

CINI4.0



Secure Industrial communication over TSN to protect your devices

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HMS Networks Benelux



HMS at a glance

+7,000,000

devices connected
in automation

+300,000

machines connected
to cloud systems

Our field:
Industrial ICT

(Information and
Communication
Technology)

5G 
Smart Grid
AI IoT **Wireless**

At the forefront of
technology

700
employees
worldwide

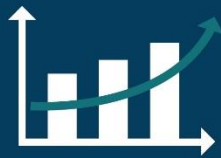


Partners in over
50 countries



Offices in **16**
countries

Head office in
Halmstad, Sweden



π billion SEK:
2025 growth goal

1467 MSEK
2020 sales

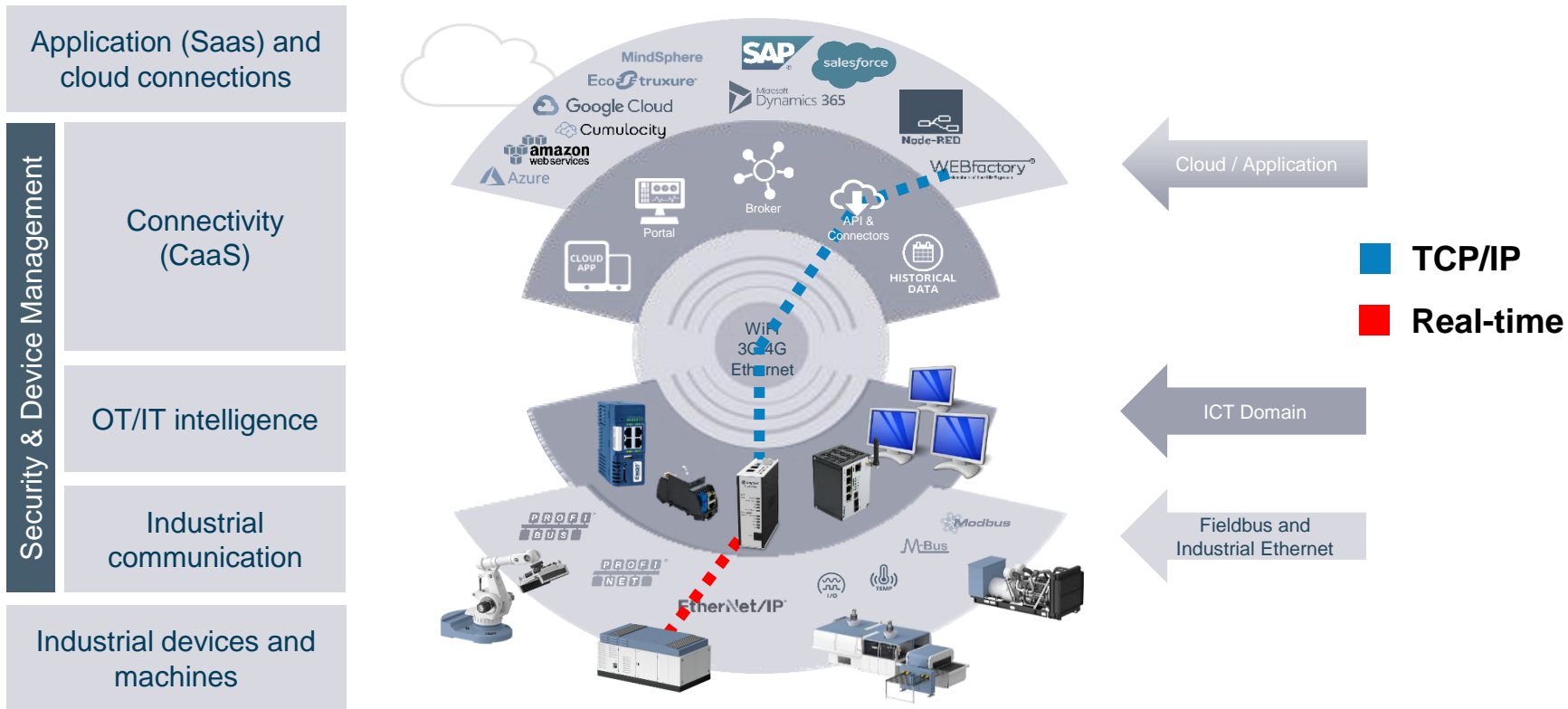


Operating
margin goal:
20%



Earnings
per share:
4,79 SEK

The tailor-made data journey



The background features a complex network of white and light blue lines connecting various nodes. Some nodes are represented by small white circles, while others are hexagonal shapes. The overall aesthetic is clean and technical, typical of a presentation on networking or data science.

