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Webinar

From PROFINET to the Cloud

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CLOUD MACHINE DATA ACCESS

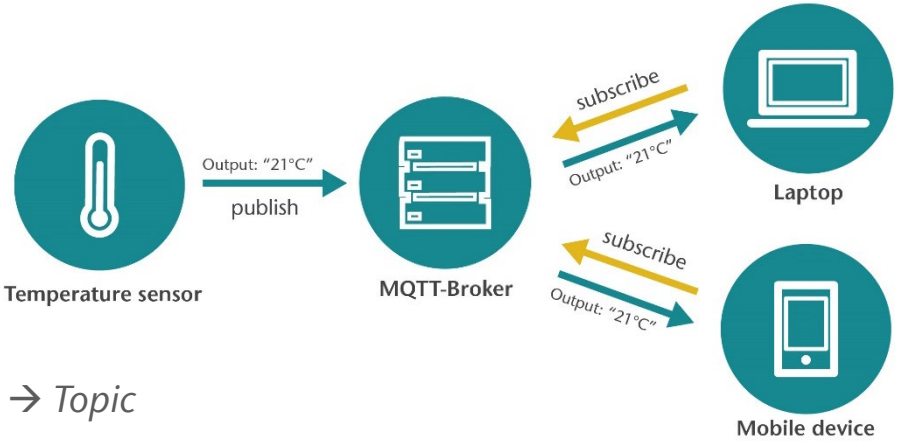
Challenge

- External access to the machine
- Who can access which data?
- Which data can be written?
- Edge Gateways are active components with access to the machine from outside

PN/MQTT COUPLER

MQTT Protocol

- Message Queue Telemetry Transport (IBM)
- OASIS Standard
- Publisher = Send data
- Broker collects and distributes data
- Subscriber = Receives/subscribes to data
- Data identification: “Livingroom/Light/Switch“ → *Topic*
- Data presentation can be simple (just the value) or structured (JSON formatted)
- Encryption (SSL) and authentication possible



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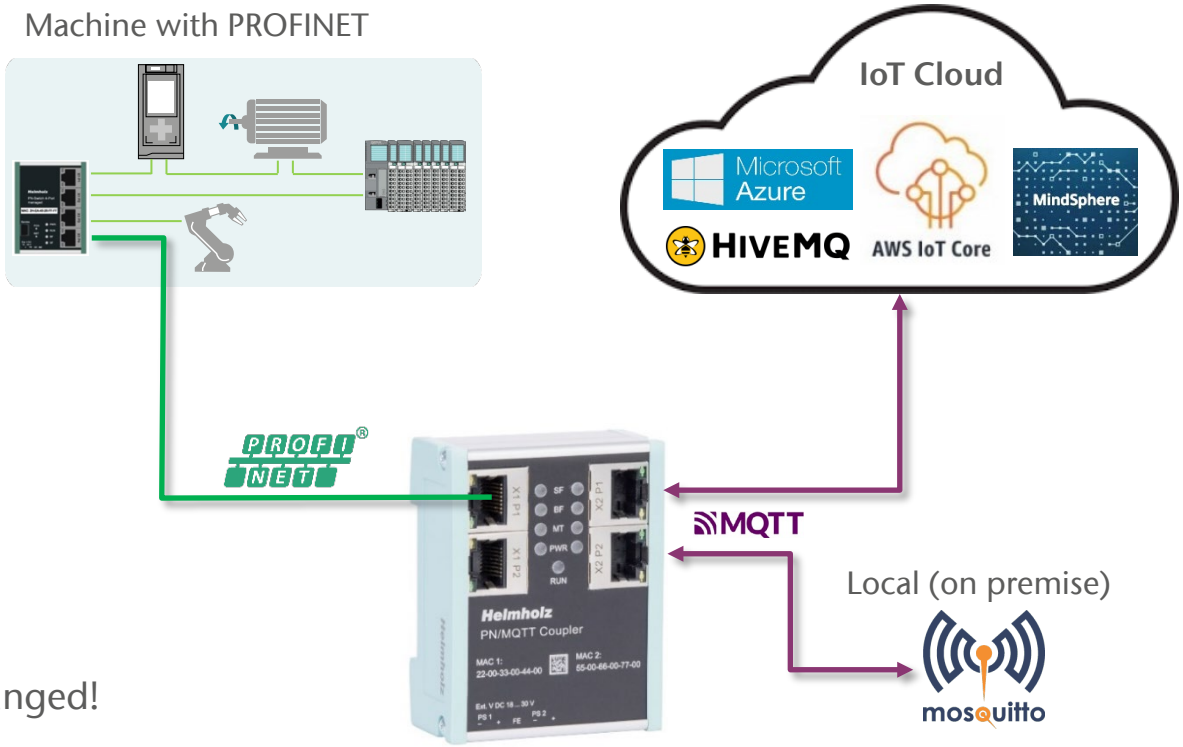
Application

