OPC XML-DA Client Driver Help

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OPC XML-DA Client Driver Help

Help version 1.018

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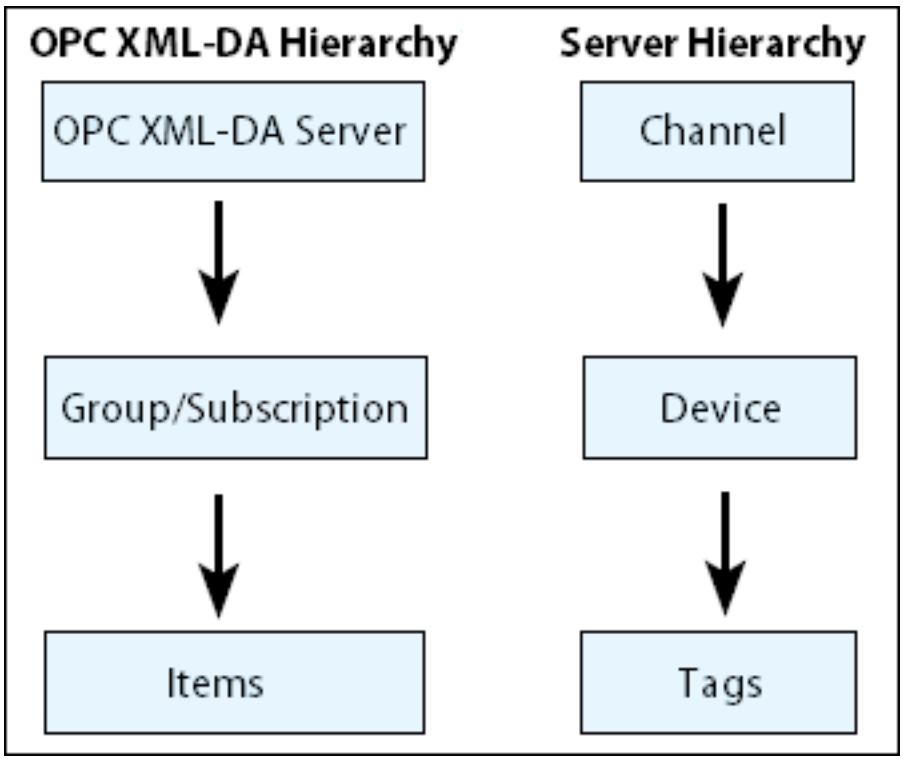
Overview

The OPC XML-DA Client Driver provides a quick and easy way to connect OPC XML-DA enabled devices through the Internet or factory intranet. It provides the following:

- A reliable connection point for accessing data from multiple remote or local OPC XML-DA enabled devices.
- Secure communications between devices on different networks with the use of HTTPS and SSL certificates.

Project Architecture

An OPC XML-DA Client Driver channel represents a connection to an OPC XML-DA Server; an OPC XML-DA Client Driver device represents an OPC XML-DA Group or Subscription while using Polled or Exception-based communications (respectively). The image below displays an example of the similarities between the OPC XML-DA and server functional hierarchies.

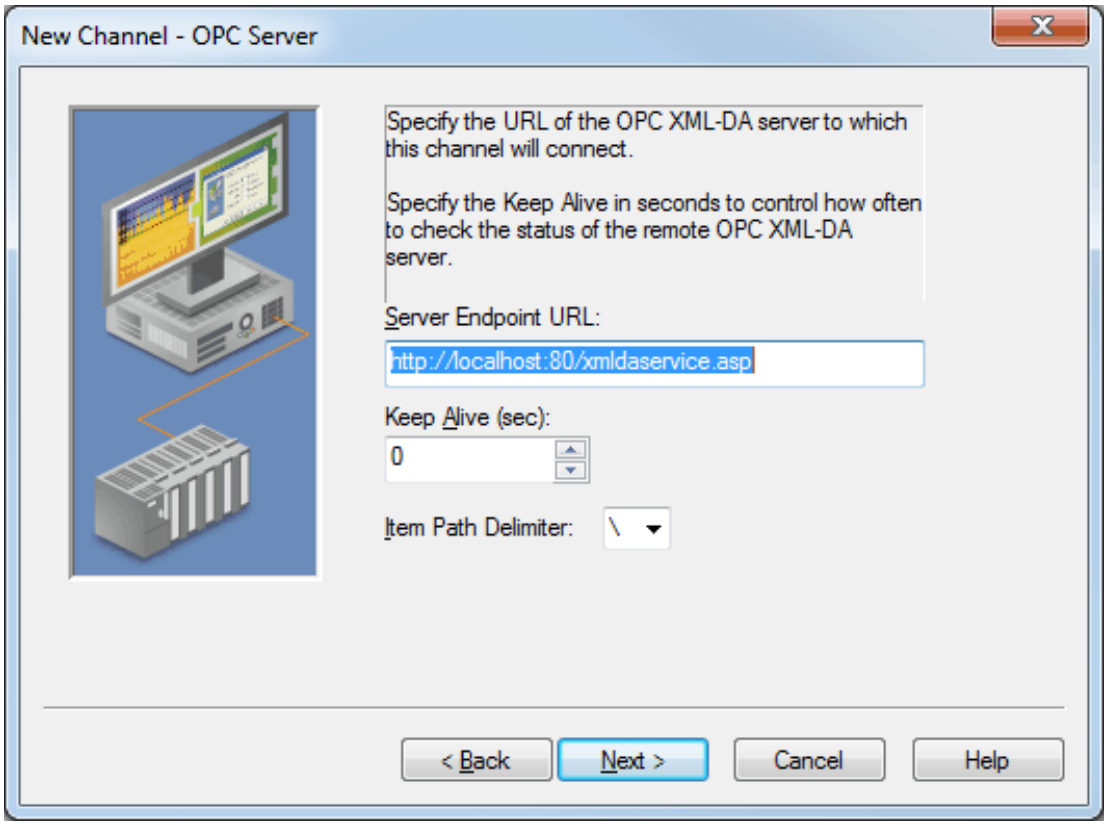


Note: The XML-DA client supports simultaneous connections to multiple servers.

Channel Setup

OPC Server

This dialog is used to specify the OPC server to which the channel will connect.