Time-sensitive Networking



Time-sensitive Networking

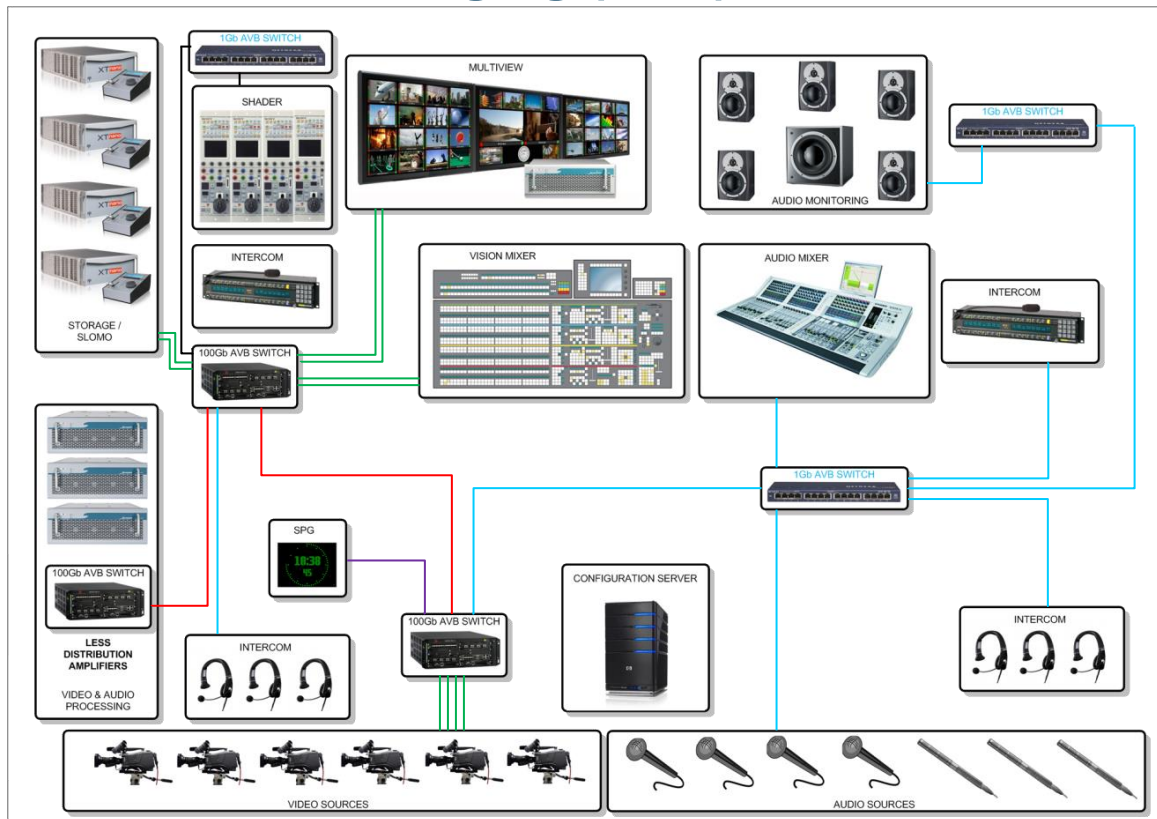
Audio Video Broadcasting





Time-sensitive Networking

Audio Video Bridging (AVB)



Control

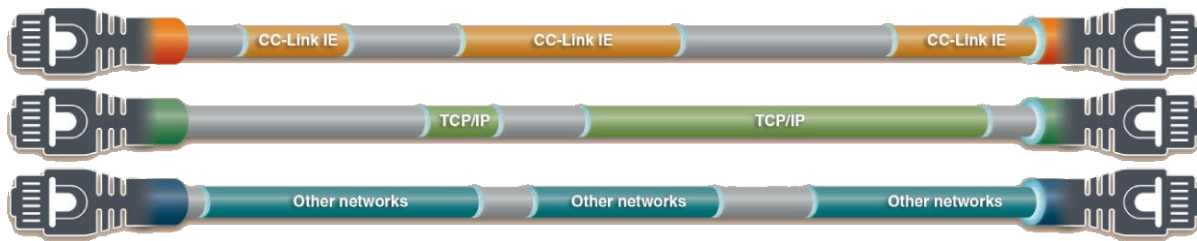
AVB 100Gb

AVB 10G

AVB 1Gb

Clock reference

TSN Principle



Mixing different and real-time protocols into one





Time-sensitive Networking

Based on enhanced networking standards

Standard

IEEE 802.1 - IEEE 1588

IEEE 802.1Qbu

IEEE 802.1Qbv

IEEE 802.1Qca

IEEE 802.1Qcc

IEEE 802.1Qci

IEEE 802.1CB

Area

Precision Timing

Frame pre-emption

Scheduled traffic

Path control and reservation

Central configurator

Per-stream filtering and policing

Seamless redundancy

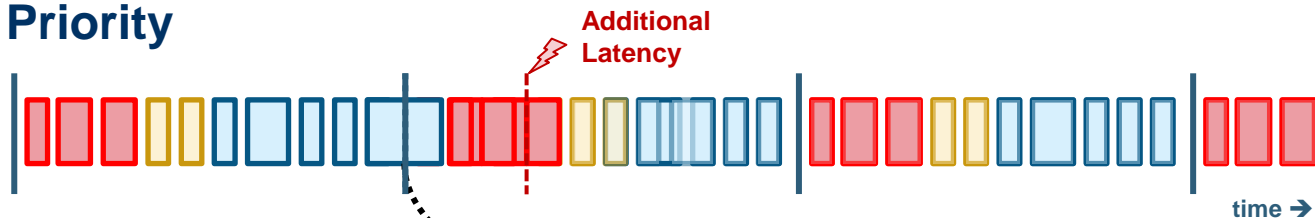
OSI Model

7	Application
6	Presentation
5	Session
4	Transport
3	Network
2	Data link
1	Physical

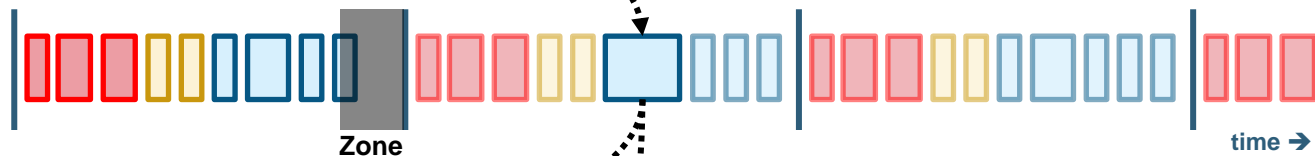
TSN is a set of standards to combine streams, not a new protocol!