- Totally separate networks
- Only I/O data exchange
- MQTT Publish and Subscribe
- Easy configuration via GSDML
- Machine developer decides which data is allowed to be exchanged!



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Device concept

- Galvanic isolation of both machines
- 2 Ethernet ports per network side (switched)
- Redundant power supply
- Very compact design
- Firmware update via web interface
- PROFINET Conformance Class B

X1

X2

PROFINET-Device (X1)	Internal Memory	MQTT Client (X2)
Outputs	→	Publish
Inputs	←	Subscribe

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Concept of data exchange

- Bits, Bytes, Words or Double Words can be transmitted
- Values are transmitted via MQTT in humanly readable form → „-1234“, „0xFCBE“ or “12.2345”
- Values will be automatically sent upon change (Outputs → Publish)
- upon receipt the new value is permanently available as input (Subscribe → Inputs)

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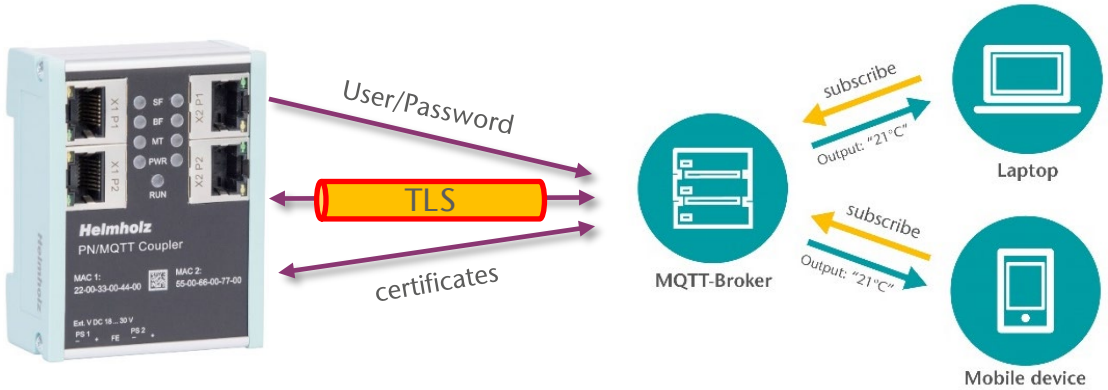
Content and transmission security

- Secure data exchange with broker:
  - User & Password when setting up connection→ Rights management
  - TLS Encryption for transmission (TLS V1.2)
  - Authentication using certificates
  - All optional!



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Data transmission concept – Configuration example

Slot	Module	IO	Type	Direction	Topic name (Example)	Value (Example)
1	Output Byte (1 Byte, hex.)	1 Byte Output	Byte	Publish →	“Output AB10”	“0x12”
2	Output Unsigned Int (2 Bytes, dec.)	2 Bytes Outputs	Unsigned Integer	Publish →	“RPM”	“65534”
3	Output Signed dInt (4 Bytes, dec.)	4 Bytes Outputs	Signed double Integer	Publish →	“Output AD14”	“-12345678”
4	Input Word (2 Bytes, hex.)	2 Bytes Inputs	Word	← Subscribe	„Control Word“	„0xFFEE“
5	Input Unsigned sInt (1 Bytes, dec.)	1 Byte Input	Unsigned short Int	← Subscribe	„setpoint“	„255“
6	Input Double Word (4 Byte, hex.)	4 Bytes Inputs	Double Word	← Subscribe	„Configuration“	„0x11223344“
7	Output Signed Int (2 Byte, dec.)	2 Bytes Outputs	Signed Integer	Publish →	„Temperature“	„25“
...						

