KEPServerEX V5 Help

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KEPServerEX

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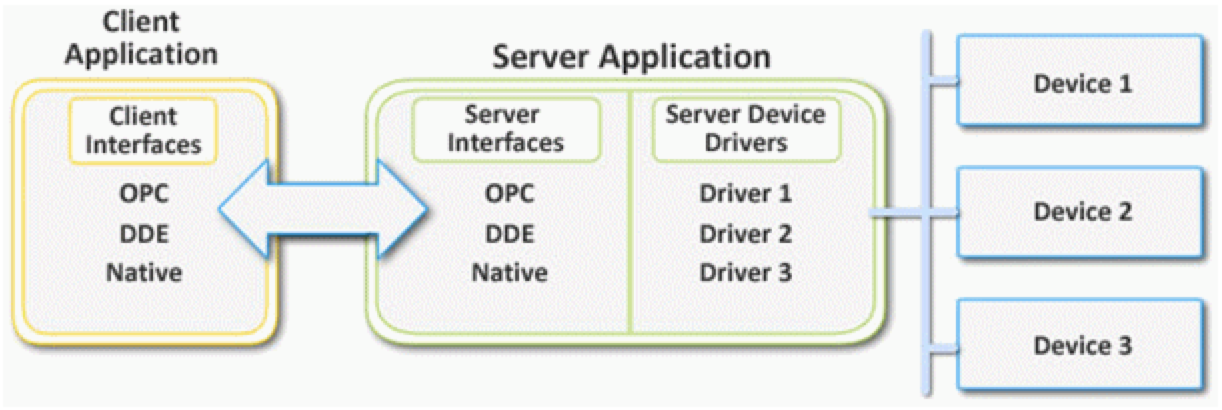
Note: For information regarding product licensing, refer to the License Utility help file. To access the help file through the server Configuration menu, click Help | Server Help | License Utility. To access the help file through the server Administration menu, right-click on the KEPServerEX icon in the System Tray and then select Help | License Utility.

Help version 1.153

Introduction

This software based server is designed for accurate communications, quick setup and unmatched interoperability between client applications, industrial devices and systems. The server provides a wide range of plug-in device drivers and components that suit most communication needs. The plug-in design and single user interface provides consistent access from standards-based applications (such as OPC) and non-standards based applications with native interfaces.



System Requirements

The OPC server has minimum system requirements for both software and hardware. These requirements must be met in order for the application to operate as designed.

This application supports the following Microsoft Windows operating systems.
- Windows 7*
- Windows Server 2008*
- Windows Vista Business/Ultimate*
- Windows Server 2003 SP2*
- Windows XP SP2*
- Windows 2000 SP4

*When installed on a 64 bit operating system, the application will run in a subsystem of Windows called WOW64 (Windows-on-Windows 64 bit). WOW64 is included on all 64 bit versions of Windows and is designed to make differences between the operating systems transparent to the user.

The OPC server requires the following hardware at a minimum.
- 2.0 GHz Processor
- 1 GB installed RAM
- 180 MB available disk space
- Ethernet Card

Server Summary Information

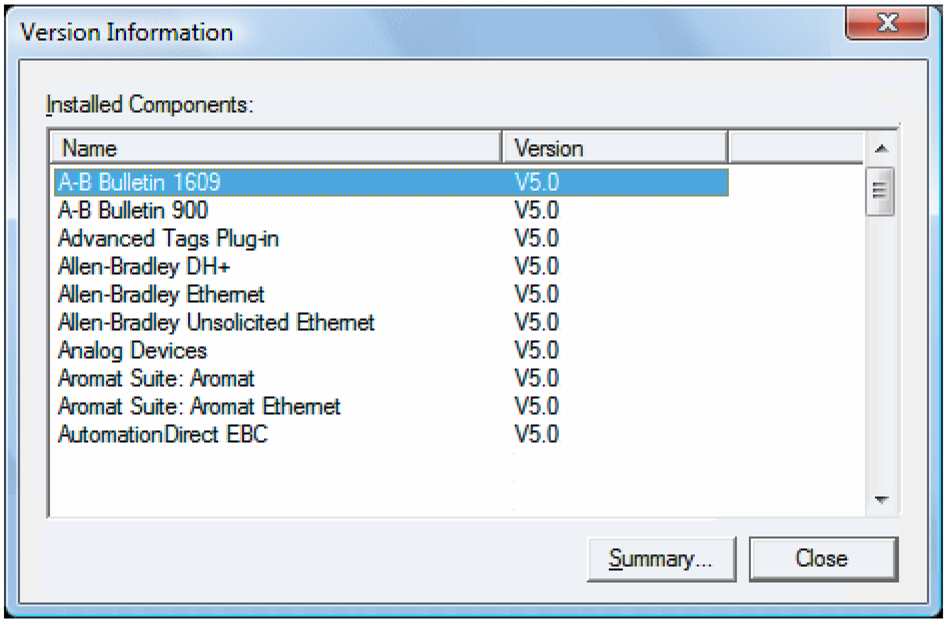
The server provides basic summary information about itself and the drivers that are currently installed for its use.

About the Server

The server version is readily available for review and provides a means of finding driver-specific information. To access, click **Help** | **Support Information** in the server main menu. For a display of the versions of all installed plug-in components, click **Version**.

Component Version Information

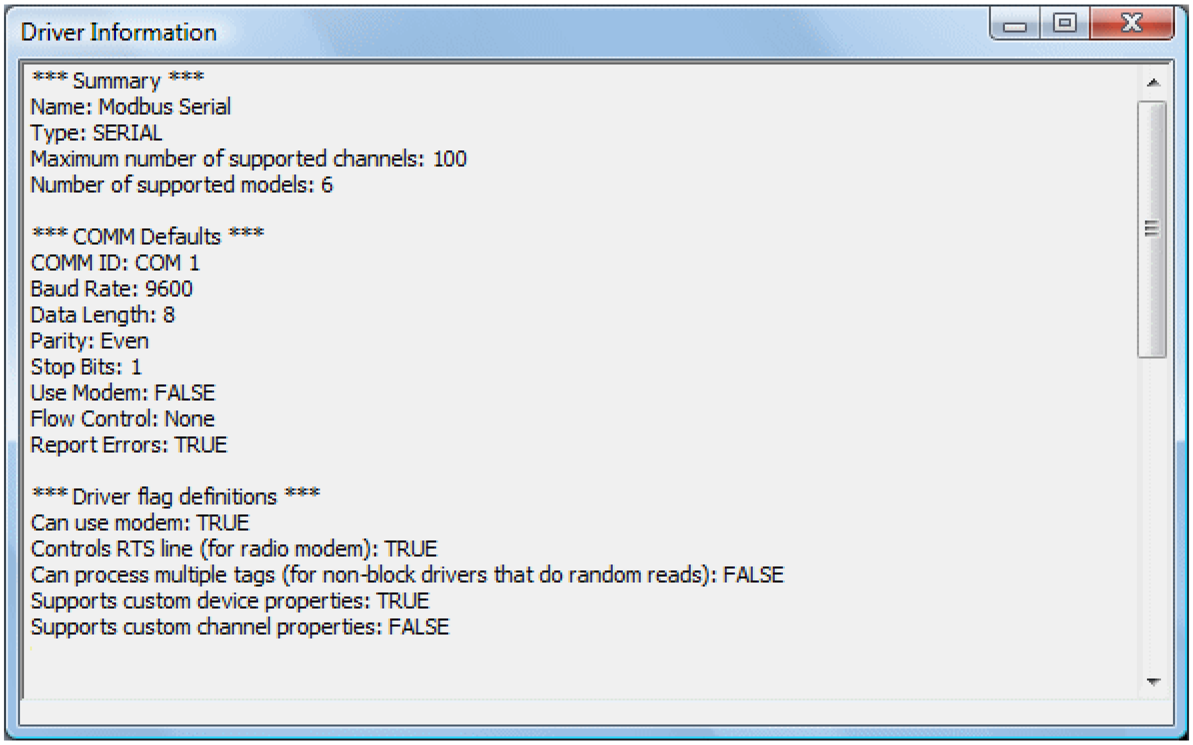
The Version window displays the installed drivers and components along with their version numbers. For driver-specific summary information, select a driver and then click **Summary**.



Name	Version
A-B Bulletin 1609	V5.0
A-B Bulletin 900	V5.0
Advanced Tags Plug-in	V5.0
Allen-Bradley DH+	V5.0
Allen-Bradley Ethernet	V5.0
Allen-Bradley Unsolicited Ethernet	V5.0
Analog Devices	V5.0
Aromat Suite: Aromat	V5.0
Aromat Suite: Aromat Ethernet	V5.0
AutomationDirect EBC	V5.0

Driver Information

The Driver Information window provides a summary of the driver's default settings. Every driver will display the maximum number of supported channels.



```
*** Summary ***
Name: Modbus Serial
Type: SERIAL
Maximum number of supported channels: 100
Number of supported models: 6

*** COMM Defaults ***
COMM ID: COM 1
Baud Rate: 9600
Data Length: 8
Parity: Even
Stop Bits: 1
Use Modem: FALSE
Flow Control: None
Report Errors: TRUE

*** Driver flag definitions ***
Can use modem: TRUE
Controls RTS line (for radio modem): TRUE
Can process multiple tags (for non-block drivers that do random reads): FALSE
Supports custom device properties: TRUE
Supports custom channel properties: FALSE
```

The information available is as follows.

- **Summary** provides the driver name and type, the maximum number of supported channels and the number of models in the driver.
- **COMM Defaults** displays the default settings for the driver. The default settings may or may not match the settings of the device or devices being configured.
- **Driver flag definitions** displays the driver library functions and indicates whether or not they have been enabled in the driver.
- **Model Information** displays driver-specific addressing and driver features. It lists the name for each supported model as well as its specific addressing values and other features.

Interfaces and Connectivity

This communications server simultaneously supports the client/server technologies listed below. Client applications can use any of these technologies to access data from the server at the same time.

- **OPC DA:** Versions include 1.0a, 2.05a and 3.0.
- **OPC A&E:** Versions 1.0 and 1.10.
- **OPC UA:** Version 1.0 optimized binary TCP.
- **DDE:** Formats include CF_Text, XLtable, Advanced DDE and Network DDE.
- **FastDDE/SuiteLink**
- **iFIX Native Interfaces**
- **Thin-Client Terminal Server**

OPC Data Access (DA)

OPC Data Access 1.0a was the original specification that the OPC Foundation developed in 1996. Although many of the OPC client applications in use today still support this original specification, OPC Data Access 2.0 enhanced OPC better utilizes the underlying Microsoft COM technology. Most OPC client applications support version 2.0 of the OPC specification. OPC Data Access 3.0 is the latest version of the OPC DA interface.

OPC A&E
Events are used to signal an occurrence in the server, similar to data updates in OPC Data Access. The OPC AE functionality allows users to receive Simple Events from the server, including system startup and shutdown messages, warnings, errors and so forth. These events will be displayed in the Event Log and by OPC A&E clients connected to the server.

OPC Unified Architecture (UA)
OPC Unified Architecture (UA) is an open standard created by the OPC Foundation with help from dozens of member organizations. It provides an additional way to share factory floor data to business systems (from shop-floor to top-floor). UA also offers a secure method for remote client-to-server connectivity without depending on Microsoft DCOM. It has the ability to connect securely through firewalls and over VPN connections. This implementation of the UA server supports optimized binary TCP and the DA data model.

Note: There is currently no support for UA via HTTP/SOAP web services or for complex data.

Dynamic Data Exchange (DDE)
The DDE format CF_Text is the standard DDE format as defined by Microsoft. All DDE aware applications support the CF_Text format. The DDE Format XL table is the standard DDE format as defined by Microsoft that is used by Excel. For more information on using DDE, refer to **How To... Use DDE with the Server**.

Advanced DDE is the DDE Format defined by Rockwell Automation. All Rockwell Client applications are still Advanced DDE aware today. Advanced DDE is a variation on the normal CF_Text format. Advanced DDE allows larger amounts of data to transfer between applications at higher rates of speed and with better error handling than a normal CF_Text DDE link.

Network DDE (Net DDE) is the standard for remote DDE connection as defined by Microsoft. It uses the CF_Text format. For more information on using Net DDE, refer to **How to... Use Net DDE Across a Network**.

FastDDE/SuiteLink
FastDDE is a DDE format defined by Wonderware. FastDDE allows larger amounts of data to transfer between applications at higher speed and with better error handling than generic DDE. SuiteLink is a client/server communication method that has succeeded FastDDE. It is TCP/IP based and has improved bandwidth and speed. It also configures similarly to FastDDE. All Wonderware client applications support FastDDE and SuiteLink.

iFIX Native Interface
The iFIX Native Interface simplifies the overall connection task by allowing a direct connection to the local iFIX application without the use of the iFIX OPC Power Tool. When supported, this interface has the ability to refine the connection between the server and the iFIX Process Database (PDB) as well.

Thin-Client Terminal Server
Windows Remote Desktop (formerly called Terminal Services) is a Microsoft Windows component that allows users to access data and applications on a remote computer over a network. This component also enables communications servers to be configured via remote client machines.

Components

The server implements client/server architecture. The components include Configuration, Runtime, Administration and Event Log.

Configuration

The Configuration is the client-user interface that is used to modify the Runtime's project. The Configuration can be launched by multiple users and will eventually support remote Runtime configuration.

Runtime

The Runtime is the server component that starts as a service by default. Clients can connect to the runtime remotely or locally.

Administration

The Administration is used to view and/or modify settings and launch applications that pertain to user management and the server. By default, the Administration is started and sent to the System Tray when a user account logs onto the operating system.

Event Log

The Event Log service collects information, warnings and error events. These events are then sent to the Configuration's Event Log window for viewing.

Process Modes

The Runtime's process mode can be changed while the server is running; however, doing so while a client is connected will interrupt the connection for a short period of time. The modes of operation are System Service and Interactive.

System Service

By default, the server is installed and runs as a service. When System Service is selected, the Runtime does not require user intervention and will start when the operating system opens. This provides user independent access to the server by the clients.

Interactive

When Interactive is selected, the Runtime will remain stopped until a client attempts to connect to it. Once started, it will run until all clients have disconnected and then shutdown. The Runtime will also shutdown if the user account logs off the operation system.

Note: The Runtime's process mode may be changed to meet client applications' needs through the Administration settings dialogs.

System Service is required for the following conditions:

- When iFIX is required to run on an operating system while UAC is enabled.

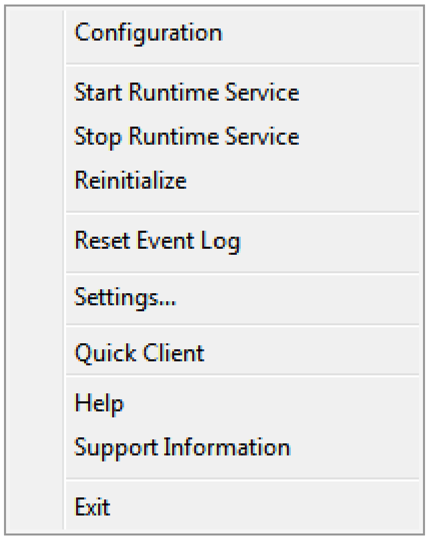
Interactive is required for the following conditions:

- When a communication interface must exchange information with the user desktop and the server is installed on Windows Vista, Windows Server 2008 or later operating systems.

See Also: **Settings - Runtime Process** and **How To...Allow Desktop Interactions**.

Accessing the Administration Menu

The Administration is a tool that is used to view and/or modify user management settings and launch server applications. To access the Administration Menu, right-click on the Administration icon located in the System Tray. The menu should appear as shown below.



Description of the options are as follows:

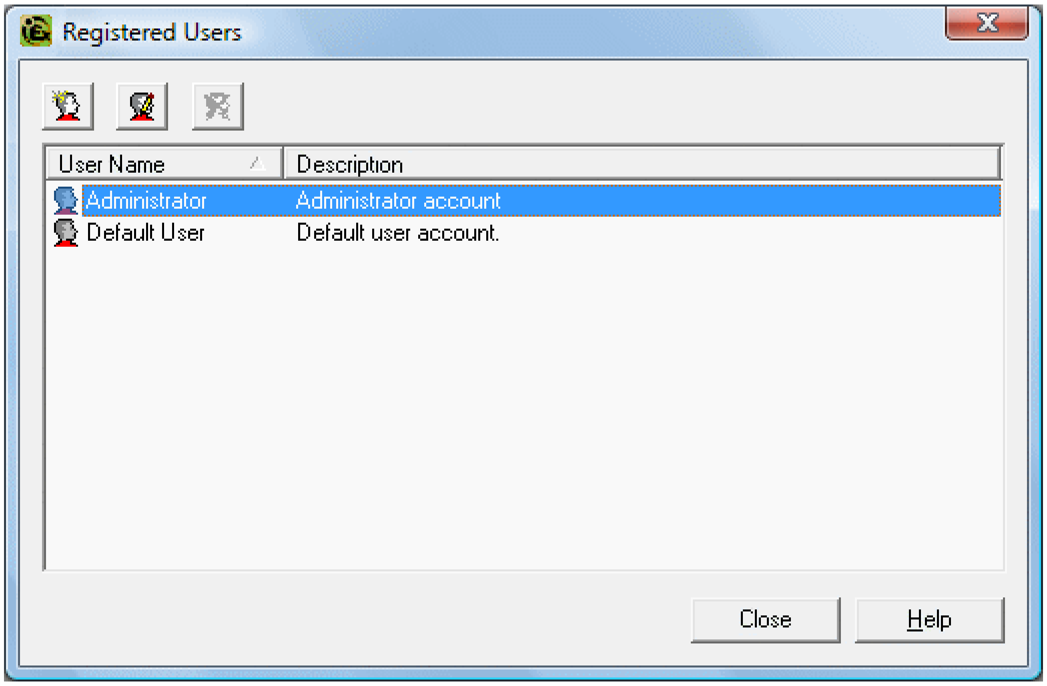
- **Configuration:** This option launches the OPC server's configuration.
- **Start Runtime Service:** This option starts the server Runtime process and loads the default Runtime project.
- **Stop Runtime Service:** This option disconnects all clients and then saves the default Runtime project before

stopping the server Runtime process.

- **Reinitialize:** This option disconnects all clients and resets the Runtime server. It automatically saves and reloads the default Runtime project without stopping the server Runtime process.
- **Reset Event Log:** This option resets the Event Log. The date, time and source of the reset will be added to the Event Log in the configuration window.
- **User Manager...:** This option launches the Registered Users dialog, through which new users can be added and existing accounts can be edited. For more information, refer to **User Manager**.
- **Settings...:** This option launches the Settings dialog. For more information, refer to **Settings - Administration**.
- **OPC UA Configuration:** This option launches the OPC UA Configuration Manager.
- **Quick Client:** This option launches the Quick Client.
- **License Utility:** This option launches the server's License Utility.
- **Help:** This option launches the server's help documentation.
- **Support Information:** This option launches a dialog that contains basic summary information on both the server and the drivers currently installed for its use. For more information, refer to **Server Summary Information**.
- **Exit:** This option closes the Administration and removes it from the System Tray. To view it again, select it from the Windows Start menu.

User Manager

This server includes a built-in User Manager that allows complete control over which users can access the Runtime and what privileges they have once connected. This is critical since the server can be managed remotely and more than one account can be connected at a time. The Administrator account is used to add multiple users, each with their own set of rights for server access. Any user action that can influence or disrupt server operation is logged to server's Event Logging system. By default, all server operations are available at all times. The User Manager functions are available only when needed.



User Name	Description
Administrator	Administrator account
Default User	Default user account.

User Accounts

There are always two user accounts available by default: the **Administrator** account and the **Default User** account. Only the Administrator account can be used to add additional users to the system or to change the settings of existing accounts. By default, the password for the Administrator account is blank, as this disables the security settings for connecting the **Configuration**. Setting the password will enable the User Management System. Although the

Administrator account cannot be deleted, its name and password can be changed.

The Default User account is used when no other account is active. This is the normal condition of the server. Like the Administrator account, the Default User account cannot be deleted; however, its name and password are fixed. The account can only be disabled when the Administrator denies the Default User all privileges.

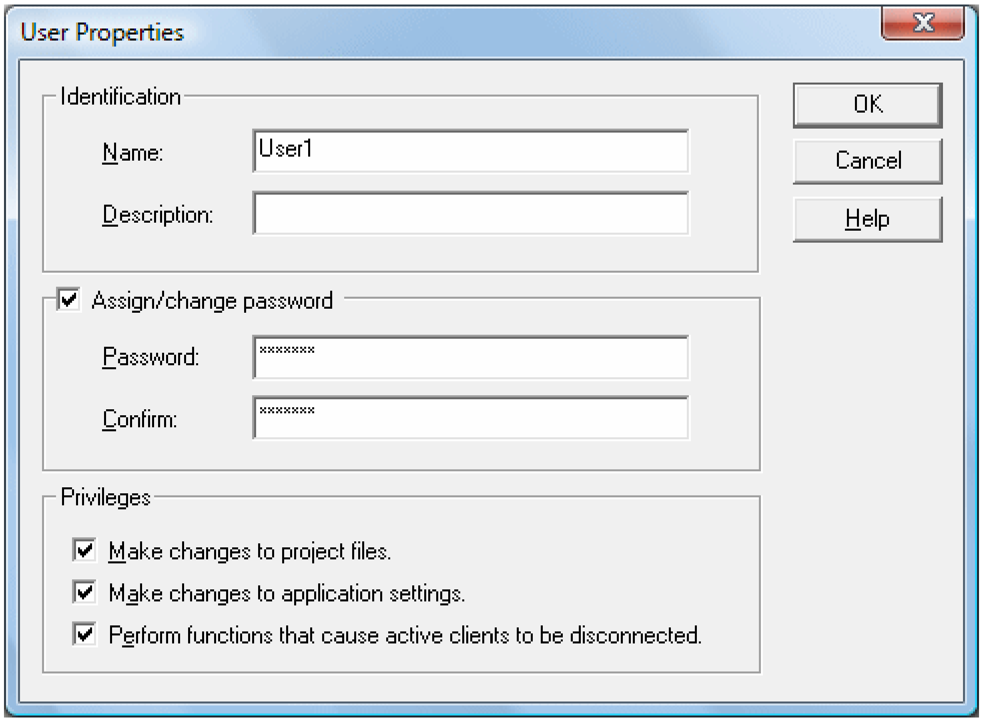
Adding and Editing User Accounts

The Administrator can create additional user accounts by clicking on the **New User** icon in the **User Properties** dialog. Similarly, existing user accounts can be edited by selecting the account and either double-clicking on it or by pressing the **Edit User** icon. To delete a user account, select it and then press the **Delete User** icon.

Note: When the User Management system is used, the server will log the current account name to the Event Log for all server actions taken by the user.

User Properties

The User Management system of the server is used to control what actions a user can take within a server project. The User Properties dialog is used to configure the name, password and privileges available for the account.



Identification
Name: User1
Description:

✓ Assign/change password
Password: *******
Confirm: *******

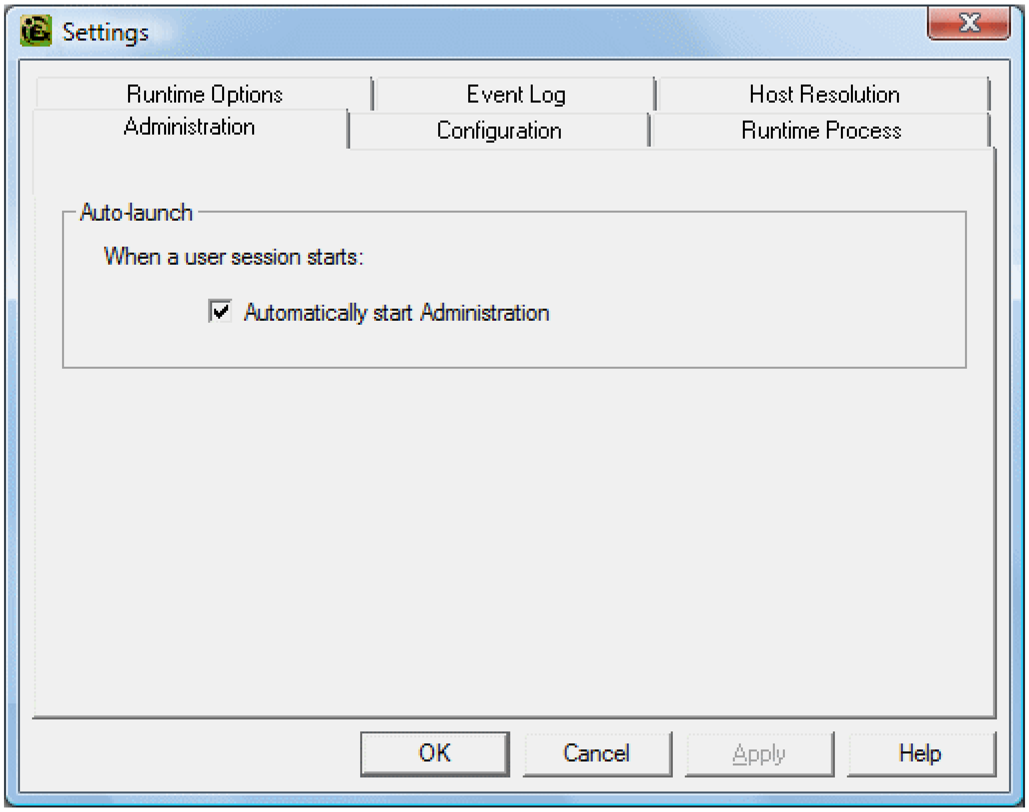
Privileges
✓ Make changes to project files.
✓ Make changes to application settings.
✓ Perform functions that cause active clients to be disconnected.

Descriptions of the parameters are as follows.

- **Name:** This parameter is used to specify a name for the user. The name can be up to 31 characters in length.
- **Description:** This parameter is used to briefly describe each user account. This can be particularly helpful for ensuring that operators log in to the proper account.
- **Password:** This parameter is used to specify the password that the user must enter in order to log in to the system. The password can be up to 15 characters in length. Users must enter it correctly in both the Password and Confirm fields for the change to be accepted. Each time a user account is edited, the password must be re-entered. If the field is left blank, the password will be removed from the account.
- **Privileges:** This parameter is used to control what actions a given user account can access. There are three selections. The **Make changes to project files** selection allows the user to modify the server project freely. If disabled, the user will not be able to make any changes to the project. The **Make changes to application settings** selection allows an operator to make changes to the Server Options or Settings. The **Perform functions that will cause active clients to be disconnected** selection allows the user to perform actions that may cause clients to be disconnected from the server. When it is disabled, the user cannot disrupt currently active clients.

Settings - Administration

The Administration tab is used to configure the Runtime Administration's actions.



Auto-launch

When a user session starts:

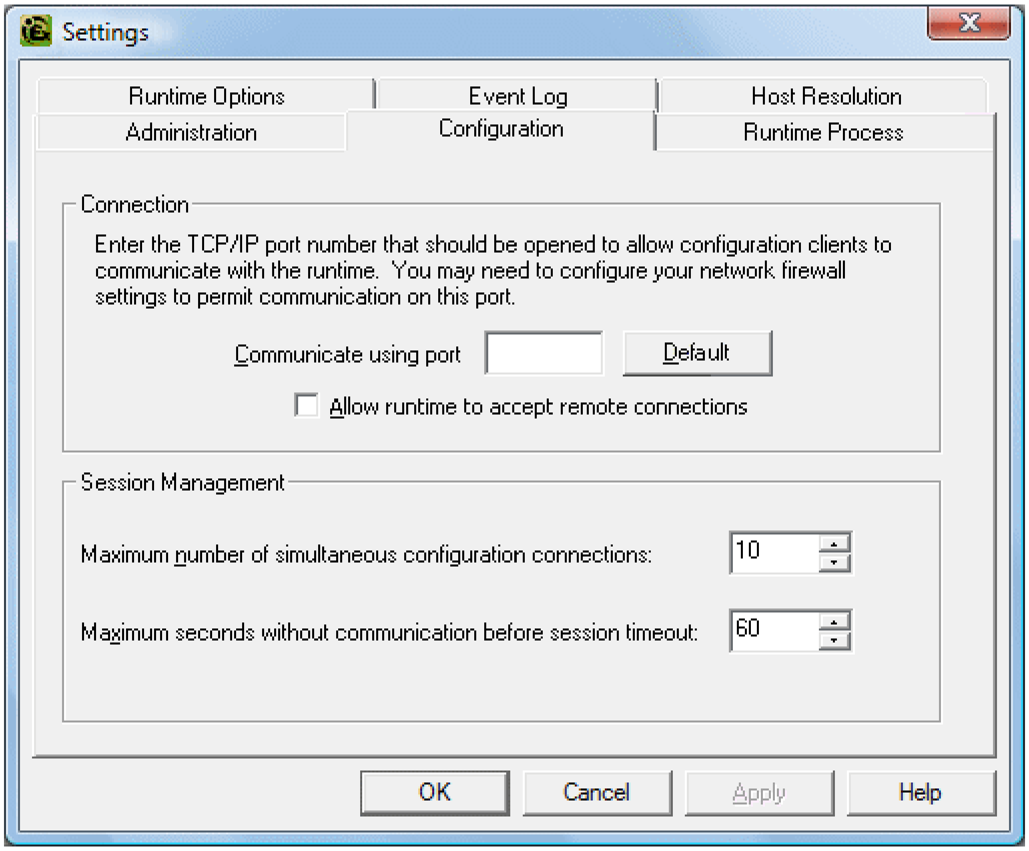
☑ Automatically start Administration

Description of the parameter is as follows:

- **Automatically start Administration:** When checked, this parameter enables the Administration to start automatically. The Administration is a System Tray application that allows quick links to various server tools including the Settings Console, Configuration, Licensing Utility, User Manager Console and controls for stopping and starting the Runtime service.

Settings - Configuration

The Configuration tab is used to configure how the Configuration both connects to and interacts with the Runtime.



Enter the TCP/IP port number that should be opened to allow configuration clients to communicate with the runtime. You may need to configure your network firewall settings to permit communication on this port.

Communicate using port:

Allow runtime to accept remote connections: ☐

Session Management

Maximum number of simultaneous configuration connections: 10

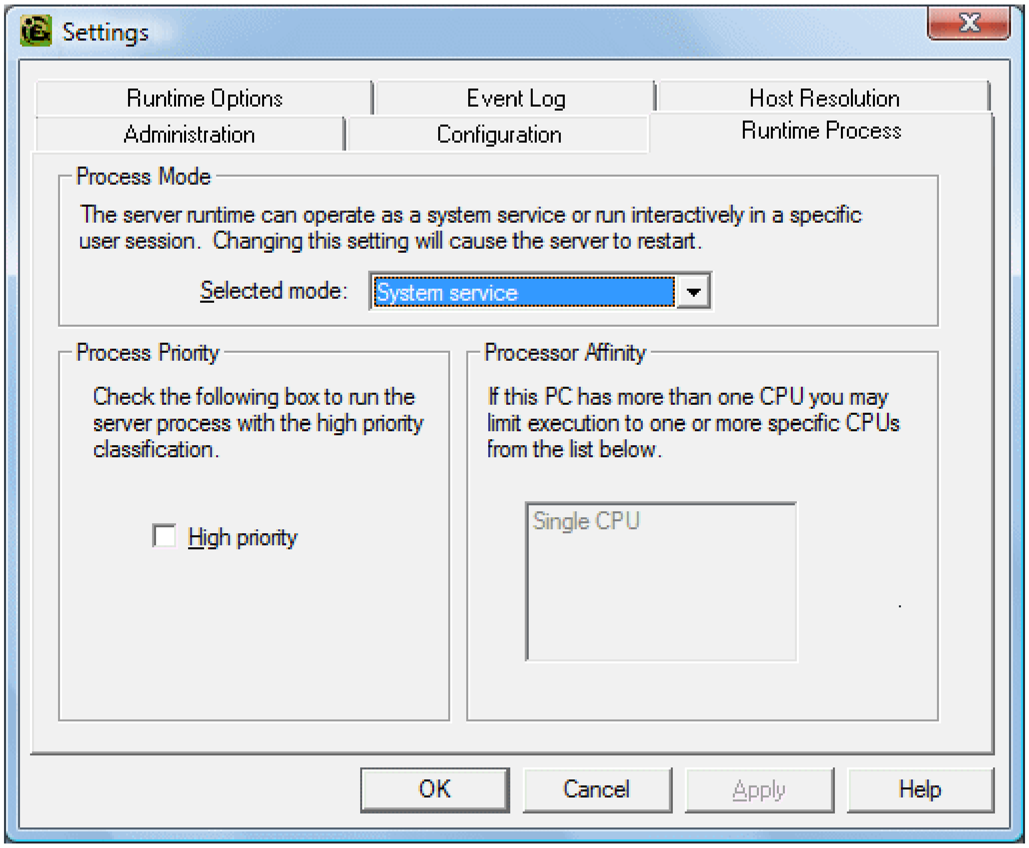
Maximum seconds without communication before session timeout: 60

Descriptions of the parameters are as follows.

- **Communicate using port:** This parameter is the TCP/IP port that will be used to communicate between the Configuration and the Runtime. To obtain the default setting, click **Default**.
- **Allow runtime to accept remote connections:** When checked, the Runtime will be able to accept remote connections. The default setting is unchecked.
- **Maximum number of simultaneous configuration connections:** This setting is used to specify the number of Configuration connections that can be made to the Runtime at one time. The range is 1 to 64. The default is 10.
- **Maximum seconds without communication before session timeout:** This setting is used to set the length of time that the console connection can sit idle before it times out. The range is 10 to 3600 seconds. The default is 60 seconds.

Settings - Runtime Process

The Runtime Process tab is used to specify the server Runtime's process mode, as well as how it utilizes the PC's resources.



Process Mode

The server runtime can operate as a system service or run interactively in a specific user session. Changing this setting will cause the server to restart.

Selected mode: System service

Process Priority

Check the following box to run the server process with the high priority classification.

☐ High priority

Processor Affinity

If this PC has more than one CPU you may limit execution to one or more specific CPUs from the list below.

Single CPU

Descriptions of the parameters are as follows.

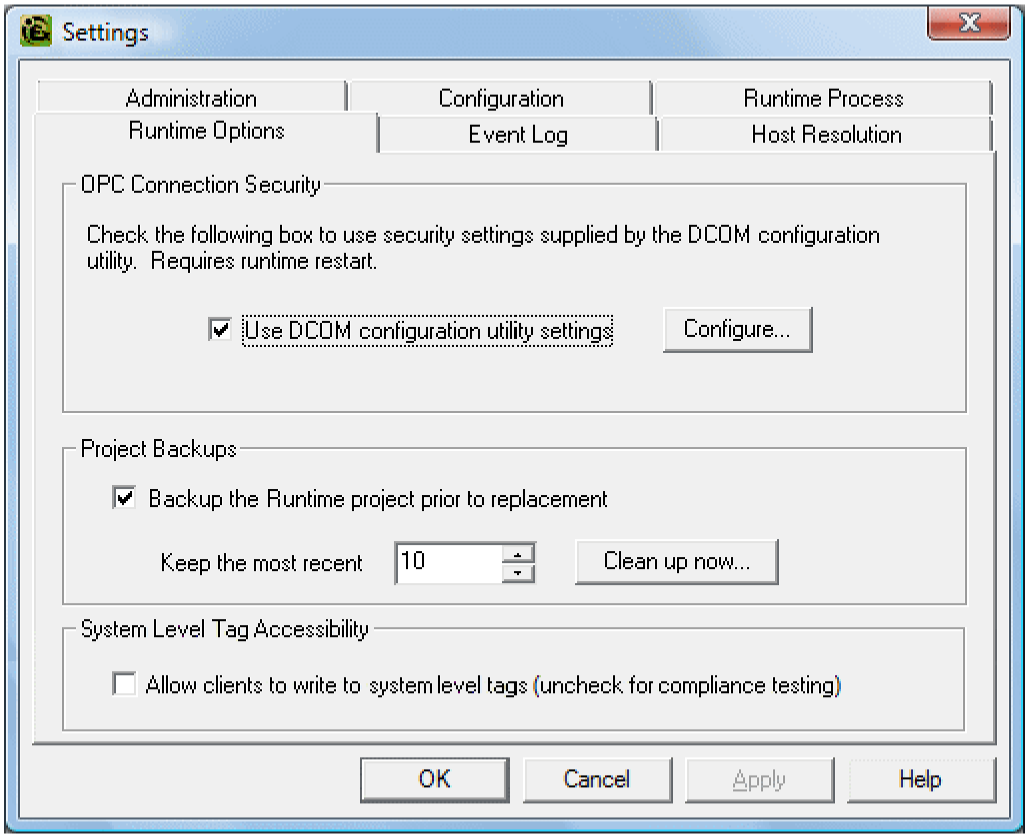
- **Selected Mode:** This parameter is used to specify whether the server will be running as **System Service** or **Interactive**. By default, the server installs and runs as System Service. Changing this setting causes all clients, both Configuration and process, to be disconnected and the server to be stopped and restarted.
- **High Priority:** This parameter is used set the server process priority to high. The default setting is normal. When checked, this setting allows the server to have priority access to resources.

  Note: Microsoft recommends against setting applications to a high priority as it can adversely affect other applications running on the same PC.

- **Process Affinity:** This parameter is used to specify which CPUs the server can be executed on when it is run on PCs containing more than one.

Settings - Runtime Options

The Runtime Options tab is used to change settings in the project that's being executed in the Runtime.



OPC Connection Security

Check the following box to use security settings supplied by the DCOM configuration utility. Requires runtime restart.

[✓] Use DCOM configuration utility settings

Project Backups

[✓] Backup the Runtime project prior to replacement

Keep the most recent: 10

System Level Tag Accessibility

[ ] Allow clients to write to system level tags (uncheck for compliance testing)

Descriptions of the parameters are as follows:

- **Use DCOM configuration utility settings:** This parameter allows users to select authentication and also launch and access security requirements through the DCOM Configuration Utility. In addition, users can both specify the level of security to implement and restrict access for certain users and/or applications.

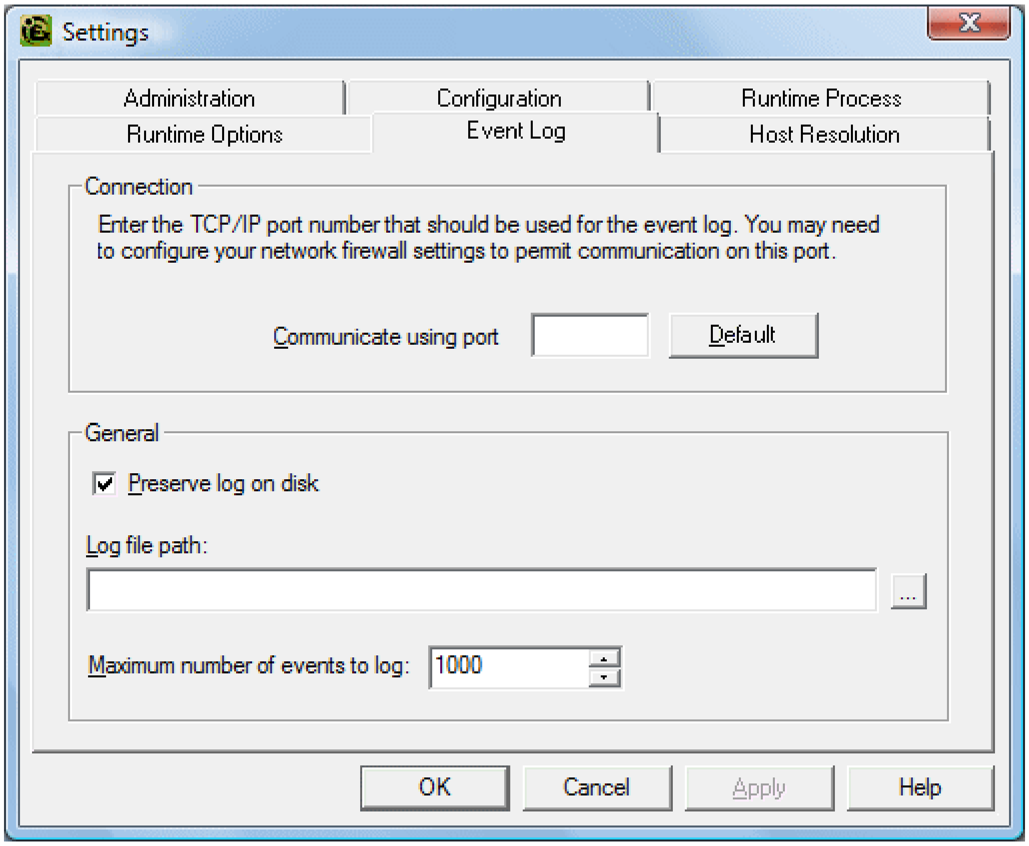
  When this setting is disabled, the server will override the DCOM settings set for the application and will not perform any authentication on the calls received from client applications. It will impersonate the security of the client when performing any actions on behalf of the client application. Disabling this setting provides the lowest level of security and is not recommended. If this setting is chosen, users should ensure that the client and server applications are running in a secure environment so that the application is not compromised.
- **Backup the Runtime project prior to replacement:** This parameter enables the Runtime project to be backed up before it is overwritten. The backup's location will be displayed in the Event Log. This option is enabled by default.

  Note: The Runtime project will be overwritten if either **New** or **Open** is selected while connected to the Runtime. In addition, connecting to the Runtime while working offline with a project may result in Runtime project replacement.

- **Keep the most recent:** This parameter limits the number of backup files that will be saved to disk. The range is 1 to 1000. The default is 10.
- **Clean up now:** This parameter invokes a confirmation dialog that allows users to delete all the Runtime project backups. Doing so will not affect the current running project.
- **Allow clients to write to system level tags** controls Write access to System Tags on a given device. In some cases, users may not want a client application to have the ability to turn a device on or off in the project. This setting applies to all system level tags. This option is disabled by default.

Settings - Event Log

The Event Log tab is used to define whether or not a Runtime log file is kept; and, if so, where and how many events are logged into it.



Connection

Enter the TCP/IP port number that should be used for the event log. You may need to configure your network firewall settings to permit communication on this port.

Communicate using port: [ ] Default

General

[✓] Preserve log on disk

Log file path:

Maximum number of events to log: 1000

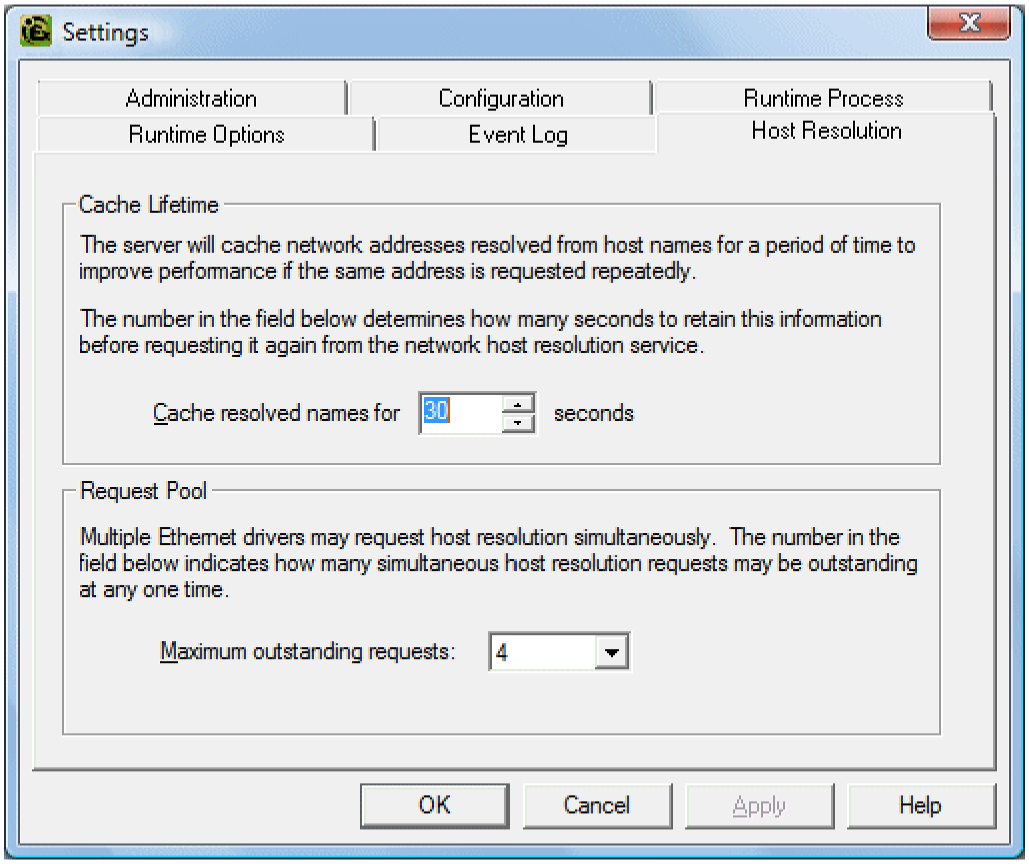
Descriptions of the parameters are as follows.

- **Communicate using port:** This parameter is the TCP/IP port that will be used to communicate between the Event Log and the Runtime. To obtain the default setting, click **Default**.
- **Preserve log on disk:** This parameter enables the use of a disk-based log file. When enabled, all events in the server will be maintained on disk from one run to the next. If disabled, the server's Event Logging system will be recorded in memory and no disk log will be generated. When disabled, the Event Log contents will be emptied each time the server is run.
- **Log file path:** This parameter specifies where the log file will be stored its preservation is enabled.
- **Maximum number of events to log:** This parameter determines the number of records the log system will hold before the Log Full action comes into effect. The valid range is 100 to 30000 records. The default value is 1000 records. If users attempt to change this parameter to a value that is less than the current number of records in the log, they will receive a warning that log file truncation will occur.

Note: The Event Log System would be useless if there was no mechanism to protect its contents. If operators could change these parameters or reset the log, the purpose would be lost. Utilize the User Manager to limit what functions an operator can access.

Settings - Host Resolution

The Host Resolution tab is used to specify how the server manages Host Name Resolution with Ethernet drivers that support the use of host names for connectivity.



Cache Lifetime

The server will cache network addresses resolved from host names for a period of time to improve performance if the same address is requested repeatedly.

The number in the field below determines how many seconds to retain this information before requesting it again from the network host resolution service.

Cache resolved names for 30 seconds

Request Pool

Multiple Ethernet drivers may request host resolution simultaneously. The number in the field below indicates how many simultaneous host resolution requests may be outstanding at any one time.

Maximum outstanding requests: 4

Descriptions of the parameters are as follows.

- **Cache resolved names for __ seconds:** This parameter is used to determine how long the server will keep the resolved addresses from host names. The server caches network addresses that it has resolved from host name requests for a period of time to improve performance when the same address is requested repeatedly. The period is 30 to 7200 seconds. The default is 30 seconds.
- **Maximum outstanding requests:** This parameter is used to specify how many simultaneous requests for Host Name Resolution can be processed at one time. It allows multiple Ethernet drivers to process at the same time and also manages the resources that are used to resolve host names. The range is 1 to 8 requests. The default is 4.

Tag Management

The server's new user-defined tag management features can be used to create a tag database structure that fits an application's specific nature. Multiple tag groups can be defined to segregate the tag data on a device-by-device basis. Drag and drop editing makes adding large numbers of tags easy. Additionally, CSV import and export allows tag editing to be done in any application needed. Like all other server features, new tags can be added to the application at any time.

Automatic Tag Database Generation

The OPC server supports the automatic generation of tags for select communication drivers. The Automatic Tag Database Generation feature brings OPC technology one step closer to Plug and Play operation. Drivers that support this feature can either Read tag information directly from a device or generate tags from stored tag data. In either case, the user no longer needs to manually enter OPC tags into the server.

System Tags

System Tags are used to provide general error feedback to client applications, allow operation control over when a device is actively collecting data and allow the standard parameters of a either a channel or device to be changed from an OPC client application. The number of System Tags available at either the channel or device-level varies depending on the nature of the driver being used. The System Tag can also be grouped according to their purpose as both status and control or parameter manipulation.

Property Tags

Tag Properties are available as additional tags that can be accessed by any Data Access client by appending the property name to any fully qualified tag address. When using an OPC client that supports item browsing, users can browse tag properties by turning on **Include tag properties when a client browses the server** under OPC DA Settings. **See Also:** **Project Properties - OPC DA Settings** .

Statistics Tags

Statistics Tags are used to provide feedback to client applications regarding the operation of the channel communications in the server. When diagnostics are enabled, there are seven built-in statistics tags available. **See Also:** **OPC Diagnostics Window**.

Automatic OPC Tag Database Generation

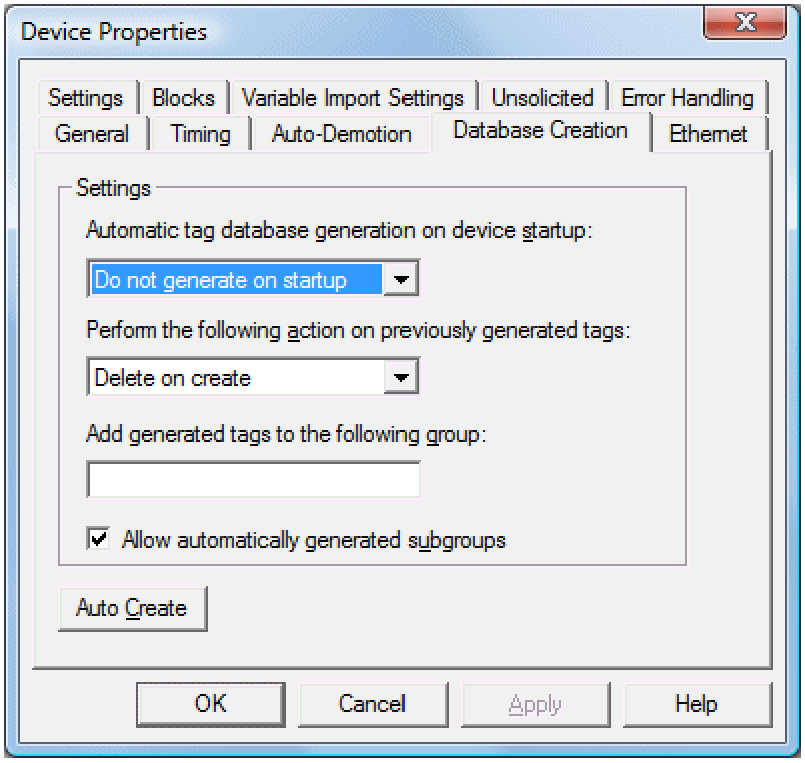
This server's Automatic OPC Tag Database Generation features have been designed to make setting up the OPC application a plug and play operation. Communications drivers that support this feature can be configured to automatically build a list of OPC tags within the server that correspond to device-specific data. The automatically generated OPC tags can then be browsed from the OPC client. The OPC tags that are generated depend on the nature of the supporting driver.

If the target device supports its own local tag database, the driver will read the device's tag information and then use the data to generate OPC tags within the server. If the device does not natively support its own named tags, the driver will create a list of tags based on driver-specific information. An example of these two conditions is as follows:

1. If a data acquisition system supports its own local tag database, the communications driver will use the tag names found in the device to build the server's OPC tags.
2. If an Ethernet I/O system supports detection of its own available I/O module types, the communications driver will automatically generate OPC tags in the server that are based on the types of I/O modules plugged into the Ethernet I/O rack.

Automatic tag database generation's mode of operation is completely configurable. Parameters set in the following dialog allows users to configure how the server and its associated communications driver will handle automatic OPC tag database generation.

Important: When running in System Service Mode, the file from which tags are being created must be located in a folder accessible to System Service in order for it to be loaded by the Runtime. For example, a file residing in a network drive that requires authentication will cause the loading to fail. For more information on System Service Mode, refer to **Process Mode**.


Device Properties

Settings | Blocks | Variable Import Settings | Unsolicited | Error Handling
General | Timing | Auto-Demotion | Database Creation | Ethernet

Settings

Automatic tag database generation on device startup: Do not generate on startup

Perform the following action on previously generated tags: Delete on create

Add generated tags to the following group:

[✓] Allow automatically generated subgroups

Auto Create

OK | Cancel | Apply | Help

The **Automatic tag database generation on device startup** setting is used to configure when OPC tags will be automatically generated. Descriptions of the selections are as follows.

- **Do not generate on startup**, the default condition, prevents the driver from adding any OPC tags to the tag space of the server.
- **Always generate on startup** causes the driver to evaluate the device for tag information and to add OPC tags to the tag space of the server every time the server is launched.
- **Generate on first startup** causes the driver to evaluate the target device for tag information the first time the project is run and add any OPC tags to the server tag space as needed.

Note: The Auto-Create button will be disabled when the Configuration edits a project offline.

When the option to automatically generate OPC tags is selected, any tags that are added to the server's tag space must be saved with the project. Users can configure the project to auto save from the **Tools** | **Options** menu.

Perform the Following Action

When automatic OPC tag database generation is enabled, the server needs to know what to do with OPC tags that it may have added from a previous run or with OPC tags that have been added or modified after the communications driver added them originally. The **Perform the following action** setting is used to control how the server handles OPC tags that were automatically generated and currently exist in the project. This feature also prevents automatically generated tags from accumulating in the server.

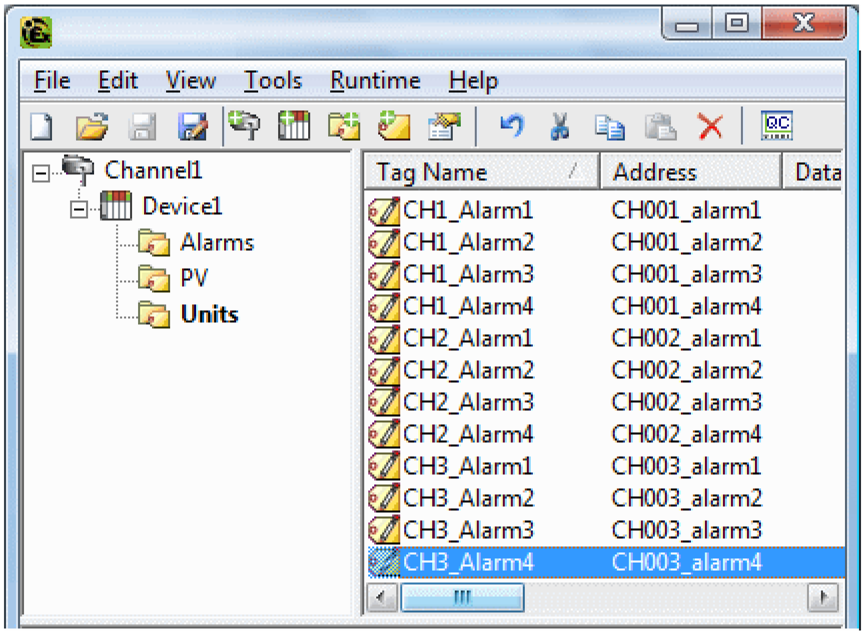
For example, review the Ethernet I/O example mentioned above. If users continued to change the I/O modules in the rack with the server configured to **Always generate new OPC tags on startup**, new tags would be added to the server every time the communications driver detected a new I/O module. If the old tags were not removed, many unused tags could accumulate in the server's tag space. The **Perform the following action** setting allows users to tailor the server's operation to best fit the application's needs. Descriptions of the selections are as follows.

1. **Delete on create**, the default condition, deletes any tags that had previously been added to the tag space before the communications driver adds any new tags.
2. **Overwrite as necessary** instructs the server to remove only those tags that the communications driver is replacing with new tags. Any tags that are not being overwritten will remain in the server's tag space.
3. **Do not overwrite** prevents the server from removing any tags that had been previously generated or may have already existed in the server. With this selection, the communications driver can only add tags that are completely new.

4. **Do not overwrite, log error** has the same effect as the third; however, in addition, an error message will be posted to the server's Event Log when a tag overwrite would have occurred.

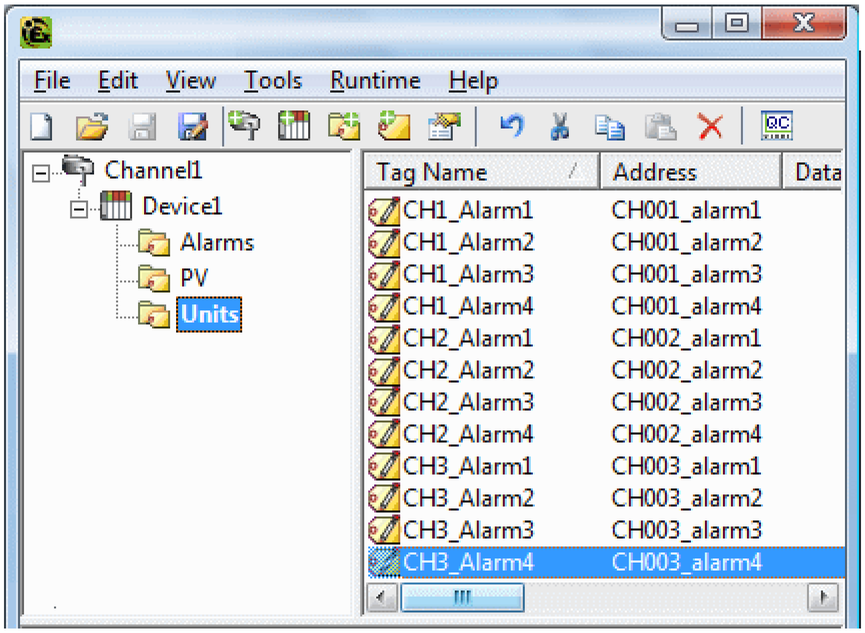
Note: Removing OPC tags affects tags that have been automatically generated by the communications driver as well as any tags that have been added using names that match generated tags. It is recommended that users avoid adding tags to the server using names that match tags that may be automatically generated by the driver.

The parameter **Add generated tags to the following group** can be used to keep automatically generated tags from mixing with tags that have been entered manually. This parameter is used to specify a subgroup that will be used when adding all automatically generated tags for this device. The name of the subgroup can be up to 256 characters in length. The following screens show where automatically generated tags will be placed in the server's tag space. As shown below, this parameter provides a root branch to which all automatically generated tags will be added.



