

XML-DA client-side Gateway Software

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The OPC XML-DA specification is included in the XDAGW-CS distribution.

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Overview

The XDAGW-CS XML-DA client-side Gateway enables OPC-DA clients to access OPC XML-DA servers.

The XML-DA server may be a native XML-DA server or a gateway to an OPC-DA server. The main application areas for the XDAGW-CS gateway are:

- OPC-DA clients can access remote OPC-DA servers via the Internet and through firewalls.
- Existent OPC-DA clients can access XML-DA web services and need not be replaced by a web services client application.

The XDAGW-CS gateway is an OPC-DA V2.05 and V3.0 compliant server with a built-in XML-DA client. The OPC-DA clients can access the XML-DA server as if it were an OPC-DA server. The gateway converts the client calls to appropriate XML-A server calls or handles the calls internally. Read and write access is supported.

High performance and quick cache read access is achieved by gateway internal data buffering. Items referenced by clients are periodically polled from the XML-DA server.

Test clients are provided to help checking the installation and configuration.

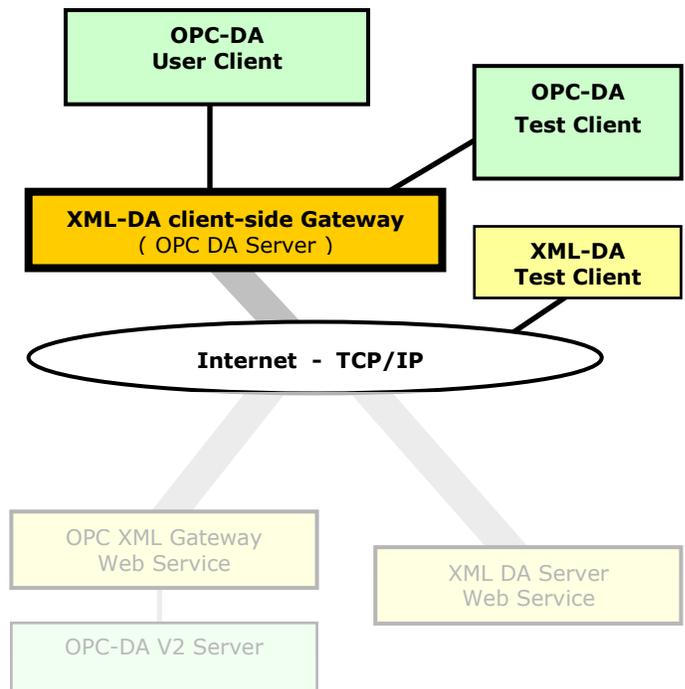
Gateway Versions

The XDAGW-CS gateway is provided in a version for:

- .NET2
- .NET3.5 (WCF communication)
- .NET4.x
- .NET4.x WCF (WCF Communication)

The .NET2 /.NET4.x versions require less configuration and we recommended using these version unless also the XML DA server supports WCF.

WCF communication can be configured for protocols other than HTTP for higher performance and security. However, WCF has many configuration settings (such as buffer sizes) that need to be set to fit the application requirements. The default settings are often insufficient.



Requirements

The gateway and the test clients are .NET applications that run on Windows-7/8/10, Windows Vista, Windows-XP, or Windows 2003/2008/2012 Server

with installed .NET Framework 2.0 or 4.x.

The WCF versions of the gateway require either .NET 3.5 or 4.x

Installation

Install the .NET Framework

On newer Windows versions the .NET Framework is pre-installed.

If the WCF gateway version is to be used then WCF must be activated in the Windows settings.

Installing the Gateway Software

The product distribution is a setup executable that installs the software according to the selections in the setup dialogs.

The main selections are:

- Gateway version to be installed
- Tools to be installed
- Target directory

Gateway Configuration

The gateway needs to be configured with the provided configuration utility. The main settings are:

- ProgID/CLSID of the gateway server. These must be unique within the machine.
- URL of the XML DA server

Gateway Server Registration

The gateway is an OPC DA server that must be registered with DCOM.

The configuration utility has a *Register* button that executes the server registration with the configured settings.

