



OPC UA DEVELOPMENT TRAINING

OPC INTRODUCTION

AGENDA

- HISTORY OF OPC, OPC OVERVIEW
- HISTORY OPC CLASSIC AND OPC UA
- DIFFERENCES OPC CLASSIC AND OPC UA



OPC UA INTRODUCTION

- TUTORIAL AS PDF AVAILABLE VIA DOWNLOAD

[HTTPS://TECHNOSOFTWARE.COM/DOCUMENTATION/OPC-UA-SOLUTION-NET-INTRODUCTION.PDF](https://technosoftware.com/documentation/OPC-UA-SOLUTION-NET-INTRODUCTION.PDF)

- OR FROM GITHUB

[HTTPS://GITHUB.COM/TECHNOSOFTWARE-GMBH/OPCUA-SOLUTION-NET-SAMPLES](https://github.com/technosoftware-gmbh/opcu-solution-net-samples)

OPC – HISTORY

■ PROBLEM

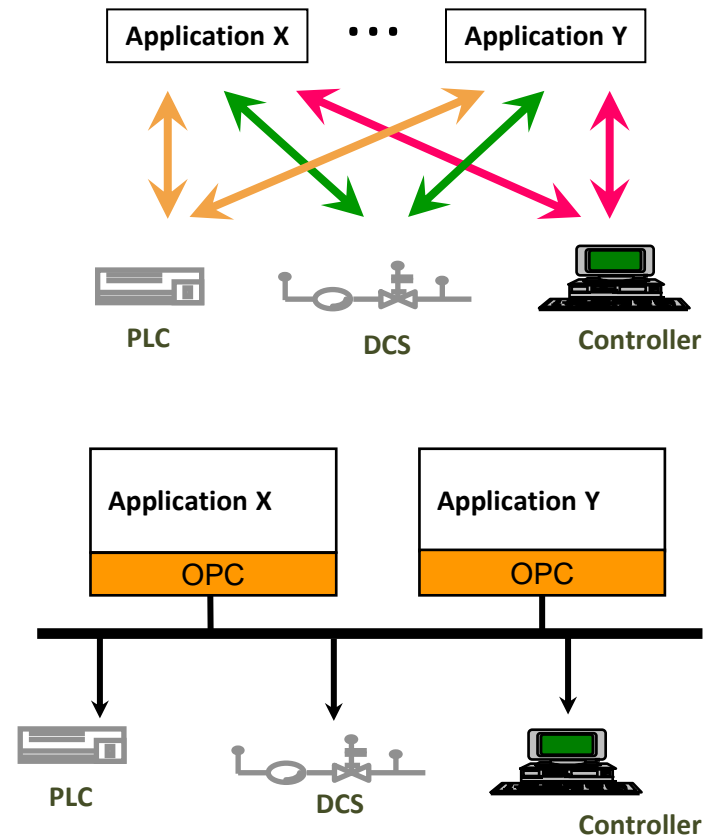
- DIFFERENT VENDORS
- INCREASING NUMBER OF PROTOCOLS
- CUSTOMER SPECIFIC SOLUTIONS
- MAINTENANCE PROBLEM
- ...

■ IDEA

- UNIFYING THE DEVELOPMENT OF DRIVERS

■ SOLUTION

- OPC



OPC – HISTORY

■ DEFINITION OF THE TERM **OPC** IN THE HISTORY AND TODAY

- HISTORY
 - **O**LE FOR **P**ROCESS **C**ONTROL
 - **O**PENNESS **P**RODUCTIVITY **C**OLLABORATION
- DEFINITION SINCE 2011:
 - **O**PEN **P**RODUCTIVITY & **C**ONNECTIVITY
 - THE INTEROPERABILITY STANDARD FOR INDUSTRIAL AUTOMATION™

OPC – HISTORY

■ 1995

- ESTABLISHMENT OF THE OPC TASK FORCE
 - FISHER-ROSEMOUNT, INTELLUTION, INTUITIVE TECHNOLOGY, OPTO22, ROCKWELL, SIEMENS AG
 - MICROSOFT DELIVERED TECHNICAL SUPPORT

■ AUGUST 1996

- PUBLICATION OF THE **OPC SPECIFICATION VERSION 1.0**

■ SEPTEMBER 1996

- ESTABLISHMENT OF THE OPC FOUNDATION AT THE ISA SHOW IN CHICAGO

OPC – HISTORY

■ FEBRUARY 1997

- ESTABLISHMENT OF THE OPC FOUNDATION EUROPE

■ SEPTEMBER 1997

- PUBLICATION OF AN UPDATED **OPC SPECIFICATION** UNDER THE NEW NAME **OPC DATA ACCESS SPECIFICATION 1.0A**
- THIS VERSION WAS USED AS BASE FOR THE FIRST PRODUCTS WHICH SUPPORTED OPC.

