TEEP WG
Problem Statement Recap

IETF 101, London

Background

- Hardware based security is desirable
  - Today's processor technology supports various isolation concepts.
  - Well known are the concepts like the memory management unit, user and kernel space, and the hypervisor.
  - Additional isolation concepts where a Rich Execution Environment (REE) resides alongside a Trusted Execution Environment (TEE)

- TEE already widely deployed in the payment industry
- TEE already adopted in other standard bodies (GP, OneM2M, etc.)

Benefits of TEE

- A TEE provides hardware-enforcement that
  - The device has unique security identity
  - Any code inside the TEE is authorized code
    - Reduced risk for application compromise
  - Any data inside the TEE cannot be read by code outside the TEE
    - Safe area of the device to protect assets (great for key management)
  - Compromising REE and normal apps don’t affect TEE and code (called Trusted Application) running inside TEE

Background: Hardware Details

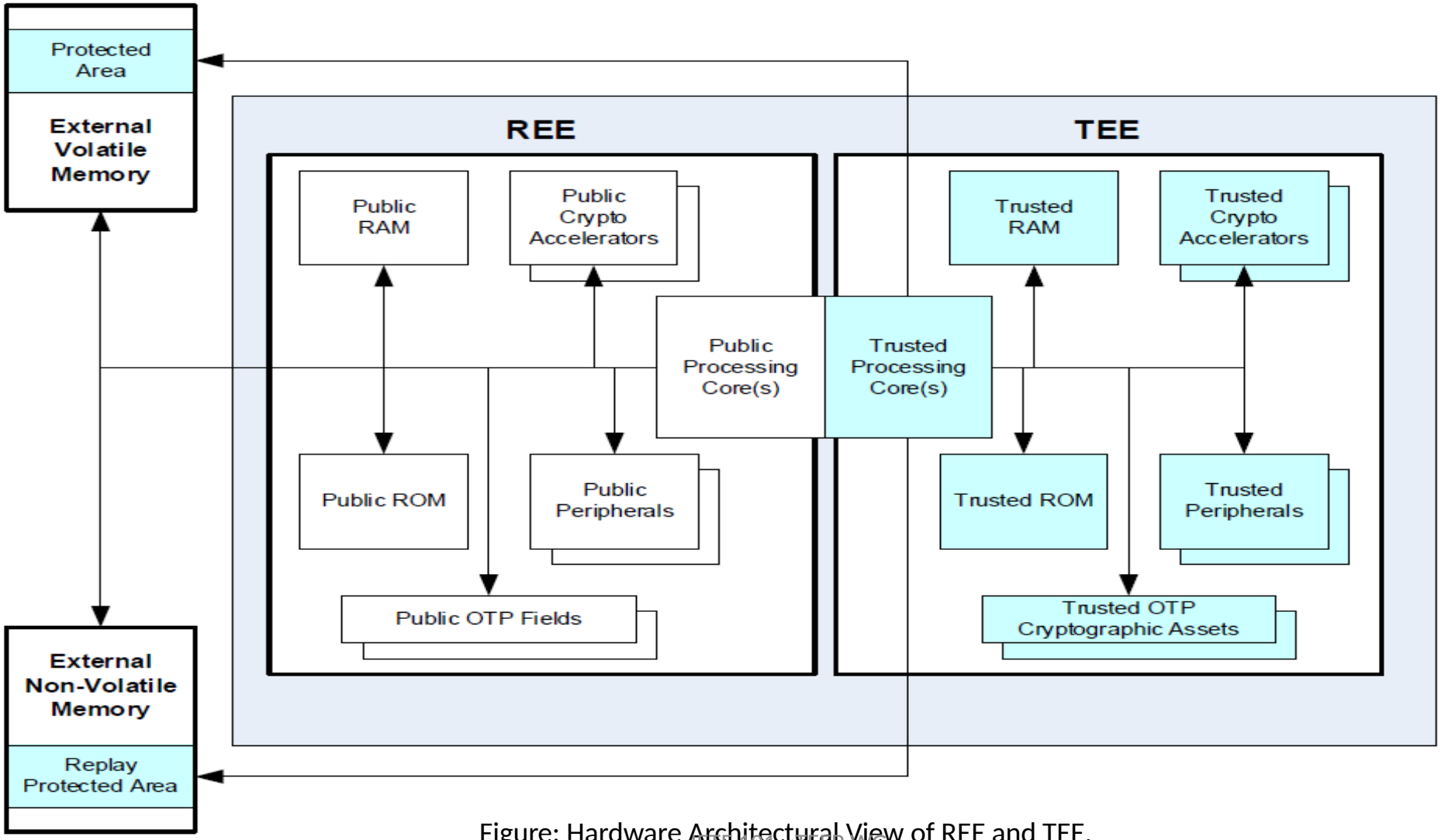


Figure: Hardware Architectural View of REE and TEE,
Global Platform, TEE System Architecture v1.1

