Security for legacy IoT systems

Plug-in options for strongest security with root-of-trust device

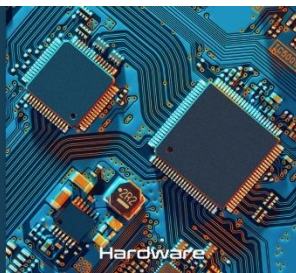swissbit®   Damien.Col@Swissbit.com   on behalf of   RUTRONIK ELECTRONICS WORLDWIDE

Cyber attacks getting more frequent + with larger impact

Impacting Operations e.g. Colonial Pipeline (2021)

Ransomware – Pay or Restore?

caused by

Outdated security, e.g.

- Password leakage
- Single-factor authentication
- One perimeter for entire network

OT/ICS Malware, e.g.

- Stuxnet (2010)
  Iranian nuclear-enrichment centrifuges
- Industroyer (2016)
  power outage in Ukraine

OT = Operational Technology   ICS = Industrial Control Systems

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Infrastructure has been build over decades – security has evolved

- Historic security concept outdated, but still in installed base
  one network perimeter to protect against the outside (inside all considered secure)
  ➜ zero-trust network architecture (micro-perimeter around each device)

- Economic advatages of connecting Operational Technology to the cloud

- Most vulnerable: Critical Infrastruture
  - (Public) infrastructure: Water, Electricity, Oil & Gas, Transportation, Communication
  - Government: Governmental departments, intelligence service, defense
  - Private infrastructure: Manufacturing sites (production stillstand)

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"Visibility" is the foundation of industrial security

Companies having visibility on their OT devices

The Public having visibility on your OT devices

#1 Challenge

Asset visibility
on IoT connected devices, especially OT devices

Protocol	Censys Query	# of Exposed Devices	Top Countries
Modbus	services.service_name=`MODBUS`	36,387	United States, South Korea, France
Niagara Fox	services.port = 911 or services.port = 4911 and niagara	4,175	United States, China, Moldova
BACnet	services.service_name=`BACNET`	13,973	United States, Canada, France
Siemens S7	(services.port = 102) and services.service_name=`S7`	7,308	Japan, Germany, Italy
DNP3	services.service_name=`DNP3`	832	United States, Poland, China
Ethernet/IP	services.service_name=`EIP`	7,231	United States, Canada, Spain

Examples of internet-exposed device statistics from Censys search engine.