Multiple Gateway Instances

The XDAGW-CS gateway handles a single OPC XML DA server.

To handle multiple XML DA servers multiple gateway instances must be installed. Each instance requires a license, even if the instances are on the same machine.

Steps to set up an additional gateway instance on the machine:

- Copy the directory of the first instance
- Use the configuration utility to change:
 - o The XML DA server URL
 - o The gateway server ProgID (must be unique)
 - o The gateway server CLSID (must be unique)
- Save the configuration
- Click the Register button to register this server instance

Security

In remote access application security is of critical importance and has to be properly implemented on different levels:

OPC-DA Server Access	Windows protects COM components with a complex permission checking system. Depending on your security requirements you need to make the appropriate settings. See COM Security Settings for a sample configuration. On the client side, COM security defines what clients can access the Gateway OPC server.
XML-DA Server Access	The XML-DA server is typically installed on another computer and the client computer needs to have access to the server computer and the XML-DA web service. If the server computer is on a local network then both computers need to be in the same domain or have the same user/password in a workgroup configuration. For access through the Internet the XML-DA web service security settings must allow such access. If the XML-DA server is a gateway to an OPC-DA server then also the OPC-DA server must be configured in DCOM to grant launch/access rights to network users. In case of access problems check the XML-DA server access with the supplied XML-DA test client. Access denied may be caused by the XML-DA server or the OPC-DA server in case of gateway web service. Access the XML-DA server with the Internet browser to test the web service access only. The browser should list the web service methods.
Secure Server Access	WCF Gateway Version WCF (Windows Communication Foundation) supports variety of communication protocols. The basicHTTP binding is ASP.NET2 web service compatible and must be used unless both, client and server, are WCF applications. Several kinds of bindings for secure communication can be selected, including X.509 certificates. Use the WCF configuration tool to configure the communication settings.

COM Security Settings

Security settings are a very complex matter and here we can give only some hints and instructions for default Windows installations.

For Windows XP SP2 machines please follow the instructions in the *Using OPC via DCOM with XP SP2.pdf* document.

COM Launch/Access Permission

The XDAGW-CS gateway runs as and OPC DA COM server. The user running the client application needs to be in the launch and access list of users.

Use DCOMCNFG to check the settings and add the user if necessary.

Impersonation

Default COM configuration is for COM components to run in the 'Launching User'. This may cause multiple instances be started if clients run in different users. To prevent that DCOM must be configured to run the OPC Server in a specific user.

Create a user and assign it to the Power Users group

1. From **Control Panel - Performance and Maintenance - Administrative Tools** run **Computer Management**
2. Select **Local Users and Groups - User - New User** and enter the user name (e.g. *OPC Servers*) and password
3. Right click the newly **created user**, select **Properties** and tab **Member Of**
4. Click **Add** and enter *Power Users*

Define the user for the OPC server XDAGW.CS

1. Run DCOMCNFG and select **Component Services - Computers - DCOM Configuration**
2. Right click the OPC server *XML-DA client-side Gateway* and select **Properties - Identity**
3. Select **This User** and enter the name of the user (e.g. *OPC Servers*) and the password

Configuration

XDAGW-CS client-side Gateway Configuration

The configuration definitions for the client side gateway are in the file **XDAGWCS.exe.config**. This file has to be in the same directory as the **XDAGWCS.exe gateway executable**.

Configuration Utility

The **ConfigXDAGWCS.exe** configuration utility can be used instead of editing the configuration XML file manually.

The screenshot shows the 'XDAGW-CS Gateway Configuration' utility window. The configuration file is 'C:\Program Files\Advosol\XDAGW-CS client-side Gateway Evaluation\Gateway Server .NET2\XDAGWCS.exe.config'. The XML DA Service URL is 'http://advosol.us/XMLDADemo/ts_sim/OpcDaGateway.asmx'. The XML DA Web Service Access Credentials are set to 'Anonymous' mode. The Gateway OPC DA Server is 'XDAGWCS' with version '.6' and description 'XML-DA client-side Gateway' with version 'V6.0'. The CLSID is '{2092917d-60c3-4fb6-9727-5ad4d203e925}'. The Error Log File is 'ErrorLog.txt'. The XML DA Server settings include a Refresh Interval of 5000 ms, Wait Time of 2000 ms, and Ping Interval of 50000 ms. The Locale ID is 'en-US'. The Branch Delimiter and ItemPath Bracket are set to '\'. The utility has buttons for 'Save', 'Save As..', 'Save and Exit', and 'Cancel'.

