TrustedFirmware.org Community Project Overview

January 2024

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TrustedFirmware.org Overview

TrustedFirmware .org

Trusted Firmware provides a reference implementation of secure software for, but not limited to, **Armv8-A**, **Armv9-A** and **Armv8-M** architectures. It provides SoC developers and OEMs with a reference trusted code base complying with the relevant Arm specifications.

- Provides the preferred software implementation of the Arm specifications allowing quick and easy porting to modern chips and platforms.
- Forms the foundations of a **Trusted Execution Environment (TEE)** on application processors, or the **Secure Processing Environment (SPE)** of microcontrollers.

Collaborative Security

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Member Benefits: Highlights

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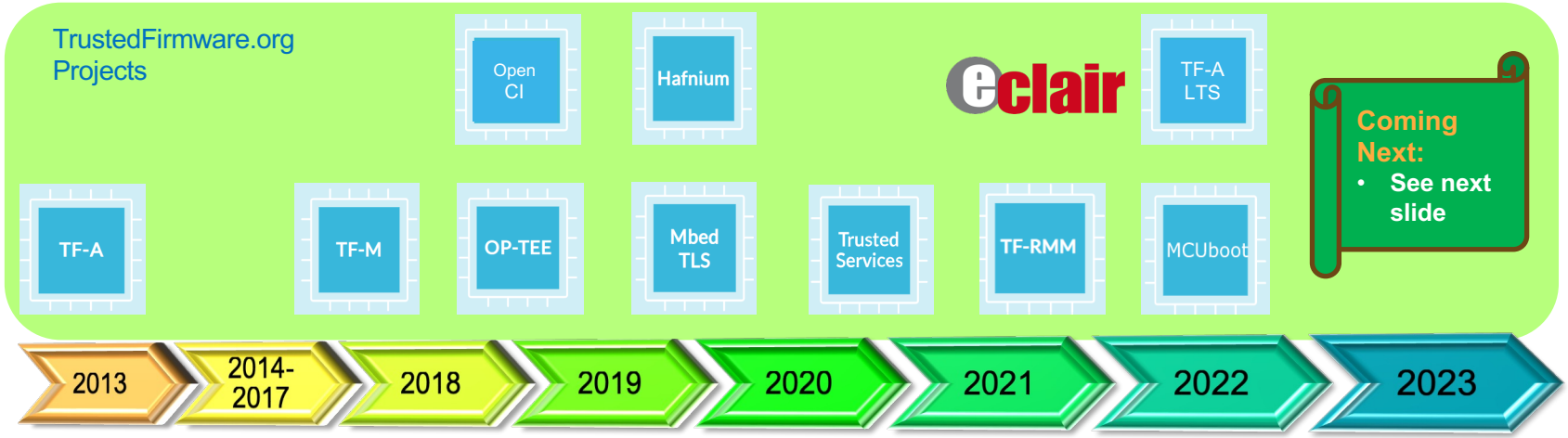
- Member platforms in Open CI (Refer to the “Open CI Summary” section below) to maintain functionality with latest builds increasing customer confidence and decreased TTM
- ✓ Confidence in proper handing of security incidents
- ✓ Close engineering collaboration with other members
- ✓ Enhanced / Joint marketing opportunities
- ✓ Direct access to code and security maintainers.
- Governing Board seat driving strategic direction and investments
  (Budget, Marketing Initiatives, explore new investment areas)
- Part of Technical Steering Committee driving technical direction of project
  (Define Release process, Security Incident Handling process, Roadmaps reviews & influence)
- Refer to “Membership Structure & Benefits” slide below for more details

10yrs of growing collaboration in building security



arm Google FUTUREWEI Technologies PROVENRUN

Linaro life.augmented NXP NORDIC SEMICONDUCTOR

RENESAS

- 150+ platforms
- 5000+ yearly code contributions
- Hundreds of collaborators

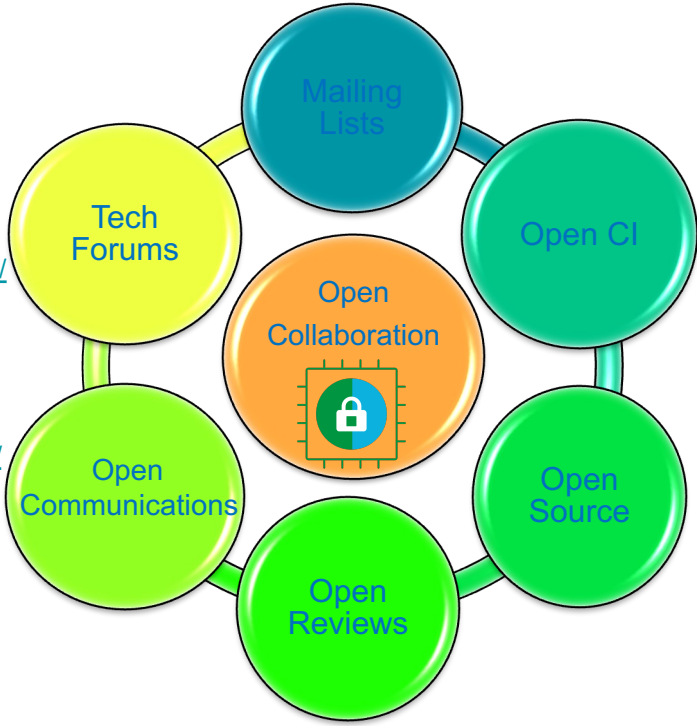
Coming next

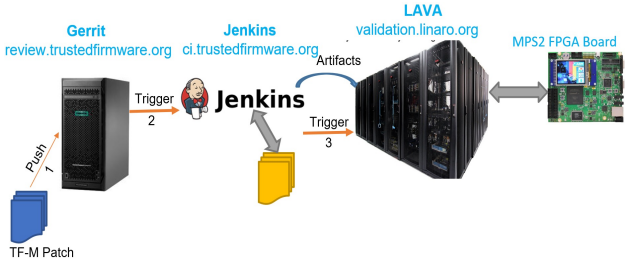
- CI infrastructure for:
  - TF-RMM
  - Trusted Services
  - MCUBoot
- More investment in LTSs
  - TF-M LTSs introduction
  - More parallel LTS branches for TF-A
- New TF-PSA-Crypto repository as reference implementation of the PSA Cryptography APIs

