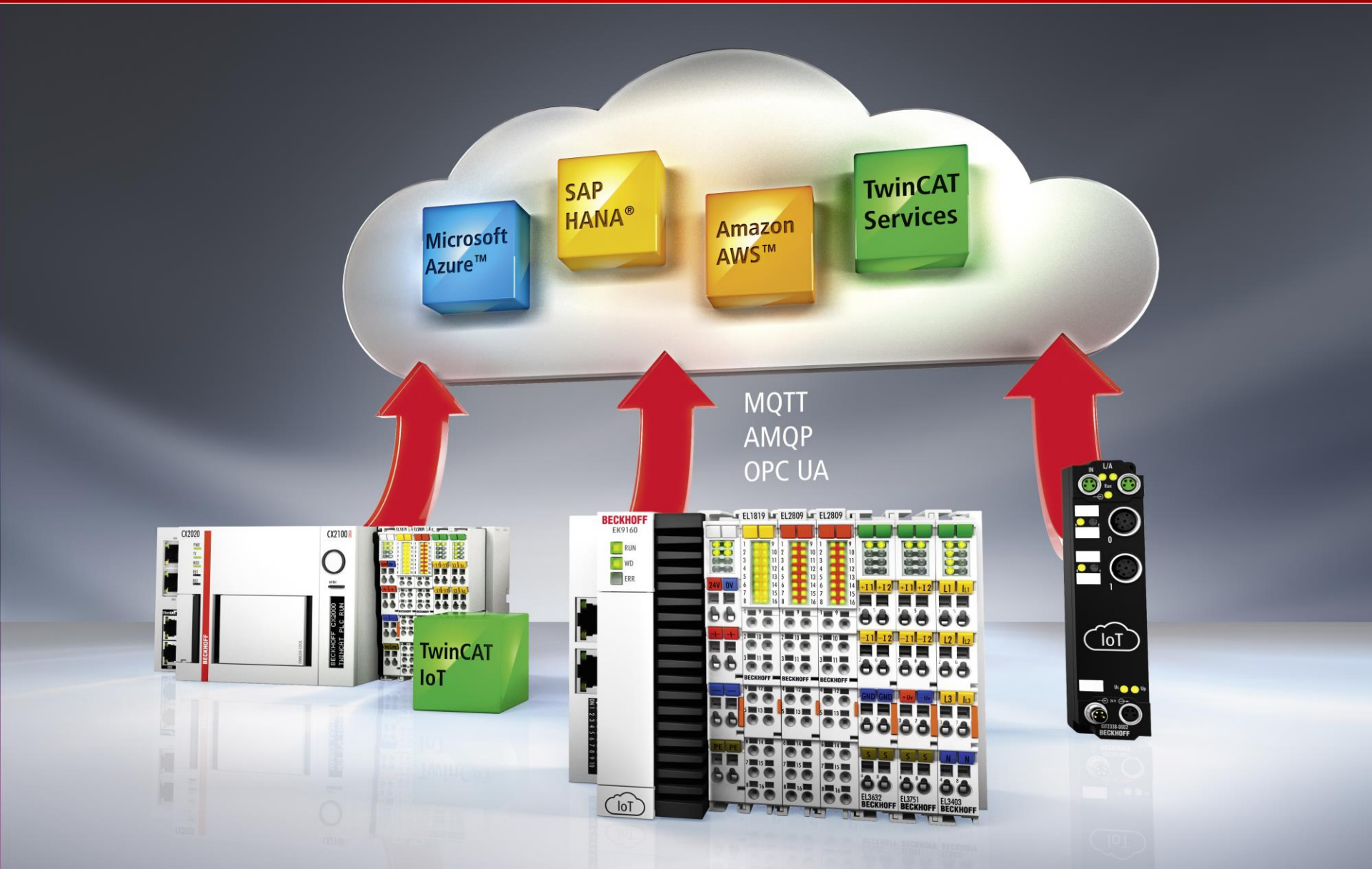
Products for Industrie 4.0 and IoT

BECKHOFF



Business Goals of End Customers

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- Reduce **production costs**
- Increase **product quality**
- Efficient **production control**
- Minimize **production losses**

→Increase competitiveness !!







Business Goals of Machine Builders

BECKHOFF

- Reduce **machine costs**
- Smart **machine optimization**
  - Optimize production cycle times
  - Optimize energy consumption
- Efficient **machine maintenance**
  - Dedicated and predictable
- Increase **machine attractiveness**

→Increase competitiveness !!

→Develop new business models

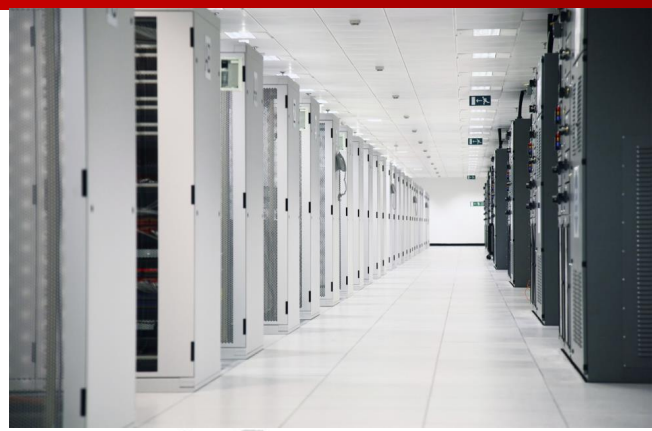


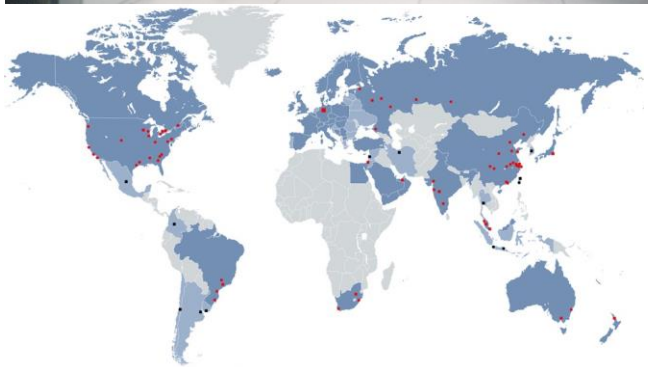


Implementation Strategies

BECKHOFF

- **More and detailed data**
  - Metadata
  - Easy and secure data access
  - ‘Infinite’ data storage
- **Powerful and scalable tools**
  - Location-independent availability
  - High usability
  - High uptime and reliability
  - Easy integration into infrastructure
  - Use of standards