Descriptions of the parameters are as follows:

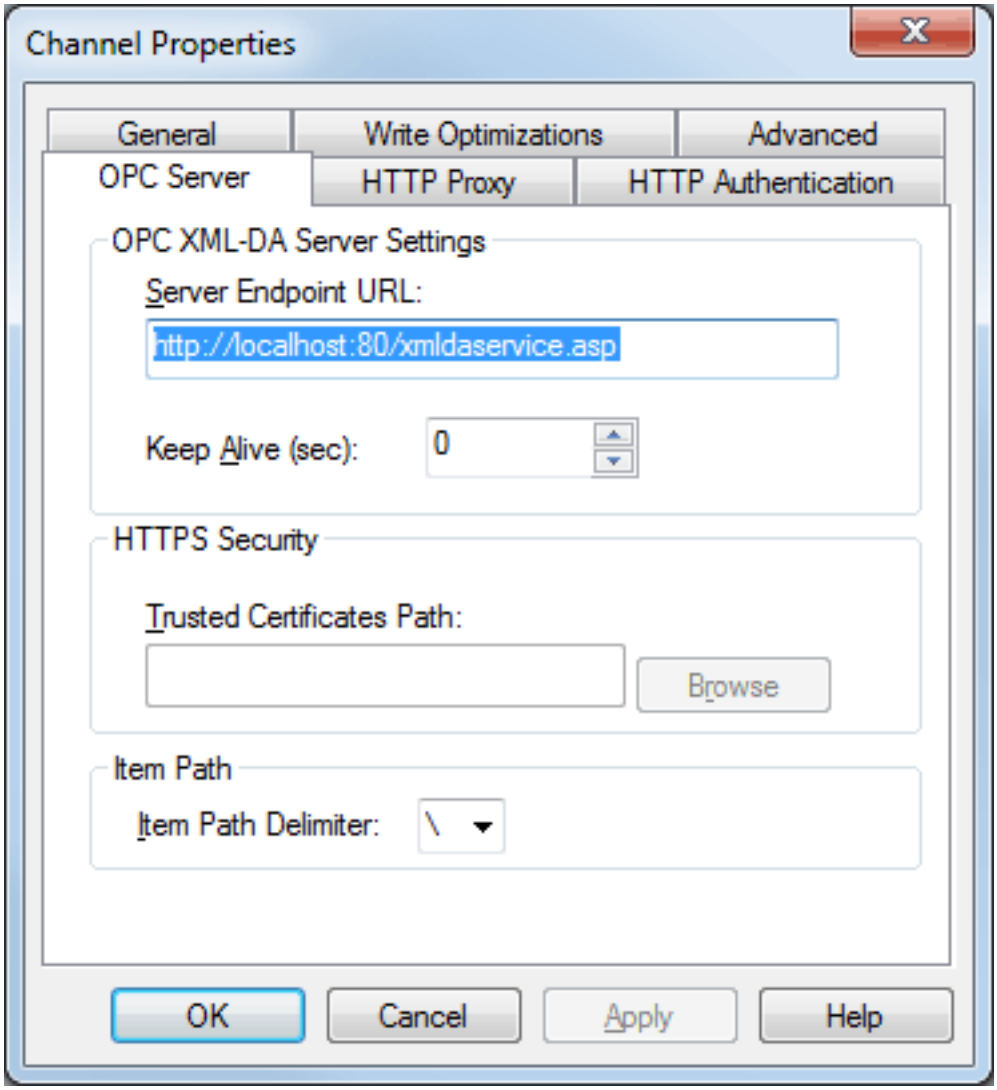
- **Server Endpoint URL:** This parameter specifies the address that will be used to connect to the remote XML-DA server. It is a required field.
- **Keep Alive:** This parameter specifies the rate at which a GetStatus call will be sent to the server to check on the server's operational status. The valid range is 0 to 100 hours. The default setting is 0 seconds. When 0 is specified, no Keep Alive will be sent.

  Note: An error message will be posted to the server's Event Log if a GetStatus call fails.
- **Item Path Delimiter:** This option specifies the item path delimiter, which is used in the tag address with the format <*ItemPath*><*Delimiter*><*ItemName*>. Options include backslash, forward slash, exclamation point, vertical bar, period, underscore, and dash. The default setting is backslash (\).

  Note: This is optional. If the server does not use item paths, then the item path and delimiter are not needed.

HTTP Security

This section will be visible in the OPC Server tab of Channel Properties if the Server Endpoint URL starts with "https". It is recommended that HTTP Security be used when there are concerns about security.



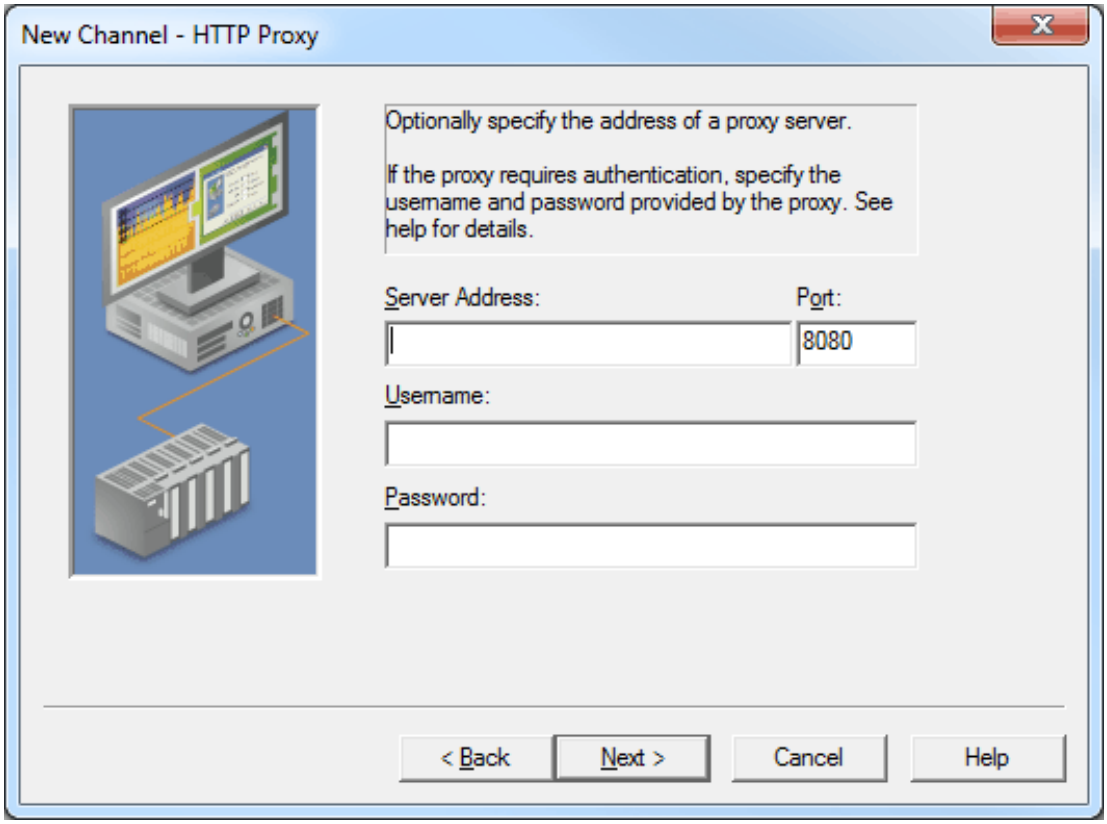
Description of the parameter is as follows:

- **Trusted Certificates Path:** This parameter specifies a path to a file that contains certificates that the client driver should trust. This parameter is required when using SSL.

