



OSIsoft®

Putting OPC to Work

OSIsoft OPC Products and Architecture

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Introduction

On its tenth birthday, OLE for Process Control (OPC) is now a well accepted data access standard, and is especially prevalent on factory floor devices and machines. Now, as the OPC Foundation is poised to release a suite of specifications and tools for OPC UA (Unified Architecture), OSIsoft customers are understandably curious about how all these systems work with the PI System.

From its inception, OSIsoft has been actively involved in OPC Foundation work and has been one of the major contributors to the existing OPC HDA specification. OSIsoft has also been intimately involved in creating the OPC UA specification.

This white paper summarizes the features and benefits of OSIsoft's available OPC products and discusses how OPC UA will work with OSIsoft's operational data management platform, the PI System. It will cover the advantages of OPC UA, as well as how OSIsoft's implementation of OPC UA can help customers use production data more effectively.

OSIsoft OPC Products

As one of the leaders in developing the OPC specifications, OSIsoft has an extensive set of OPC clients and servers. In fact, the OPC clients are now the top selling OSIsoft interfaces due to the acceptance of OPC throughout the industry.

OSIsoft's Commitment to the Enterprise

PI System Platform Releases are migrating toward an increasingly flexible, federated real-time architecture to satisfy the wide range of enterprise needs in our 10,000 + global installations. In keeping with OSIsoft's promise to provide value now, and value over time, our enterprise strategy will continue to introduce new configuration-based, visual real-time solutions.

The strategy to participate in the development of the OPC UA Foundation specifications and to develop a suite of products that will support these specifications demonstrates OSIsoft's commitment to provide open platform solutions to meet enterprise needs. OSIsoft enterprise users will benefit from our commitment to expose PI data through OPC UA, but will benefit even more from the increasing data sources that they will now be able to access.

Why Buy OSIsoft OPC Clients and Servers?

The OPC Foundation issues specifications, not production software, although software that can be used in production is expected to be released as part of OPC UA. Developing PI OPC clients and servers is costly, both in terms of development time and OPC expertise required. Purchasing OSIsoft OPC products makes good business sense. OSIsoft's investment in working on OPC specifications has yielded an immensely



popular OPC product line. These OPC products have been carefully developed to work with the PI System, as well as to provide OPC connectivity with third party software. When you purchase an OSIsoft OPC product, you can easily configure and use it right away.

Integration with the PI System Means Your Data Can Work for You

When you permanently archive device data in the PI System, you make the data available to all of the PI System's set of data management and visualization tools – Analysis Framework, RtAlerts, ProcessBook, DataLink, RtWebParts, iViews, and RtReports. All OSIsoft applications and tools can use the data accessed through OPC in real-time applications. Users can apply the data to context-driven analysis and reporting, to real-time production optimization solutions, and in SharePoint or NetWeaver portals, where all members of a group or a company can share information.

PI OPC Servers

This section describes the PI OPC DA/HDA server.

PI OPC DA/HDA Server

PI OPC DA/HDA Server is an OPC server for OSIsoft's PI System. It implements the OPC Data Access (DA) standards 1.0a and 2.05 and the OPC Historical Data Access (HDA) standard 1.1. It supports browsing, synchronous reads, asynchronous reads, read on change, called Advise, and both writes and deletes.

This server interoperates with any OPC client that is compliant with one or more of those standards to provide access to the current and historical data for PI tags, attributes for PI tags, and access to the PI Module Database (PI MDB) modules, aliases, and properties. It also allows the user to read data or delete data from the PI System and to write data to the PI system.



OSIsoft OPC Clients

This section describes the OSIsoft OPC clients.

PI OPC Interface

PI OPC Interface is an OPC Data Access client that communicates with OPC DA servers that support v1.0a and 2.05 of the OPC DA specification. The interface sends and retrieves data from the PI System. It also supports two types of redundancy – on an interface level and on an OPC server level. The interface level redundancy allows you to run two copies of the interface – one as a primary and the other as a backup. When the primary interface goes down, the backup interface continues to acquire data from an OPC server and sends it to the PI System. At the OPC server level redundancy, the interface is capable of connecting to a backup OPC server if a primary OPC server stops responding. This feature ensures a more reliable and robust infrastructure between OPC servers and the PI System. No additional software is required to implement either type of failover.