Tag Name	Address	Data
CH1_Alarm1	CH001_alarm1	
CH1_Alarm2	CH001_alarm2	
CH1_Alarm3	CH001_alarm3	
CH1_Alarm4	CH001_alarm4	
CH2_Alarm1	CH002_alarm1	
CH2_Alarm2	CH002_alarm2	
CH2_Alarm3	CH002_alarm3	
CH2_Alarm4	CH002_alarm4	
CH3_Alarm1	CH003_alarm1	
CH3_Alarm2	CH003_alarm2	
CH3_Alarm3	CH003_alarm3	
CH3_Alarm4	CH003_alarm4	

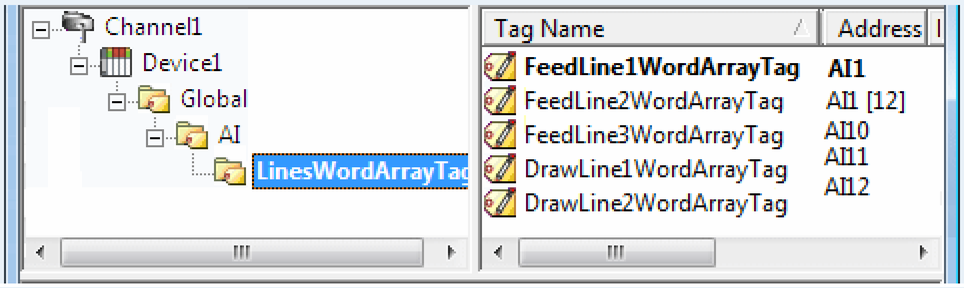
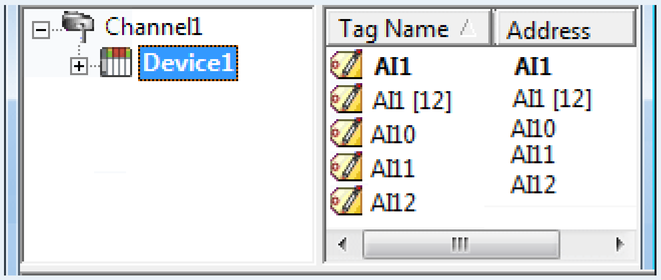
The **Add generated tags to the following group** was left blank.



Tag Name	Address	Data
CH1_Alarm1	CH001_alarm1	
CH1_Alarm2	CH001_alarm2	
CH1_Alarm3	CH001_alarm3	
CH1_Alarm4	CH001_alarm4	
CH2_Alarm1	CH002_alarm1	
CH2_Alarm2	CH002_alarm2	
CH2_Alarm3	CH002_alarm3	
CH2_Alarm4	CH002_alarm4	
CH3_Alarm1	CH003_alarm1	
CH3_Alarm2	CH003_alarm2	
CH3_Alarm3	CH003_alarm3	
CH3_Alarm4	CH003_alarm4	

"**MyGroup**" was entered in the **Add generated tags to the following group** field.

Allow Automatically Generated Subgroups
The **Allow automatically generated subgroups** setting controls whether or not the server automatically creates subgroups for the automatically generated tags.

Checked (default)	The server will automatically generate the device's tags and organize them into subgroups. In the server project, the resulting tags will retain their tag names.  Tag Name / Address: FeedLine1WordArrayTag – AI1; FeedLine2WordArrayTag – AI1 [12]; FeedLine3WordArrayTag – AI10; DrawLine1WordArrayTag – AI11; DrawLine2WordArrayTag – AI12
Unchecked	The server will automatically generate the device's tags in a simple list without any subgrouping. In the server project, the resulting tags will be named with the address value. For example, the tag names will not be retained during the generation process. The image below shows how the tag names were created using the tag's address.  Tag Name / Address: AI1 – AI1; AI1 [12] – AI1 [12]; AI10 – AI10; AI11 – AI11; AI12 – AI12 **Note:** If, as the server is generating tags, a tag is assigned the same name as an existing tag, the system will automatically increment to the next highest number so that the tag name is not duplicated. For example, if the generation process were to create a tag named AI22 but there already existed a tag with that name, it would create the tag as AI23 instead.

Auto Create
Auto Create is used to manually initiate the creation of automatically generated OPC tags. If the device's configuration has been modified, clicking Auto Create will force the communications driver to reevaluate the device for possible tag changes. Auto Create can be accessed from the System Tags for this device, which allows OPC client application to initiate tag database creation.

Note: With the server's online full-time operation, these parameters can be changed at any time. Utilize the User Manager to restrict access rights to server features in order to prevent operators from changing the parameters.

System Tags
System Tags are used to provide general error feedback to client applications, to allow operational control when a device is actively collecting data and to allow the standard parameters of a either a channel or device to be changed by an OPC client application when needed.

System Tags
The number of system tags available at both the channel-level or device-level varies depending on the nature of the driver being used. In addition, application-level system tags allow client applications to monitor the server's status. System tags can also be grouped according to their purpose as both status and control or parameter manipulation.

Parameter Control Tags
While the standard system tags provide needed feedback on server operation, the parameter control tags provide the most powerful feature. Parameter control tags can be used to modify the operational characteristic of the server application. This provides a great deal of flexibility in the OPC applications. By using the parameter control tags, users

can implement redundancy by switching communications links or changing the Device ID of a target device. Users can also provide access to the tags through special supervisory screens that allow a plant engineer to make changes to the communication parameters of the server if needed.

The tables below include descriptions of the following:

Application-Level System Tags
Channel-Level System Tags / Serial
Channel-Level System Tags / Ethernet
Device-level System Tags / Serial and Ethernet

Application-Level System Tags
Syntax Example: <Channel Name>.<Device Name>._System._ActiveTagCount

Tag	Description
_ActiveTagCount Class: Status Tag	The _ActiveTagCount is a tag that indicates the number of tags that are currently active in the server. This is a Read Only tag.
_ClientCount Class: Status Tag	The _ClientCount is a tag that indicates the number of clients that are currently connected to the server. This is a Read Only tag.
_Date Class: Status Tag	The _Date is a tag that indicates the current date of the system that the server is running on. The format of this string is defined by the operating system date/time settings. This is a Read Only tag.
_DateTime Class: Status Tag	The _DateTime is a tag that indicates the GMT date and time of the system that the server is running on. The format of the string is '2004-05-21T20:39:07.000'. This is a Read Only tag.
_DateTimeLocal Class: Status Tag	The _DateTimeLocal is a tag that indicates the localized date and time of the system that the server is running on. The format of the string is '2004-05-21T16:39:07.000'. This is a Read Only tag.
_FullProjectName Class: Status Tag	The _FullProjectName is a tag that indicates the fully qualified path and file name to the currently loaded project. This is a Read Only tag.
_ProjectName Class: Status Tag	The _ProjectName is a tag that indicates the currently loaded project file name and does not include path information. This is a Read Only tag.
_Time Class: Status Tag	The _Time is a tag that indicates the current time of the system that the server is running on. The format of this string is defined by the operating system date/time settings. This is a Read Only tag.
_TotalTagCount Class: Status Tag	The _TotalTagCount is a tag that indicates the total number of tags that are currently being accessed. These tags can be active or inactive. **Note:** This count does not represent the number of tags configured in the project. This is a Read Only tag.

Channel-level System Tags for Serial Port Driver

Syntax Example: <Channel name>._System._BaudRate

Tag	Description
_AvailableNetworkAdapters Class: Parameter Tag	The _AvailableNetworkAdapters is a tag that lists the available NICs and will include both unique NIC cards and NICs that have multiple IPs assigned to them. Additionally this tag will also display any WAN connections that are active, such as a dialup connection. This tag is provided as a string tag and can be used to determine the network adapters available for use on this PC. The string returned will contain all of the NIC names and their IP assignments. A semicolon will separate each unique NIC in order to allow the names to be parsed within an OPC application. For a serial driver this tag will only be used if Ethernet Encapsulation is selected. This is a Read Only tag.
_NetworkAdapter Class: Parameter Tag	The _NetworkAdapter tag is a tag that allows the current NIC adapter in use by the driver to be changed on the fly. As a string tag, the name of the newly desired NIC adapter must be written to this tag in string format. The string written must match the exact description of the desired NIC in order for the change to take effect. NIC names can be obtained from the _AvailableNetworkAdapters tag listed above. For a serial driver, this tag will only be used if Ethernet Encapsulation is selected. **Note:** When changing the NIC selection the driver will be forced to break all current device connections and reconnect. This is a Read/Write tag.
_ComId Class: Parameter Tag	The _ComId tag is a tag that allows the comm port selection for the driver to be changed on the fly. As a string tag, the desired comm port must be written to the tag as a string value using the following possible selections: COM 1, COM 2 COM 3, COM 4, - - -, COM 16, and Ethernet Encapsulation. When selecting **Device Properties - Ethernet Encapsulation** mode, users will also need to set the IP number of the remote terminal server. This is done at the device-level and will be shown below. This is a Read/Write tag.
_BaudRate Class: Parameter Tag	The _BaudRate tag is a tag that allows the baud rate of the driver to be changed on the fly. The _BaudRate tag is defined as a long value and therefore new baud rates should be written in this format. Valid baud rates are as follows: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 56000, 56700, 115200, 128000 and 256000. This is a Read/Write tag.
_Parity Class: Parameter Tag	The _Parity tag is a tag that allows the parity of the driver to be changed on the fly. As a string tag, the desired parity setting must be written to the tag as a string value using the following possible selections: None, Odd and Even. This is a Read/Write tag.
_DataBits Class: Parameter Tag	The _DataBits tag is a tag that allows the data bits of the driver to be changed on the fly. The _DataBits tag is defined as a signed 8 bit value. Valid data bits selections are 5, 6, 7 and 8. This is a Read/Write tag.
_StopBits Class: Parameter Tag	The _StopBits tag is a tag that allows the stop bits of the driver to be changed on the fly. The _StopBits tag is defined as a signed 8 bit value. Valid data bit selections are 1 and 2. This is a Read/Write tag.
_FlowControl	The _FlowControl tag is a tag that allows the flow control setting of the driver to be changed on the fly. As a string tag, the desired flow control

Class: Parameter Tag	setting must be written to the tag in this format. Possible selections for flow control include: None, DTR, RTS, "DTR,RTS", RTS Always and RTS Manual. Not all drivers support the RTS Manual mode of operation. This is a Read/Write tag.
_RtsLineRaise Class: Parameter Tag	The _RtsLineRaise tag is a tag that allows the RTS Line to be raised for a user-selected period of time before the driver attempts to transmit a message. This tag will only be effective for drivers that support Manual RTS mode. The _RtsLineRaise is defined as a long value. The valid range is 10 - 2550 milliseconds. The Manual RTS mode has been designed for use with radio modems. This is a Read/Write tag.
_RtsLineDrop Class: Parameter Tag	The _RtsLineDrop tag is a tag that allows the RTS Line to be lowered for a user-selected period of time after the driver attempts to transmit a message. This tag will only be effective for drivers that support Manual RTS mode. The _RtsLineDrop is defined as a long value. The valid range is 0 - 2550 milliseconds. The Manual RTS mode has been designed for use with radio modems. This is a Read/Write tag.
_RtsLinePollDelay Class: Parameter Tag	The _RtsLinePollDelay tag is a tag that allows a user-configurable pause to be placed after each message sent from the driver. This tag will only be effective for drivers that support Manual RTS mode. The _RtsLinePollDelay is defined as a long value. The valid range is 0 - 2550 milliseconds. The Manual RTS mode has been designed for use with radio modems. This is a Read/Write tag.
_ReportComErrors Class: Parameter Tag	The _ReportComErrors tag is a tag that allows the reporting of low level communications errors such as parity and framing errors to be enabled or disabled. This tag is defined as a Boolean tag and can be set either true or false. When true, the driver will report any low-level communications error to the server event system. When set false the driver will ignore the low-level communications errors and not report them. The driver will still reject a communications transaction if it contains errors. If the environment contains a lot of electrical noise, this feature can be disabled to prevent the Event Log from filling with error messages. This is a Read/Write tag.
_EnableDiagnostics Class: Parameter Tag	The _EnableDiagnostics tag is a tag that allows the diagnostic system of the driver to be enabled and disabled. The diagnostic system places a little additional burden on the driver while enabled. As such the server allows diagnostics to be enabled or disabled to improve the driver's performance. When disabled, the **Diagnostics Tags** will not be available. This is a Read/Write tag.
_WriteOptimizationDutyCycle Class: Parameter Tag	The _WriteOptimizationDutyCycle tag is a tag that allows the duty cycle of the Write to Read ratio to be changed on the fly. The duty cycle controls how many Writes the driver will do for each Read it performs. The _WriteOptimizationDutyCycle is defined as an unsigned long value. The valid range is 1 to 10 Write per Read. **See Also:** **Channel Properties: Write Optimizations**. This is a Read/Write tag.

Channel-level System Tags for Ethernet Drivers
Syntax Example: <Channel name>._System._NetworkAdapter

Tag	Description
_AvailableNetworkAdapters	The _AvailableNetworkAdapters is a tag that lists the available NICs

Class: Parameter Tag	and will include both unique NIC cards and NICs that have multiple IPs assigned to them. Additionally this tag will also display any WAN connections that are active, such as a dialup connection. This tag is provided as a string tag and can be used to determine the network adapters available for use on this PC. The string returned will contain all of the NIC names and their IP assignments. A semicolon will separate each unique NIC in order to allow the names to be parsed within an OPC application. For a serial driver, this tag will only be used if Ethernet Encapsulation is selected. This is a Read Only tag.
_NetworkAdapter Class: Parameter Tag	The _NetworkAdapter tag is a tag that allows the current NIC adapter in use by the driver to be changed on the fly. As a string tag, the name of the newly desired NIC adapter must be written to this tag in string format. The string written must match the exact description of the desired NIC in order for the change to take effect. NIC names can be obtained from the _AvailableNetworkAdapters tag listed above. For a serial driver, this tag will only be used if Ethernet Encapsulation is selected. **Note:** When changing the NIC selection, the driver will be forced to break all current device connections and reconnect. This is a Read/Write tag.
_EnableDiagnostics Class: Parameter Tag	The _EnableDiagnostics tag is a tag that allows the diagnostic system of the driver to be enabled and disabled. The diagnostic system places a little additional burden on the driver while enabled. As such the server allows diagnostics to be enabled or disabled to improve the driver's performance. When disabled the **Diagnostics Tags** will not be available. This is a Read/Write tag.
_WriteOptimizationDutyCycle Class: Parameter Tag	The _WriteOptimizationDutyCycle tag is a tag that allows the duty cycle of the Write to Read ratio to be changed on the fly. The duty cycle controls how many Writes the driver will do for each Read it performs. The _WriteOptimizationDutyCycle is defined as an unsigned long value. The valid range is 1 to 10 Write per Read. **See Also: Channel Properties: Write Optimizations**. This is a Read/Write tag.

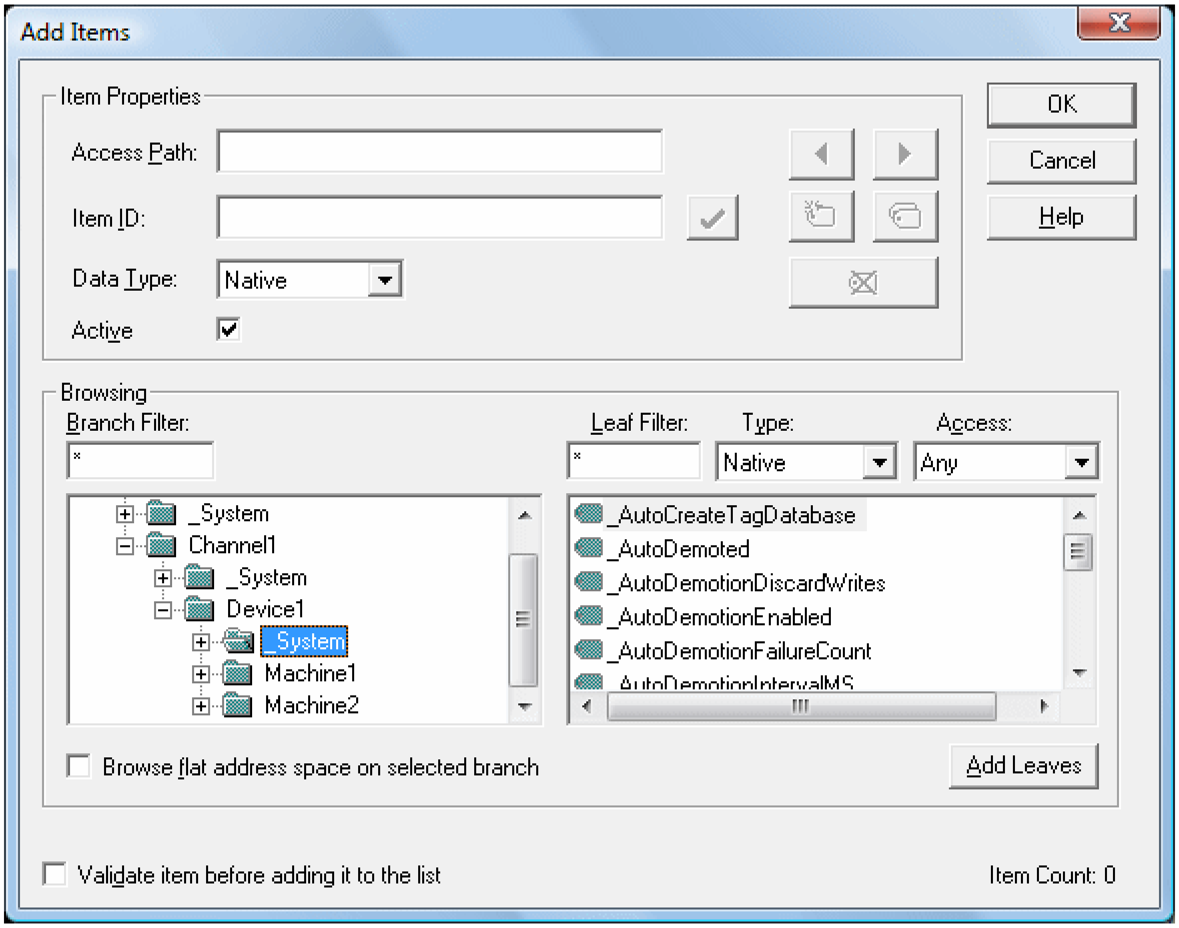
Device-level System Tags for both Serial and Ethernet Drivers
Syntax Example: <Channel Name>.<Device Name>._System._Error

Tag	Description
_DeviceId Class: Parameter Tag	The _DeviceId tag is a tag that allows the ID of the device to be changed on the fly. The data format of the _DeviceId depends on the type of device. For most serial devices this tag will be a Long data type. For Ethernet drivers the _DeviceId will be formatted as a string tag, allowing the entry of an IP address. In either case, writing a new Device ID to this tag will cause the driver to change the target field device. This will only occur if the Device ID written to this tag is correctly formatted and within the valid range for the given driver. This is a Read/Write tag.
_ConnectTimeout Class: Parameter Tag	The _ConnectTimeout is a tag that allows the timeout associated with making an IP connection to a device to be changed on the fly. This tag is available when either a native Ethernet driver is in use or a Serial driver is in Ethernet Encapsulation mode. The _ConnectTimeout is defined as a Long data type. The valid range is 1 to 30 seconds. This is a Read/Write tag.
_RequestTimeout	The _RequestTimeout is a tag that allows the timeout associated with a

Class: Parameter Tag	data request to be changed on the fly. The _RequestTimeout tag is defined as a Long value. The valid range is 100 to 30000 milliseconds. This parameter tag applies to all drivers equally. This is a Read/Write tag.
_RequestAttempts Class: Parameter Tag	The _RequestAttempts is a tag that allows the number of retry attempts to be changed on the fly. The _RequestAttempts is defined as a Long value. The valid range is 1 to 10 retries. This parameter tag applies to all drivers equally. This is a Read/Write tag.
_InterRequestDelay	The _InterRequestDelay is a tag that allows the time interval between device transactions to be changed on the fly. The _InterRequestDelay is defined as a Long data type. The valid range is 0 to 30000 milliseconds. This parameter tag only applies to drivers that support this feature. This is a Read/Write tag.
_EncapsulationIp Class: Parameter Tag	The _EncapsulationIp tag allows the IP of a remote terminal server to be specified and changed on the fly. This parameter tag is only available on serial drivers that support **Device Properties - Ethernet Encapsulation** mode. The _EncapsulationIp is defined as a string data type, allowing the entry of an IP address number. The server will reject entry of invalid IP addresses. This tag is only valid for a Serial driver in Ethernet Encapsulation mode. This is a Read/Write tag.
_EncapsulationPort Class: Parameter Tag	The _EncapsulationPort Tag allows the port number of the remote terminal server to be specified and changed on the fly. The _EncapsulationPort is defined as a long data type. The valid range is 0 to 65535. The port number entered in this tag must match that of the desired remote terminal server for proper Ethernet Encapsulation to occur. This tag is only valid for a Serial driver in Ethernet Encapsulation mode. This is a Read/Write tag.
_EncapsulationProtocol Class: Parameter Tag	The _EncapsulationProtocol tag allows the IP protocol used for Ethernet Encapsulation to be specified and changed on the fly. The _EncapsulationProtocol is defined as a string data type. Writing either "TCP/IP" or "UDP" to the tag specifies the IP protocol. The protocol used must match that of the remote terminal server for proper Ethernet Encapsulation to occur. This tag is only valid for a Serial driver in Ethernet Encapsulation mode. This is a Read/Write tag.
_AutoCreateTagDatabase Class: Parameter Tag	The _AutoCreateTagDatabase tag is a Boolean tag that is used to initiate the automatic OPC tag database functions of this driver for the device to which this tag is attached. When this tag is set TRUE, the communications driver will attempt to automatically generate an OPC tag database for this device. This tag will not appear for drivers that do not support Automatic OPC Tag Database Generation. This is a Read/Write tag.
_Enabled Class: Parameter Tag	The _Enabled tag is a Boolean tag that allows the active state of the device to be turned On or Off. When this tag is set FALSE, all other user-defined tags and data from this device will be marked as invalid and Writes will not be accepted for the device. When this tag is set TRUE, normal communications will occur with the device. This is a Read/Write tag.
_Error Class: Status Tag	The _Error tag is a Boolean tag that returns the current error state of the device. When FALSE, the device is operating properly. When set TRUE, the driver has detected an error when communicating with this device. A device enters an error state if it has completed the cycle of

	request timeouts and retries without a response. **See Also:** **Device Properties - Timing**. This is a Read Only tag.
_NoError Class: Status Tag	The _NoError tag is a Boolean tag that returns the current error state of the device. When TRUE, the device is operating properly. When FALSE, the driver has detected an error when communicating with this device. A device enters an error state if it has completed the cycle of request timeouts and retries without a response. **See Also:** **Device Properties - Timing**. This is a Read Only tag.
_Simulated Class: Status Tag	The _Simulated tag is a Boolean tag that provides feedback about the simulation state of the current device. When Read as TRUE, this device is in a simulation mode. While in simulation mode, the server will return good data for this device but will not attempt to communicate with the actual physical device. When tag is Read as FALSE, communication with the physical device will be active. This is a Read Only tag.
_AutoDemoted	The _AutoDemoted tag is a Boolean tag that returns the current auto-demoted state of the device. When FALSE, the device is not demoted and is being scanned by the driver. When set TRUE, the device is in demoted and not being scanned by the driver. This is a Read Only tag.
_AutoDemotionEnabled	The _AutoDemotionEnabled tag is a Boolean tag that allows the device to be automatically demoted for a specific time period when the device is nonresponsive. When this tag is set FALSE, the device will never be demoted. When this tag is set TRUE, the device will be demoted when the _AutoDemotedFailureCount has been reached. This is a Read/Write tag.
_AutoDemotedFailureCount	The _AutoDemotedFailureCount tag specifies how many successive failures it takes to demote a device. The _AutoDemotedFailureCount is defined as a long data type. The valid range is 1 to 30. This tag can only be written to if _AutoDemotionEnabled is set to TRUE. This is a Read/Write tag.
_AutoDemotionIntervalMS	The _AutoDemotionIntervalMS tag specifics how long, in milliseconds, a device will be demoted before re-attempting to communicate with the device. The _AutoDemotionIntervalMS is defined as a long data type. The valid range is 100 to 3600000 milliseconds. This tag can only be written to if _AutoDemotionEnabled is set to TRUE. This is a Read/Write tag.
_AutoDemotionDiscardWrites	The _AutoDemotionDiscardWrites tag is a boolean tag that specifies whether or not Write requests should be discarded during the demotion period. When this tag is set to FALSE, all Writes requests will be performed regardless of the _AutoDemoted state. When this tag is set to TRUE, all Writes will be discarded during the demotion period. This is a Read/Write tag.

When using an OPC client, the system tags will be found under the _System branch of the server browse space for a given device. The following image taken from the supplied OPC Quick Client shows how the system tags appear to an OPC client.



The _System branch found under the DeviceName branch is always available. If referencing a system tag from a DDE application given the above example and the DDE defaults, the link would appear as "<DDE service name>|_ddedata!Channel1.Device1._System._Error".

The _Enabled tag provides a very flexible means of controlling the OPC applications. In some cases, specifically in modem applications, it can be convenient to disable all devices except the device currently connected to the modem. Additionally, using the _Enable tag to allow the application to turn a particular device off while the physical device is being serviced can eliminate harmless but unwanted communications errors in the server's Event Log.

See Also: **Statistics Tags** and **Property Tags**.

Note: Modem Tags are described in the topics under Modem Support.

Property Tags

Property Tags are used to provide Read Only access to Tag Properties for client applications. To access a tag property, append the property name to the fully qualified tag address that has been defined in the server's tag database. For more information, refer to **Tag Properties - General**.

If the fully qualified tag address is "Channel1.Device1.Tag1," its description can be accessed by appending the description property as "Channel1.Device1.Tag1._Description".

Supported Property Tag Names

Tag Name	Description
_Name	The _Name property tag indicates the current name for the tag it is referencing.
_Address	The _Address property tag indicates the current address for the tag it is

	referencing.
_Description	The _Description property tag indicates the current description for the tag it is referencing.
_RawDataType	The _RawDataType property tag indicates the raw data type for the tag it is referencing.
_ScalingType	The _ScalingType property tag indicates the scaling type (None, Linear or Square Root) for the tag it is referencing.
_ScalingRawLow	The _ScalingRawLow property tag indicates the raw low range for the tag it is referencing. If scaling is set to none this value contains the default value if scaling was applied.
_ScalingRawHigh	The _ScalingRawHigh property tag indicates the raw high range for the tag it is referencing. If scaling is set to none this value contains the default value if scaling was applied.
_ScalingScaledDataType	The _ScalingScaledDataType property tag indicates the scaled to data type for the tag it is referencing. If scaling is set to none this value contains the default value if scaling was applied.
_ScalingScaledLow	The _ScalingScaledLow property tag indicates the scaled low range for the tag it is referencing. If scaling is set to none this value contains the default value if scaling was applied.
_ScalingScaledHigh	The _ScalingScaledHigh property tag indicates the scaled high range for the tag it is referencing. If scaling is set to none this value contains the default value if scaling was applied.
_ScalingClampLow	The _ScalingClampLow property tag indicates whether the scaled low value should be clamped for the tag it is referencing. If scaling is set to none this value contains the default value if scaling was applied.
_ScalingClampHigh	The _ScalingClampHigh property tag indicates wether the scaled high value should be clamped for the tag it is referencing. If scaling is set to none this value contains the default value if scaling was applied.
_ScalingUnits	The _ScalingUnits property tag indicates the scaling units for the tag it is referencing. If scaling is set to none this value contains the default value if scaling was applied.

See Also: **Statistics Tags**, **System Tags**, **Modem Tags** and **Property Tags**.

Statistics Tags

Statistics Tags are used to provide feedback to client applications regarding the operation of the channel communications in the server. Currently there are seven built-in statistics tags available when diagnostics are enabled. For more information, refer to **OPC Diagnostic Window**.

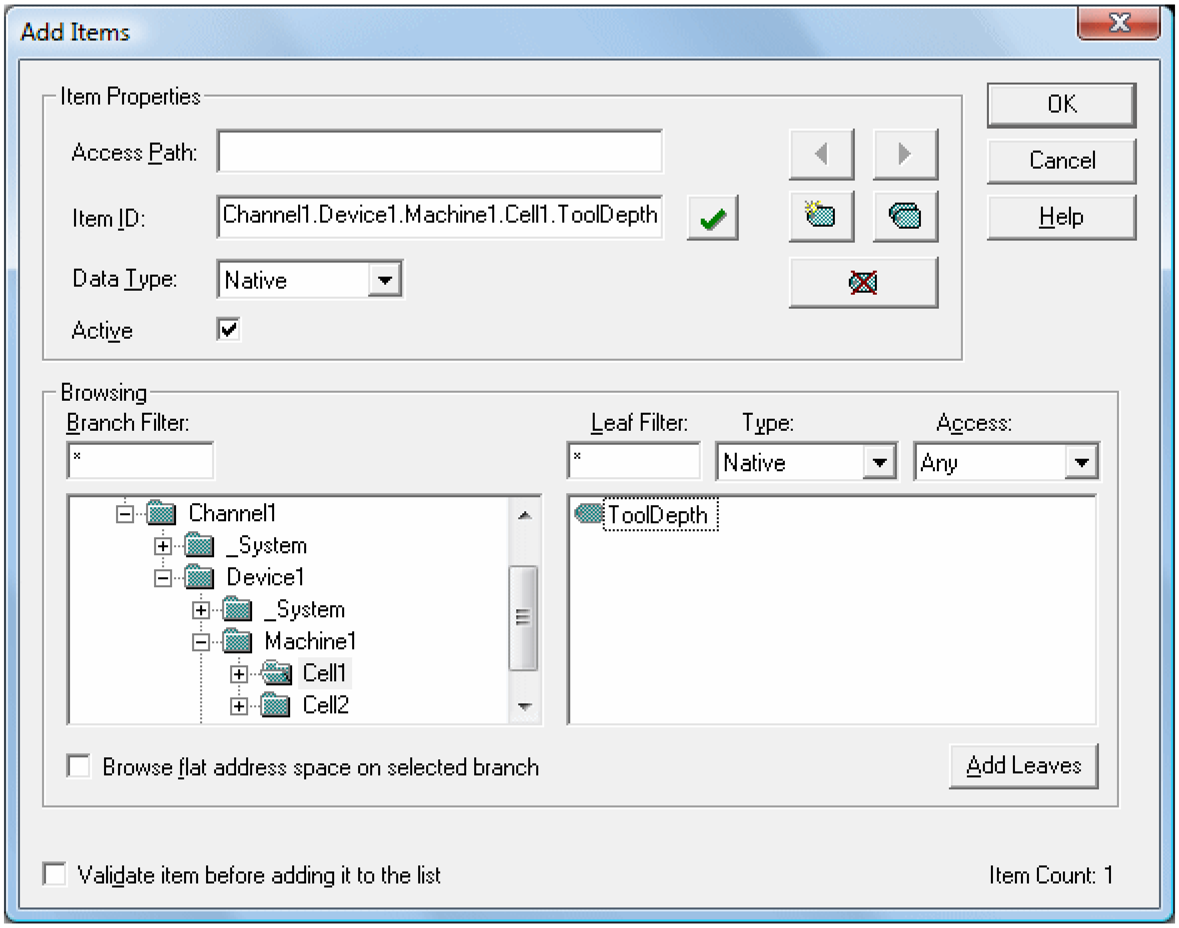
Syntax Example: *<Channel Name>._Statistics._FailedReads*

Supported Statistics Tag Names

Tag Name	Description
_SuccessfulReads	The _SuccessfulReads tag contains a count of the number of Reads this channel has completed successfully since the start of the application or since the last time the _Reset tag was invoked. This tag is formatted as unsigned 32 bit integer and will eventually rollover. This tag is Read Only.
_SuccessfulWrites	The _SuccessfulWrites tag contains a count of the number of Writes this channel has completed successfully since the start of the application or since the last time the _Reset tag was invoked. This tag is formatted as an unsigned 32 bit integer and will eventually rollover. This tag is Read Only.
_FailedReads	The _FailedReads tag contains a count of the number of Reads this channel has failed to complete since the start of the application or since the last time the _Reset tag was invoked. This count is only incremented after the channel has failed the request based on the configured timeout and retry count for the device. This tag is formatted

	as an unsigned 32 bit integer and will eventually rollover. This tag is Read Only.
_FailedWrites	The _FailedWrites tag contains a count of the number of Writes this channel has failed to complete since the start of the application or since the last time the _Reset tag was invoked. This count is only incremented after the channel has failed the request based on the configured timeout and retry count for the device. This tag is formatted as unsigned 32 bit integer and will eventually rollover. This tag is Read Only.
_RxBytes	The _RxBytes tag contains a count of the number of bytes the channel has received from connected devices since the start of the application or since the last time the _Reset tag was invoked. This tag is formatted as unsigned 32 bit integer and will eventually rollover. This tag is Read Only.
_TxBytes	The _TxBytes tag contains a count of the number of bytes the channel has sent to connected devices since the start of the application or since the last time the _Reset tag was invoked. This tag is formatted as unsigned 32 bit integer and will eventually rollover. This tag is Read Only.
_Reset	The _Reset tag can be used to reset all diagnostic counters. The _Reset tag is formatted as a Boolean tag. Writing a non-zero value to the _Reset tag will cause the diagnostic counters to be reset. This tag is Read/Write.
_MaxPendingReads	The _MaxPendingReads tag contains a count of the maximum number of pending read requests for the channel since the start of the application (or the _Reset tag) was invoked. This tag is formatted as an unsigned 32 bit integer. The tag is Read Only.
_MaxPendingWrites	The _MaxPendingWrites tag contains a count of the maximum number of pending write requests for the channel since the start of the application (or the _Reset tag) was invoked. This tag is formatted as an unsigned 32 bit integer. The tag is Read Only.
_PendingReads	The _PendingReads tag contains a count of the current pending read requests for the channel. This tag is formatted as an unsigned 32 bit integer. The tag is Read Only.
_PendingWrites	The _PendingWrites tag contains a count of the current pending write requests for the channel. This tag is formatted as an unsigned 32 bit integer. This tag is Read Only.

Statistics Tags are only available when diagnostics are enabled. To access from an OPC client, the diagnostic tags can be browsed from the _Statistics branch of the server browse space for a given channel. The following diagram, taken from the supplied OPC Quick Client, shows how the Diagnostics Tag appear to an OPC client.



The _Statistics branch found under the Channel branch will only appear when diagnostics are enabled for the channel. In order to reference a Diagnostics Tag from a DDE application given the above example and the DDE defaults, the link would appear as
"<DDE service name>|_ddedata!Channel1._Statistics._SuccessfulReads".

The values of the Diagnostics Tag can also be viewed directly in the server by using the **Channel Diagnostics** window. If "Enable Diagnostics" has been selected under Channel Properties, right-click on that channel and then select **Diagnostics**.

See Also: System Tags and **Property Tags**.

Note: Modem Tags are described in the topics under Modem Support.

Modem Tags

The following tags are created automatically for the channel when modem use is selected. An example of the syntax is as follows:

<Channel Name>.<Device Name>._Modem._Dial

Supported Modem Tag Names

Tag Name	Description	Access
_Dial	Writing any value to this tag initiates dialing of the current PhoneNumber. The Write is ignored unless the current Status is 3 (Idle). An error is reported if the is current phone number has not been initialized.	Read/Write

	Attempting to issue a dial command while the Mode Tag is set to 2 (incoming call only) will generate an error.	
_DialNumber	The DialNumber Tag shows the phone number that is actually dialed, after any dialing preference translations have been applied (such as the addition of an area code). This tag is intended for debugging purposes. It can provide useful feedback to an operator if phone numbers are entered manually.	Read Only
_Hangup	Writing any value to this tag hangs up the current connection. The Hangup Tag will also hang-up the current connection when an external device has called the server. Writes to the Hangup Tag will be ignored if the Status <= 3 (Idle) meaning that there is no currently open connection.	Read/Write
_LastEvent	Whenever the Status changes, the reason for the change is set in this tag as a number. For a list of event numbers and meanings, refer to **Last Event Values**.	Read Only
_Mode	This allows for configuring the line for calling only, answering only or both. Writing a 1 to the Mode Tag sets the line for outgoing calls only, no incoming calls will be answered when in this mode. Writing a 2 to the Mode Tag sets the line for incoming calls only, requests to dial out (Writes to the Dial tag) are ignored. The default setting is 0, which allows for both outgoing and incoming calls. This value can only be changed when the Status is <= 3 (Idle).	Read/Write
_PhoneNumber	This is the current phone number that will be dialed. Users can Write to this value at any time, but the change is only effective if Status is <= 3 (Idle). If users Write to the phone number while the status is greater than 3, the number will be queued. As soon as the status drops to 3 or less, the new number will be transferred to the tag. The queue is of size 1, so only the last phone number written will be remembered. The phone number must be in canonical format in order to apply the dialing preferences. If the canonical format is used, the resulting number that will be dialed (after dialing preferences have been applied) can be displayed as the DialNumber.	Read/Write

	Canonical format is the following: +<country code>[space](<area code>)[space]<phone number> example: +1 (207) 846-5881 **Note:** The country code for the U.S. is 1. If the number is not in canonical form, dialing preferences will not be applied. The number will be dialed exactly as it is entered. Users can also enter a Phonebook Tag name instead of a phone number. In this case, the current value of the phonebook tag will be used.	
_Status	This is the current status of the modem assigned to a channel. For a list of status values and meanings, refer to **Status Values**.	Read Only
_StringLastEvent	This contains a textual representation of the LastEvent Tag value. For a list of event numbers and meanings, refer to **Last Event String Values**.	Read Only
_StringStatus	This contains a textual representation of the Status Tag value. For a list of event numbers and meanings, refer to **Status String Values**.	Read Only

Status Values

The five lowest bits of the 32 bit status variable are currently being used.

Bit	Meaning
0	Initialized with TAPI
1	Line open
2	Connected
3	Calling
4	Answering

When read as an integer, the value of the Status Tag will always be one of the following:

Value	Meaning
0	Un-initialized, the channel is not usable
1	Initialized, no line open
3	Line open and the state is idle
7	Connected
11	Calling
19	Answering

Status String Values

Status Value	StringStatus Text
0	Uninitialized, channel is unusable
1	Initialized, no line open
3	Idle
7	Connected

11	Calling
19	Answering

Last Event Values

LastEvent	Reason for Change
-1	<blank> [no events have occurred yet]
0	Initialized with TAPI
1	Line closed
2	Line opened
3	Line connected
4	Line dropped by user
5	Line dropped at remote site
6	No answer
7	Line busy
8	No dial tone
9	Incoming call detected
10	User dialed
11	Invalid phone number
12	Hardware error on line caused line close

Last Event String Values

LastEvent	StringLastEvent
-1	<blank> [no events have occurred yet]
0	Initialized with TAPI
1	Line closed
2	Line opened
3	Line connected
4	Line dropped by user
5	Line dropped at remote site
6	No answer
7	Line busy
8	No dial tone
9	Incoming call detected
10	User dialed
11	Invalid phone number
12	Hardware error on line caused line close
13	Unable to dial

Communication Serialization Tags

An example of the syntax is as follows:

<Channel Name>._CommunicationSerialization._VirtualNetwork

Tag	Description
_VirtualNetwork Class: Parameter Tag	The _VirtualNetwork tag allows the virtual network selection for the channel to be changed on the fly. As a string tag, the desired virtual network must be written to the tag as a string value using the following possible selections: None, Network 1, Network 2, ---, Network 50. To disable communication serialization, select None.

	This tag is Read/Write.
_Registered Class: Status Tag	The _Registered tag indicates whether the channel is currently registered to a virtual network. After setting the _VirtualNetwork, the channel will unregister from the network it is currently registered to (indicated in _RegisteredTo) when it is capable of doing so. In other words, if the channel owns control during the switch, it cannot unregister until it has released control. Upon unregistering, the channel will register with new virtual network. This tag will be FALSE if _VirtualNetwork is None. This tag is Read Only.
_RegisteredTo Class: Status Tag	The _RegisteredTo tag indicates the virtual network to which the channel is currently registered. After setting the _VirtualNetwork, the channel will unregister from the network it is currently registered to when it is capable of doing so. In other words, if the channel owns control during the switch, it cannot unregister until it has released control. Upon unregistering, the channel will register with new virtual network. This tag will indicate if there are delays switching networks as _VirtualNetwork and _RegisteredTo could differ for a period of time. This tag will be N/A if _VirtualNetwork is None. This tag is Read Only.
_NetworkOwner Class: Status Tag	The _NetworkOwner tag indicates if the channel currently owns control of communications on the network. The frequency of change reflects how often the channel is granted control. This tag is Read Only.
_StatisticNetworkOwnershipCount Class: Status Tag	The _StatisticNetworkOwnershipCount tag indicates the number of times the channel has been granted control of communications since the start of the application (or since the last time _StatisticsReset was written to). This tag is formatted as an unsigned 32-bit integer and may eventually rollover. This tag is Read Only.
_StatisticNetworkOwnershipTimeSec Class: Status Tag	The _StatisticNetworkOwnershipTimeSec tag indicates how long in seconds the channel has held ownership since the start of the application (or since the last time _StatisticsReset was written to). This tag is formatted as a 32-bit floating point and may eventually rollover. This tag is Read Only.
_StatisticAvgNetworkOwnershipTimeSec Class: Status Tag	The _StatisticAvgNetworkOwnershipTimeSec tag indicates how long on average the channel holds ownership of control since the start of the application (or since the last time _StatisticsReset was written to). This tag will aid in identifying busy channels/bottlenecks. This tag is formatted as a 32-bit floating point and may eventually rollover. This tag is Read Only.
_StatisticsReset	The _StatisticsReset tag can be used to reset all the statistic counters. The _StatisticsReset tag is formatted as a Boolean tag. Writing a non-zero value to the _StatisticsReset tag will cause the statistics counters to be reset.

	This tag is Read/Write.

Communications Management

Auto-Demotion

The Auto-Demotion parameters allow a driver to temporarily place a device off-scan in the event that a device is not responding. By placing a nonresponsive device offline, the driver can continue to optimize its communications with other devices on the same channel by stopping communications with the nonresponsive device for a specific time period. After the specific time period has been reached, the driver will re-attempt to communicate with the nonresponsive device. If the device is responsive, the device will be placed on-scan; otherwise, it will restart its off-scan time period. **See Also:** **Device Properties - Auto-Demotion**.

Network Interface Selection

Users can select a NIC card for use with any Ethernet driver or serial driver running in Ethernet Encapsulation mode. The Network Interface feature is used to select a specific NIC card based on either the NIC name or its currently assigned IP address. The list of available NICs will include both unique NIC cards and NICs that have multiple IPs assigned to them. The selection will also display any WAN connections that may be active (such as a dialup connection).

Ethernet Encapsulation

The Ethernet Encapsulation mode has been designed to provide communications with serial devices connected to terminal servers on the Ethernet network. A terminal server is essentially a virtual serial port: the terminal server converts TCP/IP messages on the Ethernet network to serial data. Once the message has been converted to a serial form, users can connect standard devices that support serial communications to the terminal server. Using a terminal server device allows users to place RS-232 and RS-485 devices throughout the plant operations while still allowing a single localized PC to access the remotely mounted devices. Furthermore, the Ethernet Encapsulation mode allows an individual Network IP address to be assigned to each device as needed. By using multiple terminal servers, users can access hundreds of serial devices from a single PC via the Ethernet network. For more information, refer to **How Do I..** and **Device Properties - Ethernet Encapsulation**.

Modem Support

This server supports the use of modems to connect to remote devices, which is established through the use of special modem tags that become available at the channel-level when a dial-up network connection has been created. These channel-level modem tags can be used to dial a remote device, monitor the modem status while connected and terminate the call when completed.

Note: Not all serial drivers support the use of modems. To determine modem support, refer to the specific driver's help documentation.

When accessing the new modem tags, the channel name can be used as either a base group or topic name. If the project contains more than one channel definition, users will need to configure the channel names so that each is unique. This remains true for device names, as well. Channel names can no longer match the device name when the project needs to be configured to use a modem. The channel name requirements do not apply to projects that are not using a modem.

In order to be used, modems need to be configured with the operating system through the Control Panel settings. For specific setup information, refer to the Windows and modem documentation. Once the modem has been properly installed, it can be enabled by selecting the **Use Modem** checkbox in the Channel Wizard.

Important: Many new commercial modems are designed to dial-up network server connections and negotiate the fastest and clearest signal. When communicating to a serial automation device, the modem needs to connect at a specific Baud (Bits per Second) and Parity. For this reason, we strongly recommend the use of an external modem, which can be configured to dial using specific Baud Rate and Parity settings. To determine the best modem for a specific application, check with Technical Support. For examples on how to use a modem in a project, refer to **How Do I...**.

Using a Modem in the Server Project

Modems convert the serial data from the RS-232 port into signal levels that can be transmitted over the phone line. To do this, modems break each byte of the serial data down into bits used to generate the signal to be transmitted. Most modems can handle converting up to 10 bits of information for every byte of data that they send. To communicate with a device via modem, it must be able to use 10 bits or less. The following formula can be used to determine how many bits a specific device is using.

Start Bits + Data Bits + Parity + Stop Bits = Total Bit Count

For example, if using the Modbus RTU driver we can assume that the device is configured to use 8 Data Bits, Even Parity and 1 Stop Bit (1 Start bit is always implied). When plugged into the formula, it would be 1 + 8 + 1 + 1 = 11 Bits. A normal modem would not be able to transmit data to this Modbus device using these settings. If the Parity is changed to None, however, the result becomes 1 + 8 + 0 + 1=10 Bits. A normal modem can now be used to transmit data to this Modbus device.

Some drivers simply cannot use a normal modem connection and cannot be configured to use a 10 bit or less data format. These devices cannot use standard modems. Luckily, there are manufacturers who provide modems that can handle transmitting 11 data bits. If the driver falls into this category, users should consult the device's manufacturer for recommendations on an appropriate modem vendor. Modem operation will be enabled for all serial drivers regardless of their suitability for modem operation.

Note: For the following example instructions, create a project and set the channel settings to use 10 bits or less for the connection. Configure the device to use the same settings.

Configuring the Initiating Modem

This server uses the Windows TAPI interface to access modems attached to the PC. The TAPI interface was designed to provide Windows programs a common interface that could be accessed by a range of modems existing in a PC. A set of drivers for the Windows OS, which are provided by the modem's manufacturer, must be installed before the server can use the modem in a project. The Windows Control Panel can be used to install new modems. For information regarding modem installation and setup, refer to both the Windows and the modem's help documentation.

Once the modem has been properly installed, users can begin using it in a server project. The receiving end, or the device modem, needs to be properly configured before it can be used. Each driver contains a Modem Configuration page in its help file. This page contains a listing of the receiving modem's active profile. Users will need to confirm that the receiving modem matches the profile provided by the driver.

Configuring the Receiving Modem

Use the Hyperterminal program that is included with Windows to configure the Receiving Modem easily. For more information, follow the instructions below.

1. Use an available Serial Port to connect the desired receiving modem to the PC. Start **Hyperterminal** and then open a new connection. Name the new connection **ModemSetup**.

2. In the invoked **Connect To** dialog, click in the **Connect Using** drop-down menu and select the communication port to which the receiving modem is attached. Although other modems may appear in this list, they should be ignored for the moment.

3. In the **COMx Properties** dialog, configure the communications port settings that will be used to talk to the receiving modem.

Important: The COMx Properties settings must match the Baud Rate, Data Bits, Parity and Stop Bits used by the target device. Modems remember the Baud Rate, Data Bits, Parity and Stop Bits that were used to talk to it last; thus, if the receiving modem was configured at 19,200 baud but the device was configured for 9600 baud, the modem will never be able to speak to the device. Although it could connect, the receiving modem would send all the data to the device at 19,200 baud. This is true even if the modem connects at 9600 baud or if the transmitting modem is being spoken to at 9600 baud. Any disparity between the settings will cause the modem application to fail. To avoid the error, match the settings between the newly created server project and one that has a direct cable connection.

4. Next, enter the port settings. Then, click **OK**.

Note: At this point, users should be able to issue commands to the receiving modem. On many modems, this can be tested by typing **ATI4** followed by **Enter**. To ensure this is a valid test for a specific modem, refer to its help documentation. If the modem is properly attached to the PC it will respond by displaying its current profile settings.

5. Set the receiving modem's desired profile and then save the settings by issuing a write command to the modem. To do so, type **AT&W0** followed by **Enter**. To test the receiving modem's configuration afterwards, simply turn it off for a moment and then turn it back on. Next, type **AT14** followed by **Enter** (or another applicable command). The modem should display its current profile, including any changes that have been made.

Important: The profile settings and reference documents provided here are to be used as examples. Because of different configuration commands and codes that may be used among modem manufacturers, refer to the specific help documentation to verify all settings.

Cables

Before the project is ready to be used, users need to configure the correct cable connection between the receiving modem and the device. There are 3 cables necessary for this: the existing **device communication cable** for direct connection, a **NULL modem adapter** and a **NULL modem cable**. A NULL modem cable, in which all the pins are connected to the same pins on both ends of the cable, is connected to the modem. The device communication cable, used to connect to the target device, usually has pins 2 and 3 reversed. Since the cable being used to talk to the device for the direct connection is obviously working properly by this point, users can use it on the receiving modem by attaching a NULL modem adapter. Similarly, a PC modem cable will run from the PC to the initiating modem. With the cables in place, users are now ready to use a modem in their application.

Note: NULL modem adapters can be found at most computer stores.

Example: Server Side Modem Configuration

After the modems have been properly configured and installed, users can enable their use with the server. At this point, users should refer back to the direct connect project completed earlier when testing the device configuration and communications.

1. Load the direct connect project and then double-click on the **Channel Name**. This will invoke the current direct connect settings for Baud Rate, Parity and etc.

2. Select the **Use Modem** checkbox. The settings on this page should now become unavailable.

3. Next, click on the **Modem** tab to display the list of modems available on the computer.

Note: If there are no modems visible on list, users will need to exit the server and attempt to reinstall the modem using the Modem Configuration tools supplied with the operating system.

4. Select the modem that will be used with the server project. At this point, the **Dialing...** and **Properties...** buttons should become available. Select **Properties..**.

Note: The Properties dialog is used to configure the initiating modem's characteristics. There are two sections available:

- **General** is used to set connection speed and speaker volume. The connection speed should be set to match the speed used by the target device when this was a direct connect project.
- **Connection** is used to configure Data Bits, Parity and Stop Bits. These settings should be set to match the target device settings.

5. Next, click the **Advanced...** button.

Note: The **Advanced Connection** dialog is used to configure error correction and flow control for the initiating modem. For more information about recommended settings, refer to the specific driver's help documentation. In most cases, Error Correction and Data Compression can be enabled; Flow Control can be either enabled or disabled, depending.

6. Next, click **OK** in each dialog until returned to the modem list within the server. When editing an existing project, users can click **OK**. When editing a new project, users can click **Next**. If, at this point, an existing direct connect project has just been edited, the server project is now ready for modem operation.

7. **Save** the project.

Using a Modem in Your Application

Once modem operation has been enabled for the driver, a list of predefined tags became available in the driver's Tag Window. These Modem Tags are contained under the Channel Name, which has become an active OPC Access path used to access the Modem Tags. The Modem Tags are used to control and monitor an attached modem. Operationally, the server knows very little about what the application needs for modem control; thus, the server does not imply any type of control over it. By using the predefined Modem Tags, users can apply the application's control or scripting capabilities to control the server's use of the selected modem.

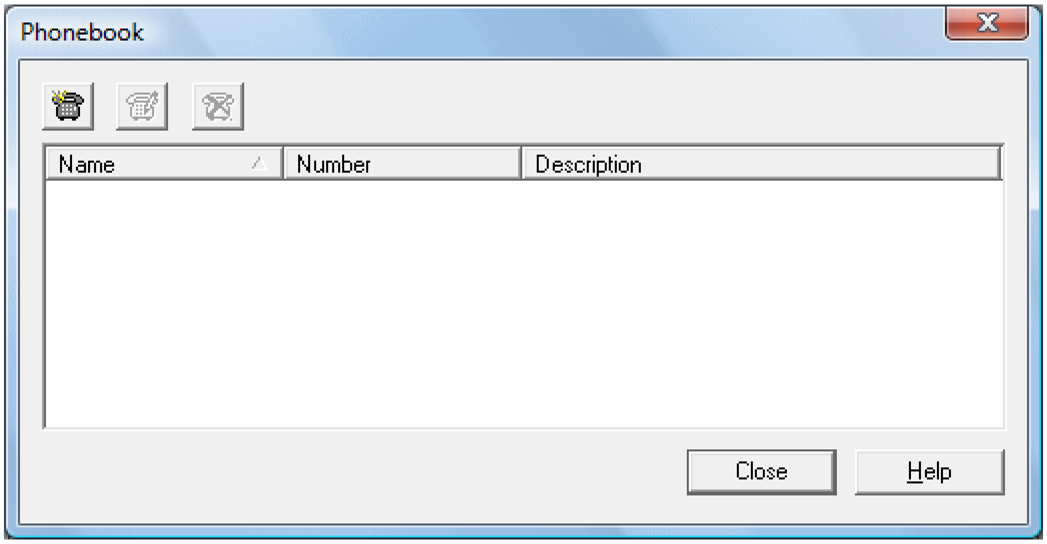
Phonebook Tags

A Phonebook Tag can be used in place of specifying a telephone number by directly writing to the PhoneNumber tag. A phonebook tag can be created on the channel, along with the other modem system tags previously described. The data associated with a Phonebook Tag is a phone number that can be assigned when the tag is created and/or later modified when the server has an active client connection. The phone number stored in a phonebook tag can be used to dial by simply writing anything to the tag. The act of writing will cause the selected phonebook tag to dial.

Syntax Example: *<Channel Name>._Phonebook.<Phonebook Tag Name>*

Data Type	Privilege
String	Read/Write

Phonebook Tags are entered using the dialog shown below.



To add a new phonebook tag, simply click on the New Phonebook icon to display the **Phone Number** dialog.

Example

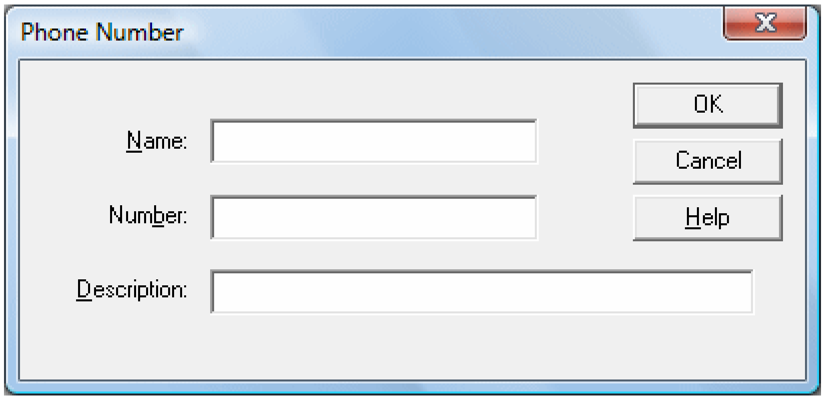
A phonebook tag name was created for 'Site1.'

Syntax Example: *<Channel Name>.<Device Name>._Phonebook.Site1*

Tag Name	Description	Access
<Name of Phone book tag created in Modem Configuration>	Instead of specifying a telephone number by directly writing to the PhoneNumber tag, a phonebook tag can be used. A phonebook tag can be created on the channel, along with the other modem system tags previously described. The data associated with a Phonebook Tag is a phone number that can be assigned when the tag is created and/or later modified when the server has an active client connection. The phone number stored in a phonebook tag can be used to dial by simply writing anything to the tag. The act of writing will cause the selected phonebook tag to dial.	Read/Write

Phone Number

The Phone Number dialog is used to enter a new Phonebook Tag, which can then be used to dial a desired phone number. Phonebook Tags keep the list in the server, which is useful if the OPC client application cannot store the phone number for a device location. To invoke a phonebook tag, the OPC client must write any string value to the desired phonebook tag. The phone number dialog should appear as shown below.



- The **Name** parameter is used to enter the string that will represent the phone number available from the phonebook tag. Names can be up to 256 characters in length. Although using descriptive names is generally a good idea, some OPC client applications may have a limited display window when browsing the tag space of an OPC server. The phonebook tag name is part of the OPC browse data. Phonebook Tag names must be unique within a given device.
- The **Number** parameter is used to enter the phone number that will be dialed when the tag is invoked from an OPC client application. A string of up to 64 digits can be entered.
- The **Description** parameter is used to attach a comment to this tag. A string of up to 64 characters can be entered.

Note: With the server's online full-time operation, these parameters can be changed at any time. Changes made to Tag Properties will take effect immediately; however, OPC clients that have already connected to this tag will not be affected until they release and reacquire this tag. To prevent operators from changing these parameters use the User Manager to restrict access rights to server features.

Built-In Diagnostics

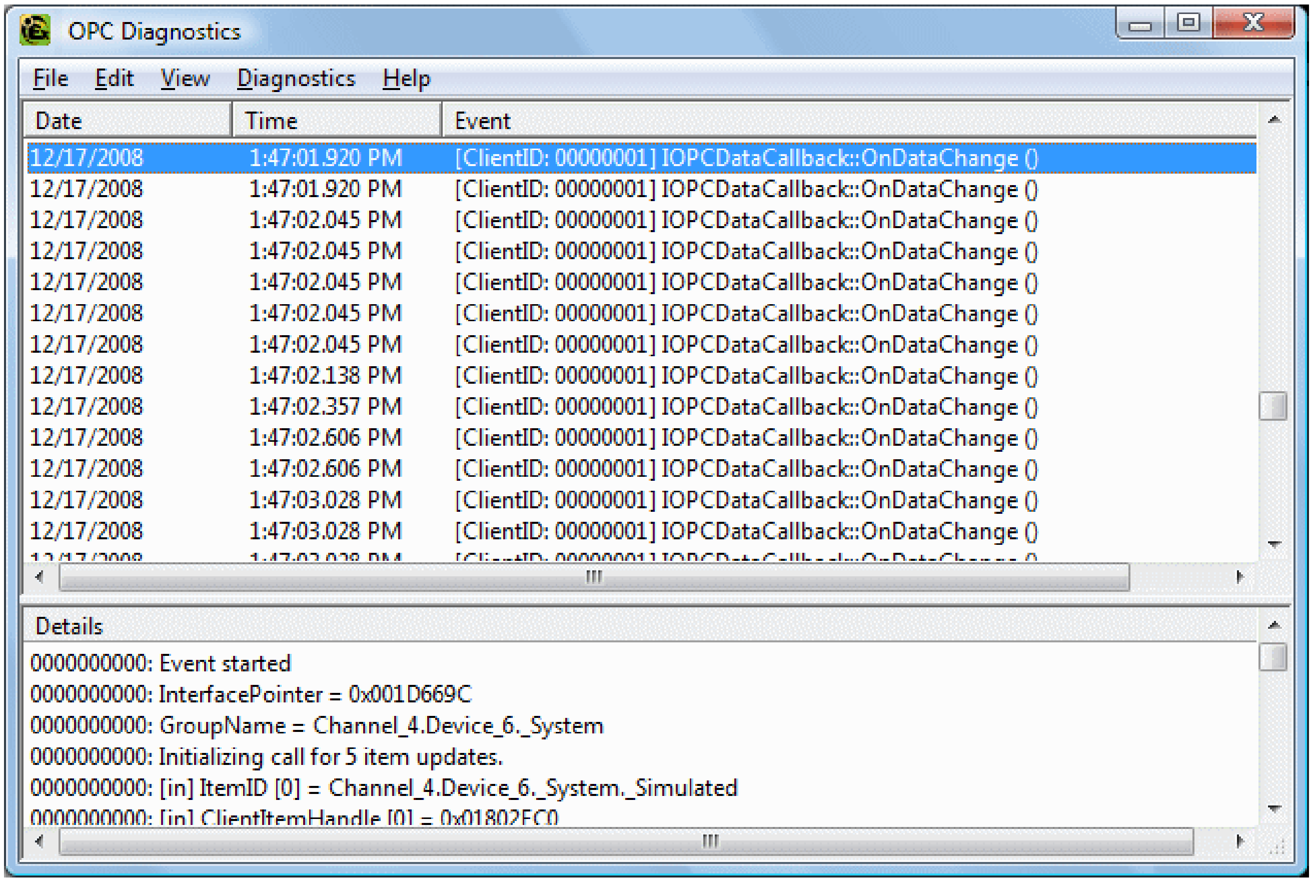
Communications problems may occur upon occasion that require insight to their cause. In these situations, an advanced user can employ the various Diagnostics views available to help determine what the communications problem may be. Two diagnostic tools available in the server are the **OPC Diagnostics Window** and **Channel Diagnostics**. These views provide both server and driver level Diagnostics for advanced users.

