



# Wonderware FactorySuite Gateway User's Guide

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# Welcome

FactorySuite Gateway (FS Gateway) is a Microsoft® Windows® application program that acts as a communications protocol converter. It was built with the Arcestra® DAS Toolkit. FS Gateway can be used to link clients and data sources that communicate using different data access protocols.

## Documentation Conventions

This documentation uses the following conventions:

| Convention       | Used for                                                   |
|------------------|------------------------------------------------------------|
| Initial Capitals | Paths and filenames.                                       |
| <b>Bold</b>      | Menus, commands, dialog box names, and dialog box options. |
| Monospace        | Code samples and display text.                             |

## Technical Support

Wonderware Technical Support offers a variety of support options to answer any questions on Wonderware products and their implementation.

Before you contact Technical Support, refer to the relevant section(s) in this documentation for a possible solution to the problem. If you need to contact technical support for help, have the following information ready:

- The type and version of the operating system you are using.
- Details of how to recreate the problem.
- The exact wording of the error messages you saw.
- Any relevant output listing from the Log Viewer or any other diagnostic applications.
- Details of what you did to try to solve the problem(s) and your results.
- If known, the Wonderware Technical Support case number assigned to your problem, if this is an ongoing problem.

# Chapter 1

## Getting Started

This chapter provides you with an overview of the Wonderware® FactorySuite Gateway (referred to as FS Gateway throughout the remainder of this document), the communication protocols used between data sources and clients, accessing items, and product features.

FS Gateway is an application developed with the Archestra DAS Toolkit that acts as a communications protocol converter. FS Gateway can be used to link clients and data sources that communicate using different protocols.

FS Gateway documentation covers only the information you need to configure and run the FS Gateway component. See the documentation that comes with the related components for details on their operation. You can find installation instructions in a help file on the distribution CD.

You use the DAServer Manager to configure, activate, and troubleshoot FS Gateway. The DAServer Manager is located in the System Management Console (SMC).

This documentation describes some of the features of the DAServer Manager. See the DAServer Manager User's Guide to find more information on:

- Global parameters
- Configuration sets
- Time zone features
- Icon definitions
- Activation/deactivation

- Configuring as a service
- Importing/exporting device items
- Standard diagnostics

You can troubleshoot problems with FS Gateway using the ArchestrA Log Viewer, a snap-in to the SMC. See the Log Viewer help file to find information on:

- Viewing error messages.
- Determining which messages are shown.
- Bookmarking error messages.

You may also be able to troubleshoot problems using your client application, such as the Wonderware InTouch HMI software. The client application can use system device items to determine the status of nodes and the values of some parameters.

The basic rules for FS Gateway include:

- One instance of FS Gateway can run per node.
- FS Gateway can be configured to run as a service (auto or manual) or not as a service.
- FS Gateway can be activated and deactivated using the DAServer Manager snap-in.
- FS Gateway can be activated as a COM Server (OPC Server) using standard COM activation mechanisms.
- FS Gateway can be run only out-of-proc within OPC clients.
- FS Gateway can communicate only with ArchestrA data source components delivered with Industrial Application Server v2.0 and later. Earlier versions of IAS are not supported.

FS Gateway allows Windows application programs access to data from a variety of data sources. The following matrix indicates supported source/client mappings. Clients are listed in the left column, data sources are displayed across the top row, and N/A means not supported.

|                         | <b>OPC v2.05 Data Access Server</b> | <b>SuiteLink I/O Server</b> | <b>ArchestrA</b> | <b>DDE I/O Server</b> | <b>FastDDE v2 I/O Server</b> | <b>FastDDE v3 I/O Server</b> | <b>InTouch</b> |
|-------------------------|-------------------------------------|-----------------------------|------------------|-----------------------|------------------------------|------------------------------|----------------|
| <b>OPC Client</b>       | N/A                                 | Yes                         | Yes              | Yes                   | Yes                          | Yes                          | Yes            |
| <b>SuiteLink Client</b> | Yes                                 | N/A                         | Yes              | Yes                   | Yes                          | Yes                          | Yes            |

|                          | <b>OPC v2.05 Data Access Server</b> | <b>SuiteLink I/O Server</b> | <b>ArchestraA</b> | <b>DDE I/O Server</b> | <b>FastDDE v2 I/O Server</b> | <b>FastDDE v3 I/O Server</b> | <b>InTouch</b> |
|--------------------------|-------------------------------------|-----------------------------|-------------------|-----------------------|------------------------------|------------------------------|----------------|
| <b>DDE Client</b>        | Yes                                 | Yes                         | Yes               | N/A                   | N/A                          | N/A                          | Yes            |
| <b>FastDDE v2 Client</b> | N/A                                 | N/A                         | Yes               | N/A                   | N/A                          | N/A                          | N/A            |
| <b>FastDDE v3 Client</b> | Yes                                 | N/A                         | Yes               | N/A                   | N/A                          | N/A                          | N/A            |

**Note:** InTouch v7.11 and greater is supported. FastDDE v2 supports value data only. FastDDE v3 supports VTQ (value, time, quality). All versions of DDE must be local (NetDDE is not supported). FS Gateway must be located on the same node as ArchestraA in order to use that data source.

To access FS Gateway, the chosen client must also have a valid configuration, which is client specific.

## Before You Begin

Before configuring FS Gateway, verify the following items:

- A PC is set up with the necessary network cards, and is connected to the necessary networks.
- The Windows administration account is created or identified.
- The DAServer and any other Wonderware software such as the DAServer Manager is installed with the proper licenses. For more information, see the License Utility documentation on the distribution CD.
- The client software is installed.
- The device(s) is/are connected (networked) and, if necessary, programmed.

Before configuring FS Gateway, you should know:

- The device network configuration and addresses.
- Which data items are needed for the client application.
- The device name/topic name/group name.
- The desired update intervals.

## Supported Client Protocols

The client applications connect to FS Gateway using following protocols:

- OPC
- SuiteLink
- DDE/FastDDE

### OPC

OPC (OLE for Process Control) is a non-proprietary set of standard interfaces based on Microsoft's OLE/COM technology. This standard makes possible interoperability between automation/control applications, field systems/ devices, and business/office applications.

Avoiding the traditional requirement of software/application developers to write custom drivers to exchange data with field devices, OPC defines a common, high-performance interface that permits this work to be done once, and then easily reused by HMI, SCADA, control and custom applications.

Over a network, OPC uses DCOM (Distributed COM) for remote communications.

### SuiteLink

SuiteLink uses a TCP/IP-based protocol and is designed specifically to meet industrial needs such as data integrity, high throughput, and easier diagnostics. This TCP/IP standard is supported on Windows operating systems.

SuiteLink is not a replacement for DDE or FastDDE. The protocol used between a client and a server depends on your network connections and configurations. SuiteLink provides the following features:

- Value Time Quality (VTQ) places a time stamp and quality indicator on all data values delivered to VTQ-aware clients.
- Extensive diagnostics of the data throughput, server loading, computer resource consumption, and network transport are made accessible through the operating system's performance monitor. This feature is critical for the operation and maintenance of distributed industrial networks.

- Consistent high data volumes can be maintained between applications regardless if the applications are on a single node or distributed over a large node count.
- The network transport protocol is TCP/IP using Microsoft's standard WinSock interface.

## DDE/FastDDE

DDE/FastDDE communication protocols allow communication between a client and a server. DDE protocol is developed by Microsoft whereas FastDDE protocol is proprietary to Wonderware.

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**Important:** On Windows Vista and later operating systems, Local DDE is supported only when the DAServer is configured as "Not a Service" and activated from its executable file or launched from InTouch. Local DDE is not supported when the DAServer is activated from the System Management Console (SMC).

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### DDE

DDE is a communications protocol to allow applications in the Windows environment to send/receive data and instructions to/from each other. It implements a Client/Server relationship between two concurrently running applications.

The server application provides the data and accepts requests from any other application interested in its data. Requesting applications are called clients. Some applications such as InTouch and Microsoft Excel can simultaneously be both a client and a server.

### FastDDE

FastDDE provides a means of packing many proprietary Wonderware Dynamic Data Exchange messages into a single Microsoft DDE message. This packing improves efficiency and performance by reducing the total number of DDE transactions required between a client and a server.

Although Wonderware's FastDDE has extended the usefulness of DDE for our industry, this extension is being pushed to its performance constraints in distributed environments.

## ArchestrA Message Exchange

Message Exchange is a proprietary communication protocol used by Invensys's ArchestrA infrastructure. It provides data communication across ArchestrA's object-based system.



# Chapter 2

## Setting Up FS Gateway

This section describes the procedures required to set up FS Gateway for use with the supported devices and communication-interfaces.

Many high-level functions and user-interface elements of the DAServer Manager are universal to all DAServers. These universal functions are described in detail in the *DAServer Manager User's Guide*.

See the *DAServer Manager User's Guide* to find more information on:

- Global parameters
- Configuration sets
- Time zone features
- Icon definitions
- Activation/deactivation
- Configuring as a service
- Importing/exporting device items
- Standard diagnostics

## Checklist for Setting up FS Gateway

If you are setting up a FS Gateway for the first time, perform the following tasks in the order listed:

- 1 Review the items described in "Before You Begin" on page 11.
- 2 Locate the FS Gateway in the System Management Console (SMC). See "Finding FS Gateway in the SMC" on page 16.
- 3 Configure the global parameters. See the *DAServer Manager User's Guide*.
- 4 Add one or more objects. See "Configuring FS Gateway" on page 20.
- 5 Add device items. See "Device Item Definitions" on page 82.
- 6 Activate FS Gateway. See "Configuring FS Gateway" on page 20.
- 7 Access data from the client, see "Accessing the Data in FS Gateway" on page 77.
- 8 Troubleshoot any problems. See "Troubleshooting" on page 101.

## Finding FS Gateway in the SMC

FS Gateway is identified by a unique program name (ProgID) under the SMC. The ProgID for this FS Gateway is:

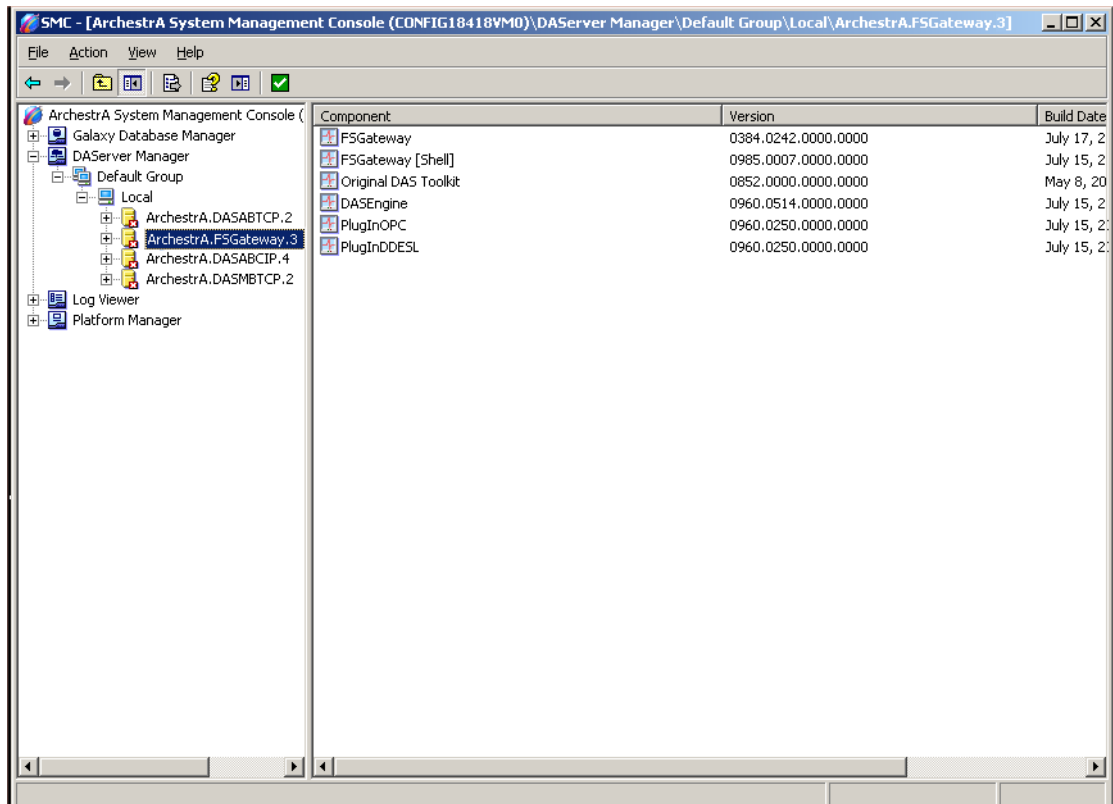
**ArchestrA.FSGateway.3.**

On the computer where FS Gateway is installed, it can be found in the local node of the default group of the DAServer Manager.

You do not need to install the DAServer Manager on the same computer as the DAServer. When you access the FS Gateway remotely, you will not find FS Gateway node under the local node. You must locate and identify FS Gateway on a computer in one of the node groups.

### To find FS Gateway

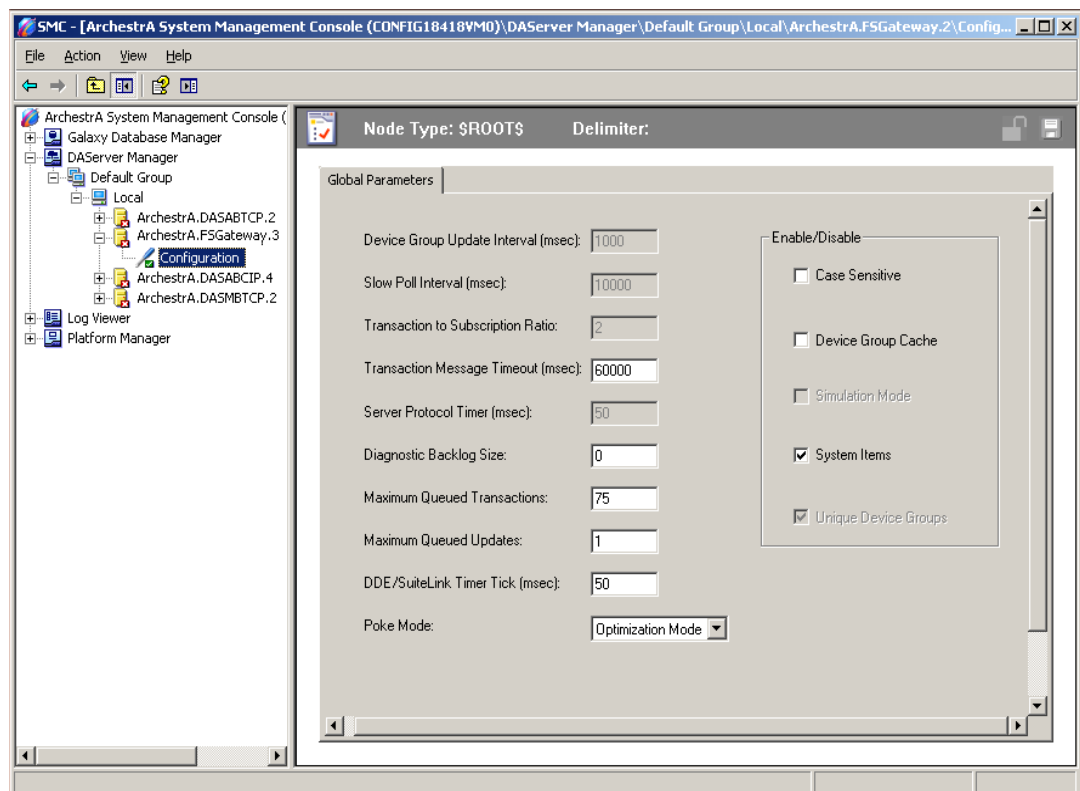
- 1 On the system **Start** menu, click **Programs**. Navigate to the Wonderware folder that contains the System Management Console and then click **System Management Console**.
- 2 In the **System Management Console**, expand **DAServer Manager**.
- 3 Locate the group with the node **Archestra.FSGateway.3**



- 4 Expand the **Archestra.FSGateway.3** node to display the global parameters.

5 Select the **configuration** node to display the global parameters.

To view global parameter configuration and settings in detail, see the *DAServer Manager User's Guide*.



# Chapter 3

## Configuration

Network Communication Bridge/Interface Modules are the communication links between FS Gateway and its supported Data Sources (OPC Server, Application Server, InTouch, DDE/SuiteLink). You must create these links within the DAServer Manager hierarchy to bridge/route control and information data between different networks to target data sources.

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**Important:** To run FS Gateway as a service, right-click FS Gateway name (**ArchestrA.FSGateway.3**) under DAServer Manager and select **Configure As Service** from the shortcut menu. You can configure it as an auto service or manual service. (For more information about configuring as a service see the Activation/Deactivation/ Service Component of the DAServer Manager documentation.) FS Gateway must be run as a service if you are using a DDE/SuiteLink client.

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## Configuring FS Gateway

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**Important:** FS Gateway is hosted by the DAServer Manager, a Microsoft Management Console (MMC) snap-in, which is part of the Archestra System Management Console (SMC) suite of utilities. Many high-level functions and user-interface elements of the DAServer Manager are universal to numerous products created with the Archestra DAS Toolkit. Only the documentation for the DAServer Manager contains descriptions of those universal functions/UI elements. Therefore, reading the documentation for both the MMC and the DAServer Manager is critical to understanding this user's guide. To read the documentation about the MMC and DAServer Manager, click the **Help** command on the SMC's **Action** menu. Both the MMC's help and the DAServer Manager's help are displayed. An Adobe Acrobat version of the DAServer Manager documentation (filename: `DAServerManager.pdf`) is also available in the CD-ROM folder `\User Docs\English`.

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**Note:** The shortcut menu items described in this document typically represent only a subset of any actual shortcut menu. Most items in each shortcut menu are standard Microsoft Windows or MMC-specific commands. For more information about those commands, please see MMC help.