HTTP Proxy

This dialog is used to specify optional information for situations in which the use of a proxy is required.

Note: It is recommended that a proxy be used if there is a gateway to the remote server.



Descriptions of the parameters are as follows:

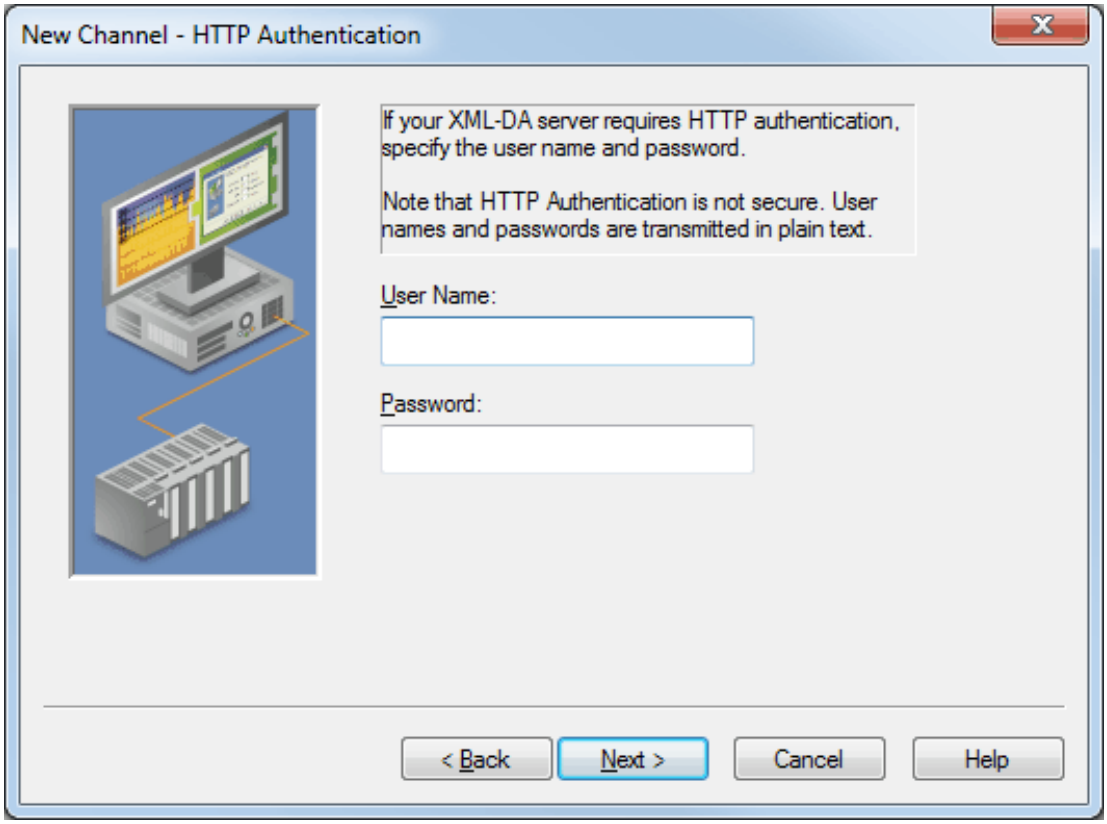
- **Server Address:** This parameter specifies the address that will be used as a proxy. Either an IP or a Domain name may be used.
- **Port:** This parameter specifies the port that will be connected to on the remote server. The valid range is 0 to 65535. The default setting is 8080.
- **Username:** This parameter specifies the user name (if one is required to connect to the server).
- **Password:** This parameter specifies the password (if one is required to connect to the server).

  Note: The Username and Password parameters are only required if the proxy requires authentication. When using a proxy without HTTPS, the username and password will be secured according to the type of proxy being used. This means that a clever and malevolent user could gain access to the Username and Password.

HTTPS/SSL
The client driver supports Simple SSL, which is the version used by most HTTPS-secured websites. In this configuration, the client driver must have the server certificate or root CA's certificate in the trusted list.

HTTP Authentication

This dialog is used to specify the user name and password for HTTP Authentication if required by the XML-DA server.



Descriptions of the parameters are as follows:

- **User Name:** This parameter specifies the user name if required by the XML-DA server. The default setting is blank.
- **Password:** This parameter specifies the password if required by the XML-DA server. The default setting is blank.

Caution: HTTP Authentication is not secure. User names and passwords will be transmitted in plain text.