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Sources like Shodan, Censys

Next to visibility are security measures

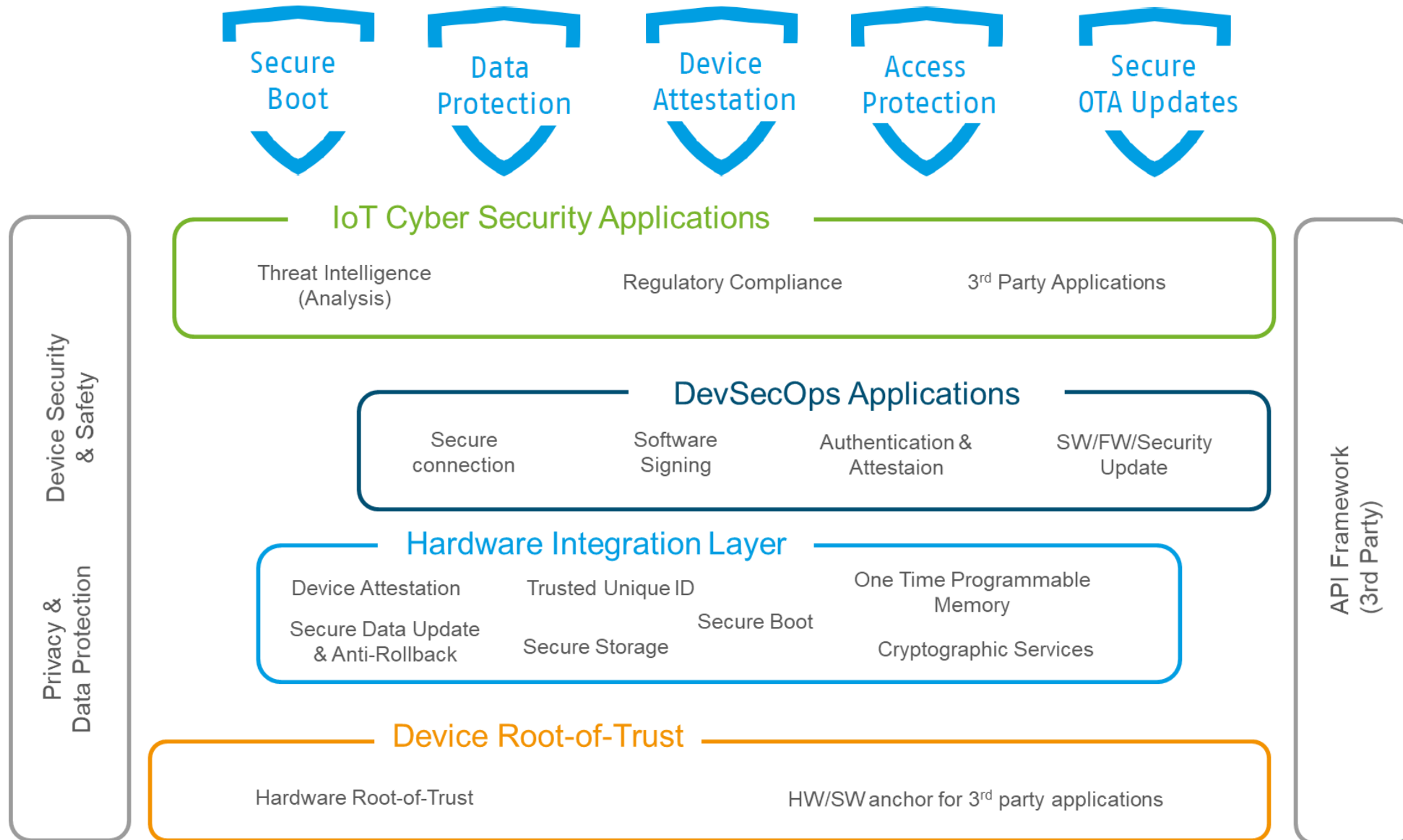Upgrading your legacy IoT systems to today's cybersecurity standards:

1. Visibility on OT environment ("device / asset inventory")
2. Authentication – for secure network access
3. Secure communication (device-2-device)
4. Integrity of firmware & software

retrofit possible!

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Build and operate secure IoT devices and solutions

Secure Boot

Data Protection

Device Attestation

Access Protection

Secure OTA Updates

IoT Cyber Security Applications

Threat Intelligence (Analysis)