The Virtuous Circle Of Collaboration!

https://www.trustedfirmware.org/meetings/

https://lists.trustedfirmware.org/mailman3/lists/





https://ci.trustedfirmware.org/
https://mbedtls.trustedfirmware.org/
https://tf.validation.linaro.org/

https://www.trustedfirmware.org/blog/

TrustedFirmware Discord Server

https://git.trustedfirmware.org/

https://review.trustedfirmware.org/

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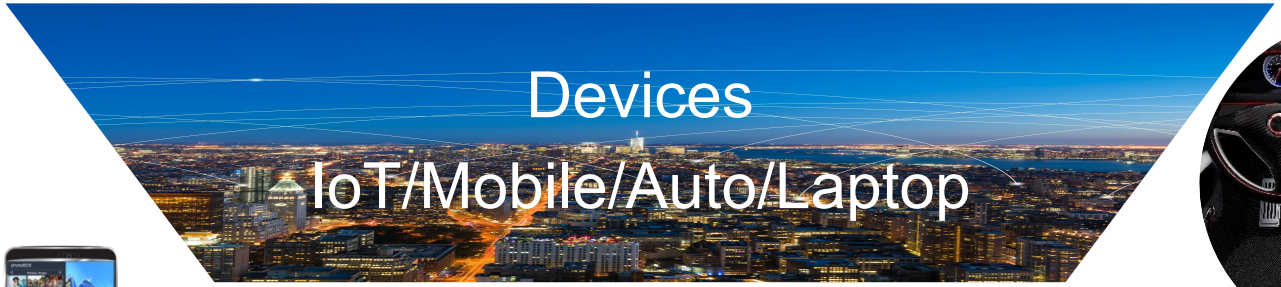
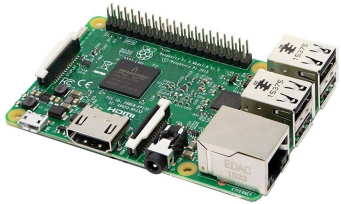
For all market segments





Cloud Server

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Trusted Firmware Security Center

TrustedFirmware.org security incident handling and vulnerability disclosure process.

- https://trusted-firmware-docs.readthedocs.io/en/latest/security_center/index.html

- Found a security vulnerability in Trusted Firmware?

  → **Report it here: security@lists.trustedfirmware.org**

- Coordinated disclosure with Trusted Stakeholders and ESS
  - https://trusted-firmware-docs.readthedocs.io/en/latest/security_center/incident_handling_process.html#trusted-stakeholder-registration
- Per-project security email aliases
  - https://trusted-firmware-docs.readthedocs.io/en/latest/security_center/mailing_aliases.html

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Membership Structure & Benefits

***: Only for G2 & G3 General members**
G1: $3K (0 to 50 empl. only)
G2: $12k (0-499)
G3: $30k (500+)

	Diamond	Platinum	General	Community (Uni/Non-profit)	Individual (invite only)	Non-Member
Code Access, Review Participation	Yes	Yes	Yes	Yes	Yes	Yes
Technical Forums	Yes	Yes	Yes	Yes	Yes	Yes
Logo and marketing recognition (scaled per tier)	Yes	Yes	Yes	Yes	N/A	No
Technical Steering Committee (TSC) seat+vote	Yes (2 votes each)	Yes (1 vote each)	Yes (1 vote every 5)	Yes (1 vote every 5)	Yes	No
Governing Board seat + vote	Yes (2 votes each)	Yes (1 vote each)	Yes* (1 vote every 5)*	Yes (1 vote every 5)	No	No
Platforms in Open CI	1 (D1) or 2 (D2) new / year	1 new / year	No	No	No	No
Fees	**D1: $100k D2: $120k**	**$60k**	**G1: $3K G2: $12K G3: $30K**	**$3K**	**$600**	No

