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Scalable Security using SAM and CSP

Session: Hardwarebasierte Vertrauensanker für die europäische eID Technologie

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Omnisecure Berlin, 22.01.2024

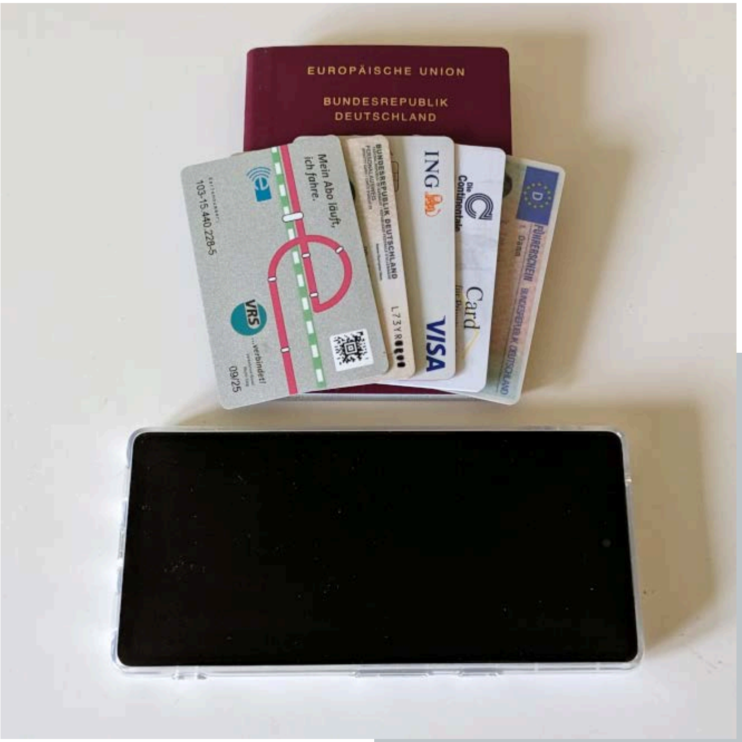
Digital Identities on mobile platforms …

Goals:

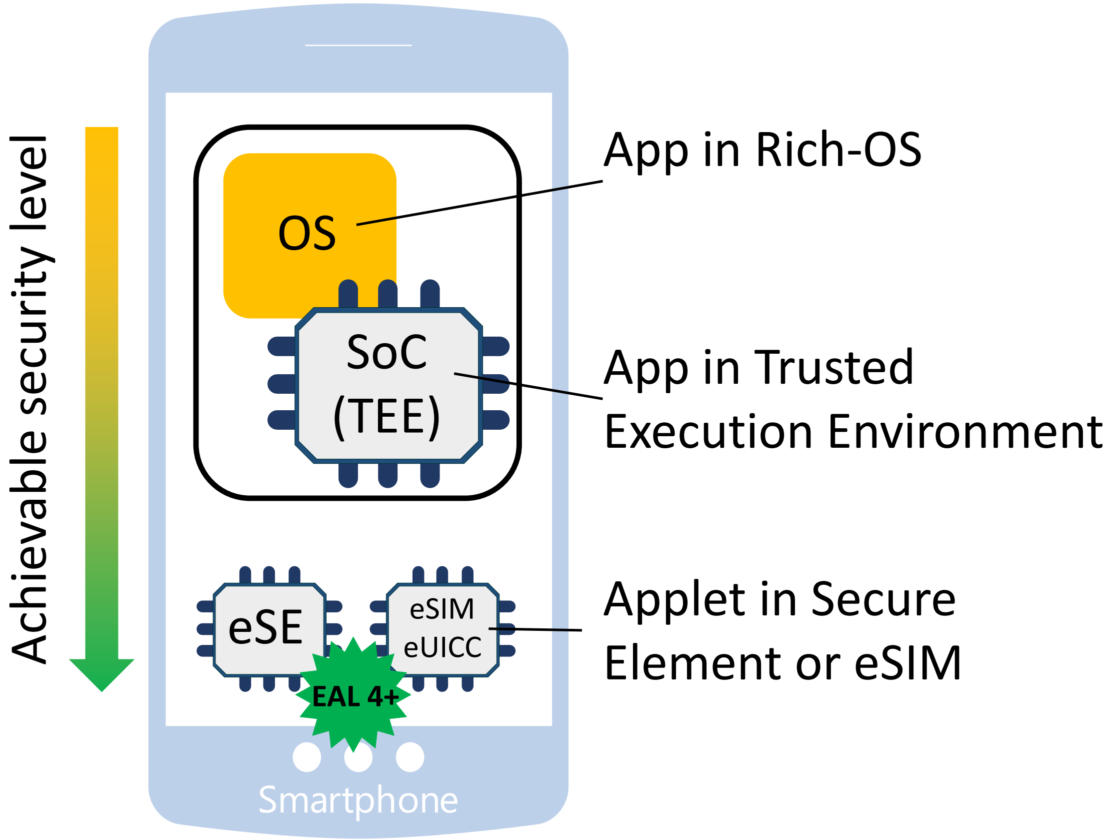
- Ease of use
- High functionality
- Broad availability
- New use cases
- Much more …