- The module types can be mixed, order is irrelevant
- Up to 100 slots configurable
- Up to 1024 bytes IO exchange

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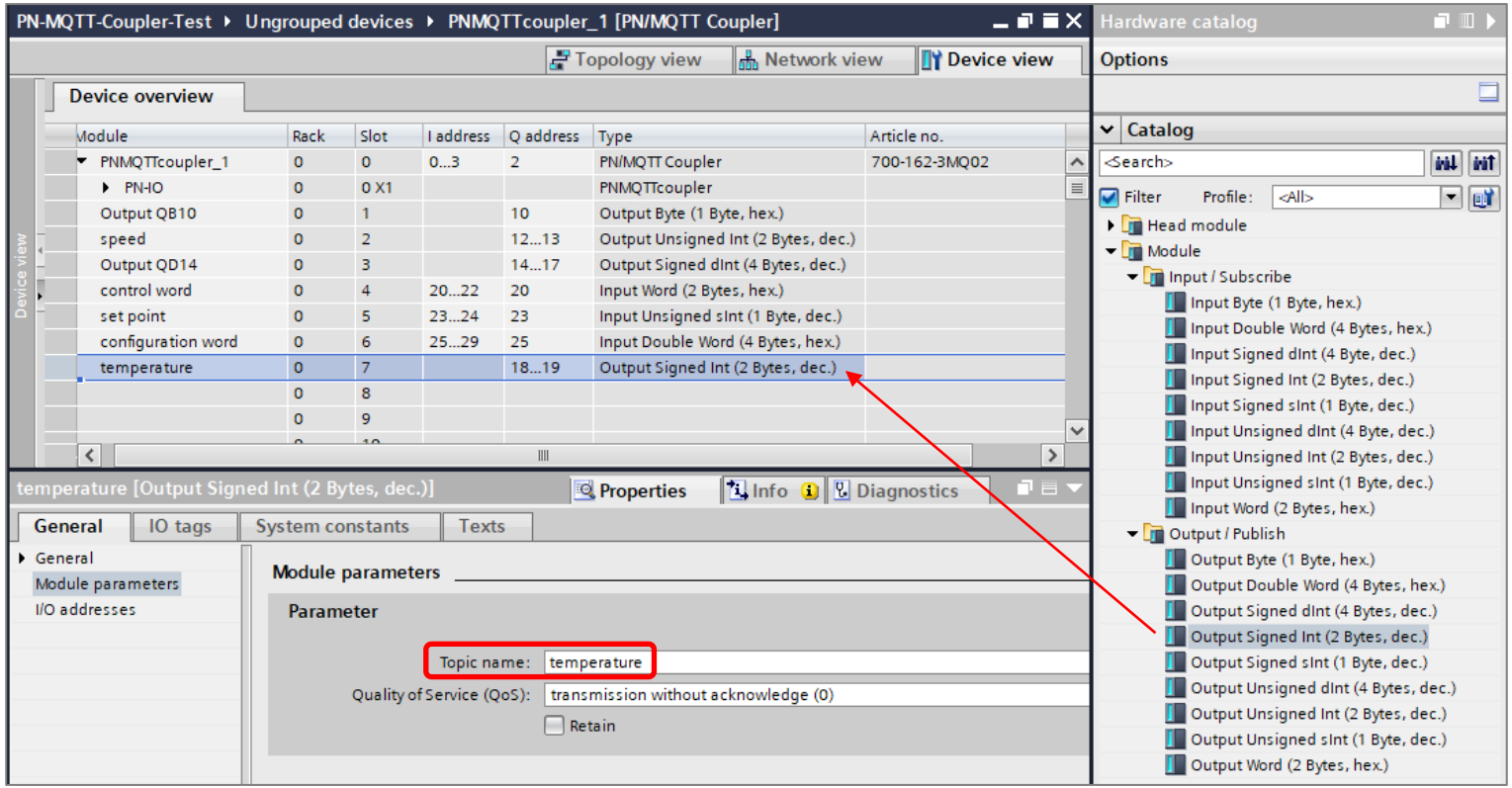
Data transmission concept – Configuration example



