OPC Gateway Data Sheet

The OPC Gateway

"Your OPC Server-to-Server Data Exchange Solution"

Contents

New Features in Version 2.4 of the OPC Gateway

- The OPC Gateway Console combines engine control and diagnostics in a single, easy-to-use application.
- Monitor your data exchange application values in real-time.
- Organize server-to-server mappings of interest into UserViews.
- Simplified access to engine trace logging features for application validation purposes.
- Expanded on-line help content.

Introduction

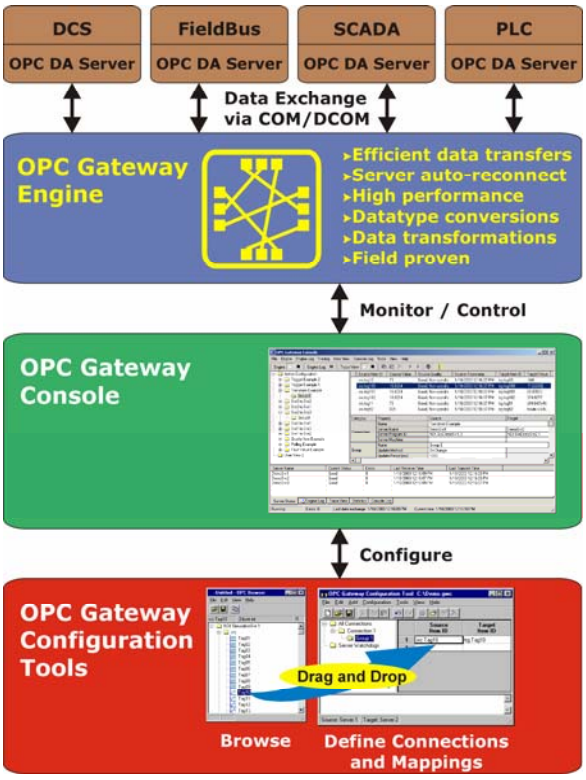
The OPC Gateway software is a high performance OPC client application you configure to exchange data between your OPC Data Access servers.

Your once closed and proprietary manufacturing automation systems are now made open by the OPC standards. Real-time factory floor data is now available to all OPC clients like HMIs and Data Historians.

Now, make that same data available to other OPC servers by using the OPC Gateway.

Leverage the investment you have made in your OPC server infrastructure. Use the OPC Gateway to integrate the automation islands that are hidden behind your fieldbus and PLC OPC servers. Release the untapped potential of your factory floor by allowing these automation islands to interact.

Read this document to learn more about the core features and benefits of the OPC Gateway.



Free Demonstration Software

You can download the OPC Gateway from our website and try it free for 30 days. The full featured demo contains three demonstration OPC servers or you can use your own OPC servers. The URL is www.OPCexperts.com/gw. Then click Demo.

Benefits & Features

Benefits

Designed specifically for OPC server-to-server integration. Specialized configuration and diagnostic tools are provided to meet the unique requirements of this application.

Plug and play operation because the OPC Gateway is based on public standards. No programming required.

Proven interoperability. The OPC Gateway has proven its interoperability with all major OPC server applications and has an extensive industry track record.

Easy to use with a documented, flexible user interface.

OPC Expert support. Northern Dynamic has provided OPC client and server technical support for 10 years for companies big and small. Get our OPC experts working for you.

Features at a Glance

For a more detailed discussion of OPC Gateway features, read the following pages.

Configuration (see page 3 for details)

Standalone configuration tool – can be used anywhere to build server-to-server mappings offline

Before activating your configuration, use the verify tool to check your mappings for:

- Configuration problems,
- Mapping cycles,
- Data transform expression errors.

Flexible user interface options :

- Drag and drop OPC item configuration,
- Spreadsheet-style interface,
- Documented dialogs,
- Import / Export (CSV format).

Standalone OPC Browser utility used for:

- Browsing the namespace of a server
- Displaying item data type and access rights
- Off-line configuration – browse a server namespace and save it to a file for later use
- Use with third party applications (like MS Excel) for quickly specifying OPC Item IDs; drag and drop onto a spreadsheet

Data Exchange (see page 4 for details)

Supports 1.0a and 2.0 compliant OPC servers

Standalone, dedicated data transfer engine runs as a service

High performance and multi-threaded – designed to handle 1000's of transfers per second

Optimize data throughput and OPC server loading – "tune" your configuration to satisfy your system performance requirements

Communications between 'good' servers not affected by lost or latent server connections

Configuration is verified by the engine at startup. Several data transfer options – write a target point when:

- Source value or quality changes (OnChange)
- Configured period expires (Polled)
- An OPC item value changes or expression is TRUE (Triggered)

Source item quality can be transferred

Source item bad quality value can be specified

Automatic data type conversion between source and target – including support for arrays

User defined data transforms

- Can be defined for each mapping
- Sample implementations: engineering unit conversion, bit shifting, bit masking, and logical expressions
- 40+ operators provided including bit wise and logical operators, logic functions, trigonometric functions

Monitoring & Control (see page 5 for details)

Monitor server-to-server data in real-time.

