

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

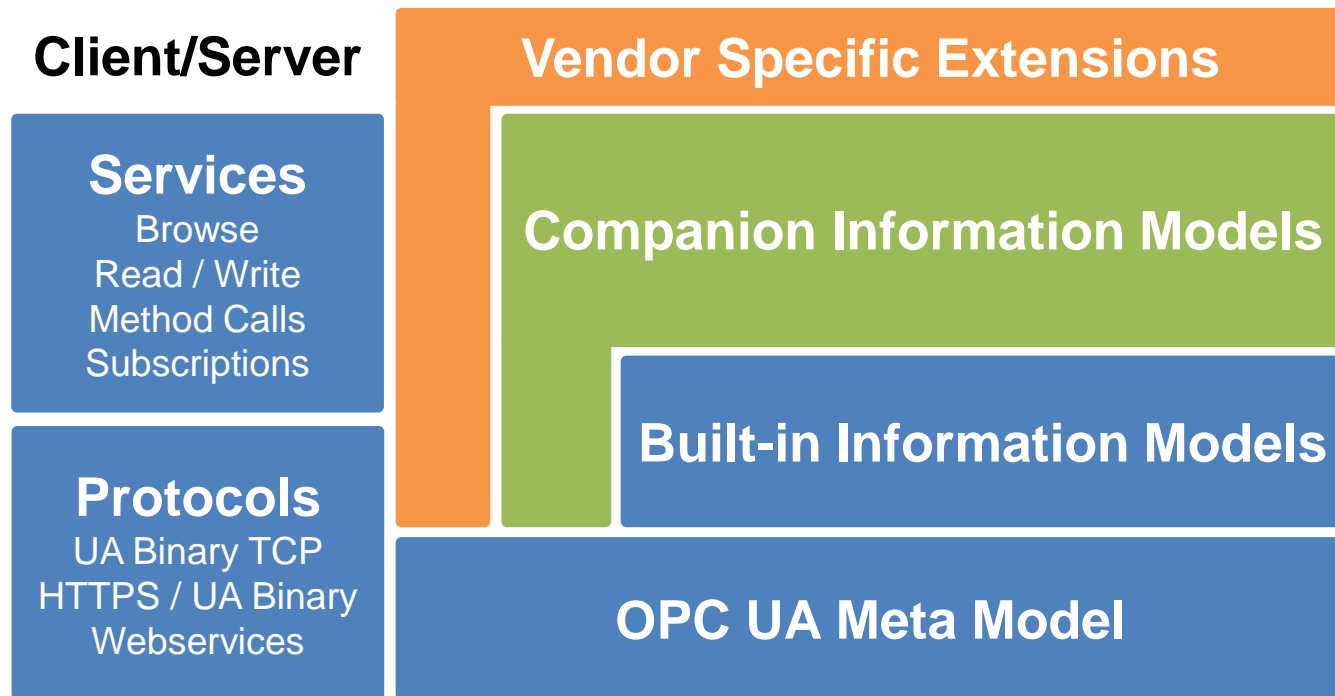
Built-in Information Models

OPC UA Meta Model

OPC Unified Architecture

OPC UA Client/Server Communication Model

- ▶ Client friendly API to access information in the server

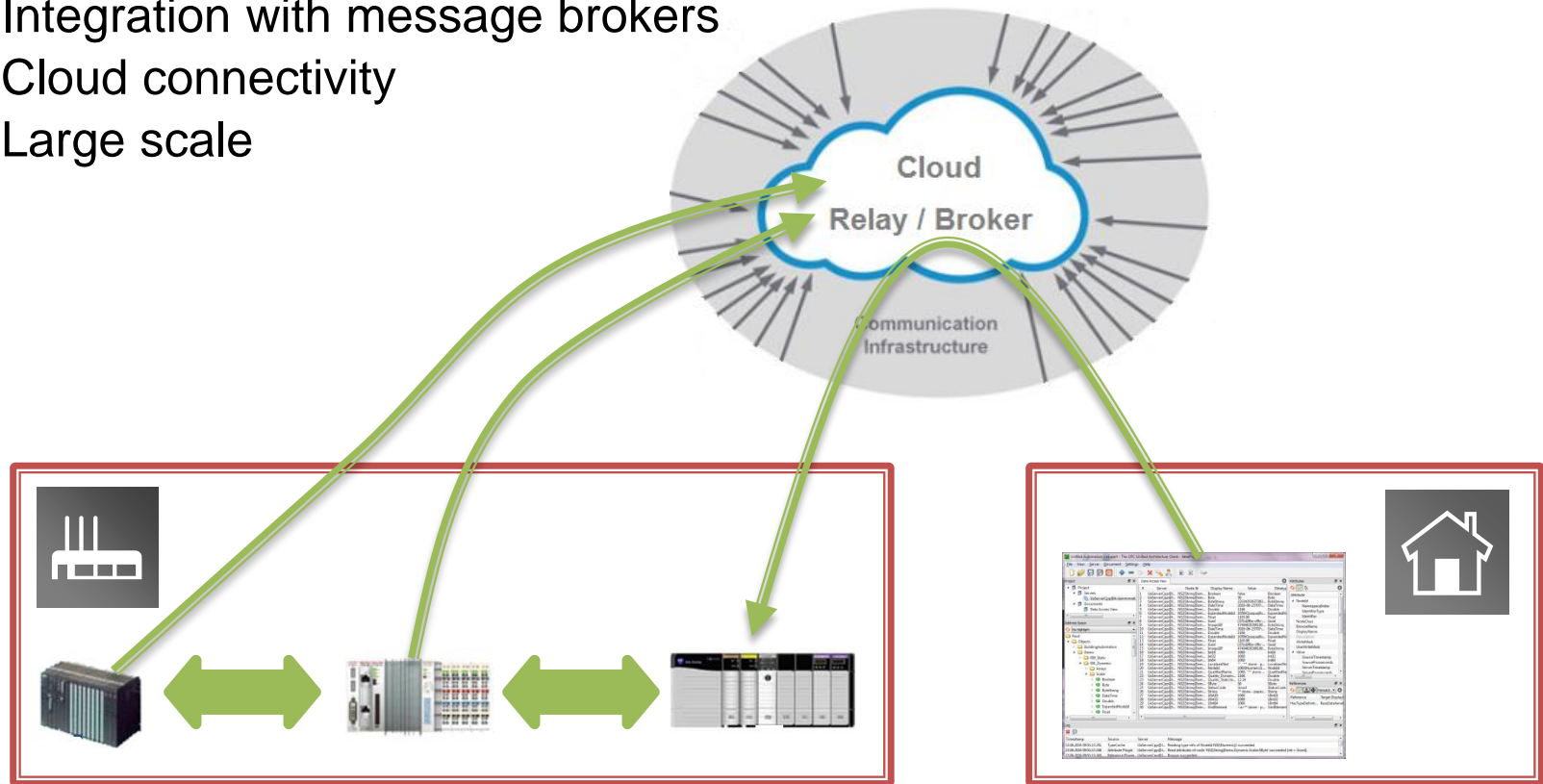