Current members

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Diamond Members

arm

Google

Platinum Members

Linaro

NXP

RENESAS

life.augmented

General Members

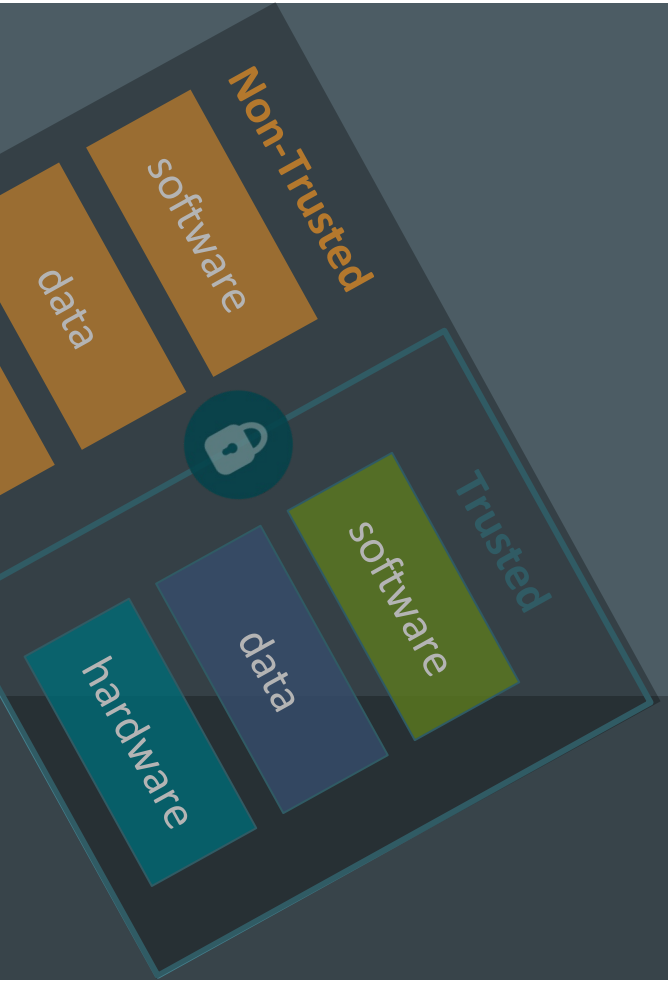
FUTUREWEI Technologies

NORDIC SEMICONDUCTOR

PROVENRUN

Partners

bugseng



Open CI Summary

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Open CI Summary

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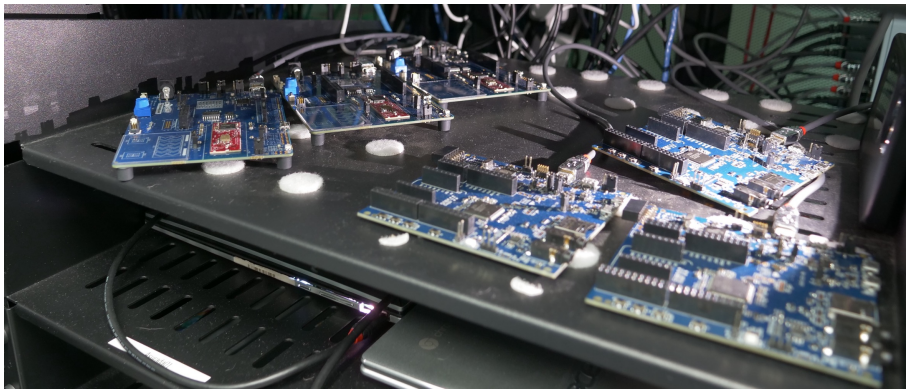
The Trusted Firmware **Open CI** (Continuous Integration) is a cloud-based CI that is a critical component of the comprehensive end-to-end CD infrastructure including code development, integration, test, and release.

- Leverages Git, Gerrit, Jenkins, TuxSuite, and LAVA to provide efficient checks upon code checkin as well as daily build checks
- Validates TrustedFirmware.org builds on Member hardware located in a centralized hardware lab
- Integrated ECLAIR MISRA test suites / Static Analysis tooling assuring high-quality codebases and providing formal compliance jumpstarts
- Currently leveraged by TF-M, TF-A, Mbed TLS and Hafnium, with additional TrustedFirmware supported projects planned



Open CI Additional Features cont'd

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Additional features of Open CI:

- Hardware validation lab additional details:
  - Leverages LAVA for validation of software updates on member hardware
    - Code update regression testing /validation prior to final review and merge
  - Validates code updates on multiple toolchains and hundreds of unique configurations
  - Arm Fixed Virtual Platform (FVP) software emulators leveraged for enhanced validation and test configurations
  - Includes Mbed TLS unit tests validated on multiple OS's

All the above, while maintaining an efficient software development and validation environment