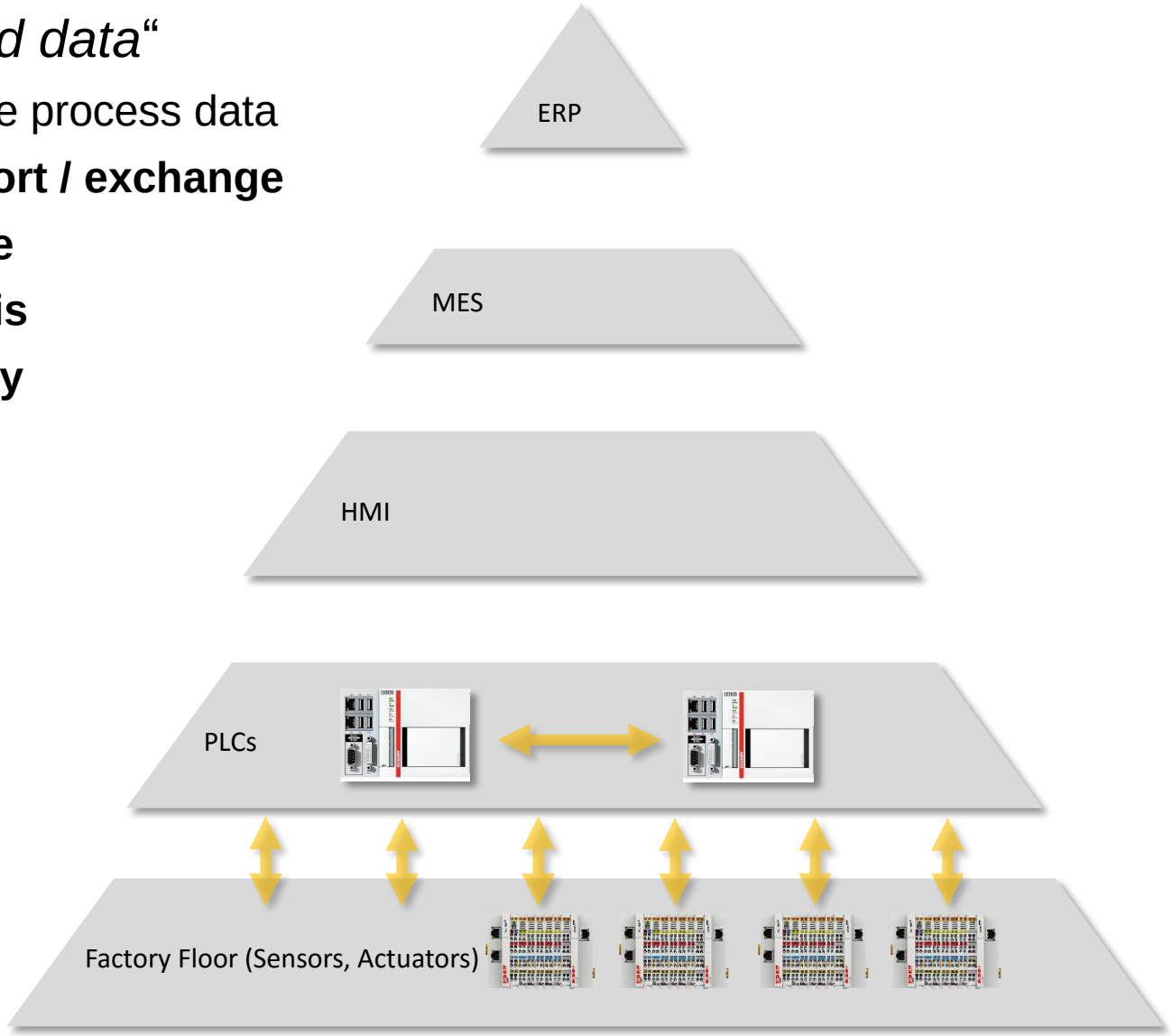




Requirements

BECKHOFF

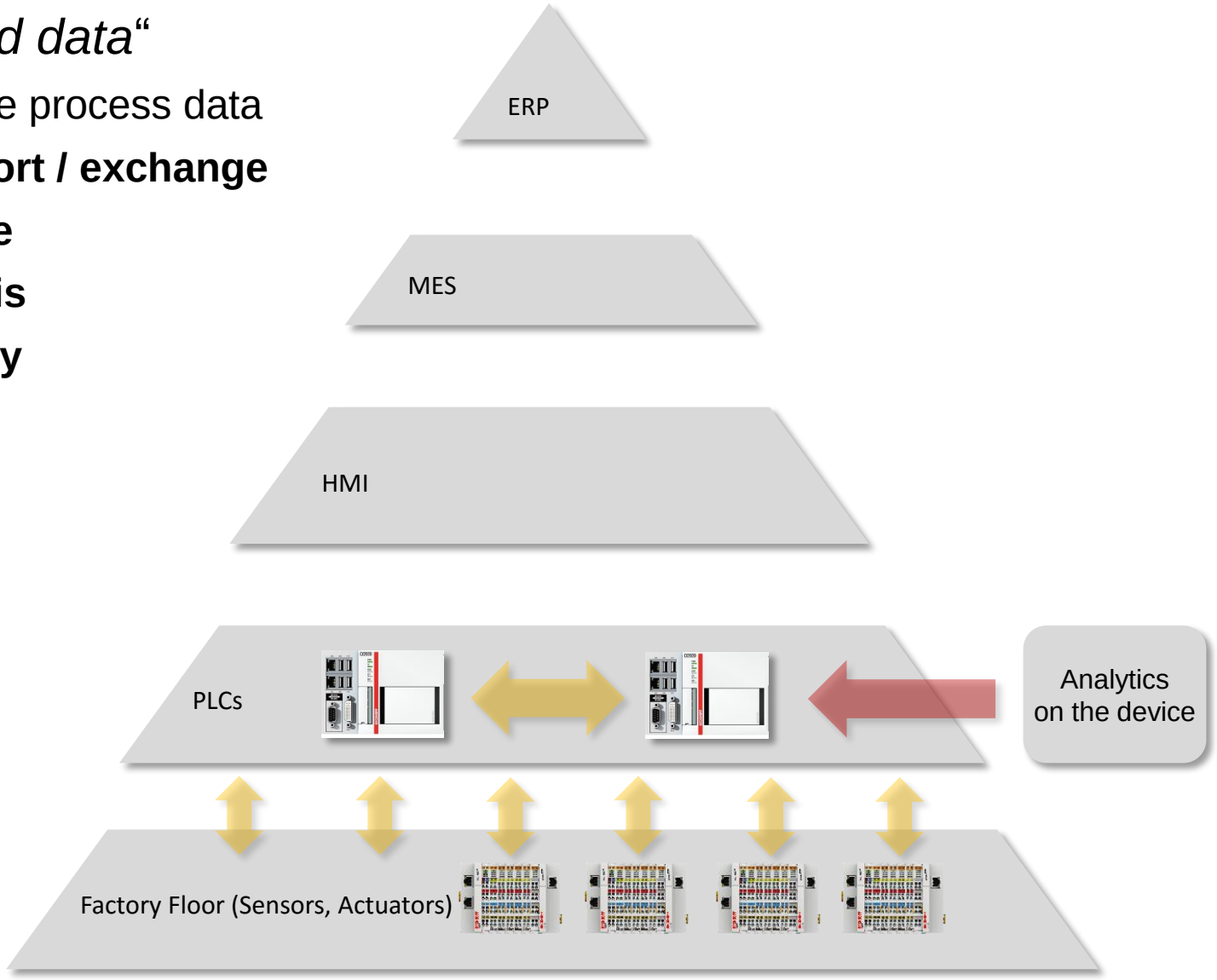
- “*More detailed data*“
  - Capture more process data
  - Data **transport / exchange**
  - Data **storage**
  - Data **analysis**
  - Data **security**



Requirements

BECKHOFF

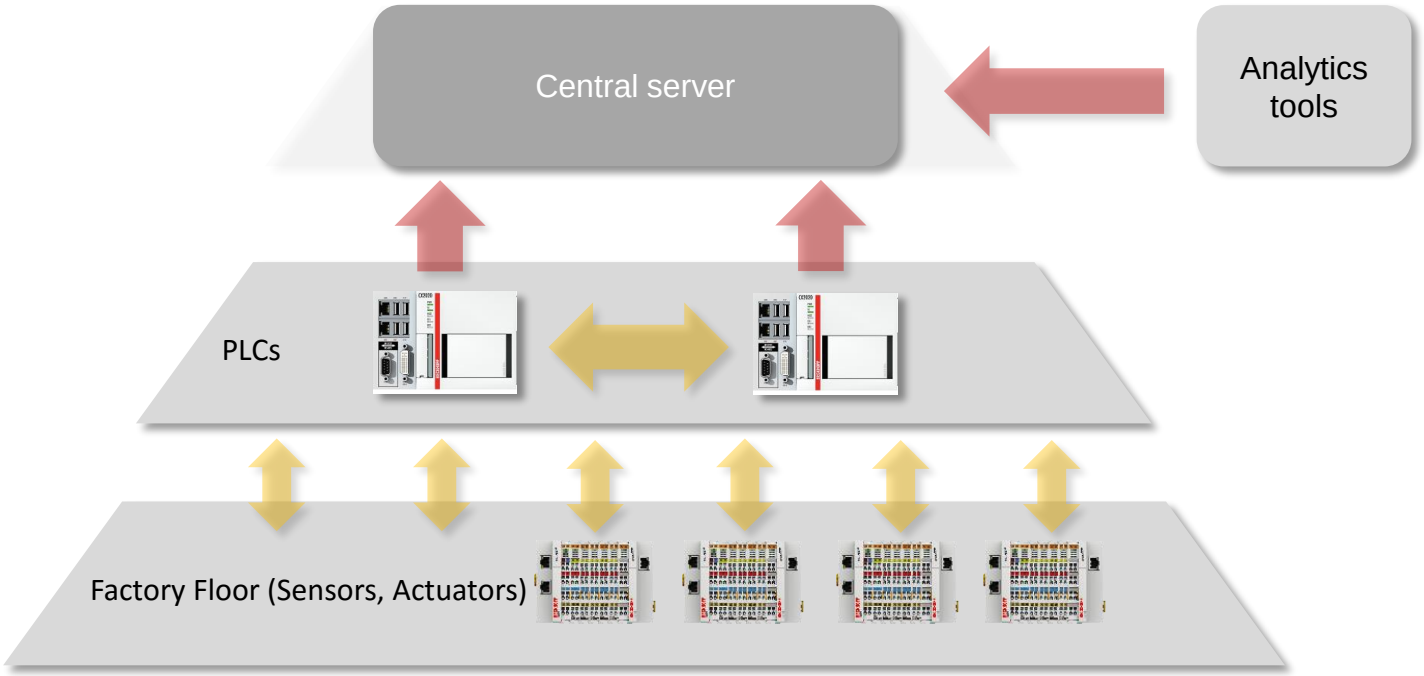
- “*More detailed data*“
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Requirements