Monitor status of the OPC Gateway Engine and obtain exchange statistics.

Control center for manually starting and stopping the engine.

Diagnostics & Support (see page 6 for details)

Tier-1 Diagnostics

- OPC server Watchdog points
- Communications status display
- Throughput performance statistics
- Event logging

Tier-2 Diagnostics

- Detailed data exchange transaction logs

Tier-3 Diagnostics

- OPC COM Call Tracing – quickly diagnose OPC interoperability problems

OPC Expert Support

- Focused, experienced, knowledgeable, and responsive – OPC is what we do
- OPC experts since 1996
- On-site support available

Extensive 'self-help' available in OPC Gateway online help Troubleshooting section

Configuration

The OPC Gateway is an OPC Data Access (DA) client application that is used to integrate automation systems by using their OPC DA servers.

The gateway manages a DA server's OPC item resources to exchange data and quality information between servers. The resources are managed by defining connections between servers, creating mapping groups with common transfer parameters (i.e. OnChange, Polled, Triggered) and specifying item mappings between specific OPC items. An item mapping is composed of a source OPC item and a target OPC item.

Basic Configuration Steps

Follow these basic steps to configure the OPC Gateway. For a comprehensive tutorial, visit our website at www.OPCexperts.com/gw and click on Tutorial.

1. Select your OPC DA Servers.
2. Define connections between servers.
3. Within a connection, define your mapping groups. Pick your desired transfer mechanism (any combination of OnChange, Polled, Triggered) for a group.
4. Within a mapping group, define your source and target OPC items.
5. Save your configuration and start the OPC Gateway Engine to activate the data exchange.

Configuration Tools

The OPC Gateway provides flexible configuration options to aid with the creating of a configuration, either large or small.

Configuration Tool – A familiar spreadsheet-style interface allows you to directly specify configuration parameters. For new users or for access to advanced features, documented dialogs are available by simply double clicking on a configuration element.

Specifying OPC items could not be easier. Use the OPC Browser to browse a server and select an item. Then drag and drop the item into your configuration (see Figure 1).

OPC Browser – An information packed browser utility used to browse the namespace of an OPC server. The browser connects to a chosen server and lists data type and access right information for OPC items. The OPC Browser works with the Configuration Tool, so you can drill down to an OPC item and drag and drop the item into your configuration. Optionally, the namespace can be saved to a file for configuration even when the OPC server is not available.

Verify – This tool performs a comprehensive design-time check of a configuration.

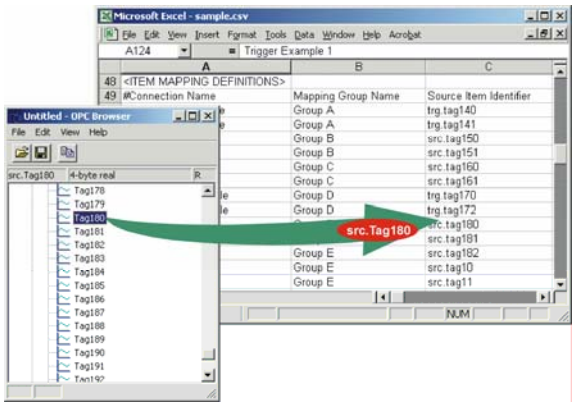


Figure 1
Use the OPC Browser utility with Excel and the Configuration Tool's Import / Export utility to build large configurations.

