Simplifying Device Deployments with Generic Secure Element and Bootstrapping Join Service

Actility & IDEMIA

LoRaWAN®

Creating Valuable IoT Connections

Generic Secure Element and Bootstrapping Join Service

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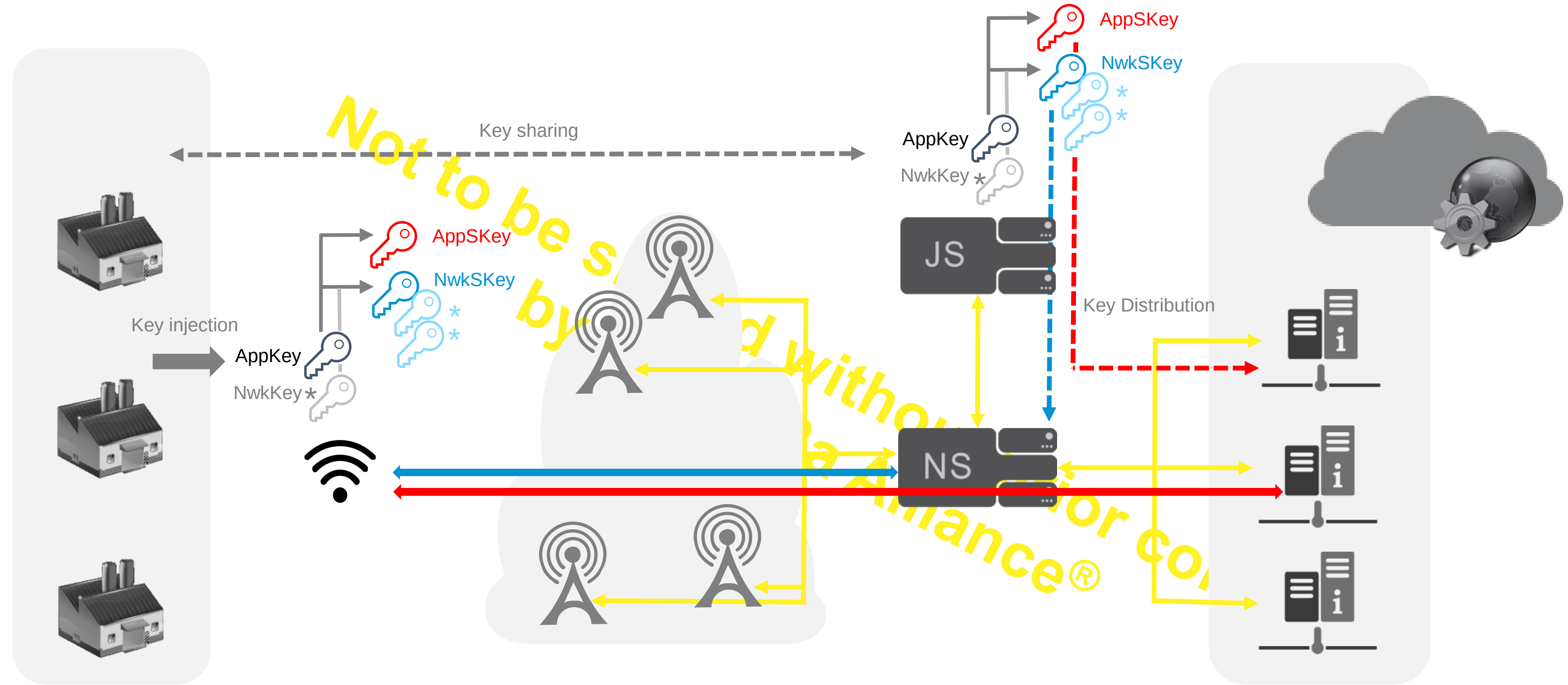
LoRaWAN® Security Overview



Device Manufacturers

End Device (ED)

Gateways (GW)

Join Server
Network Server

Application Servers (AS)

LoRaWAN® Device Deployment

LoRaWAN® defines cryptographic primitives used for security

- Authentication with MIC/NwkSkey
- Confidentiality with AppSKey encryption
- Session key generation based on AppKey during Join procedure
- Session key distribution based on LoRaWAN® backend interface

However, LoRaWAN does not define the Secret Key handling

- AppKey injection
- AppKey sharing

Coming from smart card industry, we have defined a secure way of personalizing secure element for LoRaWAN

Secret Key Handling, a Primer

1. A secret key value is never exposed !
2. A secret key is handled inside a Hardware Security Module (HSM) in a High Security Area (HSA)
3. A secret key is under the responsibility of its owner, i.e. not shared ☺

