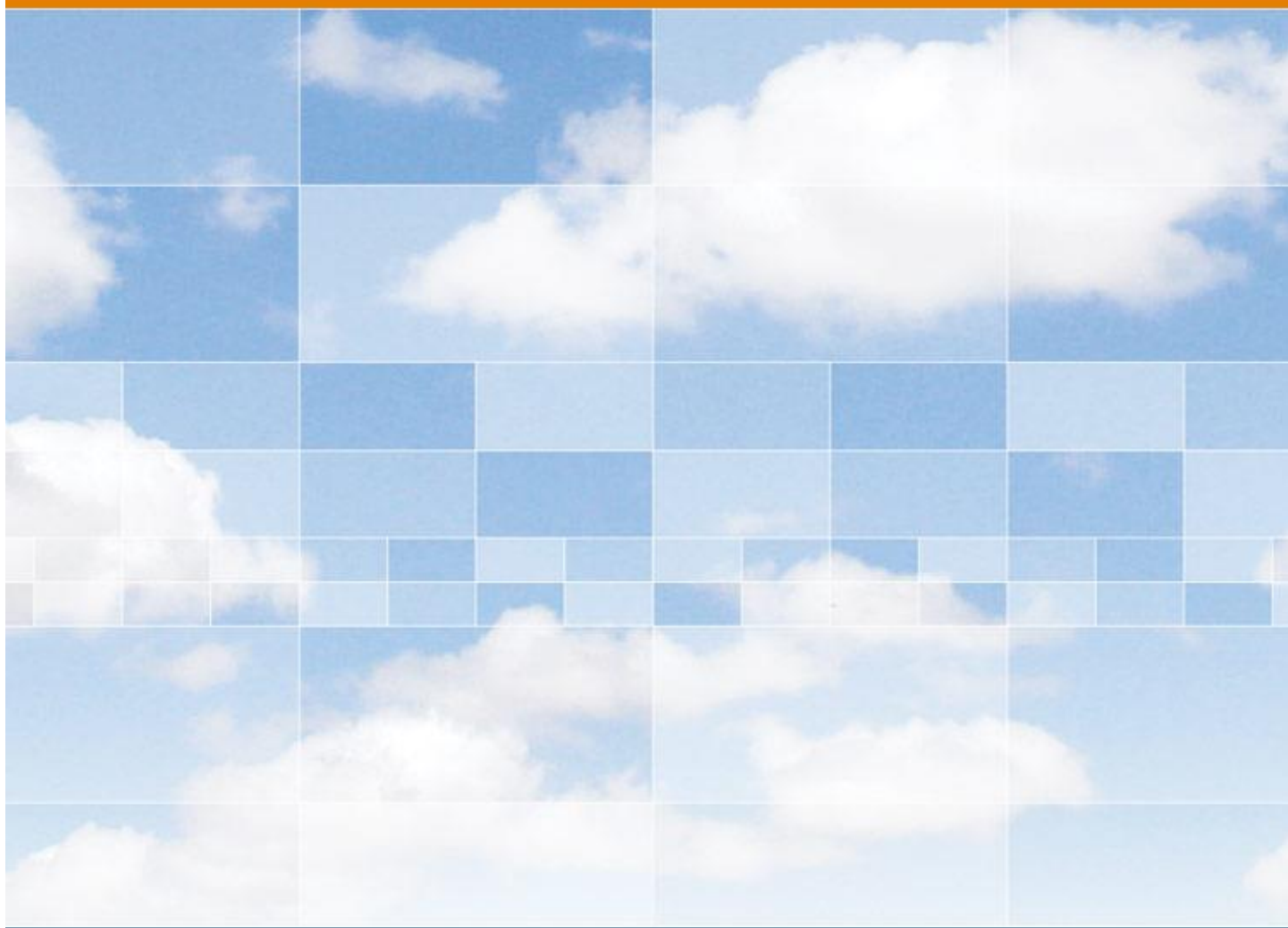




MatrikonOPC Data Manager

User's Manual

MatrikonOPC Data Manager

User's Manual

This manual is a product of Matrikon Inc.

Matrikon Inc.
Suite 1800, 10405 Jasper Avenue
Edmonton, AB T5J 3N4
Canada

Phone: +1.780.448.1010
Fax: +1.780.448.9191
www.matrikonopc.com

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Introduction

Although OPC is a standard, it only supports communications between OPC servers and OPC clients. If data needs to be transferred from one OPC server to another or from one OPC client to another, standard OPC is insufficient. MatrikonOPC™ Data Manager is an OPC client designed to provide a solution for these OPC connectivity problems. MatrikonOPC Data Manager allows you to link OPC-compliant servers so that data changes on one server can be transmitted (i.e., mirrored) to another server.

MatrikonOPC Data Manager has the following features:

- OPC 1.0a, and OPC 2.0
- Supports both COM and DCOM.
- Can run as a Windows server, or as a normal application.
- Enables easy and efficient re-transmission of data among OPC servers.
- Allows this data to be viewed as it is updated.
- Provides DDE and OPC server functionality.
- Performs extensive error tracking and management.
- Supports redundancy operation (version 4.0 and onward).

Generally, any plant that requires data to be moved from one OPC server to another, uses Data Manager.

Figure 1 shows just three of the numerous possible MatrikonOPC Data Manager configurations:

- Client to client communication
- Server to server communication
- Communication of a client with a number of servers via a single client interface

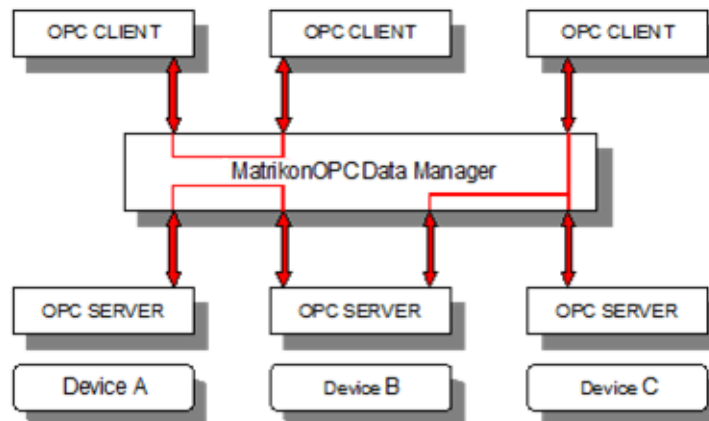


Figure 1 - MatrikonOPC Data Manager Connectivity

MatrikonOPC Data Manager consists of three separate applications:

1. The main MatrikonOPC Data Manager application (which is normally expected to run as a Windows service).

2. The MatrikonOPC Data Manager Configuration Tool.
3. MatrikonOPC Server for Data Manager.

The system architecture is shown in Figure 2.

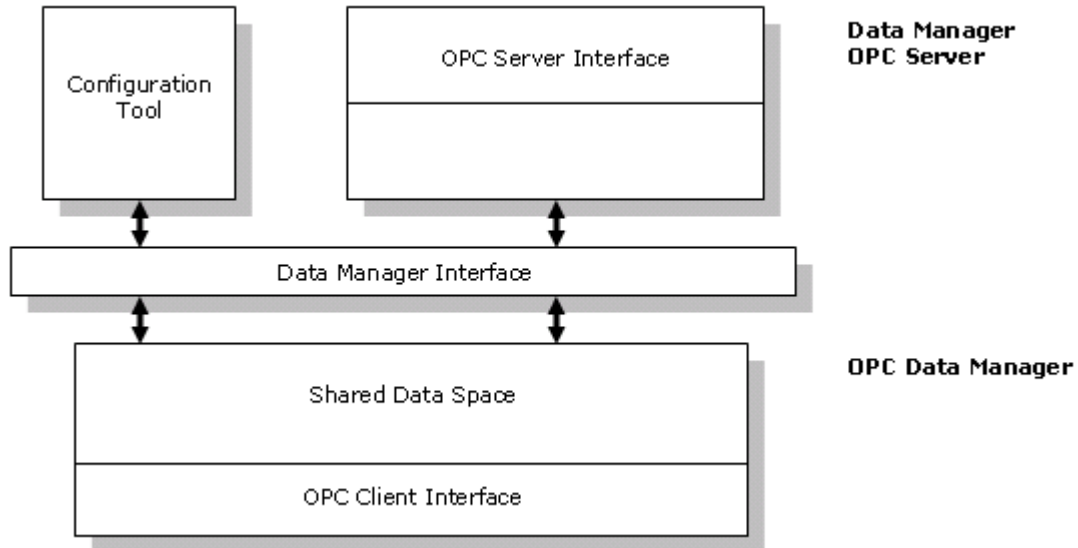


Figure 2 - MatrikonOPC Data Manager Operation

MatrikonOPC Data Manager communicates with the OPC Data Manager server and with the Configuration Tool using COM.

Who Should Use This Manual

This manual is intended for use by all users of the MatrikonOPC Data Manager.

This manual explains how to install and configure the software, and how to perform common tasks. In addition, technical information about OPC data items is included, along with sections on diagnostics and troubleshooting.

Overview of Manual

This document uses icons to highlight valuable information. Remember these icons and what they mean, as they will assist you throughout the manual.

	This symbol denotes important information that must be acknowledged. Failure to do so may result in the software not functioning properly.
BOLD	Font displayed in this color and style indicates a hyperlink to the applicable/associated information within this document, or if applicable, any external sources.

The *User's Manual* has been designed as such so that you can click on references in the document to jump to that referenced point without having to scroll through several pages (in some cases). For example, if you were to see the sentence "Refer to Figure 1 for more information", pressing the

CTRL key and clicking your mouse on the text “*Figure 1*” will automatically take you to the location of Figure 1 within the document.

This manual consists of several sections and is structured as follows:

- **Introduction** – this introductory chapter.
- **Getting Started** – provides instructions for installing the server, and how to contact MatrikonOPC’s Support team.
- **Using MatrikonOPC Data Manager** – outlines how to use the functions of MatrikonOPC Data Manager.
- **Redundancy** – provides instructions for setting up a redundant system.
- **Alarms and Events** – describes how the A&E client works and how to set up the A&E capabilities in MatrikonOPC Data Manager.
- **MatrikonOPC Data Manager Configuration** – shows how to start and configure MatrikonOPC Data Manager and describes each component in detail.
- **MatrikonOPC Server for Data Manager Configuration** – shows how to start and configure the server, and describes each component in detail, including windows/screens, panels, tabs, and menu commands.
- **OPC Data Items** – describes the server’s items.
- **Diagnostics** – explains how to use logging, statistical items, data qualities, timestamps, and result codes to get the most efficiency from the user’s system.
- **Troubleshooting** – provides solutions for common problems that may be encountered, and answers to frequently asked questions.
- **Un-installation** – provides instructions on un-installing software.
- **OPC Compliance** – details supported interfaces with regard to installation, common interfaces, and data access.
- **Appendices:**
 - **A** - DCOM
 - **B** – Aliases
 - **C** – Standard Data Types
 - **D** – Microsoft Excel as a DDE Client
 - **E** - Security

References

This document references information found within the following documents/sites:

- www.opcfoundation.org
- www.matrikonopc.com
- www.opcsupport.com
- *OPC Overview 1.0*
- *OPC Common Definitions and Interfaces 1.0*
- *OPC Security Custom Interface 1.0*

- *OPC Data Access Custom Interface (Version 2.05) Specification*
- *OPC Data Access Custom Interface (Version 1.0a) Specification*
- *OPC Historical Data Access Custom Interface (Version 1.2) Specification*

Document Terminology

The following terms are used interchangeably throughout this document:

- *screen and window*
- *MatrikonOPC Data Manager and ODM*

Table 1 provides a list of definitions for terms used throughout this document.

Term/Abbreviation	Description
A&E	One of the OPC specifications. Used to exchange and acknowledge process alarms and events.
COM	Component Object Model. A method for organizing software, specifying how to build components that can be dynamically interchanged.
CSV	Comma-Separated Values. A MatrikonOPC Data Manager configuration may be stored in a CSV file.
DA	OPC Data Access. Provides access to real-time process data.
DCOM	Distributed Component Object Model. An extension of COM that allows communication between COM components over a network.
DDE	Dynamic Data Exchange. Allows the transfer of data between two running applications.
HDA	OPC Historical Data Access. Used to retrieve historical process data.
HMI	Human Machine Interface. Device that allows interaction between the user and machine. Typically used in process control applications.
Matrikon	Matrikon Inc.
MatrikonOPC	Matrikon's brand name for its OPC servers and clients.
ODM	MatrikonOPC Data Manager.
OPC	A communication standard. Refer to www.opcfoundation.org for more information.
PLC	Programmable Logic Controller.

Table 1 - Terms and Definitions

Getting Started

This chapter contains important information about installing MatrikonOPC Data Manager and how to contact Matrikon's Support team.

The **System Requirements** section shows how to avoid future problems by ensuring that the system meets the minimum software and hardware requirements. Detailed step-by-step instructions **Installation** section walks the user through the installation process and lists the files that are installed during this process.

Once the server has been installed, refer to the *Licensing Procedures* document that was installed along with the product and this User's Manual, to learn how to obtain the appropriate license. If any problems are encountered during installation or licensing, refer to the **Contacting Support** section for information about how to contact the MatrikonOPC Support team for assistance.

System Requirements

The software has minimum **Software** and **Hardware** system requirements. These requirements must be met for the software to function properly.



Note: To install and configure a MatrikonOPC product, you must be set up as an administrative user account rather than a restricted user account.

Software Requirements

The server requires the following software:

- Microsoft Windows 7 (32-bit and 64-bit)
- Microsoft Windows 10
- Microsoft Windows Server 2008 (32-bit SP2, 64-bit SP2, and R2), or
- Microsoft Windows Server 2012 R2 or
- Microsoft Windows Server 2016



Note: It is recommended that the most current service packs are installed.

- Microsoft .NET Framework
 - On Microsoft Windows 7 and 2008, the MatrikonOPC installation package will automatically install the required Dot Net framework.
 - On Microsoft Windows 10, Windows 2012, and higher, Microsoft Dot Net 3.5 will need to be installed manually by the user before the OPC server can be installed.

Hardware Requirements

The server requires the following hardware:

- Intel® Pentium® 4 Processor
- 512 MB RAM
- 40 GB 7200 RPM hard drive

Installation

Once the system requirements have been met, you are ready to install the software.



Note: As part of the installation process, the **MatrikonOPC Analyzer** tool is installed and used to detect the system settings that affect the use of this software. No information is communicated back to MatrikonOPC. Information is stored on this system **only** for future use by MatrikonOPC Support to assist with troubleshooting, if required.

To install the software:

1. Insert the MatrikonOPC Data Manager CD into the CD drive.
2. If the MatrikonOPC **Welcome** screen does not automatically appear, double-click the *MatrikonOPCDataManager.EXE* file. The **MatrikonOPC Data Manager – InstallAware Wizard** verifies its contents (Figure 3) and the **Welcome to MatrikonOPC Data Manager Setup** screen (Figure 4) appears.

Note: The **Version** number located in the lower left corner indicates the version number of the software that is being installed. The text "X.X.X.X" will be replaced with the specific product version.

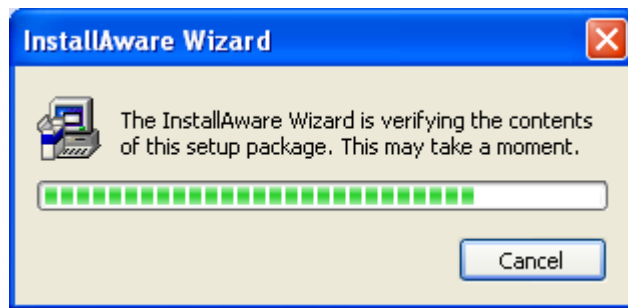


Figure 3 - InstallAware Wizard Verification Window

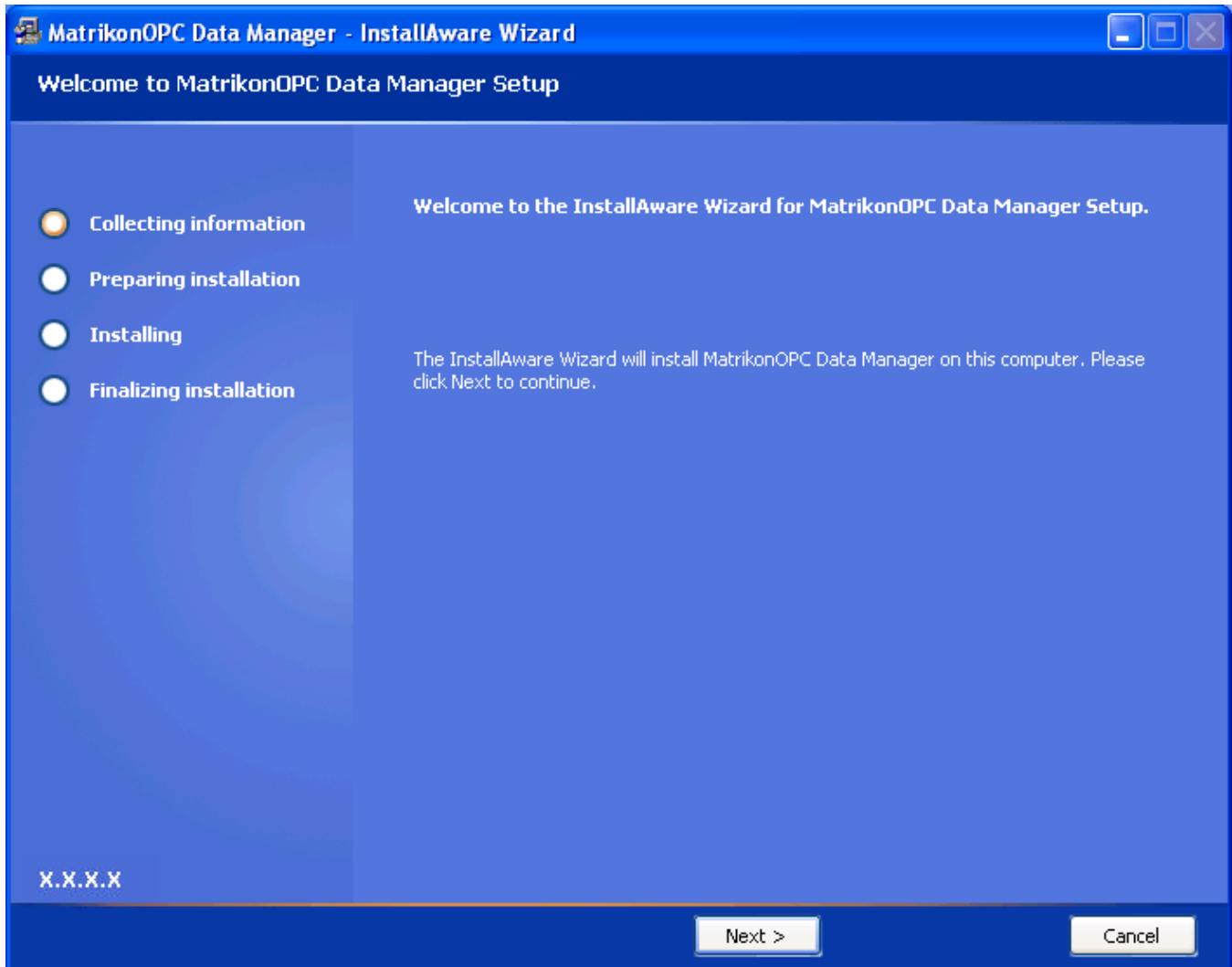


Figure 4 - Welcome to MatrikonOPC Data Manager Setup Screen

3. Click on the **Next** button. The **License Agreement** screen (Figure 5) appears.

Notes:

- From the **License Agreement** screen, you have the option of clicking on the **Back** button to return to the **Welcome** screen, or selecting the **I reject the license agreement** option. Selecting the **I reject the license agreement** option button disables the **Next** button so your options are to return to the previous screen, cancel the install by clicking on the **Cancel** button, or select the **I accept the license agreement** option button enabling you to proceed through the install.
- From this point onward, the **Back** button is available allowing you to return to the previous screen or screens.

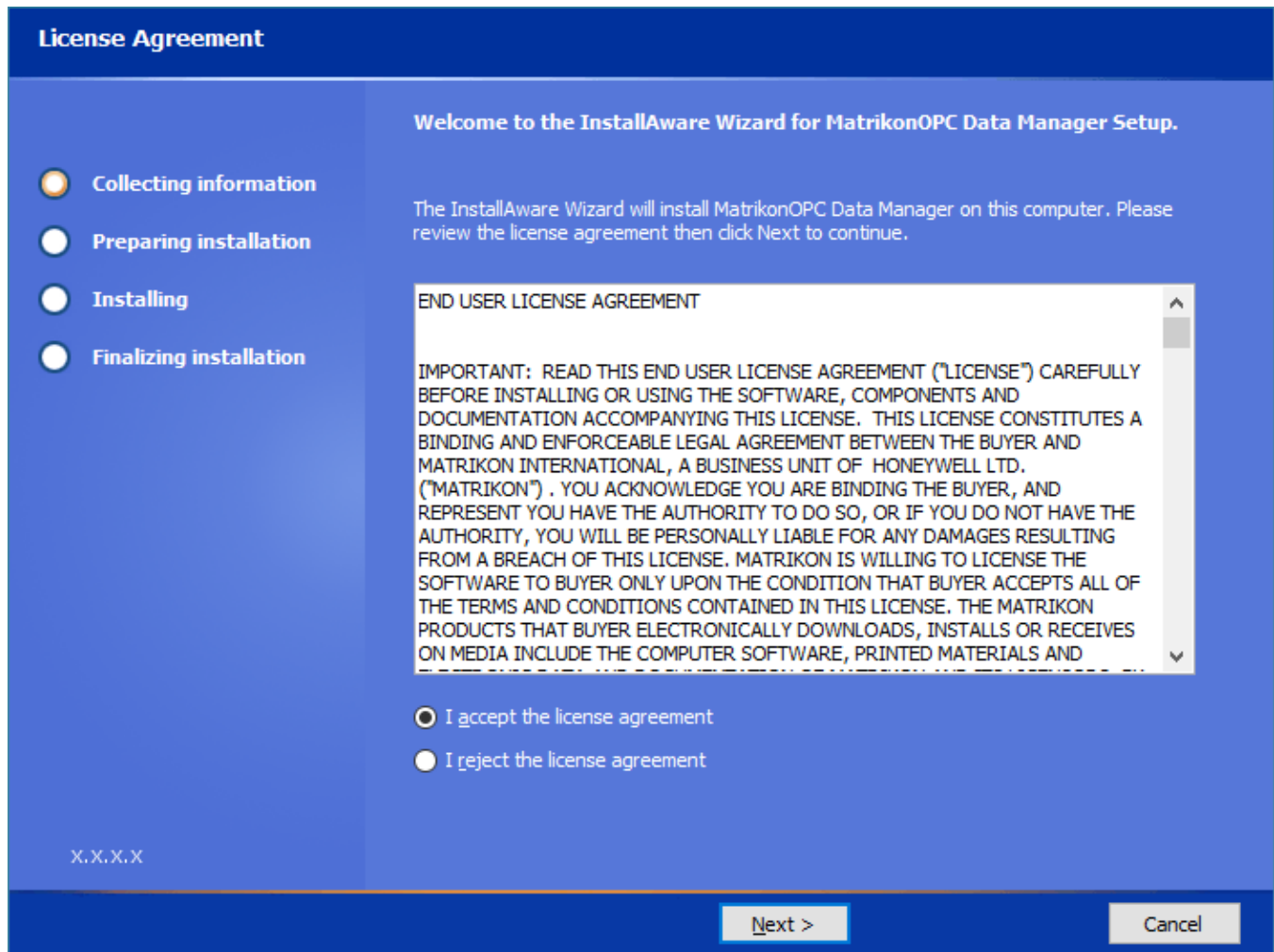


Figure 5 - License Agreement Screen

4. Read the **Software License Agreement**, using the scroll bar to view the entire message.
5. Select the **I accept the license agreement** option button.
6. Click on the **Next** button. The **Setup Type** screen (Figure 6) appears.

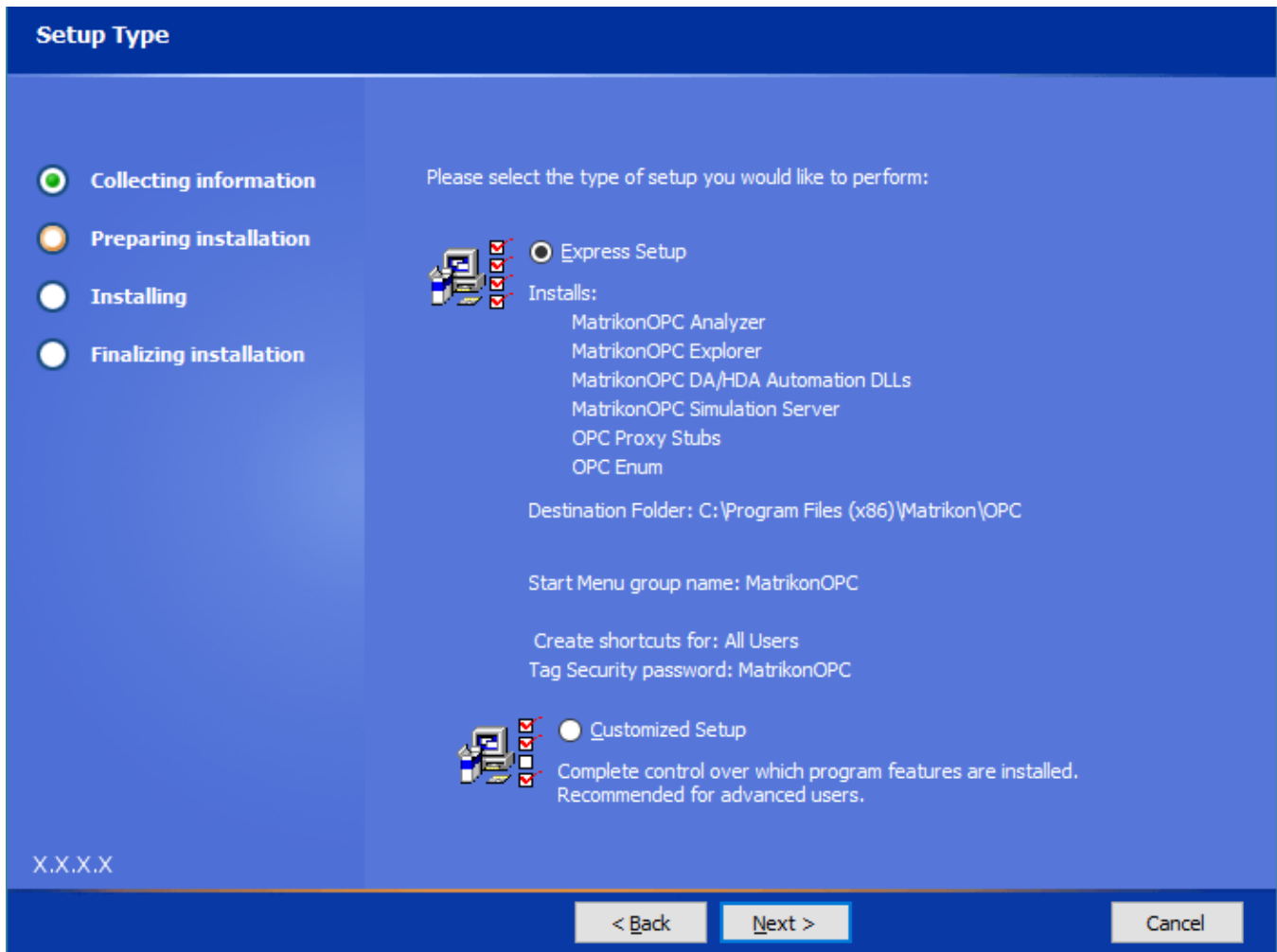


Figure 6 - Setup Type Screen

7. Select the type of setup to be performed.
Note: MatrikonOPC recommends that you select the **Express Setup** option.
8. Click on the **Next** button. If you selected an **Express** setup, the **Licensing** screen (Figure 10) appears, otherwise the **Destination Folder** screen (Figure 7) appears.

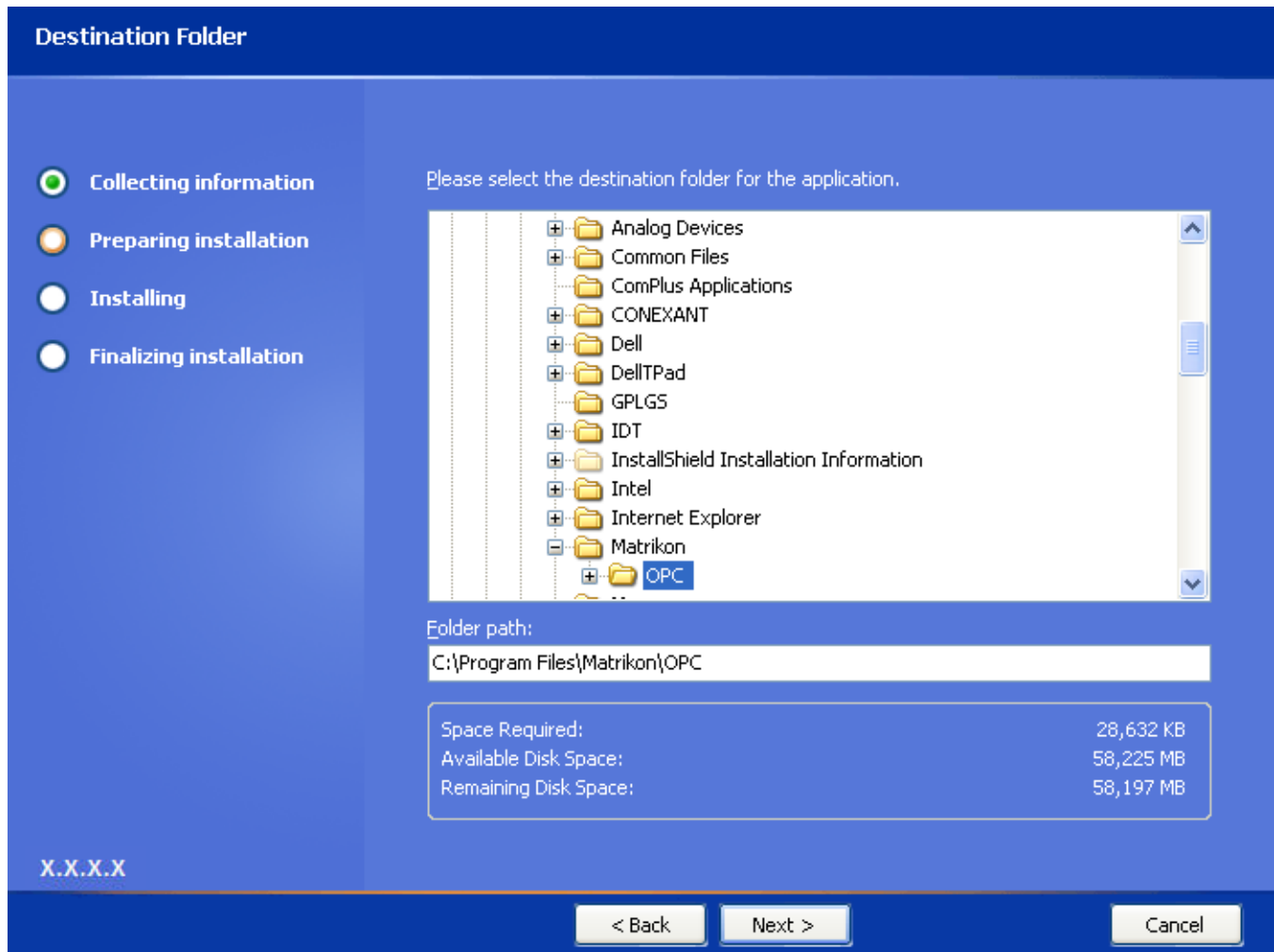


Figure 7 - Destination Folder Screen

9. Select the folder in which to install MatrikonOPC Data Manager, or accept the default location displayed in the **Folder path** field.
10. Click on the **Next** button. The **Start Menu** screen (Figure 8) appears.