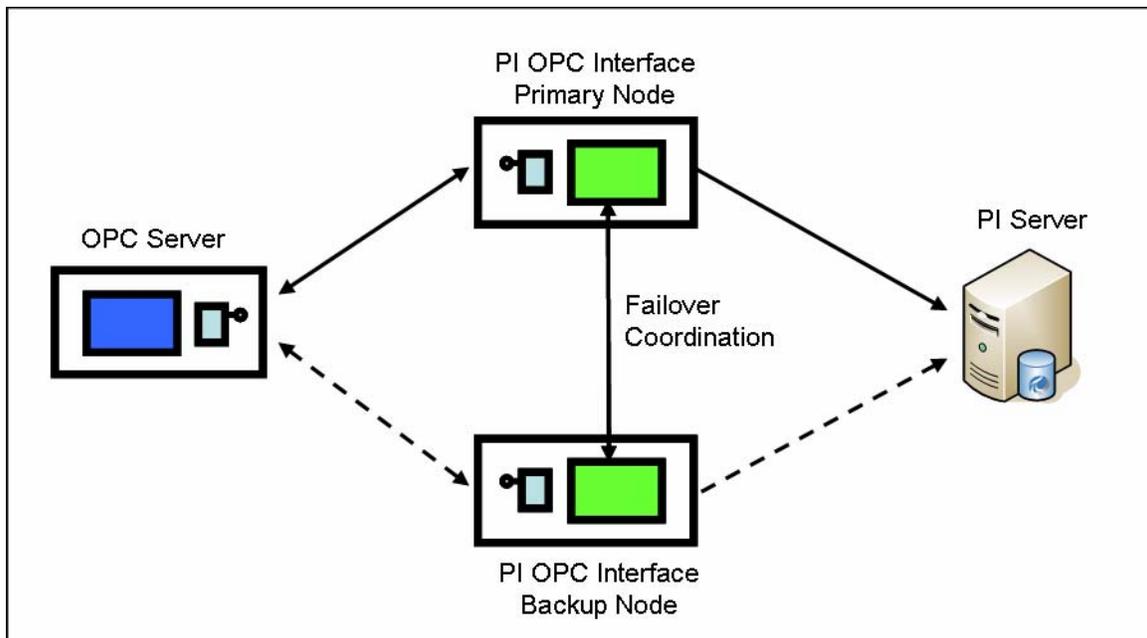


Figure 1. OPC Interface-level redundancy

PI OPC HDA Interface

The PI HDA Interface is an OPC Historical Data Access client that supports v1.1 and 1.2 of the OPC HDA specification. This client version only supports the required COM HDA interfaces. The optional interfaces will be added in the future as they are needed. The client acts as a link between PI System and a foreign historian to allow data transfer from one to another. The PI OPC HDA interface can be set to a history recovery mode, which ensures that all missed data during a downtime will be requested from the OPC server and sent to the PI System.