■ OCTOBER 1998

- PUBLICATION OF THE **OPC OVERVIEW SPECIFICATION 1.0**
- PUBLICATION OF THE **OPC COMMON DEFINITION & INTERFACES SPECIFICATION 1.0**
- PUBLICATION OF THE **OPC DATA ACCESS SPECIFICATION 2.0**

OPC – HISTORY

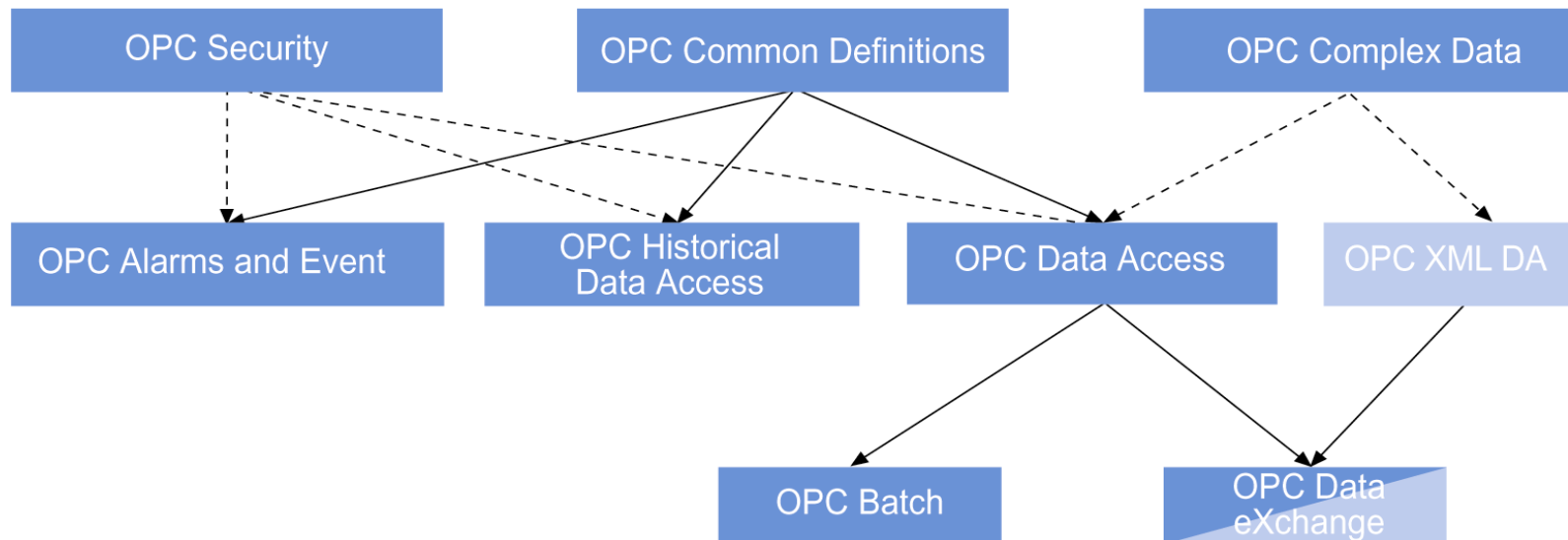
■ 1999 UNTIL 2003

- PUBLICATION OF ADDITIONAL SPECIFICATIONS, LIKE
 - **OPC ALARMS&EVENTS SPECIFICATION 1.01**
 - **OPC HISTORICAL DATA ACCESS SPECIFICATION 1.0**
 - **OPC SECURITY SPECIFICATION 1.0**
 - **OPC DX SPECIFICATION 1.0**
 - **OPC DATA ACCESS SPECIFICATION 3.0**
 - **OPC XML-DA SPECIFICATION 1.0**

- ALL SPECIFICATIONS EXCEPT OPC XML-DA BASE ON THE DCOM TECHNOLOGIE
- THE OPC XML-DA SPECIFICATION WAS JUST AN INTERMEDIATE STEP TO A COMPLETE REWORK OF THE OPC SPECIFICATIONS

OPC SPECIFICATION

OPC Overview



OPC SPECIFICATION

Specification	Description	Version
<i>OPC Overview</i>	It gives background information, motivation, architectural highlights and an abstract for each OPC topic	1.00
<i>OPC Common Definitions and Interfaces</i>	Contains common rules and design criteria and the specification of interfaces which are common for several topics	1.10
<i>OPC Data Access Specification</i>	Definition of an interface for reading and writing of “real-time” data	3.00
<i>OPC Alarms&Events Specification</i>	Definition of an interface to monitor events	1.10
<i>OPC Historical Data Access Specification</i>	Definition of an interface for accessing historical data	1.20
<i>OPC Batch Specification</i>	Definition of an interface for accessing data, which are required for the batch processing	2.00

OPC SPECIFICATION

Specification	Description	Version
<i>OPC Security Specification</i>	Definition of an interface for setting and use of safety aspects	1.00
<i>OPC Data eXchange (DX)</i>	Communication between the server and server	1.00
<i>OPC Complex Data</i>	Definition of possibilities to describe the structure of complex data and the access to those complex data	1.00
<i>OPC Commands</i>	Definition of ways to describe the structure of complex data and to access such data	Draft 1.00
<i>OPC XML-DA</i>	Integration of OPC and XML to create Web applications	1.00

OPC UA – HISTORY

■ 2004

- ESTABLISHMENT OF THE OPC UNIFIED ARCHITECTURE WORKING GROUP

■ 2006

- **OPC UNIFIED ARCHITECTURE VERSION 1.0** BECOMES AVAILABLE.

