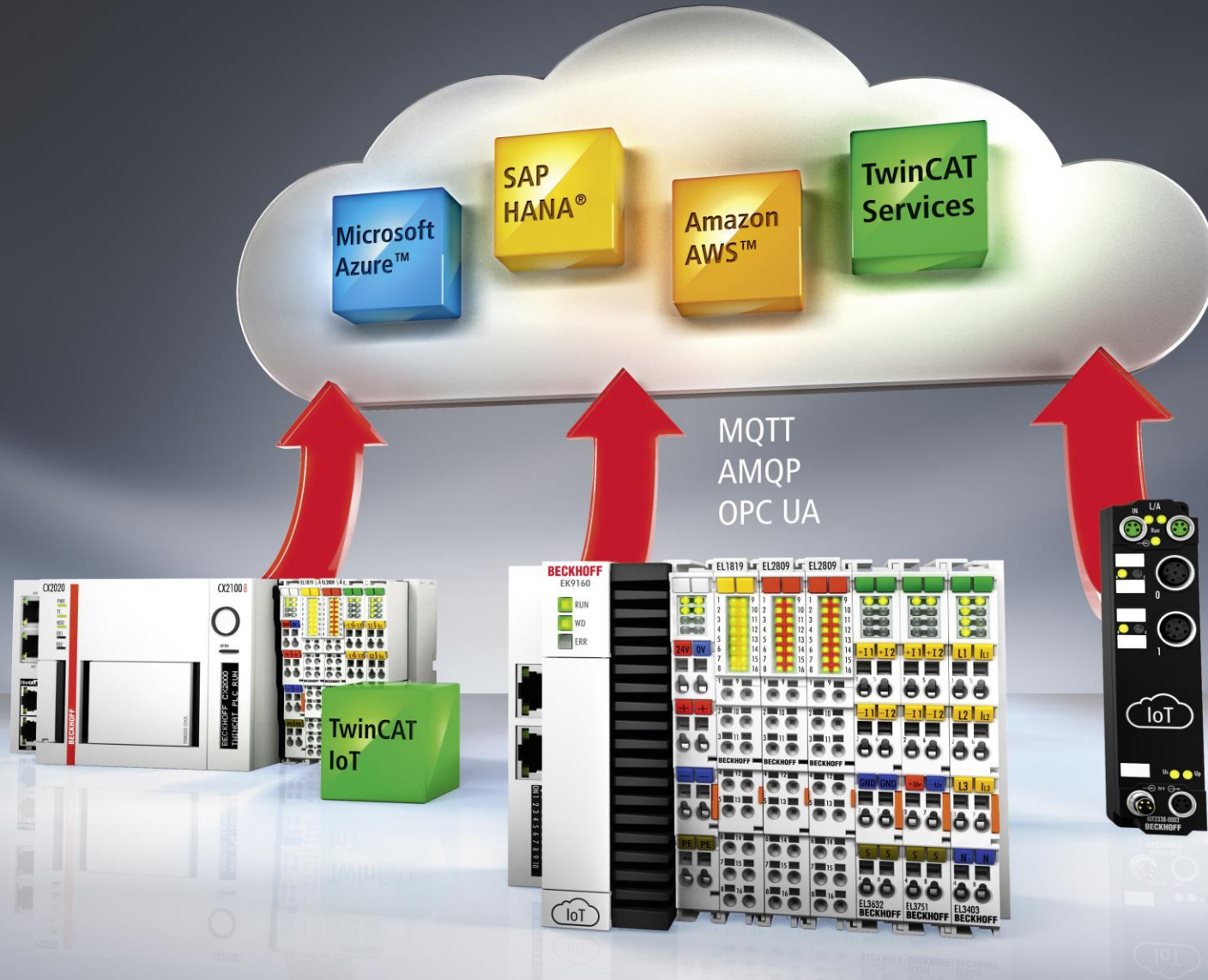


Ready-to-use products for Industrie 4.0 and IoT

BECKHOFF



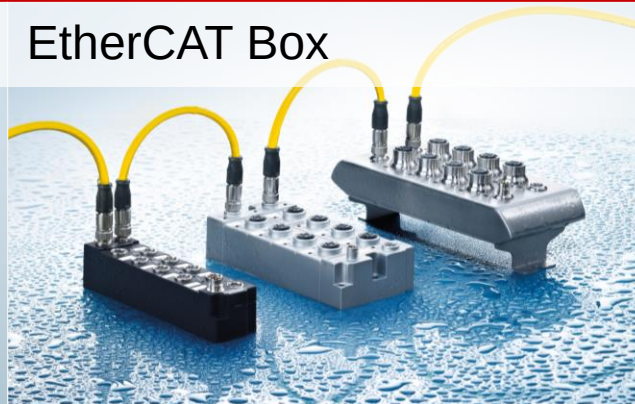
Products and system solutions

BECKHOFF

Industrial PC



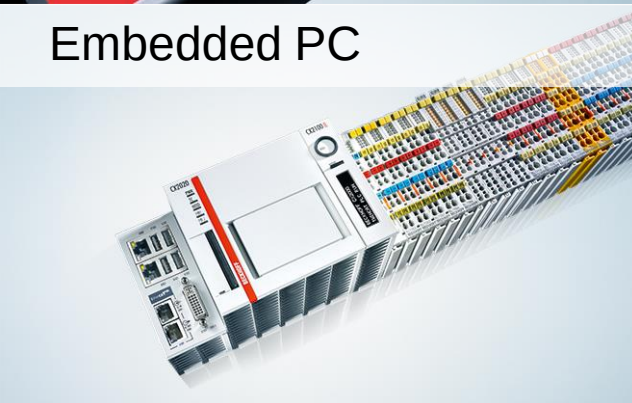
EtherCAT Box



TwinCAT



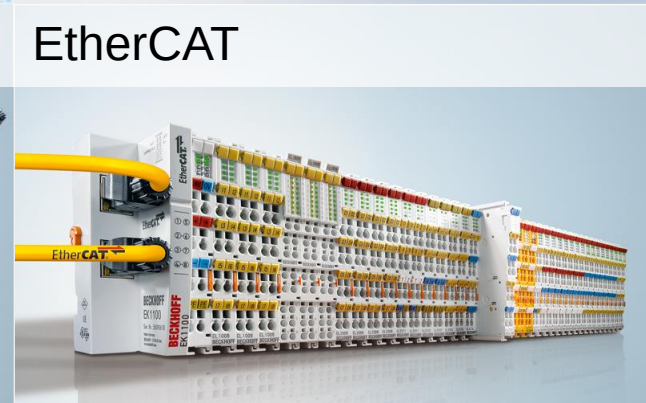
Embedded PC



Bus Terminal



EtherCAT



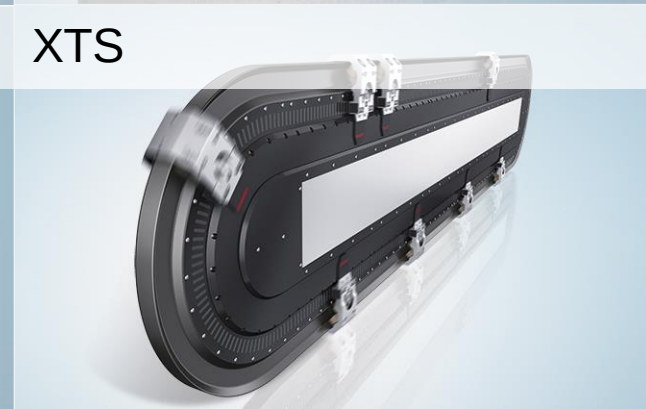
Infrastructure Components



Drive Technology



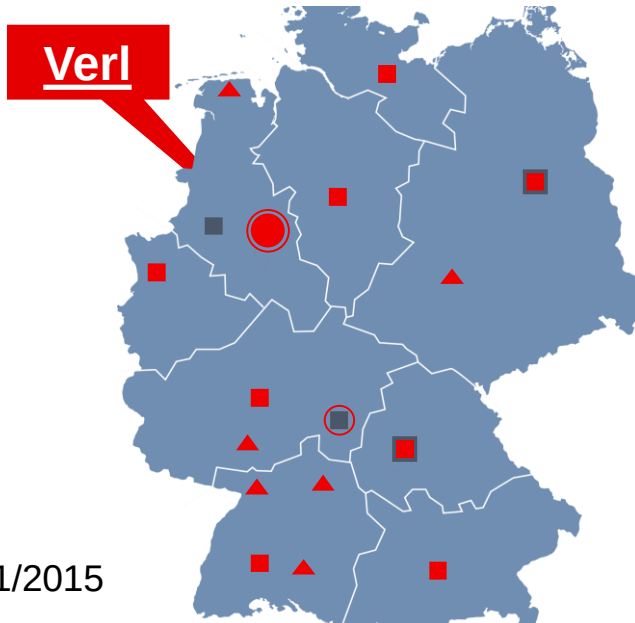
XTS



About Beckhoff Automation

BECKHOFF

Headquarters:	Verl, Germany
Employees worldwide:	3.000
Number of engineers:	1.000
Sales/technical offices in Germany:	14
Beckhoff companies worldwide:	34 countries
Subsidiaries and distributors:	> 75 countries
Sales worldwide 2014:	510 million € (+17 %)
Sales worldwide 2015:	610 million € (+20 %)

