OPC UA
From Sensor to IT Enterprise

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OPC UA – Core Value Proposition For the IIoT

278 companies took part in the survey, mainly from the machinery and plant manufacturing industry. 205 of the companies that took part had fewer than 500 employees. (Source: BITKOM, VDMA, ZVEI 2013)

What are the greatest challenges connected with implementing Industrie 4.0? (you may select more than one answer)

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standardisation</td>
<td>147</td>
</tr>
<tr>
<td>Process/work organisation</td>
<td>129</td>
</tr>
<tr>
<td>Product availability</td>
<td>98</td>
</tr>
<tr>
<td>New business models</td>
<td>85</td>
</tr>
<tr>
<td>Security know-how protection</td>
<td>78</td>
</tr>
<tr>
<td>Lack of specialist staff</td>
<td>70</td>
</tr>
<tr>
<td>Research</td>
<td>64</td>
</tr>
<tr>
<td>Training and CPD</td>
<td>42</td>
</tr>
<tr>
<td>Regulatory framework</td>
<td>30</td>
</tr>
</tbody>
</table>

Industry 4.0 Basic list 7 criteria – 2 of them are OPC UA

→ **Criteria 2: Industry 4.0 communication**
Mandatory: Administration shell of the product can be addressed (at any time) with the assistance of the identification online via TCP/UDP/IP with at least the information model from OPC-UA

→ **Criteria 5: Industry 4.0 services and conditions**
Optional: Information such as statuses, error messages, warnings, etc. available via OPC UA information model in accordance with an industry standard

(Source: www.zvei.org)

OPC UA serves as the common data connectivity and collaboration standard for local and remote device access in IoT, M2M, and Industrie4.0 settings

- Definition 2003 – 2006
- Verification and Implementation 2006 – 2008
- Final OPC Foundation Release 2009
- IEC 62541 Release 2010 – 2012
Industry 4.0 Paradigm Shift – OPC UA the Industrial Interoperability Standard

**Benefit in the Data & Management Level**
- Platform independent
- Semantic services
- Direct device connection over all levels
- Authentication and encryption

**Benefit in the Controller & Field Level**
- Deterministic
- Real-time capable
- Real-time C2C-communication
- Standardized profiles

**Enterprise Cloud / Industry 4.0 Backbone / Analytics (AI)**
- Asset Mgmt., Predictive Maintenance, OEE, Energy Mgmt., Machine Learning

**Increased Interaction / Data Analytics**
- Centralized Supervision / Integrated MES

**Fog / Edge Server / Edge Computing / M2M**
- On-premise Private Cloud, Data Center, Edge Gateway, Basic Automation

**Shop Floor / Distributed Control / Field Sensing Device**
- I/O Modules, Servo Driver, Inverter, Sensors

(Source: Siemens & OPC Foundation)
Accelerating IoT Deployment by Industrial Edge-SRP

- Data Logger w/Diverse Database
- Protocol Conversion
- Resume Breakpoints
- Real-time Fieldbus & SoftMotion Control
- IEC 61131-3 Programming Compliance
- OT/IT Integration Flexibility
- Centralized Visualization Management
- Web-based Data Monitoring
- Production Reporting Interface
- Instinct Model Tuning
- Preventive Maintenance
- Secured IoT Authorization
- Edge SRP data exchange via OPC-UA
- Remote Access by IT system

3rd Party Solution Provider

Microsoft Azure

Amazon Web Services

Advantech

WISE-PaaS

AloT Solutions & Marketplace

Telecom Provider

WISE-PaaS Marketplace

Customer Existing Remote Service Server

WISE-PaaS/Device On

WISE-PaaS/Device On

kubernetes

(Container Docker)

Local Installation

PLC 200+

WISE-PaaS/EdgeLink

WISE-PaaS/EdgeControl

WebAccess/HMI

WebAccess/SCADA

EDGEcross

Microsoft Azure IoT Edge

Advantech

Edge Gateway

Edge Controller

Edge Visualizer

Edge AI & Analysis
Field Sensing Device drives Digitalization in IIoT Application

- IT and OT convergence toward IIoT by Cloud Access via MQTT or OPC UA
- PoE IEEE 802.3af ready for quickly integration existing PoE system
- Intelligent Alarm by actively notify through e-mail
- Secure data by TLS encryption transmission and Restrict the access by White List & Certificate Trust X

OPC UA Remote I/O
ADAM-6300 Series

OPC UA Server

Cloud Application
OPC UA Clients
CNC Edge Gateway Box for Intelligent CNC Machinery Management

- Supports multiple CNC protocols for data conversion
- Improves productivity with data-driven decision making
- Enables machine-to-intelligence solutions

CNC Smart Edge Box
ESRP-CNC-UNO1372
WebAccess/CNC

M2I/CNC
WISE-PaaS/CNC

Machinery CNC Controller
Machinery CNC Controller

- CNC Status
- NC Program
- Spindle Loading
- Servo Speed
- Motor Temperature
- G-code, Coordinates

Edge – Connect to All CNC
- Centralized Data Management
- Industrial Cloud Platform Service (PaaS)
- Domain APP Services

WISE-PaaS Cloud

OEE KPI (A/P/Q)
Process-Monitoring
Abnormality Analysis

Factory Overview
Production Line Monitoring
Machine Availability

Cloud Application
OPC UA Clients

Edge Computing
OPC UA Server

Field Server Application
OPC UA Server/ Clients

ERP / MES / SFR Database

WISE-PaaS Cloud (DeviceM+ 
KPI Analysis & Monitoring

Machinery CNC Controller
Machinery CNC Controller

- Machine Connectivity
- Machine Connectivity

Edge Computing
OPC UA Server

Field Server Application
OPC UA Server/ Clients

ERP / MES / SFR Database
Edge Gateway with Complete Data Collection for Equipment & Facility

