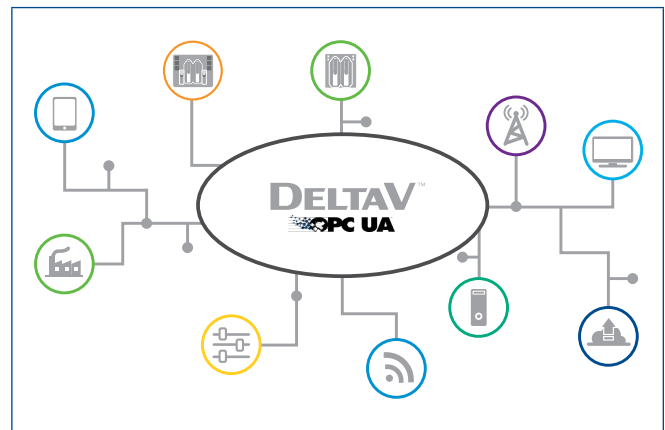


# DeltaV™ OPC UA Servers and Clients

- Platform Independent
- Secure Communications
- Robust Connectivity
- Unified Architecture
- Easy Migration from Legacy Interfaces
- Based on Open Industry Standards



## Introduction

OPC UA is an interoperability standard that allows for a secure and reliable exchange of real-time and historical data between the DeltaV™ system and other systems, applications and enterprise users. OPC UA is rapidly gaining acceptance in the process automation space as a standard protocol for data integration and extends DeltaV OPC Classic functionality by adding important capabilities such as platform independence, scalability and high availability.

## Benefits

**Platform Independent:** OPC UA standard is now compatible with Windows and non-Windows platforms, and DeltaV takes advantage of that by offering OPC UA server and client in the Professional PLUS and Application stations (Windows), as well as an embedded OPC UA server in the PK Controller and an OPC UA client in the Ethernet I/O Card (Non-Windows). This provides greater flexibility and connectivity in your DeltaV projects.

**Secure Communications:** Security is an essential part of the DeltaV system and the OPC UA standard. OPC UA allows for secure communications between your DeltaV system and your applications by supporting multiple levels of security that include: encryption, authentication, and auditing.

**Robust Connectivity:** OPC UA is designed to be more robust than existing interface technologies by using a client-server architecture that provides mechanisms for quickly detecting and recovering from communication failures associated with transfers without having to wait for long timeouts. DeltaV provides both OPC UA server and clients to quickly and easily reconnect in case of loss of communications.

**Unified Architecture:** OPC UA provides a single interface for accessing real-time, historical and alarm and event data. The DeltaV OPC UA server in the Professional PLUS and Application stations provide an interface to access the same data available in the DeltaV OPC Classic servers but with a single, common interface.

**Easy Migration from Legacy interfaces:** Existing DeltaV OPC Classic components are easily migrated into the new DeltaV OPC UA servers and client.

**Open industry Standards:** OPC UA is an open standard that is supported by many member and technology organizations, making it the interoperability platform of choice.

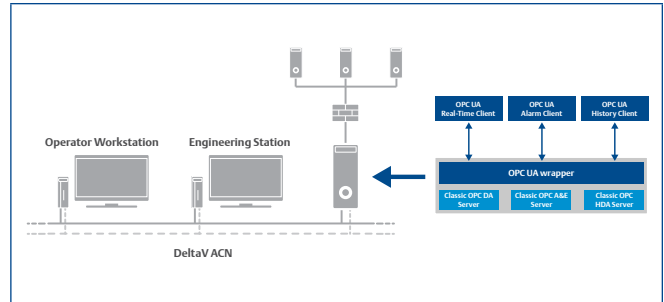
## Product Description

OPC (OLE for Process Control) was first defined in 1995 due to the collaboration of several players in the automation industry, including Emerson. Over the years, it became a good option to bring information in and out of the control system across various industries. The OPC classic consist of 3 different main standards depending of the type of data they provide: real time Data Access (DA), Alarm & Events (AE), and Historical Data Access (HDA).