Common questions:

- Use case (What?)
- Regulation (Who?)
- Acceptance (Why?)
- **Implementation (How?!)**



… designed secure !


Achievable security level
OS
SoC
(TEE)
eSE
eSIM
eUICC
EAL 4+
Smartphone
App in Rich-OS
App in Trusted Execution Environment
Applet in Secure Element or eSIM

Security by certification

- Verifiability
- Documented security assertion
- Highest security guarantees by using dedicated hardware (EAL 4+, VAN.5 highly avail.) eIDAS 'high'

Challenging constraints:

- Mobile devices are complex
- Heterogeneous market (many OEMs & devices)
- High number of involved parties (OEMs, MNOs, Service Providers, …)

Implementation: Secure, Scalable, Available, Economical ?

Two contributions

1 **Secured Applications for Mobile (SAM)**

organizational & technical approach for the reduction of dependencies regarding the life cycle

2 **Cryptographic Service Provider (CSP)**

organizational & technical approach for secure implementation and reduction of certification requirements

Secured Applications for Mobile – Use Case

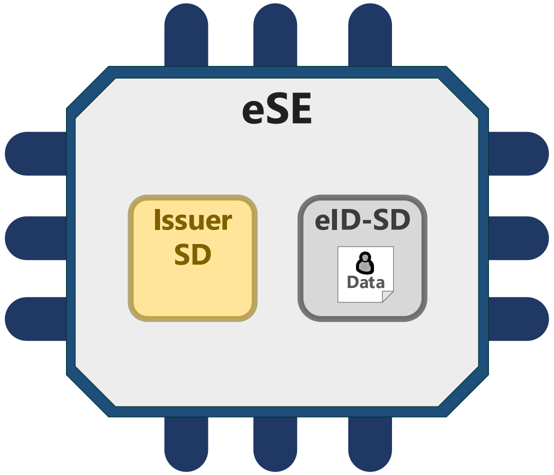
> *The Secured Applications for Mobile specification defines a capability allowing cellular connected Devices to use a wide range of secured applets within an eUICC. Such applets can be managed by a service provider, and may be paired with applications running in the Device itself.*
>
> *- GSMA SAM v1.1*

Use case / process (here: eID):

1. Download und install an app of the Application Service Providers (ASP) into Rich-OS.
2. Evaluation (by the app) if platform and eUICC are eligible (availability, version, storage space, etc.).
3. If positive: Register at ASP and in the SAM-SD of the eUICC.
4. Install the appropriate eID-applet into the SAM-SD. Transfer rights to ASP.
5. Personalize the eID-applet with user data (utilizing e.g. the physical eID-card).
6. Secure use of the eID functionality.