Priority and Preemption

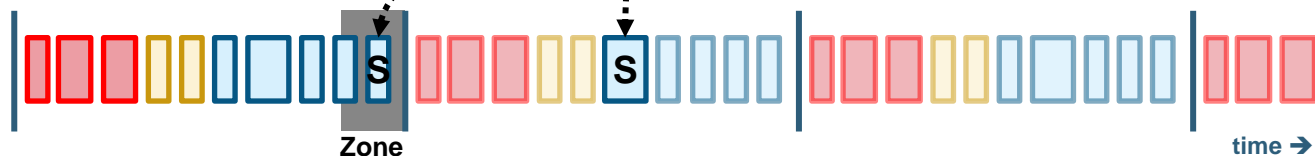
Priority



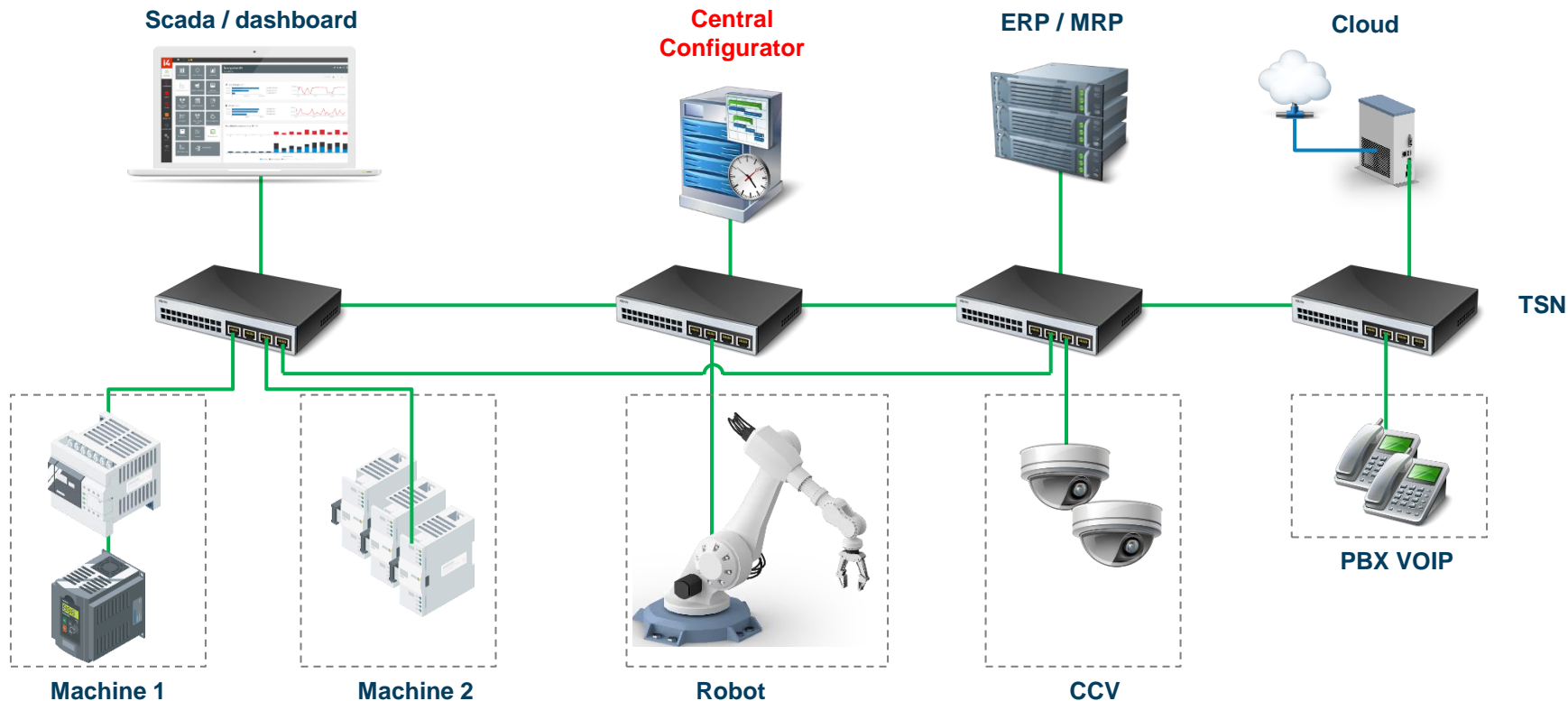
Guard zone



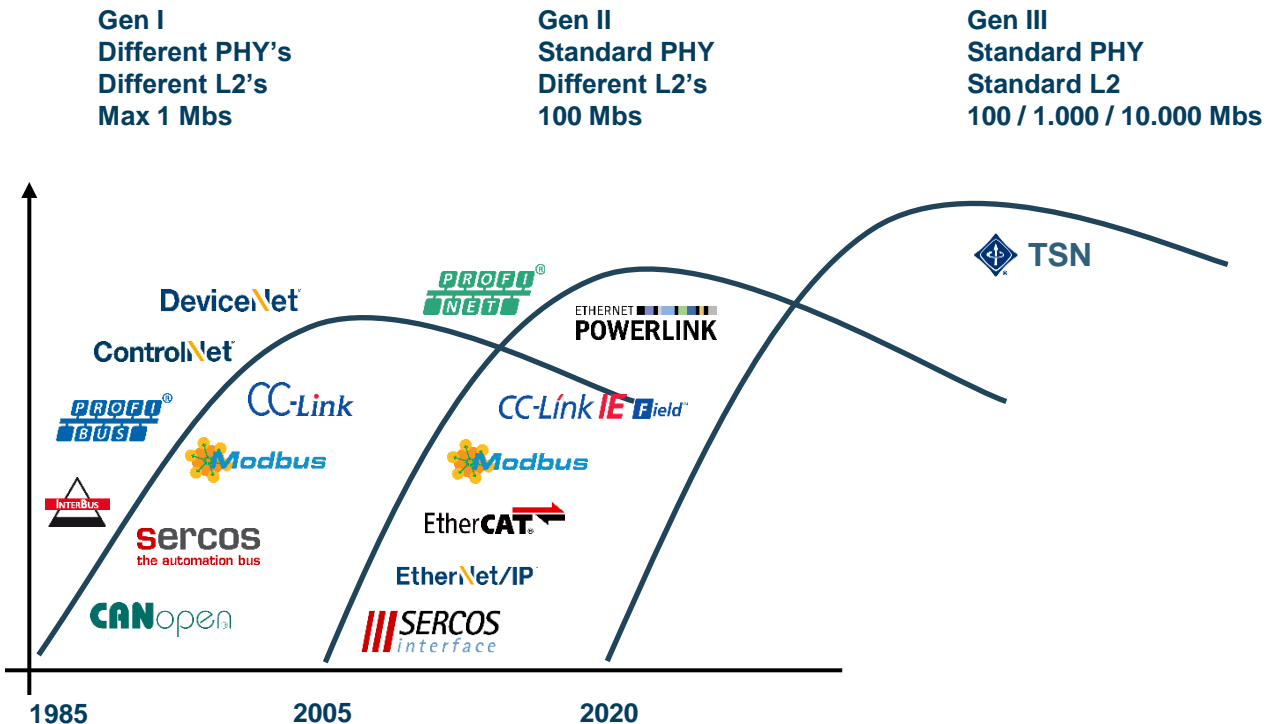
Preemption



Network Topology



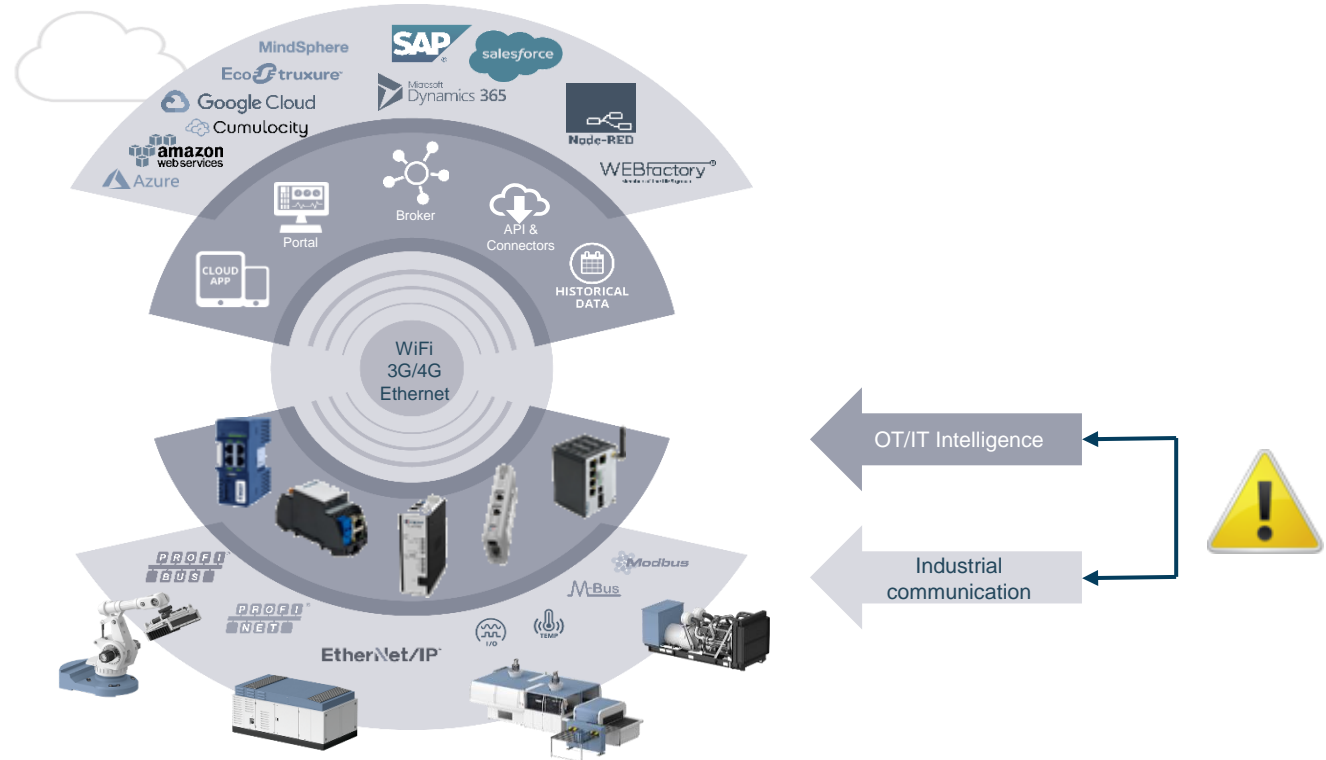