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### To prepare FS Gateway

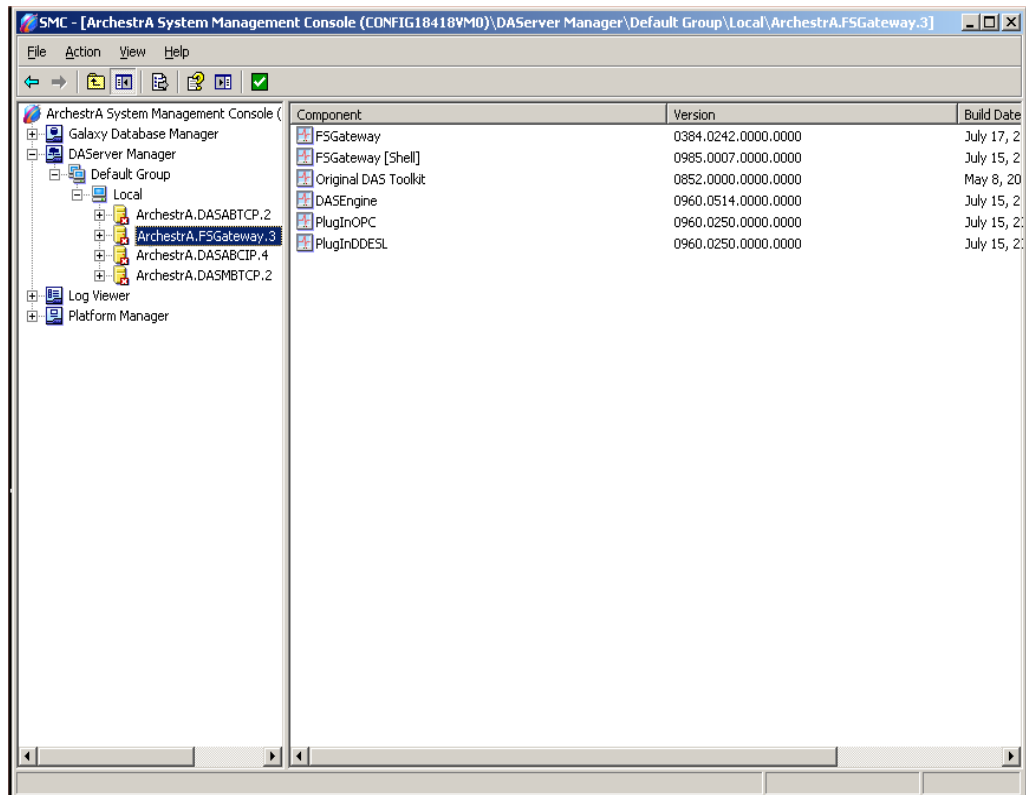
- 1 Install FS Gateway by running the **Setup.exe** program.

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**Note:** Installation instructions are included in the product's Installation Guide (filename: `Install-FSGateway.chm`).

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- 2 Accept all the default settings during the installation.
- 3 Start the System Management Console. by clicking **Start**, pointing to **Programs** and then **Wonderware**, and then clicking **System Management Console**.
- 4 From the System Management Console, find the DAServer Manager utility and then FS Gateway below in the hierarchy tree.
  - Click on Default Group, then the Local node.
  - Under the Local node, find FS Gateway (named **Archestra.FSGateway.3**).
  - See the DAServer Manager documentation for general information about working in this snap-in environment.



**Important:** Selecting the **Configuration** object of the hierarchy tree displays the **Global Parameters** configuration view for FS Gateway. The default Poke Mode settings for FS Gateway is Optimization mode. If you intend to put more than 5,000 items on advise, we recommend that you set Transaction Message Timeout to 120 seconds. Configure all other global parameters as required. For more information about the **Global Parameters** configuration view, including descriptions of the different Poke Modes, see the DAServer Manager documentation. Global parameters that appear dimmed are either not supported or cannot be configured in FS Gateway. Simulation Mode is not supported.

- 5 Before activating FS Gateway for connection, you must first build and configure a hierarchy of one or more data sources to establish communications between sources and clients.

**Note:** For step-by-step procedures on how to build and configure this hierarchy, please see the section, "FS Gateway Data Source Hierarchy."

- 6 You may create desired groups and topics for each data source by:
  - Navigating to a data source object in the DAServer Manager tree view.
  - Right-clicking the object and selecting the group/topic object provided. Each data source has only one type of group or topic object that can be added to the hierarchy.
  - Configure the group or topic.

- 7 Finally, you may create desired device items for each group or topic by:
  - Selecting the group or topic object.
  - Clicking the **Device Items** tab.
  - Right-clicking anywhere in the **Device Items** configuration view and clicking **Add** from the shortcut menu.

---

**Important:** For step-by-step procedures on configuring Device Items, please see the section, "Configuring Device Item Definitions."

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**Note:** When you are viewing the configuration hierarchy of FS Gateway and someone views the same FS Gateway in another instance of the DAServer Manager, the second instance is displayed in read-only mode. To gain configuration access in this second instance, you must close the first instance of the DAServer Manager (or just remove focus from FS Gateway hierarchy) and then toggle focus away from and then on FS Gateway hierarchy of the second instance.

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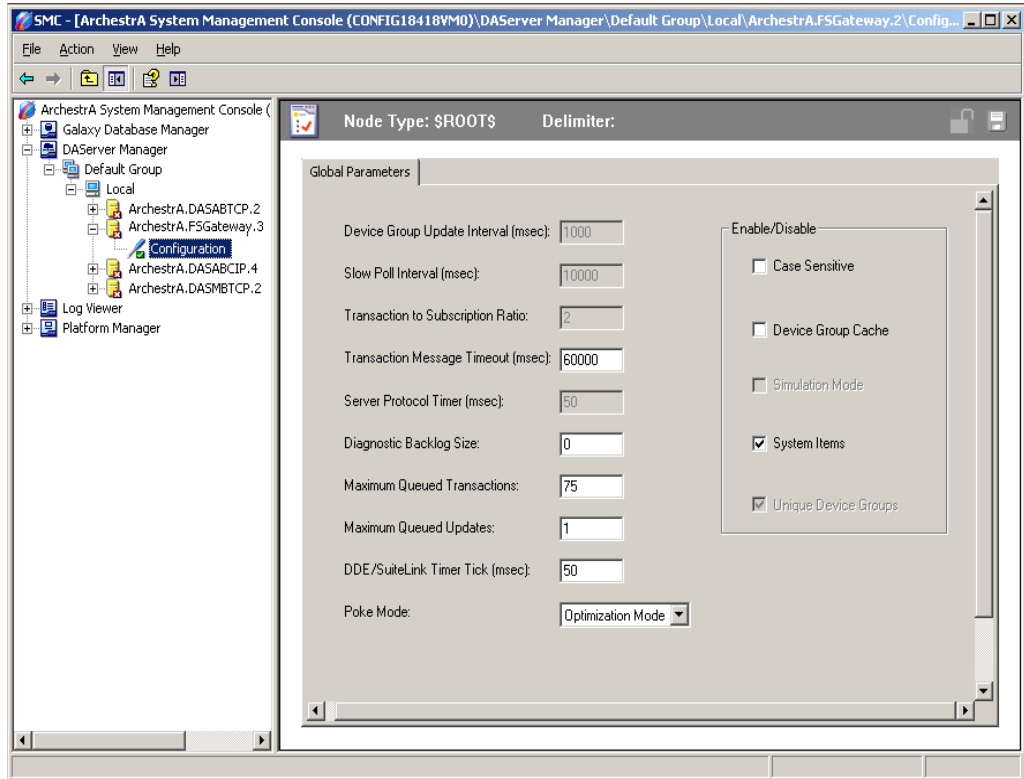
FS Gateway is now ready for use. In order to use it, you must activate it. The following rules apply:

- If you are using an OPC Client, FS Gateway can be auto-started.
- If you are using DDE/SuiteLink, you must start FS Gateway either as a manual or automatic service.
- To activate FS Gateway, right-click on **ArchestraA.FSGateway.3** and click **Activate Server** on the shortcut menu.

## FS Gateway Data Source Hierarchy

**Note:** Before attempting to configure FS Gateway, determine the hierarchical structure of the data sources you wish to use.

The data source configuration part of FS Gateway hierarchy begins under the Configuration branch.



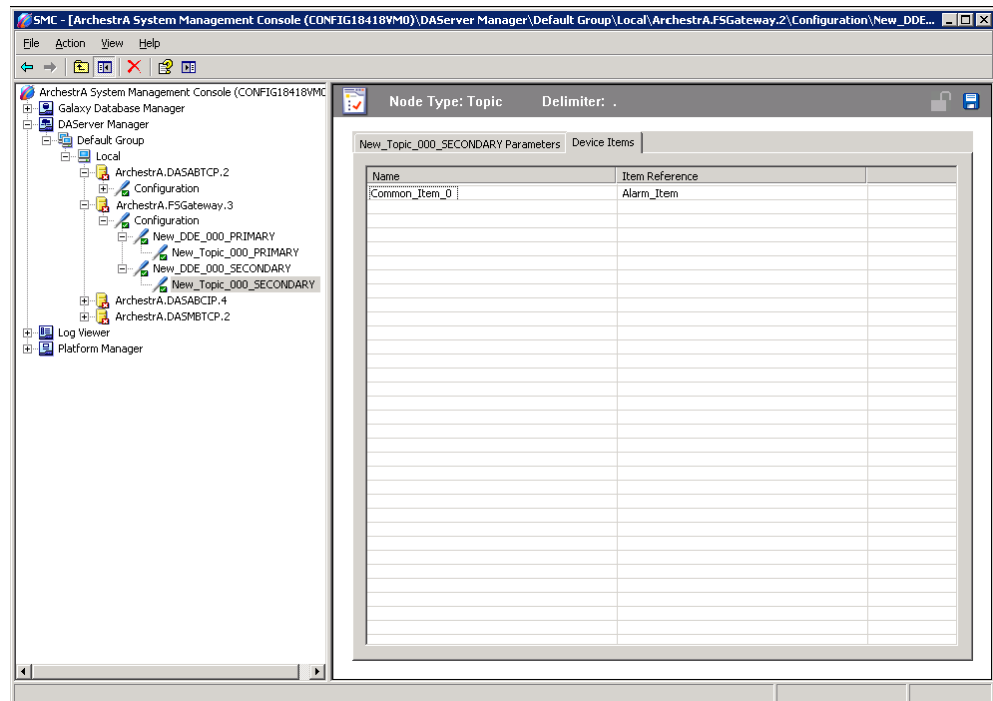
**Note:** The default name created from adding a hierarchy object is in the format of **New\_<ObjectName>\_###**, where **<ObjectName>** is the name of the object type and **###** is a numeric value starting from "000" enumerated sequentially per hierarchy object. The hierarchy object name can contain up to 32 characters. The link name for the OPC items is constructed by assembling the respective object names of the nodes along the hierarchy tree in the logical order, starting from the data source root down to the leaf. Therefore, the link name is always unique.

For information about configuring specific data sources, see:

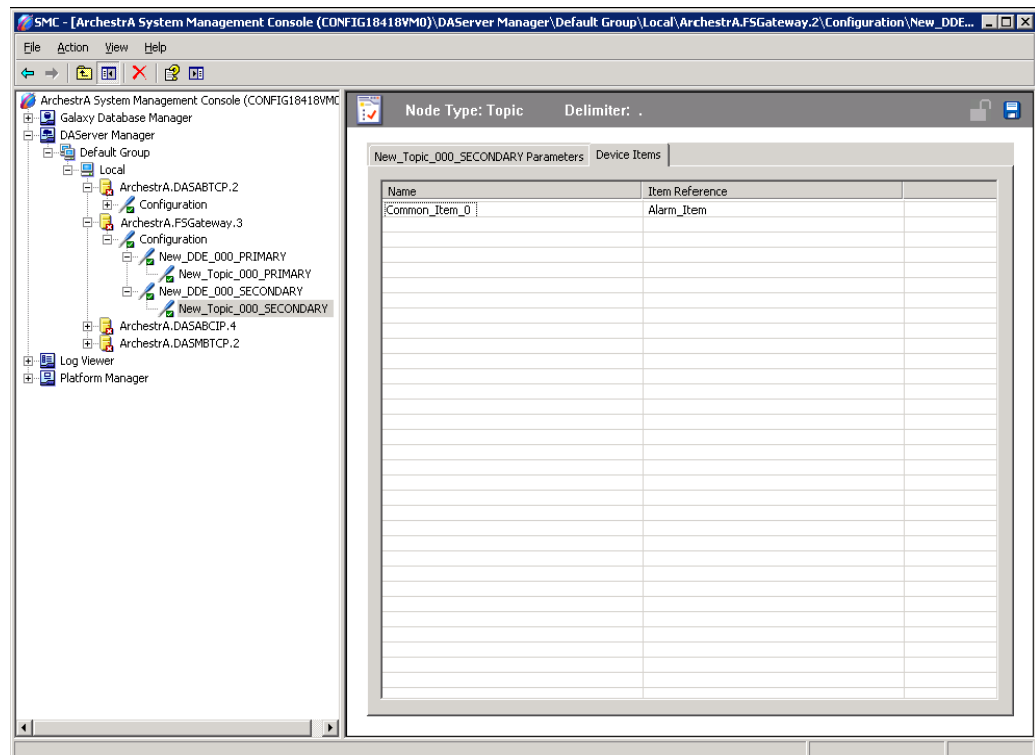
- Connecting to an ArchestrA Data Source
- Connecting to an OPC Data Source
- Connecting to a DDE/SuiteLink Data Source
- Connecting to an InTouch Data Source



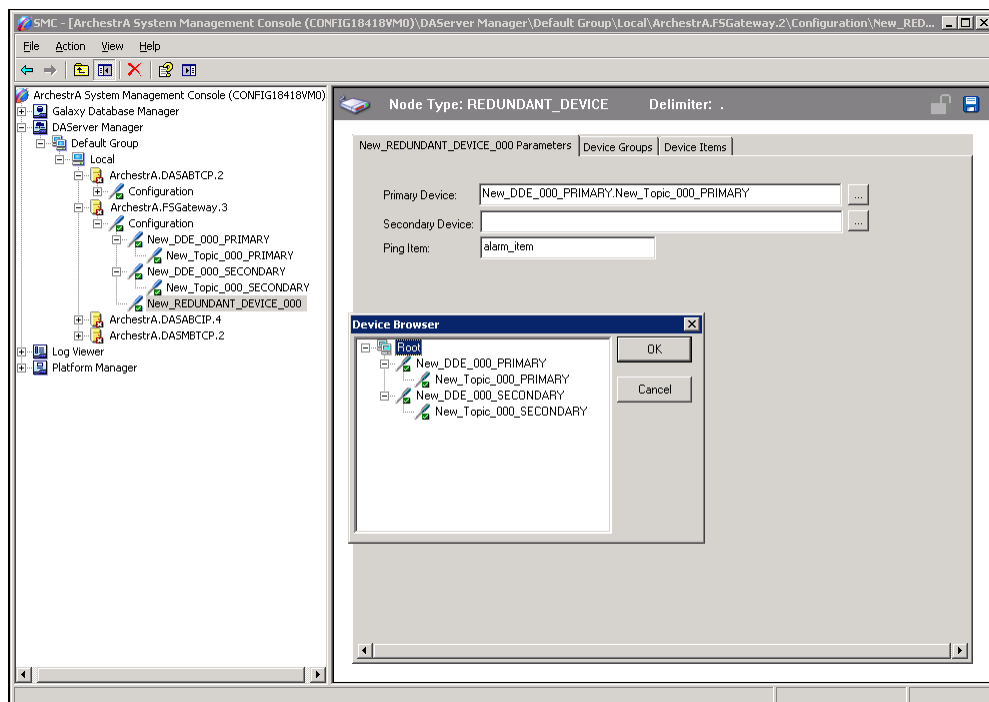
- 3 Set up an secondary device on the same DAServer. Once again, create an identical device item within the secondary device so that device status can be determined.



- 4 Select and right-click on the configuration node .
- 5 Select **Add REDUNDANT\_DEVICE Object**. An object called **New\_REDUNDANT\_DEVICE\_000** is created.



- 6 Rename the newly created object as appropriate. The **New\_REDUNDANT\_DEVICE\_000** configuration view is displayed in the Configuration branch of the hierarchy.
- 7 Enter or use the device browser to select the primary and secondary devices. Save the hierarchy node configuration by clicking on the save icon.



**Note:** Unsolicited message configuration is not supported from the device redundant hierarchy.

**Important:** A Ping item must be specified and be a valid tag in both the primary and secondary controllers to determine the connection status for `$$SYS$Status`. The Ping item can be a static item in the device such as a firmware version or processor type. If the Ping item is invalid or does not exist in the controller, the failover operation may not work correctly as the value of `$$SYS$Status` may continue to stay as `FALSE` in the standby device.

## Chapter 4

# Connecting to an ArcestrA Data Source

To connect to an ArcestrA data source, create and configure its hierarchy (data source and groups), and use the proper item naming conventions in its client(s).

Refer to Configuration for a general overview about configuring data sources in FS Gateway.

- Configuring an ArcestrA Data Source Object
- Configuring an ArcestrA Group Object
- Configuring Device Items
- ArcestrA Item Names
- ArcestrA Data Conversion

## Configuring an Arcestra Data Source Object

**To add an Arcestra data source object to your FS Gateway hierarchy**

- 1 Right-click **Configuration** in the hierarchy, and select **Add Arcestra Object** from the shortcut menu. The following rules apply:
  - A new object is created in the hierarchy tree and is named **New\_Arcestra\_000** by default (in "edit mode"). Rename it, if desired. You are allowed to add only one Arcestra data source.

The **New\_Arcestra\_000 Parameters** configuration view (right pane) is displayed.

The screenshot shows a configuration window for an Arcestra data source. The window title is "Node Type: Arcestra" and "Delimiter: .". It has two tabs: "New\_Arcestra\_000 Parameters" and "Device Items". The "Parameters" tab is active, showing the following fields:

- Device Group Name: Arcestra
- Reconnect Attempts: 3
- Reconnect Period: 30000 MSec
- Write Credentials:
  - ☒ Read Only
  - Domain: [text box]
  - User Name: [text box]
  - Password: [text box]

- 2 Configure the new Arcestra object according to the following option definitions:
  - **Device Group Name** – Name of the topic to which DDE or SuiteLink clients of FS Gateway connect in order to access items in the Arcestra data source. Default value is Arcestra (this cannot be edited).