Note: Diagnostics should only be utilized when debugging or trouble-shooting because it may affect performance.

OPC Diagnostic Window

The OPC Diagnostics Window provides a real-time and historical view of OPC events that occur between any OPC client and the server. An event is a method call that a client makes into the server, or a callback the server makes into a client. This window is separate from the main server configuration window, which can be used to hide the window even while diagnostics are being captured. In the event that there is an issue between a client and the server, the Diagnostics Window can be opened to display the events that have occurred. The operation of this view can be controlled through the menu, toolbar or by right-clicking in the Event Window.

The events and details captured by this utility are specific to the OPC Data Access 1.0, 2.0 and 3.0 Custom Specifications. To determine the meaning of the data presented by this window, refer to those specifications. Copies of these specifications can be found on the OPC Foundation web site: www.opcfoundation.org.



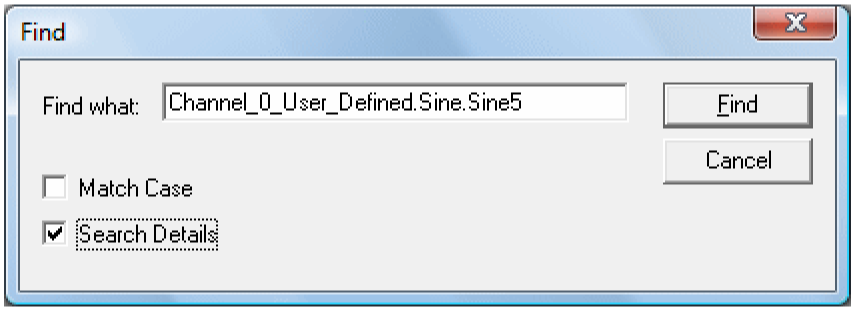
Date	Time	Event
12/17/2008	1:47:01.920 PM	[ClientID: 00000001] IOPCDataCallback::OnDataChange ()
12/17/2008	1:47:01.920 PM	[ClientID: 00000001] IOPCDataCallback::OnDataChange ()
12/17/2008	1:47:02.045 PM	[ClientID: 00000001] IOPCDataCallback::OnDataChange ()
12/17/2008	1:47:02.045 PM	[ClientID: 00000001] IOPCDataCallback::OnDataChange ()
12/17/2008	1:47:02.045 PM	[ClientID: 00000001] IOPCDataCallback::OnDataChange ()
12/17/2008	1:47:02.045 PM	[ClientID: 00000001] IOPCDataCallback::OnDataChange ()
12/17/2008	1:47:02.045 PM	[ClientID: 00000001] IOPCDataCallback::OnDataChange ()
12/17/2008	1:47:02.138 PM	[ClientID: 00000001] IOPCDataCallback::OnDataChange ()
12/17/2008	1:47:02.357 PM	[ClientID: 00000001] IOPCDataCallback::OnDataChange ()
12/17/2008	1:47:02.606 PM	[ClientID: 00000001] IOPCDataCallback::OnDataChange ()
12/17/2008	1:47:02.606 PM	[ClientID: 00000001] IOPCDataCallback::OnDataChange ()
12/17/2008	1:47:03.028 PM	[ClientID: 00000001] IOPCDataCallback::OnDataChange ()
12/17/2008	1:47:03.028 PM	[ClientID: 00000001] IOPCDataCallback::OnDataChange ()

Details

```
0000000000: Event started
0000000000: InterfacePointer = 0x001D669C
0000000000: GroupName = Channel_4.Device_6._System
0000000000: Initializing call for 5 item updates.
0000000000: [in] ItemID [0] = Channel_4.Device_6._System._Simulated
0000000000: [in] ClientItemHandle [0] = 0x01802FC0
```

OPC Diagnostic Features

The **Find Dialog** can be used to search for specific text within the diagnostics view. This aids in the debugging of a particular issue by allowing users to search for key information transferred between the client and server. For example, all actions on a particular Item ID or group name can easily be found using the search functionality.



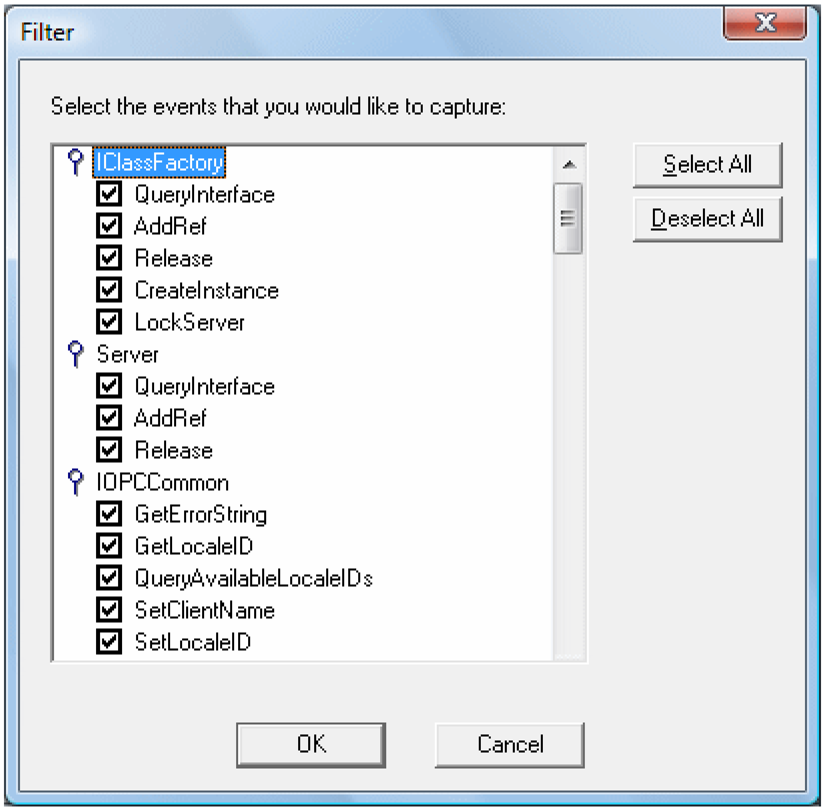
Find what: Channel_0_User_Defined.Sine.Sine5

Match Case: [ ]
Search Details: [✓]

Users can specify whether the search criteria should be case-sensitive by selecting the **Match Case** checkbox, or whether or not to include details in the search by selecting the **Search Details** checkbox.

When an event or detail with the specified text is found, the line containing the text is highlighted. Press **F3** to perform a **Find Next** operation which will look for the next occurrence of the specified text. When the last occurrence is found a message box indicating this condition will be posted. To change the search criteria at any time, press **Ctrl+F** to invoke the **Find Dialog**.

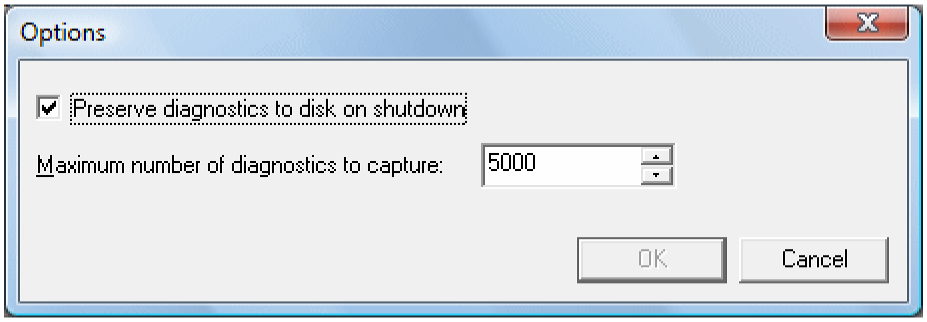
The **Filter Dialog** can be used to select which events will be captured. This aids in debugging a particular issue by eliminating events that do not pertain to a particular issue. For example, most clients will make continuous GetStatus calls into the server to determine that the server is still available. Filtering this event will simplify the diagnostics data to examine.



Each method (such as, GetErrorString) of every OPC Data Access 1.0, 2.0 and 3.0 interface (such as, IOPCCommon) supported by the server is available as a filter. Users can select a method by clicking the checkbox to the left of the method name. Additionally, users can select all methods of an interface by double-clicking the interface name. By default, all methods for all interfaces are selected.

Note: Filter changes apply only to new events captured. Previous events that meet the filter criteria will not be removed from the view.

The **Options Dialog** is used to control certain functionality built into the OPC diagnostics feature.


Options

☑ Preserve diagnostics to disk on shutdown

Maximum number of diagnostics to capture: 5000

Remember that the performance of the server is affected by capturing diagnostic information, as it is an additional layer of processing that occurs between all client/server communications. The OPC diagnostic information is saved to the installation directory under the file name **autosave.opcdiag**. The file is only created on shutdown. This functionality is turned off by default.

Users can also decide whether of not to persist OPC diagnostic information to disk when the server is shutdown by selecting the **Preserve diagnostics to disk on shutdown**. This can be useful if users need to go back in time to determine where a particular issue may have occurred. Users can also create a backup of diagnostics data at any time through the **File | Save As** menu option. By default, this functionality is turned on.

Since diagnostic information affects memory/file storage, users can decide the maximum number of OPC diagnostic events that should be captured at any specific time by modifying the **Maximum number of diagnostics to capture**. This value only pertains to the number of events and does not include the number of details, as the detail count for a particular event could be potentially very high. The range for this setting is 1000 to 30000. The default value is 5000.

OPC Diagnostic Events

Click on a link below to jump to any of the following OPC Diagnostic Events.

IClassFactory

The IClassFactory interface contains several methods intended to deal with an entire class of objects. It is implemented on the class object for a specific class of objects and is identified by a CLSID.

- **QueryInterface** - The client can ask the object whether it supports any outgoing interfaces by calling QueryInterface for IConnectionPointContainer. If the object answers "yes" by handing back a valid pointer, the client knows it can attempt to establish a connection.
- **AddRef** - Increments the reference count for an interface on an object. It should be called for every new copy of a pointer to an interface on a given object.
- **Release** - Decreases the reference count of the interface by 1.
- **CreateInstance** - Creates an uninitialized object.
- **LockServer** - Allows instances to be created quickly when called by the client of a class object to keep a server open in memory.

Server

The client calls CoCreateInstance to create the Server object and the initial interface.

- **QueryInterface -** The client can ask the object whether it supports any outgoing interfaces by calling QueryInterface for IConnectionPointContainer. If the object answers "yes" by handing back a valid pointer, the client knows it can attempt to establish a connection.
- **AddRef** - Increments the reference count for an interface on an object. It should be called for every new copy of a pointer to an interface on a given object.
- **Release** - Decreases the reference count of the interface by 1.

IOPCCommon

This interface is used by all OPC Server types (DataAccess, Alarm&Event, Historical Data and etc.). It provides the ability to set and query a Locale ID which would be in effect for the particular client/server session. That is, the actions of one client do not affect other clients.

- **GetErrorString** - Returns the error string for a server specific error code. The expected behavior is that this will include handling of Win32 errors as well (such as RPC errors).
- **GetLocale ID** - Returns the default Locale ID for this server/client session.
- **QueryAvailableLocale IDs** - Returns the available Locale IDs for this server/client session.
- **SetClientName** - Allows the client to optionally register a client name with the server. This is included primarily for debugging purposes. The recommended behavior is that users set the Node name and EXE name here.
- **Set LocalID** - Sets the default Locale ID for this server/client session. This Locale ID will be used by the GetErrorString method on this interface. The default value for the server should be LOCALE_SYSTEM_DEFAULT.

IOPCServer

This is the main interface to an OPC server. The OPC server is registered with the operating system as specified in the Installation and Registration Chapter of this specification.

- **AddGroup** - Adds a Group to a Server. A Group is a logical container for a client to organize and manipulate data items.
- **CreateGroupEnumerator** - Creates various enumerators for the groups provided by the Server.
- **GetErrorString** - Returns the error string for a server specific error code.
- **GetGroupByName** - Returns an additional interface pointer when given the name of a private group (created earlier by the same client). Use GetPublicGroupByName to attach to public groups. This function can be used to reconnect to a private group for which all interface pointers have been released.
- **GetStatus** - Returns current status information for the server.
- **RemoveGroup** - Deletes the Group. A group is not deleted when all the client interfaces are released, since the server itself maintains a reference to the group. The client may still call GetGroupByName after all the interfaces have been released. RemoveGroup() causes the server to release it's 'last' reference to the group, which results in the group being deleted.

IConnectionPointContainer(Server)

This interface provides the access to the connection point for IOPCShutdown.

- **EnumConnectionPoints** - Creates an enumerator for the connection points supported between the OPC Group and the Client. OPCServers must return an enumerator that includes IOPCShutdown. Additional vendor specific callbacks are allowed.
- **FindConnectionPoints** - Finds a particular connection point between the OPC Server and the Client. OPCServers must support IID_IOPCShutdown. Additional vendor specific callbacks are allowed.
- **IConnectionPoint(Server)** - Establishes a call back to the client.
- **Advise** - Establishes an advisory connection between the connection point and the caller's sink object.
- **EnumConnections** - Creates an enumerator object for iteration through the connections that exist to this connection point.
- **GetConnectionInterface** - Returns the IID of the outgoing interface managed by this connection point.
- **UnAdvise** - Terminates an advisory connection previously established through the Advise method.

IOPCBrowse

IOPCBrowse interface provides improved methods for browsing the server address space and for obtaining the item properties.

- **GetProperties** - Returns an array of OPCITEMPROPERTIES, one for each Item ID.
- **Browse** - Browses a single branch of the address space and returns zero or more OPCBROWSEELEMENT structures.

IOPCBrowseServerAddressSpace

This interface provides a way for clients to browse the available data items in the server, giving the user a list of the valid definitions for an Item ID. It allows for either flat or hierarchical address spaces and is designed to work well over a network. It also insulates the client from the syntax of a server vendor specific Item ID.

- **BrowseAccessPaths** - Provides a way to browse the available AccessPaths for an Item ID.
- **BrowseOPCItem IDs** - Returns an IENUMString for a list of Item IDs as determined by the passed parameters. The position from which the browse is made can be set in ChangeBrowsePosition.
- **ChangeBroserPosition** - Provides a way to move up, down or to in a hierarchical space.
- **GetItem ID** - Provides a way to assemble a fully qualified Item ID in a hierarchical space. This is required since the browsing functions return only the components or tokens that make up an Item ID and do not return the delimiters used to separate those tokens. Also, at each point one is browsing just the names below the current

node (e.g. the units in a cell).
- **QueryOrganization** - Provides a way to determine if the underlying system is inherently flat or hierarchical and how the server may represent the information of the address space to the client. Flat and hierarchical spaces behave somewhat different. If the result is flat then the client knows that there is no need to pass the Branch or Leaf flags to BrowseOPCItem IDs or to call ChangeBrowsePosition.

IOPCItemProperties

This interface can be used to browse the available properties associated with an Item ID as well as to Read the properties' current values.

- **GetItemProperties** - Returns a list of the current data values for the passed ID codes.
- **LockUpItem IDs** - Returns a list of Item IDs for each of the passed ID codes if any are available. These indicate the Item ID which could be added to an OPCGroup and used for more efficient access to the data corresponding to the Item Properties.
- **QueryAvailableProperties** - Returns a list of ID codes and descriptions for the available properties for this Item ID. This list may differ for different Item IDs. This list is expected to be relatively stable for a particular Item ID, although it could be affected from time to time by changes to the underlying system's configuration. The Item ID is passed to this function because servers are allowed to return different sets of properties for different Item IDs.

IOPCItemIO

The purpose of this interface is to provide an extremely easy way for simple applications to obtain OPC data.

- **Read** - Reads one or more values, qualities and timestamps for the items specified. This is functionally similar to the IOPCSyncIO::Read method.
- **WriteVQT** - Writes one or more values, qualities and timestamps for the items specified. This is functionally similar to the IOPCSyncIO2::WriteVQT except that there is no associated group. If a client attempts to write VQ, VT, or VQT it should expect that the server will Write them all or none at all.
- **Group** - The client calls CoCreateInstance to create the Server object and the initial interface.
- **QueryItnerface** - The client can ask the object whether it supports any outgoing interfaces by calling QueryInterface for IConnectionPointContainer. If the object answers "yes" by handing back a valid pointer, the client knows it can attempt to establish a connection.
- **AddRef** - Increments the reference count for an interface on an object. It should be called for every new copy of a pointer to an interface on a given object.
- **Release** - Decreases the reference count of the interface by 1.

IOPCGroupStateMgt

IOPCGroupStateMgt allows the client to manage the overall state of the group. Primarily, this accounts for changes made to the group's update rate and active state.

- **CloneGroup** - Creates a second copy of a group with a unique name.
- **GetState** - Gets the current state of the group. This function is typically called to obtain the current values of this information prior to calling SetState. This information was all supplied by or returned to the client when the group was created.
- **SetName** - Changes the name of a private group. The name must be unique. The name cannot be changed for public groups. Group names are required to be unique with respect to an individual client to server connection.
- **SetState** - Sets various properties of the group. This represents a new group which is independent of the original group.

IOPCGroupStateMgt2

This interface was added to enhance the existing IOPCGroupStateMgt interface.

- **SetKeepAlive** - Causes the server to provide client callbacks on the subscription when there are no new events to report. Clients can then be assured of the health of the server and subscription without resorting to pinging the server with calls to GetStatus().
- **GetKeepAlive** - Returns the currently active keep-alive time for the subscription.
- **IOPCItemMgt** - IOPCItemMgt allows a client to add, remove and control the behavior of items is a group.
- **AddItems** - Adds one or more items to a group. It is acceptable to add the same item to the group more than once, thus generating a second item with a unique ServerHandle.
- **CreateEnumerator** - Creates an enumerator for the items in the group.
- **RemoveItems** - Removes items from a group. Removing items from a group does not affect the address space of the server or physical Device. It simply indicates whether or not the client is interested in those particular items.
- **SetactiveState** - Sets one or more items in a group to active or inactive. This controls whether or not valid data

can be obtained from Read cache for those items and whether or not they are included in the IAdvise subscription to the group. Deactivating items will not result in a callback, since by definition callbacks do not occur for inactive items. Activating items will generally result in an IAdvise callback at the next UpdateRate period.

- **SetClientHandles** - Changes the client handle for one or more items in a group. In general, it is expected that clients will set the client handle when the item is added and not change it later.
- **SetDataTypes** - Changes the requested data type for one or more items in a group. In general, it is expected that clients will set the requested datatype when the item is added and not change it later.
- **ValidateItems** - Determines if an item is valid and could be added without error. It also returns information about the item such as canonical datatype. It does not affect the group in any way.

IOPCItemDeadbandMgt

Force a callback to IOPCDataCallback::OnDataChange for all active items in the group, whether they have changed or not. Inactive items are not included in the callback. The MaxAge value will determine where the data is obtained. There will be only one MaxAge value, which will determine the MaxAge for all active items in the group. This means some of the values may be obtained from cache while others could be obtained from the Device depending on the "freshness" of the data in the cache.

- **SetItemDeadband** - Overrides the deadband specified for the group for each item.
- **GetItemDeadband** - Gets the deadband values for each of the requested items.
- **ClearItemDeadband** - Clears the individual item PercentDeadband, effectively reverting them back to the deadband value set in the group.

IOPCItemSamplingMgt

This optional interface allows the client to manipulate the rate at which individual items within a group are obtained from the underlying Device. It does not affect the group update rate of the callbacks for OnDataChange.

- **SetItemSamplingRate** - Sets the sampling rate on individual items. This overrides the update rate of the group as far as collection from the underlying Device is concerned. The update rate associated with individual items does not affect the callback period.
- **GetItemSamplingRate** - Gets the sampling rate on individual items, which was previously set with SetItemSamplingRate.
- **ClearItemSamplngRate** - Clears the sampling rate on individual items, which was previously set with SetItemSamplingRate. The item will revert back to the update rate of the group.
- **SetItemBufferEnable** - Requests that the server turns on or off, depending on the value of the bEnable parameter, the buffering of data for the identified items, which are collected for items that have an update rate faster than the group update rate.
- **GetItemBufferEnable** - Queries the current state of the servers buffering for requested items.

IOPCSyncIO

IOPCSyncIO allows a client to perform synchronous Read and Write operations to a server. The operations will run to completion.

- **Read** - Reads the value, quality and timestamp information for one or more items in a group. The function runs to completion before returning. The data can be read from cache in which case it should be accurate to within the 'UpdateRate' and percent deadband of the group. The data can be read from the Device, in which case an actual Read of the physical Device must be performed. The exact implementation of cache and Device Reads is not defined by the specification.
- **Write**- Writes values to one or more items in a group. The function runs to completion. The values are written to the Device, meaning that the function should not return until it verifies that the Device has actually accepted or rejected the data. Writes are not affected by the active state of the group or item.

IOPCSyncIO2

This interface was added to enhance the existing IOPCSyncIO interface.

- **ReadMaxAge** - Reads one or more values, qualities and timestamps for the items specified. This is functionally similar to the OPCSyncIO::Read method except no source is specified (Device or cache). The server will make the determination as whether the information will be obtained from the Device or cache. This decision will be based upon the MaxAge parameter. If the information in the cache is within the MaxAge, then the data will be obtained from the cache, otherwise the server must access the Device for the requested information.
- **WriteVQT** - Writes one or more values, qualities and timestamps for the items specified. This is functionally similar to the IOPCSyncIO::Write except that Quality and Timestamp may be written. If a client attempts to write VQ, VT or VQT it should expect that the server will Write to all or none.

IOPCAsyncIO

IOPCAsyncIO allows a client to perform asynchronous Read and Write operations to a server. The operations will be 'queued' and the function will return immediately so that the client can continue to run. Each operation is treated as a 'transaction' and is associated with a Transaction ID. As the operations are completed, a callback will be made to the IAdvise Sink in the client (if one has been established). The information in the callback will indicate the Transaction ID and the error results. By convention, 0 is an invalid Transaction ID.

- **Cancel** - Requests that the server cancel an outstanding transaction.
- **Read** - Reads one or more items in a group. The results are returned via the IAdvise Sink connection established through the IDataObject. For cache Reads the data is only valid if both the group and the item are active. Device Reads are not affected by the active state of the group or item.
- **Refresh** - Forces a callback for all active items in the group, whether they have changed or not. Inactive items are not included in the callback.
- **Write** - Writes one or more items in a group. The results are returned via the IAdviseSink connection established through the IDataObject.

IDataObject

IDataObject is implemented on the OPCGroup rather than on the individual items. This allows the creation of an Advise connection between the client and the group using the OPC Data Stream Formats for the efficient data transfer.

- **DAdvise** - Create a connection for a particular 'stream' format between the OPC Group and the Client.
- **DUnadvise** - Terminate a connection between the OPC Group and the Client.

IAdviseSink

The client only has to provide a full implementation of OnDataChange.

- **OnDataChange** - This method is provided by the client to handle notifications from the OPC Group for exception based data changes, Async Reads and Refreshes and Async Write Complete.

IOPCAsyncIO2

This interface is similar to IOPCAsync(OPC 1.0) and is intended to replace IOPCAsyncIO. It was added in OPC 2.05.

- **Cancel2** - Requests that the server cancel an outstanding transaction.
- **GetEnable** - Retrieves the last Callback Enable value set with SetEnable.
- **Read** - Reads one or more items in a group. The results are returned via the client's IOPCDataCallback connection established through the server's IConnectionPointContainer. Reads are from 'Device' and are not affected by the active state of the group or item.
- **Refresh2** - Forces a callback to IOPCDataCallback::OnDataChange for all active items in the group, whether they have changed or not. Inactive items are not included in the callback.
- **SetEnable** - Controls the operation of OnDataChange. Setting Enable to False will disable any OnDataChange callbacks with a transaction ID of 0 (which are not the result of a Refresh). The initial value of this variable when the group is created is True; thus, OnDataChange callbacks are enabled by default.
- **Write** - Writes one or more items in a group. The results are returned via the client's IOPCDataCallback connection established through the server's IConnectionPointContainer.

IAsyncIO3

This interface was added to enhance the existing IOPCAsyncIO2 interface.

- **ReadMaxAge** - Reads one or more values, qualities and timestamps for the items specified. This is functionally similar to the OPCSyncIO::Read method except it is asynchronous and no source is specified (Device or cache). The server will make the determination as whether the information will be obtained from the Device or cache. This decision will be based upon the MaxAge parameter. If the information in the cache is within the MaxAge, then the data will be obtained from the cache; otherwise, the server must access the Device for the requested information.
- **WriteVQT** - Writes one or more values, qualities and timestamps for the items specified. The results are returned via the client's IOPCDataCallback connection established through the server's IConnectionPointContainer. This is functionally similar to the IOPCAsyncIO2::Write except that Quality and Timestamp may be written. If a client attempts to write VQ, VT or VQT it should expect that the server will Write them all or none at all.
- **RefreshMaxAge** - Forces a callback to IOPCDataCallback::OnDataChange for all active items in the group, whether or not they have changed. Inactive items are not included in the callback. The MaxAge value determines where the data is obtained. There will be only one MaxAge value, which determines the MaxAge for all active items in the group. This means some of the values may be obtained from cache while others can be obtained from the Device, depending on the type of the data in the cache.

IConnectionPointContainer (Group)

This interface provides functionality similar to the IDataObject but is easier to implement and to understand. It also provides the functionality missing from the IDataObject Interface. The client must use the new IOPCAsyncIO2 interface to communicate via connections established with this interface. The 'old' IOPCAsnyc will continue to communicate via

IDataObject connections as in the past.

- **EnumConnectionPoints** - Creates an enumerator for the Connection Points supported between the OPC Group and the Client.
- **FindConnectionPoint** - Finds a particular connection point between the OPC Group and the Client.
- **IconnectionPoint (Group)** - Establishes a call back to the client.
- **Advise** - Establishes an advisory connection between the connection point and the caller's sink object.
- **EnumConnections** - Creates an enumerator object for iteration through the connections that exist to this connection point.
- **GetConnectionInterface** - Returns the IID of the outgoing interface managed by this connection point.
- **GetConnectionPointContainer** - Retrieves the IConnectionPointContainer interface pointer to the connectable object that conceptually owns the connection point.
- **Unadvise** - Terminates an advisory connection previously established through the Advise method.

IOPCDataCallback

In order to use connection points, the client must create an object that supports both the IUnknown and IOPCDataCallback Interface.

- **OnDataChange** - This method is provided by the client to handle notifications from the OPC Group for exception based data changes and Refreshes.
- **OnReadComplete** - This method is provided by the client to handle notifications from the OPC Group on completion of Async Reads.
- **OnWriteComplete** - This method is provided by the client to handle notifications from the OPC Group on completion of AsyncIO2 Writes.
- **OnCancelComplete** - This method is provided by the client to handle notifications from the OPC Group on completion of Async Cancel.

IEnumOPCItemAttributes

IEnumOPCItemAttributes allows clients to find out the contents of a group and the attributes of those items. Most of the returned information is either supplied by or returned to the client at the time it called AddItem.

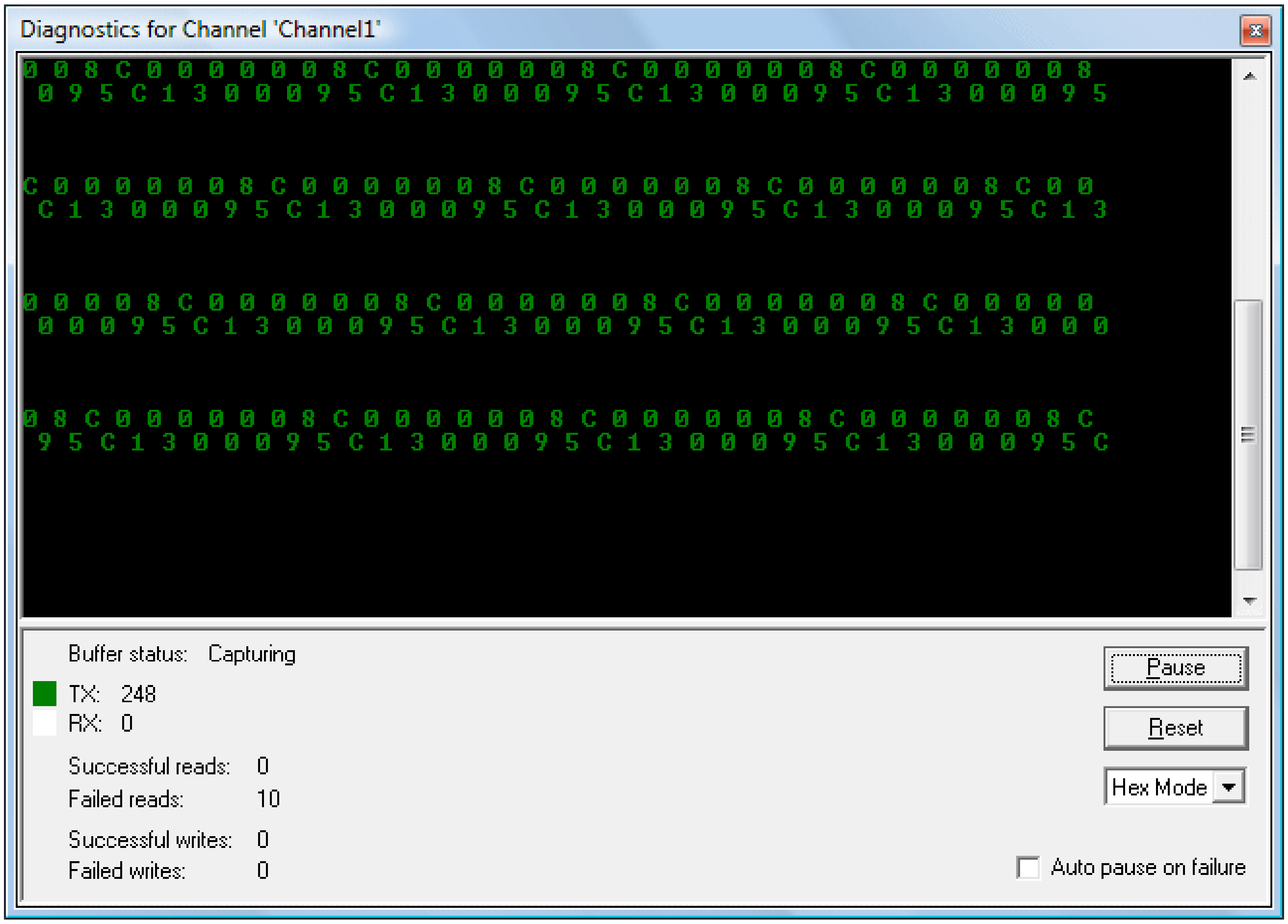
- **Clone** - Creates a second copy of the enumerator. The new enumerator is initially in the same state as the current enumerator.
- **Next** - Fetches the next 'celt' items from the group.
- **Reset** - Resets the enumerator back to the first item.
- **Skip** - Skips over the next 'celt' attributes.

Important: For more information on the general principles of Connection points, refer to Microsoft documentation.

Channel Diagnostics

The server's diagnostic features provides real-time data on the communication driver's performance. All Read and Write operations can either be viewed in the diagnostic display window or tracked directly in the OPC client application by using built-in **Diagnostics Tags**. These diagnostics make it easy to debug communication issues. The diagnostic display window also provides a real-time protocol view, which is useful when making changes to key communication parameter settings (such as baud rate, parity or Device IDs). The changes' effects are displayed in real-time. Once the correct communication and device settings are set, users will immediately see the exchange of data with the device.

To modify the operation of the Diagnostic Window, right-click in the window's protocol view.


Diagnostics for Channel 'Channel1'

```
0 0 8 C 0 0 0 0 0 0 8 C 0 0 0 0 0 0 8 C 0 0 0 0 0 0 8 C 0 0 0 0 0 0 8
 0 9 5 C 1 3 0 0 0 9 5 C 1 3 0 0 0 9 5 C 1 3 0 0 0 9 5 C 1 3 0 0 0 9 5


C 0 0 0 0 0 0 8 C 0 0 0 0 0 0 8 C 0 0 0 0 0 0 8 C 0 0 0 0 0 0 8 C 0 0
 C 1 3 0 0 0 9 5 C 1 3 0 0 0 9 5 C 1 3 0 0 0 9 5 C 1 3 0 0 0 9 5 C 1 3


0 0 0 0 8 C 0 0 0 0 0 0 8 C 0 0 0 0 0 0 8 C 0 0 0 0 0 0 8 C 0 0 0 0 0
 0 0 0 9 5 C 1 3 0 0 0 9 5 C 1 3 0 0 0 9 5 C 1 3 0 0 0 9 5 C 1 3 0 0 0


0 8 C 0 0 0 0 0 0 8 C 0 0 0 0 0 0 8 C 0 0 0 0 0 0 8 C 0 0 0 0 0 0 8 C
 9 5 C 1 3 0 0 0 9 5 C 1 3 0 0 0 9 5 C 1 3 0 0 0 9 5 C 1 3 0 0 0 9 5 C
```

Buffer status: Capturing

🟩 TX: 248

RX: 0

Successful reads: 0

Failed reads: 10

Successful writes: 0

Failed writes: 0

Note: The Diagnostic Window operates in a modeless form that allows it to exist while other dialogs in the server are open.

Diagnostic Controls

Descriptions of the Diagnostics Controls are as follows.

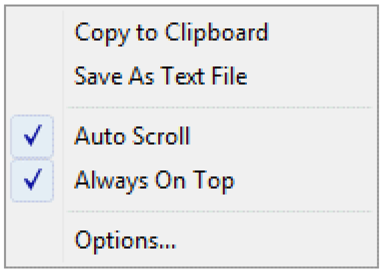
- **Pause** captures and freezes the protocol data in the Diagnostics Window. The Diagnostics Tags will continue to be updated.
- **Reset** clears only the contents of the protocol view and does not affect the Diagnostics Tags.
- **Mode** displays the protocol information in a pure Hex representation (Hex Mode) or in a mixture of ASCII and Hex representation (Mix Mode). Depending on the target device's nature, the Mode selection may need to be changed to provide the best view of the protocol.
- **Auto Pause** on failure function causes the capture buffer of the protocol view to stop whenever either a Read or Write error occurs. This selection is turned off by default and the protocol capture will run in continuous mode. Auto Pause is a great way to capture intermittent communications issues.

Using the Diagnostic Window

Before attempting to use the Diagnostic Window, ensure that diagnostic functions have been enabled in Channel Properties. Next, display the Diagnostic Window by either selecting it from a context menu on the channel or by clicking **View** | **Diagnostics**. Once the diagnostic menu is displayed, it will begin capturing the real-time protocol data. If communications are occurring properly, there will be a stream of communications messages between the server and the device. Users can tell when this is occurring due to both the two-color scheme of the protocol window and by the current counts of the Diagnostics Tags.

If, for some reason, communications do not appear to be occurring normally, the channel's parameters can be accessed easily. The diagnostic window will remain displayed even when users display the Channel Properties for settings like the communications parameters. This allows users to interactively change communications parameters while monitoring the effect in the protocol view. Remember to display the diagnostic window before accessing any parameter dialogs.

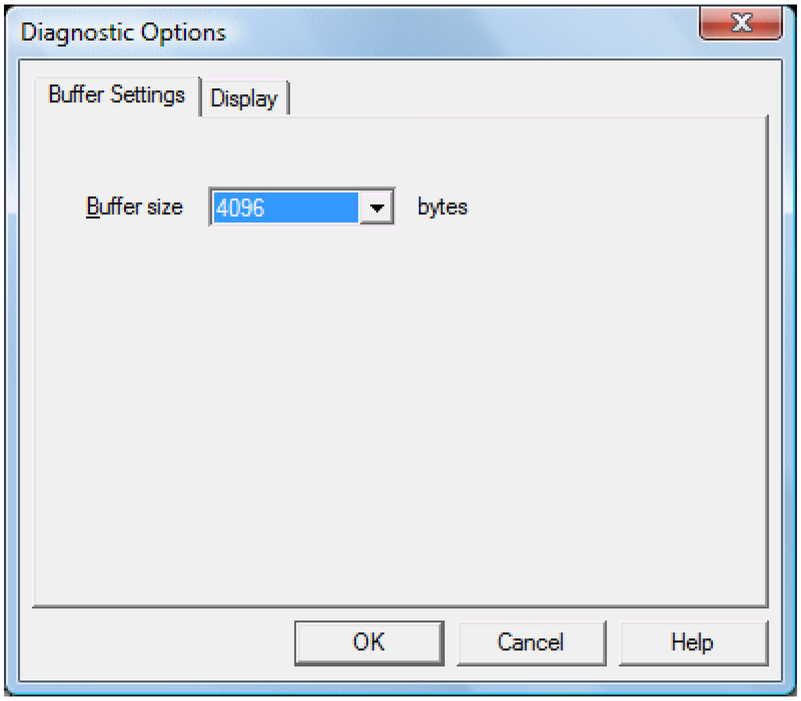
Once the diagnostic window is displayed, various communication and device settings in the channel and device can be modified to see the effect on the communications stream. If a communications problem persists, right-click in the diagnostic window to invoke the context menu. The selections available from this menu can be used to tailor the operation of the diagnostic window and copy the contents of the protocol view to the Clipboard.



Descriptions are as follows.

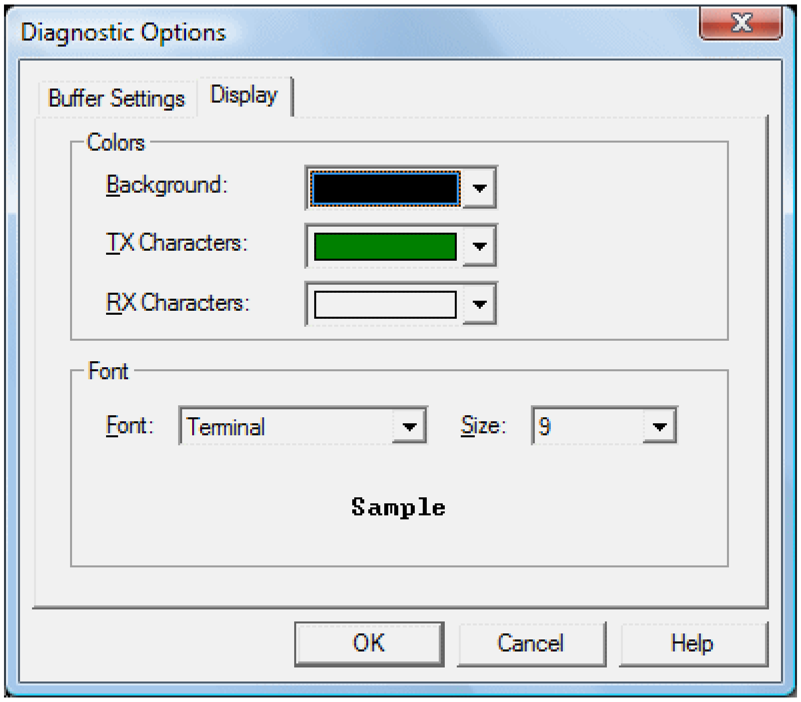
- **Copy to Clipboard** helps Technical Support solve many communications issues when they occur. This selection formats the protocol capture buffer's contents as text for easy "cut and paste" into either an email or fax message (which can then be sent to Technical Support for analysis and diagnosis).
- **Save as Text File** saves the current contents of the protocol view directly to a text file.
- **Auto Scroll** ensures that the protocol view will automatically scroll to the next line as new protocol data is received.
- **Always on Top** forces the Diagnostics Window to remain on the top of all other application windows. This is the default condition.
- **Options...** is used to select a buffer size for the protocol capture buffer, set the font and size used by the protocol view and also assign unique colors to both the transmit and receive data streams.

Buffer Size is used to select a capture buffer of 1024, 2048, 4096, 8192, 16384, 32768 or 65536 bytes. Depending on the device's speed, a larger buffer size may be needed to effectively capture protocol related issues.



Buffer size 4096 bytes

Display is used to tailor the appearance of the protocol view. The Background, TX Characters and RX Characters color selections can be used to select from a palette of 16 available colors. Each selection is required to be unique. The font used by the protocol view can also be selected from this dialog, as well as the size of that font. When selecting a font, keep in mind that it can affect the speed of update if the size is set to large. Larger font sizes also prevent users from being able to see a usable amount of the protocol.



Colors

Background: 🟫

TX Characters: 🟩

RX Characters: ⬜

Font

Font: Terminal

Size: 9

Sample

Basic Server Components

For more information on a specific server component, select a link from the list below.

What is a Channel?
What is a Device?
What is a Tag?
What is a Tag Group?
What is the Alias Map?
What is the Event Log?

What is a Channel?

Channel Functions

A channel represents a communication medium from the PC to one or more external devices. A channel can be used to represent a serial port, a card installed in the PC or an Ethernet socket.

Before adding devices to a project, users must define the channel that will be used when communicating with devices. A channel and a device driver are closely tied. After creating a channel, only devices that the selected driver supports can be added to this channel.

Adding a Channel

Channels are added using the Channel Wizard, which guide users through the channel definition process. To start, users will be prompted for a logical name to assign the channel. This name must be unique among all channels and devices defined in the project. Next, users will be prompted for the device driver that will be used. A list box is presented that displays all of the device drivers currently installed in the system. All serial drivers can be used with multiple channels in the same project.

Note: For hardware card drivers, refer to the driver's help documentation the determine the ability to use with multiple channels in a single project. For information on how to determine the number of supported channels, refer to **Server Summary Information**.

Users will then be prompted for the specific communication parameters to be used. Multiple channels cannot share identical communication parameters; for example, two serial drivers cannot use COM1. For the correct communication parameters of a particular device, refer to both the manufacturer's and the driver's help documentation.

Note: Flow Control settings for serial drivers are primarily used when connecting RS422/485 network devices to the RS232 serial port via a converter. Most RS232 to RS422/485 converters require either no flow control (None) or that the RTS line be on when the PC is transmitting and off when listening (RTS).

The Channel Wizard will finish with a summary of the new channel.

Removing a Channel

To remove a channel from the project, select the desired channel and then press the **Delete** key. Alternatively, select **Edit** | **Delete** from the Edit menu or toolbar.

Displaying Channel Properties

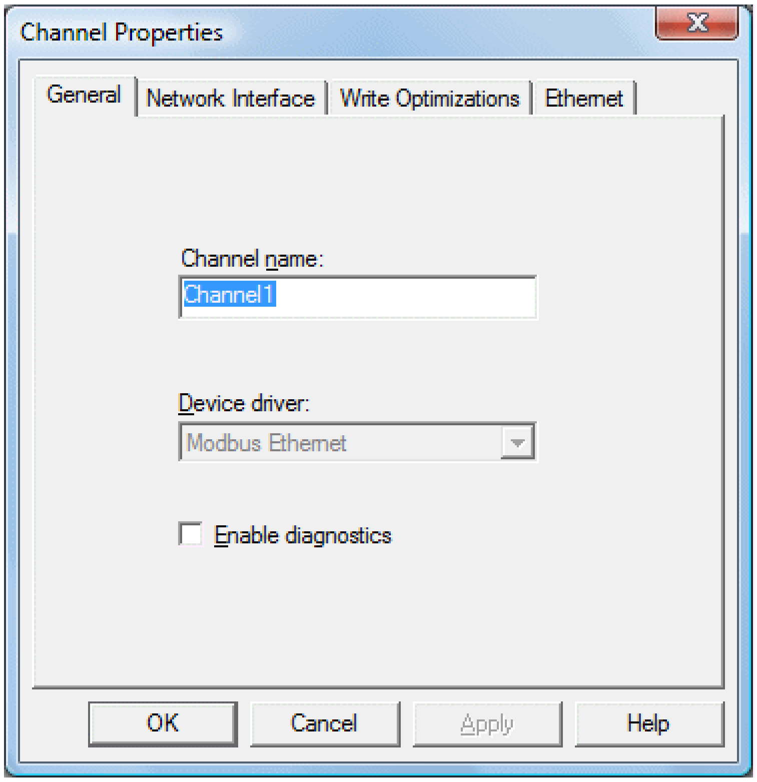
To display the Channel Properties of a specific channel, select the channel and then click **Edit** | **Properties** from the Edit menu or toolbar.

See Also: Channel Properties - General

Channel Properties - General

Each protocol or driver used in a server project is called a channel, which refers to a specific communications driver. A server project can consist of many channels: each with unique communications drivers or each with the same communications driver.

In a server application, every **channel name** must be unique. Although names can be up to 256 characters long, some OPC client applications may have a limited display window when browsing the tag space of an OPC server. The channel name entered will be part of the OPC browser information.



Channel name: Channel1

Device driver: Modbus Ethernet

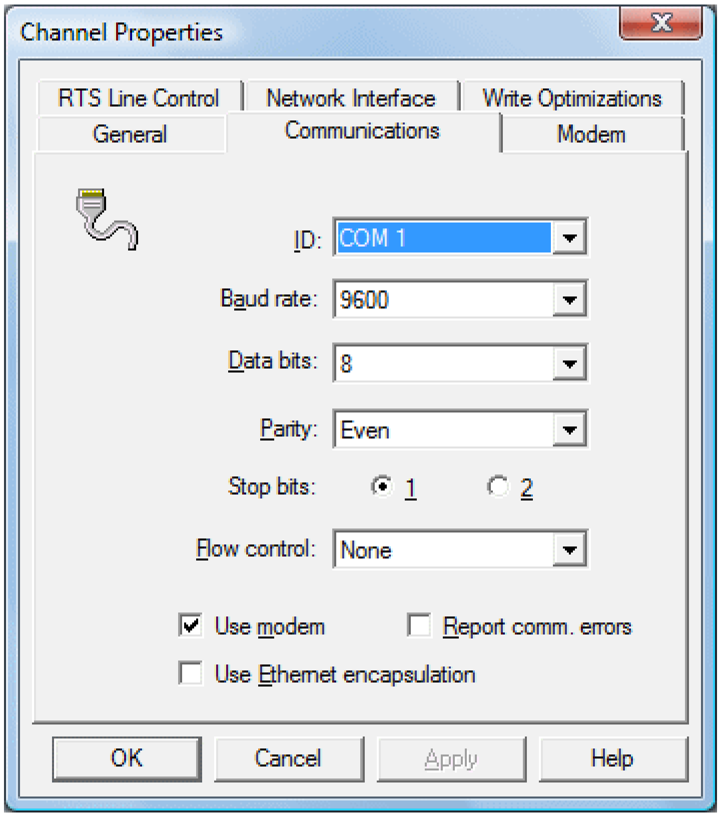
☐ Enable diagnostics

Checking the **Enable** diagnostics check box will make the channel's diagnostic information available to the OPC application. With diagnostic functions enabled, **Diagnostic Tags** and the **OPC Diagnostic Window** can be used within client applications. Because the diagnostic features of the server require a minimal amount of overhead processing, it is recommended that users only utilize the diagnostic features when needed and disable them when not in use. This is the default condition.

Note: With the server's online full-time operation, these parameters can be changed at any time. This includes changing the channel name in order to prevent clients from registering data with the server. If a client has already acquired an item from the server before the channel name is changed, the items will be unaffected. If, after the channel name has been changed, the client application releases the item and attempts to re-acquire using the old channel name, the item will not be accepted. With this in mind, changes to the parameters should not be made once a large client application has been developed. Utilize the User Manager to prevent operators from changing parameters and restrict access rights to server features.

Channel Properties - Communications

The dialog seen under this heading will vary depending on the device driver that has been selected. If a serial device driver has been selected, a dialog should appear similar to the following.



ID: COM 1
Baud rate: 9600
Data bits: 8
Parity: Even
Stop bits: [✓ 1] 2
Flow control: None
[✓] Use modem
[ ] Report comm. errors
[ ] Use Ethernet encapsulation

Users will be asked to provide the following information.

- **ID** specifies the Communications ID that will be used when communicating with devices assigned to the channel.
- **Baud Rate** specifies the baud rate that should be used to configure the selected Communications port.
- **Data Bits** specifies the number of data bits per data word (5, 6, 7, or 8).
- **Parity** specifies the type of parity the data should use (Odd, Even, or None).
- **Stop Bits** specifies the number of stop bits per data word (1 or 2).
- **Flow Control** determines how the RTS and DTR control lines should be utilized.
- **Use Modem:** If planning to use a modem to communicate with devices connected to the port, check this box. This selection is only available if a modem has been defined for the PC.

  If Use Modem has been selected, the next page allows users to select a unique modem to use for each channel. After selecting a modem, users can set the dialing and modem properties for the channel. Dialing properties allow users to specify where the call is coming from and how the server should dial an outside line or long distance number. For these settings to take effect, the phone number must be in **canonical** format. Use the Properties dialog to configure the modem, and refer to the modem's documentation for assistance. **See Also:**

Using a Modem in the Server Project.

- **Report Comm. Errors** turns the reporting of low level communications errors On or Off. When enabled, low-level errors (such as parity, framing and overrun errors) are posted to the Event Log when they occur. When disabled, these same errors will not be posted even though normal request failures will be.
- **Use Ethernet Encapsulation:** Many serial drivers also support Ethernet Encapsulation mode, which uses an Ethernet based serial port gateway instead of the normal PC based serial port. **See Also:** Channel Properties - Ethernet Encapsulation.

Note: With the server's online full-time operation, these parameters can be changed at any time (including communications port, baud rate and etc.). Utilize the User Manager to restrict access rights to server features and prevent operators from changing the parameters. Changes made to these parameters can temporarily disrupt communications.

Flow Control RTS & DTS

Flow control may be required in order to communicate with a specific serial device. Descriptions of the available flow control options are as follows.

- **None:** No control lines are toggled or asserted.
- **DTR:** The DTR line is asserted when the communications port is opened and remains on.
- **RTS:** This specifies that the RTS line will be high if bytes are available for transmission. After all buffered bytes have been sent, the RTS line will be low. This is normally used with RS232/RS485 converter hardware.
- **RTS, DTR:** This is a combination of DTR and RTS as described above.
- **RTS Always:** The RTS line is asserted when the communication port is opened and remains on.
- **RTS Manual:** The RTS line is asserted based upon the timing parameters entered for manual RTS control.

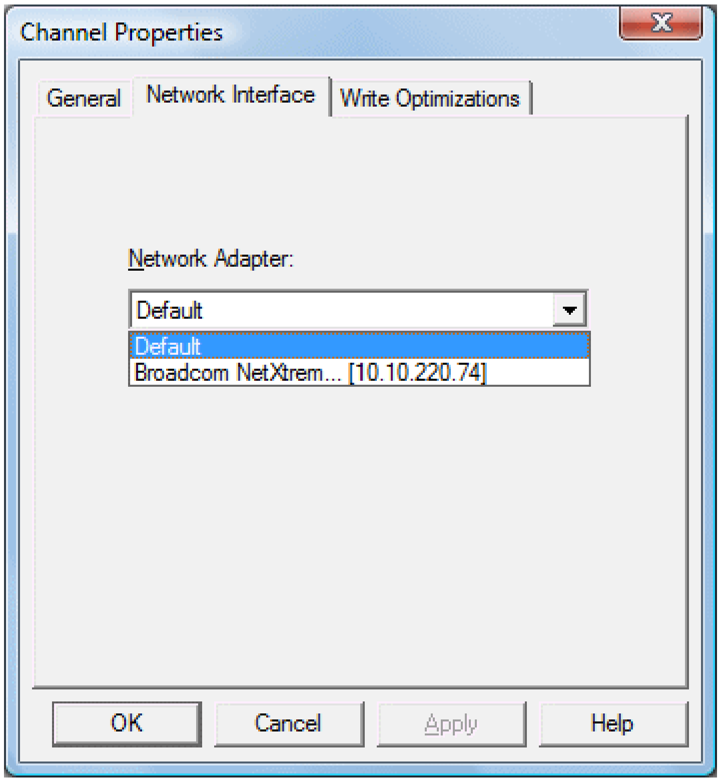
Note: When using 2 wire RS485, "echoes" may occur on the communication lines. Since this communication server's serial drivers do not support echo suppression, it is recommended that the proper RS-485 converter be used in order to avoid issues with echo.

Channel Properties - Network Interface

With the addition of Ethernet Encapsulation, virtually all of the drivers currently available support some form of Ethernet communications. Whether a natively Ethernet based driver or a serial driver configured for Ethernet Encapsulation is being used, some form of a network interface will be used. In most cases, that interface takes the form of a **Network Interface Card (NIC)**. For a PC that has networking installed, this usually means that a single NIC is installed that provides a connection to either the IT or plant floor network (or both). This configuration normally works very well for typical network configurations and loading. While this configuration might be fine for normal performance levels, problems may arise if data needs to be received from an Ethernet device at a regular interval. If the plant floor network is mixed with the IT network, a large batch file transfer could completely disrupt the interval of the plant floor data.

The most common way to deal with this issue is to install a second NIC in the PC. Then, one NIC can be used for accessing the IT network while the other NIC accesses the plant floor data. Although this may sound reasonable, simple problems occur when trying to separate the networks. When using multiple NICs, users must determine the **bind order** . The bind order determines what NIC is used to access different portions of the Ethernet network. In many cases, bind settings can be easily managed using the operating system's tools.

When there is a clear separation between the types of protocols and services that will be used on each NIC card, the bind order can be created by the operating system. If there isn't a clear way to select a specific bind order, users may find that the Ethernet device connection is being routed to the wrong network. In this case, the **Network Interface** shown below can be used to select a specific NIC card to use with the Ethernet driver. The Network Interface selection can be used to select a specific NIC card based on either the NIC name or its currently assigned IP address. This list of available NICs will include either unique NIC cards or NICs that have multiple IP assigned to them. The selection will also display any WAN connections are active (such as a dialup connection).



Network Adapter:

Default

Default
Broadcom NetXtrem... [10.10.220.74]

By selecting a specific NIC interface, users will be able to force the driver to send all Ethernet communication through the specified NIC. When a NIC is selected, the normal operating system bind order is completely bypassed. This ensures that users have control over how the network operates and thus eliminates any guesswork.

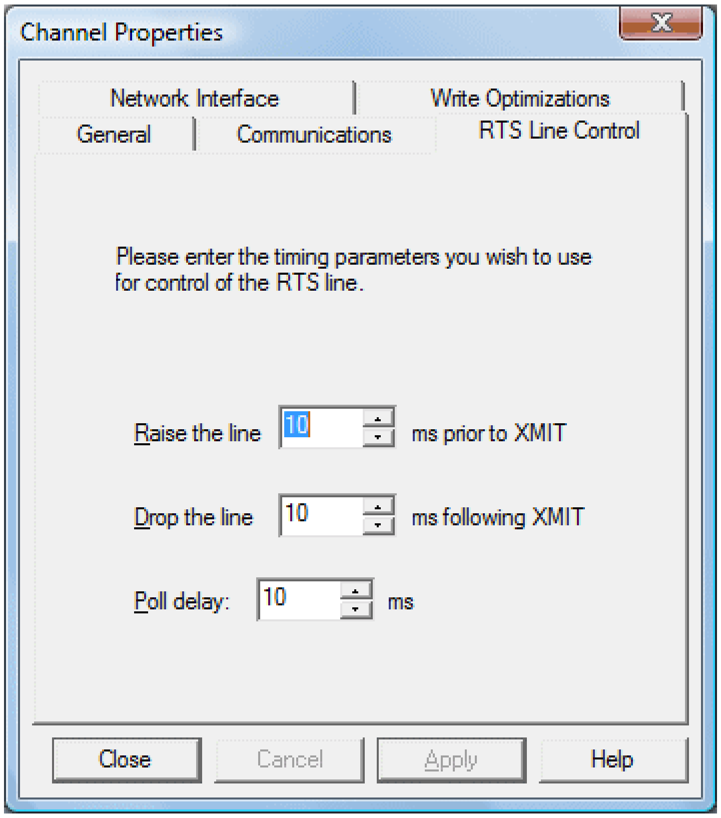
The selections shown in the Network Adapter drop-down menu depend on three things: the network configuration settings, the number of unique NICs installed in the PC and the number of unique IPs assigned to the NICs. In order to force the operating system to create the bind order selection, select Default as the network adapter. This allows the driver to use the operating system's normal bind order to set the NIC that will be used.

Important: Always select the Default condition if unsure of which NIC to use. Similarly, the Default condition is recommended if an Ethernet based device is being used and this feature is exposed through a product upgrade.

Note: With the server's online full-time operation, these parameters can be changed at any time. Utilize the User Manager to restrict access rights to server features and prevent operators from changing the parameters. Keep in mind that changes made to this parameter can temporarily disrupt communications.

Channel Properties - RTS Line Control

The Flow Control selection of RTS Line allows the server to control the operation of the RTS line for use with external devices (such as radio modems) that require additional timing to properly initiate communications.



Please enter the timing parameters you wish to use for control of the RTS line.

Raise the line 10 ms prior to XMIT

Drop the line 10 ms following XMIT

Poll delay: 10 ms

For those drivers that support it, the RTS Line selection enables the setting of three timing parameters. These settings will only appear if the driver in use supports RTS line.

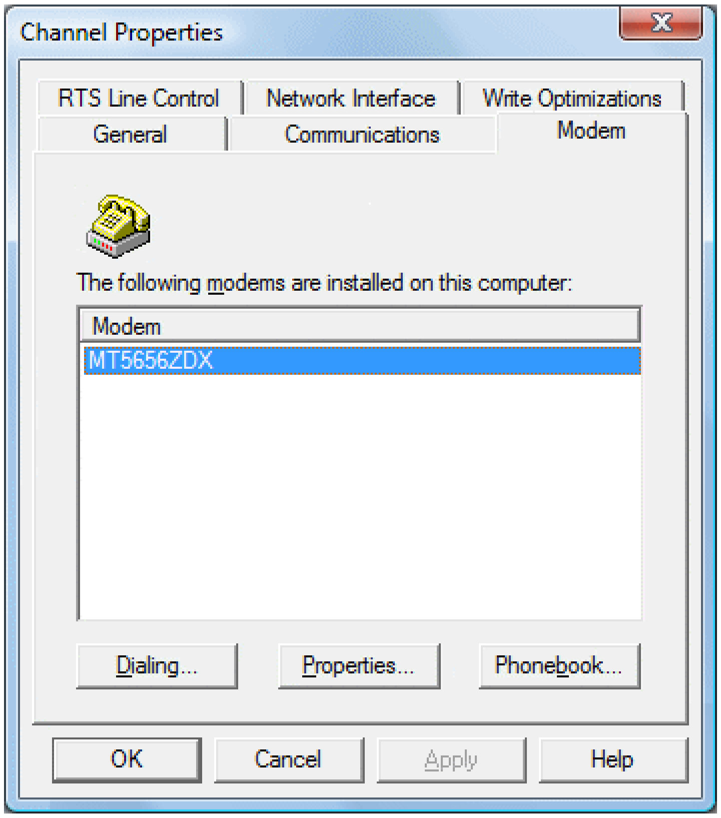
- **Raise the RTS line** controls how long the RTS line will be high before any data is transmitted from the communications port. The time entered is in milliseconds and has a valid range of 0 to 2550 milliseconds. The default is 10 milliseconds.
- **Drop the RTS line** controls how long the RTS line will be held high after any data is transmitted from the communications port. The time entered is in milliseconds and has a valid range of 0 to 2550 milliseconds. The default is 10 milliseconds.
- **Poll Delay** allows a delay to be introduced between each communication request. Some radio modems need a defined amount of settling time before the next transmission can occur. The Poll Delay is used to configure that delay. The time entered is in milliseconds and has a valid range of 0 to 2550 milliseconds. The default is 10 milliseconds.

