Arm® CryptoCell™-312

Product revision: r1p4-00rel0

OSS RT Release Note

Non-confidential

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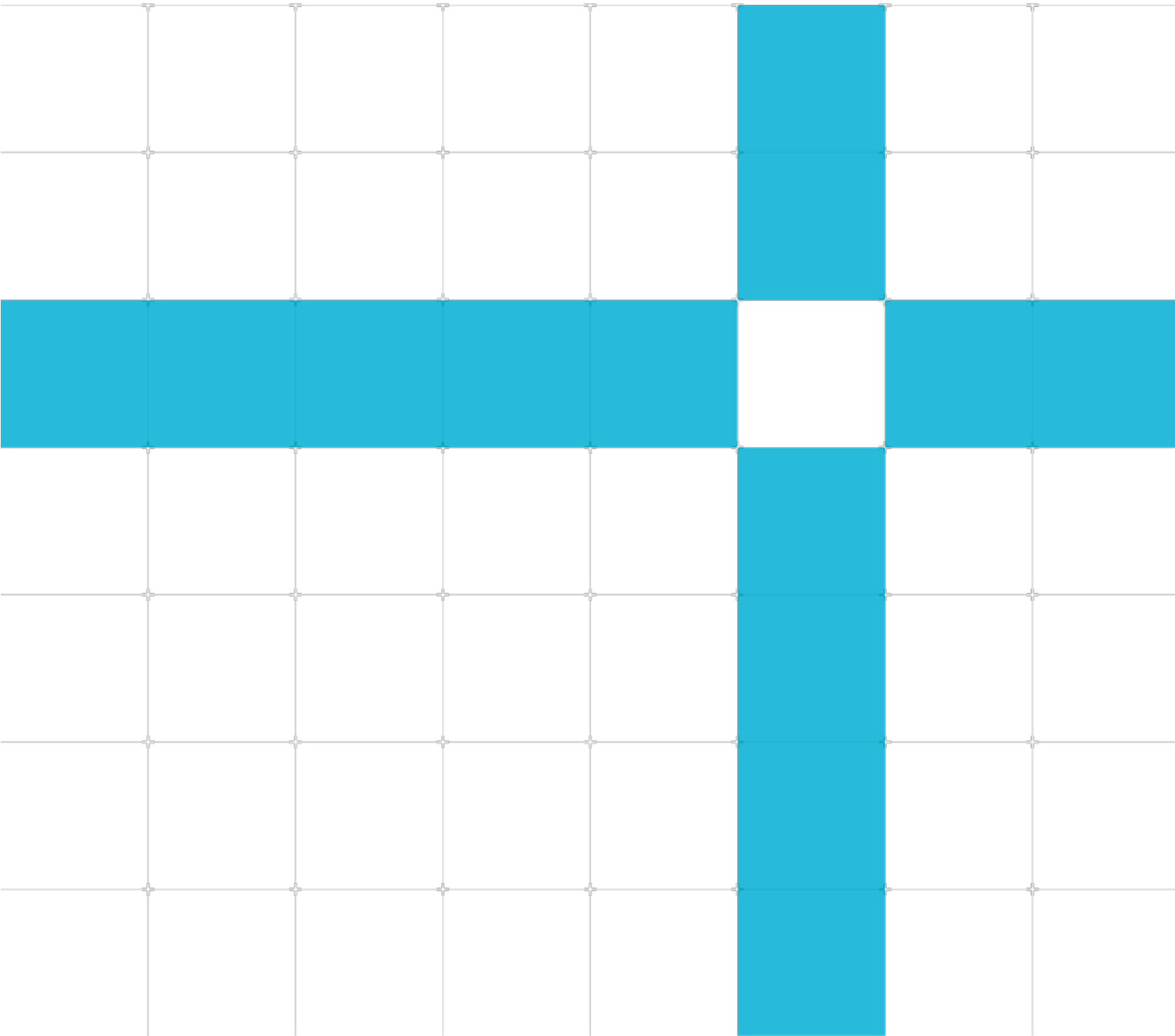

Arm® CryptoCell™-312
OSS RT Software Release Note

Non-Confidential Proprietary Notice

(LES-PRE-20349)

Confidentiality Status

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Product status

The information in this document is Final, that is for a developed product.

Web address

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Contents

1 Conventions

The following subsections describe conventions used in Arm documents.