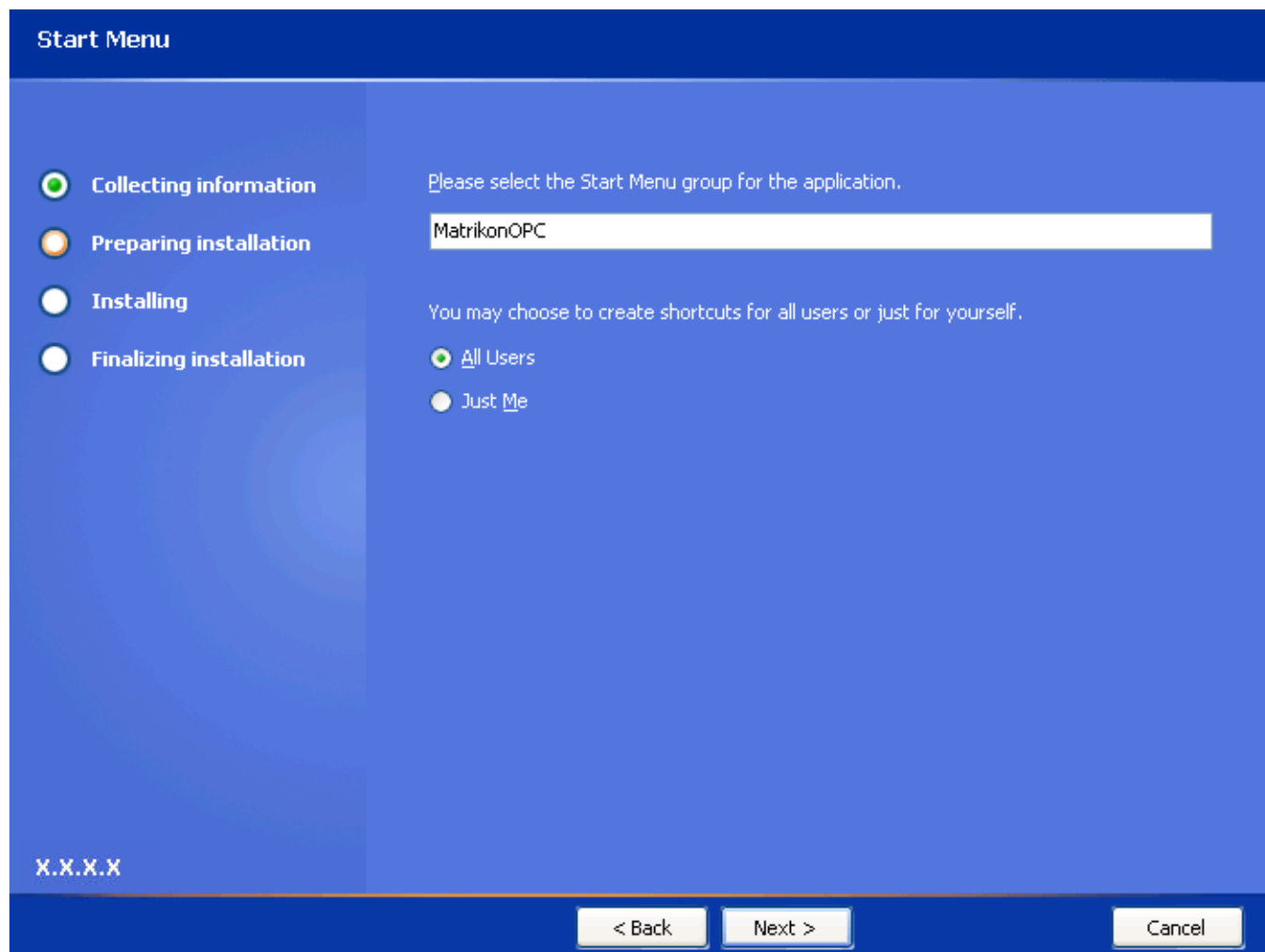
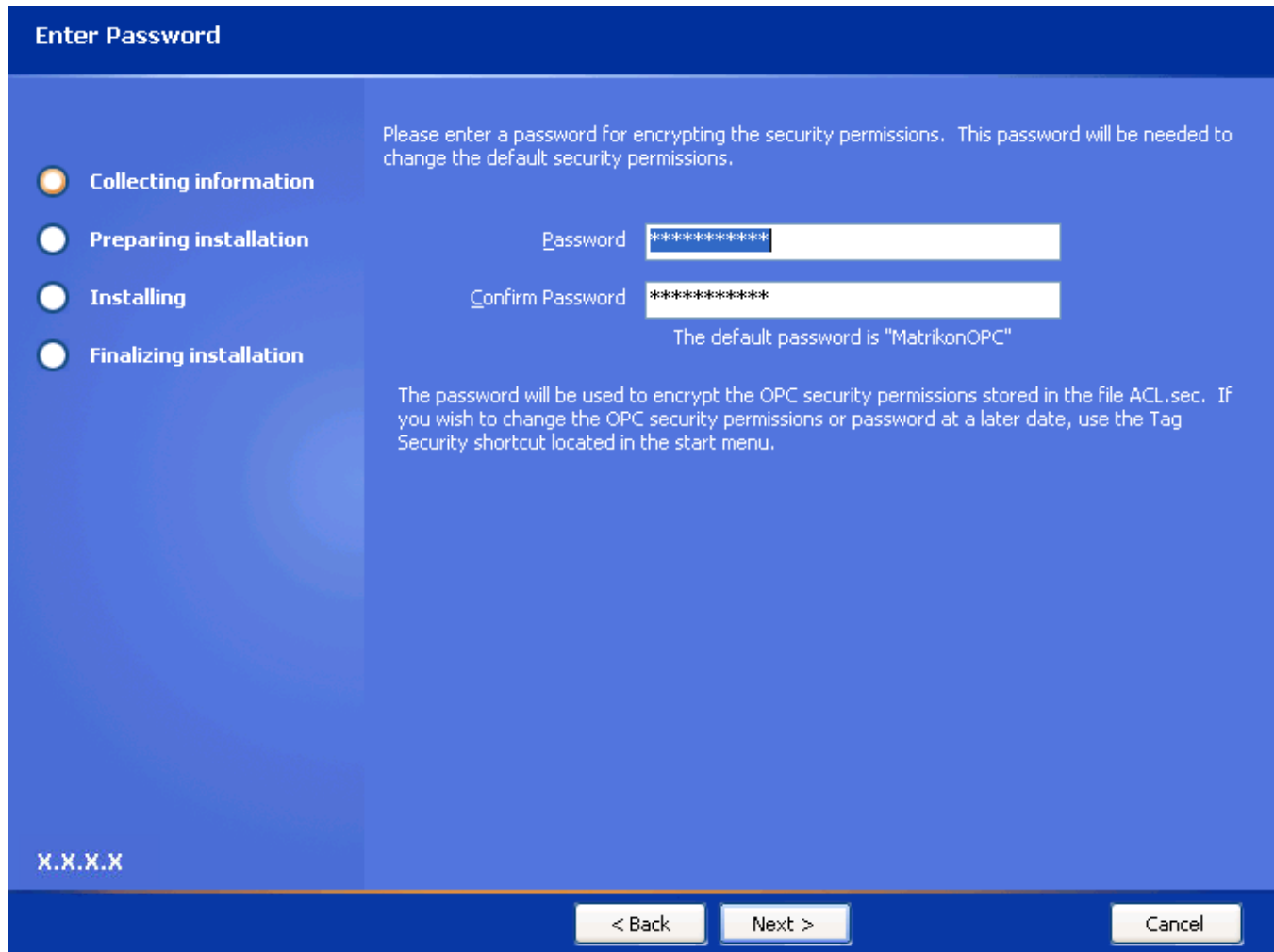


Figure 8 - Start Menu Screen

11. Select the Start Menu group and specify whether you want shortcuts created only for yourself, or for all users, by selecting the applicable option button.
12. Click on the **Next** button. The **Enter Password** screen (Figure 9) appears.



Enter Password

Please enter a password for encrypting the security permissions. This password will be needed to change the default security permissions.

☒ Collecting information
☐ Preparing installation
☐ Installing
☐ Finalizing installation

Password:
 Confirm Password:

The default password is "MatrikonOPC"

The password will be used to encrypt the OPC security permissions stored in the file ACL.sec. If you wish to change the OPC security permissions or password at a later date, use the Tag Security shortcut located in the start menu.

X.X.X.X

Figure 9 - Enter Password Screen

13. A default password is supplied for you in the **Password** and **Confirm Password** fields.

Notes:



- The default password provided for you is **MatrikonOPC**. Note this password for future reference.
- If you need to change the password at a later date, access the **Tag Security** shortcut from the **Start** menu. Click on the Windows **Start** button. Select **Programs** -> **MatrikonOPC** -> **<OPC Server Name>** -> **Tag Security**.

14. Click on the **Next** button to accept the default password. The **Licensing** screen (Figure 10 - Licensing Screen) appears.

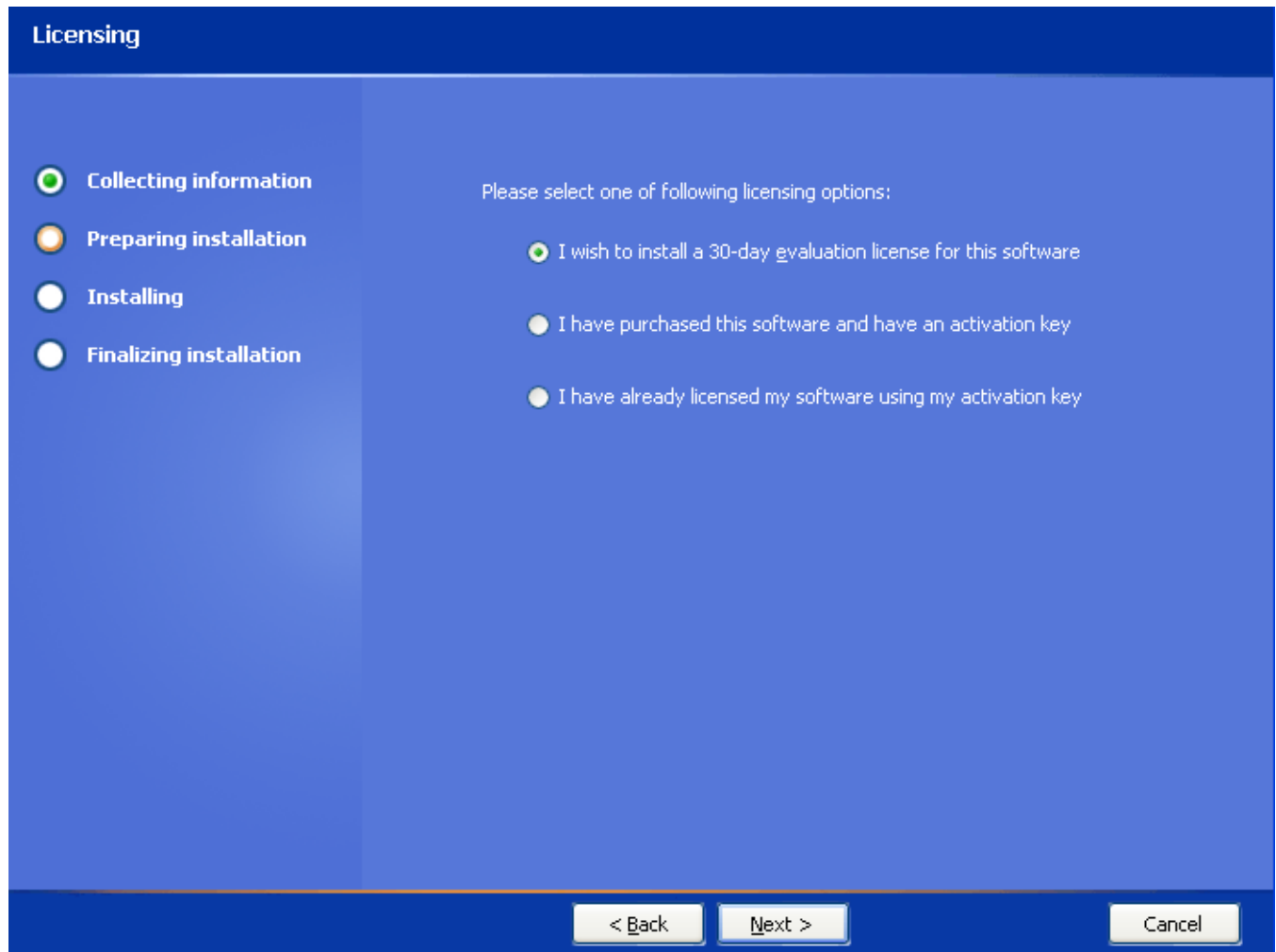


Figure 10 - Licensing Screen

15. Select the applicable licensing option.

16. Click on the **Next** button. The **Ready to Install** screen (Figure 11) appears.

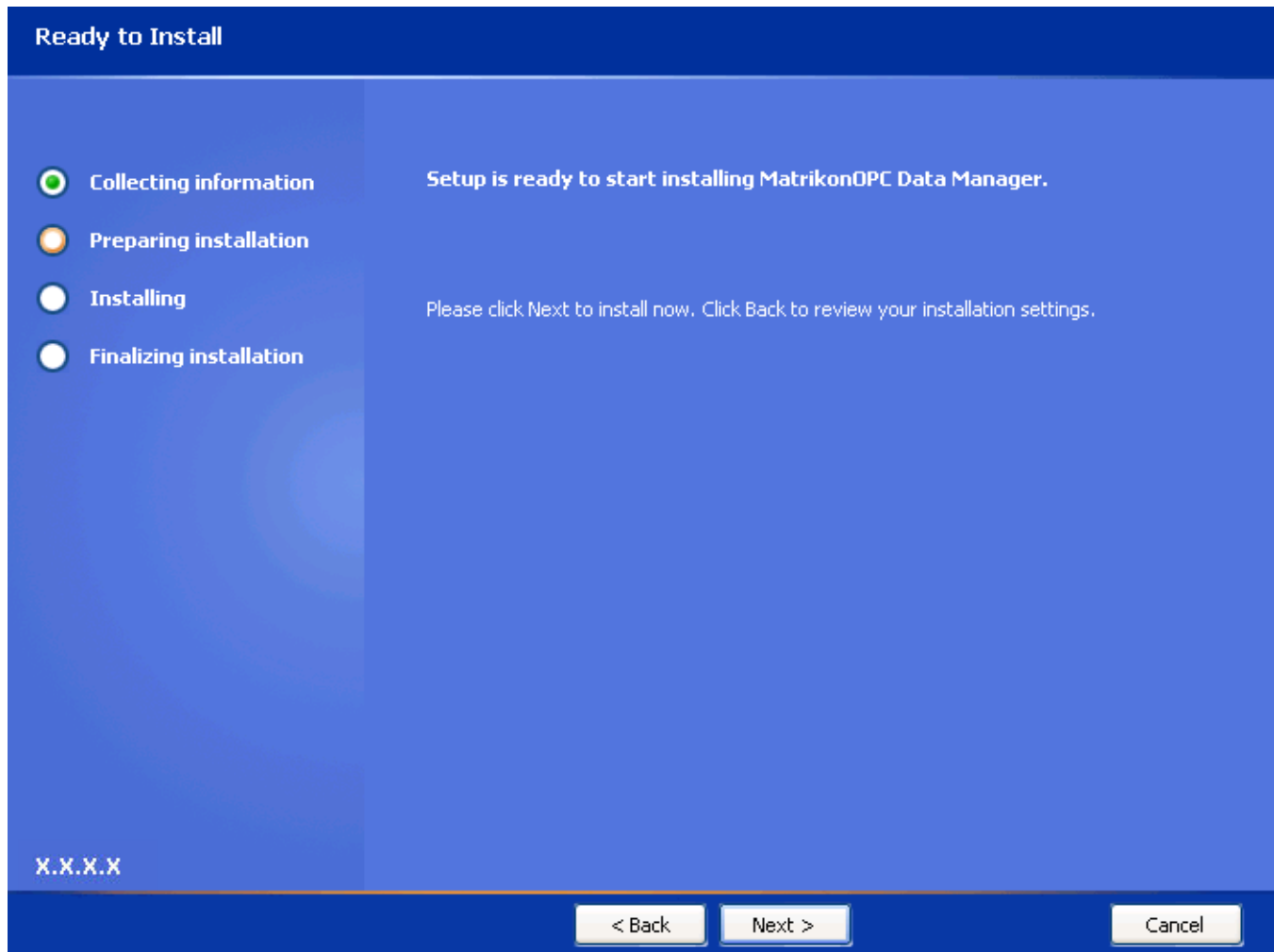


Figure 11 - Ready to Install Screen

17. Click on the **Next** button. Installation begins (Figure 12), and the product files are copied to the computer.

Note: Prior to starting the installation, you have the option of clicking on the **Back** button to change any of the installation information. Click on the **Cancel** button if you wish to stop or cancel the installation.

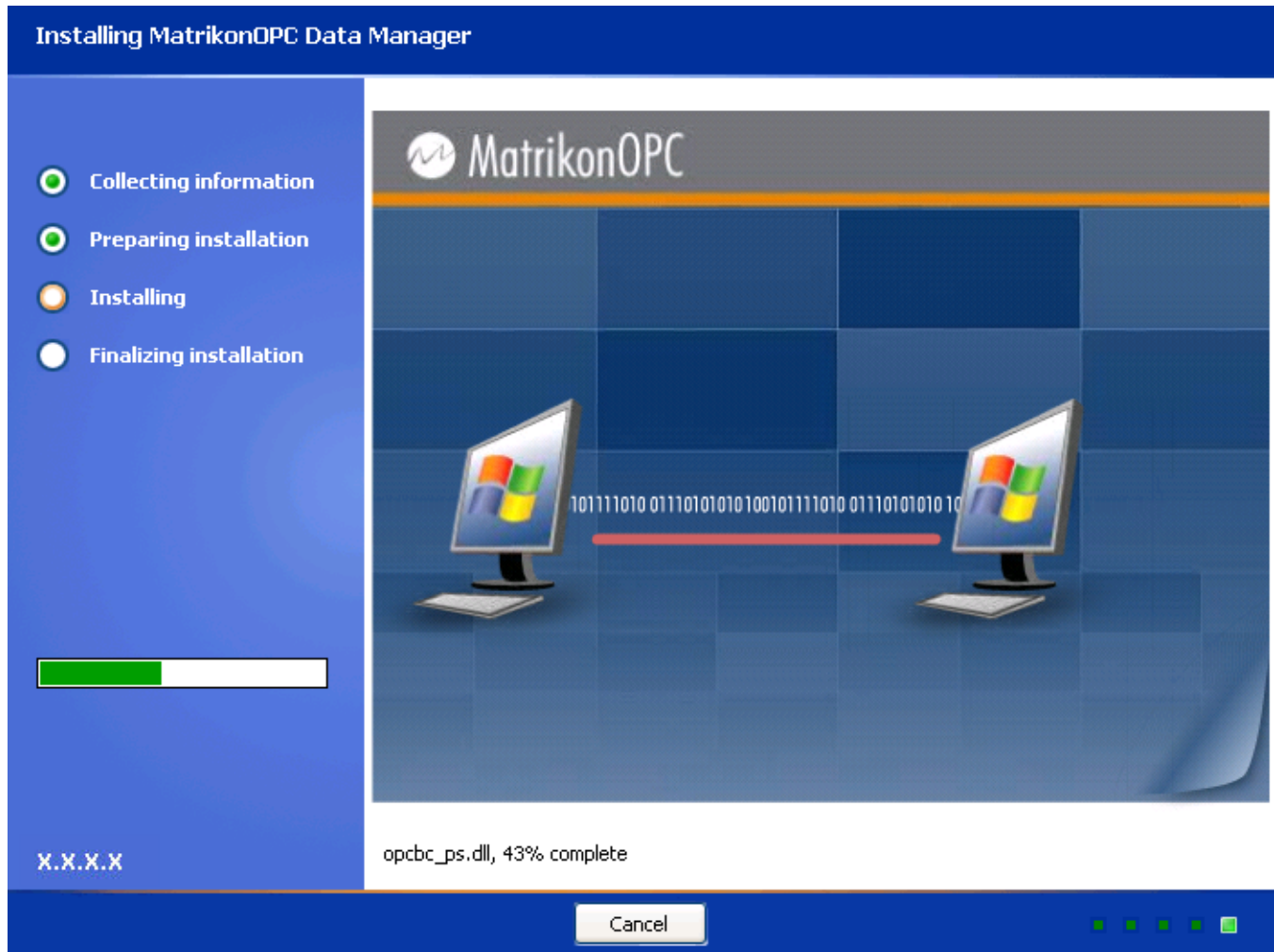
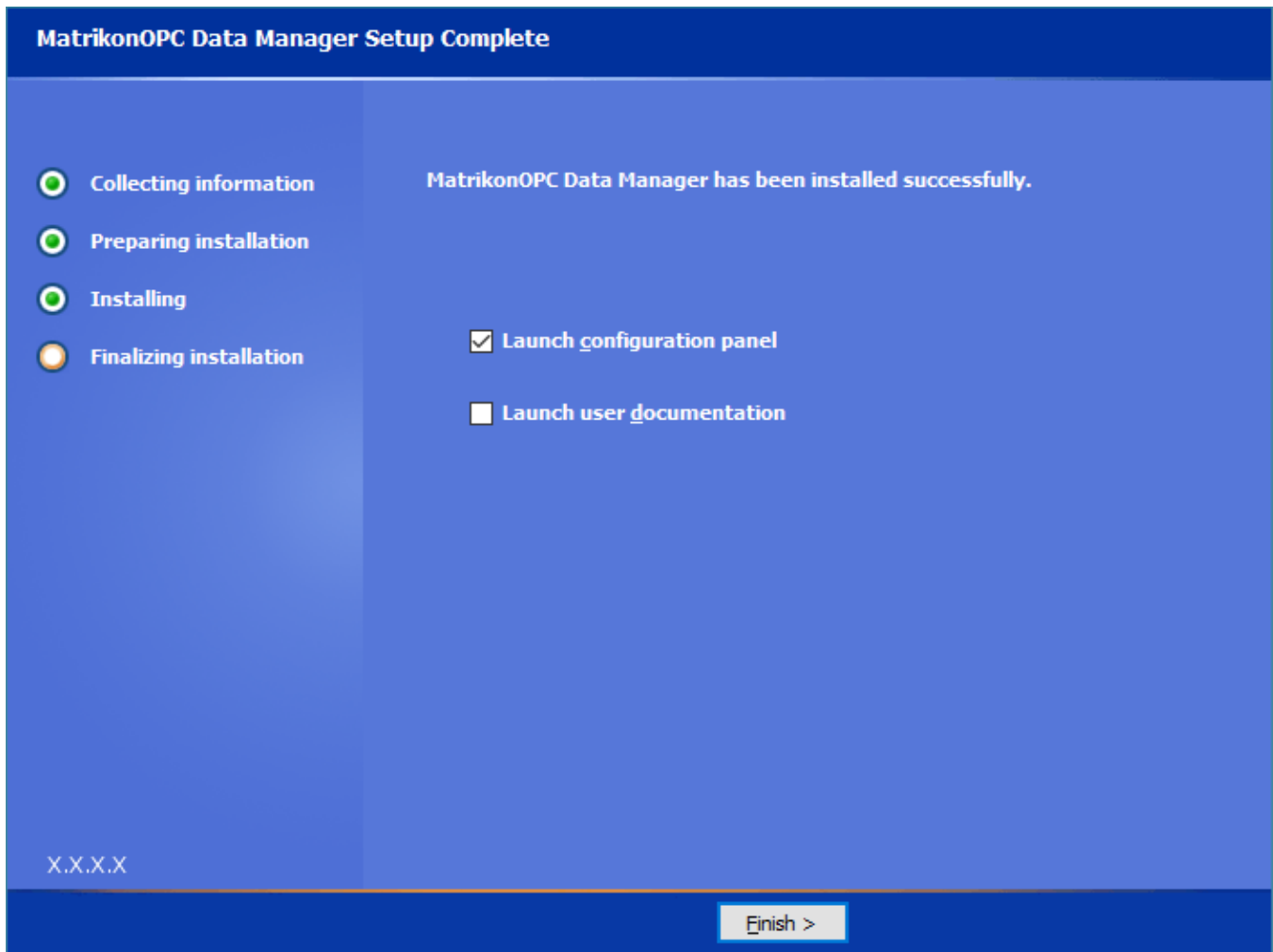


Figure 12 - Installing MatrikonOPC Data Manager Screen

18. When the installation has finished, the **MatrikonOPC Data Manager Setup Complete** screen (Figure 13) appears stating that MatrikonOPC Data Manager has been successfully installed.



19.

Figure 13 - MatrikonOPC Data Manager Setup Complete Screen

20. At this point you have the option of launching the server's *Configuration Panel* and/or *User's Manual*. Select the necessary checkbox or checkboxes.
21. Click on the **Finish** button to complete the installation and exit the Wizard.
22. The necessary files are copied to the target computer, the software components are registered, and shortcut icons are created in the **Start** menu.



Note: At this point, it is recommended that you verify the DCOM settings. Reference to the DCOM configuration can be found in the **DCOM Manual**. This configuration varies for different operating systems.

Installed Files

The installation program copies all necessary files to the target computer and creates shortcut icons in the **Start** menu.

The files listed in Table 2 are installed by default, in the following location:

C:\Program Files (x86)\Matrikon\OPC\Data Manager

File Name	Description
ACL.sec	Access control list containing users and permissions for MatrikonOPC Security Gateway.
ACLSecure.exe	Command-line security utility used to encrypt/decrypt the ACL file.
Altova.dll	Advanced alias library
AltovaXML.dll	Advanced alias library
CalcEngine.dll	Advanced alias library
CalcEngineResource.dll	Advanced alias library
CalcEngineServerPS.dll	Advanced alias library
CalcEngineWrapper.dll	Advanced alias library
CalculationGraph.dll	Advanced alias library
Clipsdll.dll	Advanced alias library
DataManager.exe	MatrikonOPC Data Manager executable.
Dbghelp.dll	Debug help dll
DefaultConfig.csv	Default configuration for Data Manager
DefaultConfig.xml	Default configuration for the OPC Server for Data Manager
DMConfig.exe	MatrikonOPC Data Manager Configuration Tool executable.
DMInterfacesProxy.dll	Data Manager proxy dll
EventLogger.dll	Logging library
Icudt40.dll	Logging library
Icuin40.dll	Logging library
Log4cxx.dll	Logging library
Lsapiw32.dll	Licensing library
MatrikonOPC Data Manager Release Notes.pdf	<i>Release Notes</i> for this product.
MatrikonOPC Data Manager User Manual.pdf	This <i>User's Manual</i> .
NetPortalQueryServerPS.dll	Advanced alias library
OPCODM.exe	MatrikonOPC Server for Data Manager executable.
ProcessNetDataDelivery.dll	Advanced alias library
ProgID.txt	Security information file used by the encryption utility.
PSTCFGDataManagerLib.ocx	ActiveX configuration panels.
RmsApiProxy.dll	Licensing proxy library
Scheduler.dll	Scheduler library
ScriptLibrary.dll	Scripting library
Security.cfg	Security settings.

Table 2 - Files Installed in "Data Manager" Folder

The files listed in Table 3 are installed by default, in the following location:

C:\Program Files\Common Files\MatrikonOPC\Common

File Name	Description
ACLConfig.exe	Tag security configuration utility.
OPCAalyzer Logs	This folder contains the analyzer logs.
EULA.pdf	End-User License Agreement in PDF format.
Haspds_windows.dll	Hardware Key Licensing Library
HASP.exe	Hardware Licensing Utility.
MTKAuthorize.exe	MatrikonOPC Product Authorization Utility.
OEM_MATRIKON_OPC.dll	MatrikonOPC OEM Badge Library.
OPCAuto.dll	MatrikonOPC Automation Component – enables developers to access OPC data from client applications developed using Automation tools.
opcda20_auto.doc	MatrikonOPC Automation Component Interface Standard.
OPCDAAuto.dll	MatrikonOPC Automation Component – enables developers to access OPC data from client applications developed using Automation tools such as <i>Visual Basic®</i> , <i>VBA</i> , and <i>VB Script</i> .
opchda_ps.dll	The proxy-stub file to allow OPC Clients to make remote connections to an OPC HDA server.
opchda10_auto.doc	Developer documentation for the HDA Automation Component.
OPCHDAAuto.dll	MatrikonOPC HDA Automation Component – enables developers to access OPC HDA data from client applications developed using Automation tools.
PSTCFG.exe	MatrikonOPC Product Configuration Utility.
PSTCFGInterface.dll	MatrikonOPC Product Configuration Library.
PSTcfggps.dll	MatrikonOPC Product Configuration Marshalling Library.

Table 3 - Files Installed in "Common" Folder

The files listed in Table 4 are installed in the **WINDOWS\system32** folder:

File Name	Description
Expreval.dll	Expression Evaluation Library for Alias Equations.
opcproxy.dll	OPC Data Access 2.0 and 1.0a Interfaces and Marshalling Library.
opccomn_ps.dll	OPC Common Interfaces and Marshalling Library.
opcSec_PS.dll	OPC Security Interfaces and Marshalling Library.
opc_aeps.dll	OPC Alarms and Events 1.0 Interfaces Marshalling Library.
actxprxy.dll	ActiveX Interface Marshalling Library.
Opcenum.exe	OPC Server List Component.

Table 4 - Files Installed in "system32" Folder

Using the Command Prompt

MatrikonOPC Data Manager is, by default, installed as a service. However, you can choose to run it as an application or a service.

To view the services running, go to the **Services** window (**Start** -> **Run** -> enter **services.msc** – click **OK**). MatrikonOPC Data Manager is listed in the services that are running.

To register MatrikonOPC Data Manager as an application, open a command prompt, go to the directory in which DataManager.exe resides, run it with the **-register** or **-regserver** flag:

DataManager.exe -register

DataManager.exe -regserver

To un-register MatrikonOPC Data Manager as an application, enter one of the following:

DataManager.exe -unregister

DataManager.exe -unregserver

To register MatrikonOPC Data Manager as a service, open a command prompt, go to the directory in which DataManager.exe resides, run it with the **-service** flag:

DataManager.exe -service

Similarly, the MatrikonOPC Server for OPC Data Manager can be configured to run as a service or as an application. In the directory which OPCODM.exe resides, the following commands can be used to register the OPC Server as an application:

OPCODM.exe -register

OPCODM.exe -regserver

To unregister the OPC Server as an application:

OPCODM.exe -unregister

OPCODM.exe -unregserver

To register the OPC Server as a service:

OPCODM.exe -service



Note: At this point, it is recommended that you verify the DCOM settings as changing the registration of each of the executables can erase DCOM settings. A reference to the DCOM configuration can be found in the **DCOM Manual**. This configuration varies for different operating systems.

Licensing

Most MatrikonOPC products require some form of licensing criteria be met to ensure that it functions successfully

The MatrikonOPC Data Manager supports **both** software and hardware licensing.

IMPORTANT TO NOTE:

The following licensing information is described in detail within the *Licensing Procedures* document which accompanies the Data Manager software and *User's Manual*:



- Requesting a software license.
- Enabling a temporary software authorization.
- Installing a permanent software license.
- De-licensing software.
- Licensing Q&A and Troubleshooting.

Contacting Support

The MatrikonOPC Customer Services department (www.opcsupport.com) is available 24 hours a day, seven days a week.

Contact MatrikonOPC Support using the information below, or send an email (support@MatrikonOPC.com).

For Monday to Friday **daytime support** requests, contact MatrikonOPC Support using the regional phone numbers provided in Table 5.

Region	Office Hours	Contact Information
North America UTC/GMT -7 hours (MST)	8:00am-5:00pm	+1-877-OPC-4-ALL
Europe /Africa * UTC/GMT +1 hours (CET)	9:00am-5:00pm	+49-221-969-77-0 (Request OPC Support)
Australia/Asia * UTC/GMT +10 hours (AEST)	9:00am-5:00pm	+61-2-4908-2198 (Request OPC Support)

* Toll-free regional numbers coming soon!

Table 5 - MatrikonOPC Support Regional Contact Information

For **after-hours support** in all regions, please use the following number. There is no extra charge from MatrikonOPC for calling their after-hours support number.

Region	Contact Information
All	+1-780-231-9480

Table 6 - After-Hours Support

Using MatrikonOPC Data Manager

Starting MatrikonOPC Data Manager

To launch MatrikonOPC Data Manager, choose the appropriate shortcut from the **Start** menu.

To start MatrikonOPC Data Manager:

1. Click on the Windows **Start** button and select **Programs -> MatrikonOPC -> MatrikonOPC Data Manager**, and choose **MatrikonOPC Data Manager**.
2. The **MatrikonOPC Data Manager Configuration Tool** appears.
3. The MatrikonOPC Data Manager logo appears in the **Tool Tray** (Figure 14).

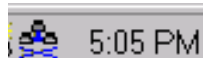


Figure 14 - Tool Tray

Note: The **Tool Tray** icon does not appear when Windows 2008 and Windows 7 are in use.

4. Double-click your mouse on this icon to open the **MatrikonOPC Data Manager Configuration Tool** (Figure 15).

Configuration Tool Screen

The following sections describe how to use the **MatrikonOPC Data Manager Configuration Tool** to create and configure MatrikonOPC Data Manager points. After start-up, the **Configuration Tool** displays the main screen as shown in Figure 15.

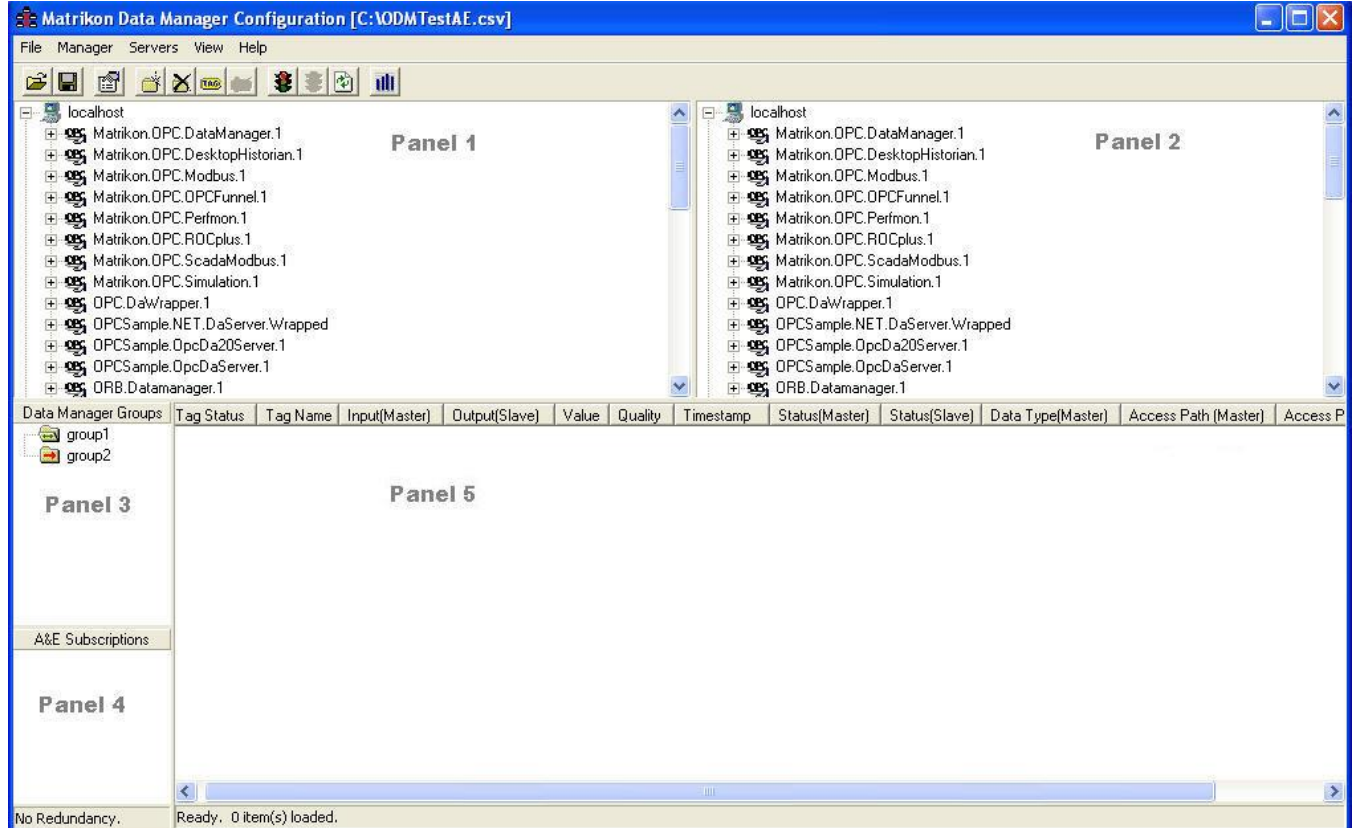


Figure 15 - MatrikonOPC Data Manager Configuration Tool

The main screen consists of five panels (numbered 1 through 5 and labelled accordingly in Figure 15):

1. An OPC server browser located in the top left side of the screen. Use this panel to browse the OPC servers that are available on the local host and on the network.
2. An OPC server browser located in the top right side of the screen. This panel is identical to the OPC server browser on the left, used for convenient point configuration by “drag-and-drop”.
3. This panel (labelled **Data Manager Groups**) is located in the bottom left side of the screen and is a list of MatrikonOPC Data Manager groups.
4. This panel (labelled **A&E Subscriptions**) is also located in the bottom left side the screen. This section contains a list of OPC A&E subscriptions.
5. A list of MatrikonOPC Data Manager points is located in the bottom right side of the screen. The Master Status and the Slave Status tabs display the status of the input and output points. If there are no errors with the input and output point a status of **Good** is reported by the shared point under the **Master Status** and **Slave Status** columns. If there are errors in the shared point, then the error is displayed under the **Master** or **Slave** column depending on the server that has the error. An error would be displayed in the status tab if the server is down (i.e., server failed), an item is not present in the server’s address space (i.e., invalid item error), an item cannot be written to (i.e., write error) or an item cannot be read from (i.e., read error).



Note: When browsing the tags available under the servers listed in the left and right OPC server browser panels, it may be necessary to perform a **Refresh** (under the **View** menu) to see updated information. This is because browsing only happens on the first attempt to view the contents of a server (by clicking on the node to the left of the server name on the server tree). Any further attempts to view a server’s contents will not yield updated information, and therefore it is necessary in this case to refresh.

Main Menu

The following sections describe the menus available from the **Configuration Tool** screen, and what they are used for.

File Menu

Table 7 describes the **File** menu commands.

Command	Description
Open	Clears the current configuration and loads a configuration from a CSV file.
Save	Saves the MatrikonOPC Data Manager configuration to a CSV file.
Save As	Saves the MatrikonOPC Data Manager configuration to a CSV file after prompting for a file name.
Import	Loads a configuration from a CSV file. The current MatrikonOPC Data Manager configuration is merged with the configuration in the CSV file.
Export	Saves part of the MatrikonOPC Data Manager configuration to a CSV file. You are given an opportunity to select the MatrikonOPC Data Manager groups that should be exported.

Command	Description
Exit Config Tool	Closes the MatrikonOPC Data Manager Configuration Tool . Note: MatrikonOPC Data Manager continues to run after the Configuration Tool is closed.

Table 7 - File Menu Commands

Manager Menu

Table 8 describes the **Manager** menu commands.

