Wonderware®

FactorySuite Gateway User's Guide

Version A

Last Revision: 6/21/04

Invensys Systems, Inc.

Invensys Systems, Inc.
26561 Rancho Parkway South
Lake Forest, CA 92630 U.S.A.
(949) 727-3200
http://www.wonderware.com

Trademarks

Contents

Before You Begin

About This Book

This book describes how the Wonderware® FactorySuite Gateway (FS Gateway) is configured and used, after it has been installed. The book is organized in the following fashion:

- **Contents**
- **Introduction**: contains overview information about the FS Gateway and the environment in which it works.
- **Configuring FS Gateway**: contains general descriptions of the user-interface elements of this gateway in addition to its functionality.
- **Connecting to an ArchestrA Data Source**: contains specific information about configuring a connection between a client and an ArchestrA data source.
- **Connecting to an OPC Data Source**: contains specific information about configuring a connection between a client and an OPC data source.
- **Connecting to a DDE/SuiteLink Data Source**: contains specific information about configuring a connection between a client and a DDE/SuiteLink data source.
- **Connecting to an InTouch Data Source**: contains specific information about configuring a connection between a client and an InTouch data source.
- **System Names**: describes the system item-naming conventions for targeted devices.
- **Troubleshooting**: provides information about error messages and codes displayed by this gateway.
- **Reference**: describes the FS Gateway architecture in general.
- **Index**

You can view this document online or you can print it, in part or whole, by using the Adobe Acrobat Reader's print facility. To view this document properly, you must use version 4.0 or later of the Acrobat Reader.

Documentation Conventions

This documentation uses the following conventions:

Convention	Used for
Bold	Menus, commands, buttons, icons, dialog boxes and dialog box options.
`Monospace`	Start menu selections, text you must type, and programming code.
Italic	Options in text or programming code you must type.

Technical Support

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

Prior to contacting technical support, please refer to the relevant chapter(s) in this *FactorySuite Gateway User's Guide* for a possible solution to any problem you may have with FS Gateway. If you find it necessary to contact technical support for assistance, please have the following information available:

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

C H A P T E R 1

Introduction

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.

Contents

Overview

FS Gateway is a Microsoft® Windows® application program that acts as a communications protocol converter. It was built with the ArchestrA DAS Toolkit. FS Gateway can be used to link clients and data sources that communicate using different data access protocols. 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 in-proc or out-of-proc within OPC clients.
- FS Gateway can communicate only with ArchestrA data source components delivered with Industrial Application Server v2.0. 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.

	OPC v2.05 Data Access Server	SuiteLink I/O Server	ArchestrA	DDE I/O Server	FastDDE v2 I/O Server	FastDDE v3 I/O Server	InTouch
OPC Client	N/A	Yes	Yes	Yes	Yes	Yes	Yes
SuiteLink Client	Yes	N/A	Yes	Yes	Yes	Yes	Yes
DDE Client	Yes	Yes	Yes	N/A	N/A	N/A	Yes
FastDDE v2 Client	N/A	N/A	Yes	N/A	N/A	N/A	N/A
FastDDE v3 Client	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 ArchestrA in order to use that data source.

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

Communications Protocols

FS Gateway communicates with data sources and clients using one of the following communications protocols:

- OPC
- SuiteLink™
- DDE
- FastDDE
- ArchestrA Message Exchange

For more information about FS Gateway architecture, see the Reference section.

Protocols

FS Gateway utilizes the following application communications protocols to communicate with data sources and clients.

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 NT and Windows NT-technology-based operating systems (for example, Windows 2000, Windows XP and Windows 2003).

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

DDE (Dynamic Data Exchange) is a communications protocol developed by Microsoft 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 packaging many proprietary Wonderware DDE messages into a single Microsoft DDE message. This packaging 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.

Accessing Items via FS Gateway

The method for accessing items through FS Gateway depends on the communications protocol being used.

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 (either in-process or 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 the OPC protocol:

- **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.1**.
- **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.

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.

  For more information on item names, see the Item Names sections for the respective data sources as well as System Items.

Features

FS Gateway provides the following features:

- The ability to communicate over multiple application-level protocols at the same time.
- The ability to add new application-level protocols on the fly.
- The ability to be configured remotely.
- New, robust diagnostic abilities.

For more in-depth information on FS Gateway architecture, see the Reference section.

C H A P T E R 2

Configuring FS Gateway

Once the FS Gateway has been installed, a small amount of configuration is required. Configuration is done through the DAServer Manager, which is hosted by the System Management Console (SMC).

Open the SMC by clicking **Start**, pointing to **Programs** and then **Wonderware**, and then clicking **System Management Console**. Navigate in the DAServer Manager utility to the FS Gateway hierarchy.

Before FS Gateway can be activated, the data source hierarchy must be built to establish communications between data source and client. Build this hierarchy by adding one or more nodes to the FS Gateway hierarchy. Once that hierarchy is built, each data source can be configured.

Important! To run FS Gateway as a service, right-click the FS Gateway name (**ArchestrA.FSGateway.1**) 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.

Note Microsoft Windows NT does not support Microsoft Management Console (MMC). So for Windows NT 4.0 (Workstation and Server) users, the DAServer Manager is unavailable on this platform. NT users must install at least FS Gateway's DAServer Manager option on a remote computer running a supported post-NT operating system. Perform all of the required configuration on the NT-based FS Gateway as mentioned in this chapter from this remote node. FS Gateway should reside on the same computer as your DDE data source because NetDDE is not supported.

Contents

Getting Started Quickly with FS Gateway

This section briefly describes the procedures required to prepare the FS Gateway for use. Detailed descriptions of each step can be found in later sections of this documentation. This section is intended for people who are familiar with FS Gateway.

If you are not familiar with FS Gateway functionality, please read the more-detailed procedures in Configuring FS Gateway.

To prepare the FS Gateway

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

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

   - Accept all the default settings during installation.
2. Start the **System Management Console**.
3. From the **System Management Console**, find the DAServer Manager utility and then FS Gateway below in the hierarchy tree.
   - Under the Local branch node, find FS Gateway (named **ArchestrA.FSGateway.1**).
   - See the DAServer Manager documentation for general information about working in this snap-in environment.
4. The new FS Gateway must now be configured.
   - Before proceeding, determine the type of data source(s) to which you plan to connect.
5. Right-click the **Configuration** object in the tree, and select one of the five data source objects from the shortcut menu (**Add SuiteLink Object, Add DDE Object, Add ArchestrA Object, Add OPC Object, or Add InTouch Object)**.
   - A new object is created as a node in the hierarchy tree and is named **New_<OBJECTNAME>_000** by default.
   - 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, a numeric sequencing system is applied. Any hierarchy entry can be renamed at a later time.
6. Right-click on the new object, and from the shortcut menu, select the appropriate one of the following:

   Add Topic Object

   Add ArchestrAGroup Object

   Add OPCGroup Object

   Add InTouchGroup Object
7. Configure the respective topic or group objects, if applicable, with appropriate values.

FS Gateway is now ready for use. In order to use it, you must activate it from the DAServer Manager by right-clicking the FS Gateway name (**ArchestrA.FSGateway.1**) and selecting the **Activate Server** command on the shortcut menu.

Configuring FS Gateway

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`.

