GSMA IoT SAFE Applet – only for the eSIM?

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Motivation

Usecase Secure Cloud Authentication

› Establishing secure connection to AWS, Azure and Co. with TLS

High Level Overview about the GSMA IoT SAFE specification

› A common API provided by an Java Card Applet used as a ‘Root of Trust’ by IoT devices

GSMA IoT SAFE for non-cellular?

› IoT SAFE was originally intended for eSIM.

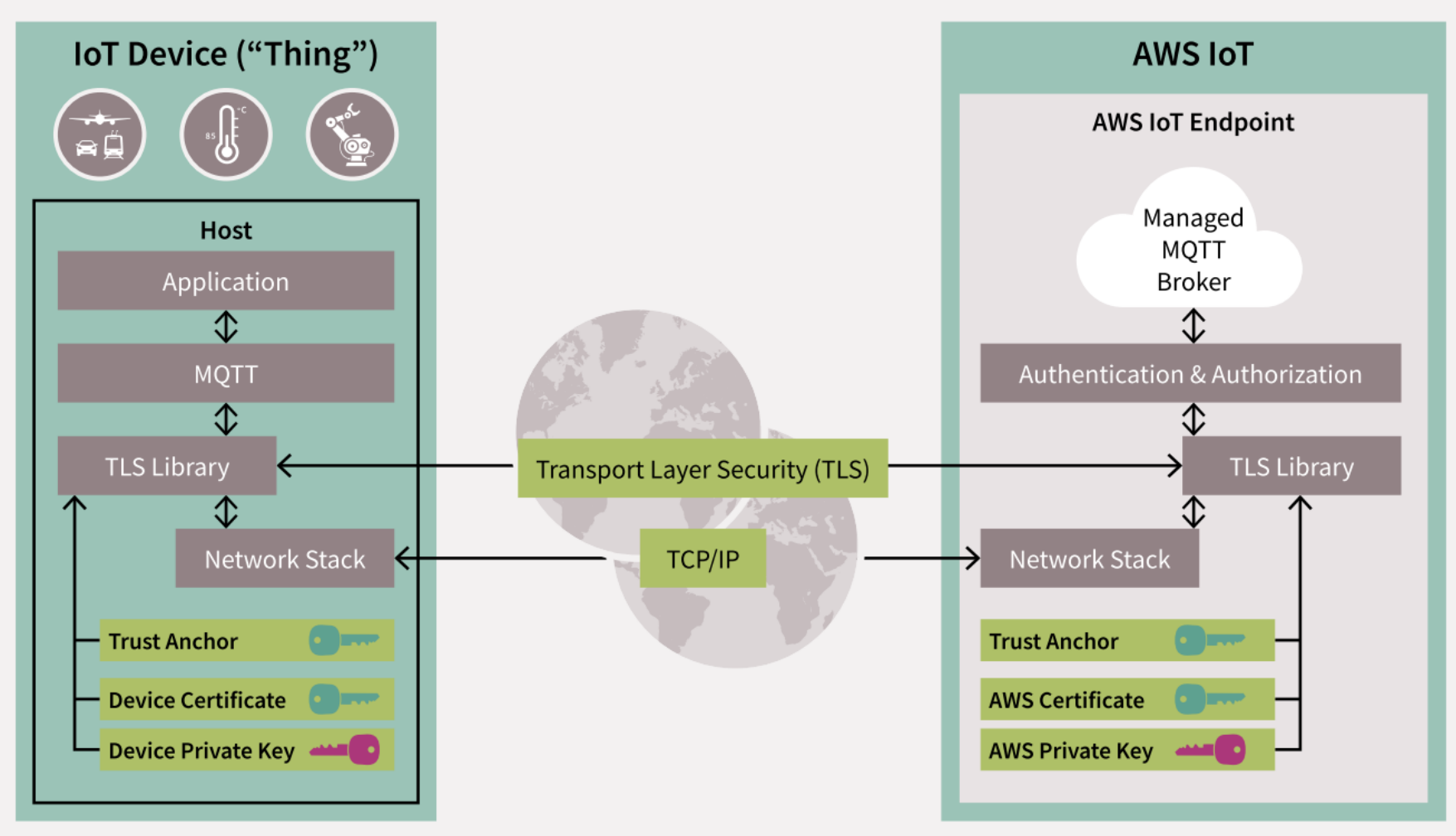
Benefits for IoT SAFE applet with Java Card™ for Infineon

› Java Card as the basis for Plug and Play Security.

