Industrial application

OPC UA or in other words OPC Unified Architecture is a platform independent service-oriented architecture that integrates all the functionality of the individual OPC Classic specifications into one extensible framework.

This multi-layered approach accomplishes the original design specification goals of:

* **Functional equivalence:** all COM OPC Classic specifications are mapped to UA
* **Platform independence:** from an embedded micro/controller to could/based infrastructure
* **Secure:** encryption, authentication and auditing
* **Extensible:** ability to add new features without affecting existing applications
* **Comprehensive information modeling:** for defining complex information

Platform Independence:

Given the wide array of available hardware platform and operating systems, platform independence is essential. OPC UA functions on any of the following:

* **Hardware platforms:** traditional PC hardware, cloud-based servers, PLC, micro-controllers
* **Operating systems:** Microsoft Windows, Apple OSX, Android, any distribution of Linux.

OPC UA provides the necessary infrastructure for interoperability across the enterprise, from machine-to-machine machine-to-enterprise and everything in between.

Security:

One of the most important considerations in choosing a technology is security. OPC UA is a firewall-friendly while addressing security concerns by providing a suite of controls:

* **Transport:** numerous protocols are defined providing options such as the ultra-fast OPC-binary transport or the more universally compatible JSON over Web sockets.
* **Session Encryption:** messages are transmitted securely at various encryption levels
* **Message Signing:** with message singing the recipient can verify the origin and integrity of received messages
* **Sequenced Packets:** exposure to message replay attacks is eliminated with sequencing
* **Authentication:** each US client and server is identified through X509 certificates providing control over which applications and systems are permitted to connect with each other
* **User Control:** applications can require users to authenticate (login credentials, certificate, web token, etc.) and can further restrict and enhance their capabilities with access right and address-space “views”
* **Auditing:** activities by user and/or system are logged providing an access audit trial

Extensible:

The multi-layered architecture of OPC US provides a “future proof” framework. Innovative technologies and methodologies such as new transport protocols, security algorithms, encoding standard, or application-services can be incorporated into OPC UA while maintaining backwards compatibility for existing products. UA products built today will work with the products of tomorrow.

**MODBUS:**

Modbus is a data communications protocol originally published by Modicon in 1979 for use with its programmable logic controllers (PLC).

Modbus is popular in industrial environments because it is openly published and royalty-free. It was developed for industrial applications, is relatively easy to deploy and maintain compared to other standards, and places few restrictions – other then the datagram size – on the format of the data to be transmitted.

Modbus supports communication to and from multiple devices connected to the same cable or Ethernet network. For example, there can be a device that measures temperature and another device to measure humidity connected to the same cable, both communicating measurements to the same computer.

Modbus is often used to connect a plant/system supervisory computer with a remote terminal unit in supervisory control and data acquisition systems in the electric power industry.

Communications and devices:

Each device communicating on a Modbus is given a unique address. On Modbus RTU, Modbus ASCII and Modbus Plus, only the node assigned as the Client my initiate a command. All other devices are servers and respond to requests and commands.

Many modems and gateways that support Modbus, as it is a very simple and often copied protocol. Some of them were specifically designed for this protocol. Different implementations use wireline, wireless communication, such as in the ISM band, and SMS or GPRS.