- **Reconnect Attempts** – Number of times FS Gateway attempts to reconnect to the specified data source if a connection fails. The value (-1) means no limit to the number of attempts. The value Zero (0) means no attempts. Minimum/maximum range is -1 to 1,000,000. Default value is 3. Entry of a value that is excessively out of the allowed range will display an error message about illegal format.
- **Reconnect Period** – Delay (in ms) between reconnection attempts if a connection fails. Minimum/maximum range is 10,000 to 300,000 ms (corresponding to the range of 10 sec to 5 min). Default value is 30000 ms. Entry of a value that is excessively out of the allowed range will display an error message about illegal format.
- **Write Credentials** – User credentials created in ArcestrA for write qualifications.
- **Read Only** – Check this box to make all items connected through the ArcestrA data source read only. This qualification is in addition to any read-only condition that ArcestrA imposes. Unchecking this box only removes FS Gateway-imposed read-only qualifications. In other words, items inherently read-only in the data source remain so. Default value is checked.
- **Domain** – This option, **User Name** and **Password** are credentials used to logon to ArcestrA if the **Read Only** box is unchecked and ArcestrA has security enabled. In such a case, you must enter valid credentials as configured in ArcestrA. Default value is blank.

---

**Note:** The **Domain** option should have a valid domain name when the ArcestrA security authentication mode is "OS Users" or "OS Groups". This option should be left empty when the ArcestrA security authentication mode is "Galaxy".

---

- **User Name** – This option, **Domain** and **Password** are credentials used to logon to ArcestrA if the **Read Only** box is unchecked and ArcestrA has security enabled. In such a case, you must enter valid credentials as configured in ArcestrA. Default value is blank.
- **Password** – This option, **Domain** and **User Name** are credentials used to logon to ArcestrA if the **Read Only** box is unchecked and ArcestrA has security enabled. In such a case, you must enter valid credentials as configured in ArcestrA. Password data is stored in the FSGateway.AAcfg configuration file, but in encrypted form. Default value is blank.

---

**Note:** ArcestrA user login data is not hot-configurable. FS Gateway must be restarted for the new values to take affect.

---

## Configuring an ArcestrA Group Object

Although the ArcestrA namespace is flat, ArcestrA groups provide an artificial grouping hierarchy. Items are added in the same way at both the ArcestrA data source and group levels. In both cases, the same ArcestrA attribute is referenced, the exception being the ArcestrA Item ID Prefix that is provided at the group level.

### To add a group object to your ArcestrA data source hierarchy

- 1 Select the new data source object, right-click it, and then click **Add ArcestrAGroup Object** on the shortcut menu.
  - A new object is created in the hierarchy tree and is named **New\_ArcestrAGroup\_000** by default (in "edit mode"). Rename it, if desired. You are allowed to add up to 100 new group objects.

---

**Note:** Do not configure an ArcestrA group name to be identical with an item prefix. This name clash could cause unexpected behavior. Identical means the same in a case-insensitive manner. For more information, see Using Item Prefixes. Naming an ArcestrA group the same as an item (or the first part of an item name) also causes an ambiguity in FS Gateway namespace. In other words, do not name an ArcestrA group "Float" if a "Float.PV.Value" item exists in the Galaxy.

---

The **New\_ArchestrAGroup\_000 Parameters** configuration view (right pane) is displayed.

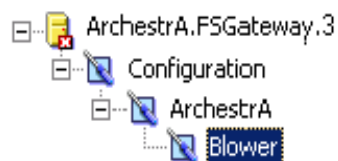
The screenshot shows a configuration window for an ArchestrA Group. The title bar indicates the node type is 'ArchestrAGroup' and the delimiter is a period. The window has two tabs: 'New\_ArchestrAGroup\_000 Parameters' and 'Device Items'. The 'Parameters' tab is active, showing three configuration options: 'Device Group Name' (set to 'New\_ArchestrA\_000\_New\_ArchestrAGroup\_000'), 'ArchestrA Item ID Prefix' (empty), and a 'Read Only' checkbox (unchecked).

- 2 Configure the new group object according to the following option definitions:
  - **Device Group Name** – Name of the topic that DDE or SuiteLink clients of FS Gateway connect to in order to access items at the ArchestrA group. Default value is the concatenation of the ArchestrA object's name and the group object's name (this cannot be edited).
  - **ArchestrA Item ID Prefix** – A string prefixed to item names added through this ArchestrA group. For instance, a prefix of "Blower\_" would be added to an item such as "001.Temp1" to create an item request of "Blower\_001.Temp1". Default value is blank.
  - **Read Only** – Check this box to make all items connected through the ArchestrA group read only. This qualification is in addition to any read-only condition that ArchestrA imposes. Unchecking this box only removes FS Gateway-imposed read-only qualifications. In other words, items inherently read-only in the data source remain so. Default value is unchecked.

**Example:**

An ArcestrA data source called "ArcestrA"

A single ArcestrA group called "Blower"



---

**Important:** Each group or topic must be uniquely named for the data source associated with it.

---

## Configuring Device Items

ArcestrA data sources allow you to add items either at the data source branch of the hierarchy or through group objects.

See Device Item Definitions for more on Device Items.

You can add items directly to the ArcestrA data source branch or in a group that allows you to group related ArcestrA tagnames together.

To add device items to your group, select the new group object and click the **Device Items** tab. For more information, see Configuring Device Item Definitions.

## ArcestrA Item Names

---

**Important:** Writes are not supported from FS Gateway to an ArcestrA item whose security is configured as VerifiedWrite. Writes to items configured as SecuredWrite are supported.

---

This section describes how a connected client requests access to items (or attributes) of a particular ArcestrA data source.

The following are examples of pairs of client/data source connections via FS Gateway, and their associated item name syntax:

- To access an item in ArcestrA via FS Gateway through an OPC client, use the following syntax:

**Establish connection:**

"ArcestrA.FSGateway.3"

**Reference item:**

"ArcestrA.TIC101.PV"

- To access an item in ArchestrA via FS Gateway through a DDE or SuiteLink client, use the following syntax:

**Establish connection:**

Application = FSGateway

Topic (Device Group) = ArchestrA

**Reference item:**

"TIC101.PV"

## Example #1

Assume that the ArchestrA data source is named "ArchestrA" and an attribute exists called "Blower\_001.Temp1".

### OPC Client

To access the item in an ArchestrA data source via FS Gateway through an OPC client, use the following syntax:

**Establish connection:** "ArchestrA.FSGateway.3"

**Reference item:** "ArchestrA.Blower\_001.Temp1"

### DDE / SuiteLink Client

DDE and SuiteLink clients add items to a Device Group associated with the ArchestrA data source. The topic the DDE/SuiteLink client needs to connect to FS Gateway is provided by this Device Group. The Device Group associated with the ArchestrA data source is created automatically and always named "ArchestrA".

To access the item in an ArchestrA data source via FS Gateway through a DDE or SuiteLink client, use the following syntax:

**Application:** FSGateway

**Topic (Device Group):** ArchestrA

**Item:** Blower\_001.Temp1

**Excel cell reference:** =FSGateway|ArchestrA!Blower\_001.Temp1

ArchestrA groups allow you to group related ArchestrA tagnames together. Items can be added to ArchestrA groups in the same way as they are added to the ArchestrA data source. The same ArchestrA attribute is referenced whether the items are added directly to the data source or to a group.

## Example #2

Assume a configuration with an Arcestra data source named "Arcestra" and a single group called "Blower".

### **OPC Client**

OPC clients may add items to either the data source or the group. Fully qualified OPC item names are created by concatenating the hierarchy tiers, separated by periods. Therefore, to access the item (attribute "Blower\_001.Temp1") in an Arcestra group via FS Gateway through an OPC client, use either of the following syntax formats, which are equivalent:

Arcestra.Blower\_001.Temp1

Arcestra.Blower.Blower\_001.Temp1

### **DDE / SuiteLink Client**

DDE and SuiteLink clients add items to a Device Group associated with either the Arcestra data source or a group. The topic the DDE/SuiteLink client needs to connect to FS Gateway is provided by this Device Group. The Device Group associated with the Arcestra group is created automatically when you create the group in the hierarchy. Its name is generated automatically by concatenating the Arcestra data source name with the group name, separated by an underscore ("\_"). In the case above, the Device Group name would be "Arcestra\_Blower".

Therefore, to access an item in Arcestra via FS Gateway through DDE and SuiteLink clients, use either of the following syntax formats, which are equivalent:

### **Examples:**

FSGateway | Arcestra!Blower\_001.Temp1

FSGateway | Arcestra\_Blower!Blower\_001.Temp1

## Using Item Prefixes

In addition, you can configure an item prefix for an ArchestrA group. This prefix, which is added at runtime, can simplify item naming for ArchestrA groups in some situations.

Assume the item prefix for the ArchestrA group "Blower" is "Blower\_". Item names added directly through the data source remain unchanged, but the same items added through the "Blower" group are simplified.

### OPC Client Syntax

ArchestrA.Blower\_001.Temp1 (at the data source level)

ArchestrA.Blower.001.Temp1 (at the group level)

### DDE/SuiteLink Client Syntax

FSGateway|ArchestrA!Blower\_001.Temp1 (at the data source level)

FSGateway|ArchestrA\_Blower!001.Temp1 (at the group level)

---

**Note:** Do not configure an ArchestrA group name to be identical with an item prefix. This name clash could cause unexpected behavior. Identical means the same in a case-insensitive manner.

---

## ArchestrA Data Conversion

A key part of FS Gateway's protocol conversion capabilities is its data type conversion between DDE, SuiteLink, OPC, and ArchestrA Message Exchange sources and clients.

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**Note:** Since InTouch communicates through DDE or SuiteLink protocols, its data type conversions are covered in the following sections that address DDE and SuiteLink conversion.

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Each protocol has a set of supported data types for the values that can be accessed. The following sections describe the data conversion mapping scheme applied by FS Gateway.

---

**Note:** If a client pokes an out-of-range value for any data type, FS Gateway does no clamping on the value. FS Gateway passes the client request to the server.

---

---

**Important:** All pokes greater than 499 characters return Uncertain quality in the client and SMC. The value is successfully poked to ArchestrA but it is truncated to 499 characters on the read-back. Additionally, all data below  $\pm 1.5e-45$  is rounded to 0.0.

---

## ArcestraA-DDE/SuiteLink Mappings

The following sections describe ArcestraA to DDE/SuiteLink and DDE/SuiteLink to ArcestraA data conversions.

### ArcestraA to DDE/SuiteLink Conversions

In the case of the gateway receiving data from an ArcestraA source and sending it to a DDE/SuiteLink client, the gateway converts ArcestraA types to DDE/SuiteLink types as follows:

| <b>ArcestraA Type</b> | <b>DDE/SuiteLink Type</b> | <b>Comments</b>                                          |
|-----------------------|---------------------------|----------------------------------------------------------|
| Boolean               | Discrete                  | False = 0, True = 1.                                     |
| Float                 | Real                      |                                                          |
| Integer               | Integer                   |                                                          |
| String                | String                    | If too long, truncated and marked Q=Uncertain.           |
| Double                | Real                      | If overflows, marked Q=Bad and set value = NaN.          |
| Time                  | String                    |                                                          |
| ElapsedTime           | Real                      | Pass as float seconds; consistent with InTouch behavior. |
| CustomEnum            | String                    | If too long, truncated and marked Q=Uncertain.           |
| InternationalString   | String                    | If too long, truncated and marked Q=Uncertain.           |
| BigString             | String                    | If too long, truncated and marked Q=Uncertain.           |
| CustomStruct          | Not supported             |                                                          |
| MxReference           | String                    | If too long, truncated and marked Q=Uncertain.           |
| Datatype              | String                    |                                                          |
| MxStatus              | String                    | If too long, truncated and marked Q=Uncertain.           |

## DDE/SuiteLink to ArchestrA Conversions

In the case of the gateway receiving (write) data from a DDE/SuiteLink source and sending it to an ArchestrA client, the gateway converts DDE/SuiteLink types to ArchestrA types as follows:

**Note:** Write failures can occur if the target ArchestrA attribute is a non-coercible type. In this case, the gateway returns a failed write status to the client.

| DDE / SuiteLink Type | ArchestrA Type | Comments                                                                                                                                                                                                                                                  |
|----------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Discrete             | Boolean        | False = 0, True = 1                                                                                                                                                                                                                                       |
| Real                 | Float          |                                                                                                                                                                                                                                                           |
| Integer              | Integer        | FS Gateway does no clamping when writing an integer from a DDE/SuiteLink client to an ArchestrA data source. In the case of a client poking a number greater than 2147483647 or -2147483647, the target link changes the data to a 1 or -1, respectively. |
| String               | String         |                                                                                                                                                                                                                                                           |

## ArchestrA–OPC Mappings

The following sections describe ArchestrA to OPC and OPC to ArchestrA data conversions. The following rules follow the OPC Data Access (DA) Specification v2.05.

### ArchestrA to OPC Conversions

In the case of the gateway receiving data from an ArchestrA source and sending it to an OPC client, the gateway converts ArchestrA types to OPC types as follows:

| ArchestrA type | OPC Variant Canonical Mapping | Comments                                       |
|----------------|-------------------------------|------------------------------------------------|
| Boolean        | VT_BOOL                       | Discrete (0/1) translates to OPC VT_BOOL.      |
| Float          | VT_R4                         |                                                |
| Integer        | VT_I4                         |                                                |
| String         | VT_BSTR                       | If too long, truncated and marked Q=Uncertain. |

|                     |               |                                                          |
|---------------------|---------------|----------------------------------------------------------|
| Double              | VT_R4         | If overflows, marked Q=Bad and set value = NaN.          |
| Time                | VT_BSTR       |                                                          |
| ElapsedTime         | VT_R4         | Pass as float seconds; consistent with InTouch behavior. |
| CustomEnum          | VT_BSTR       | If too long, truncated and marked Q=Uncertain.           |
| InternationalString | VT_BSTR       | If too long, truncated and marked Q=Uncertain.           |
| BigString           | VT_BSTR       | If too long, truncated and marked Q=Uncertain.           |
| CustomStruct        | Not supported |                                                          |
| MxReference         | VT_BSTR       | If too long, truncated and marked Q=Uncertain.           |
| Datatype            | VT_BSTR       |                                                          |
| MxStatus            | VT_BSTR       | If too long, truncated and marked Q=Uncertain.           |

## OPC to ArchedrA Conversions

In the case of the gateway receiving (write) data from an OPC source and sending it to an ArchedrA client, the gateway converts OPC types to ArchedrA types as follows:

**Note:** Write failures can occur if the target ArchedrA attribute is a non-coercible type. In this case, the gateway returns a failed write status to the client.

| OPC Variant Type | ArchedrA Type | Comments                                      |
|------------------|---------------|-----------------------------------------------|
| VT_EMPTY         | Not supported | Reject write.                                 |
| VT_NULL          | Not supported | Reject write.                                 |
| VT_I2            | Integer       |                                               |
| VT_I4            | Integer       |                                               |
| VT_R4            | Float         |                                               |
| VT_R8            | Float         | Reject write if outside of valid float range. |
| VT_CY            | String        |                                               |
| VT_DATE          | String        |                                               |
| VT_BSTR          | String        | Reject write if too large.                    |

|                    |               |                            |
|--------------------|---------------|----------------------------|
| VT_DISPATCH        | Not supported | Reject write.              |
| VT_ERROR           | Integer       |                            |
| VT_BOOL            | Boolean       |                            |
| VT_VARIANT         | Not supported | Reject write.              |
| VT_DECIMAL         | Float         |                            |
| FVT_RECORD         | Not supported | Reject write.              |
| VT_UNKNOWN         | Not supported | Reject write.              |
| VT_I1              | Integer       |                            |
| VT_UI1             | Integer       |                            |
| VT_UI2             | Integer       |                            |
| VT_UI4             | Integer       | Reject write if too large. |
| VT_INT             | Integer       |                            |
| VT_UINT            | Integer       | Reject write if too large. |
| VT_VOID            | Not supported | Reject write.              |
| VT_HRESULT         | Integer       |                            |
| VT_PTR             | Not supported |                            |
| VT_SAFEARRAY       | Not supported | Reject write.              |
| VT_CARRAY          | Not supported | Reject write.              |
| VT_USERDEFINED     | Not supported | Reject write.              |
| VT_LPSTR           | String        | Reject write if too large. |
| VT_LPWSTR          | String        | Reject write if too large. |
| VT_FILETIME        | String        |                            |
| VT_BLOB            | Not supported | Reject write.              |
| VT_STREAM          | Not supported | Reject write.              |
| VT_STORAGE         | Not supported | Reject write.              |
| VT_STREAMED_OBJECT | Not supported | Reject write.              |
| VT_STORED_OBJECT   | Not supported | Reject write.              |
| VT_BLOB_OBJECT     | Not supported | Reject write.              |
| VT_CF              | Not supported | Reject write.              |
| VT_CLSID           | String        |                            |
| VT_VECTOR          | Not supported | Reject write.              |
| VT_ARRAY           | Not supported | Reject write.              |
| VT_BYREF           | Not supported | Reject write.              |
| VT_RESERVED        | Not supported | Reject write.              |



# Chapter 5

## Connecting to an OPC Data Source

To connect to an OPC data source, create and configure its hierarchy (data source and groups), and use the proper item naming conventions in its client(s).

Refer to Configuration for a general overview about configuring data sources in FS Gateway.

- Configuring an OPC Data Source Object
- Configuring an OPC Group Object
- Configuring Device Items
- OPC Item Names
- OPC Data Conversion

### Before Configuring FS Gateway

Windows Server operating systems Server 2003 ship with ICMP(v4) Echo Request disabled by default. You must enable this for an OPC client such as FS Gateway to connect to the server.

To determine the status of ICMP (v4) Echo on the server, open a command prompt on the FS Gateway computer and type:

```
ping SERVER_COMPUTER
```

Where "SERVER\_COMPUTER" is the name or IP address of the remote OPC computer.