The next networking wave





Cyber & Factory Security

The security pitfall



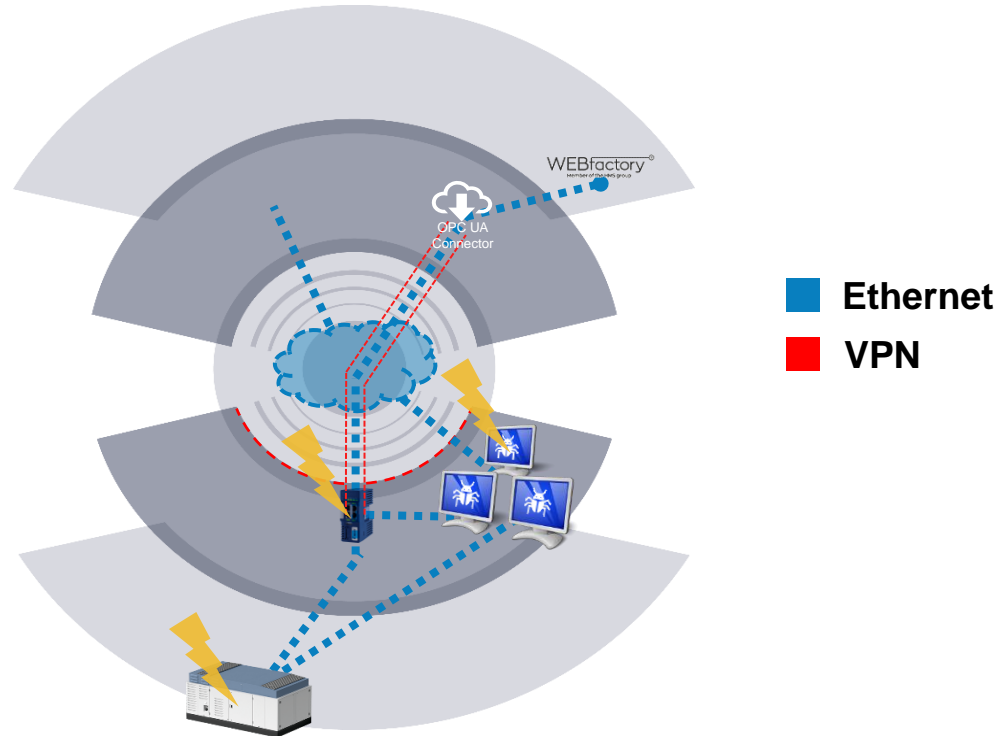
Type of hackers

		IT	OT
	Coincidental event		
	Cybercrime		
	Hacker Groups / Terrorists		
	Nations / States		