Regulatory Compliance

3rd Party Applications

DevSecOps Applications

Secure connection

Software Signing

Authentication & Attestaion

SW/FW/Security Update

Hardware Integration Layer

Device Attestation

Trusted Unique ID

One Time Programmable Memory

Secure Data Update & Anti-Rollback

Secure Storage

Secure Boot

Cryptographic Services

Device Root-of-Trust

Hardware Root-of-Trust

HW/SW anchor for 3rd party applications

Device Security & Safety

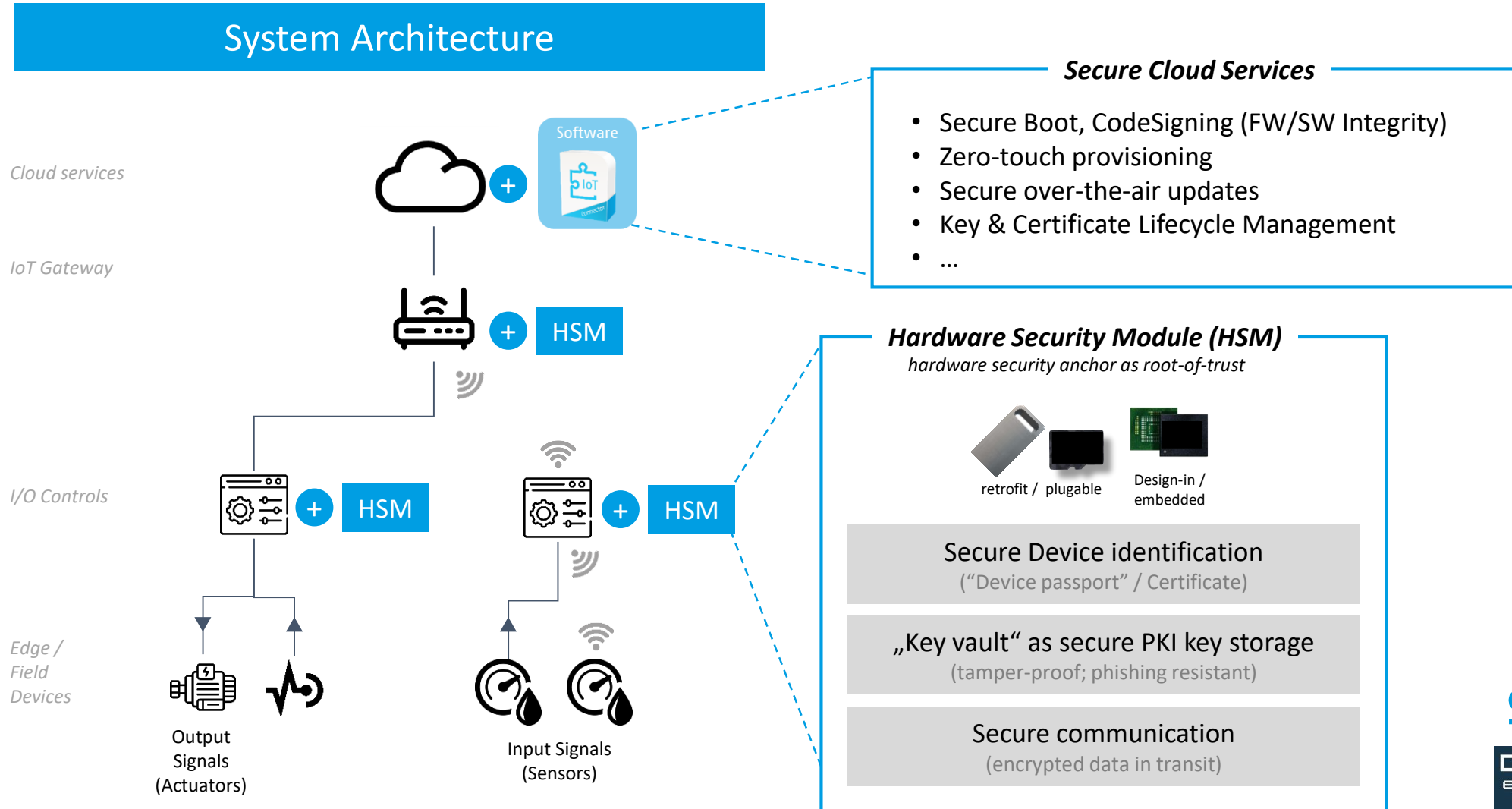Privacy & Data Protection

API Framework (3rd Party)

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Security can be retrofitted – avoiding expensive exchange

System Architecture

Cloud services

IoT Gateway

I/O Controls

Edge / Field Devices

Software

IoT

HSM

HSM

HSM

Output Signals (Actuators)

Input Signals (Sensors)

Secure Cloud Services

- Secure Boot, CodeSigning (FW/SW Integrity)
- Zero-touch provisioning
- Secure over-the-air updates
- Key & Certificate Lifecycle Management
- …

Hardware Security Module (HSM)
hardware security anchor as root-of-trust

retrofit / plugable   Design-in / embedded

Secure Device identification
("Device passport" / Certificate)

„Key vault" as secure PKI key storage
(tamper-proof; phishing resistant)

Secure communication
(encrypted data in transit)

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Legacy IoT security upgrade needed throughout.

Smart Building	Critical Infrastructure	Healthcare	Automotive	Manufacturing (cross-vertical)
• Elevators • Building Automation • Security & Surveillance (incl. Access mgmt.)	• Utilities (Power & Electricity) • Water • Gas & Pipelines • Traffic Mgmt. (Mobility) • Transportation (Trains) • Communication • Government • Defense	• Medical devices	• Passenger cars • Trucks	• Industrial Automation & Control Systems

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- ## Trusted Partner for 20 years
  - Own Production & Products "Made in Germany"
  - Worldwide leader of industrial storage and security solutions

- ## Proven Security Competence
  - Over 10 years of field proven security products and solutions to protect data and devices
  - Trusted Supply Chain

