarounds to move an Envelope project file to a new location:</p> <ul style="list-style-type: none"> ■ Use the Save As option from the Envelope File menu to save the project to the new location. (You can afterwards delete the original project file.). ■ Copy the directory structure containing both the project file and the related unprotected binary to the new location.
93877	<p>(For Windows Vista and Windows 7) In the event that the error “Serious internal engine error (65535)” is displayed, make sure that you have write permission for the specified output directories and that the output directory is not protected by Windows UAC.</p>
178432	<p>If the installation path for the Vendor Suite contains GB 18030 or Unicode characters, then the help file for Envelope, ToolBox, or Data Encryption utility does not open.</p> <p>This is Microsoft limitation. See the related article link: http://support.microsoft.com/kb/2606439</p> <p>Workaround: Manually open the help files after copying them from \Windows\Installed\VendorTools\VendorSuite\translations\6.4 on the DVD to a location on your local hard drive whose path name does not contain GB 18030 or Unicode characters.</p> <p><i>OR</i></p> <p>Install the Vendor Suite in a location whose path name does not contain GB 18030 or Unicode characters.</p>
182883	<p>If the logon user name for Envelope contains multibyte UTF-8 characters: When the user attempts to protect an application, the error “Undefined engine error (1)” is generated.</p> <p>Workaround: Do not use multibytes UTF-8 characters in the logon user name.</p> <p><i>OR</i></p> <p>In the Envelope Settings screen (Advanced tab), select the option to use Legacy Envelope engines.</p>
183967	<p>If an Envelope project name contains Unicode characters, then while launching Data Encryption from Envelope, the message "Could not open project" is displayed.</p> <p>Workaround: Do not include Unicode characters in the Envelope project name.</p> <p><i>OR</i></p> <p>Do not launch Data Encryption from within Envelope. Instead, start the Data Encryption utility (datahasp.exe). In the Data Encryption utility, click New project and provide the path of the Envelope project.</p>

Ref	Issue
185624	<p>In the Protection Settings for a Windows DLL, you cannot select the option User debugger detection.</p> <p>Workaround:</p> <ol style="list-style-type: none"> Select the option Overwrite default protection settings. Save the project and close Envelope. Restart Envelope. <p>You can now select the option User debugger detection.</p>

Java

Ref	Issue
11043	<p>To protect JAR files using Sentinel LDK Envelope on Windows 2008 Server 64-bit computers, you must have the Win32 Java Run-time Environment (JRE) installed, even if you already have the Windows x64 JRE installed. Alternatively, ensure that the path to the Windows x64 JRE is included in the system path variables.</p>
91963 (CASE 20)	<p>When a (vendor) developer attempts to create a shared object file that links to the Sentinel LDK shared object file libhasp_linux_batchCode.so, error messages similar to the following are displayed:</p> <pre> user@host:~/Desktop/API/Runtime/Java/source> ./build_linux_x64.sh Building HASP Java native library /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../x86_64-suse-linux/bin/ld: HASPJava.o: relocation R_X86_64_32 against `a local symbol' can not be used when making a shared object; recompile with -fPIC HASPJava.o: could not read symbols: Bad value collect2: ld returned 1 exit status </pre> <p>This problem occurs because the Sentinel Licensing (Run-time) API was not compiled to allow position-independent code generation (using the -fPIC flag).</p> <p>Workaround: You can obtain a version of the Sentinel Licensing API that was compiled with the -fPIC flag. For more information, contact Technical Support.</p>