BECKHOFF

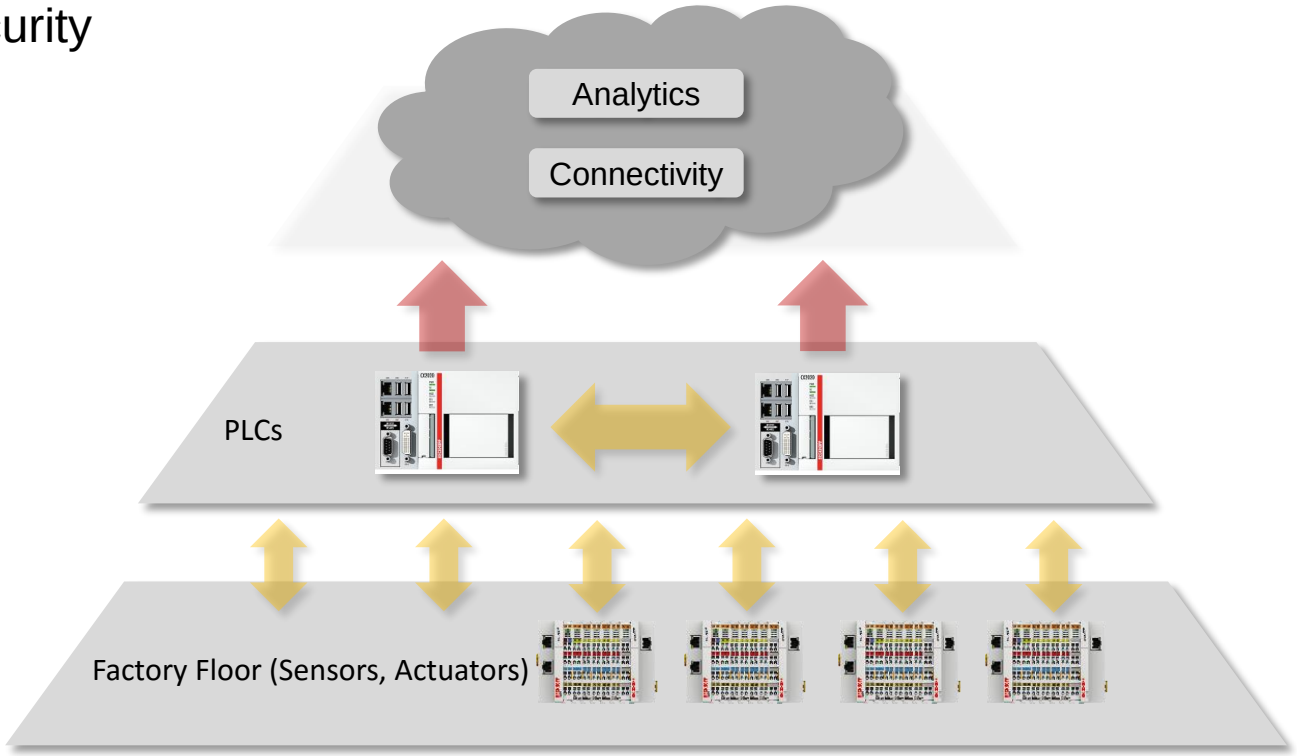
- Central Server
  - High hard-/software costs
  - High know-how and staff required
  - High maintenance effort
  - Poor scalability
  - Good security



Requirements

BECKHOFF

- Better solution: Cloud services
  - Low hard-/software costs
  - Little expertise (‘know how’) and staff required
  - Low maintenance effort
  - Great scalability
  - Good security

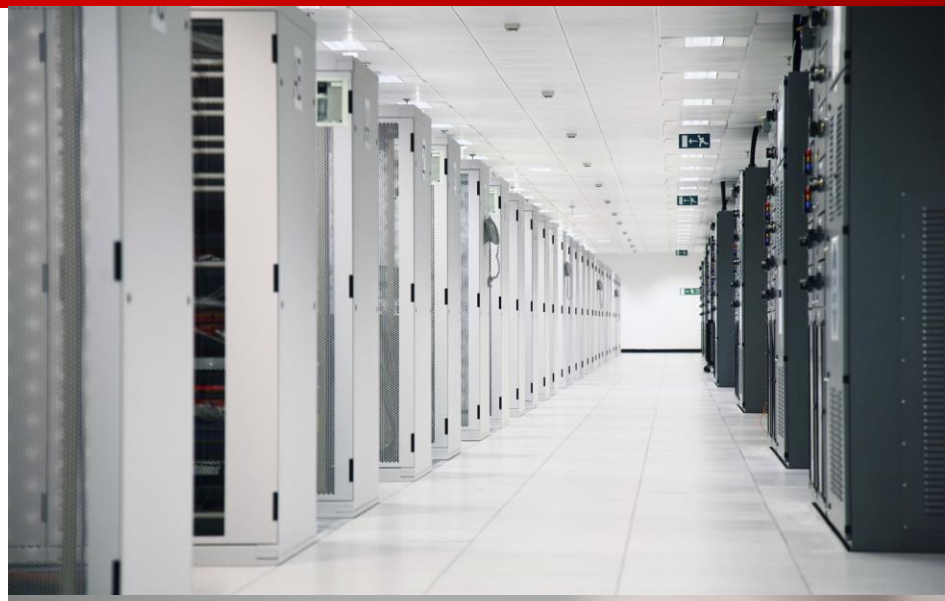


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- **Cloud Computing**

  "[…] on-demand network access to a pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort […]"
  NIST 2011

- Different types
  - **Public** Cloud
  - **Private** Cloud





Solutions

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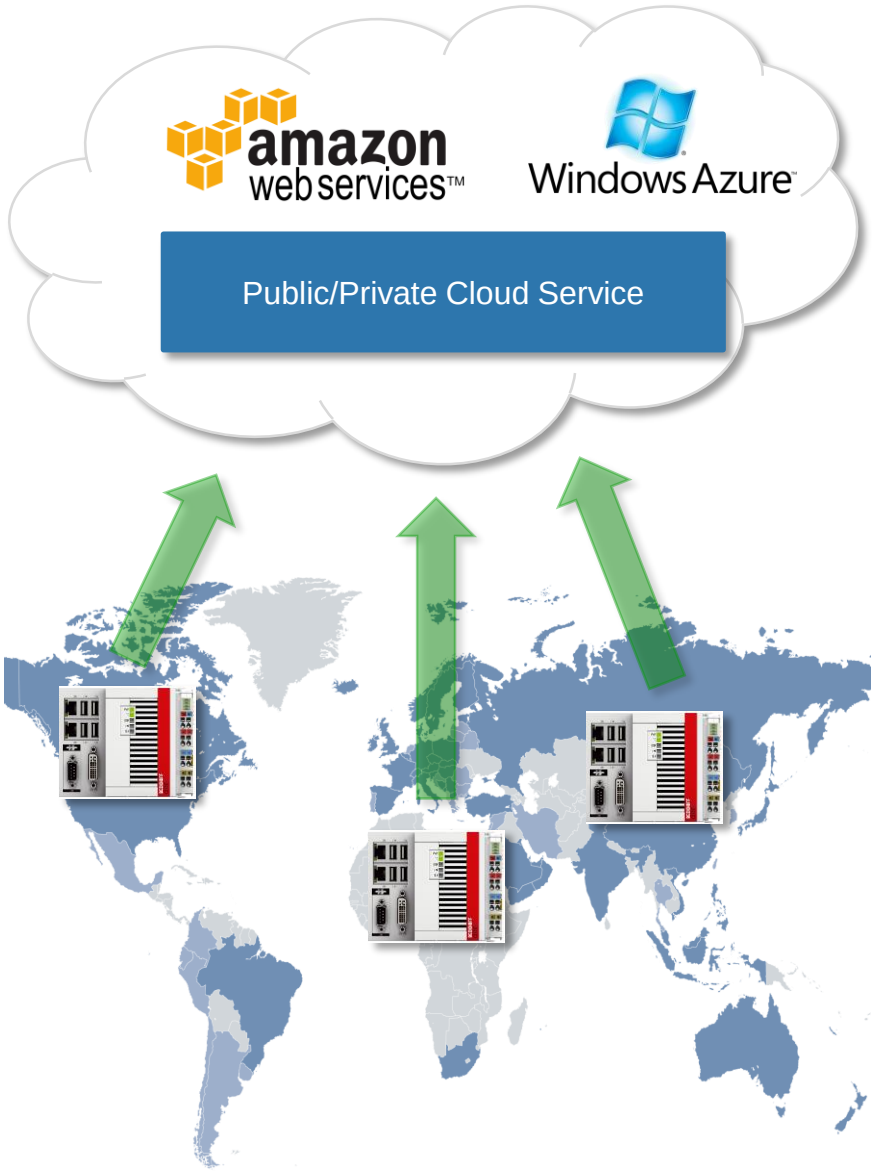
- **Public Cloud** Service Provider
  - Provides access to his data center infrastructure, e.g. for:
  - Communication services
  - Storage services
  - Analytics services