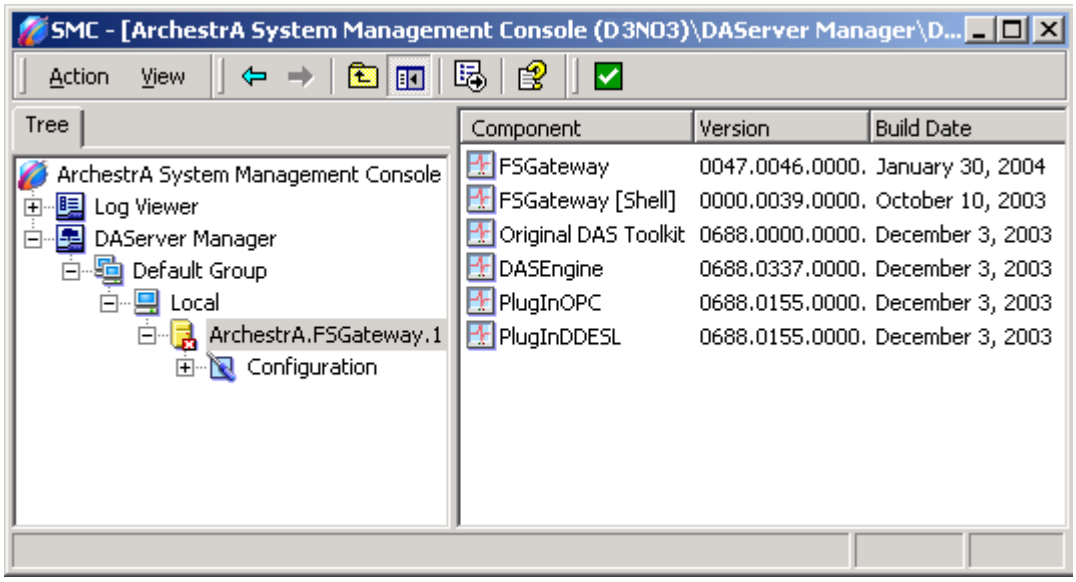
Note The shortcut menu items described in this document typically represent only a subset of any actual shortcut menu. Most items in each shortcut menu are standard Microsoft Windows or MMC-specific commands. For more information about those commands, please see MMC help.

To prepare FS Gateway

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

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

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. See image below.
   - Click on Default Group, then the Local node.
   - Under the Local node, find FS Gateway (named **ArchestrA.FSGateway.1**).
   - 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."

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 the FS Gateway hierarchy) and then toggle focus away from and then on the FS Gateway hierarchy of the second instance.

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 **ArchestrA.FSGateway.1** and click **Activate Server** on the shortcut menu.

FS Gateway Data Source Hierarchy

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

The data source configuration part of the 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, refer to the following sections:

- 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

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 the FS Gateway configuration hierarchy change to the chosen configuration set.

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:

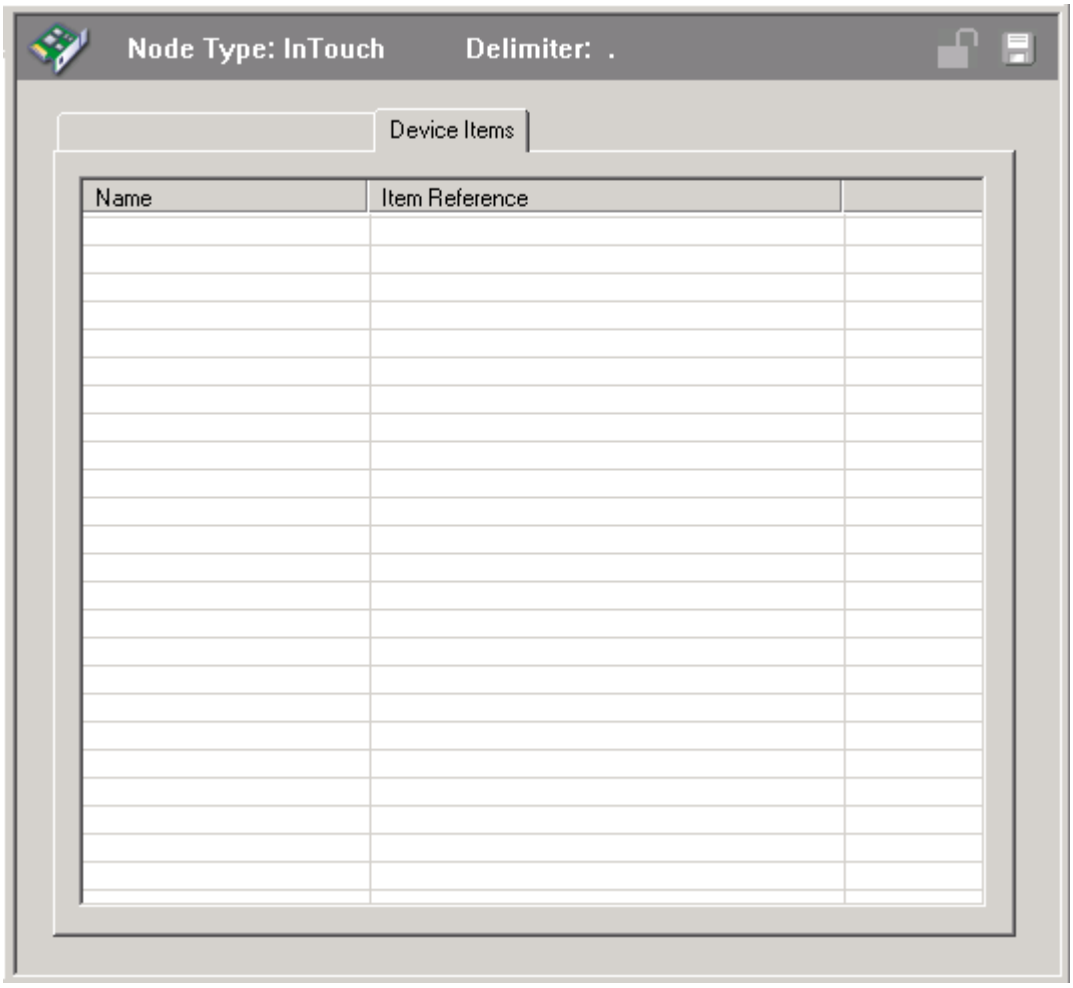
- Creating new device item definitions for data source items.
- Modifying existing device items.
- Deleting existing device items.
- Exporting the list of device items to a comma separated values (.csv) file. A .csv file can be opened with Microsoft Excel or any text editor.
- Importing device items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

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)

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.

Note None of FS Gateway's parameters are hot configurable when it is installed on Windows NT.

