OPC UA Working Group

OPC UA Technical Update

Matthias Damm
Executive Director ascolab GmbH
matthias.damm@ascolab.com
Associate and Consultant Unified Automation
OPC Foundation Board of Directors
Editor OPC UA working group
Chairman DI, BACnet and PubSub working group
Agenda

- OPC UA Introduction
- OPC UA Work Items
- OPC UA Sub Working Groups
- OPC UA PubSub Roadmap
OPC Unified Architecture

OPC UA is an information centric layered architecture
- Secure
- Platform Independent
- Scalable
- Vendor Interoperability
- Object Oriented

OPC UA is much more than a protocol

Built-in Information Models
Base, DA, AC, HA, Prog, DI

OPC UA Meta Model
Basic rules for exposing information with OPC UA
OPC Unified Architecture

OPC Foundation collaborations with organizations and domain experts
- OPC UA defines HOW
- Domain experts define WHAT

Companion Information Models
- PLCopen, ADI, FDI, FDT, BACnet, MDIS, ISA95, AutomationML, MTConnect, AutoID, VDW, IEC 61850/61400, ODVA/Sercos and more coming

Built-in Information Models

OPC UA Meta Model
OPC Unified Architecture

OPC UA Client/Server Communication Model
- Client friendly API to access information in the server

Client/Server

Vendor Specific Extensions

Services
- Browse
- Read / Write
- Method Calls
- Subscriptions

Protocols
- UA Binary TCP
- HTTPS / UA Binary
- Webservices

Companion Information Models

Built-in Information Models

OPC UA Meta Model
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New Use Cases

- Clients and Servers behind firewalls (Relay)
- Controller to controller communication
- Integration with message brokers
- Cloud connectivity
- Large scale
OPC UA Publish/Subscriber Communication Model

- Generic Pub-Sub Information Model
- Initial protocols selected, evaluation of other protocols ongoing
OPC UA Server and Publisher

OPC UA Server

Client A Session

Subscription

Address Space

Message Oriented Middleware

Subscriber 1

Subscriber N

Publisher

DataSetWriter

DataSet
Pub-Sub with UDP Secure Multicast

OPC UA Subscriber

Message 276

Publisher

Connection

Group

DataSetWriter

OPC UA Subscriber

Message 276

OPC UA Subscriber

Message 276

UDP Multicast Group 224.0.5.1

UDP Multicast Group

OPC UA application

Subscriber

Connection

Group

DataSetReader

OPC UA application
Controller to Controller

- Existing OPC UA Server can be extended
- Configuration through OPC UA Clients

 OPC UA Client

UA TCP / UA Binary

Configure

OPC UA Server

Product specific address space and data integration

Publisher

Send

UA UDP Multicast

Subscriber

Receive

OPC UA Server

Product specific address space and data integration
Pub-Sub with Broker

Supports connectivity between OPC UA applications that reside in different networks, or where data shall be published to Clients that reside “in the Cloud”, as well as network topologies where relays, brokers, or event hubs enable the data transmission. It can connect any number of Servers with any number of Clients.

AMQP 1.0 chosen as the technology to use (also used by MS Azure and others)
Initial prototype will use JSON for topic communication and UA Binary for Queues.
Other features in work

- Relay protocol binding for Client/Server
  - Encoding: UA Binary
  - Message Security: UA Secure Conversation
  - Transport: AMQP
- New user token type based on OAuth 2.0
- Standard user authorization configuration for OPC UA Server address space
- Simplified and optimized meta data access for structure data types
- Extension to file transfer functionality
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OPC UA Security Working Group

- Sub Group of OPC UA Working Group

- Started end of 2014 as permanent WG
  - Dedicated group of security experts
  - Review results of OPC UA security reviews by organizations like NIST or BSI
  - Review OPC UA security research papers
  - Propose security related enhancements to UA WG
  - Documented BSI results available: https://opcfoundation.org/security/
PubSub Prototyping

- Sub-Group of UA WG
- Kick-off on June 8, 2015
- Over 80 WG members
- Wireshark available
- Second demo finished
Controller to Controller real-time?

- UDP Multicast provides
  - Thin and efficient protocol stack for message handling
  - Allows cyclic data exchange
  - Base for device side real-time handling

- Standard Ethernet is not real-time capable

- TSN (Time Sensitive Network) can solve this
  - IEEE 802 working group – will be part of standard Ethernet
  - Time synchronization
  - Guaranteed bounded latency
  - Path redundancy for reliability
  - Low latency (cut-through and preemption)
  - Bandwidth (Gb+)
TSN Evaluation

- Sub-Group of UA Working Group
- Kick-off on June 8, 2015
- Over 80 WG members
- TSN Evaluation
  - TSN is a standard real-time extension for Ethernet
  - Collection of use cases and requirements finished
  - Communication parameters and OPC UA requirements already defined and integrated in PubSub definition
  - Configuration model discussion started
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OPC UA PubSub Roadmap

2014
UA WG
Use Cases collected

2015
UA WG
First Draft

2016
UA WG
Stable Draft
UA WG
Release Candidate

2017
UA WG
PubSub Release
UDP AMQP
UA WG
Stable OPC UA TSN Draft

Main definition phase

Prototyping
First sample applications available

Prototyping
First multivendor demo at Hannover Fair

Prototyping
Enhanced multivendor demo at SPS/IPC/Drives

Prototyping
Complete PubSub implementations
OPC UA Pub-Sub

- OPC UA – communication platform for information models (HOW)
- Domain experts define information models (WHAT)
- OPC Foundation extends communication with Pub-Sub
- Information Models are not affected
- OPC UA Applications just update SDKs and Stacks