1.1 Glossary

The Arm Glossary is a list of terms that are used in Arm documentation, together with definitions for those terms. The Arm Glossary does not contain terms that are industry standard unless the Arm meaning differs from the generally accepted meaning.

See the Arm Glossary for more information: https://developer.arm.com/glossary.

1.2 Typographical conventions

Convention	Use
italic	Introduces citations.
bold	Highlights interface elements, such as menu names. Denotes signal names. Also used for terms in descriptive lists, where appropriate.
`monospace`	Denotes text that you can enter at the keyboard, such as commands, file and program names, and source code.
`monospace bold`	Denotes language keywords when used outside example code.
`monospace underline`	Denotes a permitted abbreviation for a command or option. You can enter the underlined text instead of the full command or option name.
<and>	Encloses replaceable terms for assembler syntax where they appear in code or code fragments. For example: `MRC p15, 0, <Rd>, <CRn>, <CRm>, <Opcode_2>`
small CAPITALS	Used in body text for a few terms that have specific technical meanings, that are defined in the Arm® Glossary. For example, IMPLEMENTATION DEFINED, IMPLEMENTATION SPECIFIC, UNKNOWN, and UNPREDICTABLE.
	This represents a recommendation which, if not followed, might lead to system failure or damage.
	This represents a requirement for the system that, if not followed, might result in system failure or damage.
	This represents a requirement for the system that, if not followed, will result in system failure or damage.

 Note	This represents an important piece of information that needs your attention.
 Tip	This represents a useful tip that might make it easier, better or faster to perform a task.
 Remember	This is a reminder of something important that relates to the information you are reading.

2 Release overview

2.1 Product description

Arm® CryptoCell™-312 (CryptoCell-312) is an embedded security solution for high-efficiency systems, with emphasis on small footprint and low power-consumption. It offers platform security services, as well as a rich set of cryptographic services, targeting multiple threats.

The services CryptoCell-312 offers are needed across various IoT domains, for example, home automation, factory automation, smart energy, industrial IoT, and any other domain where there is use of a Cortex®-M processor.

2.2 Release status

This is the REL release of r1p4 Arm® CryptoCell™-312 software.

These deliverables are being released under the terms of the agreement between Arm and each licensee (the "Agreement"). All planned verification and validation is complete.

The release is suitable for volume production under the terms of the Agreement.

2.3 Standards compliance

This release is compliant with the following standards:

Table 2-1 Compliant standards

Doc ID	Document title	Compliance	Version
DEN 0007C-4	*Arm® Trusted Base System Architecture Client1*	Full	-
DEN 0006C-1	*Arm® Trusted Board Boot Requirements CLIENT*	Full	-
ANSI X9.31-1988	*Public Key Cryptography Using Reversible Algorithms for the Financial Services Industry (rDSA)*	Fully compliant, excluding section C.9.	1998
ANSI X9.42-2003	*Public Key Cryptography for the Financial Services Industry: Agreement of Symmetric Keys Using Discrete Logarithm Cryptography*	Sections 7.1, 7.2, 7.3, 7.4, 7.5.1, 7.7.1, 7.7.2, 8.1.1, 8.1.2, 8.1.3, 8.1.4 and Annex B.	2003
ANSI X9.62-2005	*Public Key Cryptography for the Financial Services Industry, The Elliptic Curve Digital Signature Algorithm (ECDSA)*	Sections 7.2, 7.3, and 7.4.1 (prime curves).	2005
ANSI X9.63-2011	*Public Key Cryptography for the Financial Services Industry - Key Agreement and Key Transport Using Elliptic Curve Cryptography*	Sections 5.2, 5.3, 5.4.1, 5.6.2, 5.6.3, 5.7, 5.9, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7 and 6.8 (EC over FP).	2011