C H A P T E R 3

Connecting to an ArchestrA Data Source

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

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

Contents

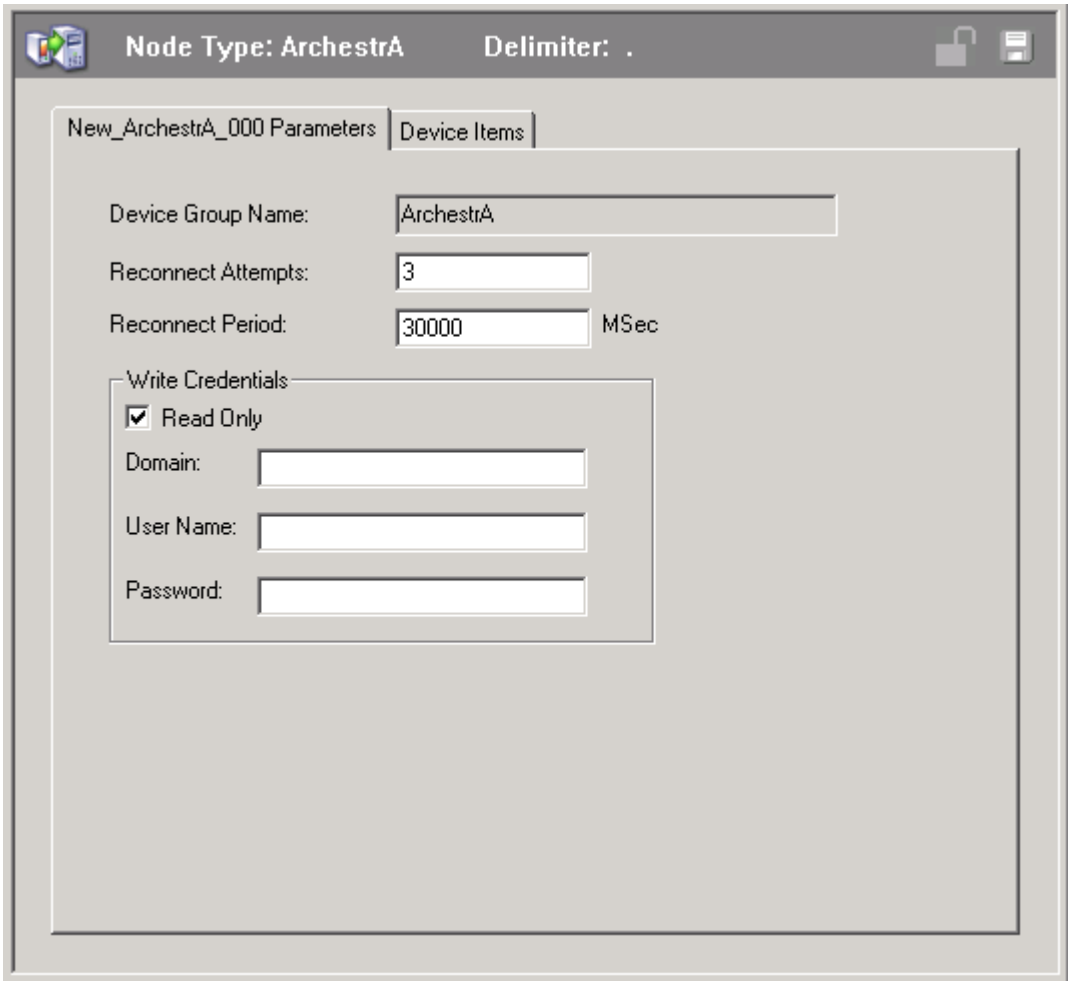
Configuring an ArchestrA Data Source Object

To add an ArchestrA data source object to your FS Gateway hierarchy

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

- A new object is created in the hierarchy tree and is named **New_ArchestrA_000** by default (in "edit mode"). Rename it, if desired. You are allowed to add only one ArchestrA data source.

The **New_ArchestrA_000 Parameters** configuration view (right pane) is displayed.



2. Configure the new ArchestrA 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 ArchestrA data source. Default value is ArchestrA (this cannot be edited).
   - **Reconnect Attempts** – Number of times FS Gateway attempts to reconnect to the specified data source if a connection fails. Zero (0) means no limit to the number of attempts. Minimum/maximum range is 0 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 ArchestrA for write qualifications.
- **Read Only –** Check this box to make all items connected through the ArchestrA data source 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 checked.
- **Domain –** This option, **User Name** and **Password** are credentials used to logon to ArchestrA if the **Read Only** box is unchecked and ArchestrA has security enabled. In such a case, you must enter valid credentials as configured in ArchestrA. Default value is blank.

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

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

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

Configuring an ArchestrA Group Object

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

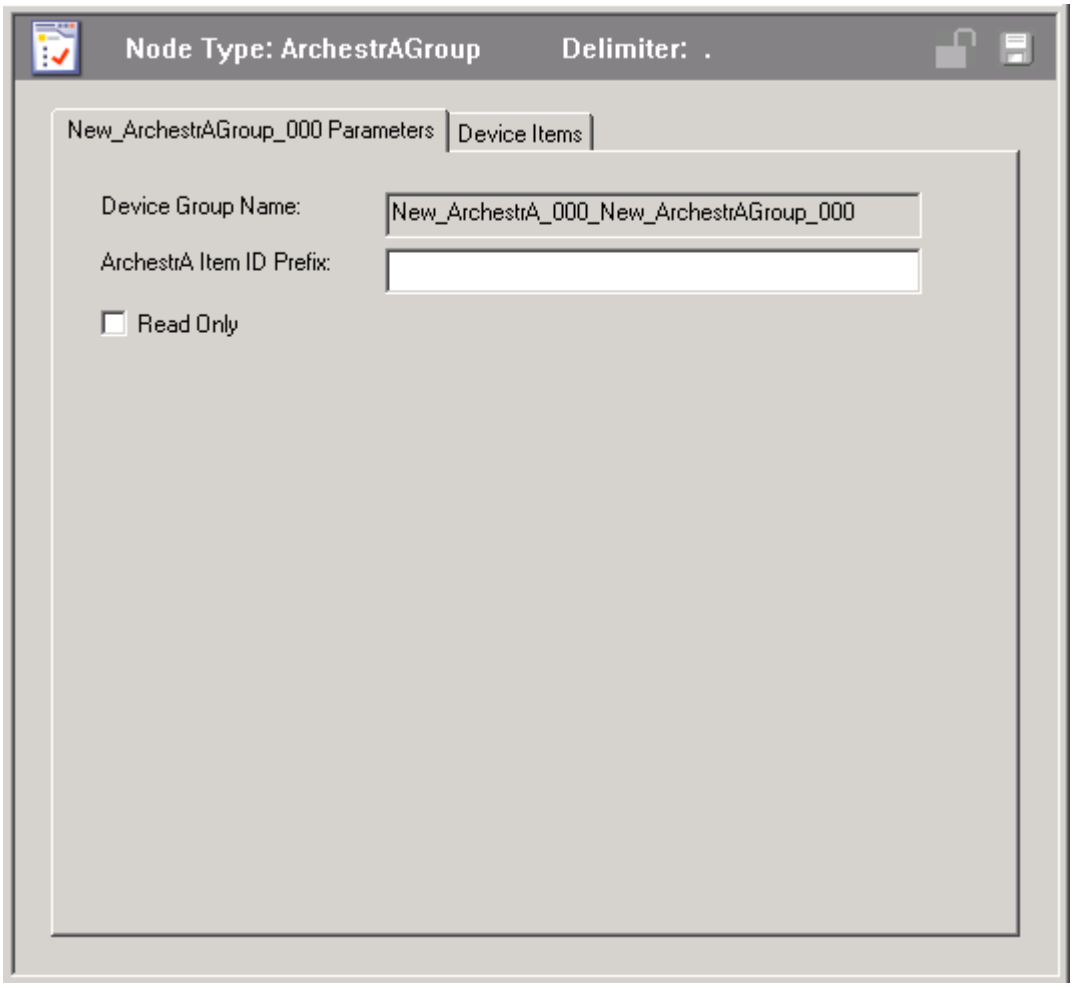
To add a group object to your ArchestrA data source hierarchy

1. Select the new data source object, right-click it, and then click **Add ArchestrAGroup Object** on the shortcut menu.

- A new object is created in the hierarchy tree and is named **New_ArchestrAGroup_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 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. For more information, see Using Item Prefixes. Naming an ArchestrA group the same as an item (or the first part of an item name) also causes an ambiguity in the FS Gateway namespace. In other words, do not name an ArchestrA group "Float" if a "Float.PV.Value" item exists in the Galaxy.

The **New_ArchestrAGroup_000 Parameters** configuration view (right pane) is displayed.



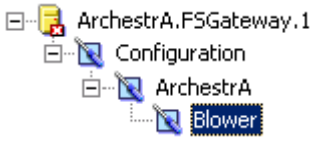
2. Configure the new group object according to the following option definitions:

- **Device Group Name** – Name of the topic that DDE or SuiteLink clients of FS Gateway connect to in order to access items at the 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 (see image below):

An ArchestrA data source called "ArchestrA"

A single ArchestrA group called "Blower"



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

Configuring Device Items

ArchestrA 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 ArchestrA data source branch or in a group that allows you to group related ArchestrA 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.