Command	Description
Add Group	Opens the Add Data Manager Group screen.
Delete Group	Deletes a MatrikonOPC Data Manager group.
Add Shared Point	Opens the Add Shared Point screen.
Delete Shared Point	Deletes a shared point.
Statistics	Opens the Configure Statistics screen.
Settings	Opens the Data Manager Settings screen.

Table 8 - Manager Menu Commands

Servers Menu

Table 9 describes the **Servers** menu commands.

Command	Description
Configure	Opens the OPC Server Configuration screen, allowing you to configure MatrikonOPC servers. Other OPC servers must be configured manually.
Aliases	This option is currently disabled.

Table 9 - Servers Menu Commands

View Menu

Table 10 describes the **View** menu commands.

Command	Description
Refresh	Refreshes the values displayed in the Configuration Tool .
Log Window	Enables/disables the Configuration Tool log window.
Set Log Level	Sets the Configuration Tool log level. Note: This is not the MatrikonOPC Data Manager log level (refer to Advanced Options for details on setting the MatrikonOPC Data Manager log level).

Table 10 - View Menu Commands

Help Menu

Table 11 describes the **Help** menu commands.

Command	Description
About	Displays the Welcome screen, which includes information about the software

Command	Description
	version.

Table 11 - Help Menu Commands

Main Toolbar

The **Main Toolbar** (Figure 16) provides shortcut buttons for commands in the **Main Menu**.



Figure 16 - Configuration Tool Main Toolbar

Table 12 describes the toolbar buttons.

Command	Description
 Open File	Clears the current configuration and loads a configuration from a CSV file.
 Save File	Saves the MatrikonOPC Data Manager configuration to a CSV file.
 Data Manager Settings	Opens the Data Manager Settings screen.
 Add Group	Opens the Add Data Manager Group screen.
 Delete Group	Deletes a MatrikonOPC Data Manager group.
 Add Shared Point	Opens the Add Shared Point screen.
 Delete Shared Point	Deletes a shared point.
 Ignore Updates	Ignores updates for all shared points within the group.
 Process Updates	Processes updates for all shared points within the group.
 Refresh	Refreshes the values displayed in the Configuration Tool .
 Statistics	Opens the Configure Statistics screen.

Table 12 - Toolbar Commands

Creating a Group

Basic Configuration

A valid MatrikonOPC Data Manager configuration consists of MatrikonOPC Data Manager groups and points. A MatrikonOPC Data Manager group holds multiple MatrikonOPC Data Manager points. Each point contains the information about the OPC items that it connects to. A point can be uni-directional (transmitting information from the master OPC item to the slave OPC item) or it can be bi-directional (transmitting information in both directions) whenever either OPC item changes its value, the changed value is sent to the other OPC item.

Before creating data points in MatrikonOPC Data Manager, you must first define a group to hold the items.

The **Add Data Manager Group** (Figure 17) window is used to define groups. This window consists of two tabs:

- **General**
- **Options**

General Tab

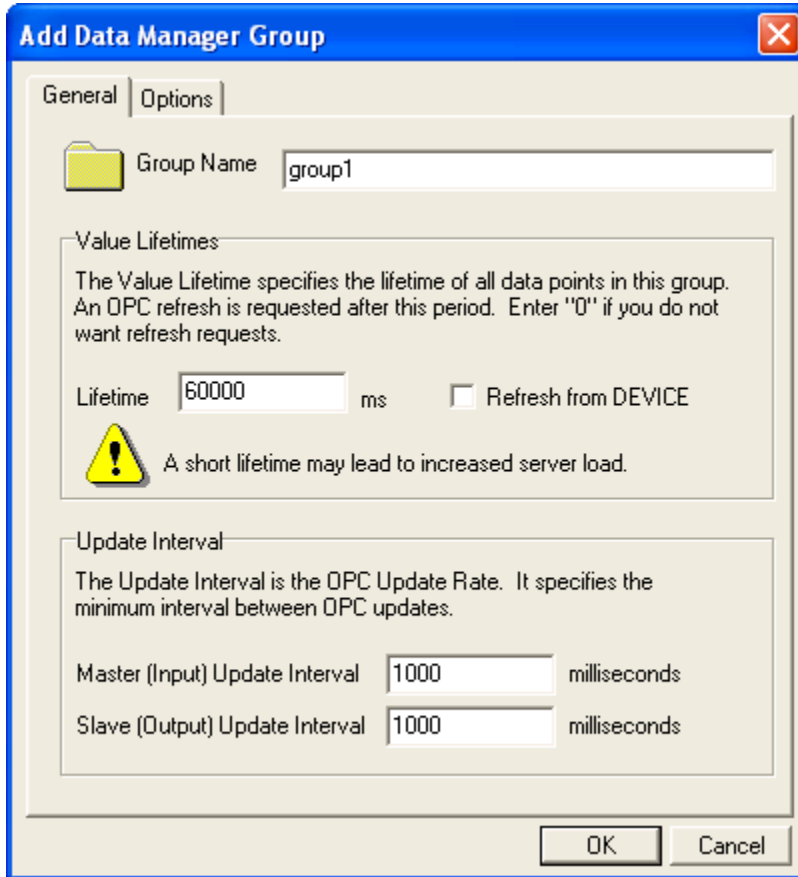


Figure 17 - Add Data Manager Group (General Tab) Window

Table 13 describes the **Add Data Manager Group General** tab components.

Component	Description
Group Name	Allows you to enter the name of the Data Manager group you are adding.
Lifetime	Allows you to enter a value (in milliseconds) specifying the lifetime of the values of the points in the group. A value is considered to be valid until it is updated or until its lifetime is exceeded. All items in a group share the same lifetime. When a value's lifetime is exceeded, a refresh is done on the associated OPC items. You can enter 0 if you do not want refresh requests to be sent.
Refresh from DEVICE	The Refresh from Device checkbox specifies whether Data Manager will request refreshes from Device (checked) or Cache (cleared).
Master (Input) Update Interval	The Master (Input) Update Interval field value specifies the maximum rate at which OPC servers send data updates back to MatrikonOPC Data Manager. For example, if a value changes 10 times per second and the update rate is

Component	Description
Slave (Output) Update Interval	1000 ms (1 second), then the MatrikonOPC Data Manager point is updated only once per second. Values are always written to the destination point as soon as they are received. If the point is unidirectional, the Slave (Output) Update Interval is ignored. For example, a bidirectional point uses a Master Update Interval of 5 seconds and a Slave Update Interval of 3 seconds. The Master point updates every 5 seconds, and if it changes, the value is sent to the Slave. The Slave point updates every 3 seconds, and if it changes, the value is sent to the Master. There is currently no option to read data into the MatrikonOPC Data Manager shared point faster than it is written out.
OK	Select this button to save any changes and close the window.
Cancel	Select this button to close this window without saving any changes made.

Table 13 - Add Data Manager Group (General Tab) Window Components

Options Tab

Figure 18 shows the **Options** tab on the **Add Data Manager Group** window.

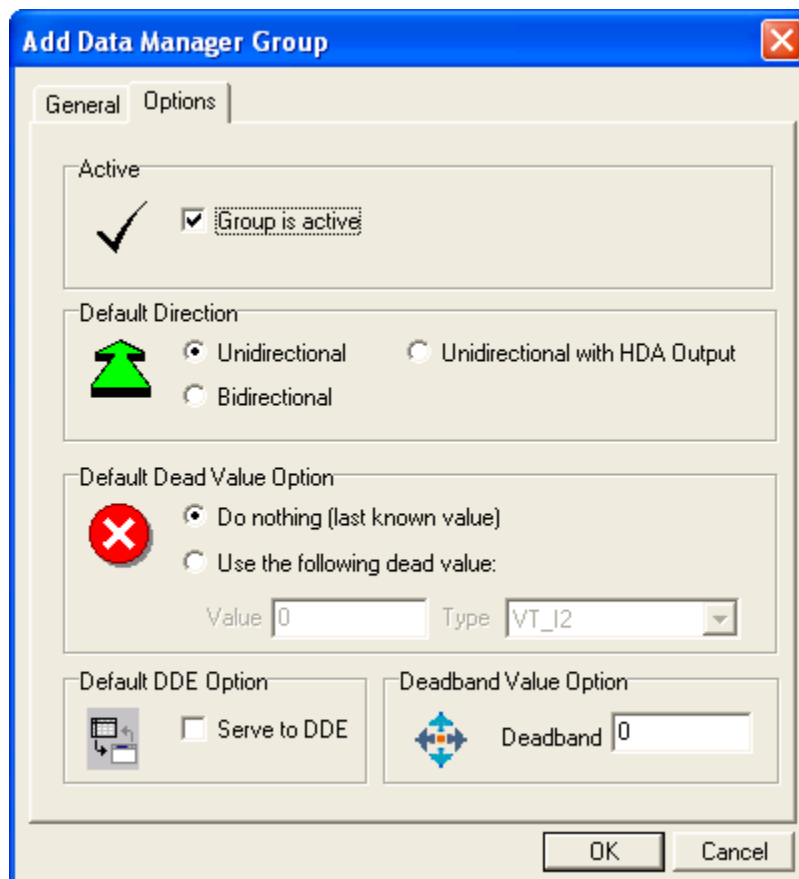


Figure 18 - Add Data Manager Group (Options Tab) Window

Table 14 describes the **Add Data Manager Group Options** tab components.

Component	Description
Active	Select the Group is active checkbox to activate the current group.
Default Direction	Select the required default point type for the groups: Unidirectional , Unidirectional with HDA Output , Bidirectional . If necessary, you can override this default setting on a point-by-point basis.
Default Dead Value Option	A dead value is a value that a MatrikonOPC Data Manager point is set to if the OPC input quality is bad for longer than the lifetime of the group. Select the Use the following dead value option to specify a default dead value for the points in this group. The dead value immediately takes effect in the case of a bad quality if a lifetime of 0 is specified. You can override this default setting on a point-by-point basis, if required. A dead value can be configured for array of float and array of string data type shared points, but the dead value is not passed to the output point. This is due to the fact that the array of string and array of float data types are not supported for the dead value.
Deadband Value Option	The deadband value option limits the value change that is permitted to pass through MatrikonOPC Data Manager. When set to 0, all values are valid to pass through Data Manager. When configuring deadband through Data Manager and the shared point is of a STRING data type, the value is not passed to the output tag when the input tag changes. This is because the changed value of the string would not exceed the deadband value.
Default DDE Option	Select the Serve to DDE checkbox to have the group seen by the DDE clients, by default. If required, you can override this default setting on a point-by-point basis.
OK	Select this button to save any changes and close the window.
Cancel	Select this button to close this window without saving any changes made.

Table 14 - Add Data Manager Group (Options Tab) Window Components

To create a MatrikonOPC Data Manager group:

1. From the **Configuration Tool** main screen, select the **Add Group** menu option from the **Manager** menu, or
Right-click your mouse in the bottom left panel and select **Add Group** from the displayed menu.
2. The **Add Data Manager Group** (Figure 17) window appears.
3. Edit the group components as desired.
4. Click on the **OK** button. If the group is created successfully, it will appear as a folder in the Data Manager Groups panel (Figure 19). The group name appears in lowercase characters, and the icon adjacent to the name is either  for a unidirectional group, or  for a bidirectional group.

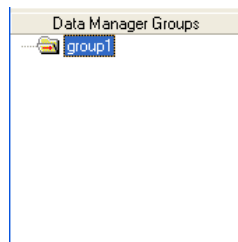


Figure 19 - New Group

Group Context Menu

MatrikonOPC Data Manager groups can be manipulated via the group context menu. This menu is displayed by right-clicking your mouse on a group in the **Data Manager Groups** panel (Figure 20).

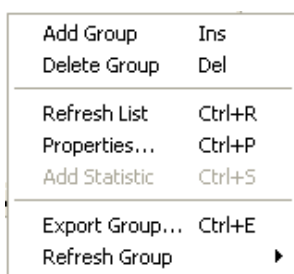


Figure 20 - Group Context Menu

Table 15 describes the group context menu commands.

Command	Description
Add Group	Select this menu option to add a new MatrikonOPC Data Manager group.
Delete Group	Select this menu option to delete an existing MatrikonOPC Data Manager group.
Refresh List	Select this menu option to refresh the list of MatrikonOPC Data Manager groups. Use this option if another client (other than the Configuration Tool being used) is connected to MatrikonOPC Data Manager.
Properties	Select this menu option to access the Group Properties window. You may also double-click your mouse on a particular group to access the same window.
Add Statistic	Select this menu option to access the Configure Statistics screen.
Export Group	Select this menu option to save the selected group of a CSV file.
Refresh Group	This menu option has two sub-choices: • Refresh from OPC – select this option to refresh all points in the group from the respective OPC servers. • Refresh from ODM – select this option to refresh all points in the group from MatrikonOPC Data Manager. This means that the values currently stored in MatrikonOPC Data Manager will be displayed in the Configuration Tool.

Table 15 - Group Context Menu Commands

Creating a Shared Point

Shared points are the central data structures that establish connections between OPC items. Each shared point stores a value that can be written to from various sources and that can be read or written out to various destinations. Figure 21 illustrates the shared point concept.

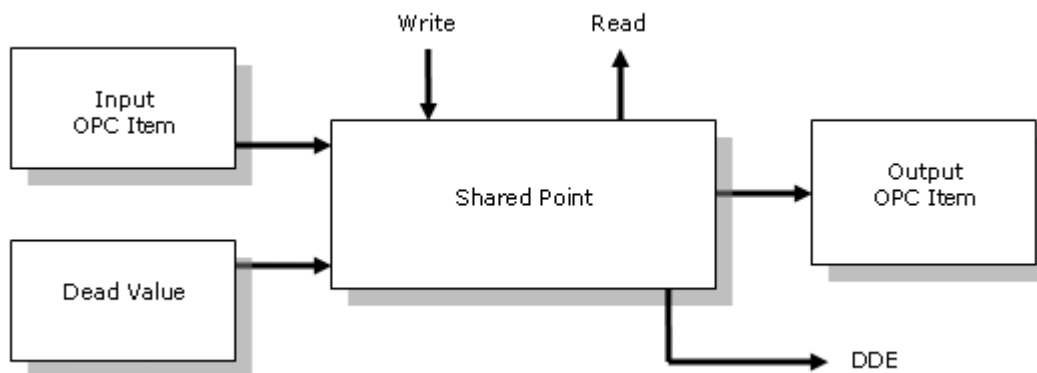


Figure 21 - Shared Point Behaviour

A shared point receives its value from one of three possible sources:

1. An OPC item.
2. The configurable dead value.
3. A direct "write" operation on the MatrikonOPC Data Manager COM interface (for example, by the Configuration Tool or by the MatrikonOPC Data Manager OPC server).

The value of the shared point can be written to OPC item and can be read by both DDE and OPC clients.

Master and Slave

MatrikonOPC Data Manager uses the Master/Slave designation to decide when to transfer values from an OPC item to another. Depending on whether the point is unidirectional or bidirectional, MatrikonOPC Data Manager uses the following rules when a point receives a value from an OPC item:

- If the quality of the new value is not good, then the value is transferred only if the shared point has an HDA output.
- If the quality of the new value is good, then rules in Table 16 are used which explain updating items as Master/Slave, in detail.



Note: A thorough understanding of the Master/Slave concept is needed to correctly configure bidirectional MatrikonOPC Data Manager points. Please read this section carefully if bidirectional points need to be used.

	Updating Item is Master	Updating Item is Slave
Unidirectional Point	The value is always written to the Slave (output) item.	The value is never written to the Master (input) item.
Bidirectional Point	The value is always written to the Slave (output) item.	The value is written to the Master if: 1. The new OPC item value does not match the ODM point's

		current value, <i>and</i> 2. The Master item has updated the point at least once with a good value, <i>and</i> 3. The update is not the result of a refresh request.
--	--	--

Table 16 - Unidirectional vs. Bidirectional Points

These rules prevent data from bouncing back and forth between the Master and the Slave. The rules also prevent the Slave from contaminating the Master's value before the Master has a chance to write to the slave.

Basic Point Configuration

Once a group has been created, it is possible to create shared points. Shared points are created in the **Add Shared Point** window (Figure 22) which consists of three tabs:

- **General**
- **Options**
- **Advanced**

General Tab

Figure 22 displays the **General** tab on the **Add Shared Point** window.

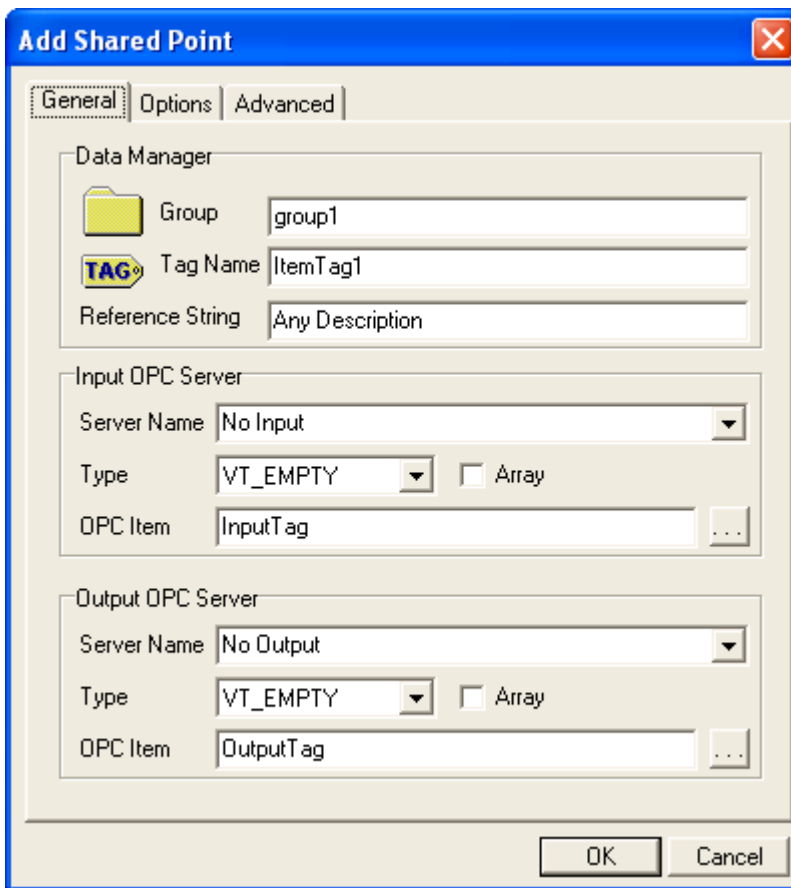


Figure 22 - Add Shared Point Window (General Tab)

Table 17 describes the **Add Shared Point General** tab components.

Component	Description
Group	The name of the MatrikonOPC Data Manager group to which you are adding the shared point.
Tag Name	The name of the new point. Note: Tag names must be unique within each group.
Reference String	A string that helps you to remember what the value stands for. This field has no effect on program operation, so it can be set to any valid string value.
Input OPC Server	
Server Name	Select an OPC server from the drop-down list if you want the new point to receive values from it. If you choose No Input , the point will receive a value only if it is written to using the Configuration Tool.
Type	Specify the requested data type from the drop-down list. Select VT_EMPTY to indicate that you will accept any data type chosen by MatrikonOPC Data Manager.
Array	Select this check box on both the input and output points of the shared point if you are transferring an array. All of the points within the array will be transferred to the output if the quality is good. You cannot transfer an array point to a non-array point, and vice versa.
OPC Item	Specify the OPC item ID. This field follows the syntax of the selected server. For example, when using the MatrikonOPC Server for DDE, the syntax to access an Excel value looks like this: Excel [book1]sheet1!r1c1 . An example of an item on the MatrikonOPC Server for OPC devices is: Modicon-test.Mod1.4:1 . Access paths can be specified in curly brackets following the item ID. For example: This.Is.an:ItemID{this is the access path} .
Output OPC Server	
Server Name	The fields in this section are analogous to the Input OPC Server specification. If you do not want values to be output to an OPC item, select No Output from the drop-down list in the Server Name field.
Type	
Array	
OPC Item	
OK	Select this button to save any changes and close the window.
Cancel	Select this button to close this window without saving any changes made.

Table 17 - Add Shared Point Window (General Tab) Components

Options Tab

Figure 23 displays the **Options** tab on the **Add Shared Point** window.

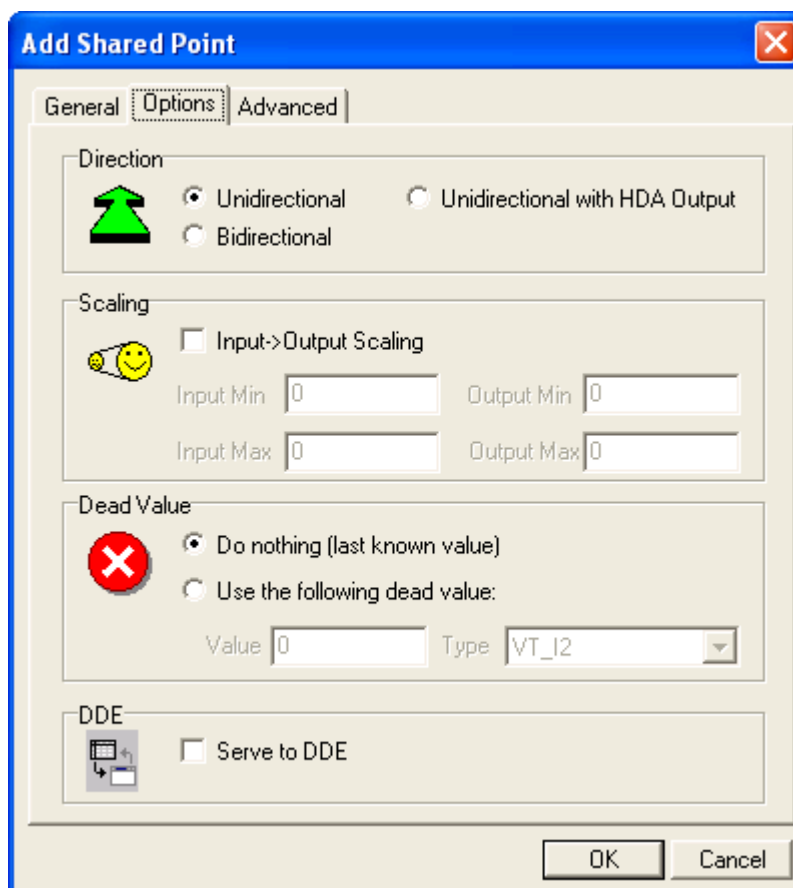


Figure 23 - Add Shared Point Window (Options Tab)

The **Add Shared Point Options** tab components are described in Table 18.

Component	Description
Direction	Select Unidirectional if data transfer is always from input to output. Select Unidirectional with HDA Output if you want data to be written as an HDA item with the timestamp from the Master tag. Select Bidirectional if you want data to be transferred in both directions.
Scaling	Select the Input -> Output Scaling checkbox to perform input/output scaling. When this checkbox is selected, the Input Min , Output Min , Input Max , and Output Max fields are enabled allowing you to set the your scaling parameters.
Dead Value	Select the Use the following dead value option to specify a dead value. Selecting that option enables the Value and Type fields. The dead value is the value that the point assumes if the OPC input quality is bad for longer than the specified lifetime value. The dead value has no effect if the lifetime is set to 0, or in no input OPC tag is specified.
DDE	Select the Server to DDE checkbox if you want the point to be visible to the DDE clients. The point can be accessed from a DDE client by using the syntax:

Component	Description
	DataManager\hub!group\item Note: The DDE topic name is hub unless specified otherwise by the -t start-up parameter to MatrikonOPC Data Manager. The DDE item name is the concatenation of the group and shared point tags with a \ delimiter.
OK	Select this button to save any changes and close the window.
Cancel	Select this button to close this window without saving any changes made.

Table 18 - Add Shared Point Window (Options Tab) Components

Advanced Tab

Figure 24 displays the **Advanced** tab on the **Add Shared Point** window.

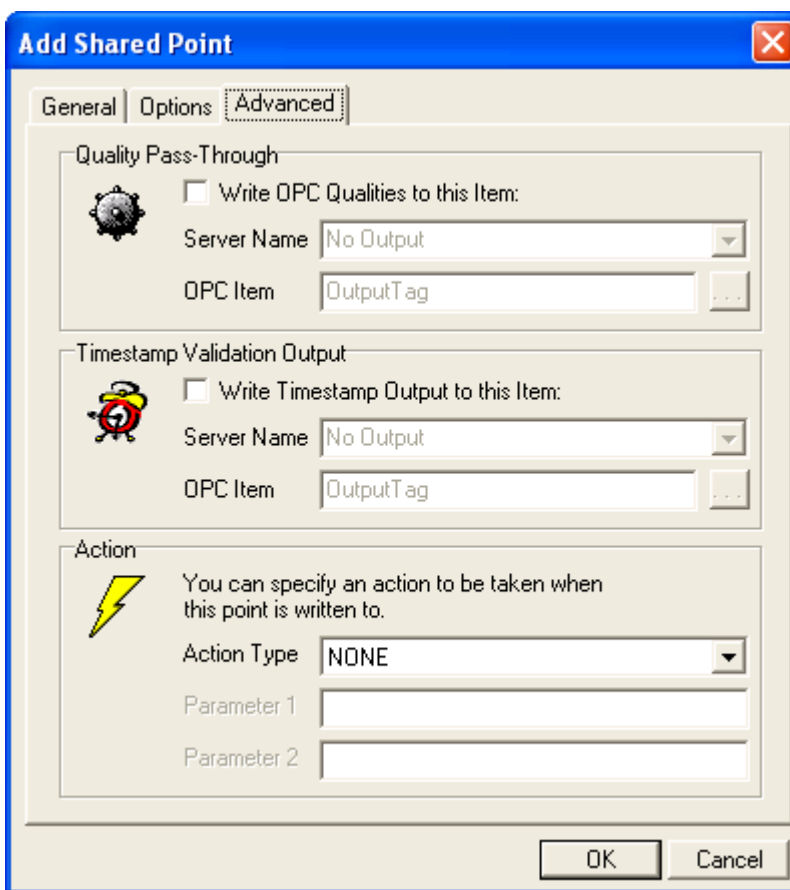


Figure 24 - Add Shared Point Window (Advanced Tab)

The **Add Shared Point Advanced** tab components are described in Table 19.

Component	Description
Quality Pass-Through	Select the Write OPC Qualities to this Item checkbox if you want the OPC quality (e.g., GOOD , BAD , UNCERTAIN) of the input OPC item to be written to an output item. You can then specify the Server Name and OPC Item (i.e., tag name) of the output item.

Component	Description
Timestamp Validation Output	Select the Write Timestamp output to this Item checkbox if you would want the timestamp from the input OPC item to be written to an output item as an output validation. You can then specify the Server Name and OPC Item (i.e., tag name) of the output item. Note: The timestamp occurs in the milliseconds format. If the output tag does not accept milliseconds then a string data type can be used instead.
Action	Use the Action Type drop-down list to specify and assign an action to the shared point. Actions are triggered when a value is written to the share point. An example of an action is " <i>whenever point group1\item1 is updated, set the OPC update rate for group Group1 to 3000</i> ". The actual action that is taken depends on the contents of the Parameter fields (which are enabled once an Action Type of anything other than NONE is selected) and on the value that is written to the point when the action is triggered. Table 20 describes the available action types, the meaning of the parameters, and the write value. Note: All values written by an action to a shared point must be 32-bit words (VT_UI4).
OK	Select this button to save any changes and close the window.
Cancel	Select this button to close this window without saving any changes made.

Table 19 - Add Shared Point Window (Advanced Tab) Components

Table 20 shows the list of action types, parameters, and value the action type takes.

Action Type	Parameter 1	Parameter 2	Value
ACTION_NONE No action (this is the default)	N/A	N/A	N/A
ACTION_SETIGNOREALL Clears or sets the IgnoreAll OPC Updates flag	N/A	N/A	0: Clears flag 1: Sets flag
ACTION_REFRESHALL Refreshes all values in all ODM groups	N/A	N/A	Must be ≥ 1
ACTION_REFRESHGROUP_DEVICE Refreshes the ODM point values from the devices	ODM group name	N/A	Any value change
ACTION_REFRESHGROUP_CACHE Refreshes the ODM point values from the cache	ODM group name	N/A	Any value change
ACTION_RESETGROUPSTATS Resets all ODM group statistics to 0	ODM group name	N/A	Must be ≥ 1
ACTION_RESETPOINTSTATS Resets all ODM point statistics to 0	ODM point name; format: group\point	N/A	Must be ≥ 1

Action Type	Parameter 1	Parameter 2	Value
ACTION_RESETALLSTATS Resets all ODM statistics to 0	N/A	N/A	Must be ≥ 1
ACTION_SETGROUP_MASTERUPDATERATE Sets the Master OPC update rate for an ODM group	ODM group name	N/A	New update rate (in ms)
ACTION_SETGROUP_SLAVEUPDATERATE Sets the Slave OPC update rate for an ODM group	ODM group name	N/A	New update rate (in ms)
ACTION_SETGROUP_LIFETIME Sets the lifetime for an ODM group	ODM group name	N/A	New lifetime (in ms)
ACTION_ACTIVATEGROUP Activates an ODM group	ODM group name	N/A	Must be ≥ 0
ACTION_DEACTIVATEGROUP Deactivates an ODM group	ODM group name	N/A	Must be ≥ 0
ACTION_DELAYEDDEACTIVATEGROUP Deactivates an ODM group after x seconds, then writes a 0 to the point in Parameter 2	ODM group name	DM point; format: group\point	Delay time x, in seconds
ACTION_ACTIVATE_DEACTIVATEGROUP activates an ODM group, then deactivates it after x seconds	ODM group name	N/A	Delay time x, in seconds
ACTION_SETGROUP_ACTIVESTATE Activates or deactivates an ODM group	ODM group name	N/A	0: Deactivate ≥ 1 : Activate

Table 20 - Actions

To create a shared point:

1. From the **Configuration Tool** main screen, in the **Data Manager Groups** panel, highlight the group to which you want to add a shared point.
2. Select the **Add Shared Point** menu option from the **Manager** menu, or
Right-click your mouse in the bottom right panel and select **Add Shared Point** from the displayed menu.
3. The **Add Shared Point** (Figure 22) window appears.
4. Edit the shared point components as desired.
5. Click on the **OK** button. If the shared point is created successfully, it will appear in the bottom right panel (Figure 25).

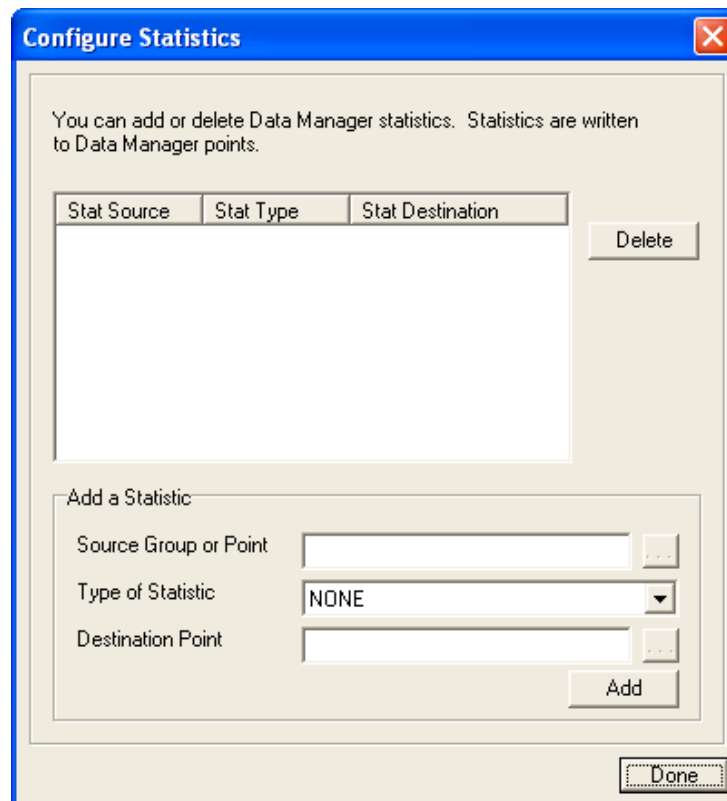
Data Manager Groups	Tag	A.	B.	Master (Input)	Acc...	Slave (Output)	Acc...	Type	Master's ...	Quality	Timestamp
group1	itemtag4			Localhost\Matri...				VT_I1	0	Good	9/12/2008...
A&E Subscriptions											
No Redundancy.											
Ready. 1 item(s) loaded.											

Figure 25 - New Shared Point

Adding Statistics

Data Manager collects a number of statistics that can be written to Data Manager shared points. Once a statistic has been written to a Data Manager point, it can be used like any other point in that it can be viewed using the Configuration Tool, and it can be written to OPC items.

Statistics are added in the **Configure Statistics** window (Figure 26). The window components are described in Table 21.



Configure Statistics

You can add or delete Data Manager statistics. Statistics are written to Data Manager points.

Stat Source	Stat Type	Stat Destination

Delete

Add a Statistic

Source Group or Point:

Type of Statistic:

Destination Point:

Add

Done

Figure 26 - Configure Statistics Window

Component	Description
Grid	Lists all existing statistics according to Stat Source , Stat Type , and Stat Destination .
Delete	Highlight a statistic in the grid and then select this button to delete the statistic.
Source Group or Point	Enter the source of the statistic. For example, the source for GROUPREADS is an ODM group name and therefore the name of the group for which the statistic is being requested, is to be entered.
Type of Statistic	From the drop-down list, select the type of statistic you are adding. For example, GROUPREADS specifies the number of reads in a Data Manager group. Refer to Table 22 for a list of the available statistic types.
Destination Point	The destination point of the statistic. This is the name of the Data Manager point to which the statistic should be written.
Add	Once you have configured the statistic, select this button to add it to the grid at the top of the window.
Done	Once you have finished adding statistics, select this button to close the Configure Statistics window.

Table 21 - Configure Statistics Window Components

Table 22 lists and describes types of statistics.

Statistic Type	Description
GROUPREADS	The total number of reads (i.e., updates) into an ODM group.
GROUPREADERRS	The total number of read errors (i.e., BAD quality updates) by an ODM group.
GROUPWRITES	The total number of writes from an ODM group.
GROUPWRITEERRS	The total number of write errors (i.e., BAD quality writes) by an ODM group.
POINTREADS	The total number of reads (i.e., updates) into an ODM point.
POINTREADERRS	The total number of read errors (i.e., BAD quality updates) into an ODM point.
POINTWRITES	The total number of writes from and ODM point.
POINTWRITEERRS	The total number of write errors (BAD quality writes) by an ODM point.

Table 22 - Statistic Types

To add a statistic:

1. From the **Configuration Tool** main screen, select the **Statistics** menu option from the **Manager** menu.
2. The **Configure Statistics** (Figure 26) window appears.
3. Enter or select the statistic information as desired.
4. Click on the **Add** button. The newly-created statistic now appears in the grid section of the window (Figure 27).