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New Use Cases

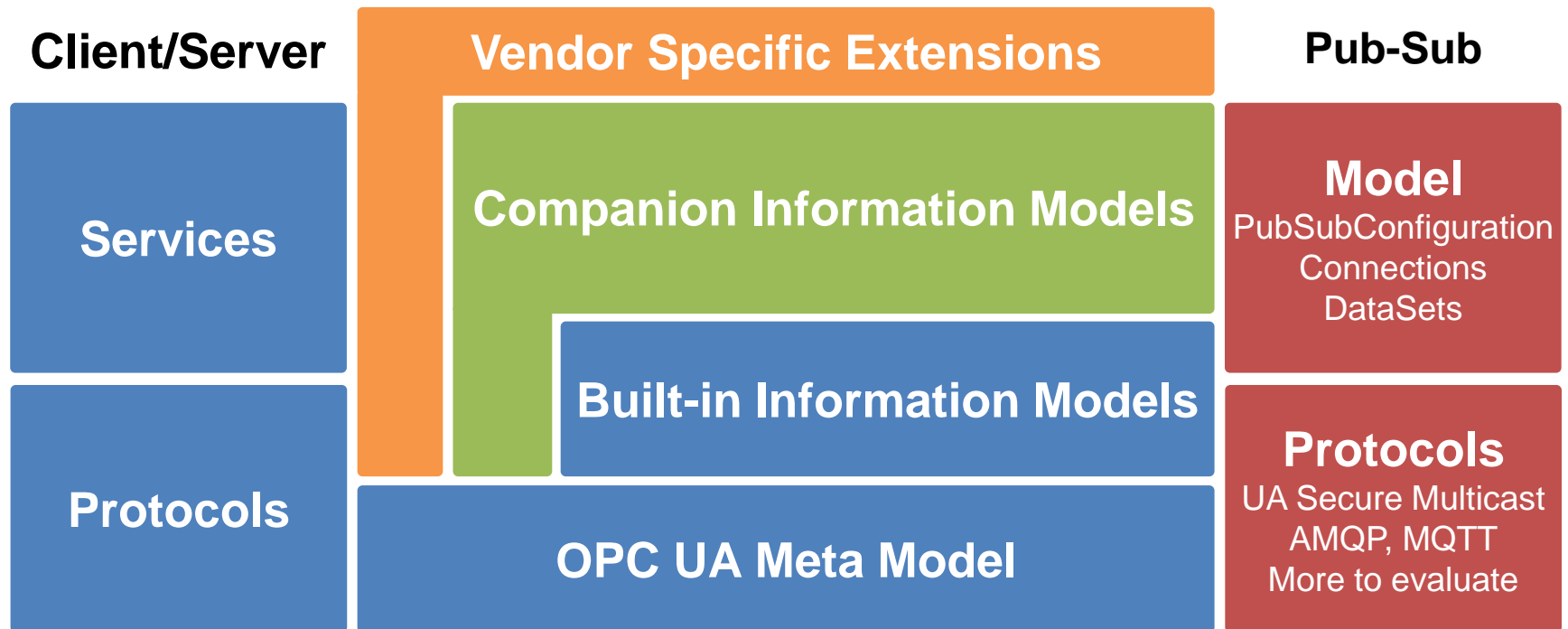
- ▶ Clients and Servers behind firewalls (Relay)
- ▶ Controller to controller communication
- ▶ Integration with message brokers
- ▶ Cloud connectivity
- ▶ Large scale