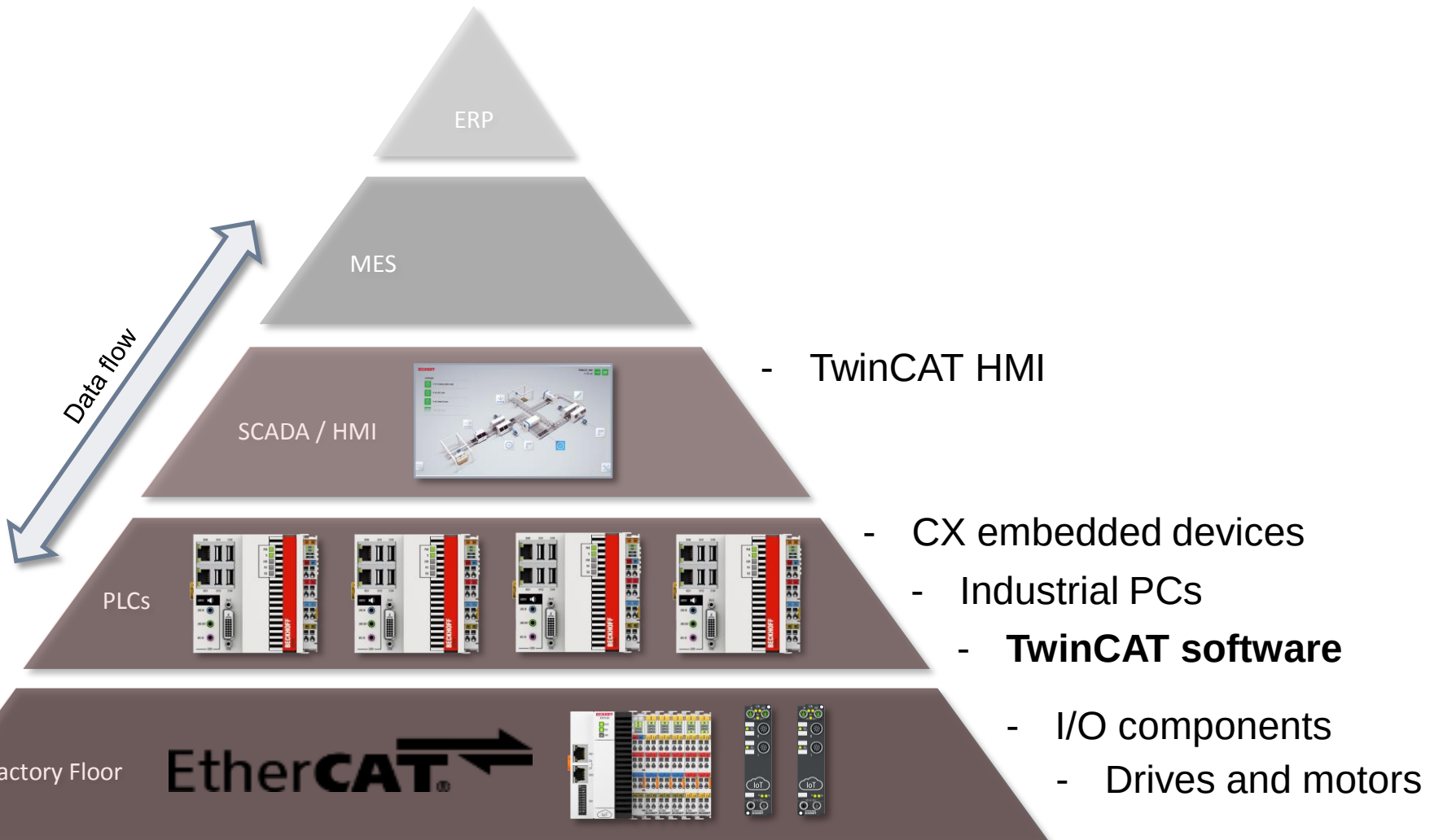


as of: 11/2015



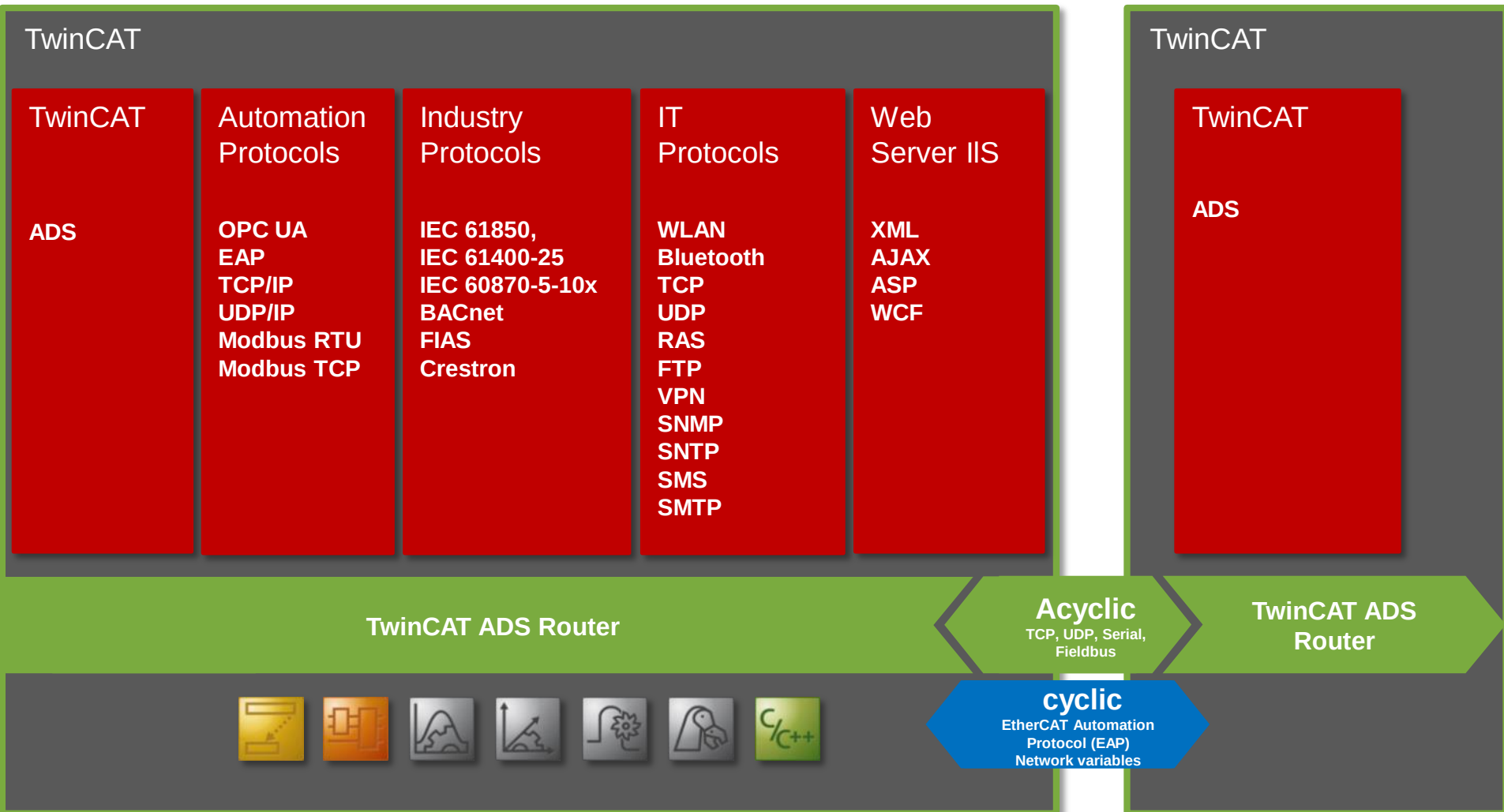
The automation pyramid

BECKHOFF

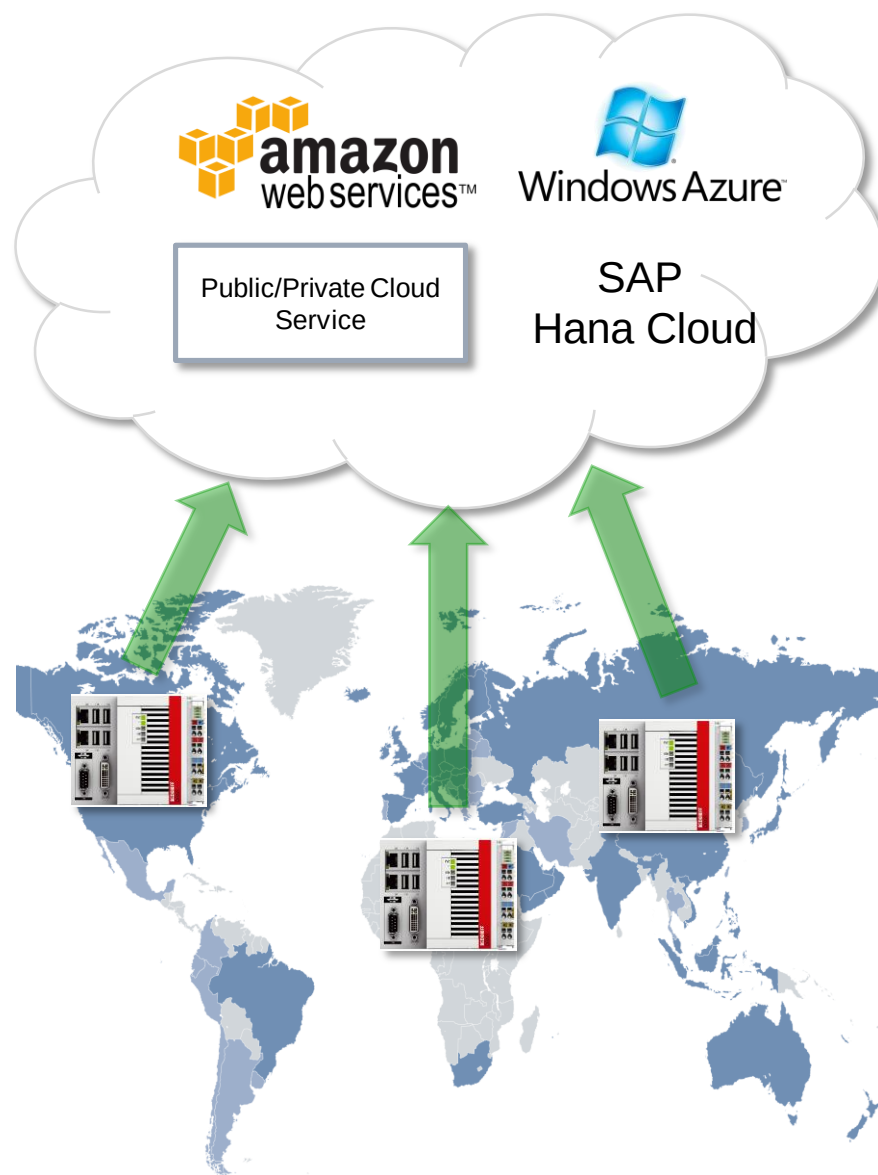


Overview TwinCAT connectivity

BECKHOFF

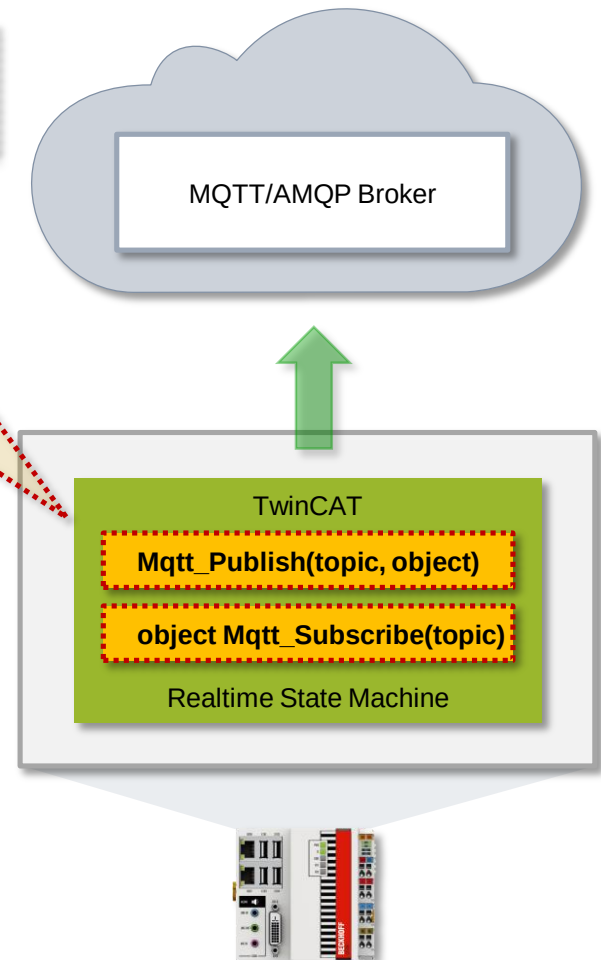


- New product family for connectivity world
- Easy connectivity for IoT communication
- Support for
 - Public and Private Cloud
 - MQTT, AMQP, OPC-UA
 - Third-Party devices
 - TwinCAT Analytics
- Smartphone app
 - Including push technologies to wearable devices