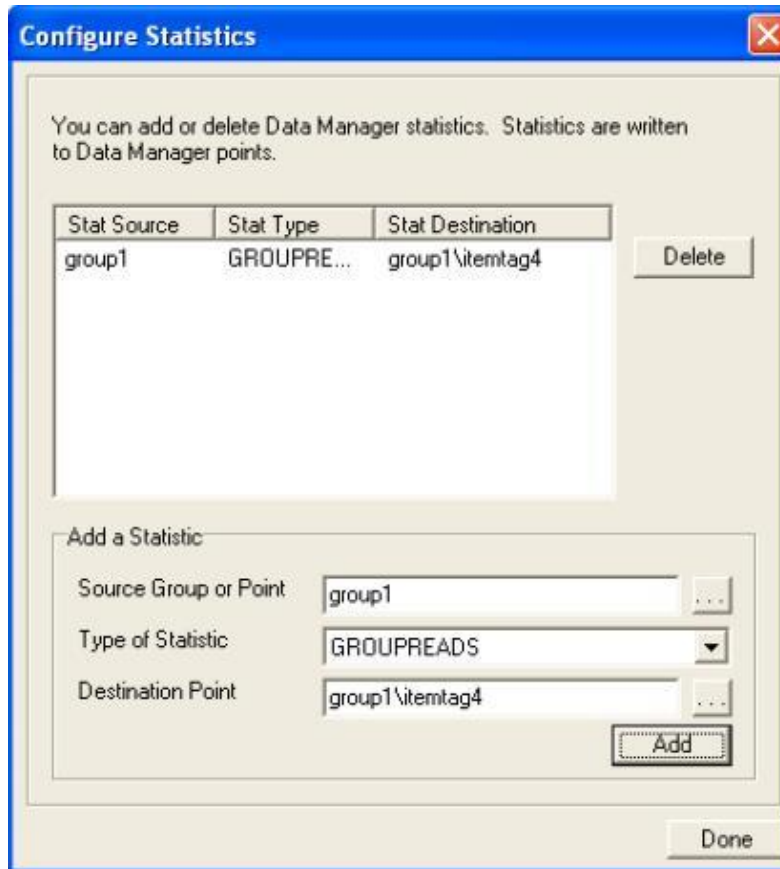


Figure 27 - New Statistic

5. Click on the **Done** button to close the **Configure Statistics** window and return to the **Configuration Tool**.

To delete an existing statistic:

1. From the **Configuration Tool** main screen, select the **Statistics** menu option from the **Manager** menu.
2. The **Configure Statistics** (Figure 27) window appears.
3. In the grid at the top of the window, select the statistic you wish to remove.
4. Click on the **Delete** button. The grid is refreshed and the statistic is no longer listed.
5. Click on the **Done** button to close the **Configure Statistics** window and return to the **Configuration Tool**.

Shortcuts

Creating a MatrikonOPC Data Manager point can be cumbersome if many points need to be configured. The **Configuration Tool** offers two shortcuts that lead to a partially-completed **Add Shared Point** window:

1. By using the OPC server browsers in the top two panels, and dragging one OPC item and dropping it on another, it is possible to specify a MatrikonOPC Data Manager point with the dragged OPC item as its input and the dropped-upon item as its output.
2. By double-clicking on an OPC item in either OPC server browser, it is possible to specify a MatrikonOPC Data Manager point with no output, and the selected point as its input.

Redundancy

Need for Redundancy

Some industries need extremely high reliability even if the components themselves may not be reliable. These industries implement redundant systems so that if one system fails, a backup system can take over. MatrikonOPC Data Manager (Version 4.0 and onward) now supports redundancy.

Two MatrikonOPC Data Managers can be configured as a primary/backup pair so that if the primary fails, the backup takes over. Each MatrikonOPC Data Manager considers the other MatrikonOPC Data Manager to be its sibling, that is, an identical copy of it that can support all of its functionality should it fail.

Redundancy Signalling

Redundancy is implemented by having each MatrikonOPC Data Manager send a signal, or "heartbeat", to its sibling. The sibling monitors this heartbeat every 10 milliseconds. When a pre-determined period of time has elapsed with no heartbeat detected, MatrikonOPC Data Manager considers its sibling as having failed and takes the appropriate action. The primary MatrikonOPC Data Manager continues acting as the primary while a backup MatrikonOPC Data Manager ramps up to act as the full primary MatrikonOPC Data Manager. When the heartbeat is once again detected, a backup MatrikonOPC Data Manager returns to its backup duty. When the primary Data Manager loads a configuration file, it is considered as non-operational. The backup Data Manager does not stop to receiving and sending the data until the Primary Data Manager fully loads its configuration. If the primary has no shared point groups, it will be considered non-operational and the backup Data Manager takes control until groups are added to the primary.

Backup Operation

A MatrikonOPC Data Manager can be configured in any one of three redundancy settings: **Primary**, **Hot Backup**, or **Warm Backup**. The possible redundancy settings are illustrated in Figure 28. Lines show connections (i.e., links) and arrows show data transmission.

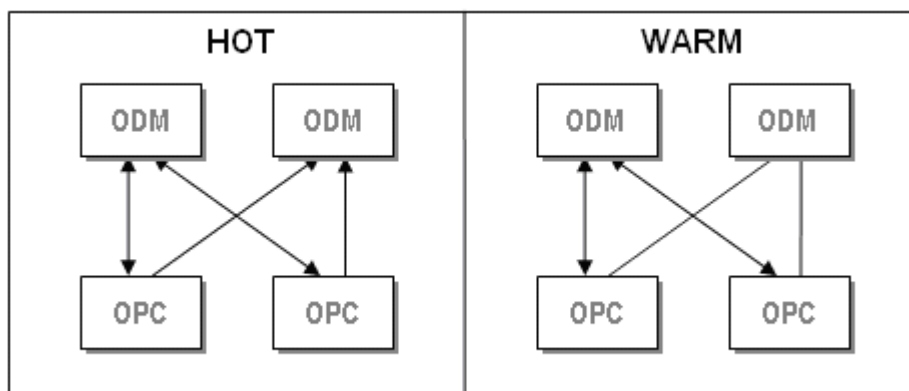


Figure 28 - Backup Operation

A **Primary** Data Manager operates as a normal MatrikonOPC Data Manager. This setting is used for an ODM that is either a sole Data Manager, or the primary Data Manager of a primary/backup pair.

A **Hot Backup** Data manager will operate as a normal MatrikonOPC Data Manager but, since it is a backup, it will not attempt to write to any of the OPC servers until the primary fails. A Hot Backup Data Manager will, however, read from the servers and thus has up-to-date information on all

points, at all times. Since a Hot Backup Data Manager is active, the time between detection of failure and full operation is minimal (less than one second). A Hot Backup will stop writing as soon as the primary's heartbeat is detected again. This setting is used to achieve the maximum amount of reliability possible, at the expense of more network traffic and a higher amount of memory and CPU usage in each OPC server.

A **Warm Backup** Data Manager will create groups in each OPC server, but will not activate any of its groups until the primary fails. This means that it does not read from or write to any of the OPC servers until the primary fails. Even though it is subscribed, it will likely have bad or outdated information when it starts up, as Warm Backup must activate all of its groups when the primary fails. The time needed to respond to the failure may be significant, depending on how many groups the Data Manager is handling. A Warm Backup will stop writing to the OPC servers as soon as the primary's heartbeat is detected again, and will need additional time to deactivate all of the groups it has activated. This setting is used when the amount of additional data traffic generated by a Hot Backup is not desirable, and the additional time required to enable the group is not considered vital.

Redundancy Display

The current redundancy status is displayed in the extreme lower left corner of the MatrikonOPC Data Manager **Configuration Tool** window (under the **A&E Subscriptions** screen section). The left portion of the status bar changes colour and displays a message, depending on the redundancy setting and the current sibling status. The representation of the connections in the MatrikonOPC Data Manager's system tray icon also changes colour to reflect the status of communication between MatrikonOPC Data Manager and the server to which it is connected. Table 23 lists the available redundancy messages.

Colour	Message	Description
Default screen colour	No Redundancy.	Redundancy has not been enabled.
Yellow	Waiting.	MatrikonOPC Data Manager is in the initial "Wait <i>time</i> before detecting" phase or is now waiting to detect a heartbeat.
	Sibling has no configuration.	Currently, the sibling does not have any groups loaded and is considered failing. A failover will happen immediately in that case.
	Sibling is loading configuration.	Currently, the sibling is loading a configuration file. A failover will happen immediately in that case.
Green	Alive <i>time</i> ago.	The sibling last sent a heartbeat <i>time</i> ago. This is less than the preset failure time.
Red	Down for <i>time</i> .	The sibling last sent a heartbeat <i>time</i> ago. This is greater than or equal to the preset failure time.

Table 23 - Redundancy Messages

Caveats

The redundancy in MatrikonOPC Data Manager assumes that each MatrikonOPC Data Manager is configured properly. To ensure that a configuration is correct, observe these guidelines:

- Each MatrikonOPC Data Manager must run on its own machine. If two instances of ODM are created on the same computer, the second will fail and shut down.

- Configuring both a MatrikonOPC Data Manager and its sibling as Primary or Backup will result in an error and both units will shut down.
- Each MatrikonOPC Data Manager should be configured so that the heartbeat transmission rate is at least ten times faster than the heartbeat detection time on the other unit. For example, if the Primary MatrikonOPC Data Manager sends its heartbeats every 50 milliseconds, the Backup MatrikonOPC Data Manager may be set to detect them every 1,000 milliseconds.
- Files to be executed when a MatrikonOPC Data Manager or sibling error occurs must be an executable, batch file, or other program that can be launched within a system shell. If a relative directory path, or no directory path, is specified, the DM directory is used as the default directory.
- Redundancy uses Universal (or User) Datagram Protocol (UDP) to transmit the heartbeat to each other. Make sure that no firewalls or other port-blocking methods prevent this from happening.
- Users cannot set the transmit rate to be higher than 1,000 milliseconds. If this is set higher, MatrikonOPC Data Manager will stop transmitting a heartbeat.

Alarms and Events

MatrikonOPC Data Manager, in addition to mirroring OPC data, is also able to report OPC alarms and events. This section describes how the alarms and events client works, and how to set up the alarms and events capabilities in MatrikonOPC Data Manager.

MatrikonOPC Data Manager is capable of advanced event reporting using the OPC A&E and DA specifications. MatrikonOPC Data Manager connects to any number of event servers as a client and requests event updates based on the configured event subscriptions. Upon receiving new events, MatrikonOPC Data Manager matches the event against the user-defined event criteria and writes the event value to the specified OPC data item.

Figure 29 shows the flow of event data through MatrikonOPC Data Manager.

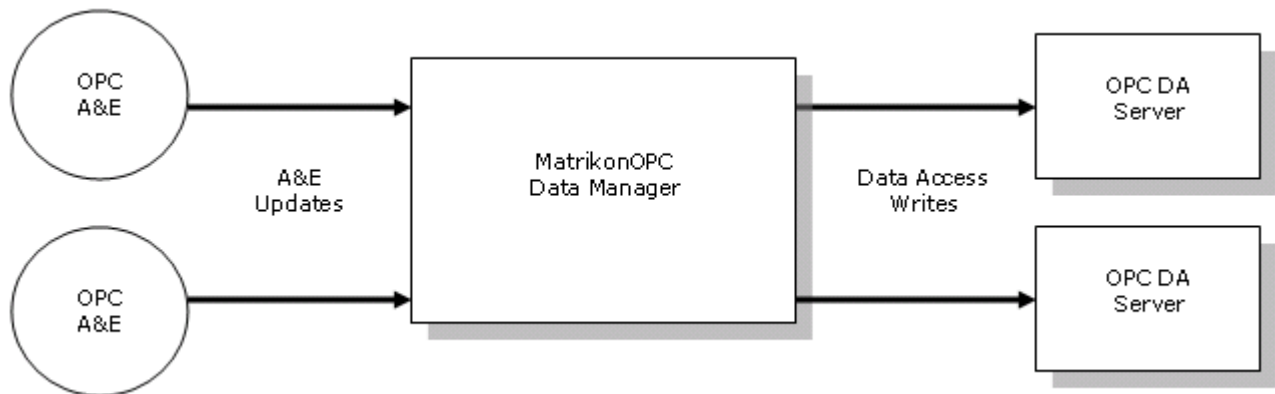


Figure 29 - Alarms and Events Data Flow

To achieve this data flow, you must configure event subscriptions and event mappings. Subscriptions are specific to a single OPC event server. The server interprets a subscription as an event filter. MatrikonOPC Data Manager allows subscriptions to filter by event type, severity, and category. Event mappings would let the MatrikonOPC Data Manager know what to do when it receives an event update from the OPC server. Without any mappings, MatrikonOPC Data Manager will take no action when events are received. Each mapping specifies criteria that MatrikonOPC Data Manager can use to uniquely identify one or more events and write the appropriate value to an OPC data item.

MatrikonOPC Data Manager Main Screen

The primary MatrikonOPC Data Manager configuration display has few additions to support OPC alarms and events. The left OPC server tree shows OPC event servers with event subscriptions listed under the shared groups. Event mappings can be displayed in the same space as shared points, depending on whether a shared group or an event subscription is selected. This section describes each of these displays.

Event Server Tree

The left OPC server tree displays OPC event servers underneath the data servers. These event server nodes can be expanded to show information about the given server. Each server node expands to show the three basic event types:

- Simple
- Conditional
- Tracking

The event types contain event categories, which contain both attributes and conditions. Finally, each condition expands to show all sub-conditions. Nodes that do not expand have no children. Figure 30 shows the **Event Server Tree**.

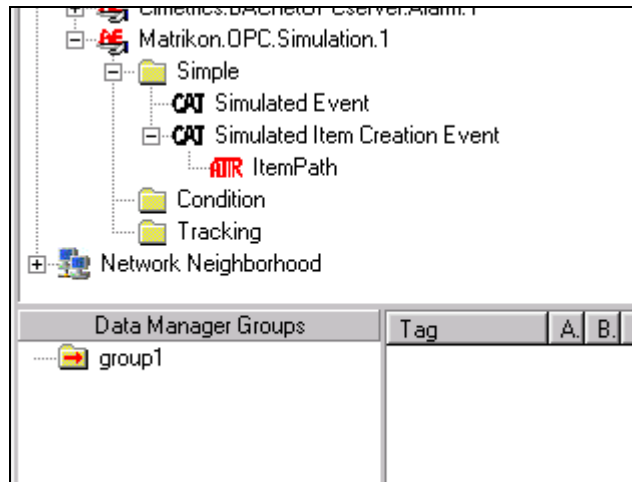


Figure 30 - Event Server Tree Example

Event Subscription List

Similar to the way shared groups are listed, event subscriptions are displayed to the left of the shared point list. Each event subscription currently configured, is listed in a small frame under the shared group list. Since event subscriptions can only receive event data and write to OPC items, they are considered unidirectional and are therefore represented by the unidirectional icon as shown in Figure 31.

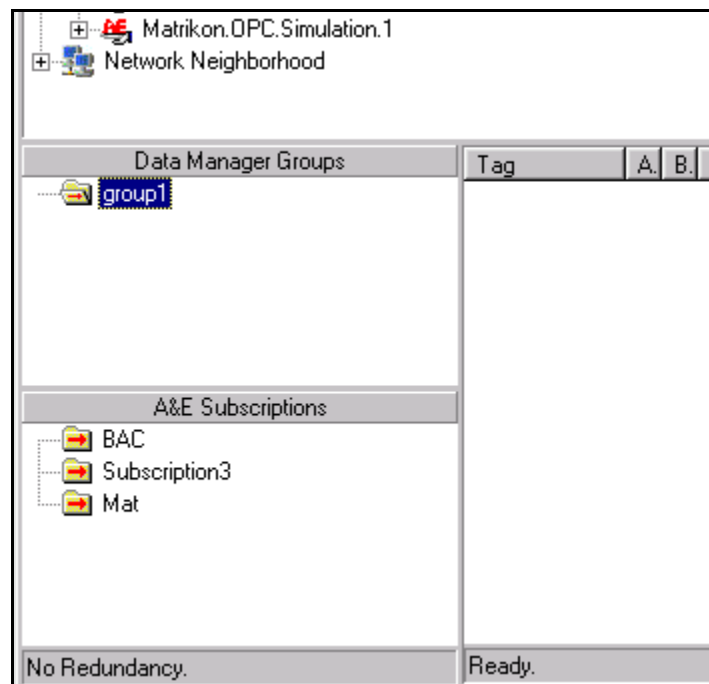


Figure 31 - Event Subscription List

Event Mapping List

The area normally used to view shared points serves a dual purpose. When an event subscription is selected from the subscriptions list this area changes to display the event mappings for that subscription. When an event is received that matches the criteria for any of these events, the event list is updated with the new value, severity, and timestamp. It is possible that several events will show updates if the received event matches the criteria for several mappings. The event list displays the event name, event type, category, condition, sub-condition, source string, output OPC item, value of the last event, and the time of the last event. The event mapping list is shown in Figure 32.

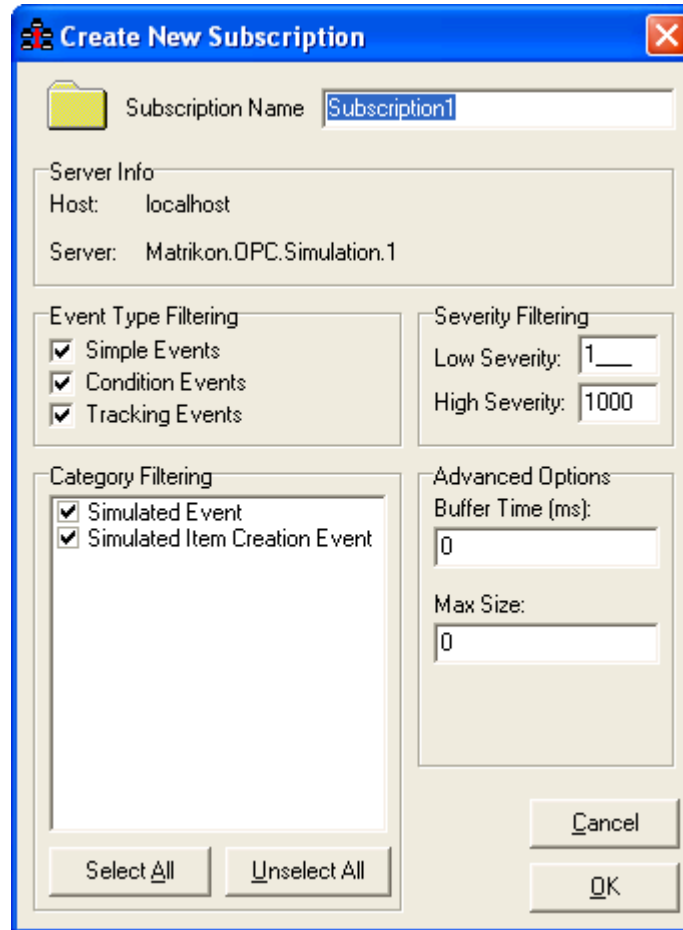
Event	Type	Category	Condit...	Subco...	Source...	Output	Value	Severity	Timestamp
Event0	Simple	All	All	All		Local...	Low	0	5/22/2001 17:05:51
Simulated Event	Simple	Simulated Event	All	All		Local...	Low	0	5/22/2001 17:05:51
Ready.									

Figure 32 - Event Mapping List

Event Subscriptions

Event subscriptions are the conduit through which MatrikonOPC Data Manager communicates with an OPC event server. Subscriptions define a filter, telling the OPC event server which events to send to MatrikonOPC Data Manager.

Event subscriptions are created in the **Create New Subscription** window (Figure 33). Table 24 describes the window components.



The dialog box is titled "Create New Subscription" and contains the following sections:

- Subscription Name:** A text field containing "Subscription1".
- Server Info:**
 - Host: localhost
 - Server: Matrikon.OPC.Simulation.1
- Event Type Filtering:**
 - ☒ Simple Events
 - ☒ Condition Events
 - ☒ Tracking Events
- Severity Filtering:**
 - Low Severity: 1
 - High Severity: 1000
- Category Filtering:**
 - ☒ Simulated Event
 - ☒ Simulated Item Creation Event
- Advanced Options:**
 - Buffer Time (ms): 0
 - Max Size: 0

At the bottom, there are buttons for "Select All", "Unselect All", "Cancel", and "OK".

Figure 33 - Create New Subscription

Component	Description
Subscription Name	Enter a name for the current subscription.
Server Info	Displays the OPC event server Host and Server name. This information is display only and cannot be changed.
Event Type Filtering	Choose one or more event types by selecting or clearing the required checkboxes.
Severity Filtering	Enter a range of event severities. These values must be between 0 and 1000 . The Low Severity cannot be greater than the High Severity .
Category Filtering	This field displays all of the categories supported by the event server. Choose one or more of these categories to reported by the server.
Advanced Options	This section allows you to fine tune the way the server buffers new events. Buffer Time tells the server how often (in milliseconds) to send event notifications. This is a minimum time. The server will not send new events faster than this time unless the Max Size parameter is greater than 0 , in which case the server will send notifications sooner to obey the Max Size. A Buffer Time value of 0 means that the server will send event notifications as soon as possible.

Component	Description
	The Max Size option is the maximum number of events that will be reported by the server at a time. A value of 0 means that there is no limit. Note: A Max Size value greater than 0 may cause the server to send new events more frequently than the Buffer Time .
Cancel	Select this button to close this window without saving any changes made.
OK	Select this button to save any changes and close the window.

Table 24 - Create New Subscription Window Components

To create an event subscription:

1. From **Configuration** tool, in the browser in the top left panel, browse to any OPC event server.

Notes:

- The red AE letters on the server icon identify event servers.
 - OPC event servers are browsed on the left browsing tree view only.
2. Right-click your mouse on the selected server and select the **Add Subscription** menu option from the displayed menu.
 3. The **Create New Subscription** window appears.
 4. Enter or select the required subscription properties.
 5. Select the **OK** button to close the **Create New Subscription** window and return to the **Configuration Tool**. The new event subscription item appears in the **A&E Subscriptions** panel (Figure 34).



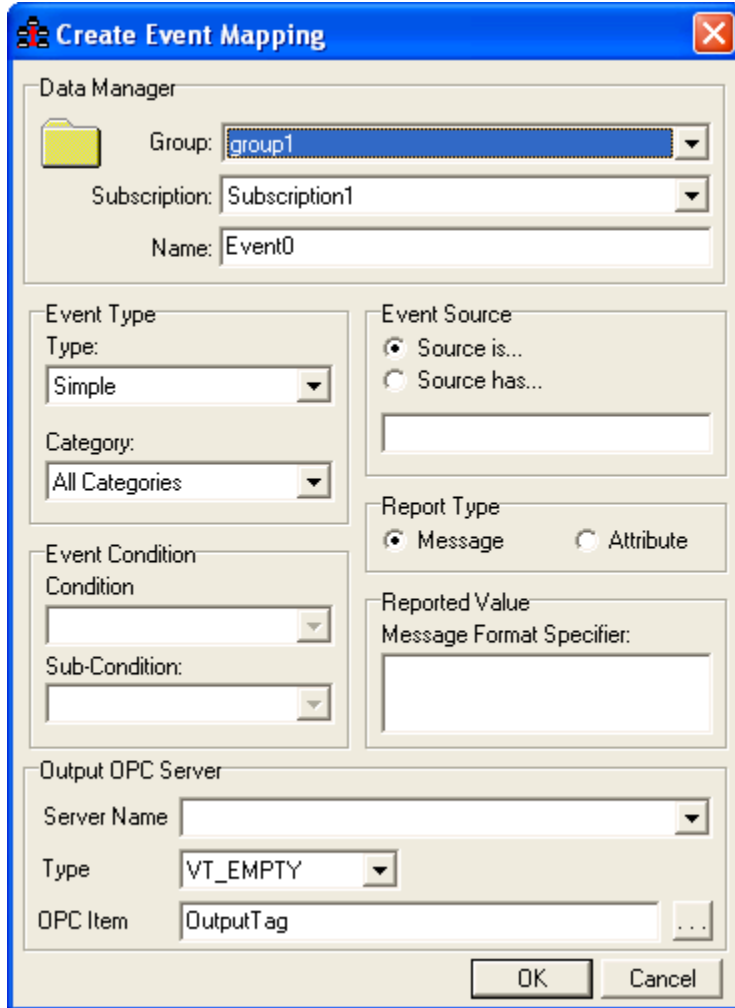
Figure 34 - New Subscription

Note: Right-clicking your mouse on an item in the subscription list displays menu options allowing you to delete or edit a subscription. The **Change Subscription** window is identical to the window for creating a new subscription. Changes take effect immediately.

Event Mappings

MatrikonOPC Data Manager event mappings control how MatrikonOPC Data Manager will respond to event notifications. The mapping defines a set of criteria that MatrikonOPC Data Manager uses to uniquely identify a group of events. Once MatrikonOPC Data Manager receives an event that matches the criteria of one or more mappings, the value of the event is extracted and written to the appropriate OPC data item.

Before you can create an event mapping, you must have at least one shared group configured. Once you have a shared group, you can create an event mapping by selecting a subscription, right-clicking your mouse in the event list display, and selecting the **Add Event** menu option from the displayed menu. The **Create Event Mapping** window (Figure 35) is displayed.



The **Create Event Mapping** window is a dialog box with a blue title bar and a close button. It contains several sections for configuring an event mapping:

- Data Manager:** Includes a folder icon, a **Group:** dropdown menu (set to "group1"), a **Subscription:** dropdown menu (set to "Subscription1"), and a **Name:** text field (set to "Event0").
- Event Type:** Includes a **Type:** dropdown menu (set to "Simple") and a **Category:** dropdown menu (set to "All Categories").
- Event Source:** Includes two radio buttons: **Source is...** (selected) and **Source has...**. Below them is an empty text field.
- Event Condition:** Includes a **Condition** dropdown menu and a **Sub-Condition** dropdown menu.
- Report Type:** Includes two radio buttons: **Message** (selected) and **Attribute**.
- Reported Value:** Includes a **Message Format Specifier** text field.
- Output OPC Server:** Includes a **Server Name** dropdown menu, a **Type** dropdown menu (set to "VT_EMPTY"), and an **OPC Item** text field (set to "OutputTag") with a browse button (...).

At the bottom right are **OK** and **Cancel** buttons.

Figure 35 - Create Event Mapping Window

Event Identification

Each event mapping must be associated with a shared group and an event subscription. These are selected by choosing from the **Group** and **Subscription** drop-down lists at the top of the **Create Event Mapping** window. You must also give the event mapping a name. Once the event is created you cannot change the name or subscription, so be sure that these are correct **before** you select the **OK** button.



Note: Unlike shared points, event mappings may have duplicate names. To avoid confusion however, be careful not to give two events the same name.

Event Criteria

Users configure the criteria by which events are uniquely identified by setting the event type, condition, and source. The event type is used to quickly discard events that do not meet the criteria.

The event mapping must be associated with an event type, which can be one of simple, conditional, or tracking. After choosing the event type, the **Category** drop-down list is filled with potential categories for the selected type. Choose the category criteria by selecting a category from this field. You can also choose to accept any category by selecting **All Categories**.

If the selected event type is **Condition**, the **Condition** and **Subcondition** drop-down lists are populated with possible choices. Making a selection from these fields sets the condition and sub-condition criteria. Additionally, you may choose to accept any conditions or sub-conditions by selecting **All Conditions** or **All Subconditions** respectively.

The final filter criterion is event source. Enter all or a portion of the source string in the **Event Source** field. The radio option buttons above the text field determine how the source string will be interpreted. If you choose **Source is...** then MatrikonOPC Data Manager will accept only events whose source exactly matches the string entered in text field. If the **Source has...** option is selected then events will be accepted as long as the text in the text field appears anywhere in the event source. To accept all event sources simply leave the event source text field blank.

Event Data Reporting

When MatrikonOPC Data Manager receives events, they contain several pieces of information. Each event mapping tells MatrikonOPC Data Manager how to extract a single value from the event and to which OPC data item to write the value.

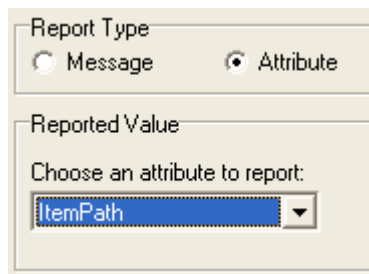
MatrikonOPC Data Manager can extract the event value in one of two ways:

1. By reading the event message, or
2. By reading an event attribute.

You must select either the **Message** or **Attribute** option from the **Report Type** screen section, to choose the value reporting type. The **Reported Value** field changes when the report type is selected to allow you to further specify how to report the value.

Specifying an Attribute Value

When the **Attribute** option is selected in the **Report Type** screen section, the **Reported Value** field changes to allow you to select an event attribute as shown in Figure 36. This drop-down list is populated only after the category has been selected. Therefore it is not possible to use attribute reporting with the **All Categories** option.



The screenshot shows a software interface with two main sections. The top section is titled 'Report Type' and contains two radio buttons: 'Message' and 'Attribute'. The 'Attribute' radio button is selected. The bottom section is titled 'Reported Value' and contains a label 'Choose an attribute to report:' followed by a drop-down menu. The drop-down menu is open, showing 'ItemPath' as the selected option.

Figure 36 - Specifying an Attribute Value

The exact attribute value to report is chosen by making a selection from the drop-down list in the **Reported Value** field. When MatrikonOPC Data Manager receives an event notification that

matches the criteria set by the rest of this window, the value of this event attribute will be written to the specified OPC data item.

Specifying a Message Value

Choosing the **Message** option in the **Report Type** screen section causes the **Reported Value** field to display the message format entry field as shown in Figure 37. This field allows you to enter a string that tells MatrikonOPC Data Manager how to interpret the event message and how to extract a value from that message.

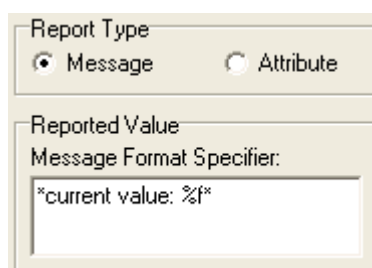


Figure 37 - Specifying a Message Value

The message format string may contain the common wild-card characters asterisk (*) and question mark (?). The asterisk character means that MatrikonOPC Data Manager will match any number of any characters, including no characters. The question mark tells MatrikonOPC Data Manager to accept any single character. If MatrikonOPC Data Manager cannot successfully match the message format string against the event message, then the event will be discarded. This allows you to use the message format string as additional filter criteria.

Identifying the value to extract from the message string is done using the percent (%) character followed by a letter to specify the data type to read. The follow data type identifiers are valid:

- F** – Floating Point
- I** – Integer
- S** – String

When MatrikonOPC Data Manager encounters this special character arrangement in the message format string, it will attempt to read the given data type from the event message at that position. This value becomes the value that is written to the OPC data item.

If you wish to read a portion of the event message as a string, you must provide a text string following the **%S**. This text trailer acts as the right-hand delimiter for the string value. For instance if the message format string is **Text: %S end**, and the event message is **Text: This is the end**, then the value extracted from the message will be **This is the**. To extract a string value to the end of the event message either provide no right-hand delimiter or use the asterisk wild-card character.

Table 25 contains some message formatting examples:

Message Format String	Event Message	Value
current value: %f	The current value: 12.4 lbs	12.4
current value: %f*	The current value: 12.4 lbs	No Data (format does not match)
current value: %i	current value: 12.4 lbs	12
current value: %s	The current value: 12.4 lbs	12.4 lbs
current value: %s kilos	The current value: 12.4 lbs	No Data (format does not match)

Message Format String	Event Message	Value
current value: %s (	The current value: 12.4 lbs (mo)	12.4 lbs
current value:(%s)*	The current value: 12.4 lbs (mo)	mo

Table 25 - Message Formatting Examples

Specifying an Output Data Item

The final step in setting up an event mapping is specifying which OPC data item to which to write the event value. This information is entered in the **Output OPC Server** screen section. You must specify the target OPC data server, the data type of the data to be written, and the full item path. If you wish to use the default data type for the given item, select **VT_EMPTY** in the **Type** drop-down list.

Event Interaction

You can delete or edit an event mapping once it is created. To access the necessary change or delete options, right-click your mouse on an event in the event mapping list.



Note: Editing an event does not allow you to change the event's name or subscription designation.

MatrikonOPC Data Manager Configuration

MatrikonOPC Data Manager Global Settings

MatrikonOPC Data Manager configuration settings can be accessed by selecting the **Settings** option from the **Manager** menu. The **MatrikonOPC Data Manager Settings** window has five tabs:

- **Startup**
- **Advanced**
- **Quality**
- **Redundancy**
- **Other**

Startup Tab

The **Startup** tab on the **Data Manager Settings** window is displayed in Figure 38.

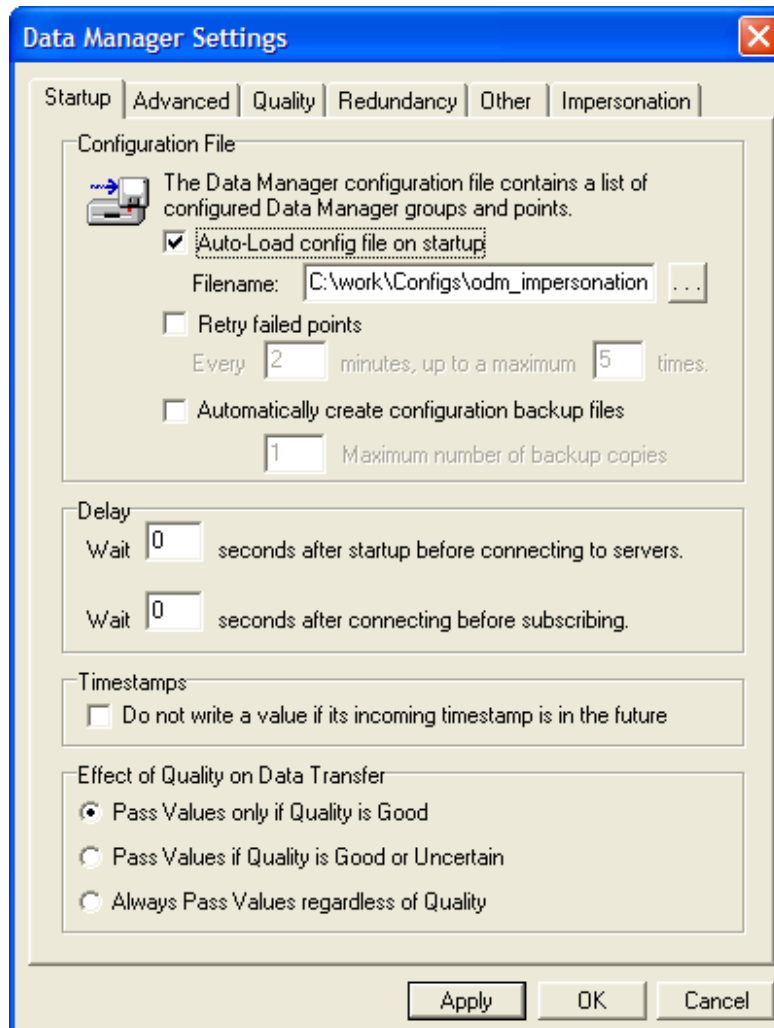


Figure 38 - Data Manager Settings Window (Startup Tab)

Table 26 describes the components of the **Data Manager Settings** window **Startup** tab.

Component	Description
Auto-Load config file on startup	Select this checkbox if you want MatrikonOPC Data Manager to automatically load a configuration file. This option is especially useful when MatrikonOPC Data Manager is running as a Windows service that starts automatically. The file to be loaded can be either typed in the Filename field (which is enabled once the checkbox is selected), or selected from a menu by choosing the ellipsis button beside it.
Retry failed points	Select this checkbox if you want MatrikonOPC Data Manager to try to create points that can not be created on the first try. MatrikonOPC Data Manager will retry each point at the interval specified, up to the number of retries specified.
Delay	You can specify a delay (in seconds) that MatrikonOPC Data Manager will wait before subscribing to points. Use this to give slow OPC servers time to connect to the device and start device communications.
Timestamps	If this checkbox is selected, a value with an incoming timestamp that is in the future, is not written.
Effect of Quality on Data Transfer	This screen section allows you to select what qualities will be passed from one server to the another. There are three options: • Pass Values only if Quality is Good • Pass Values if Quality is Good or Uncertain • Always Pass Values regardless of Quality
Apply	Select this button to apply any changes made. Using this button does not close the window.
OK	Select this button to save any changes and close the window.
Cancel	Select this button to close this window without saving any changes made.