Open CI & Board Farm

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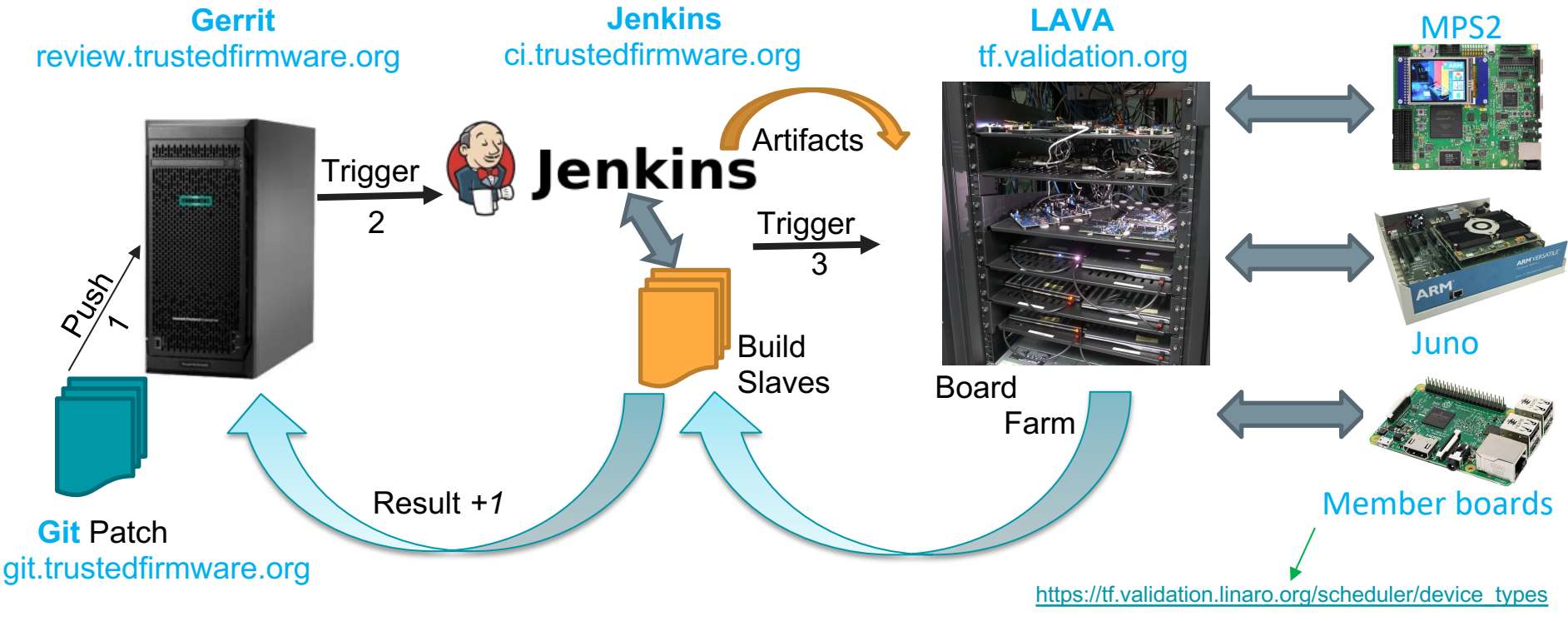
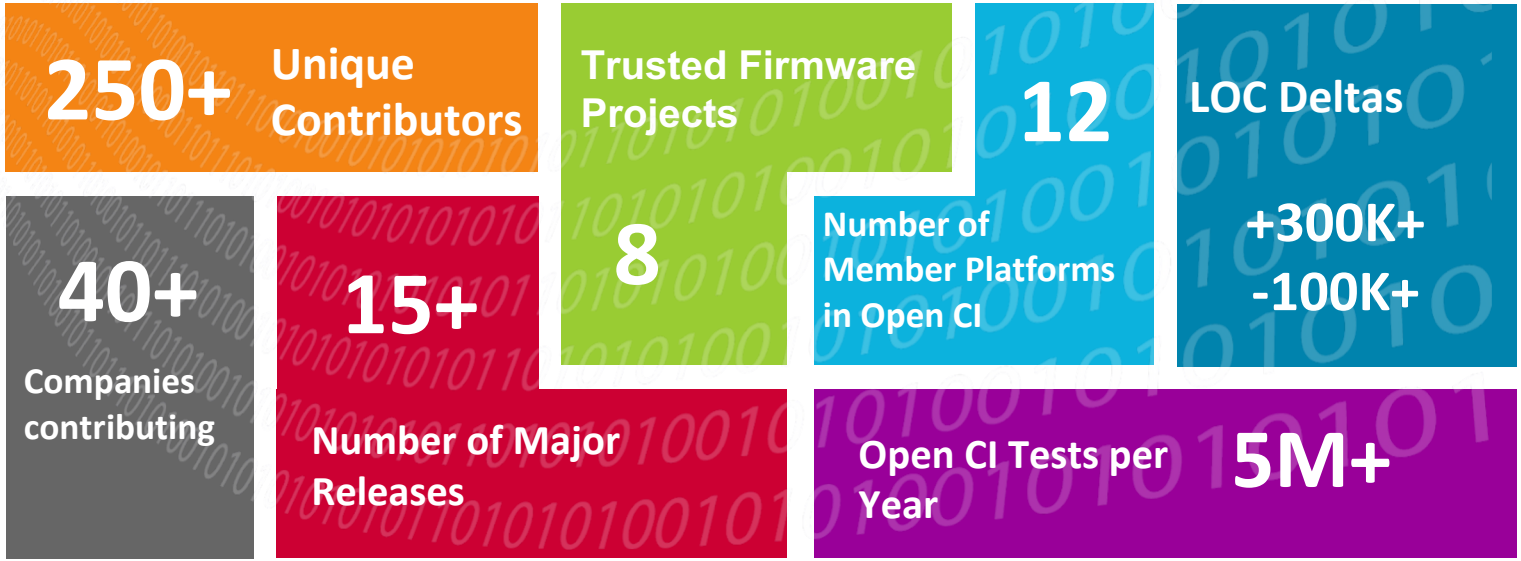


Adopt Trusted Firmware to build your next secure platform

FY23 results



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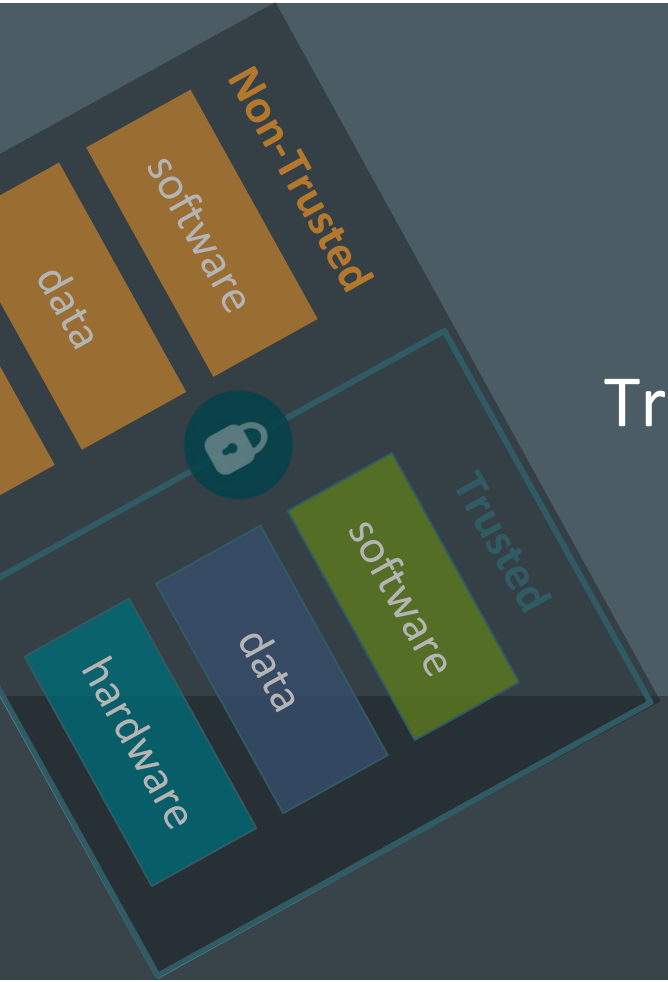