- Examples:
  - Microsoft Azure
  - Amazon AWS
  - Google Cloud Platform



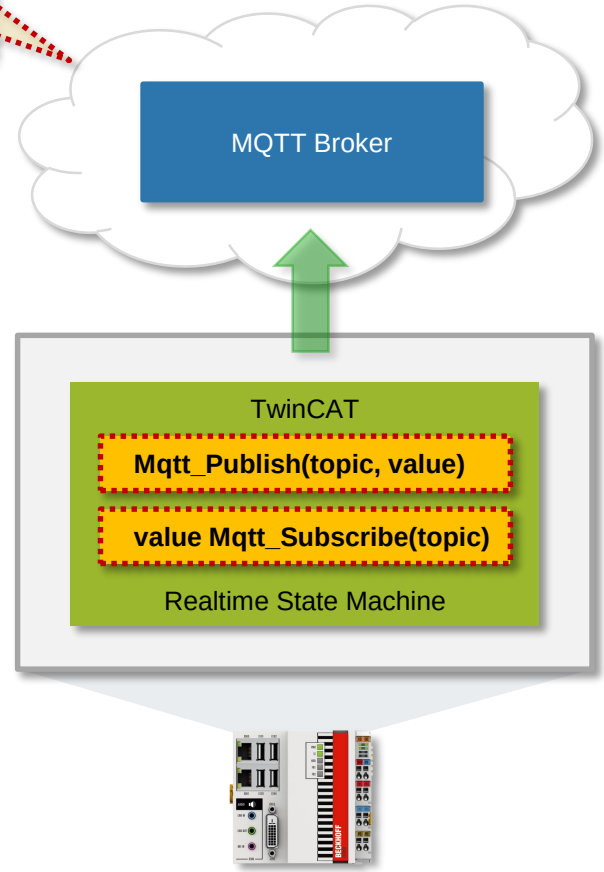
BECKHOFF

- **TwinCAT IoT product family**
  - Provides easy connectivity for IoT communication
  - Supports several Public and Private Cloud systems
  - Supports standardized communication via MQTT, AMQP, OPC-UA
  - Enables push technologies to wearable devices



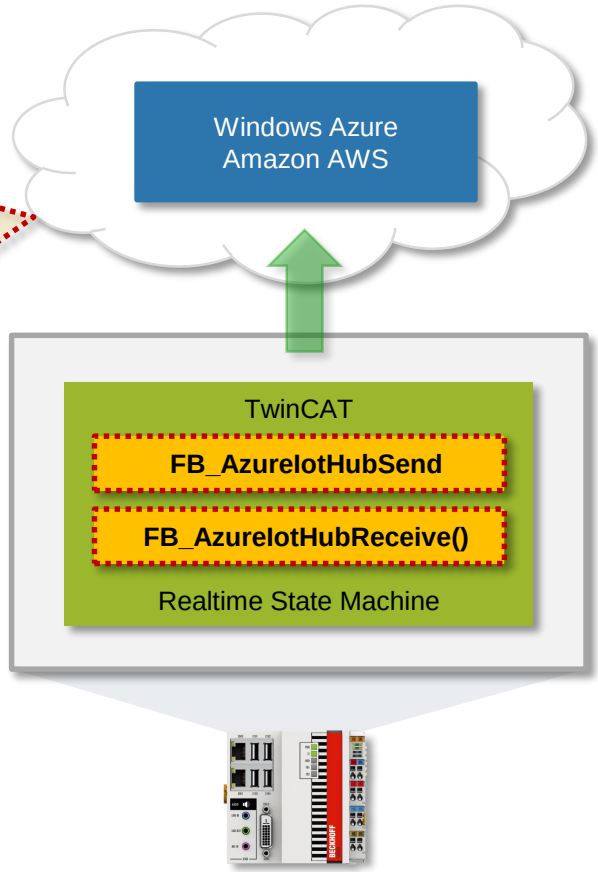
BECKHOFF

- **TwinCAT IoT Product Family**
  - **TF670x IoT Communication**
    - Publish/Subscribe data exchange via MQTT/AMQP



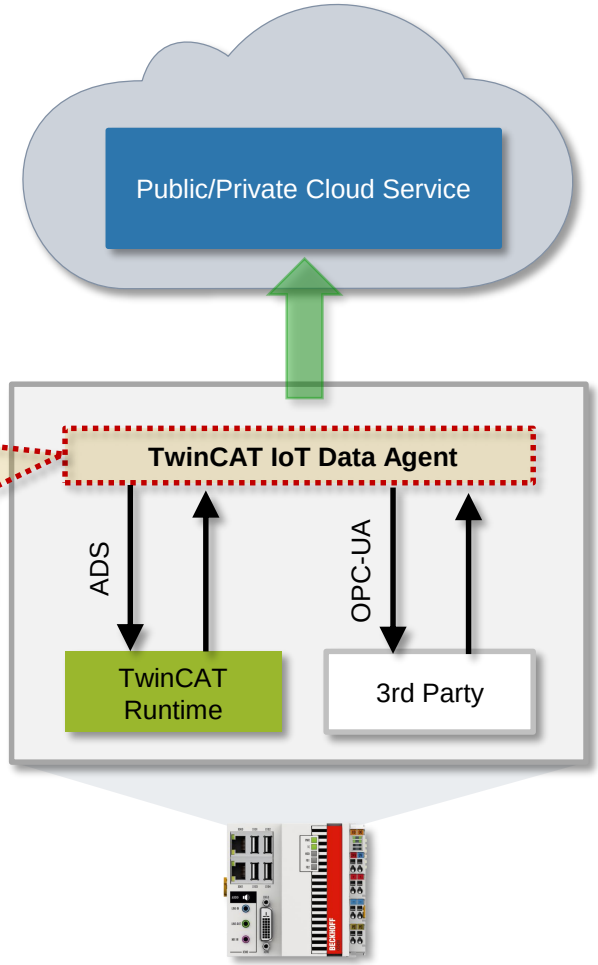
BECKHOFF

- **TwinCAT IoT Product Family**
  - **TF670x IoT Communication**
    - Publish/Subscribe data exchange via MQTT/AMQP
  - **TF671x IoT Functions**
    - Easy connectivity for Public Cloud services
    - Microsoft Azure and Amazon AWS