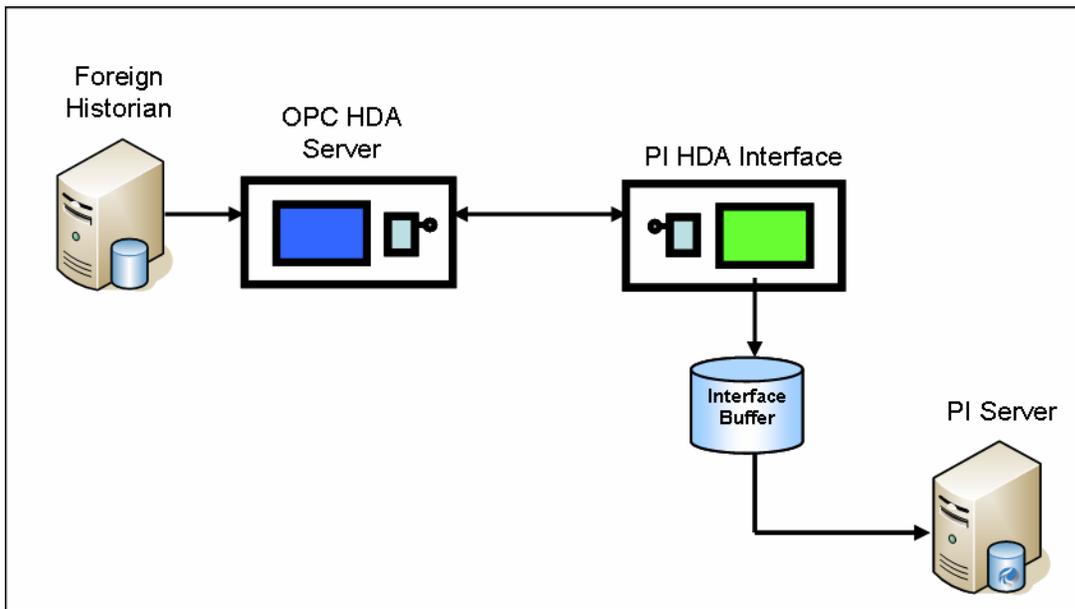


Figure 2. PI OPC HDA Interface with interface buffering.

PI OPC A&E Interface

The PI OPC Alarms and Events (A&E) Interface is designed to communicate with OPC A&E servers and receive both alarm and event data, including all three event types – Simple, Tracking-related, and Condition-related – as described by the OPC specification. The data is sent to and stored in PI System. The Interface creates and maintains a persistent connection between the OPC A&E server and the PI System. If the connection to OPC A&E server is lost, the Interface periodically tries to reconnect and restore the dataflow. When a connection to the PI System is lost, it continues to gather data and attempts to send it when the connection is reestablished.

PI OPC XML Interface

The PI XML client interface allows data to be passed between an XML server and the PI System. The interface architecture allows you to plug in different XML-based protocol layers to communicate with various types of XML servers. The OPC XML is one of the plug-ins that is built to support v1.0 of OPC XML-DA specification. This plug-in can



define the method of connectivity and transport of the XML data. When the plug-in is loaded, the PI-XML interface tries to establish a connection to the PI System and check the status of the XML server. If a successful response is received, the interface will then initiate requests to get data from the XML server. If the connection is not successful, the interface attempts to periodically establish a connection.

PI OPC HDA COM Connector

The PI OPC HDA COM Connector allows PI System clients to access data from a foreign data historian without storing the data in the PI System. The HDA COM Connector is designed specifically for OPC HDA servers. If a foreign historian has a standard OPC HDA server, the HDA COM Connector can communicate with it and create a seamless connection. After it is connected, the manufacturing data becomes available to all PI System applications for analysis, simplified reporting, and clearer visual monitoring. This data can then be used in ProcessBook, ActiveView, or DataLink applications.