■ TwinCAT IoT Product Family

- TF670x IoT Communication
 - Publish/Subscribe data exchange via MQTT/AMQP



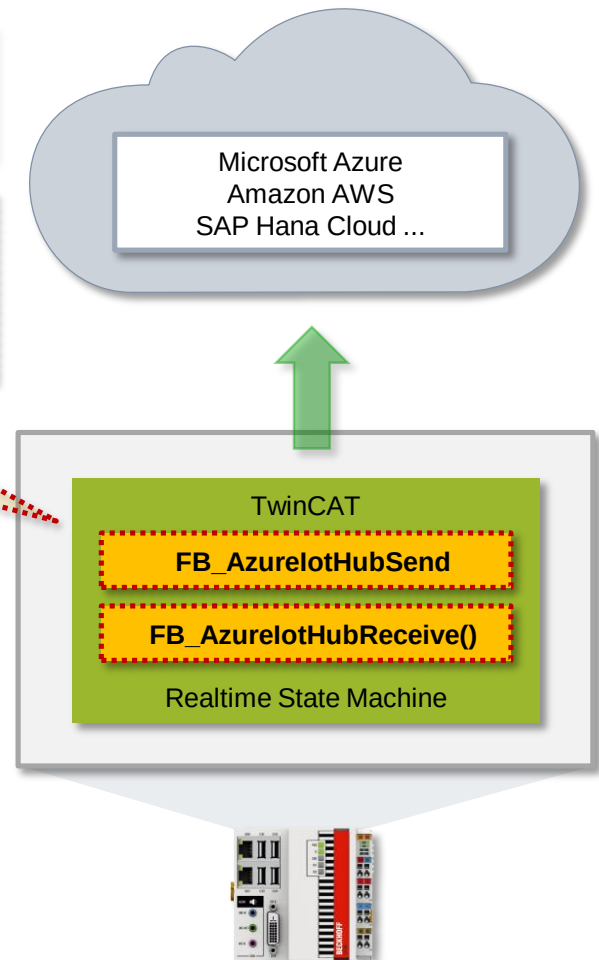
■ TwinCAT IoT Product Family

– TF670x IoT Communication

- Publish/Subscribe data exchange via MQTT/AMQP

– TF671x IoT Functions

- Easy connectivity for Public Cloud services
- Microsoft Azure and Amazon AWS



■ TwinCAT IoT Product Family

– TF670x IoT Communication

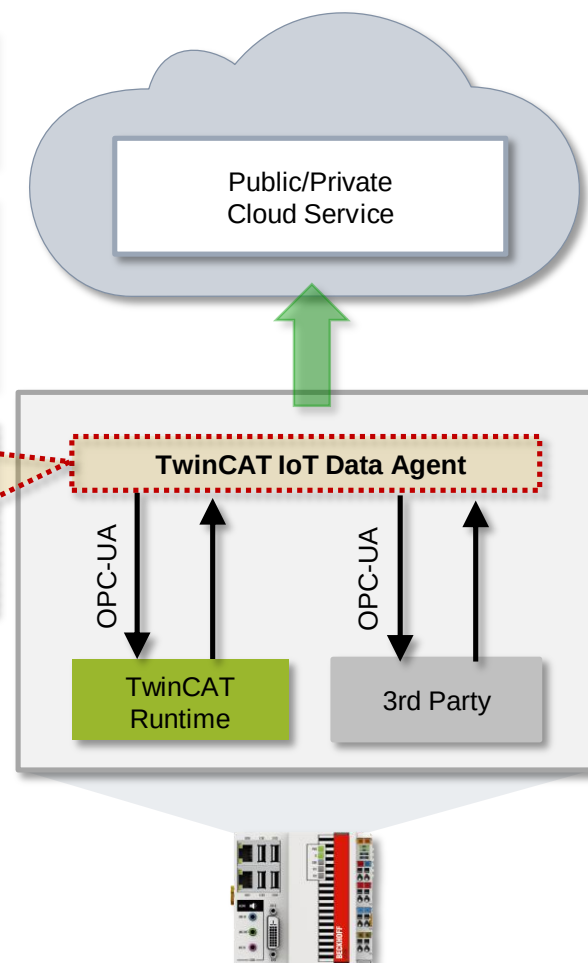
- Publish/Subscribe data exchange via MQTT/AMQP