Challenge: Accessing the eSE / eSIM

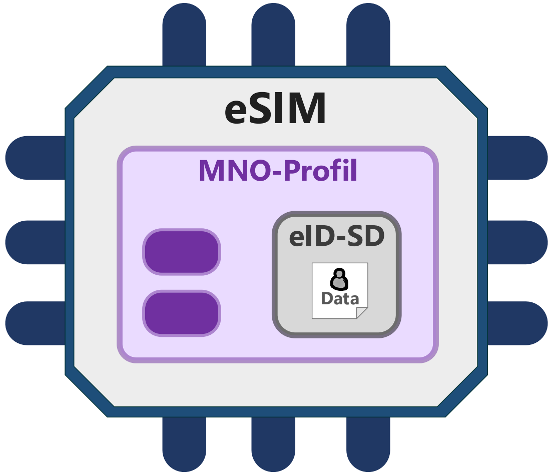
eID in eSE



Dependencies on OEM

Access to embedded Secure Elements (eSE) only possible via interfaces of the device manufacturer.

eID in MNO-Profile on eSIM



Dependencies on MNO

Access to eUICC/eSIM only possible via interfaces of the mobile network operator (MNO).

- Accessing the dedicated hardware to use secured applications is typically very restrictive and limited.
- Need to use OEM- and MNO- specific interfaces and background systems.

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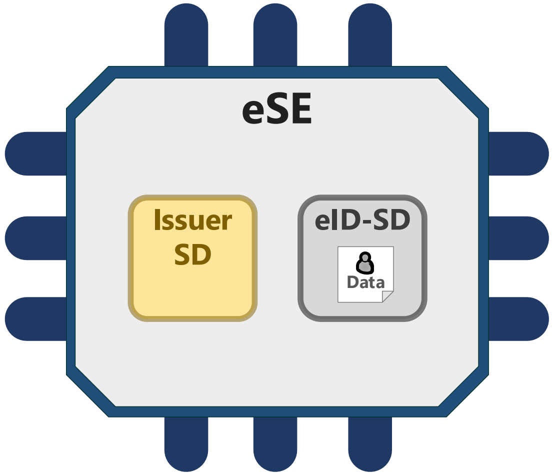
SAM as foundation for third party applications on eSE / eSIM

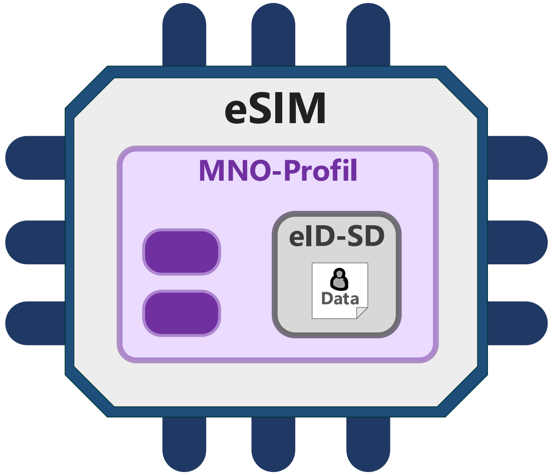
eID in eSE



Dependencies on OEM

Access to embedded Secure Elements (eSE) only possible via interfaces of the device manufacturer.

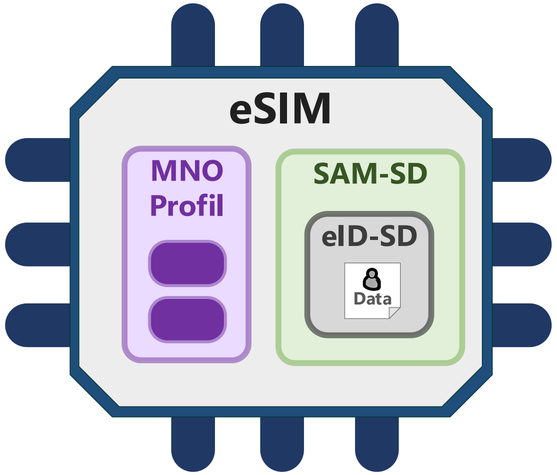
eID in MNO-Profile on eSIM



Dependencies on MNO

Access to eUICC/eSIM only possible via interfaces of the mobile network operator (MNO).

eID in SAM-SD besides MNO-Profile (eSIM) or Issuer SD (eSE)



Reduced dependencies

Access to SAM-SD on eSE / eUICC via SAM management systems and SAM-PKI.

