

# AN13283

## AUTH Plug & Trust MW Documentation

Rev. 1.3 — 24 March 2022

Application note

### Document information

Information	Content
Keywords	Plug & Trust, Middleware, A5000
Abstract	The document contains the documentation on A5000 Plug & Trust MW.





# AUTH Plug & Trust MW Documentation

*Release v04.01.01*

**NXP**

**Mar 24, 2022**

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## NXP AUTH PLUG & TRUST MIDDLEWARE

This documentation covers Secure IoT Authenticator - A5000 (in following document, we refer it as AUTH). It's an addendum to NXP Plug & Trust MW Documentation (v04.01.01)

**Documentation covers:**

- Feature of AUTH.
- API definition of AUTH.
- Demo Examples of AUTH.
- AUTH Building

**A5000 documentation:**

- A5000 Edge Lock R Secure Authenticator Data Sheet, document number 667601.
- A5000 Authentication Application APDU Specification Application Note, document number AN13157.
- Get started with EdgeLockTM SE05x support package Application Note, document number AN13256.

## AUTH FEATURES

This section provides the overview of functionalities of AUTH.

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**Note:** The A5000 Authentication Application is referred as Applet in this document.

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- **ECC Curves.**
  - NIST\_P256
  - NIST\_P384
- **Key management.**
  - ECC: AUTH supports NIST\_P256 and NIST\_P384.
  - AES: AUTH supports key of size 128, 192 or 256 bit
  - DES: AUTH supports key of size 8, 16 or 24 bytes respectively for DES, 2-key 3DES and 3-key 3DES.
- **Symmetric cryptographic operations.**
  - DES ECB, CBC
  - AES ECB, CBC, CTR
  - AES CCM, GCM
- **Asymmetric cryptographic operations.**
  - ECDSA sign and verify
  - ECDH with curve NIST\_P256 and NIST\_P384
- **Hash/HMAC/HKDF/TLSPerformPRF operations**
  - AUTH supports SHA-256 and SHA-384

SSS APIS: AUTH

SSS API name	AUTH
sss_session_open()	Available
sss_session_close()	Available
sss_key_store_set_key()	For asymmKey object, only support those mentioned in Section 2 <i>AUTH Features</i> on SA.
sss_key_store_generate_key()	For asymmKey object, only support those mentioned in Section 2 <i>AUTH Features</i> on SA.
sss_key_store_get_key()	Available
sss_key_store_open_key()	Available
sss_key_store_erase_key()	Available
sss_key_store_context_free()	Available
sss_key_object_init()	Available
sss_key_object_allocate_handle()	Available
sss_key_object_get_handle()	Available
sss_key_object_free()	Available
sss_symmetric_context_init()	Available
sss_cipher_one_go()	Available
sss_cipher_init()	Available
sss_cipher_update()	Available
sss_cipher_finish()	Available
sss_cipher_crypt_ctr()	Available
sss_symmetric_context_free()	Available
sss_aead_context_init()	Available
sss_aead_one_go()	Available
sss_aead_init()	Available
sss_aead_update_aad()	Available
sss_aead_update()	Available
sss_aead_finish()	Available
sss_aead_context_free()	Available
sss_digest_context_init()	Available
sss_digest_one_go()	Available. Only works for SHA-256 and SHA-384 on SA.
sss_digest_init()	Available. Only works for SHA-256 and SHA-384 on SA.
sss_digest_update()	Available
sss_digest_finish()	Available
sss_digest_context_free()	Available
sss_mac_context_init()	Available

continues on next page

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SSS API name	AUTH
<code>sss_mac_one_go()</code>	Available. In case of HMAC, only works for SHA-256 and SHA-384 on SA.
<code>sss_mac_init()</code>	Available. In case of HMAC, only works for SHA-256 and SHA-384 on SA.
<code>sss_mac_update()</code>	Available
<code>sss_mac_finish()</code>	Available
<code>sss_mac_context_free()</code>	Available
<code>sss_asymmetric_context_init()</code>	Available
<code>sss_asymmetric_encrypt()</code>	Not available for SA.
<code>sss_asymmetric_decrypt()</code>	Not available for SA.
<code>sss_asymmetric_sign_digest()</code>	Available. Only support ECC curves mentioned in <a href="#">Section 2 AUTH Features</a> on SA.
<code>sss_asymmetric_verify_digest()</code>	Available. Only support ECC curves mentioned in <a href="#">Section 2 AUTH Features</a> on SA.
<code>sss_asymmetric_context_free()</code>	Available
<code>sss_derive_key_context_init()</code>	Available
<code>sss_derive_key_go()</code>	Deprecated. Only works for SHA-256 and SHA384 on SA.
<code>sss_derive_key_one_go()</code>	Only works for SHA-256 and SHA-384 on SA.
<code>sss_derive_key_sobj_one_go()</code>	Only works for SHA-256 and SHA-384 on SA.
<code>sss_derive_key_dh()</code>	Available
<code>sss_derive_key_context_free()</code>	Available
<code>sss_rng_context_init()</code>	Available
<code>sss_rng_get_random()</code>	Available
<code>sss_rng_context_free()</code>	Available

## **AUTH DEMO LIST**

This section provides the overview of demos provided by MW. Some of them are not supported on AUTH.