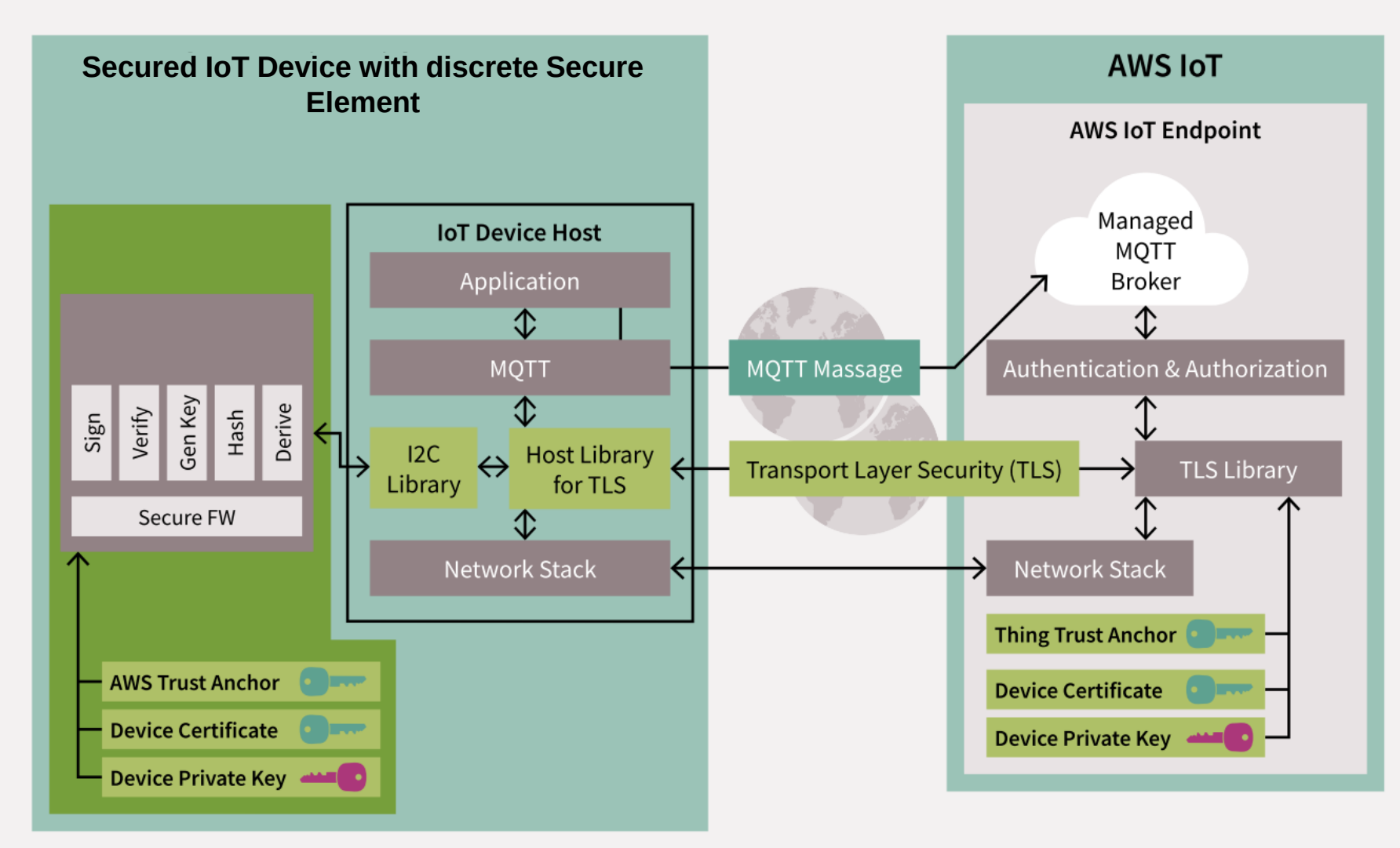
Infineon findings with a GSMA IoT SAFE applet