Doc ID	Document title	Compliance	Version
BSI AIS-31	*Functionality Classes and Evaluation Methodology for True Random Number Generators*	Compliant in an implementation using FETRNG driver with PTG.2.	Version 3.1, September 2001
-	*ChaCha, a variant of Salsa20*	Full	January 2008
Curve25519	*New Diffie-Hellman Speed Records*	Full	-
Ed25519	*High-Speed High-Security Signatures*	Full	-
FIPS Publication 180-4	*Secure Hash Standard (SHS), compliant excluding support for truncated hash operation*	Full	-
FIPS Publication 186-4	*Digital Signature Standard (DSS)*	Sections 5.1, 6.2, 6.3, 6.4, B.1.2, B.2.2, B.3.6, B.4.2, C.3.1, C.3.3, C.3.5, C.9, and D.1.2.	July 2013
FIPS Publication 197	*Advanced Encryption Standard, support only 128-bit and 256-bit keys*	Full	-
FIPS Publication 198-1	*The Keyed-Hash Message Authentication Code (HMAC)*	Full	July 2008
IEEE 802.15.4	*IEEE Standard for Local and metropolitan area networks— Part 15.4: Low-Rate Wireless Personal Area Networks (LR-WPANs)*	Compliant with CCM* (section 7 and Annex B).	5 September 2011
IEEE 1363-2000	*IEEE Standard for Standard Specifications for Public-Key Cryptography*	Sections 7.2.1, 8 (excluding 8.2.6, 8.2.7, 8.2.8, 8.2.9), 10.3, 11, 12.2, 13 (excluding RIPEMD-160) and 14 (excluding RIPEMD-160).	2000
ISO/IEC 18033-2:2006	*Information technology -- Security techniques -- Encryption algorithms -- Part 2: Asymmetric ciphers*	Sections 10.2, 10.2.1, 10.2.3 and 10.2.4.	May 2006
ISO/IEC 9797-1	*Message Authentication Codes (MACs) -- Part 1: Mechanisms using a block cipher*	Compliant with CBC-MAC without padding, output transformation based on sections 6.2, 6.3.1, 6.4, 6.5.1, and 7.1.	-
NIST SP 800-22	*A Statistical Test Suite for Random and Pseudorandom Number Generators for Cryptographic Applications*	The second phase in the CryptoCell-312 TRNG characterization process is compliant with this.	April 2010
NIST SP 800-38A	*Recommendation for Block Cipher Modes of Operation: Methods and Techniques*	Sections 6.1, 6.2, 6.4, and 6.5.	-
NIST SP 800-38B	*Recommendation for Block Cipher Modes of Operation: the CMAC Mode for Authentication*	Full	-
NIST SP 800-38C	*Recommendation for Block Cipher Modes of Operation: the CCM Mode for Authentication and Confidentiality*	Full	July 2007
NIST SP 800-38D	*Recommendation for Block Cipher Modes of Operation: Galois/Counter Mode (GCM) and GMAC*	Full	November 2007

Doc ID	Document title	Compliance	Version
NIST SP 800-38F	*Recommendation for Block Cipher Modes of Operation: Methods for Key Wrapping,*	Section 6	November 2007
NIST SP 800-56A	*Recommendation for Pair-Wise Key Establishment Schemes Using Discrete Logarithm Cryptography*	Sections 5.1, 5.2, 5.3, 5.4, 5.5.1.1, 5.6.1, 5.6.2.3, 5.7.1.1, 5.7.1.2 and 5.8.2.	Revision 2, May 2013
NIST SP 800-90A	*Recommendation for Random Number Generation Using Deterministic Random Bit Generators – App C.*	Section 10.2 - DRBG mechanism based on block ciphers.	January 2012
NIST SP 800-90B	*Recommendation for the Entropy Sources Used for Random Bit Generation.*	Section 4.4 tests in runtime SW.	January 2018
NIST SP 800-90C	*Recommendation for Random Bit Generator (RBG) Constructions*	Full	April 2016
NIST SP 800-108	*Recommendation for Key Derivation Using Pseudorandom Functions*	Section 5.1.	-
NIST SP 800-135	*Recommendation for Existing Application-Specific Key Derivation Functions*	Full	Revision 1, December 2011
-	*The Poly1305-AES message-authentication code.*	Full	-
Public-Key Cryptography Standards (PKCS) #1:	*RSA Encryption Standard*	Backwards compatibility required by PKCS#1 Version 2.1.	Version 1.5, November 1993
Public-Key Cryptography Standards (PKCS) #1	*RSA Cryptography Specifications*	Fully compliant, excluding ASN.1 syntax.	Version 2.1, June 2002
Public-Key Cryptography Standards (PKCS) #3	*Diffie Hellman Key Agreement Standard*	-	-
Public-Key Cryptography Standards (PKCS) #7	*Cryptographic Message Syntax Standard*	Section 10.3 – padding scheme.	Version 1.5, November 1993
RFC-2104	*HMAC: Keyed-Hashing for Message Authentication*	SHA1	February 1997
RFC-3394	*Advanced Encryption Standard (AES) Key Wrap Algorithm*	Full	September 2002
RFC-5449	*Advanced Encryption Standard (AES) Key Wrap with Padding Algorithm*	Full	August 2009
RFC-3566	*The AES-XCBC-MAC-96 Algorithm and Its Use with IPsec*	Fully compliant, excluding support for truncation to 96-bits.	-