TrustedFirmware.org Projects Summaries

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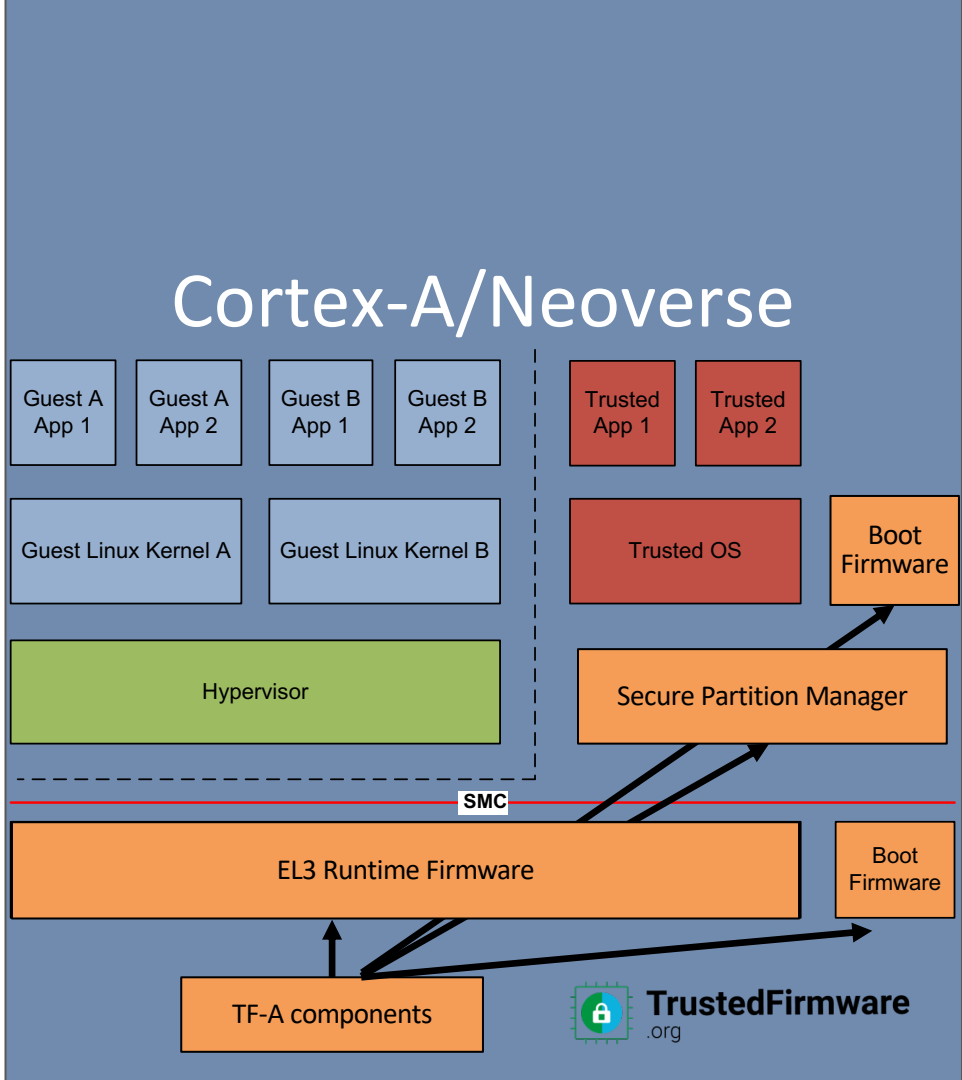
Trusted Firmware-A

https://trustedfirmware-a.readthedocs.io/en/latest/

Secure world reference software for all Arm Cortex-A & Neoverse processors across all market segments.

Trusted boot flow and runtime firmware providing standard implementation of Arm specifications:

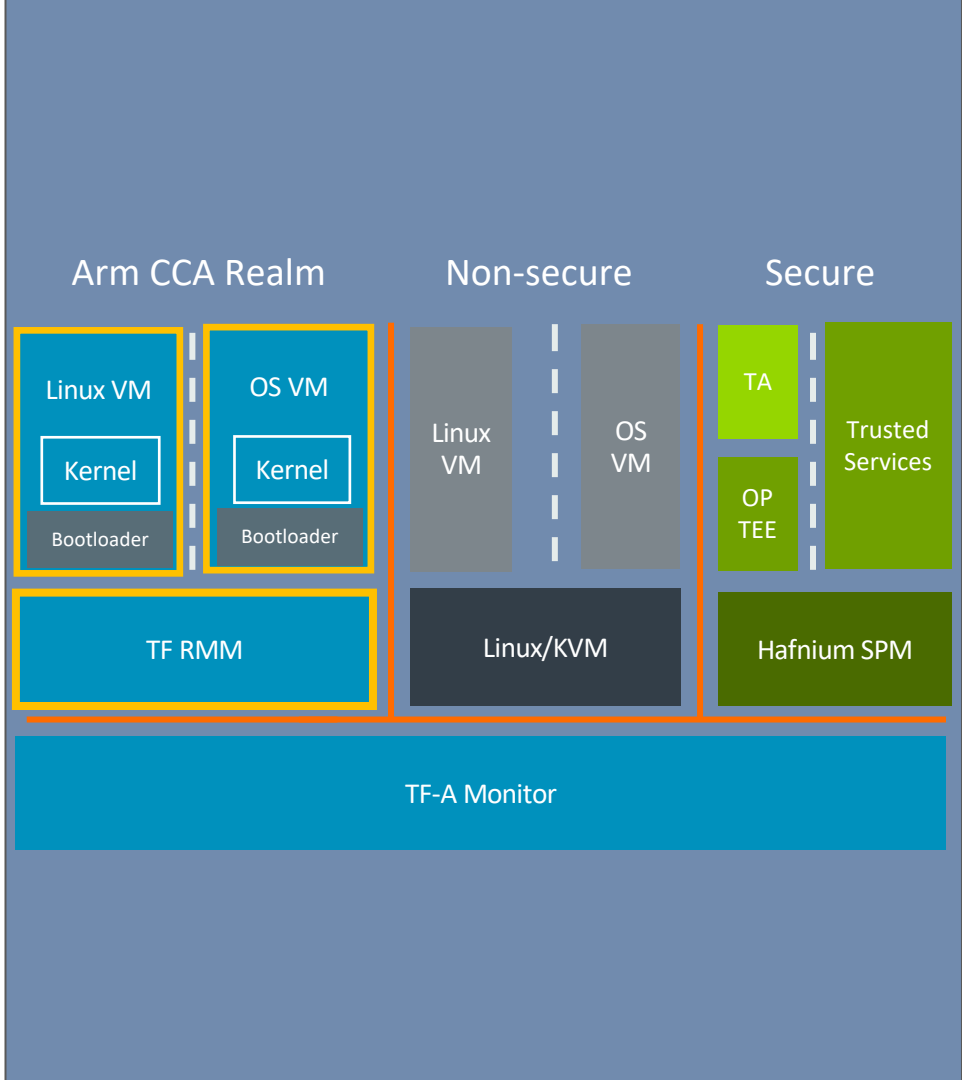
- SMC CC (Secure Monitor Call Calling Convention)
- TBBR (Trusted Board Boot Requirements)
- PSCI (Power State Coordination Interface)
- SCMI (System Control & Management Interface)
- FF-A (Firmware Framework for A-Profile)