**Over time, control systems have evolved into a more advance platform with new needs and requirements in communications** and cybersecurity that OPC Classic is unable to meet. This resulted in the creation of a new standard, OPC Unified Architecture (UA). OPC UA is platform independent, supports Windows and Non-windows devices, with a service-oriented architecture that integrates all the functionality of the individual OPC Classic specifications (DA, A&E and HDA) into one extensible framework. By adopting OPC UA, the DeltaV system now provides greater flexibility when connecting to different network layers in a easy, robust and secure way.

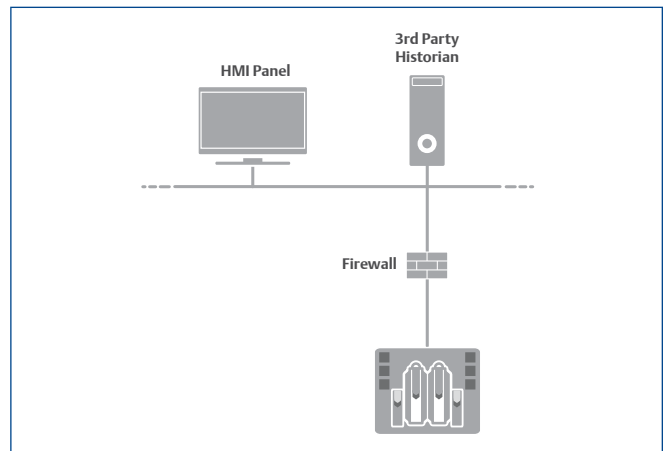
### DeltaV OPC UA Servers

The OPC UA server provides data to the UA client. With DeltaV OPC Classic servers, the exchange of information has been traditionally done through the DeltaV Application stations and ProfessionalPLUS station. The DeltaV OPC UA server in the workstation uses a wrapper to convert OPC Classic into OPC UA, providing an interface to access the same data available but with a single-common interface for reading and writing DeltaV real-time process data (DA), real-time alarm and event data (A&E), and historical data (HDA). That means, that OPC Classic and OPC UA can now run at the same time in the same workstation, allowing clients from both Classic and UA to connect to the same workstation. This facilitates the migration of OPC Classic applications since they can continue communicating with the DeltaV system and move to OPC UA when they are ready.



*DeltaV OPC UA server in the Application Station providing a single point of connection for DA, HDA and A&E.*

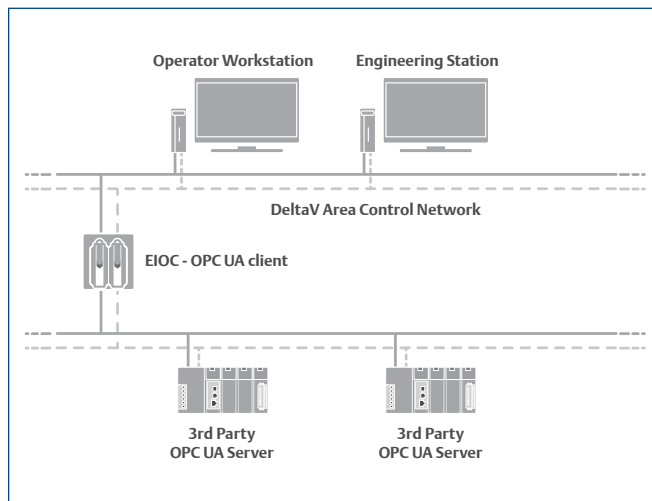
DeltaV also offers an OPC UA server embedded in the PK Controller, providing easy access directly to the information inside the controller, in a robust redundant platform and eliminating the need for a workstation to provide OPC UA communications. The OPC UA server in the PK Controller only provides an interface for real time data (DA) that resides inside the PK Controller for 3rd party OPU UA clients. A&E and HDA server are not supported in the PK Controller. For more information on PK Controller applications and features, please refer to the PK Controller product data sheet.