Application Configuration XML File

The ServiceUrl needs to be set to the URL of the XML-DA web service to be accessed. Other configuration settings may have to be changed to meet the application requirements.

Default configuration definition:

```
<appSettings>
  <add key="ServiceUri" value="http://localhost/OpcXmlGateway/OpcDaGateway.asmx"/>

  <add key="CredentialsMode" value="Anonymous"/> or Integrated or Basic
  <add key="CredentialDomain" value=""/>
  <add key="CredentialUser" value=""/>
  <add key="CredentialPassword" value=""/>

  <add key="ProxyAddress" value=" "/>
  <add key="ProxyBypassOnLocal" value="true"/>
```

```

<add key="ProxyCredentialDomain" value="" />
<add key="ProxyCredentialUser" value="" />
<add key="ProxyCredentialPassword" value="" />

<add key="LocaleId" value="en-US" />
<add key="RefreshInterval" value="5000" />
<add key="WaitBeforeResubscribe" value="5000" />
<add key="Deadband" value="0.0" />

<add key="WaitTime" value="2000" />
<add key="PingRate" value="60000" />
<add key="BranchDelimiterChar" value="" />
<add key="ItemPathBracket" value="" />

<add key="ErrLogFile" value="ErrLog.txt" />
<add key="LogCommunicationActivity" value="yes" />

<add key="StaticItemsFile" value="" />

<add key="StaticItemsOnly" value="no" />
<!-- server registration definitions -->
<add key="CLSIDServer" value="{045CDAE7-9A76-404a-B29F-10993BE33EFC}" />
<add key="PrgidServer" value="XDAGW.CS" />
<add key="PrgidCurrServer" value="XDAGW.CS.4" />
<add key="NameServer" value="XML-DA client-side Gateway" />
<add key="NameCurrServer" value="XML-DA client-side Gateway V4" />
</appSettings>

```

XML DA Server Poll interval in ms.

Wait time in ms after errors before a re-subscribe

Percent deadband for all subscriptions.

The server may ignore the request for some or all items.

Max. wait time if there are no changed signals.

PingRate for the XML-DA item refresh subscription (in ms)

autodetected by default

String that encapsulates the XML DA ItemPath in the OCP DA Item ID
e.g. \\path\branch.item

path name of the error log file. Delete the entry to disable error logging.

Log all server access except the periodic poll handling.

Optional. Name of text file with item identifiers.

The defined items are added to the server cache at startup.

If yes, then only the items defined in the *StaticItemsFile* are accessible.

If the XML-DA Server is on another computer, then *'localhost'* has to be replaced with the domain name of this computer. You may for example access the OPC Server on Advosol's Web server through the server-side gateway at http://advosol.com/XMLDADemo/TS_Sim/OpcXmlGateway.aspx

The gateway server will be registered with the names defined in the configuration file.
The registration definitions may have to be changed for two reasons:

- If the gateway is used as a bridge to a remote OPC-DA server the gateway can be given the name of the remote OPC-DA server so that the client application need not be modified at all.
- If **multiple instances** of the gateway are installed on one computer then each instance needs to have unique registration names. Also the CLSID needs to be different for each instance.