Ref	Issue
93464	<p>Envelope v.5.10 and Envelope v.6.0 both provide extensive enhancements for protection of Java programs. As a result, projects for Java programs that were created before the release of this version of Envelope must be updated using the Sentinel LDK Envelope GUI. (Make sure that you update existing Envelope projects as described below before you attempt to use the current Envelope command-line utility with these projects.)</p> <p>To update an existing Envelope project (v.5.10 or earlier) to v.6.0 or later:</p> <ol style="list-style-type: none"> 1. Open the project in the Sentinel LDK Envelope v.6.0 GUI and click the application in the Project pane. Envelope fills in the class/method list. By default, some methods are preselected. This is equivalent to the results expected when adding a new project. 2. Review the selection of methods that were selected by default for protection. For more information, see “Optimizing Protection Settings for Performance and Security” in the Sentinel LDK Envelope online help. 3. Save the project.
94373	<p>One of the optional behaviors in Envelope for protecting JEE applications is to halt the thread if the protected JEE application fails to detect a Sentinel protection key. This behavior is controlled by the advanced protection property <code>SUSPEND_THREADS</code>. However, the protection mechanism also halts all threads from all third-party application running in the same Java Virtual Machine instance (JVM) on the Tomcat server. (Note that each Tomcat server only starts a single JVM instance.) Therefore, when protecting JEE applications in Envelope, the default value for the <code>SUSPEND_THREADS</code> property is currently set to False (although the documentation states that it is set to True). If you attempt to set the value for this property to True, a warning message is displayed.</p>
95269	<p>The current release of Sentinel LDK Envelope does not support protection of Java paint methods, but it allows you to select them in the user interface. As a result, the protected program may cause a deadlock when it executes a protected paint method at runtime with no Sentinel key connected. To prevent this issue from occurring, you can deselect all paint methods. Note that paint methods do not usually contain application logic; therefore, deselecting them typically has no impact on security. As an alternative, you can select console output for messages by enabling stderr output instead of windows in the Advanced settings panel.</p>
95491	<p>The current release of Sentinel LDK Envelope does not support protecting instance methods that call instance methods of the super class. Note that such methods are not detected by the Envelope and may be selected for protection by default. As a result, the protected application may trigger an <i>IllegalAccessError</i> exception during runtime.</p> <p>To prevent such exceptions, you can disable the protection of methods that contain calls to super class methods. Note that this reduces the level of protection.</p> <p>As an alternative, you can create a new class with a method that contains only the code leading up to (but not including) the call to the super instance method. You can protect this method instead of protecting the original method that contains the super instance method call.</p>

Ref	Issue
104163 (99869)	<p>A protected JAR/WAR archive that contains Unicode characters in its path or name will not operate under the native operating system. Although there is small chance that the archive will run (depending on the type of Unicode characters that are used), in most cases the application will not run and will display an error message. (This problem does not occur on systems that use MUI for localization.)</p> <p>Workaround: Install the Tomcat server in a path whose name contains only ASCII characters. Ensure that the name of the WAR archive contains only ASCII characters.</p>
104179	<p>The number of instances of a protected application that can run in a network environment may exceed the number of concurrent instances allowed by the license terms.</p> <p>Workaround: In the protected application, call a Run-time API function to open a permanent session to the Feature for which concurrency is restricted.</p>
179821	The Java Envelope does not support unicode.
180073	When a protected Java application is executed, the execution counter is decremented once, and then decremented for each protected method. Therefore protected Java applications should not be licensed based on execution count.
180733	The current release of Envelope supports only one protected war file in a given JBOSS 7 Server.
181673	Legacy Envelope engines for Windows x86 and Windows x64 programs are not supported under Windows 8 (32-bit and 64-bit) or Windows 2012 Server.
LDK-2490	<p>If the protected application contains code similar to this:</p> <pre>List<User> function_name (Parameter) { ... }</pre> <p>After this method is protected with Java Envelope, Envelope will return a List variable that is not typecasted to the <User> type. This <User> type is another defined class in the same scope.</p>
LDK-2891	<p>The protected Java application directory should be set in the environment variable, or the classpath entry should be in the Manifest file of the original application.</p> <p>In fact, Java Envelope adds an entry for run-time required JAR files in the protected application Manifest file under the classpath tag. If the classpath tag did not exist in the original Manifest file, then these entry will not work. At run time, the protected Java application will search for run-time JAR files from the classpath environment variable. If the application does not find these run-time JAR files, it will throw “Class Not Exception” for these files.</p> <p>Workaround 1: Add the current directory path to the classpath environment variable.</p> <p>Workaround 2: Modify the Manifest file to add the classpath tag.</p>
None	If protected JEE applications from multiple vendors are deployed on a single Tomcat server, the applications will not operate.

Ref	Issue
LDK-4683	<p>Sentinel LDK Envelope for Java cannot be used to protect applications that use the ModelMap data type.</p> <p>Workaround: To protect such applications, change ModelMap data types to a less strict data type.</p>

.NET

Ref	Issue
89873	<p>If a base class is selected to be obfuscated and a derived class is not set to be obfuscated, the derived class will not find the base class. Therefore, if you select a base class for obfuscation, you must also select any derived class for obfuscation.</p>

Sentinel LDK Envelope for Linux

Ref	Issue
LDK-4545	Applications that do not link any object dynamically cannot be protected.
LDK-4931	The background checks function in Linux Envelope is currently not support for shared objects.