› Performance and Feature proposals

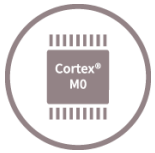
Usecase Secure Cloud Authentication:
System Integration Perspective **Without** Hardware Security



Usecase Secure Cloud Authentication:
System Integration Perspective with Hardware Security



Main drivers why customers decide on discrete SecureElements for Cloud Authentication



Secure Trust Provisioning decoupled from the Main MCU Firmware

- Cloud authentication keys is security sensitive data
- Device OEM treating this very carefully and try to separate this from standard firmware loading for the MCU
- SE components provide a secure storage for this sensitive data
- This sensitive data shall only be handled by highly secure and trusted personalization sites.

Physicial Tamper Resistance

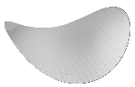
- mitigation against strong adversaries, e.g. against cold boot memory attacks or hardware bugs such as Spectre/Meltdown Rowhammer , or Clkscrew
- the main application processor will always have a significantly larger attack surface than dedicated secure hardware

Certification and Regulations

- Some cloud products require a certified Secure Element today e.g. AliCloud
- Preparing long term
- Proofing "state of the art security" by using a certified product

Persistant Storage for flashless SoC

- Application Processors with their extremely small technology nodes today (<10nm) cannot efficiently accommodate NVM anymore
- Monotonic values for countermeasures need to reside in NVM
  - Retry counter for the PIN
  - Session counter in Secure Protocols Replay Attack Prevention
  - Values have to be persistent (atomic and tearing-safe)



Flexible, fast and costefficent personalization options

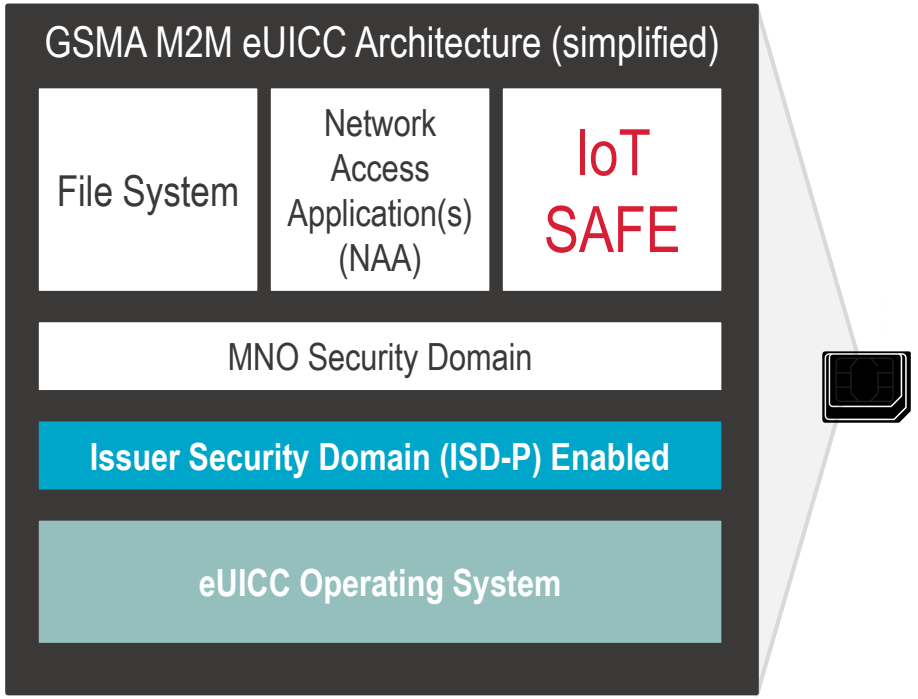
- Loading of customer specific and chip unique credentials during the wafer test
- Wireless of the inbuild low cost contactless interface on each chip (for some products)