Table 26 - Data Manager Settings Window (Startup Tab) Components



Note: Re-using CSV files created in case sensitive mode, in non-case sensitive mode, may lead to unexpected results. For example, the tag names **Tag1** and **tag1** are different in case sensitive mode, but identical in non-case sensitive mode. Loading a CSV file with both tag names in non-case-sensitive mode will result in the second tag being ignored.

Advanced Tab

The **Advanced** tab on the **Data Manager Settings** window is displayed in Figure 39.

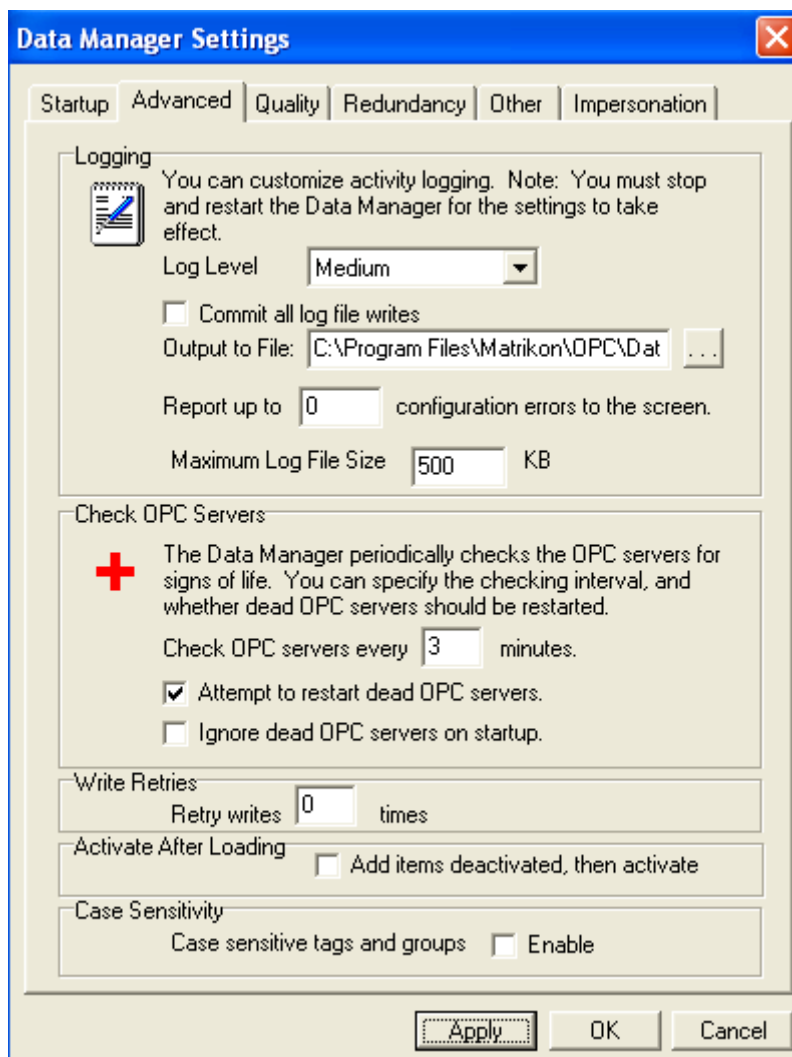


Figure 39 - Data Manager Settings Window (Advanced Tab)

Table 27 describes the components of the **Data Manager Settings** window **Advanced** tab.

Component	Description
Logging	You can select a MatrikonOPC Data Manager logging level and output log file. Notes: - This is not the same as the Configuration Tool log level (from the Configuration Tool main screen, select the Set Log Level menu option from the View menu). A log level of Low is recommended when not debugging MatrikonOPC Data Manager functionality. A High log level can result in very large log files and can slow down MatrikonOPC Data Manager considerably. - Selecting the Commit all log file writes checkbox forces all log file writes to take place immediately, rather than being buffered by the system. You can also set the maximum number of errors in the configuration file that MatrikonOPC

Component	Description
	Data Manager will report to on-screen logging.
Check OPC Servers	MatrikonOPC Data Manager periodically checks the “alive” status of the OPC servers it connects to. Use the fields in this section to specify the checking interval and whether MatrikonOPC Data Manager should attempt to restart an OPC server that it believes has failed. Attempting to restart servers while MatrikonOPC Data Manager is starting may cause a significant delay as MatrikonOPC Data Manager repeatedly attempts to restart a dead server to add points to it. Select the Ignore dead OPC servers on startup checkbox to cause MatrikonOPC Data Manager to ignore this option during start-up. This will cause MatrikonOPC Data Manager to not attempt to start servers that it cannot subscribe to during start-up (when MatrikonOPC Data Manager is initializing points from its configuration file). All points in these servers will be considered non-existent.
Write Retries	For DA writes, Data Manager may be configured to retry failed writes. Use Write Retries to set the number of retries that will take place after a failed write.
Activate After Loading	Starting with version 6.0.2.0, Data Manager will: • create its groups inactive. • add all of the OPC items for each group at once, which is repeated for all groups. • activate any groups that should be in an active state. If this checkbox is selected, OPC items will be added as being disabled and then enabled. If it is not selected, items will be added as being enabled. By OPC specification, items will not update unless the group is active and the item is enabled, so items will not start updating until the groups are activated.
Case Sensitivity	When case sensitivity is turned on (i.e., the Enable checkbox is selected), MatrikonOPC Data Manager will keep the exact case sensitive tag names and groups that the you specify. If this option is turned on, you need to turn this setting on inside the MatrikonOPC Data Manager OPC server as well. MatrikonOPC Data Manager must be restarted for changes in case sensitivity to take effect.
Apply	Select this button to apply any changes made. Using this button does not close the window.
OK	Select this button to save any changes and close the window.
Cancel	Select this button to close this window without saving any changes made.

Table 27 - Data Manager Settings Window (Advanced Tab) Components

Quality Tab

The **Quality** tab on the **Data Manager Settings** window is displayed in Figure 40. On this tab, a table that maps numerical OPC qualities to a string can be defined. When a quality item is defined, the OPC quality written to the item is determined by the following rules:

1. If the OPC quality item is a string, then a value from the **Translation** column is written. Consider Figure 40, if the quality of an OPC item is **192** and the type of the quality item is a string, then the string from the **Translation** column, **GOOD**, is written.
2. If the OPC item is numeric and the string in the **Translation** column is also numeric, Data Manager will attempt to convert this number to the type of the OPC item. Consider a mapping from the **OPC Quality** of **192** with a **Translation** of **9999**. If we receive an OPC quality of **192** and the quality item is a two-byte unsigned integer, the string will be converted to the value **9999** and be written to quality item. If the quality item is a one-byte unsigned integer, this conversion fails (because the value **9999** is too large), and Data Manager tries the third rule.
3. If the quality item is numeric, but the **Translation** from the quality translation table is not, then Data Manager writes the numeric OPC quality to the quality tag. Consider Figure 40, if the quality of the OPC item is **192** and the type of the quality item is numeric, we cannot write the string **GOOD** to this item. Thus the numeric OPC value **192** is used.
4. If it is impossible to write a string or number to the quality item, then this write simply fails. This will be true for OPC items with array types.

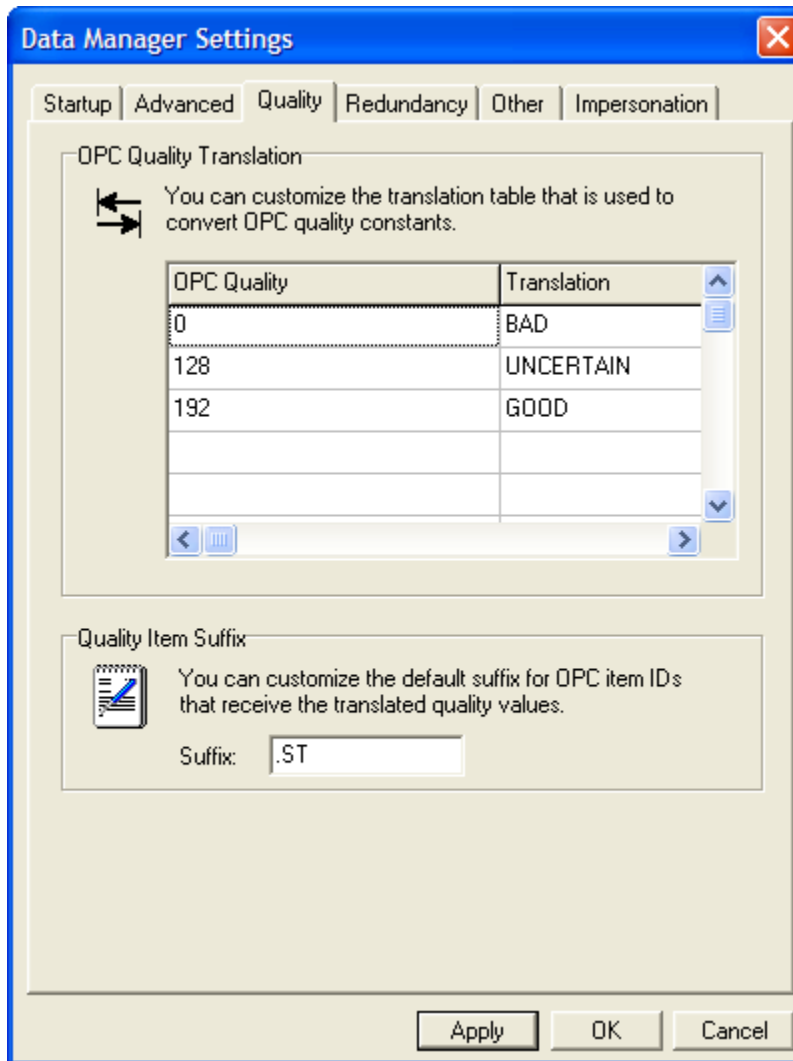


Figure 40 - Data Manager Settings Window (Quality Tab)

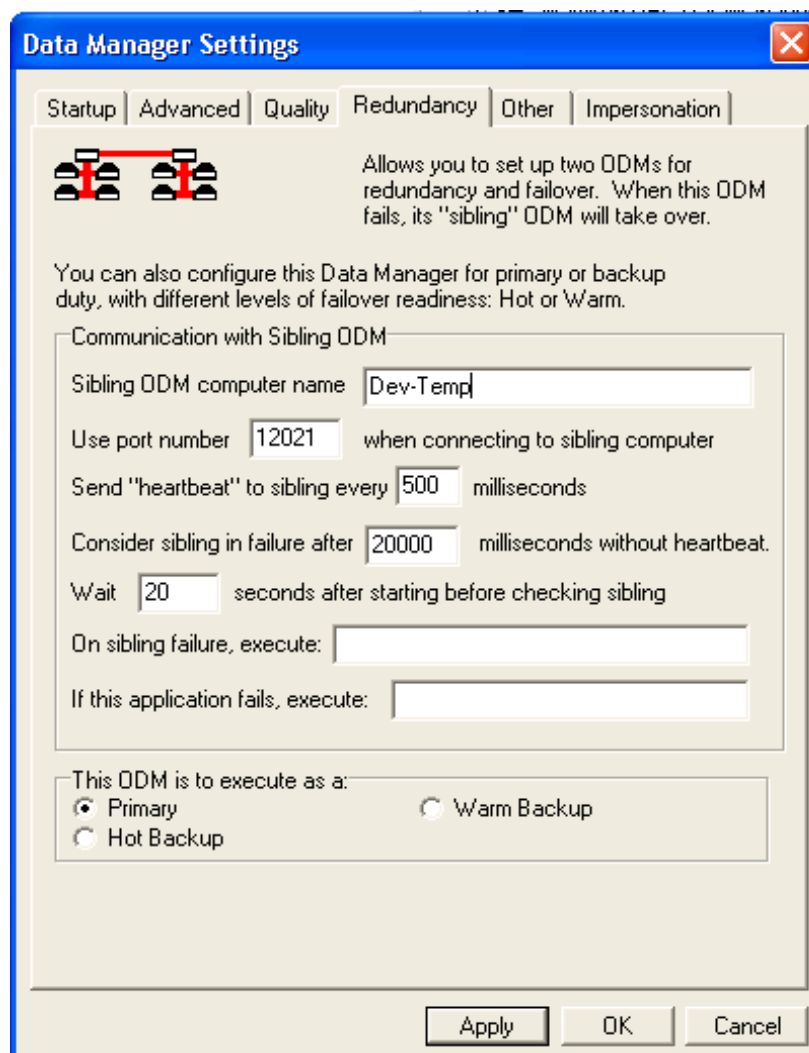
Table 28 describes the components of the **Data Manager Settings** window **Quality** tab.

Component	Description
OPC Quality Translation	When a Data Manager point receives values from OPC items, it can write the quality of those items to other OPC items. The Quality tab allows you to specify how the incoming OPC Quality values are translated into outgoing values. The values only have an effect for Data Manager points that actually specify an OPC item to send the quality to. This screen section consists of a translation table (which you can customize) used to convert OPC quality constants
Quality Item Suffix	The Suffix field allows you to enter a default suffix for OPC item IDs that receive the translated quality values.
Apply	Select this button to apply any changes made. Using this button does not close the window.
OK	Select this button to save any changes and close the window.
Cancel	Select this button to close this window without saving any changes made.

Table 28 - Data Manager Settings Window (Quality Tab) Components

Redundancy Tab

The **Redundancy** tab on the **Data Manager Settings** window is displayed in Figure 41.



Data Manager Settings

Startup | **Advanced** | Quality | Redundancy | Other | Impersonation

 Allows you to set up two ODMs for redundancy and failover. When this ODM fails, its "sibling" ODM will take over.

You can also configure this Data Manager for primary or backup duty, with different levels of failover readiness: Hot or Warm.

Communication with Sibling ODM

Sibling ODM computer name

Use port number when connecting to sibling computer

Send "heartbeat" to sibling every milliseconds

Consider sibling in failure after milliseconds without heartbeat.

Wait seconds after starting before checking sibling

On sibling failure, execute:

If this application fails, execute:

This ODM is to execute as a:

☒ Primary ☐ Warm Backup ☐ Hot Backup

Apply OK Cancel

Figure 41 - Data Manager Settings Window (Redundancy Tab)

Table 29 describes the components of the **Data Manager Settings** window **Redundancy** tab.

Component	Description
Sibling ODM computer name	For no redundancy, leave this field blank. The program will operate as a single (non-redundant) Data Manager. To configure a redundant pair, type in the computer name of the other (sibling) Data Manager in this field. The computer name must not have slashes before it.
Use port number	The configuration requires a port to send out the heartbeat on. This port must be the same for both of the Redundant MatrikonOPC Data Managers.
Send "heartbeat" to sibling every	Each unit sends a "heartbeat" to the other to inform the other that it is alive.
Consider sibling in failure after	You can control how often a signal is sent to the sibling Data Manager to inform it that this Data Manager is still active, and how often this Data Manager checks to see that this signal has been received.
Wait	The duration the backup must wait from the time it starts for a signal

Component	Description
	from the primary, before going into the full operating mode. This only occurs on application start-up and is designed to allow a brief period of time, for both Primary and Backup to initialize the data spaces and to stabilize in the normal operating mode, before the failover triggers are monitored.
On sibling failure, execute	This field allows you to specify a program to execute when the Data Manager detects that its sibling has failed.
If this application fails, execute	This field allows you to specify a program to execute when the Data Manager detects that it has hit a critical error and cannot continue. Note: If a Data Manager crashes or the computer or network connection fails, it cannot inform the user and the program specified here will not be run
This ODM is to execute as a	In this screen section, you can specify whether a MatrikonOPC Data Manager operates as a primary unit or a backup unit, and the specific level of redundancy desired.
Apply	Select this button to apply any changes made. Using this button does not close the window.
OK	Select this button to save any changes and close the window.
Cancel	Select this button to close this window without saving any changes made.
Sibling ODM computer name	For no redundancy, leave this field blank. The program will operate as a single (non-redundant) Data Manager. To configure a redundant pair, type in the computer name of the other (sibling) Data Manager in this field. The computer name must not have slashes before it.

Table 29 - Data Manager Settings Window (Redundancy Tab) Components

Other Tab

The **Other** tab on the **Data Manager Settings** window allows you to configure miscellaneous options and is displayed in Figure 42.

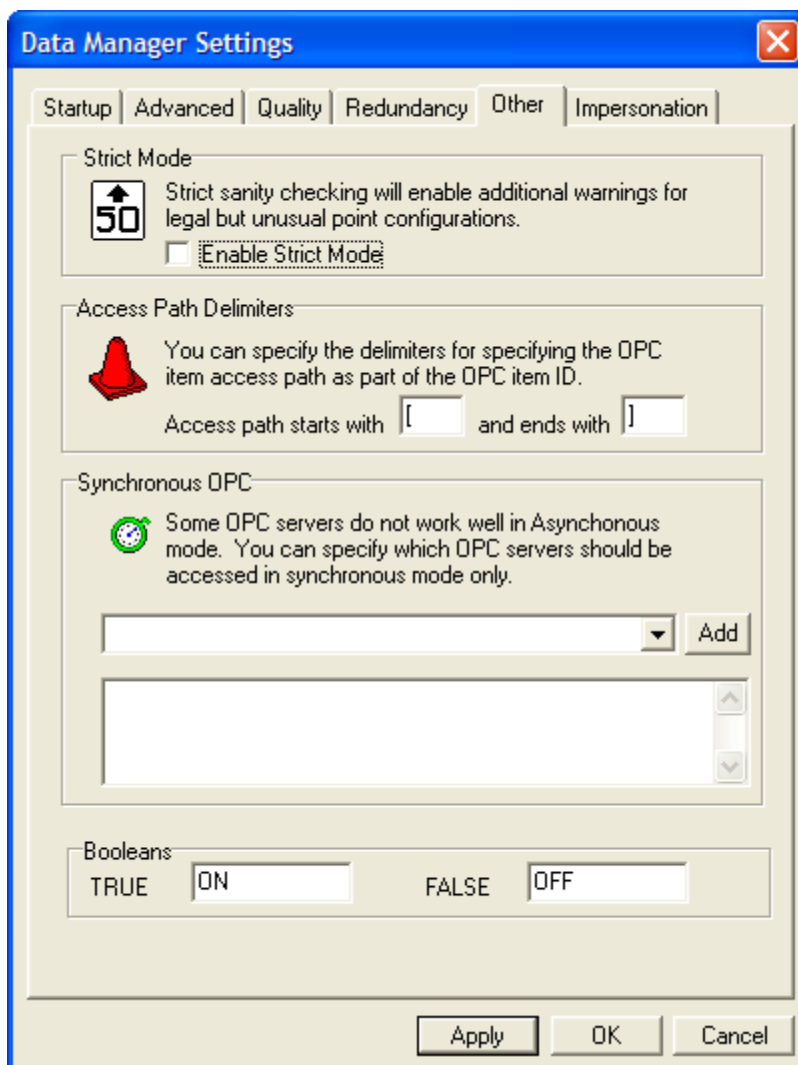


Figure 42 - Data Manager Settings Window (Other Tab)

Table 30 describes the components of the **Data Manager Settings** window **Other** tab.

Component	Description
Strict Mode	Selecting this checkbox enables strict mode. This means that some legal but unusual point configurations result in warnings being logged. Some such configurations are: - Points with no input or no output OPC items. - Points where the input data type does not match the output data type
Access Path Delimiters	Change this section if you want to change the access path delimiters from the default of { and }. For example, if you change the start and end delimiters to (and), respectively, an OPC item specification with an access path will have the form: <i>This:is:the:ItemID(This is the access path)</i>
Synchronous OPC	Change this section if you want the Data Manager to access an OPC server using synchronous interfaces only. This may be required

Component	Description
	because the asynchronous interfaces on some OPC servers are not implemented correctly. To do so, enter the ProgID of the server to which you wish to communicate synchronously (e.g., Matrikon.OPC.Simulation.1). The drop-down list in this section includes all of the servers detected by Data Manager. The Add button is used to add the server selected from the drop-down list to the list of synchronous servers.
Booleans	You can specify what text is written to the Slave value of a Master-Slave pair when the Master is a Boolean and the Slave is a String. For example, you may want OPEN and CLOSED, 1 and 0, ON and OFF, TRUE and FALSE, or -1 and 0. If either of these fields is cleared, the corresponding Boolean values will not display. If the Configuration Tool is closed and reopened, any Boolean values which were cleared will be restored to the default TRUE or FALSE.
Apply	Select this button to apply any changes made. Using this button does not close the window.
OK	Select this button to save any changes and close the window.
Cancel	Select this button to close this window without saving any changes made.

Table 30 - Data Manager Settings Window (Other Tab) Components

Impersonation Tab

The **Impersonation** tab on the **Data Manager Settings** window allows you to configure a user used for impersonation upon login and is displayed in Figure 43.

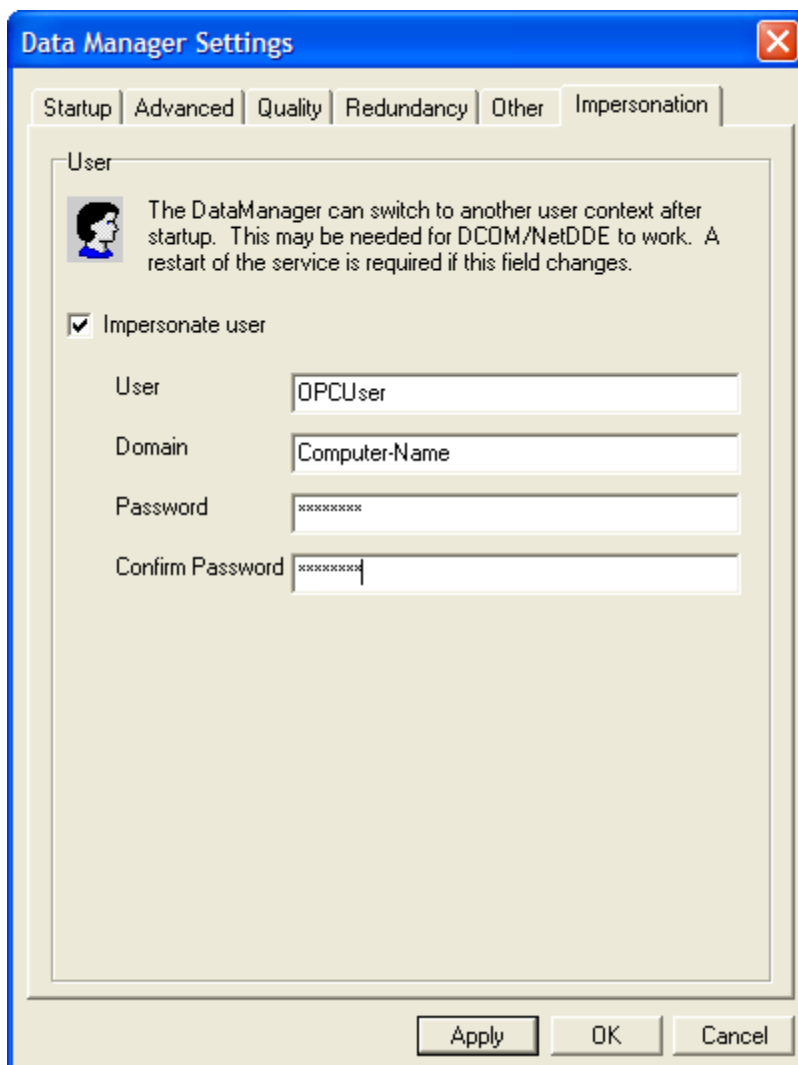


Figure 43 - Data Manager Settings Window (Impersonation Tab)

Table 31 describes the components of the **Data Manager Settings** window **Impersonation** tab.

Component	Description
Impersonate user	Checking this checkbox enables the user to configure a user for impersonation and enables ODM to impersonate the configured user upon login.
User	User account ODM will run under.
Domain	Domain that this user exists on.
Password	User's password to login.
Confirm Password	Password requires confirmation.

Table 31 - Data Manager Settings Window (Impersonation Tab) Components

Notes:

- When the **Impersonate user** checkbox is not selected, ODM runs under the SYSTEM account, just like a normal service.
- If ODM is installed as a service, the user account to be impersonated should have the privileges to log on as a service. If the user does not have this privilege, ODM may fail to communicate.
- To grant the log on service privilege to a user, an Administrative user must perform the following steps:



1. Launch **Local Security Policy** editor (**Start** menu -> **Control Panel** -> **Administrative Tools**).
2. Click on **User Rights Assignment** (under **Security Settings** -> **Local Policies**).
3. Double-click on the **Log on as a service** policy.
4. If the user you wish to use does not show up in the list and is not part of any groups listed, click on the **Add User** or **Group** button, enter the user or group name, and click **OK**.
5. Click **OK** to close the **Log on as a service Properties** window.

MatrikonOPC Data Manager Configuration Files

File Format

MatrikonOPC Data Manager uses standard comma-separated value (*.CSV) file format. Each file contains lines describing MatrikonOPC Data Manager statistics, groups, points, event subscriptions and event mappings.

Defining Statistics Using CSV

CSV lines describing statistics have the fields shown in Table 32.

Number	Field
1	STATISTIC keyword.
2	Source of statistic (ODM point for point statistics, or ODM group for group statistics).
3	Destination of statistic (ODM point to which to write value).
4	Type of statistic (refer to Table 22).
5	Reserved, must be blank.
6	Reserved, must be blank.

Table 32 - Statistic Configuration Lines

For example, the following line defines a read statistic. The number of reads of Data Manager group **group1** is tallied, and is stored in ODM point **group5\itemtag10**.

STATISTIC, group1, group5\itemtag10, GROUPREADS,,

Configuring Groups Using CSV

The lines describing groups each have the following 25 comma-separated items as shown in Table 33.

Number	Field
1	GROUP keyword.
2	Group name.
3	Lifetime in milliseconds.
4	Master OPC update rate in milliseconds.
5	Slave OPC update rate in milliseconds.
6	Default dead option flag – 0: no dead value by default, 1: use dead value.
7	Default DDE option flag.
8	Default direction flag – 0: unidirectional, 1: bidirectional.
9	Active flag.
10	Refresh data from – 0: ODM CACHE, 1: PHYSICAL DEVICE.
11	Reserved, must be blank.
12	Reserved, must be blank.
13	Reserved, must be blank.
14	Default dead value.
15	Default dead value type, must be one of VT_I2, VT_I4, VT_R4, VT_R8, VT_CY, VT_DATE, VT_BSTR, VT_BOOL, VT_I1, VT_UI1, VT_UI2, VT_UI4.
16	Reserved, must be blank.
17	Reserved, must be blank.
18	Reserved, must be blank.
19	Reserved, must be blank.
20	Reserved, must be blank.
21	Reserved, must be blank.
22	Reserved, must be blank.
23	Reserved, must be blank.
24	Reserved, must be blank.
25	Reserved, must be blank.

Table 33 - Group Configuration Lines

For example, the following line describes a bi-directional active group with a point lifetime of 30 seconds, master update rate of 1.001 seconds, slave update of 1 second, with no dead value:

GROUP,"bi fast additional 5000",30000,1001,1000,,,1,1,,,,,VT_EMPTY,,,,,,,,,

Defining Points Using CSV

The shared point lines must have 31 items as listed in Table 34.

Number	Field
1	POINT keyword.
2	ODM point tag name.
3	Reference string.
4	InputTag, format: Host_Name\ProgId_of_OPC_Server\OPC_Item .
5	OutputTag, format: Host_Name\ProgId_of_OPC_Server\OPC_Item .
6	Input data type. Must be one of VT_I2, VT_I4, VT_R4, VT_R8, VT_CY, VT_DATE, VT_BSTR, VT_BOOL, VT_I1, VT_UI1, VT_UI2, VT_UI4. See Appendix C – Standard Data Types for further information.
7	Output data type. Must be one of VT_I2, VT_I4, VT_R4, VT_R8, VT_CY, VT_DATE, VT_BSTR, VT_BOOL, VT_I1, VT_UI1, VT_UI2, VT_UI4. See Appendix C – Standard Data Types for further information.
8	Dead value flag – 0: no dead value, 1: use dead value. Fields 16-17 set the dead value.
9	Scaling flag -- 0: no scaling, 1: scaling. Fields 18-21 set the scaling factor.
10	DDE flag – 1: tag visible by DDE, 0 or no flag: invisible to DDE.
11	Quality flag – 1: write quality to separate ODM item. Use field 22 to specify the ODM point. A value of 0, or no value, indicates that quality will not be written elsewhere.
12	Action flag – 1: perform action on write. Use fields 23-25 to specify the action. A value of 0 or no value indicates that no action is to be performed on write.
13	Bidirectional flag – 0: unidirectional point, 1: bidirectional point.
14	HDA output flag – 0: normal output, 1:HDA output.
15	OPC Timestamp Output – 0:no output, 1:output timestamp to 2 nd item.
16	Dead value.
17	Dead value type. Must be one of VT_I2, VT_I4, VT_R4, VT_R8, VT_CY, VT_DATE, VT_BSTR, VT_BOOL, VT_I1, VT_UI1, VT_UI2, VT_UI4. See Appendix C – Standard Data Types for further information.
18	Scaling parameter: Input minimum.
19	Scaling parameter: Input maximum.
20	Scaling parameter: Output minimum.
21	Scaling parameter: Output maximum.
22	Quality Tag, format: Host_Name\ProgId_of_OPC_Server\OPC_Item .
23	Action type (see table 3-2).
24	Action parameter 1 (see Table 20).
25	Action parameter 2 (see Table 20).
26	Input tag access path.
27	Output tag access path.
28	Reserved, must be blank.

Number	Field
29	Reserved, must be blank.
30	Reserved, must be blank.
31	Reserved, must be blank.

Table 34 - Point Configuration Lines

For example, the following line defines a Data Manager point named **itemtag2**, in unit **group1**. It will have its input side tied to item **Random.Int1** on the **Matrikon.OPC.Simulation** server on the computer **TREVOR-KIZIAK**, and will accept values of type **VT_I1**. It has no output side and no dead value.

```
POINT,group1\itemtag2,"Any Reference String",  
\\TREVOR-KIZIAK\Matrikon.OPC.Simulation\Random.Int1,,  
VT_I1,,,,,,,,VT_EMPTY,0,0,0,0,,NONE,,,,,,,,
```

Defining Event Subscriptions Using CSV

The event subscription configuration lines will have a variable number of items depending on how the subscription was configured. Table 35 describes each item in the order that they must appear in the line.

Field
SUBSCRIPTION keyword.
Event Subscription Name.
OPC Event Server, format: Host_Name\ProgId_of_Event_Server .
Buffer Time (in milliseconds).
Maximum Event Items.
Filter Type. Use 1 for simple, 2 for conditional, and 4 for tracking.
Number of Event Categories.
Event Category IDs (one CSV item for each category ID).
Low Severity.
High Severity.
Number of Areas (<i>not supported – must be zero</i>).
Area Names (one CSV item for each area) (<i>not supported – must be omitted</i>).
Number of Sources (<i>not supported – must be zero</i>).
Source Names (one CSV item for each source) (<i>not supported – must be omitted</i>).
Reserved, must be blank.
Reserved, must be blank.
Reserved, must be blank.
Reserved, must be blank.
Reserved, must be blank.

Field
Reserved, must be blank.
Reserved, must be blank.
Reserved, must be blank.
Reserved, must be blank.
Reserved, must be blank.

Table 35 - Order of Items

Defining Event Mappings using CSV

Event mapping configuration lines have 29 CSV items. Table 36 lists the required items.

Number	Field
1	EVENT keyword.
2	Event Mapping Name.
3	Shared Group Name.
4	Event Subscription Name.
5	Event Type. Use 1 for simple, 2 for conditional, and 4 for tracking.
6	All Categories Flag. 1 = Accept all categories.
7	Category ID. Only valid if All Categories Flag is zero.
8	All Conditions Flag. 1 = Accept all conditions.
9	Condition Name. Only valid if All Condition Flag is zero.
10	All Subconditions Flag. 1 = Accept all subconditions.
11	Subcondition Name. Only valid if All Subcondition Flag is zero
12	Source Type. Use 1 for "Source is" and 2 for "Source has".
13	Source String.
14	Report Type. Use 1 for message reporting and 2 for attribute reporting.
15	Message Filter String. Only valid if the report type is "message".
16	Attribute ID. Only valid if the report type is "attribute".
17	Output OPC Data Server, format: Host_Name\ProgId_of_OPC_Server .
18	Output Data Type.
19	Output OPC Item.
20	Reserved, must be blank.
21	Reserved, must be blank.
22	Reserved, must be blank.
23	Reserved, must be blank.
24	Reserved, must be blank.

Number	Field
25	Reserved, must be blank.
26	Reserved, must be blank.
27	Reserved, must be blank.
28	Reserved, must be blank.
29	Reserved, must be blank.

Table 36 - Required Items

Saving MatrikonOPC Data Manager Configuration Files

The current MatrikonOPC Data Manager configuration can be saved to a file by selecting **File** from the main configuration tool menu, followed by the **Save As** menu option.

Loading MatrikonOPC Data Manager Configuration Files

There are three ways to configure MatrikonOPC Data Manager using a configuration file:

1. MatrikonOPC Data Manager will automatically load the specified configuration file if file auto-load is selected in the MatrikonOPC Data Manager settings (select **Manager** -> **Settings** -> **Startup** to set this value).
2. A configuration file can be selected and loaded via the Configuration Tool's **File, Open** menu selection.
3. The **-c=xxxx** command line option loads the configuration file **xxxx**.

MatrikonOPC Server for Data Manager Configuration

The product's GUI allows users to view and alter configuration parameters at run time. When a user views a configuration parameter, the information is retrieved and displayed. The updated parameters are sent as a group to the server when submitted.

Minimal configuration of the MatrikonOPC Data Manager is required for the server to function properly, but users can customize the server's behaviour as required. This chapter shows users how to start and configure the product and describes each component in detail, including the windows, panels, and menu commands.

The **Starting MatrikonOPC Server for Data Manager** section of this manual shows users how to start the software. The next four sub-sections describe the **Tool Tray Menu**, **Control Panel**, **Configuration** window, and the **Options** window, in detail.

The **Server Configuration** section describes in detail how to configure the product. Instructions for configuring the MatrikonOPC Data Manager as a DDE service appear in **Appendix D - Microsoft Excel as a DDE Client**. The **Alias Configuration** section explains how to create user-defined aliases in place of regular OPC items, followed by four sub-sections that cover saving, clearing, and loading configuration settings, and shutting down the product.

Dynamic Data Exchange (DDE)

The server may act as a DDE service. In this way, a DDE client can request data from the server using the following DDE commands:

XTYP_POKE	Write data to an item in the server.
XTYP_REQUEST	Read data from an item in the server.
XTYP_ADVREQ	Read latest data from an active advice loop.
XTYP_ADVSTART	Create and activate an advice loop on a single item in the server.
XTYP_ADVSTOP	Stop and destroy an advice loop on a single item in the server.

DDE service can be enabled or disabled using a checkbox (refer to **Advanced Options** for more information, including the location of, this checkbox). Note that these options will not be available if the server does not support DDE.

Items within the server can be referenced using the following syntax:

SERVICE_NAME | ITEM! SCANDetails

SERVICE_NAME represents the name of the DDE service. The first edit box specifies the service name used by this server.

ITEM refers to an Item ID of a point within the server.

SCANDetails is a combination of the desired scan rate of the item, and an access path. One or more delimiting characters separate the scan rate and access path. The second edit box can be used to change the delimiters. The delimiting characters must be provided when referencing an item in the server, however the scan rate and access path are optional. However, if no scan rate is specified, only data contained in the server cache will be available through DDE, and an advice loop will not be updated.

Changes to the DDE options will not take effect until the server is restarted.



Note: DDE Name Syntax – DDE Names may be described in the following syntax: **SERVICE|TOPIC|NAME**

In this case, consider the **TOPIC** to be the item ID, and the **NAME** to be a combination of the scan rate and access path.

