Reading data directly from real-time Ethernet network, parsing it and providing it to cloud systems.

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Agenda

• Short company intro
• OT – IT data flow solutions
• Reading data directly from real-time Ethernet network, parsing it and providing it to cloud systems
• Practical examples
Short Company Intro

Core Competence in Communication

Headquarters in Germany.
280 employees - 50% engineers.
~ 37 Mio Euro turnover worldwide.

Core competence in communication for factory automation since 1986.
Industrial Ethernet network analytics.

Own network controller family (netX) with real time Ethernet and fieldbus systems.
> 3 Mio nodes worldwide.
Short Company Intro
Core Competence in Communication and IIoT

Our core competence in communication on a Edge-Gateway with following unique USP’s:

- Device scanning and illustration
- Auto detection of device changes / errors
- Auto illustration of network topology
- Network analysis and illustration
- Collecting data on sensor/actor level
- Data aggregation on the shop floor

- Support Brownfield installations
OT – IT Data Flow Solutions Overview

Solutions:

1. Connecting PLC (classic way)

2. Connecting sensor/actuator

3. Connecting factory network
   a) passive mode (read only over TAP)
   b) active mode (data exchange)
Adjustments in the PLC program necessary.

Performance?

Classical data flow

- Enterprise
- Operating
- Process Control
- Control Device
- Field Device

ERP
MES
HMI/SCADA
PLC/IPC
Sensor/Actor
OT – IT Data Flow Solutions

2 Connecting Sensor / Actuator

Sensor/actuator supplier must supply / provide IoT-protocol parallel to real-time Ethernet protocol.

Real-Time Ethernet has 1ms cycle, too fast for IT.

Sensor/Actuator controller has not enough power for build secure keys.

PROFINET as example:
OT – IT Data Flow Solutions
3a Connecting Network – passive mode

Read only (over TAP)
Highest security!
Now way to attack the factory network!

Send data from cloud systems in the direction of the network (actor) is not possible.
OT – IT Data Flow Solutions

3b Connecting Network – active mode

Send data from cloud systems in the direction of the network (actor) is possible.

Adjustments in the PLC program necessary.

Security solution;
- OT and IT network are separated.
- Data exchange done by application.
Read (over TAP)

Write over second network to PLC.
PLC driver in Docker.
Practical Examples
Reading process data from network

Easy to use visualization and analysis of process data

1. Passive recording directly from the network

2. Capture every communication cycle, no loss of information due to under-sampling

3. Supports free filters for every EtherTYPE

4. No need to access the PLC software
   Works with any PLC from any manufacturer
Practical Examples
Reading process data from network in passive mode

Free filters for every EtherType to identify a telegram for value extraction.
Practical Examples
Reading process data from network in passive mode

Free filters for every EtherType to identify a telegram for value extraction.

PowerLINK as example
- EtherType: 0x88AB
- MessageType: PollResponse
- Destination: broadcast
- Source: 1 (Controlled Node)
Practical Examples
Reading process data from network in passive mode

Free filters for value extraction.

PowerLINK as example
- Variable type: **UNSIGNED32**
  (Type needs to be known)
- Length in bits: **32** (= 4 Bytes)
- Byte offset: **24** (Position in telegram needs to be known)
→ In this example value **9fa0a1a2** will be extracted
Practical Examples
Reading process data from network in passive mode

Scope software for PROFINET and EtherCAT for value extraction

1. File import
   - EtherCAT: from ENI file
   - PROFINET: from GSDML file

2. File selection and assign data to be exported
Practical Examples
Reading process data from network in passive mode

Processing data in thing editor Node-RED (JSON) and forwarding to SQL server or the cloud.
Practical Examples

Reading process data from network in passive mode

Node-RED Example for data extraction

Assign request delay and count limit
eg. Request delay = 100ms
  Count limit = 50
  -> Capture = every 2ms

Value list (array)
50 Counts

Value
Timestamp

Value
Timestamp
Special Offer
limited for 10 projects in 2017

1 Edge Gateway “On Premise”

2 Day local support on your machine / plant (in Switzerland)
   1 Day data exchange from your real-time Ethernet to the Edge-Gateway (4 variables)
      - in passive mode or as active device
      - free filters for every EtherTYPE or PROFINET/EtherCAT
   1 Day start an Azure project trough cloud architect

1 Day closing open questions by email/phone

Guaranteed goal
Data exchange/illustration from your machine/plant in a cloud system

Price
3’500 Euro

Contact
sales.swiss@hilscher.com
Industrial IoT-Workshop at the Swiss Smart Factory in Biel/Bienne

Date 26. September 2017
Location Swiss Smart Factory Biel/Bienne
Content
- IoT protocols: MQTT, AMQP and OPC UA
- Architecture / Security for IoT applications with Microsoft Azure
- Practical implementation on the IoT gateway with the Node-RED flow modelling tool and Microsoft Azure.

Target audience Developers and technically oriented product managers involved in or planning Real-Time Ethernet and IoT systems.

Speaker OT Prof. Max Felser
IT/Azure Azure Marcel Lattmann
Lap For each 2 participant a IIoT- Lap is available.
Registration sales.swiss@hilscher.com
Cloud Solution for Factory Automation
Vertical Data Flow from/to Sensor-Cloud

Hilscher:
- Data from the sensor to the cloud
- Multi cloud and multi protocol
- MQTT and OPC-UA
- Edge-Gateway with Node-RED, Docker and RESTful API

For any questions, please contact me: Andreas Läng
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Backup

Edge Gateway
As a platform for cloud applications:

- Native cloud connectors (Azure, Bluemix, SAP)
- Thing editor Node-RED
- Docker
- RESTful API
- OPC-UA server for IT and client for OT
- Security between OT/IT
- Real-time Ethernet connectivity for factory automation