GSMA IoT SAFE

IoT **S**IM **A**pplet **F**or Secure **E**nd-to-End Communication

IoT SAFE:

- Uses the SIM as a mini 'crypto-safe' inside the device to securely establish a (D)TLS session with a corresponding application cloud/server
- Is compatible with all SIM form factors (e.g. SIM, eSIM, iSIM)
- Provides a common API for the highly secure SIM to be used as a hardware 'Root of Trust' by IoT devices
- Helps solve the challenge of provisioning millions of IoT devices



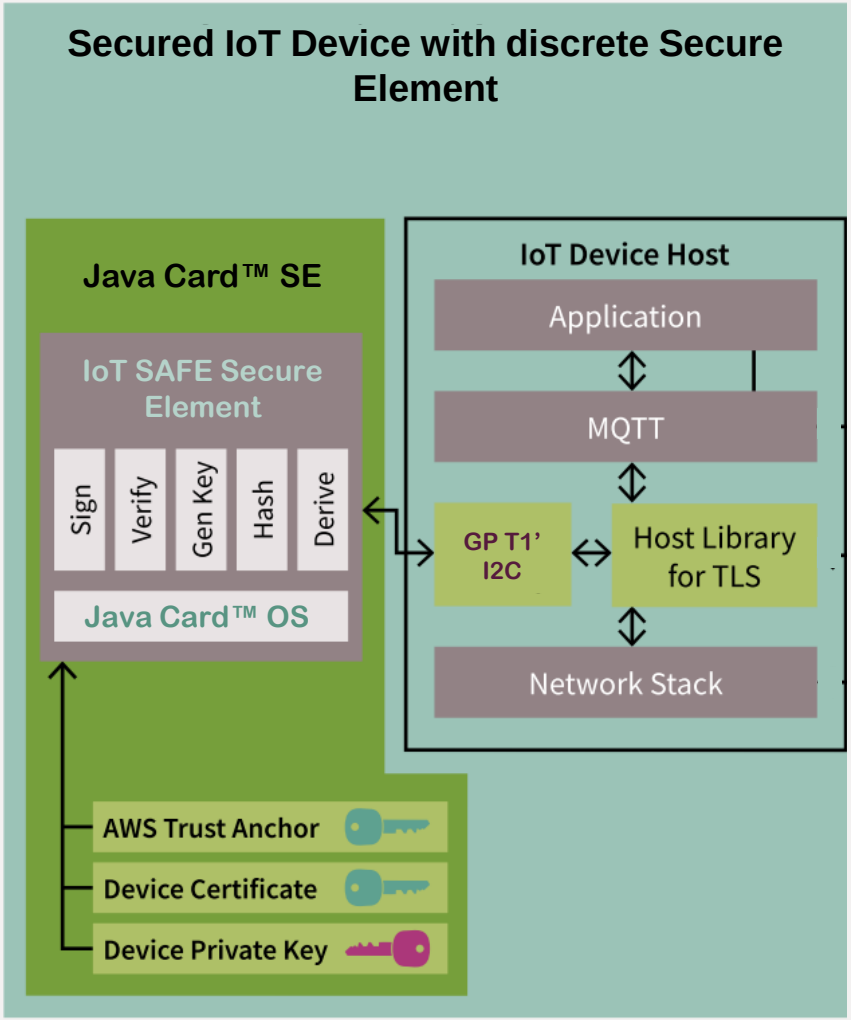
- Standardized approach for a TLS Root of Trust in form of an Java Card Applet
- Another important step towards real Plug and Play Security
- Eases the integration efforts with middleware ecosystems eg. openSSL