ArchestrA Item Names

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

This section describes how a connected client requests access to items (or attributes) of a particular ArchestrA 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 ArchestrA via FS Gateway through an OPC client, use the following syntax:

  Establish connection:

  "ArchestrA.FSGateway.1"

  Reference item:

  "ArchestrA.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.1"

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 ArchestrA data source named "ArchestrA" 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 ArchestrA group via FS Gateway through an OPC client, use either of the following syntax formats, which are equivalent:

ArchestrA.Blower_001.Temp1

ArchestrA.Blower.Blower_001.Temp1

DDE/SuiteLink Client

DDE and SuiteLink clients add items to a Device Group associated with either the ArchestrA 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 ArchestrA group is created automatically when you create the group in the hierarchy. Its name is generated automatically by concatenating the ArchestrA data source name with the group name, separated by an underscore ("_"). In the case above, the Device Group name would be "ArchestrA_Blower".

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

Examples:

FSGateway|Archestra!Blower_001.Temp1

FSGateway|Archestra_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.

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.

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 +/-1.5e-45 is rounded to 0.0.

ArchestrA-DDE/SuiteLink Mappings

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

ArchestrA to DDE/SuiteLink Conversions

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

ArchestrA Type	DDE/SuiteLink Type	Comments
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	The 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.

Array – subscription to entire array by [ ] specifier on reference.	VT_BSTR	Puts each element of the array into a comma separated string, such as: “Value1, ,Value2,Value3”. If truncated, then associated quality sent to OPC set to Uncertain. Cannot write to an entire array using this technique; therefore, entire arrays are read-only.
Array – subscription to specific item by [n] specifier on reference.	VT_BSTR VT_R4 VT_I4 VT_BOOL	Supports the subscription to a single element of an array. In that case, the conversions above apply. Otherwise, return empty string with Bad quality. Single elements of arrays are writable (attribute-category permitting).

OPC to ArchestrA Conversions

In the case of the gateway receiving (write) data from an OPC source and sending it to an ArchestrA client, the gateway converts OPC 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.

OPC Variant Type	ArchestrA 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 4

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 Configuring FS Gateway for a general overview about configuring data sources in FS Gateway.

Contents

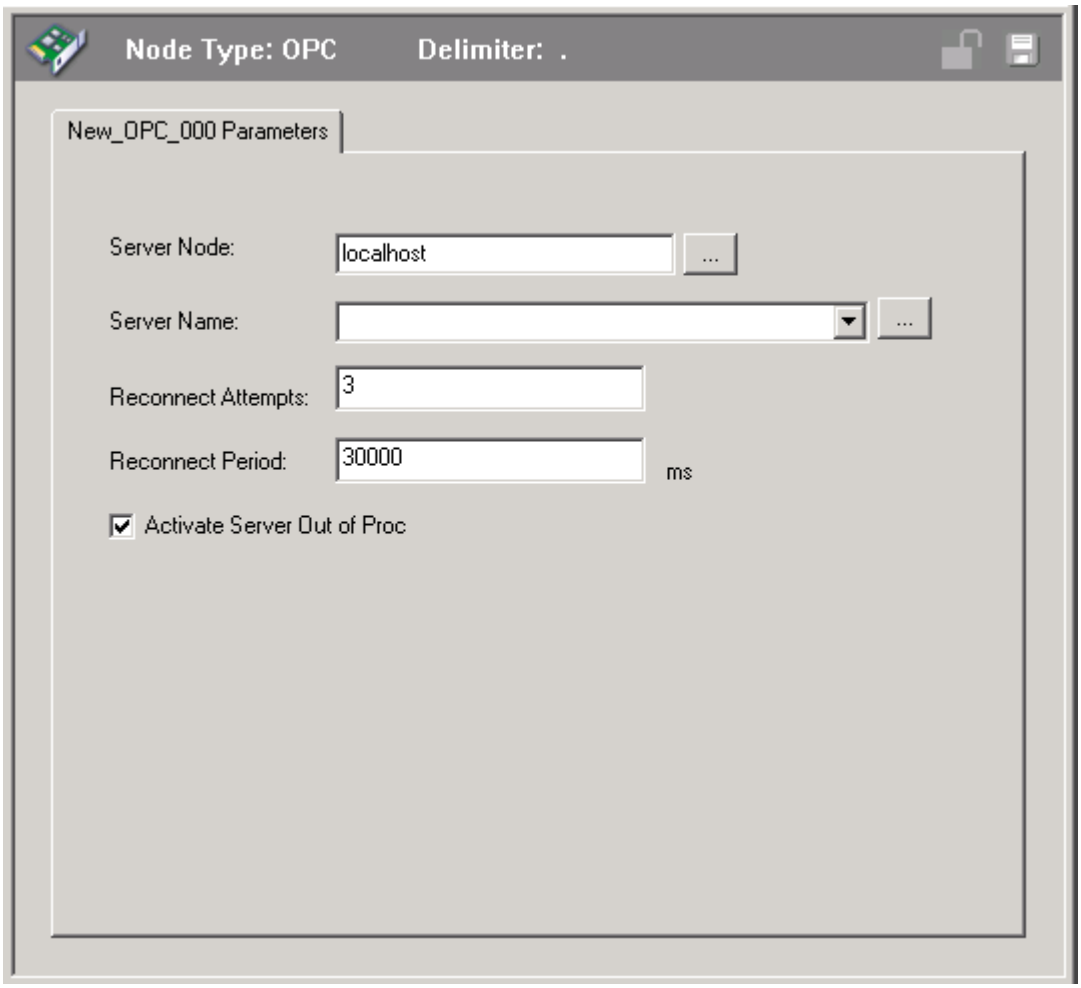
Configuring an OPC Data Source Object

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.



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.DASABTCP.1, 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. Zero (0) means no limit to the number of reconnect attempts. Minimum/maximum range is 0 to 3. 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.