TF-RMM (Arm CCA)

Reference implementation of the Arm Realm Management Monitor (RMM) specification for the Arm Confidential Compute Architecture (Arm CCA)

- Enhanced security isolation
- Flexible workload isolation
- Reduced attack surface



TF-A-Tests

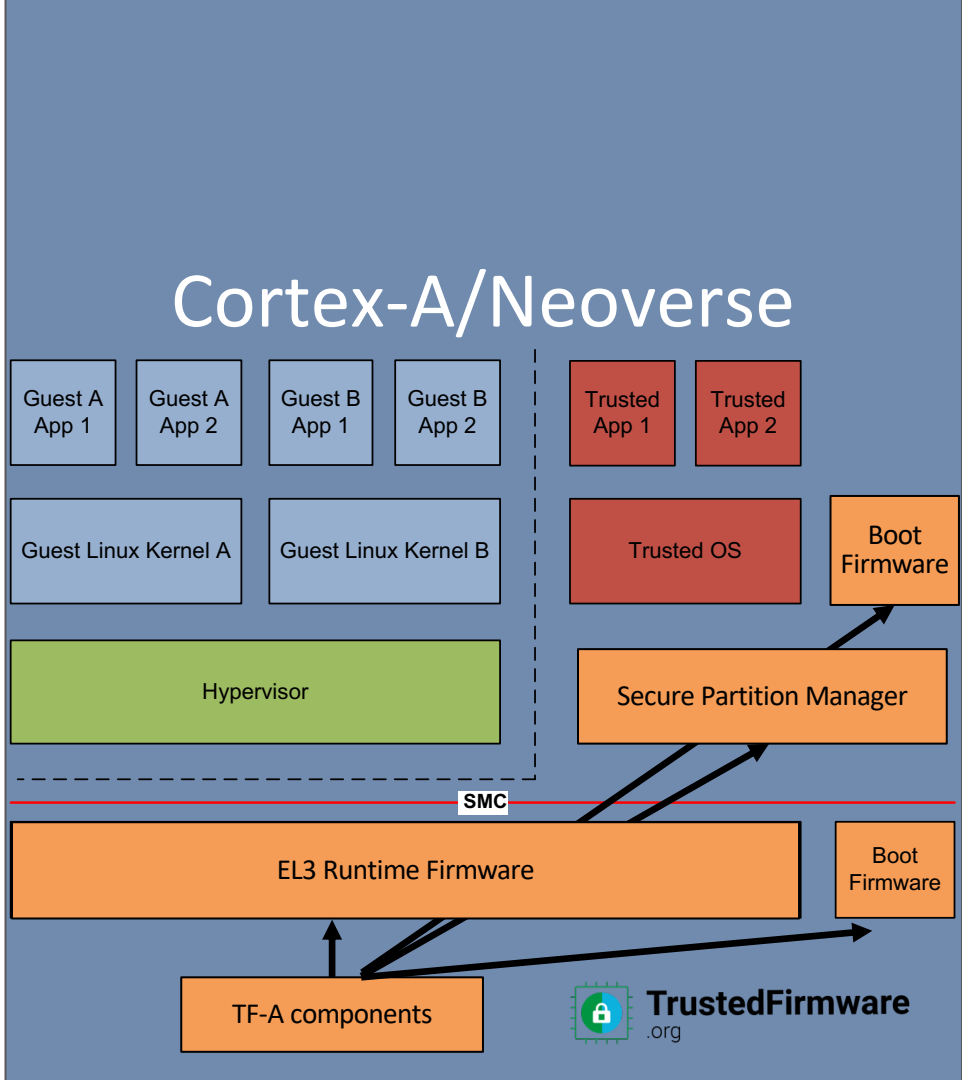
https://trustedfirmware-a-tests.readthedocs.io/en/latest/

A suite of bare-metal functional tests to exercise TF-A features from the Normal World, without dependencies on a Rich OS

Provides a strong basis for TF-A developers to validate their own platform ports and add their own test cases, interacting with TF-A through its SMC interface

Features currently tested include:

- SMC Calling Convention
- Power State Coordination Interface (PSCI)
- Software Delegated Exception Interface (SDEI)
- Performance Measurement Framework (PMF)
- Trusted Board Boot Requirements (TBBR)
- Secure Partition Manager (SPM)
- … and more!