Vulnerabilities

Issues

- No 1-to-1 connection
- OT connected to IT
- Vulnerabilities in IT
- Via IT to OT

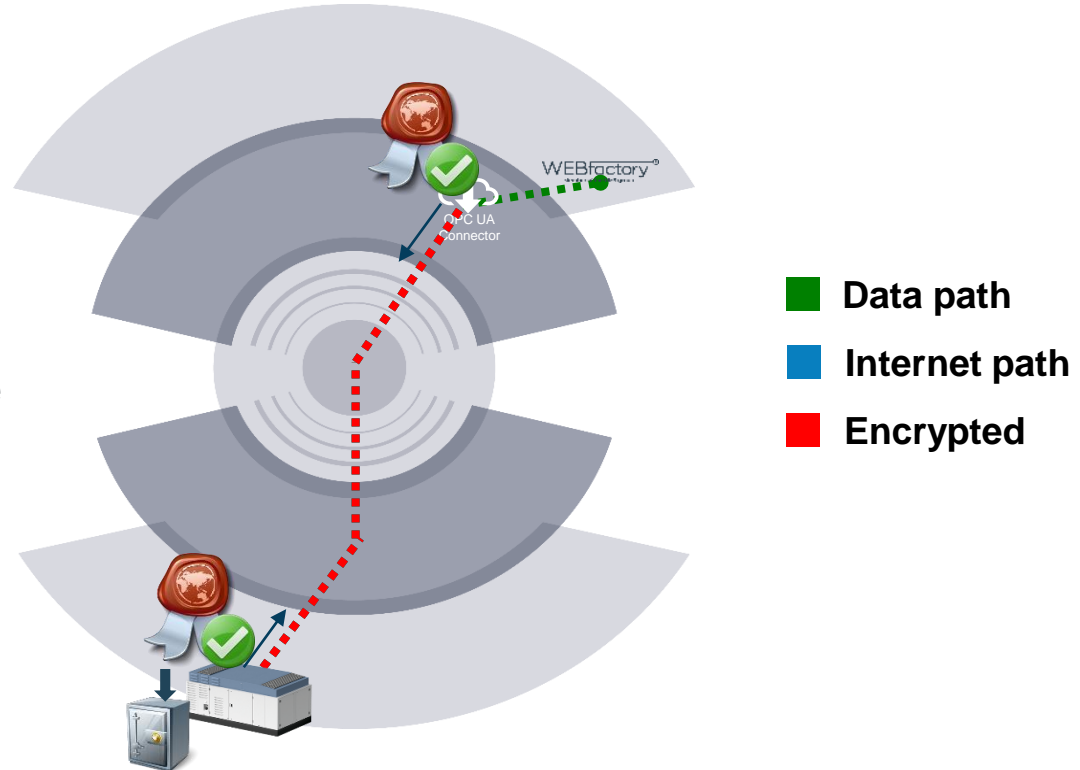


Secure Connection and Authentication

Process

- Request access
- Certificates exchange
- Encryption
- Credentials

- Safe certification storage





Node Building blocks

**Certificate
Management**



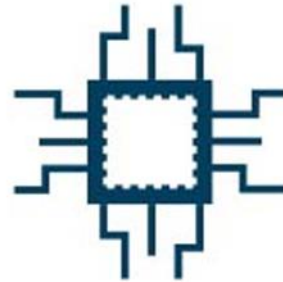
Trusted parties

Encryption



Secure channels

Security Chip



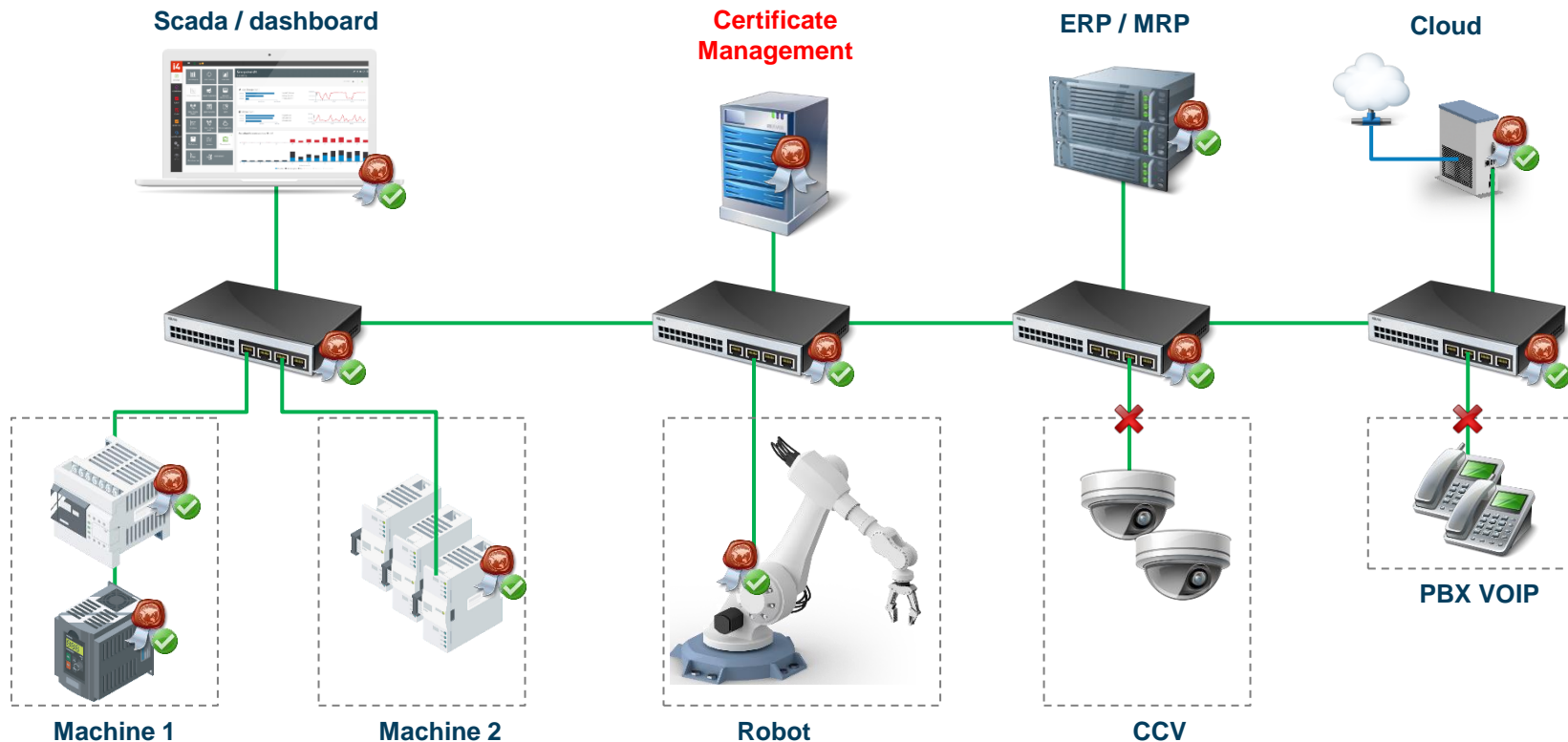
Store secret data

Secure Boot



Trusted firmware

Factory security



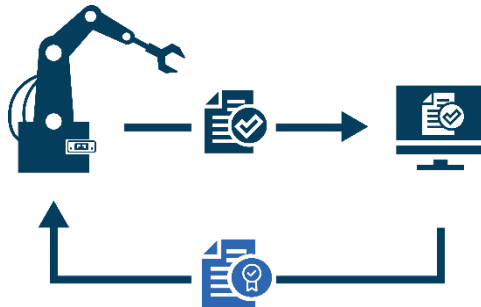
ID Certificate



Set-up custom with tool

- Factory-set public key
- Send key to local secure server
- Save certificate in security chip

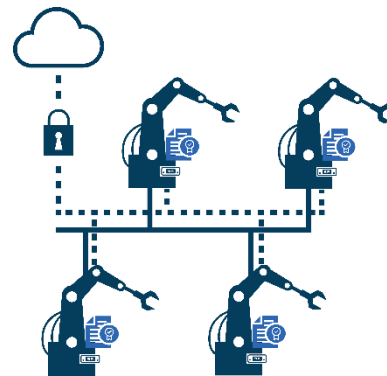