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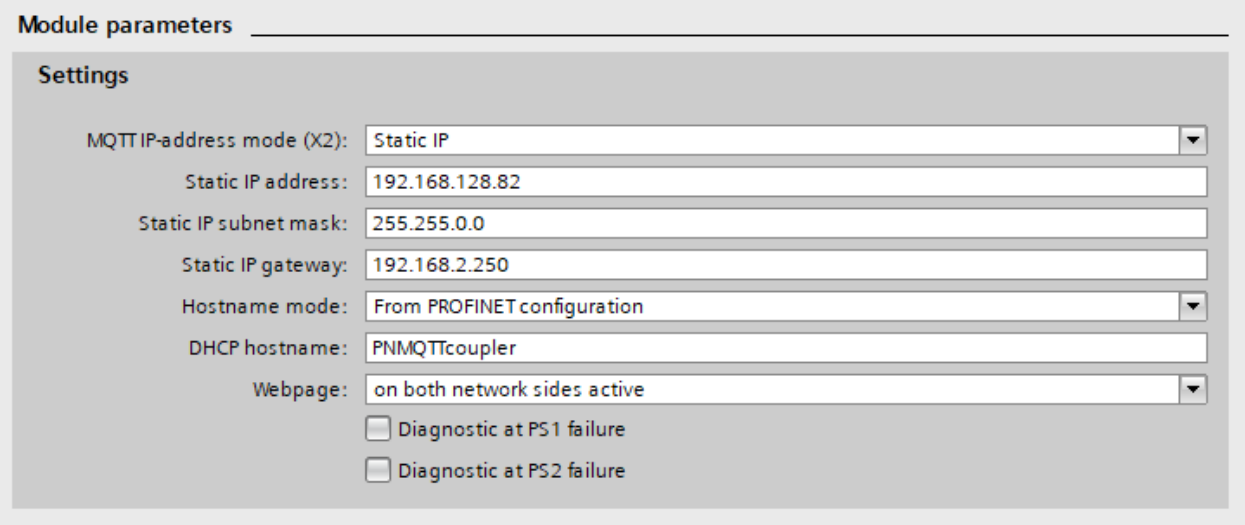
Data transmission concept – Configuration example

- MQTT IP address: „Static IP“ / „DHCP“ / „Setting via website“
- Enable webpage



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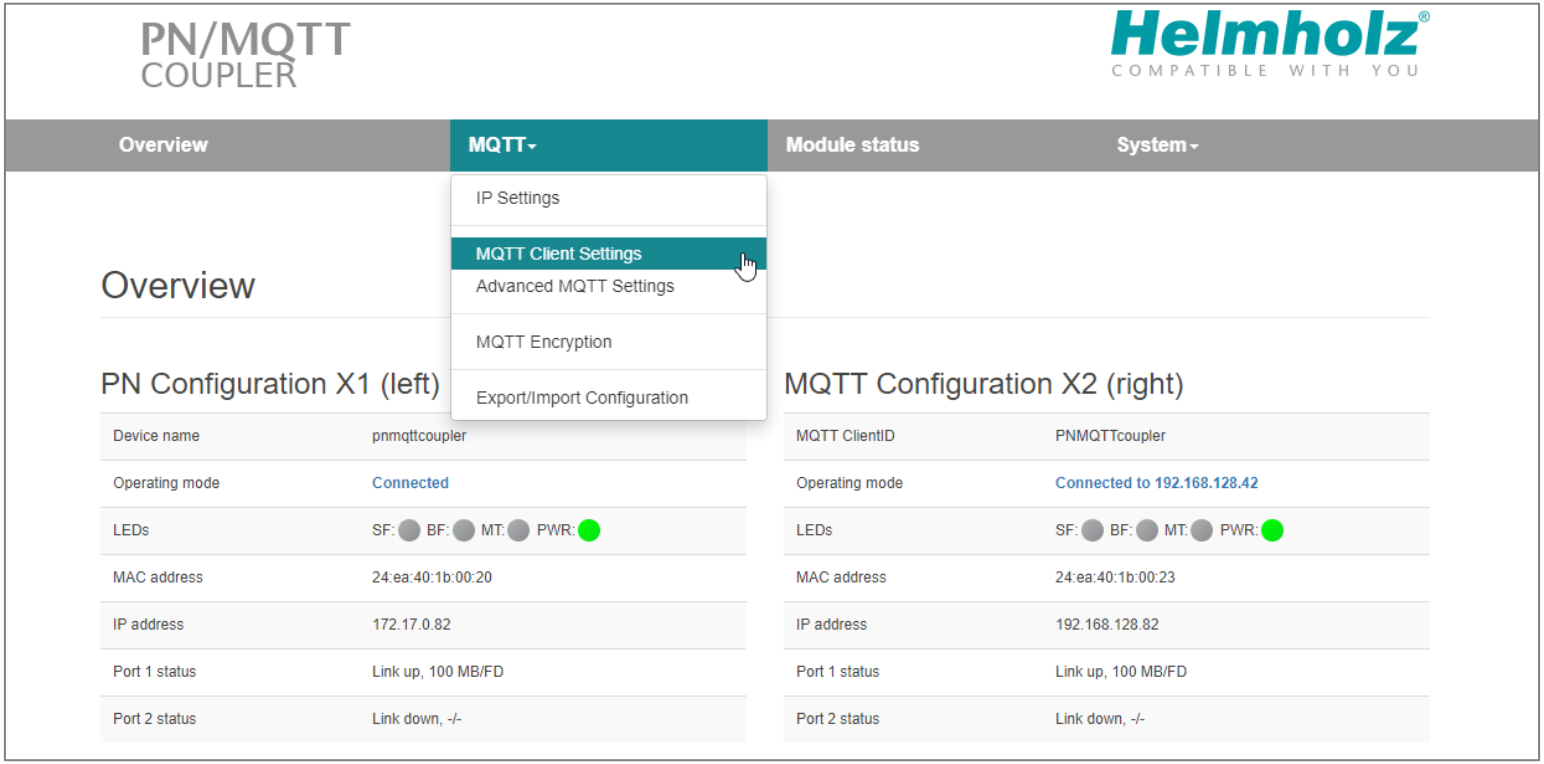
Configure the Broker connection via website