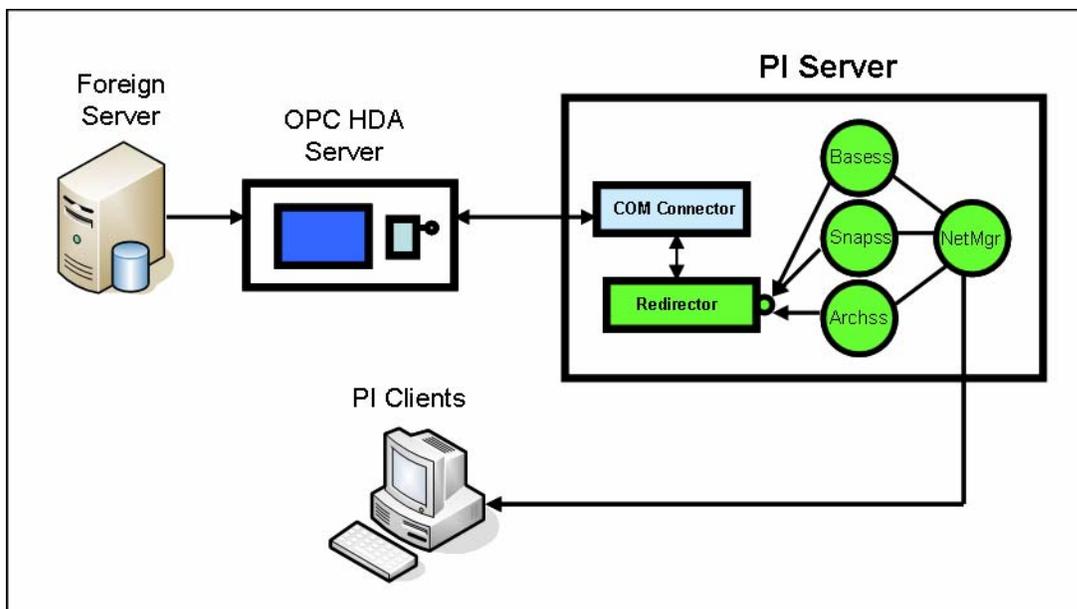


Figure 3. PI OPC HDA COM Connector



The Future – OPC UA

OPC Unified Architecture (UA) is the next generation of OPC standard. OPC UA is a preferred approach for providing secure, reliable, and robust interoperability between clients and servers based on a flexible transport mechanism. It combines the functionalities and information models of the existing COM-based OPC specifications and provides a single coherent data model. OPC UA promises to result in even broader acceptance than its predecessor, since it is built on top of web services, making it extensible to a real-time data management platform such as PI System and other database platforms.

OSIsoft plans to extend OPC data access capabilities for its customers through its data management services and visualization components associated with the PI System. This section describes these features and their benefits to the OPC UA adopter.

Information Modeling

OPC UA incorporates an information model that allows users to organize data in a structured manner. This structure can contain contextual relationships between various pieces of information and combine them in one system. For example, equipment models or asset models can represent such structures. This type of data cannot be exposed using older OPC specifications. OPC UA rectifies this problem through its own Information Modeling technology.

As part of its 2007 release of the PI System, OSIsoft will offer a new framework — referred to as the PI Systems' Data Directory Service – that provides data organization, search, and association capabilities within the PI System. Data Directory will allow the users to create asset templates that describe their production systems, instrumentation, and relationships. Once these templates and /or relationship models are created, they can be exposed to PI System clients. With the use of OPC UA Information Modeling, these asset models can be exposed to UA clients as well. With this capability, users can infuse rich content into their views of production environments, which ultimately will support real-time decision-making.

Security

OPC UA provides a security model that can be configured based on the needs and requirements of a specific system. It provides specifications for the authentication of clients, servers, and users. The security model supports the integrity of the information, and confidentiality of the communication. OPC UA security is not dependent upon a particular technology, and therefore can be extended to use future technologies.

Transport

OPC UA has a broadly defined transport specification that encompasses many transport types, including web services or even the direct exchange of binary data. The core design



is isolated from underlying network transport technologies. OSIsoft is committed to exposing PI data in its OPC UA server implementation.

The OPC UA transport also supports *deterministic* transport, sending an error message if data is not received. The deterministic transport feature brings value to complex processes—such as those in the industrial, chemical, and pharmaceutical industries—that rely on one process completing before another starts.

Unified Address Space

OPC UA servers will expose content as a set of Nodes connected by References. Each node can have references to each other, representing interrelated network of Nodes. The servers can also show a subset of Address Space in Views. The Unified Address Space will enhance browsing for applications dependent upon the PI System's Data Directory Service (Analysis Framework today). With this feature, users will be able to access data by an alias as well as by a PI tag name.

OPC Foundation Wrapper

OPC Foundation has launched an Early Adopter Program that is designed to help member companies with adoption of UA and migration of existing legacy OPC products into UA. The wrappers enable PI System to receive data from systems that implement a COM-based OPC Server but do not support OPC UA. The data can then be used in PI System applications for analysis, reporting, and visualization.

OSIsoft Brings OPC and OPC UA to the Enterprise

OSIsoft brings a wealth of OPC research and development experience to our OPC and upcoming OPC UA products. Our OPC products can save you months of valuable development time and personnel. OSIsoft customers have already realized the value of the OSIsoft OPC clients and servers and the benefit of using the data with the very rich suite of OSIsoft analysis and visualization tools. Please visit the OSIsoft website to learn more about OSIsoft OPC and PI System enterprise solutions at www.osisoft.com.