Two contributions

① **Secured Applications for Mobile (SAM)**

organizational & technical approach for the reduction of dependencies regarding the life cycle

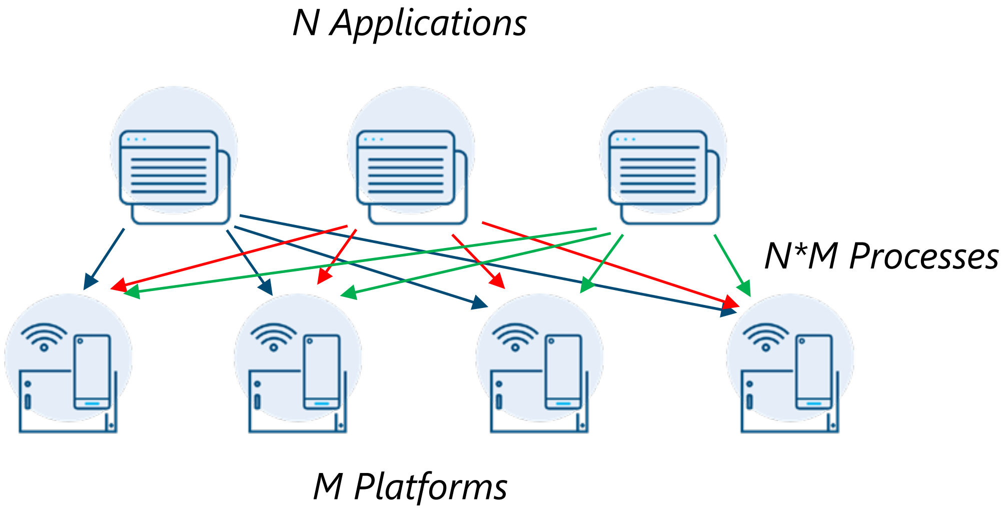
② **Cryptographic Service Provider (CSP)**

organizational & technical approach for secure implementation and reduction of certification requirements

Scalability of security certifications

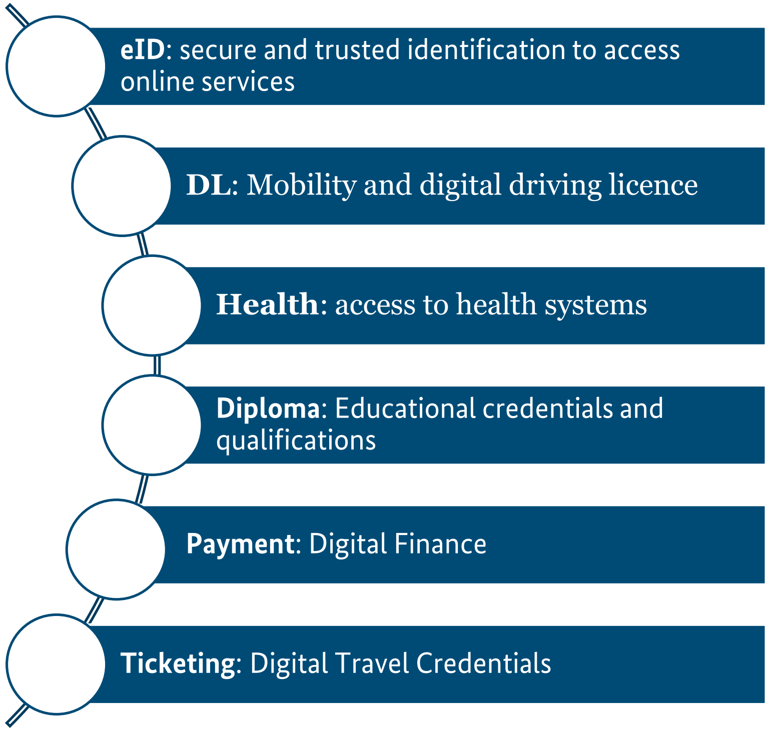
‘Composite evaluation’ for high assurance classes

