



Intel® Software Guard Extensions (Intel® SGX) SDK for Windows* OS

Installation Guide

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Revision History

Revision Number	Description	Revision Date
1.1	Intel® SGX Win 1.1 release	September 2015
1.6	Intel® SGX Win 1.6 release	May 2016
1.7	Intel® SGX Win 1.7 release	November 2016
1.8	Intel® SGX Win 1.8 release	June 2017
1.9	Intel® SGX Win 1.9 release	October 2017
1.9.5	Intel® SGX Win 1.9.5 release	January 2018
1.9.6	Intel® SGX Win 1.9.6 release	March 2018
2.0.0	Intel® SGX Win 2.0.0 release	April 2018
2.0.1	Intel® SGX Win 2.0.1 release	April 2018
2.1	Intel® SGX Win 2.1 release	August 2018
2.2	Intel® SGX Win 2.2 release	November 2018
2.2.3	Intel® SGX Win 2.2.3 release	February 2019
2.3	Intel® SGX Win 2.3 release	March 2019
2.4	Intel® SGX Win 2.4 release	June 2019
2.5	Intel® SGX Win 2.5 release	October 2019
2.5.1	Intel® SGX Win 2.5.1 release	November 2019
2.6	Intel® SGX Win 2.6 release	January 2020
2.7	Intel® SGX Win 2.7 release	March 2020
2.7.1	Intel® SGX Win 2.7.1 release	April 2020
2.8	Intel® SGX Win 2.8 release	June 2020
2.9	Intel® SGX Win 2.9 release	August 2020
2.10	Intel® SGX Win 2.10 release	September 2020
2.11	Intel® SGX Win 2.11 release	November 2020
2.12	Intel® SGX Win 2.12 release	January 2021

Intel® Software Guard Extensions SDK and Platform Software Installation

This document provides the instructions on how to install the Intel® SGX SDK and platform software. You can see the details in the following topics:

- [Install Intel® SGX SDK](#)
- [Install Intel® SGX Platform Software](#)

Install Intel® SGX SDK

Prerequisites

The Intel® Software Guard Extensions SDK package includes components to develop Intel® SGX applications. The main components include:

- Trusted libraries, including standard C library, C++ runtime support, C++11, and so on.
- Development tools including Edger8r application, signing tool, add-ins and wizards for Microsoft Visual Studio* 2017 IDE and Microsoft Visual Studio* 2019 IDE, and EPC measurement tool.
- Sample Projects.

The installer only installs the add-in and wizard for Microsoft Visual Studio* 2017 IDE and/or Microsoft Visual Studio* 2019 IDE if those applications have been installed on the platform.

Install

To install the Intel® Software Guard Extensions SDK, run `Intel(R)_SGX_Windows_SDK_<version>.exe` and follow the instructions.

Command line options

Usage: `Intel(R)_SGX_Windows_SDK_<version>.exe --a [<command>] [arguments...]`

command	install - install the product remove - remove the product repair - repair existing installation modify - modify existing installation
arguments (man-	--output=<file> [command: all] - specify a file where the

andatory)	output will be redirected --eula={accept reject} [command: install] - accept or reject the End User License Agreement (EULA); you should explicitly accept the EULA to proceed with the installation
arguments (optional)	none

When you complete the installation, you should be able to see the item **Intel® Software Guard Extensions SDK for Windows*** in the **Apps and Features\Programs and Features** list.

NOTE

The add-in and wizard for Microsoft Visual Studio* 2017 IDE and/or Microsoft Visual Studio* 2019 IDE are also provided separately with vsix as extension name. If it fails to install the add-in or wizard unfortunately, please double click the corresponding vsix files to install them manually.

Uninstall/Update

To uninstall/update the Intel® Software Guard Extensions SDK, run `Intel (R) _SGX_Windows_SDK_<version>.exe`, and select one of the following options listed on the welcome page:

1. Modify – Change installed features or feature settings.
2. Repair – Fix missing or corrupted files, shortcuts, and/or registry entries.
3. Remove – Remove Intel® Software Guard Extensions SDK from the platform.

Install Intel® SGX Platform Software

The 1.9.5 release of the Intel® SGX Platform Software (Intel® SGX PSW) is the first release that provides an INF-based installation that does not use the traditional desktop EXE installer. However, it does not support this new INF installation mechanism in older versions of the OS. Older OSes can use the traditional desktop EXE installer instead.

Windows 10 Fall Creators Update (version 1709) and later

The Intel® SGX PSW is provided as a Software Component that matches the Software Component device `swc\ven_int&dev_0e0c`. This Software Component device is created when installing the base driver for the Intel® SGX ACPI device `acpi\int0e0c`. When Intel® SGX is enabled and the Intel® SGX PSW

is installed, **Device Manager** will include **Intel® Software Guard Extensions** in both the **System Devices** and in **Software Components**.

For more information regarding software components, please see the Intel® Software Guard Extensions Platform Software for Windows* OS Release Notes.

Online Installation

If BIOS has been configured to enable Intel® SGX and the system is configured to obtain updates from Windows Update, it will automatically install the Intel® SGX base driver and the Intel® SGX PSW from Windows Update.

Offline Installation

To install the Intel® SGX PSW when not receiving Windows Updates, the base INF and the component INF must both be installed. To achieve this, execute the following commands:

- `pnputil /add-driver sgx_base.inf /install`
- `pnputil /add-driver sgx_psw.inf /install`

Uninstallation

Uninstallation of INF-installed Intel® SGX PSW is not recommended.