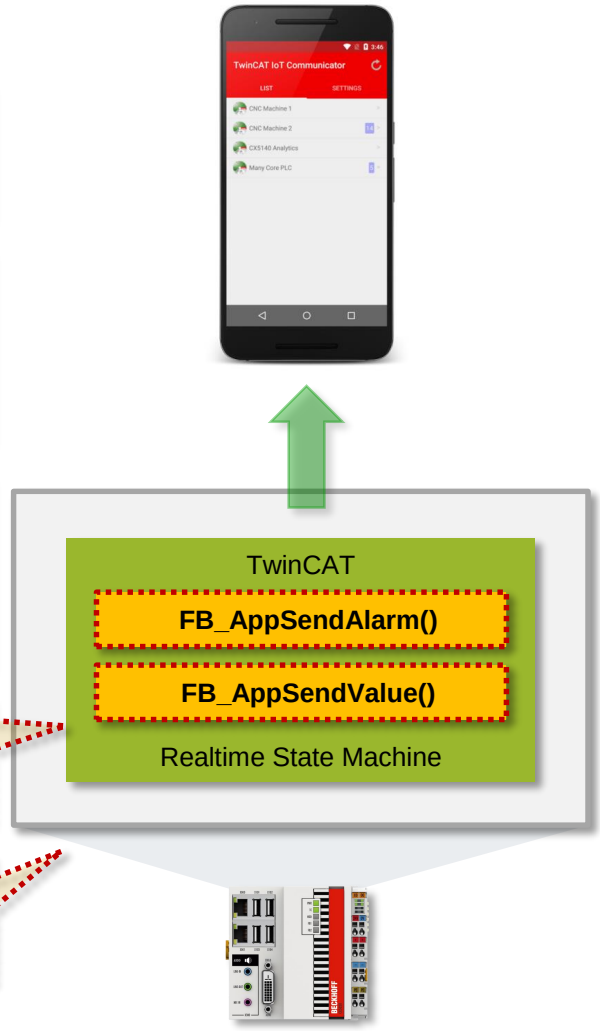
BECKHOFF

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  - **TF672x IoT Data Agent**
    - Gateway application for Cloud connectivity
    - Easy configuration without programming



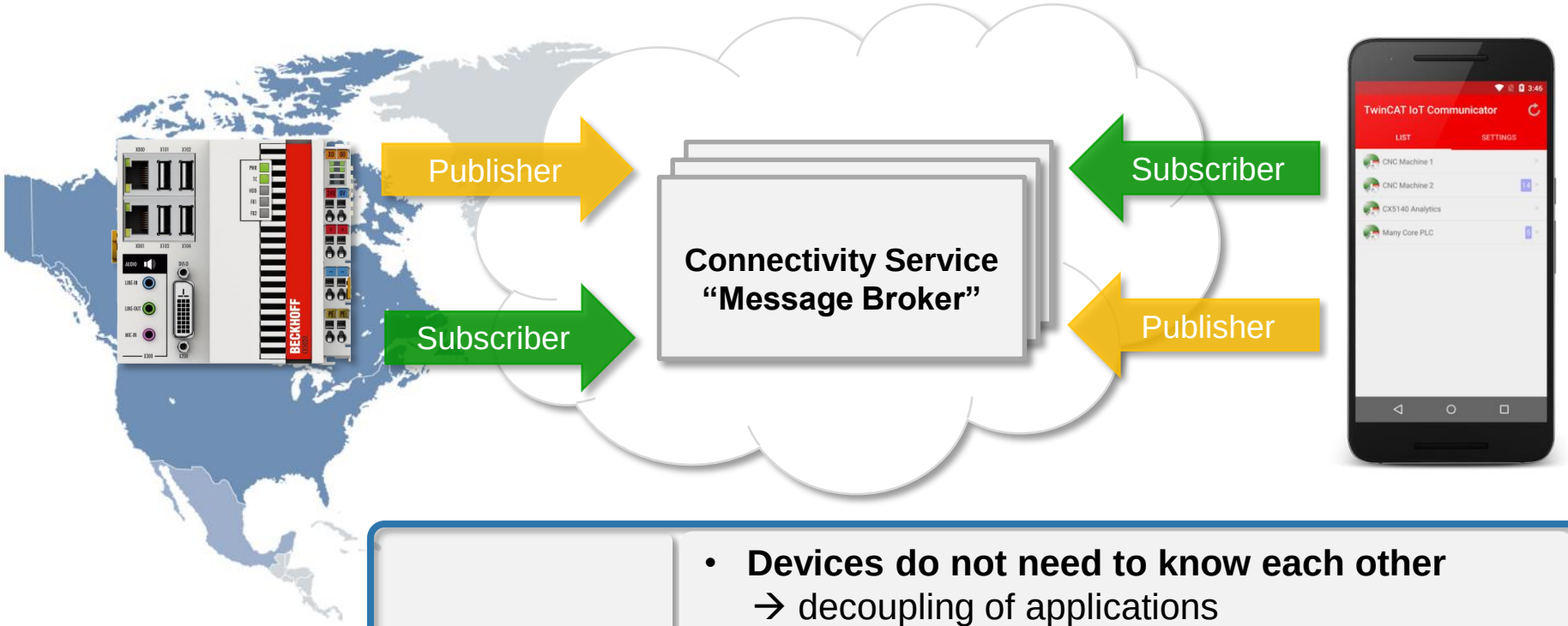
BECKHOFF

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  - **TF671x IoT Functions**
    - Easy connectivity for Public Cloud services
    - Microsoft Azure and Amazon AWS
  - **TF672x IoT Data Agent**
    - Gateway application for Cloud connectivity
    - Easy configuration without programming
  - **TF6730 IoT Communicator**
    - Easy integration of mobile devices
  - **TF6735 IoT Communicator App**
    - Smartphone App for TF6730



Publish/Subscribe

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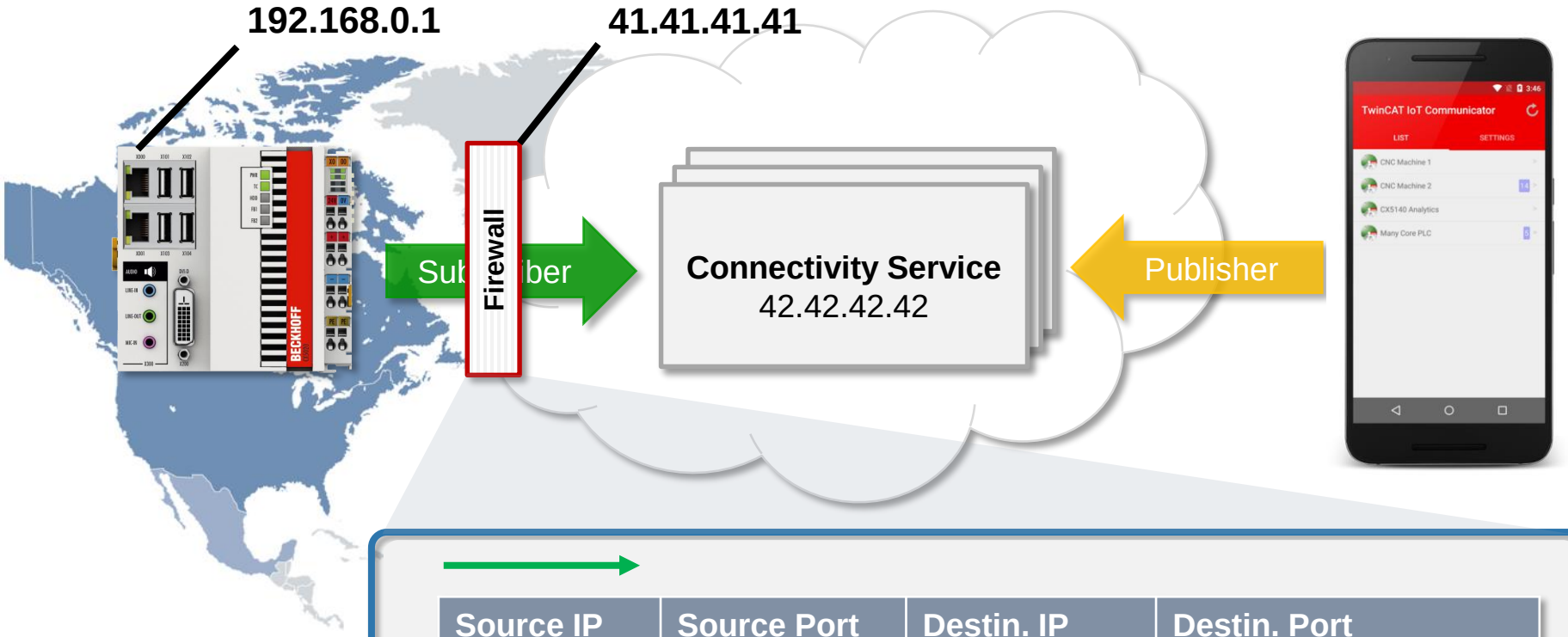


