NXP Semiconductors
Release Note

SECO FW release note

1. Revision History

VERSION	DATE	CHANGE DESCRIPTION
0.1	2020-02-18	Initial version
0.2	2020-02-26	Add version 2.6.0
0.3	2020-03-12	Add version 2.6.1
0.4	2020-04-20	Add versions 3.3.2, 3.5.7, 3.6.2
0.5	2020-06-10	Document SHE specification deviations in section 5
0.6	2020-07-30	Add version 3.7.0 Reformat release table
0.7	2020-09-10	Add version 3.7.1
0.8	2021-01-08	Add version 3.7.4 Add version 3.7.5
0.9	2021-03-19	Add version 3.7.7
1.0	2021-04-09	Add version 3.7.8
1.1	2021-05-12	Add version 3.8.1 Add version 4.8.0
1.2	2021-10-15	Add version 3.8.2 Add version 3.8.3
1.3	2021-11-23	Add version 3.8.4
1.4	2022-01-31	Add version 3.8.5
1.5	2022-03-31	Add version 3.8.6
1.6	2022-06-22	Add version 3.8.5-458893af
1.7	2022-06-27	Add version 5.8.7
1.8	2022-08-03	Remove duplicate tables, add V2X version for 5.8.7, add FIPS references
2.0	2022-09-14	Add version 5.9.0
2.1	2022-09-29	Update 5.9.0 to use V2X 1.2.1, reformat table of releases

2. Contents

3. Release description

Each release is composed of a binary image in AHAB container format. The container contains:

- SECO firmware
- V2XP firmware (i.MX8 DXL only)
- V2XS firmware (i.MX8 DXL only)

The firmware is available as binary only.

3.1. Supported features and changes

The table below provides information about the contents of all released containers.

SECO/V2X FW release numbering is as follows:

- The first digit corresponds to the anti-rollback protection.
- The second digit increases when major features are added.
- The third digit corresponds to minor fixes.

Feature version	Anti rollback version	Incremental version	SECO FW version	SECO FW release type	V2X FW version	SOC revision	Change description (please check the applicable SOC Revision for each change)
1.x	1	1.0	1.1.0	Mainline	N/A	QXP B0 QM B0	The support of the roll-back protection of the first two containers including the SECO FW and the SCFW has been added. The support of the SRK revocation for the two SRK sets, NXP and OEM, has been added. The support of the low power transitions has beed added. The support of the SECO FW attestation has been added.
		1.1	1.1.1	Patch of 1.1.0	N/A	QXP B0 QM B0	The support of the oscillator 32k trimming using fuses has been added.
						QXP B0	A USB SDP timer SCU ROM fix has been removed from the SCU patch and replaced in the SECO FW. *Note: This fix was not enough and has been updated in the versions 3.3.2, 3.5.7, 2.6.1.*
3.x	2	3.0	2.3.0	Mainline	N/A	QXP B0 QM B0	The support of the encrypted boot has been added. The encrypted boot makes use of AES 128, 192 or 256-bit keys. The support of the manufacturing protection has been added. The support of the message unit / device ID assignment has been added. The support of the VPU and IEE key handling has been added. The support of the SCU patch update has been added. The TRNG initialization sequence has been improved. Image integrity check failures generate events in OPEN configuration.
						QM B0	The support of the HDMI FW authentication has been added.
						QXP B0	A USB SDP timer SCU ROM fix has been removed from the SCU patch and replaced in the SECO FW. *Note: This fix was not enough and has been updated in the versions 3.3.2, 3.5.7, 2.6.1.*
	2	3.1	2.3.1	Mainline	N/A	QXP B0 QM B0	The support of the oscillator 32k trimming using fuses has been added.
	3	3.2	3.3.2	Patch of 2.3.1	N/A	QXP B0 QM B0	Manage the USB SDP boot disablement through the new SDP_DISABLE fuse.
						QXP B0	Update of the USB SDP timer fix.
4.x	2	4.1	2.4.1	Mainline	N/A	QXP B0 QM B0	**The support of the SHE specification has been added.**