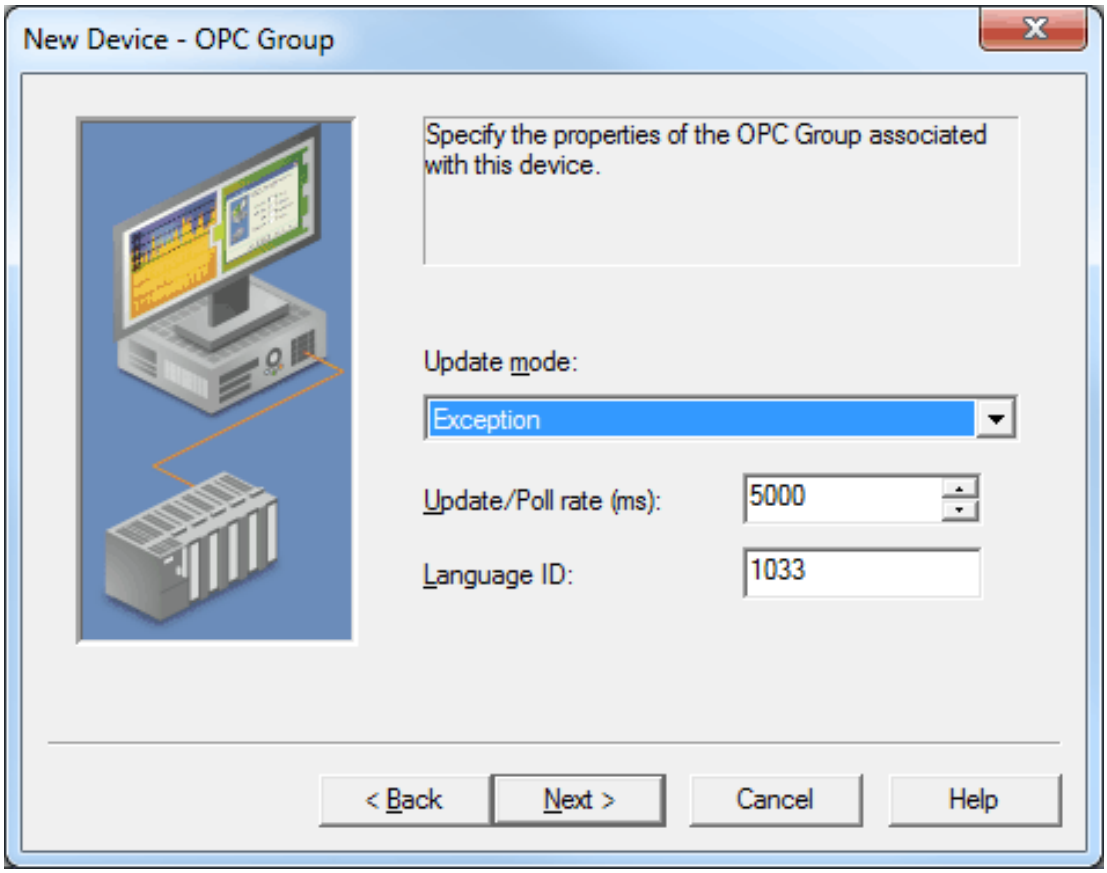
Device Setup

Maximum Number of Supported Channels and Devices

The maximum number of supported channels is 128. The maximum number of devices supported per channel is 256.

OPC Group

This dialog is used to configure the OPC Group's Update Mode and associated settings.



Descriptions of the parameters are as follows:

- **Update mode:** This parameter specifies the OPC Group's update mode. Options include Exception and Poll. The default setting is Exception. Descriptions of the options are as follows:

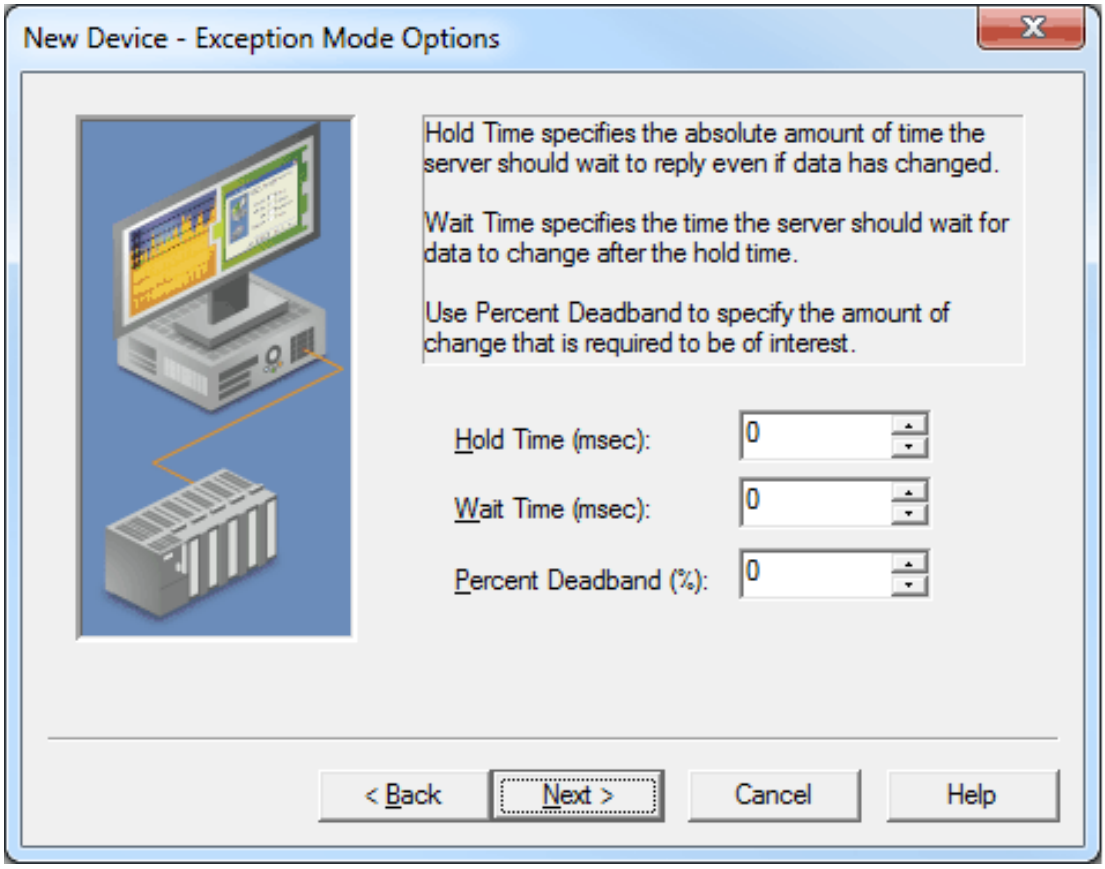
    - **Exception:** In this mode, a subscription will be created for a set of tags, and the server will be instructed to update the client when the data changes. The client driver will make SubscriptionPolledRefresh requests at the Update/Poll rate. If the server does not receive a response from the client referencing a particular subscription, it will terminate the subscription after the maximum allowed time (65.5 seconds) has elapsed.

      Note: The Exception Mode for the OPC XML-DA Client Driver differs from other drivers. All function requests made through the OPC XML-DA Client Driver are synchronous and blocking, meaning that the response from the server will immediately follow the client request. If a request is made, the client will wait until a response from the server is received. The OPC XML-DA Client Driver is designed to divide computational resources among devices/groups within each channel. The channel will operate independently from other channels, whereas the devices within each channel will take turns making requests. This can cause problems when using Exception-based communications where multiple devices share a channel. For example, if two devices share a channel and one has a long hold time and wait time, the second driver will have to wait for the first driver to finish its request/response transaction before the second driver can begin its request. In this case, it might be helpful to delegate devices with long hold times to their own channel.

  - **Poll:** In this mode, no subscription is created. Tags will be read from the server at the interval specified in the Update Rate parameter.
- **Update/Poll rate:** When in Exception Mode, this parameter specifies how often the underlying OPC server will provide updates for changing data. When in Poll Mode, this parameter specifies how often the driver will read the items attached to the group. The valid range is 0 milliseconds to 1 hour. The default setting is 5000 milliseconds.
- **Language ID:** This parameter specifies the language that will be used by the underlying server when returning values as text for operations. The default setting is 1033 (English).

Exception Mode Options

This dialog is used to specify additional settings for the Exception Mode. It will only be available when the OPC Group has specified Exception Mode for the Update Mode.