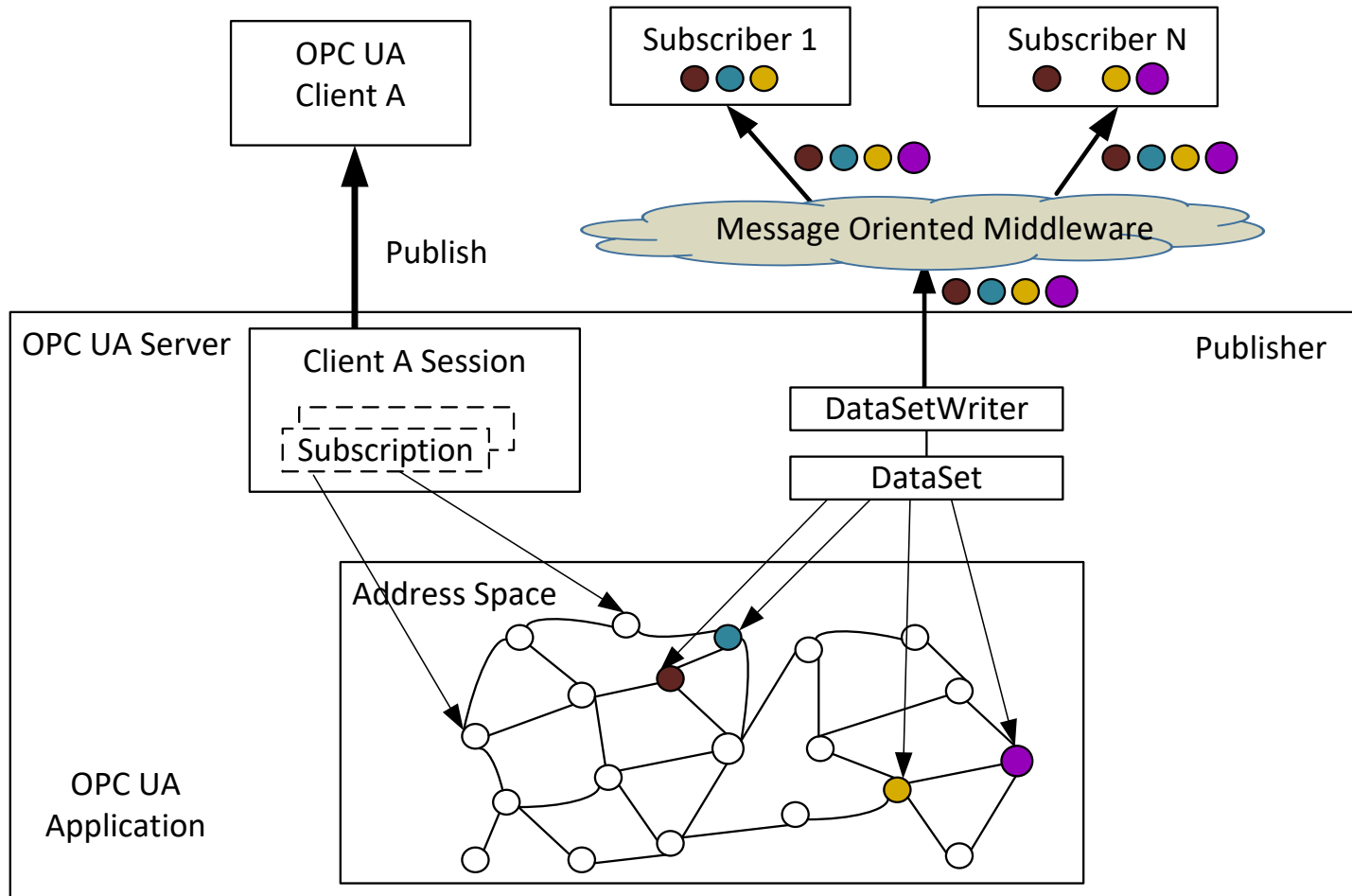
OPC Unified Architecture

OPC UA Publish/Subscriber Communication Model