Starting MatrikonOPC Server for Data Manager

To launch the MatrikonOPC Server for Data Manager, choose the appropriate shortcut from the **Start** menu.

To start the MatrikonOPC Server for Data Manager:

1. Click on the Windows **Start** button and select **Programs -> MatrikonOPC -> Data Manager**, and choose **MatrikonOPC Server for Data Manager**.

When the server is installed as a service, the splash screen does not appear, nor does the logo appear in the **Tool Tray**. Instead, the main **Configuration** window is immediately displayed. If the server is installed as a Windows service, users can also start it using the **Service Control Manager** applet (under the Windows **Control Panel**).

2. If the server is not installed as a Windows service, the service starts and the **MatrikonOPC** logo  appears in the **Tool Tray** (Figure 44), located by default in the system tray.



Figure 44 - Tool Tray

If the product is not installed as a Windows service, the **Welcome** screen appears briefly when the product starts up.

Notes:



- If the product is not installed as a service, the server will automatically start up when a client (such as MatrikonOPC Explorer) first tries to connect to it.
- If the server is installed as a service, users can choose to run it as an application by re-registering the OPC server executable using the **/REGSERVER** command-line switch.

Tool Tray Menu

Note: If the server is installed as a Windows service, the **Tool Tray** and **Tool Tray Menu** are not available.

The **Tool Tray Menu** provides access to the **Control Panel**, the **Configuration** window, and the **About** screen. It also contains the commands to shut down the server.

To view the Tool Tray Menu:

1. Right-click your mouse on the **MatrikonOPC** logo .
2. The **Tool Tray Menu** appears (Figure 45).

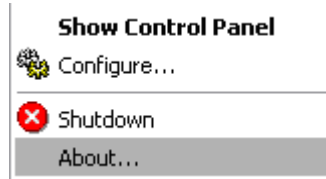


Figure 45 - Tool Tray Menu

Table 37 describes the commands in the **Tool Tray Menu**.

Command	Description
Show Control Panel	Displays the configuration control panel .
 Configure	Displays the main Configuration window .
 Shutdown	Shuts down the server.
About	Displays the server's Welcome screen, which includes information about the software.

Table 37 - Tool Tray Menu Commands

When started from a command line, MatrikonOPC Data Manager accepts the following command line parameters:

- **-t=xxxxx** The DDE topic name used for serving DDE items. The default value is **hub**.
- **-l=xxxxx** The name of the log configuration file.
- **-c=xxxxx** The name of the configuration CSV file. By default, MatrikonOPC Data Manager starts up with no shared points configured unless an auto-load configuration file has been specified with the configuration tool. If an auto-load configuration file and **-c=xxxxx** are both specified, the **-c=xxxxx** option takes precedence.

Example:

DataManager.exe -l=C:\MyLogs\PlantDMInfo.log -c=C:\Devices\PlantDeviceList.csv

Control Panel

Note: If the server is installed as a Windows service, the **Control Panel** is not available.

The **Control Panel** displays the server's status, system time, and number of clients connected to the server. The **Control Panel** allows users to:

- Access the **Configuration** window.
- Access the **About** screen.
- Execute the command to shut down the server.

The **Control Panel** stays on top of every other window on the desktop to help monitor the status of the server.

To view the Control Panel:

1. Right-click your mouse on the **MatrikonOPC logo** .
2. The **Tool Tray Menu** appears.
3. From the **Tool Tray Menu**, select the **Show Control Panel** menu option.

- The **Control Panel** (Figure 46) appears.



Figure 46 - Control Panel

- To “window shade” the **Control Panel** so that it displays only the client count, double-click your mouse on the title bar.

Table 38 describes the commands in the **Tool Tray Menu**.

Command	Description
Status	Displays the current status of the server.
Time	Displays the current time.
Clients	Displays the total number of OPC clients presently connected to the server.
Configure	Displays the main Configuration window.
Shutdown	Shuts down the server.
About	Displays the server’s Welcome screen, which includes information about the software.

Table 38 - Control Panel Commands

Configuration Window

Note: If the server is installed as a Windows service, the **Tool Tray Menu** and **Control Panel** are not available. In this case, the **Configuration** window is then accessed via the Windows **Start** menu.

The **Configuration** window displays a tree view of objects configured in the server. Select an object to display its current configuration, which appears on the right-hand side of the window.

If the server runs as a local executable, it will remain running even after the main configuration window is closed, even if no clients are connected. Displaying the control panel or main configuration window for the server will “lock” it so that it will not shut down while configuration is being performed.

If the server runs as an NT service, it will remain running so long as there are clients connected to it. Closing the main configuration window will shut down the configuration utility, but will not interfere with the normal operation of the server.

To view the Configuration window:

- From the **Tool Tray Menu** or the **Control Panel**, select **Configure**.
- The **Configuration** window (Figure 47) appears.

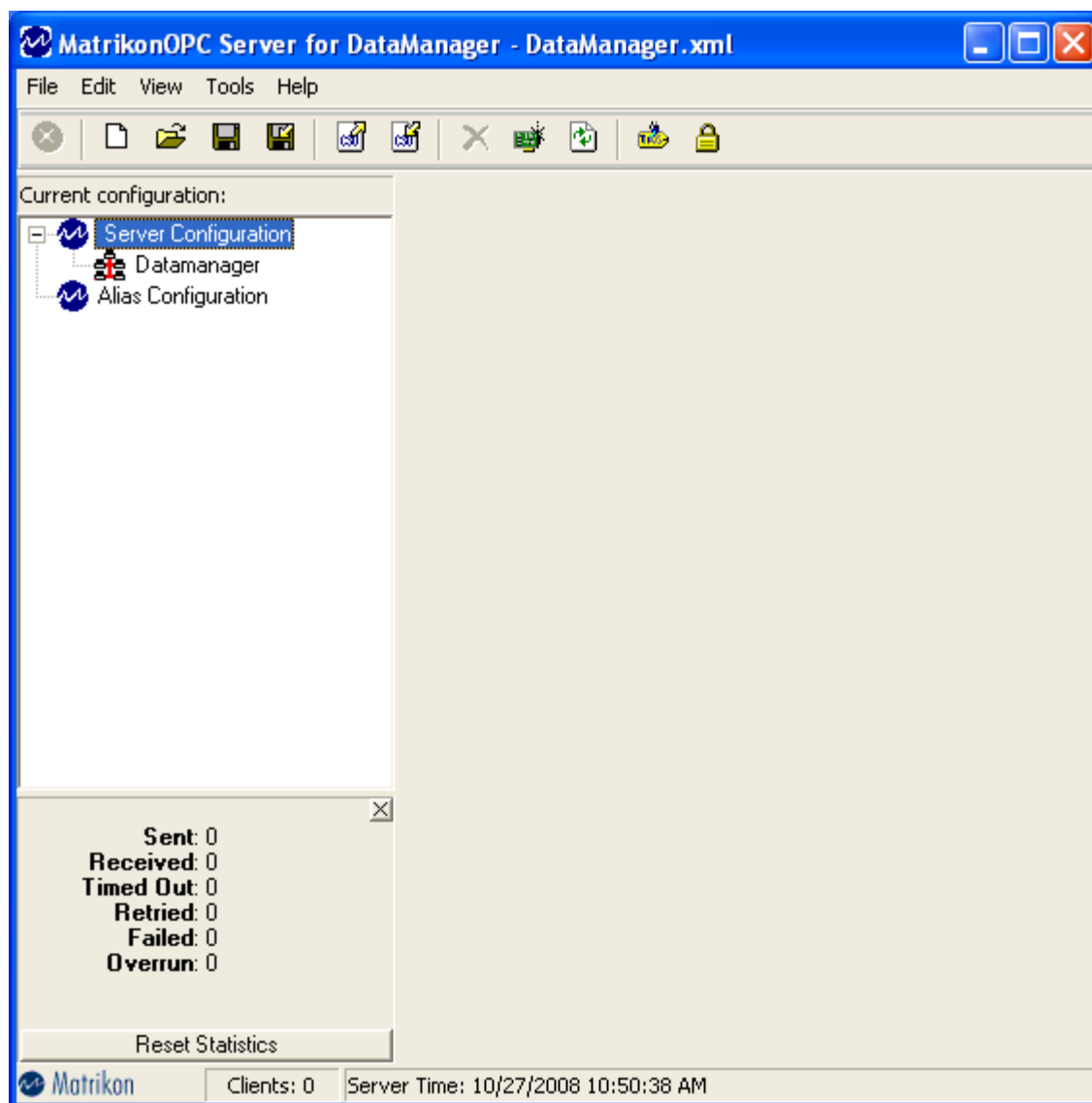


Figure 47 - Configuration Window

Table 39 describes the commands in the **Configuration** window.

Command	Description
Main Menu	Provides access to the File , Edit , View , Tools , and Help menus.
Main Toolbar	Provides shortcut buttons for commands in the Main Menu .
Current Configuration	Displays a tree of configuration objects currently defined in the server. Select an object to display its current settings in the right-hand panel.
Server Configuration	Objects under this node affect how the server communicates with the data source.
Alias Configuration	Define aliases and alias groups under this node.
Object Settings Panel	Displays the current settings of the object presently selected in the tree.
Statistics Panel	Displays available statistics for the object presently selected in the tree:

Command	Description
	<i>Sent, Received, Timed Out, Retried, Failed, Overrun.</i>
Reset Statistics	Resets statistics on the object presently selected in the configuration tree.
MatrikonOPC Logo	Opens a link to the MatrikonOPC web site.
Clients	Displays the total number of OPC clients presently connected to the server.
Server Time	Displays the current time.

Table 39 - Configuration Window Commands

The following sections describe the menus available from the **Configuration** window, and what they are used for.

File Menu

Table 40 describes the **File** menu commands.

Command	Description
 New	Clears the current configuration and starts a new one. If OPC clients are still connected to the server, the user is prompted for confirmation before continuing.
 Open	Clears the current configuration and loads a new one from an existing file. Displays the Open Configuration window to prompt for the file name. If OPC clients are still connected to the server, the user is prompted for confirmation before continuing.
 Save	Saves the current configuration to an XML file. Displays the Save Configuration window to prompt for a new file name if the configuration is new and has not been saved before.
 Save As	Saves the current configuration to an XML file. Displays the Save Configuration window to prompt for a new file name.
 Export Aliases	Exports all currently configured aliases to a CSV file. Displays the Export Aliases window to prompt for a file name.
 Import Aliases	Clears all aliases and imports new ones from a CSV file. Displays the Import Aliases window to prompt for an existing file name.
 Shutdown Server	Closes the current configuration and shuts down the server after signalling the shutdown event to all connected clients. If OPC clients are still connected to the server, the user is prompted for confirmation before continuing. Note: This command is available (i.e., enabled) only when you are running the server as an application; it is not available for the server if it runs as a Windows service. Services can be shut down only from the Service Control Manager applet in the Windows Control Panel .
Close	Hides the main Configuration window. The server shuts down after a short delay if no OPC clients are currently connected to the server.

Table 40 - File Menu Commands

Edit Menu

Table 41 describes the **Edit** menu commands that appear when the currently selected object appears under the **Server Configuration** node.

Command	Description
Undo/Can't Undo	Not implemented.
 Delete	Removes the currently selected object from the server configuration. Prompts the user for confirmation before continuing to see if the OPC clients have reference to items associated with the selected object or one of its children. Does not remove such objects but simply disables them and sets them to "marked for deletion".
 Define New	Displays the Insert New Object window used to create a new configuration object under the currently selected configuration object.

Table 41 - Edit Menu Commands (Server Configuration)

Table 42 describes the **Edit** menu commands that appear when the currently selected object appears under the **Alias Configuration** node.

Command	Description
Undo/Can't Undo	Not implemented.
 Rename	Renames the currently selected alias group.
 Delete Alias Group	Removes the currently selected alias group and all subordinate groups and aliases.
Delete Alias	Removes the currently selected aliases.
 Insert Alias Group	Creates a new alias group under the currently selected alias group.
Insert New Alias	Displays the Insert New Alias window used to create a new alias under the currently selected alias group.

Table 42 - Edit Menu Commands (Alias Configuration)

View Menu

Table 43 describes the **View** menu commands.

Command	Description
Statistics	Displays/hides general communication statistics for the currently selected object.
Reset Statistics	Resets all statistics for the currently selected object to zero.
Defaults	Displays the Server Defaults window used to configure the default settings for the various types of communication objects available in the server.
 Refresh	Rebuilds the tree display of the server configuration and fully expands all branches.
Options	Displays the Options window used to change general server options.

Table 43 - View Menu Commands

Tools Menu

Table 44 describes the **Tools** menu commands.

Command	Description
 DCOM Configurator	Launches the Microsoft Distributed COM Configuration Properties utility. This utility can be used to edit DCOM settings for specific COM servers to allow client applications on remote computers to connect to the server.
 View Tags	Launches MatrikonOPC Explorer which is a general-purpose OPC client included with all MatrikonOPC servers with which to test the capabilities of the software. For more information, refer to the <i>MatrikonOPC Explorer User's Manual</i> .
 Security Settings	Launches the Enter server password window where you are asked to enter the security password set during the installation of MatrikonOPC Server for OMRON PLCs. The default password set for the installation of this server is MatrikonOPC . The MatrikonOPC Tag Security Configuration Utility screen is then displayed which allows you to configure security settings. For more information, refer to Appendix E – Security .

Table 44 - Tools Menu Commands

Help Menu

Table 45 describes the **Help** menu commands.

Command	Description
MatrikonOPC on the Web	Opens a link to the MatrikonOPC web site.
About	Displays the Welcome screen, which includes information about the software version.

Table 45 - Help Menu Commands

Options Window

The **Options** window is used to edit the server's options and contains four tabs: **General**, **General Logging**, **Interface Logging**, and **Advanced**.

General Options

The **General** tab allows users to edit general server options (i.e., settings).

To view the General options:

1. On the **Configuration** window, from the **View** menu, select the **Options** menu item.
2. The **Options** window appears.
3. From the **Options** window, select the **General** tab (Figure 48).

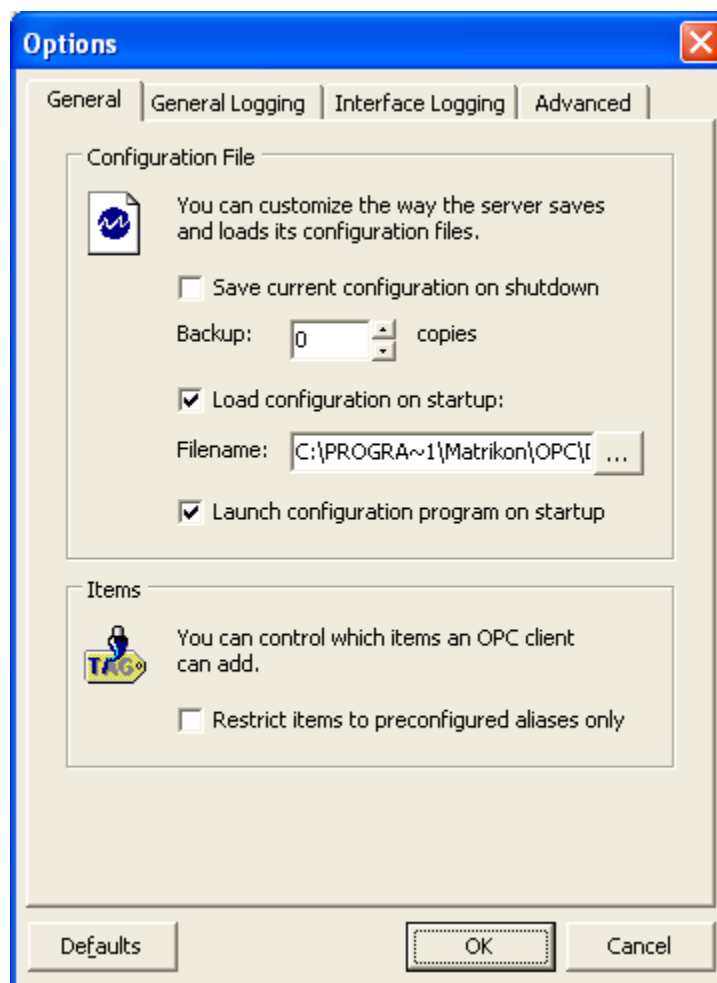


Figure 48 - General Options Tab

Table 46 describes the fields available on the **General** tab.

Field	Description
Save current configuration on shutdown	Automatically saves the current configuration to the specified file before shutting down, if selected.
Backup: X copies	Automatically keeps up to the specified number (i.e., X) of backup copies of the configuration file when saving the configuration.
Load configuration on setup	Automatically loads a configuration from the specified file when starting up, if selected.
Filename	Displays the full path of an existing file for load and save operations. Click on the ellipsis button (...) to display the Open window used to select an existing file name.
Launch configuration program on startup	Automatically launches the configuration utility when starting up as a local executable (rather than a Windows service), if selected.
Restrict items to preconfigured aliases	Prevents OPC clients from adding items other than configured aliases, if selected. Selecting this option will cause clients to see only aliases when

Field	Description
only	browsing this server. Note: As is the case with any changes to General options, if this option is changed you will need to restart the server for the change to take effect.

Table 46 - General Options Tab Fields

Note: The server loads these settings from the Windows registry upon start-up. Changes to the **General** options settings take effect when the server is restarted.

General Logging Options

The **General Logging** tab allows users to edit general logging options.

To view the General Logging options:

1. On the **Configuration** window, from the **View** menu, select the **Options** menu item.
2. The **Options** window appears.
3. From the **Options** window, select the **General Logging** tab (Figure 49).

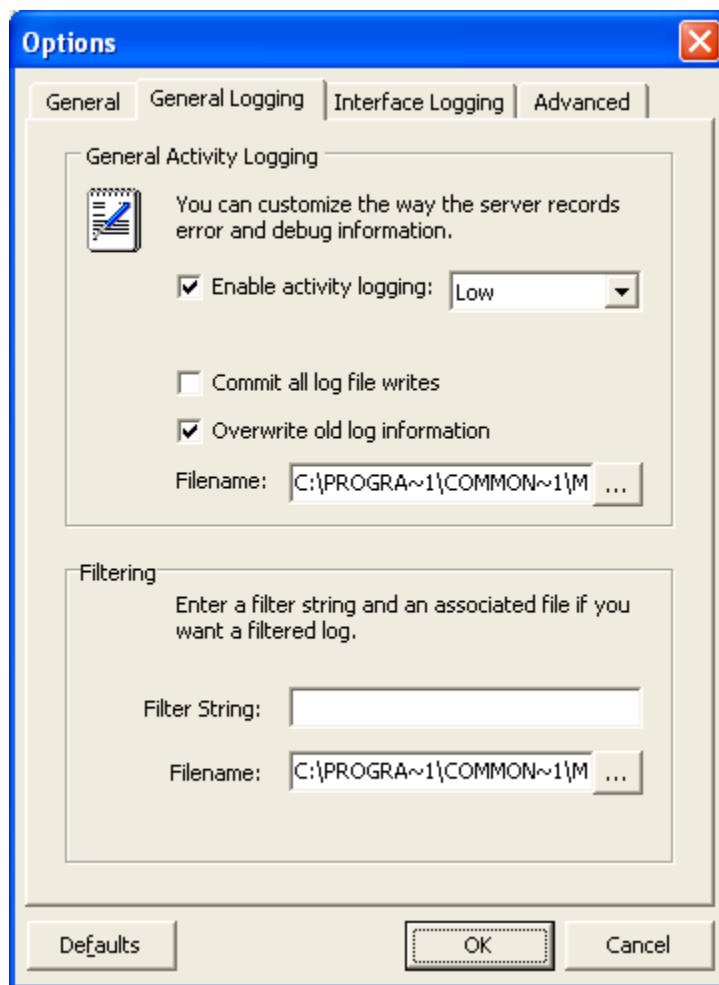


Figure 49 - General Logging Options Tab

Table 47 describes the fields available on the **General Logging** tab.

Field	Description
Enable activity logging	Enables/disables general activity logging at the specified detail level (High , Medium , Low , or None), if selected. Note: If performance is a concern, to improve it you may want to disable this function (i.e., clear the checkbox).
Commit all log file writes	Purges the file buffer after each message is logged in the event of an unexpected server shut down.
Overwrite old log information	Overwrites the old log file each time the server starts up, if selected. Otherwise, rename the old log file with a (*.bak) suffix.
General Activity Logging Filename	Displays the full path for the general activity log file. Click on the ellipsis button (...) to display the Open window used to select an existing file name. The default path is C:\PROGRAM FILES\COMMON FILES\MatrikonOPC\COMMON\PSTCFGMatrikon.OPC.DataManager.1.LOG .
Filter String	Match string for filtered log is displayed.
Filtering Filename	Displays the full path for the filtered log file. Click on the ellipsis button (...) to display the Open window used to select an existing file name.

Table 47 - General Logging Options Tab Fields

Note: General Logging options settings take effect immediately.

Interface Logging Options

The **Interface Logging** tab allows users to view and edit COM interface logging options.

To view the Interface Logging options:

1. On the **Configuration** window, from the **View** menu, select the **Options** menu item.
2. The **Options** window appears.
3. From the **Options** window, select the **Interface Logging** tab (Figure 50).

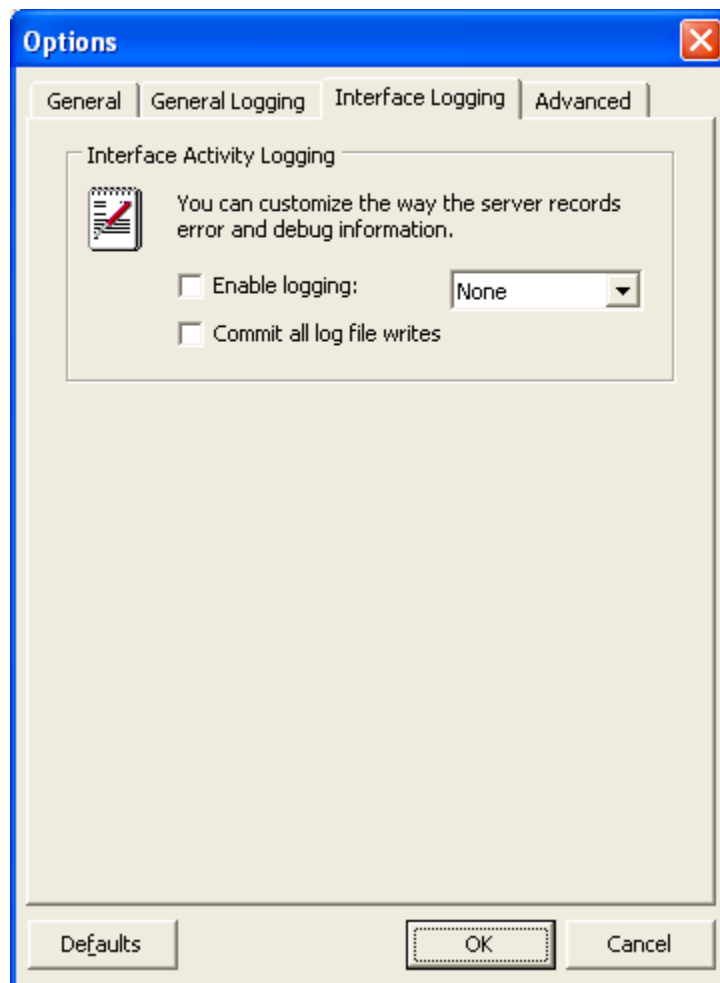


Figure 50 - Interface Logging Options Tab

Table 48 describes the fields available on the **Interface Logging** tab.

Field	Description
Enable logging	Enables/disables interface logging at the specified detail level (High , Medium , Low , or None), if selected. Generates a separate log file for each client named <i>PST###.TMP</i> in the server installation directory. Note: This option should not be selected unless users are debugging a problem as this will have a negative effect on performance of the OPC server.
Commit all log file writes	Purges the file buffer after each message is logged in the event of an unexpected server shut down.

Table 48 - Interface Logging Options Tab Fields

Note: Interface Logging options settings take effect when the next OPC client connects to the server.

Advanced Options

The **Advanced** tab allows users to view and edit advanced server options.

To view the Advanced options:

1. On the **Configuration** window, from the **View** menu, select the **Options** menu item.
2. The **Options** window appears.
3. From the **Options** window, select the **Advanced** tab (Figure 51).

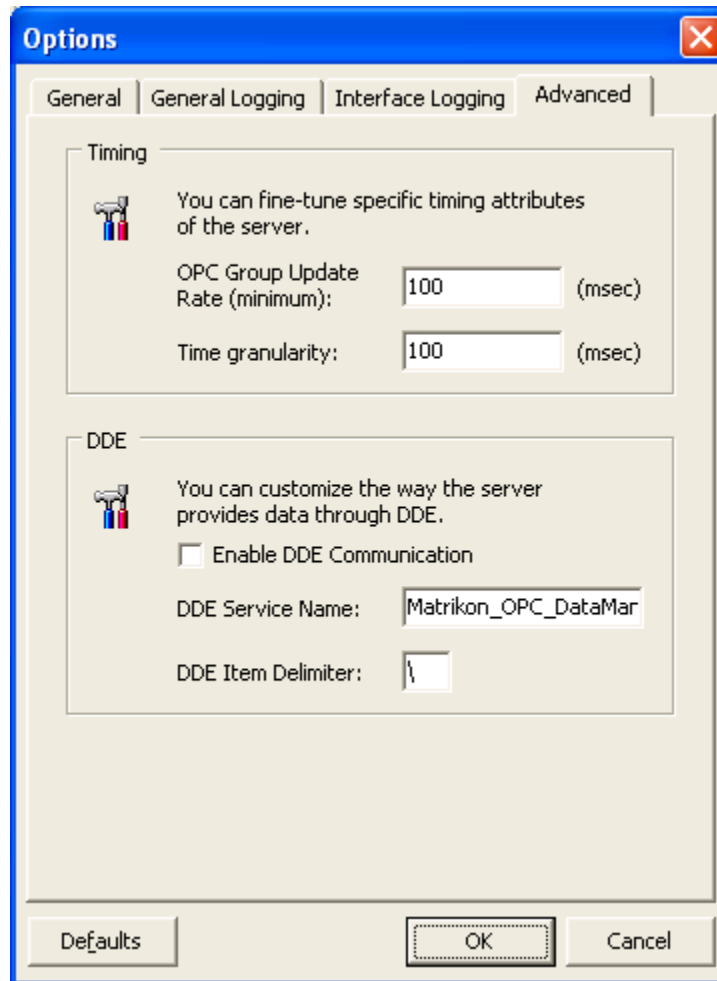


Figure 51 - Advanced Options Tab

Table 49 describes the fields available on the **Advanced** options tab.

Field	Description
OPC Group Update Rate (minimum)	Minimum update rate (milliseconds) allowed for an OPC group. Prevents OPC clients from requesting update rates that are impossible to achieve or that cause heavy CPU loads. The default value is 100 ms.
Time granularity	OPC server group scan thread interval (milliseconds). Determines the maximum resolution for data change detection. Time granularity should always be equal to or less than the minimum group update rate.
Enable DDE Communication	Selecting this checkbox this will allow the server to accept Dynamic Data Exchange (DDE) connections.

Field	Description
DDE Service Name	The DDE service name that should be used by clients to connect to this program.
DDE Item Delimiter	The character to be used to indicate the start of a new item in the DDE data request.

Table 49 - Advanced Options Tab Fields

Note: The server loads these settings from the Windows registry on start-up. Changes to **Advanced** options settings take effect when the server is shut down and restarted.

Server Configuration

The server requires minimal configuration for it to run properly, but you can customize the server's behaviour as required. This section shows you how to create and edit objects using the **Configuration** window.

Creating Objects

The **Insert New Object** and **Create New** windows are used to create device link objects.

Insert New Object Window

The **Insert New Object** window (Figure 52) displays a different set of options depending on the type of object selected and the types of objects already configured under it.

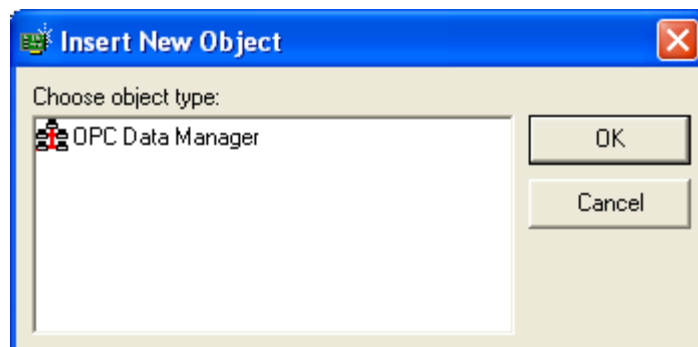


Figure 52 - Insert New Object Window

To insert a new object:

1. On the **Configuration** window, either select the **Define New** menu option from the **Edit** menu, or click on the  icon.
2. The **Insert New Object** window (Figure 52) appears.
3. From the displayed list, select the type of object to be created.

Note: Different objects may be available depending on which object is currently selected in the tree view.

4. Click on the **OK** button.
5. The **Create New** window appears.

To create a newly inserted object:

1. From the **Create New** window, enter a name for the object. This name is part of the item ID that globally identifies data items from under the object. Users may also choose to enter a description of the object.
2. Edit the configuration components as desired.
3. Click on the **OK** button. The object is created.

Note: For the object to be used for communication, it must be enabled. This can be done at any time.

Create New Window

The **Create New** window (Figure 53) displays the settings available for a new object.

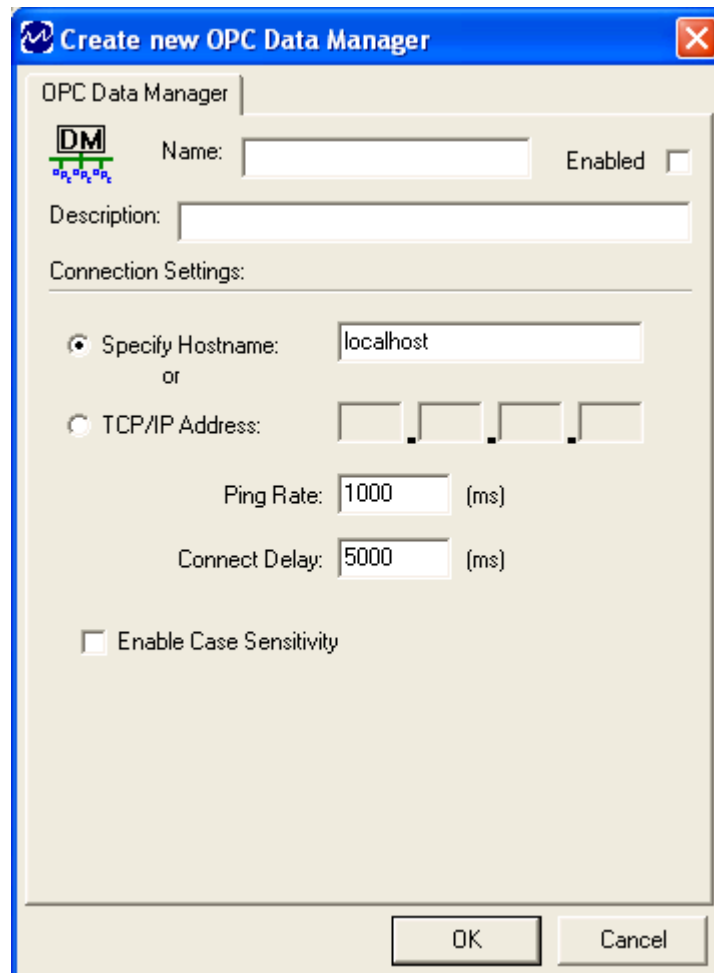


Figure 53 - Create New OPC Data Manager Window

To change an object's configuration:

1. Once an object is created, select it in the tree view panel.
2. In the configuration panel, make the applicable changes.
3. Click on the **Apply** button to accept the changes, or click on the **Cancel** button to discard them.

Table 50 describes the components of the **Create New OPC Data Manager** window.

Component	Description
Name	Allows you to enter the name of the object, which becomes an element of the item ID for data items under the object. Automatically converted to title case for display purposes.
Enabled	Use this checkbox to enable (i.e., checkbox is selected) or disable (i.e., checkbox is cleared) communication for the object. By default, the checkbox is cleared.
Description	This field is optional, and takes any user-defined text (64-character maximum) for documentation purposes. By default, this field is blank.
Specify Hostname or TCP/IP Address	Select the necessary option and then enter either the devices network name or TCP/IP address.
Ping Rate	Allows you to specify how often (in milliseconds) to ping (i.e., check), making sure the server is still connected.
Connect Delay	Allows you to specify the number of milliseconds to wait before trying the connection.
Enable Case Sensitivity	Select this checkbox to enable case sensitivity.
OK	Select this button to save any changes and close the window.
Cancel	Select this button to close this window without saving any changes made.

Table 50 - Create New OPC Data Manager Window Components

Removing Objects

Note: Users can easily remove any object that they have created, but a warning message (Figure 54) will appear when users remove an object that has data items to which one or more OPC clients hold reference.

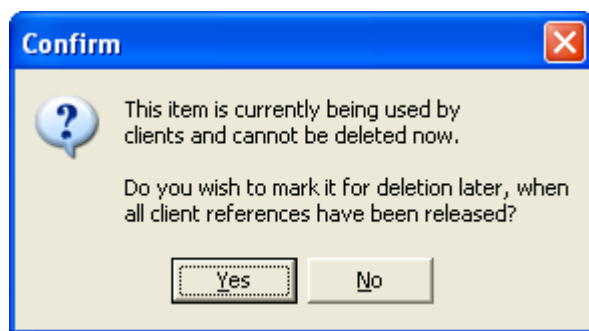


Figure 54 - Client Reference Warning Message

To remove an object:

1. In the **Configuration** window, under **Server Configuration**, select the object to be removed.
2. From the **Edit** menu, select the **Delete** menu option (or click on the  button).

Note: If one or more OPC clients hold references to data items somewhere under the selected object, a warning message (Figure 54) appears.

3. To mark the object for later deletion, click on the **Yes** button. To leave the object unmodified, click on the **No** button.

Note: Items marked for deletion are disabled and a red X appears over the icon on the right side of the window when the object is selected.

Alias Configuration

MatrikonOPC servers, including this one, provide the ability to create user-defined aliases that can be used in place of regular OPC items. This feature is particularly useful when the item path for a given server is very complex or difficult to remember, for example: *Com1.Radio1.Unit1.41.4.123*.

Servers can also be configured so that client applications have access to configured aliases only, rather than every available item.

This section of the manual describes how to create and edit aliases using the **Configuration** window.

Note: It is not necessary to define aliases before accessing server data items from an OPC client.

Inserting Alias Groups

Note: Alias Groups are used to contain one or more configured aliases.

To insert an Alias Group:

1. On the **Configuration** window, select **Alias Configuration** or a previously configured **Alias Group**.
2. From the **Edit** menu, choose **Insert Alias Group** or click on the  button.
3. A new **Alias Group** folder appears.
4. Enter a new name for the **Alias Group**, and press **Enter**.
5. The **Alias Group** is renamed.

Renaming Alias Groups

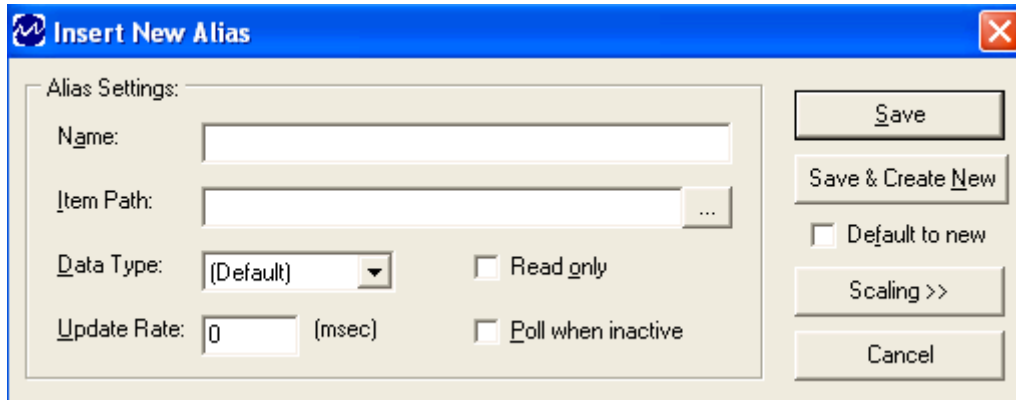
Note: Alias Groups can be renamed after they have been created.