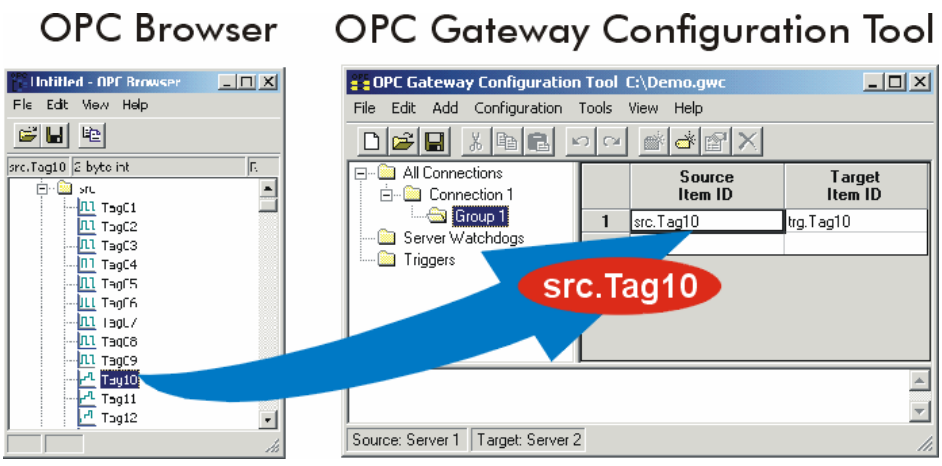


Figure 2
Drag and drop configuration for item mappings. The browser shows data type and access right information.

Data Exchange

Robust Data Exchange Engine

Data exchange is what the OPC Gateway is all about. The OPC Gateway Engine is a standalone background application that is dedicated to providing fast and reliable transfers between OPC servers for:

- Item values
- Item quality information (quality values and/or pre-configured bad data values)

Throughput – The engine was designed to facilitate thousands of data transfers per second efficiently and robustly.

Lost or latent server connections – The engine automatically restores lost server connections (lost due to network or server failure) without interrupting the data exchange between good servers. Server startup and connection delays are managed by the engine. The engine can run as a service and work with system specific startup timing constraints.

Data Management

The engine provides run-time data management features that make the integration of data in different formats easier and in most cases, transparent.

Data type conversion – The engine automatically performs data type conversions, including support for arrays. So, for example, mapping a PLC register integer value to a DCS point real value is transparent.

Data transforms – The engine also implements user-specified data transforms. Evaluate a mathematical or logical expression based on the source item value and write the result to a target item. Transforms are configured using the Configuration Tool's expression editor and expression tester. Your configuration is a central location and consistent framework for managing data transformations between your OPC servers.

40+ arithmetic and logical operators are available. Example applications include:

- Engineering unit conversions
- Integer to string translations
- Bit masking and bit shifting for PLC register or field device data encoding and decoding

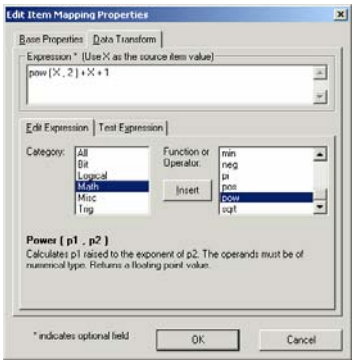


Figure 3
Screen shot illustrates the data transform expression editor.

Data Transfer Options

The OPC Gateway offers three flexible mechanisms for determining how often a data exchange occurs. Each mechanism can be used on it's own or in combination each others.

OnChange – The data exchange occurs when the source item's OPC server notifies the engine that a change has occurred in the item's value and/or quality. The mapped item in the target server is updated.

Polled – The engine periodically polls the source item's value and quality and updates the target item.

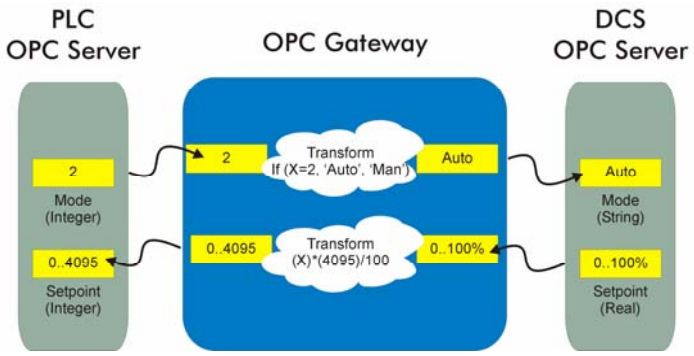
Triggered – The engine updates the target item only when the value of a pre-defined trigger item changes or a trigger expression evaluates to a non-zero value.

Figure 4: Data Transforms

This diagram illustrates two simple data transforms:

1. An integer to string conversion for mapping integer mode values in a PLC to corresponding mode strings in a DCS.
2. A simple engineering unit conversion for mapping a scaled setpoint to a 12-bit PLC register value.

The data transforms are executed whenever there is a new value to report to the target server.



The OPC Gateway Console: Monitoring & Control

Introduction

The OPC Gateway Console is used to monitor and control your OPC Gateway data exchange application. The console is a independent OPC Data Access client application that connects to the servers defined in your OPC Gateway configuration and displays data in real-time as it is exchanged between servers.