– TF671x IoT Functions

- Easy connectivity for Public Cloud services
- Microsoft Azure and Amazon AWS

– TF672x IoT Data Agent

- Gateway application for Cloud connectivity
- Easy configuration without programming



■ 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

– TF672x IoT Data Agent

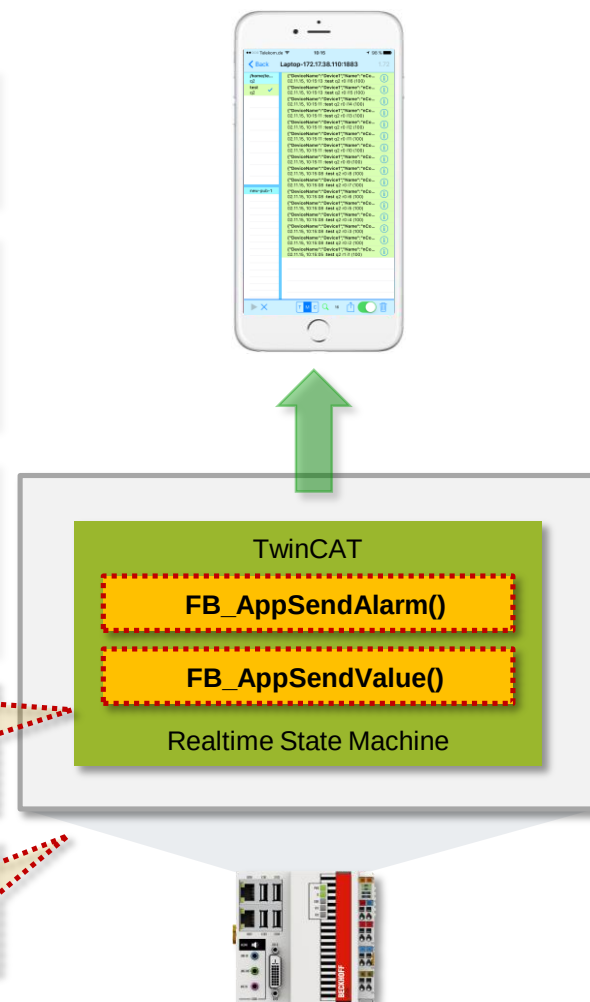
- Gateway application for Cloud connectivity
- Easy configuration without programming

– TF6730 IoT Communicator

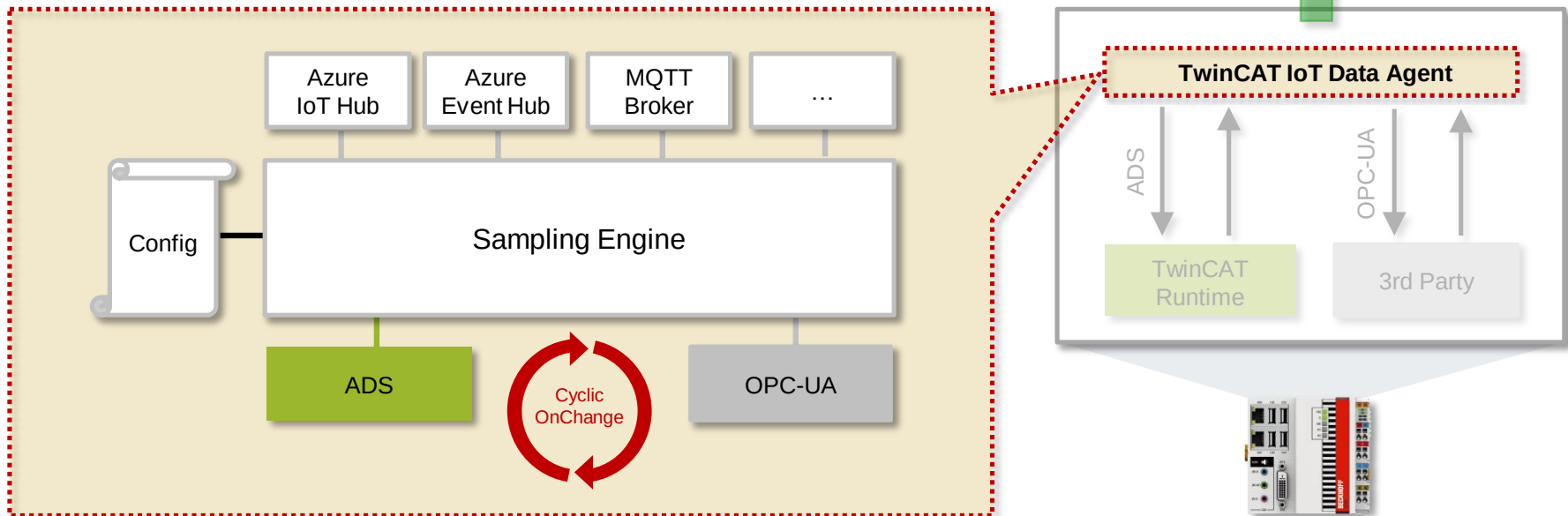
- Easy integration of mobile devices

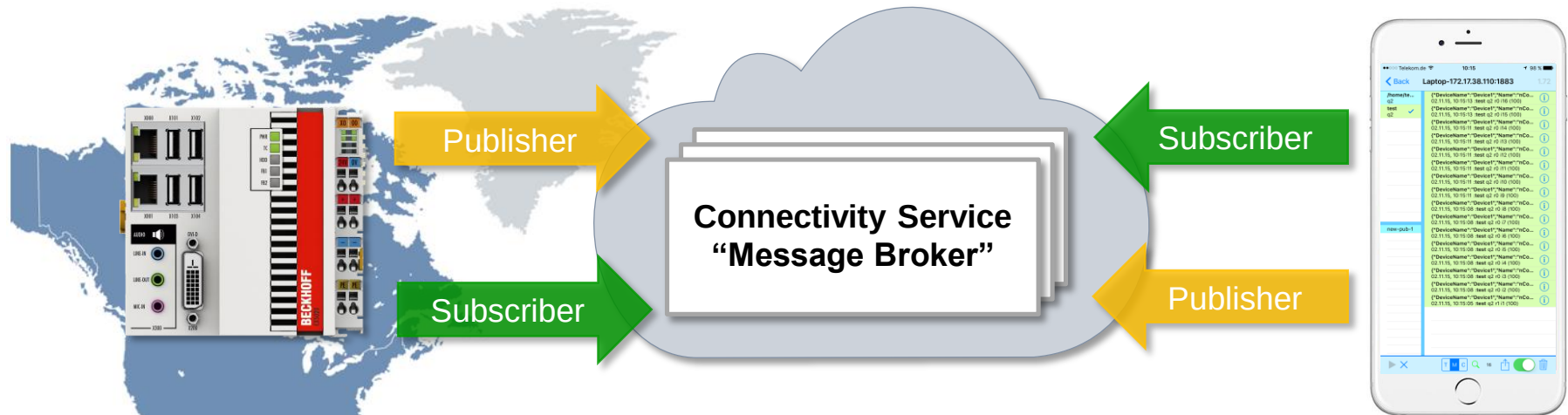
– TF6735 IoT Communicator App

- Smartphone App for TF6730



- Easy configuration via graphical tool
- Support for
 - multiple devices to retrieve data from
 - multiple IoT services



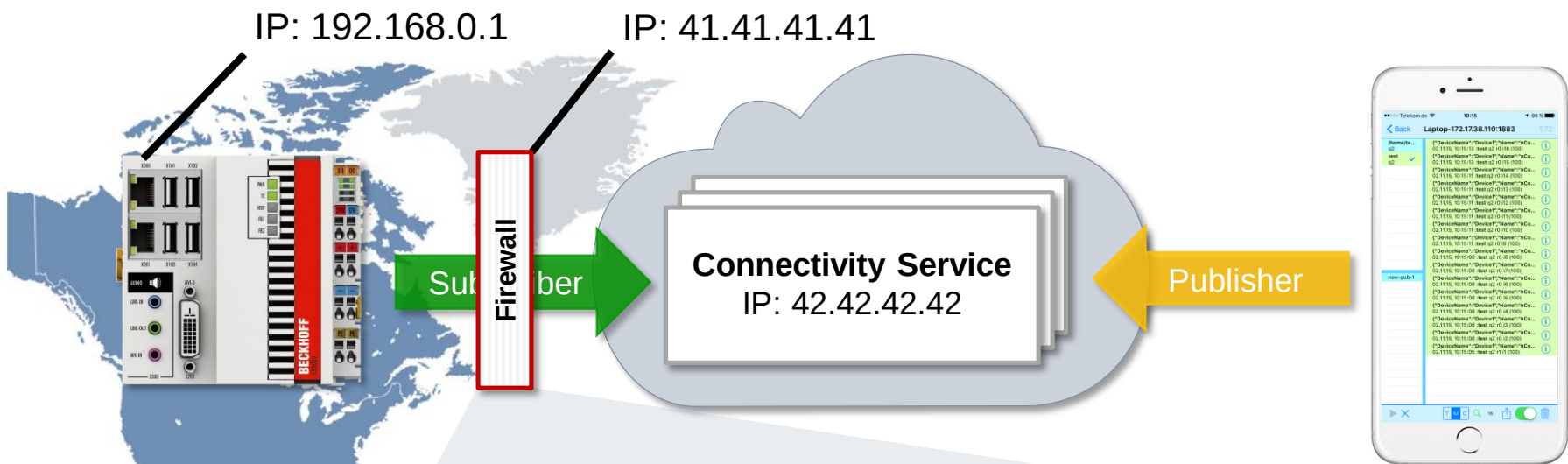


Advantages

- **Devices do not need to know each other**
→ decoupling of applications
- **All communication is outgoing**
→ easy firewall configuration
→ easy setup in IT infrastructure