- ## Best Service & Support
  - Custom form factor and custom branding possible
  - Unique sales & worldwide technical support
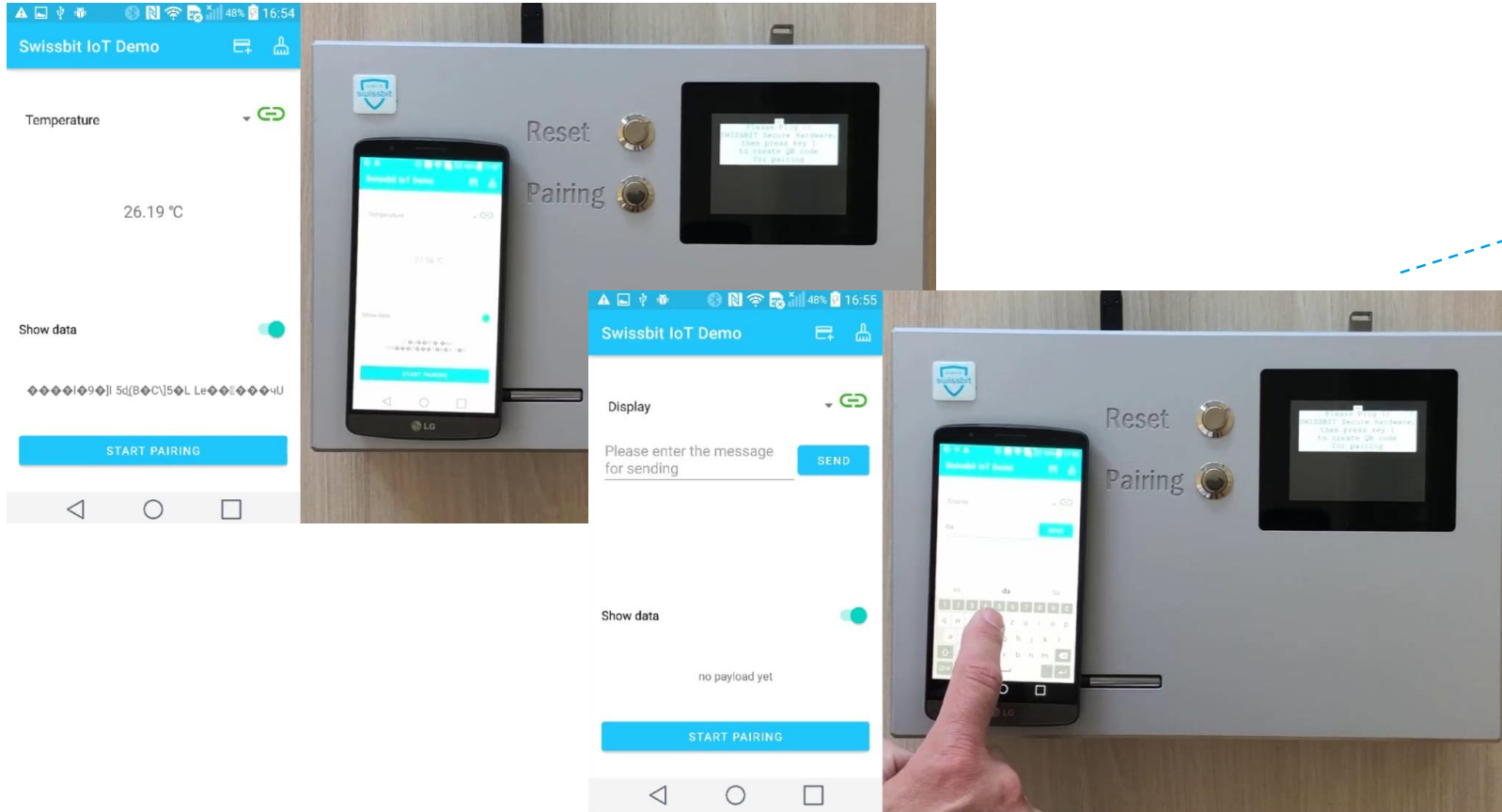
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ELECTRONICS WORLDWIDE

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DEMO plug-in option swissbit® with root-of-trust device

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on booth

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