- Provides complete HMI functionality
- Supports 450 PLC communication protocols for excellent connectivity
- Various data visualization applications for operation monitoring

- Supports various PLC protocol drivers for data conversion
- Enhances cyber security with embedded security chip
- Bridges the gap between OT and IT through OPC UA over MQTT
Edge Controller CODESYS Solutions for Real-Time Machine Control

- One Open Controller for all Control System with Real-Time Fieldbus Control
- Reduce Equipment Downtime with Powerful Visualization Management
- Variety Database Connection for Flexible Management Integration
Machine & Process Visualization easy Operation Management

- Provides complete HMI functionality
- Supports 450 PLC communication protocols for excellent connectivity
- Various display module sizes for diverse visualization applications
- Easy operation on any browser with 100% HTML5 web-based SCADA
- Open interfaces and database connectivity ensures flexible integration
- Reliable and continuous operation with SCADA redundancy
Secured Intelligent Platform with Azure IoT Edge Ready

Azure IoT Edge
- ESRP-CSS-UNO2484
- ESRP-CSS-UNO2271
- ESRP-CSS-UNO1372
- ESRP-CSS-UNO2372

WISE-PaaS/EdgeLink
- Supports more than 200+ PLC devices

- Extends cloud intelligence and analytics to edge devices
- Boosts productivity and response times with data insights
- Offers secure cloud communication and edge intelligence
- WISE-PaaS/EdgeLink supports more than 200 PLC device
**OPC Foundation Collaboration with Partners**

**Specific Models**
- Use case specific models
- Industry specific models
- Device / machine specific models

**Vendor Specific Extensions**

**Companion Information Models**
- PLCopen, ADI, FDI, FDT, BACnet, MDIS, ISA95, AutomationML, MTConnect, AutoID, VDW, EUROMAP, Robotics, Vision Systems
- IEC 61850/61400, Sercos, PowerLink, PROFINet and more coming

**DI Model**
- UA for Devices

**Built-In Information Models**
- Base, DA, AC, HA, Programs

**OPC UA Meta Model**
- Basic rules for exposing information with OPC UA

**Built-in Services**
- Browse, Read / Write
- Method Calls, Subscriptions

**Message Model**
- PubSub Configuration, DataSets
- Message Readers and Writers

**Built-in Binary**
- UA Binary

**Built-in Security**
- UA Secure Conversation
- UA TCP
- UA Binary
- UA Secure Conversation
- UA TCP

**Built-in JSON**
- JSON

**Built-in WebSockets**
- WebSocket / HTTPS

**OPC Foundation Responsibility**
- OPC UA = IEC 62541

Source: OPC UA Foundation
OPCF “Field Level Communication Initiative”
Extending OPC UA include TSN down to field level

1. IT / OT Communication
2. Cloud Integration
3. Secure Remote Access
4. Local OT Communication
5. Controller to Controller
6. Controller to Field Device
7. Wireless Integration (5G)
8. Future Ready

Source: OPC UA Foundation
OPCF – FLC Collaboration with IEC & IEEE

The working groups will closely align with the TSN Profile for Industrial Automation (TSN-IA-Profile) which will be standardized by the IEC/IEEE 60802 standardization group. This will help ensure that a single, converged TSN network approach is maintained so that OPC UA can share one common multi-vendor TSN network infrastructure together with other applications.
Find Products

The OPC Foundation recommends the use of Certified Products. OPC Certified Products have successfully passed rigorous testing at an OPC Foundation test-lab and demonstrate compliance, interoperability, robustness, reliability, and usability.

This product catalog features OPC Servers, Clients, Toolkits and Services from OPC Foundation members.

<table>
<thead>
<tr>
<th>Name</th>
<th>Member</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>ESRP-PCS-UNO2271</td>
<td>Advantech Co., LTD.</td>
<td>Edge Data Gateway [Key Features] Supports ...</td>
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<tr>
<td>ESRP-PCS-UNO1372</td>
<td>Advantech Co., LTD.</td>
<td>Intelligent Platform with Azure IoT Edge &amp; WISE-PaaS/EdgeLink ...</td>
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<td>Diagnosis and preventive maintenance platform ...</td>
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<td>ESRP-MPM-UNO3283</td>
<td>Advantech Co., LTD.</td>
<td>Diagnosis and preventive maintenance platform, EDGECROSS ...</td>
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<td>ESRP-SCS-UNO1372</td>
<td>Advantech Co., LTD.</td>
<td>Cabinet controller: CODESYS RTE with SoftMotion + Visualization Training ...</td>
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<tr>
<td>ESRP-SCS-TPC5152</td>
<td>Advantech Co., LTD.</td>
<td>Panel controller: CODESYS RTE with SoftMotion + Visualization Target ...</td>
</tr>
<tr>
<td>ESRP-SCA-TPC6200</td>
<td>Advantech Co., LTD.</td>
<td>Process Visualization with Various Display Sizes ...</td>
</tr>
<tr>
<td>ESRP-HMI-TPCB200</td>
<td>Advantech Co., LTD.</td>
<td>Machine Visualization with Various Display Sizes ...</td>
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</table>

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Edge SRP Ready to GO!

https://opcfoundation.org/products
Co-Creating the Future of the IoT World