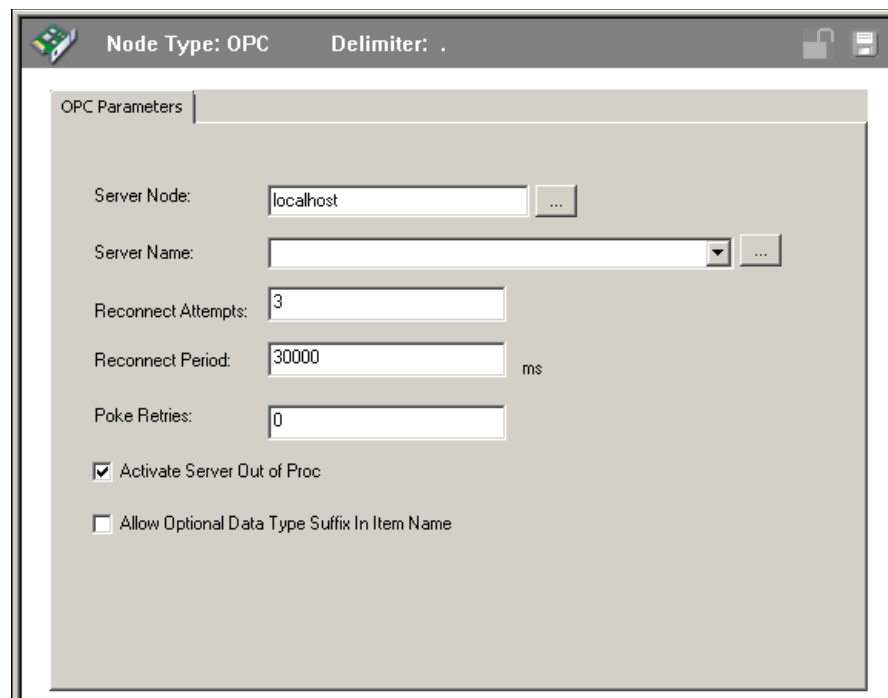
If the remote computer does not respond to the ping command, enable ICMP(v4) Request on the remote computer according to the procedure for the Microsoft Windows operating system in use on that computer.

## Configuring an OPC Data Source Object

**To add an OPC data source object to your FS Gateway hierarchy**

- 1 Right-click **Configuration** in the hierarchy, and select **Add OPC Object** from the shortcut menu. The following rules apply:
  - A new object is created in the hierarchy tree and is named **New\_OPC\_000** by default (in "edit mode"). Rename it, if desired. You are allowed to add an unlimited number of OPC data sources.

The **New\_OPC\_000 Parameters** configuration view (right pane) is displayed.



The screenshot shows the 'OPC Parameters' configuration window. The title bar indicates 'Node Type: OPC' and 'Delimiter: .'. The window contains the following fields and options:

- Server Node:** A text box containing 'localhost' and a browse button (...).
- Server Name:** A dropdown menu and a browse button (...).
- Reconnect Attempts:** A text box containing '3'.
- Reconnect Period:** A text box containing '30000' followed by 'ms'.
- Poke Retries:** A text box containing '0'.
- ☒ **Activate Server Out of Proc**
- ☐ **Allow Optional Data Type Suffix In Item Name**

- 2 Configure the new OPC object according to the following option definitions:
  - **Server Node** – The computer node on which the specified data source can be found. Default value is localhost. Use the browse button to select from a list of all nodes on your network.
  - **Server Name** – ProgID or ClassID of the OPC server (example of a ProgID: ArchestrA.FSGateway.3, ClassIDs are GUIDs). Use the browse button to select from a list of OPC server ProgIDs on your network. Default value is blank.

---

**Note:** Use ClassID when referencing a server that does not use OPC enum to enumerate a ProgID.

---

- **Reconnect Attempts** – Number of times FS Gateway attempts to reconnect to the specified data source if a connection fails. The value (-1) means no limit to the number of attempts. The value Zero (0) means no attempts. Minimum/maximum range is -1 to 1,000,000. Default value is 3.
  - **Reconnect Period** – Delay (in ms) between reconnect attempts if a connection fails. Minimum/maximum range is 10,000 to 300,000 ms (corresponding to the range of 10 sec to 5 min). Default value is 30000 ms.
  - **Poke Retries** – Number of times FS Gateway attempts to retry the write operation if a write operation fails. The value zero (0) means no retry attempts. Minimum/maximum range is 0 to 100. Default value is zero (0).
- 3 Configure OPC options.
    - **Activate Server Out of Proc** – When selected, FS Gateway will attempt to start the external OPC Server Out-of-Proc. When not selected, FS Gateway will attempt to start the external OPC Server In-Proc. For more information, see "In-Proc/Out-of-Proc" on page 76.
    - **Allow Optional Data Type Suffix in Item Name** – When selected and a VT suffix is appended to the item name, FS Gateway adds the item to the OPC server with the requested type set to the type specified in the VT suffix. FS Gateway removes the VT suffix from the item name string before the item is added to the OPC server.  
  
If selected and no VT suffix is appended to the item name, FS Gateway adds the item to the OPC server with requested type = VT\_EMPTY.  
  
If not selected, the item name is passed to the OPC server with requested type = VT\_EMPTY. FS Gateway does not parse the item names looking for a VT suffix.

## Configuring an OPC Group Object

### To add a group object to your OPC data source hierarchy

- 1 Select the new data source object, right-click it, and then click **Add OPCGroup Object** on the shortcut menu.
  - A new object is created in the hierarchy tree and is named **New\_OPCTGroup\_000** by default (in "edit mode"). Rename it, if desired. You are allowed to add up to 100 new group objects.

The **New\_OPCTGroup\_000 Parameters** configuration view (right pane) is displayed.

- 2 Configure the new group object according to the following option definitions:
  - **Device Group Name** – Name of the topic that DDE or SuiteLink clients of FS Gateway connect to in order to access items at the OPC group. Default value is the concatenation of the OPC data source object's name and the group object's name (this cannot be edited).

- **Update Rate** – Value (in ms) used by FS Gateway to update the OPC group. Minimum/maximum range is 0 to 2147483646 ms. If the OPC server supports it, zero (0) update rate means the data source sends data changes immediately. If the server does not support zero update rate, it typically returns a message including information about its fastest possible update rate. Default value is 1000 ms.

The update rate can also be adjusted at run time by setting the \$SYS\$OPCUpdateInterval system item.

- **OPC Item ID Prefix** – String prefixed to all item names added to the OPC group. Default value is blank. **Example:** Item Prefix=40, Item=001, Item requested from data source=40001.
- **Use Group Name as Access Path** – Provides control over the OPC Access Path for items added to the OPC group. When checked, the name of the OPC group object is used as the OPC Access Path for all items. When unchecked, the default (blank) OPC Access Path is used. Default value is unchecked.
- **Read Only** – Check this box to make all items connected through the OPC group read only. This qualification is in addition to any read-only condition that the OPC server imposes. Unchecking this box only removes FS Gateway-imposed read-only qualifications. In other words, items inherently read-only in the data source remain so. Default value is checked.
- **Demand Read After Poke** – Provides an option to read an item immediately after a write transaction on the item. When checked, a read transaction is performed on the item whenever it has a write transaction irrespective of the subscription group interval. When unchecked, the value of the item is updated at the specified subscription interval after a write operation on the item. Default value is unchecked.
- **Browse OPC Items button** – Opens the OPC browser, in which you can select items directly from the OPC server.

OPC groups are used to model the behavior of OPC servers. You cannot add items directly to an OPC data source, but must add them at the group level.

**Example:**

An OPC data source called "ModbusOverOPC"

A single OPC group called "Group1"



---

**Important:** Each group or topic must be uniquely named for the data source associated with it.

---

## Configuring Device Items

To add device items to your group, select the new group object and click the **Device Items** tab. For more information, see Device Item Definitions.

---

**Note:** When using a VT suffix, the suffix must be specified in the Item Reference column in the Device Items tab, not in the item name subscribed from a client.

---

## OPC Item Names

This section describes how a connected client requests access to items (or attributes) of a particular OPC data source.

You can also use item suffixes for OPC data sources to specify VT data type information.

### Using Item Suffixes

You can configure OPC data sources to use the /VT item suffix to gain better control of data access in FS Gateway. Using the /VT item suffix enables you to tell the underlying OPC server the type of data you want the underlying OPC server to report to FS Gateway.

## OPC Client Syntax

Apply RequestVT (/VT item suffix) to an item name using the following syntax:

/VT\_<DataType>

Example:

If you want to specify 2-byte signed Integer (/VT\_I2) as the data type for an OPC server path of OPCServer.Blower.Int2, the item name in FS Gateway will be subscribed as: .

OPCServer.Blower.Int2 /VT\_I2

## Supported VT Data Types

The following table describes the supported VT types.

| VT Suffix   | Description                 |
|-------------|-----------------------------|
| /VT_BSTR    | Automation String           |
| /VT_BOOL    | Boolean                     |
| /VT_I1      | Char                        |
| /VT_I2      | 2-byte Signed Integer       |
| /VT_I4      | 4-byte Signed Integer       |
| /VT_I8      | 8-byte Signed Integer       |
| /VT_UI1     | Unsigned Char               |
| /VT_UI2     | 2-byte Unsigned Integer     |
| /VT_UI4     | 4-byte Unsigned Integer     |
| /VT_UI8     | 8-byte Unsigned integer     |
| /VT_UINT    | Unsigned machine Integer    |
| /VT_INT     | Signed machine Integer      |
| /VT_R4      | 4-byte Real                 |
| /VT_R8      | 8-byte Real                 |
| /VT_DATE    | Time stamp                  |
| /VT_CY      | 8-byte Currency             |
| /VT_BSTR[ ] | Automation String array     |
| /VT_BOOL[ ] | Boolean array               |
| /VT_I1[ ]   | Char array                  |
| /VT_I2[ ]   | 2-byte Signed Integer array |

| <b>VT Suffix</b> | <b>Description</b>                                                                                  |
|------------------|-----------------------------------------------------------------------------------------------------|
| /VT_I4[ ]        | 4-byte Signed Integer array                                                                         |
| /VT_I8[ ]        | 8-byte Signed Integer array                                                                         |
| /VT_UI1[ ]       | Unsigned Char array                                                                                 |
| /VT_UI2[ ]       | 2-byte Unsigned Integer array                                                                       |
| /VT_UI4[ ]       | 4-byte Unsigned Integer array                                                                       |
| /VT_UI8[ ]       | 8-byte Unsigned Integer array                                                                       |
| /VT_UINT[ ]      | Unsigned machine Integer array                                                                      |
| /VT_INT[ ]       | Signed machine Integer array                                                                        |
| /VT_R4[ ]        | 4-byte Real array                                                                                   |
| /VT_R8[ ]        | 8-byte Real array                                                                                   |
| /VT_DATE[ ]      | Time stamp array                                                                                    |
| /VT_CY[ ]        | 8-byte Currency array                                                                               |
| /VT_EMPTY        | Data Type suffix option not enabled;<br>OPC server reports the default data<br>type for the tagname |

### OPC Connectivity Examples

Assume a configuration with an OPC data source called "ModbusOverOPC" and a single group called "Group1" and an item reference "R1".

#### DDE / SuiteLink Client

To access an item in an OPC server via FS Gateway through a SuiteLink client, use the following syntax:

**Establish connection:**

Application = FSGateway

Topic = OPCServer1\_OPCTagGroup1

**Reference item:**

"R1"

DDE and SuiteLink clients add items to a Device Group associated with the OPC group. The topic the DDE/SuiteLink client needs to connect to FS Gateway is provided by this Device Group. The Device Group is created automatically when you create the group in the hierarchy. Its name is generated by concatenating the OPC data source name with the group name, separated by an underscore ("\_"). In the example above, the Device Group would be named "ModbusOverOPC\_Group1".

DDE and SuiteLink clients would access items as follows:

```
FSGateway|ModbusOverOPC_Group1!Modbus.QT.R1
```

Using the VT syntax, you can specify the 4-byte Integer (/VT\_I4) from the ModbusOverOPC data source for item "R1" as follows:

```
FSGateway|ModbusOverOPC_Group1!Modbus.QT.R1 /VT_I4
```

---

**Note:** Use the "Device Group Name" as on the faceplate of the OPC Group Node.

---

### InTouch HMI

Using InTouch as a data access client functions very much the same as the DDE/SuiteLink client. Access an item "R1" in an OPC data source, "ModbusOverOPC", via FS Gateway through InTouch, and specify a 4-byte signed Integer as follows:

**Establish connection:**

Application = FSGateway

Topic = OPCServer1 OPCGroup1

**Reference item:**

"R1"

In InTouch, add tagnames in the Tagname Dictionary, configured for the defined Access Name, or for "OPC", the default Access Name. Typically, you will configure Access Names for read or read/write as follows:

```
ModbusOverOPC.R1
```

You can specify the 4-byte Integer (/VT\_I4) from the ModbusOverOPC data source for item "R1" as follows:

```
ModbusOverOPC.R1 /VT_I4
```

## OPC Data Conversion

A key part of FS Gateway's protocol conversion capabilities is its data type conversion between DDE, SuiteLink, and OPC sources and clients.

---

**Note:** Since InTouch communicates through DDE or SuiteLink protocols, its data type conversions are covered in the following sections that address DDE and SuiteLink conversion.

---

Each protocol has a set of supported data types for the values that can be accessed. The following section describe the data conversion mapping scheme applied by FS Gateway.

---

**Note:** If a client pokes an out-of-range value for any data type, FS Gateway does no clamping on the value. FS Gateway passes the client request to the server.

---

## DDE/SuiteLink-OPC Mappings

The following sections describe OPC to DDE/SuiteLink and DDE/SuiteLink to OPC data conversions.

### OPC to DDE/SuiteLink Conversions

In the case of the gateway receiving (write) data from an OPC client and sending it to a DDE/SuiteLink data source, the gateway converts OPC types to DDE/SuiteLink types as follows:

| OPC Variant Type | DDE / SuiteLink Type | Comments                            |
|------------------|----------------------|-------------------------------------|
| VT_EMPTY         | Not supported        |                                     |
| VT_NULL          | Not supported        |                                     |
| VT_I2            | Integer              |                                     |
| VT_I4            | Integer              |                                     |
| VT_R4            | Real                 |                                     |
| VT_R8            | Real                 | Set Quality to bad if out of range. |
| VT_CY            | String               |                                     |
| VT_DATE          | String               |                                     |
| VT_BSTR          | String               | Set Quality to bad if out of range. |
| VT_DISPATCH      | Not supported        | Set Quality to bad.                 |
| VT_ERROR         | Integer              |                                     |
| VT_BOOL          | Discrete             |                                     |
| VT_VARIANT       | Not supported        | Set Quality to bad.                 |
| VT_DECIMAL       | Float                | Set Quality to bad if out of range. |
| VT_RECORD        | Not supported        | Set Quality to bad.                 |
| VT_UNKNOWN       | Not supported        | Set Quality to bad.                 |
| VT_I1            | Integer              |                                     |
| VT_UI1           | Integer              |                                     |
| VT_UI2           | Integer              |                                     |
| VT_UI4           | Integer              | Set Quality to bad if out of range. |
| VT_INT           | Integer              |                                     |
| VT_UINT          | Integer              | Set Quality to bad if out of range. |
| VT_VOID          | Not supported        | Set Quality to bad.                 |
| VT_HRESULT       | Integer              |                                     |

| OPC Variant Type   | DDE / SuiteLink Type | Comments                                    |
|--------------------|----------------------|---------------------------------------------|
| VT_PTR             | Not supported        | Set Quality to bad.                         |
| VT_SAFEARRAY       | Not supported        | Set Quality to bad.                         |
| VT_CARRAY          | Not supported        | Set Quality to bad.                         |
| VT_USERDEFINED     | Not supported        | Set Quality to bad.                         |
| VT_LPSTR           | String               | If too long, truncate and mark Q=Uncertain. |
| VT_LPWSTR          | String               | If too long, truncate and mark Q=Uncertain. |
| VT_FILETIME        | String               | If too long, truncate and mark Q=Uncertain. |
| VT_BLOB            | Not supported        | Set Quality to bad.                         |
| VT_STREAM          | Not supported        | Set Quality to bad.                         |
| VT_STORAGE         | Not supported        | Set Quality to bad.                         |
| VT_STREAMED_OBJECT | Not supported        | Set Quality to bad.                         |
| VT_STORED_OBJECT   | Not supported        | Set Quality to bad.                         |
| VT_BLOB_OBJECT     | Not supported        | Set Quality to bad.                         |
| VT_CF              | Not supported        | Set Quality to bad.                         |
| VT_CLSID           | String               |                                             |
| VT_VECTOR          | Not supported        | Set Quality to bad.                         |
| VT_ARRAY           | Not supported        | Set Quality to bad.                         |
| VT_BYREF           | Not supported        | Set Quality to bad.                         |
| VT_RESERVED        | Not supported        | Set Quality to bad.                         |

## DDE/SuiteLink to OPC Conversions

In the case of the gateway receiving (write) data from a DDE/SuiteLink client and sending it to an OPC data source, the gateway converts DDE/SuiteLink types to OPC types as follows:

**Note:** Conversion failures can occur, in which case FS Gateway returns a write error to the DDE/SuiteLink client.

| DDE / SuiteLink Type | OPC Variant Canonical Mapping | Comments |
|----------------------|-------------------------------|----------|
| Discrete             | VT_BOOL                       |          |
| Float                | VT_R4                         |          |
| Integer              | VT_I4                         |          |
| String               | VT_BSTR                       |          |



# Chapter 6

## Connecting to a DDE/SuiteLink Data Source

To connect to a DDE/SuiteLink data source, create and configure its hierarchy (data source and topics), and use the proper item naming conventions in its client(s).

Refer to Configuration for a general overview about configuring data sources in FS Gateway.