HSM

Certified tamper resistant hardware appliance handling cryptographic fonctions and storage

HSA

Certified security area with physical barriers, access control and surveillance made available on a secured network

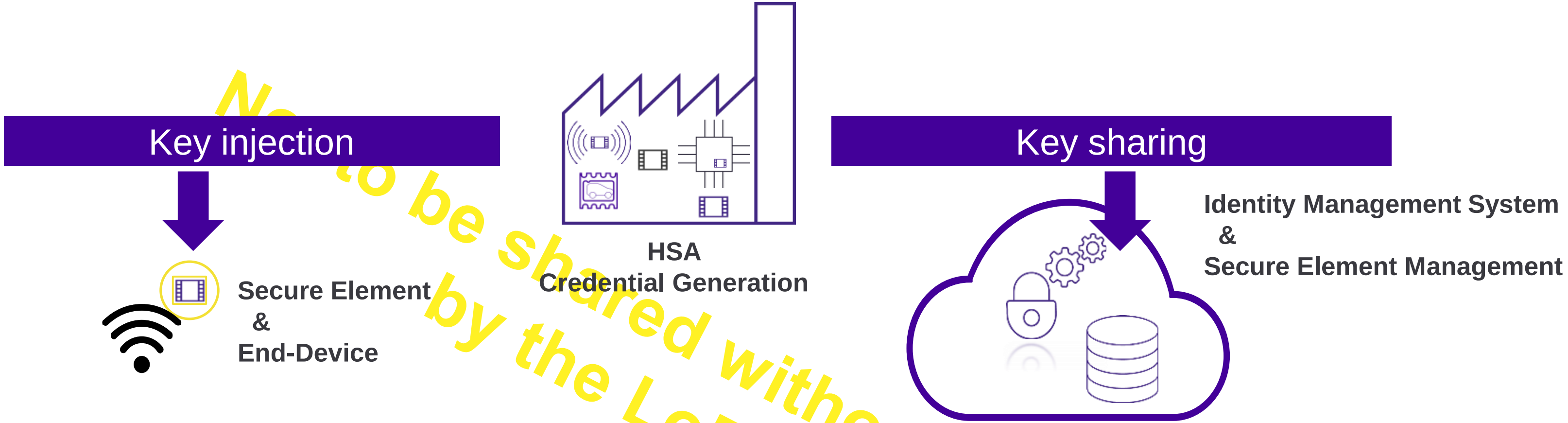
In a physical world …

The owner of the key can open the safe …

In a digital world …

When a key is transfered, the key is duplicated
See point 3 above…

Secure credentials provisioning



Key injection

Secure Element
&
End-Device

HSA
Credential Generation

Key sharing

Identity Management System
&
Secure Element Management

Bootstrap credentials (DevEUI, JoinEUI, AppKey) are securely provisionned in the Secure Element from a HSA (High Security Area)

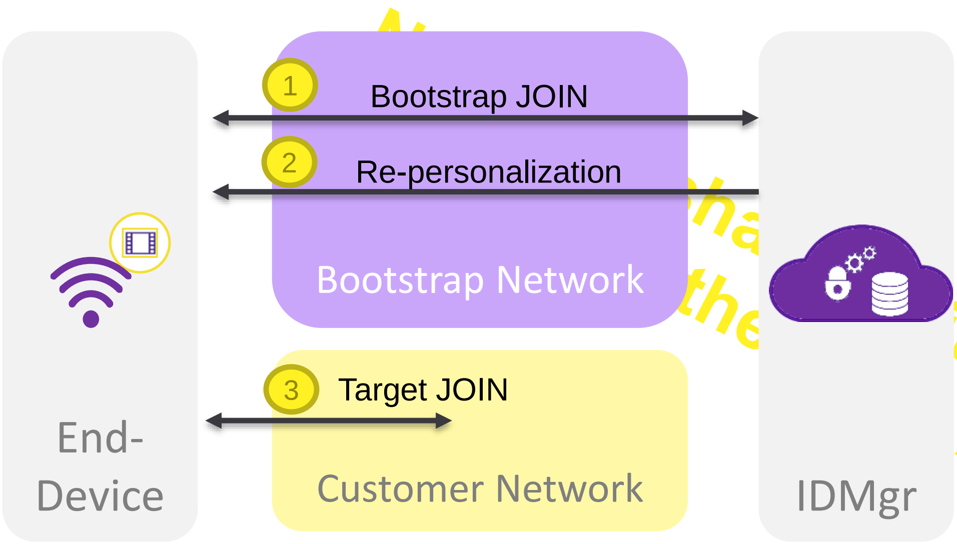
- No End-Device personalization required
- Simply solder Secure Element