Device Certification



Identification at start-up

- Sent certificate to server
- Return certificate
- Enable data

Secure Operation



Secure and Identified

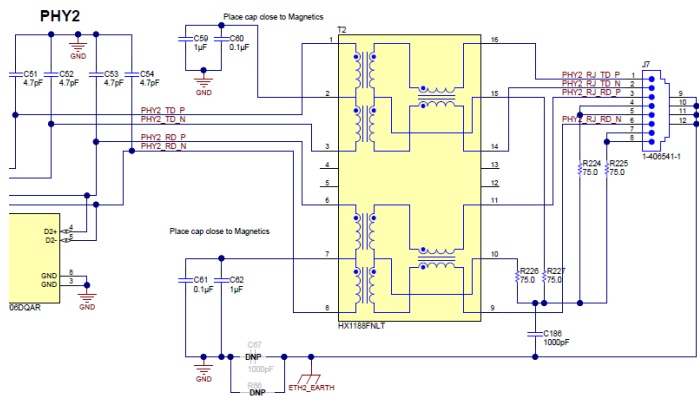
- All nodes certified
- Trusted data exchange
- All data encrypted

The background features a complex network of white and light blue lines connecting various nodes. Some nodes are represented by small white circles, while others are hexagonal shapes. The overall aesthetic is clean and technical, typical of a presentation on network technology.

TSN Design-in

Hardware

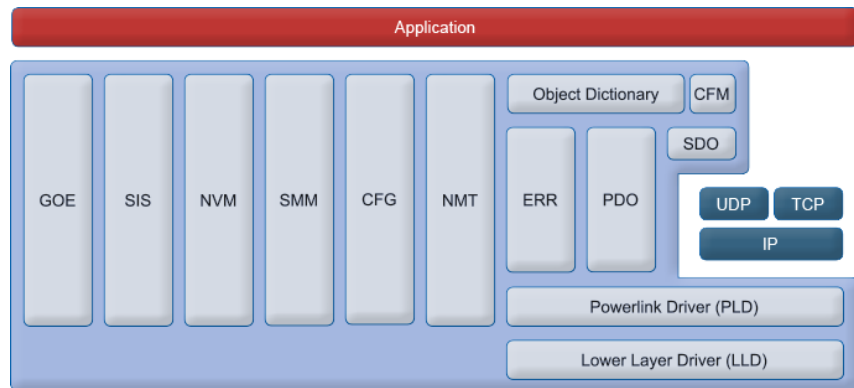
Understanding the architecture



- Common PHY and MAC
- Data Link TSN Scheduler / Shaper
- IEEE 1588 clocking
- Security Chip interfacing