- Configuring a DDE/SuiteLink Data Source Object
- Configuring a DDE/SuiteLink Topic Object
- Configuring Device Items
- DDE/SuiteLink Item Names
- DDE/SuiteLink Data Conversion

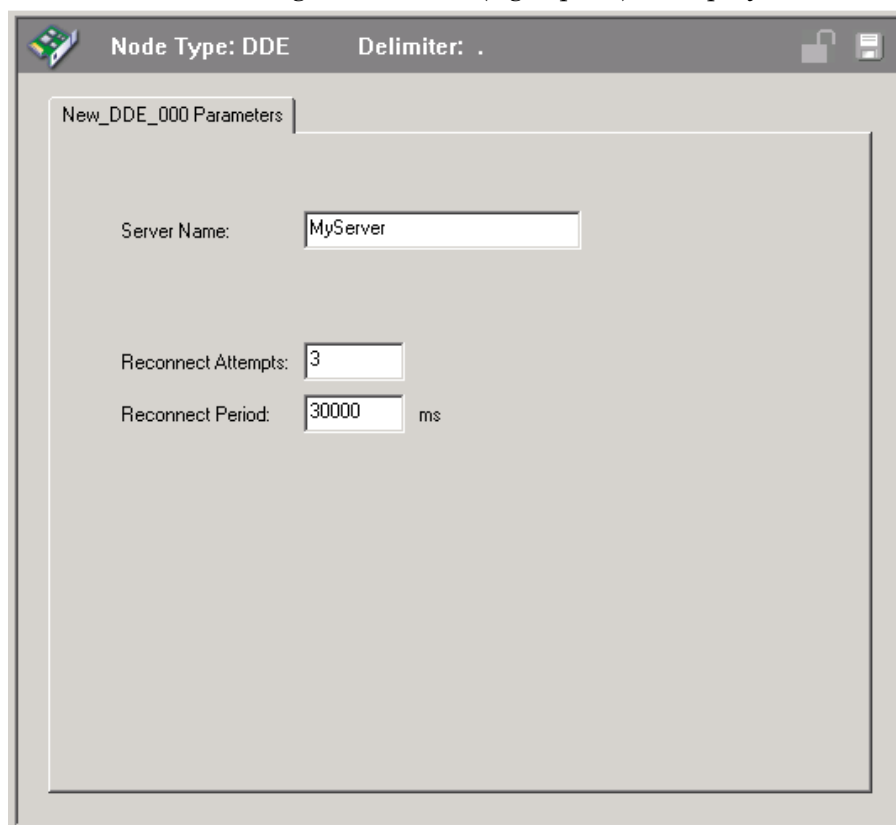
## Configuring a DDE/SuiteLink Data Source Object

**To add a DDE or SuiteLink data source object to your FS Gateway hierarchy**

- 1 Right-click **Configuration** in the hierarchy, and select either **Add DDE Object** or **Add SuiteLink Object** from the shortcut menu. The following rules apply:

- A new object is created in the hierarchy tree and is named **New\_DDE\_000** or **New\_SuiteLink\_000** by default. You are allowed to add an unlimited number of DDE and SuiteLink data sources.
- In this step and succeeding steps, each hierarchy entry is added in "edit mode," providing a convenient place for you to appropriately name components of your specific environment. If you do not rename the object at this time, the numeric sequence system is applied. Any hierarchy entry can be renamed at a later time.

The **New\_DDE\_000 Parameters** or **New\_SuiteLink\_000 Parameters** configuration view (right pane) is displayed.



The screenshot shows a configuration window titled "New\_DDE\_000 Parameters". The window has a header bar with "Node Type: DDE" and "Delimiter: ." on the left, and a lock icon and a document icon on the right. The main area contains three input fields: "Server Name:" with the value "MyServer", "Reconnect Attempts:" with the value "3", and "Reconnect Period:" with the value "30000" and a unit "ms" to its right.

The screenshot shows a configuration window titled "New SuiteLink\_000 Parameters". The window has a title bar with a SuiteLink icon, "Node Type: SuiteLink", and "Delimiter: .". Inside the window, there are four input fields: "Server Name" with the value "MyServer", "Server Node" with the value "localhost" and a browse button "...", "Reconnect Attempts" with the value "3", and "Reconnect Period" with the value "30000" and the unit "ms".

2 Configure the new DDE or SuiteLink object according to the following option definitions:

- **Server Name** – Name of the DDE or SuiteLink server you want to use as a data source (for instance, Invensys's DASABTCP). Default value is MyServer. **Server Name** can be from 1 to 32 characters long (cannot be blank), and all printable characters are allowed except a space and > : " / \ | , . ; ? ' [ ] { } ` ~ ! @ # \$ % ^ & \* ( ) \_ + - =.
- **Server Node** – The computer node on which the specified data source can be found. This parameter is displayed for SuiteLink only because DDE servers must be located on the same node as FS Gateway. Default value is localhost. Use the browse button to select from a list of all nodes on your network.
- **Reconnect Attempts** – Number of times FS Gateway attempts to reconnect to the specified data source if a connection fails. The value minus one (-1) means no limit to the number of attempts. The value zero (0) means no attempts. Minimum/maximum range is -1 to 1,000,000. Default value is 3. Entry of a value that is excessively out of the allowed range will display an error message about illegal format.

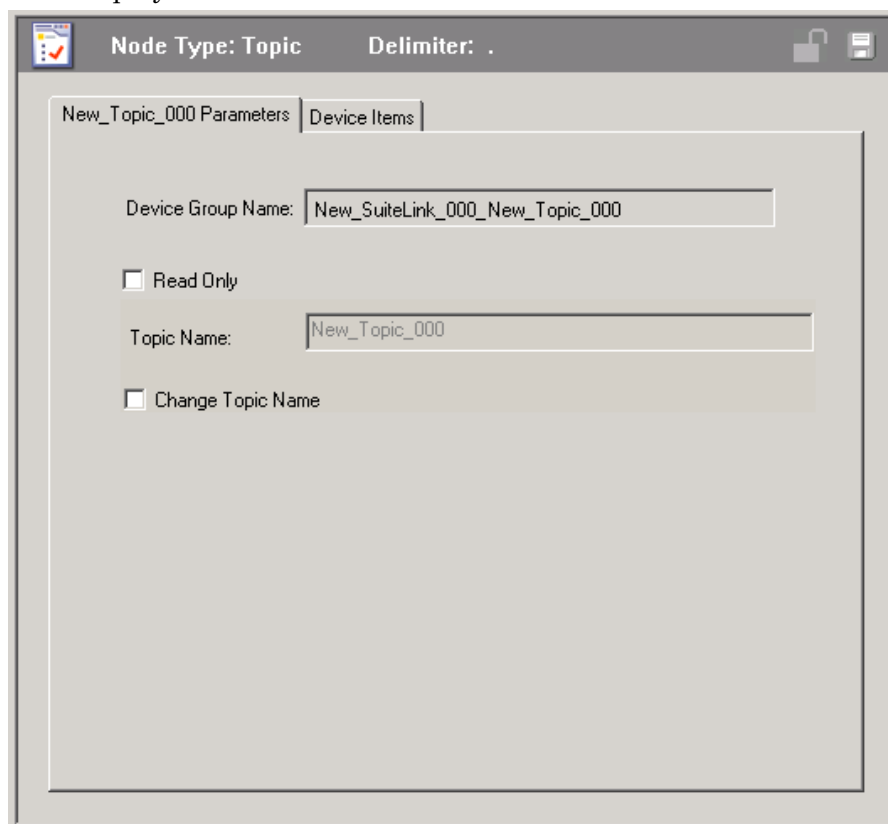
- **Reconnect Period** – Delay (in ms) between reconnection attempts if a connection fails. Minimum/maximum range is 10,000 to 300,000 ms (corresponding to the range of 10 sec to 5 min). Default value is 30000 ms. Entry of a value that is excessively out of the allowed range will display an error message about illegal format.

## Configuring a DDE/SuiteLink Topic Object

### To add a topic to your DDE or SuiteLink object

- 1 Select the new data source object, right-click it, and then click **Add Topic Object** on the shortcut menu.
  - A new object is created in the hierarchy tree and is named **New\_Topic\_000** by default (in "edit mode"). Rename it to match the Topic name as defined in your DDE or SuiteLink data source to be connected. You are allowed to add up to 100 new topic objects.

The **New\_Topic\_000 Parameters** configuration view (right pane) is displayed.



The screenshot shows a configuration window titled "Node Type: Topic" with a "Delimiter: ." field. The window has two tabs: "New\_Topic\_000 Parameters" (active) and "Device Items". The "New\_Topic\_000 Parameters" tab contains the following fields and controls:

- Device Group Name:** A text field containing "New\_SuiteLink\_000\_New\_Topic\_000".
- Read Only:** A checkbox that is currently unchecked.
- Topic Name:** A text field containing "New\_Topic\_000".
- Change Topic Name:** A checkbox that is currently unchecked.

- 2 Configure the new Topic object according to the following option definitions:
  - **Device Group Name** – Name of the topic that DDE or SuiteLink clients of FS Gateway connect to in order to access items at this topic in the data source. Default value is the concatenation of the DDE or SuiteLink object's name and the Topic object's name (this cannot be edited).
  - **Read Only** – Check this box to make all items connected through this topic read only. This qualification is in addition to any read-only condition the DDE or SuiteLink data source imposes. Unchecking this box only removes FS Gateway-imposed read-only qualifications. In other words, items inherently read-only in the data source remain so. Default value is unchecked.
  - **Topic Name** – Name of the topic in the DDE/SuiteLink data source. Default value is the name of the topic node in the hierarchy. You can change this name by checking the **Change Topic Name** check box.
  - **Change Topic Name** – Check this box to enable the **Topic Name** box so as to change the topic name. Changing the text in the **Topic Name** box has no effect on the name of the topic node in the hierarchy. Default value is unchecked.

Topic objects, which are identical between DDE and SuiteLink data sources, model the behavior of DDE and SuiteLink servers.

#### Example:

A SuiteLink data source called "ModbusOverSL"

A single SuiteLink topic called "FastTopic"




---

**Important:** Each group or topic must be uniquely named for the data source associated with it. That is, the topic object name or its **Topic Name** parameter should exactly match a topic defined in the DDE/SuiteLink server data source in a case-insensitive manner.

---

## Configuring Device Items

DDE and SuiteLink data sources allow you to add items through topic objects that model the behavior of DDE and SuiteLink servers.

Since items are added to topics in DDE and SuiteLink servers, topic objects are required in the DDE/SuiteLink hierarchy if you want to add items.

To add device items to your topic, select the new topic object and click the **Device Items** tab. For more information, see Device Item Definitions.

## DDE/SuiteLink Item Names

This section describes how a connected client requests access to items (or attributes) of a particular DDE/SuiteLink data source.

The following is an example of a client/data source connection via FS Gateway, and its associated item name syntax:

- To access an item in a DDE/SuiteLink server via FS Gateway through an OPC client, use the following syntax:

**Establish connection:**

"ArchestrA.FSGateway.3"

**Reference item:**

"ABTCPDDE.FastTopic.N7:0"

### Example #1

Assume an FS Gateway configuration with a SuiteLink data source object called "ModbusOverSL" and a single topic object called "FastTopic" that matches a topic name defined in the Modbus server.

#### **OPC Client**

OPC clients add items to the topic object, building the fully qualified OPC item name, by concatenating the hierarchy tiers, separated by periods.

**Establish connection:** "ArchestrA.FSGateway.3"

**Reference item:** ModbusOverSL.FastTopic.40010

**DDE / SuiteLink Client**

DDE and SuiteLink clients add items to the Device Group associated with the given topic object. To access the item in a DDE/SuiteLink data source via FS Gateway through a DDE or SuiteLink client, use the following syntax:

**Application:** FSGateway

**Topic (Device Group):** ModbusOverSL\_FastTopic

**Item:** 40010

**Excel cell reference:** =FSGateway|ModbusOverSL\_FastTopic!40010

---

**Important:** Do not confuse the topic (FS Gateway hierarchy object) used to model the DDE/SuiteLink data sources with the Device Group (Topic Object's parameter as shown in the "Device Group Name" field on the "Topic Object" configuration view) used to provide access to DDE/SuiteLink clients. FS Gateway hierarchy "Topic Object" node that is added to the DDE/SuiteLink Data Source node in the tree view on the left corresponds to a Topic that is configured in the DDE/SuiteLink Server (DataSource). **Here, FS Gateway acts as a DDE / SuiteLink Client to the DDE / SuiteLink Server (Data Source).** The "Device Group Name" field on the "Topic Object's" configuration view on the right is used by FS Gateway's DDE/SuiteLink clients to connect to FS Gateway. **Here, FS Gateway acts as a DDE / SuiteLink Server to the connected clients.**

---

## Example #2

To access an item "s:23" in a PLC from a SuiteLink server like DASABTCP on remote node "Computer1" through FS Gateway using a DDE Client.

PLC -> DASABTCP (server) -> FS Gateway -> DDE Client

**Data source (ABTCP Server) configuration:**

Add "Topic0" in the ABTCP server with the appropriate update interval and configured to communicate with a PLC.

**FS Gateway configuration:**

- 1 Add the SuiteLink Object and name it "ABTCP\_SuiteLink".
- 2 Configure Server Name as "ABTCP" and Server Node as "Computer1".
- 3 Add a Topic Object node that corresponds with the topic in the server. In this case, name the node "Topic0" to correspond with the topic name "Topic0" in the ABTCP Server. Optionally, check the **Change Topic Name** check box and override with an entry in the **Topic Name** box of this "Topic Object" configuration view.

**DDE Client configuration:**

Advise the item using Application as "FSGateway", Topic as "ABTCP\_SuiteLink\_Topic0" (corresponding to the Device Group Name field on the Topic Object ), and Item as "s:23".

To access the item in a DDE/SuiteLink data source via FS Gateway through a DDE or SuiteLink client, use the following syntax:

**Application:** FSGateway

**Topic (Device Group):** ABTCP\_SuiteLink\_Topic0

**Item:** s:23

**Excel cell reference:** =FSGateway|ABTCP\_SuiteLink\_Topic0!'s:23'

## DDE/SuiteLink Data Conversion

A key part of FS Gateway's protocol conversion capabilities is its data type conversion between DDE, SuiteLink, and OPC sources and clients.

---

**Note:** Since InTouch communicates through DDE or SuiteLink protocols, its data type conversions are covered in the following sections that address DDE and SuiteLink conversion.

---

Each protocol has a set of supported data types for the values that can be accessed. The following sections describe the data conversion mapping scheme applied by FS Gateway.

---

**Note:** If a client pokes an out-of-range value for any data type, FS Gateway does no clamping on the value. FS Gateway passes the client request to the server.

---

## OPC–DDE/SuiteLink Mappings

The following sections describe OPC to DDE/SuiteLink and DDE/SuiteLink to OPC data conversions.

### DDE/SuiteLink to OPC Conversions

In the case of the gateway receiving data from a DDE/SuiteLink source and sending it to an OPC client, the gateway converts DDE/SuiteLink types to OPC types as follows:

---

**Note:** Conversion failures can occur. In this case, the gateway returns Bad quality to the OPC client.

---

| <b>DDE/SuiteLink Type</b> | <b>OPC Variant Canonical Mapping</b> | <b>Comments</b> |
|---------------------------|--------------------------------------|-----------------|
| Discrete                  | VT_BOOL                              |                 |
| Float                     | VT_R4                                |                 |
| Integer                   | VT_I4                                |                 |
| String                    | VT_BSTR                              |                 |

## OPC to DDE/SuiteLink Conversions

In the case of the gateway receiving (write) data from an OPC client and sending it to a DDE/SuiteLink data source, the gateway converts OPC types to DDE/SuiteLink types as follows:

| <b>OPC Variant Type</b> | <b>DDE/SuiteLink Type</b> | <b>Comments</b>                      |
|-------------------------|---------------------------|--------------------------------------|
| VT_EMPTY                | Not supported             | Reject write.                        |
| VT_NULL                 | Not supported             | Reject write.                        |
| VT_I2                   | Integer                   |                                      |
| VT_I4                   | Integer                   |                                      |
| VT_R4                   | Real                      |                                      |
| VT_R8                   | Real                      | On writes, rejected if out of range. |
| VT_CY                   | String                    |                                      |
| VT_DATE                 | String                    |                                      |
| VT_BSTR                 | String                    | On writes, rejected if out of range. |
| VT_DISPATCH             | Not supported             | On writes, rejected.                 |
| VT_ERROR                | Integer                   |                                      |
| VT_BOOL                 | Discrete                  |                                      |
| VT_VARIANT              | Not supported             | On writes, rejected.                 |
| VT_DECIMAL              | Float                     | On writes, rejected if out of range. |
| VT_RECORD               | Not supported             | On writes, rejected.                 |
| VT_UNKNOWN              | Not supported             | On writes, rejected.                 |
| VT_I1                   | Integer                   |                                      |
| VT_UI1                  | Integer                   |                                      |
| VT_UI2                  | Integer                   |                                      |
| VT_UI4                  | Integer                   | On writes, rejected if out of range. |

|                    |               |                                               |
|--------------------|---------------|-----------------------------------------------|
| VT_INT             | Integer       |                                               |
| VT_UINT            | Integer       | On writes, rejected if out of range.          |
| VT_VOID            | Not supported | On writes, rejected.                          |
| VT_HRESULT         | Integer       |                                               |
| VT_PTR             | Not supported | On writes, rejected.                          |
| VT_SAFEARRAY       | Not supported | Rejects write. On reads, sets quality to Bad. |
| VT_CARRAY          | Not supported | Rejects write.                                |
| VT_USERDEFINED     | Not supported | On writes, rejected.                          |
| VT_LPSTR           | String        | On writes, rejects if too long.               |
| VT_LPWSTR          | String        | On writes, rejects if too long.               |
| VT_FILETIME        | String        | On writes, rejects if too long.               |
| VT_BLOB            | Not supported | On writes, rejected.                          |
| VT_STREAM          | Not supported | On writes, rejected.                          |
| VT_STORAGE         | Not supported | On writes, rejected.                          |
| VT_STREAMED_OBJECT | Not supported | On writes, rejected.                          |
| VT_STORED_OBJECT   | Not supported | On writes, rejected.                          |
| VT_BLOB_OBJECT     | Not supported | On writes, rejected.                          |
| VT_CF              | Not supported | On writes, rejected.                          |
| VT_CLSID           | String        |                                               |
| VT_VECTOR          | Not supported | On writes, rejected.                          |
| VT_ARRAY           | Not supported | On writes, rejected.                          |
| VT_BYREF           | Not supported | On writes, rejected.                          |
| VT_RESERVED        | Not supported | On writes, rejected.                          |

# Chapter 7

## Connecting to an InTouch Data Source

To connect to an InTouch data source, create and configure its hierarchy (data source and topics), and use the proper item naming conventions in its client(s).

Refer to Configuration for a general overview about configuring data sources in FS Gateway.

- Configuring an InTouch Data Source Object
- Configuring an InTouch Group Object
- Configuring Device Items
- InTouch Item Names
- InTouch Data Conversion

## Configuring an InTouch Data Source Object

**To add an InTouch data source object to your FS Gateway hierarchy**

- 1 Right-click **Configuration** in the hierarchy, and select **Add InTouch Object** from the shortcut menu. The following rules apply:
  - A new object is created in the hierarchy tree and is named **New\_InTouch\_000** by default (in "edit mode"). Rename it, if desired. You are allowed to add an unlimited number of InTouch data sources.

The **New\_InTouch\_000 Parameters** configuration view (right pane) is displayed.

- 2 Configure the new InTouch object according to the following option definitions:
  - **Device Group Name** – Name of the topic that DDE or SuiteLink clients of FS Gateway connect to in order to access items at the InTouch data source. Default value is the InTouch data source object's name (this cannot be edited).