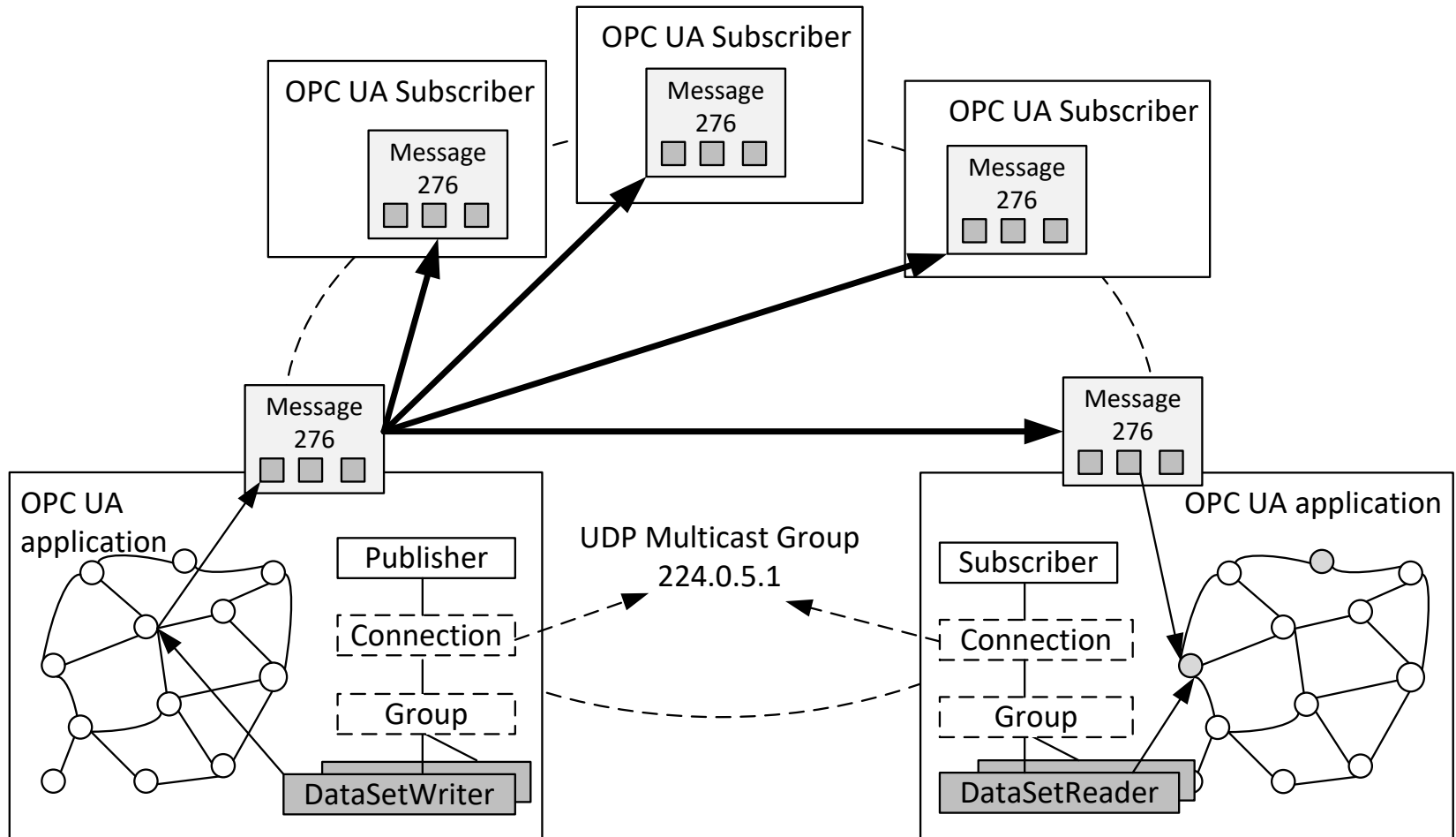
- ▶ Generic Pub-Sub Information Model
- ▶ Initial protocols selected, evaluation of other protocols ongoing