Advantages

- **Devices do not need to know each other**
  → decoupling of applications
- **All communication is outgoing**
  → easy firewall configuration
  → easy setup in IT infrastructure
- **MQTT/AMQP**
  → lightweight, standardized protocols
  → high performance

Publish/Subscribe

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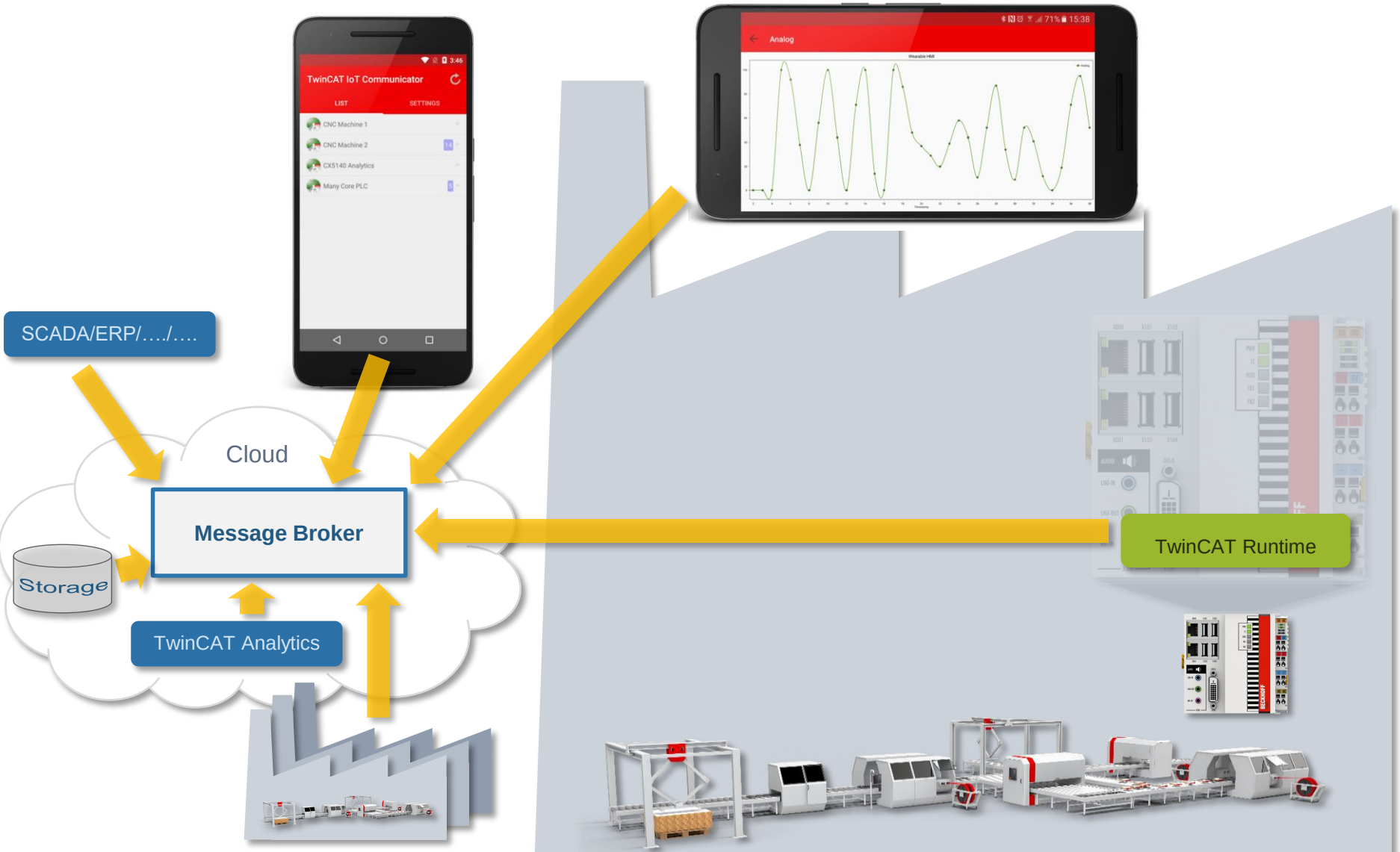
Source IP	Source Port	Destin. IP	Destin. Port
192.168.0.1	12345	42.42.42.42	1883