Monitoring

As a monitoring tool the console:

Monitors server-to-server data exchange in real-time including item values, quality, timestamps and run-time configuration parameters (e.g. server IDs, datatypes, and data transformations).

Provides a real-time view of the data as it is exchanged between OPC Data Access servers (the Item View).

Provides a transactional view of data exchange between servers (the Trace View).

Provides access to the OPC Gateway engine log.

Monitors the status of the OPC Gateway Engine and provides the following statistics:

- Engine performance statistics.
- Real-time communications statistics with your OPC servers.
- Data exchange statistics.

Activates and monitors an engine trace. Tracing records all engine server-to-server transaction details to help with application debugging.

Control

As a control center, the console also allows you to:

Select the engine configuration file.

Manually start and stop the OPC Gateway Engine.

Simulate the server connections the OPC Gateway Engine will make with your configuration before activating the engine.

Selecting the Active Configuration

When the console application is started, the console loads the configuration currently used by the OPC Gateway Engine. If the engine is not running, the active configuration is the configuration file selected to be used by the engine the next time the engine is activated. Note that if a new configuration file is selected while the engine is running, The active configuration affects what is displayed in the Navigation and Item View Panes.

Organizing Mappings for Validation and Diagnostics

Individual item mappings can be selected and organized into a customized User View. Grouping your mappings together into a custom view is useful for application validation and diagnostic purposes.

Select the User View () folder in the Navigation Pane to display the User View. Views can be stored to a file and opened for future use. Refer to the topic User View for a complete discussion.

OPC Gateway Console Tool Tray Indicator

An indicator will appear in the tool tray when the console is running. Following is a cutout from a screen shot showing the tool tray indicator.

The indicator provides a visual cue of the state of the OPC Gateway Engine. Each state and the associated tool tray icons are discussed below.

Blue Star— Indicates the engine is running and that no errors have occurred since the engine was activated or the error indicator was reset, which ever occurred most recently.

Red Star— Indicates the engine Error Indicator state. A red star signals that the engine is running, but one or more errors have occurred since the engine was activated or the error indicator was last reset. The engine will log one or more messages to the engine log. Refer to the topic Engine Log Tab for more information. The error indicator (red star) is a latched state and must be manually reset. Read below for more details.

Crossed Red Star— Indicates the engine is not running. No data exchanges are occurring.

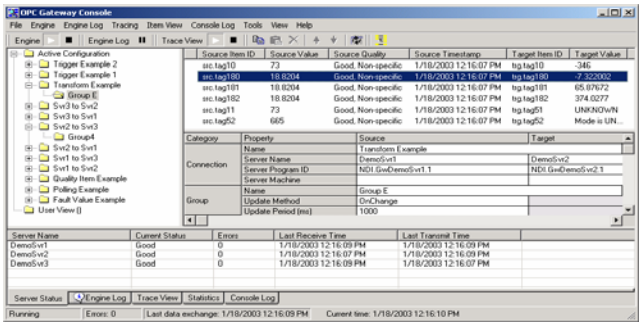


Figure 5: OPC Gateway Console Interface

Diagnostics & Support

When deployed, the OPC Gateway is part of a system composed of an OPC client (the OPC Gateway) and several OPC servers. It is normal over the lifetime of a system for exceptions to occur. The exception could be temporary (e.g. disconnected network cable) or more permanent (hard drive failure on PC hosting an OPC server). Therefore the system elements should provide the means to alert operators and support staff of a problem and provide the tools to quickly diagnose and correct the problem.

The OPC Gateway implements a three-tiered set of diagnostic tools for detecting system, application, and interoperability errors.

Tier 1—Watchdogs, Comm Status and Statistics, Event Log

Server watchdogs – One OPC server can be configured to receive the communication status (good/bad) between the OPC Gateway Engine and the other OPC server(s). For example, your DCS OPC server could be configured to alarm off the watchdog item when communications with a PLC OPC server fails.

Communication Status and Statistics – The status monitor utility provides communication status information for each server and statistics that indicate data exchange activity.

Event Log – Detailed event messages are logged to the NT event log. Each message is documented in the Troubleshooting section of the online help.

Tier 2—Data Exchange Tracking

Application errors (e.g. data type conversion errors, incorrect mappings, scaling problems) can be quickly diagnosed by using the engine trace feature. Tracing logs the details for each data exchange transaction to a text file and/or TraceView utility.