*PK Controller with embedded OPC UA server providing real time data to a 3rd party HMI and 3rd party Historian in a standalone mode.*

### DeltaV OPC UA Clients

The OPC UA client is the side that initiates a communication session. UA clients have the capability to browse the UA server configuration and determine the delivery of a specific piece of information. Traditionally, DeltaV provided OPC Classic client capabilities with OPC Mirror, a separate piece of software that was installed between OPC DA Classic servers and acting as a bi-directional client to both servers. Starting with DeltaV v14.LTS, we provide a native implementation of an OPC UA client in the Ethernet I/O card (EIOC), Application station and ProfessionalPlus, thus eliminating the need of configuring a separate piece of software and allows you to bring data from external OPC UA servers directly into DeltaV system.

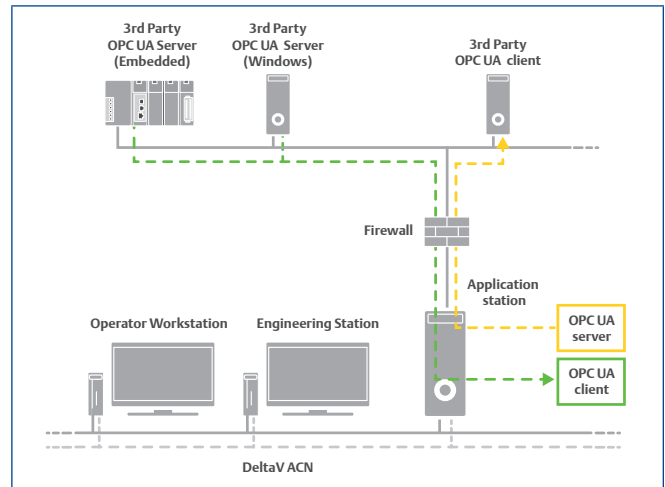


Ethernet I/O card with OPC UA client connected with 3rd party OPC UA servers.

The EIOC is the perfect place to integrate a lot of data into the DeltaV system using OPC UA client functionality since it acts as an independent processor (does not count as a controller) with a large capacity and in a redundant platform. It is also easier to engineer since the DeltaV OPC UA client supports:

1. Online browsing of signals from the OPC UA servers that are connected
2. Offline browsing of a Nodest file (configuration file) from an OPC UA server and
3. Manual configuration of signals in the same way as any other Ethernet protocol in the EIOC.

Once the signals are configured and the OPC UA servers are communicating, the Control Modules running in the EIOC can process the signals to read and write values to the OPC UA servers. This make communications with the devices much faster, direct and independent from each other, allowing users to diagnose and troubleshoot individual sessions without affecting the performance of the other sessions in the device network.

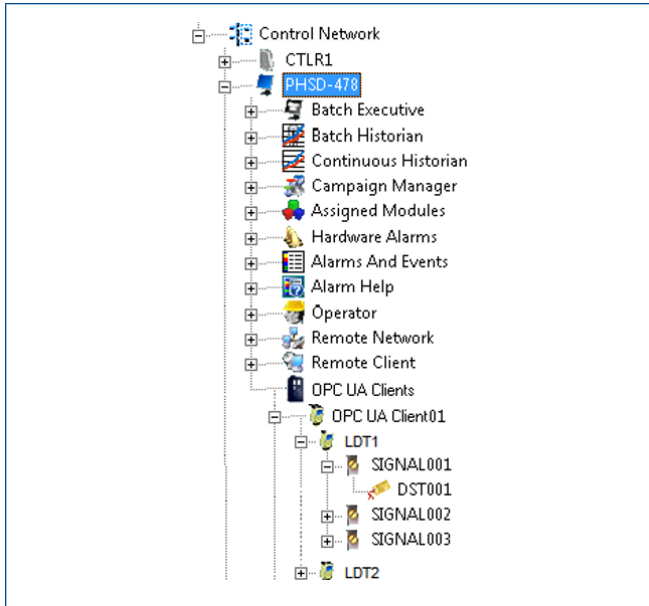


Application station with OPC UA server and client enabled at the same time and connected with 3rd party OPC UA servers and clients.