Item Handling

The XDAGW-CS gateway adds items to the OPC DA server cache when a client first requests access to the item. Cached items are added to a XML DA subscription so that the gateway cache always has up-to-date values. The dynamic item handling is transparent to the OPC DA client. Browse requests are forwarded to the XML DA server and the browse result contains all items accessible in the XML DA server, independent of the caching state. Static items:

The **StaticItemsFile** configuration option can define the name of a text file with item identifiers. The file has one identifier per line. The identifiers must be exactly as returned in an OPC DA browse result. The items defined in the definition file are added to the server cache at startup and are handled as if they had been requested by a client.

```
<add key="StaticItemsFile" value="StaticItems.txt" />
```

Sample Item Definition File Content:

```
SimulatedData.Signal  
SimulatedData.Step  
SimulatedData.Ramp  
SimulatedData.Sine
```

The **StaticItemsOnly** configuration option changes the browse behavior when defined as *yes*. In this case the browse result contains only the items in the gateway server cache and the clients can access only these items.

```
<add key="StaticItemsOnly" value="no" />
```

Testing the Installation

The XDAGW-CS gateway is simple to install and configure. However for it to work, a number of communication interfaces have to be configured correctly.

It is therefore recommended to test the installation step for step as follows:

1. Test the XML-DA server access

In the configuration utility click "Test XML DA Server Access" with the proper URL selected.

If the access is denied with insufficient error information then access the XML DA web service with the Internet Explorer.

Start the Web browser and enter the URL of the XML-DA server, e.g. <http://xxx/OpcxmlGateway/OpcDaGateway.asmx> (xxx is the computer network name, Internet domain name or the IP address of the remote computer)

→ A page with the description of the methods supported by the XML-DA web service is displayed if the URL address is correct and the service is accessible

Install the XDAGW-CS gateway and start the XML-DA Test Client

Select Configuration – Service URL and check/modify the URL

Select the Get Status tab and click the Get Status button

→ The XML-DA web service is activated and should return it's status. Either the status or an error message is displayed. The first time this may take while because a number of system components may need to be loaded.

Errors are most likely due to wrong configuration or security permission problems. If the XML-DA server is an OPC-DA gateway then the assigned OPC-DA server is accessed from the user ASPNET. DCOM should be configured to launch the OPC servers under a specific user and must have the user ASPNET defined in the launch and access user list.

2. Access the XML-DA server through the XDAGW-CS Gateway

Modify the URL in the configuration file `Program Files\Advosol\XDAGW\Web Client\XDAGWCS.exe.config` to the same address as used before in the Web browser

Start the OPC DA Test Client and connect to the OPC server with the ProgId `XDAGWCS.FW11.4` or `XDAGWCS.FW2.4`

→ The XDAGW-CS gateway is started and connects as an XML-DA client to the XML-DA web service at the specified URL. The OPC-DA test client should show the same items as the XML-DA test client.

The XDAGW-CS gateway logs events into the file `Program Files\Advosol\XDAGW\Web Client\ErrLog.txt`. Check this file for event and error information.

Start your client and configure it to use the OPC server with the ProgId `XDAGWCS.FW11.4` or `XDAGWCS.FW2.4`

Error Messages

The XDAGW-CS gateway behaves on one side according the OPC XML-DA specification and on the other side according the OPC-DA standard. It has therefore limited possibilities to give detailed error indications. Problems in the communication are therefore logged into a text file. Consult this file to locate problems. The path name of the error log file can be configured (see configuration) and is by default `ErrorLog.txt` in the same directory as the exe of the gateway.

Use the ***XML-DA Test Client*** to get errors in the XML communication directly displayed.

Installing Multiple Gateway Instances

The XDAGW-CS gateway can handle only one OPC-DA server. To handle multiple OPC-DA servers on the same computer it is necessary to install multiple instances of the gateway.

A RUN-TIME LICENSE IS REQUIRED FOR EACH GATEWAY INSTANCE!

Execute the following steps to install an additional gateway instance:

1. Create a subdirectory in the installation directory `Program Files\Advosol\XDAGW\Web Client` (e.g. Instance2)
2. Copy the files from this directory into the created subdirectory
3. Modify the copied `XDAGWCS.exe.config` file
 - Change the server registry information including the CLSID. Use the configuration utility to create a unique CLSID.
 - Change the XML-DA server URL and any necessary configuration parameter.
4. Execute the `RegisterServer.BAT` file in the new directory to register the gateway instance with the new name

Install Gateway as Service

The XDAGW-CS gateway can run as a Windows service. As such he can be started at system start-up and does not terminate when all clients disconnect.