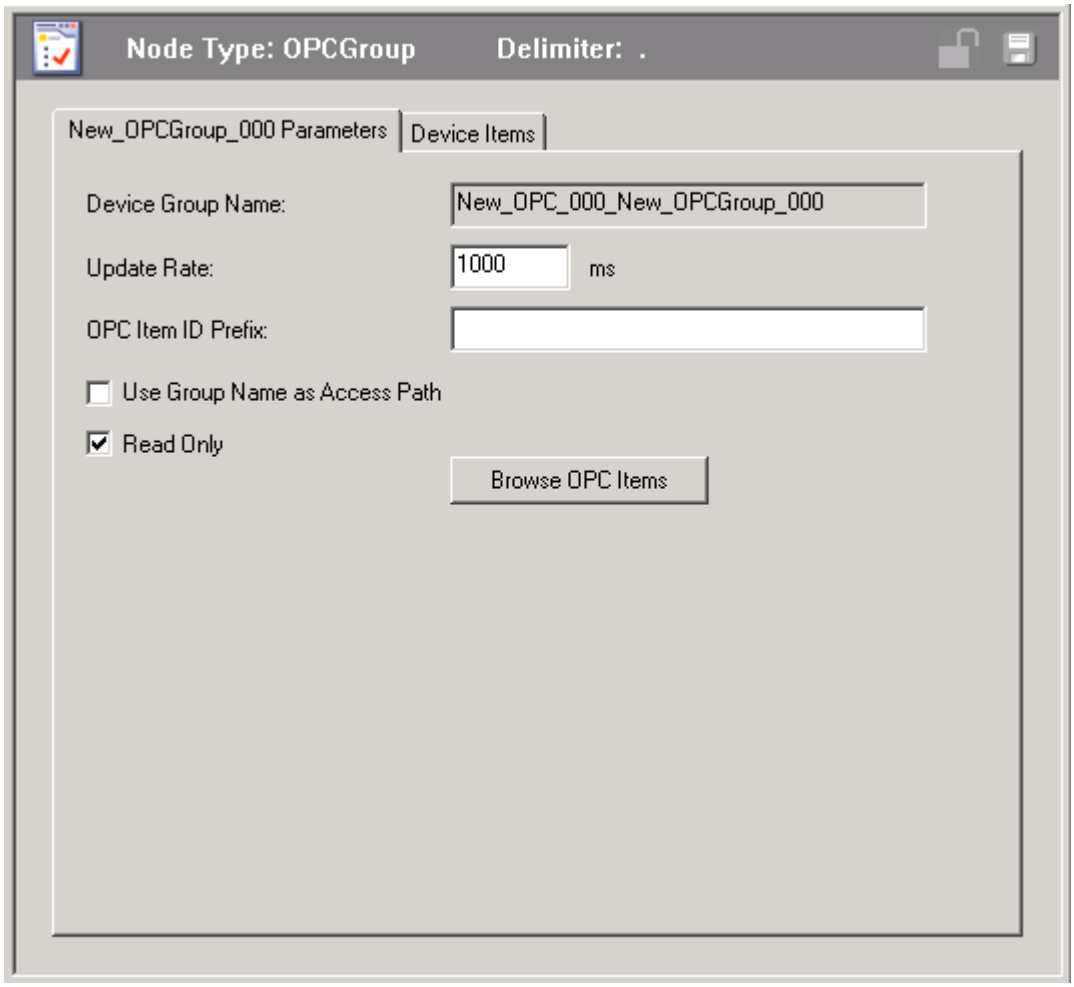
Configuring an OPC Group Object

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_OPCGroup_000** by default (in "edit mode"). Rename it, if desired. You are allowed to add up to 100 new group objects.

The **New_OPCGroup_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 10,000 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.

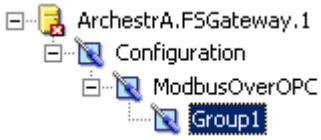
- **OPC Item ID Prefix –** String prefixed to all item names added to the OPC group. Default value is blank. **Example:** Item Prefix=40, Item=001, Item requested from data source=40001.
- **Use Group Name as Access Path –** Provides control over the OPC Access Path for items added to the OPC group. 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.
- **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 (see image below):

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 Configuring Device Item Definitions.

OPC Item Names

This section describes how a connected client requests access to items (or attributes) of a particular OPC 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 an OPC Server via FS Gateway through a SuiteLink client, use the following syntax:

  Establish connection:

  Application = FSGateway

  Topic = OPCServer1_OPCGroup1

  Reference item:

  "R1"

Example

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

DDE/SuiteLink Client

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.40010

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

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 or 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	
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 5

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 Configuring FS Gateway for a general overview about configuring data sources in FS Gateway.

Contents

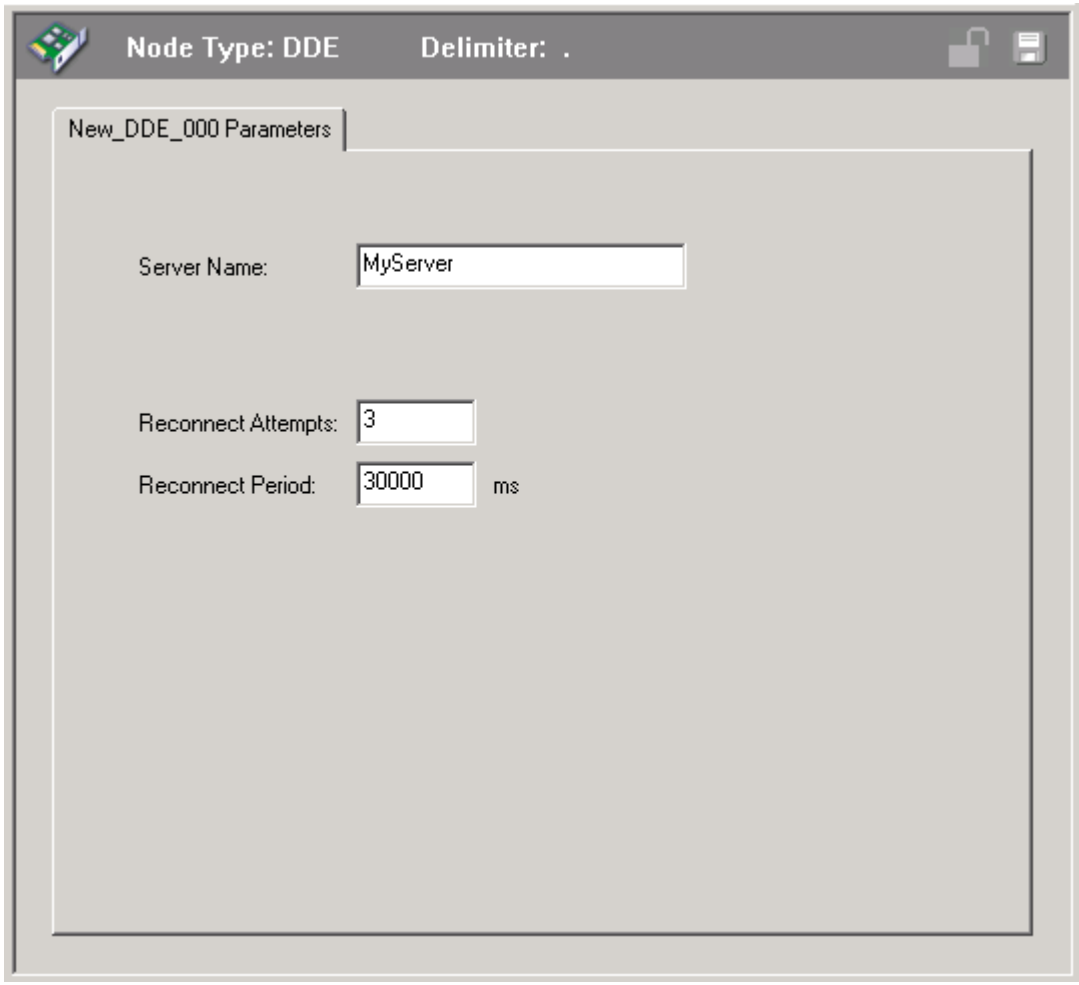
Configuring a DDE/SuiteLink Data Source Object