Bootstrap credentials are also securely transferred to an Identity Management System (IDMgr)

- Manage Secure Element life cycle: Initial Join, reprovisioning services, Fleet Transfer, Key renewal …

Bootstrap secret keys are never exposed

Re-Personalization over the air



1 End-Device joins via a bootstrap network using IDMgr

- ➢ Using LoRaWAN® L2 and backend interface
- ➢ Secure Element bootstrap credentials are known to IDMgr

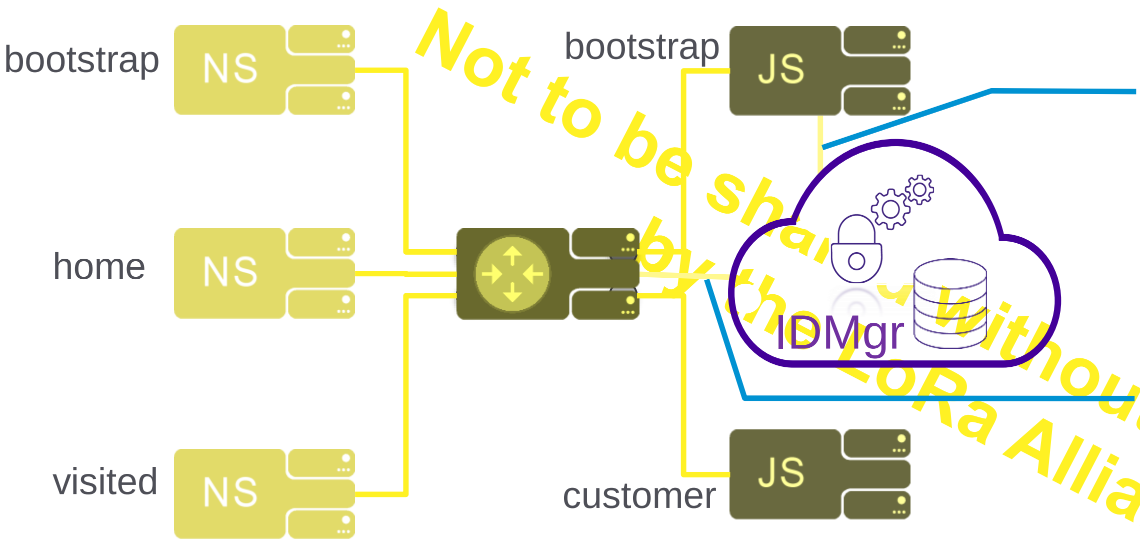
2 IDMgr sends customer profile to Secure Element

- ➢ Using End-Device application layer
- ➢ Customer profile is sent over the air, including encrypted AppKey, secured via Message Layer Security protocol in Secure Element

3 End-Device re-joins via customer network

- ➢ Using LoRaWAN® L2 and backend interface
- ➢ Customer network is provisioned with final credentials

Backend Interface Connectivity



IDMgr is connected to bootstrap JS but not necessarily to customer JS

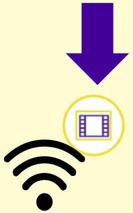
- ➢ Select a JS supplier: operator, manufacturer or JSaaS

IDMgr is connected to bootstrap NS

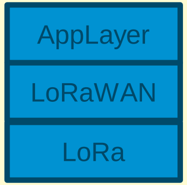
- ➢ Select a bootstrap network supplier
- ➢ It should ensure bootstrap coverage via roaming agreements

Use a peering hub to facilitate interconnection

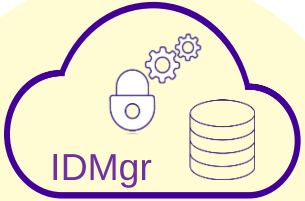
Benefits of bootstrapping & OTA re-personalisation



- ✓ Generic Secure Element
- ✓ Over-the-air profile delivery



- ✓ Extensible Application layer
- ✓ Independent from LoRaWAN® MAC version



- ✓ Isolation of security domains across all instances of JSs
- ✓ ID manager can be operated by separate supplier