Publish/Subscribe

BECKHOFF



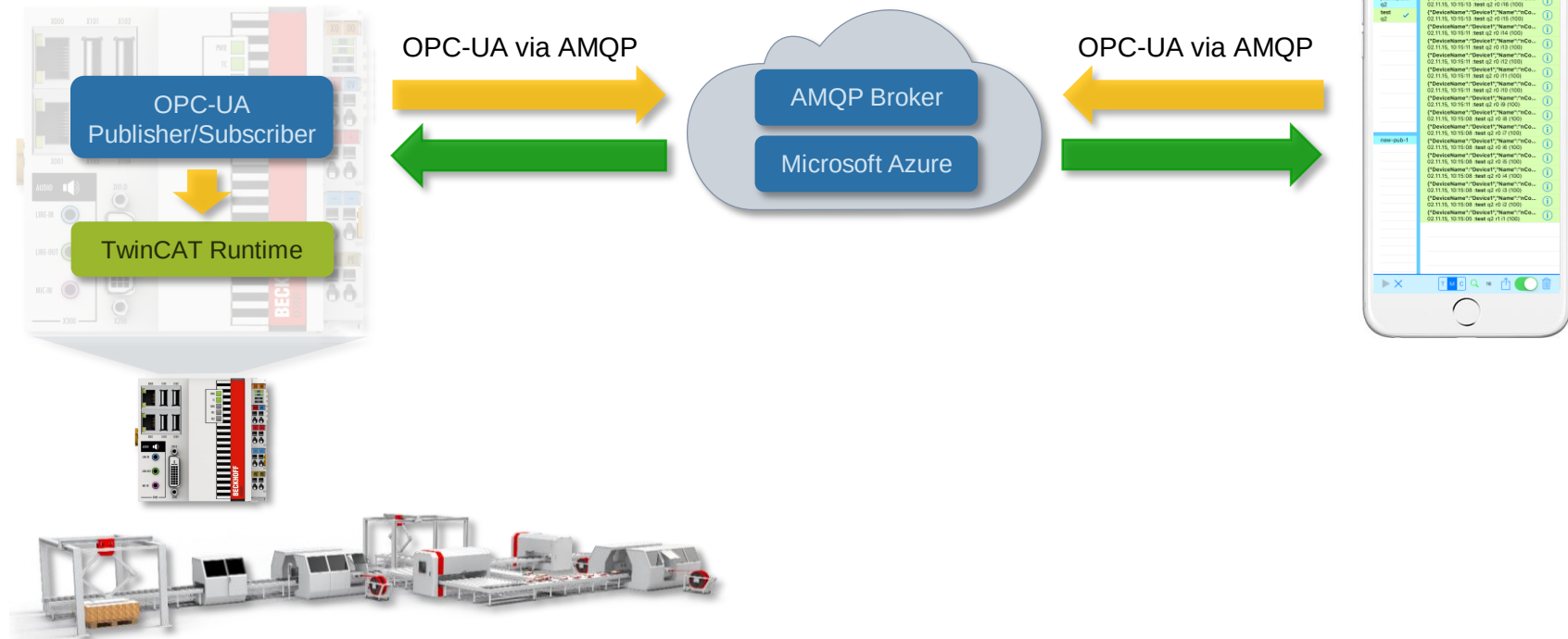
Source IP	Source Port	Destin. IP	Destin. Port
192.168.0.1	12345	42.42.42.42	1883

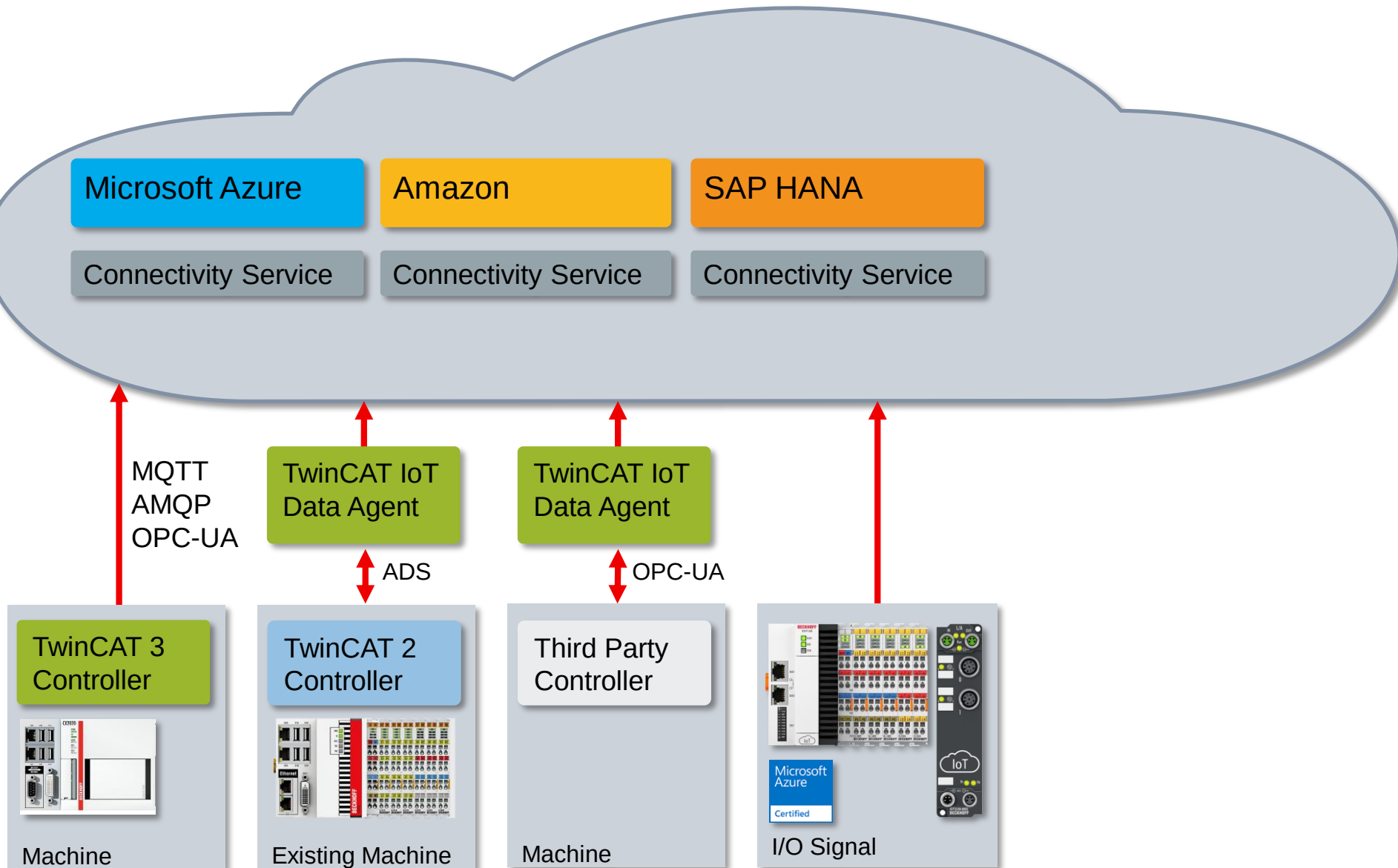


TCP reply

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

- OPC-UA:
 - recommended by RAMI4.0, BSI-proven
- Extension to spec: UA-via-AMQP
 - Enables Cloud-based connectivity scenarios
 - Integration in Microsoft Azure