5.x	2	5.3	2.5.3	Mainline	N/A	QXP B0 QM B0	The support of the SNVS tamper enablement has been added. Fix a low power issue introduced in 2.4.1.
		5.4	2.5.4	Mainline	N/A	QXP B0/C0 QM B0	The support of the i.MX8 QXP C0 hardware has been added. QXP C0 inherits from all features already delivered up to 2.5.3. Fix an issue with the request SHE_KEY_UPDATE that has been introduced in 2.5.3. ***Note: The SHE feature is deprecated in the SECO FW releases 2.5.4 and 2.5.6.***
						QM B0	The support of the HDCP 1.4 and 2.2 keys loading has been added.
		5.6	2.5.6	Mainline	N/A	QXP B0/C0 QM B0	***Note: The SHE feature is deprecated in the SECO FW releases 2.5.4 and 2.5.6.***
						QM B0	Fix an HDMI FW loading issue introduced in 2.5.4.
	3	5.7	3.5.7	Patch of 2.5.6	N/A	QXP B0/C0 QM B0	The SHE feature is available. Manage the USB SDP boot disablement through the new SDP_DISABLE fuse.
						QXP B0	Update of the USB SDP timer fix.
6.x	2	6.0	2.6.0	Mainline	N/A	QXP C0	**The support of the HSM feature set has been added.**
						QXP B0/C0 QM B0	The SHE feature is available. Permanent clearing of adm_caam_cg_inhibit to allow execution of DQS2DQ.
		6.1	2.6.1	Mainline	N/A	QXP B0	Update of the USB SDP timer fix.
	3	6.2	3.6.2	Mainline	N/A	QXP B0/C0 QM B0	Manage the USB SDP boot disablement through the new SDP_DISABLE fuse.
7.x	3	7.0	3.7.0	Mainline	N/A	QXP C0	Increase the TRNG entropy delay. Fix the memory leakage when handling the HSM key store.
						QXP B0/C0 QM B0	Fix an invalid attestation response when the SHE user in place.
		7.1	3.7.1	Mainline	N/A	QXP C0	Release for the HSM FIPS 140-2 level 3 certification. https://csrc.nist.gov/projects/cryptographic-module-validation-program/certificate/3990
		7.4	3.7.4	Mainline	N/A	QXP B0/C0 QM B0	SHE/HSM Minimum mac length configuration enhancement Add signed message to address FIPS140-2 key zeroization Key store provisioning: optionally export the key store to the external NVM. Low power fix: SECO allows the Low power mode only when all the pending SHE/HSM services are closed. SHE RAM KEY update: fix debugger/secure boot protection flags handling.

		7.5	3.7.5	Mainline	N/A	QXP C0	HSM mac one go: mac generation/verification fix
		7.7	3.7.7	Mainline	N/A	QXP B0/C0	Add HSM Per key minimum mac length configuration Add HSM key exchange KEK generation SHE/HSM NVM error management : - Timeout on NVM manager communication removed. - The NVM import/export process is retried one time in case of failures (2 attempts totally) - An unrecoverable error state has been introduced. HSM AES GCM IV management (not backward compatible): in case of encryption the IV cannot be entirely provided by the caller anymore (either totally either partially generated by SECO)
		7.8	3.7.8	Mainline	N/A	QXP C0	Fix bug preventing to recover the key store in case of issues during the process of exporting the HSM blocks to the external NVM
8.x	4	8.0	4.8.0	Mainline	N/A	QXP C0	Release for the HSMv2 FIPS 140-2 level 3 certification. - The SHE feature set is not supported (this release only) - HMAC and TLS are supported (this release only) https://csrc.nist.gov/projects/cryptographic-module-validation-program/certificate/4152
	3	8.1	3.8.1	Mainline	1.1.0	QXP B0/C0 DXL A1	Add DXL A1 support Fix bug preventing set/get boot state commands handling when in error state
		8.2	3.8.2	Mainline	1.1.1	DXL A1	SM4 CCM support on V2X
		8.3	3.8.3	Mainline	1.1.2	QXP B0/C0 QM B0 DXL A1	**SECO:** New handling for the LPSR SPON bit “Write special fuse” command to handle supporting the update of bits on the fuse word containing the duplicate LC Bug fixes: The SCFW ready message is now supported on QM B0 RTC update hang **V2X:** MU power down support a “forced” bit requiring to free all the resources associated with the MU The AES CCM payload size is not restricted to a multiple of the block size
		8.4	3.8.4	Mainline	1.1.3	DXL A1	SECO: Fig bug preventing low power when opening a SHE keystore V2X: Update the WD handling