Note: With the server's online full-time operation, these parameters can be changed at any time. Utilize the User Manager to restrict access rights to specific server features in order to prevent operators from changing the parameters.

Channel Properties - Modem

If Modem Support has been selected for the application, users must select the modem they intend to use for the channel. The Channel Properties - Modem dialog is used to select a modem from the list that are configured for the PC, set its properties and enter Phonebook Tags. Once the modem has been selected, its settings must be configured to match that of the target device. For more information on Modem Configuration , refer to **Using a Modem in the Server Project**.

Once the modem has been properly configured, users can begin using Modem Tags directly in their application to set the desired phone number to dial. Users can also establish a list of phone numbers that can be seen as OPC tags from the OPC client application. The Phonebook Tags, once configured, can be used to automatically dial a desired number simply by writing anything to the tag. To enter a Phonebook Tag, click on the Phonebook button.



The following modems are installed on this computer:

Modem
MT5656ZDX

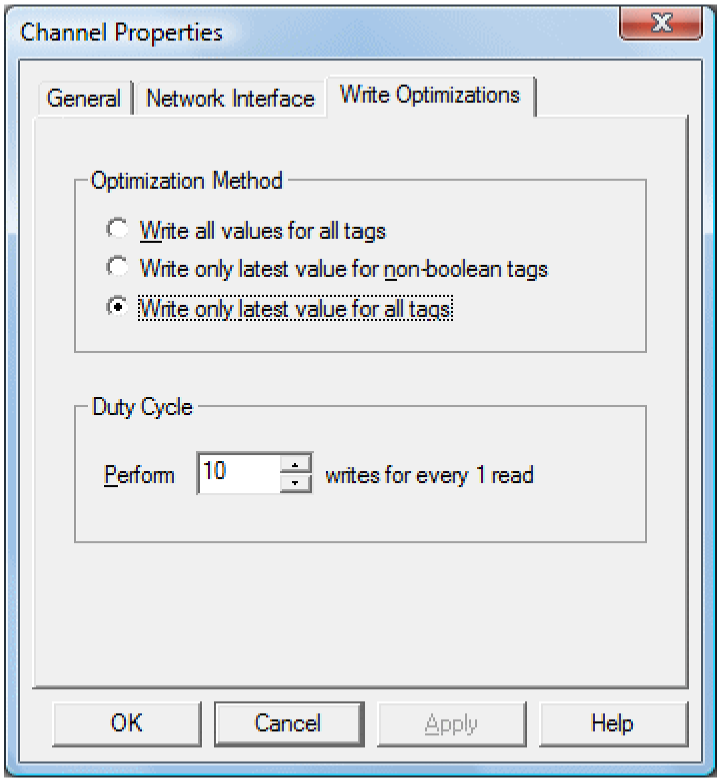
Note: With the server's online full-time operation, these parameters can be changed at any time. Utilize the User Manager to restrict access rights to server features and prevent operators from changing parameters.

Channel Properties - Write Optimizations

As with any OPC server, writing data to the device may be the application's most important aspect. The server's objective is to ensure that the data written from the OPC client application gets to the device in a timely fashion. Given this goal, the server provides a number of optimization settings that can be used to tailor the server to meet specific needs and improve the application's responsiveness.

Optimization Method

The Write Optimization dialog is mainly used to control how Write data is passed to the underlying communications driver as well as to adjust the ratio at which those Writes will be processed and then sent to the device.


Channel Properties

Optimization Method

( ) Write all values for all tags
( ) Write only latest value for non-boolean tags
(●) Write only latest value for all tags

Duty Cycle

Perform 10 writes for every 1 read

1. Write all values for all tags
'Write all values for all tags' forces the server to attempt to Write every value to the controller. In this mode, the server continues to gather OPC Write requests and add them to the server's internal Write queue. Then, the server processes the Write queue and attempts to empty it by writing data to the device as quickly as possible. This mode ensures that everything written from the OPC client applications will be sent to the target device. This mode should be selected if the Write operations's order or the Write item's content must uniquely be seen at the target device. This is the default mode.

2. Write only latest value for non-Boolean tags
Many consecutive Writes to the same value can accumulate in the Write queue, due to the time required to actually send the data to the device. If the server were to update a Write value that has already been placed in the Write queue, far fewer Writes would need to be done to reach the same final output value. In this way, no extra Writes accumulate in the server's queue. When the user stops moving the slide switch, the value in the device is at the correct value at virtually the same time. This is the mode of operation that the second Write optimization mode, 'Write only latest value for non-Boolean tags,' allows. As the mode states, any value that is not a Boolean value will be updated in the server's internal Write queue and will then be sent to the device at the next possible opportunity. This can greatly improve the application's overall performance.

Note: 'Write only latest value for non-Boolean tags' does not attempt to optimize Writes to Boolean values. This allows users to optimize the operation of HMI data (such as the slide switch example) without causing problems with Boolean operations like a momentary push button.

3. Write only the latest value for all tags
'Write only the latest value for all tags' takes the theory behind the second optimization mode and applies it to all tags. It is especially useful if the application only needs to send the latest value to the device. This mode optimizes all Writes by updating the tags currently in the Write queue before they are sent.

Duty Cycle

The Duty Cycle selection is used to control the ratio of Write operations to Read operations. The ratio is always based on one Read for every one to ten Writes. The duty cycle is set to ten by default, meaning that ten Writes will occur for each Read operation. Although the application is doing a large number of continuous Writes, it must be ensured that Read data is still given time to process. A setting of one will result in one Read operation for every Write operation. If there are no Write operations to perform, Reads will be processed continuously.

Note: We strongly suggest that the application be characterized for compatibility with these Write optimization enhancements before they are used in a production environment.

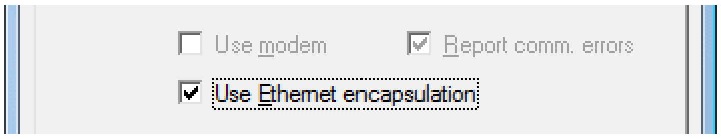
Channel Properties - Ethernet Encapsulation

Ethernet Encapsulation mode has been designed to provide communication with serial devices connected to terminal servers on the Ethernet network. A terminal server is essentially a virtual serial port. The terminal server converts TCP/IP messages on the Ethernet network to serial data. Once the message has been converted to a serial form, users can connect standard devices that support serial communications to the terminal server. For more information, refer to **How Do I..** .

Ethernet Encapsulation can be used over wireless network connections (such as 802.11b and CDPD packet networks) and has also been developed to support a wide range of serial devices. Using a terminal server device allows users to place RS-232 and RS-485 devices throughout the plant operations while still allowing a single localized PC to access the remotely mounted devices. Ethernet Encapsulation also allows an individual Network IP address to be assigned to device as needed. By using multiple terminal servers, users can access hundreds of serial devices from a single PC.

Configuring Ethernet Encapsulation Mode

To use Ethernet Encapsulation, click the **Use Ethernet Encapsulation** checkbox in **Communications Parameters** while in the Channel Wizard. Alternatively, click **Channel Properties** | **Communications** as shown below.

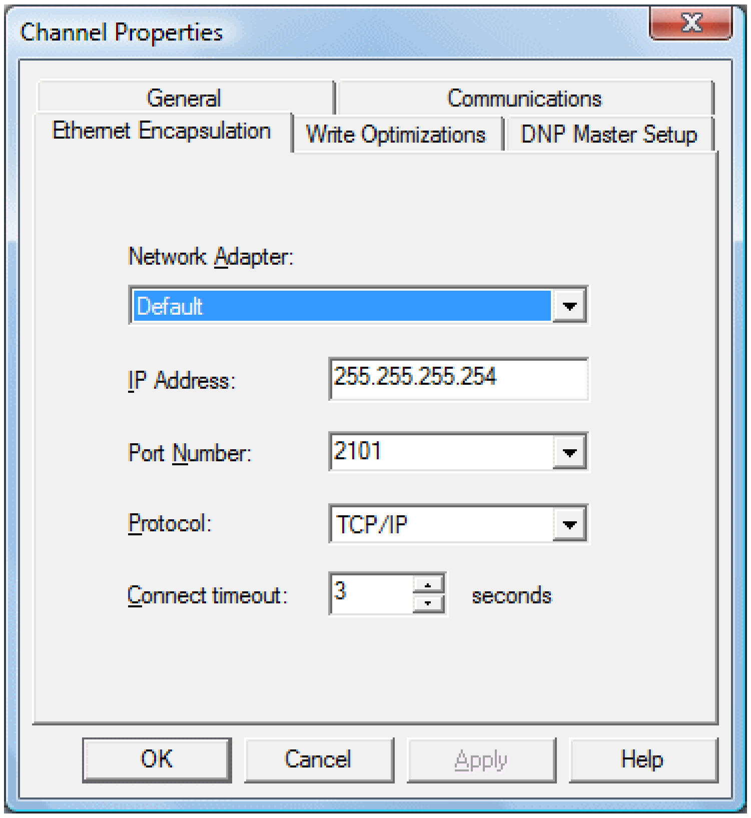


Important: When Ethernet Encapsulation mode is selected, the serial port settings (such as baud rate, data bits and parity) will become greyed out. This occurs because these settings cannot be used in Ethernet Encapsulation mode. The terminal server being used must, however, have its serial port properly configured to match the requirements of the serial device that will be attached to the terminal server.

The server's multiple channel support allows users to have up to 16 channels on each driver protocol. When using multiple channels, a channel can be defined to use the local PC serial port and another channel can be defined to use Ethernet Encapsulation mode.

Channel-level Ethernet Encapsulation Settings

Once Ethernet Encapsulation mode has been enabled, users need to configure its settings. If **Use Ethernet Encapsulation** was checked in the Communications Parameters dialog of the wizard, the settings will be displayed in a Channel Wizard dialog. To access the settings after the channel has been added, right-click on the channel and then select **Properties** | **Ethernet Encapsulation**.



Network Adapter: Default

IP Address: 255.255.255.254

Port Number: 2101

Protocol: TCP/IP

Connect timeout: 3 seconds

- The **Network Adapter** parameter's drop-down list is used to select the network adapter.
- The **IP Address** parameter is used to enter the four-field IP address of the terminal server to which this device is attached. IPs are specified as YYY.YYY.YYY.YYY The YYY designates the IP address: each YYY byte should be in the range of 0 to 255. Each channel will have its own IP address.
- The **Port Number** parameter is used to configure the Ethernet port that will be used when connecting to a remote terminal server. The valid range is from 1 to 65535, with some numbers reserved. The default is 2101.
- The **Protocol** parameter is used to select either TCP/IP or UDP communications and depends entirely on the nature of the terminal server being used. The default protocol selection is TCP/IP. For more information on the protocol available, refer to the terminal server's help documentation.

  Important: The Ethernet Encapsulation mode is completely transparent to the actual serial communications driver. With this in mind, users must configure the remaining device settings just as if they were connecting to the device directly on the local PC serial port.

- The **Connect Timeout** setting defines the amount of time in seconds that is required to establish a socket connection for a remote device to be adjusted. In many cases, the connection time to a device can take longer than a normal communications request to that same device. The valid range is 1 to 999 seconds. The default is 3 seconds.

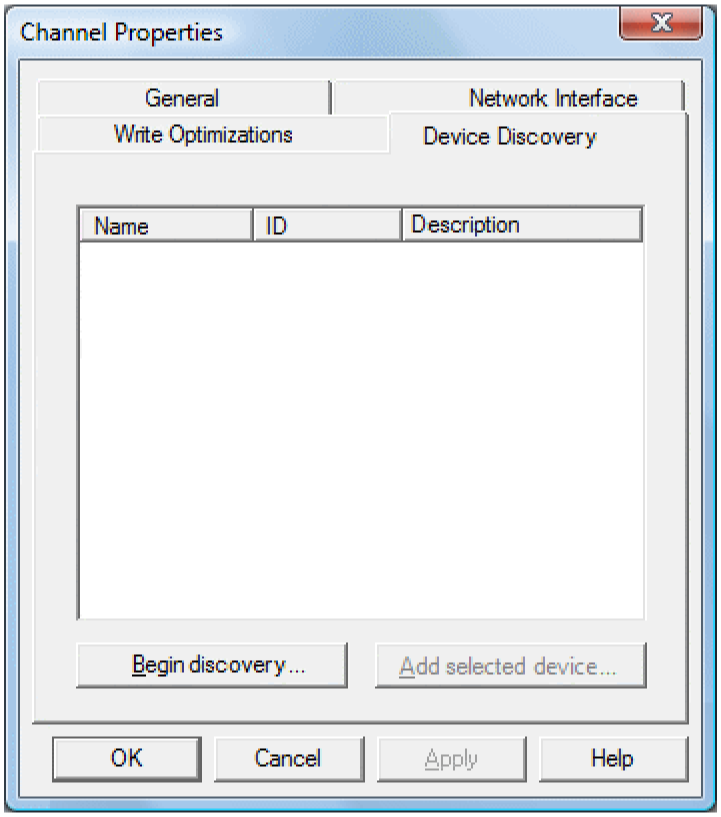
Note: With the server's online full-time operation, these parameters can be changed at any time. Utilize the User Manager to restrict access rights to server features and prevent operators from changing the parameters.

Cable Diagrams

For more information on cables, refer to **How To... Select the Correct Network Cable**.

Channel Properties - Device Discovery

The Device Discovery tab is available for drivers that support device discovery, and is used to specify parameters for locating devices on the network. Once devices are found, they may be added to the channel. The maximum number of devices that can be discovered at once is 65535.



Descriptions of the parameters are as follows:

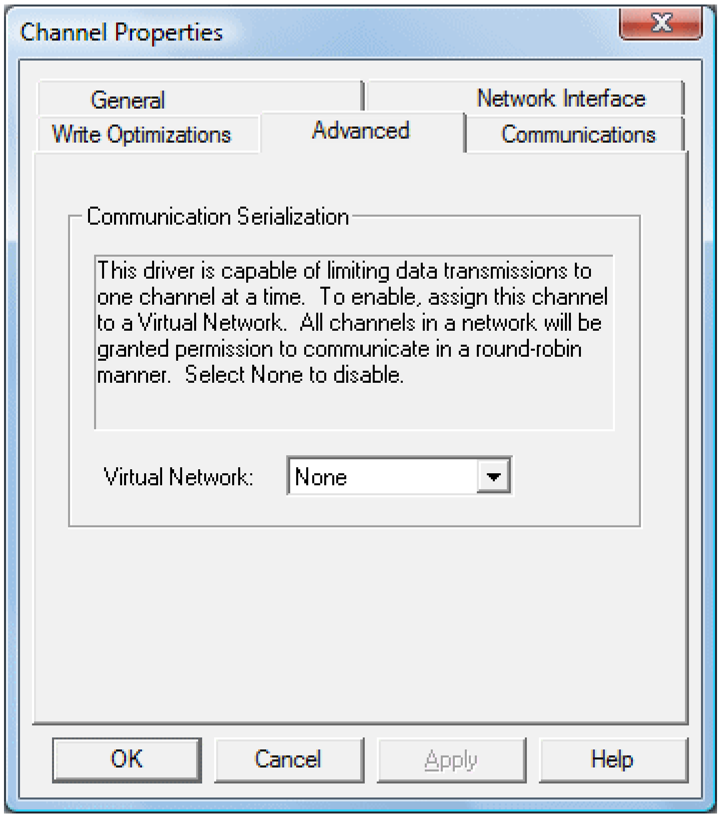
- **Name:** This parameter specifies the name of the discovered device.
- **ID:** This parameter specifies the ID of the discovered device. This may be the Device ID or the device's IP address, depending on the driver being used.
- **Description:** This parameter specifies the description of the discovered device.
- **Begin discovery...:** This button launches the Discovery Settings dialog, which is used to specify the discovery parameters. Its parameters and appearance are driver-specific.
- **Add selected device...:** This button launches the General tab in the driver's **Device Properties**.

Note: For more information on Device Discovery, refer to the driver's help documentation.

Channel Properties - Advanced

Due to the server's multi-threading architecture, channels can communicate with devices independently. In some cases, only one transmitter is allowed in order to avoid collisions (such as with Ethernet radios). Communication serialization addresses this issue by limiting one channel for communication.

The term "virtual network" is used to describe a collection of channels and associated devices that use the same pipeline for communications. For example, the pipeline of an Ethernet radio is the master radio. All channels using the same master radio will associate with the same virtual network. Channels are granted exclusive control of communications in a round-robin manner: the channel will release control when all executed transactions are complete. This means that if the controlling channel has a device that is not responding to a request, the channel cannot release control until the transaction has timed out. This results in data update delays for the other channels in the virtual network.



This driver is capable of limiting data transmissions to one channel at a time. To enable, assign this channel to a Virtual Network. All channels in a network will be granted permission to communicate in a round-robin manner. Select None to disable.

Virtual Network: None

Description of the parameter is as follows:
- **Virtual Network:** This parameter specifies the channel's mode of communication serialization. Options include None and Network 1-Network 50. **None** disables communication serialization for the channel. **Network 1 - Network 50** specifies the virtual network to which the channel will be assigned. The default setting is None.

Important: Not all drivers support communication serialization. To determine whether a specific driver supports communication serialization, refer to its help documentation.

What is a Device?

Device Functions

Devices represent the PLCs or other hardware with which the server communicates. The device driver that the channel is using restricts device selection.

Adding a Device

Devices can be added using the New Device Wizard both at the initial setup and afterwards. To do so, click **Edit** | **New Device**. Users will be prompted to enter the **Device Name**, which is user-defined and should be logical for the device. This will be the browser branch name used in OPC links to access the device's assigned tags. Users will also be prompted to enter a **Network ID**, which is a number or string that uniquely identifies the device on the device's network. Networked, multi-dropped devices must have a unique identifier so that the server's data requests are routed correctly. Devices that are not multi-dropped do not need an ID; thus, this setting is not available.

Removing a Device

To remove a device from the project, select the desired device then press **Delete**. Alternatively, select **Edit** | **Delete** from the Edit menu or toolbar.

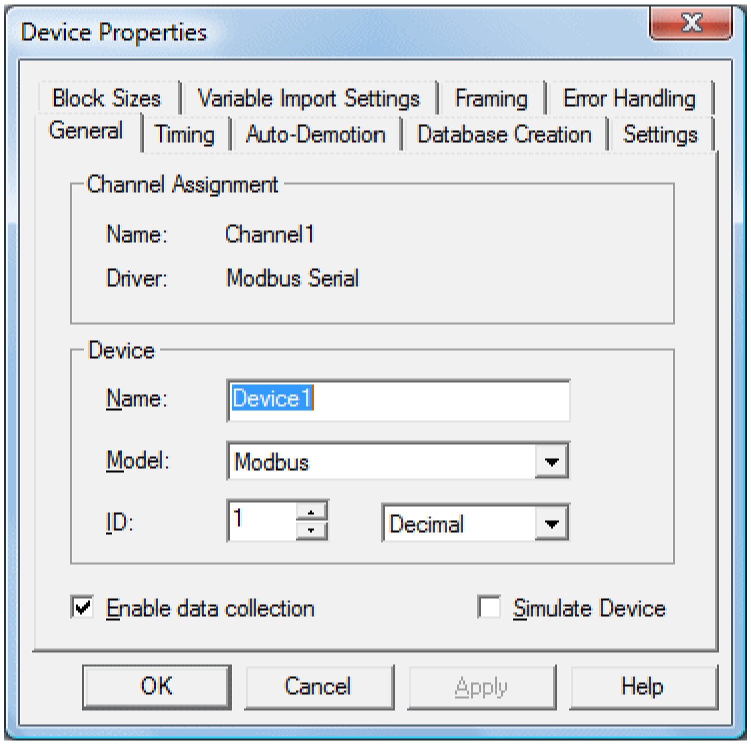
Displaying Device Properties

In order to display a device's properties, first select the device and then click **Edit** | **Properties** from the Edit menu or toolbar.

See Also: Device Properties

Device Properties - General

There are a couple of steps required before a project can be configured. First, a channel must be created. Next, a device, which represents a single target on a communications channel, must be added to that channel. If the chosen driver supports multiple controllers, a Device ID must then be created for each controller. The following images demonstrate the appearance of general Serial and Ethernet Device Properties dialogs.

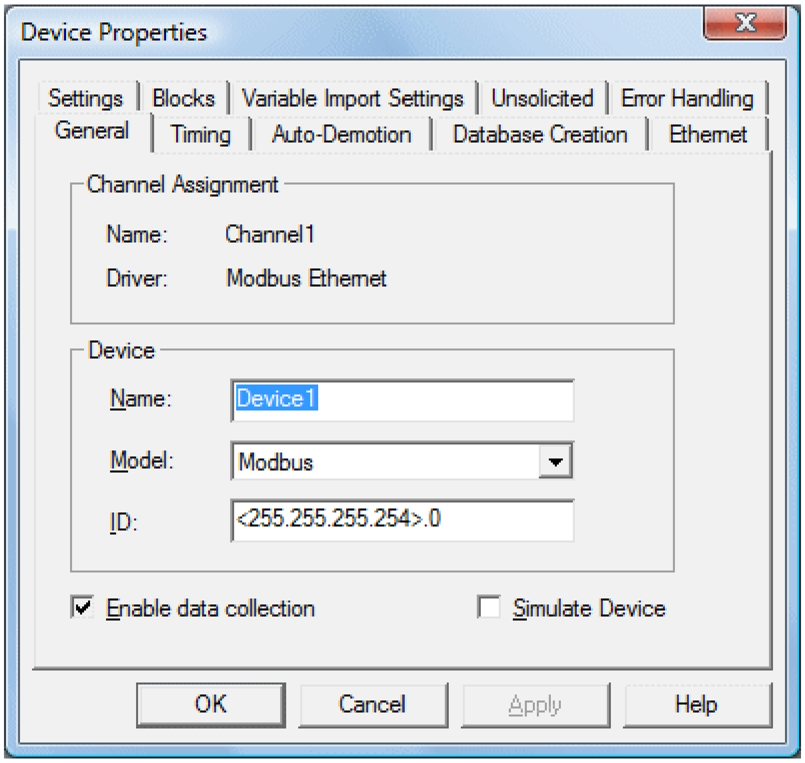


Channel Assignment
Name: Channel1
Driver: Modbus Serial

Device
Name: Device1
Model: Modbus
ID: 1 Decimal

[✓] Enable data collection
[ ] Simulate Device

Figure 1 - Serial Device Properties



Channel Assignment

Name: Channel1

Driver: Modbus Ethernet

Device

Name: Device1

Model: Modbus

ID: <255.255.255.254>.0

[✓] Enable data collection

[ ] Simulate Device

Figure 2 - Ethernet Device Properties

Device Names

Device Names, which are logical user-defined names for the device, can be up to 256 characters long. The same names can be used on multiple channels. While long descriptive names are generally a good idea, some OPC client applications may have a limited display window when browsing the tag space of an OPC server. The device name and channel name will become part of the browse tree information as well.

Within an OPC client, the combination of channel name and device name would appear as "ChannelName.DeviceName".

Model

Model is used to select the specific type of the device associated with this **ID**. The model selection's drop-down menu contents will vary depending on the communications driver. If a driver does not support a specific model, the model will be greyed out. If the communication driver being used supports multiple models, try to match the model selection to the physical device. If the device being used is not represented in the model drop down, select a model that conforms closest to the target device. To determine this, refer to the driver help documentation that discusses each available model. In some drivers, a model selection called **Open** is available, which allows users to communicate without knowing the specific details of the target device.

Device ID

The Device ID is used to specify a device's driver specific station or node. The type of ID entered will depend on the communications driver being used. For many communication drivers, the ID is a numeric value. As shown in Figure 1 above, when a driver supports a numeric ID, the menu option allows users to enter a numeric value. Additionally, the format of the numeric value can be changed to suit the needs of either the application or the characteristics of the chosen communication driver. The format is set by the driver by default. Possible formats include Decimal, Octal and Hexadecimal.

If the driver in use is either Ethernet-based or happens to support an unconventional station or node name, Figure 2 may be shown. In this case, the Device ID is TCP/IP ID. TCP/IP (or UDP IDs) consist of four values separated by periods, with each value containing a range of 0 to 255. Some Device IDs are string based. Depending on the communications driver being used, there may be more parameters to set up within the ID field. For more information on Device IDs, refer to the driver's help documentation.

Enable Data Collection

This parameter is used to control the device's active state. Although device communications are enabled by default, this parameter can be used to disable a physical device for servicing. After a device has been disabled, no communications will be attempted. From a client standpoint, the data will be marked as invalid and Write operations will not be accepted. This parameter can be changed at any time either through the menu selection or by accessing the device's System Tags.

Simulate Device

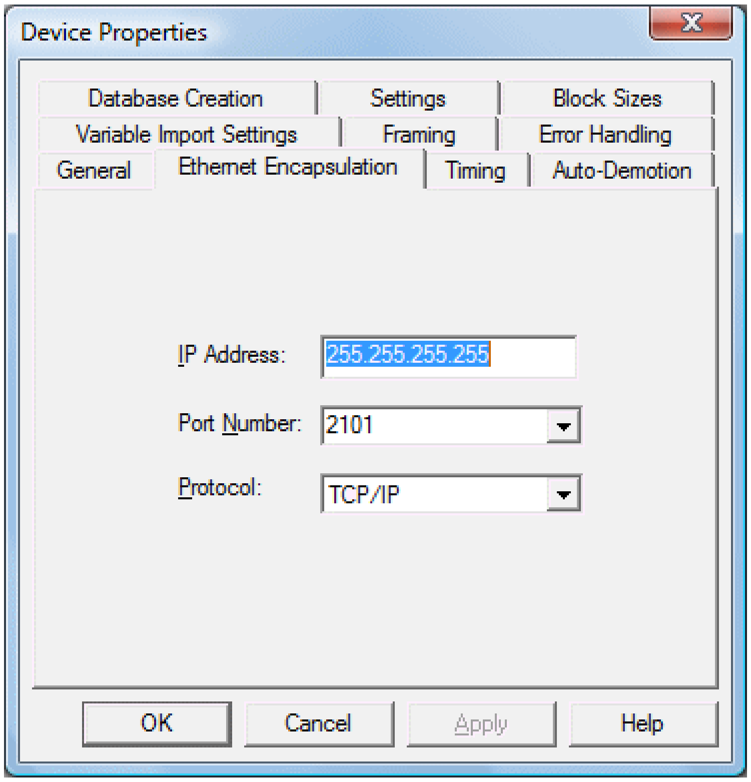
This parameter is used to place the device into a simulation mode. While in simulation mode, the driver will not attempt to communicate with the physical device; however, the server will continue to return valid OPC data. Unlike the **Enable data collection** parameter (which stops physical communications with a given device and places the OPC data into an error state) the Simulate Device stops physical communications with the device but allows OPC data to be returned to the OPC client as valid data. While in Simulation mode, the server will treat all data for the device as reflective, meaning that whatever is written to the simulated device will be Read back. Furthermore, each OPC item is treated individually. The items' memory map is based on the Group Update Rate. The data will not be saved if the server removes the item (such as when the server is reinitialized). Simulation mode is disabled by default. This parameter can be changed at any time either through the menu selection or by accessing the device's System Tags. The system tags also allow this parameter to be monitored from the OPC client. Users may turn off the ability to Write to system tags under OPC DA Settings in the server.

Caution: Simulation mode is for test and simulation purposes only.

Note: With the server's online full-time operation, these parameters can be changed at any time. Changing the Device Name can prevent clients from registering data with the server. If a client has already acquired items from the server before the name was changed, the items will be unaffected. If, after name has changed, the client application releases the item and attempts to reacquire it using the old device name, the item will not be accepted. Thus, users shouldn't make changes to parameters like device name after a large client application has developed. The Device ID parameter can be changed at any time and will take effect immediately. If the communications driver supports multiple device models, the model selection can only be changed if there are currently no client applications connected to the device. Utilize the User Manager to restrict access rights to server features in order to prevent operators from changing parameters.

Device Properties - Ethernet Encapsulation

Ethernet Encapsulation mode has been designed to provide communication with serial devices connected to terminal servers on the Ethernet network. A terminal server is essentially a virtual serial port. The terminal server converts TCP/IP messages on the Ethernet network to serial data. Once the message has been converted to a serial form, users can connect standard devices that support serial communications to the terminal server. For more information, refer to **How to.. Use Ethernet Encapsulation**.



IP Address: 255.255.255.255

Port Number: 2101

Protocol: TCP/IP

Device-level Ethernet Encapsulation Settings

Descriptions of the parameters are as follows.

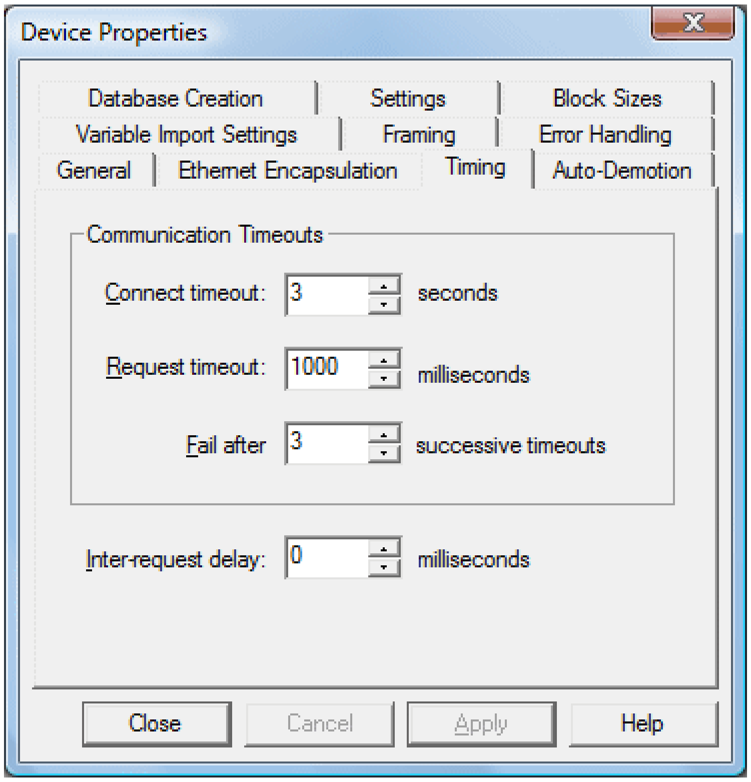
- **IP Address:** This parameter is used to enter the four-field IP address of the terminal server to which the device is attached. IPs are specified as YYY.YYY.YYY.YYY The YYY designates the IP address: each YYY byte should be in the range of 0 to 255. Each serial device may have its own IP address; however, devices may have the same IP address if there are multiple devices multi-dropped from a single terminal server.
- **Port:** This parameter is used to configure the Ethernet port that will be used when connecting to a remote terminal server.
- **Protocol:** This parameter is used to select either TCP/IP or UDP communications. The selection depends on the nature of the terminal server being used. The default protocol selection is TCP/IP. For more information on available protocols, refer to the terminal server's help documentation.

Important: The Ethernet Encapsulation mode is completely transparent to the actual serial communications driver. Thus, the remaining device settings should be configured as if they were connecting to the device directly on the local PC serial port.

Note: With the server's online full-time operation, these parameters can be changed at any time. Utilize the User Manager to restrict access rights to server features and prevent operators from changing the parameters.

Device Properties - Timing

The Device Timing parameters allow the driver's response to error conditions to be tailored to fit the application's needs. In many cases, the environment in which the application runs may require changes to the Timing parameters. Factors such as electrically generated noise, modem delays and bad physical connections can influence how many errors or timeouts a communications driver encounters. Timing parameters are specific to each configured device.



Communication Timeouts

Connect timeout: 3 seconds

Request timeout: 1000 milliseconds

Fail after 3 successive timeouts

Inter-request delay: 0 milliseconds

Connection Timeout

This parameter, used primarily by Ethernet based drivers, controls the amount of time required to establish a socket connection to a remote device. The device's connection time often takes longer than normal communications requests to that same device. The valid range is 1 to 30 seconds. The default is typically 3 seconds, but can vary depending on the driver's specific nature. If this setting is not supported by the driver, it will be disabled.

Note: Due to the nature of UDP connections, the connection timeout setting is not applicable when communicating via UDP.

Request Timeout

This parameter is an interval used by all drivers to determine how long the driver will wait for a response from the target device. The valid range is 100 to 30000 milliseconds. The default is typically 1000 milliseconds but can vary depending on the driver's specific nature. The default timeout for most serial drivers is based on a baud rate of 9600 baud or better. When using the driver at lower baud rates, users may need to increase the timeout to compensate for the increased time required to acquire data.

Fail After

This parameter is used to determine how many times the driver will retry a communications request before considering the request to have failed and the device to be in error. The valid range is 1 to 10 retries. The default is typically 3 retries but can vary depending on the driver's specific nature. The number of retires configured for an application depends largely on the communications environment.

Timeouts

If the environment is prone to noise induced communications failures, users may want to set up the devices for **auto-demotion** or increase the number of retries that the driver performs. If increasing the number of retries, note that when the driver encounters a communication issue, it will attempt to reacquire the data for any lost requests. Based on the "Request timeout" and the "Fail after" count, the driver will pause on a specific request until either the device responds or the timeout and retries have been exceeded. This can potentially decrease the communications of other devices that have been configured on that channel. In this situation, it may be more appropriate to utilize the auto-demotion functionality to optimize communications with other devices on the same channel.

Inter-Request Delay

This parameter is used to specify how long the driver will wait before sending the next request to the target device. It will override the normal polling frequency of tags associated with the device, as well as one-shot Reads and writes. This delay can be useful when dealing with devices with slow turnaround times and in cases where network load is a concern. Configuring a delay for a device will, however, affect communications with all other devices on the channel. Thus, it is recommended that users segregate any device that requires an inter-request delay to a separate channel if possible. The inter-request delay has a valid range of 0 to 30000 milliseconds. The default is 0, indicating that there will be no delay between requests with the target device. This setting will be disabled if it is not supported by the driver. For information on Inter-Request Delay support, refer to the specific driver's help documentation.

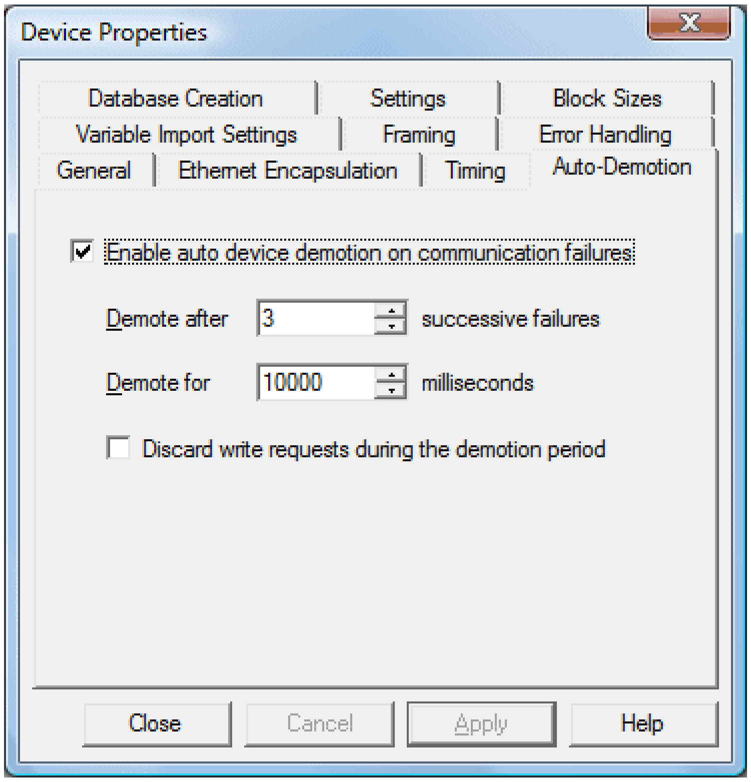
Note 1: To determine when communication errors are occurring, use the device's _System Tag, _Error.

Note 2: With the server's online full-time operation, these parameters can be changed at any time. Utilize the User Manager to restrict access rights to server features in order to prevent operators from changing the parameters.

Device Properties - Auto-Demotion

The Auto-Demotion parameters allow a driver to temporarily place a device off-scan in the event that a device is not responding. By placing a nonresponsive device offline for a specific time period, the driver can continue to optimize its communications with other devices on the same channel. After the time period has been reached, the driver will reattempt to communicate with the nonresponsive device. If the device is responsive, the device will be placed on-scan; otherwise, it will restart its off-scan time period.

Auto-demotion can be turned on by selecting the **Enable auto device demotion on communication failures** checkbox in Device Properties as shown below.



[✓] Enable auto device demotion on communication failures

Demote after 3 successive failures

Demote for 10000 milliseconds

[ ] Discard write requests during the demotion period

There are three other parameters in the Auto-Demotion tab in Device Properties. Descriptions are as follows.

- **Demote after** indicates how many successive cycles of request timeouts and retries will occur before the device is placed off-scan. The valid range is 1 to 30 successive failures. The default is 3 successive failures.
- **Demote for** indicates how long the device should be placed off-scan when the "Demote after" parameter has been reached. During this period, no read requests will be sent to the device and all data associated with the read requests will be set to bad quality. The valid range is 100 to 3600000 milliseconds. The default is 10000 milliseconds. When this period expires, the driver will place the device on-scan and allow for another attempt at communications.
- **Discard write requests during the demotion period** is used to control whether or not Write requests should

be attempted during the off-scan period. The default setting always sends write requests regardless of the demotion period. If users choose to discard writes, the server will automatically fail any write request received from a client and will not post an "Unable to write..." message to the server Event Log.

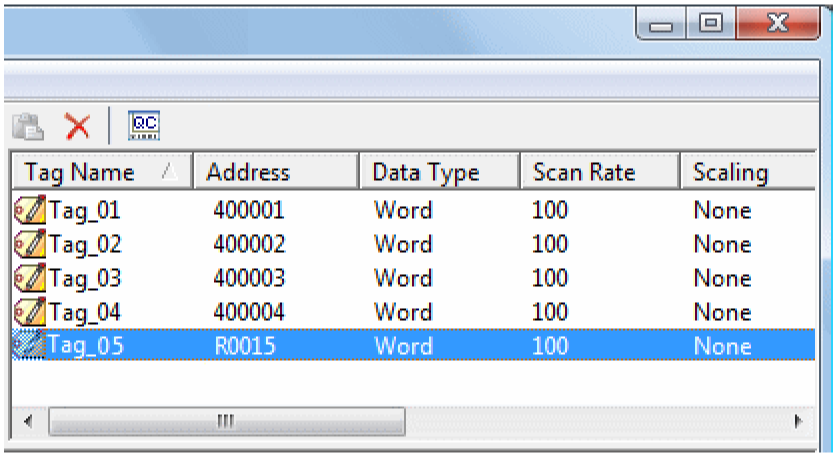
Note: Users can determine when a device is off-scan by monitoring its demoted state by using the _AutoDemoted System Tag.

What is a Tag?

A tag represents addresses within the PLC or other hardware device with which the server communicates. The server allows both Dynamic Tags and user-defined Static Tags. Dynamic Tags are entered directly in the OPC client and specify device data. User-defined Static Tags are created in the server and support tag scaling. They can be browsed from OPC clients that support tag browsing.

Displaying Tag Properties

To invoke the Tag Properties for a specific tag, double-click on it in the Tag Selection pane of the server configuration.

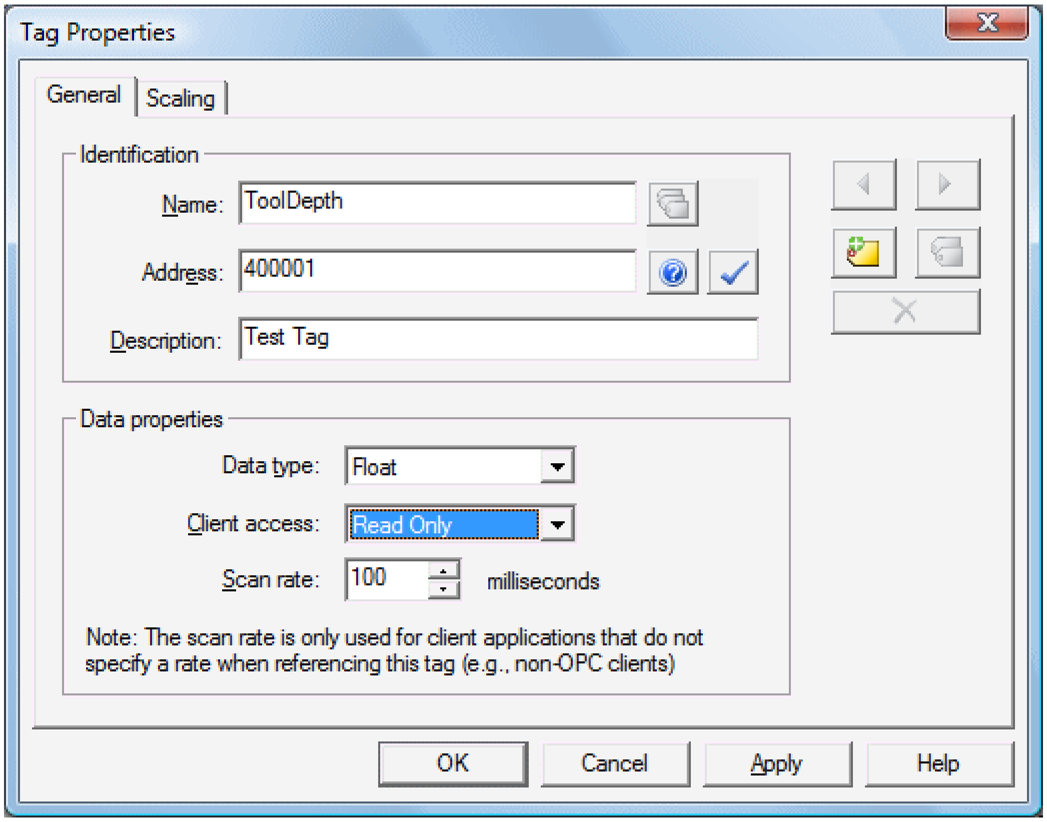


Tag Name	Address	Data Type	Scan Rate	Scaling
Tag_01	400001	Word	100	None
Tag_02	400002	Word	100	None
Tag_03	400003	Word	100	None
Tag_04	400004	Word	100	None
Tag_05	R0015	Word	100	None

Tag Properties - General

A tag represents addresses in the PLC or other hardware device with which the server communicates. The server allows both Dynamic Tags and user-defined Static Tags. Dynamic Tags are entered directly in the OPC client and specify device data. User-defined Static Tags are created in the server and support tag scaling and can be browsed from OPC clients that support tag browsing. For more information, refer to **Dynamic Tags** and **Static User-Defined Tags**.

Note: This dialog contains a number of features that are driven by icons.


Tag Properties

General | Scaling

Identification

Name: ToolDepth

Address: 400001

Description: Test Tag

Data properties

Data type: Float

Client access: Read Only

Scan rate: 100 milliseconds

Note: The scan rate is only used for client applications that do not specify a rate when referencing this tag (e.g., non-OPC clients)

OK | Cancel | Apply | Help

Descriptions of the parameters are as follows:

- **Tag Name:** This parameter is used to enter the string that will represent the data available from the tag. The tag name can be up to 256 characters in length. While using long descriptive names is generally a good idea, some OPC client applications may have a limited display window when browsing the tag space of an OPC server. The tag name is part of the OPC browse data tag names must be unique within a given device branch or tag group branch. If the application is best suited for using blocks of tags with the same names, then use tag groups to segregate the tags. For more information, refer to **Tag Group Properties**.
- **Address:** This parameter is used to enter the tag's desired driver address. The address's format is based on the driver being used. To determine how an address should be entered, click **Hints**. The address entered can be up to 128 characters in length. Once an address has been entered, it can be tested by clicking **Check Address**, which will then attempt to validate the address with the driver. If the driver accepts the address as entered, no message will be displayed. A popup will inform of any error. Some errors will be related to the data type selection and not the address string.

  Note: Hints provide a quick reference guide to the driver's address formats. Users can also access the driver's help documentation from Hints.

- **Description:** This parameter is used to attach a comment to the tag. A string of up to 64 characters can be entered for the description. When using an OPC client that supports Data Access 2.0 Tag Properties, the description parameter will be accessible from the tag's Item Description properties.
- **Data Type:** This parameter is used to specify the format of this tag's data as it is found in the physical device. In most cases, this is also the format of the data as it returned to the client. The data type setting is an important part of how a communication driver Reads and Writes data to a device. For many drivers, the data type of a particular piece of data is rigidly fixed and the driver knows what format needs to be used when reading the device's data. In some cases, however, the interpretation of device data is largely in the user's hands. An example would be a device that uses 16 bit data registers. Normally this would indicate that the data is either a Short or Word. Many register-based devices also support values that span two registers. In these cases the double register values could be a Long, DWord or Float. When the driver being used supports this level of flexibility, users must tell it how to read data for this tag. By selecting the appropriate data type, the driver to is being told to read either one register or two or possibly a Boolean value. The driver governs the data format being choosen. For specific information on available data types, click **Hints** to access the driver's help documentation. Available data type selections are as follows:

Default - This selection allows the driver to choose its default data type.
Boolean - Single bit data On or Off.
Char - Signed 8 bit data.
Byte - Unsigned 8 bit data.
Short - Signed 16 bit data.
Word - Unsigned 16 bit data.
Long - Signed 32 bit data.
DWord - Unsigned 32 bit data.
Float - 32 bit Real value IEEE format.
Double - 64 bit Real value IEEE format.
String - Null terminated ASCII string.
BCD - Two byte-packed BCD value range is 0-9999.
LBCD - Four byte-packed BCD value range is 0-99999999.
Date - 64 bit Real value representing the number of days since December 31, 1899.

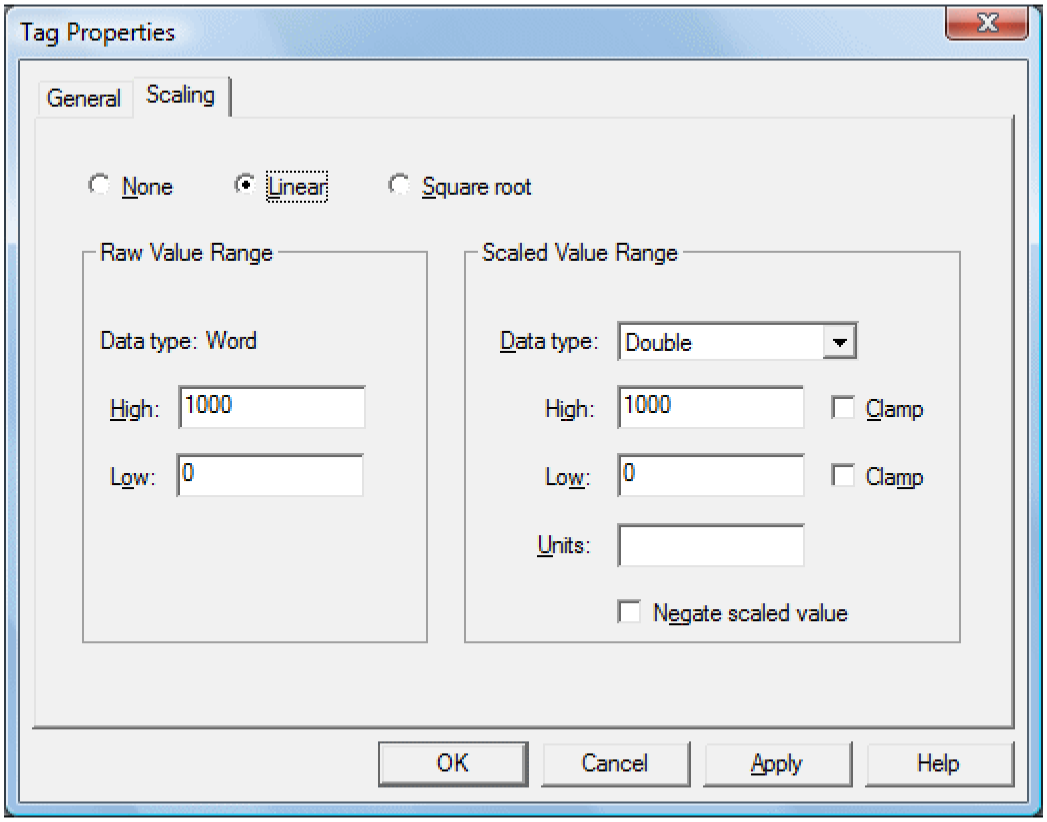
- **Client Access:** This parameter is used to specify whether the tag is **Read Only** or **Read/Write**. By selecting **Read Only**, users can prevent client applications from changing the data contained in this tag. By selecting **Read/Write**, users allow client applications to change this tag's value as needed. The **Client access** selection also affects how the tag appears in the browse space of an OPC client. Many OPC client applications allow users to filter tags based on their attributes. Changing the access method of this tag may change how and when the tag will appear in the browse space of the OPC client.
- **Scan Rate:** This parameter is used to specify the update interval for this tag when used with a non-OPC client. OPC clients can control the rate at which data is scanned by using the update rate that is part of all OPC groups. Normally non-OPC clients don't have that luxury. The server is used to specify an update rate on a tag per tag basis for non-OPC clients. Using the scan rate, users can tailor the bandwidth requirements of the server to suit the needs of the application. If, for example, data that changes very slowly needs to be read, there is no reason to read the value very often. Using the scan rate this tag can be forced to read at a slower rate reducing the demand on the communications channel. The valid range is 10 to 99999990 ms., with a 10 ms. increment. The default is 100 milliseconds.

Note: With the server's online full-time operation, these parameters can be changed at any time. Changes made to Tag Properties will take effect immediately; however, OPC clients that have already connected to this tag will not be affected until they release and attempt to reacquire it. Utilize the User Manager to restrict access rights to server features and prevent operators from changing the parameters.

Tag Properties - Scaling

This server supports Tag Scaling, which allows raw data from the device to be scaled to an appropriate range for the application. To enable tag scaling, select either **Linear** or **Square Root**. Scaling cannot be enabled if None is checked. The formula for both tag scaling types are shown in the table below.

Type	**Formula for Scaled Value**
Linear	(((ScaledHigh - ScaledLow)/(RawHigh - RawLow))*(RawValue - RawLow)) + ScaledLow
Square root	(Square root ((RawValue - RawLow)/(RawHigh - RawLow))*(ScaledHigh - ScaledLow)) + ScaledLow



None [✓ Linear] Square root

Raw Value Range
Data type: Word
High: 1000
Low: 0

Scaled Value Range
Data type: Double
High: 1000 ☐ Clamp
Low: 0 ☐ Clamp
Units:
☐ Negate scaled value

The **Raw Value Range** settings are used to specify the range of raw data from the device. The raw value **High** setting must be greater than the **Low** setting. The valid range depends on the raw tag value's data type. For example, if the raw value is Short, the valid range of the raw value would be from -32768 to 32767.

The **Scaled Value Range** settings are used to specify the range of the resulting scaled value.

Parameter	Definition
Data Type	A scaled value is usually assumed to result in a floating-point value, although the server does not make that assumption. The data type can be set to any valid OPC data type. This gives users the ability to scale from a raw data type such as Short to an engineering value with a data type of Long if needed. The default scaled data type is Double.
High and Low	The scaled value High must be greater than the scaled value Low. The valid range depends on the data type of the scaled value. For example, if the scaled data type is set to Long, then the valid range would be -2147483648 to 2147483647.
Clamp	The raw data from the device may exceed the range that has been specified for the raw data. When this occurs, the scaled value is also forced outside of the established range. To prevent this from occurring, the High and Low Clamps can be used to constrain the scaled value to the range specified.
Units	The server also allows a unit's string to be assigned to a scaled tag. The units' string can be up to 32 characters long.
Negate scaled value	This parameter forces the resulting value to be negated before being passed to the client.

Note 1: The OPC server supports the OPC tag properties available in the 2.0 Data Access specifications. If the OPC client being used supports these properties, it can automatically configure the range of objects (such as user input objects or displays) by using the Scaling settings.

Note 2: With the server's full-time online operation, these parameters can be changed at any time. Changes made to Tag Properties will take effect immediately; however, OPC clients that have already connected to the tag will not be affected until they release and reacquire it. Utilize the User Manager to restrict access rights to server features in order to prevent any unauthorized operator from changing these parameters.

Dynamic Tags

Dynamic Tag addressing is a second method of defining tags. Dynamic Tags allow users to define tags solely in the client application. Thus, instead of creating a tag item in the client that addresses another tag item created in the server, users only need to create tag items in the client that directly accesses the device driver's addresses. On client connect, the server will create a virtual tag for that location and will start scanning for data automatically.

To specify an optional data type, append one of the following strings after the '@' symbol:

- Byte
- Char
- Short
- Word
- Long
- DWord
- Float
- Double
- BCD
- LBCD
- String

If the data type is omitted, the driver will choose a default data type based on the device and address that is being references. The default data types for all locations are documented in each individual driver's help documentation. If the data type specified is not valid for the device location, the server will not accept the tag and an error will be posted in the Event Log window.

OPC Client Using Dynamic Addressing Example

Scan the 16-bit location 'R0001' on the Simulator device. The following Dynamic Tag examples assume that the project created is part of the example.

1. Start the OPC client application and connect to the server.
2. Using the Simulator driver, create a channel and name it **Channel1**. Then, make a device and name it **Device1**.
3. In the client application, define an item name as **Channel1.Device1.R0001@Short**.
4. The client project will automatically start receiving data. The default data type for address R0001 in the Simulator device is **Word**. To override this, the **@Short** has been appended to select a data type of **Short**.

Note: When utilizing Dynamic Tags in an OPC client application, the use of the **@[Data Type]** modifier is not normally required. OPC clients can specify the desired data type as part of the request when registering a link for a specific data item. The data type specified by the OPC client will be used if it is supported by the communications driver. The @[Data Type] modifier can be useful when ensuring that a communications driver interprets a piece of data exactly as needed.

Non-OPC Client Example

Non-OPC clients can override the update rate on a per-tag basis by appending **@[Update Rate]**.

For example, appending "<DDE service name>|_ddedata!Device1.R0001@500" will override just the update rate. "<DDE service name>|_ddedata!Device1.R0001@500,Short" will override both update rate and data type.

See Also: **Static Tags (User-Defined)** and **Designing a Project: Adding User-Defined Tags**.

Note 1: For every device in a project that can be used by a client to determine whether a device is functioning properly, the server creates a special Boolean tag. To use this tag, specify the item in the link as **Error**. The value of this tag is zero if the device is communicating properly; otherwise, it is one.

Note 2: If device address is used as the item of an link such that the address matches the name of a user-defined tag in the server, the link will reference the address pointed to by the user-defined tag.

Note 3: Static Tags must be used in order to scale data in the server.

Static Tags (User-Defined)

The most common method that uses the server to get data from the device to the client application has two requirements. Users must first define a set of tags in the server project and then use the assigned tag name as the item of each link between the client and the server. The primary benefit to using this method is that all user-defined tags are available for browsing within most OPC clients. Before deciding whether or not to create Static Tags, ensure that the client can browse or import tags from the server.

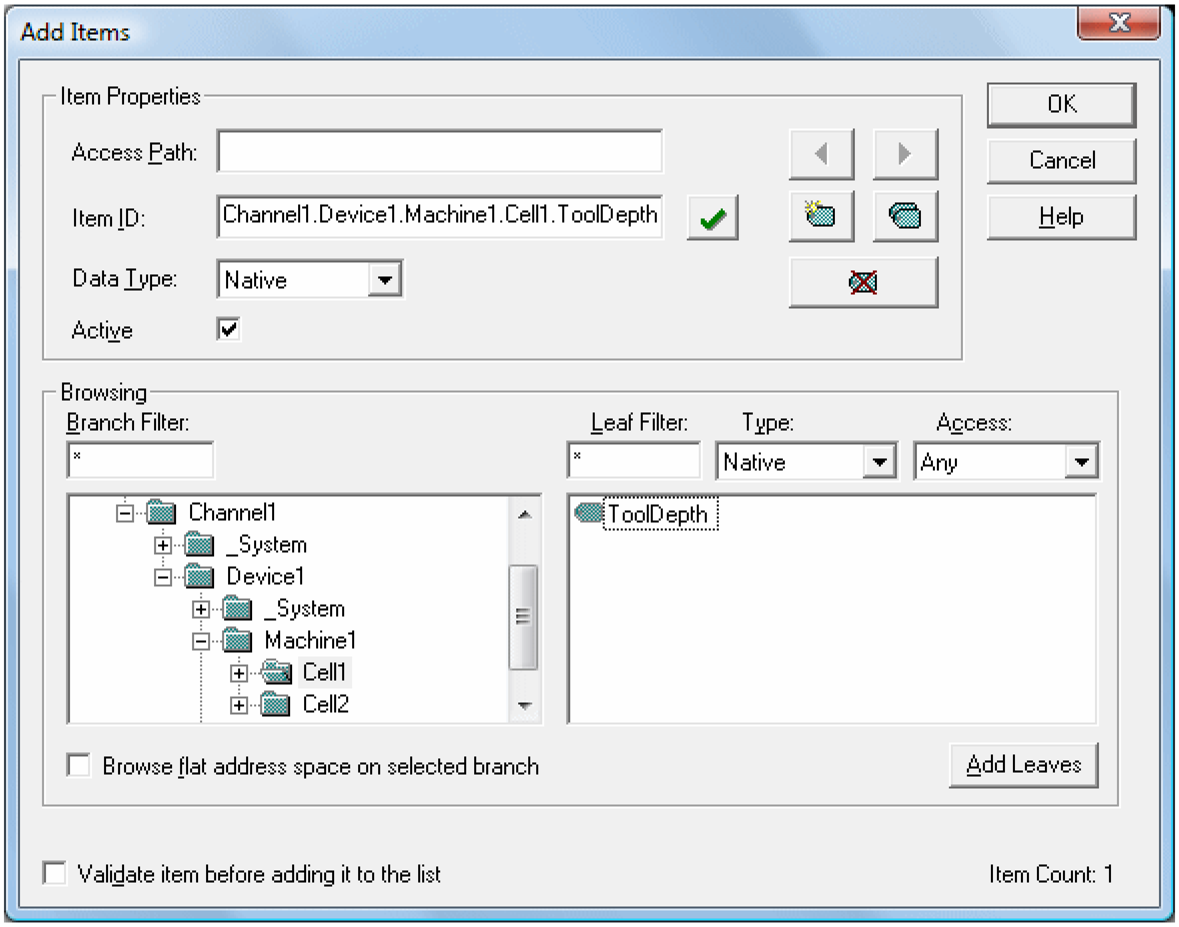
Note: User-defined tags support scaling.