### **4.1 SSS APIs Examples**

Demo	AUTH supported
ECC Example: Inject ECC Key and use it for sign and verify operation	Yes
Symmetric AES Example: Inject AES key, encrypt and decrypt data with it	Yes
HKDF Example: HMAC Key derivation operation based on the info and salt. Inject HMAC key into SA and derive a key using HMAC from the SA into the host keystore	Yes
Message Digest Example: Message Digest hashing operation. Calculate SHA256 over data.	Yes
HMAC Example: Inject HMAC key and calculate a HMAC	Yes
ECDH Example: Inject ECC key into SA and derive a key using ECDH from the SA into the host keystore.	Yes

### **4.2 Cloud connectivity Examples**

Demo	AUTH supported
AWS Demo for KSDK: Connect to Amazon Web Services IoT Core	Yes
AWS Demo for iMX Linux / RaspberryPi: Connect to Amazon Web Services	Yes
GCP Demo for KSDK: Connect to Google Cloud	Yes
GCP Demo for iMX Linux / Raspberry Pi: Connect to Google Cloud	Yes
IBM Watson Demo for KSDK: Connect to IBM Watson	Yes
IBM Watson Demo for iMX Linux / Raspberry Pi: Connect to IBM Watson	Yes
Azure Demo for KSDK: Connect to Microsoft Azure	Yes
Azure Demo for iMX Linux / Raspberry Pi: Connect to Microsoft Azure	Yes
Greengrass Demo for Linux: Connect as AWS Greengrass Core	Yes



## 4.3 OpenSSL Engine Examples

Demo	AUTH supported
OpenSSL Engine: TLS Client example for iMX/Rpi3: Setting up a TLS Link using OpenSSL Engine	Yes

## 4.4 mbedTLS Examples

Demos regarding the mbedTLS ALT implementation. See mbedTLS-alt

Demo	AUTH supported
SSL2 Client: Use extended SSL Client 2 & SSL Server 2 from mbedTLS	Yes
DTLS Client: Use extended dtls_client & dtls_server from mbedTLS	Yes

## 4.5 AUTH Specific Examples

Demo	AUTH supported
AUTH Minimal example: Showcase usage of AUTH low level APIs	Yes
AUTH Multiple Digest Crypto Objects example: Showcase Platform details of AUTH	Yes
APDU Player Demo: Send RAW APDUs to AUTH	Yes
Using policies for secure objects: Showcase usage of policies	Yes
Get Certificate from the SA: Read the certificate from the SA and store it on the file system.	Yes
AUTH Rotate PlatformSCP Keys Demo: Showcase Rotation of AUTH Platform-SCP03 Keys	Yes
AUTH Export Transient objects: Export transient objects	Yes
AUTH Import Transient objects: Import transient objects	Yes
Import External Object Prepare: Create ImportExternlObject raw APDU	Yes
AUTH Mandate SCP example	Yes
Read object with Attestation: Demonstrate how to read object with attestation	Yes
AUTH Transport Lock example: Show transport lock feature	Yes
AUTH Transport UnLock example: Show transport unlock feature	Yes
AUTH Timestamp: Demonstrate increment of timestamp inside SA	Yes
Write APDU to buffer: Demonstrate how to write APDU to buffer	Yes
Inject Certificate into SA: Example to showcase injection of certificates into SA	Yes
AUTH Read State example: Example to Read the LockState, RestrictMode and PlatformSCPRequest of SA	Yes
AUTH MultiThread demo: Showcase opening multiple sessions using multiple threads	Yes
AUTH Invoke Garbage Collection Example: Invoke Garbage Collection	Yes
ECC Concurrent Example	Yes
Symmetric Multi Step Concurrent Example	Yes

## 4.6 Examples that use OpenSSL

Demo	AUTH supported
Tool to create Reference key file: Native example to generate refKeys. (Only for NIST-P256 curve).	Yes
Building a self-signed certificate: Create self signed certificates	Yes

## 4.7 Ease of Use Configuration Examples

Steps for using the Ease Of Use Configuration of AUTH.

Demo	AUTH supported
Ease of Use configuration - IBM Watson	Yes
Ease of Use configuration - Google Cloud Platform	Yes
Ease of Use configuration - Azure IoT Hub	Yes
Ease of Use configuration - AWS IoT Console	Yes

## 4.8 LPC55S-PUF Based examples

Demo	AUTH supported
Key Injection to PUF: Example to demonstrate inject PlatformSCP keys into PUF	Yes
Key Rotation using PUF: Example to demonstrate PlatformSCP key rotation using PUF	Yes
Secure Boot Demo: Example to demonstrate Secure Binding with LPC55S and AUTH using PUF	Yes

## 4.9 EdgeLock 2GO Agent example

Demo	AUTH supported
EdgeLock 2GO Agent Examples: Example of usage of the EdgeLock 2GO Client	Yes

## AUTH BUILDING

AUTH follows the same way(CMake) as SE051 to compile/build middleware. CMake Options Applet and SE05X\_Ver should be selected for AUTH.

### Applet

-DApplet=AUTH: The Secure IoT Authenticator Applet - AUTH

### SE05X\_Ver

-DSE05X\_Ver=07\_02: Selection of Applet version 07\_02

## 5.1 Reference Commands

We recommend to use out of the source build of Cmake and run it from other directory.

A reference command to compiling for AUTH from Windows PC is:

```
cd <ROOT_DIR>
mkdir ..\build_auth
cd ..\build_auth
cmake ..\<ROOT_DIR> -DApplet=AUTH -DSE05X_Ver=07_02 -DHost=PCWindows
```

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