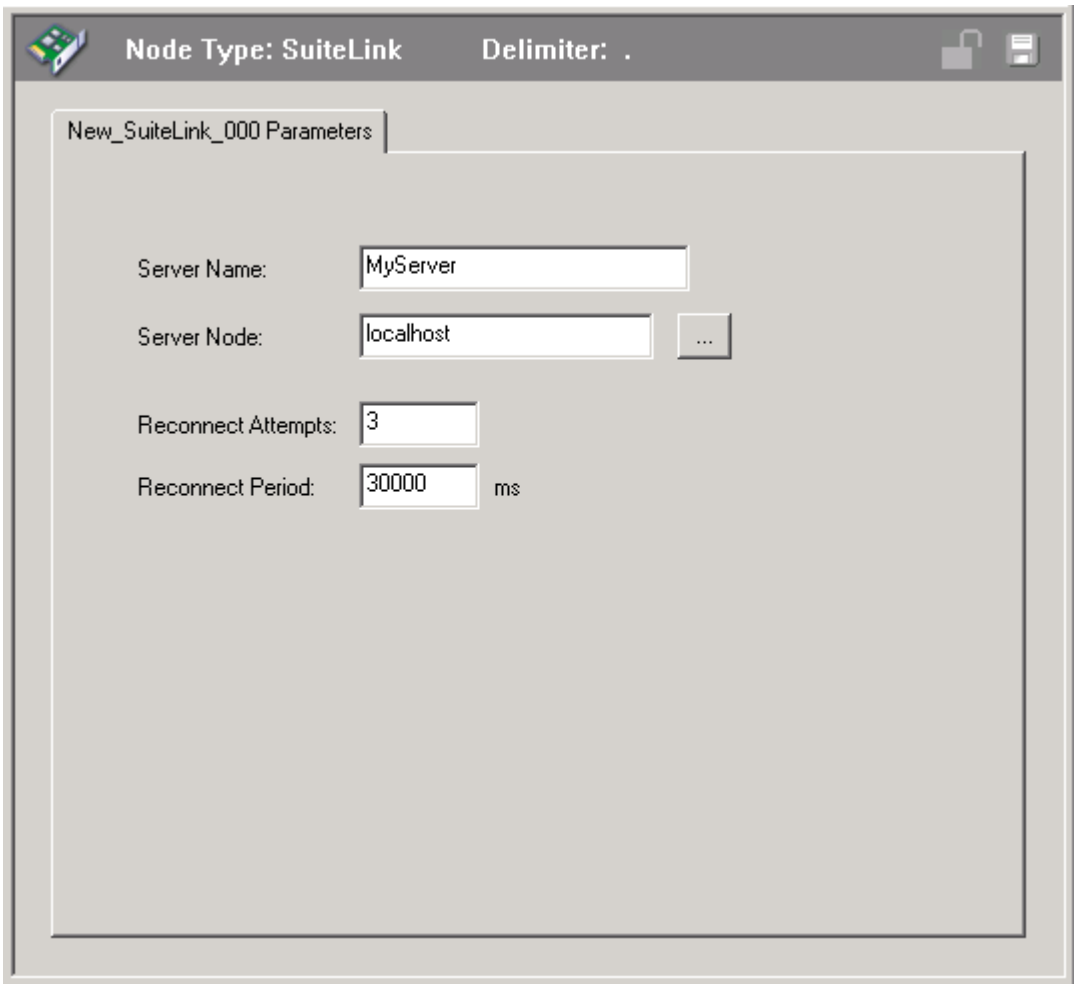
To add a DDE or SuiteLink data source object to your FS Gateway hierarchy

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. See images below.





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, ABTCP). 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. Zero (0) means no limit to the number of attempts. Minimum/maximum range is 0 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.

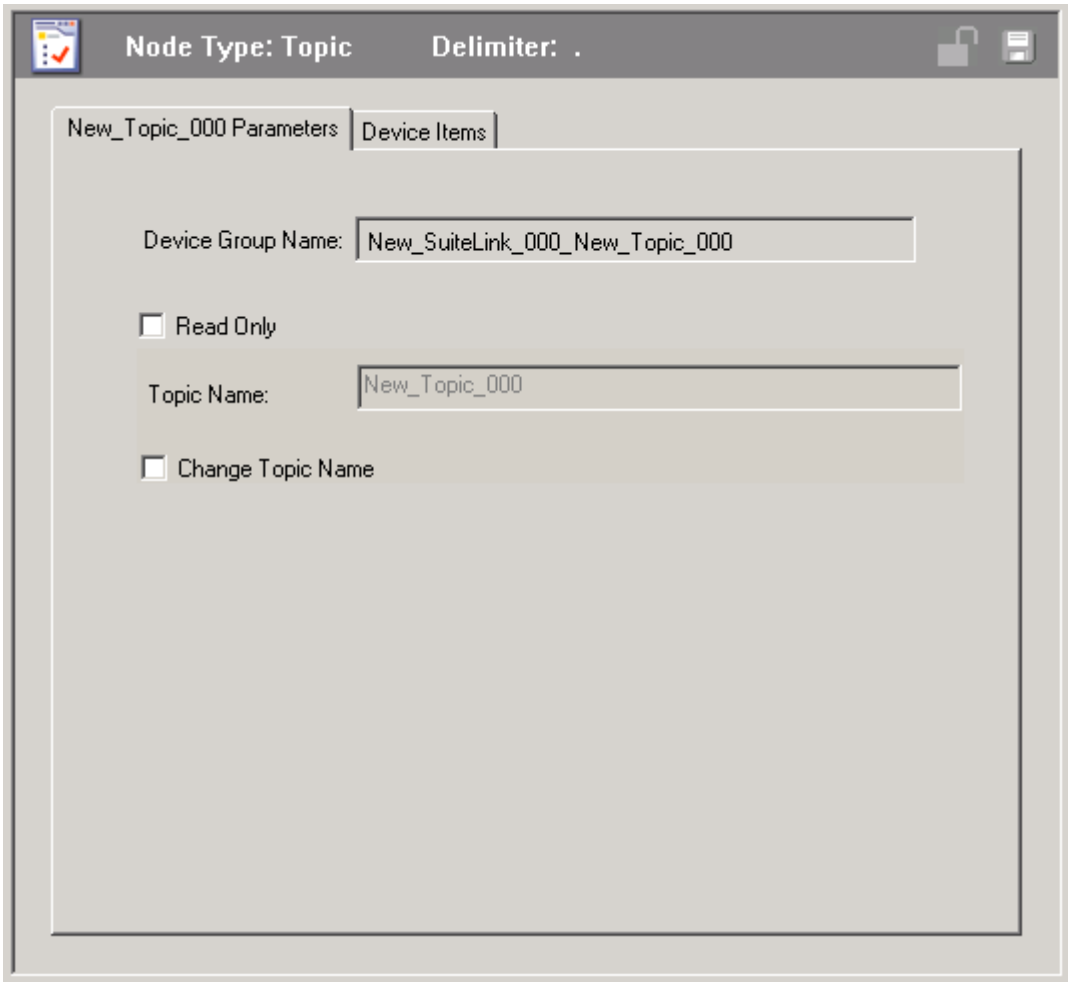
Configuring a DDE/SuiteLink Topic Object

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.



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 (see image below):

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 Configuring 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.1"

  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.1"

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. The 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 ABTCP on remote node "Computer1" through FSGateway using a DDE Client.

PLC -> ABTCP (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.

DDE/SuiteLink Type	OPC Variant Canonical Mapping	Comments
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:

OPC Variant Type	DDE/SuiteLink Type	Comments
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.

C H A P T E R 6

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 Configuring FS Gateway for a general overview about configuring data sources in FS Gateway.