What is a Tag Group?

This server allows tag groups to be added to the project. Tag groups are used to tailor the layout of OPC data into logical groupings that fit the application's needs. Tag groups allow multiple sets of identical tags to be added under the same device: this can be convenient when a single device handles a number of similar machine segments.

Tag Group Properties

From an OPC client standpoint, Tag Groups allow users to segregate OPC data into smaller tag lists, thus making finding specific tags easier when browsing the server. The following image used the supplied OPC Quick client to create Cell1 and Cell2 tag groups and simplify the OPC Client browsing.


Add Items

Item Properties
Access Path:
Item ID: Channel1.Device1.Machine1.Cell1.ToolDepth
Data Type: Native
Active ✓

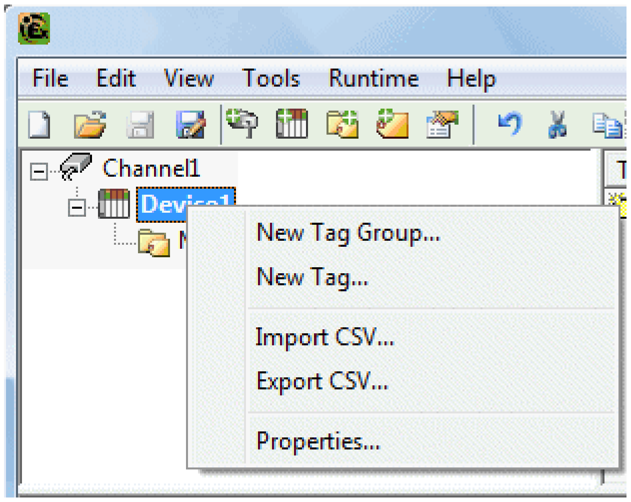
Browsing
Branch Filter: *
Leaf Filter: *
Type: Native
Access: Any

Channel1
_System
Device1
_System
Machine1
Cell1
Cell2

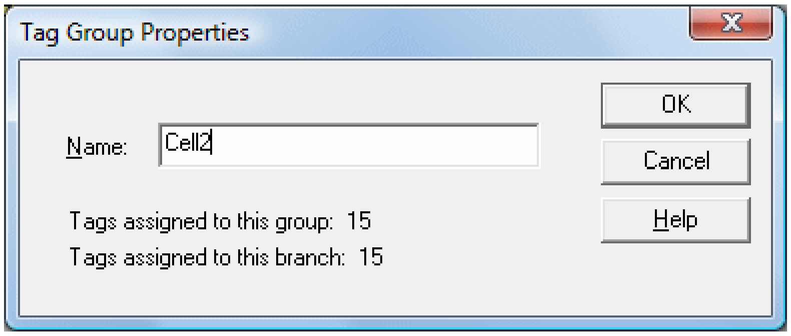
ToolDepth

Browse flat address space on selected branch
Validate item before adding it to the list
Item Count: 1

To add a new tag group to the project, right-click on either an existing device or tag group branch and select **New Tag Group** from the context menu. Alternatively, click on either an existing device or tag group branch and then click the New Tag Group icon on the toolbar.



When adding a new tag group to the project, users will be presented with the following dialog.



Name: Cell2

Tags assigned to this group: 15

Tags assigned to this branch: 15

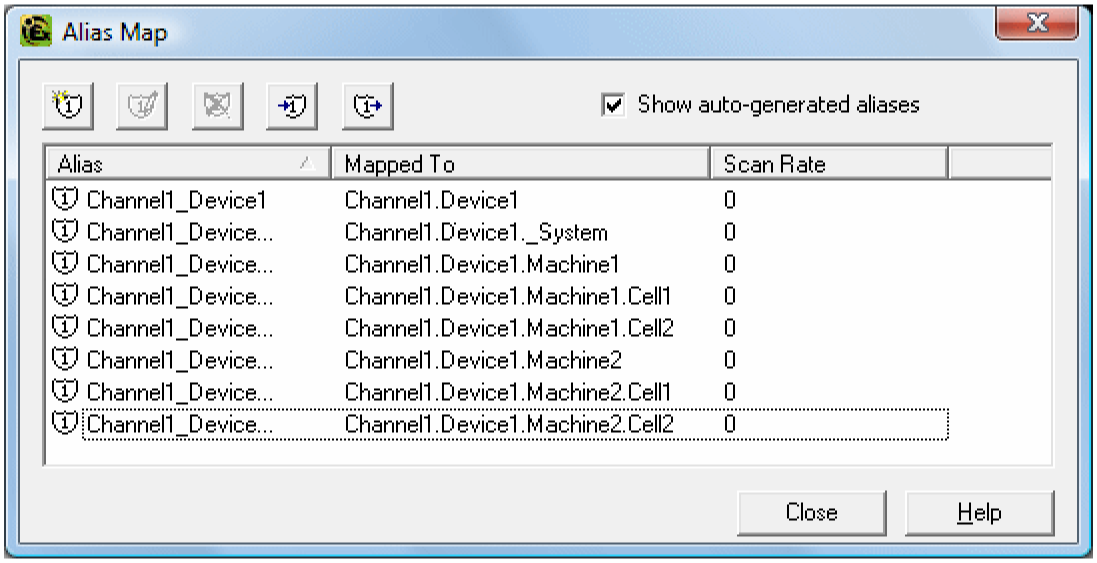
Tag groups can be added at any level from the device-level down, and multiple tag groups can be nested together to fit the application's needs. As seen in the OPC Quick Client dialog above, the fully qualified OPC item path is "Channel1. Device1.Machine1.Cell1.Tag1". For this OPC item, "Machine1" and "Cell1" segments are nested tag groups.

Note: With the server's online full-time operation, these parameters can be changed at any time. Any changes made to the tag groups will take effect immediately. If the name is changed, OPC clients that have already used that tag group as part of an OPC item request will not be affected until they release the item and attempt to reacquire it. New tag groups added to the project will immediately allow browsing from an OPC client. Utilize the User Manager to restrict access rights to server features in order to prevent operators from changing the parameters.

What is the Alias Map?

The Alias Map provides both a mechanism for backwards compatibility with legacy server applications as well as a way to assign simple alias names to complex tag references. This is especially useful in client applications that limit the size of tag address paths. Although the latest version of the server will automatically create the alias map, users can add their own alias map entries to compliment those created by the server. Users can also filter the server created aliases so that the only ones visible are their own.

Alias Map elements can be added, edited, deleted, exported and imported by clicking on the appropriate icon buttons in the Alias Map window. The Alias Properties dialog allows an alias to be added or edited. The image below displays the various alias map entries generated for the server project.



☑ Show auto-generated aliases

Alias	Mapped To	Scan Rate
Channel1_Device1	Channel1.Device1	0
Channel1_Device...	Channel1.Device1._System	0
Channel1_Device...	Channel1.Device1.Machine1	0
Channel1_Device...	Channel1.Device1.Machine1.Cell1	0
Channel1_Device...	Channel1.Device1.Machine1.Cell2	0
Channel1_Device...	Channel1.Device1.Machine2	0
Channel1_Device...	Channel1.Device1.Machine2.Cell1	0
Channel1_Device...	Channel1.Device1.Machine2.Cell2	0

Descriptions of the icons are as follows.

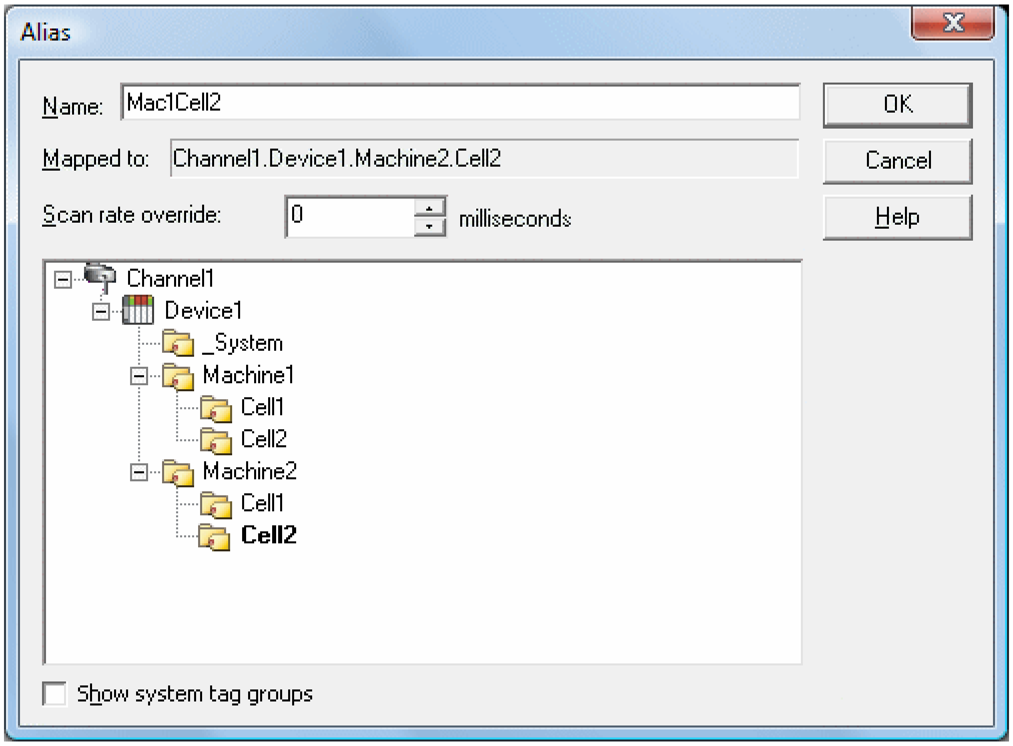
- To **create** a new Alias, click .
- To **edit** an existing alias, select the alias from the list and then click .
- To **delete** manually created aliases, click .
- To **import** an alias map as a .CSV file, click .
- To **export** an alias map as a .CSV file, click .

Note: When checked, the **Show auto-generated aliases** parameter will show the server's automatically generated aliases. The default setting is unchecked.

See Also: How to Create and Use an Alias

Alias Properties

The Alias Map allows a way to assign simple alias names to Complex Tag references that can be used in client applications. An alias is constructed by entering an alias name and then clicking on the desired device name or group name.



Name: Mac1Cell2

Mapped to: Channel1.Device1.Machine2.Cell2

Scan rate override: 0 milliseconds

- Channel1
  - Device1
    - _System
    - Machine1
      - Cell1
      - Cell2
    - Machine2
      - Cell1
      - **Cell2**

☐ Show system tag groups

Descriptions of the Alias Properties are as follows.

- **Alias Name:** This parameter is used to enter the alias name, which can be up to 256 characters long. It must be unique in the alias map.
- **Mapped To:** This parameter specifies the location of the Alias. Because the alias map does not allow tag items to be browsed from the alias table, users should create a simple name that replaces the address that leads up to the tag. This will make is easier to address items in a client application that does not support tag browsing.
- **Scan rate override:** This selection is used to specify an update rate that will be applied to all DDE/FastDDE/ SuiteLink and most other non-OPC tags accessed using this alias map entry. This setting is equivalent to the Topic update rate found in many DDE only servers. The valid range is 0 to 99999990 milliseconds. The default is 0 milliseconds. When set to 0 milliseconds the server will observe the DDE scan rate set at the individual tag level using the Tag Properties - General dialog.
- **Show system tag groups:** When checked, this parameter will display the channel and device level _System tag groups. The default setting is unchecked.

Once the desired path has been selected and the DDE scan rate has been set, click **OK** to complete the alias. To enter more alias map elements, return to the Alias Map dialog.

What is the Event Log?

The Event Log displays the date, time and source of an information, warning or error event. For more information, select a link from the list below.

Event Log Display
Event Log Page Setup

See Also: Components

Event Log Display

The Event Filter helps users tailor the Event Log's contents to meet the application's reporting requirements. There are currently three types of messages that can be recorded in the Event Log: **General Messages**, **Warnings** and **Errors**. General messages include server startup and shutdown messages; Warnings include messages such as device not responding; Errors include messages such as the rejection of bad OPC item request.

Users can access the Event Filter in the Configuration Client by clicking **Tools** | **Event Log** | **Event Filter**. Alternatively, users can also right-click anywhere in the Event Log display and then select **Event Filter**.

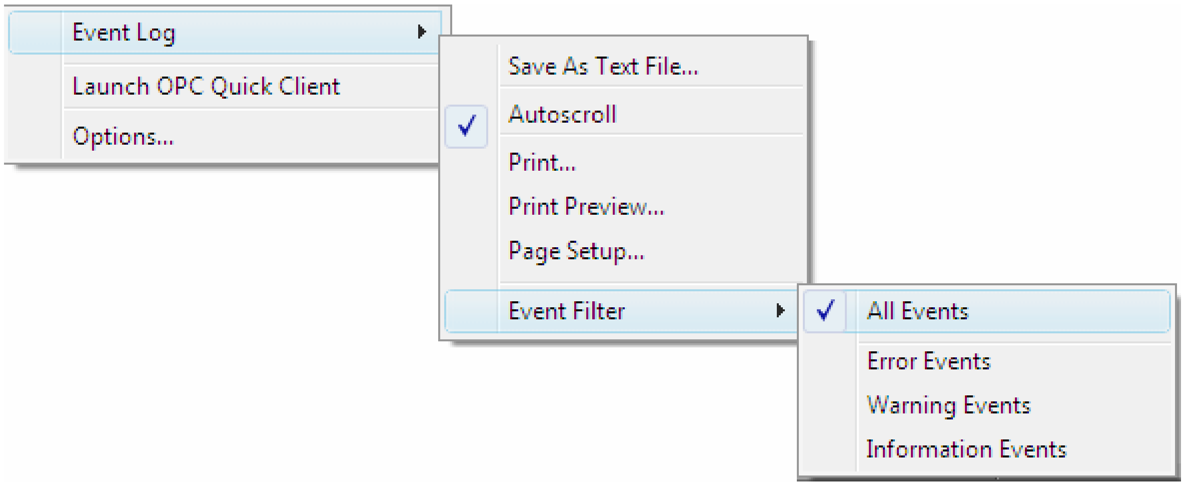


Figure 1: Accessing through the Tools menu

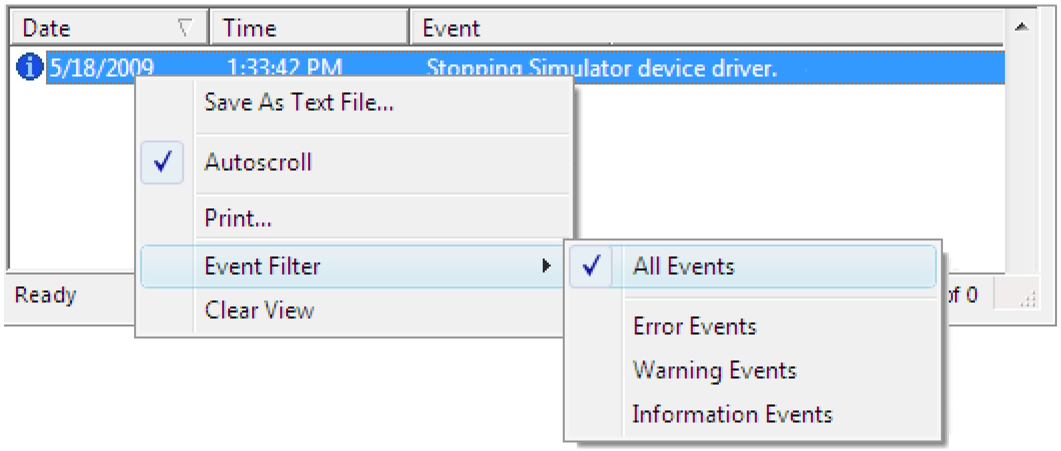


Figure 2: Accessing through the context menu

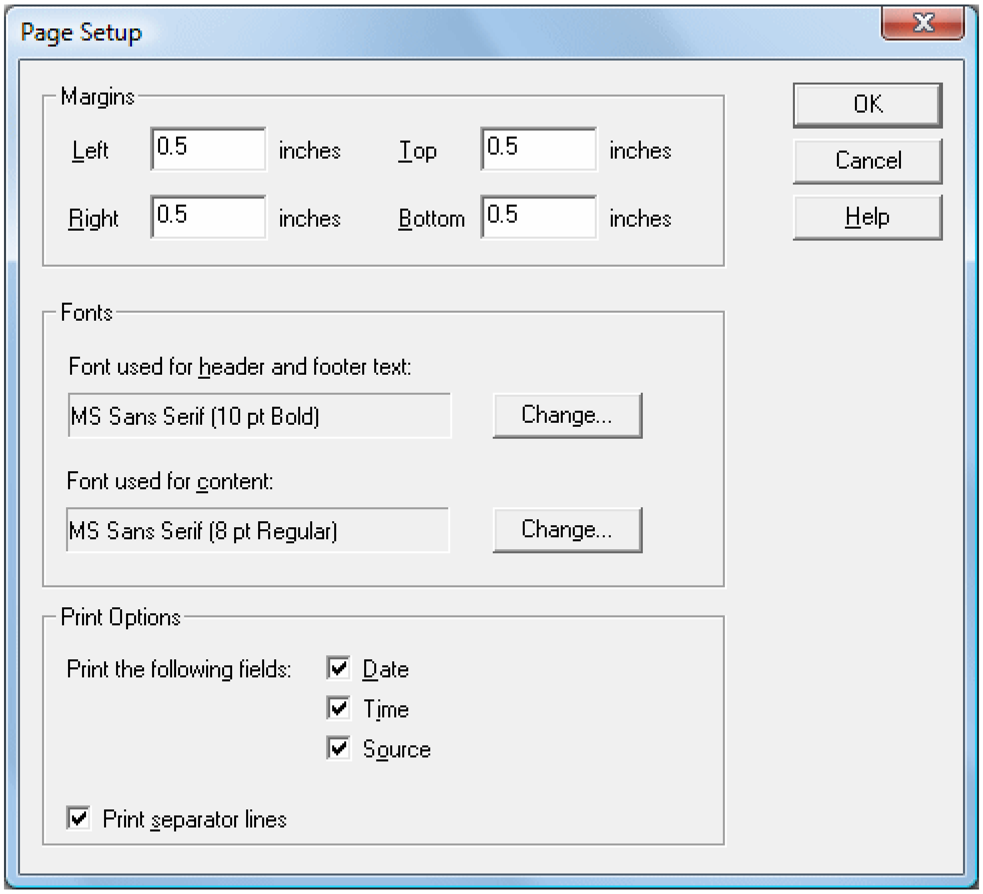
Note: The Event Log system would be useless if there was no mechanism to protect its contents. If operators could change these parameters or reset the log, the purpose would be lost. Utilize the User Manager to limit the functions an operator can access and prevent these actions from occurring.

See Also: [Settings - Event Log]

Event Log Page Setup

Event Log Printing and Setup

The Event Log's print content and appearance can be customized by selecting **Tools** | **Event Log** | **Page Setup**. Options for modification include margin size, font and event details. To preview the changes, click **Tools** | **Event Log** | **Print Preview**.


Page Setup

Margins

Left 0.5 inches Top 0.5 inches

Right 0.5 inches Bottom 0.5 inches

Fonts

Font used for header and footer text: MS Sans Serif (10 pt Bold)

Font used for content: MS Sans Serif (8 pt Regular)

Print Options

Print the following fields: ☑ Date ☑ Time ☑ Source

☑ Print separator lines

Descriptions of the parameters are as follows.

- The **Margin** parameter sets the distance from the edge of the Event Log's printed page to the top, bottom, left and right. All margin settings are entered in inches.
- The **Fonts** parameter selects a font to be used as the header and footer text, as well as for the actual Event Log records. Only fixed space fonts will appear in the Fonts dialog. To change a font, simply click on the change button. When invoked, the standard font selection dialog will be displayed. The default settings are shown in the image above.
- The **Print Options** parameter selects which fields will be included in the print output. If all options are deselected, the resulting output will only contain a list of event descriptions.
- The **Print separator lines** option forces a single line to be drawn between each group of five event records on the resulting Event Log printout.

Designing a Project

Although this server is designed for easy usage, there are several steps required to create, configure and run a project. Utilize the server's User Interface to build a project, starting by selecting the specific communications driver, configuring its parameters and then adding user-defined tags as necessary. Before beginning, refer to **System Requirements**.

The following steps provide guidance on the process of building a project. Throughout this example, a number of additional help links will be presented in order to provide supplemental information. Use the **Back** button on the help system's toolbar to return to the example. Select a link below to jump to a specific page.

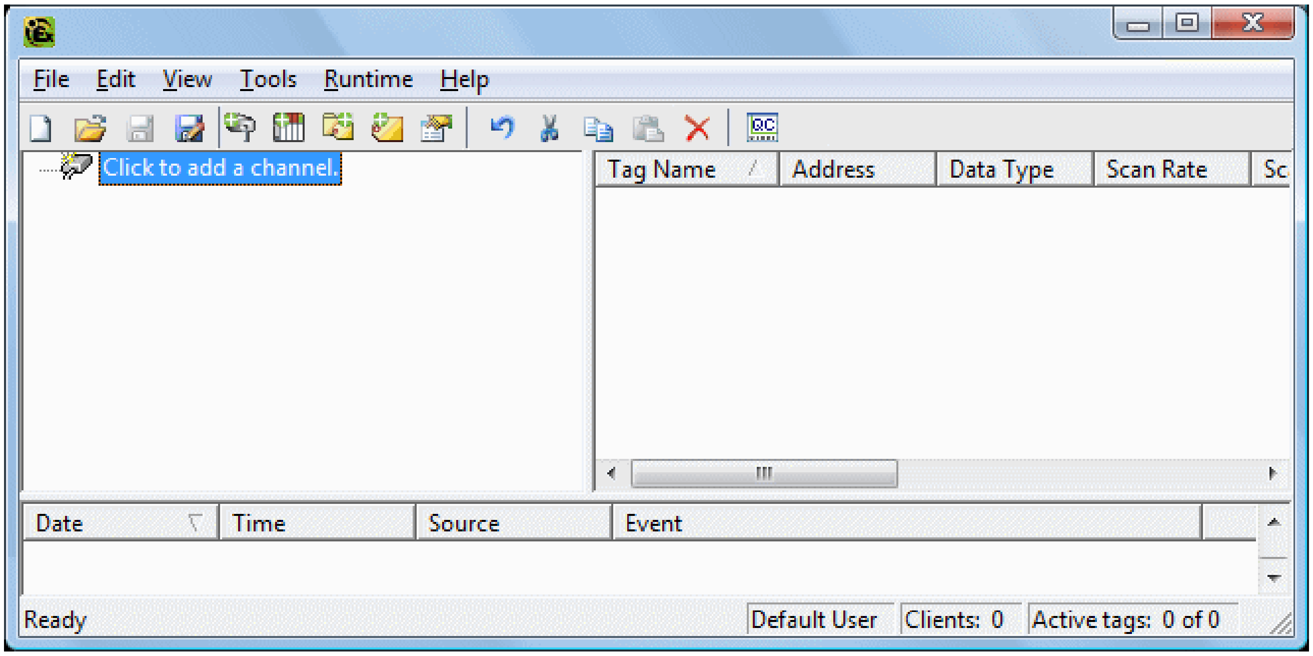
Running the Server
Starting a New Project
Adding and Configuring a Channel
Adding and Configuring a Device

Note: The examples in the following pages use the Simulator driver supplied with the server. The Simulator driver is a memory-based driver that provides both static and changing data for demonstration purposes. The Simulator driver does not have the broad range of configuration options found in many other communication drivers; thus, some examples may require additional screen shots to demonstrate specific product features that are present when using one of the normal communication drivers. In these cases, screen shots will be provided.

Running the Server

Although this server runs as a service by default, users can choose to run it on the desktop. When running as a service, the server is online all the time. When running as a desktop application, the OPC client can automatically invoke the server when it attempts to connect and collect data. In order for either process to occur correctly, users must first create and configure a project. When invoked, the server automatically selects the most recently used project.

Initially, however, users need to manually invoke the server using the desktop icon, the Windows Start menu or by selecting **Configuration** in **Administration** on the **System Tray**. The image below displays the invoked interface (although its appearance may differ depending on any changes that may have been made). For more information on the Configuration's elements, refer to **Basic Server Components**.



Note: Now that the server is running, a project may be created.

Starting a New Project

This server must be configured to determine what content it will provide while operating. For a server project, the content that is determined will define channels, devices, optional tag groups and tags. These factors exist in the context of a project file. As with many applications, users can define a number of project files and save and load them as needed.

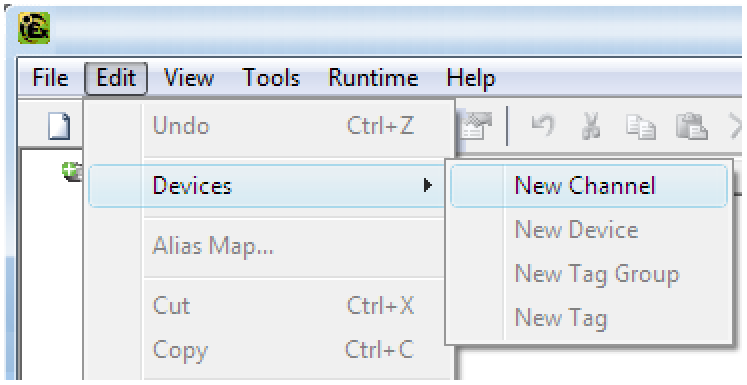
Most of the configuration needed within the server is contained within a project file; however, there are also a number of configuration options that are global and are applied to all projects. These global options are configured in the **Tools | Options** menu. Options include General Options, Runtime Connection Options, Event Logger Options, OPC Options and Compliancy Options. Furthermore, all global options are stored in a Windows INI file called "Servermain.INI" and set in the Windows registry. This file is located in the server's root directory. While it is normal practice to store global options in the Windows registry, an INI file allows users to move the global settings easily from one machine to another.

Adding and Configuring a Channel

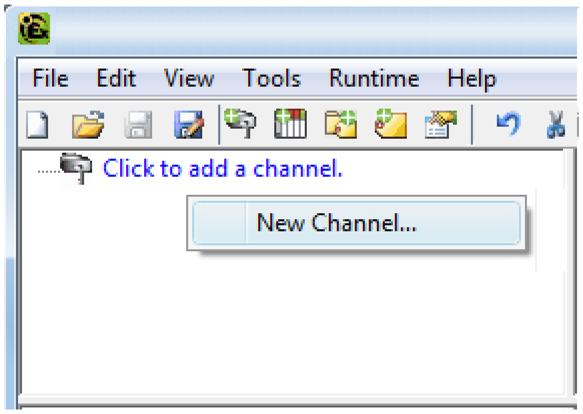
The first step in creating a new project is determining the communications driver(s) required by the application. In the server, a communications driver is referred to as a channel. Users can define a number of channels within a single project, depending on the driver or drivers installed.

Note: The Simulator Driver is used in this example.

1. To add a new channel to the project, click **Edit** | **Devices** | **New Channel**. Alternatively, click the New Channel icon on the toolbar or right-click and select it on the context menu. Selecting New Channel by all of these methods will invoke the Channel Wizard, which is used to both name the channel and select a communications driver.



New Channel by Edit | Add Channel



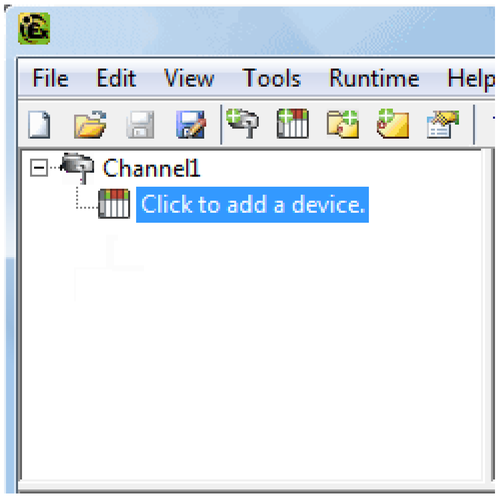
New Channel by Context Menu

2. For simplicity, leave the channel name "Channel1".

3. Select the communications driver that will be applied to this channel. For this example, choose the Simulator driver from the driver selection drop-down menu.

Note: For this driver, the Next dialog is the Channel Summary. In other applications, there will be additional dialog pages that allow the configuration of parameters such as communications port, baud rate and parity.

Thus, while not used by the Simulator driver, the following figure demonstrates the communications dialog that is common to all drivers that use the serial port.



4. To complete the addition of the channel, click **Next** | **Finish**.

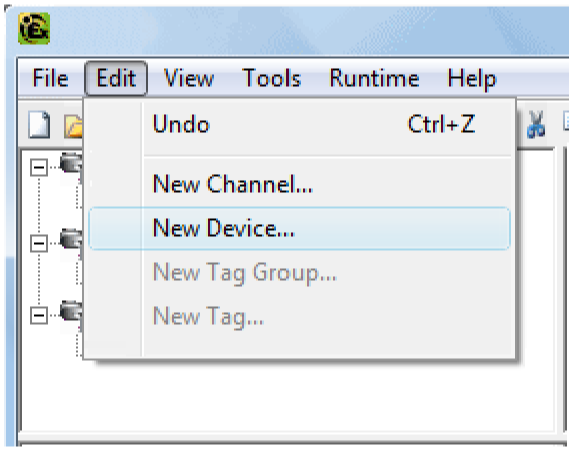
Important: A a small red "x" should be visible below the channel icon. This denotes that the channel does not contain a valid configuration because no devices have been added yet.

See Also: How to... Optimize the Server Project and Server Summary Information.

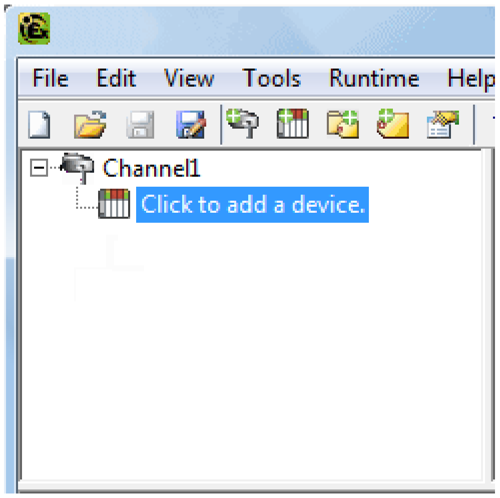
Adding and Configuring a Device

Once a channel has been defined in a project, a device must then be added to the channel. A device identifies the physical node or station on a communications link. A device can also be thought of as a way of framing the definition of a connection to a specific point of interest in the application. In this respect, a device would still be used as a term when describing the connection to a database object. In this example, "device" refers to a specific device on a network. In the Simulator driver, a device supports multiple device nodes and allows users to simulate networked devices.

1. To add a device, select the channel to which the device will be added. Next, click **Edit** | **New Device**. Alternatively, click the Add Device icon on the toolbar or right-click and select Add Device from the context menu. Selecting New Device by all of these methods will invoke the Device Wizard, which is used to both name the device and set its Node ID.



New Device by Edit | New Device



New Device by Context Menu

2. For simplicity, leave the device name "Device1".

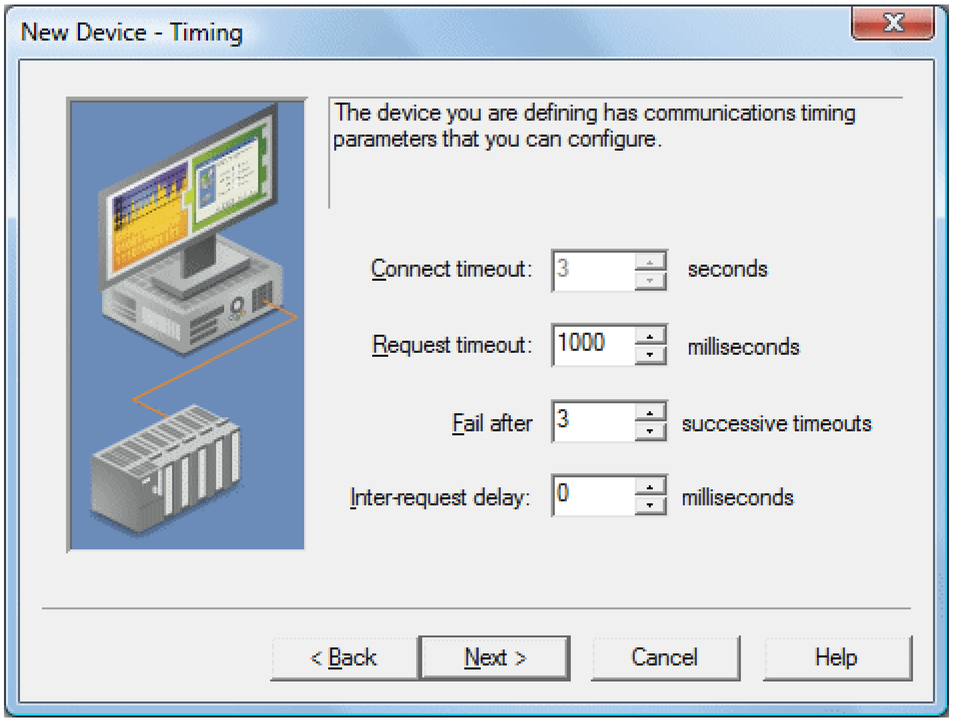
Note: The number of dialog pages in the Device Wizard depends on the driver being used in the application.

3. Click **Next** to proceed to the next dialog. Then, select either a 16 bit or 8 bit register size for the device being simulated. In other device drivers, users would select a device model. For this example, however, choose the 16 bit device size.

4. Then select the Device ID, which is the unique identifier required by the actual communications protocol. For the Simulator driver, the Device ID is a numeric value. The format and style of the Device ID depends on the communications driver being used.

Note: For this driver, the next dialog is the Device Summary. In other applications, there will be additional dialog pages that allow the configuration of parameters such as device timeout and retry count.

Thus, while not used by the Simulator driver, the following figure demonstrates the Timeout dialog that is common to all communications drivers.



The device you are defining has communications timing parameters that you can configure.

Connect timeout: 3 seconds

Request timeout: 1000 milliseconds

Fail after 3 successive timeouts

Inter-request delay: 0 milliseconds

5. To complete the addition of the device, click **Next** | **Finish**.

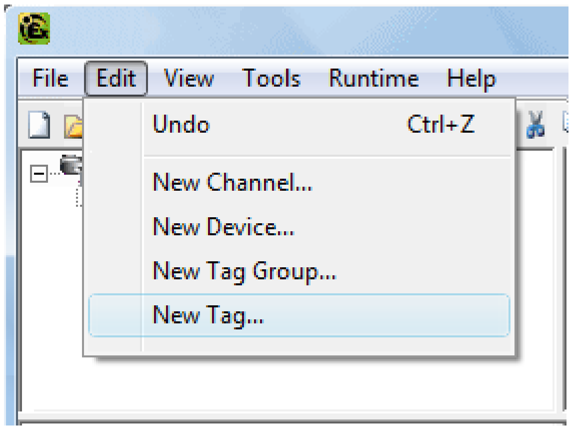
Note: The server is now ready to start providing data to OPC clients. With the server's online full-time mode of operation, the server can start providing OPC data immediately. At this point, however, the configuration can potentially be lost since the project has not yet been saved. Before saving, users can add tags to the server. For more information, refer to **Adding User-Defined Tags**.

Adding User-Defined Tags

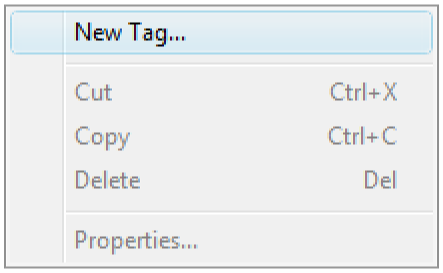
There are two ways to use the server to get data from a device to the client application. The first and most common method requires that users first define a set of tags in the server project and then use the name previously assigned to each tag as the item of each link between the client and the server. This method makes all user-defined tags available for browsing within OPC clients. User-defined tags also support scaling. **See Also: Adding Tag Scaling**.

1. To add a tag to the project, first select a device name from the Channel/Device tree view within the server. The Tag dialog below uses the example project and has "Device1" as the currently selected device.

2. Next, click **Edit** | **New Tag**. Alternatively, right-click on the device and select Add Tag from the Context Menu or click the toolbar's Add Tag icon. Selecting Add Tag by all of these methods will invoke Tag Properties - General, a dialog in which users set the tag name, specify a device-specific address, select a data type and set the tag's access method. Before continuing, refer to **Tag Properties - General** for terminology.



Add Tag by Edit | New Tag

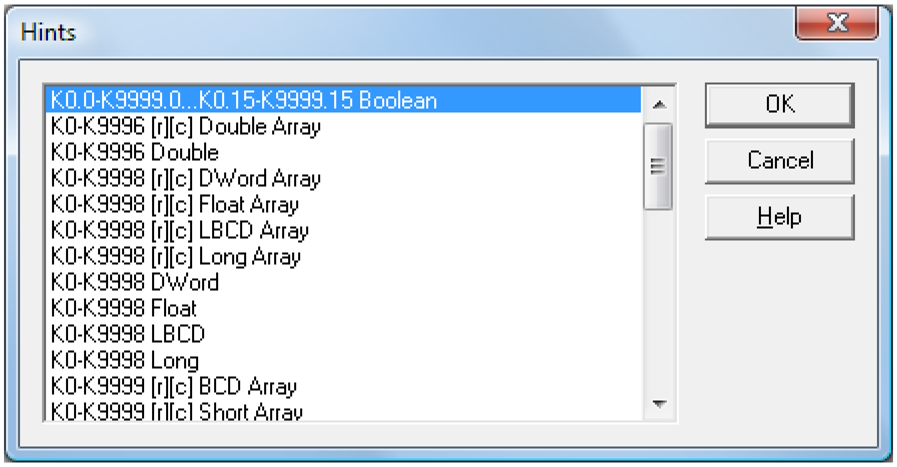


Add Tag by Context Menu

3. Edit the controls to match the following content (as shown in the Tag dialog image).
   - Tag Name: MyFirstTag
   - Address: R000
   - Description (Optional): My First Simulator Tag
   - Data Type: Word
   - Client Access: Read/Write
   - Scan Rate: 100 milliseconds*

*This does not apply for OPC tags.

Note: The Address, Data Type and Client Access fields depend on the communications driver being used. With the Simulator driver, "R000" is a valid address. The address "R000" supports a data type of "Word" and client access rights of "Read/Write;" however, this will obviously not be the case with every communications driver. To aid users in determining the correct settings for their driver, there is the **Hints** function. To use Hints, click on the question mark icon in Tag Properties. This will invoke the driver-specific tag information (such as available addresses and data types). For the Simulator driver, Hints appears as follows.



K0.0-K9999.0...K0.15-K9999.15 Boolean
K0-K9996 [r][c] Double Array
K0-K9996 Double
K0-K9998 [r][c] DWord Array
K0-K9998 [r][c] Float Array
K0-K9998 [r][c] LBCD Array
K0-K9998 [r][c] Long Array
K0-K9998 DWord
K0-K9998 Float
K0-K9998 LBCD
K0-K9998 Long
K0-K9999 [r][c] BCD Array
K0-K9999 [r][c] Short Array

For additional information, click the Help button in the Hints dialog. This invokes the driver specific help documentation at the page that covers data addressing for the device currently selected.

4. Commit the tag to the server by pressing **Apply** in Tag Properties - General. The tag should now be visible in the Tag View area of the server. If only one tag needed to be added, users would be finished at this point. For this example, however, a second tag needs to be added for use in **Tag Properties - Scaling**.

5. If Apply has already been pressed, click the **New** icon in Tag Properties - General. This clears all of the fields and returns them to their default state. Enter the following data:

- Tag name: MySecondTag
- Address: K000
- Description: My First Scaled Tag
- Data Type: Short
- Client Access: Read/Write
- Scan rate: (Doesn't Apply)

6. Next, press **Apply** to commit the second tag.

Note: When entering tag information, users can and will be presented with an occasional error message. The error messages presented will be generated by either the server or the driver. The server will generate error messages when users attempt to add a tag using the same tag name as an existing tag. The communications driver will generate errors for three possible reasons:

1. If there are any errors entered in the format or content of the address field, including errors in the address range of a particular device specific data item.
2. When the data type selected is not available for the address that has been entered.
3. If the client access level chosen is not available for the address that has been entered.

In each of these cases, the error message will be specific in describing the error. The error message will also provide the option of directly invoking the driver specific help documentation in order to help remedy the problem.

Dynamic Tag Addressing

Dynamic Tag Addressing is another way of defining tags. Dynamic tags are used to define tags solely in the client application. Instead of creating a tag item in the client that addresses another tag item that has been created in the server, users only need to create a tag item in the client that directly accesses the device address.

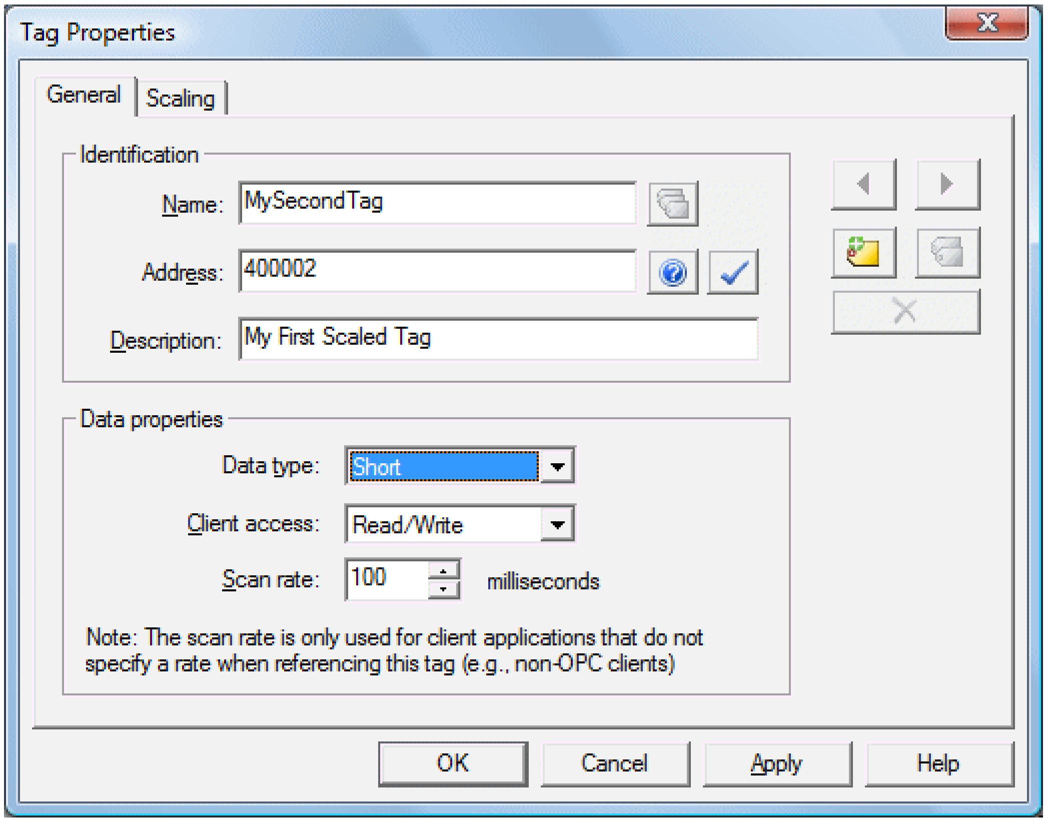
Note 1: The server creates a special Boolean tag for every device in a project that can be used by a client to determine whether that device is functioning properly. To use this tag, specify the item in the link as Error. The value of this tag is zero if the device is communicating properly; otherwise, it is one.

Note 2: If a device address is used as the item of a link, such that the address matches the name of a user-defined tag in the server, the link will reference the address pointed to by the user-defined tag. Furthermore, with the server's online full-time operation, users can technically begin using this project in an OPC client at this moment. For the sake of work preservation, proceed to Saving and Testing the Project.

Adding Tag Scaling

When defining a new tag in the server, users have the option of applying tag scaling, which allows raw data from the device to be scaled to an appropriate range for the application. There are two types of scaling: Linear and Square Root. For more information, refer to **Tag Properties - Scaling**.

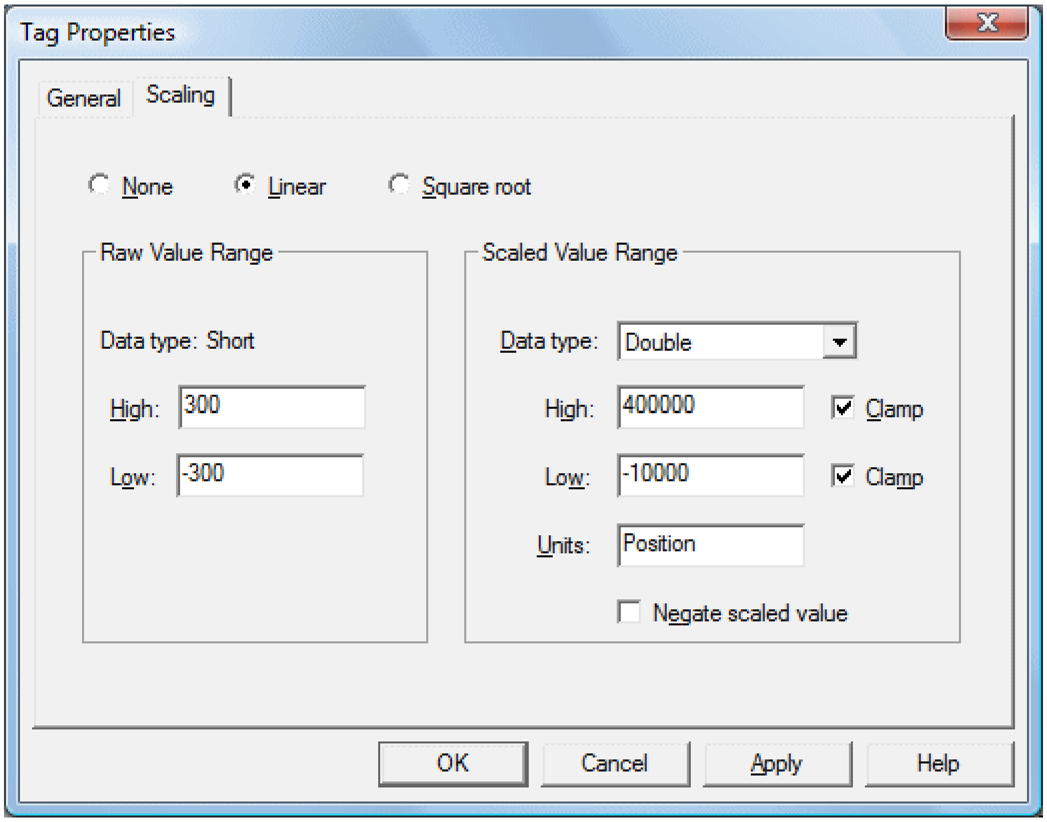
Note: The image below uses the second tag previously developed in this example. The Tag Properties - General dialog should appear as shown below.



Name: MySecondTag
Address: 400002
Description: My First Scaled Tag
Data type: Short
Client access: Read/Write
Scan rate: 100 milliseconds

Note: The scan rate is only used for client applications that do not specify a rate when referencing this tag (e.g., non-OPC clients)

1. To add scaling to this tag, click on the **Scaling** tab to open the Scaling Properties. Then edit the content of the dialog to match the following.


Tag Properties

General | Scaling

None [✓ Linear] Square root

Raw Value Range

Data type: Short

High: 300

Low: -300

Scaled Value Range

Data type: Double

High: 400000 [✓ Clamp]

Low: -10000 [✓ Clamp]

Units: Position

Negate scaled value

2. In this example, **Linear Scaling** has been selected. The raw value range allows users to specify what they expect to receive as a data range from the actual device. The scaled data type also allows users to specify how the resulting scaled value is presented to the OPC client application. The scaled value range is used to specify the desired range in engineering units for the resulting value. By applying the high and low clamps, users can ensure that their output will always stay within the configured limits. This may not always be the case. If the raw data exceeds the range set by the raw value High and Low, it forces the scaled value beyond the range that has been entered for the scaled value. The clamps prevent this from occurring.

3. The **Units** field allows users to provide a string to the OPC client that describes the format or unit for the resulting engineering value. In order to use the Units field, an OPC client that can access the Data Access 2.0 tag properties data is required. If the client does not support these features, there is no need to configure the Units field.

4. Once the data has been entered as shown above, click **OK** or **Apply** to commit the scaling changes.

Dynamic Addressing

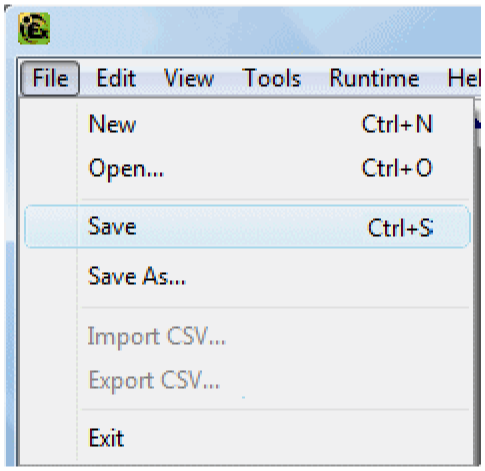
Dynamic Tag Addressing is the second method for defining tags. Dynamic tags are used to define tags solely in the client application. Instead of creating a tag item in the client that addresses another tag item created in the server, users only need to create tag items in the client that directly accesses the device driver's addresses. On client connect, the server will create a virtual tag for that location and start scanning for data automatically.

Note: If the data type is omitted, the driver will choose a default data type based on the device and address being referenced. The default data types for all locations are documented in the individual driver help documentation. If the data type specified is not valid for the device location, the server will not accept the tag and an error will be posted in the Event Log window.

Saving the Project

If each step in this example has been followed correctly, there should now be a project configured with two user-defined tags that are ready to be saved. How the project is saved varies and depends on whether a **Runtime project** or an **offline project** is being edited.

When editing projects in the Runtime, the server's online full-time operation allows tags to be accessed immediately from an OPC client once it has been saved to disk. The changes are made to the actual project, so users save by clicking **File** | **Save**. Users can overwrite the existing project or save the edits as a new project. They are also given the option of loading the new project as the default Runtime project.



When editing projects offline, users have the option to save to the same project or to save as a new project. Once completed, users can click **Runtime** | **Connect** and then load the new project as the default Runtime project.

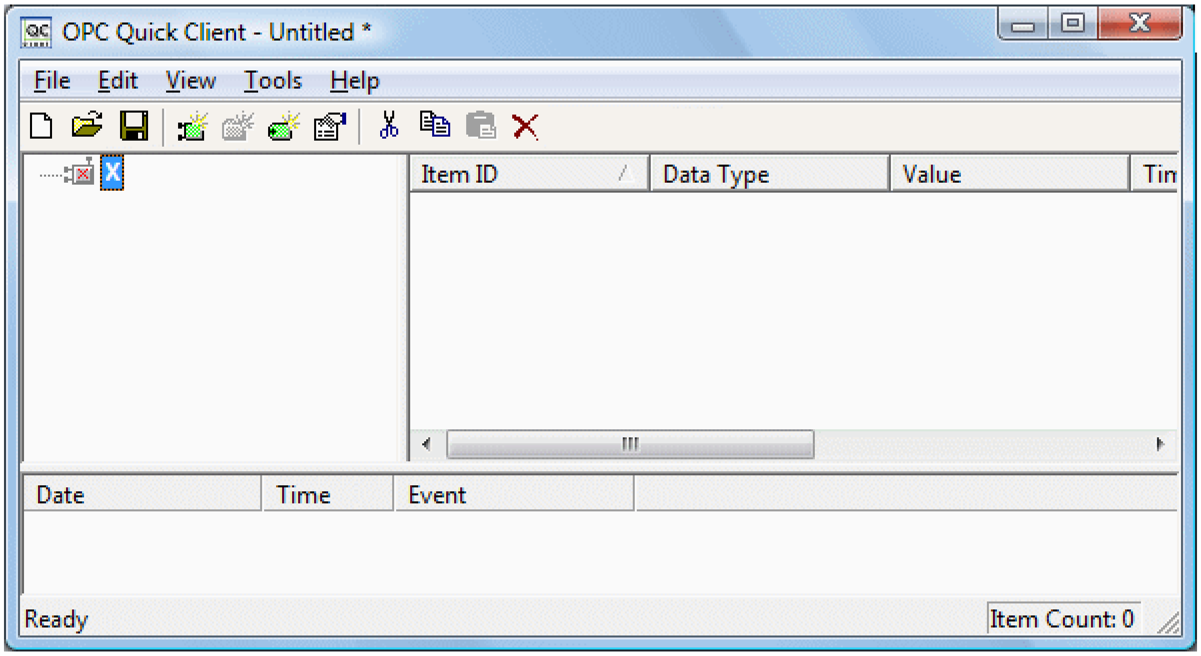
Note: An OPC client application can automatically invoke an OPC server when the client needs data. The OPC server, however, needs to know what project to run when called upon in this fashion. The server will load the most recent project that has been loaded or configured. To determine what project the server will load, look to the **Most Recently Used** file list found in **File**. The loaded project will be the first project file listed.

Testing the Project

The server includes a full-featured OPC Quick Client, which supports all of the operations available in any OPC client application. Users can utilize the Quick Client to access all of the data available in the server application. The quick client is used to read and write data, perform structured test suites and test server performance. It also provides detailed feedback regarding any OPC errors returned by the server.

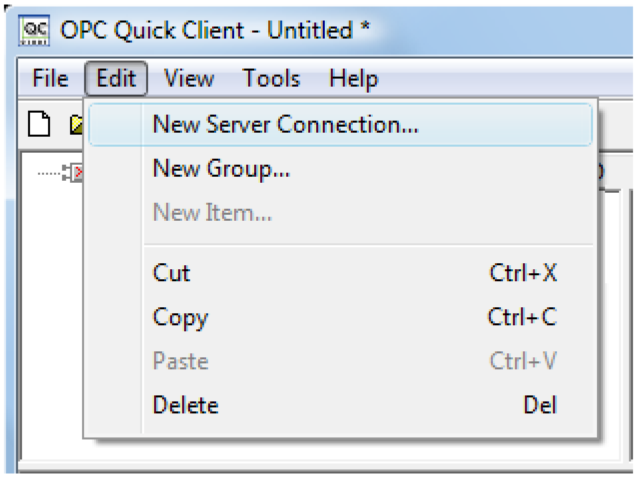
1. Locate the OPC Quick Client program in the same program group as the server.

2. Run the OPC Quick Client. The following dialog will be invoked.

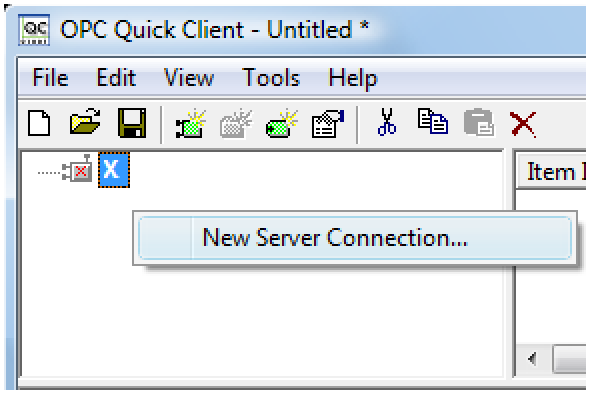


Establishing a Connection

3. Next, establish a connection by clicking **Edit** | **New Server Connection**. Alternatively, right-click and select New Server Connection from the Context Menu or click the New Server icon on the toolbar. Selecting New Server Connection by all of these methods will invoke the **OPC Server Selection dialog**, which is used to make connections with an OPC Server either locally or remotely via DCOM.

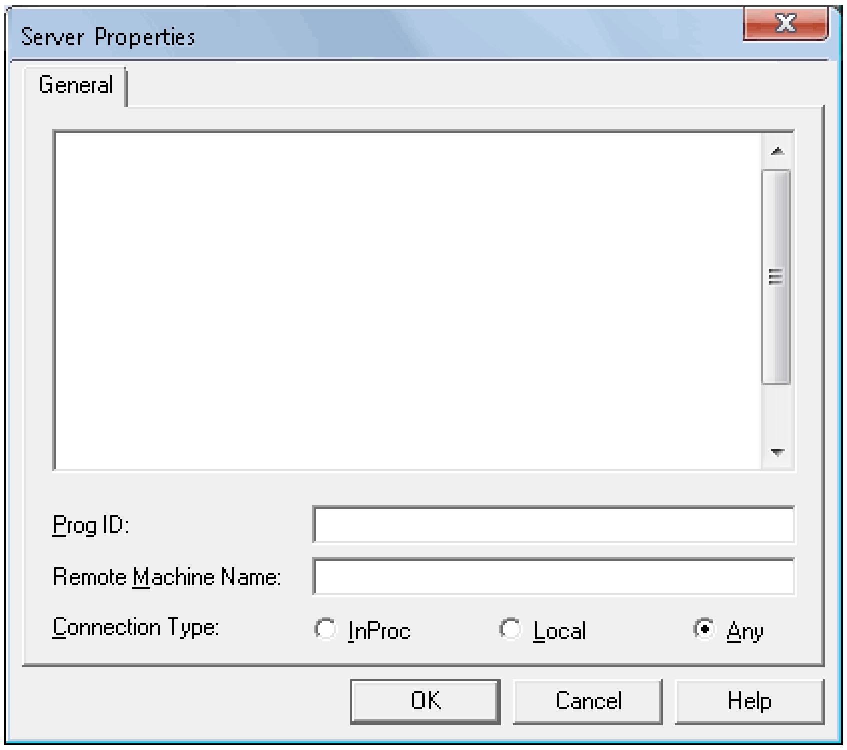


Connect to Server by Edit | New Server Connection



Connect to Server by the Context Menu

Note 1: By default, the Server Selection dialog is configured with the Prog ID of the server. The name listed in the server connection dialog is called the Prog ID of the server. OPC clients use this name to reference a specific OPC server. The server connection dialog should appear as shown below.



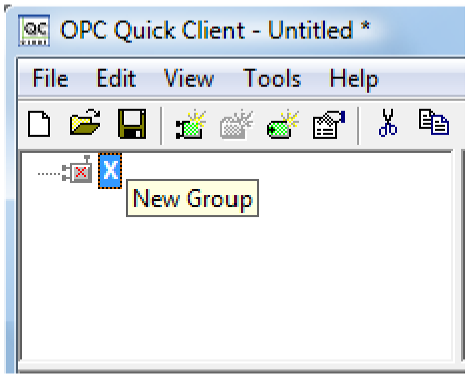
Prog ID:
Remote Machine Name:
Connection Type: InProc Local [✓ Any]

Note 2: Once a connection is made, two things may happen. If the server is running, the OPC Quick Client will simply make a connection to the server. If the server is not running, it will start up automatically.