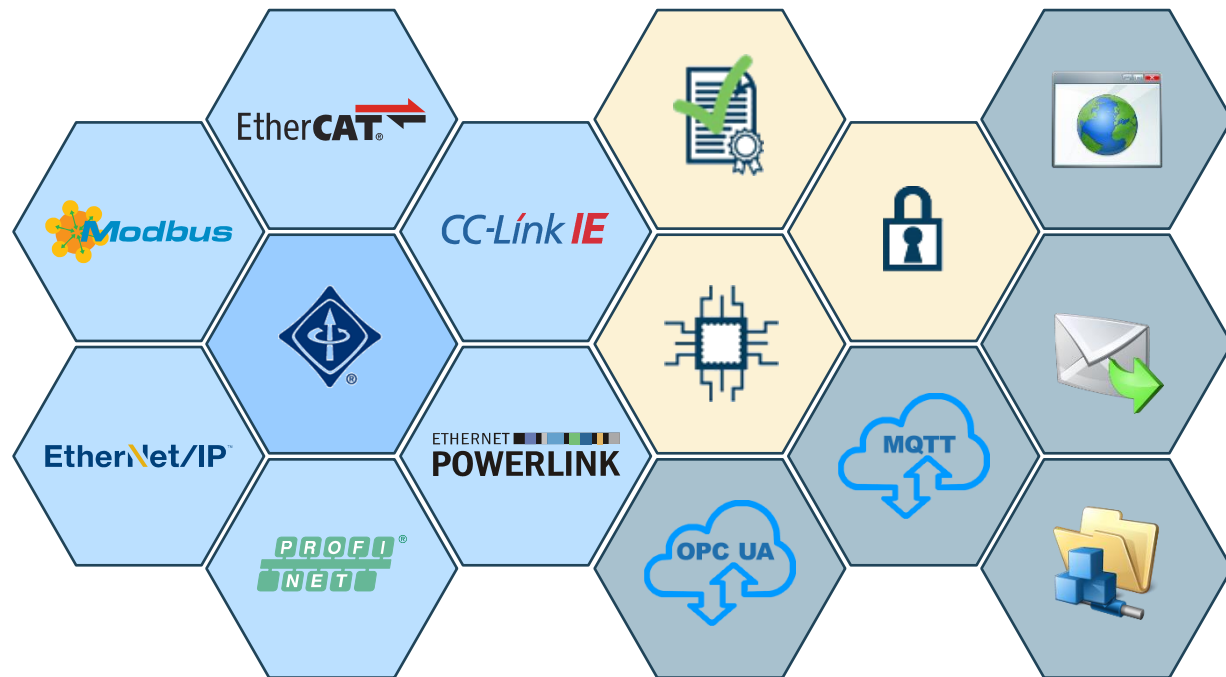
Software

Understanding the protocols



- TSN Configurator and low-level driver
- Stacks requires in-depth knowledge
- Certification

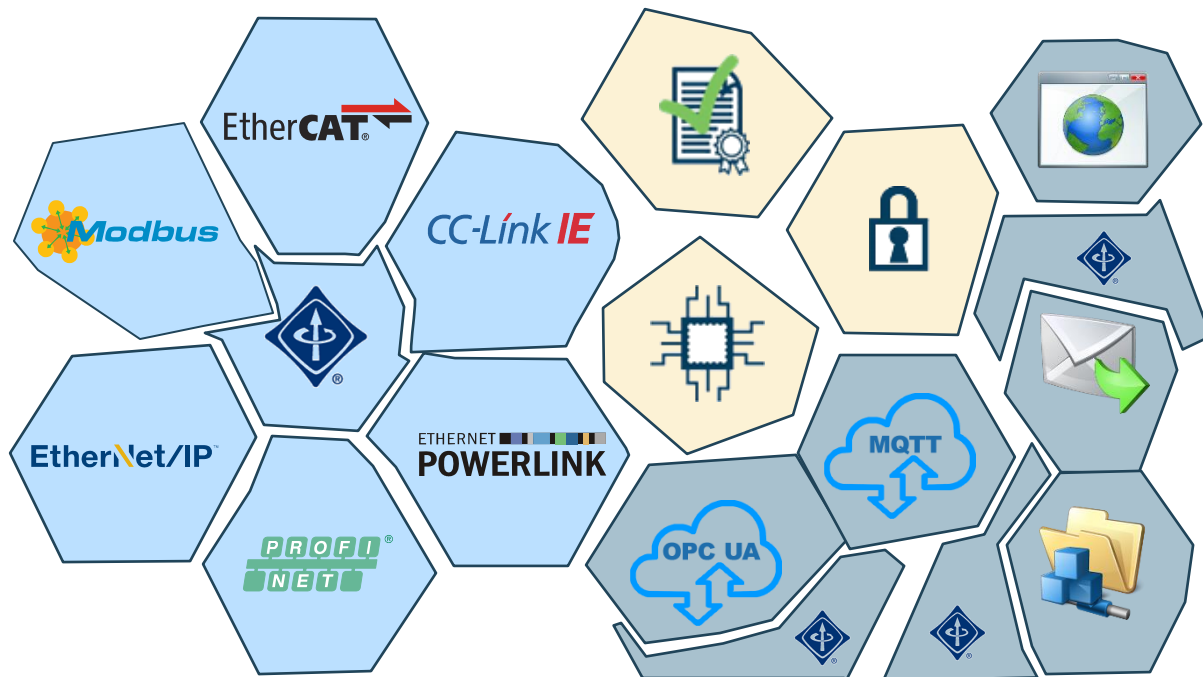
Multiple-protocol - Multiple software stacks



Software is not standardized

- Different vendors
- Different structures
- Different interfaces
- Different drivers
- Different releases

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Multi-protocol software-development is a complex task!

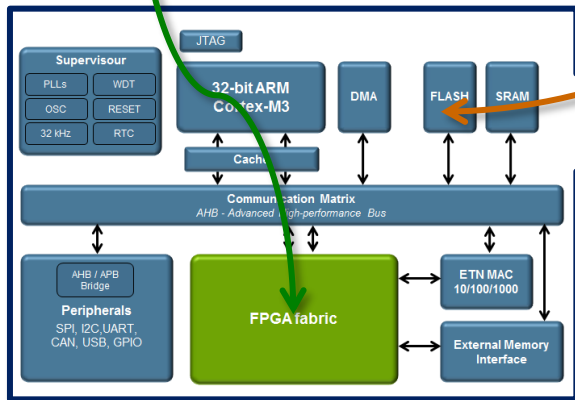
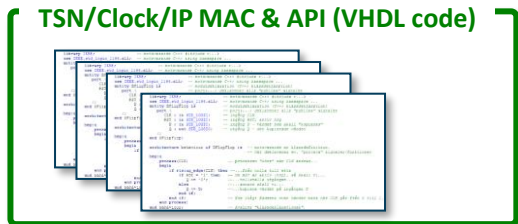
The background features a complex network of white and light blue lines connecting various nodes. Some nodes are represented by small white circles, while others are hexagonal shapes. The overall aesthetic is clean and modern, with a focus on connectivity and data flow.