Contents

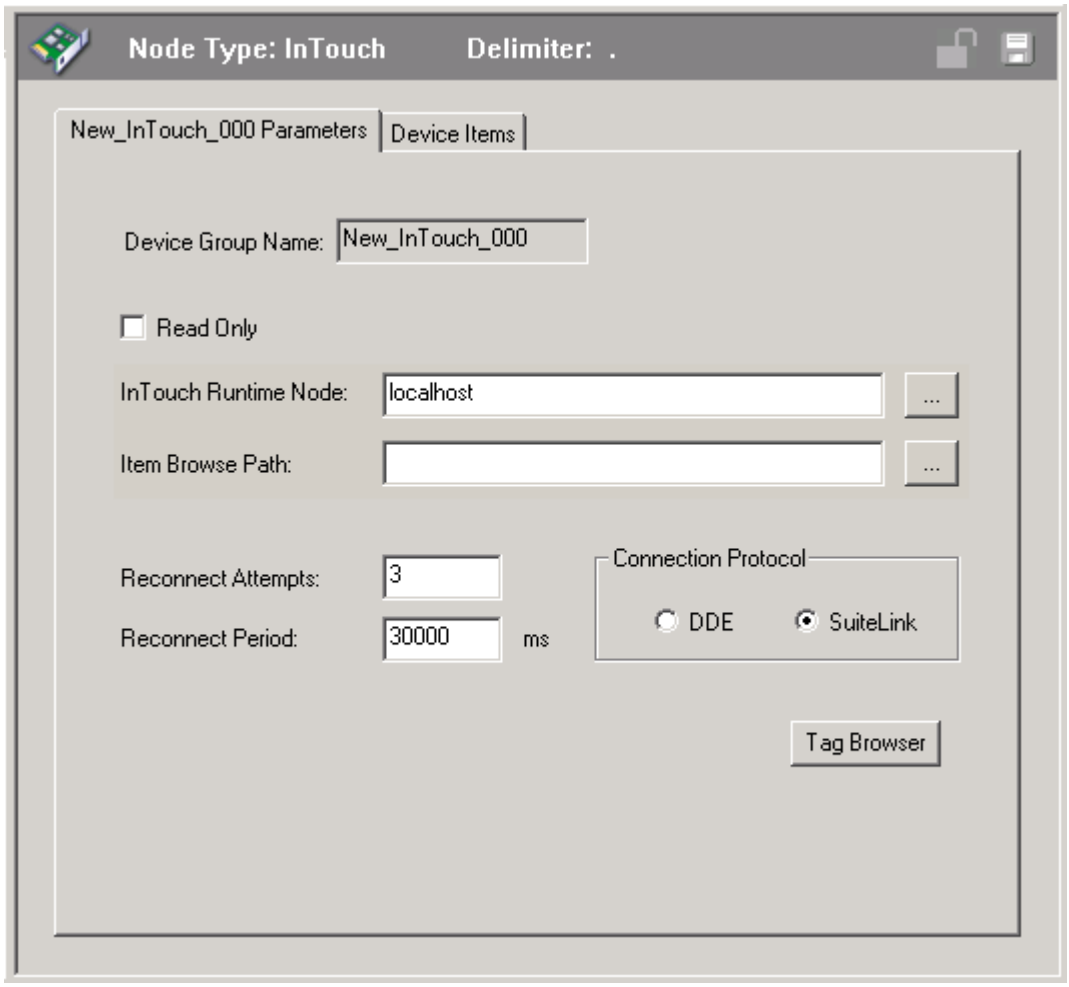
Configuring an InTouch Data Source Object

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. Zero (0) means no limit to the number of attempts. Minimum/maximum range is 0 to 3. 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.

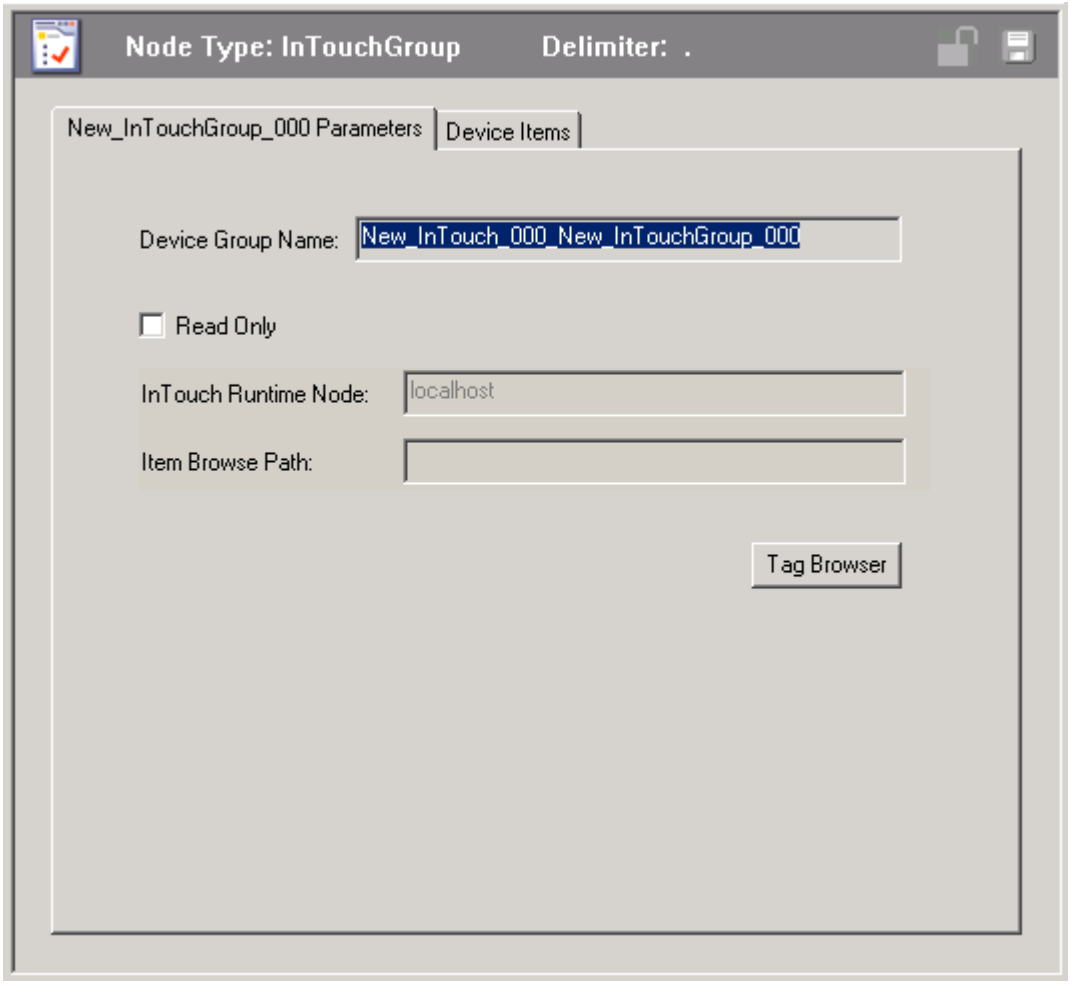
Configuring an InTouch Group Object

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.



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 (see image below):

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.

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:

  "ArchestrA.FSGateway.1"

  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.

C H A P T E R 7

System Items

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

Contents

Standard System Items

System items provide you with easy access to the 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, SYSStatus always comes from the leaf level of the gateway hierarchy branch, which is the destination data source. For OPC clients, SYSStatus can be accessed at all hierarchy levels. SYSStatus 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 SYSStatus at any hierarchy levels other than the root. In the case of an ArchestrA data source, SYSStatus 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
SYSLicensed		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
SYSStatus	Boolean/ Read	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. The status can be good even if individual items have errors. For DDE/SuiteLink clients, SYSStatus always comes from the leaf level of a gateway hierarchy branch, which is the destination data source. For OPC clients, SYSStatus can be accessed at all hierarchy levels. SYSStatus 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 SYSStatus at any hierarchy levels other than the root.	RANGE: 0, 1 1: Gateway connection to the data source is intact. 0: Error communicating with the data source.

System Item Name	Type/ Access Rights	Description	Values
SYSErrorCode	Longint/ Read	Detailed error code of the communications state to the data source. The device group (OPC access path/topic) does not affect the value.	>= 0: Good status (0 is the default state – connected. >0: is some state like: connecting, initializing, etc. <0: Error status (value indicates the error).
SYSErrorText	String/ Read	Detailed error string of the communications state of the data source. The device group (OPC access path/topic) does not affect the value.	Descriptive text for the communications state corresponding to the error code.

Caution! For all three device-specific system items, status is always good for an ArchestrA 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
SYSUpdateInterval		Not used.	
SYSMaxInterval		Not used.	

System Item Name	Type/ Access Rights	Description	Values
SYSWriteComplete	Integer/ ReadWrite	Used to access 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. 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. 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. 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). If the value of this item is zero, it cannot be poked.	RANGE: -1, 0, 1 1: Write complete (no writes are pending – initial state). 0: Writes are pending. -1: Writes completed with errors.
SYSReadComplete	Integer/ ReadWrite	Used to access 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. 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. 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.	RANGE: -1, 0, 1 1: Read complete (all values have been read). 0: Not all values have been read. -1: All values have been read but some have a non-good quality.
SYSItemCount	DWord/ Read	Used to access the number of items in the corresponding device group. This item is read-only.	RANGE: 0…2147483647 >=0: Number of active items.