To rename an Alias Group:

1. On the **Configuration** window, select an **Alias Group**.
2. From the **Edit** menu, choose **Rename** or click on the  button.
3. The **Alias Group** is renamed.

Inserting New Aliases

Use the **Insert New Alias** window (Figure 55) to insert a new alias into an Alias Group, or insert a new alias on its own directly under the Alias Configuration node.



The dialog box is titled "Insert New Alias" and contains the following fields and buttons:

- Alias Settings:**
 - Name:** A text input field.
 - Item Path:** A text input field with an ellipsis button (...).
 - Data Type:** A dropdown menu currently showing "(Default)".
 - Update Rate:** A numeric input field showing "0" followed by "(msec)".
 - Read only:** A checkbox.
 - Poll when inactive:** A checkbox.
- Buttons:**
 - Save:** A button.
 - Save & Create New:** A button.
 - Default to new:** A checkbox.
 - Scaling >>:** A button.
 - Cancel:** A button.

Figure 55 - Insert New Alias Window

Table 51 describes the components of the **Insert New Alias** window.

Component	Description
Name	Name for the alias (unique within the alias group).
Item Path	Fully-qualified item ID for the OPC item to which the alias refers. Click on the ellipsis button (...) to display the Item Path Browser window used to select an existing OPC item on the server. Alternatively, leave the item path blank to use the alias as a general in-memory variable. When doing so, either define the data type for the alias point as something other than Default , or have the alias set for reading and define the data type while writing values to the alias from an OPC client.
Data Type	Set the value of the OPC item to the specified type unless Default is selected. Also serves as the "canonical" data type for the alias.
Read only	When this checkbox is selected, it prevents OPC clients from writing values to the alias.
Update Rate	Update rate (milliseconds) to use with the Poll when inactive option.
Poll when inactive	If selected, continues updating the value for the alias at the specified update rate even if there are no OPC clients currently accessing the alias.
Save	Save changes to the alias and hide the window.
Save & Create New	Save changes to the alias and begin configuring a new one.
Default to new	Pressing Enter activates the Save & Create New button rather than the Save button, if selected.
Scaling >>	Enables scaling for the alias (displays scaling options).
<< No Scaling	Disables scaling for the alias (hides scaling options).
Cancel	Discards changes to (abandon creation of) the alias and hides the window.

Table 51 - Insert New Alias Window Options

The **Insert New Alias** window can be expanded to display **Scaling Options** (Figure 56). The available forms of scaling include: **Linear**, **Square Root**, **Gain/Offset**, and simple text **Expressions**.

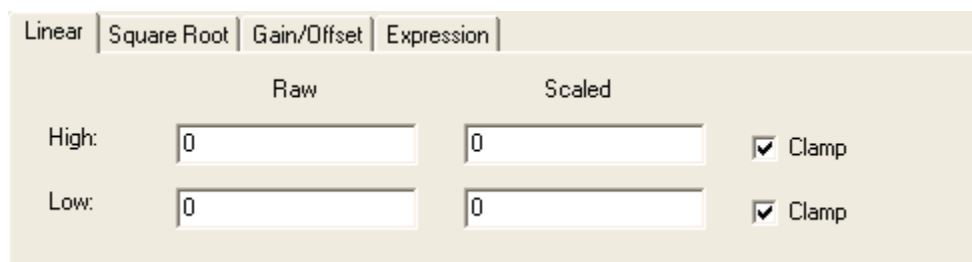


Figure 56 - Insert New Alias Window Scaling Options

Table 52 describes the **Scaling Options** for the **Insert New Alias** window.

Tab	Component	Description
Linear and Square Root	Raw High	Maximum expected raw value of the OPC item.
	Raw Low	Minimum expected raw value of the OPC item.
	Scaled High	Maximum desired scaled value for the alias (corresponds to Raw High).
	Scaled Low	Minimum desired scaled value for the alias (corresponds to Raw Low).
	Clamp High	Clamp the scaled value at the high limit to prevent it from going out of range.
	Clamp Low	Clamp the scaled value at the low limit to prevent it from going out of range.
Gain/Offset	Gain	Scaling factor. (No limits are assumed.)
	Offset	Scaling offset.
Expression	Input	Simple text equation to apply to incoming values (reads). Click on the ellipsis button (...) to display the Expression Wizard screen used to help build a formula. For more information, refer to the Expression Wizard section in this manual.
	Output	Simple text equation to apply to outgoing values (writes). Click on the ellipsis button (...) to display the Expression Wizard screen used to help build a formula. For more information, refer to the Expression Wizard section in this manual.

Table 52 - Insert New Alias Window Scaling Options

Notes:



- The data type for scaled values is double-precision real unless the alias data type is specified.
- Using invalid settings, such as **zero-zero** for the high-low range in Linear scaling, may be fatal to the server, OPC clients, and communications.
- The OPC item values must be numeric for Linear, Square Root, and Gain/Offset scaling to work.
- The OPC item values must be non-negative for Square Root scaling to work. Otherwise, the scaled value will be **-1** with a bad quality.
- The server may be unable to load configuration files containing invalid scaling expressions, and may fail to start up properly. If this occurs, rename the configuration file so that the server will not load it upon start-up. Alternatively, edit the XML file to correct the invalid alias settings.

To insert a new alias:

Note: It is recommended that you create a new alias under an **Alias Group** rather than directly under the **Alias Configuration** node.

1. On the **Configuration** window, select **Alias Configuration** or a previously configured **Alias Group**.
2. The **Contents** table for that **Alias Group** is displayed on the right side of the **Configuration** window (Figure 57), listing the aliases it contains.

Contents of alias group 'New Alias 1':				
Name	Item Path	Data Type	R/W	Update Rate
Alias1	Net1.Host1.Unit1.041.4.123	(Default)	R/W	
Alias2	Net1.Host1.Unit1.041.4.124	(Default)	R/W	
Alias3	Net1.Host1.Unit1.041.4.125	(Default)	R/W	

Figure 57 - Contents Table

3. From the **Edit** menu, choose **Insert New Alias**.
4. The **Insert New Alias** window (Figure 55) appears.
5. Enter a name for the alias in the **Name** field.
6. Enter the item **Path** and **ID** for the item to which the alias refers, or click on the **Browse** button to navigate to the item.
7. Click on the **Scaling** button to enable scaling for the alias. Click on the **No Scaling** button to disable scaling and hide the **Scaling Options**.
8. The **Scaling Options** are displayed at the bottom of the **Insert New Alias** window (Figure 55).
9. Configure the **Scaling Options** as required (see Table 52 for a description of these options), by clicking the appropriate tab for the form of scaling that maybe required.

Note: Available forms of scaling include: **Linear**, **Square Root**, **Gain/Offset**, and **Expression**. **Expression**, which uses an Expression Wizard to help build equations, is used

frequently and is intended to view individual bits from registers. Refer to the **Expression Wizard** section for more information.

10. Configure the remaining fields as required (see Table 51) for a description of all the components).
11. Click on the **Save** button to save the alias.

Editing Aliases

Note: Aliases can be edited after they have been created using the **Edit Alias** window. This is virtually the same as the **Insert New Alias** window (Figure 55), with the exception that it appears after the alias has been created.

To edit an alias:

1. On the **Configuration** window, select the alias you want to change, and then double-click or press **Enter**.
2. The **Edit Alias** window appears.
3. Make the changes as required.

Removing Aliases

Note: Any alias that was created can be removed.

To remove an alias:

1. On the **Configuration Window**, select one or more aliases that you want to remove.
2. From the **Edit** menu, choose the **Delete Alias** menu option.
3. The alias is removed.

Removing Alias Groups

Note: Any Alias Group that was created can be removed.

To remove an Alias Group:

1. On the **Configuration** window, select the Alias Group you want to remove.
2. From the **Edit** menu, select the **Delete Alias Group** menu option or click on the  button.
3. The **Alias Group** is removed.

Exporting Aliases

Note: Use the **Export Aliases** window to export all currently configured aliases to a CSV file.

To export all currently configured aliases:

1. From the **File** menu, select the **Export Aliases** menu option or click on the  button.
2. The **Export Aliases** window appears.
3. Enter a file name for the CSV export file.
4. Click **Save**.
5. The aliases are exported.

Importing Aliases

Note: Use the **Import Aliases** window to clear all aliases and import new ones from a CSV file.

To import aliases from a CSV file:

1. From the **File** menu, select the **Import Aliases** menu option or click on the  button.
2. The **Import Aliases** window appears.
3. Browse to the CSV file name.
4. Click **Open**.
5. The old aliases are cleared and the new ones are imported.

Expression Wizard

The **Expression** form of scaling uses an **Expression Wizard** to build formulas. The created formula is a simple text equation that is applied to either incoming values (i.e., reads), or outgoing values (i.e., writes).

Table 53 describes the **Expression Wizard** fields.

Component	Description
Input/Output Expression	Displays the expression as it is created. This field is free-form which allows you to manually enter or edit information. This field reads Input Expression when creating an input or "read" expression. It reads Output Expression when creating an output or "write" expression.
Database field	This button is reserved for future enhancements.
Function	Select this button to display the Select function window which allows you to select the necessary function from those available.
Variable	Select this button to display the Select variable window which allows you to select the necessary variable from those available.
Operators	Select the applicable button to add the corresponding operator or operators to the expression.
Clear	Select this button to clear the Input/Output Expression field.
Validate	Select this button to validate the expression that appears in the Input/Output Expression field. If the expression is invalid, an error message is displayed. If the expression is valid, a message is displayed indicating there are no errors and also stating what the result is.
OK	Select this button to accept changes to (or the creation of) the expression.
Cancel	Select this button to discard changes to (or abandon the creation of) the expression.

Table 53 - Expression Wizard Options

Notes:

- The **Expression Wizard** appears and functions the same for an input expression as it does for an output expression. The differences being the expression field label: **Input Expression**, **Output Expression**, and that one is for reads and the other for writes.

- If you are expecting to read a particular alias, create an **Input Expression**. If you are expecting to write to a particular alias, create an **Output Expression**.

To create an Input or Output Expression:

1. On the **Configuration** window, select **Alias Configuration** or a previously configured **Alias Group**.
2. The **Contents** table for that **Alias Group** is displayed on the right side of the **Configuration** window (Figure 47), listing the aliases it contains.
3. Either create a new alias (for instructions, see *To insert a new alias*), or
Double-click your mouse on an existing alias, or
Right-click your mouse on an existing alias and select the **Edit Alias** option from the displayed menu.
4. Click on the **Scaling** button to enable scaling for the alias. The **Scaling Options** are displayed at the bottom of the **Insert New Alias** window (Figure 55) or the **Edit Alias** window.

Note: Whether the **Insert New Alias** window or the **Edit Alias** window is displayed depends on whether you are creating a new alias or editing an existing one.

5. Select the **Expression** tab (Figure 58).

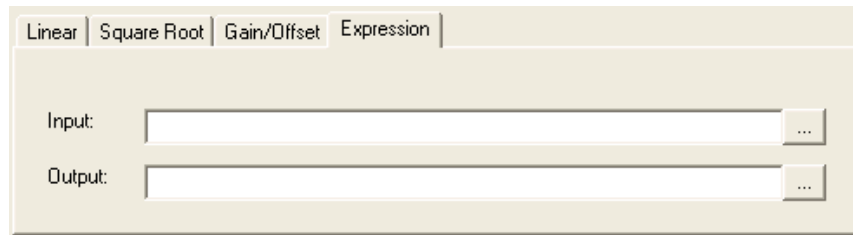


Figure 58 - Expression Tab

6. Click on the ellipsis button adjacent to the **Input** field (or **Output** field).
7. The **Expression Wizard** (Figure 59) is displayed.



Figure 59 - Expression Wizard

8. Manually enter your new expression in the **Input/Output Expression** field and proceed to step 14, or

Perform steps 9 through 13 using a combination of the **Function**, **Variable**, and **Operators** buttons to create your expression, which will be displayed in the **Input/Output Expression** field as you build it.

9. Click on the **Function** button to go to the **Select function** (Figure 60) window. After selecting the required function, click on the **Continue** button to close the **Select function** window and return to the **Expression Wizard**.

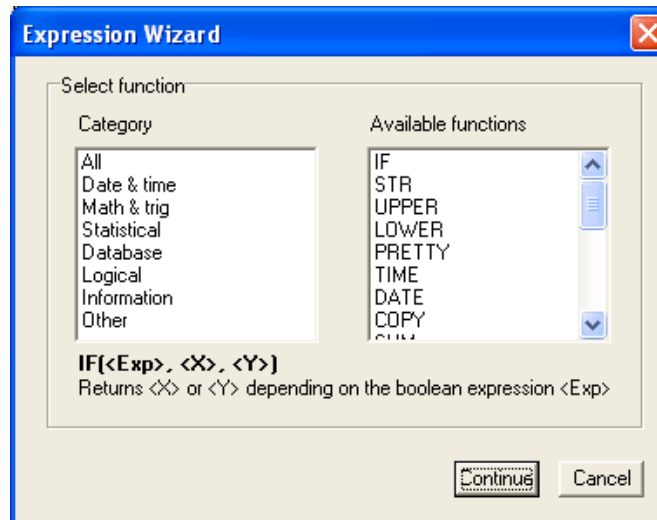


Figure 60 - Select Function Window

10. Click on the **Variable** button to go to the **Select variable** (Figure 61) window. After selecting the required variable, click on the **OK** button to close the **Select variable** window and return to the **Expression Wizard**.

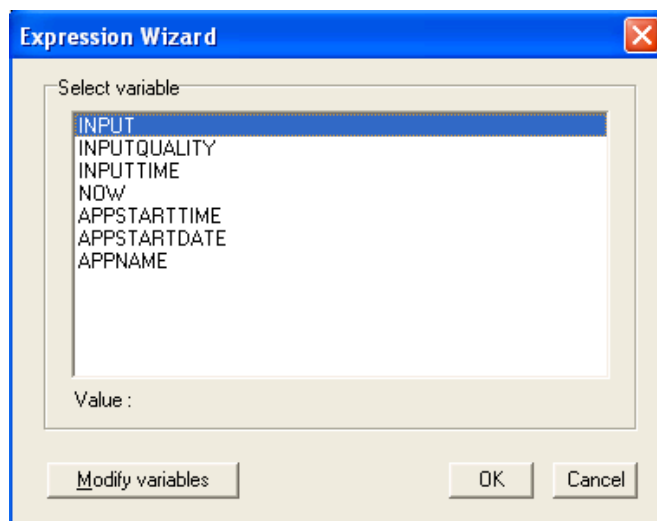


Figure 61 - Select Variable Window

11. If required, from the **Select variable** window, click on the **Modify variables** button to access the **User Defined Functions Editor** (Figure 62) which allows you to add, change, or delete variables.

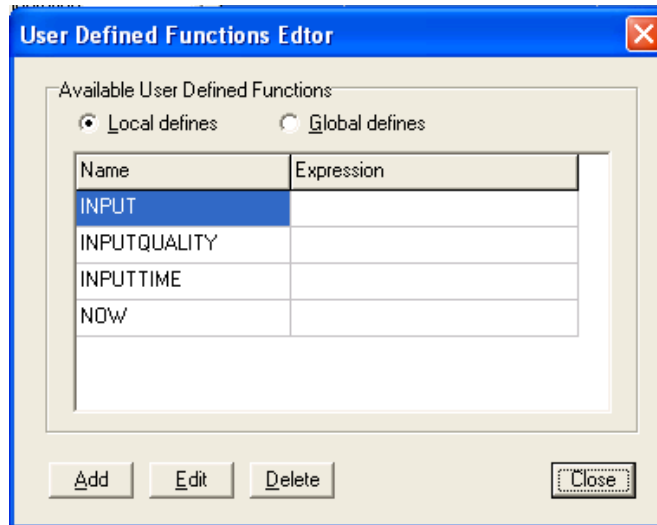


Figure 62 - User Defined Functions Editor

12. The **Operators** buttons (Figure 63) allow you to enter an operation descriptor based on the selected button.

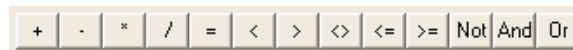


Figure 63 - Operators Buttons

13. Click on the **Validate** button to determine whether or not the expression is valid.
14. If the expression is valid (i.e., a confirmation message is displayed), click on the **OK** button to close the message window and return to the **Expression Wizard** screen.
15. Click on **OK** button on the **Expression Wizard** screen to close the wizard and display the expression in either the **Input** or **Output** field, depending on which expression you defined.
16. From either the **Insert New Alias** or **Edit Alias** window, click on the **Save** button.
17. The **Insert New Alias** or **Edit Alias** window closes and you are returned to the **Configuration** window.

Saving a Configuration

Note: When the server configuration is complete, use the **Save Configuration** window to save the configuration to an XML file.

To save a configuration to an XML file:

1. From the **File** menu, select the **Save As** menu option or click on the  button (alternatively, users can choose **Save** or click .
2. The **Save Configuration** window appears.
3. Enter a file name if saving the file for the first time.
4. Click **Save**.
5. The configuration is saved.

Clearing a Configuration

Note: Starting a new configuration will clear the existing one.

To clear a configuration:

1. From the **File** menu, choose the **New** menu option or click on the  button.
2. If OPC clients are still connected to the server, a warning message appears.
3. Click **OK**.
4. The configuration is cleared.

Loading an Existing Configuration

Note: If you have previously saved a configuration, you can clear the current configuration and then load the saved configuration file.

To load an existing configuration file:

1. From the **File** menu, select the **Open** menu option or click on the  button.
2. The **Open Configuration** window appears.
3. Browse for the configuration file that you want to load.
4. Click **Open**.
5. If OPC clients are still connected to the server, a warning message appears.

Notes:

- At this stage, the connection between the server and the client needs to be broken.
 - When the new configuration is completely loaded, the changes will take effect in the OPC client.
6. Click **OK**.
 7. The old configuration is cleared and the new configuration is loaded from the file.

Shutting Down the Server

Note: Ordinarily, the server shuts down automatically shortly after the last OPC client disconnects from it. However, if the **Configuration** window is displayed, the configuration utility locks the server so that it will not shut down.

To shut down the server:

1. On either the **Control Panel** or the **Tool Tray Menu**, select **Shutdown**. If the server is running as a local executable, choose **Shutdown Server** from the **File** menu or click on the  button.
2. If OPC clients are still connected to the server, a warning message appears.
3. Click **OK**.
4. The server is shut down.



Note: The **Shutdown Server** command is not available for the server if it runs as a Windows service. Services can be shut down only from the **Service Control Manager** applet in the Windows **Control Panel**.

OPC Data Items

This section describes the OPC data items used in MatrikonOPC Data Manager.

MatrikonOPC Data Manager Items

MatrikonOPC Data Manager OPC item ID syntax is as follows with field descriptions defined in Table 54:

Servername\active
Servername\redundancy setting
Servername\redundant config
Servername\sibling down time
Servername\sibling failed
Servername\sibling last failure
Servername\sibling server name

Field	Description
Active	Statistical item that displays the redundant sibling's active state.
Redundancy setting	Statistical item that displays the redundant sibling's settings.
Redundant config	Statistical item that displays the redundant sibling's configurations.
Sibling down time	Statistical item that displays the redundant sibling's down time.
Sibling failed	Statistical item that displays the redundant sibling's failed status.
Sibling last failure	Statistical item that displays the redundant sibling's last failure time.
Sibling server name	Statistical item that displays the redundant sibling's server name.

Table 54 - Item ID Field Descriptions

Diagnostics

The server supplies diagnostic information to assist operators and support personnel with troubleshooting communication problems and software faults.

Logging

All MatrikonOPC servers produce log files that record errors and debugging information. The log files can be extremely valuable for troubleshooting. As such, it is important to note that the default log level is set to low. The **General Logging** tab of the **Options** dialogue in the main configuration window contains settings to control server logging.

General Activity Logging records information about the internal workings of the OPC server. It is useful for troubleshooting problems with configuration and device communication. Interface Activity Logging records information about the client/server OPC communication. It is useful for troubleshooting compliance issues.

For General logging, the higher the log level, the more information that is recorded. However, server performance may decrease at higher log levels. The recommended operating level is **Medium**. More log levels are available for both types of logging which record more detailed information, as well as the ability to output log statements to a console window at run time. Contact MatrikonOPC support for further instructions on how to enable the higher log levels and console logging.

For Interface logging, the log level can be considered very high and therefore should never be used during normal operation of the OPC server unless specifically working on problems related to interfacing.

MatrikonOPC Sniffer is a useful tool for logging OPC client/server communication. It enhances the Interface Activity Logging by recording the client-side transactions. It can also be used with other OPC servers. MatrikonOPC Sniffer is a utility used to troubleshoot OPC client/server interoperability issues. Contact the MatrikonOPC Sales department for further information about this product, or use the following link to access the **MatrikonOPC Sniffer Download**.

In general, the server logs all errors and other information of immediate importance to the user at the low detail level, all warnings and other information of moderate importance to the user at a medium detail level, and additional information concerning the normal functioning of the software at a high detail level. The server also logs further information of concern to support personnel at the debug log level.



Note: The higher the log level, the slower the performance of the server. It is recommended that the log level be left at the default, unless troubleshooting needs to be performed.

Limitations

MatrikonOPC Data Manager has no known or expected limitations.

Refer to the *MatrikonOPC Data Manager Release Notes* for known issues.

Troubleshooting

The following section addresses some of the most common problems encountered, and questions asked, while using this OPC server. Please check the following **Problems/Solutions** and **Questions/Answers** sections before contacting the MatrikonOPC Support team.

Problems and Solutions

Server stops updating client with item values after two hours

Problem: The server stops updating the client with item values after two hours.

Solution: The server may be licensed with a hardware key and the hardware key may not be properly detected, or the software license has expired.

Alternatively, try running the **MatrikonOPC Licensing** utility from the shortcut menu. Click on the **Check Licenses** button to see the status of all MatrikonOPC product licenses.

Check that the correct HASP hardware key is securely fastened to the parallel port. If it is, run the HINSTALL program that is located in the **Program Files\Common Files\MatrikonOPC\Common** directory.

Server shuts down after five minutes when no clients connected

Problem: The server automatically shuts down after five minutes when there are no clients connected.

Solution: This is standard behaviour for COM servers. However, this behaviour can be overridden as shown in the following example:



Note: Microsoft highly recommends that you back up the registry before editing it or making changes to it.

1. From the **Run** command, enter **REGEDIT**.
2. The **Registry Editor** (Figure 64) is launched.
3. In the **Registry Editor**, under **HKEY_CLASSES_ROOT**, look for the required program ID (e.g., *Matrikon.OPC.Simulation.1*).

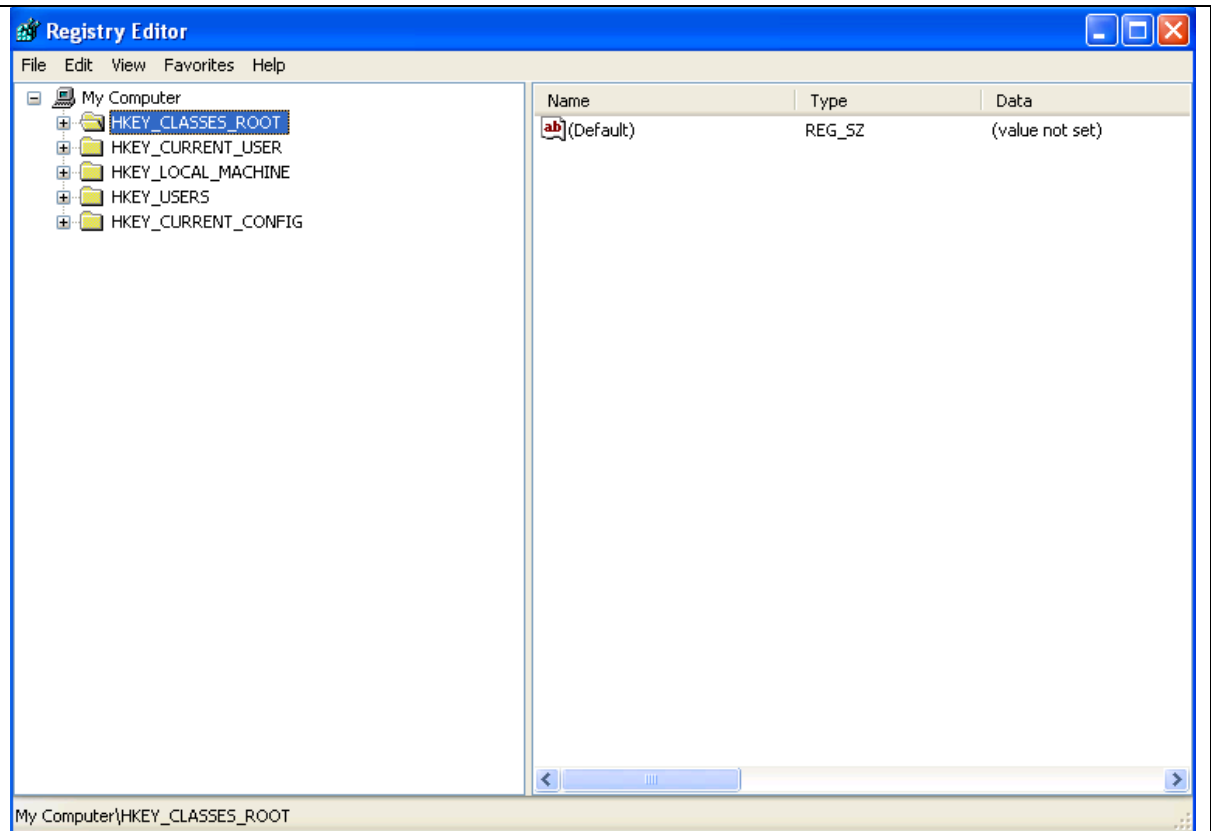


Figure 64 - Registry Editor

4. Expand the program ID branch.
5. Click on the CLSID branch.
6. Record the global universal ID (GUID).

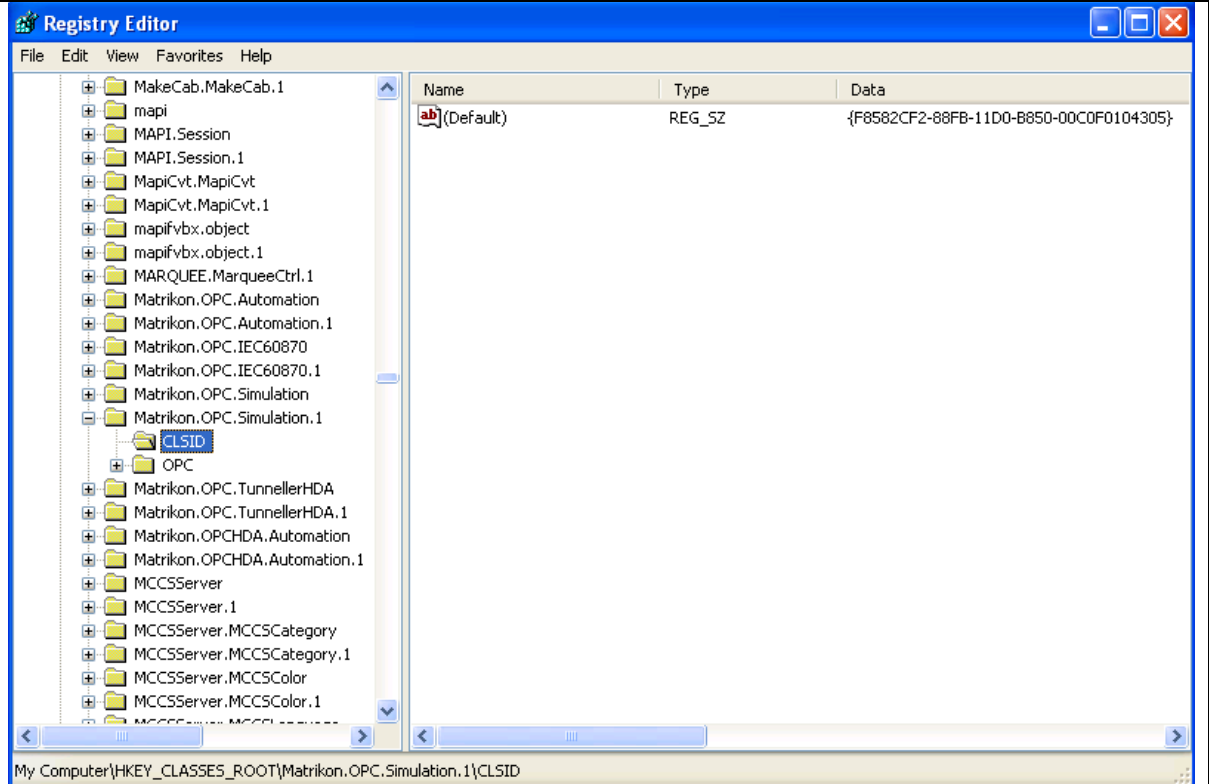


Figure 65 - Program ID Branch

7. Under the **HKEY_CLASSES_ROOT\CLSID** branch, search for the GUID retrieved in the previous step (e.g., **HKEY_CLASSES_ROOT\CLSID\{024C7FFC-9CC3-476f-867A-BC3CAD79F4FE}**).
8. Create a string value called **LockServer** in the Options branch underneath the GUID (e.g., **HKEY_CLASSES_ROOT\CLSID\{024C7FFC-9CC3-476f-867A-BC3CAD79F4FE}\Options**).
9. Create a new value using the context menu and choose **New String Value** from the menu.
10. Set the value of the **LockServer** entry to **1**.

Note: To edit the value, select the entry and select the **Modify** menu option from the **Edit** menu.
11. Shut down the server and restart it for the change to take effect.

Cannot configure client access paths, so cannot configure item options

Problem:	The OPC client does not provide a means to configure access paths, making it difficult to correctly specify the data acquisition options for the items.
Solution:	The server provides a global parameter for configuring an escape character, to allow users to append communication options to the end of an item ID which would accommodate clients that do not support access paths.

Perform the following steps as shown (with example) below:



Note: Microsoft highly recommends that you back up the registry before editing it or making changes to it.

1. From the **Run** command, enter **REGEDIT**.
 2. The **Registry Editor** is launched.
 3. In the **Registry Editor**, under **HKEY_CLASSES_ROOT**, look for the required program ID (e.g., Matrikon.OPC.Simulation.1).
 4. Expand the program ID branch.
 5. Click on the CLSID branch.
 6. Record the global universal ID (GUID).
 7. Under the **HKEY_CLASSES_ROOT\CLSID** branch, search for the GUID retrieved in the previous step (e.g., **HKEY_CLASSES_ROOT\CLSID\{024C7FFC-9CC3-476f-867A-BC3CAD79F4FE}**).
 8. Create a string value called **ItemIDEscapeCharacter** in the Options branch underneath the GUID (e.g., **HKEY_CLASSES_ROOT\CLSID\{024C7FFC-9CC3-476f-867A-BC3CAD79F4FE}\Options**).
- Note:** To create a new value, use the context menu and select the **New String Value** menu option.
9. Set the value of **ItemIDEscapeCharacter** to a single character, such as "|" (pipe).
- Note:** To edit the value, select the entry and select the **Modify** menu option from the **Edit** menu.
10. Shut down the server and restart it for the change to take effect.
 11. Configure the **ItemIDEscapeCharacter Item ID** in the OPC client with the access path appended to the end with the configured escape character (e.g., **ITEMID|ACCESSPATH**).

More than one HASP attached to parallel port, but only first one is recognized

Problem: There is more than one HASP hardware key from MatrikonOPC attached to the parallel port, but the software recognizes only the first one.

Solution: HASP keys from the same vendor cannot be chained together. Send an email to the MatrikonOPC Support team to obtain a HASP key containing the combined codes of all installed MatrikonOPC Servers.

Server cannot be configured; no MatrikonOPC logo in Tool Tray

Problem: The server cannot be configured because there is no MatrikonOPC logo  in the **Tool Tray**.

Solution: If the Server is running as a service, the MatrikonOPC logo  does not appear in the **Tool Tray**.

To configure the server, start the configuration utility by using the shortcut to the OPC server in the Windows **Start** menu (this shortcut starts the **Configuration** utility as well as the OPC Server).



Note: If the server configuration utility generates an “access denied” error on launch, the DCOM permissions have not been configured properly.

OPC client unable to create or read items under configured object (device)

Problem: The OPC client is unable to create or read items under a configured object (device).

Solution: Check the object configuration (for more information, refer to **Server Configuration**). Ensure the **Enabled** checkbox is selected.

Server does not retain settings

Problem: The server does not retain its previous settings and needs to be reconfigured each time it starts up.

Solution: In the **Configuration** window, choose **Options** from the **View** menu. Under the **General** tab, ensure that the **Load configuration on start-up** checkbox is selected and that the correct file name appears in the edit box (see **General Options**).

Server cannot save configuration in XML format

Problem: The OPC server cannot save the configuration in XML format.

Solution: Microsoft Internet Explorer 4.01 (or later) must be installed to use the .XML format.

Server does not show up in the list of locally available program IDs in OPC client application

Problem: The server does not show up in a list of locally available program IDs in the OPC client application.

Solution: Make sure that a user with local administrative rights installs the OPC server so that it can create the necessary entries in the registry.

Ensure OPCEnum is registered as a service, DCOM permissions are configured properly, and the OPCEnum service is running.

Also, especially for older OPC clients that do not use the OPC server browser, make sure the client is running as a user that has *read* access to the registry.

Server does not show up as remote program in OPC client application

Problem: The OPC server does not show up in a list of remotely available program IDs in my

OPC client application.

Solution: Follow the steps found in **Appendix A – Distributed COM (DCOM)** to copy the program ID from the server machine to the client machine.

Access denied or time-out error when connecting to remote server via DCOM

Problem: **Access Denied** error message appears, or time out occurs when trying to connect to a remote OPC server via DCOM.

Solution: Ensure that the access and launch permissions for the OPC server are set correctly on the server machine. For more information, refer to **Appendix A – Distributed COM (DCOM)**.

Server does not start up or client cannot connect

Problem: A client tries to connect to the server and fails, or the server does not start up.

Solution: Ensure that the access and launch permissions for the OPC server are set correctly. For more information, refer to **Appendix A – Distributed COM (DCOM)**.

About screen and Configuration window do not show up

Problem: The **About** screen and **Configuration** window do not show up when a remotely connecting client or a client that runs as a service (such as the *Aspen Technologies CIMIO OPC Manager*) tries to launch the OPC server.

Solution: Either set the identity for the OPC server to the interactive user, or consider running the server as a service. For more information, refer to **Appendix A – Distributed COM (DCOM)**.

DA 2.0 asynchronous I/O does not work

Problem: After installing an older OPC server, DA 2.0 asynchronous I/O no longer works.

Solution: The old installation program installed and registered its own (older) version of the OPC proxy/stub DLL.
Reinstall the standard OPC proxy/stub DLLs, using an up-to-date installation program or re-register them using the **REGSVR32** command-line utility (refer to the **OPC Compliance - Installation** section in this manual).

Server cannot find hardware key

Problem: (If using hardware key.) I don't think the server can find my hardware key.

Solution: Try running the **hasp.exe** utility under:
C:\Program Files\Matrikon\OPC\Common
When this is run, a small window appears. With the hardware key plugged into the printer port on the back of the computer, select **Check key** from the **utilities** menu. If an error message appears (e.g., "There is a problem with the hardware key set-up"),

then there is a problem reading the hardware key. Users *should* see *MatrikonOPC Data Manager User's Manual* in the window, or something similar.