Sentinel LDK Envelope and Data Encryption for Mac OS X

Ref	Issue
11416	<p>In certain instances, a protected Mach-O binary may have a different owner and permissions than it had prior to protection with Envelope. This is caused because Envelope designates the current user (that is, the user applying the protection) as the owner of the newly-created files.</p>
132292	<p>Applications that use deprecated functions or classes (for example: NSQuickDrawView used by SDL, deprecated since OS X 10.4.x) might fail to run under Mac OS X 10.7.x after protection. This is the case even if the unprotected application executes correctly or if the protected application executes correctly under versions of Mac OS X prior to 10.7.x</p> <p>Workaround: Do not use SDL or any other Library/Framework that relies on deprecated System Frameworks.</p>

Ref	Issue
151020	<p>Given the following situation:</p> <ul style="list-style-type: none"> ■ An application is protected using Envelope with the Data Encryption facility enabled. ■ The protected application is operated under OS X 10.6.x or later with Versions feature enabled. <p>Encrypted files may become corrupted, resulting in data loss.</p> <p>Workaround: Handle data encryption/decryption manually without using the Data Encryption facility. You can use the <code>hasp_encrypt</code> and <code>hasp_decrypt</code> functions in the Sentinel Licensing API. For examples that use these functions, see the Runtime samples provided for Mac. Check the SafeNet website periodically for an updated version of the Envelope that resolves this issue.</p>
175314	<p>When protecting a Mac application, the following error message may be displayed: "Insufficient GAP for protection. Processing aborted"</p> <p>If this occurs, do one of the following:</p> <p>For Realbasic applications:</p> <p>Use a newer version of Realbasic. In laboratory tests at SafeNet, the problem did not occur when working with Real Studio 2012 Release 2.</p> <p>For other applications:</p> <p>Pass suitable values to the -headerpad argument to ld, the static linker. For more details, refer to the documentation for ld, gcc or clang. You can add the option in the Other Linker Flags in the Linking section of the build settings in Xcode.</p> <p>The headerpad option requires a size value in hexadecimal notation. For example, for one VM page, specify 0x4000. For more information, see the manpages ("man ld") description of headerpad size.</p> <p>To add the headerpad argument in the project settings in Xcode, enter the following string under Other Linker Flags, for both Debug and Release builds:</p> <p>-Wl,-headerpad,size</p> <p>Notes:</p> <ul style="list-style-type: none"> ■ In the string above, "Wl" is capital "W", lowercase "l". ■ Some projects do not use ld directly, but link the application via gcc or clang.
177241	<p>Applications that implement the symbols <code>malloc</code>, <code>calloc</code>, <code>free</code>, <code>realloc</code>, <code>dlopen</code>, <code>dlderror</code>, <code>dlsym</code> or <code>dlclose</code> cannot be protected. However, application can use any of these standard library functions.</p>
183388	<p>An application may fail to run if it has been built with LDK static libraries using the Dead Code Stripping linking option.</p> <p>Workaround: Do not use the Dead Code Stripping option in linking.</p>

Sentinel LDK Envelope and Support for ARC in Mac OS X

ARC ("Automatic Reference Counting") is completely implemented by Apple in OS X as combination of:

- Special features of the clang compiler (ARC adds the code that had to be added by developers in the past).
- certain extensions to the Objective-C Runtime libraries.

Sentinel LDK Envelope for Mac sees an application using ARC as a standard application (since the missing code is created at compile time) interacting with an evolved backend (which is part of the operating system). As a result, Envelope supports applications that use ARC.

However, limitations exist as described in the explanation that follows.

Apple introduced ARC with OS X 10.7, so ARC is enabled in Xcode for OS X 10.7 (includes 10.7 SDK and clang supporting ARC). ARC is only available for 64-bit Mac applications. Apple also introduced a workaround to run ARC application under OS X 10.6.

The workaround is called *ARCLite*, as not all features are supported. ARCLite is a small static library that is linked to the developer application by default, at the time that the application is built with Xcode. This library basically extends the Objective-C runtime available under OS X 10.6 with the ARC feature.

In order to "inject" the ARC feature into pre-ARC Objective-C runtime, the ARCLite library (*libarclite*) contains code that is executed during initialization of the process *before* the original entry point is executed. Envelope cannot intercept this call. As the entry point has not been called, the code of libarclite (together with the application code) is still encrypted. As a result, the protected application fails.

Apple now uses ARCLite to extend older Objective-C runtime versions with new language features (new literals, indexed accessors in arrays and dictionaries) introduced as "modern Objective-C" in 10.8, even though these are unrelated to ARC.

Some applications that are linked with ARCLite fail after protection with Envelope, while others operate successfully. SafeNet is currently investigating this issue in order to obtain a clearer understanding of the problem.

Workaround

If an application that is linked with ARC fails after protection (especially when the application is started under the targeted OS X version, and not under the version under which the application was built), you can circumvent the issue by telling Xcode not to link ARCLite to the application. (As a result, certain new features possibly cannot be used on older platforms.)

To prevent Xcode from linking ARCLite, you must change the project/target settings. In the Xcode project settings pane, set the parameter **Implicitly Link Objective-C Runtime** to "NO".

This workaround generally prevents the protected application from failing. However, the workaround may cause issues when the application (with or without protection) is launched under older versions of OS X.