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MQTT Broker solutions

- Local Broker: Mosquitto
- Cloud Broker: HiveMQ

- IoT Cloud solutions using MQTT:
  - Amazon IoT Core
  - Microsoft Azure IoT Hub
  - IBM Watson IoT
  - Siemens Mindsphere
  - Google IoT
  - SAP IoT

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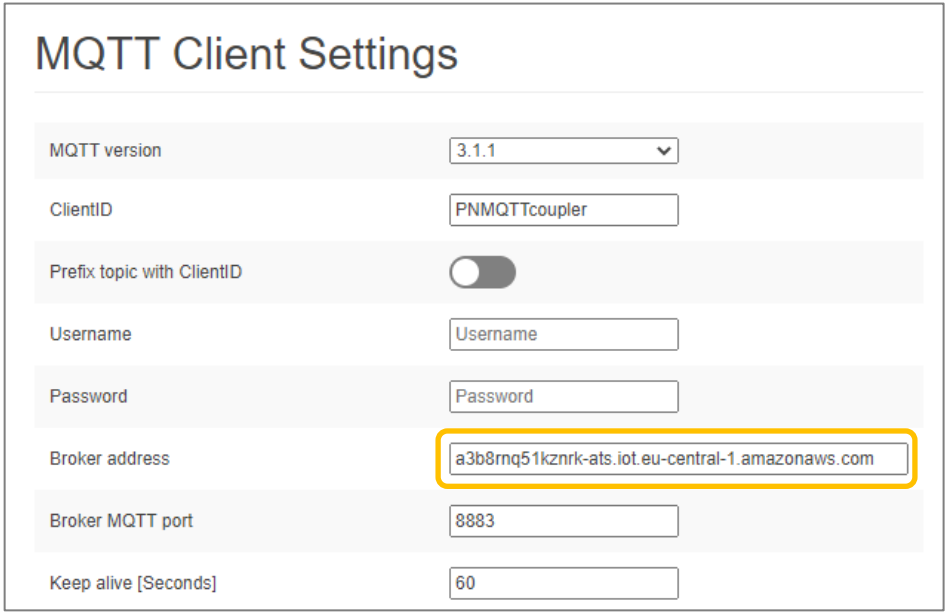
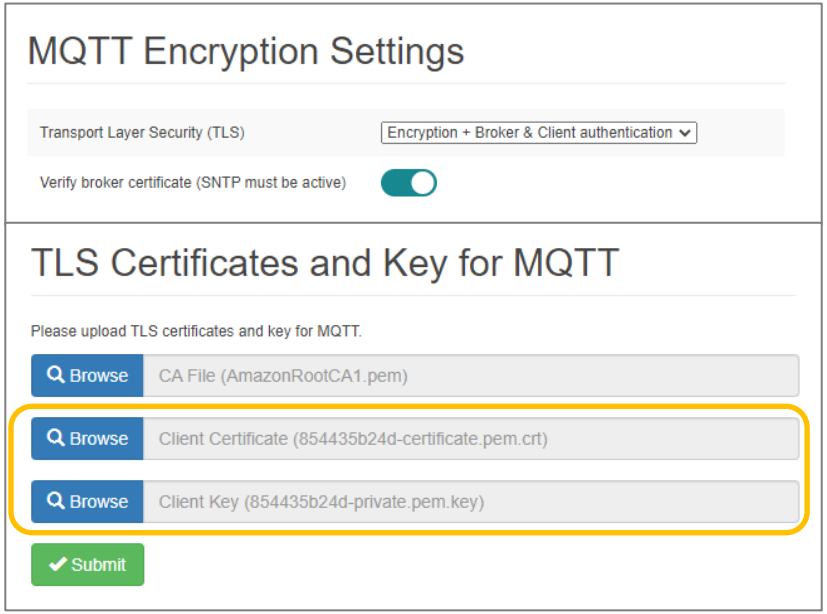
Sample configuration Amazon IoT Core (AWS) connection

