Security: Quo Vadis?

Hannes Tschofenig

Recent work on communication security makes it harder for MITM attackers to inspect traffic

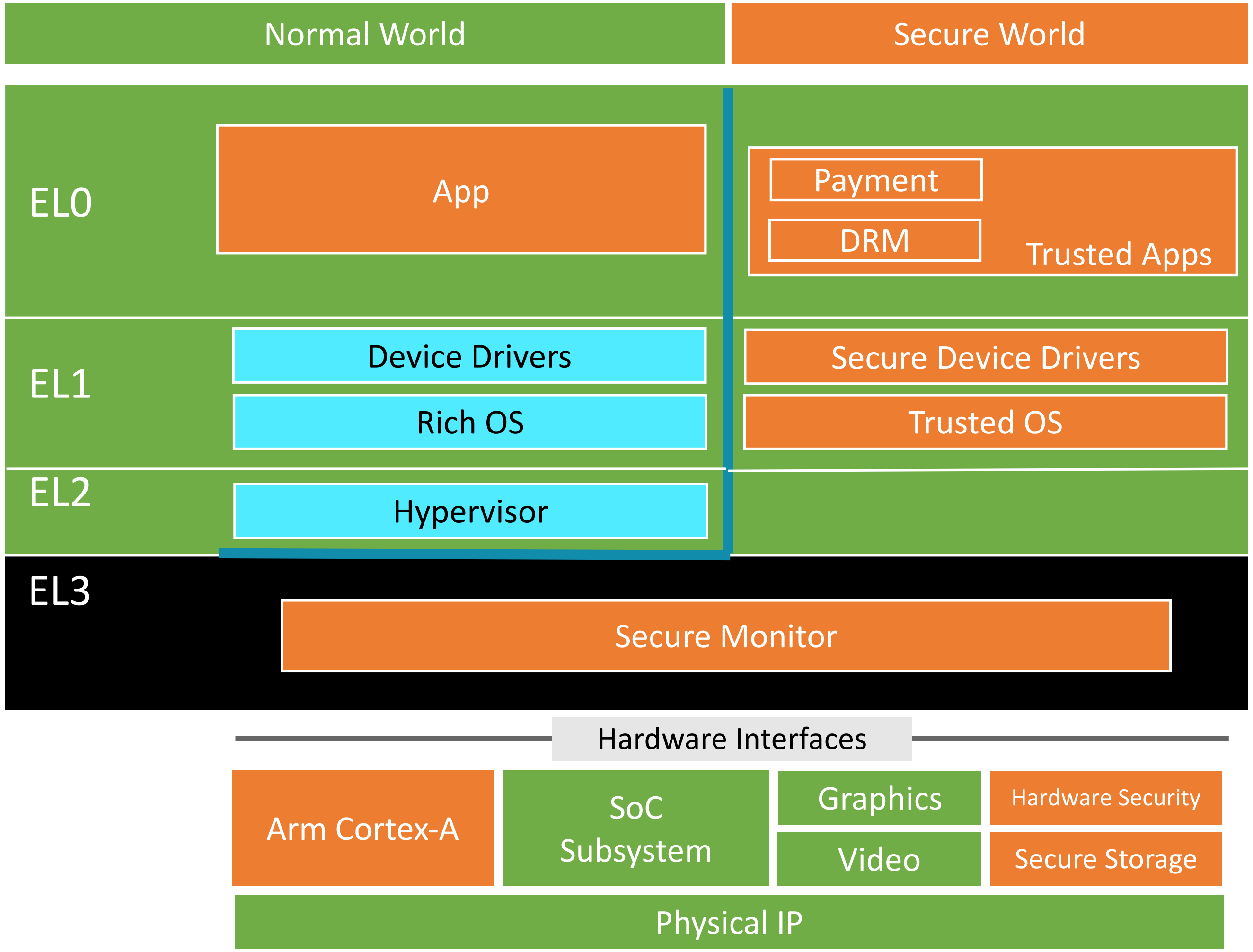
And there is a lot more encrypted communication in general (thanks to Let’s Encrypt and other efforts).

Security protection needs to happen at the endpoints

Think also about “zero trust networking”.