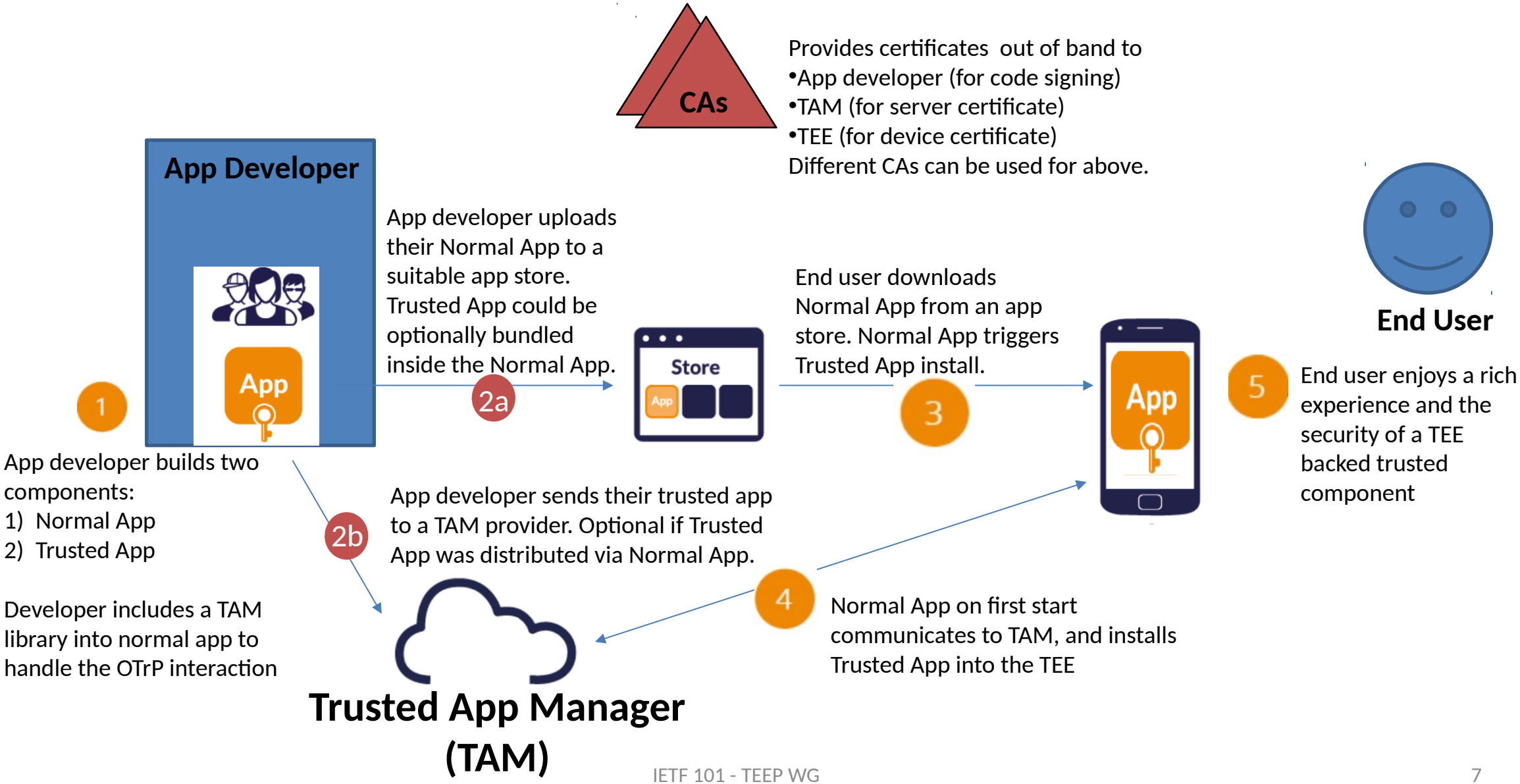
Despite such widely available TEE environment