To have the gateway run as a service it has to be registered with `/Service` instead of with `/RegServer`.

Modify the `RegisterServer.bat` file in the XDAGW-CS installation directory and execute it. The next time a client connects the gateway is installed as a Windows service.

The XDAGW-CS service is configured for manual start, meaning that the service is started when the first client connects. To have the service automatically started as system startup the service configuration must be changed. Start the *Windows Service Manager*, select the *XML-DA client-side Gateway* service and set the *startup type* property to *Automatic*.

Test Clients

Three test client applications are provided. These clients are part of the Advosol XMLDA.NET product and are provided as an evaluation version. The evaluation version shows an evaluation dialog at startup but is otherwise fully functional.

TestClientFW2.exe	XML DA / OPC DA test client application built for .NET2 AnyCPU (runs in 32bit or 64bit mode)
XMLDATestClientWCF	XML DA test client application built for .NET3 (WCF) AnyCPU. XML DA server access through WCF.
OpcDaTestClientNet2X86	OPC DA test client application built for .NET2 X86 (runs in 32bit)
OpcDaTestClientNet4X86	OPC DA test client application built for .NET4 X86 (runs in 32bit)

The XML DA test clients can be used as:

- OPC DA client to access the XDAGW-CS gateway OPC DA server
Specify the OPC ProgID as the server URL (e.g. XDAGWCS.6)
- XML DA client to access XML DA servers directly, instead of through the XDAGW-CS gateway.
Specify the XML DA server URL (e.g. http://advosol.com/XMLDADemo/XML_Sim/opcxmldaserver.asmx)

The test client executables are in the setup subdirectory *Tools*

There is a program menu and desktop link to one test client, depending on the available .NET version.

Change the link if another test client is preferred.

The test client main form shows the selected configuration file.

Select or enter the URL/ProgID of the server. A name starting with http is considered to be a web service URL of an XML DA server. Any other string is used as an OPC DA server ProgID.

Usually the server is browsed as the first step. Right click items or branches to copy the item names into the lists for read/write/subscription operations.

WCF version: For the user the only difference is that the test client application configuration file needs to contain the proper WCF endpoint and bindings definitions and in the test client interface one of the configured endpoints needs to be defined. The endpoint configuration settings must exactly match the server configuration settings.

Get Server Status

By clicking this button the active OPC Server is accessed and some status information is displayed.

Browse Operations

The root is browsed and displayed. Branches are browsed when they are first selected. Don't check *All Initially* if the server has a large address space. This could take a long time.

Read Operations

Select the item(s) in the browse control and right-click. In the pop-up menu select *Copy selected items to Read List*. Select the *Read* tab and then click the *Read* button.

Write Operations

Select the item(s) in the browse control and right-click. In the pop-up menu select *Copy selected items to Write List*. Select the *Write* tab and right click the item name. In the modify item control change the value and optionally the quality/timestamp.

Click the *Write* button when all items show the value to write.

Subscriptions

For subscribed items the XML-DA server buffers value changes and returns all changes in the next client poll.

To create a subscription select the item(s) in the browse control and right-click. In the pop-up menu select *Copy selected items to Subscription List*

Select the *Subscriptions* tab and click the *Add* button. The handle of the added subscription is displayed.

Refresh

To poll new values of the subscribed items select the *Refresh* tab and click the *Poll* button.

Get Properties

The client can read all or some of the properties defined for the requested items.

Select the item(s) in the browse control and right-click. In the pop-up menu select *Copy selected items to Properties List*

Select the *Properties* tab and select the properties to be read. Click the *Get Properties* button to read the item properties from the server.

Secure Web Service Access

WCF (.NET3.5 or .NET4.x)

The Windows Communication Foundation was introduced with .NET3 and combines many of the earlier communication solutions into one package.

WCF makes it easy to configure the communication by selecting bindings such as:

- basicHTTP for compatibility with ASP.NET2 web services
- different secure communications including X.509 certificates
- TCP based communication for high performance

All WCF settings are in the client and server application configuration file and can be modified with the WCF configuration utility. No code changes are required.