Layers and layers of isolation

Exception Levels, TrustZone



Adding secure world hypervisor

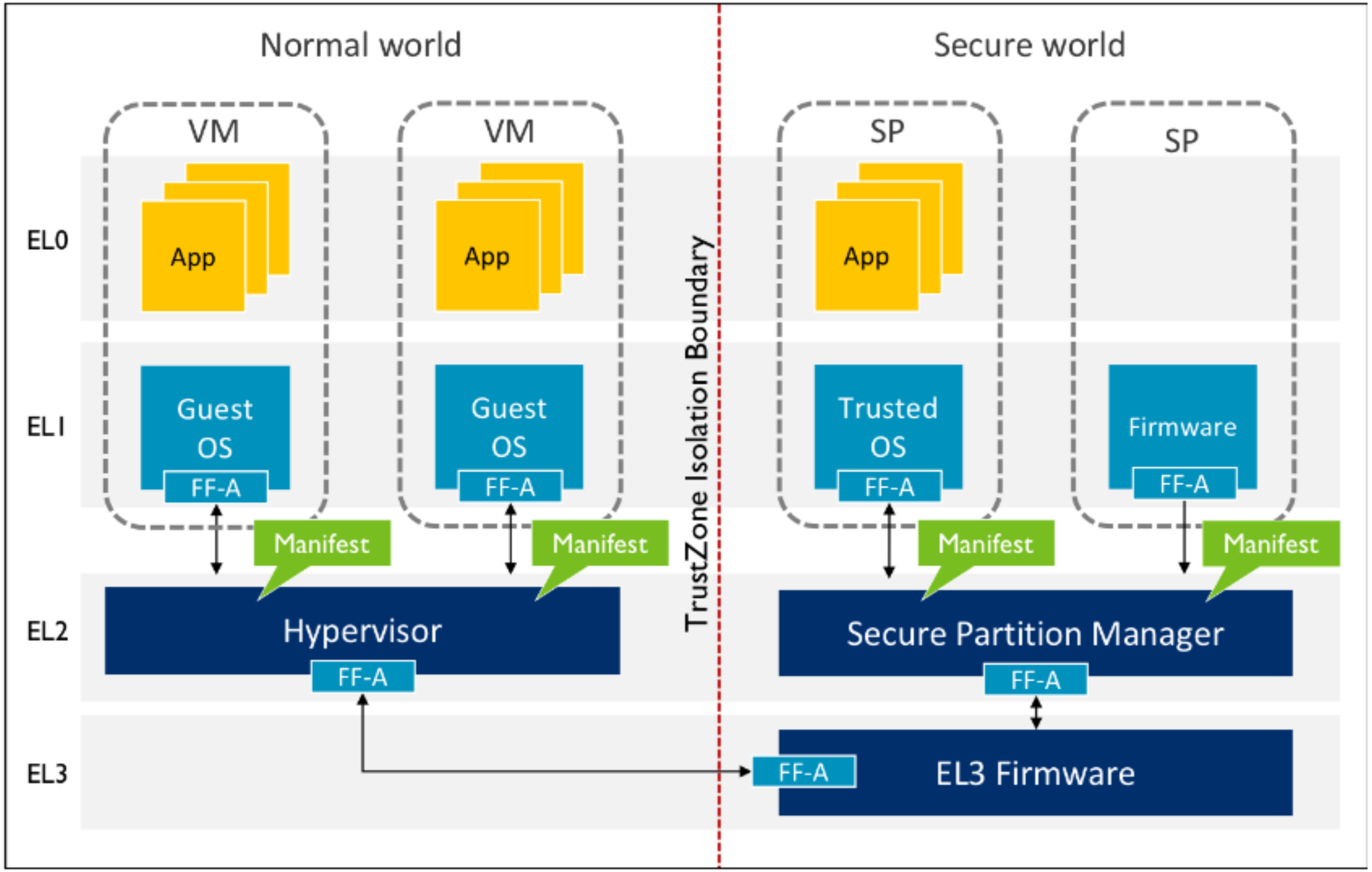
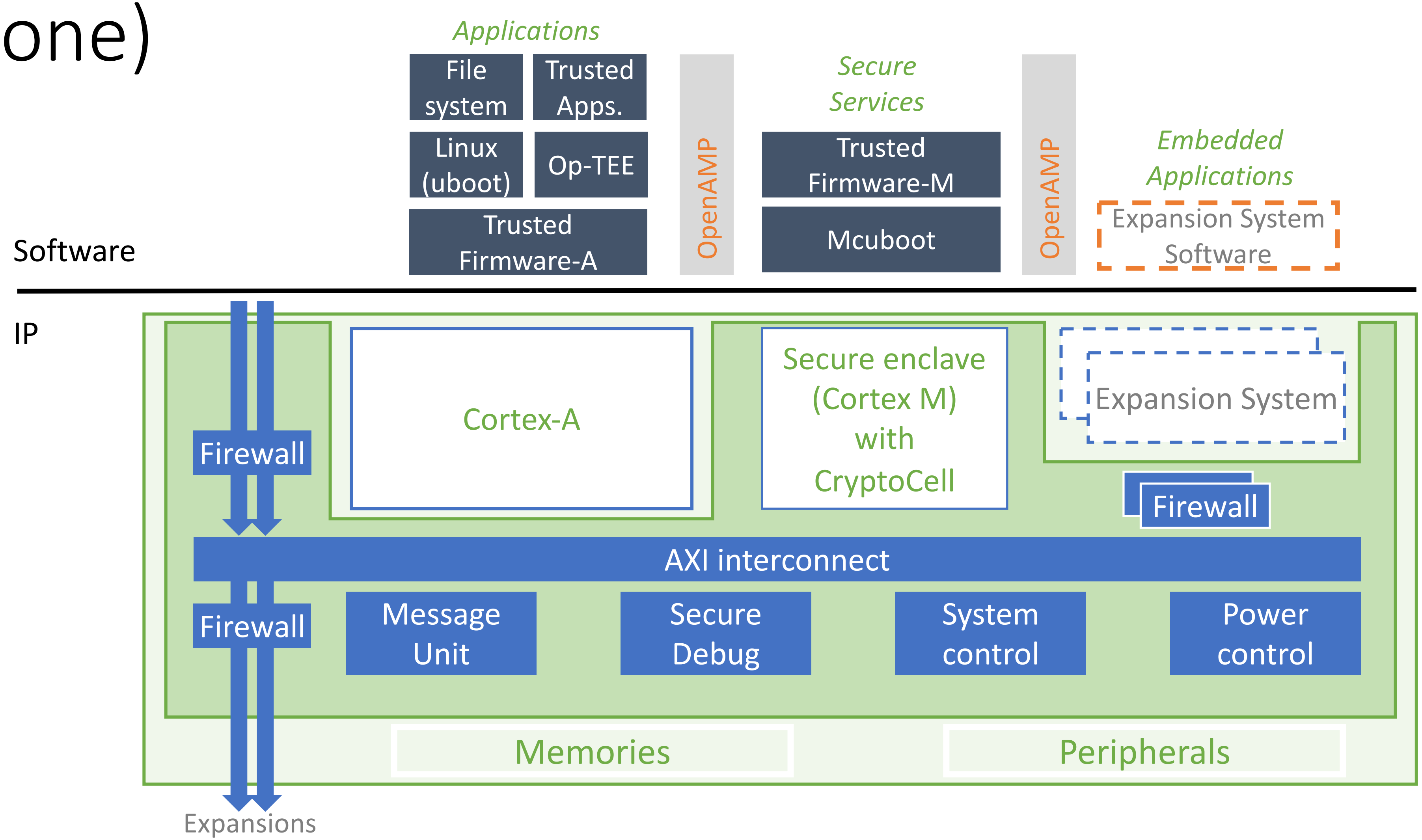