Descriptions of the parameters are as follows:

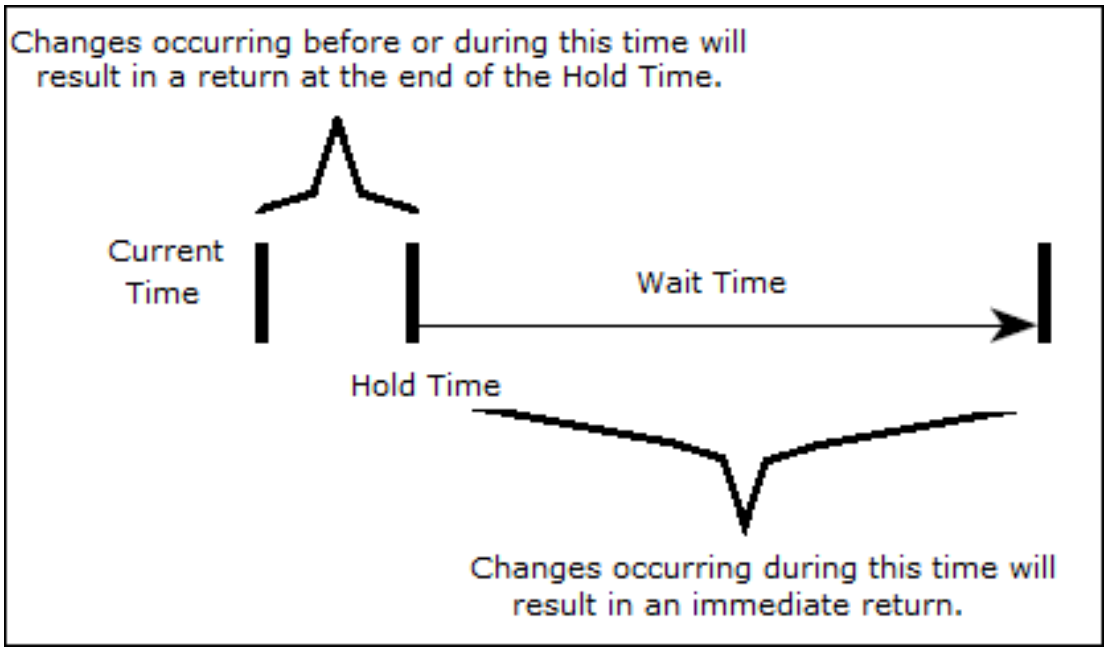
- **Hold Time:** This parameter specifies the amount of time that the server will wait before either continuing to wait or returning updates. The valid range is 0 to 360000000 milliseconds (0 to 100 hours). The default setting is 0 milliseconds.

  Note: Because the client specifies the amount of time that the server is instructed to wait (the client's present time plus the specified duration in milliseconds), synchronization between the client and server is critical in order to eliminate the differences in time propagating themselves through to the hold time.
- **Wait Time:** This parameter specifies the amount of time that the server will wait before returning updates from a SubscriptionPolledRefresh request if no data change has taken place. Otherwise, the server will return a value any time during the Wait Time period on a data change. The valid range is 0 to 360000000 milliseconds. The default setting is 0 milliseconds.
- **Percent Deadband:** This parameter specifies the minimum percent change needed in a tag's value to return the value to the client. This will be based on range values that are determined by the server. The valid range is 0 to 100%. The default setting is 0.

Note: If the Update Rate is less than the Hold Time, the blocking nature of the API calls will cause the next refresh request to be sent when the previous request completes. For more information, refer to "Differences in Exception Mode" below.

Differences in Exception Modes

Because HTTP is an inherently synchronous protocol, the classic model from OPC DA of opening ports and listening for messages from a server is impossible. To simulate Exception Mode, the OPC XML-DA Specification explains that when in Exception Mode, the client sends a Subscribe request to the server and then follows it with a Refresh request at the Update Rate. The client has the option of specifying a Hold Time and a Wait Time at each refresh request.

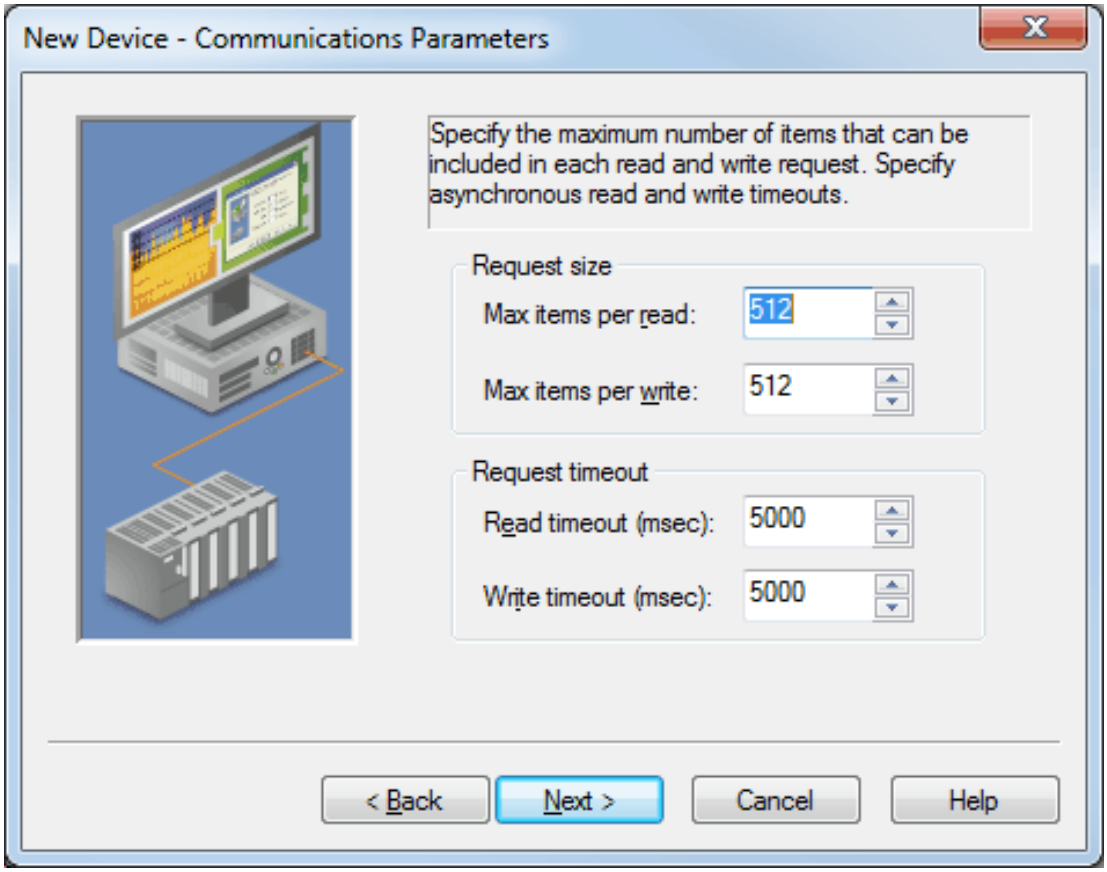


Descriptions of the terms are as follows:

- **Hold Time:** This is the minimum data resolution that is expected in a subscription-based setup. When an XML-DA server receives a refresh request with a Hold Time, the server delays the refresh response for the given Hold Time.
- **Wait Time:** This is the maximum data resolution that is expected in a subscription-based setup. When an XML-DA server receives a refresh request with a Wait Time, the server sends the refresh response when the data has changed since the last refresh or until the end of the wait time.