Doc ID	Document title	Compliance	Version
RFC-5280	*Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile*	Section 4 – secure boot and secure debug certificates.	May 2008
RFC-5869	*HMAC-based Extract-and-Expand Key Derivation Function (HKDF)*	Full	May 2010
RFC-7539	*ChaCha20 and Poly1305 for IETF Protocols*	Full	May 2015
SEC 2	*Standards for Efficient Cryptography Group (SECG) Recommended Elliptic Curve Domain Parameters*	Section 2 160* domains. Smaller domains are not supported.	Version 1.0, September 20, 2000
SEC 2	*Standards for Efficient Cryptography Group (SECG) Recommended Elliptic Curve Domain Parameters*	Section 2.	Version 2.0, January 27, 2010
SEC1	*Elliptic Curve Cryptography*	Sections 2.1.1, 2.2.1, 3.1.1, 3.2, 3.3.1, 3.6.1, 4, and 6.1.	2000
SRP	*The Secure Remote Password Protocol*	-	1997

3 Release contents

The following subsections describe:

- The product parts are delivered as part of this release.
- Any changes since the previous release.
- Any known issues and limitations that exist at the time of this release.

3.1 Deliverables

Arm® CryptoCell™-312 OSS includes the following deliverables:

- CryptoCell-312 runtime software.
- CryptoCell-312 runtime software integration tests.
- CryptoCell-312 runtime tools.
- Runtime API documentation: *Arm® CryptoCell™-312 Runtime Software Developers Manual*.

Documentation may change between product releases. For the latest documentation, please check the delivery platform.

3.1.1 Associated products

The following parts are available to licensees only:

- Arm® CryptoCell™-312 boot services software
- Arm® CryptoCell™-312 hardware

3.2 Differences from previous release

The following subsections describe differences from the previous release of Arm® CryptoCell™-312.

3.2.1 Changes

Table 3-1 describes any technical changes to features or components in this release.

Table 3-1: Changes to existing features or components introduced in this release

Component/feature name	Description of change	Impacted functionality
OpenSSL	Compliance with OpenSSL 1.1.1d	CryptoCell-312 utilities code and tools are upgraded to use OpenSSL 1.1.1d

3.2.2 Resolved issues

Table 3-2 describes any technical issues resolved in this release.

Table 3-2: Defects resolved in this release

ID	Title	Description	Impacted functionality
RN-003-CC110-R1P4-00REL0	`prepare_mbedtls` script used non-formal git branch	`prepare_mbedtls` script flow uses a correct git checkout flow to use mbedTLS version 2.16.2 in a generic flow.	Flowless retrieval of mbedTLS 2.16.2
RN-004-CC110-R1P4-00REL0	Redundant scripts in utils directory	Removed some redundant scripts (used for internal tests only) from the formal release.	None
RN-006-CC110-R1P4-00REL0	OpenSSL version is outdated	Previous versions used OpenSSL 1.0.1f - which is obsolete. CryptoCell-312 now uses OpenSSL version 1.1.1d (LTS version)	Utilities


Note

The ID is for reference only.

3.3 Known limitations

Any issues known at the time of this release are detailed in the following subsections.

3.3.1 Missing functionality

- RSA 4K key generation is not supported.
- The PKCS #1 v2.1 standard recommends not using MD5 hash. Therefore, CryptoCell-312 does not support it.
- The Mbed TLS `MBEDTLS_MD_NONE` value is not supported by CryptoCell-312 software.

3.3.2 Open technical issues

The following table details any technical issues that are open at the time of this release.