- **Read Only** – Check this box to make all items connected through the InTouch data source read only. This qualification is in addition to any read-only condition that InTouch imposes. Unchecking this box only removes FS Gateway-imposed read-only qualifications. In other words, items inherently read-only in the data source remain so.. Default value is unchecked.
- **InTouch Runtime Node** – The name of the node (computer) on which the InTouch application runs. If the InTouch data source is local, value is LocalHost. Click the ellipse button to browse nodes.
- **Item Browse Path** – The full universal naming convention (UNC) directory path that contains the InTouch Tagname Dictionary file, Tagname.X, for the target InTouch application. The format is:  
    \\Node\directory or Drive:\directory (local or mapped drive)  
The InTouch application directory must be a shared directory. Click the ellipse button to browse to the shared directory.
- **Reconnect Attempts** – Number of times FS Gateway attempts to reconnect to the specified data source if a connection fails. The value (-1) means no limit to the number of attempts. The value Zero (0) means no attempts. Minimum/maximum range is -1 to 1,000,000. Default value is 3.
- **Reconnect Period** – Delay (in ms) between reconnect attempts if a connection fails. Minimum/maximum range is 10,000 to 300,000 ms (corresponding to the range of 10 sec to 5 min). Default value is 30000 ms.
- **Connection Protocol** – The protocol FS Gateway should use to connect to InTouch. Default value is SuiteLink.

---

**Note:** If the **InTouch Runtime Node** option is blank, then the InTouch data source would default to LocalHost.

---

- **Tag Browser button** – Click to open the InTouch Tag Browser, in which you can select InTouch tags for inclusion in the items list on the **Device Items** tab. See InTouch documentation for information about how to use the Tag Browser. While using the Tag Browser, note that you can use typical Windows operations such as Ctrl-Click to toggle selections and Shift-Click to multi-select tagnames.

---

**Note:** When a DDE connection fails, the InTouch data source object automatically switches to SuiteLink even though DDE has been configured as its **Connection Protocol**. This happens in instances such as connecting to a remote InTouch node in which NetDDE is not supported.

---

## Configuring an InTouch Group Object

### To add a group to your InTouch object

- 1 Select the new data source object, right-click it, and then click **Add InTouchGroup Object** on the shortcut menu.
  - A new object is created in the hierarchy tree and is named **New\_InTouchGroup\_000** by default (in "edit mode"). Rename it, if desired. You are allowed to add up to 100 new group objects.

The **New\_InTouchGroup\_000 Parameters** configuration view (right pane) is displayed.

The screenshot shows a configuration window titled "Node Type: InTouchGroup" and "Delimiter: .". The window has two tabs: "New\_InTouchGroup\_000 Parameters" (selected) and "Device Items". The "Parameters" tab contains the following fields and controls:

- Device Group Name:** A text field containing "New\_InTouch\_000.New\_InTouchGroup\_000".
- Read Only:** A checkbox that is currently unchecked.
- InTouch Runtime Node:** A text field containing "localhost".
- Item Browse Path:** An empty text field.
- Tag Browser:** A button located at the bottom right of the configuration area.

- 2 Configure the new group object according to the following option definitions:
- **Device Group Name** – Name of the topic that DDE or SuiteLink clients of FS Gateway connect to in order to access items at the InTouch group. Default value is the concatenation of the InTouch data source object's name and the group object's name (this cannot be edited).
  - **Read Only** – Check this box to make all items connected through the InTouch group read only. This qualification is in addition to any read-only condition that InTouch imposes. Unchecking this box only removes FS Gateway-imposed read-only qualifications. In other words, items inherently read-only in the data source remain so. Default value is unchecked.
  - **InTouch Runtime Node** – The name of the node (computer) on which the InTouch application runs. Default value is the same as the InTouch data source object's **InTouch Runtime Node** setting (this is not editable).
  - **Item Browse Path** – The path to the InTouch file, Tagname.X. It identifies the InTouch application whose tagname database is accessed by this InTouch group. Default value is the same as the InTouch data source object's **Item Browse Path** setting (this is not editable).
  - **Tag Browser button** – Click to open the InTouch Tag Browser, in which you can select InTouch tags for inclusion in the items list on the **Device Items** tab of this group. See InTouch documentation for information about how to use the Tag Browser. While using the Tag Browser, note that you can use typical Windows operations such as Ctrl-Click to toggle selections and Shift-Click to multi-select tagnames.

---

**Note:** Since an InTouch group always belongs to a given InTouch data source object, all of its parameters (except the **Read Only** check box and the Tag Browser button) are implicitly inherited and thus for reference only (non-configurable) from the InTouchGroup configuration view.

---

Although the InTouch tagname database is flat, InTouch groups provide an artificial grouping hierarchy.

**Example:**

An InTouch data source called "InTouch"

A single InTouch group called "Cleaner"



---

**Important:** Each group or topic must be uniquely named for the data source associated with it.

---

## Configuring Device Items

You can add items directly to the InTouch data source branch or in a group that allows you to group related InTouch tagnames together.

To add device items to your group, select the new group object and click the **Device Items** tab. For more information, see [Configuring Device Item Definitions](#).

## Adjusting for Time Zones

### Handling Time Zones with the Time Property

If you need to share time stamp values across different time zones (Platforms), use the Time data type in every time zone location. However, if you need to share it as string, remember that when converting the Time data type to a string (for example, in a script), it is automatically converted to local time, so you lose the ability to adjust it in a different time zone.

For example, to convert the Time property to a string GMT:

```
Dim localDateTime As System.DateTime;  
  
localDateTime = System.DateTime.Parse( obj.attr.Time );  
  
obj.udStringGMTfromLocalTime=  
    localDateTime.ToUniversalTime().ToString();
```

To convert the string GMT to a string of local time:

```
Dim univDateTime As System.DateTime;
```

```

univDateTime = System.DateTime.Parse(
    obj.udStringGMTfromLocalTime );

Obj.udStringLocalTimeFromGMT =
    univDateTime.ToLocalTime().ToString();

```

## Preserving Time Stamps from the Publishing Source

In the following cases, if you want to pass only the time stamp, the subscriber gets the time stamp as converted to the local time zone of the publisher and not the time zone of the data source.

Examples of configurations that do not preserve the original time zone are as follows.

In this configuration, GalaxyB:Object1.TimeAttr shows the time adjusted to the local time zone of the GalaxyA FS Gateway and not the time zone of the PLC:

```

PLC.Item <= GalaxyA Object1.IntAttr.Time <= FSGateway <=
    GalaxyB OPCClient <= Object1.TimeAttr

```

In this configuration, GalaxyB:Object1.TimeAttr shows the time adjusted to the local time zone of the InTouch application and not the time zone of the PLC:

```

PLC.Item <= GalaxyA Object1.IntAttr.Time <= InTouch App I/O
    Message Tag <= GalaxyB InTouchProxy <= Object1.TimeAttr

```

To avoid these problems, subscribe to the GalaxyA:Object1.IntAttr value property. This way, both the value and time stamp propagate to GalaxyB:Object1.IntAttr. You can then use the GalaxyB:Object1.IntAttr.Time. For example:

```

PLC.Item <= GalaxyA Object1.IntAttr <= FSGateway <= GalaxyB
    OPCClient <= Object1.IntAttr

```

```

PLC.Item <= GalaxyA Object1.IntAttr <= InTouch App I/O Integer
    Tag <= GalaxyB InTouchProxy <= Object1.IntAttr

```

In this configuration, the time property propagates from InTouch to Object.IntAttr.Time:

```

PLC.Item <= InTouch I/O Integer Tag <= Galaxy InTouchProxy <=
    Object.IntAttr

```

## InTouch Item Names

This section describes how a connected client requests access to items (or attributes) of a particular InTouch data source.

The following is an example of a client/data source connection via FS Gateway, and its associated item name syntax:

- To access an item in InTouch via FS Gateway through an OPC client, use the following syntax:

**Establish connection:**

"ArchestraA.FSGateway.3"

**Reference item:**

"InTouch1.Pump1"

An InTouch data source is a special case of DDE and SuiteLink data source. FS Gateway always communicates with InTouch using either DDE or SuiteLink.

Items can be added either directly to the InTouch data source object or to its group object.

### Example #1

Assume the InTouch data source object is named "MyInTouch".

#### **OPC Client**

Access the same TankLevel item through an OPC client as follows:

MyInTouch.TankLevel

#### **DDE / SuiteLink Client**

DDE and SuiteLink clients add items to the Device Group associated with the given InTouch data source object. To access the item in an InTouch data source via FS Gateway through a DDE or SuiteLink client, use the following syntax:

**Application:** FSGateway

**Topic (Device Group):** MyInTouch

**Item (Tagname):** TankLevel

**Excel cell reference:** =FSGateway | MyInTouch!TankLevel

## Example #2

An InTouch data source object allows you to group related InTouch tagnames together under the InTouch group object. Items can be added to InTouch group objects in the same way as they are added directly to the InTouch data source object. The same InTouch tagname is referenced whether the item is added directly to the InTouch data source object or to an InTouch group object.

Assume a configuration with an InTouch data source object called "MyInTouch" and a single group object called "Cleaner".

### OPC Client

OPC clients can add items to either the InTouch data source object or to the group object. Fully qualified OPC item names are created by concatenating the hierarchy tiers, separated by periods. The following two examples are equivalent:

MyInTouch.TankLevel

MyInTouch.Cleaner.TankLevel

### DDE/SuiteLink Client

DDE and SuiteLink clients add items to the Device Group associated with either the InTouch data source object or its group object. The topic the DDE/SuiteLink client needs to connect to FS Gateway is provided by this Device Group. The Device Group is created automatically when you create either the InTouch data source object or the group object in the hierarchy.

The item name for a DDE or SuiteLink client would be as follows:

**Application:** FSGateway

**Topic (Device Group):**

MyInTouch

*or*

MyInTouch\_Cleaner

**Item:** TankLevel

**Excel cell reference:**

=FSGateway | MyInTouch!TankLevel

*or*

=FSGateway | MyInTouch\_Cleaner!TankLevel

## InTouch Data Conversion

Since InTouch communicates through DDE or SuiteLink protocols, refer to its data type conversions in DDE/SuiteLink Data Conversion.



# Chapter 8

## Managing FS Gateway

After you configure FS Gateway, there are two steps to take before you can access data with your client application.

The first step is to determine what kind of client applications are to be used with this FS Gateway. If any of your client applications use DDE/SuiteLink, you must configure FS Gateway as a service. If only OPC client applications will be used, you can configure FS Gateway as a service or as not a service.

The last step is to activate FS Gateway. Some client applications can programatically activate FS Gateway. If you configure FS Gateway as an automatic service, FS Gateway is started and activated when the computer on which the DAServer is installed starts up. If you configure the DAServer as a manual service, the DAServer is not started when the computer starts up. Instead, it is started upon the first connection from an OPC client or when activated from the DAServer Manager.

After a DAServer is running as an auto or manual service, it stays running until explicitly stopped in the DAServer Manager or the computer shuts down.

## Configuring the FS Gateway as Service

To support DDE/SuiteLink clients, the FS Gateway must be configured as a service.

### To configure the FS Gateway as a service

- 1 In the DAServer Manager, navigate to the FS Gateway.
  - Expand **DAServer Manager**, expand the node group, and then expand **Local** or the remote computer name.
- 2 Right-click **ArchestrA.FSGateway.3** and then click **Configure As Service**.
- 3 Click either **Auto Service** or **Manual Service**.
- 4 Read the warning message and click **Yes**.

## Configuring the FS Gateway as Not a Service

The FS Gateway can only be set to run as not a service when the DAServer is in the deactivated state.

### To configure the FS Gateway as not a service

- 1 In the DAServer Manager, navigate to the FS Gateway.
  - Expand **DAServer Manager**, expand the node group, and then expand **Local** or the remote computer name.
- 2 Right-click **ArchestrA.FSGateway.3** and then click **Configure As Service**.
- 3 Click **Not a Service**.
- 4 Read the warning message and click **Yes**.

## Archiving Configuration Sets

After your FS Gateway has been configured, you can archive that specific configuration. You can archive more than one configuration set, and subsequently choose different configurations for different purposes.

### To archive configuration sets

- 1 In the DAServer Manager, right-click on the **Configuration** node in the hierarchy below your FS Gateway.
- 2 Select **Archive Configuration Set** from the shortcut menu.
- 3 In the **Archive Configuration Set** configuration view, provide a Configuration Set Name.

**4 Click **Archive**.**

- All current configuration values are saved to the archived set.

Once you have archived at least one configuration set, you can select it for use.

**To use different configuration sets from the current one**

- 1** Make sure FS Gateway is not running.
- 2** In the DAServer Manager, right-click the **Configuration** node in the hierarchy below FS Gateway.
- 3** Select **Use Another Configuration Set** from the shortcut menu and click on a configuration set in the sub-menu.

All parameters in FS Gateway configuration hierarchy change to the chosen configuration set.

## Activating/Deactivating the FS Gateway

When you activate the FS Gateway, it starts communicating and accepting requests from client applications. If a DAServer is configured as an automatic service, the DAServer is started and activated when the computer starts up. Also, a DAServer can be activated by the an OPC client connection request, but only out-of-proc..

**To activate the FS Gateway**

- 1** In the DAServer Manager, navigate to the FS Gateway.
  - Expand **DAServer Manager**, expand the node group, and then expand **Local** or the remote computer name.
- 2** Right-click **ArchestrA.FSGateway.3** and then click **Activate Server**.

Deactivating your FS Gateway stops it from communicating with client applications.

A DAServer with active OPC clients does not stop until the last OPC client shuts down.

**To deactivate the FS Gateway**

- 1** In the DAServer Manager, navigate to the FS Gateway.
  - Expand **DAServer Manager**, expand the node group, and then expand **Local** or the remote computer name.
- 2** Right-click **ArchestrA.FSGateway.3** and then click **Deactivate Server**.
- 3** Read the warning message and click **Yes**.

## In-Proc/Out-of-Proc

The DAServer can run only as a stand-alone process (out-of-proc). If the CLXCTX\_ALL option is the chosen, out-of-proc activation for the DAServer is triggered. Explicitly starting as part of the client process (in-proc) is not currently supported. Activation using the CLSCTX\_ACTIVATE \_64\_BIT\_SERVER flag is also not supported.

When the DAServer is running out-of-proc, it supports requests from both DDE/SuiteLink and OPC client applications.

If the DAServer is running as a service, the icon on the DAServer node in the SMC is yellow. If the DAServer is not running as a service, the icon is white. For more information, see the *DAServer Manager User's Guide*.

## Hot Configuration

FS Gateway is mostly hot-configurable. For instance, you can do the following while the gateway is activated:

- Modify Global Parameters
- Add, delete, or modify data source nodes
- Add, delete, or modify device groups or topics
- Add, delete, or modify device items
- Modify data source and group/topic configuration

ArchestrA user login data is not hot-configurable. FS Gateway must be restarted for the new values to take affect.

# Chapter 9

## Accessing the Data in FS Gateway

Client applications read and write to data items that are internal to the DAServer, as well as to the items located in the devices. Client application communication with the DAServer is done using either the OPC or DDE/SuiteLink protocols. The client application may or may not be on the same computer as the DAServer.

You do not need to create device items in the DAServer for your OPC client application.

### Accessing Data Using OPC

In the case of OPC communications, the protocol addresses an element of data in a conversation with six characteristics: node name, program name, group name, device group, link name, and item name.

- The node name (required for remote access) and device group are optional.
- A fully qualified OPC Item name (ItemID) is composed of the link name and item name.
- All other characteristics are specified through separate FS Gateway means.

To access an OPC item, the OPC client needs to connect to FS Gateway (only out-of-process) and create an OPC group defining the data-acquisition properties for the collection of items to be added. Although OPC groups can be either public or private, FS Gateway only supports private groups. Public OPC groups are shared across multiple clients, whereas private OPC groups are local to a single client. Optionally, a device group, which indicates the access path to the items for read/write, can be specified from FS Gateway.

The following briefly describes each characteristic of OPC data access:

- **node name:** Computer (host) name identifying a specific node on the network (for Remote Access ONLY).
- **program name:** The registered OPC server name uniquely identifying a specific server (ProgID). For FS Gateway, the program name is **ArchestrA.FSGateway.3**.
- **group name:** The OPC group created from the client for organizing a collection of items logically with the same data acquisition properties between the client and the server, such as update rate.
- **device group:** Meaningful names configured in FS Gateway under a specific data source for the common custom attributes between FS Gateway and the source, such as update interval. If not specified from the client, the default device group using the global configuration attribute values from FS Gateway is assumed. Functionally, a device group is equivalent to an access path (optional).
- **link name:** The set of hierarchy node names, representing the specific data source on a communications path link from the hierarchy root to a specific source as configured for FS Gateway under the DAServer Manager, separated by delimiters.
- **item name:** A specific data element, the leaf of the hierarchy tree of FS Gateway, within the specified group.
- **item suffix:** Optionally configure OPC data sources to use the /VT item suffix to tell the underlying OPC server the type of data you want the underlying OPC server to report to FS Gateway. For more information, see Chapter 5, "Connecting to an OPC Data Source."

## Accessing Data Using DDE/SuiteLink

In the case of DDE/SuiteLink communications, the protocol addresses an element of data in a conversation that uses a four-part naming convention. That convention includes the node name, application name, topic name, and item name. The fully qualified DDE/SuiteLink naming convention includes all four parts, although the node name part (required for remote access only and only for SuiteLink) is optional. The following briefly describes each portion of this naming convention:

- **node name:** Computer (host) name identifying a specific node on the network (for remote access only).
- **application name:** In the case of data going to clients via the DDE/SuiteLink PlugIn of FS Gateway, the application name portion of the address is **FSGateway**.
- **topic name:** Meaningful names are configured in FS Gateway to identify specific data sources. These names are then used as the topic names in all conversations with that source. Topic name maps to a device group defined in FS Gateway.

---

**Note:** You can define multiple device-group (topic) names for the same data source to poll different data at different rates.

---

- **item name:** A specific data element within the specified topic.