GSMA IoT SAFE
Supporting Documents

Download from here

Download from here

Plug and Play Trust Anchor Secure Element



- Java Card is the foundations for even further standardized components
- IoT SAFE implements the application for the cloud authentication vertical
- The GlobalPlatform APDU over I2C/SPI T1' specification defines an common protocol layer

Flying with Security ease – paradigm of flying IoT

PrimeKey

Multiple certification and PKI in action

PrimeKey

Issuance of certificates and keys to the drone

PKI service

PKI hierarchy

PrimeKey

Permission is granted via personalization of certificates and keys

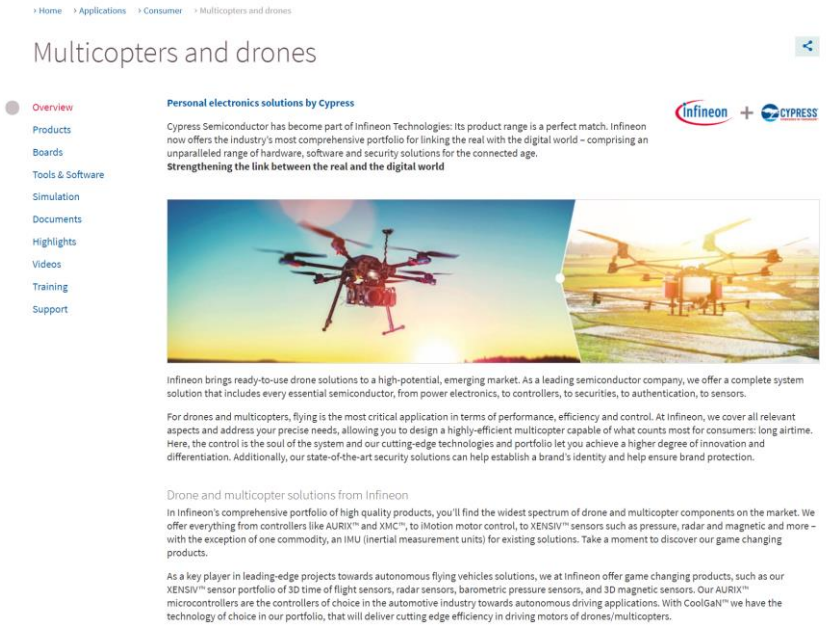
Permission is managed by PKI system provided by PrimeKey

Certificates are used to authenticate the drone to a Air Traffic Control Center using LTE

Secure Drone Demo

Supporting Material

[Securing the commercial use of multicopters - whitepaper]



[Infineon Multicopters and Drones - website]

IoT SAFE
One Applet multiple use

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- Applet Development
- Verification
- Documentation

External Sourcing because of Java Card API and IoT SAFE

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GSMA IoT SAFE Java Card™ Applet

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Cellular eSIM portfolio

Java Card™

OPTIGA™ Connect IoT

Java Card™

OPTIGA™ Connect Consumer

non-cellular SE portfolio

Java Card™

OPTIGA™ Trust non-cellular IoT

Java Card™

Secora™ Connect for wearables

Findings in our IoT SAFE implementation

Performance Improvements
- Extended APDU vs Chaining support
- Combination of commands into oneShot operations

Feature Improvements
- Configurable Access Policies
- Creation of generic data objects
- Creation of referenced key object
- More algorithm supported e.g. ED25519 and NIST p384/521

ALI ID2 support
- AES encryption schemes(ECB)

Key take-aways / Summary / Conclusion

IoT Cloud Authentication with discrete HW Root of Trust are frequently asked by OEMS

The great idea of IoT SAFE can also be extended to non-cellular products

Real Plug n Play security requires standardization on different level to make the integrations experience best in class

Part of your life. Part of tomorrow.