		8.5	3.8.5	Mainline	1.1.4	QXP B0/C0 QM B0 DXL A1	SECO : 2nd/3rd container out of secure memory support Freeze the SW version in the container header to a fixed version “F000” On DXL A1 & QXP C0 : Enable use of the CAU exclusively for HSM CMAC operations when no SHE session available On QXP B0/C0, QM B0: Fig bug preventing low power when opening a SHE keystore
			3.8.5-458893af	Patch on 3.8.5	1.1.4	DXL A1	SECO : Enable use of secure RAM for HSM CMAC operation using the CAU Fix memory corruption during HSM operations interrupted by SCFW request
		8.6	3.8.6	Mainline	1.1.5	DXL B0	Add DXL B0 support SECO : - Add HSMv2 features (HMAC & TLS) - DXL B0 only SECO & V2X - New OEM KEK handling – DXL B0 only - HSM AES CCM IV management (not backward compatible): in case of encryption the IV cannot be entirely provided by the caller anymore (either totally either partially generated internally) Note: does not include changes from 3.8.5-458893af
	5	8.7	5.8.7	Mainline	1.1.6	DXL A1/B0	SECO : - Enable use of secure RAM for HSM CMAC operation using the CAU - Fix memory corruption during HSM operations interrupted by SCFW request - Add SECO MU power down command
9.x		9	5.9.0	Mainline	1.2.1	DXL B0	SECO & V2X: - Add FIPS support - DXL B0 DL2 & DL3 only - Voltage monitoring and on demand integrity tests - DXL B0 only

4. Release Files

Release files are located in the following git repository:

ssh://git@bitbucket.sw.nxp.com/imx/imx-seco.git

The files are in the firmware/seco directory.

The table below describes the release files. Note that the containers for the various devices may contain different revision FW. Refer to commit-id.txt for the specific version of each container.

File name	File desciption
commit-id.txt	Version of each container listed below
mx8dxla1-ahab-container.img	Container with SECO/V2X FW for i.MX8 DXL A1
mx8dxlb0-ahab-container.img	Container with SECO/V2X FW for i.MX8 DXL B0
mx8qmb0-ahab-container.img	Container with SECO FW for i.MX8 QM B0
mx8qxb0-ahab-container.img	Container with SECO FW for i.MX8 QXP B0
mx8qxc0-ahab-container.img	Container with SECO FW for i.MX8 QXP C0
SECO_FW_release_note.pdf	This document

5. SHE specifications deviations

The below deviations to the SHE Functional Specification v1.1 are documented.

5.1. Unsupported commands

The SECO FW is not providing support for the following SHE commands:

- CMD_DEBUG : The SECO debug is not allowed in production life cycles, therefore the CMD_DEBUG is not supported in the current solution. To simplify the debug activity additional error codes are provided by the SECO API in case of error.
- CMD_CANCEL: the CMD_CANCEL is not handled by the SECO but by the SHE caller driver (e.g. seco_libs, CRYPTO Driver) requesting the SHE service to SECO. As result of the CMD_CANCEL the current command inputs and outputs are cleared
- CMD_SECURE_BOOT, CMD_BOOT_OK and CMD_BOOT_FAILURE are not supported: All boot images are authenticated using the i.MX8 boot process based on ECDSA signature verification.

5.2. Requirements deviations

We have deviations on the following requirements:

- Requirement: A non-volatile memory is required to store information that needs to be available after power cycles and resets of the microcontroller.

In the QXP/QM solution, the security subsystem implementing the SHE module doesn't own a non-volatile memory. The persistent keys are managed in the security enclave internal SECURE RAM and exported in the external NVM in an encrypted (chip-unique) format.

- Requirement: The latency of the AES must remain <2 us per encryption/decryption of a single block, including the key scheduler.

The latency of an AES encryption/decryption of a single block has been measured at 3,4 us (micro seconds).

- Requirement: The number of updates for a single memory slot is only limited by the width of the counter and the physical memory write endurance.

i.MX8 QXP/QM an OTP monotonic counter of 1920 bits is used as roll-back protection. The monotonic counter may be shared between the SHE and the generic-HSM services, a dedicated API is provided to configure these partitions

- Requirements: The facilities of SHE can be used to secure the boot process, i.e., to monitor the authenticity of the software on every boot cycle.

SHE secure boot is not supported by this solution, all boot images, included the SECO FW, are authenticated using the iMX8 boot process based on ECDSA signature verification

5.3. Additional requirements implemented

Moreover the solution implements the additional features required by the SHE+ extension.

- support of additional 40 general purpose keys
- support of the additional security flag: VERIFY_ONLY

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