Table 3-3: Defects in this release

ID	Title	Description	Workaround
RN-001-CC110-R1P3-00REL	Mbed TLS compilation issue	When compiling Mbed TLS while using the flag `MBEDTLS_ECDSA_VERIFY_ALT=1`, a warning appears. This is a known issue in Mbed TLS.	None
RN-005-CC110-R1P4-00REL0	Unused CryptoCell register	The definition of `HASH_AES_SW_RESET`. Register is not used in the system.	No effect on functionality, therefore, there is no need for a workaround.
RN-010-CC110-R1P4-00REL0	Wrong return type for `no_os` implementation of `CC_PalPowerSaveModeStatus`	`CC_PalPowerSaveModeStatus` for `no_os` PAL return value should be `int32_t` instead of `void`.	-
RN-014-CC110-R1P4-00REL0	Preparing OTP in Secure Boot integration test	When using a real chip for runtime integration tests, a failure occurs in some tests. This is because the user cannot program Kce, Kcp, and the OEM flags when the LCS is CM, and the flow of the tests assumes that the device moves directly to SE LCS from CM LCS.	No current workaround.
RN-015-CC110-R1P4-00REL0	Preparing OTP in provisioning integration tests	When using a real chip for provisioning integration tests, a failure occurs in some tests. This is because the user cannot program Kce, Kcp, and OEM flags when the LCS is CM, and the flow of the tests assumes that the device moves directly to SE LCS from CM LCS.	No current workaround.
RN-016-CC110-R1P4-00REL0	Typographical error in the names of source code implementation of ECC Edwards curve Ed25519	The implementation of EC Edwards Ed25519 is written in `cc_ec_edw.c`, `ec_edw.c`, and `ecdsa_edwards.c` source files. The naming convention causes the user to think about implementing EC curve25519.	The implementation of EC Edwards ed25519 (in files `cc_ec_edw.c`, `ec_edw.c`, and `ecdsa_edwards.c`) is correct. The implementation of EC curve25519 is written in other files.

The ID is for reference only.

4 Get started

This section describes information to help you get started with accessing, setting up, and using Arm® CryptoCell™-312.

4.1 Licensing information

The Arm® CryptoCell-312 runtime library and integration tests are published under two optional licenses, located at the root of the project tree:

- BSD-3 clause - Full license is disclosed in `BSD-3-Clause.txt`.
- Arm non-OSI - Full license is disclosed in `Arm-proprietary-license.txt`.

4.2 Download the product

Arm delivers the files through GitHub.

You can download the product package in one of the following ways:

- Download .zip file directly from https://github.com/ARM-software/cryptocell-312-runtime
- Use one of the following git clone commands:

The target directory is only mentioned to align with the compilation commands listed afterwards.

  - `git clone https://github.com/ARM-software/cryptocell-312-runtime.git cryptocell-312-runtime-master`
  - `git clone git@github.com:ARM-software/cryptocell-312-runtime.git cryptocell-312-runtime-master`

You can download the product package as a single zip file: `cryptocell-312-runtime-master.zip`.

4.2.1 Unpack the product

If you downloaded a .zip file directly from GitHub, perform the following steps to unpack the product package:

1. Relocate the package file:
   Copy the .zip files to the directory where these files are to be installed.
2. Unzip the package - it should be extracted into a directory named: `cryptocell-312-runtime-master`.

4.2.2 Compile the product

The optimization level is O2.

The following steps describe how to unpack and compile each constituent part delivered in this shipment, once the previous step is complete.

This product was tested with Cortex®-M3 and Cortex®-M33. You must declare which processor you are using with the following command:

```
export ARM_CPU=<cpu-type>
```

There are several environment variables that you must set before you issue make commands:

```
export ARCH=arm
export ARM_CPU=<cortex-m3 or cortex-m33>
export CROSS_COMPILE=<compiler-prefix>
export KERNEL_DIR=/path/to/kernel/
export COMPILER_TYPE=<armclang or armcc or gcc>
export PATH=$PATH:/path/to/compiler/executable/dir/bin
```

We have added internal guards (file `host/Makefile.guards`) to verify that mandatory environment variables are defined before you invoke make commands. This means that:

- Using Cortex-M3 requires this declaration:
  `export ARM_CPU=cortex-m3`
- Using Cortex-M33 requires this declaration:
  `export ARM_CPU=cortex-m33`
- Using Arm compiler 6 requires this declaration:
  `COMPILER_TYPE=armclang`
- Using Arm compiler 5 requires this declaration:
  `COMPILER_TYPE=armcc`
- Using GCC-based compilers requires this declaration:
  `COMPILER_TYPE=gcc`

The combination of `ARM_CPU=cortex-m33` and `COMPILER_TYPE=armcc` is not supported. The following table lists the valid combinations:

CPU	armcc	armclang	gcc
cortex-m3	Valid	Valid	Valid
cortex-m33	Not valid	Valid	Valid

We did not validate `cortex-m0` with this release. However, you can adjust the runtime code to compile it with `ARM_CPU=cortex-m0` by adjusting `prepare_mbedtl.sh` to correctly intercept the combination of `CROSS_COMPILE` and `CORTEX` and add corresponding compilation flags with `CFLAGS`.