Communications Parameters

This dialog is used to specify the maximum number of items that can be included in each Read and Write request, as well as the asynchronous Read and Write timeouts.

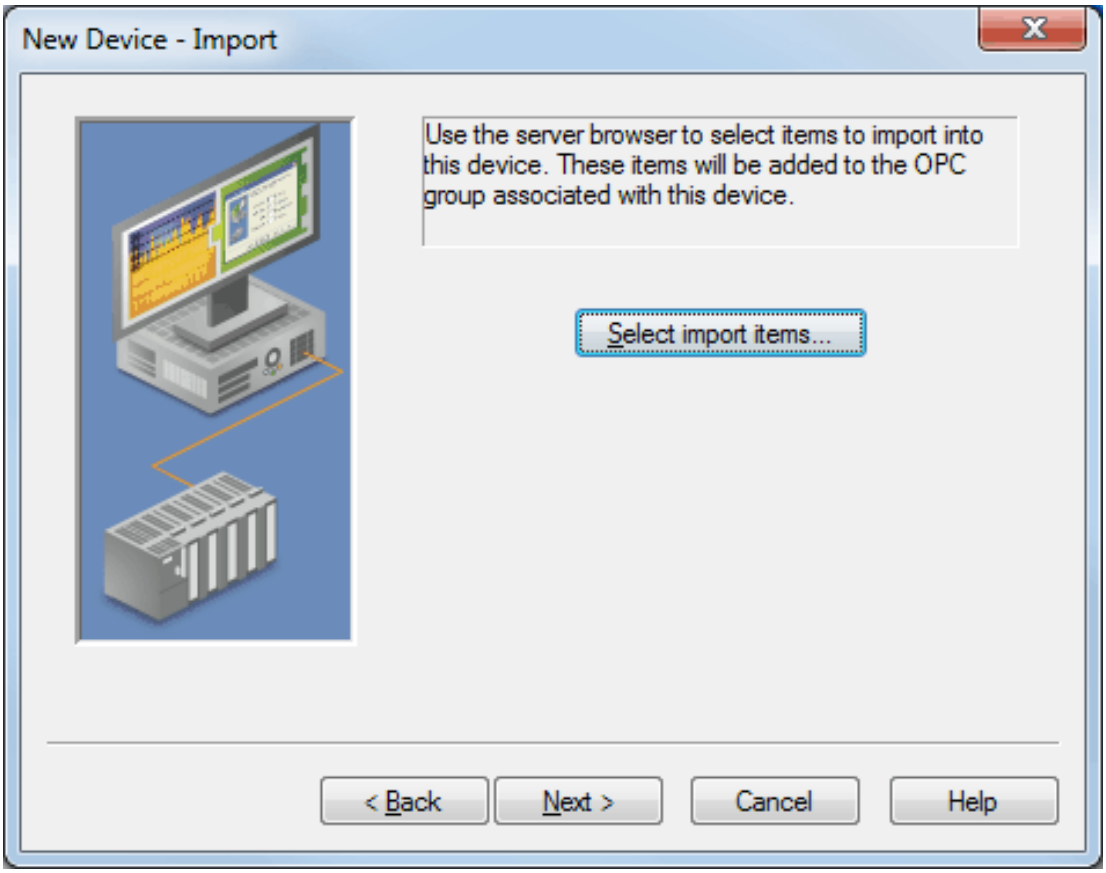


Descriptions of the parameters are as follows:

- **Max items per read:** This parameter specifies the maximum number of items that can be included in a single Read request. The valid range is 1 to 512. The default setting is 512.
- **Max items per write:** This parameter specifies the maximum number of items that can be included in a single Write request. The valid range is 1 to 512. The default setting is 512.
- **Read timeout:** This parameter specifies the amount of time that the driver will wait for a Read Complete notification to be returned from the server before any other Read or Write requests will be sent. If the expected notification is not received, the items that were included in the request will be set to Bad quality, and will remain Bad until the next successful Read. The valid range is 100 to 3600000 milliseconds. The default setting is 5000 milliseconds.
- **Write timeout:** This parameter specifies the amount of time that the driver will wait for a Write Complete notification to be returned from the server before sending any other Write or Read request. If the expected notification is not received, the driver will log a Write failed message on timeout. The valid range is 100 to 3600000 milliseconds. The default setting is 5000 milliseconds.

Import

This dialog is used to browse the server for tags to import into the device.



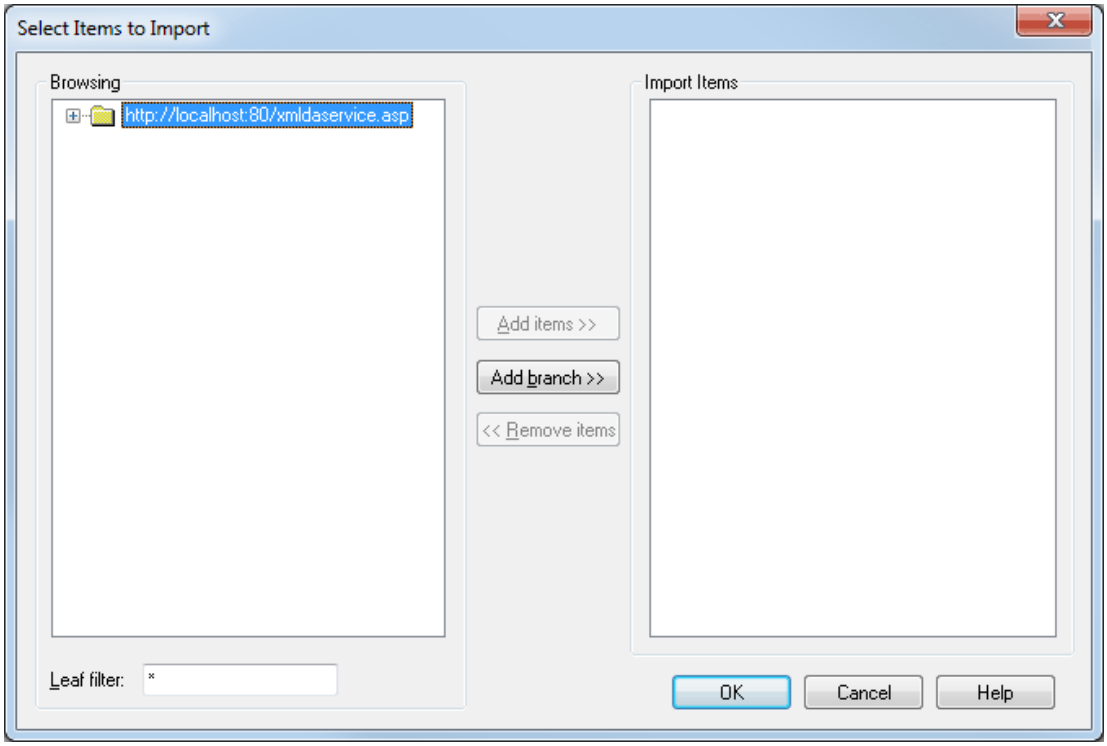
Description of the option is as follows:

- **Select import items:** When clicked, this button invokes the Select Items to Import dialog for browsing the server for tags. For more information, refer to "Selecting Items to Import" below.

Selecting Items to Import

The driver displays all items in the tree. To add items for import, simply select them from the tree and then click **Add Items >>**. The Import Items list will then display the items for import. To remove items, simply select them and then click **<< Remove Items**. Once finished, click **OK**.

Note: The **Leaf Filter** specifies a wild card string that conforms to the Visual Basic LIKE operator (which is used to filter leaf names).



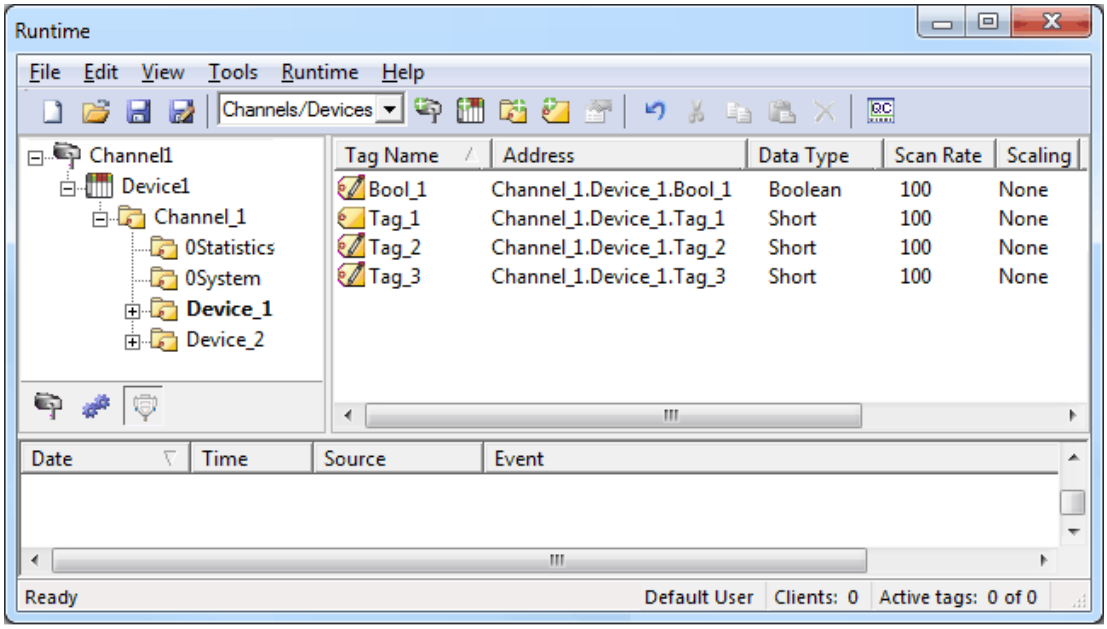
Note: The Import Items list box only displays the list of tags that the user would like to import. The driver will validate the tags after the device has completed configuration. Any tags found invalid will not be created, and a message will be posted on the Event Log.

Data Types Description

Data Type	Description
Boolean	Single bit
Byte	Unsigned 8-bit value bit 0 is the low bit bit 7 is the high bit
Char	Signed 8-bit value bit 0 is the low bit bit 6 is the high bit bit 7 is the sign bit
Word	Unsigned 16-bit value bit 0 is the low bit bit 15 is the high bit
Short	Signed 16-bit value bit 0 is the low bit bit 14 is the high bit bit 15 is the sign bit
DWord	Unsigned 32-bit value bit 0 is the low bit bit 31 is the high bit
Long	Signed 32-bit value bit 0 is the low bit bit 30 is the high bit bit 31 is the sign bit
QWord	Unsigned 64-bit value bit 0 is the low bit bit 63 is the high bit
LLong	Signed 64-bit value bit 0 is the low bit bit 62 is the high bit bit 63 is the sign bit
Float	32-bit floating point value. The driver interprets two consecutive 16-bit registers as a floating point value by making the second register the high word and the first register the low word.
Double	64-bit floating point value
String	Zero-terminated character array
Date	Date YYYY-MM-DDTHH:MM:SS.MMM

Address Descriptions

The OPC XML-DA Client Driver's address descriptions refer to fully-qualified Item IDs defined on an OPC XML-DA server. Arrays are supported for all data types.



Error Descriptions

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

Access is denied for item <address>
An invalid subscription handle was passed to the server on <channel/device name>
General SOAP fault on <channel/device name>
Invalid continuation point
Invalid filter
Invalid hold time for item <address>
Invalid item name for item <address>
Invalid path for item <address> with path <path>
Item <address> is Write Only
Server is busy on <channel/device>
Server is in an abnormal state on <channel/device name>
SOAP data queue overflow
SOAP HTTP communication error on <channel/device name>
SOAP SSL authentication error on <channel/device name>
SOAP TCP communication error on <channel/device name>
SOAP XML parse error on <channel/device name>
The data type cannot be accepted for item <address>
The item name <Channel>.<Device>.<Item Path>.<Item Name> is no longer available in the server address space
The item path <Channel>.<Device>.<Item Path> is no longer available in the server address space
The Property ID is invalid for the item <address>
The server reported an unspecified failure on <channel/device>
The server reported that the operation timed out on <channel/device name>
The server returned a "Not Supported" error on item <address>
The server returned an "Out of Memory" error on <channel/device name>
The specified write value for <address> is out of range
Unknown data type for tag <item> on device <device>. Using Default

Note: For information on errors that are not listed above, contact the OPC XML-DA server manufacturer.