- Amazon IoT „Thing“ → the digital twin of the device





- Step-by-step instructions in the PN/MQTT Coupler manual

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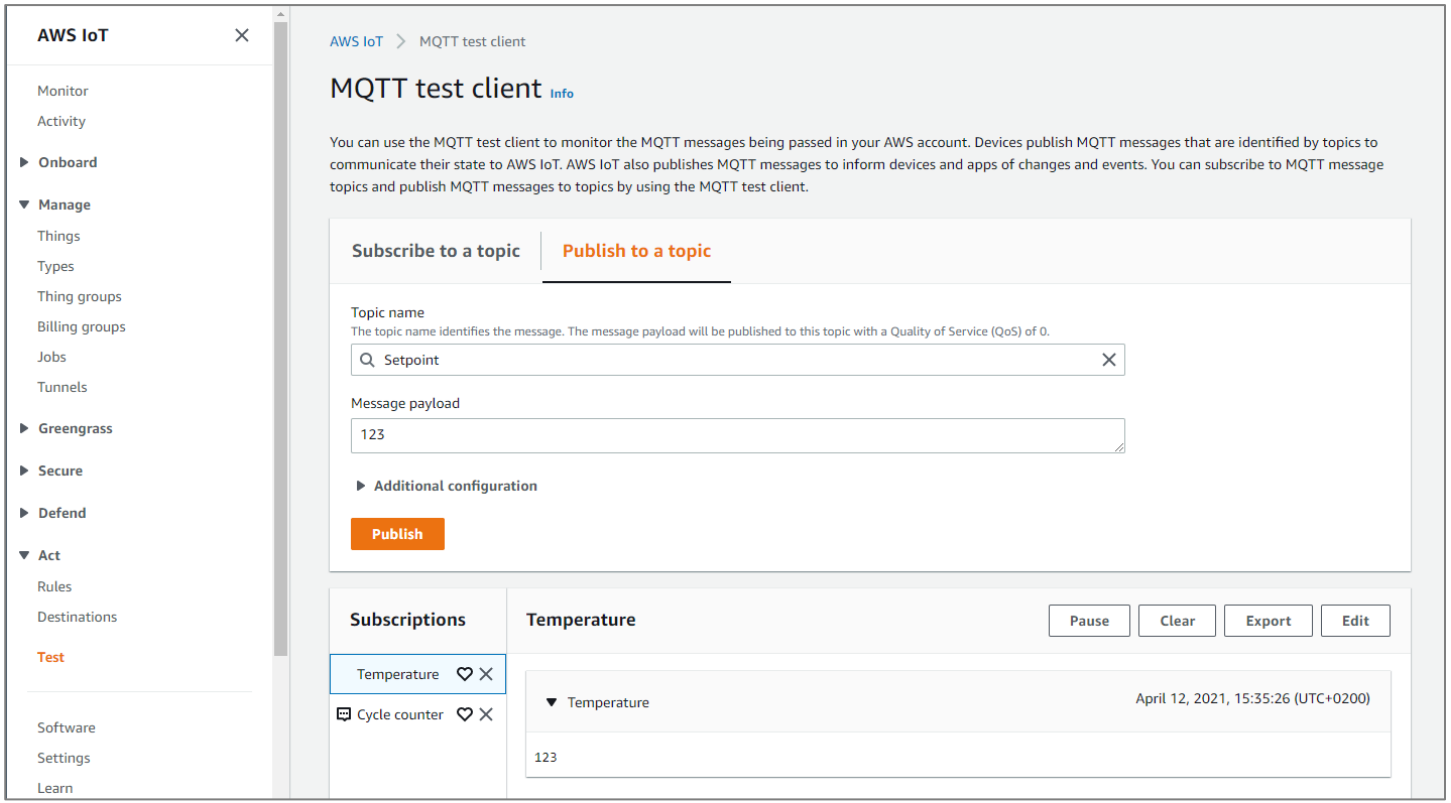
Sample configuration Amazon IoT Core (AWS) connection



