Industry 4.0: OPC UA bridging IT and automation

October 7, 2014, OPC & MES Event, Peter Seeberg, © Softing Industrial Automation
Smart Machine Module

- smart controller
- smart controller
- smart controller
- smart controller
- smart controller
- smart controller
- smart controller

© smartfactory-KL 2014-17
Recommendations for implementing the strategic initiative INDUSTRIE 4.0

Final report of the Industrie 4.0 Working Group
Manufacturing Process Control
1. Revolution
Changing control architecture

Enterprise level
Control level
Field level

Today
Hierarchical automation pyramid

Tomorrow
Smart CPS network

© SmartFactory 2014 - 23
Before OPC

бýtь чёлóвеkom со срёдствами
10100100
01000111
11010101
With Classic OPC

On?

Yes
With OPC Unified Architecture

Can I see your ID

Here is my ID

On?

Please inform me if something goes wrong

Yes
With OPC UA Information Models

Who are you?

My name is R2-D2

What can you do for me?

I can navigate, lift, drill and cut

Can you lift me up to the second floor?

What is your weight?

200 kg

OK, let's start
Customer Order: 50 gears until Monday

I cannot make Saturday

I will fill the depot.

Turn me on.

The depot is almost empty.

I can work Saturday

Capacity booked until Friday.

Must be in Shipping in 2 hrs.
"The soul that sees beauty may sometimes walk alone."

"I can navigate, lift, drill and cut."

"00011010 111001011 011111011."
Implicitly Secure

Authentication of Clients and Servers
- Achieved by using X.509 certificates ("application instance certificates")

Authentication of users
- Achieved by using username/password, X.509 certificate, or WS-SecurityToken

Integrity of their communications
- Digital signatures based on X.509 certificates

Confidentiality of their communications
- Encryption based on symmetric cryptography, key negotiation includes authentication based on X.509
Platform Independence

Scalability

Portables

Desktop PC

Server Cluster

Server

Cloud

Controllers

Embedded Systems

Mac

Java Client

Java Server

Linux

Windows 7

.NET Client

.NET Server

Windows XP Embedded

Linux

C/C++ Client

C/C++ Server

VxWorks
Communication Reliability

- OPC UA recovers from communication loss
- OPC UA ensures robust and reliable communication
  - Keep-alive monitoring
  - Buffering of data and acknowledgements
  - Fast recovery in case of communication errors
  - Redundancy concepts
Compliance

OPC Interoperability Workshop, Asia
June 18 - 20, 2014, Tokyo, Japan

Test applications in a real-world environment with peers.
Interops are “extremely valuable” in preparing products for release.

Learn more
Transport Protocol Bindings

- OPC UA has been architected for speed and network performance

<table>
<thead>
<tr>
<th>XML Web Services</th>
<th>Optimized OPC UA Binary</th>
</tr>
</thead>
<tbody>
<tr>
<td>UA XML</td>
<td>UA Binary</td>
</tr>
<tr>
<td>WS Secure Conversation</td>
<td>UA Secure Conversation</td>
</tr>
<tr>
<td>SOAP 1.2</td>
<td>UA TCP</td>
</tr>
<tr>
<td>HTTP</td>
<td>TCP/IP</td>
</tr>
</tbody>
</table>
The new smartfactory demonstrator and its partners

Worldwide first Industrie 4.0 demonstrator built by industry

smartFactory®

© smartfactory-KL 2014-30

© Softing 2014 / Page 28
Peter Seeberg
Market Segment Manager, Factory Automation

Softing Industrial Automation GmbH
http://industrial.softing.com