Access is denied for item <address>

Error Type:
Error

Possible Cause:
The server denied Read and/or Write access to the specified item. This is usually caused by Web Service security (such as, globally-disabled write capabilities).

Solution:
This problem cannot be rectified by the client: users may need to modify the OPC XML-DA server permissions or contact the OPC XML-DA server provider.

An invalid subscription handle was passed to the server on <channel/device name>

Error Type:
Error

Possible Cause:
The OPC XML-DA server referenced by the channel and device terminated the subscription abnormally.

Solution:
If this error persists, contact the OPC XML-DA server provider.

Invalid continuation point

Error Type:
Error

Possible Cause:
The server timed out.

Solution:
Retry browsing.

Invalid filter

Error Type:
Error

Possible Cause:
The filter string is invalid.

Solution:
Enter a valid filter string.

Note:
For information on acceptable filter strings, refer to the OPC XML-DA server documentation.

Invalid hold time for item <address>

Error Type:
Error

Possible Cause:
The Hold Time is too long.

Solution:
Change the Hold Time to a smaller value.

Note:
The Hold Time's valid range is determined by the OPC XML-DA server.

See Also:

Exception Mode Options

Invalid item name for item <address>

Error Type:
Error

Possible Cause:
The item name does not conform to the server's syntax.

Solution:
Change the item name to match one that is specified in the OPC XML-DA server.

Invalid path for item <address> with path <path>

Error Type:
Error

Possible Cause:
The Item Path does not conform to the server's syntax.

Solution:
If this error persists, contact the OPC XML-DA server provider.

Item <address> is Write Only

Error Type:
Warning

Possible Cause:
An attempt was made to read a value that is Write Only. This value may not be read from or returned as part of a write response.

Solution:
Do not attempt to read the item.

General SOAP fault on <channel/device name>

Error Type:
Error

Possible Cause:
The OPC XML-DA server referenced by the channel and device is not responding.

Solution:
Check the SOAP endpoint URL, proxy settings, security settings, and network connection.

Server is busy on <channel/device>

Error Type:
Error

Possible Cause:
The OPC XML-DA server referenced by the channel and device is processing another polled refresh for one or more of the subscriptions.

Solution:
If the action is a Write, resend the request. Otherwise, the error will be handled by the driver and the request will be resubmitted automatically.

Server is in an abnormal state on <channel/device name>

Error Type:
Error

Possible Cause:
The OPC XML-DA server referenced by the channel and device is in an abnormal state. The requested operation could not be completed.

Solution:
If this error persists, contact the OPC XML-DA server provider.

SOAP data queue overflow

Error Type:
Error

Possible Cause:
The OPC XML-DA server referenced by the channel and device is not responding.

Solution:
Check the SOAP endpoint URL, proxy settings, security settings, and network connection.

SOAP HTTP communication error on <channel/device name>

Error Type:
Error

Possible Cause:
An HTTP error occurred while communicating with the OPC XML-DA server referenced by the channel and device.

Solution:
If this error persists, contact the OPC XML-DA server provider.

SOAP SSL authentication error on <channel/device name>

Warning

Possible Cause:
An error occurred authenticating the OPC XML-DA server referenced by the channel.

Solution:
Check the SOAP endpoint URL, proxy settings, security settings, and network connection.

SOAP TCP communication error on <channel/device name>

Error Type:
Error

Possible Cause:
The OPC XML-DA server referenced by the channel and device is not responding.

Solution:
Check the SOAP endpoint URL, proxy settings, security settings, and network connection.

SOAP XML parse error on <channel/device name>

Error Type:
Warning

Possible Cause:
The XML response from the OPC XML-DA server referenced by the channel and device could not be parsed.

Solution:
If this error persists, contact the OPC XML-DA server provider.

The data type cannot be accepted for item <address>

Error Type:
Error

Possible Cause:
The tag's data type does not match the data type of the item in the OPC XML-DA server.

Solution:
Ensure that the tag's data type matches the data type of the item in the OPC XML-DA server.

The item name <Channel>.<Device>.<Item Path>.<Item Name> is no longer available in the server address space

Error Type:
Error

Possible Cause:
The item has been removed by the OPC XML-DA server.

Solution:
Ensure that the requested item is available in the OPC XML-DA server.

The item path <Channel>.<Device>.<Item Path> is no longer available in the server address space

Error Type:
Error

Possible Cause:
The item path is not recognized by the OPC XML-DA server.

Solution:
If this error persists, contact the OPC XML-DA server provider.

The Property ID is invalid for the item <address>

Error Type:
Error

Possible Cause:
The Property ID is not valid for the item.

Solution:
If this error persists, contact the OPC XML-DA server provider.

The server reported an unspecified failure on <channel/device>

Error Type:
Error

Possible Cause:
The execution of a request failed due to unknown reasons, although the server is in a state that should support that request.

Solution:
If this error persists, contact the OPC XML-DA server provider.

The server reported that the operation timed out on <channel/device name>

Error Type:
Error

Possible Cause:
The operation took too long to complete on the OPC XML-DA server referenced by the channel and device.

Solution:

The length of time allowed for the request to complete is determined by the server manufacturer. If this error persists, contact the OPC XML-DA server provider.

The server returned a 'Not Supported' error on item <address>

Error Type:
Error

Possible Cause:
An attempt was made to write to the quality and/or timestamp (which is not supported by the server).

Solution:
N/A.

The server returned an "Out of memory" error on <channel/device name>

Error Type:
Error

Possible Cause:
The server does not have enough resources to fulfill the request.

Solution:
If the error persists, contact the OPC XML-DA server provider.

The specified write value for <address> is out of range

Error Type:
Error

Possible Cause:
An attempt was made to write a value that is not supported by the data type.

Solution:
Write a value within the supported range.

See Also:
Data Types Description

Unknown data type for tag <item> on device <device>. Using Default

Error Type:
Warning

Possible Cause:
1. The target server did not return a data type.
2. The data type that was entered is not supported by the driver.

Solution:
1. The server will determine the data type once a client is connected.
2. Enter a data type that is supported by the driver.

Time-Sensitive Data Acquisition

This driver operates very differently than other COM/DCOM-based drivers. XML is transmitted over the network in plain text with considerable serialization and deserialization overhead. Furthermore, all API calls are synchronous due to limitations in the gSOAP serialization library and the HTTP protocol. This means that subscriptions on the same channel will compete for time.

To resolve this, users can put time-sensitive subscriptions onto their own channel where they will get a dedicated thread. This minimizes the interactions between subscriptions.

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