Figure from **Arm® Firmware Framework for Armv8-A**

System on Chip Design with secure enclave (Corstone)



- Conceptually similar to TPMs and iSIMs but better integrated into the rest of the SoC design.

Confidential Computing: aims to reduce the ability for the owner/operator of a platform to access data and code inside TEE (Intel SGX, AMD SEV-SNP and ARM CCA)

Alternative solution: Privacy-Preserving Computation (e.g. via homomorphic encryption and multi-party computation).

https://confidentialcomputing.io

Isolation requires more code and more complex setup

Reference implementation of low-level software

https://www.trustedfirmware.org

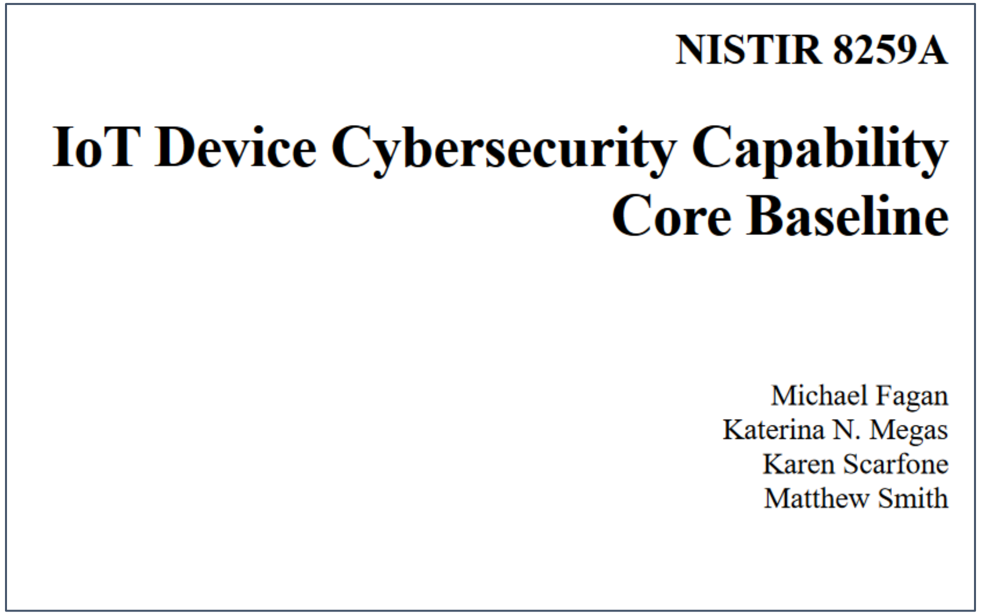
TrustedFirmware

Secure Software Development with
- testing,
- fuzzing,
- static (and potentially dynamic) analysis
- formal methods.

Lots of hardware security mechanisms to deal with programming language issues

Memory encryption, Pointer authentication, Stack limit checking, XN, MPUs, Memory Tagging Extension

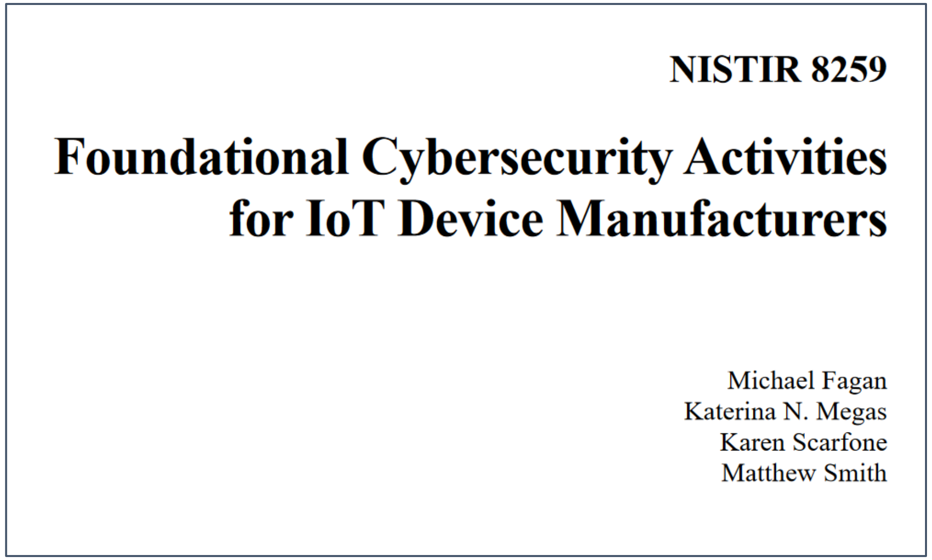
Morello: CHERI (Capability Hardware Enhanced RISC Instructions)



NISTIR 8259A

IoT Device Cybersecurity Capability Core Baseline

Michael Fagan
Katerina N. Megas
Karen Scarfone
Matthew Smith



NISTIR 8259

Foundational Cybersecurity Activities for IoT Device Manufacturers

Michael Fagan
Katerina N. Megas
Karen Scarfone
Matthew Smith

Large number of guidance documents being published

How to make sure that vendors follow the guidance? Certification

Certification

Common Criteria

psacertified™

SESIP™

What are the attacks we are still seeing?

- Stupid mistakes
- Side channel attacks
- Fault injection attacks
- Firmware rootkits
- Social engineering attacks
- Ransomware

Despite all these security technologies, why do we still have attacks?

Or: What should we do differently (better)?

My list

- Too many unfinished libraries
- Complexity causes problems for developers
- Technology deployment takes a long time
- Hacking is more rewarding than securing