Generic and secure devices ready to be activated on all LoRaWAN® networks

IDEMIA & Actility Solution

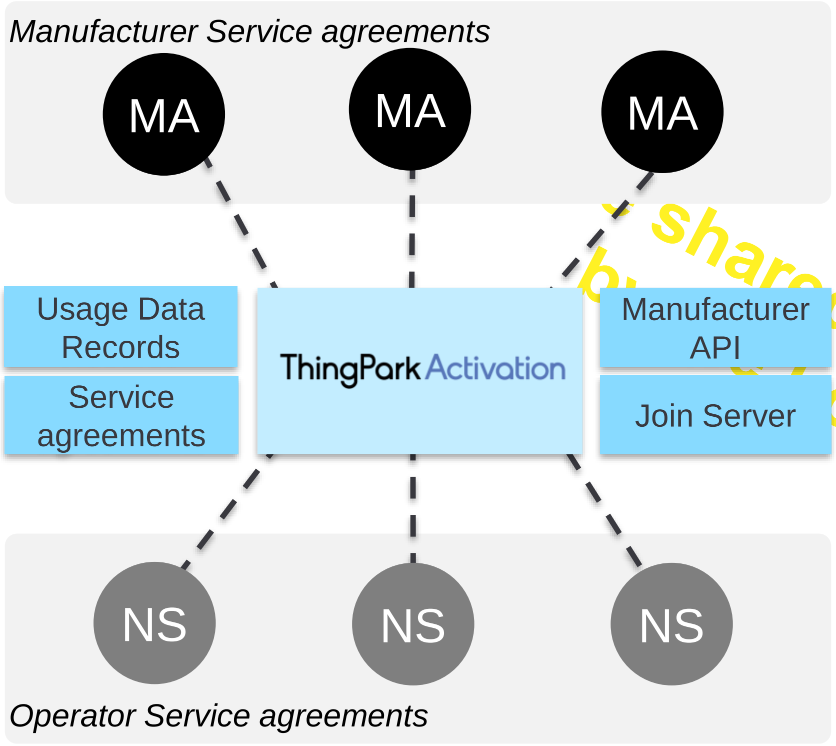
ThingPark Activation

IDEMIA

M-TRUST

Come and see our demo at Actility’s booth

Actility ThingPark Activation Service



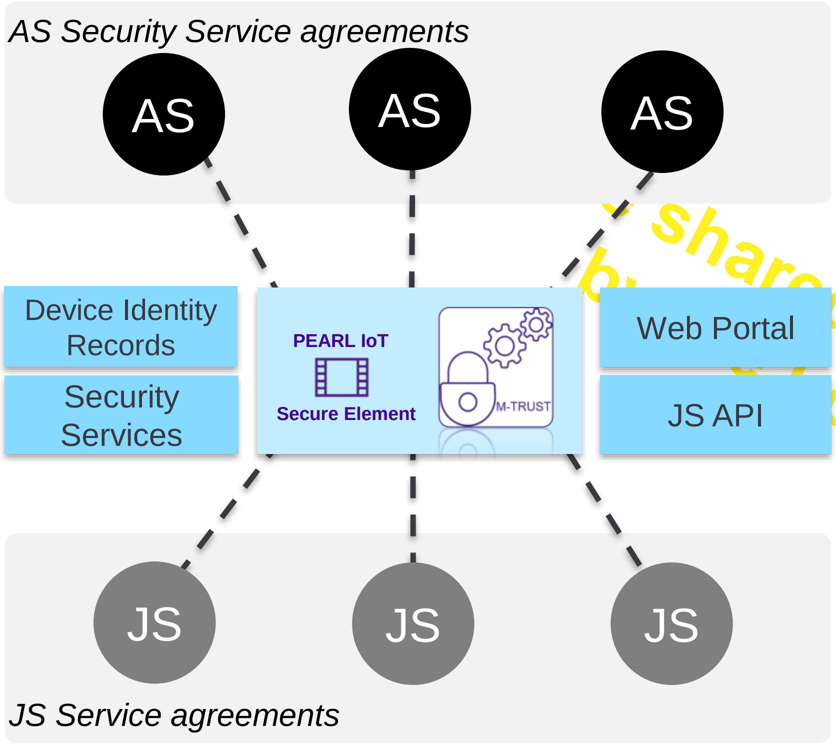
Generic device onboarding

- Solder IDEMIA Secure Element to onboard ThingPark Activation
- Device manufacturer benefits from unique Activation agreement for all onboarded operators
- Can be used in parallel with existing Activation agreements (i.e. other Join Servers)

Operators can onboard massively

- All onboarded device manufacturers can join the Operator network
- Service secured with Hardware Security Module (HSM)
- Supports Passive Roaming Activation, using direct or hub roaming connectivity

IDEMIA M-TRUST Security Services



Generic device onboarding

- Solder IDEMIA Secure Element to onboard ThingPark Activation
- In field re-provisioning service to final destination

Security services

- Support in field migration use cases
  - Fleet ownership, NS/JS change
- Support key renewal upon security policy
- Support secure command use case
- Support custom security services

Q&A session

THANK YOU

@LoRaAlliance

linkedin.com/company/loraalliance/

marcom@lora-alliance.com

lora-alliance.org