- High effort (financial & time-wise)
- Requires deep understanding of the platform (requirements & restrictions)
- Limited usability of the platform certificate (18 months)
- Static assurance class, low modularity
- Low scalability



No ideal fit for products in heterogeneous markets with short product cycles

Applications



eID: secure and trusted identification to access online services

DL: Mobility and digital driving licence

Health: access to health systems

Diploma: Educational credentials and qualifications

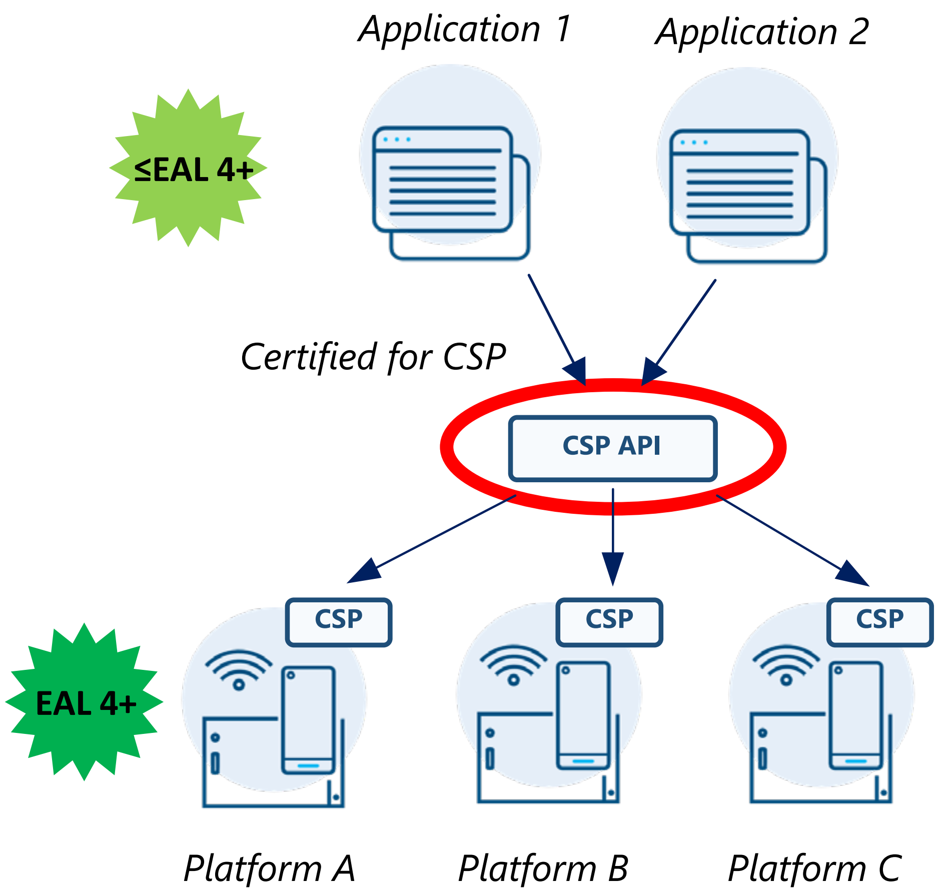
Payment: Digital Finance

Ticketing: Digital Travel Credentials

Applications require secure implementations of identical cryptographic building blocks:

- Secure key management for ID and Auth
- Secure storage for user data
- Authentication protocols
- Secure and Trusted channels, e.g. to back-end
- Signatures
- Secure Personalization
- Secure Erase and Termination

CSP Concept: More than a Crypto-Lib !



CSP goals:

- Separation of business logic and crypto
- Ease scalable certification efforts (eliminate composite certification!)
- Provide complete building blocks and protocols for the full life cycle
- Prevent misuse of cryptography

CSP Functional Requirements (excerpt):