The DeltaV OPC UA Client is now a native implementation in the Professional PLUS and Applications station and runs at the same time as other OPC applications (OPC UA server, OPC Classic server and OPC Classic Mirror client). This allows flexibility to bring information from third party servers and clients, and at the same time migrate OPC Classic applications without affecting the performance.

The DeltaV OPC UA client in the workstation works in a very similar way as in the EIOC. The configuration is done via Online browsing, offline browsing of a Nodest file and by Manual configuration at the OPC UA Client hierarchy level in the workstation. The OPC UA client hierarchy in DeltaV Explorer consist of:

- OPC UA Client – At this level, the security for the DeltaV OPC UA client in the workstation can be setup.
- PDT – The 3rd party OPC UA servers are added and configured under the OPC UA Client as Physical Devices (PDTs). The number of PDTs you can configure will depend on the type of workstations.
- LDT – Logical Devices (LDTs) are added under the PDTs to configure signals or control tags.



DeltaV Explorer showing the DeltaV OPC UA client hierarchy in the Application station.

Also, Control Modules running in the workstation can process the signals to read and write values to the OPC UA servers. For limitations in the number of control module and control capabilities on each workstation, please refer to the Application Station and ProfessionalPlus product data sheets.

## Secure Communications

The DeltaV UA servers and clients enable secure communications between your DeltaV system and your enterprise applications by OPC UA web technologies which are easy to implement and firewall friendly. Some of these technologies are:

**Transportation:** provides an ultra-fast OPC-binary transport or in the case of the server a more universally compatible SOAP-HTTPS to help connect through more complex enterprise networks.

**Session Encryption:** messages are transmitted securely at 128 or 256-bit encryption levels.

**Message Signing:** messages are received exactly as they were sent.

**Authentication:** each UA client and server is identified through Digital Certificates, providing control over which applications and systems are permitted to connect with each other.

**User Control:** require users to authenticate (with User certificates, and username and password) to further restrict and enhance access rights and address-space “views”.

**Auditing:** activities by user and/or system are logged providing an access audit trail.

DeltaV OPC UA servers and client implements all these technologies and can be used in any combination to provide the level of security needed in the DeltaV system.

## Robustness

DeltaV OPC UA includes several features that ensure the robustness of communications that are integrated in different layers of the OPC UA Framework. It includes:

- Error detection and handling on transport and service level.
- Auditing – the support for security audit trails with traceability between Client and Server audit logs and availability of diagnostic information via DeltaV Diagnostics.

## Based on Open Industry Standard

To ensure interoperability with other vendors, all DeltaV OPC UA servers and clients have been tested against OPC UA standard version 1.03.

## Licensing

For licensing the OPC UA servers and clients in the workstations, an OPC UA activation license is required. This is a one-time and system wide license that activates all the OPC UA servers and clients in all the Application stations and ProfessionalPlus in the system. Once the OPC UA activation license is present, the OPC UA server consumes licenses from the Classic OPC servers (DA, A&E and HDA). Please look at the product data sheets of DeltaV OPC real time, OPC Historian and OPC A&E on how to license the classic OPC servers.

The OPC Client in the workstation, will consume its own license depending of the amount of values that need be mapped.

The OPC UA client in the Ethernet I/O Card (EIOC) is licensed like the other protocols in the EIOC. It will require a protocol license, a device license, and will consume DSTs. Consult the EIOC product data sheet for details.

The PK Controller OPC UA server is the only one that does not require a license for activation. Consult the PK Controller product data sheet for details.