# Chapter 10

## Device Groups and Device Items

### Configuring Device Item Definitions

The **Device Items** tab in a data source's topic or group (also on the data source tier for InTouch and ArchestrA) is used to define aliases to actual data source items. The **Device Items** configuration view is the place where the following activities are performed:

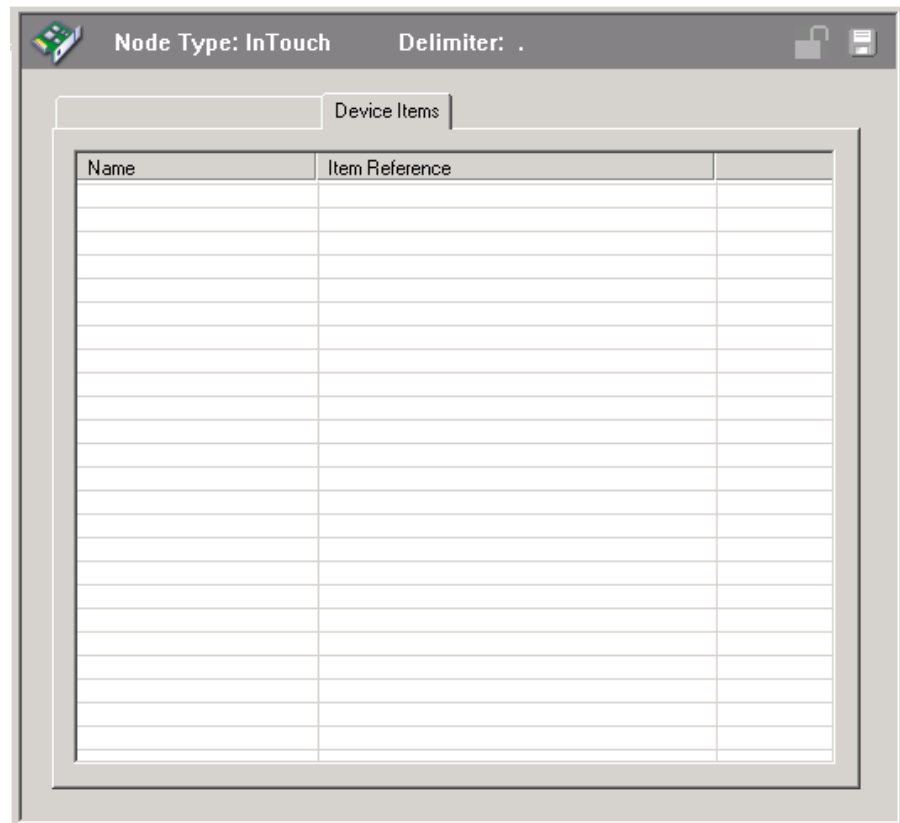
- Creating new device item definitions for data source items.
- Modifying existing device items.
- Deleting existing device items.
- Exporting the list of device items to a comma separated values (.csv) file. A .csv file can be opened with Microsoft Excel or any text editor.
- Importing device items from a .csv file into the **Device Items** tab.

Each device item definition should contain a unique name for the data source associated with it.

For detailed information about item naming conventions in FS Gateway, see the Item Names sections for the respective data sources as well as System Items.

## Device Item Definitions

The **Device Items** configuration view is used to add, clear all, rename, delete, import and export device items.



The **Device Items** configuration view has the following two columns:

- **Name:** This column defines the alias names to actual data source items.
- **Item Reference:** The actual data source item names defined in this column.

**Note:** When you create or add a new device item, a unique name needs to be entered for it.

**To create or add device items**

- 1 To create or add device items, right-click anywhere in the **Device Items** configuration view.
- 2 Select the **Add** command from the shortcut menu.
  - A device item is created, and it is numerically named by default.  
For example, Item\_0, Item\_1, and so on.
- 3 Change the default name by double-clicking on it and entering the new name.
  - Enter a unique name for the new device item.

**To add item references**

Item references for each of the device items that have been created can be added as follows:

- 1 In the **Item Reference** column, double-click on the area in the same horizontal line as the selected device item.
- 2 Type in the actual data source item name in the frame that appears.
- 3 Click anywhere in the configuration view or press the **Enter** key to have the change take effect.

**To rename a device item from the list**

- 1 Right-click on the device item to be renamed.
- 2 Select the **Rename** command from the shortcut menu and enter the new device item name.
- 3 Click anywhere in the configuration view or press the **Enter** key to apply the change.

**To delete a device item from the list**

- 1 Right-click on the device item to be deleted.
- 2 Select the **Delete** command from the shortcut menu.
  - The device item and its corresponding data source item name are deleted from the configuration view.

---

**Note:** When you select another part of FS Gateway tree hierarchy, you are prompted to save the modifications to the configuration set.

---

**To clear all device items**

- 1 Right-click anywhere in the **Device Items** configuration view.
- 2 Select the **Clear All** command from the shortcut menu.
  - All the device items listed in the configuration view, including their corresponding data source item names, are deleted.

## Exporting and Importing FS Gateway Item Data

The **Export** and **Import** commands on the shortcut menu enable you to export and import the FS Gateway item data to and from a CSV file, after the configuration of the Device Items has been completed. These commands will allow you to perform an off-line, large-scale edit on the item data configured for a controller, and import what has been edited back into the controller configuration.

The **Export** and **Import** features on the shortcut menu of the **Device Items** dialog box enable you to export and import the FS Gateway device item data to and from a CSV file, after the configuration of the Device Items has been completed. These features provide you with the following capabilities:

- Archive lists of device items.
- Bring an archived list of device items into the **Device Items** dialog box when you need to utilize or reconfigure any of the device items on the archived list.
- Perform an off-line, large-scale edit on the item data configured for a PLC.
  - Import what has been edited back into the PLC configuration.

### To export device items

When you want to archive a list of device items, use the **Export** feature in the **Device Items** configuration view.

- 1 To export the list, right-click anywhere in the **Device Items** configuration view.
- 2 Select the **Export** command from the shortcut menu.
- 3 Select the folder into which the list is to be saved.
- 4 Name the list to be exported.
- 5 Click the **Save** button.
  - The whole list is saved as a .csv file.

### To import device items

The **Import** feature in the **Device Items** configuration view is used to import an archived list of device items into the configuration view.

- 1 To import the list, right-click anywhere in the **Device Items** configuration view.
- 2 Select the **Import** command from the shortcut menu.
- 3 Select the archived list (.csv file) to be imported.

**4** Click the **Open** button.

- The whole list is imported into the **Device Items** configuration view.

---

**Note:** Duplicate items with the same Item References are ignored during import. Duplicate items with different Item References cause a dialog box to be displayed, in which you must make a selection.

---

---

**Important:** FS Gateway resolves item names from its clients at runtime in the following order:

1. System items (those prefixed with \$SYS\$)
  2. Device items (those defined in the **Device Items** configuration view)
  3. All other items (validated directly from the PLC device)
-



# Chapter 11

## FS Gateway Features

### Data Source Redundancy

The DAServer Manager provides the ability to assign redundant data sources for fail-over protection in the event of data source failure. Two identical data sources are expected to be configured in the DAServer Manager having identical item syntax, connected to the same FS Gateway. Configuring the primary device and secondary device parameters of a Redundant Device Object (RDO) can meet this expectation.

---

**Note:** Items can not be added for updates through the Redundant Device Object if the items do not exist in both controllers.

---

If the Primary data source fails, the FS Gateway will automatically switch over to the Secondary data source. The Secondary data source then becomes the active data source with the failed Primary data source reverting to the backup role. If the failed data source recovers to good status, it will remain in the standby mode.

---

**Note:** Redundant Device Object does not support the ArchestraA object. There can only be one ArchestraA object per hierarchy.

---

## Runtime Behavior

The FS Gateway will start with the active data source. The DAS Engine will switch to the standby data source when the active data source fails to communicate. The value of the `$$SYS$Status` will determine the communication failure.

---

**Note:** The value of the `$$SYS$Status` of the standby data source must be TRUE in order to switch over to the standby data source. Otherwise, there will not be any failover.

---

When `$$SYS$Status` shows a FALSE value at both active and standby data sources, the DAS Engine will consider a complete communication failure and mark all the items subscribed to the redundancy data source hierarchy with the current time and the appropriate OPC quality. The DAS Engine will activate the slow-poll mechanism to retry the communication to both data sources until either one of the Ping Items returns to a good quality and update its `$$SYS$Status` item to TRUE.

When the DAS Engine switches to the standby data source, the standby data source becomes active and the originally active data source becomes the standby.

When the active data source becomes the standby data source the Ping Item will not be deleted from that the standby data source. This will ensure the standby will be able to recover the communication again.

---

**Note:** The Ping Item must be a valid item from the controller that has not been rejected by the server for the failover to function properly.

---

The FS Gateway will log any failover activities. All other functionality such as diagnostics, enable/disable, and reset will be performed exactly same as it is performed for any other hierarchy node.

---

**Note:** Unsolicited message configuration is not supported in the Redundant Device Object (RDO) itself. You can still receive unsolicited messages directly from data source groups defined in the regular server hierarchy.

---

This feature allows the FS Gateway to provide fail over support by providing one node which switches between two other nodes. The Redundant Device Object is configured with a redundancy node which directs itself to one of the two nodes and switches to the other based on lack of communications to a common user-configured controller item. In this manner the Redundant Device Object can be used to direct client requests to the redundant node, which switches between data source or communication pathway failure without intervention.

---

# Chapter 12

## System Items

This section describes standard system items, data quality and timestamping in FS Gateway.

### Standard System Items

System items provide you with easy access to FS Gateway's status and diagnostics information. They are treated just like ordinary items with respect to the client. However, in most cases these items are not directly acquired via the communications layer. System item values are usually generated through internal calculations, measurements, and the tracking of the DAS Engine.

System items, like ordinary items, are defined by the following properties:

- **Group** (client group/OPC group): The arbitrary collection of items, not correlated.
- **Hierarchical location** (link name/OPC path, the hierarchical node section of the fully qualified OPC item ID): The device the item is attached to.
- **Device group** (OPC access path/topic, or a Scan Group on a hierarchical branch): A collection of items on the same physical location with the same protocol update rate.

---

**Note:** For DDE/SuiteLink clients, `$SYS$Status` always comes from the leaf level of the gateway hierarchy branch, which is the destination data source. For OPC clients, `$SYS$Status` can be accessed at all hierarchy levels. `$SYS$Status` at the root level of the whole hierarchy tree is always good, as it represents the quality status of the local computer itself. Hence, for practical application, OPC clients should reference `$SYS$Status` at any hierarchy levels other than the root. In the case of an ArchestrA data source, `$SYS$Status` is always good, even at the ArchestrA Group level.

---

In the ArchestrA context, the device group plays the most important role of identifying the scope of any item. The device group defines the hierarchical location implicitly when using globally unique device-group names, which is required for DDE/SuiteLink compatibility.

All system items follow the same naming convention:

- All system items start with `$SYS$`.
- The DAS Engine scans and parses the name for system items. Parsing of the name is case-insensitive.

All system items can be accessed through subscriptions to a Device Group. However, while some system items return data for that Device Group, others are gateway-wide.

## Global System Item

The following system item refers to specific information regarding a global condition of the gateway.

| System Item Name             | Type / Access Rights | Description | Values |
|------------------------------|----------------------|-------------|--------|
| <code>\$SYS\$Licensed</code> |                      | Not used.   |        |

## Device-Specific System Items

The following system items refer to specific information regarding the data source(s) FS Gateway is connected to.

| System Item Name | Type / Access Rights | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Values                                                                                                                                                                                     |
|------------------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| \$SYS\$Status    | Boolean/<br>Read     | <p>Binary status indication of the connection state to the device (hierarchy level) the item is attached to. The device group (OPC access path/topic) does not affect the value.</p> <p>The status can be good even if individual items have errors.</p> <p>For DDE/SuiteLink clients, \$SYS\$Status always comes from the leaf level of a gateway hierarchy branch, which is the destination data source.</p> <p>For OPC clients, \$SYS\$Status can be accessed at all hierarchy levels. \$SYS\$Status at the root level of the whole hierarchy tree is always good, as it represents the quality status of the local computer itself. Hence, for practical application, OPC clients should reference \$SYS\$Status at any hierarchy levels other than the root.</p> | <p>RANGE: 0, 1</p> <p>1: Gateway connection to the data source is intact.</p> <p>0: Error communicating with the data source.</p>                                                          |
| \$SYS\$ErrorCode | Longint/<br>Read     | <p>Detailed error code of the communications state to the data source.</p> <p>The device group (OPC access path/topic) does not affect the value.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <p>&gt;= 0: Good status (0 is the default state – connected).</p> <p>&gt;0: is some state like: connecting, initializing, etc.</p> <p>&lt;0: Error status (value indicates the error).</p> |

| System Item Name     | Type / Access Rights   | Description                                                                                                                                      | Values                                                                         |
|----------------------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| \$SYS\$ErrorText     | String/<br>Read        | Detailed error string of the communications state of the data source.<br><br>The device group (OPC access path/topic) does not affect the value. | Descriptive text for the communications state corresponding to the error code. |
| \$SYS\$StoreSettings | Integer/<br>Read Write | Not used.                                                                                                                                        |                                                                                |

**Caution:** For all three device-specific system items, status is always good for an ArchedrA data source.

## Device Group-Specific System Items

The following system items refer to specific information regarding device groups that have been configured in FS Gateway.

| System Item Name      | Type / Access Rights | Description | Values |
|-----------------------|----------------------|-------------|--------|
| \$SYS\$UpdateInterval |                      | Not used.   |        |
| \$SYS\$MaxInterval    |                      | Not used.   |        |

| System Item Name     | Type / Access Rights  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Values                                                                                                                                                          |
|----------------------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| \$SYS\$WriteComplete | Integer/<br>ReadWrite | <p>Accesses the state of pending write activities on the corresponding device group. On device group creation (adding items to an OPC group), the value of this system item is initially 1, indicating all write activities are complete – no pokes are pending.</p> <p>If values are poked into any items of the device group, the value of this item changes to 0, indicating write activity is currently in progress.</p> <p>If the server has completed all write activities, the value of this item changes to 1 if all pokes were successful or to -1 if at least one poke has failed.</p> <p>If the value of this item is not zero, the client can poke 1 or -1 to it (poke a 1 to clear errors, or a -1 to test a client reaction on write errors).</p> <p>If the value of this item is zero, it cannot be poked.</p> | <p>RANGE: -1, 0, 1</p> <p>1: Write complete (no writes are pending – initial state).</p> <p>0: Writes are pending.</p> <p>-1: Writes completed with errors.</p> |

| System Item Name       | Type / Access Rights  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Values                                                                                                                                                                                      |
|------------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| \$SYS\$ReadComplete    | Integer/<br>ReadWrite | <p>Accesses the state of initial reads on all items in the corresponding device group. The value is 1 if all active items in a device group have been read at least once.</p> <p>If at least one item in the device group is activated, this item changes to 0. It changes to 1 if all items have been read successfully, or to -1 if at least one item has a non-good quality.</p> <p>Poking a 0 to this item resets the internal read states of all items in this device group. This resets this item to 0. If all items are read again after this poke, this item changes back to 1 or -1.</p> | <p>RANGE: -1, 0, 1</p> <p>1: Read complete (all values have been read).</p> <p>0: Not all values have been read.</p> <p>-1: All values have been read but some have a non-good quality.</p> |
| \$SYS\$ItemCount       | DWord/<br>Read        | Accesses the number of items in the corresponding device group. This item is read-only.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <p>RANGE: 0...2147483647</p> <p>&gt;=0: Number of active items.</p>                                                                                                                         |
| \$SYS\$ActiveItemCount | DWord/<br>Read        | Accesses the number of active items in the corresponding device group. This item is read-only.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <p>RANGE: 0...2147483647</p> <p>&gt;=0: Number of active items.</p>                                                                                                                         |
| \$SYS\$ErrorCount      | DWord/<br>Read        | <p>Accesses the number of all items (active and inactive) that have errors (non-good OPC quality) in the corresponding topic.</p> <p>If the communications status of a device group is bad, all items have errors. This item is read-only.</p>                                                                                                                                                                                                                                                                                                                                                    | <p>RANGE: 0...2147483647</p> <p>&gt;=0: Number of all items (active and inactive) with errors.</p>                                                                                          |

| System Item Name | Type / Access Rights  | Description                                                                                                                                                                                                                                                                                                                         | Values       |
|------------------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| \$SYS\$PollNow   | Boolean/<br>ReadWrite | <p>Poking a 1 to this item forces all items in the corresponding device group to be read immediately.</p> <p>This is useful if you want to force to get the newest values from the device, regardless of its update interval.</p> <p>This also works on device groups with a zero update interval (manual protocol triggering).</p> | RANGE: 0, 1, |

## FS Gateway-Specific System Items

The following system items refer to specific information regarding FS Gateway.

**Important:** FS Gateway-specific systems items are available only at the following hierarchy levels: ArchestraA data source, OPC groups, DDE/SL topics, and InTouch data source.

| System Item Name                             | Type / Access Rights  | Description                                                                                                            | Values                                                                                                         |
|----------------------------------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| \$SYS\$Gateway<br>ConnectionStatus           | Boolean/<br>Read-Only | Indicates whether FS Gateway has established a successful connection to the configured data source and topic (if any). | <p>RANGE: True, False</p> <p>True: When connected to the data source.<br/>False: When disconnected.</p>        |
| \$SYS\$Gateway<br>ConnectionStatus<br>String | String/<br>Read-Only  | Indicates whether FS Gateway has established a successful connection to the configured data source and topic (if any). | <p>"Connected": When successful connection to data source is achieved.<br/>"Disconnected": When otherwise.</p> |

| System Item Name          | Type / Access Rights   | Description                                                                                                                                                                                                                                                | Values                                                                                                                                                                               |
|---------------------------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| \$SYS\$Reconnect          | Boolean/<br>Read/Write | Triggers a reconnect attempt to the configured data source. If you poke a value of 1 (True), this functionality is exercised even if the maximum number of reconnects is reached. By default, this item reads zero (0, False). Writing False does nothing. | RANGE: True, False<br><br>True: Triggers reconnect attempt. If data source is already connected, it is disconnected and then reconnected.<br><br>False: Does nothing. Default value. |
| \$SYS\$OPCUpdate Interval | DWORD/<br>Read/Write   | Indicates the update interval, in milliseconds, of the connected OPC server. This particular system item is available only in the OPC group.                                                                                                               | RANGE:<br>0...2147483647<br>If 0 is specified, then the fastest update interval supported by the OPC server is used.                                                                 |

## FS Gateway Redundant Device-Specific System Items

These system items are specific to the Redundant Device.

| System Item Name              | Type / Access Rights  | Description                                                                                                                                                                                                            | Values                                                               |
|-------------------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| \$SYS\$ForceFailover          | Boolean/<br>ReadWrite | This is required to achieve the failover condition to be forced by client.<br><br><b>Note:</b> By poking a value of "1" (True) into the Force Failover item, a client can conveniently switch to the secondary device. | TRUE, FALSE                                                          |
| \$SYS\$ActiveDevice           | String/Read           | This system item will show the current runtime active device.                                                                                                                                                          | Node Hierarchy Name                                                  |
| \$SYS\$FailoverTime           | Time/Read             | This system item will show the time at which the switch occurred.                                                                                                                                                      | Time at which the switch occurred                                    |
| \$SYS\$StandbyDevice          | String/Read           | This system item will show the current runtime standby device.                                                                                                                                                         | Node Hierarchy Name                                                  |
| \$SYS\$Secondary DeviceStatus | Boolean/Read          | This system item will show the status of the secondary device. This is the status of the second device defined in the configuration and is not changed with any failover.<br>RANGE: 0, 1                               | RANGE: 0, 1<br>(Contains the value of the system item \$SYS\$Status) |

| System Item Name            | Type / Access Rights | Description                                                                                                                                                                           | Values                                                                             |
|-----------------------------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| \$SYS\$PrimaryDevice Status | Boolean/Read         | This system item will show the status of the primary device. This is the status of the first device defined in the configuration and is not changed with any failover.<br>RANGE: 0, 1 | RANGE: 0, 1<br>(Contains the value of the system item \$SYS\$Status)               |
| \$SYS\$FailoverReason       | String/Read          | This system item will show the reason for the failover.                                                                                                                               | Descriptive text “ForceFailover” or the value of the system item \$SYS\$ErrorText. |

---

**Important:** The Redundant Hierarchy, including the Device Group, is not hot-configurable, and requires a Reset on the Redundant Hierarchy to effect a configuration change.