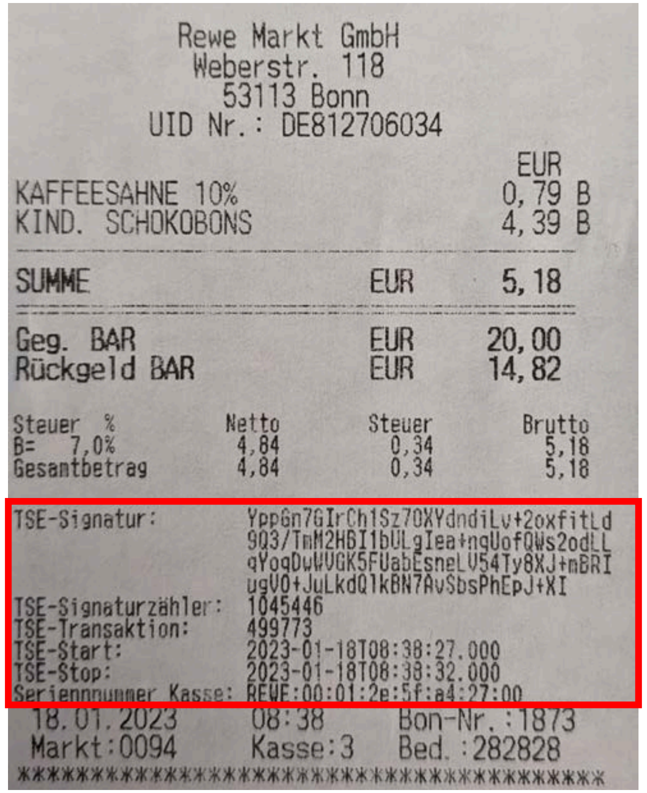
(derived from BSI-CC-PP-0104 & BSI TR-03181 CSP2)

- key management
- identification and authentication
- session handling
- signing
- secure storage (wrapped import/export)
- encryption
- attestation

CSP utilization since 2020

Security modules (TSS / TSE) for cash registers in Germany:

- > 2 M cash registers
- > 2.000 cash register manufacturers
- 6 certified TSS (+ variants)
- 4 certified CSP, incl. 2 SE (1 JavaCard)



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                   Weberstr. 118
                    53113 Bonn
                UID Nr.: DE812706034
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KAFFEESAHNE 10%                      0,79 B
KIND. SCHOKOBONS                     4,39 B
-------------------------------------------
SUMME                       EUR       5,18
-------------------------------------------
Geg.  BAR                   EUR      20,00
Rückgeld BAR                EUR      14,82

Steuer  %         Netto      Steuer      Brutto
B=   7,0%          4,84        0,34        5,18
Gesamtbetrag       4,84        0,34        5,18

TSE-Signatur:           YppGn7GIrCh1Sz70XYdndiLv+2oxfitLd
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                        ugV0+JuLkdQ1kBN7AvSbsPhEpJ+XI
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TSE-Transaktion:        499773
TSE-Start:              2023-01-18T08:38:27.000
TSE-Stop:               2023-01-18T08:38:32.000
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Thank you for your attention!

Contact

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BSI as the Federal Cyber Security Authority shapes information security in digitalization through prevention, detection and response for government, business and society.

Current State, Literature, and Further Readings

SAM & CSP: From Concepts to Standards

Current state on SAM:

- SAM Requirements document published by GSMA in June 2021
- SAM Configuration (technical specification document) in final phase at GlobalPlatform
- SAM PKI and PKI policy in discussion with multiple actors

Current state on CSP:

- BSI Technical Guideline TR-03181 – CSP2 published in June 2023
- technical specification currently under work at GlobalPlatform, to be published as amendment to the GP Card Specification, „Amendment N – CSP“

SAM & CSP: Literature

- BSI overview page with links to BSI SAM Position Paper, CSP Whitepaper, BSI TR-03181
  https://www.bsi.bund.de/dok/secureelements
- SAM Requirements document by GSMA
  https://www.gsma.com/newsroom/gsma_resources/sam-01-secured-applications-for-mobile-requirements/
- SAM Position Paper by Eurosmart
  https://www.eurosmart.com/european-mobile-identity-recommendations-on-sam-technology/
- SAM Position Paper by TCA
  https://trustedconnectivityalliance.org/wp-content/uploads/2023/02/TCA_SAM_PositionPaper_FINAL.pdf
- Digital Wallet
  https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/european-digital-identity_en