## Product Specifications

| OPC UA Servers          |   |  |  |
|-------------------------|---|--|--|
|                         | Application Station   | ProfessionalPLUS   | PK Controller  |
| Real time Data (DA)     | 30K Monitored items/sec <sup>(1)</sup><br>2K writes/sec<br>100 concurrent clients | 250 Monitored items or writes/sec <sup>(1)</sup><br>2 concurrent clients | 5,000 Monitored items/sec<br>500 writes/sec<br>3 concurrent clients <sup>(2)</sup> |
| Alarms and Events (A&E) | 300 events/sec<br>25 concurrent clients   | 300 events/sec <sup>(3)</sup><br>25 concurrent clients                   | Not supported  |
| Historical Data (HDA)   | 7K parameters/sec<br>25 concurrent clients  | 7K parameters/sec <sup>(3)</sup><br>25 concurrent clients                | Not supported  |
| Transportation          | Binary, HTTP and HTTPS  | Binary, HTTP and HTTPS   | Binary   |
| Redundancy              | No  | No   | High Availability <sup>(2)(4)(5)</sup>   |

<sup>(1)</sup> Client redundancy might affect the number of items that are used. For example, a redundant EIOC OPC UA client uses twice the number of configured items

<sup>(2)</sup> The PK Controller supports 6 concurrent sessions that can be consumed by 3 clients. A redundant OPC UA client connected to the PK Controller will consume more than one session.

<sup>(3)</sup> HDA and A&E performance in the ProfessionalPlus may be less due the number of critical applications running in this workstation. If you have specific performance requirements for HDA and A&E applications, use a dedicated Applications Station

<sup>(4)</sup> High Availability means that when a controller switchover occurs, the client will be disconnected. The new Active controller will have the OPC UA server available for connection almost immediately, with the same IP address but different MAC address. The client would be responsible for re-connecting with the OPC UA server once it is active

<sup>(5)</sup> When connecting a PK Controller to a redundant OPC UA client with redundant communications (e.g. EIOC), the client could consume 4 times the amount of values and 4 times the amount of sessions from the OPC UA server. In this scenario, the maximum capacity will be 1,250 Monitored items/sec and will consume 4 sessions (leaving other 2 sessions only for diagnostics).

| OPC UA Clients          |   |   |   |
|-------------------------|---|---|---|
|                         | Application Station   | Professional PLUS   | EIOC  |
| Real time Data (DA)     | 30,000 Monitored items/sec<br>15,000 writes/sec<br>64 concurrent clients <sup>(1)</sup> | 30,000 Monitored items/sec <sup>(2)</sup><br>15,000 writes/sec <sup>(2)</sup><br>64 concurrent clients <sup>(1)</sup> | 30,000 Monitored items/sec<br>15,000 writes/sec<br>64 concurrent clients <sup>(1)</sup> |
| Alarms and Events (A&E) | Not Supported   | Not Supported   | Not Supported   |
| Historical Data (HDA)   | Not Supported   | Not Supported   | Not Supported   |
| Transportation          | Binary  | Binary  | Binary  |
| Redundancy              | No  | No  | Yes <sup>(3)</sup>  |

<sup>(1)</sup> Clients are equivalent to Physical Devices (PDTs) when configuring the OPC UA clients in DeltaV Explorer.

<sup>(2)</sup> The performance of the ProfessionalPLUS OPC UA client may be less due the number of critical applications that run in the workstation. If you have specific communications performance requirements the OPC UA client, use a dedicated Applications Station or an EIOC.

<sup>(3)</sup> Redundant installations use more sessions and tags. For example, a redundant EIOC on a single device network consumes two sessions and twice the amount of tags from the OPC UA server to which it is connected. A non-redundant EIOC on a redundant device network also consumes two sessions and twice the amount of tags. A redundant EIOC on a redundant device network consumes four sessions and four times the amount of tags.