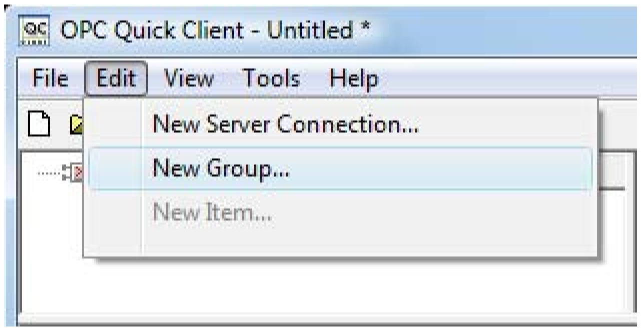
Adding a Group

4. Next, add a group needs to the connection. To do so, select the server connection and then click **Edit** | **New Group**. Alternatively, right-click and select New Group from the context menu or click the New Group icon on the toolbar. Selecting New Group by all of these methods will invoke the Group Properties dialog, which is used to configure how the group interacts with the OPC server.

Note: Groups act as a container for any tags that will be accessed from the server. All OPC clients use groups to access OPC server data. Aside from providing a container for lists of tags, OPC groups also provide control over how tags are updated. There are a number of properties attached to a group that allow the OPC client to determine how often data should be read from the tags, whether the tags are active or inactive, whether a dead band applies and etc. These properties let the OPC client control how the OPC server operates. For more information on Group Properties, refer to the OPC Quick Client help documentation.

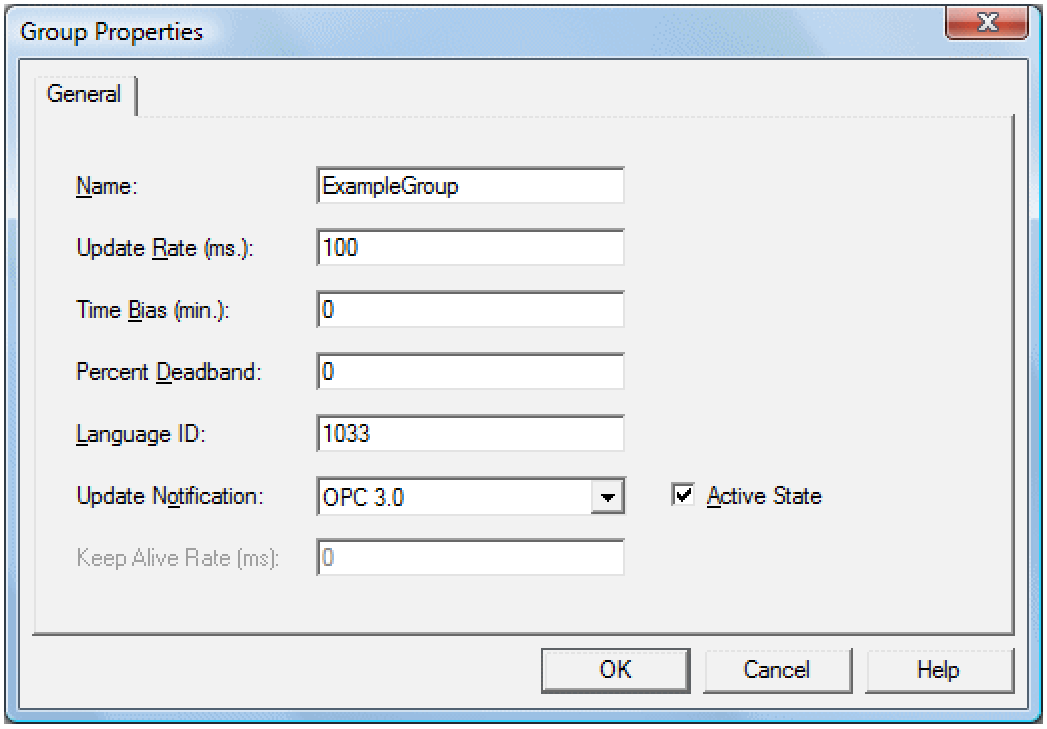


Adding a Group by Toolbar Icon



Adding a Group by Context Menu

5. For the purposes of this example, edit the Group Properties parameters so that they match the following image.



Name:	ExampleGroup
Update Rate (ms.):	100
Time Bias (min.):	0
Percent Deadband:	0
Language ID:	1033
Update Notification:	OPC 3.0
Active State	✓
Keep Alive Rate (ms):	0

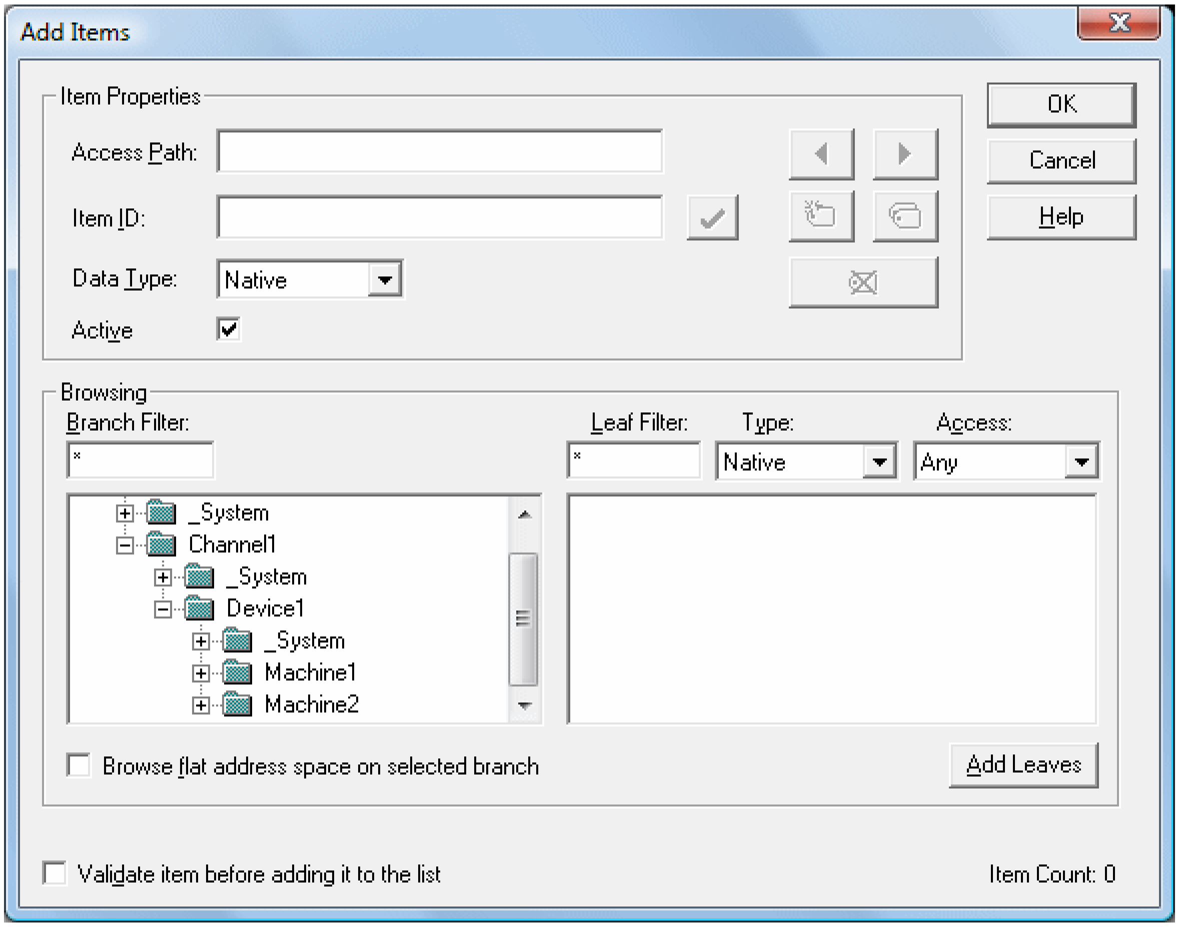
Note: The **Update Rate**, **Percent Dead Band** and **Active State** parameters control when and if data will be returned for the group's tags. The **Update Rate** determines how often data will be scanned from the actual device. It determines how often data will be returned to the OPC client as a result of that scan. The **Percent Dead Band** is used to eliminate or reduce noise content in the data by only detecting changes when they exceed the percentage change that has been requested. The percent change is a factor of the data type of a given tag. The **Active State** is used to turn all of the tags in this group either on or off. The **Group Name** is used for reference from the client and can actually be left blank.

6. Press **OK** to commit the group when finished.

Accessing Tags

7. OPC server tags must be added to the group before they can be accessed. OPC Data Access specifications defines a tag browsing interface as one that allows an OPC client to directly access and display the available tags in an OPC server. By allowing the OPC client application to browse the tag space of the OPC server, a user can simply click on the desired tags to automatically add them to a group.

8. Select the group in which tags will be placed. Then, click **Edit** | **New Item**. Alternatively, right-click and select New Item from the Context Menu or click the New Server icon in the toolbar. Selecting New Item from all of these methods will invoke the Add Items dialog, which is used to enter an Item ID, Data Type and Active State for an OPC item



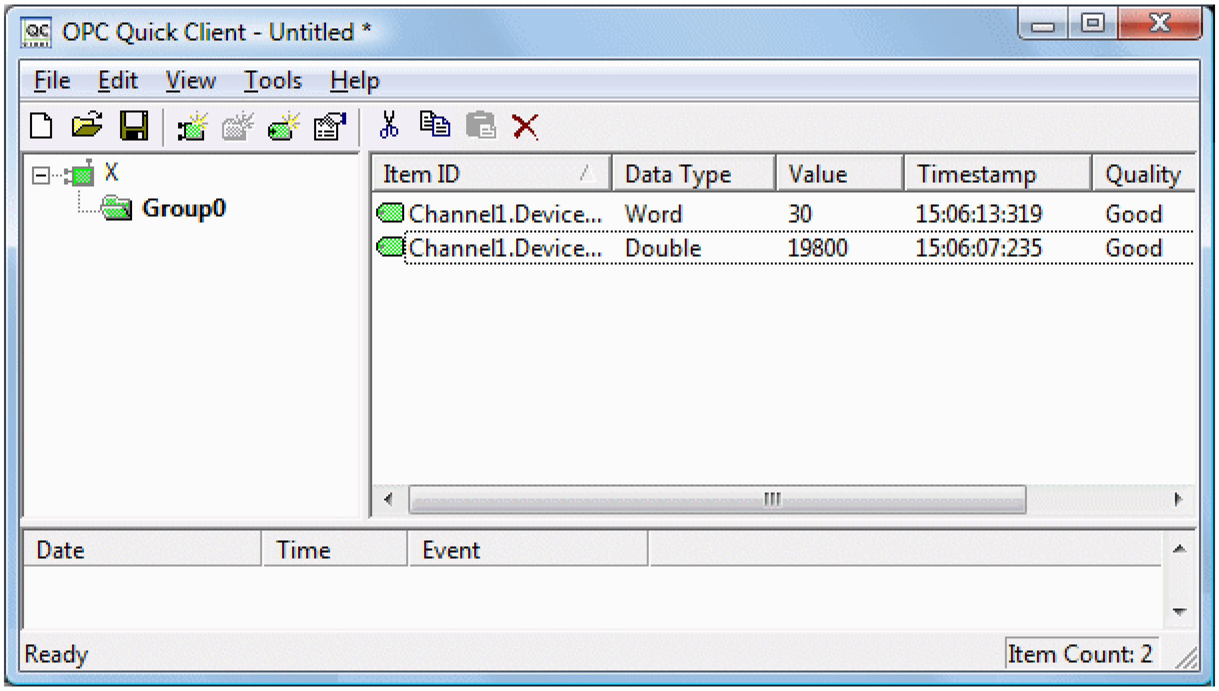
Note: The Add Items dialog also provides a tree view of the Browsing section and can be used to browse into an OPC server to find tags configured at the server. Using the "Example1" project created as part of this example, users can access the tags previously defined by expanding the branches of the view.

9. Once the tree hierarchy is at the point shown in the image above, users can begin adding tags to the OPC group by double-clicking on the tag name. As tags are added to the group, the **Item Count** shown at the bottom of the Add Items dialog will increase to indicate the number of items being added. If both "MyFirstTag" and "MySecondTag" were added, the item count should be 2.

10. When finished, commit the tags to the group by clicking **OK**.

Note: Users should now be able to access data from the server using the two tags that were defined. The OPC Quick

Client should appear as shown below.



Item ID	Data Type	Value	Timestamp	Quality
Channel1.Device...	Word	30	15:06:13:319	Good
Channel1.Device...	Double	19800	15:06:07:235	Good

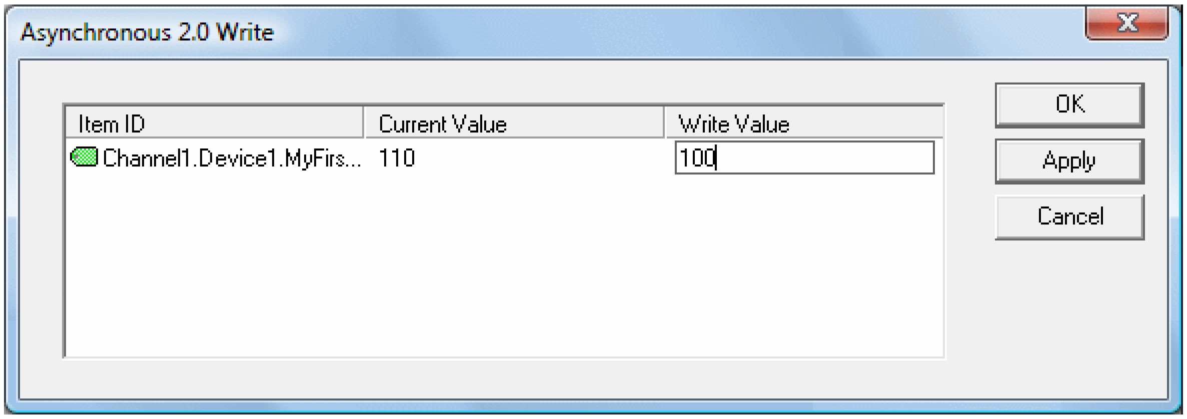
Date	Time	Event

The first tag, "MyFirstTag," should contain a changing value. The second tag should be zero at this point. If users only needed to test the reading of an OPC item, they are now finished. If, however, users desired to change an OPC item, they can use one of the write methods to send new data to the OPC item.

Writing Data to the OPC Server

The OPC Quick Client supports two methods for writing data to an OPC server: **Synchronous Writes** and **Asynchronous Writes**. **Synchronous Writes** perform a write operation on the OPC server and wait for it to complete. **Asynchronous Writes** perform a write on the OPC server but doesn't wait for the write to complete. Users can choose either method when writing data to an OPC: the different write methods are more of a factor in OPC client application design.

11. To write to an OPC item, first select the item and right-click to display its context menu. Then, select either Synchronous or Asynchronous Writes. Both choices will invoke the Write Dialog. For the purpose of this example, right-click on "**MyFirstTag**" and select **Asynchronous Write**.



Item ID	Current Value	Write Value
Channel1.Device1.MyFirs...	110	100

Note: Although the Write Dialog is displayed, the value will continue to update. Users can enter a new value in for this item by clicking in the item's **Write Value** and then entering a different value. Once completed, the **Apply** button will become active. Press **Apply** to write the data. Apply allows users to continue to write new values: **OK** writes the new value but also closes the dialog. Thus, once users are finished making changes, they can exit the dialog by pressing **OK**

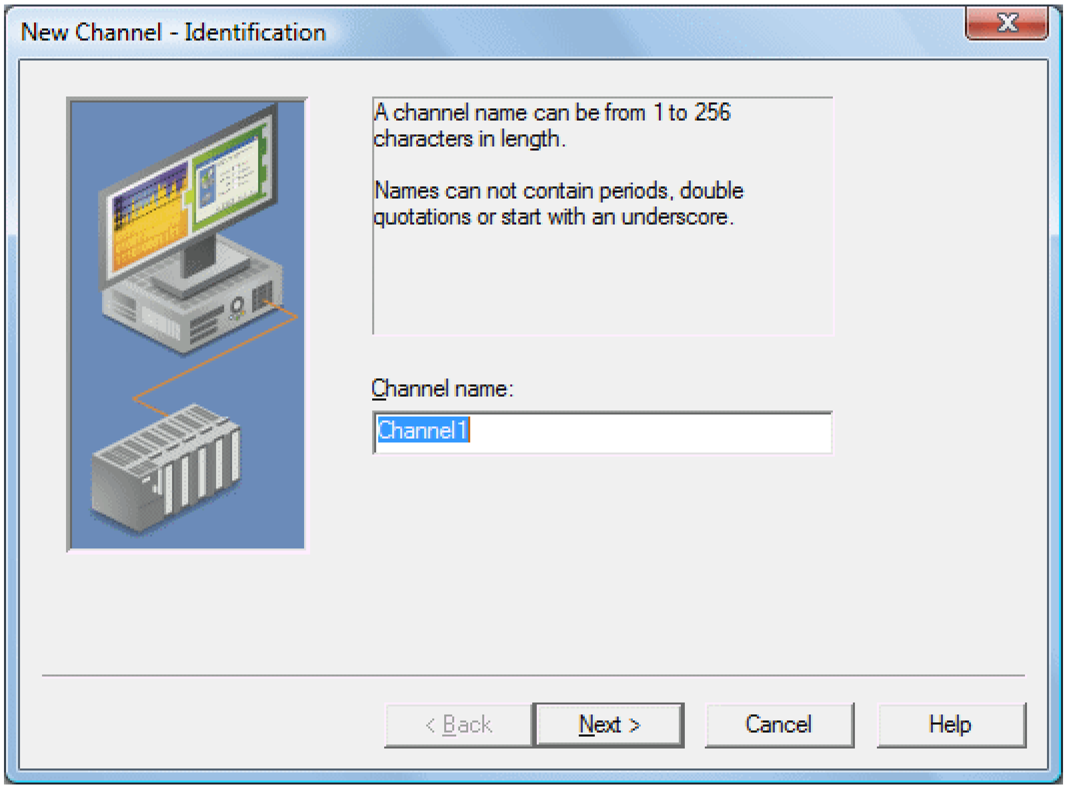
. If no new data has been entered, clicking OK will not send data to the server.

Conclusion
At this point, all of the basic steps involved in building and testing an OPC project have been discussed. Users are encouraged to continue to test various features of both the server and the OPC Quick Client for greater understanding and comprehension. For more information on the OPC Quick Client, refer to its help documentation.

If the basic terminology and concepts are understood, users can begin developing their OPC application. If using Visual Basic, please refer to the supplied example projects. These two projects provide both a simple and complex example of how OPC technology can be used directly in Visual Basic applications.

New Channel - Identification

This server supports the use of simultaneous multiple communications drivers. Each protocol or driver used in a project is called a Channel, which refers to a specific communications driver. A server project can consist of many channels, each with either unique communications drivers or with the same. A channel acts as the basic building block of an OPC link. Its properties control parameters such as communications port, baud rate and parity.


New Channel - Identification

A channel name can be from 1 to 256 characters in length.

Names can not contain periods, double quotations or start with an underscore.

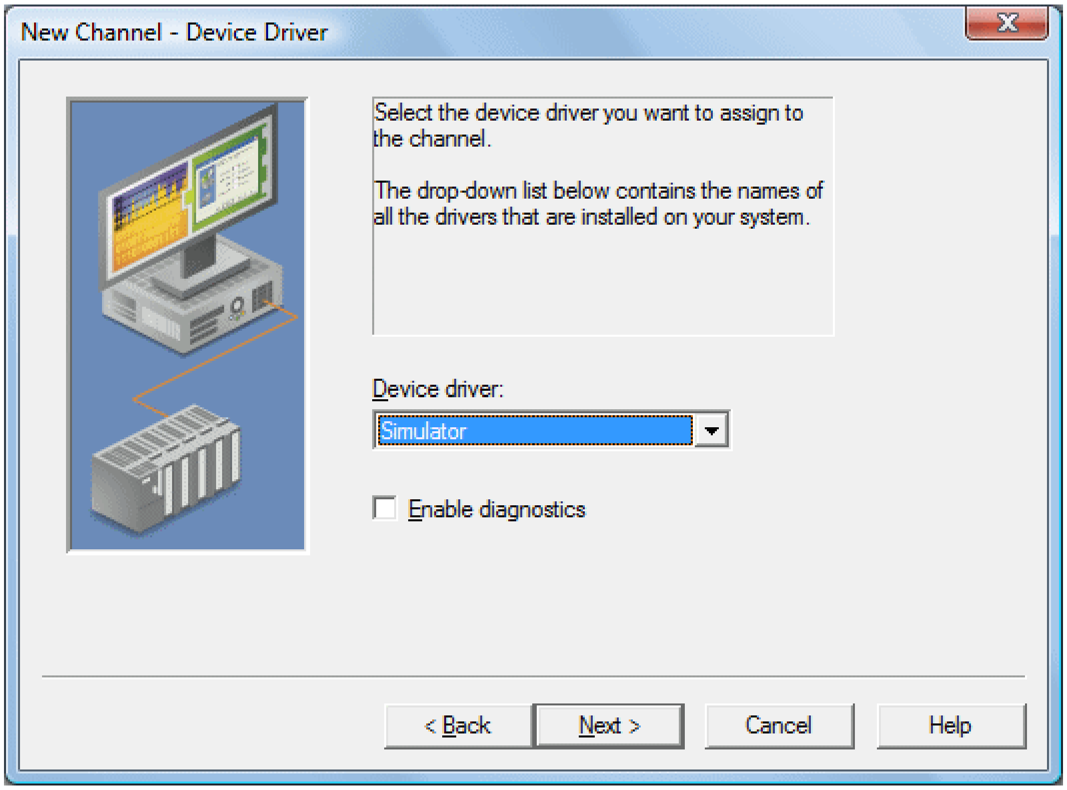
Channel name: Channel1

In a server project, each **Channel Name** must be unique and can be up to 256 characters long. Although using descriptive names is usually a good idea, some OPC client applications may have a limited display window when browsing the tag space of an OPC server.

Note: The channel name entered will be part of the OPC browser information.

New Channel - Device Driver

After a name has been entered for the new channel, a communications driver must be selected from the "Device driver:" drop-down list. The drop-down list's contents depend on the communications drivers currently installed on the PC. The list will contain the drivers available for use in the server project.


New Channel - Device Driver

Select the device driver you want to assign to the channel.

The drop-down list below contains the names of all the drivers that are installed on your system.

Device driver: Simulator

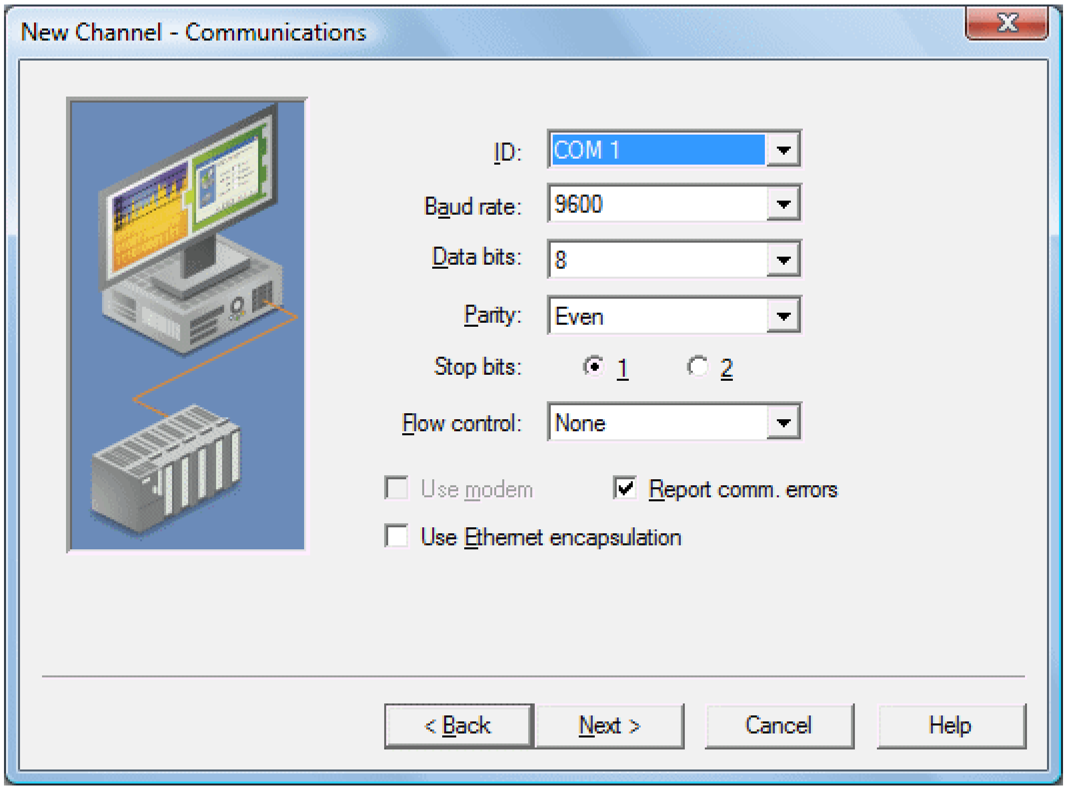
Enable diagnostics [ ]

Since the server supports the use of simultaneous multiple communications drivers, users can add a number of channels to the project. It is not necessary to select a different communications driver for each channel. Many of the communications drivers available for the server support operation on either multiple communications ports or across multiple network connections. If the driver chosen does not support multiple channels (or if the number of supported channels has been exceeded) the driver will display a dialog stating so.

Another server feature is the ability to run **Channel Diagnostics**. Users can select the **Enable Diagnostics** check box in order to make diagnostic information available to the OPC application. When diagnostic functions are enabled, **Diagnostic Tags** will be available for use within client applications. A **Diagnostic Window** will also be available when this feature is enabled.

New Channel - Communications

After a device driver has been selected, suers need to set up its communications. The server supports several mediums for communications; thus, the Communications dialog's format will vary depending on the driver's requirements.



ID: COM 1

Baud rate: 9600

Data bits: 8

Parity: Even

Stop bits: [✓ 1] 2

Flow control: None

Use modem

[✓] Report comm. errors

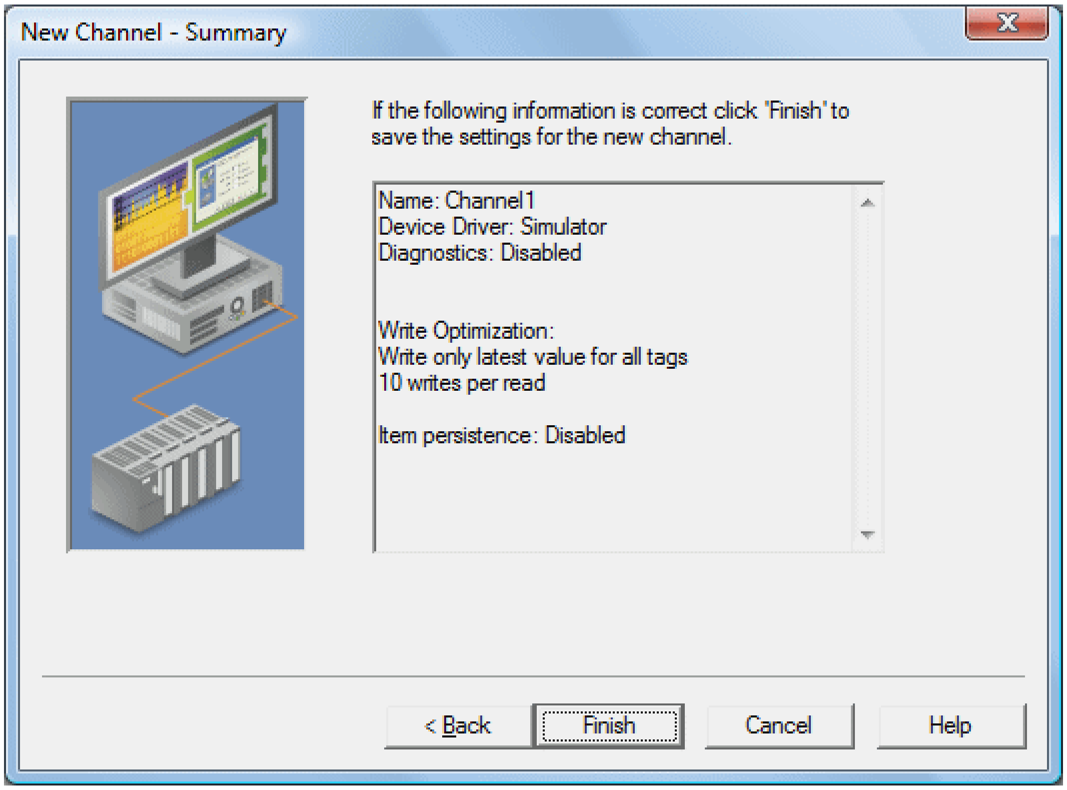
Use Ethernet encapsulation

For Serial based drivers, the Communications dialog is used to set the Serial Port, Baud rate, Data bits, Parity, Stop bits and RTS/DTR Flow Control.

Note: The dialog's additional options allow users to select and use dial-up Modem support or Ethernet Encapsulation for connecting to devices via Serial to Ethernet terminal servers. For more information, refer to **Using a Modem in the Server Project** and **Device Properties - Ethernet Encapsulation**.

New Channel - Summary

The Channel Summary dialog allows users to review the selections they have made while defining the channel. If a mistake is found upon review, users can simply click the **Back** button until the required dialog is displayed. After making changes, users can click the **Next** button to return to the Summary page. Once satisified with the Channel Summary, click **Finish**.



If the following information is correct click 'Finish' to save the settings for the new channel.

Name: Channel1
Device Driver: Simulator
Diagnostics: Disabled

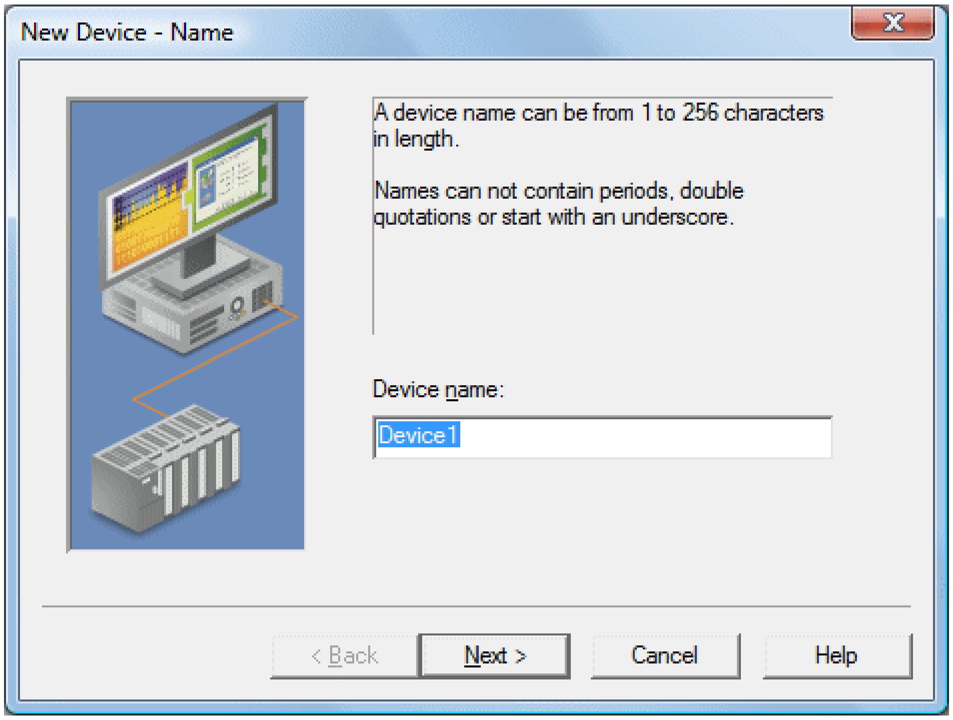
Write Optimization:
Write only latest value for all tags
10 writes per read

Item persistence: Disabled

New Device - Name

A Device Name can be the same from one channel to the next; however, each device under a channel must have a unique name. The Device Name is a user-defined logical name for the device that can be up to 256 characters long. While long descriptive names are generally good, some OPC client applications may have a limited display window when browsing the tag space of an OPC server.

Note: The device name and channel name are part of the browse tree information.



A device name can be from 1 to 256 characters in length.

Names can not contain periods, double quotations or start with an underscore.

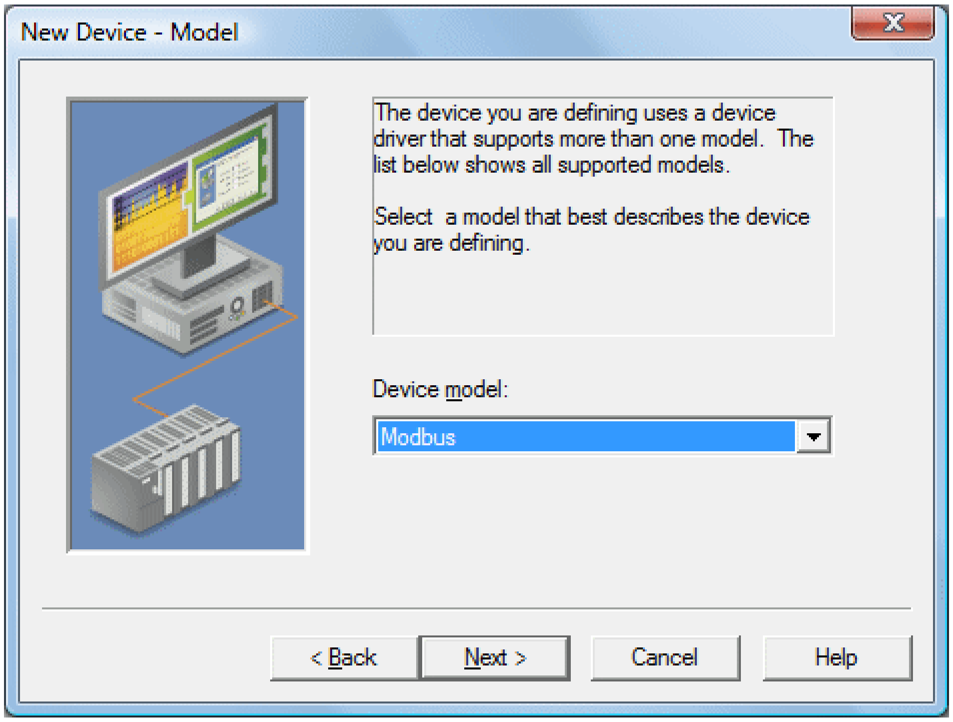
Device name: Device1

Note: Within an OPC client, the combination of channel name and device name would appear as **ChannelName. DeviceName**.

New Device - Model

The Model parameter is used to select the device model associated with the Device ID. The Model selection drop-down menu's contents will vary depending on the chosen communication driver. If a driver does not support model selection, this option will be unavailable. If the communication driver does support multiple models, users should match the model selection to the physical device. If the device being used is not represented in the model drop-down list, select a model that conforms closest to the target device. This can be determined from the specific driver's help documentation.

Note: Some drivers support an **Open** model, which allows users to communicate without knowing the target device's specific details.



The device you are defining uses a device driver that supports more than one model. The list below shows all supported models.

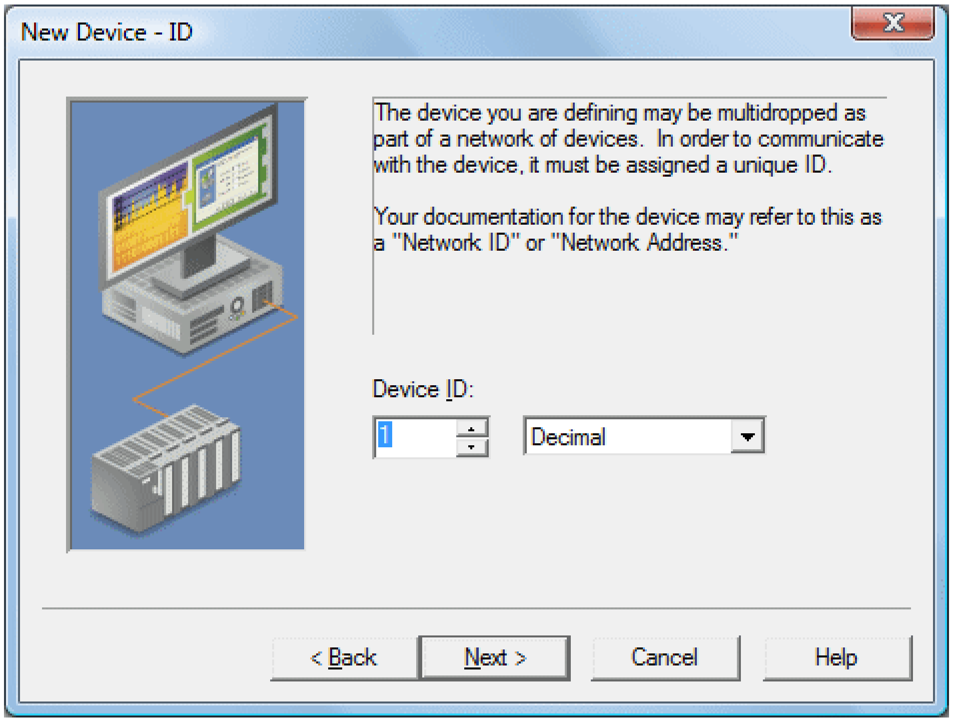
Select a model that best describes the device you are defining.

Device model: Modbus

Note: With the server's online full-time operation, these parameters can be changes at any time. If the communications driver supports multiple device models, the model selection can only be changed if there are currently no client applications connected to the device. Since the device is being added at this time, any model can be selected. Utilize the User Manager to restrict access rights to server features and prevent operators from changing parameters.

New Device - ID

The Device ID parameter is used to specify a device's driver-specific station or node. The type of ID entered will vary depending on the communication driver being used. For example, many communication drivers use a numeric value. As shown in the image below, when a driver supports a **Numeric ID**, the menu option allows users to enter a numeric value. The numeric value's format can be changed to suit the needs of either the application or the communication driver's characteristics. The format is set by the driver by default. Possible formats include **Decimal**, **Octal** and **Hexadecimal**.


New Device - ID

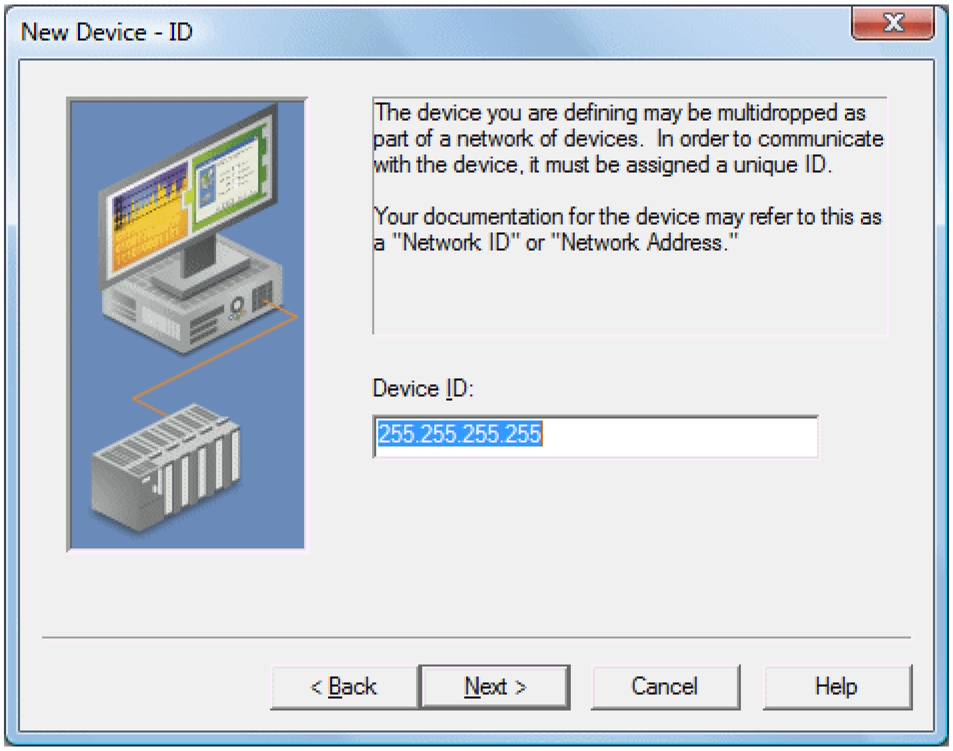
The device you are defining may be multidropped as part of a network of devices. In order to communicate with the device, it must be assigned a unique ID.

Your documentation for the device may refer to this as a "Network ID" or "Network Address."

Device ID: 1 Decimal

If the communications driver is either Ethernet-based or supports an unconventional station or node name, the dialog shown below may be displayed. In this case, the Device ID is a **TCP/IP ID**. TCP/IP or UDP IDs consist of four values separated by periods. Each value has a range of 0 to 255. Some Device IDs are string based.

Note: Depending on the communications driver being used, there may be more parameters that need to be defined in the New Device - ID dialog. For more information on the driver's Device ID, refer to its help documentation.


New Device - ID

The device you are defining may be multidropped as part of a network of devices. In order to communicate with the device, it must be assigned a unique ID.

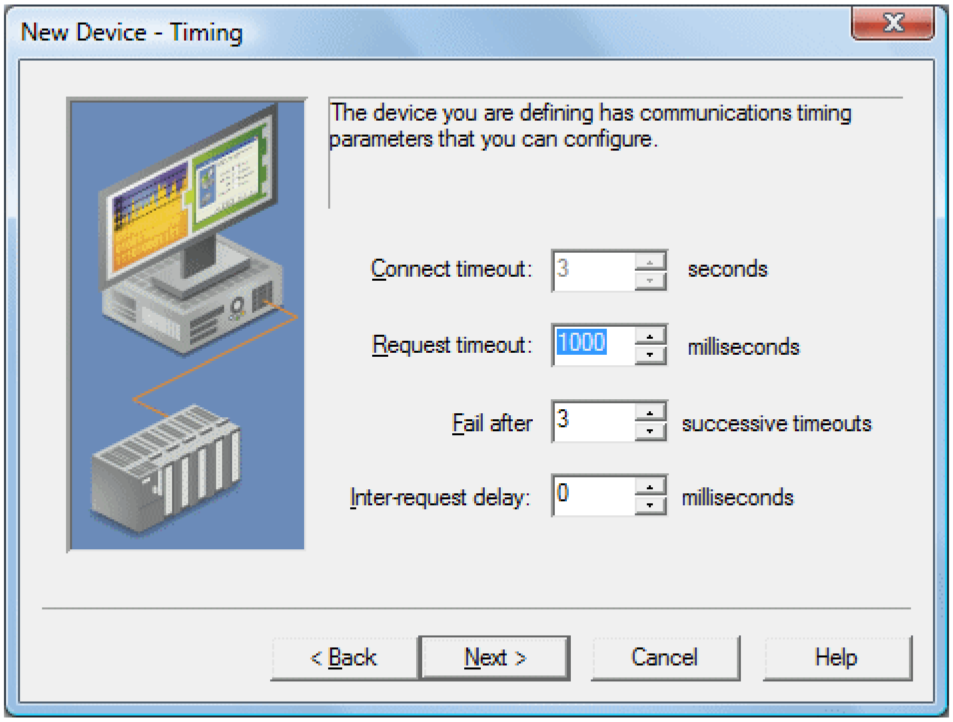
Your documentation for the device may refer to this as a "Network ID" or "Network Address."

Device ID: 255.255.255.255

Note: With the server's online full-time operation, these parameters can be changed at any time. Any changes made to the Device ID will take effect immediately. Utilize the User Manager to restrict access rights to server features and prevent operators from changing parameters.

New Device - Timing

Device Timing parameters allow a driver's response to error conditions to be tailored to the application's needs. The environment in which the application runs may require changes to the timing parameters. Factors such as electrically generated noise, modem delays and bad physical connections can all influence how many errors or timeouts a communications driver may encounter. The timing parameters are specific to each configured device.


New Device - Timing

The device you are defining has communications timing parameters that you can configure.

Connect timeout: 3 seconds

Request timeout: 1000 milliseconds

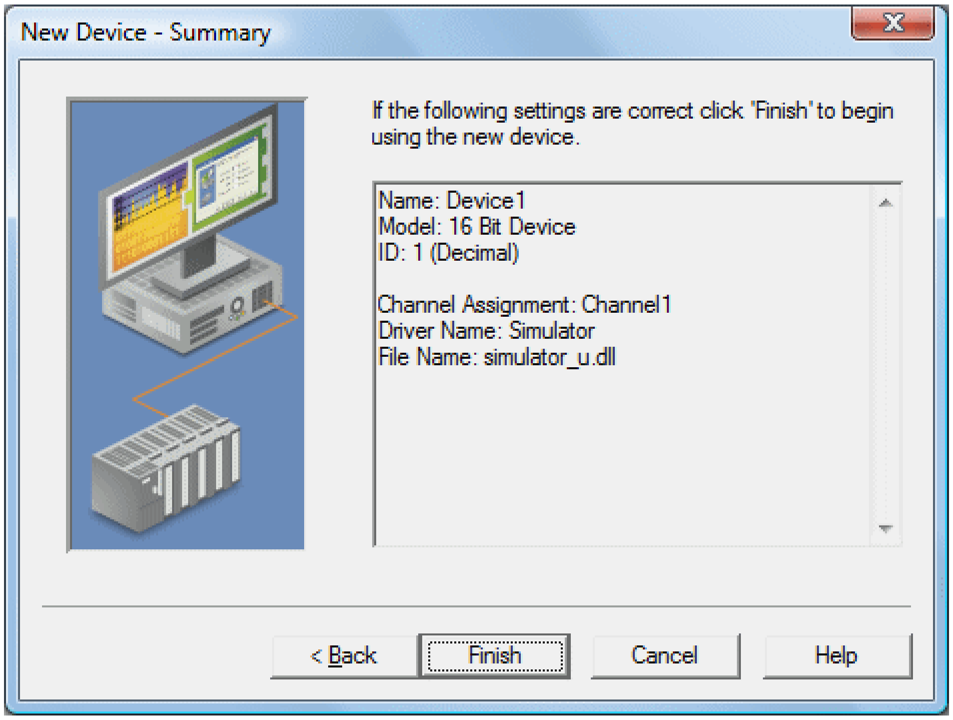
Fail after 3 successive timeouts

Inter-request delay: 0 milliseconds

Note: For most projects, the default Timeout settings work well. If users find that the project takes too long to time out a device or that there are too many timeouts, they can adjust the settings to improve performance.

New Device - Summary

The Device Summary page allows users to review the selections that have been made for the device. If a mistake is found upon review, users can simply click the **Back** button until the required dialog is displayed. After making changes, users can click the **Next** button to return to the Summary page. Once satisified with the Device Summary, click **Finish**.



If the following settings are correct click 'Finish' to begin using the new device.

Name: Device1
Model: 16 Bit Device
ID: 1 (Decimal)

Channel Assignment: Channel1
Driver Name: Simulator
File Name: simulator_u.dll

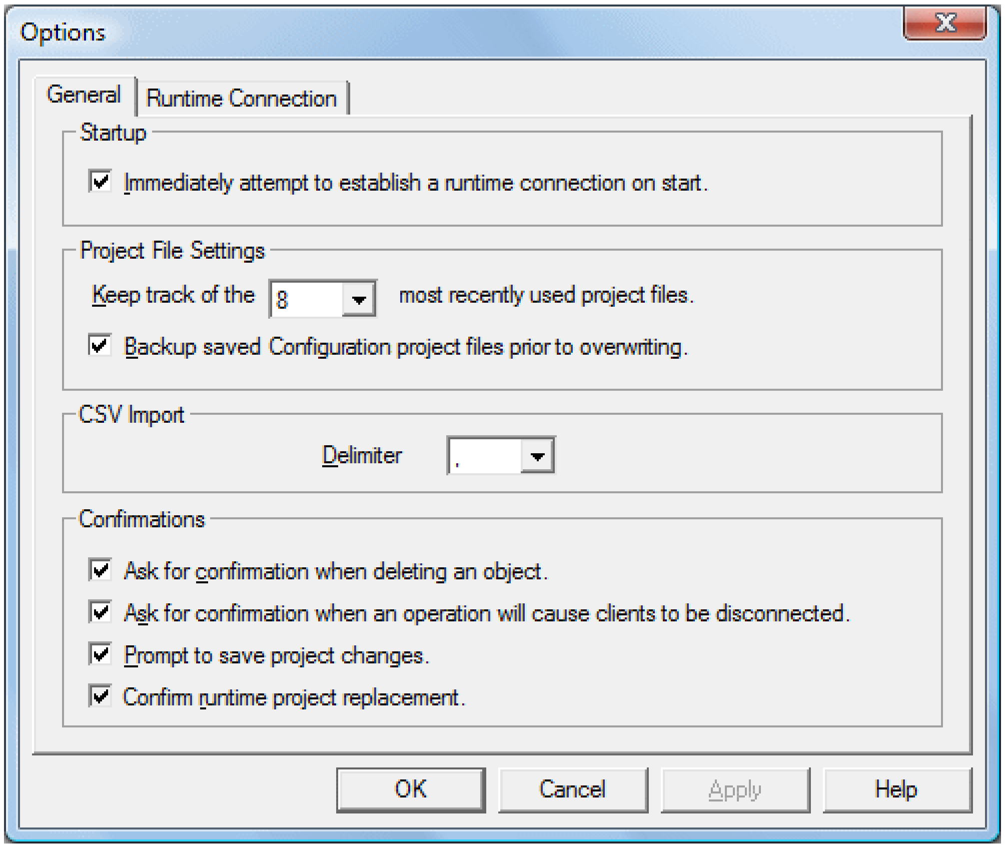
Server Options

Server options are configured on a per-user basis. For more information on a specific dialog, select a link from the list below.

Options - General
Options - Runtime Connections

Options - General

This dialog is used to specify general server options, such as when to establish a connection with the Runtime, when to back up saved Configuration project files and what conditions will invoke warning pop-ups. For more information, refer to the descriptions below.



Options

General | Runtime Connection

Startup

☑ Immediately attempt to establish a runtime connection on start.

Project File Settings

Keep track of the 8 most recently used project files.

☑ Backup saved Configuration project files prior to overwriting.

CSV Import

Delimiter ,

Confirmations

☑ Ask for confirmation when deleting an object.

☑ Ask for confirmation when an operation will cause clients to be disconnected.

☑ Prompt to save project changes.

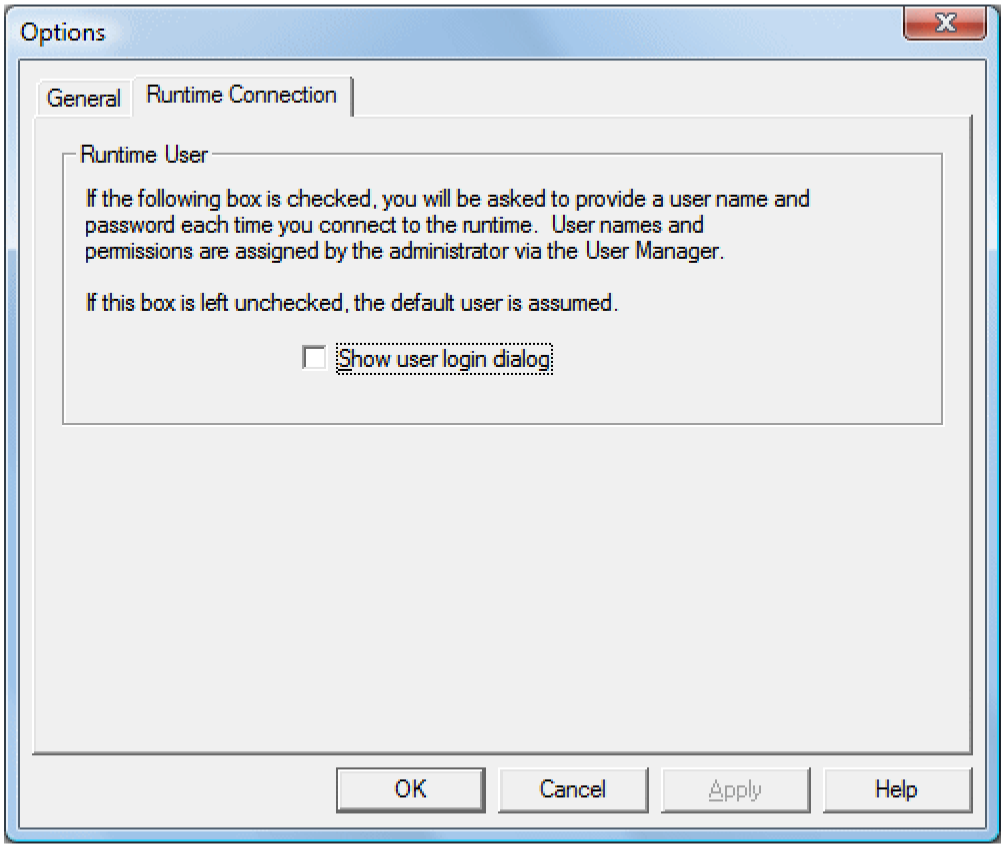
☑ Confirm runtime project replacement.

Descriptions of the parameters are as follows:

- **Immediately attempt to establish a Runtime connection on start:** This parameter is used to specify whether the configuration tool will connect to the Runtime when started. It is checked by default. If it is unchecked, users must manually connect.
- **Keep track of the __ most recently used project files:** This parameter is used to specify how many project files will be presented on the **MRU (Most Recently Used)** list of projects. The valid range is 1 to 16.
- **Backup saved Configuration project files prior to overwriting:** Select this check box in order to have the system automatically make a backup copy of the last saved Configuration project before overwriting it with a new project file. The backup file's name and location will be displayed in the Event Log.
- **CSV Import:** The **Delimiter** setting is used to select the comma-separated variable that the server will use while importing and exporting tag data in a CSV (comma separated variable) file. Users can select either the default comma or a semicolon. **See Also:** **Tag Management**.
- **Confirmations:** This parameter is used to specify the conditions that will force the server to present warning pop-ups to an operator. When **Deleting an object** is enabled, all delete operations will invoke a warning popup to be displayed to the operator that requires confirmation before the delete operation can be completed. When **Disconnect** is enabled, all operations that would cause client applications to be disconnected from the server will invoke a warning popup to be displayed that requires confirmation before the disconnect sequence can be initiated. If **Prompt to save** is enabled, a popup will be invoked if the server is being shut down while the project has outstanding changes. When connected to the Runtime and opening a project, **Confirm Runtime project replacement** will warn that the project can be opened and edited offline.

Options - Runtime Connection

This dialog is used to specify how connections to the Runtime are managed.



Runtime User

If the following box is checked, you will be asked to provide a user name and password each time you connect to the runtime. User names and permissions are assigned by the administrator via the User Manager.

If this box is left unchecked, the default user is assumed.

☐ Show user login dialog

Runtime User

Runtime User settings ensure that when **Show user login dialog** is checked, a valid user name and password will be required before the Configuration can be connected to the Runtime for project editing.

iFIX Signal Conditioning Options

The following signal conditioning options are available through the iFIX Database Manager:

3BCD
4BCD
8AL
8BN
12AL
12BN
13AL
13BN
14AL
14BN
15AL
15BN
20P
TNON

Note: Linear and logarithmic scaling is available through the server for **static tags** only. For more information, refer to **Tag Properties - Scaling**.

3BCD Signal Conditioning

Description	3-digit Binary Coded Decimal (BCD) value.
Input Range	0 - 999.
Scaling	Scales 3-digit Binary Coded Decimal values to the database block's EGU range.
Read Algorithm	Reads from a 3-digit BCD register. The Raw_value is then separated into three nibbles (4 bits) prior to scaling the value. Each nibble is examined for a value greater than 9 (A-F hex). If a hexadecimal value between A and F is found, a range alarm is generated, indicating the value is not within BCD range. Otherwise, the value is scaled with the following algorithm: Result=((Raw_value/999) * Span_egu) + Lo_egu.
Read Algorithm Variables	Lo_egu - the database block's low engineering value. Span_egu - the span of the engineering values. Raw_value - the value stored in the field device's register. Result - the scaled value stored in the database block.
Write Algorithm	Writes to a 3-digit BCD register using the following algorithm: Result=(((InputData - Lo_egu) / Span_egu) * 999 + .5.
Write Algorithm Variables	Lo_egu - the low engineering value. Span_egu - the span of the engineering values. InputData - the database block's current value. Result - the value sent to the process hardware.

4BCD Signal Conditioning

Description	4-digit Binary Coded Decimal (BCD) value.
Input Range	0 - 9999.
Scaling	Scales 4-digit Binary Coded Decimal values to the database block's EGU range.
Read Algorithm	Reads from a 4-digit BCD register. The Raw_value is then separated into four nibbles (4 bits) prior to scaling the value. Each nibble is examined for a value greater than 9 (A-F hex). If a hexadecimal value between A and F is found, a range alarm is generated, indicating the value is not within BCD range. Otherwise, the value is scaled with the following algorithm: Result=((Raw_value/9999) * Span_egu) + Lo_egu.
Read Algorithm Variables	Lo_egu - the database block's low engineering value. Span_egu - the span of the engineering values. Raw_value - the value stored in the field device's register. Result - the scaled value stored in the database block.
Write Algorithm	Writes to a 4-digit BCD register using the following algorithm: Result=(((InputData - Lo_egu) / Span_egu) * 9999 + .5.
Write Algorithm Variables	Lo_egu - the low engineering value. Span_egu - the span of the engineering values. InputData - the database block's current value. Result - the value sent to the process hardware.

8AL Signal Conditioning

Description	8-bit binary number.
Input Range	0 - 255.
Scaling	Scales 8-bit binary values to the database block's EGU range.
Read Algorithm	Reads from a 16-bit register using the same algorithm as 8BN, and returns a status indicating whether the value is out of range and in an alarm state, or OK. Result=((Raw_value/255) * Span_egu) + Lo_egu.

Read Algorithm Variables	Lo_egu - the database block's low engineering value. Span_egu - the span of the engineering values. Raw_value - the value stored in the field device's register. Result - the scaled value stored in the database block.
Write Algorithm	Writes to a 16-bit register using the same algorithm as 8BN, and returns a status indicating whether the value is out of range and in an alarm state, or OK. Result=(((InputData - Lo_egu)/Span_egu) * 255) + .5.
Write Algorithm Variables	Lo_egu - the low engineering value. Span_egu - the span of the engineering values. InputData - the database block's current value. Result - the value sent to the process hardware.

8BN Signal Conditioning

Description	8-bit binary number.
Input Range	0 - 255.
Scaling	Scales 8-bit binary values to the database block's EGU range. Ignores the most significant byte.
Read Algorithm	Reads from a 16-bit register using the following algorithm: Result =((Raw_value/255) * Span_egu) + Lo_egu.
Read Algorithm Variables	Lo_egu - the database block's low engineering value. Span_egu - the span of the engineering values. Raw_value - the value stored in the field device's register. Result - the scaled value stored in the database block.
Write Algorithm	Writes to an 8-bit register using the following algorithm: Result =(((InputData - Lo_egu)/Span_egu) * 255) + .5.
Write Algorithm Variables	Lo_egu - the low engineering value. Span_egu - the span of the engineering values. InputData - the database block's current value. Result - the value sent to the process hardware.