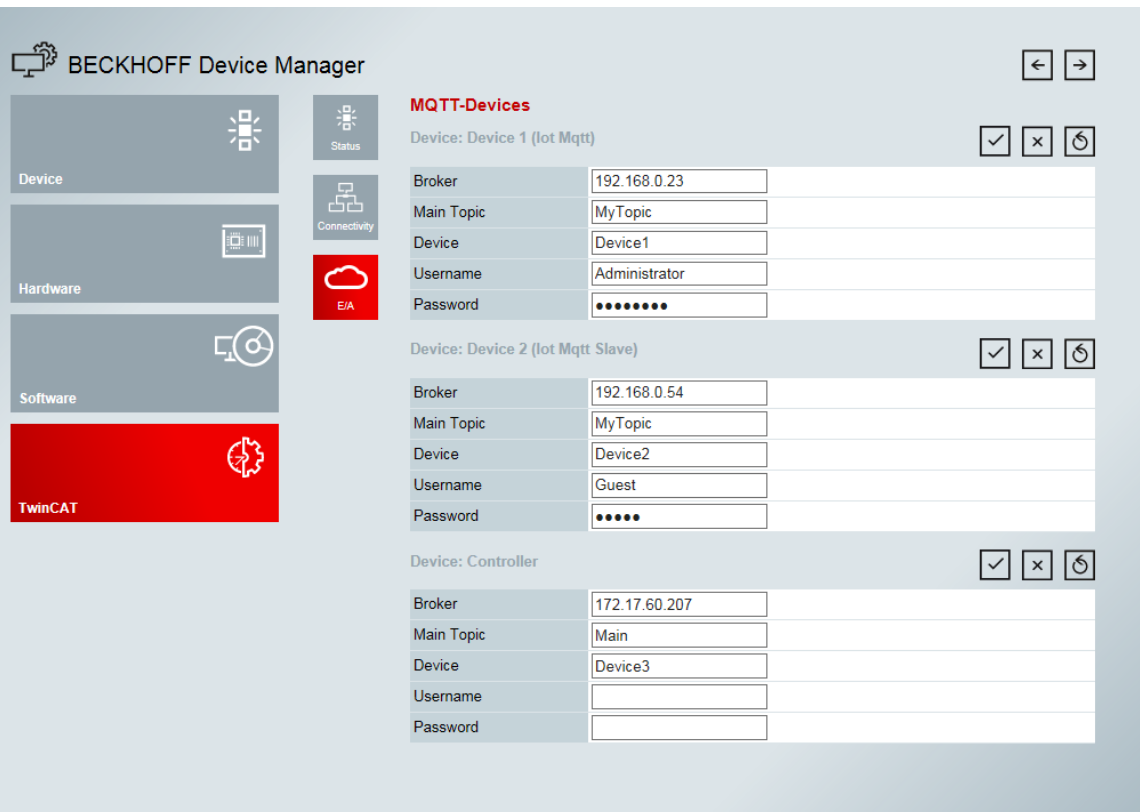




IoT Coupler (EK9160)

BECKHOFF

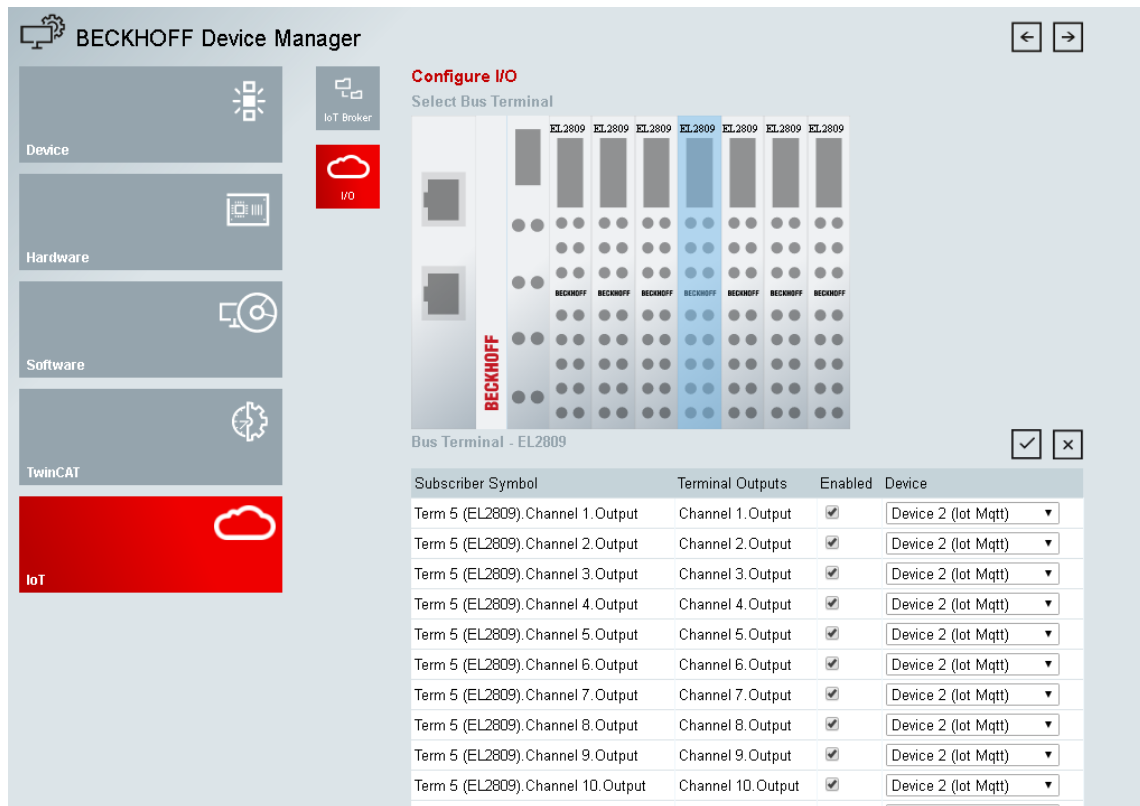
- Publish/Subscribe to process data via cloud service
- No TwinCAT System Manager necessary
- Using IPC Diagnostics website for configuration

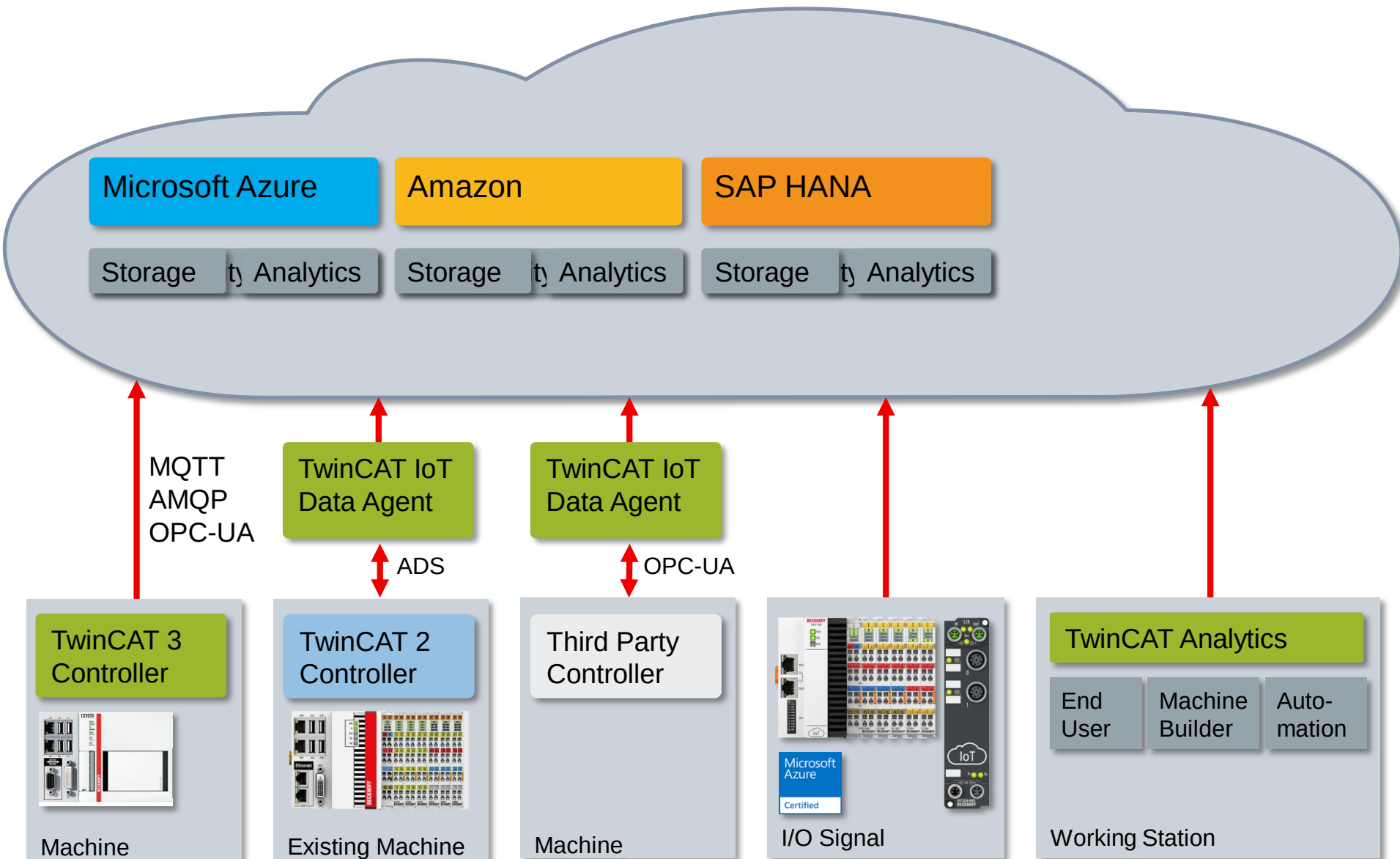


IoT Coupler (EK9160)