■ 2007

- OPC CERTIFICATION PROGRAM AND TEST LABS ARE INTRODUCED.
- AUTOMATION VENDORS BEGIN OFFERING THE FIRST PRODUCTS BASED ON OPC UA.

■ 2009

- **OPC UNIFIED ARCHITECTURE VERSION 1.01** BECOMES AVAILABLE.

■ 2010

- THE FIRST EMBEDDED OPC UA DEVICES ARE RELEASED.
- OPC UA FOR IEC 61131 IS RELEASED AS A COMPANION SPECIFICATION.

OPC UA – HISTORY

■ 2012

- IEC 62541 IS RELEASED (UA).

■ 2013

- **OPC UNIFIED ARCHITECTURE VERSION 1.02** BECOMES AVAILABLE.
- OPC UA FOR ISA-95 IS RELEASED.
- OPC UA FOR DEVICES 1.01 IS RELEASED.
- THE OPC FOUNDATION SUPPORTS OVER 480 MEMBERS ACROSS CHINA, EUROPE, JAPAN AND NORTH AMERICA.

■ 2015

- **OPC UNIFIED ARCHITECTURE VERSION 1.03** BECOMES AVAILABLE.
- 62541:2015 VERSION RELEASED
- INDUSTRIE4.0 REFERENCE ARCHITECTURE MODELL (RAMI4.0) IS LISTING OPC UA FOR COMMUNICATION LAYER

OPC UA – HISTORY

■ 2016

- THE OPC FOUNDATION SUPPORTS OVER 490 MEMBERS ACROSS CHINA, EUROPE, JAPAN AND NORTH AMERICA.

■ 2018

- **OPC UNIFIED ARCHITECTURE VERSION 1.04** BECOMES AVAILABLE.
- TOTAL OF 18 COMPANION SPECIFICATIONS RELEASED INCLUDING SPECIFICATIONS FOR ENERGY AUTOMATION (BASED ON IEC61850), TOBACCO INDUSTRY, MULTIPLE FIELDBUS MAPPINGS, PACKML, AUTOMATIONML
- ABOUT 20 WORKING GROUPS DEVELOPING FURTHER OPC UA COMPANION SPECIFICATIONS FOR ADDITIONAL MACHINES OR INDUSTRIES
- THE OPC FOUNDATION SUPPORTS OVER 636 MEMBERS ACROSS CHINA, EUROPE, JAPAN AND NORTH AMERICA.

COMPARE CLASSIC OPC – OPC UA

	Classic OPC	OPC UA
<i>Standardization</i>	Yes, OPC Foundation	Yes, OPC Foundation
<i>Interoperability</i>	Yes	Yes
<i>Performance</i>	<ul style="list-style-type: none">• Very good performance of DCOM-based specifications• Low performance of XML-DA specification	<ul style="list-style-type: none">• Very good performance when using the UA Binary protocol• Low performance when using SOAP
<i>Remote Access</i>	Yes (DCOM, SOAP)	Yes (UA Binary, SOAP)
<i>Interactions (Functionality that goes beyond the mere exchange of process data)</i>	Yes (Only a few products implements those functionality)	Yes (Structured data types, information models, calling programs, monitoring ongoing operations)

COMPARE CLASSIC OPC – OPC UA

	Classic OPC	OPC UA
<i>Security</i>	Defined by DCOM, use of firewalls impossible	Yes, based on W3C standards with user authentication, exchange of digital certificates and optional encryption of messages
<i>Robustness</i>	<ul style="list-style-type: none">• Quality attribute to process data and timestamp• No Redundancy• No Keep-Alive	<ul style="list-style-type: none">• Quality attribute to process data and timestamp• Redundancy on client, server and device level• Keep-Alive• Data buffer

COMPARE CLASSIC OPC – OPC UA

	Classic OPC	OPC UA
<i>Platform Independence</i>	<ul style="list-style-type: none">• Only on Windows (DCOM)• XML-DA on other systems	Yes
<i>Scalability</i>	No Static, complex DCOM stack memory intensive	Yes Embedded systems with single-task and single-threaded operation up to mainframes
<i>Type Information</i>	No	Yes <ul style="list-style-type: none">• There are methods to access type information• Support for any information models with arbitrary data types