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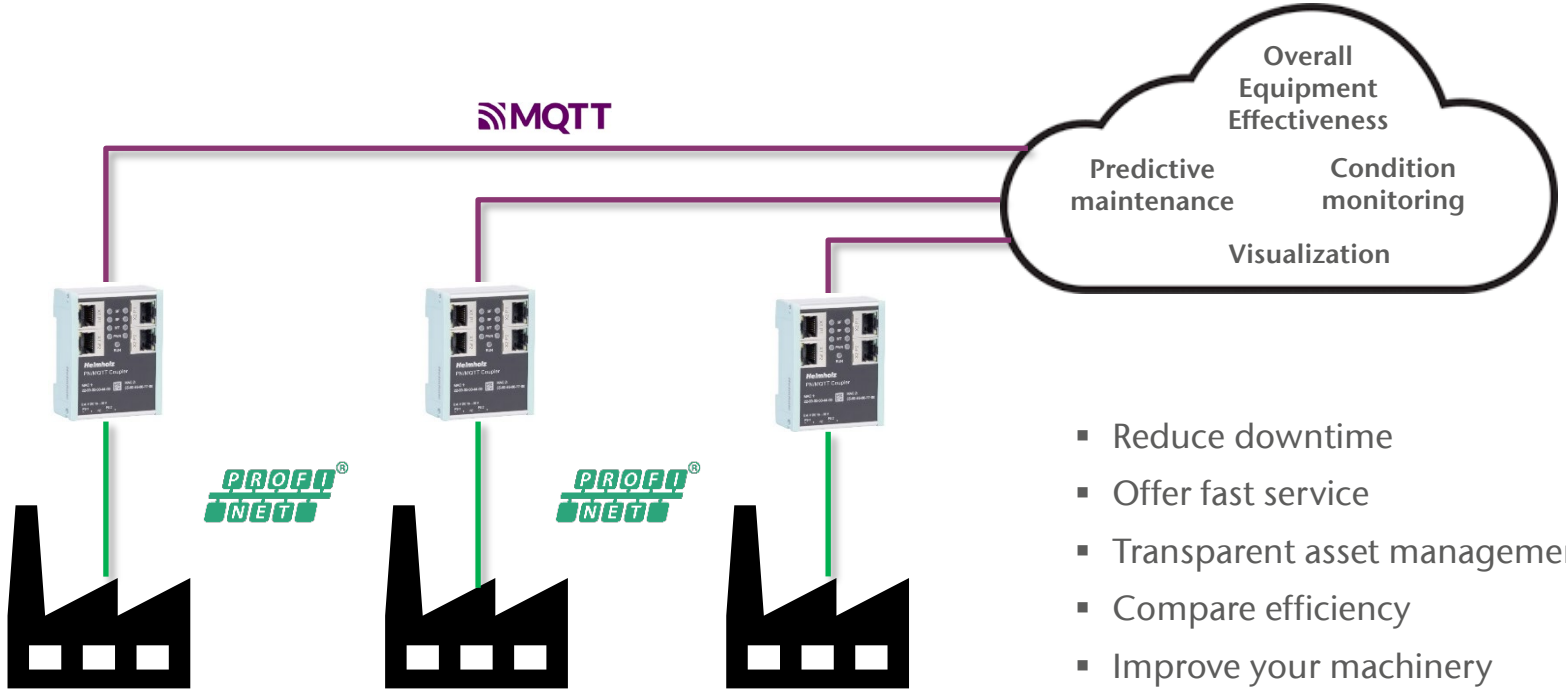
IoT communication use-cases



- Reduce downtime
- Offer fast service
- Transparent asset management
- Compare efficiency
- Improve your machinery

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Product overview

- PN/PN Coupler
- PN/DP Coupler

- PN/ModbusTCP Coupler
- PN/EtherNetIP Coupler

- PN/EtherCAT *(in development)*

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Still questions?

- Just ask...
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