Embedded Communication



Anybus CompactCom 40

Embedded Communication Module



Principle solution

Host

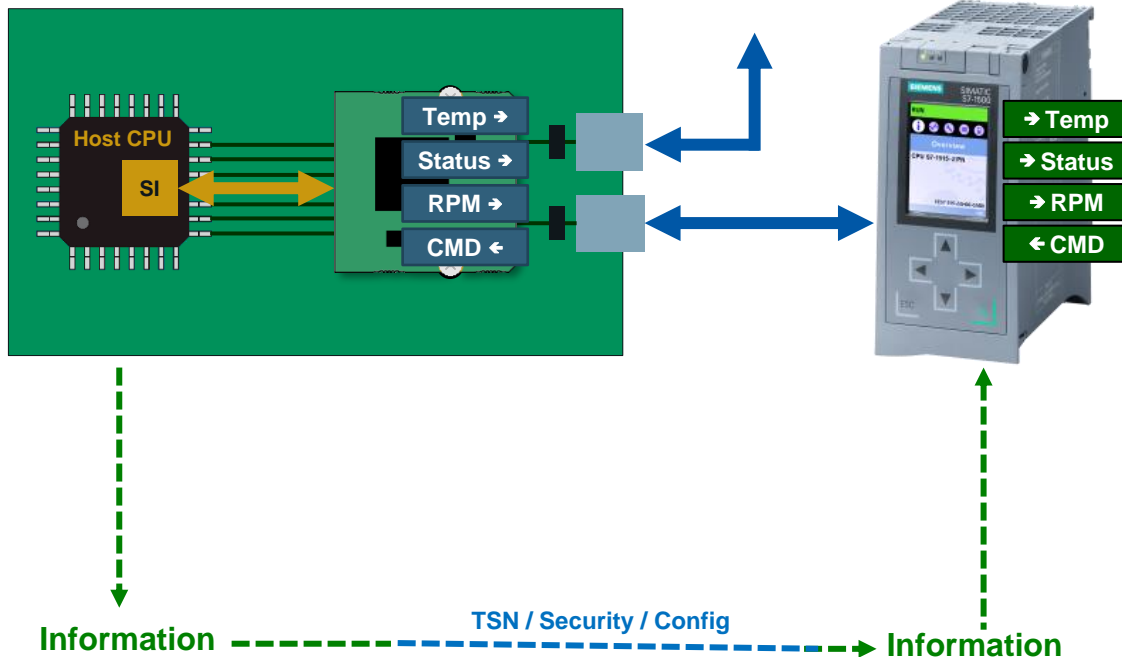
- Host CPU
- Communication Module
- Software Interface

Master

- Master Controller

Information

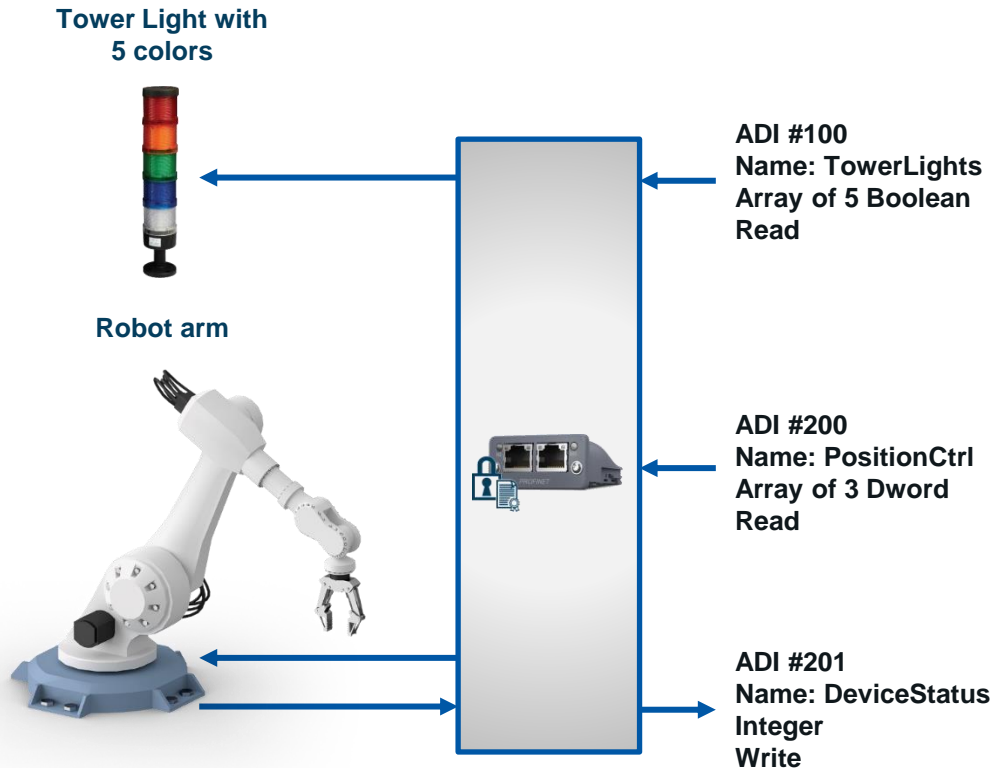
- End-to-end information
- Low-level coverage
- Exchange of variables





Anybus CompactCom 40

Practice



Availability

Secure

Time Sensitive



CC-Link I^ETSN

EtherNet/IP™





HMS – Hardware Meets Software™

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