System Item Name	Type/ Access Rights	Description	Values
SYSActiveItemCount	DWord/ Read	Used to access the number of active items in the corresponding device group. This item is read-only.	RANGE: 0…2147483647 >=0: Number of active items.
SYSErrorCount	DWord/ Read	Used to access the number of all items (active and inactive) that have errors (non-good OPC quality) in the corresponding topic. If the communications status of a device group is bad, all items have errors. This item is read-only.	RANGE: 0…2147483647 >=0: Number of all items (active and inactive) with errors.
SYSPollNow		Not used.	

FS Gateway-Specific System Items

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

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

System Item Name	Type/ Access Rights	Description	Values
SYSGatewayConnectionStatus	Boolean/ Read-Only	Used to indicate whether the FS Gateway has established a successful connection to the configured data source and topic (if any).	RANGE: True, False True: When connected to the data source. False: When disconnected.
SYSGatewayConnectionStatusString	String/ Read-Only	Used to indicate whether the FS Gateway has established a successful connection to the configured data source and topic (if any).	"Connected": When successful connection to data source is achieved. "Disconnected": When otherwise.

System Item Name	Type/ Access Rights	Description	Values
SYSReconnect	Boolean/ Read/Write	Used to trigger 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 True: Triggers reconnect attempt. If data source is already connected, it is disconnected and then reconnected. False: Does nothing. Default value.

Data Quality and Timestamping

Data quality is supported in the following protocols:

- ArchestrA 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).

Timestamped data values are supported in the following protocols:

- OPC
- SuiteLink
- FastDDE v3

Timestamped data values are not supported in the following protocols:

- ArchestrA Message Exchange
- DDE
- FastDDE v2

For those protocols that support it, timestamping is consistent with Microsoft's File Time. Therefore, timestamping 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 timestamp is dropped. In the case of a data source that does not support timestamping, if the client supports it, the timestamp is fabricated and is set to the current system timestamp in Universal Time Coordinates (UTC) time.

C H A P T E R 8

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 SYSStatus 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**.

Contents

Monitoring Connectivity Status with a Data Source

The built-in discrete item, SYSStatus, 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, SYSStatus always comes from the leaf level of the FS Gateway hierarchy branch, which is the destination data source. For OPC clients, SYSStatus can be accessed at all hierarchy levels. SYSStatus 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 SYSStatus at any hierarchy levels other than the root.

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

=FSGateway|<Device Group>!SYSStatus

where:

FSGateway	is the name of the FS Gateway application.
<Device Group>	is the exact device group defined in the FS Gateway for the data source.
SYSStatus	is the discrete item used to monitor the status of connectivity with the data source.

Example:

=FSGateway|ModbusOverSL_FastTopic!SYSStatus

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

<YourLinkName>.SYSStatus

where:

<YourLinkName>	is the assembly of hierarchy node names leading to a specific data source.
SYSStatus	is the discrete item used to monitor the status of connectivity with the data source.

Example:

ModbusOverSL.FastTopic.SYSStatus

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 SYSReconnect.

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:

view	is the name of the InTouch application.
[DDE][IO] Status	is the built-in topic name used to monitor the status of communications between FS Gateway and InTouch.
ArchestrA	is the exact topic 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:

FSGateway	is the name of the FS Gateway application.
ArchestrA	is the exact device group name defined in FS Gateway for the data source.
<tagname>	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 S_xxx	Vendor specific errors may also be returned. Descriptive information for such errors can be obtained from GetErrorString.

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 SYSGatewayConnectionStatus, 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 ArchestrA 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 maxmium 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:

Communication Failure	OPC Data Quality
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

C H A P T E R 9

Reference

Contents

FS Gateway Architecture

Note FS Gateway is supported on Microsoft Windows NT 4.0, Windows 2000, Windows XP and Windows 2003 only. NetDDE protocol is not supported.

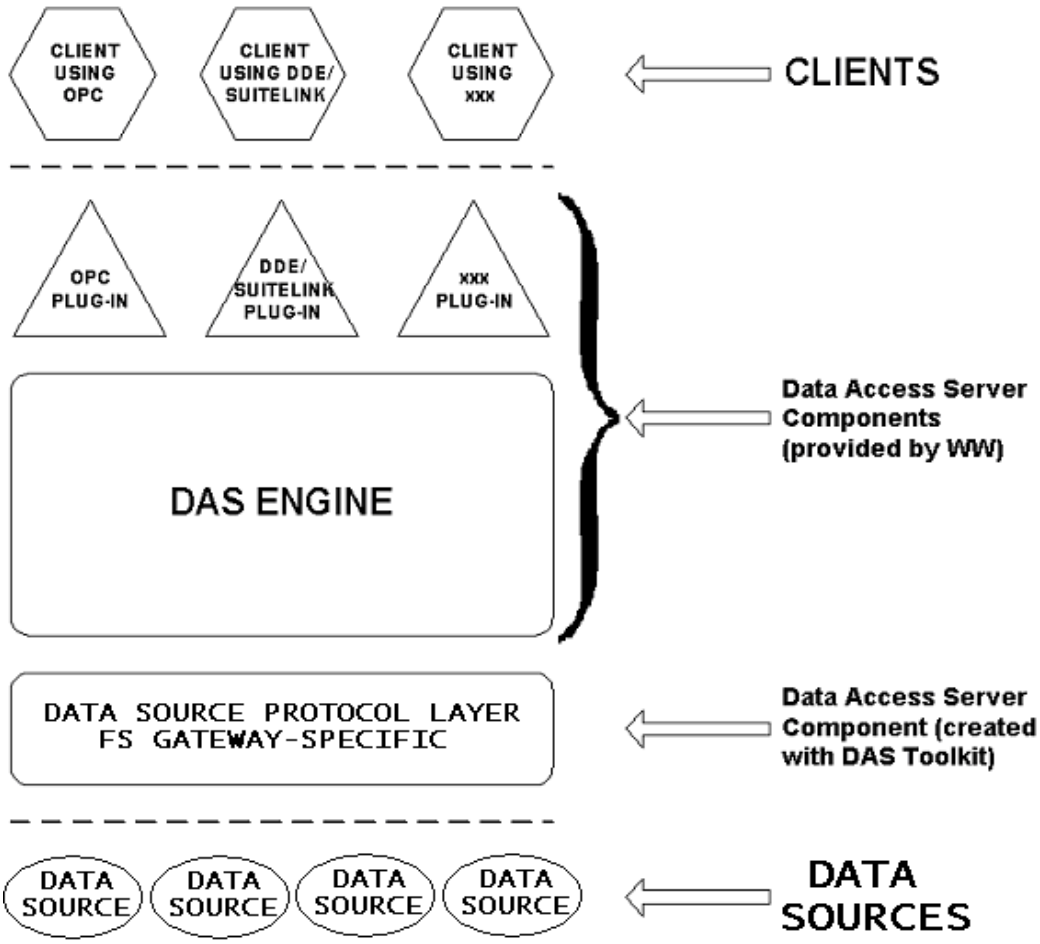
FS Gateway is a collection of components that work in concert to provide communications access with a variety of data sources and clients. These components include:

- **DAServer Manager**: This is the Microsoft Management Console (MMC) snap-in, that is part of the ArchestrA 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 the FS Gateway to define the communications between particular data sources and clients.

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.



FS Gateway 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 the 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 the FS Gateway-specific/FS Gateway-developer-defined diagnostic data.

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

Index

Symbols

A

C

D

T

U

V

W