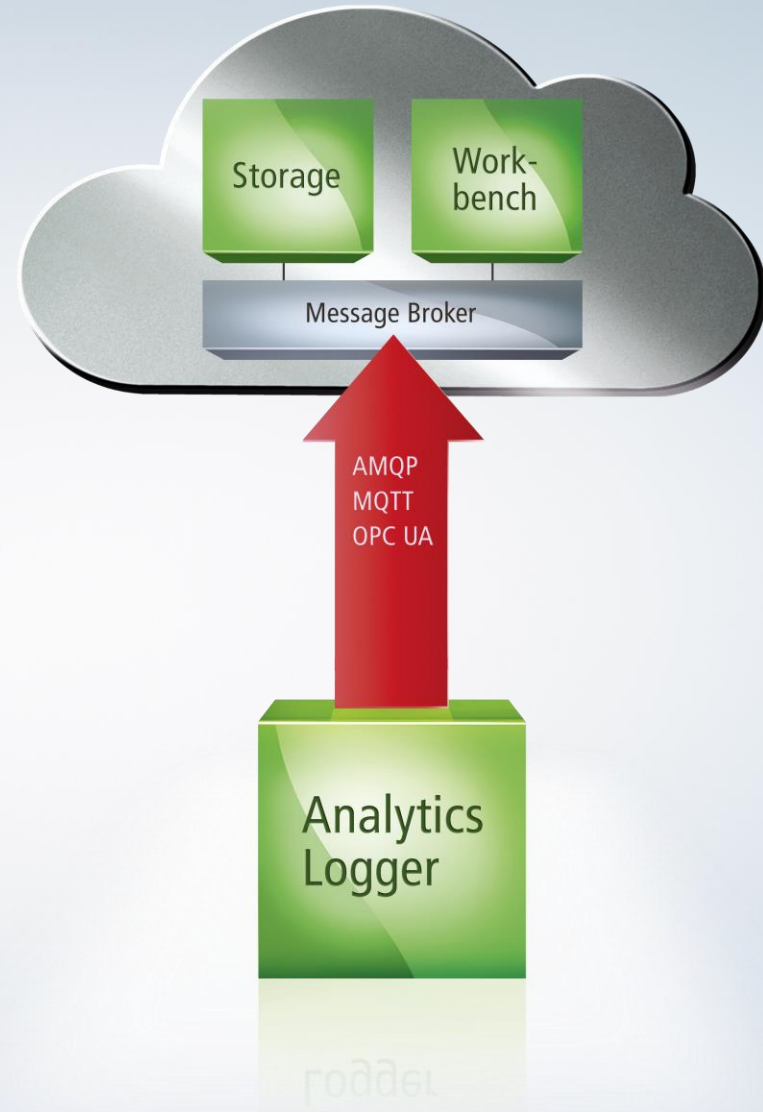
BECKHOFF

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

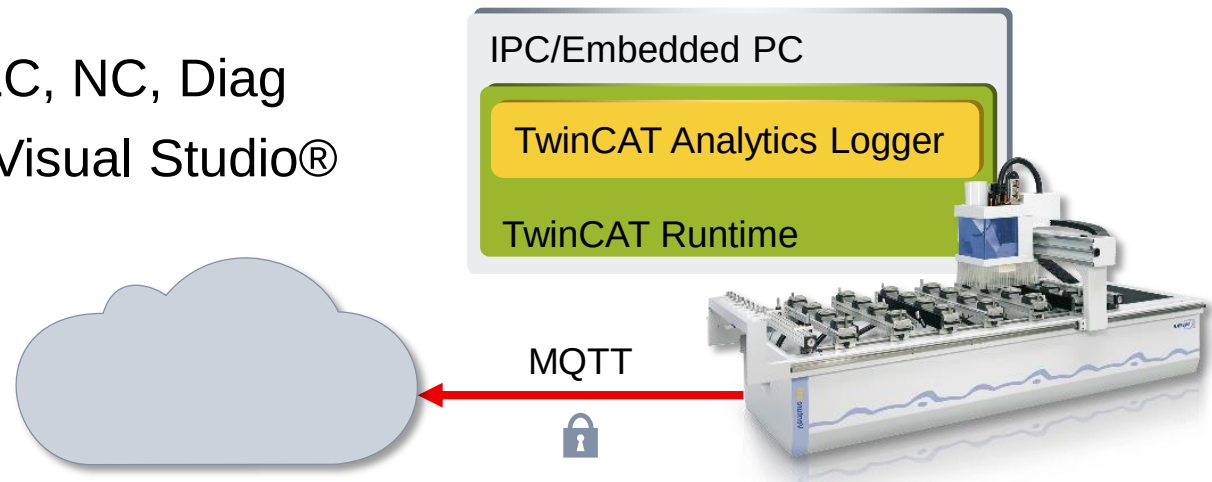




- TE35xx Analytics Workbench
- TF3500 Analytics Logger
- TF3510 Analytics Library
- TF3520 Analytics Cloud Storage Provider



- Cyclic data logging:
 - Process image, PLC, NC, Diag
- Easy configuration in Visual Studio®
- Data logging
 - IoT with MQTT
 - File based



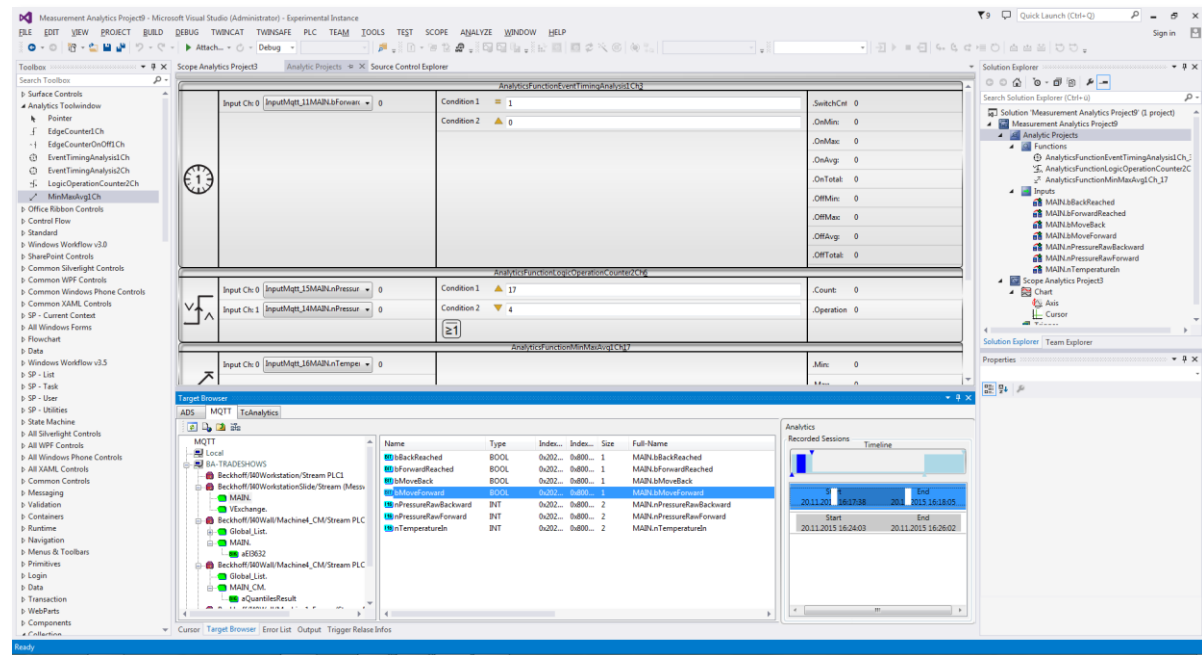
Solution Explorer

Tc3_Condition_Monitoring_Cloud

Parameter (Init)

Name	Value	CS	Type	PTCID
MQTT Host Name		☐	STRING(80)	0x02020113
MQTT Host IP Address	195.100.200.15	☐	ARRAY [0..3] OF BYTE	0x02020102
MQTT Main Topic	Beckhoff/Fair Hanover 2016/	☐	STRING(255)	0x02020008
MQTT Client ID		☐	STRING(80)	0x02020101
MQTT User Name	Pascal	☐	STRING(255)	0x02020106
MQTT Password		☐	STRING(80)	0x02020107
MQTT Data Format	IOT_FORMAT_BINARY	☐	IOT_FORMAT	0x02020114
MQTT JSON Whitespaces	FALSE	☐	BOOL	0x02020115
MQTT via ADS	FALSE	☐	BOOL	0x0202000C

- TwinCAT Analytics Configurator fully integrated into Visual Studio®
- Same algorithms in PLC library and configuration tool
 - Threshold monitoring of digital and analog values
 - Timing Analysis: total, min, max and average
 - Life time monitoring
 - Energy calculation
 - RMS calculation
 - State Analysis