TCP reply

Source IP	Source Port	Destin. IP	Destin. Port
42.42.42.42	1883	41.41.41.41	12345

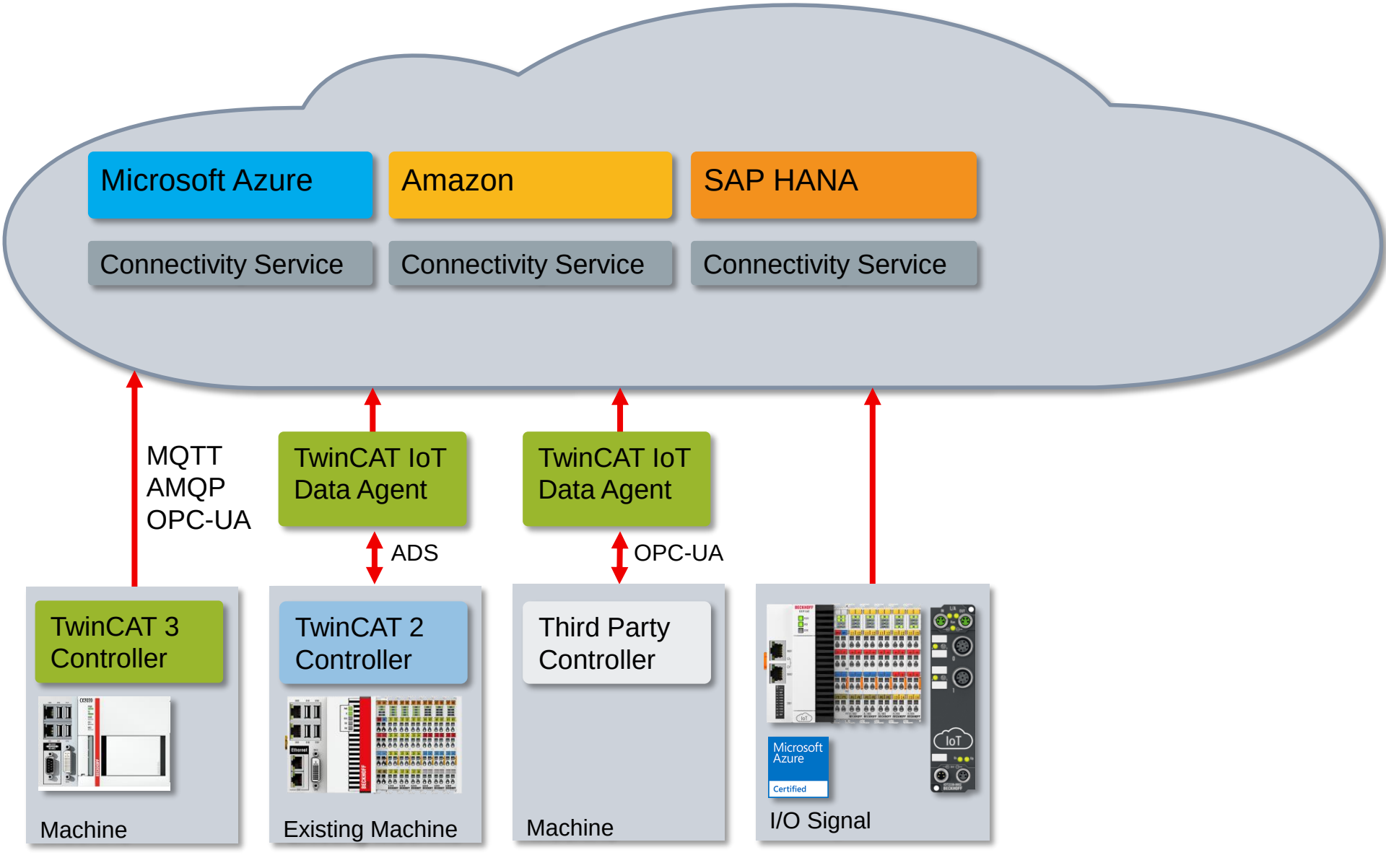
Broker Example

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Beckhoff Cloud Scenarios

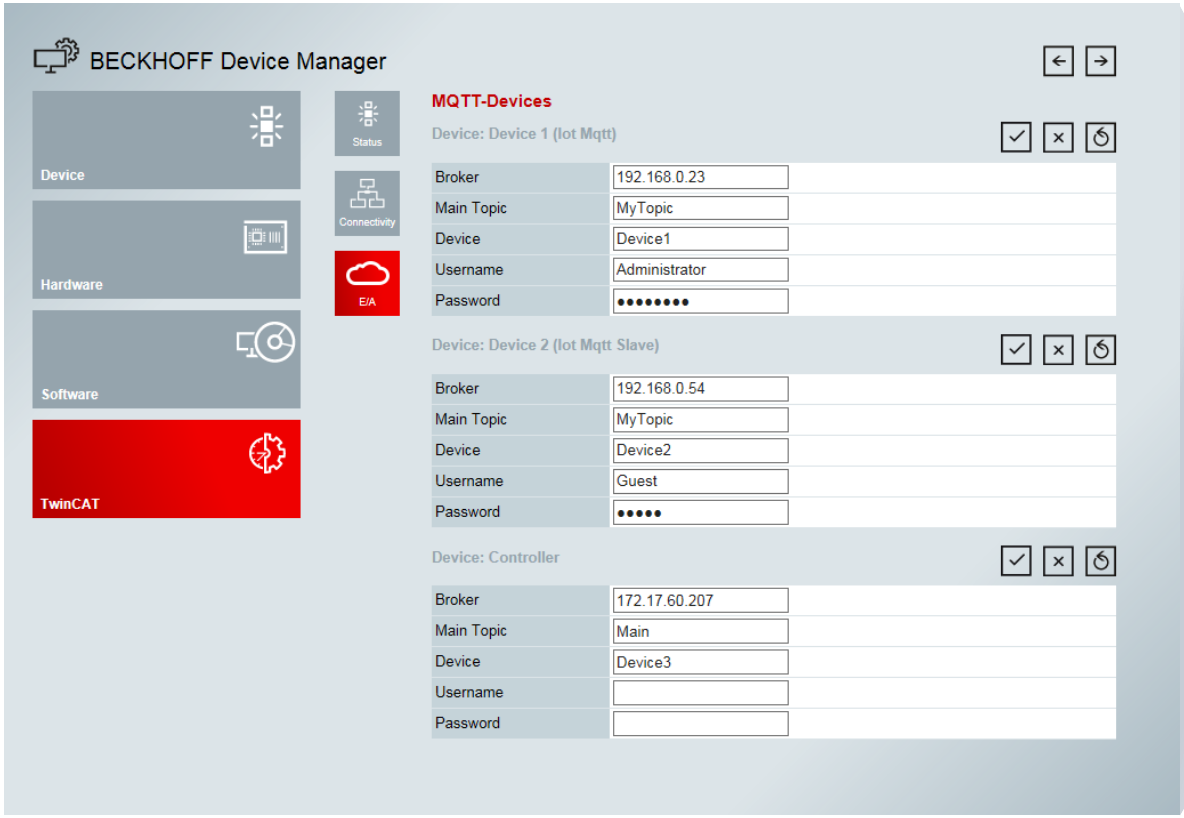
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IoT Coupler (EK9160)

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- Publish/Subscribe to process data via cloud service
- No TwinCAT System Manager necessary
- Using IPC Diagnostics website for configuration

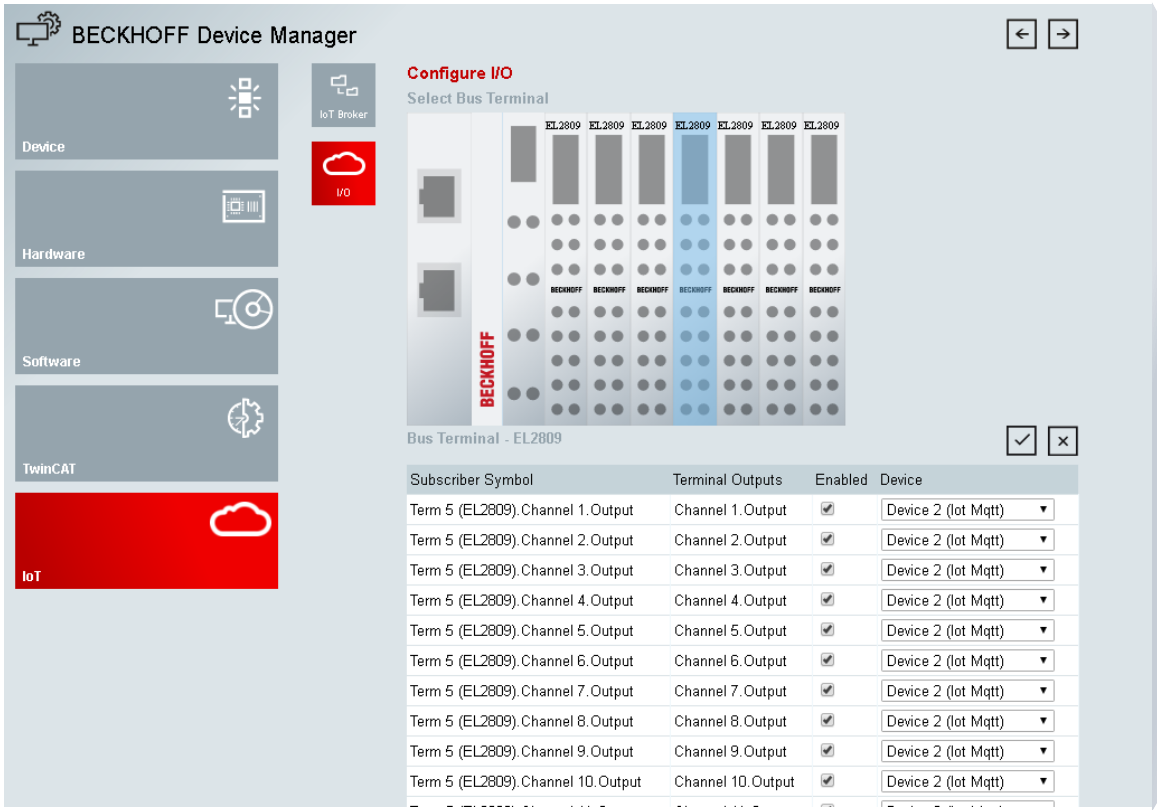


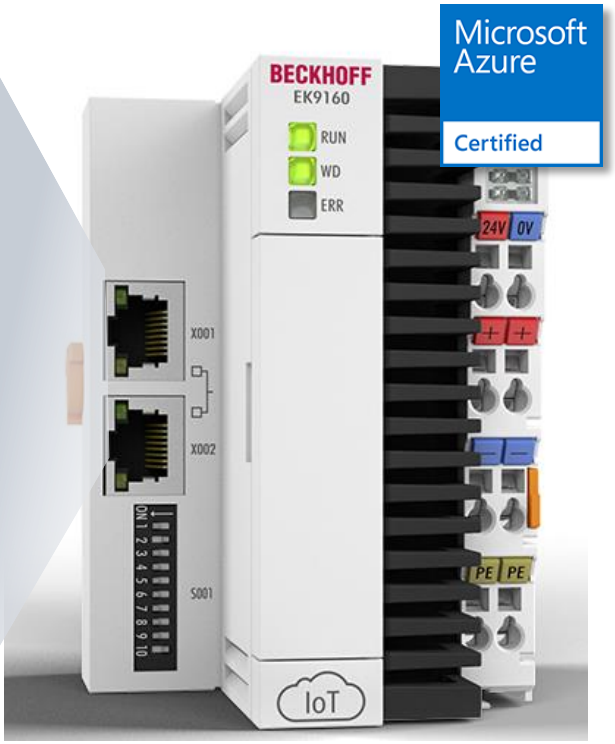


IoT Coupler (EK9160)

BECKHOFF

- Automatic I/O detection and configuration
- Simply select I/O channels and enable/disable for a Cloud service