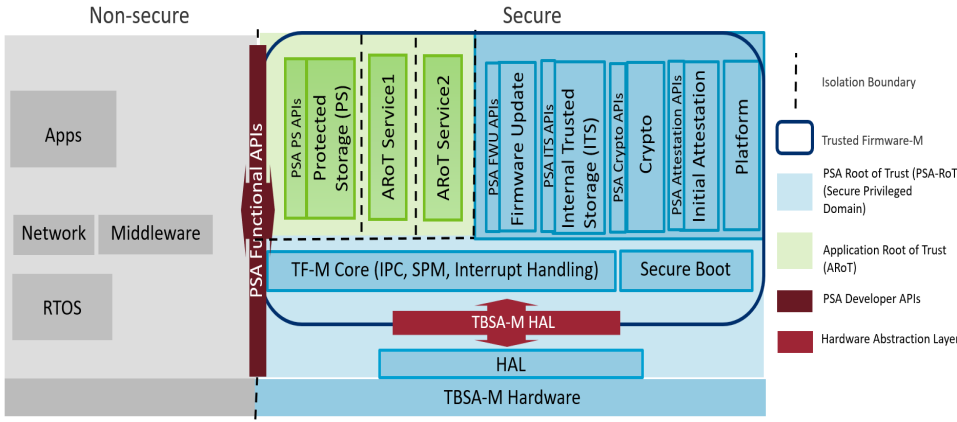


Trusted Firmware-M

Implements the Secure Processing Environment (SPE) for Armv8-M, Armv8.1-M architectures It is the platform security architecture reference implementation aligning with PSA Certified guidelines.

Consists of Secure Boot and a set of Secure Services such as Secure Storage, Crypto, Attestation, Firmware update . for Applications accessible via PSA Functional APIs.

Cortex-M



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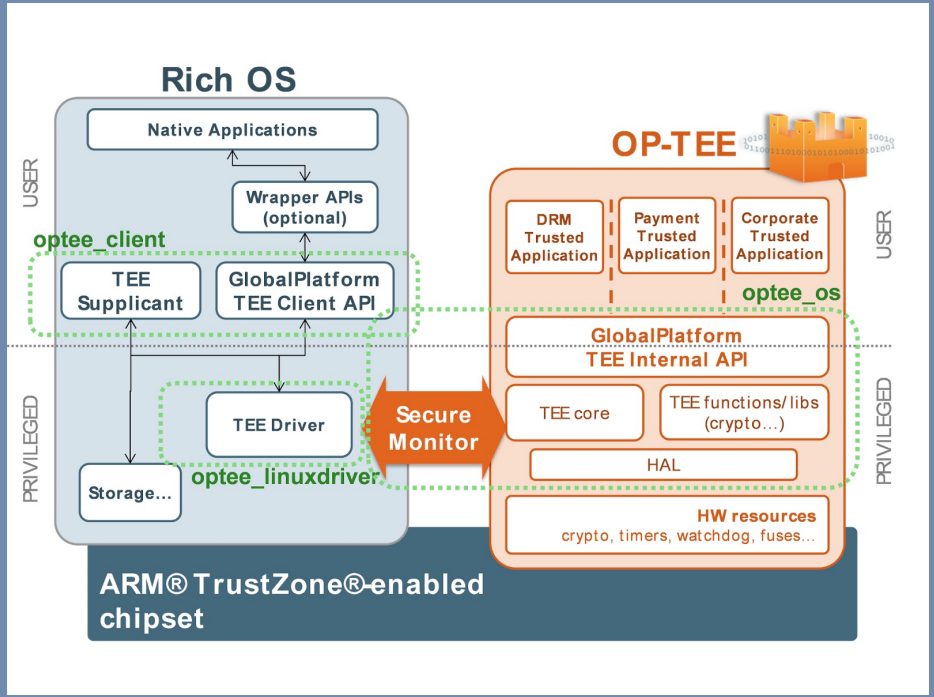
OP-TEE

A reference implementation of the Open Portable Trusted Execution Environment (OP-TEE) designed as companion to a non-secure Linux kernel running on Arm Cortex-A cores using the TrustZone technology.

Implements TEE Internal Core API and TEE Client API as defined in the GlobalPlatform API specifications.



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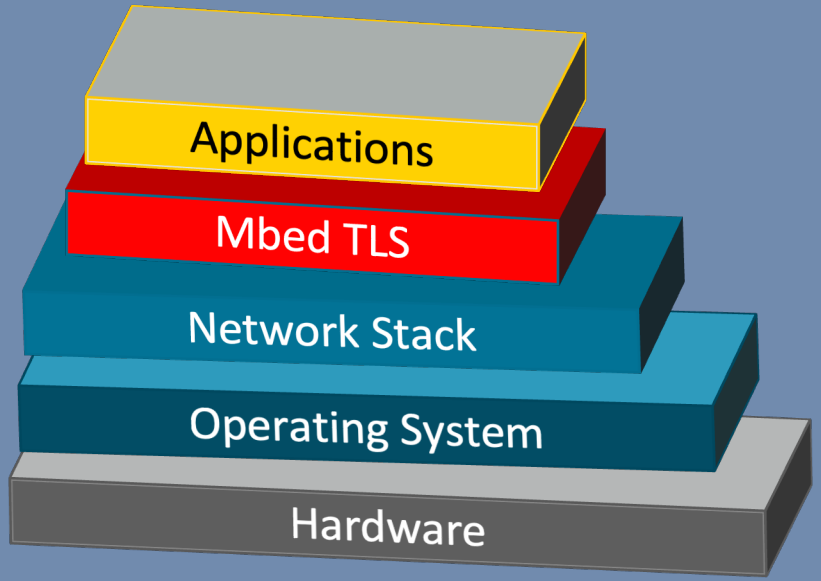
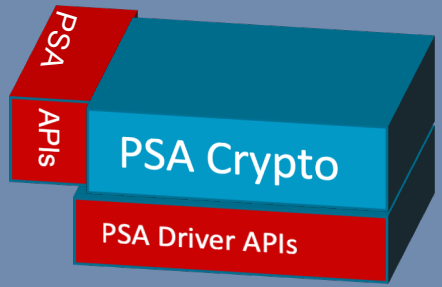
Mbed TLS