Windows 10 Creators Update (version 1703) and earlier

In older versions of the OS, the Intel® SGX PSW is installed by using the `Intel(R)_SGX_Windows_x64_PSW_<version>.exe` installer.

Prerequisites

Before installing the Intel® Software Guard Extensions platform software, ensure that the following requirements are met:

1. You are running on a machine supported by Intel® Software Guard Extensions.
2. You have administrator privileges to run the installer.

NOTE:

You cannot install Intel® SGX PSW installer when Windows* OS is installed in Legacy mode and Intel® SGX is configured as “Software Controlled” in BIOS. You need to configure Intel® SGX as “Enabled” in BIOS before installing Intel® SGX PSW.

Installation

To install the Intel® Software Guard Extensions Platform Software, run `Intel(R)_SGX_Windows_x64_PSW_<version>.exe` with Administrator privileges and follow the instructions.

Command line options

Usage: `Intel(R)_SGX_Windows_x64_PSW_<version>.exe --a [<command>] [arguments...]`

command	install - install the product remove - remove the product repair - repair existing installation modify - modify existing installation
arguments (mandatory)	--output=<file> [command: all] - specify a file where the output will be redirected --eula={accept reject} [command: install] - accept or reject the End User License Agreement (EULA); you should explicitly accept the EULA to proceed with the installation
arguments (optional)	--extractdriver=<path> [command: install] - specify a location for extracted Intel® SGX drivers from the Intel® SGX PSW installer --freshinstall [command: install] - uninstall the existing Intel® SGX PSW installer and install a new one --driveronly [command:install] - install only the Intel® SGX driver --applicationonly [command:install] - install only the Intel® SGX AESM service --force-install [command:install] - skip platform compatibility check --skipsgxdriver [command:install] - only add Intel® SGX driver files into target platform

Silent install

```
SGX_PSW.exe --s --a install --output=c:\log.txt --eula=accept --no-progress
```


After you complete the installation, you should be able to see the item **Intel® Software Guard Extensions Platform Software** in the **Control Panel\Programs\Programs and Features** list.

Uninstall/Update

To uninstall/update the Intel® Software Guard Extensions Platform Software, run `Intel(R)_SGX_Windows_x64_PSW_<version>.exe`, and select one of the following options listed on the welcome page.

- Modify - Change installed features or feature settings.
- Repair – Fix missing or corrupted files, shortcuts, and/or registry entries.
- Remove – Remove Intel® Software Guard Extensions Platform Software from the platform.

NOTE:

The Intel® SGX PSW installer does not uninstall the Intel® SGX device driver after the uninstallation of the platform software. Subsequent installations of the Intel® SGX PSW will update the driver to a newer version only (no down-grade is allowed).

Silent uninstall

```
SGX_PSW.exe --s --a remove --output=c:\log.txt --  
eula=accept --no-progress
```

Additional Dependencies

To use Intel® SGX platform services, you need to install a full set of Intel® Management Engine (Intel® ME) software components, which includes Intel® Dynamic Application Loader Host Interface Service (Intel® DAL Host Interface Service). If you install Intel® ME driver only, Intel® SGX platform service is not available.

Typically, the Intel® DAL stack and Intel® ME stack are pre-installed with other Intel software on a platform. However, if you receive an error that Intel® SGX platform services are unavailable, install the appropriate Intel® DAL stack and/or Intel® ME stack.

Please refer [install Intel® Software Guard Extensions Driver for Data Center Attestation Primitives \(Intel® SGX DCAP\)](#) to enable ECDSA attestation.

Logging

Logs are added to help debug configuration errors. By default, the SGX shared libraries output logs to standard output or standard error. The AESM as a system service/daemon outputs the log to the Event Log. Open the Event Viewer and check the Applications and Services Logs -> AESMSERVICE -> SGX/Admin or Applications and Services Logs -> AESMSERVICE -> SGX/Diagnostic to see the log.

ECDSA attestation

To enable ECDSA attestation:

- Ensure that you have the following required hardware:
 - 8th Generation Intel® Core™ Processor or newer with Flexible Launch Control support*.
 - Intel® Atom™ Processor with Flexible Launch Control support*.

- To use ECDSA attestation, you must install the Intel® Software Guard Extensions Driver for Data Center Attestation Primitives (Intel® SGX DCAP):

Follow the [Intel® SGX DCAP Installation Guide for Windows* OS](#) to install the Intel® SGX DCAP driver.

NOTE

If you already installed Intel® SGX driver without ECDSA attestation, please uninstall this driver, or the newly installed ECDSA attestation enabled Intel® SGX driver will not work.

- Install Provisioning Certificate Caching Service(PCCS). About how to install and configure PCCS, please refer [SGXDataCenterAttestationPrimitives](#).
- Ensure the PCCS is setup correctly by local administrator or data center administrator. Please also setup registry for default Quote Provider library according to your real environment.

[HKEY_LOCAL_MACHINE\SOFTWARE\Intel\SGX\QC�L]

"USE_SECURE_CERT"=dword:00000001

"PCCS_URL"="https://localhost:8081/sgx/certification/v2/"

- PCCS_URL is the URL of your PCCS caching service. Set USE_SECURE_CERT to 0 if PCCS uses self-signed certificates, and 1 for a production PCCS with authenticated certificates.