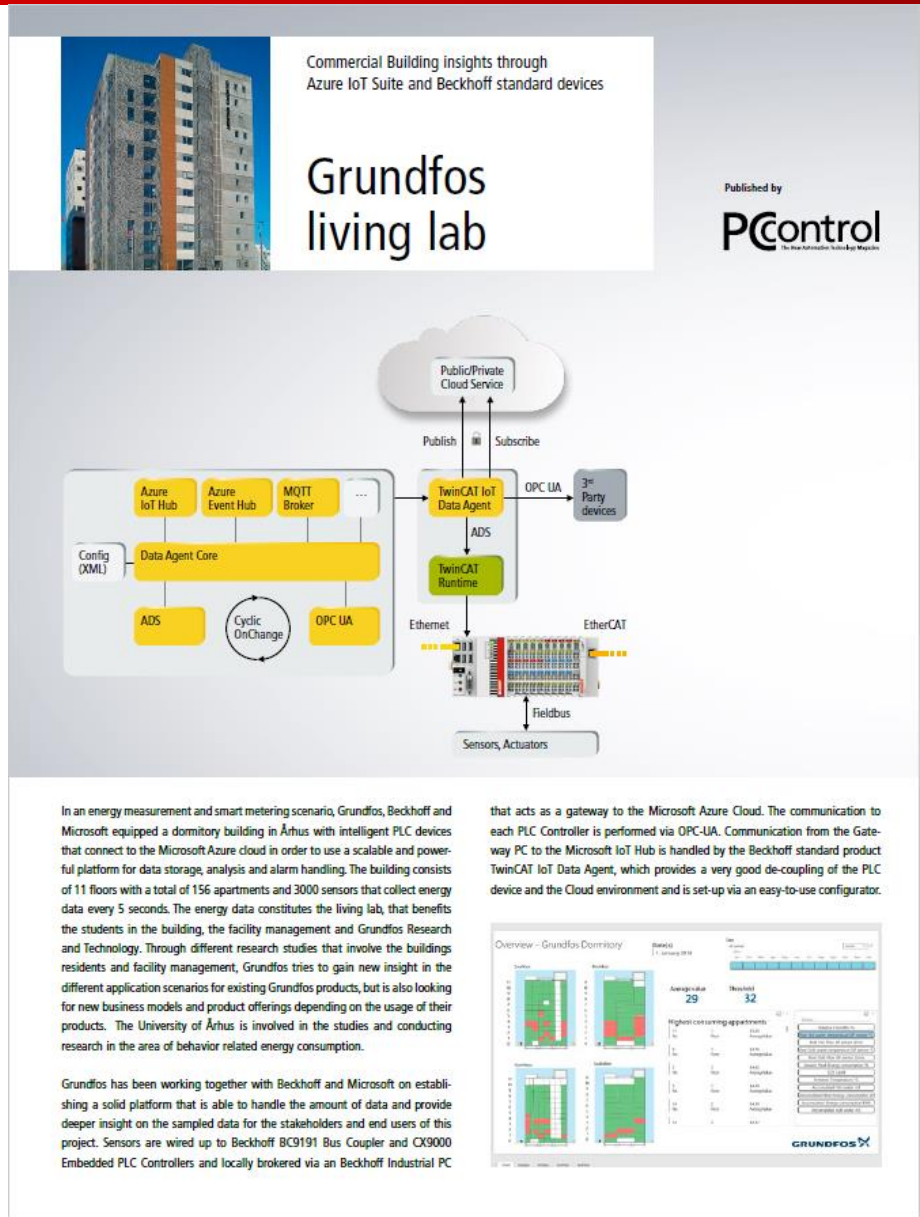


TwinCAT IoT Success Story

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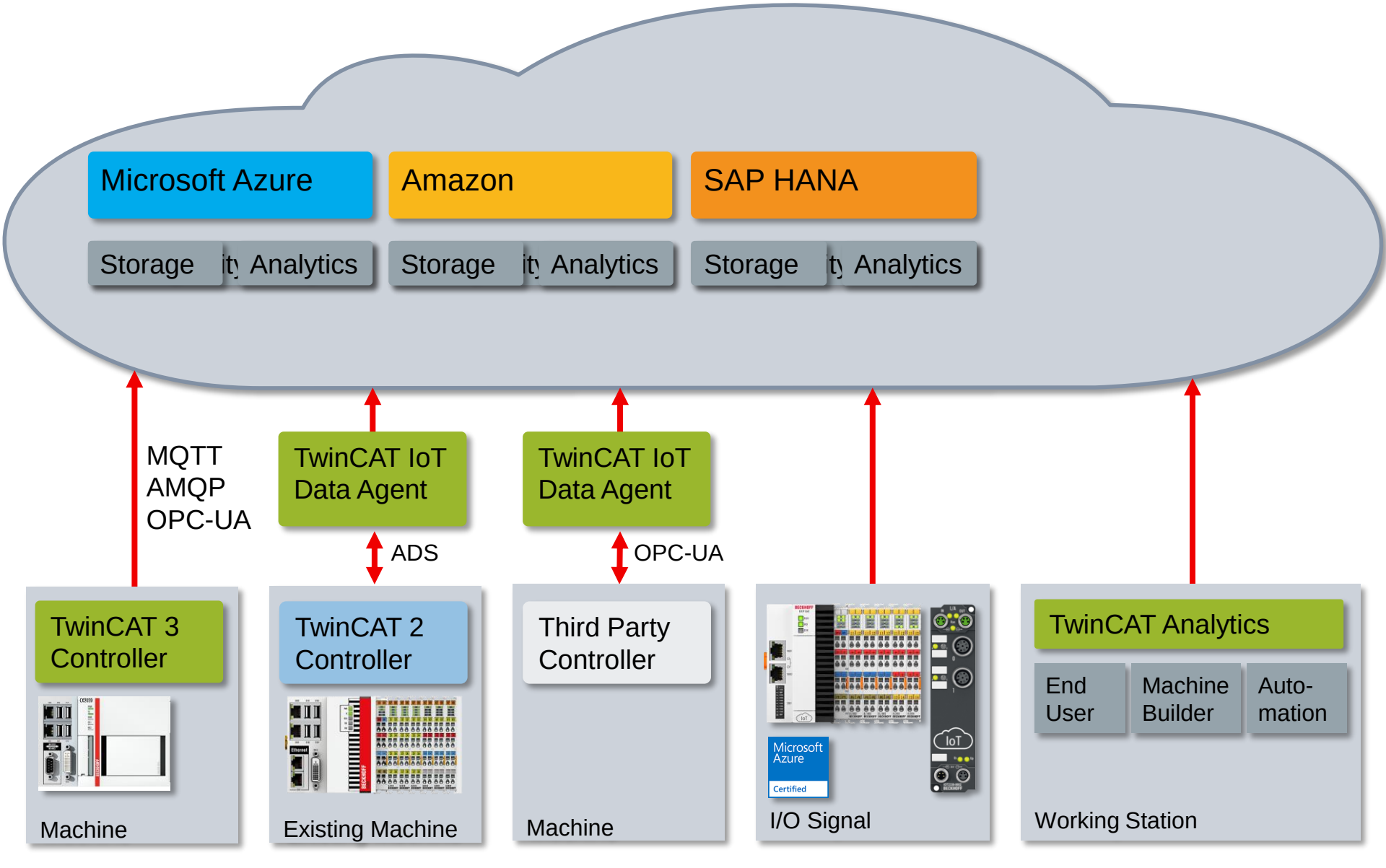
- First TwinCAT IoT success story
- Flyer for Hanover tradeshow

- 160 apartments in a student dormitrory
- Apartments quipped with either BC9191 or CX9020 devices
- Cyclic logging of energy data
- Approximately 3200 data points
- Energy data send to Microsoft Azure Cloud for Analytics



Beckhoff Cloud scenarios

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Solution validation / end user

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- Reduce **production costs**

✅ data analytics for predictive maintenance

✅ higher machine availability

✅ higher machine productivity

- Increase **product quality**

✅ data analytics for machine optimizations

✅ better control of reject parts

- Efficient **production control**

✅ location independent data aggregation

✅ optimized production chain







Solution validation / machine builder

BECKHOFF

- Reduce **machine costs**

✅ easier and faster engineering for M2M

✅ decreased hard-/software costs

✅ high scalability of infrastructure



- Efficient **machine** maintenance

✅ ongoing analysis of process data



- **Smart machine** optimization

✅ detailed analysis of machine parameters

✅ → Increased **machine attractivity**

→ New business models for custom services

TwinCAT IoT Webinar

BECKHOFF



Language: German
Date: 29.03.2016
Duration: 30 minutes
Speaker: Sven Goldstein



Language: English
Date: 30.03.2016
Duration: 30 minutes
Speaker: Daymon Thompson

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