TwinCAT Analytics Workbench

BECKHOFF

Measurement Analytics Project9 - Microsoft Visual Studio (Administrator) - Experimental Instance

FILE EDIT VIEW PROJECT BUILD DEBUG TWINCAT TWINSAFE PLC TEAM TOOLS TEST SCOPE ANALYZE WINDOW HELP

Attach... Debug

Toolbox

Search Toolbox

- Surface Controls
- Analytics Toolwindow
 - Pointer
 - EdgeCounter1Ch
 - EdgeCounterOnOff1Ch
 - EventTimingAnalysis1Ch
 - EventTimingAnalysis2Ch
 - LogicOperationCounter2Ch
 - MinMaxAvg1Ch
 - Office Ribbon Controls
 - Control Flow
 - Standard
 - Windows Workflow v3.0
 - SharePoint Controls
 - Common Silverlight Controls
 - Common WPF Controls
 - Common Windows Phone Controls
 - Common XAML Controls
 - SP - Current Context
 - All Windows Forms
 - Flowchart
 - Data
 - Windows Workflow v3.5
 - SP - List
 - SP - Task
 - SP - User
 - SP - Utilities
 - State Machine
 - All Silverlight Controls
 - All WPF Controls
 - All Windows Phone Controls
 - All XAML Controls
 - Common Controls
 - Messaging
 - Validation
 - Containers
 - Navigation
 - Menus & Toolbars
 - Primitives
 - Login
 - Data
 - Transaction
 - WebParts
 - Components
 - Collection

Scope Analytics Project3

Analytics Projects Source Control Explorer

AnalyticsFunctionEventTimingAnalysis1Ch3

Input Ch: 0	InputMqtt_11MAIN.bForward	0	Condition 1	1	.SwitchCnt	0
			Condition 2	0	.OnMin:	0
					.OnMax:	0
					.OnAvg:	0
					.OnTotal:	0
					.OffMin:	0
					.OffMax:	0
					.OffAvg:	0
					.OffTotal:	0

AnalyticsFunctionLogicOperationCounter2Ch6

Input Ch: 0	InputMqtt_15MAIN.nPressur	0	Condition 1	17	.Count:	0
Input Ch: 1	InputMqtt_14MAIN.nPressur	0	Condition 2	4	.Operation	0
			≥1			

AnalyticsFunctionMinMaxAvg1Ch17

Input Ch: 0	InputMqtt_16MAIN.nTempe	0	.Min:	0
			.Max:	0

Target Browser

ADS MQTT TcAnalytics

MQTT

- Local
- BA-TRADESHOWS
 - Beckhoff/40Workstation/Stream PLC1
 - Beckhoff/40WorkstationSlide/Stream (Messv)
 - MAIN.
 - EXchange.
 - Beckhoff/40Wall/Machine4_CM/Stream PLC
 - Global_List.
 - MAIN.
 - aE13632
 - Beckhoff/40Wall/Machine4_CM/Stream PLC
 - Global_List.
 - MAIN_CM.
 - aQuantilesResult

Name	Type	Index...	Index...	Size	Full-Name
bBackReached	BOOL	0x202...	0x800...	1	MAIN.bBackReached
bForwardReached	BOOL	0x202...	0x800...	1	MAIN.bForwardReached
bMoveBack	BOOL	0x202...	0x800...	1	MAIN.bMoveBack
bMoveForward	BOOL	0x202...	0x800...	1	MAIN.bMoveForward
nPressureRawBackward	INT	0x202...	0x800...	2	MAIN.nPressureRawBackward
nPressureRawForward	INT	0x202...	0x800...	2	MAIN.nPressureRawForward
nTemperatureIn	INT	0x202...	0x800...	2	MAIN.nTemperatureIn

Analytics

Recorded Sessions Timeline

Start	End
20.11.2015 16:17:38	20.11.2015 16:18:05
20.11.2015 16:24:03	20.11.2015 16:26:02

Solution Explorer

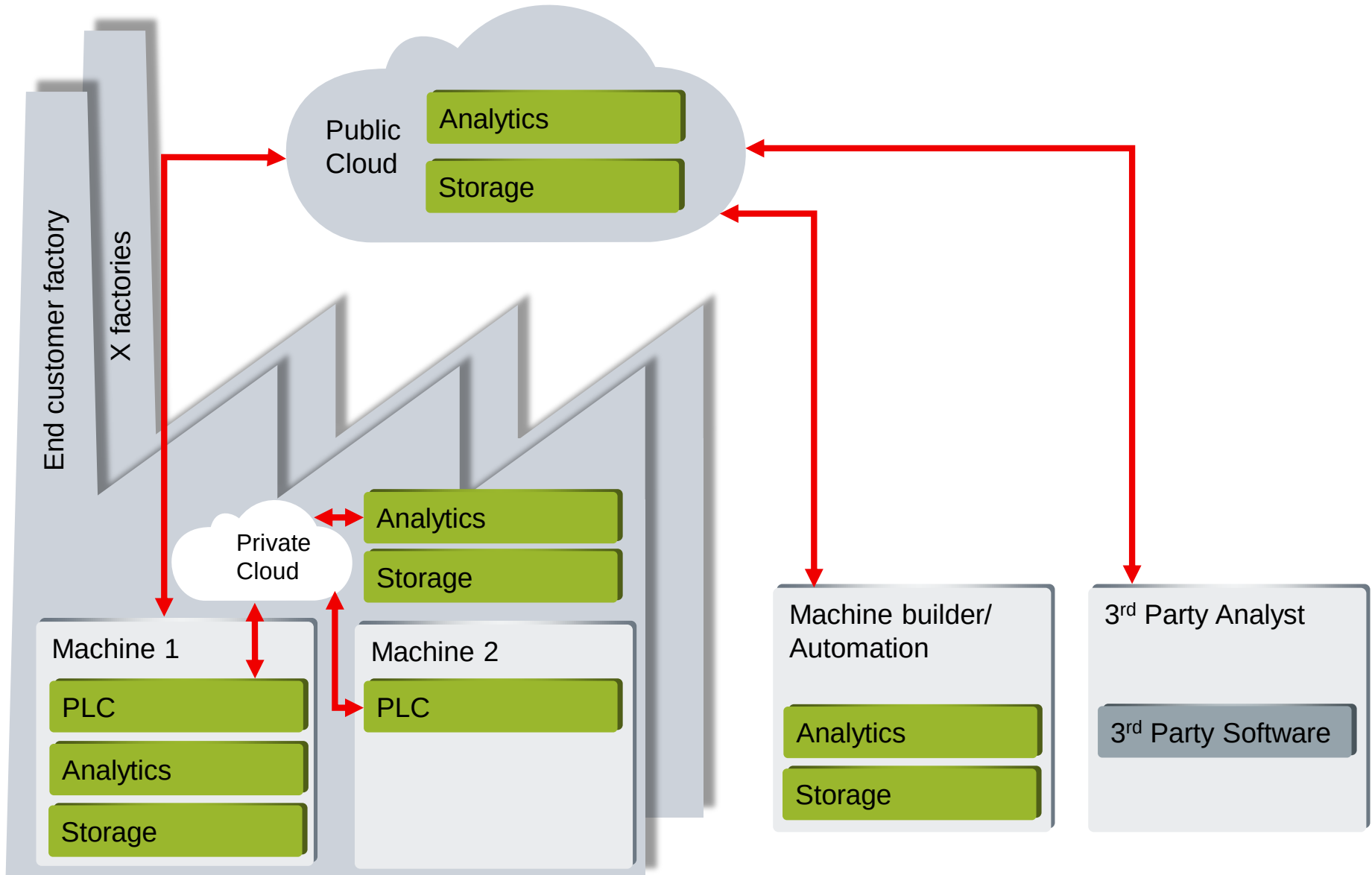
Search Solution Explorer (Ctrl+U)

- Solution 'Measurement Analytics Project9' (1 project)
- Measurement Analytics Project9
 - Analytics Projects
 - AnalyticsFunctionEventTimingAnalysis1Ch3
 - AnalyticsFunctionLogicOperationCounter2Ch6
 - AnalyticsFunctionMinMaxAvg1Ch17
 - Inputs
 - MAIN.bBackReached
 - MAIN.bForwardReached
 - MAIN.bMoveBack
 - MAIN.bMoveForward
 - MAIN.nPressureRawBackward
 - MAIN.nPressureRawForward
 - MAIN.nTemperatureIn
 - Scope Analytics Project3
 - Chart
 - Axis
 - Cursor

Solution Explorer Team Explorer

Properties

Ready



More information...

BECKHOFF

- **Beckhoff main booth**
Hall B6
- **Beckhoff on ITQ booth**
Hall B4
- **Beckhoff on OPC booth**
Hall B4
- **TwinCAT IoT webinars**
www.beckhoff.de/webinar
www.beckhoff.com/webinar