---

# Data Quality

Data quality is supported in the following protocols:

- ArcestrA Message Exchange
- OPC
- SuiteLink
- FastDDE v3

Data quality is not supported in the following protocols:

- DDE
- FastDDE v2

For those protocols that support it, quality is consistent with OPC Quality. Therefore, data quality from a source that supports it is passed through FS Gateway unmodified if the client also supports it. In the case of a client that does not support it, the quality is dropped. In the case of a data source that does not support quality, if the client supports it, the quality is fabricated and is always Good (exception: when FS Gateway cannot communicate with the target data source).



# Chapter 13

## Troubleshooting

This chapter describes troubleshooting tools that can be used to deal with FS Gateway problems you may encounter.

The DAServer Manager provides access to diagnostics and other statistical data, and the Log Viewer provides access to event messages logged during the operation of FS Gateway. Also, your client (for example, InTouch) can monitor connectivity with your data source through the \$SYS\$Status item. Use these tools together with the information in this section to troubleshoot FS Gateway.

---

**Note:** In order to determine the version of your FS Gateway, perform the following steps. Search for FSGateway.dll, right-click on the **File Name**, select **Properties** on the context menu, and select the **Version** tab on the **Properties** dialog box. The version of your FS Gateway is listed under **File Version**.

---

- Monitoring Connectivity Status with a Data Source
- Monitoring the Status of Conversations with DDE/SuiteLink Clients
- Error Messages and Codes
- Communication Failures

## Monitoring Connectivity Status with a Data Source

The built-in discrete item, `$SYS$Status`, can be used to monitor the status of communications with your data source. This item is set to the following:

- 0 (zero) when communication with the data source fails.
- 1 (one) when communication is successful.

---

**Note:** For DDE/SuiteLink clients, `$SYS$Status` always comes from the leaf level of FS Gateway hierarchy branch, which is the destination data source. For OPC clients, `$SYS$Status` can be accessed at all hierarchy levels. `$SYS$Status` at the root level of the whole hierarchy tree is always good, as it represents the quality status of the local computer itself. Hence, for practical application, OPC clients should reference `$SYS$Status` at any hierarchy levels other than the root.

---

Enter the following DDE reference formula in the appropriate place in your client:

**=FSGateway | <Device Group>!\$SYS\$Status**

where:

|                             |                                                                                       |
|-----------------------------|---------------------------------------------------------------------------------------|
| <b>FSGateway</b>            | is the name of FS Gateway application.                                                |
| <b>&lt;Device Group&gt;</b> | is the exact device group defined in FS Gateway for the data source.                  |
| <b>\$SYS\$Status</b>        | is the discrete item used to monitor the status of connectivity with the data source. |

**Example:**

**=FSGateway | ModbusOverSL\_FastTopic!\$SYS\$Status**

Enter the following OPC item reference syntax when adding the item in your OPC client:

**<YourLinkName>.\$SYS\$Status**

where:

|                             |                                                                                       |
|-----------------------------|---------------------------------------------------------------------------------------|
| <b>&lt;YourLinkName&gt;</b> | is the assembly of hierarchy node names leading to a specific data source.            |
| <b>\$SYS\$Status</b>        | is the discrete item used to monitor the status of connectivity with the data source. |

**Example:**

ModbusOverSL.FastTopic.\$SYS\$Status

---

**Note:** In case of a data source disconnection, FS Gateway attempts the number of connection retries as configured for the given data source object, and makes no more attempts afterward. Subsequently, it is up to the client to reinitiate the connection via the system item \$SYS\$Reconnect.

---

## Monitoring the Status of Conversations with DDE/SuiteLink Clients

The **InTouch WindowViewer** supports built-in topic names, called **DDEStatus** and **IOStatus**, that can be used to monitor the status of specific DAS conversations.

For example, assume that **WindowViewer (VIEW)** is communicating through FS Gateway with a data source with the topic name **ArchestrA**. The discrete items, **DDEStatus** and **IOStatus**, are set to:

- 0 (zero) when the conversation between FS Gateway and InTouch View fails.
- 1 (one) when the conversation between FS Gateway and InTouch View is successful.

---

**Note:** These items represent the status of communication between the client and FS Gateway.

---

## Using DDEStatus and IOStatus in Excel

The status of communications between FS Gateway and InTouch can be read into Excel by entering the following DDE reference formula in a cell on a spreadsheet:

**=view | DDEStatus!ArchestrA**

or

**=view | IOStatus!ArchestrA**

where:

|                         |                                                                                                         |
|-------------------------|---------------------------------------------------------------------------------------------------------|
| <b>view</b>             | is the name of the InTouch application.                                                                 |
| <b>[DDE][IO] Status</b> | is the built-in topic name used to monitor the status of communications between FS Gateway and InTouch. |
| <b>ArchestrA</b>        | is the exact access name defined in FS Gateway for the data source.                                     |

## Reading Values from FS Gateway into Excel

Values may be read directly into Excel spreadsheets from FS Gateway by entering a DDE formula into a cell using the following format:

**=applicationname | <devicegroup>!itemname**

Example formula:

**=FSGateway | ArchestrA!<tagname>**

where:

|                        |                                                                                                |
|------------------------|------------------------------------------------------------------------------------------------|
| <b>FSGateway</b>       | is the name of FS Gateway application.                                                         |
| <b>ArchestrA</b>       | is the exact device group name defined in FS Gateway for the data source.                      |
| <b>&lt;tagname&gt;</b> | is the actual location in the data source that contains the data value. This is the item name. |

In this example, each time the value of **<tagname>** changes in the data source, FS Gateway automatically sends the new value to the cell containing the formula in Excel.

---

**Note:** Refer to the Microsoft Excel manual for complete details on entering Remote Reference formulas for cells.

---

## Error Messages and Codes

To troubleshoot FS Gateway problems, use the following error messages together with the DAServer Manager Diagnostics data. Use the Log Flag data to customize the messages logged to the Log Viewer. See the Log Viewer online documentation for more information about using log flags.

FS Gateway processes write requests by receiving them from a client, doing any necessary type conversions, and then forwarding them to the data source. The write request from the gateway to the data source succeeds or fails.

In the case of write success, the gateway informs the client that the write succeeded through write acknowledgement support provided by the client side protocol.

In the case of a write failure, the gateway informs the client that the write failed through the same client side protocol support. In the case of write failure to items on ArchestrA, DDE, SuiteLink and InTouch data sources, OPC\_E\_BADRIGHTS is reported regardless of the failure reason.

## DDE/SuiteLink Client to Any Data Source – Write Errors

In the case of DDE, FastDDE and SuiteLink clients, the write response is a Nak (negative acknowledgement) with no additional failure detail code. When FS Gateway detects a failed write condition, it responds to the client with the Nak.

## OPC Client to ArchestrA – Write Errors

In the case of an OPC Client, the following error code support is used:

| Return Code         | Description                                                                                                                   |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------|
| S_OK                | The corresponding item handle was valid. The write will be attempted and the results will be returned on OnWriteComplete.     |
| E_FAIL              | The function was unsuccessful.                                                                                                |
| OPC_E_BADRIGHTS     | The item is not writeable.                                                                                                    |
| OPC_E_INVALIDHANDLE | The passed item handle was invalid.                                                                                           |
| OPC_E_UNKNOWNITEMID | The item is no longer available in the data source's address space.                                                           |
| E_XXX<br>S_XXX      | Vendor specific errors may also be returned. Descriptive information for such errors can be obtained from GetLastErrorString. |

A failed write to an ArchestrA data source is handled as follows:

- If ArchestrA responds with Nak, FS Gateway sends an E\_FAIL error code to the OPC Client.
- If FS Gateway cannot successfully convert the requested OPC data, this maps to a new vendor specific error for OPC indicating “Conversion Error” (OPC\_E\_BADTYPE).
- If the item handle is unknown to FS Gateway or ArchestrA, the OPC\_E\_INVALIDHANDLE error code is sent.
- If the item name is not valid in FS Gateway or ArchestrA, the OPC\_E\_UNKNOWNITEMID error code is sent.

## OPC Client to DDE/SuiteLink Data Source – Write Errors

A failed write to a DDE/SuiteLink data source is handled as follows:

- If the data source responds with Nak, FS Gateway sends an E\_FAIL error code to the OPC Client.
- If FS Gateway cannot successfully convert the requested OPC data, this maps to a new vendor specific error for OPC indicating “Conversion Error” (OPC\_E\_BADTYPE).
- If the item handle is unknown to FS Gateway or the data source, the OPC\_E\_INVALIDHANDLE error code is sent.
- If the item name is not valid in FS Gateway or the data source, the OPC\_E\_UNKNOWNITEMID error code is sent.

## Runtime Diagnostics and Error Reporting

For each data source connection, FS Gateway provides a read-only string item to each connected client called:

`$SYS$GatewayConnectionStatusString`

To each client, this item functions like other items, just under the topic or device group level. It indicates whether the gateway has established a successful connection to the configured data source and topic (if any) as follows:

- “Connected”
- "Disconnected”

Another item, called `$SYS$GatewayConnectionStatus`, is a Boolean that reads True when connected and False when disconnected. Note in the case of a DDE/SuiteLink data source, the connection is to an application and a topic. Also, in the case of an ArcestraA data source, the connection is to a Platform through Message Exchange. And in the case of an OPC data source, the connection is to an OPC Server through COM/DCOM object creation.

# Communication Failures

FS Gateway behaves in the following manner in the case of failed communication with a data source:

- The gateway attempts to periodically reestablish a connection with the data source up to the maximum number of retry attempts as specified in its **Reconnect Attempts** parameter.

---

**Note:** The gateway is not responsible for starting the data source server, unless the source protocol supports it. OPC has this capability.

---

- The gateway marks all items being read from the data source with Bad quality. OPC carries a sub-status of Comm Failure.
- Write attempts to the data source are rejected with an appropriate error code.

FS Gateway behaves in the following manner in the case of failed communication with a client:

- The gateway unsubscribes (deactivates) all items on the data source that were previously subscribed to by the failed client. (Exceptions: Those items required by other, still connected, clients remain subscribed. Also, in the case of an OPC client, FS Gateway maintains subscriptions to all items on the data source previously subscribed to by the failed client.)
- The gateway accepts future attempts to reconnect from the client. Reconnection is the responsibility of the client.

---

**Important:** If FS Gateway fails to connect to a remote OPC server through both its ProgID and ClassID, then lower the DCOM **Authentication Level** of the OPC server to None. Do this by opening Control Panel on the remote computer, double-clicking **Administrative Tools**, double-clicking **Component Services**, and then expanding the hierarchy tree under the Console Root as follows: Component Services, Computers, My Computer and DCOM Config. Click DCOM Config. In the right pane, right-click on the OPC server you cannot connect to, and then click **Properties** on the shortcut menu. On the **General** page of the properties dialog box, select None for **Authentication Level**. Click **OK**.

---

Communications failures with an ArchestrA data source behave in the following manner:

| <b>Communication Failure</b>                                       | <b>OPC Data Quality</b> |
|--------------------------------------------------------------------|-------------------------|
| Break between PLC and DIObject                                     | 0x1B                    |
| DIObject node disconnected                                         | 0x00                    |
| Node with ArchestrA UserDefined ApplicationObject disconnected     | 0x04                    |
| ApplicationObject undeployed                                       | 0x00                    |
| WinPlatform undeployed on FS Gateway node                          | 0x00                    |
| FS Gateway node disconnected (communicating with local OPC client) | 0x04                    |

# Chapter 14

## Reference

- FS Gateway Architecture
- Component Environments

### FS Gateway Architecture

FS Gateway is a collection of components that work in concert to provide communications access with a variety of data sources and clients. These components include:

- **DAServer Manager:** This is the Microsoft Management Console (MMC) snap-in, that is part of the Archedra System Management Console suite of utilities, supplied with FS Gateway. It provides the necessary user-interface for diagnostics, configuration, and activation.
- **Client Plug-ins:** These are the components that are added to FS Gateway to enable communications with clients. Examples are: OPC, DDE/Suitelink, and so on.
- **DAS Engine:** This is the library that contains all the common logic to drive data access.
- **Device Protocol:** This is the custom code provided by FS Gateway to define the communications between particular data sources and clients.

---

**Note:** NetDDE protocol is not supported.

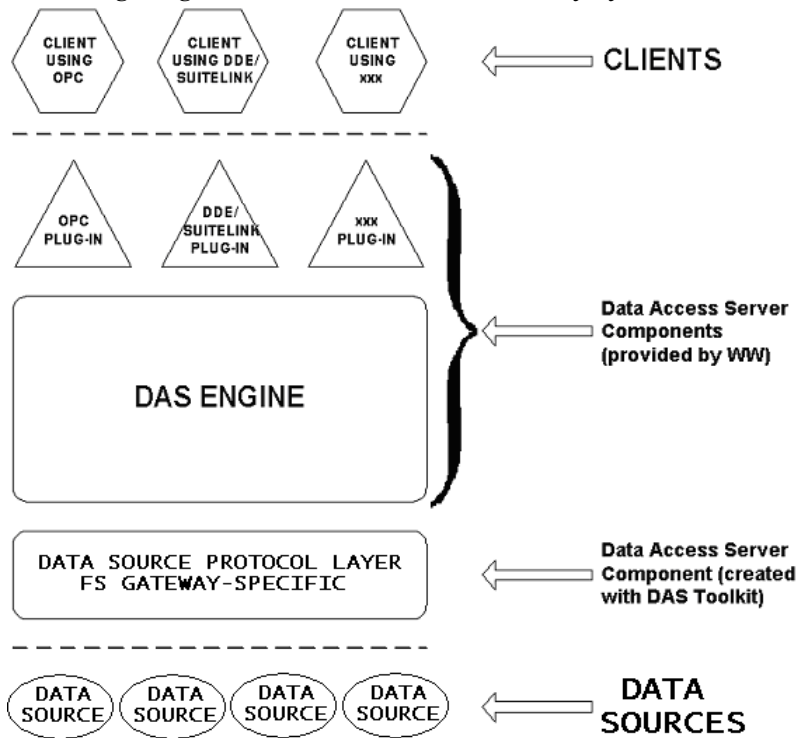
---

## FS Gateway

FS Gateway is comprised of three physical parts (see the following figure). They are the following:

- **Plug-in Component(s):** Responsible for communicating with clients.
- **DAS Engine:** This common component is used by FS Gateway as well as all Wonderware DAServers.
- **Data Source Protocol Layer, Gateway-specific:** This component is responsible for communicating with the data sources.

The following diagram describes the FS Gateway system architecture.



Each physical part of FS Gateway is comprised of a set of .exe and/or .dll modules. Wonderware provides the Plug-ins and the DAS Engine. The DAS Toolkit user creates the Data Source Protocol Layer (FS Gateway-specific) modules. All three sets of modules are required for a fully functioning gateway.

## Plug-ins

Plug-ins provide a protocol-translation function for device integration clients. Typical Plug-ins communicate in DDE, SuiteLink, or OPC protocol, and serve as interfaces between their clients and the DAS Engine.

---

**Note:** OPC-specific array data type (VT\_ARRAY) is not supported in the DDE/SL plug-in. These arrays are converted to HEX strings, which provide legacy behavior.

---

## DAS Engine

The DAS Engine is a middleware component that exposes two sets of unique interfaces, one for communicating with the Plug-ins and the other one for communicating with the Data Source Protocol Layer components.

## Data Source Protocol Layer

The Data Source Protocol Layer provides a protocol-translation function for specific data sources, such as InTouch, OPC, and ArchestrA; and it serves as an interface between the DAS Engine and the data sources.

# Component Environments

FS Gateway has the following characteristics:

- The DAS Engine is dynamically linked to the other FS Gateway components. In other words, a new DAS Engine (feature enhancement or bug fix) would not require relinking to the other components nor re-QA of those other components. When deployed to the system, the new DAS Engine would attach to all existing FS Gateway components.
- Newly deployed Plug-ins (feature enhancements or bug fixes) do not require relinking nor re-QA of associated components. Even new Plug-ins (for example, OPC Alarm & Events) would not require any development changes to the other components, and therefore no relinking in a customer- installed base. In fact, it is feasible to implement new functionality in a Plug-in to enhance FS Gateway without any involvement of the code of the other components.
- FS Gateway can be configured in one stand-alone configuration utility (DAServer Manager), and the DAServer Manager is capable of displaying specific configuration views for FS Gateway as well as other Wonderware DAServers. This utility allows the browsing and editing of Data Access products on different nodes.

- The DAServer Manager diagnostics tool displays generic diagnostic objects common to FS Gateway as well as all DAServers, in addition to FS Gateway-specific/FS Gateway-developer-defined diagnostic data.

FS Gateway's data configuration format is XML. Any XML-enabled program (for example, XML Editor) can read this format.

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