OPC UA Server and Publisher

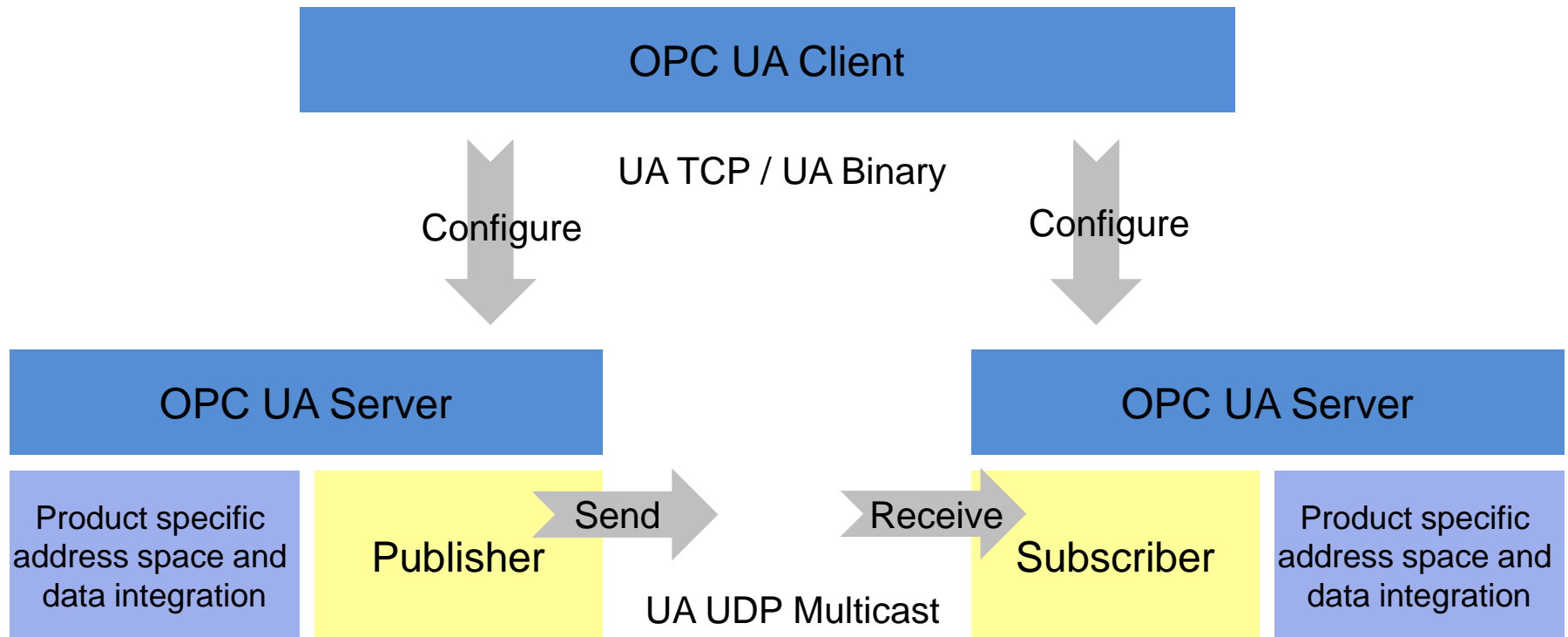


Pub-Sub with UDP Secure Multicast



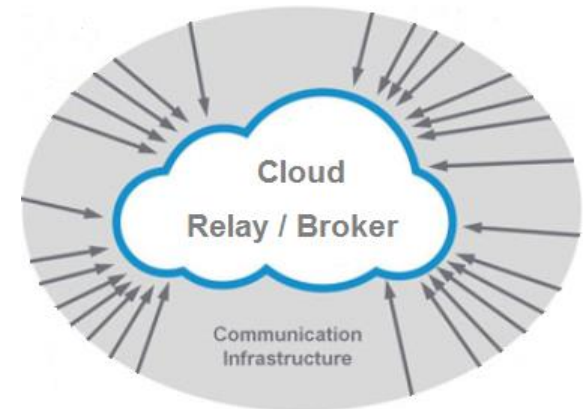
Controller to Controller

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



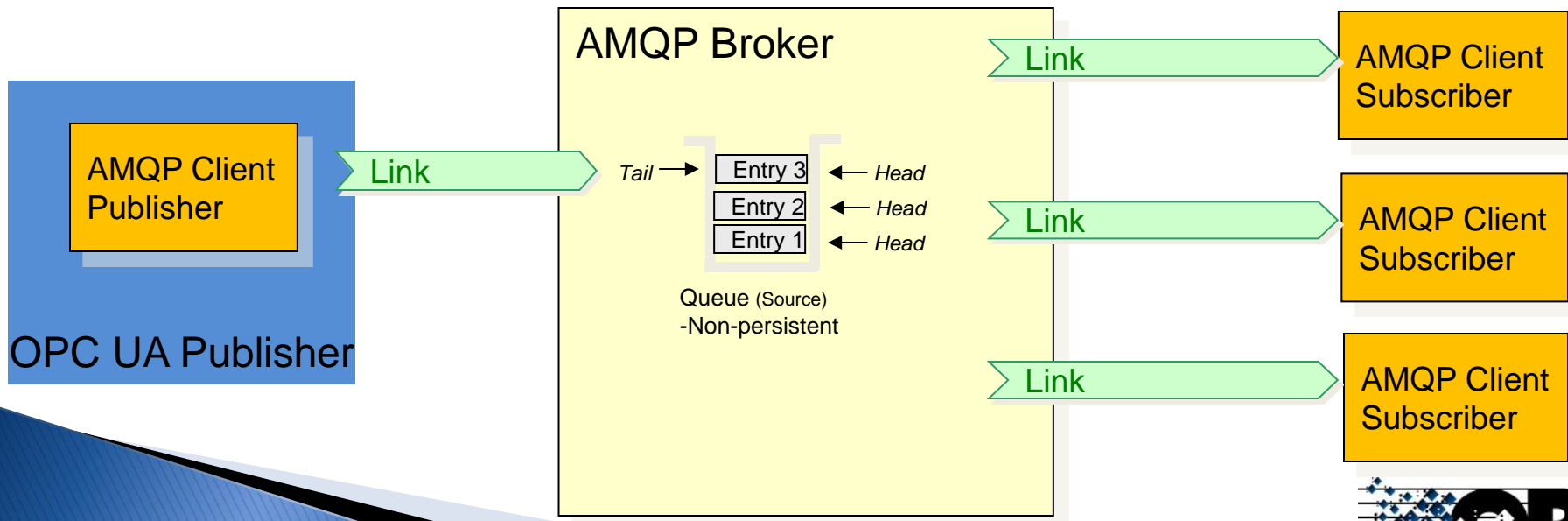
Pub-Sub with Broker

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

Early adopters

BECKHOFF

Rexroth
Bosch Group

Honeywell

IBHsoftec

NATIONAL INSTRUMENTS

RTA
riaautomation.com

optimizel
softing

SICK
Sensor Intelligence.