- Trusted App development and distribution are hard
  - Much less than that for normal apps via App Store
  - Trust and management issues due to multiple parties involved in the scenario

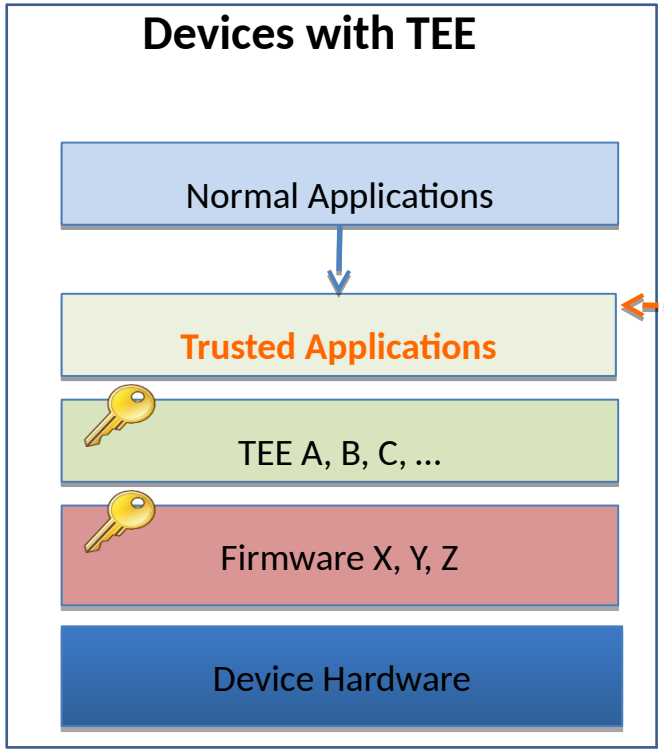
Example use cases for TEE apps

1. Payment
   - Only authorized code can make payments or see payment data, to protect against financial loss
2. IoT
   - Only authorized code can access physical actuator/sensor, to protect against safety issues
3. Confidential cloud computing
   - Only tenant (not cloud hoster) can access data

Entity Roles and Example Experience



Gaps to utilize hardware based security



Device owner:
- *what developers do I trust?*
- *what apps to accept?*

Manufacturer:
- how to trust over-the-air Apps update?

App Developers

Trusted Applications

Normal Applications

App Dev:
- *What TEEs / FW devices to trust?*
- *how to identify a remote device?*
- *How to update my apps?*

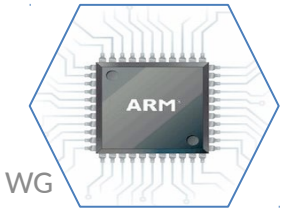
How to verify and allow many App Developers and Apps?
How to get identified and trusted?

TEE Providers

Device Manufactures

How to get FW and TEE packaged and verifiable?

Is FW trustworthy?



Firmware Providers

The Problems

- Adoption gap for App Developers
  - Applications have to be provisioned somehow into the TEE
  - Many device manufacturers + many device types (e.g., phones, tablets, networking equipment, servers) + multiple TEE providers
    - An application provider needs to support
- Lack of standards to manage Trusted Apps
  - Via proprietary techniques today
  - Need to answer
    - How is mutual trust based and verified
      - App Developers / TAM trusts Device's TEE / FW
      - Device trusts App Developers and Apps to be installed and updated
    - What messages for mutual communication
    - What permissions that different entities should have
- Fragmentation is growing - IoT accelerated that fragmentation

Goal

- Define a standardized protocol for providing and managing trusted applications in various devices with TEE
  - Grow the adoption of trusted applications to reduce the inherent security weakness with rich OS
  - Non-lock in for broad device types and providers
    - E.g., allow a TAM to work with multiple TEE & device vendors and flavors
  - Such a protocol better provides security

Software Updates for IoT (SUIT) WG relationship

- TEEP focuses on more on trusted “apps” after boot, whereas SUIT focuses more on “firmware” for boot
- TEEP focuses on installation of code into a Trusted Execution Environment (whether for IoT or not), whereas SUIT focuses on installation of code on an IoT device (whether in a TEE or not)
- TEEP focuses more on initial provisioning of code the first time, whereas SUIT focuses more on subsequent updates to already-provisioned code

Q&A