### NOTES:

- All performance specifications provided are with OPC UA security disabled in the clients and servers and have a  $\pm 3\%$  variation. Expect lesser communications performance if security is enabled.
- Workstation-based control using OPC UA clients or servers does not provide the same performance as physical controllers or EIOCs but is acceptable for most monitoring and non-critical control applications. Specifically, workstation-based control is supported for a minimum of 1 second execution (compared to 100 milliseconds in a physical controller).
- The OPC UA server in the Workstations is a COM to UA wrapper and it comply with the appropriate wrapper specification of Data Access, Alarms and Condition (A&C) and Historical Access parts of the spec. That means that there is a mapping from OPC Classic data to UA format, and no new UA functionality is added. Please review the OPC UA specification if you want to understand more the wrapper functionality.

## Ordering Information

| Description                                     | Model Number                |
|---|-----------------------------|
| Application Station Software Suite              | VE2201Sxxxxx <sup>(1)</sup> |
| DeltaV OPC History Server                       | VE2227 <sup>(2)</sup>       |
| DeltaV OPC Events Server                        | VE2228                      |
| OPC UA Activation License (system wide)         | VE2200 <sup>(3)</sup>       |
| OPC UA Client Signal License, yyyyyy Signals    | VE2204Syyyyy <sup>(4)</sup> |
| OPC-UA client for Ethernet connected I/O (EIOC) | VE4106 <sup>(5)</sup>       |

<sup>(1)</sup> xxxx represents the number of OPC items transmitted through the DeltaV OPC Data Access server, from 00250 to 30000. The DeltaV OPC Data Access Server sizes vary from 250 to 2,000 OPC items in 250 item increments and from 2,001 to 30,000 OPC items in 1,000 item increments.

<sup>(2)</sup> The DeltaV OPC History Server license provides up to 25 concurrent OPC Historical Data Access client connections. The first OPC Historical Data Access client connection is provided free of charge. The DeltaV OPC History Server license is required if more than one OPC Historical Data Access client is connected to the server at the same time.

<sup>(3)</sup> One VE2200, OPC UA Activation License (system wide), must be present on the system for OPC UA servers and clients in the workstations to function.

<sup>(4)</sup> yyyyy represents the number of OPC UA client signals transmitted by the OPC UA client in the workstation, from 00100 to 30000. Also, VE2204Syyyyy license is additive in the OPC UA client and therefore you just need to buy more licenses if you want to increase the number of signal in the OPC UA client (there is no scale up license).

<sup>(5)</sup> VE4106 is applicable only to the EIOC and requires a VE4109Sxxx for the number of physical devices connected to the EIOC.

## Related Products

- **DeltaV Application Station.** The DeltaV workstation used for OPC communications. The DeltaV OPC Data Access server is available from 250 to 30,000 OPC items per Application Station.
- **DeltaV Continuous Historian.** Captures up to 250 analog, discrete and text parameters along with their status and stores them for future analysis. Optionally scalable up to 30,250 parameters.
- **Ethernet I/O Card (EIOC)** provides a platform to monitor and control of Ethernet Devices via control modules assigned to and executed in the EIOC. Ethernet Devices like PLCs, Motor Control Centers, drives, switchgear and others can be controlled directly by the EIOC, independent of a controller.
- **PK Controller** – DeltaV controller with native Ethernet ports to connect to Ethernet Devices, allowing full control functionality in combination with all DeltaV I/O.

## Prerequisites

- DeltaV v14.LTS or later.
- A DeltaV OPC Data Access Server is required for access to real-time process data through the OPC UA server in the Application station and ProfessionalPlus.
- A DeltaV OPC History Server and DeltaV Continuous Historian are required for access to historical process data through the OPC UA server in the Application station and ProfessionalPlus.
- A DeltaV OPC Events Server is required for access to real-time event data through the OPC UA server in the Application station and ProfessionalPlus.

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