12AL Signal Conditioning

Description	12-bit binary number.
Input Range	0 - 4095.
Scaling	Scales 12-bit binary values to the database block's EGU range.
Read Algorithm	Reads from a 16-bit register using the same algorithm as 12BN, and returns a status indicating whether the value is out of range and in an alarm state, or OK. Result=((Raw_value/4095) * Span_egu) + Lo_egu.
Read Algorithm Variables	Lo_egu - the database block's low engineering value. Span_egu - the span of the engineering values. Raw_value - the value stored in the field device's register. Result - the scaled value stored in the database block.
Write Algorithm	Writes to a 16-bit register using the same algorithm as 12BN, and returns a status indicating whether the value is out of range and in an alarm state, or OK. Result=(((InputData - Lo_egu)/Span_egu) * 4095) + .5.
Write Algorithm Variables	Lo_egu - the low engineering value. Span_egu - the span of the engineering values. InputData - the database block's current value. Result - the value sent to the process hardware.

12BN Signal Conditioning

Description	12-bit binary number.
Input Range	0 - 4095.
Scaling	Scales 12-bit binary values to the database block's EGU range. Ignores the most significant nibble (4-bits). Out of range value are treated as 12-bit values. For example, 4096 is treated as 0 because the four most significant bits are ignored.
Read Algorithm	Reads from a 16-bit register using the following algorithm: Result =((Raw_value/4095) * Span_egu) + Lo_egu.
Read Algorithm Variables	Lo_egu - the database block's low engineering value. Span_egu - the span of the engineering values. Raw_value - the value stored in the field device's register. Result - the scaled value stored in the database block.
Write Algorithm	Writes to a 16-bit register using the following algorithm: Result =(((InputData - Lo_egu)/Span_egu) * 4095) + .5.
Write Algorithm Variables	Lo_egu - the low engineering value. Span_egu - the span of the engineering values. InputData - the database block's current value. Result - the value sent to the process hardware.

13AL Signal Conditioning

Description	13-bit binary number.
Input Range	0 - 8191.
Scaling	Scales 13-bit binary values to the database block's EGU range.
Read Algorithm	Reads from a 16-bit register using the same algorithm as 13BN, and returns a status indicating whether the value is out of range and in an alarm state, or OK. Result=((Raw_value/8191) * Span_egu) + Lo_egu.
Read Algorithm Variables	Lo_egu - the database block's low engineering value. Span_egu - the span of the engineering values. Raw_value - the value stored in the field device's register. Result - the scaled value stored in the database block.
Write Algorithm	Writes to a 16-bit register using the same algorithm as 13BN, and returns a status indicating whether the value is out of range and in an alarm state, or OK. Result=(((InputData - Lo_egu)/Span_egu) * 8191) + .5.
Write Algorithm Variables	Lo_egu - the low engineering value. Span_egu - the span of the engineering values. InputData - the database block's current value. Result - the value sent to the process hardware.

13BN Signal Conditioning

Description	13-bit binary number.
Input Range	0 - 8191.
Scaling	Scales 13-bit binary values to the database block's EGU range. Ignores the most significant 3 bits.
Read Algorithm	Reads from a 16-bit register using the following algorithm: Result =((Raw_value/8191) * Span_egu) + Lo_egu.
Read Algorithm Variables	Lo_egu - the database block's low engineering value. Span_egu - the span of the engineering values. Raw_value - the value stored in the field device's register. Result - the scaled value stored in the database block.
Write Algorithm	Writes to a 16-bit register using the following algorithm:

	Result =(((InputData - Lo_egu)/Span_egu) * 8191) + .5.
Write Algorithm Variables	Lo_egu - the low engineering value. Span_egu - the span of the engineering values. InputData - the database block's current value. Result - the value sent to the process hardware.

14AL Signal Conditioning

Description	14-bit binary number.
Input Range	0 - 16383.
Scaling	Scales 14-bit binary values to the database block's EGU range.
Read Algorithm	Reads from a 16-bit register using the same algorithm as 14BN, and returns a status indicating whether the value is out of range and in an alarm state, or OK. Result=((Raw_value/16383) * Span_egu) + Lo_egu.
Read Algorithm Variables	Lo_egu - the database block's low engineering value. Span_egu - the span of the engineering values. Raw_value - the value stored in the field device's register. Result - the scaled value stored in the database block.
Write Algorithm	Writes to a 16-bit register using the same algorithm as 14BN, and returns a status indicating whether the value is out of range and in an alarm state, or OK. Result=(((InputData - Lo_egu)/Span_egu) * 16383) + .5.
Write Algorithm Variables	Lo_egu - the low engineering value. Span_egu - the span of the engineering values. InputData - the database block's current value. Result - the value sent to the process hardware.

14BN Signal Conditioning

Description	14-bit binary number.
Input Range	0 - 16383.
Scaling	Scales 14-bit binary values to the database block's EGU range. Ignores the most significant 2 bits.
Read Algorithm	Reads from a 16-bit register using the following algorithm: Result=((Raw_value/16383) * Span_egu) + Lo_egu.
Read Algorithm Variables	Lo_egu - the database block's low engineering value. Span_egu - the span of the engineering values. Raw_value - the value stored in the field device's register. Result - the scaled value stored in the database block.
Write Algorithm	Writes to a 16-bit register using the following algorithm: Result=(((InputData - Lo_egu)/Span_egu) * 16383) + .5.
Write Algorithm Variables	Lo_egu - the low engineering value. Span_egu - the span of the engineering values. InputData - the database block's current value. Result - the value sent to the process hardware.

15AL Signal Conditioning

Description	15-bit binary number.
Input Range	0 - 32767.
Scaling	Scales 15-bit binary values to the database block's EGU range.
Read Algorithm	Reads from a 16-bit register with alarming using the same algorithm as 15BN, and returns a status indicating whether the value is out of range and in an alarm state, or OK.

	Result=((Raw_value/32767) * Span_egu) + Lo_egu.
Read Algorithm Variables	Lo_egu - the database block's low engineering value. Span_egu - the span of the engineering values. Raw_value - the value stored in the field device's register. Result - the scaled value stored in the database block.
Write Algorithm	Writes to a 16-bit register with alarming using the same algorithm as 15BN, and returns a status indicating whether the value is out of range and in an alarm state, or OK. Result=(((InputData - Lo_egu)/Span_egu) * 32767) + .5.
Write Algorithm Variables	Lo_egu - the low engineering value. Span_egu - the span of the engineering values. InputData - the database block's current value. Result - the value sent to the process hardware.

15BN Signal Conditioning

Description	15-bit binary number.
Input Range	0 - 32767.
Scaling	Scales 15-bit binary values to the database block's EGU range. Ignores the most significant bit.
Read Algorithm	Reads from a 16-bit register using the following algorithm: Result =((Raw_value/32767) * Span_egu) + Lo_egu.
Read Algorithm Variables	Lo_egu - the database block's low engineering value. Span_egu - the span of the engineering values. Raw_value - the value stored in the field device's register. Result - the scaled value stored in the database block.
Write Algorithm	Writes to a 16-bit register using the following algorithm: Result =(((InputData - Lo_egu)/Span_egu) * 32767) + .5.
Write Algorithm Variables	Lo_egu - the low engineering value. Span_egu - the span of the engineering values. InputData - the database block's current value. Result - the value sent to the process hardware.

20P Signal Conditioning

Description	6400 – 32000 Clamp.
Input Range	6400 – 32000.
Scaling	Scales binary values to the database block's EGU range. Clamps value to 6400 – 32000 range.
Read Algorithm	Reads from a 16-bit register using the following algorithm: Result =(((Raw_value - 6400)/25600) * Span_egu) + Lo_egu.
Read Algorithm Variables	Lo_egu - the database block's low engineering value. Span_egu - the span of the engineering values. Raw_value - the value stored in the field device's register. Result - the scaled value stored in the database block.
Write Algorithm	Writes to a 16-bit register using the following algorithm: Result =(((InputData - Lo_egu)/Span_egu) * 25600) + 6400.5.
Write Algorithm Variables	Lo_egu - the low engineering value. Span_egu - the span of the engineering values. InputData - the database block's current value. Result - the value sent to the process hardware.

TNON Signal Conditioning

Description	0 – 32000 Clamp.
Input Range	0 – 32000.
Scaling	Scales binary values to the database block's EGU range. Clamps value to 0 – 32000 range.
Read Algorithm	Reads from a 16-bit register using the following algorithm: Result =((Raw_value/32000) * Span_egu) + Lo_egu.
Read Algorithm Variables	Lo_egu - the database block's low engineering value. Span_egu - the span of the engineering values. Raw_value - the value stored in the field device's register. Result - the scaled value stored in the database block.
Write Algorithm	Writes to a 16-bit register using the following algorithm: Result =(((InputData - Lo_egu)/Span_egu) * 32000) + .5.
Write Algorithm Variables	Lo_egu - the low engineering value. Span_egu - the span of the engineering values. InputData - the database block's current value. Result - the value sent to the process hardware.

Project Startup for iFIX Applications

The server's iFIX interface has been enhanced to provide better startup performance for iFIX users. This enhancement applies to iFIX applications that use Analog Output (AO), Digital Output (DO) and/or Alarm Values that were previously initialized improperly on startup. The server maintains a special iFIX configuration file for the default server project that contains all items that will be accessed by the iFIX client. The server uses this configuration file to automatically start scanning items prior to iFIX starting up and requesting item data. Therefore, data updates that are only requested once (such as AO/DO) will have an initial value when requested by iFIX.

For information on using this feature for existing iFIX projects, follow the instructions below.

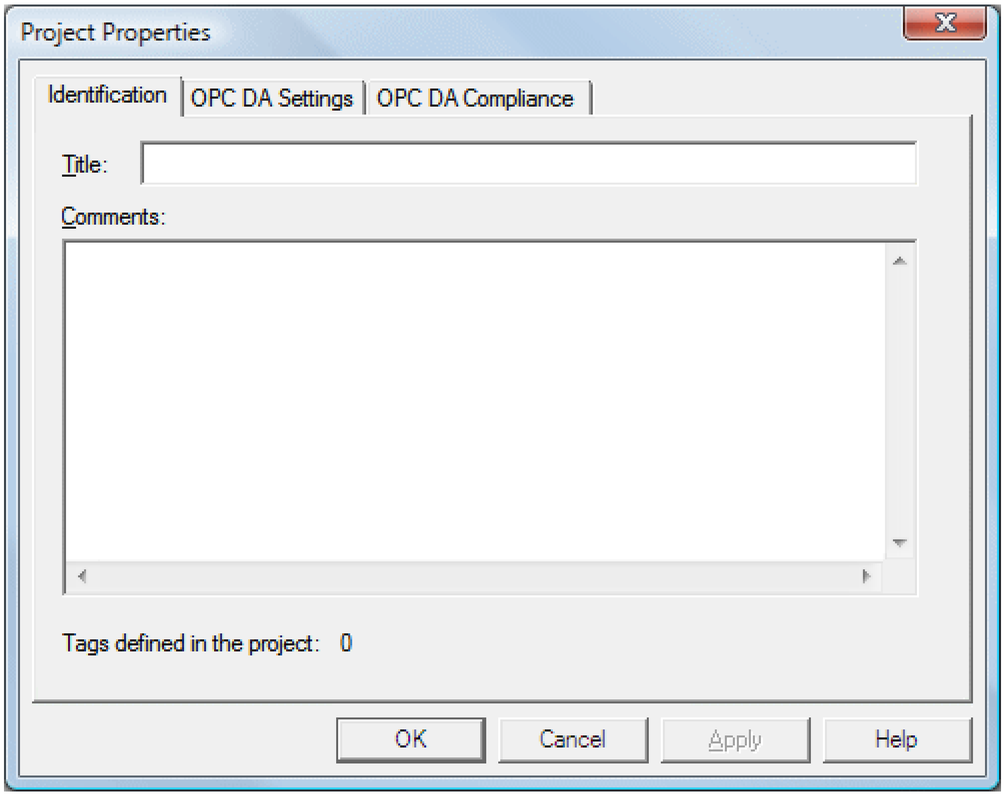
1. Export the **PDB database** from the **iFIX Database Manager**.
2. Next, re-import the exported file so that each item in the database will be re-validated with the server.
3. Select **Yes to all** when the **Confirm tag replacement** message box appears (because the same database that was previously exported is being re-imported).

   Note: A new configuration file will be created in the same folder as the default server project file, containing the name "default_FIX.ini".
4. Depending on how long it takes to read an initial value for all the items in the project, it may be necessary to delay the start of SAC processing in order to allow the server enough time to retrieve all initial updates before the iFIX client requests data from the server. For more information on the specific iFIX version, refer to the iFIX documentation.
5. Next, restart both the iFIX application and the server in order to put the changes into effect.

Note: For new projects (or when adding additional items to an existing iFIX database) users do not need to perform the steps described above. The item will be validated by the server upon its addition to the database. If valid, the server will add the item to the configuration file described above.

Project Properties - Identification

The Project Properties - Identification dialog is used to attach a title and comment to a project for reference. Although the Title field supports a string of up 64 characters, the Comments field has no practical limit. Limiting the comment to the area available within the comment box, however, will improve project load time.



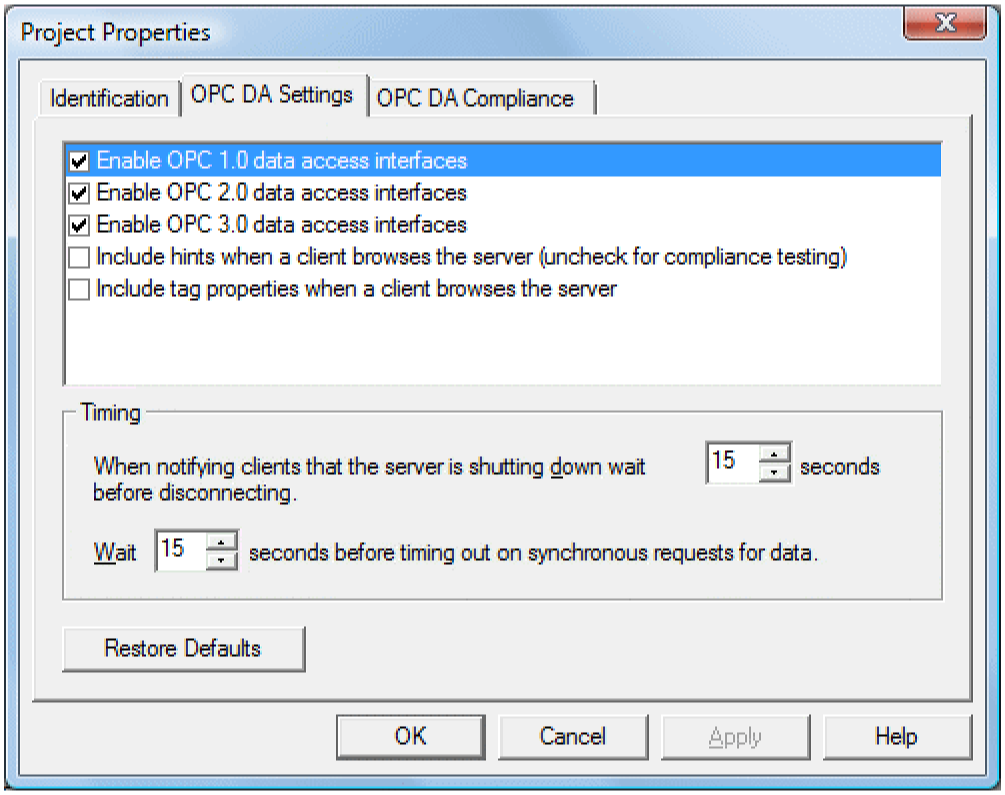
Title:

Comments:

Tags defined in the project: 0

Project Properties - OPC DA Settings

This server supports the OPC Foundation's Data Access Specifications for 1.0, 2.0 and 3.0 simultaneously. While this provides the utmost level of compatibility, there may be times when forcing the server to use one method over another is necessary. The OPC DA Options dialog is used to make these selections.



☑ Enable OPC 1.0 data access interfaces
☑ Enable OPC 2.0 data access interfaces
☑ Enable OPC 3.0 data access interfaces
☐ Include hints when a client browses the server (uncheck for compliance testing)
☐ Include tag properties when a client browses the server

Timing

When notifying clients that the server is shutting down wait 15 seconds before disconnecting.

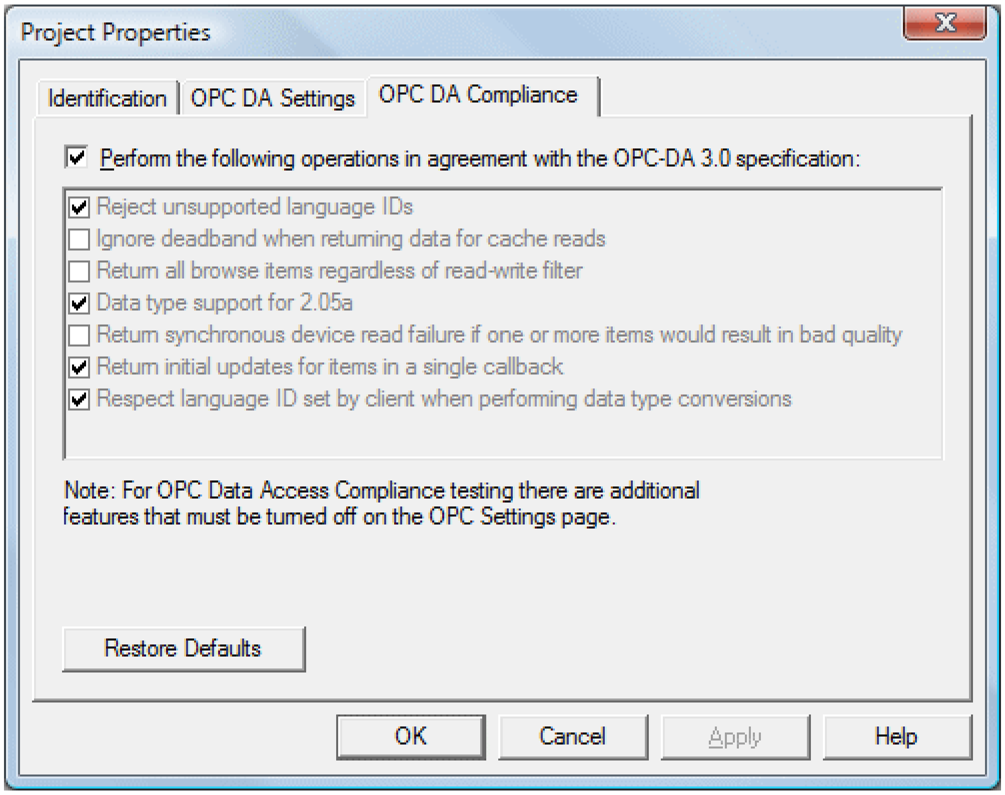
Wait 15 seconds before timing out on synchronous requests for data.

Descriptions of the parameters are as follows.

- When enabled, **Enable OPC 1.0** allows the server to accept OPC client connections from OPC clients that support the 1.0 specification. The 1.0 operation is enabled by default.
- When enabled, **Enable OPC 2.0** allows the server to accept OPC client connections from OPC clients that support the 2.0 specification. The 2.0 operation is enabled by default.
- When enabled, **Enable OPC 3.0** allows the server to accept OPC client connections from OPC clients that support the 3.0 specification. The 3.0 operation is enabled by default.
- When enabled, **Include Hints** allows OPC client applications to browse the address formatting Hints available for each communications driver. The Hints provide a visual quick reference on how a particular device's data can be addressed. This can be useful when entering Dynamic Tags from the OPC client. The hint items are not valid OPC tags. Some OPC client applications may try to add the Hint tags to their tag database. When this occurs, the client will receive an error from the server. This is not a problem for most clients, although it can cause others to stop adding tags automatically or report errors. Users can prevent this from occurring by turning the Hints On or Off. This option is disabled by default.
- When enabled, **Include Tag Properties** allows OPC client applications to browse the tag properties available for each tag in the address space. This setting is disabled by default.
- **Shut down wait timeout** allows users to configure how long the server will wait for an OPC client to return from the server shut down event. If the client application does not return within the timeout period, the server will complete its shutdown and exit. The valid range is 10 to 60 seconds. The default is 15 seconds.
- **Wait for synchronous request** parameter allows users to configure how long the server will wait for a synchronous Read or Write operation to complete. If a synchronous operation is in progress and the timeout is exceeded, the server will force the operation to complete with a failure to the OPC client. This prevents OPC clients from appearing to become locked up when using synchronous operations. The valid range is 5 to 60 seconds. The default is 15 seconds.

Project Properties - OPC DA Compliance

The server has been designed to provide the highest level of compatibility with the OPC Foundation's specifications. In testing however it has been found that being fully compatible with the specification and working with all OPC client applications is a different matter. The OPC DA Compliance option allows users to tailor the operation of the server to better meet the needs of rare OPC clients. Normally these options will not need to be adjusted for a majority of the OPC client applications users will encounter. The OPC compliancy dialog appears as shown below.



[✓] Perform the following operations in agreement with the OPC-DA 3.0 specification:

- [✓] Reject unsupported language IDs
- [ ] Ignore deadband when returning data for cache reads
- [ ] Return all browse items regardless of read-write filter
- [✓] Data type support for 2.05a
- [ ] Return synchronous device read failure if one or more items would result in bad quality
- [✓] Return initial updates for items in a single callback
- [✓] Respect language ID set by client when performing data type conversions

Note: For OPC Data Access Compliance testing there are additional features that must be turned off on the OPC Settings page.

Descriptions of the parameters are as follows.

- **Perform the following operations** is the master enabling switch for the options present in the list box. When enabled, the server will set all options to conform to OPC compliancy. This setting is not enabled by default.
- When enabled, **Reject unsupported Language IDs** only allows Language IDs that are natively supported by the server. If the OPC client application attempts to add an OPC group to the server and receives a general failure, it is possible the client has given the server a Language ID that is not natively supported. If this occurs, the server will reject the group addition. To resolve this particular issue, disable the compliant feature to force the server to accept any Language ID.
- When enabled, **Ignore dead-band when returning data for cache needs** allows the server to ignore the dead-band setting on OPC groups added to the server. For some OPC clients, passing the correct value for dead-band causes problems that may result in the OPC client (such as, having good data even though it does not appear to be updating frequently or at all). This condition is rare. As such, the selection should normally be left in its default disabled state.
- When enabled, **Return all browse items regardless of read-write filter** causes the server to return all tags to an OPC client application when a browse request is made, regardless of the access filter applied to the OPC clients tag browser.
- When enabled, **Data type support for 2.05a** causes the server to adhere to the data type requirements and expected behaviors for data type coercion that were added to the 2.05a specification.
- When enabled, **Return synchronous device read failure if one or more items would result in bad quality** causes the server to return a failure if one or more items for a synchronous device Read results in a bad quality read. Compliance requires the server to return success, indicating that the server could complete the request even though the data for one or more items may include a bad and/or uncertain quality.
- When enabled, **Return initial updates for items in a single callback** causes the server to return all outstanding initial item updates in a single callback. When not selected, the server returns initial updates as they are available (which could result in multiple callbacks).
- When enabled, **Respect Language ID set by client when performing data type conversions** determines whether the server uses the Locale ID of the running Windows Operating System or the Locale ID set by the OPC client when performing data type conversions. For example, a string representing a floating point number such as

1,200 would be converted to One Thousand - Twelve Hundred if converted using English metrics, but would be One and Two-Tenths if converted using German metrics. Thus, if German software is running on an English OS, users need to determine how the comma will be handled. This setting allows for such flexibility. By default, and due to historical implementation, the server respects the Locale ID of the operating system.

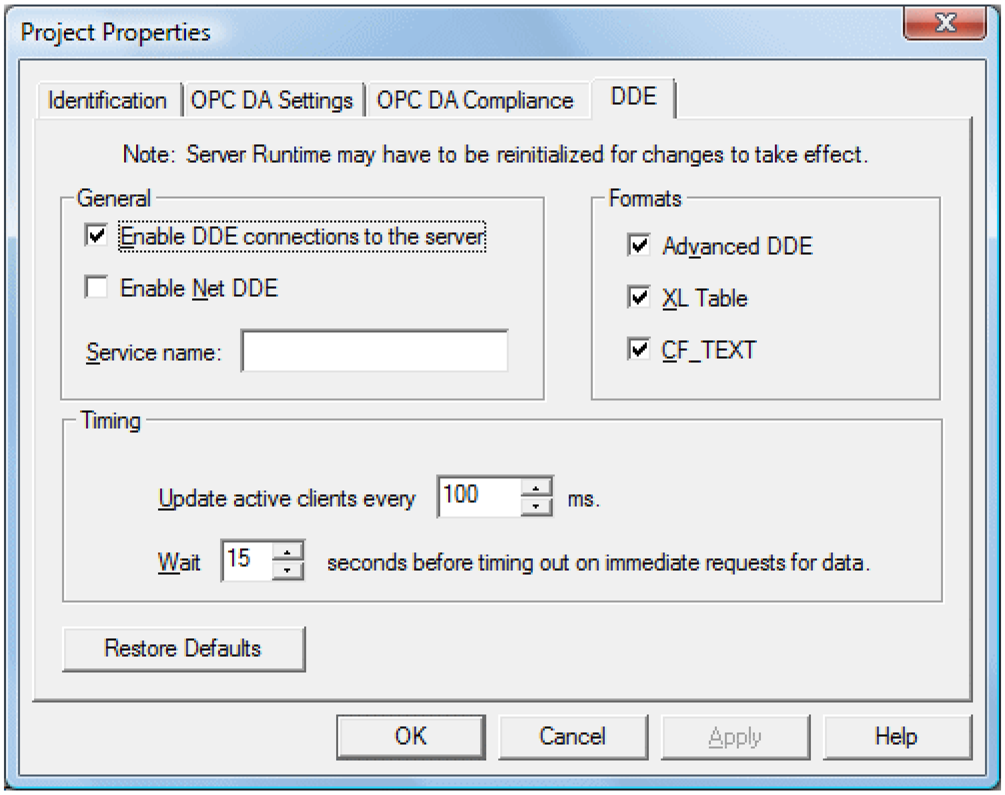
Project Properties - DDE

While the server is first and foremost an OPC server, there are still a number of applications that require **Dynamic Data Exchange (DDE)** to share data. The server provides access to DDE applications that support one of the following DDE formats: **CF_Text**, **XL_Table** and **Advanced DDE**. CF_Text and XL_Table are standard DDE formats developed by Microsoft for use with all DDE aware applications. Advanced DDE is a high performance format supported by a number of client applications specific to the industrial market.

Important: In order for the DDE interface to connect with the server, the Runtime must be allowed to interact with the desktop. For more information, refer to **How To... Allow Desktop Interactions**.

DDE Option Dialog

The DDE Option dialog, which allows users to determine how the server provides DDE data, can be reached by clicking **File** | **Project Properties** | **DDE** in the server. Its parameters can be used to tailor the DDE operation to fit the application's needs.



Note: Server Runtime may have to be reinitialized for changes to take effect.

General
- [✓] Enable DDE connections to the server
- [ ] Enable Net DDE
- Service name:

Formats
- [✓] Advanced DDE
- [✓] XL Table
- [✓] CF_TEXT

Timing
- Update active clients every 100 ms.
- Wait 15 seconds before timing out on immediate requests for data.

Enable DDE Connections to the Server

This parameter determines whether the DDE server portion of the server will be enabled or disabled. If DDE operation is disabled, the server will not respond to any request for DDE data. If intending to use the server only as an OPC server, users may want to disable DDE operation. Doing so can increase the data's security and improve the server's overall performance. DDE is disabled by default. **See Also: How To... Use DDE with the Server**.

Enable Net DDE

This parameter determines whether Microsoft's Net DDE services will be enabled or disabled. If intending to use the server only with local DDE client applications, users should keep Net DDE disabled (the default setting). Starting the Net DDE services can be a time consuming process that can slow the startup of the server. If users do need to use Net

DDE, enabling it will cause the server to automatically register its share names and start the Net DDE service manager. DDE shares will be removed when the server shuts down. **See Also:** **How To... Use Net DDE**.

Service Name

This parameter allows users to change how the server appears as an application name to DDE clients. This name will initially be set to allow compatibility with the previous versions of the server. If users need to replace an existing DDE server however, the server's service name can be changed to match the DDE server being replaced. The service name allows a string of 1 to 32 characters to be entered.

Formats

This parameter allows users to configure the format of DDE to provide to client applications. All three formats are enabled by default. This is particularly useful when users experience problems connecting a DDE client application to the server: each of the DDE formats can be disabled in order to isolate a specific format for testing purposes.

Note: Every DDE aware application must support CF_Text at a minimum.

Update active clients

This interval setting is used to batch up DDE data so that it can be transferred to client applications. When using a DDE format performance gains only come when large blocks of server data can be sent in a single DDE response. To improve the ability of the server to gather a large block of data, the update timer can be set to allow a pool of new data to accumulate before a being sent to a client application. The valid range of the update timer is 20-60000 milliseconds. The default is 100 milliseconds.

Wait

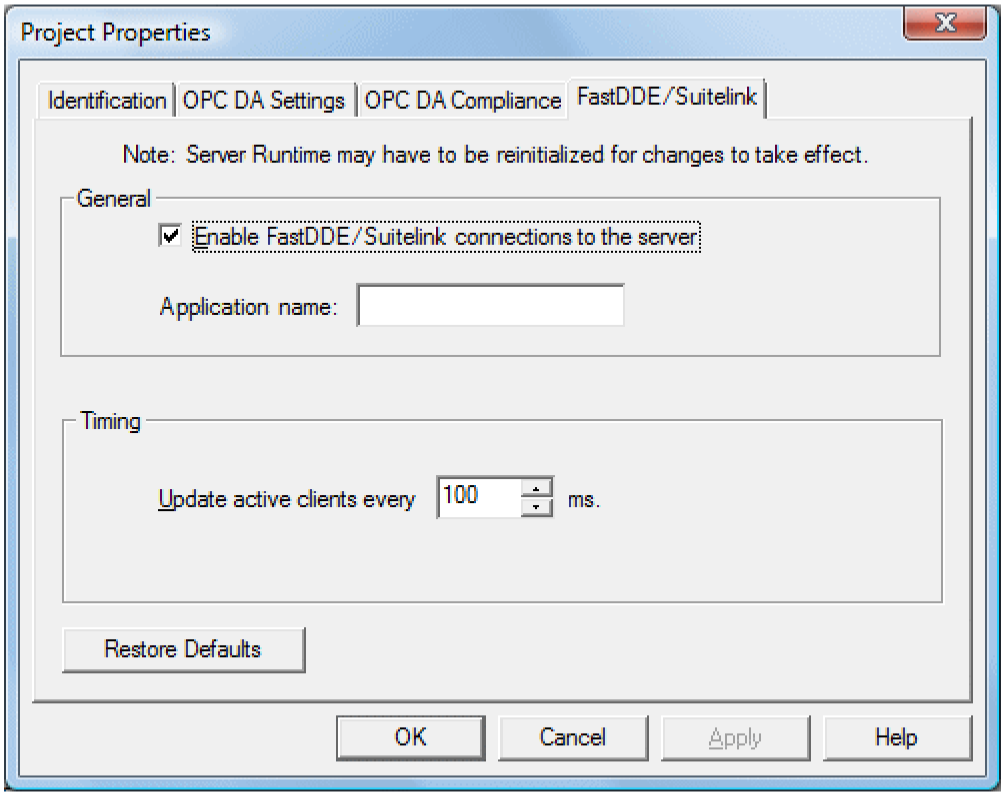
This parameter is used to configure a timeout for the completion of DDE request. If a DDE client request (either a Read or Write operation) on the server cannot be completed within the specified timeout, an error will be returned to the DDE Client. The valid range is 1-30 seconds. The default is 15 seconds.

Note: Server Runtime may have to be reinitialized for changes to take effect.

Project Properties - FastDDE/Suitelink

The server's support of Wonderware Corporation's FastDDE and SuiteLink simplifies the task of connecting the server with FactorySuite applications. The Wonderware connectivity toolkit is used to simultaneously provide OPC and FastDDE/SuiteLink connectivity while allowing for quick access to device data without the use of intermediary bridging software.

Important: In order for the FastDDE interface to connect with the server, the Runtime must be allowed to interact with the desktop. For more information, refer to **How To... Allow Desktop Interactions**.


Project Properties

Note: Server Runtime may have to be reinitialized for changes to take effect.

General

[✓] Enable FastDDE/Suitelink connections to the server

Application name:

Timing

Update active clients every 100 ms.

Note: In order for both proper FastDDE/SuiteLink operation and for this page to be displayed in the server's **File** | **Project Properties** menu, the Wonderware FS2000 Common Components (or the InTouch Runtime Component version 8.0 or higher) must be installed on the PC.

General

Enable FastDDE/SuiteLink
This parameter allows users to enable or disable support of the Client/Server protocols. When a Wonderware product is installed on the PC, this setting will be enabled by default. If the FastDDE/SuiteLink operation is disabled, the server will not respond to any request for FastDDE or SuiteLink data. If the server will only be used for OPC connectivity, we recommend that the this be disabled for better performance and security.

Application Name
This parameter is used to set the application's name. For FastDDE/SuiteLink, it is set to "server_runtime".

Timing

Update active clients
This parameter determines how often new data will be sent to FastDDE/SuiteLink client applications. The range is 20-32000 milliseconds, with a default of 100 milliseconds. The timer allows FastDDE/SuiteLink data to be batched up for transfer to client applications. When using a Client/Server protocol like FastDDE or SuiteLink, performance gains only come when large blocks of server data can be sent in a single response. To improve the ability of the server to gather a large block of data, the update timer can be set to allow a pool of new data to accumulate before being sent to a client application.

Note: The update rate applies to how often data is sent to the client application, not how often data is read from the device. The Scan Rate can be used to adjust how fast or slow the server acquires data from an attached device. **See Also: Tag Properties - General**.

Restore Defaults

This parameter restores the tab's current settings to their default values.

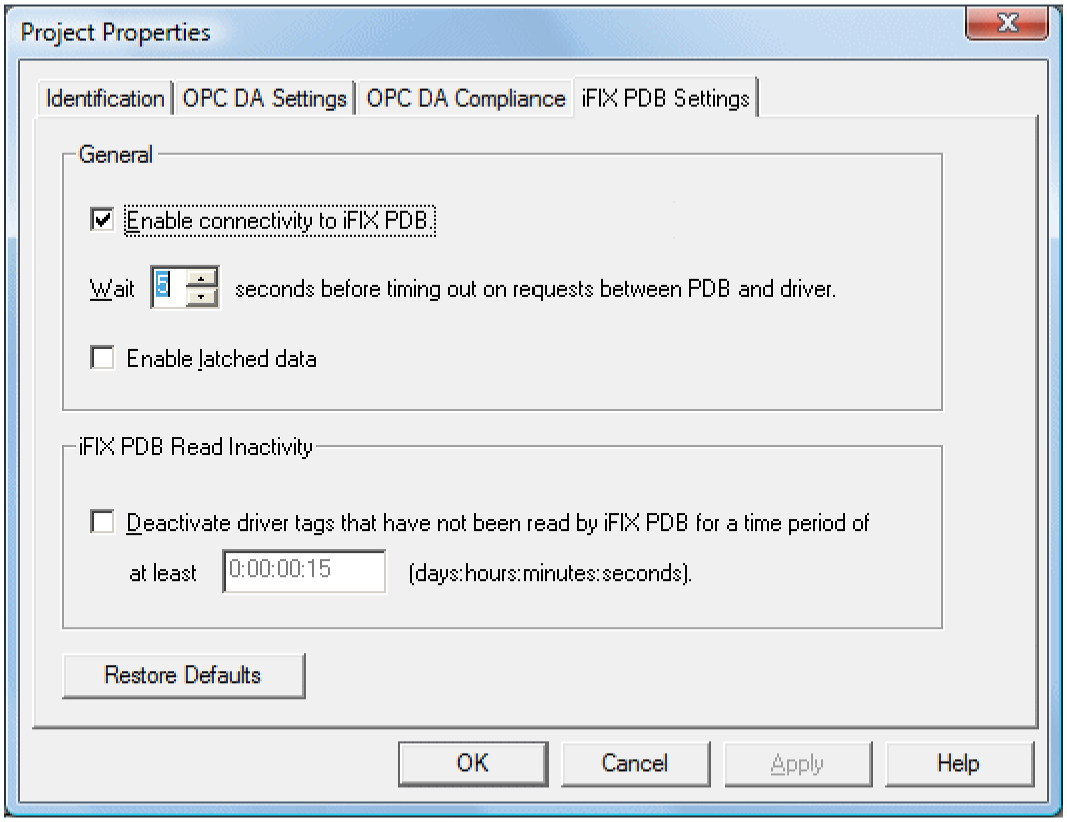
Note: Server Runtime may have to be reinitialized for changes to take effect.

Project Properties - iFIX PDB Settings

The iFIX PDB Settings dialog contains parameters that allow users to adjust the behavior between the processing of the iFIX process database (PDB) tags and the server tags. To access this tab, click **File** | **Project Properties**.

Note: The iFIX PDB Settings dialog will only be displayed in Project Properties if iFIX is installed on the computer.

Important: In some cases, the Process Mode parameter must be set to System Service in order for the iFix PDB interface to work with the Runtime. For more information, refer to **Process Modes**.


Project Properties

Identification | OPC DA Settings | OPC DA Compliance | iFIX PDB Settings

General

[✓] Enable connectivity to iFIX PDB

Wait 5 seconds before timing out on requests between PDB and driver.

[ ] Enable latched data

iFIX PDB Read Inactivity

[ ] Deactivate driver tags that have not been read by iFIX PDB for a time period of at least 0:00:00:15 (days:hours:minutes:seconds).

Note: It is recommended that users keep the default values for each field. Users should also ensure that the settings meet the application's requirements.

General

Enable connectivity to iFix PDB.
This parameter is used to enable or disable support of the Client/Server protocols. If the iFix PDB operation is disabled, the server will not respond to any request for iFix PDB data. For better performance and security when the server is only being used for OPC connectivity, disable this parameter.

Wait xx seconds before timing out on requests between PDB and Driver
This parameter specifies the amount of time that the iFIX PDB will wait for a response from an add, remove, Read or Write request before timing out. Once timed out, the request will be discarded on behalf of the server. A timeout can occur if the server is busy processing other requests or if the server has lost communications with iFIX PDB. In the case of lost communications, the iFIX PDB will automatically re-establish communications with the server so that successive timeouts do not occur. The valid range is 5-60 seconds. The default setting is 5 seconds.

Enable Latched Data
Normally, the iFIX application's data links will display a series of question marks (such as "????") if a communication failure has occurred. Users, however, may want to have a value displayed at all times. By enabling latched data, the last value successfully read will be preserved on the screen. This feature is disabled by default.

Note: Data latching is not supported for AR and DR blocks.

iFIX PDB Read Inactivity

This parameter allows the server to automatically deactivate tags that have not been read by iFIX for the time period specified. This reduces unnecessary polling of the process hardware. When iFIX PDB Read Inactivity feature is enabled, the server will look through its list of tags every 15 seconds and will deactivate any that are idle. If iFIX has not performed a Read request of a tag for the time period specified, the tag is considered idle. Since the server checks for idle tags on a 15 second cycle, a tag may not get set inactive at precisely this time from its last Read; it could be up to 15 seconds longer depending on when the last read occurred in the check cycle. If iFIX requests data from a tag that has been previously deactivated, the server will reactivate the tag and resume polling the hardware.

This feature is disabled by default upon driver install. Once this feature is enabled, however, it becomes applied to all projects. Users may specify an idle time of up to 6:23:59:59 (1 week).

Caution: This feature is meant to be used with Register Tags only and can cause non-register tags to go off scan. To avoid this situation when using this feature, be sure to set the inactivity timer greater than the longest scan time configured in the iFIX database.

Format	Range	Default Value
[days:hours:minutes:seconds]	0:00:00:15 to 6:23:59:59	0:00:00:15 (15 seconds)

Note: The time period can also be specified in seconds. For example, if 62 is entered, the page will show 0:00:01:02 when accessed next.

Examples

Time	Format
20 seconds	0:00:00:20 or 20
1 minute	0:00:01:00 or 60
1 hour and 30 minutes	0:01:30:00 or 5400
2 days	2:00:00:00

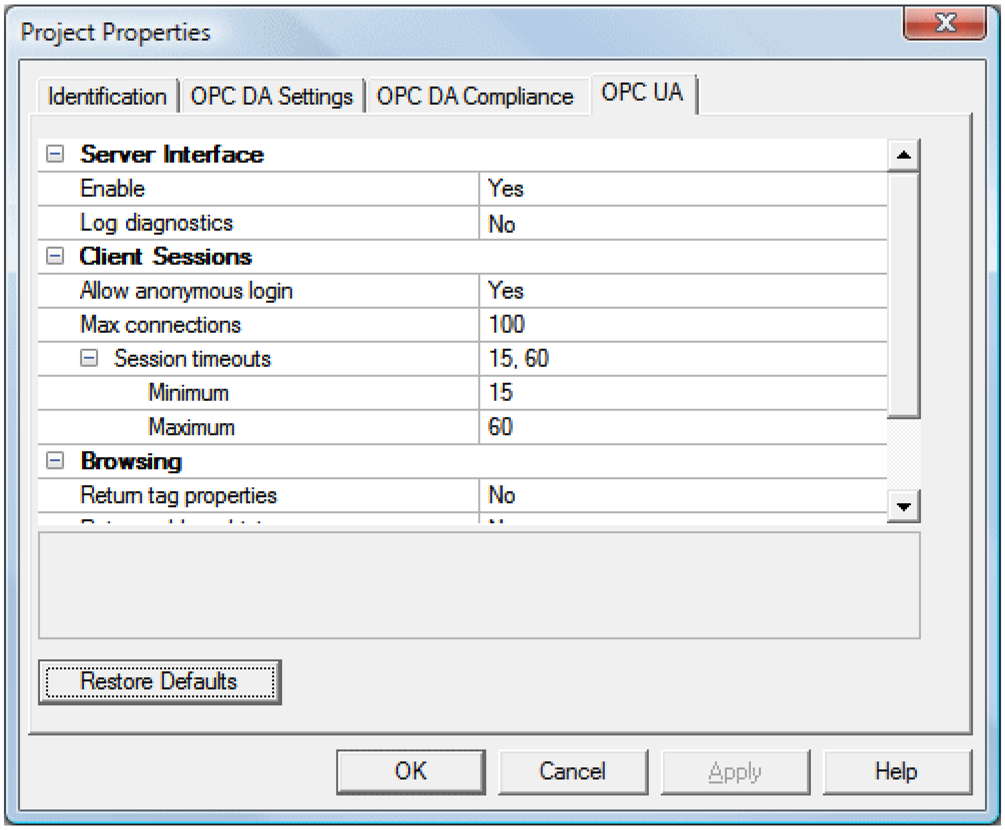
Restore Defaults

This parameter restores the tab's current settings to their default values.

Project Properties - OPC UA

OPC Unified Architecture (UA) provides a platform independent interoperability standard. It is not a replacement for OPC Data Access (DA) technologies: for most industrial applications, UA will complement or enhance an existing DA architecture. The OPC UA tab displays the current OPC UA settings in the server.

Note: To change a setting, click in the specific parameter's second column. This will invoke a drop-down menu that displays the options available.



Server Interface	
Enable	Yes
Log diagnostics	No
Client Sessions	
Allow anonymous login	Yes
Max connections	100
Session timeouts	15, 60
Minimum	15
Maximum	60
Browsing	
Return tag properties	No

Server Interface

Descriptions of the parameters are as follows:

- **Enable:** When enabled, the UA server interface will be initialized and accept client connections. When disabled, the remaining parameters on this page will also be disabled.
- **Log Diagnostics:** When enabled, OPC UA stack diagnostics will be logged to the Event Log. This should only be enabled for debugging purposes.

Client Sessions

Descriptions of the parameters are as follows:

1. **Allow Anonymous Login:** When disabled, this parameter specifies that user name and password information will be required to establish a connection. The default setting is enabled.
2. **Max Connections:** This parameter specifies the maximum number of supported connections. The valid range is 1 to 100. The default setting is 100.
3. **Session Timeouts:** This parameter specifies the UA client's timeout limit for establishing a session. Values may be changed depending on the needs of the application. The default values are 15 to 60.

   o **Minimum:** This parameter specifies the UA client's minimum timeout limit. The default setting is 15.

   o **Maximum:** This parameter specifies the UA client's maximum timeout limit. The default setting is 60.

Browsing

Descriptions of the parameters are as follows:

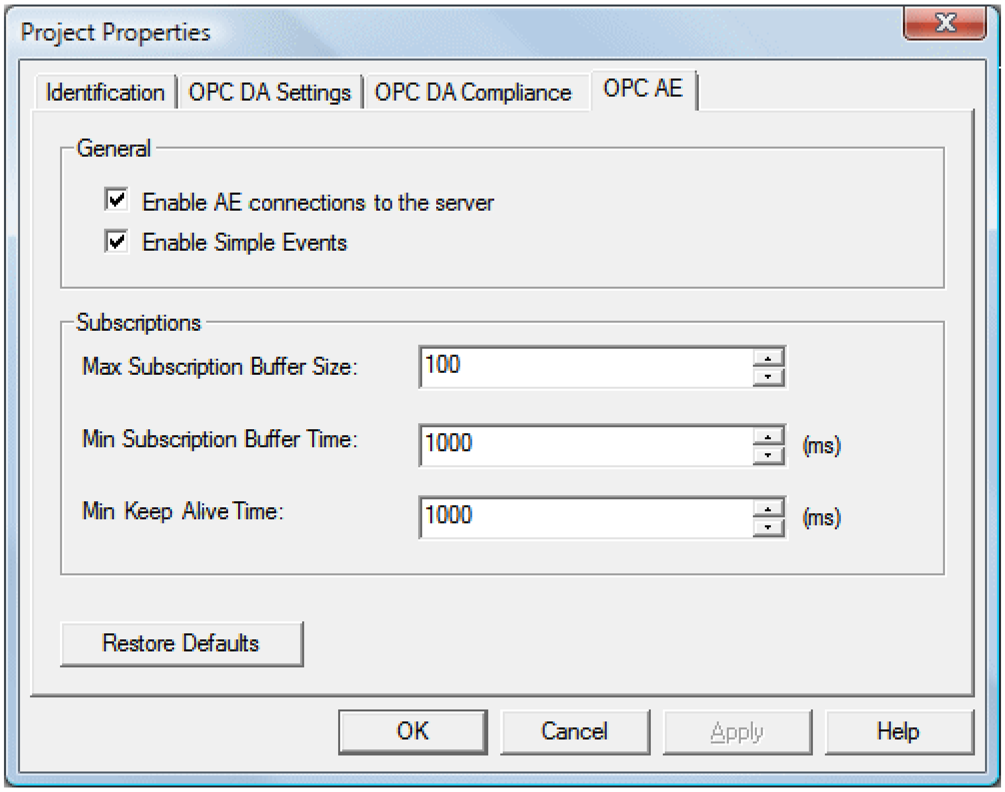
1. **Return Tag Properties:** When enabled, this parameter allows UA client applications to browse the tag properties available for each tag in the address space. This setting is disabled by default.
2. **Return Address Hints:** When enabled, this parameter allows UA client applications to browse the address formatting hints available for each item. Although the hints are not valid UA tags, certain UA client applications may try to add them to the tag database. When this occurs, the client will receive an error from the server. This

may cause the client to report errors or stop adding the tags automatically. To prevent this from occurring, make sure that this parameter is disabled. This setting is disabled by default.

Project Properties - OPC AE

Events are used to signal an occurrence in the server and are similar to data updates in OPC Data Access. The OPC AE functionality allows users to receive Simple Events from the server, including system startup and shutdown messages, warnings, errors and so forth. These events are then displayed in the Event Log.

The OPC AE tab is used to specify a number of project-level AE settings. Changes made to these settings will take effect after all A&E clients disconnect from the server.



☑ Enable AE connections to the server
☑ Enable Simple Events

Max Subscription Buffer Size: 100
Min Subscription Buffer Time: 1000 (ms)
Min Keep Alive Time: 1000 (ms)

Descriptions of the parameters are as follows:

- **Enable AE Connections to the Server:** This parameter turns the OPC AE server on and off.
- **Enable Simple Events:** When checked, simple events will be made available to clients. When unchecked, the events will be sent. The default setting is checked.
- **Max Subscription Buffer Size:** This parameter specifies the maximum number of events that the A&E Plug-In will send to a client in one send call. The range is 0 to 65534. The default setting is 100. 0 means there is no limit.
- **Min Subscription Buffer Time:** This parameter specifies the minimum time between send calls to a client. The supported range is 1000-60000ms. The default setting is 1000ms.
- **Min Keep Alive Time:** This parameter specifies the minimum amount of time between keep alive messages sent from the server to the client. The default setting is 1000ms.
- **Restore Defaults:** This parameter restores the tab's current settings to their default values.

Note: The Alarms & Events Plug-In allows Alarms & Events (A&E) clients to receive A&E data from the OPC server. It is used to convert OPC server events into A&E format and to create custom alarms using OPC server tags. For more information, contact the OPC vendor.

How Do I...

For descriptive information on how to complete the follow actions, select a link from the list below.

How To... Use DDE with the Server

Using DDE in Your Application

Dynamic Data Exchange (DDE) is a Microsoft communications protocol that provides a method for exchanging data between applications running on a Windows operating system. The DDE client program opens a channel to the DDE server application and requests item data using a hierarchy of the **Application (Service) name**, **Topic name** and **Item name**.

Example 1: Accessing a Register Locally (Using the Default Topic)

Syntax: *<application>|<topic>!<item>*

Example: MyDDE|_ddedata!Modbus.PLC1.40001

Where:
application: **DDE service name**
topic: **_ddedata** (Default topic for all DDE data not using an Alias Map entry)
item: **Modbus.PLC1.40001**

Example 2: Accessing a Register Locally (Using an Alias Name as a Topic)

Syntax: *<application>|<topic>!<item>*

Example: MyDDE|ModPLC1!40001

Where:
application: DDE service name
topic: ModPLC1 (Topic now using Alias Map entry)
item: 40001

See Also:

Project Properties - DDE
FastDDE & SuiteLink
What is the Alias Map?

Note 1: For possible additional syntax, refer to the DDE client's specific help documentation.

Note 2: For information on how to connect to remote applications using DDE, refer to **Using Net DDE Across a Network**.

How To... Use Net DDE Across a Network

DDE provides a way to share data between Windows applications as long as they exist on the same machine. Net DDE shares data from a DDE server located on a local PC with DDE client applications located on remote PCs. More information on how to configure a PC to support Net DDE is available online.

How To... Use Dynamic Tag Addressing

This server can also be used to dynamically reference a physical device data address from the server. The server will dynamically create a tag for requested item. Users cannot browse for tags from one client that were dynamically added by another. Before adding tags dynamically, users should note the following.

- The correct syntax must be used for the data address. For more information on the specific driver's syntax, refer to its help documentation.
- If users do not specify the requested item's data type, it will be set to the default setting by the application. For more information on the specific driver's supported data types, refer to its help documentation. The default data type will be displayed in bold letters.

Note: In this example, the Simulator driver is to explain addressing. Assume that the channel name is 'Channel1' and the device name is 'Device1'.

In a Non-OPC Client

In order to get data from register 'K0001' in the simulated device, use an Item ID of 'Channel1.Device1.K001.' The default data type for this register is 'Short.' Since non OPC Clients do not provide an update rate to the server, the Dynamic Tag's default update rate will be 100 msec. Both data type and update rate can be overridden after the dynamic request is sent.

To override the tag defaults, use the commercial AT sign (@) at the end of the item. If intending to add the register as a DWord (unsigned 32 bit) data type, simply use an Item ID of 'Channel1.Device1.K0001@DWord.' To change the default update rate to 1000msec , use 'Channel1.Device1.K0001@1000.' To change both defaults, use 'Channel1. Device1.K0001@DWord,1000.'

Note: The client application must be able to accept special characters like the '@' in its address space.

In an OPC Client

In an OPC client, the same syntax can be used to override the data type if the client application does not provide a means of specifying a data type when adding the OPC Item. Since the item's update rate is not used in OPC, there is no need to override it.

Note: The client application must be able to accept special characters like the '@' in its address space.

How To... Process Array Data

Many of the drivers available for this server allow clients to access data in an array format. Arrays allow the client application to request a specific set of contiguous data in one request. Arrays are one specific data type; thus, users would not have an array with a combination of Word and DWord data types. Furthermore, arrays are written to in one transaction. To use arrays in the server, the client application must support the ability to at least read array data.

In a DDE Client

Array data is only available to the client when using CF_TEXT or Advanced DDE clipboard formats.

For client applications using Advanced DDE, the number of elements in the array is specified in the sPACKDDE_DATAHDR_TAG structure. Only single dimensional arrays are supported by this protocol. This structure should be used when poking array data to the server.

For clients using CF_TEXT, one or two-dimensional arrays are supported. Data in each row is separated by a TAB (0x09) character and each row is terminated with a CR (0x0d) and a LF (0x0a) character. When a client wants to poke an array of data values, the text string written should have this delimiter format.

When poking to an array tag in either format, the entire array does not need to be written, but the starting location is fixed. If attempting to poke data in an array format to a tag that was not declared as an array, only the first value in the array will be written. If attempting to poke more data than the tag's array size, only as much data as the tag's array size will be written. If attempting to poke data while leaving some data values blank, the server will use the last known value for that array element when writing back to the device. If the value in that register has been changed but has not been updated in the server, it will be overwritten with the old value. For this reason, it is best to be cautious when writing data to arrays.

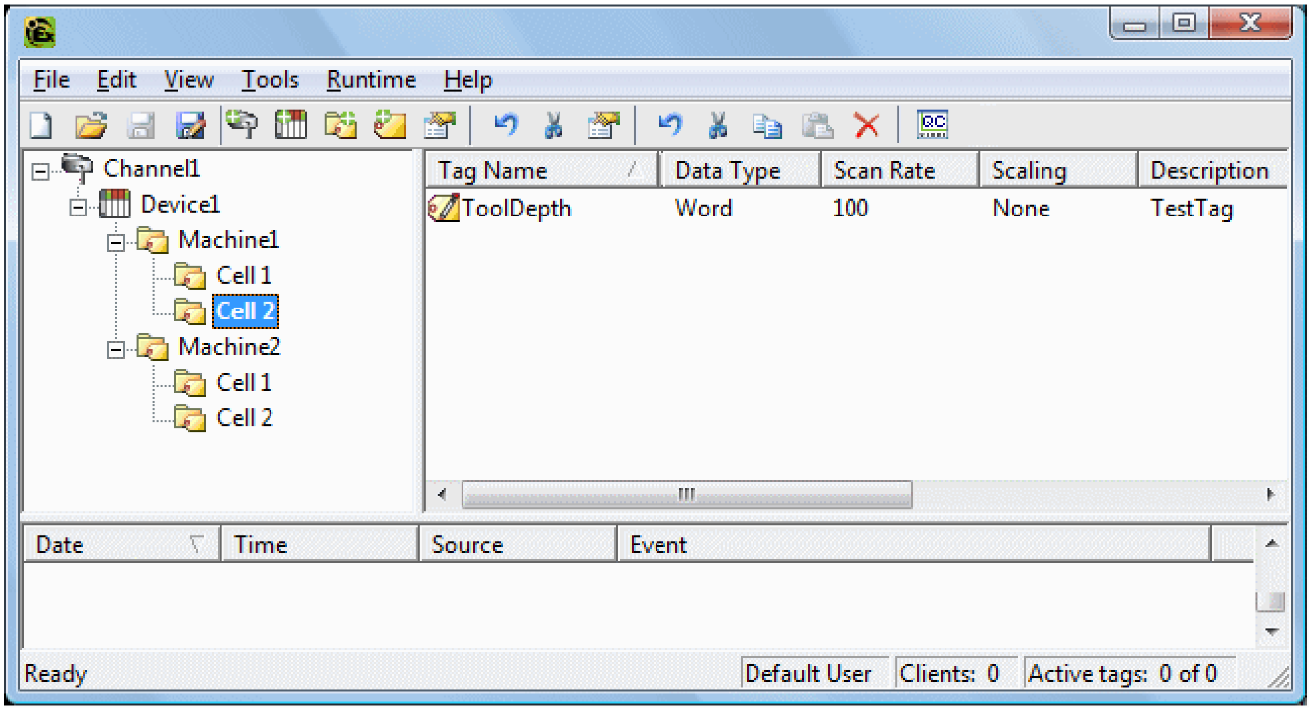
In an OPC Client

In OPC Clients that support arrays, the OPC Item data value is actually a variant array data type. The OPC Client parses the array element data: some clients will create sub tags for display purposes. For example, if the OPC client created a tag in its database named 'Process,' and the associated OPC item was a single dimensional array of 5 elements, it might create 5 tags named 'Process_1', 'Process2' and etc. Other clients (such as the OPC Quick Client) may display the data as CSV (Comma Separated Values).

How To... Create and Use an Alias

Complex Tag Reference Example

The image below displays a Complex Tag reference in the server.



Tag Name	Data Type	Scan Rate	Scaling	Description
ToolDepth	Word	100	None	TestTag

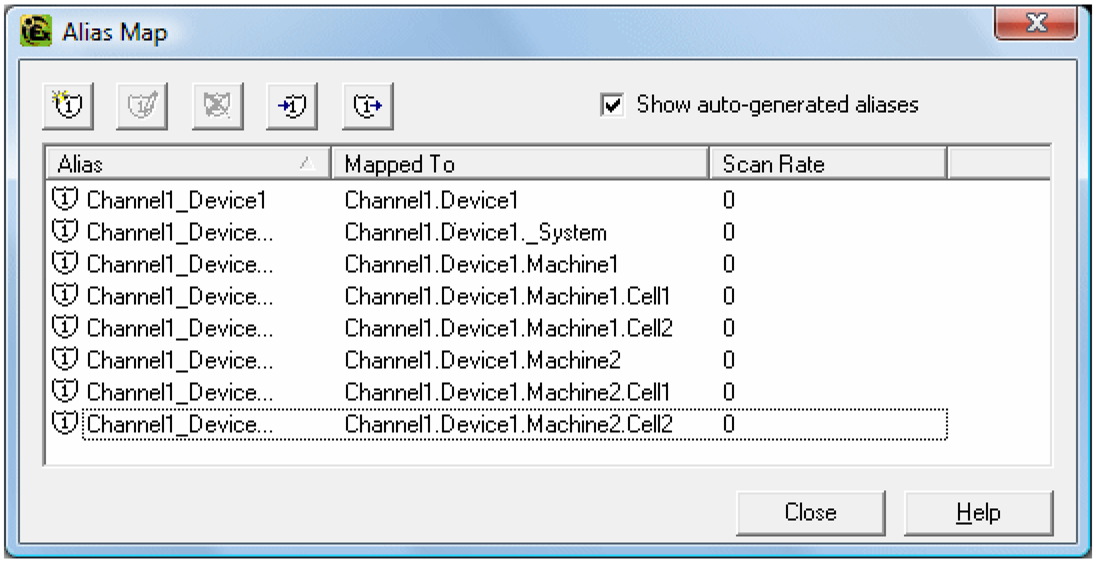
For example, to create a DDE link to an application for the "ToolDepth" tag, the DDE link must be entered as "<DDE service name>|_ddedata!Channel1.Device1.Machine1.Cell2.ToolDepth".