- Portable, highly modular, easy-to-use TLS and X.509 library
- Extensively used in various market segments
- Distributed under Apache2.0 License
- Components –
  - Cryptography
  - Protocol (TLS, DTLS)
  - Certificates (X.509, PKI)

- PSA Crypto (Mbed Crypto), derived from Mbed TLS library, brings together Crypto primitives and makes them available via PSA Crypto APIs
- PSA Crypto also support driver interfaces to integrate with Secure Elements and Crypto Accelerators





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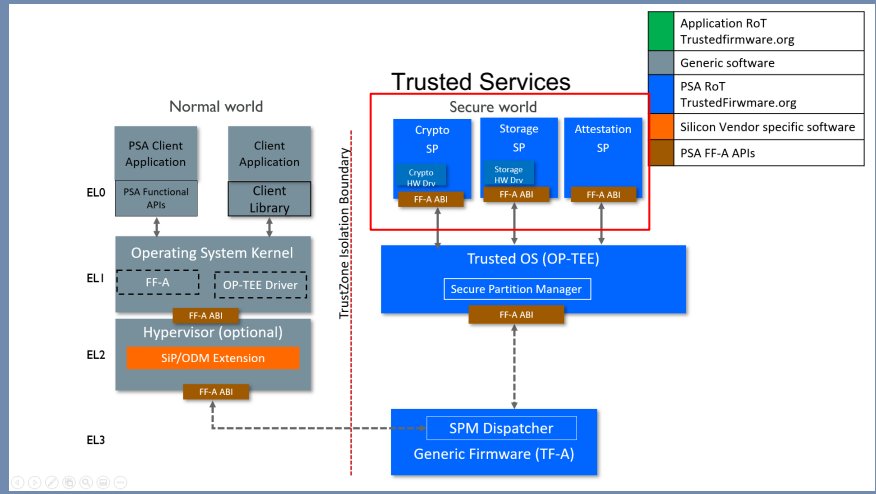
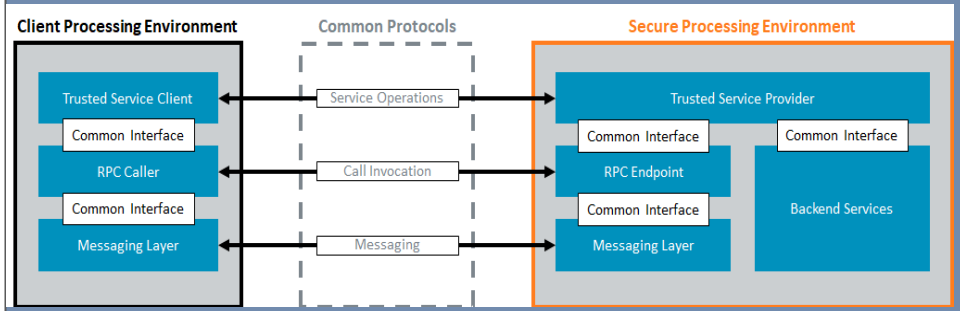
Trusted Services

- Framework to develop Security related Services for enhanced device security and a standardize security approach across platforms
- Deployable over a range of Isolated Processing Environments (e.g., Secure EL0 Partitions under OP-TEE, Secure Partition under Hafnium.)
- Applications access Trusted Services for Security Operations via standardized service layer
- Includes Platform Security Architecture (PSA) Trusted Services for Cryptography, Storage and Attestation and other Secure Services



Layered Model Of Trusted Services



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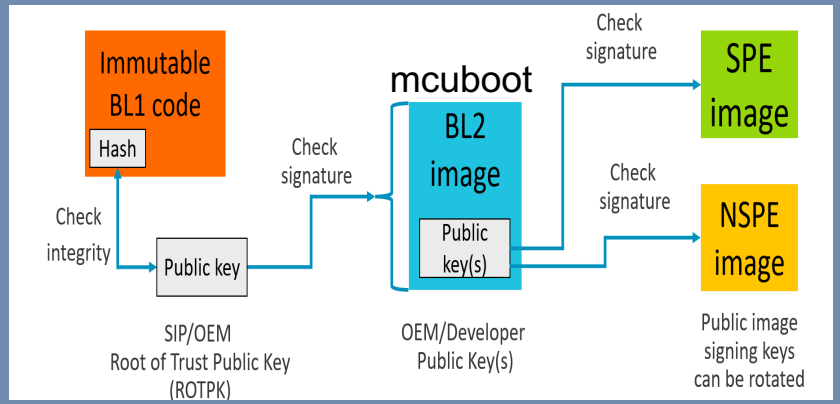
MCUBoot

- Secure bootloader for 32 bit microcontrollers
- Widely deployed secure boot solution
- Define a common infrastructure for the bootloader, system flash layout on microcontroller systems
- Enables simple software upgrades
- Used as BL2 bootloader in TF-M
- MCUboot is operating system and hardware independent and provides a hardware abstraction layer.



TF-M Boot flow

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Thank you

Visit www.TrustedFirmware.org or email
enquiries@trustedfirmware.org for more information