Unified
Automation

OPC UA Pub/Sub

Enhancement OPC-UA via UDP / AMQP / ...
Optimized for Cloud and Sensor Networks

Early adopters

BECKHOFF, Rexroth Bosch Group, Honeywell, IBHsoftec, NATIONAL INSTRUMENTS, RTA, softing, SICK, Unified Automation

Unified Automation

Technology Enabler: OPC UA gateway, Application: production system, Integration: by Partner, Location: AMBC, Cu-10, Bonn, User Team: Innovent 1.0, 01.17

- Testimonials
- Technology
- Collaboration
- Success Stories
- Getting Started

BECKHOFF

IBHsoftec

Honeywell

Rexroth Bosch Group

softing

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+)

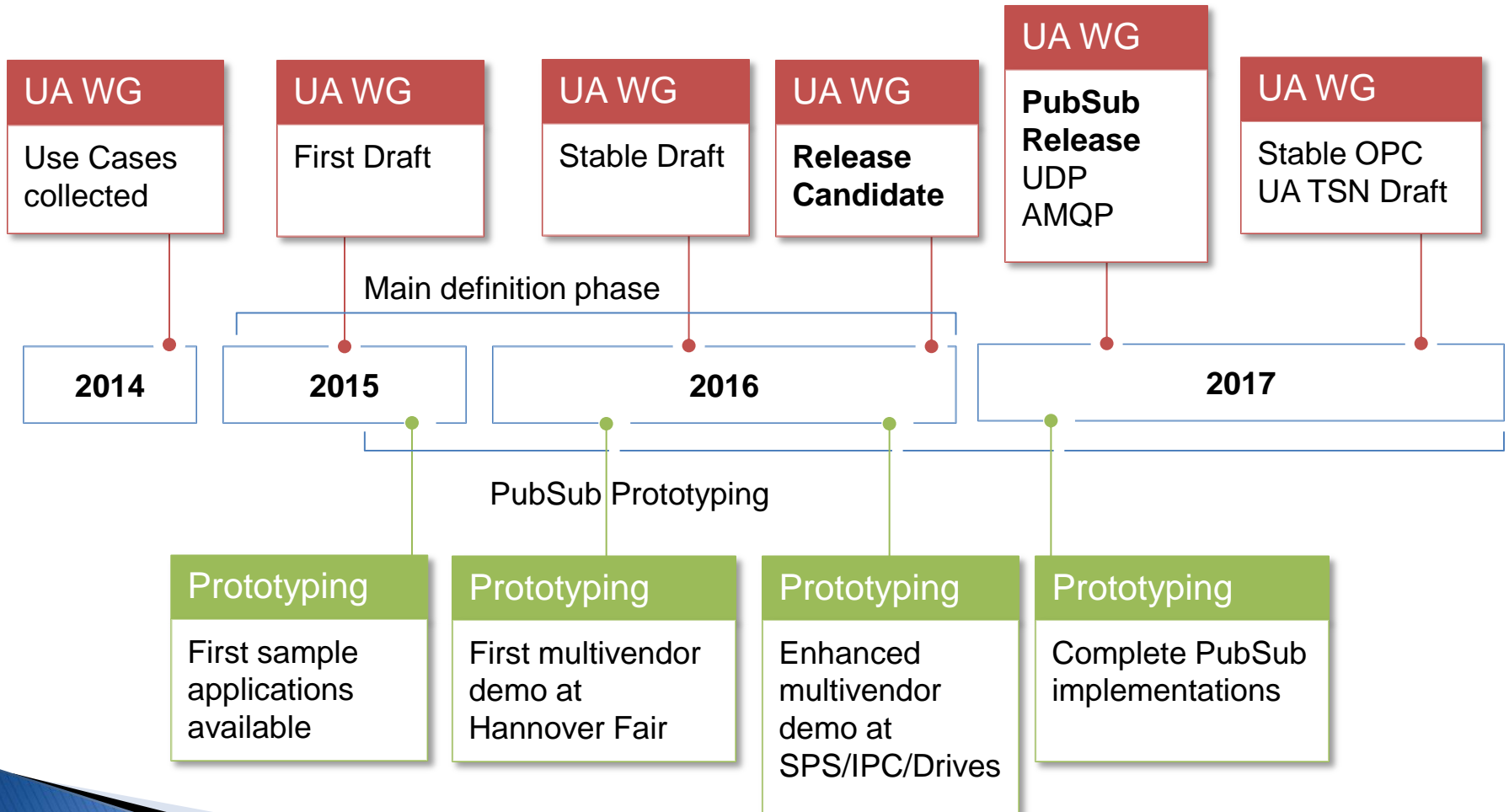
TSN Evaluation

- ▶ 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



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