The following steps assume that the downloaded bundle is extracted to the following directory:

`cryptocell-312-runtime-master`

1. Move to that directory:
```
% cd cryptocell-312-runtime-master
```
2. Compile the runtime library and the utilities:
```
% ./prepare_mbedtls.sh clone
% ./prepare_mbedtls.sh lib
```

Before proceeding to the make command, verify that `cryptocell-rt/shared/hw/include/dx_reg_base_host.h` matches the address space of the platform.

```
% make -C host/src ARM_CPU=$ARM_CPU
```

3. Compile the runtime utilities:

   Before compiling the runtime utilities, we recommend retrieving OpenSSL 1.1.1d, place it at `cryptocell-rt/utils/src/openssl` and build it first.

   The following commands are an example of how to achieve this task, assuming the current working directory is still `/path/to/cryptocell-rt/utils/src`:
```
% CROSS_COMPILEsrc=$CROSS_COMPILE
% unset CROSS_COMPILE
% wget https://www.openssl.org/source/openssl-1.1.1d.tar.gz
% tar xf openssl-1.1.1d.tar.gz && cd openssl-1.1.1d
% ./Configure shared linux-x86_64
% make
% make test
% cd .. # back to utils/src
% ln -s openssl-1.1.1d openssl
% make
% export CROSS_COMPILE=$CROSS_COMPILEsrc
```
4. Compile the runtime integration tests:
```
% make -C host/src/tests/integration_* ARM_CPU=$ARM_CPU
```
5. Compile the CMPU integration tests:
```
% make -C host/src/tests/integration_* ARM_CPU=$ARM_CPU
INTEG_TESTS=cmpu_integration_test
```
6. Compile the DMPU integration tests:
```
% make -C host/src/tests/integration_* ARM_CPU=$ARM_CPU
INTEG_TESTS=dmpu_integration_test
```

Note

The integration tests library and the `cmpu` and `dmpu` test libraries will be located in `cryptocell-rt/host/lib`. Use these libraries to build an appropriate executable for the testing platform.

4.2.3 Directory structure

Figure 4-1 shows the principal directory structure created after unpacking:

Figure 4-1 CryptoCell-312 principal directory structure

```
.
|-- codesafe
|   `-- src
|       |-- crypto_api
|       |   |-- cc3x_sym
|       |   |   |-- api
|       |   |   `-- driver
|       |   |-- common
|       |   |-- dh
|       |   |-- ec_edw
|       |   |-- ec_mont
|       |   |-- ec_wrst
|       |   |   `-- ecc_domains
|       |   |-- ffc_domain
|       |   |-- ffcdh
|       |   |-- kdf
|       |   |-- pki
|       |   |   |-- common
|       |   |   |-- ec_edw
|       |   |   |-- ec_mont
|       |   |   |-- ec_wrst
|       |   |   |-- poly
|       |   |   |-- rsa
|       |   |   `-- srp
|       |   |-- rnd_dma
|       |   |   `-- local
|       |   `-- rsa
|       |-- mbedtls_api
|       `-- secure_boot_debug
|           |-- cc3x_verifier
|           |-- common
|           |-- crypto_driver
|           |   `-- reg
|           |-- platform
|           |   |-- common
|           |   |   `-- cc3x
|           |   |-- nvm
|           |   |   `-- cc3x_nvm_rt
|           |   |-- pal
|           |   |   `-- cc3x
|           |   `-- stage
|           |       `-- rt
|           |           `-- cc3x
|           |-- secure_boot_gen
|           |-- secure_debug
|           |   `-- cc3x
|           |-- util
|           |-- x509_cert_parser
|           `-- x509_verifier
|-- docs
```

```
|-- doxygen
|   `-- additional_doc_files_cc312
|-- host
|   `-- src
|       |-- cc3x_lib
|       |-- cc3x_productionlib
|       |   |-- cmpu
|       |   |-- common
|       |   `-- dmpu
|       |-- cc3x_sbromlib
|       |-- cc_mng
|       |-- hal
|       |   `-- cc3x
|       |-- pal
|       |   |-- freertos
|       |   |-- linux
|       |   `-- no_os
|       |-- tests
|       |   |-- TestAL
|       |   |   |-- configs
|       |   |   |-- hal
|       |   |   |   |-- Juno
|       |   |   |   |-- MPS2+
|       |   |   |   |-- Zynq
|       |   |   |   `-- include
|       |   |   `-- pal
|       |   |       |-- freertos
|       |   |       |-- include
|       |   |       |-- linux
|       |   |       |-- mbedos
|       |   |       `-- no_os
|       |   |-- common
|       |   |   `-- linux64
|       |   |-- integration_cc3x
|       |   |   |-- cmpu_integration_test
|       |   |   |   `-- pal
|       |   |   |       `-- include
|       |   |   |-- dmpu_integration_test
|       |   |   |   `-- pal
|       |   |   |       `-- include
|       |   |   `-- runtime_integration_test
|       |   |       |-- pal
|       |   |       |   `-- include
|       |   |       `-- tests
|       |   `-- proj
|       |       `-- cc3x
|       |           `-- cc312_r1
|       `-- utils
|-- shared
|   |-- hw
|   |   `-- include
|   |       |-- mps2
|   |       |-- mps2.cm33
|   |       |-- musca_b1
|   |       `-- zynq
|   |-- include
|   |   |-- cc_mng
|   |   |-- cc_util
|   |   |-- crypto_api
|   |   |   `-- cc3x
|   |   |-- mbedtls
|   |   |-- pal
|   |   |   |-- freertos
|   |   |   |-- linux
```

```
|   |   |   |-- mbedos
|   |   |   `-- no_os
|   |   |-- proj
|   |   |   `-- cc3x
|   |   |-- sbrom
|   |   `-- trng
|   `-- src
|       `-- proj
|           `-- cc3x
`-- utils
    `-- src
        |-- cc3x_asset_prov_rt
        |   |-- examples
        |   `-- lib
        |-- cc3x_boot_cert
        |   |-- cert_lib
        |   |-- cert_utils
        |   |-- common_utils
        |   |-- examples
        |   |   |-- content_cert
        |   |   |-- developer_cert
        |   |   |-- enabler_cert
        |   |   `-- key_cert
        |   |-- x509cert_lib
        |   `-- x509cert_utils
        |-- cmpu_asset_pkg_util
        |   |-- examples
        |   `-- lib
        |-- common
        `-- dmpu_asset_pkg_util
            |-- common
            |-- icv_key_response
            |   |-- examples
            |   `-- lib
            |-- oem_asset_package
            |   |-- examples
            |   `-- lib
            `-- oem_key_request
                |-- examples
                `-- lib
```

4.3 Adapt the product for your system

To run cryptographic operations, you must link to all runtime libraries: `libmbedcrypto.a`, `libmbedtls.a`, and `libcc_312.a`.

To operate the production tools, you must link to the libraries of the ICV factory tools and the OEM factory tools: `libcmpu.a` and `libdmpu.a` respectively.

For more information, see the *CryptoCell-312 Software Integrators Manual*.

The *CryptoCell-312 Software Integrators Manual* is only available to licensees of CryptoCell-312.

5 Support

If you have any issues with the installation, content or use of this release, create a ticket on https://support.developer.arm.com. Arm will respond as soon as possible.

Support for this release of the product is only provided by Arm to partners who have a current support and maintenance contract for the product.

A Full release of the Arm Deliverable shall have met the contractual requirement for verification and validation of the deliverable subject to any waivers agreed between Arm and the Customer.

5.1 Tools

This release has been developed with the following tools:

Table 5-1: Tools used in developing this release

Tool usage	Tool name	Version
PC certificate generation tools	OpenSSL	1.1.1d (17 Mar 2020)
	Python	3.4.3
Toolchains	Arm Compiler (as part of arm-ds5)	5.06 update 5
	Arm Compiler	6.12
	arm-none-eabi-gcc GCC	7-2018-q2-update
TLS layer	Arm Mbed™ TLS	2.16.2

5.2 OS

This release has been developed with the following operating systems:

Table 5-2: Operating system used in developing this release

Operating System	Version
Ubuntu	16.04.2 LTS: Linux 4.13.0-32-generic x86-64