For each exchange, the following information is written in an easy-to-read format. Refer to Figure 5 for a trace file sample.

- OPC Item ID for source and target OPC item
- Data type for source and target OPC item
- Source point quality information
- Value read from source and value written to target
- Data transform expression (if configured)
- Formatted output for array items

Tier 3—OPC COMM Call Tracing

The root cause of OPC interoperability errors is sometimes difficult to determine. When you have a system to commission and put online, you do not want to be stuck navigating the technical support channels of multiple vendors. That is why the OPC Gateway includes OPC COM Call Tracing, a technology developed by Northern Dynamic. When activated, OPC COM Call Tracing creates an unbiased, detailed record of each OPC COM call made between the OPC Gateway and the servers. Using this record, our OPC Experts will diagnose and report the root cause of the problem (service available for customers with purchased support). Once determined, resolution of the problem can occur based on the facts. To learn more about our OPC COM Call Tracing technology, visit our website at www.OPCexperts.com/comcall.

OPC Expert Support

You can rely on our OPC Experts to assist with your product support and application questions. Our support team is knowledgeable, experienced and responsive because we focus on OPC middleware applications and OPC software toolkits. Our experts are also available for on-site support and consultation.

Our optional annual software maintenance contracts include software upgrades and unlimited technical support.

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.
.
16:53:32.023 Friday, March 22, 2002
Changed Items for group: Group E
Quality  ( Source Item, Data Type ) -> ( Target Item, Data Type )
        0xC0    ( src.tag180, 4-byte Real ) -> ( trg.tag180, 4-byte Real ) {Transform: ( X  - 32 ) * 5 / 9}
                        10.15864 -> -12.13409
        0xC0    ( src.tag181, 4-byte Real ) -> ( trg.tag181, 4-byte Real ) {Transform: ( X * 9 / 5 ) + 32}
                        10.15864 -> 50.28556
        0xC0    ( src.tag182, 4-byte Real ) -> ( trg.tag182, 4-byte Real )  {Transform: pow ( X , 2 ) + X + 1}
                        10.15864 -> 114.3567
        0xC0    ( src.tag10, 2-byte Int ) -> ( trg.tag10, 2-byte Int )        {Transform: ~ ( X  | @111 )}
                        10 -> -284
Number of changed items: 4
```

Figure 6: Sample text from a trace file. Illustrates data exchange of four values, each with a data transform expression configured.

Product Summary Sheet

System Requirements

Operating Systems — Windows NT 4.0 Service Pack 5 or higher, Windows 2000, Windows XP, Windows Server, Windows Vista.

OPC Servers Supported — All that are compliant with OPC Data Access 1.0a or 2.0 standards.

Disk Space — Approximately 20 MB (including system files).

Product Licensing

The OPC Gateway V2.4 is licensed in the following point counts: 16000.

Each source server to target server OPC item mapping is considered a point. One license is required per machine.

Product Support

Northern Dynamic's dedicated support team is available via telephone and e-mail.

The comprehensive OPC Gateway on-line help combined with an internet accessible knowledge-base provides quick answers to common questions.

Your new license purchase entitles you to receive 30 days of unlimited product support via email and telephone. The 30 days starts from the date of first contact. The 30 day support period expires if not used within 180 days from the date of purchase.

One (1) year support and software maintenance contracts are available separately. Contact a Northern Dynamic representative for more information.

Northern Dynamic's OPC experts are ready to assist with the design and deployment of your integration solution. Comprehensive on-site support and training is available.

Contact a Northern Dynamic representative today for more information

Proven Interoperability

The OPC Gateway has been interoperability tested with OPC servers from the following vendors:

- ABB · Allmendinger · Applicom · Bently Nevada
- CyberLogic Software · DomesticSoft · Emerson
- FactorySoft · Honeywell · Iconics · Kepware · Matrikon
- National Instruments · Nematron · Northern Dynamic
- Rockwell Software · Schneider Automation · Siemens
- Software Toolbox · SMAR · SST · Steeplechase Software
- Technosoftware · US Data · Wellspring Solutions
- Wind River · Yokogawa

Ordering Information

You can try the OPC Gateway for free by downloading our 30-day demonstration version. When you are ready, contact Northern Dynamic to purchase a license. Your demo software can be licensed immediately.

Contact Northern Dynamic for pricing information and a quotation. Distributor inquiries are welcome.

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About Northern Dynamic

Our team of OPC experts can help you embed OPC technology into your software products, supply robust integration solutions, and provide third party support during your integration efforts.

Visit our website at www.OPCexperts.com to learn more

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