WHITEPAPER

OPC UA

R. Sakthi Vignesh[1], Dr. P. D. Rathika[2], Dr. B. Vinod[3], Dr. M. Sundaram[4]
1,2 Assistant Professors, Department of Robotics and Automation Engineering
3 HoD, RAE & Centre i/c, PSG-LAPP Centre for Excellence in Cable Technology
4 Associate Professor, Department of EEE

PSG College of Technology, Coimbatore, Tamilnadu.

LAPP IN ASSOCIATION WITH PSG College of Technology

OPC UA(unified Architecture) is the next generation machine to machine communication protocol for industrial automation developed by OPC organization. UA is committed for secure, reliable and open mechanism for transferring the data between server and client. The generic architecture helps to collect data from the most of real time industrial equipment devices includes analog and digital sensors and also able to control the device asynchronously. OPC UA uses scalable platforms, multiple security models, multiple transport layers and a sophisticated information model to allow the smallest dedicated controller to freely interact with complex, high-end server applications.

OPC UA's New Architecture:

Interplatform Operatability: It is a cross platform and not dependent on one programming language. They are RTOS independent and can be implemented on Linux/UNIX based systems.

Robust Data Models: OPC UA offers a highly flexible and robust information model. It also established relationships between data items and systems that are important in today's connected world.

Security: OPC UA offers endpoint authentications, encryption and removes the reliance on DCOM OPC DA had.

OPC UA Transport Layers: OPC UA specification supports several transport at client end. The following are supportive layers.

- **SOAP / HTTP Transports** – HTTP (HyperText Transfer Protocol) is the connectionless, stateless, request-response protocol that you use every time you access a web page. SOAP (Simple Object Access Protocol) is an XML messaging protocol that provides a mechanism for applications to encode messages to other applications.

- **HTTPS Transport** – Hyper Text Transfer Protocol Secure (HTTPS) is the secure version of HTTP. It means that all communications between your browser and that website are encrypted. Just as with HTTP, SOAP is used as the request- response protocol to move the OPC UA requests between Clients and Servers.

- **UA TCP Transport** – UA TCP is a simple TCP-based protocol designed for Server devices lacking the resources to implement XML encoding and HTTP/SOAP type transports. UA TCP uses binary encoding and a simple message structure that can be implemented on low-end Servers

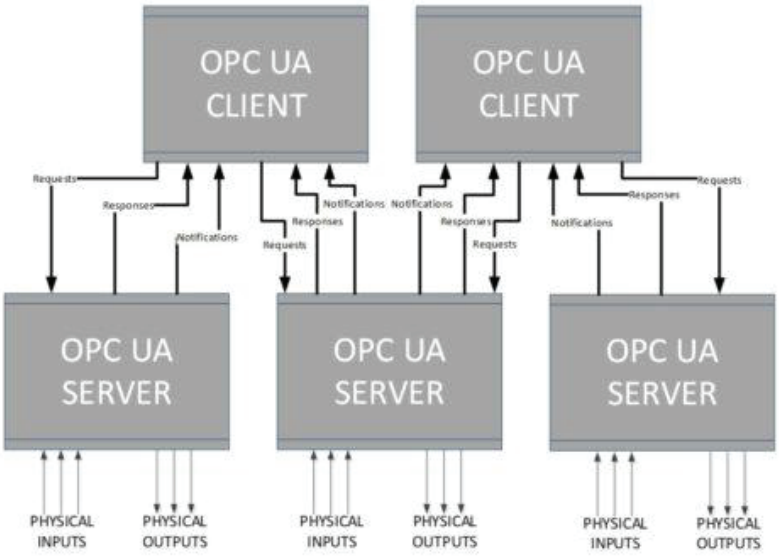

Figure 01: OPC UA Data Model

Advantages & key differentiator from other protocols:

1) OPC UA is that the mapping to the transport layer is totally independent of the OPC UA services, messaging, information and object models. That way, if additional transports are defined in the future, the same OPC UA Information Model, object model, and messaging services can be applied to that new transport. OPC UA truly is future proof.

2) Standardized communication with internet and via firewalls: OPC UA uses an optimized TCP based UA binary protocol for data exchange; Web Services and HTTP are additionally supported. It is sufficient to open up just a single port in a firewall. Integrated security mechanisms ensure secure communication via the Internet.

3) Protection against unauthorized data access: The OPC UA technology uses a mature security concept to ensure protection against unauthorised access or sabotage of process data and as well against errors due to careless operation. The OPC UA security concept is based on World Wide Web standards and encompasses options for user authentication, the signing of messages and the encryption of the transmitted user data.

4) Data Security and Reliability: OPC UA defines a robust architecture with reliable communication mechanisms, configurable timeouts, automatic error detection and recovery mechanisms. The communication connections between OPC UA clients and servers can be monitored. OPC UA offers redundancy features that can be applied to server and client applications to prevent loss of data and to implement highly available system

5) Simplification and Unification: OPC UA defines an integrated address space and an information model in which process data, alarms, historical data and program calls can be represented. The items of information are defined as typed objects, which can be placed in relationship to each other. Beyond that, OPC UA supports the use of complex data structures. This allows complex procedures and systems to be described completely with OPC UA with Classic OPC three different OPC servers – DA, AE and HDA – with different semantics are necessary in order, for example, to acquire the current value of a temperature sensor, a high temperature event and the historical average value of the temperature. This can be achieved very easily with OPC UA in just one component. Configuration and engineering times can thus be significantly reduced.