Although the DDE link's simple *<application>*|*<topic>!<item>* format still exists, the content becomes more complex when optional tag groups and the channel name are required as part of the topic. The Alias Map allows a shorter version of the reference to be used in DDE client applications. For more information, refer to **What is the Alias Map**.

Creating Aliases for Complex Address Paths

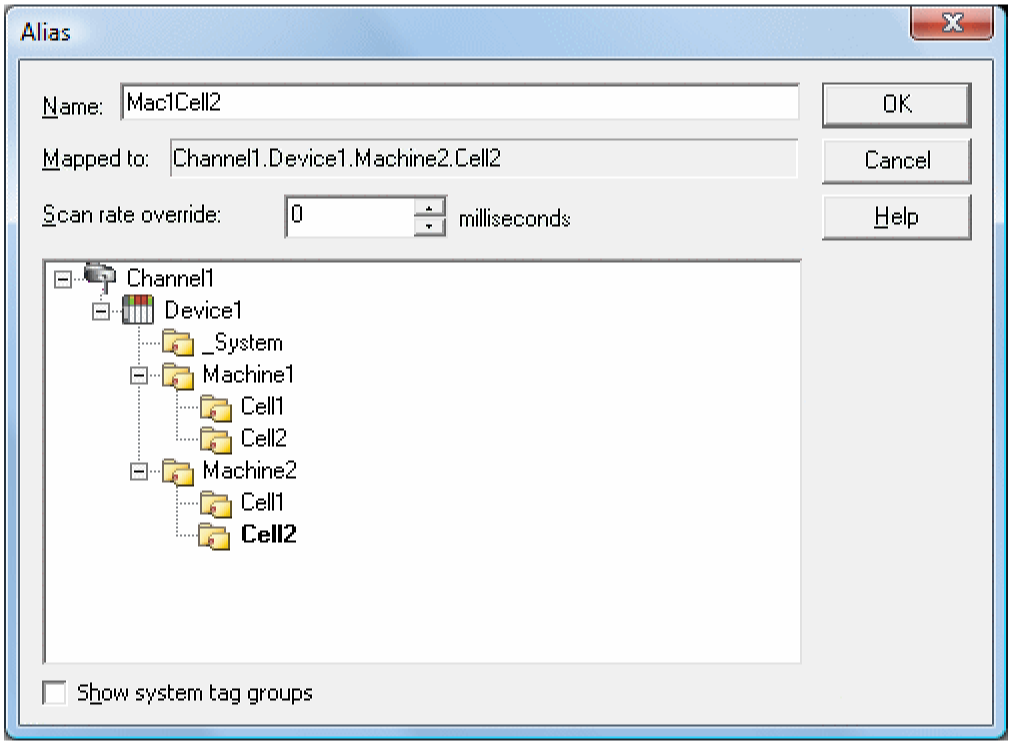
For information on creating aliases to simplify Complex Tags' address paths, follow the instructions below.

1. In the server, click **Edit** | **Alias Map**.
2. Click the **New Alias** icon, which appears as .



Alias	Mapped To	Scan Rate
Channel1_Device1	Channel1.Device1	0
Channel1_Device...	Channel1.Device1._System	0
Channel1_Device...	Channel1.Device1.Machine1	0
Channel1_Device...	Channel1.Device1.Machine1.Cell1	0
Channel1_Device...	Channel1.Device1.Machine1.Cell2	0
Channel1_Device...	Channel1.Device1.Machine2	0
Channel1_Device...	Channel1.Device1.Machine2.Cell1	0
Channel1_Device...	Channel1.Device1.Machine2.Cell2	0

3. Next, browse to the group or device that contains the item that will be referenced.



Name: Mac1Cell2
Mapped to: Channel1.Device1.Machine2.Cell2
Scan rate override: 0 milliseconds

4. Enter an alias name that will represent the complex tag reference. This alias name can now be used in the client application to address the tag found in the server.
5. The complex topic and item name "_ddedata!Channel1.Device1.Machine1.Cell2" can be replaced by using the alias "Mac1Cell2". When applied to the example above, the DDE link in the application can be entered as "<DDE service name>|Mac1Cell2!ToolDepth".

Note 1: If Net DDE is enabled, the Alias Map entries will be registered as DDE shares for use by remote applications. The names given to each Alias Map entry must not conflict with any existing DDE shares already defined on the server PC. For more information, refer to **How to Use Net DDE Across a Network**.

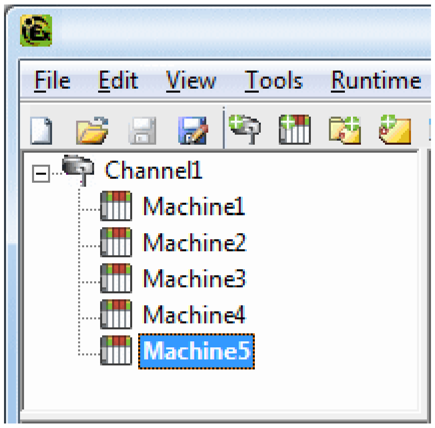
Note 2: Although possible, it is not recommended that users create an alias that shares a name with a channel. The client's item will fail if it references a dynamic address using the shared name. For example, if an alias is named

"Channel1" and is mapped to "Channel1.Device1," an item in the client that references "Channel1.Device1.<address>" will be invalid. The alias must be removed or renamed so that the client's reference can succeed.

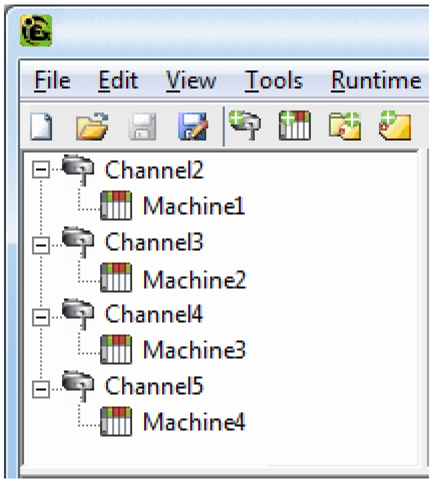
See Also: Alias Properties

How To... Use an Alias to Optimize a Project

In order to get the best performance out of a project, it is recommended that each device be placed on its own channel. If a project needs to be optimized for communication after it has been created, it can be difficult to change the client application to reference the new item names. By using an alias map, however, users can allow the client to make the legacy request to the new Configuration. To start, follow the instructions below.



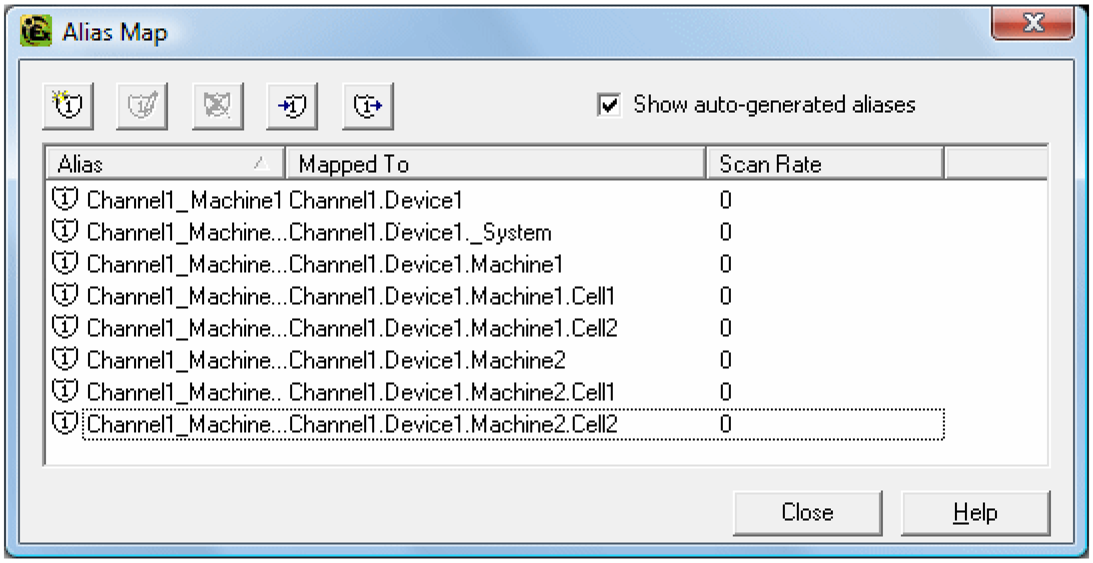
Unoptimized: Channel with multiple devices.



Optimized: Channel with each device under a different channel.

1. To start, create a new channel for each device. Place the device under the new channel and then **delete** the original channel.

2. Next, create a **New Alias** for each device in the **Alias Map**. The Alias Name will be the original channel and device name separated by a period. For example, 'Channel1.Device1.'



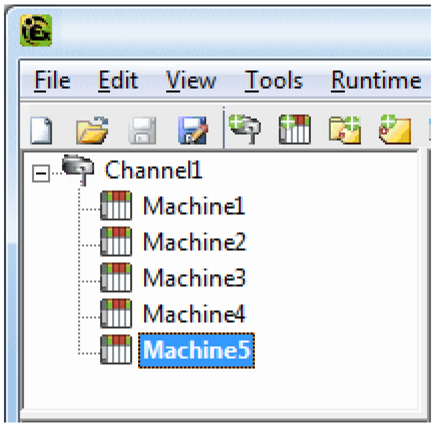
Alias	Mapped To	Scan Rate
Channel1_Machine1	Channel1.Device1	0
Channel1_Machine...	Channel1.Device1._System	0
Channel1_Machine...	Channel1.Device1.Machine1	0
Channel1_Machine...	Channel1.Device1.Machine1.Cell1	0
Channel1_Machine...	Channel1.Device1.Machine1.Cell2	0
Channel1_Machine...	Channel1.Device1.Machine2	0
Channel1_Machine..	Channel1.Device1.Machine2.Cell1	0
Channel1_Machine...	Channel1.Device1.Machine2.Cell2	0

Note: The server will validate any request for items against the Alias Map before responding back to the client application with an error that the item does not exist.

How To... Optimize the Server Project

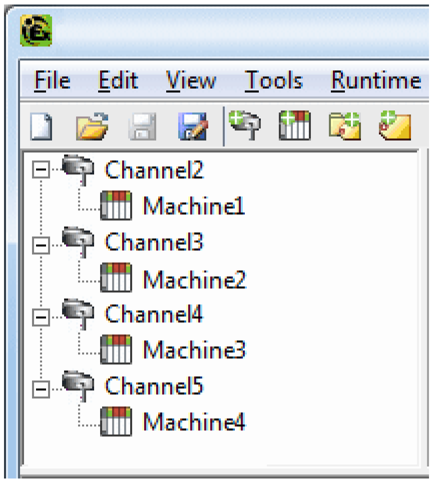
Nearly every driver of this server supports at least 100 channels; meaning, 100 COM/Serial Ports or 100 source sockets for Ethernet communications. To determine the number of supported channels available for each device, refer to the Driver Information under **Server Summary Information**.

Our server refers to communications protocols as a channel. Each channel defined in the application represents a separate path of execution in the server. Once a channel has been defined, a series of devices must then be defined under that channel. Each of these devices represents a single device from which data will be collected. While this approach to defining the application will provide a high level of performance, it won't take full advantage of the driver or the network. An example of how the application may appear when configured using a single channel is shown below.



Each device appears under a single channel. In this configuration, the driver must move from one device to the next as quickly as possible in order to gather information at an effective rate. As more devices are added or more information is requested from a single device, the overall update rate begins to suffer.

If the driver could only define one single channel, then the example shown above would be the only option available. Using multiple channels distributes, however, the data collection workload by simultaneously issuing multiple requests to the network. An example of how the same application may appear when configured using multiple channels to improve performance is shown below.



Each device has now been defined under its own channel. In this new configuration, a single path of execution is dedicated to the task of gathering data from each device. If the application has fewer devices, it can be optimized exactly how it is shown here.

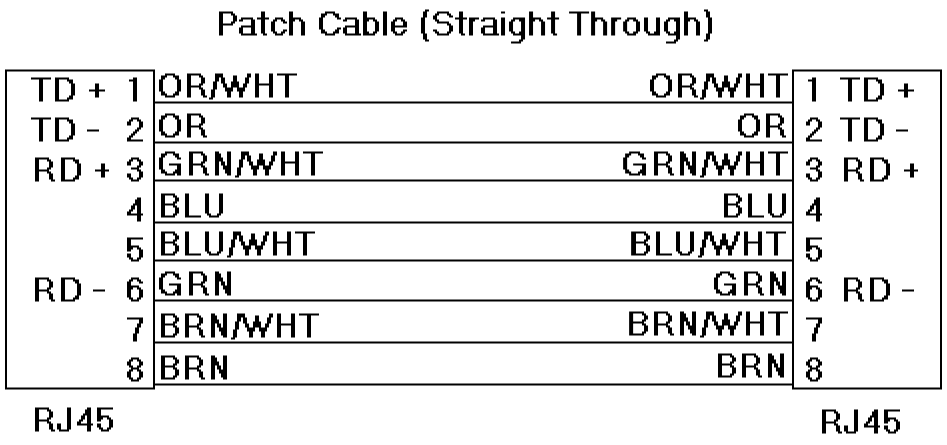
The performance will improve even if the application has more devices than channels. While 1 device per channel is ideal, the application will still benefit from additional channels. Although by spreading the device load across all channels will cause the server to move from device to device again, it can now do so with far less devices to process on a single channel.

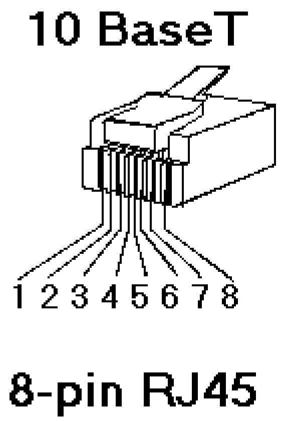
Important: This same process can be used to make multiple connections to one Ethernet device. Although the OPC Server may allow 100 channels for most drivers, the device ultimately determines the number of allowed connections. This constraint comes from the fact that most devices limit the number of supported connections. The more connections that are made to a device, the less time it will have to process request on each connect. This means that there can be an inverse tradeoff in performance as connections are added.

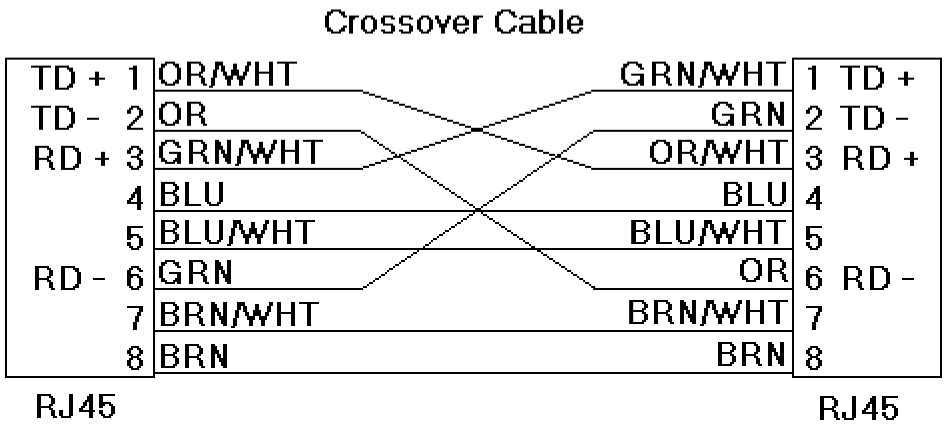
How To... Select the Correct Network Cable

Without prior experience of Ethernet enabled devices or Serial to Ethernet converters, users may find selecting the correct network cable a confusing task. There are generally two ways to determine the proper cable setup. If connecting to the device or converter through a network hub or switch, users will need **Patch Cable**. A Patch Cable gets its name from the days when a telephone operator-style board was used to patch or connect devices to each other. If connecting directly to the device from the PC, however, users will need a **Crossover Cable**. Both of these cables can be purchased from an electronic or PC supply store.

Cable Diagrams

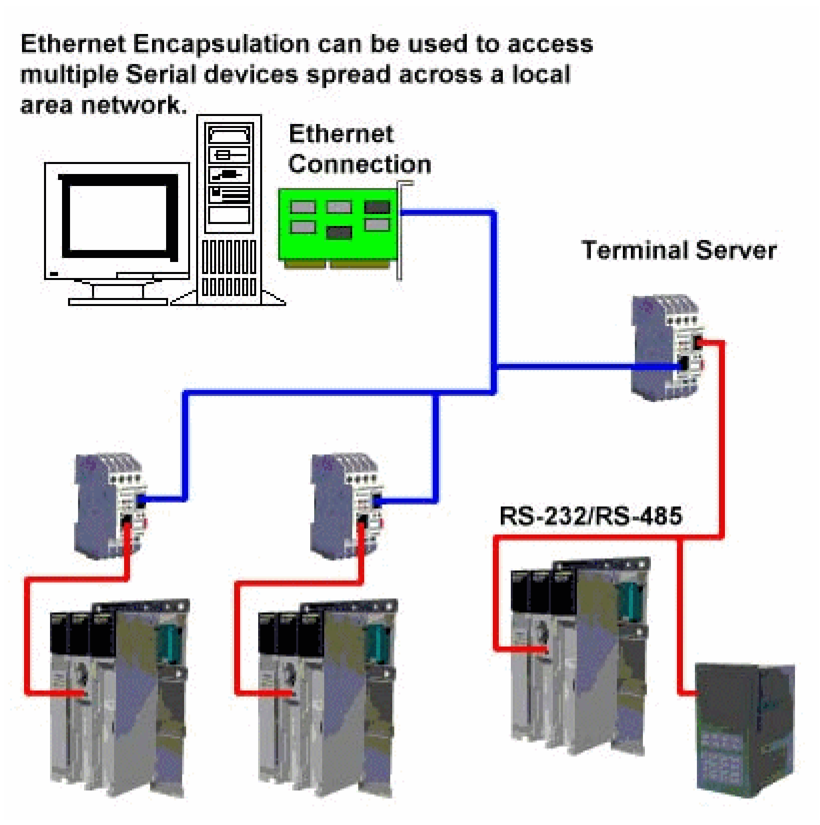






How To... Use Ethernet Encapsulation

The Ethernet Encapsulation mode has been designed to provide communications with serial devices connected to terminal servers on the Ethernet network. A terminal server is essentially a virtual serial port that converts TCP/IP messages on the Ethernet network to serial data. Once the message has been converted to a serial form, users can connect standard devices that support serial communications to the terminal server. The diagram below shows how the Ethernet Encapsulation mode should be employed.

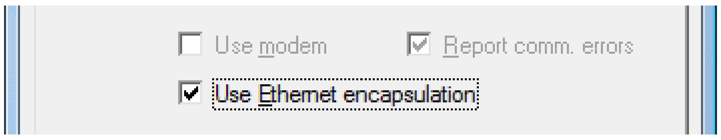

Ethernet Encapsulation can be used to access multiple Serial devices spread across a local area network.
Ethernet Connection
Terminal Server
RS-232/RS-485

Note: For unsolicited drivers that support Ethernet encapsulation, users will have to configure the port and the protocol settings at the channel-level. This will allow the driver to bind to the specified port and process incoming requests from multiple devices. An IP address is not entered at the channel since the channel will accept incoming requests from all devices.

Ethernet Encapsulation can be used over wireless network connections such as 802.11b and CDPD packet networks, and has been developed to support a wide range of serial devices. By using a terminal server device, users can place RS-232 and RS-485 devices throughout the plant operations while still allowing a single localized PC to access the remotely mounted devices. Furthermore, Ethernet Encapsulation mode allows an individual Network IP address to be assigned to each device as needed. While using multiple terminal servers, users can access hundreds of serial devices from a single PC.

Configuring Ethernet Encapsulation Mode

To configure Ethernet Encapsulation mode, open **Channel Properties** and then click on the **Communications** tab. Next, click **Use Ethernet Encapsulation**. A driver that supports Ethernet Encapsulation will allow the Ethernet Encapsulation mode to be selected from the Com port ID selection as shown in the image below.



Note: The server's multiple channel support allows users to have up to 16 channels on each driver protocol. This allows users to have a channel defined to use the local PC serial port while another channel is defined to use Ethernet Encapsulation mode.

Important: When Ethernet Encapsulation mode is selected, the serial port settings (such as baud rate, data bits and parity) will become unavailable. This occurs because the settings will not be used in Ethernet Encapsulation mode. The terminal server being used must, however, have its serial port configured to match the requirements of the serial device that will be attached to the terminal server.

After the channel has been configured for Ethernet Encapsulation mode, users will need to configure the device for

Ethernet operation. When a new device is added to the channel, the Ethernet Encapsulation settings can be used to select an Ethernet IP address, an Ethernet Port number and the Ethernet protocol.

How To... Resolve Comm Issues When the DNS/DHCP Device Connected to the Server is Power Cycled

Certain drivers support DNS/DHCP resolution for connectivity. These devices also allow users to assign unique Domain/Network names for identification purposes. When starting and connecting to the network, the devices will request an IP address from the Network DNS server. This process of resolving a domain name to an IP address for connectivity takes time; thus, for greater speed, the OS will cache all of the resolved IP/Domain names and then re-use them. The resolved names are held in cache for two hours by default.

If The Server Fails to Re-Connect to a Device

This issue normally occurs when the name of the IP address (associated with the device's Domain/Network) changes. If the change is a result of the device being power cycled, it will acquire a new IP. It could, however, also be a result of the IP being changed on the device manually. In both cases, the IP address that was being used no longer exists.

Resolving the Problem

The server automatically flushes the cache every 30 seconds; thus forcing the IP to be resolved. If this does not resolve the issue, users can manually flush the cache by typing the command string "ipconfig /flushdns" in the PC's command prompt.

Note: For more information, refer to the following Microsoft Support article **Disabling and Modifying Client Side DNS Caching**.

How To... Allow Desktop Interactions

Some communication interfaces require the server to interact with the desktop. For example, Windows Messaging Layer is used by DDE and FastDDE. It is important, however, that the operating system be taken into consideration when choosing how to communicate with the desktop.

Windows Vista, Windows Server 2008 and Later Operating Systems

In Windows Vista, Windows Server 2008 and later operating systems, services run in an isolated session that is inaccessible to users logged on to the console. These operating systems require that the process mode be set to Interactive. This allows the Runtime to run in the same user account as the current user. For information on changing the process mode, refer to **Settings - Runtime Process**.

Windows XP, Windows Server 2003 and Earlier Operating Systems

In Windows XP, Windows Server 2003 and earlier operating systems, the process mode can remain set as a System Service. The Runtime's service, however, must be allowed to interact with the desktop. This is the preferred mode of operation since a user is not required to be logged on to the console in order for the server to start. For information on allowing a service to interact with the desktop, follow the instructions below.

Note: These service settings only apply when the server is running in Service Mode.

1. Launch the **Services** snap-in, which is part of the **Microsoft Management Console**. To do so, click **Start** | **Run**. Then, type "services.msc" and click **OK**.
2. Next, locate the server by its name in the list of services. Open its context menu and select **Properties**.
3. Select the **Log On** tab.
4. Check **Allow service to interact with desktop** and then click **Apply**.
5. Click **OK** to exit.
6. Next, locate the Administration icon. Open its context menu and select **Stop Runtime Service** and then **Start Runtime Service**.

See Also: **Accessing the Administration Menu**

Error Descriptions

The following error/warning messages may be generated. Click on the link for a description of the message.

Server Runtime Error Messages

No comm handle provided on connect for line '<modem name>'
No dial tone on '<modem name>'
Remote line is busy on '<modem name>'
Remote line is not answering on '<modem name>'
TAPI configuration has changed, reinitializing...
TAPI line initialization failed: '<modem name>'
The phone number is invalid '<phone number>'
Unable to apply Modem Configuration on line '<modem name>'
Unable to dial on line '<modem name>'
Unable to start Net DDE

iFIX Error Messages

Attempt to add iFIX PDB item '< item name>' failed
Failed to enable iFIX PDB support for this server [OS Error = n]
Unable to enable iFIX PDB support for this server
Unable to read '<tag name>' on device '<channel name/device name>'

Server Runtime Error Messages

The following error/warning messages may be generated. Click on the link for a description of the message.

Server Runtime Error Messages

'<driver name>' device driver was not found or could not be loaded
'<server name>' Server Started
'<server runtime>' successfully configured to run as a system service
'<server runtime>' successfully removed from the service control manager database
Attempt to add DDE item '<item name>' failed
Attempt to add FastDDE/SuiteLink item '<tag name>' failed
Attempt to add OPC client item '<item name>' failed
Attempting to automatically generate tags for device '<device name>'
Auto generation for tag '<tag name>' already exists and will not be overwritten
Auto generation produced too many overwrites, stopped posting error messages
Channel diagnostics started on channel '<channel name>'
Channel diagnostics stopped on channel '<channel name>'
Completed automatic tag generation for device '<device name>'
Configuration session assigned to '<user name>' as Default User has ended
Configuration session assigned to '<user name>' demoted to Read Only
Configuration session assigned to '<user name>' promoted toWrite Access
Configuration session started by '<user name>'
Configuration TCP/IP port number changed to '<port number>'
Data collection is '<enabled/disabled>' on device '<device name>'
DDE client attempt to add topic '<topic>' failed
Delete object '<item name>' failed
Demo timer started. '<days>' '<hours>' '<minutes>' '<seconds>'
Demo timer updated. '<time remaining>'
Demonstration time period has expired
Device '<device name>' has been auto-demoted
Device '<device name>' has been auto-promoted to determine if communications can be re-established
Failed to upload project XML
FLEXnet Licensing Service must be enabled to process your license
Module '<module>' is unsigned or has a corrupt signature
Move object '<group>' to '<group>' failed
No device driver DLLs were loaded
Rejecting attempt to delete referenced object '<item name>'

'<driver name>' device driver was not found or could not be loaded

Error Type:
Warning

Possible Cause:
A project using a driver that has not been installed or that is not compatible with the current server/driver version was started but could not properly launch.

Solution:
1. If the driver is not installed, re-run the install and select the driver.
2. If the driver is installed, verify the version that the project was created with and install a compatible version on the running PC.

Note:
Every attempt is made to ensure backwards compatibility in the server so that projects created in older versions may be loaded in newer versions. However, since new versions of the server and driver may have properties and configurations that do not exist in older version, users may not be able to open or load a project created in a newer version of the server in an older version.

'<server name>' Server Started

Error Type:
Information

Source:
Runtime

Possible Cause:
The server Runtime has started successfully.

Solution:
N/A.

'<server runtime>' successfully configured to run as a system service

Error Type:
Information

Possible Cause:
The server runtime process has been switched from "Interactive" to "System service" mode.

Solution:
None.

'<server runtime>' successfully removed from the service control manager database

Error Type:
Information

Possible Cause:
The server runtime process has been switched from "System Service" to "Interactive" mode.

Solution:
None.

Attempt to add DDE item '<item name>' failed

Error Type:
Error

Source:
Runtime

Possible Cause:
An attempt to add an item from a DDE client failed.

Solution:
1. If attempting to add an item dynamically to a tag group that is not supported in the server: Add Dynamic Tags to the device level only.
2. If attempting to add an item dynamically but used the incorrect address syntax: Verify the syntax and try again.
3. If attempting to add an item that was not created as a static tag in the server: Add the tag in the server and then try adding the item from the client.
4. If attempting to add an item but used incorrect syntax: Correct the syntax and try again.

Attempt to add FastDDE/SuiteLink item '<tag name>' failed

Error Type:
Error

Source:
Runtime

Possible Cause:
1. The user attempted to add an item from a FastDDE/Suitelink client that was not a static tag in the server.
2. The user attempted to add an item from a FastDDE/Suitelink client that had incorrect syntax.

Solution:
1. Check the item syntax and correct if necessary.
2. Verify that the item is a valid address in the driver. If not, either use the correct address or remove the request.
3. Verify that the static tag exists in the project. If not, either add it or remove the request.

Attempt to add OPC Client item '<item name>' failed

Error Type:
Error

Source:
Runtime

Possible Cause:
An attempt to add an item from an OPC client failed.

Solution:
1. If attempting to add an item dynamically to a tag group that is not supported in the server: Add Dynamic Tags to the device level only.
2. If attempting to add an item dynamically but used the incorrect address syntax: Verify the syntax and try again.
3. If attempting to add an item that was not created as a static tag in the server: Add the tag in the server and then try adding the item from the client.
4. If attempting to add an item but used incorrect syntax: Correct the syntax and try again.

Attempting to automatically generate tags for device '<device name>'

Error Type:
Information

Source:
Runtime

Possible Cause:
The server is attempting to generate tags for the specified device.

Solution:
N/A.

Auto generation for tag '<tag name>' already exists and will not be overwritten

Error Type:
Warning

Source:
Runtime

Possible Cause:
Although the server is regenerating tags for the tag database, it has been set not to overwrite tags that already exist.

Solution:
If this is not the desired action, change the setting in the Database Creation Properties dialog.

Auto generation produced too many overwrites, stopped posting error messages

Error Type:
Warning

Source:
Runtime

Possible Cause:
To keep from filling the error log, the server has stopped posting error messages on tags that cannot be overwritten during automatic tag generation.

Solution:
N/A.

Channel diagnostics started on channel '<channel name>'

Error Type:

Information

Source:
Runtime

Possible Cause:
Channel diagnostics have started successfully on the channel.

Solution:
N/A.

Channel diagnostics stopped on channel '<channel name>'

Error Type:
Information

Source:
Runtime

Possible Cause:
Channel diagnostics have stopped successfully on the channel.

Solution:
N/A.

Completed automatic tag generation for device '<device name>'

Error Type:
Information

Source:
Runtime

Possible Cause:
The server successfully generated tags for the tag database.

Solution:
N/A.

Configuration session assigned to '<user name>' as Default User has ended

Error Type:
Warning

Source:
Runtime

Possible Cause:
The specified user connected to the Runtime has ended the session.

Solution:
None.

Configuration session assigned to '<user name>' demoted to Read Only

Error Type:
Information

Source:
Runtime

Possible Cause:
The connected user has been idle for more than 15 minutes, and so the server automatically demoted them.

Solution:
When connected with the Configuration, do not leave the connection idle if in write access mode.

Configuration session assigned to '<user name>' promoted to Write Access

Error Type:
Information

Source:
Runtime

Possible Cause:
A user that was connected to the Runtime with Write Access has disconnected or demoted due to being idle.

Solution:
N/A.

Configuration session started by '<user name>'

Error Type:
Warning

Source:
Runtime

Possible Cause:
A user on the local or remote PC has started a configuration session using a user login with Read/Write access to the Runtime project.

Solution:
The first user to connect to the Runtime with a Configuration will have Read/Write access to the Runtime all other users to connect will have Read Only access.

Configuration TCP/IP port number changed to '<port number>'

Error Type:
Information

Source:
Runtime

Possible Cause:
The port number that is used to connect the Configuration to the Runtime has been changed.

Solution:
The port was changed in the Administration settings. Change the port number in the Configuration Options in the Runtime Connection Options to match the new Runtime port.

Data collection is '<enabled/disabled>' on device '<device name>'

Error Type:

Information

Source:
Runtime

Possible Cause:
1. A client application has programmatically Enabled/Disabled Data Collection for the specified device.
2. The user's Configuration has Enabled/Disabled Data Collection for the specified device.

Solution:
N/A.

DDE client attempt to add topic '<topic>' failed

Error Type:
Error

Source:
Runtime

Possible Cause:
An attempt was made by a DDE client to add or reference a topic that does not exist.

Solution:
1. Verify that an alias has been created in the alias map with the same name as the topic.
2. The global topic is '_ddeData.' If using it, make sure to use the correct syntax. It is not case sensitive.

Delete object '<item name>' failed

Error Type:
Warning

Source:
Runtime

Possible Cause:
An attempt to remove an object failed.

Solution:
Reference the item by something else. The user may not have privileges to remove the object.

Demo timer started. '<days>' '<hours>' '<minutes>' '<seconds>'

Error Type:
Warning

Source:
Runtime

Possible Cause:
The server has started in demo mode with the specified time remaining in the demo period.

Solution:
1. If evaluating the server, no action needs to be taken.
2. If this is a production machine, activate the product licenses for the installed components before the demo time period expires.

Demo timer updated. '<time remaining>'

Error Type:
Warning

Possible Cause:
None.

Solution:
None.

Demonstration time period has expired for <Feature Name>

Error Type:
Warning

Source:
Runtime

Possible Cause:
The server was running in demo mode, but the demo period has expired.

Solution:
1. Obtain a license for the drivers or plug-ins that were functioning as a demo. For more information, refer to "Support Information," which may be accessed either from the server's Help menu or from the server's Administration menu (located in the System Tray).
2. Reset the two-hour demo period by stopping and restarting the server Runtime. To do so, select "Stop Runtime Service" and then "Start Runtime Service" from the server's Administration menu.

Notes:
1. For information on managing licenses, refer to the License Utility help file.
2. Often, an unlicensed (demo) driver or plug-in is temporarily activated either prior to or after a project is loaded with licensed drivers or plug-ins. This will trigger the two-hour demo period, which will stop the server Runtime project once it expires. To properly restart a licensed project without triggering the demo period, load a project which only uses licensed drivers and plug-ins. Then, stop and the start the server Runtime from the Administration menu.

Device '<device name>' has been auto-demoted

Error Type:
Warning

Source:
Runtime

Possible Cause:
Communications with the specified device have failed. The device has been demoted from the poll cycle.

Solution:
1. If the device fails to reconnect, investigate the reasons behind the communications loss and then correct it.
2. To stop the device from being demoted, diasbled Auto-Demotion.

Device '<device name>' has been auto-promoted to determine if communications can be re-established

Error Type:
Information

Source:
Runtime

Possible Cause:
If a device that was previously demoted from the poll cycle has been promoted, check to see if it is now available.

Solution:
N/A.

Notes:
If communications fail, the device will be demoted again.

Failed to upload project XML

Error Type:
Error

Source:
Runtime

Possible Cause:
1. The driver, driver schema file or both are not installed.
2. The project was saved in a newer version of the server or one that has incompatible schema fields.

Solution:
1. Verify that the driver and schema files are installed.
2. Compare the versions of the server in which the file was created against the version in which it is being loaded.

FLEXnet Licensing Service must be enabled to process your license. Runtime references are limited to demo operation

Error Type:
Warning

Source:
Runtime

Possible Cause:
The user is attempting to license a driver or component without the Runtime enabled and running.

Solution:
Start the Runtime Service and then re-attempt licensing.

Module '<module>' is unsigned or has a corrupt signature. Runtime references are limited to demo operation

Error Type:
Warning

Source:
Runtime

Possible Cause:
Runtime attempted to validate a license certificate and failed.

Solution:
1. Ensure that the license subscriptions are updated.
2. Ensure that the drivers or suites being used are properly licensed.

Note:

Until the problem is corrected, the Runtime project will run in Demo mode.

Move object '<group>' to '<group>' failed

Error Type:
Warning

Source:
Runtime

Possible Cause:
An attempt to move a tag or group to another group or device failed because the item is referenced by another object.

Solution:
The object may be referenced by another object, although the user may not have the privileges to make the change.

No device driver DLLs were loaded

Error Type:
Error

Source:
Runtime

Possible Cause:
The drivers may not have been installed or updated when the server was installed.

Solution:
1. Drivers are synchronized with the server build. Drivers from previous builds may not have required changes; therefore, they cannot be loaded when the server starts. Re-run the server install.
2. The drivers folder is empty; therefore, no drivers could be loaded. Re-run the server install.

Rejecting attempt to delete referenced object '<item name>'

Error Type:
Warning

Source:
Runtime

Possible Cause:
An attempt was made to remove an object from the server that is being referenced from some other place.

Solution:
Remove the reference and then re-attempt to remove the object.

Rejecting attempt to move referenced object '<item name>'

Error Type:
Warning

Source:
Runtime

Possible Cause:
An attempt was made to move an object and failed.

Solution:
The object may be referenced by another object, although the user may not have the privileges to make the change.

Runtime project replaced from '<project location>'

Error Type:
Information

Source:
Runtime

Possible Cause:
A new project was selected for the Runtime to run.

Solution:
N/A.

Simulation mode is '<enabled/disabled>' on device '<device name>'

Error Type:
Information

Source:
Runtime

Possible Cause:
The user's Configuration has Enabled/Disabled Simulation mode for the specified device.

Solution:
N/A.

Starting '<driver name>' device driver

Error Type:
Warning

Possible Cause:
The server successfully loaded and started a driver that will be used in the running project.

Starting '<plug-in name>' plug-in

Error Type:
Information

Source:
Runtime

Possible Cause:
The server started and successfully loaded the plug-in for use.

Solution:
N/A.

Stopping '<driver name>' device driver

Error Type:
Warning

Possible Cause:
The server successfully stopped the specified driver in preparation for server shutdown or project change.

Solution:
None.

Stopping '<plug-in name>' plug-in

Error Type:
Information

Source:
Runtime

Possible Cause:
The server is shutting down and the plug-in was successfully un-loaded.

Solution:
N/A.

The tier information for feature '<feature>' is invalid

Error Type:
Error

Source:
Runtime

Possible Cause:
This is a custom licensed product for OEMs and vendors. An error has occurred loading the custom licensing string.

Solution:
Contact the OEM/Vendor for more information and support.

Unable to generate a tag database for device '<device name>'. Reason: '<reason>'

Error Type:
Warning

Source:
Runtime

Possible Cause:
The server attempted to generate tags for the specified device and failed with the specified reason.

Solution:
Correct the reason of failure and then retry the tag generation.

Unable to generate a tag database for device '<device name>'. The device is not responding

Error Type:
Warning

Source:
Runtime

Possible Cause:
The server attempted to generate tags from the physical device and failed because the device did not respond to the communications request.

Solution:
1. Verify that the device is powered on and that the PC running (so that the server can connect to it).
2. Verify that all cabling is correct.
3. Verify that the Device IDs are correct.

Unable to load project '<project name>'

Error Type:
Warning

Possible Cause:
The project was created in a server version that is not compatible with version that trying to load it.

Solution:
Typically this happens when a project was created in a newer version of the server and it is being opened in an older version.

Note:
Every attempt is made to ensure backwards compatibility in the server so that projects created in older versions may be loaded in newer versions. However, since new versions of the server and driver may have properties and configurations that do not exist in older version, users may not be able to open or load a project created in a newer version of the server in an older version.

Unable to write to item '<item name>'

Error Type:
Warning

Source:
Runtime

Possible Cause:
The client application sent a write to an item and it was rejected.

Solution:
1. The tag may have Read/Write access in the server even though the device only allows reads. Verify that the item is Read Only and change the access Writes in the server. Additionally, change the action in the connected client application.
2. The server may have timed-out in demo mode. Save and then restart the server.

Update of object '<object>' failed

Error Type:
Warning

Source:
Runtime

Possible Cause:
An attempt was made to update an object in the project that is neither accessible nor available.

Solution:
Save the project to a different location.

Write request rejected on item reference '<item name>' since the device it belongs to is disabled

Error Type:
Warning

Source:
Runtime

Possible Cause:
An attempt was made to write to a tag that is on a disabled device.

Solution:
Devices can be programmatically disabled, thus indicating to the server that it should not be communicated with at this time. To enable it, write to the _Enabled system tag. Alternatively, check the Enable data collection check box in Device Properties.

Write request rejected on Read Only item reference '<item name>'

Error Type:
Warning

Source:
Runtime

Possible Cause:
An attempt was made by the client application to write to a Read Only item.

Solution:
1. Change the tag's access to Read/Write (if supported).
2. Change the client application so that it does not attempt to write to the item.

Server Configuration Error Messages

The following error/warning messages may be generated. Click on the link for a description of the message.

Server Configuration Error Messages

'<device name>' device driver loaded successfully

Error Type:
Warning

Possible Cause:
The Configuration was able to successfully load the driver into its workspace.

Solution:
N/A.

'<driver name>' device driver unloaded from memory

Error Type:
Information

Source:
Configuration

Possible Cause:
The driver was unloaded from the server's memory space because it was no longer needed.

Solution
N/A.

'<driver name>' device driver was not found or could not be loaded

Error Type:
Error

Source:
Configuration

Possible Cause:
An attempt was made to load a project with a channel using the specified driver which could not be found or loaded.

1. If the project has been moved from one PC to another, the required drivers may have not been installed yet.
2. The specified driver may have been removed from the installed server.

3. The specified driver may be the wrong version for the installed server version.

Solution:

1. Re-run the server install and add the required drivers.
2. Re-run the server install and re-install the specified drivers.
3. Ensure that a driver has not been placed in the installed server directory (which is out of sync with the server version).

'<driver name>' driver does not currently support XML persistence

Error Type:
Warning

Source:
Configuration

Possible Cause:
The specified driver does not support XML formatting.

Solution:
1. Save the project in .opf format.

'<plug-in>' plug-in was not found or could not be loaded

Error Type:
Error

Source:
Configuration

Possible Cause:
The server project being loaded is using a plug-in that cannot be found.

Solution:
Re-run the server install and select the specified plug-in for installation.

A client application has '<enabled/disabled>' auto-demotion on device '<device name>'

Error Type:
Information

Source:
Configuration

Possible Cause:
A client application that is connected to the server has enabled or disabled Auto Demotion on the specified device.

Solution:
To restrict the client application from doing this, disable its ability to write to System-level tags through the OPC DA Settings.

Closing project '<project name>'

Error Type:
Information

Source:

Configuration

Possible Cause:
The specified project was closed.

Solution:
N/A.

Created backup of project '<project name>' to '<file location>'

Error Type:
Information

Source:
Configuration

Possible Cause:
The server was able to successfully backup the server project.

Solution:
N/A.

Duplicate Channel Wizard page ID '<ID number>' detected

Error Type:
Error

Source:
Configuration

Possible Cause:
This message indicates that two Channel Wizard pages were created with the same ID.

Solution:
Contact Technical Support.

Error importing CSV tag record '<record number>': '<tag name>' is not a valid tag group name

Error Type:
Warning

Source:
Configuration

Possible Cause:
A tag group has been imported in the CSV file that is incorrectly formatted.

Solution:
Correct the syntax in the CSV file and then re-import.

Note:
Tag group names may not start with '_' (Underscores), '.' (Periods) or ' ' (spaces).

Error importing CSV tag record '<record number>': '<tag name>' is not a valid tag name

Error Type:
Warning

Source:
Configuration

Possible Cause:
A tag has been imported in the CSV file that is incorrectly formatted.

Solution:
Correct the syntax in the CSV file and then re-import.

Note:
Tag names may not start with '_' (Underscores), '.'(Periods) or ' ' (spaces).

Error importing CSV tag record '<record number>': Missing address

Error Type:
Warning

Source:
Configuration

Possible Cause:
An attempt was made to import a CSV file. The tag was configured in the CSV without an address specified in the address field.

Solution:
Add an address to the specified record and re-run the CSV import.

Error importing CSV tag record '<record number>': Tag or group name exceeds 256 characters

Error Type:
Warning

Source:
Configuration

Possible Cause:
A tag or tag group has been imported from a CSV file that has a name exceeding the 256 character limit.

Solution:
Correct the specified name in the CSV file and then re-import.

Note:
The tag record is calculated from the List of tags in the CSV file, beginning with the first item listed.

Failed to reset channel diagnostics

Error Type:
Warning

Source:
Configuration

Possible Cause:

A failed attempt was made to reset the Channel Diagnostics data.

Solution:
Ensure that diagnostics are enabled for this channel.

Failed to retrieve Runtime project

Error Type:
Error

Source:
Configuration

Possible Cause:
The Configuration connected to the Runtime but was unable to load the project for editing.

Solution:
1. The Configuration could be a different version than the Runtime. Ensure that the client and Runtime versions can work together. If not, install the correct Configuration .
2. The project loaded by the Runtime may have been deleted. Verify that the project still exists; if it does not, restore it.

Invalid Ethernet encapsulation IP '<IP address>'

Error Type:
Warning

Source:
Configuration

Possible Cause:
The IP address that is specified for a device on an Ethernet Encapsulated channel is not a valid IP address.

Solution:
Correct the IP in the XML file and then re-load the project.

Note:
This error occurs when loading XML formatted projects. These projects have usually been created or edited with a third party XML software.

Invalid or missing Modem Configuration on channel '<channel name', substituting '<modem>'

Error Type:
Warning

Source:
Configuration

Possible Cause:
A server project was loaded that uses a modem unavailable on this PC.

Solution:
1. Change the Modem Configuration in the project to use a supported modem.
2. Add the specified modem to the PC's Configuration.

Invalid XML document '<XML name>'

Error Type:
Error

Source:
Configuration

Possible Cause:
The server attempted to open a project formatted with XML and was unable to parse the XML file.

Solution:
If the server project was edited using a third party XML editor, verify that the format is correct via the schemas for the server and drivers.

Maximum channel count exceeded for the lite version '<driver name>' driver license

Error Type:
Warning

Source:
Configuration

Possible Cause:
The specified driver was activated with a lite license, which limits the number of channels that can be configured.

Solution:
1. Verify the number of channels authorized by the license. Then, correct the project design to use only that number of channels.
2. If more channels are needed or the lite activation is incorrect, contact the sales representative about upgrading the license to a version that will support the number of desired channels.

Maximum device count exceeded for the lite version '<driver name>' driver license

Error Type:
Warning

Source:
Configuration

Possible Cause:
The specified driver was activated with a lite license, which limits the number of devices that can be configured.

Solution:
1. Verify the number of devices authorized by the license. Then, correct the project design to use only that number of channels.
2. If more devices are needed or the lite activation is incorrect, contact the sales representative about upgrading the license to a version that will support the number of desired devices.

Maximum Runtime tag count exceeded for the lite version '<driver name>' driver license

Error Type:
Error

Source:
Configuration

Possible Cause:

The specified driver was activated with a lite license, which limits the number of tags that can be configured.

Solution:
1. Verify the number of tags authorized by the license and then correct the project design to use only that number of channels.
2. If more tags are needed or if the lite activation is incorrect, contact the sales representative about upgrading the license to a version that will support the number of desired tags.

Modem initialization failed on channel '<channel name>'

Error Type:
Error

Source:
Configuration

Possible Cause:
A server made a failed attempt to initialize the modem assigned to the specified channel.

Solution:
Refer to the additional events that will be posted with details on the initialization errors.

Opening project '<project name>'

Error Type:
Information

Source:
Configuration

Possible Cause:
The specified project was opened.

Solution:
N/A.

Required schema file '<schema name>' not found

Error Type:
Error

Source:
Configuration

Possible Cause:
A project formatted with XML was loaded but the specified schema file was not found in the schemas folder.

Solution:
Re-run the server install and make sure that all the drivers are updated. This will re-install any missing schema files.

Runtime project update failed

Error Type:
Error

Source:
Configuration

Possible Cause:
The client attempted to update the Runtime project and failed.

Solution:
1. The user may not have permission to make changes to the project. Log in to the User Manager with the correct user credentials.
2. The project folder may be locked to changes. Verify that all users with access to the project have permissions in the folder.

Starting OPC diagnostics

Error Type:
Information

Source:
Configuration

Possible Cause:
OPC diagnostics captures were started by a connected Configuration.

Solution:
N/A.

Stopping OPC diagnostics

Error Type:
Information

Source:
Configuration

Possible Cause:
OPC Diagnostics capturing were stopped by a connected Configuration.

Solution:
N/A.

Unable to add channel due to driver-level failure

Error Type:
Error

Source:
Configuration

Possible Cause:
An attempt was made to add a channel to the server and it failed due to issues in the driver.

Solution:
1. Refer to the additional messages that will be posted with information on the driver-level error.
2. If necessary, contact Technical Support for additional help.

Unable to add device due to driver level failure

Error Type:
Error

Source:

Configuration

Possible Cause:
An attempt was made to create a device in a server project, but it failed due to an issue in the driver.

Solution:
Refer to the additional error messages that follow, in order to learn about the driver error.

Unable to backup project file to '<file name/location>'

Error Type:
Error

Source:
Configuration

Possible Cause:
The server was unable to backup the project to the specified location.

Solution:
Ensure access permissions to the destination folder.

Unable to backup project file to '<file path>'

Error Type:
Error

Source:
Configuration

Possible Cause:
The server was unable to back up the server project to the specified file location.

Solution:
1. Ensure that the destination file is not locked by another application.
2. Ensure that the destination file, along with the folder where it is located, have Read/Write access.

Note:
This error is most likely due to Read/Write access permissions.

Unable to launch OPC Quick Client [Path: '<path>' OS Error: '<error>']

Error Type:
Error

Source:
Configuration

Possible Cause:
An attempt was made to launch the OPC Quick Client from the Configuration and it failed.

Solution:
1. Verify that the OPC Quick Client is installed in the specified location. If not, re-run the server installation and select it for installation.
2. Verify that the required access rights to launch the OPC Quick Client from its specified location are had.
3. Contact Technical Support for assistance in determining the fault from the OS Error.

Unable to load driver DLL '<driver name>'

Error Type:
Error

Source:
Configuration

Possible Cause:
The specified driver could not be loaded when the project started.

Solution:
1. Verify the version of the driver that is installed. Check the OPC server's website to see if the driver version is for the version of the server that is installed. If not, correct the server or re-run the server install.
2. If the driver is found to be corrupted, delete it an dthen re-run the server install.

Note:
This problem is usually due to corrupted driver DLLs or drivers that are not in sync with the server version.

Unable to load the '<driver name>' driver because more than one copy exists ('<driver name>' and '<driver name>')

Error Type:
Error

Source:
Configuration

Possible Cause:
There are multiple versions of the driver DLL existing in the driver's folder in the server.

Solution:
Contact Technical support and verify which version should be installed for the version of the server being run. Remove the driver that is invalid and then restart the server and load the project.

Unable to use network adapter '<adapter>' on channel '<channel name>'. Using default network adapter

Error Type:
Warning

Source:
Configuration

Possible Cause:
The network adapter specified in the project does not exist on this PC. Thus, the server will default to using the default network adapter.

Solution:
Select the network adapter that will be used on the PC and then save the project.

See Also:
Channel Properties - Network Interface

Validation error on '<tag name>': Invalid scaling parameters

Error Type:
Warning

Source:
Configuration

Possible Cause:
An attempt was made to set invalid scaling parameters on the specified tag.

Solution:
Correct the scaling parameters and then save the tag.

General Operation System Error Messages

The following error/warning messages may be generated. Click on the link for a description of the message.

General Operation System Error Messages

, Error control

Error Type:
Information

Source:
TAPI Manager

Possible Cause:
Error control has been set in the Modem Configuration dialog.

Solution:
N/A.

, Forced error control

Error Type:
Information

Source:
TAPI Manager

Possible Cause:
Forced Error control has been set in the Modem Configuration dialog

Solution:
N/A.

, Hardware flow control

Error Type:
Information

Source:
TAPI Manager

Possible Cause:
Hardware Flow control has been set in the Modem Configuration dialog.

Solution:
N/A.

, Software flow control

Error Type:
Information

Source:
TAPI Manager

Possible Cause:
Software Flow control has been set in the Modem Configuration dialog.

Solution:
N/A.

Dialing '<phone number>' on line '<modem name>'

Error Type:
Information

Source:
TAPI Manager

Possible Cause:
TAPI manager is dialing the specified number for the server.

Solution:
N/A.

Dialing aborted on '<modem name>'

Error Type:
Information

Source:
TAPI Manager

Possible Cause:
Dialing was aborted by the user.

Solution:
N/A.

Dialing on line '<modem name>' cancelled by user

Error Type:
Information

Source:
TAPI Manager

Possible Cause:
The Server has canceled its request to dial a device on the specified line.

Solution:
N/A.

Failed to open modem line '<modem name>' [TAPI error]

Error Type:
Error

Source:
TAPI Manager

Possible Cause:
TAPI attempted to open the modem line for the server and encountered an error.

Solution:
Correct the specified error. Then, re-attempt to open the modem line.

Hardware error on line '<modem name>'

Error Type:
Warning

Source:
TAPI Manager

Possible Cause:
A hardware error was returned after a request was made for a tag in a device that will be connected to the modem.

Solution:

Disable data collection on the device. Only enable it after the modem has connected to the destination modem.

Note:
The error will occur on first scan and will not be repeated.

Incoming call detected on line '<modem name>'

Error Type:
Information

Source:
TAPI Manager

Possible Cause:
The modem has detected an incoming call on phone line on which it is connected. If the modem is set to automatically answer, it will answer the incoming call.

Solution:
N/A.

Line '<modem name>' connected

Error Type:
Information

Source:
TAPI Manager

Possible Cause:
The modem lines are connected.

Solution:
None available.

Line '<modem name>' connected at '<baud rate>' baud

Error Type:
Information

Source:
TAPI Manager

Possible Cause:
The modem connected to the dialed modem at the specified rate.

Solution:
N/A.

Line '<modem name>' disconnected

Error Type:
Information

Source:
TAPI Manager

Possible Cause:

TAPI manager has disconnected the modem for the server.

Solution:
N/A.

Line '<modem name>' is already in use

Error Type:
Warning

Source:
TAPI Manager

Possible Cause:
An attempt was made to open the modem line but could not be completed because it was already open.

Solution:
Find the application that is currently holding the modem open. Then, either close or release it.

Line dropped at remote site on '<modem name>'

Error Type:
Information

Source:
TAPI Manager

Possible Cause:
The remote modem has hung up and dropped the call.

Solution:
N/A.

Modem line closed: '<modem name>'

Error Type:
Warning

Source:
TAPI Manager

Possible Cause:
The modem line was closed by the TAPI manager.

Solution:
This message is normally posted when a project is stopped and the driver no longer needs the modem line.

Modem line opened: '<modem name>'

Error Type:
Warning

Source:
TAPI Manager

Possible Cause:
The modem line was opened by the TAPI manager.

Solution:
This message is normally posted when a project is started and the driver needs the modem line.

Modem to Modem DCE: '<connection parameters>'

Error Type:
Information

Source:
TAPI Manager

Possible Cause:
Modem connection is established to the remote modem.

Solution:
N/A.

MODEMSETTINGS unavailable

Error Type:
Information

Source:
TAPI Manager

Possible Cause:
The Modem Configuration dialog has been loaded but the modem settings for the selected modem are not accessible.

Solution:
If the modem was recently installed, try stopping and restarting the server. The PC may need to be rebooted in order for the modem settings to become available.

No comm handle provided on connect for line '<modem name>'

Error Type:
Warning

Source:
TAPI Manager

Possible Cause:
An attempt was made to connect to the modem line with no specified COMM handle.

Solution:
Make sure the modem is both installed and initialized correctly.

No dial tone on '<modem name>'

Error Type:
Information

Source:
TAPI Manager

Possible Cause:
There is no dial tone on the line.

Solution:
1. Make sure that the modem is connected.
2. The phone line may require a code or number to get an outside line or dial tone. Make sure that the Modem settings are correctly set to automatically dial this number when a connection is made to the modem.

Remote line is busy on '<modem name>'

Error Type:
Information

Source:
TAPI Manager

Possible Cause:
The dialed location is busy.

Solution:
Hang up and then try again later.

Remote line is not answering on '<modem name>'

Error Type:
Information

Source:
TAPI Manager

Possible Cause:
The dialed modem is not answering the call.

Solution:
1. Hang up and then try again later.
2. Verify that the remote modem is configured to answer calls.

TAPI configuration has changed, reinitializing...

Error Type:
Information

Source:
TAPI Manager

Possible Cause:
The TAPI Line configuration has changed. TAPI is now reinitializing the modem with the changes.

Solution:
None available.

TAPI line initialization failed: '<modem name>'

Error Type:
Warning

Source:
TAPI Manager

Possible Cause:

The telephony service is not required to be running in order for the Runtime to start. When the service is disabled and a serial driver is added to the project, this error message is reported.

Solution:
1. If modem communications is not going to be used, no action is required.
2. If modem communications is required, the telephony service will need to be started on the PC.

The phone number is invalid '<phone number>'

Error Type:
Information

Source:
TAPI Manager

Possible Cause:
The phone number entered and dialed is incorrectly formatted for the local or long distance settings.

Solution:
Open the Modem Configuration and verify the number formats required. Then, re-dial the number with the correct format.

Unable to apply Modem Configuration on line '<modem name>'

Error Type:
Warning

Source:
TAPI Manager

Possible Cause:
TAPI Manager was unable to apply to Configuration changes to the server.

Solution:
1. Verify the cabling to the modem.
2. Verify that the modem is set to accept Configuration changes.
3. Verify that the modem is not being used by another application.

Unable to dial on line '<modem name>'

Error Type:
Information

Source:
TAPI Manager

Possible Cause:
The server is unable to have the modem dial the number because the modem is not in a state that allows dialing.

Solution:
In order to dial a number, the line must be idle. Monitor the _Mode Modem Tag and dial when it indicates an idle state.

Unable to start Net DDE

Error Type:
Warning

Source:

DDE

Possible Cause:
1. The server project is configured to allow Net DDE but was unable to launch Net DDE.
2. Net DDE Servers are not enabled to run as a service on this PC or have been completely disabled.

Solution:
1. Go to the Service manager and ensure that Net DDE services is enabled and set to automatically start.
2. Check with the IT administrator and make sure that Net DDE services are allowed. If not, have the local policy changed to allow Net DDE.

iFIX Error Messages

The following error/warning messages may be generated. Click on the link for a description of the message.

iFIX Error Messages
Attempt to add iFIX PDB item '< item name>' failed
Failed to enable iFIX PDB support for this server [OS Error = n]
Unable to enable iFIX PDB support for this server
Unable to read '<tag name>' on device '<channel name/device name>'

Attempt to add iFIX PDB item '< item name>' failed

Error Type:
Information

Source:
NIO

Possible Cause:
The server was not able to add the NIO interface.

Solution:
The server could be in use by a client application. In this case, changes (such as, new interfaces) can be disabled.

Failed to enable iFIX PDB support for this server [OS Error = n]

Error Type:
Information

Source:
NIO

Possible Cause:
The server was unable to access the registry to enable the NIO interface.

Solution:
This error generally concerns user account access rights. Users must have administrator privileges to write to the registry.

Unable to enable iFIX PDB support for this server

Error Type:
Information

Source:
NIO

Possible Cause:
The interface cannot be enabled for use because it may already be enabled for someone else.

Solution:
If possible, stop the other application that is using the interface.

Unable to read '<tag name>' on device ' <channel name/device name>'

Error Type:
Warning

Possible Cause:
A database tag has been created within the iFIX database containing an invalid I/O address.

Solution Steps:
1. Delete the tag from the iFIX database (if not already deleted).
2. Delete the "<server project>_FIX.ini" file.
3. Export the PDB database from the iFIX Database Manager.
4. Re-import the exported file so that "<server project>_FIX.ini" is recreated with the current list of iFIX database items. This will allow each item that is in the iFIX database to be re-validated with the server.

See Also:
Project Startup for iFIX Applications

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