Data Manager does not work with ORB when User Impersonation is turned on

Problem: When ODM is using User Impersonation, it cannot browse servers through ORB.

Solution: When only specified users have access to a server, ORB may not be able to browse since it runs as the SYSTEM account by default. You can change the user ORB runs as by going to the Services panel (**Start -> Run -> services.msc**). Right-click on **MatrikonOPC ORB Configuration** and select **Properties**. Select the **Log On** tab and select the **This account:** option button. Fill in the credentials for the impersonating user.

Data Manager does not work with Tunneller when User Impersonation is turned on

Problem: When ODM is using User Impersonation, it cannot browse servers through Tunneller.

Solution: When only specified users have access to a server, ODM may not be able to browse that server through Tunneller, since Tunneller runs under the SYSTEM account on the server side by default. This can be avoided by using the Tunneller Server-Side Configuration panel and turning on User Impersonation for Tunneller. You must supply valid credentials for the user that has permission to access the server for this to work. For more information on configuring User Impersonation in Tunneller please refer to the MatrikonOPC Tunneller User's Manual.

Impersonation does not work, even with correct credentials

Problem: ODM fails to impersonate a user even though the domain, username and password are correct.

Solution: This can happen when ODM is installed as a service and user to impersonate does not have logon as service privileges for the machine. To fix this, log on as an administrative user and grant the log on as service privileges for that user. Refer to **Impersonation Tab** section for instructions on how this can be done.

DataManager does not save a configuration file in Windows Server 2008

Problem: ODM fails to save a configuration file and throws an error when either the **Save** or **Save As** operation is attempted in Windows Server 2008.

Solution: This can happen when the user attempts to save the configuration for the first time. To fix this, set ODM to load a valid configuration file on startup by going to **Manager -> Settings**. On the **Startup** tab, check the **Auto-Load config file on startup** option and provide the path for the configuration file in the **Filename** field. Restart the service for **MatrikonOPC Data Manager** from the **Services** panel. Open the Data Manager configuration GUI and the **Save** operation would now work.

If the **Save As** option is throwing an error, create a blank .csv file or text file and save

the configuration to this file.

Questions and Answers

Using Pi OPC client

Problem: How is the Pi OPC client to be used with MatrikonOPC servers, if applicable?

Solution: When using the Pi OPC client with MatrikonOPC servers, please go into the OPC server **Advanced Options** setting and select the **Enable Mass Tag Adding** checkbox. This causes Pi to validate and add all tags in one group at a time rather than one tag at a time, resulting in significant improvements in time and network bandwidth used when initializing. Although this is highly recommended with any MatrikonOPC server, the difference is most noticeable when using products such as MatrikonOPC SCADA servers and Tunneller where each OPC operation has a high latency.

How do I remove the server as a service?

Problem: How do I remove the server as a service?

Solution: Re-register the OPC server executable using the **/REGSERVER** command-line switch.

Does the server need to be started manually when installed as a service?

Problem: Does the server need to be started manually when it is installed as a service?

Solution: No, the first OPC client that tries to connect will start the OPC server.

How can I get OPC data into other applications?

Problem: How can I get OPC data into *Microsoft Excel*, *Microsoft Word*, or another application with support for *Visual Basic*, *VBA*, or *VB Script*?

Solution: Use the MatrikonOPC **Automation Component** to create a *Visual Basic* script that connects to a server, creates groups and items, and receives data change updates. Contact **Support** for examples of how to do this in *Excel*, *Visual Basic*, or an *HTML* document.

How can I access individual bits from an integer item?

Problem: How can I access individual bits from an integer item?

Solution: Create an alias (for more information, refer to **Alias Configuration**) that references the desired item and configures scaling for the alias to use expression evaluation. Edit the input expression to use binary math to access a particular bit (e.g., `IF((INPUT AND 4)=4, 1, 0)` to access bit 2). This method allows read-access only.

Search the *MatrikonOPC Support Knowledge Base* at www.opcsupport.com to find the answers to other commonly-asked MatrikonOPC Data Manager questions.

Un-Installation

To successfully un-install MatrikonOPC Data Manager, using the **Add/Remove Programs** from the Microsoft Windows **Control Panel** is recommended.

To un-install MatrikonOPC Data Manager:

1. Click on the **Start** button and highlight the **Control Panel** item.
2. From the displayed menu, select **Add or Remove Programs**.
3. The **Add or Remove Programs** window (Figure 66) is displayed.
4. Scroll through the list of currently installed programs and updates to find and select **MatrikonOPC Data Manager**.

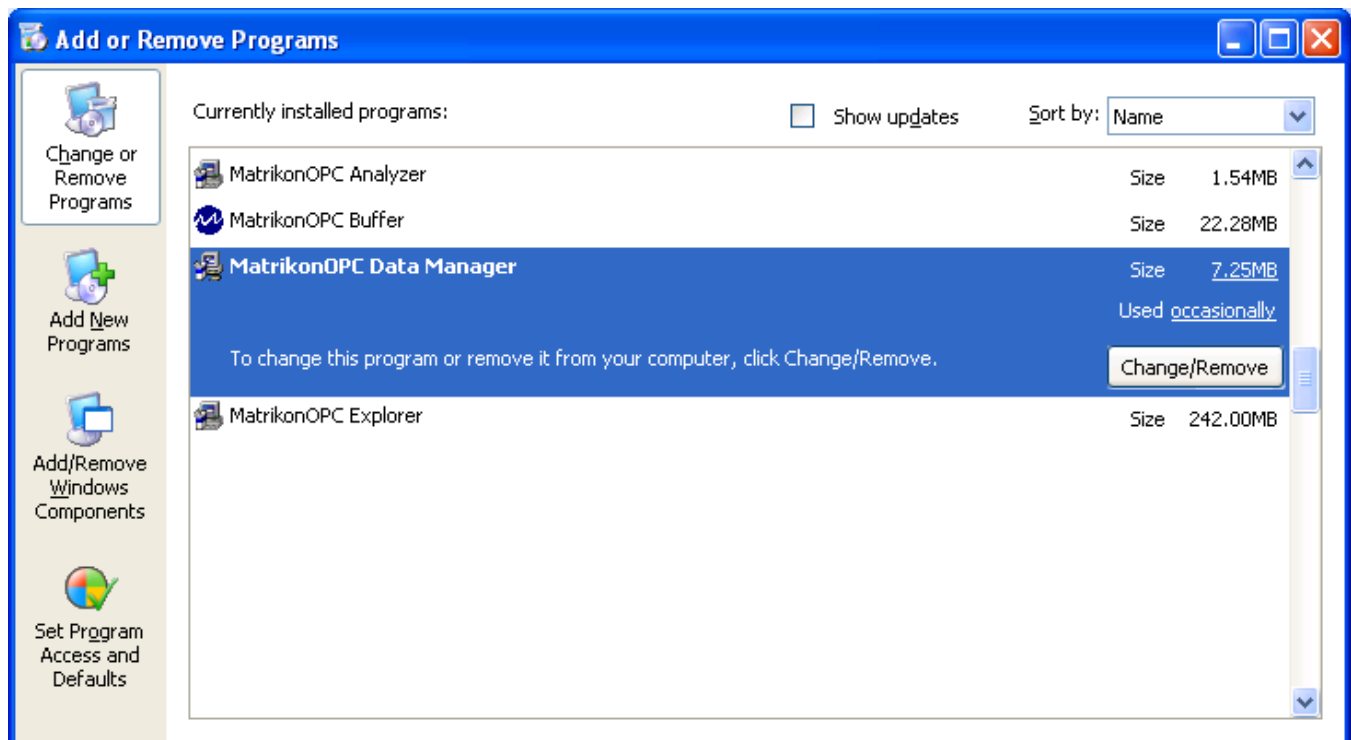


Figure 66 - Add/Remove Programs

5. Click on the **Change/Remove** button associated with the MatrikonOPC Data Manager program to initiate the un-install process.
6. The **MatrikonOPC Data Manager – InstallAware Wizard** appears, and the **Welcome to MatrikonOPC Data Manager Maintenance** screen (Figure 67) is displayed.

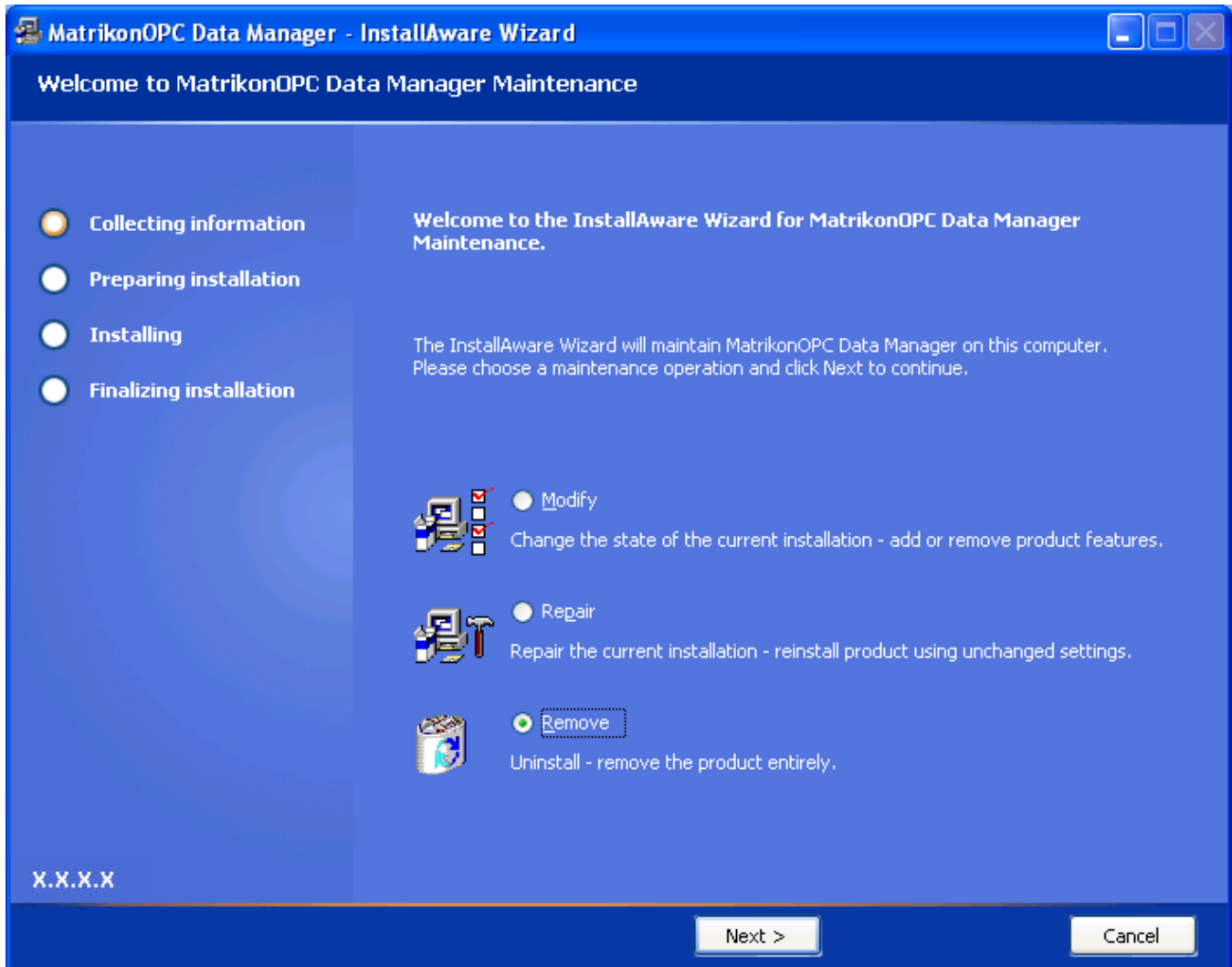


Figure 67 - Welcome to MatrikonOPC Data Manager Maintenance Screen

7. Select the **Remove** option button to un-install MatrikonOPC Data Manager entirely.
8. Click on the **Next** button.
9. The **Ready to Uninstall** window (Figure 68) is displayed.

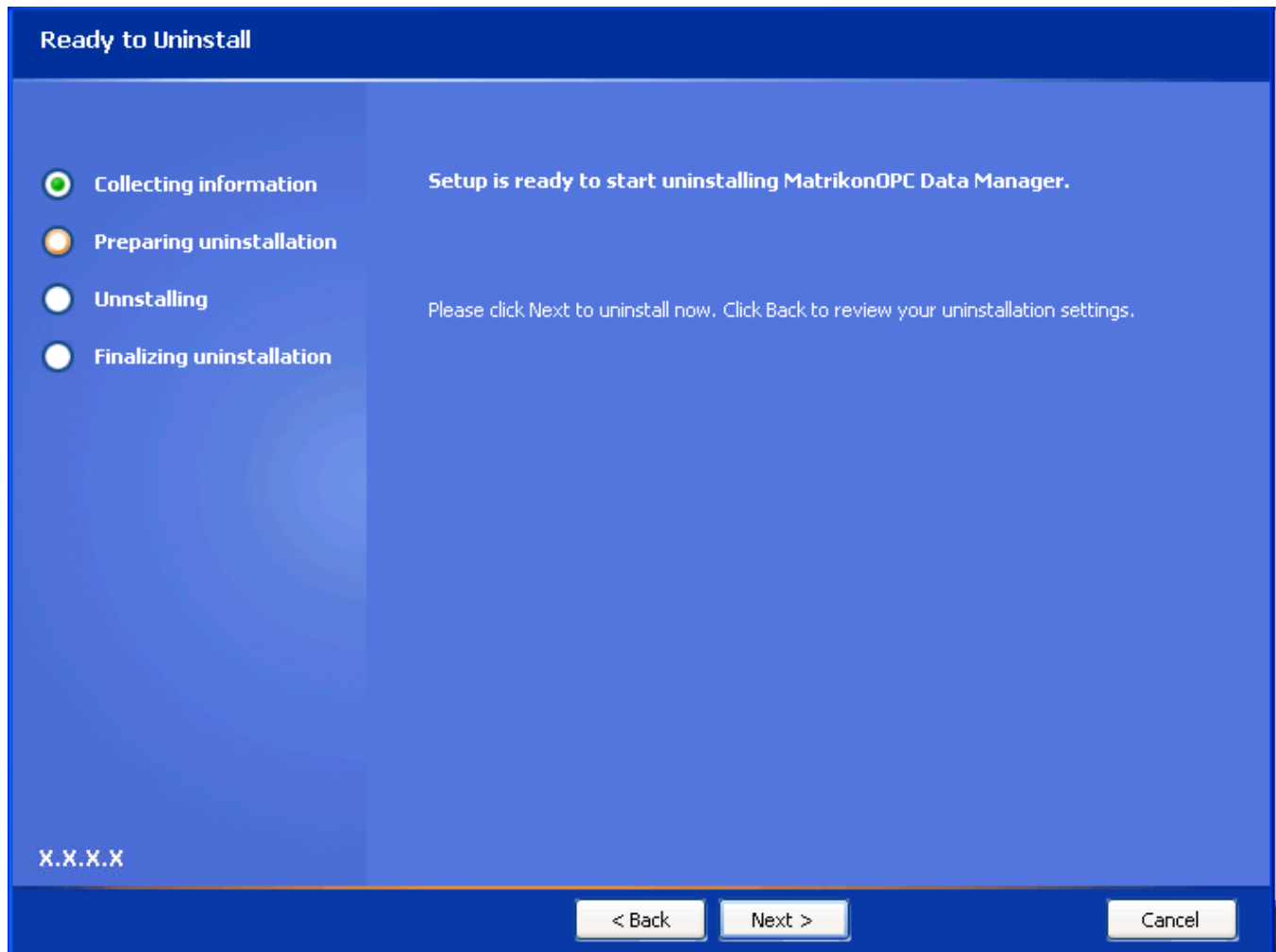


Figure 68 - Ready to Uninstall Screen

10. Click on the **Next** button.
11. The **Uninstalling MatrikonOPC Data Manager** screen (Figure 69) appears and the uninstall takes place.

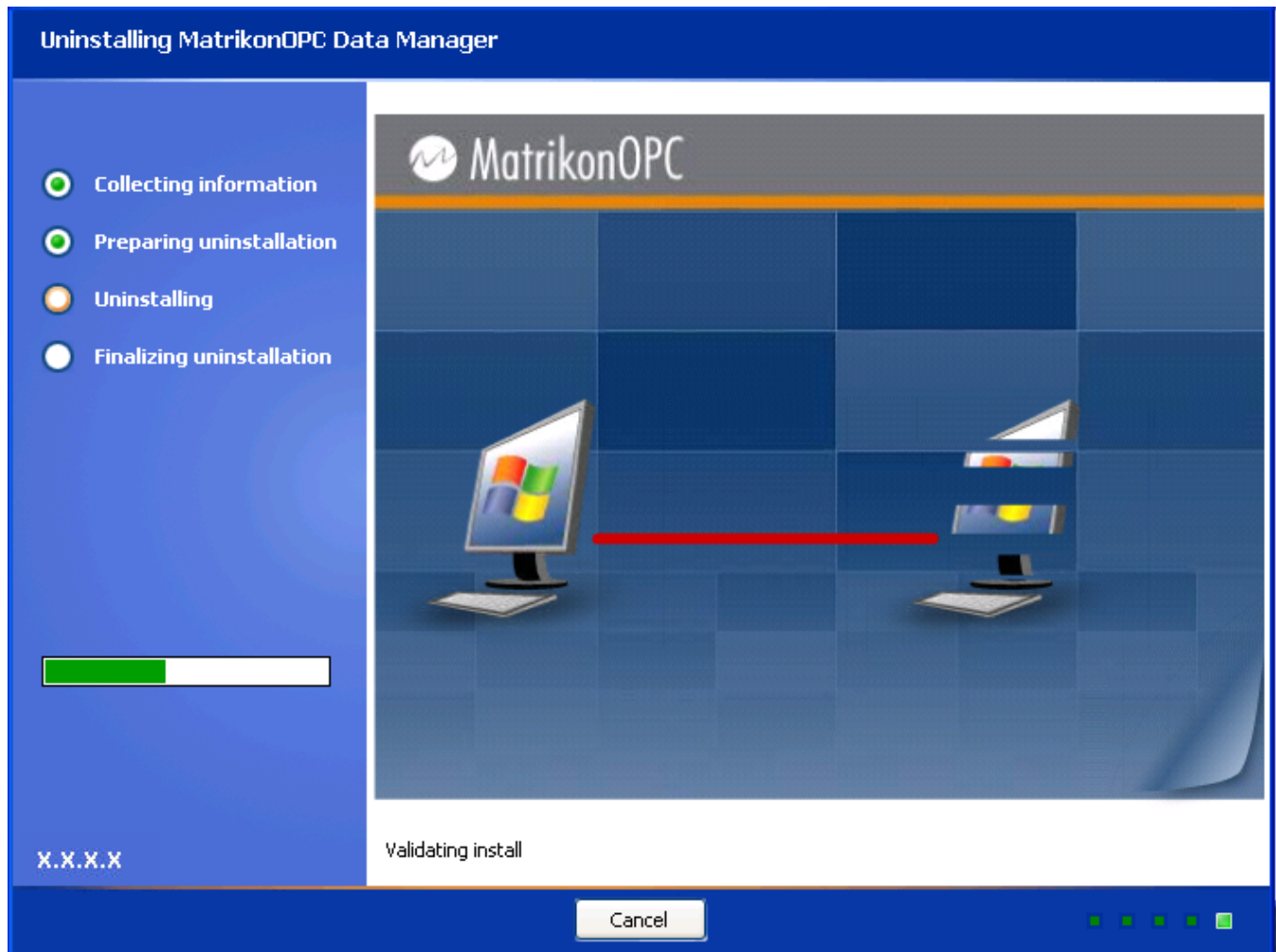


Figure 69 - Uninstalling MatrikonOPC Data Manager Screen

12. When the un-install has finished, the **MatrikonOPC Data Manager Setup Complete** screen (Figure 70) appears stating that MatrikonOPC Data Manager was successfully un-installed.

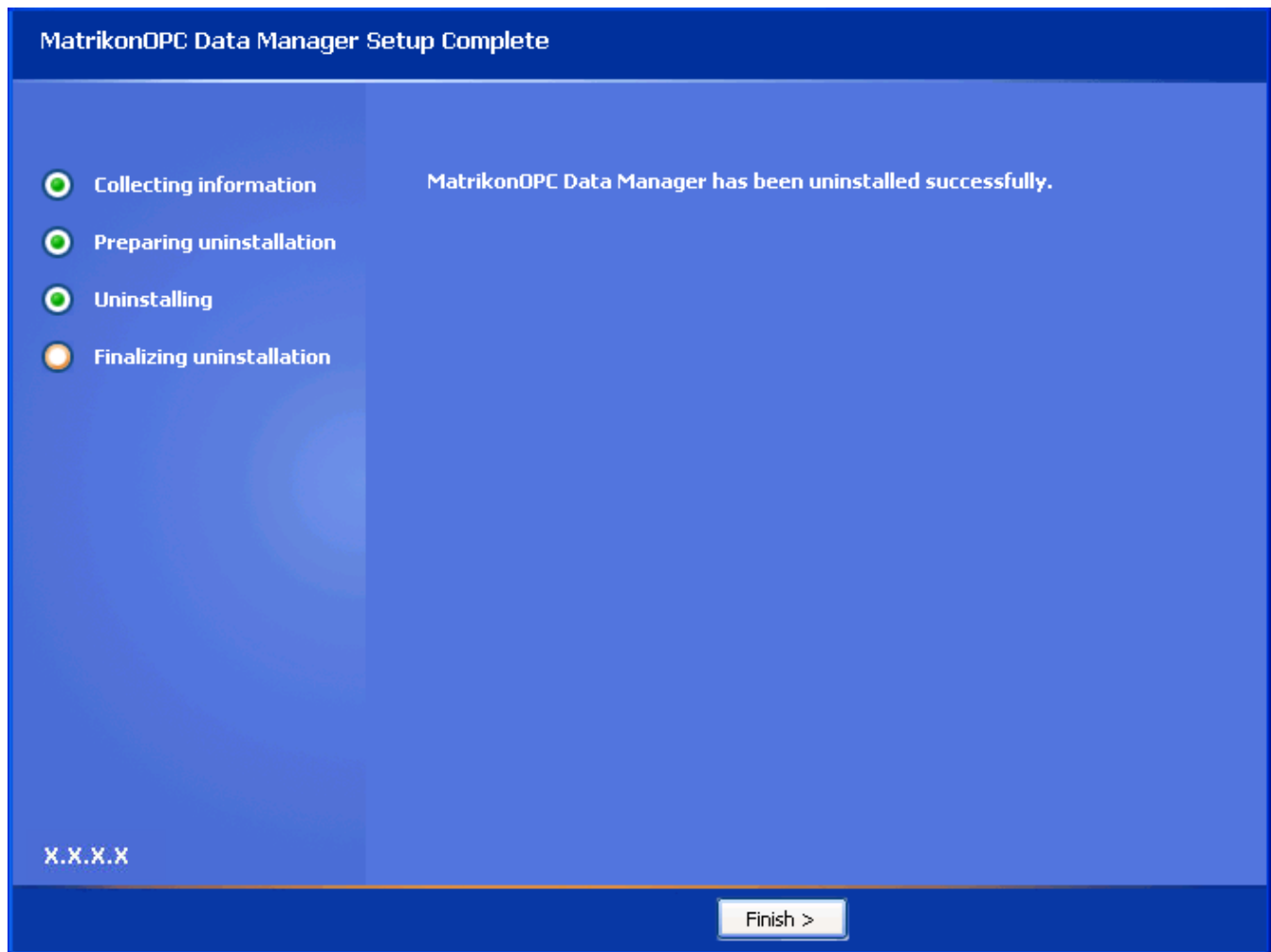


Figure 70 - MatrikonOPC Data Manager Setup Complete Screen

13. Click on the **Finish** button to complete the un-install and exit the Wizard.
14. The program no longer appears listed in the **Add or Remove Programs** window.

OPC Compliance

For more information on OPC, view the documents listed below (as well as other OPC Specifications) at <http://www.opcfoundation.org>. MatrikonOPC supports the following interfaces:

- OPC Overview 1.0
- OPC Common Definitions and Interfaces 1.0
- OPC Security Custom Interface 1.0
- OPC Data Access Custom Interface Standard 2.05

Installation

The server is by default installed as a local out-of-process COM server and enters its registration information in the Windows registry when instructed to do so with the **/REGSERVER** command-line option. The server installs itself as a Windows service and enters its registration information in the Windows registry when instructed to do so with the **/SERVICE** command-line option.

- Version-independent program ID is **Matrikon.OPC.DataManager**.
- Version-specific program ID is **Matrikon.OPC.DataManager.1**.
- OPC sub-key and vendor information string.
- Globally unique application ID (e.g., **F8582CED-88FB-11D0-B850-00C0F0104305**).
- Globally unique class ID number (e.g., **F8582CeC-88FB-11D0-B850-00C0F0104305**).
- Full path of 32-bit local server executable.
- OPC Data Access Server 1.0 and 2.0 implemented component categories.

The server removes its registration information from the Windows registry when commanded to do so with the **/UNREGSERVER** command-line option.

Common Interfaces

The server supports the mandatory functionality specified in *OPC Common Definitions and Interfaces*. The server supports the following locales for result code translation:

- US English (0x0409)
- System default (0x0800)
- User default (0x0400)
- Neutral (0x0000).

The server allows the client to set the client name for each connection. The server supports the shutdown event notification client-side interface.

Data Access

The server supports the mandatory functionality specified in the *OPC Data Access Custom Interface Standard*.

Groups

The server supports the addition, removal, and cloning of private groups. The server allows the client to manage group state.

- Name
- Active state
- Update rate (100 millisecond resolution)
- Time bias
- Dead-band (percent of analog item high-low range)

Items

The server supports the addition, removal, and validation of items in a group. The server allows the client to manage item configuration.

- Active state
- Requested data type
- Dead-band (percent of analog item high-low range)
- Sampling rate
- Buffer values (used only when sampling rate is enabled and is sampling faster than the group update rate).

Browsing and Item Properties

The server supports address space browsing.

- Hierarchical address space
- Simulate flat address space
- Branch/leaf name filter (pattern matching)
- Item data type filter
- Item access rights filter

The server supports the following mandatory item properties.

- Value, quality, and timestamp
- Canonical data type
- Access rights
- Scan rate

I/O Operations

The server supports synchronous I/O operations.

- Read active item values from cache.
- Read item values from device.
- Read items without adding the item to an OPC group.
- Write control values to items (on device).
- Write control values without adding the item to an OPC group.

The server supports asynchronous I/O operations as defined for **DA 2.0**.

- Read items values from device.

- Write control values to items (on device).
- Refresh active items from cache.
- Cancel outstanding operations.
- Enable/disable event notifications.

The server supports the data change event notification client-side interface as defined for **DA 2.0**.

- Data change or dead-band exceeded.
- Asynchronous refresh operation complete.
- Asynchronous read operation complete.
- Asynchronous write operation complete.
- Asynchronous operation cancellation complete.

The server supports asynchronous I/O operations as defined for **DA 1.0a**.

- Read items values from device.
- Read items values from cache.
- Write control values to items (on device).
- Refresh active items from cache.
- Cancel outstanding operations.

The server supports the data change event notification client-side interface as defined for **DA 1.0a**.

- Data change or dead-band exceeded – data with timestamps.
- Data change or dead-band exceeded – data without timestamps.
- Asynchronous write operation complete.

Appendix A Distributed COM (DCOM)

DCOM is an object protocol that enables COM components (such as OPC clients and servers) to communicate directly with each other across a network. A certain amount of configuration is required on the system where the OPC server is installed to allow remote clients to connect to it over the network.

Readers should be familiar with DCOM and with Windows 2000 security features and security administration. Information regarding Distributed COM and various links to related sites, white papers, specifications, and so on, can be found at

<http://www.microsoft.com/com/default.mspx>.

Notes:



- The following steps are suggestions only. Ask your Windows Network Administrator for more information about the settings that you should use, especially between different domains.
- The steps provided in this appendix apply to Windows NT operating systems only. For information on how to configure DCOM settings for newer Windows operating systems, please refer to the MatrikonOPC Online Support page on **DCOM Settings**.

DCOM Configuration Utility

Start the DCOM configuration utility either from the server configuration utility or from the command-line (`DCOMCNFG`). Answer, **yes** to any message boxes that appear (allowing the utility to assign application ID entries to those servers that don't already have them).

The main window for **DCOMCNFG** allows the user to either configure default settings for all COM servers or else to configure settings for a specific server chosen from the list. The former will affect all servers configured to use the default settings. The latter will affect the selected server only.



Note: DCOM settings are stored in the registry and loaded by COM (and OPC) servers at start-up. Therefore, server processes must be shut down and re-started for these changes to take effect.

Default Properties

The **Default Properties** tab contains settings that affect all DCOM communication on the machine.

- First of all, ensure that the **Enable Distributed COM on this computer** is selected in so that the machine is available to others via DCOM.
- Select the **Enable COM Internet Services on this computer** to allow DCOM access to the machine from the Internet (check with your administrator).
- In general, the other settings do not need to be changed.

The **Authentication Level** specifies when COM should authenticate the identity of calling clients (each call, each packet, etc).

- Normally, it should be set to **Connect**, indicating that COM should authenticate clients when they first connect to a server. If it is set to **None**, then COM performs no authentication and ignores any access permission settings.

The **Impersonation Level** specifies whether servers can ascertain the identity of calling clients and whether they can then perform operations on the client's behalf (as if the server is the client).

- Normally, it should be set to **Identify**, allowing the server to identify the calling client to see if it is allowed access to a certain resource but not to actually access any of these resources as the client.
- Select the **Provide additional security for reference tracking** to make even the reference counting on COM objects secure. This setting is not generally required.

Security Permissions

The most important DCOM settings for an OPC server are the security permissions. There are two ways for you to set these:

1. Change the specific settings for the server (recommended).
2. Change the default settings (not recommended) and make sure that the OPC server will use these.

Either way, be certain that the access and launch permissions are correct for the server.

Setting Security Permissions

To set the security permissions for an OPC Server:

1. Open the DCOM configuration utility.
2. Select the OPC server, and then click **Properties**.
3. The **Distributed COM Configuration Properties** window (Figure 71) appears.

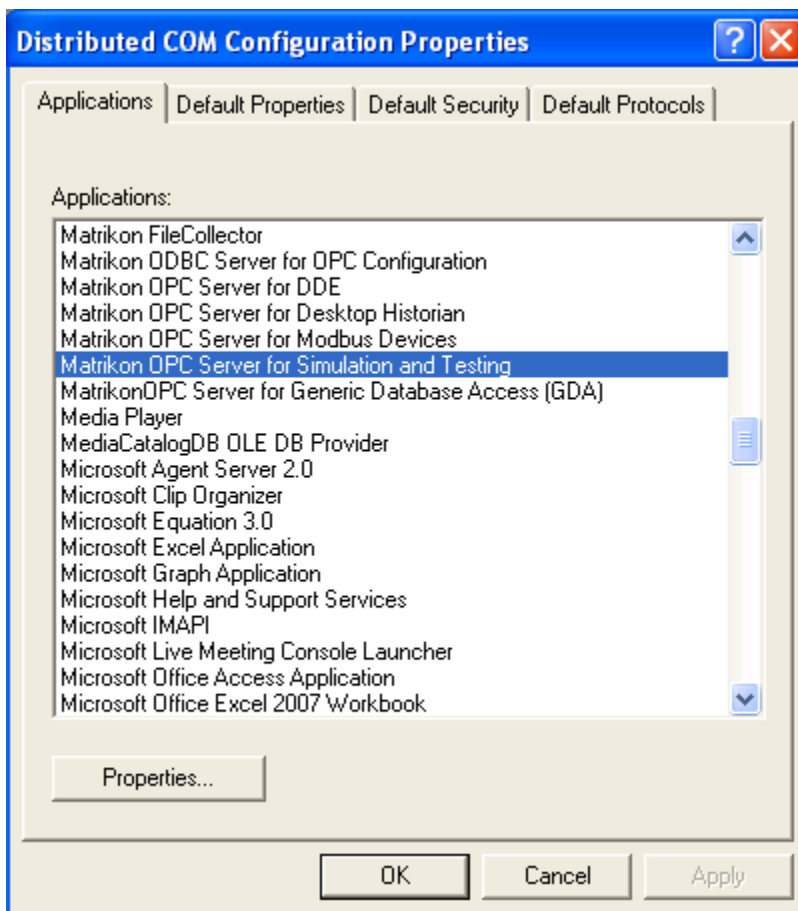


Figure 71 - Distributed COM Configuration Properties Window

4. Click on the **Security** tab to set the security for the server.
5. The **Distributed COM Configuration Security** tab (Figure 72) appears.

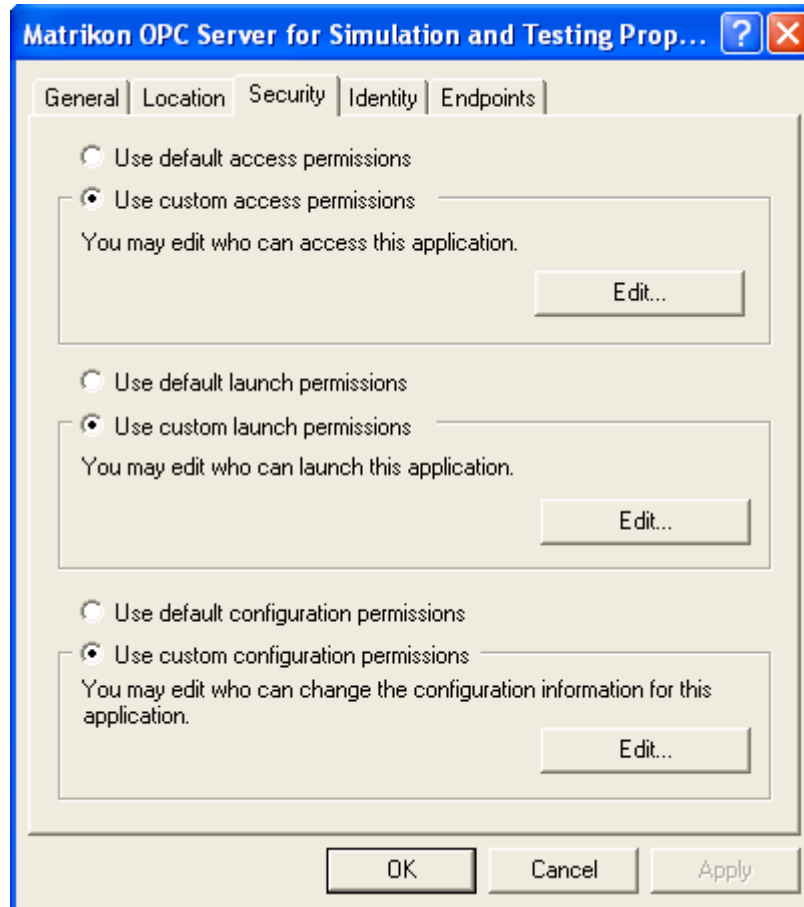


Figure 72 - Distributed COM Configuration Security Tab

Notes:

- The **Access Permissions** contain an *Access Control List* of principals that are allowed to interact with objects supplied by a server.
 - The **Launch Permissions** contain an *Access Control List* of principals that are allowed to start up a server process or service.
6. Include the names of users or user groups from trusted domains that you wish to be able to use the OPC server on this machine. Include the **Everyone** group to allow access to all users on a particular domain.
 7. To set the Access permissions, click **Use custom access permissions** and then click **Edit**.
 8. The **Registry Value Permissions** window (Figure 73) appears.

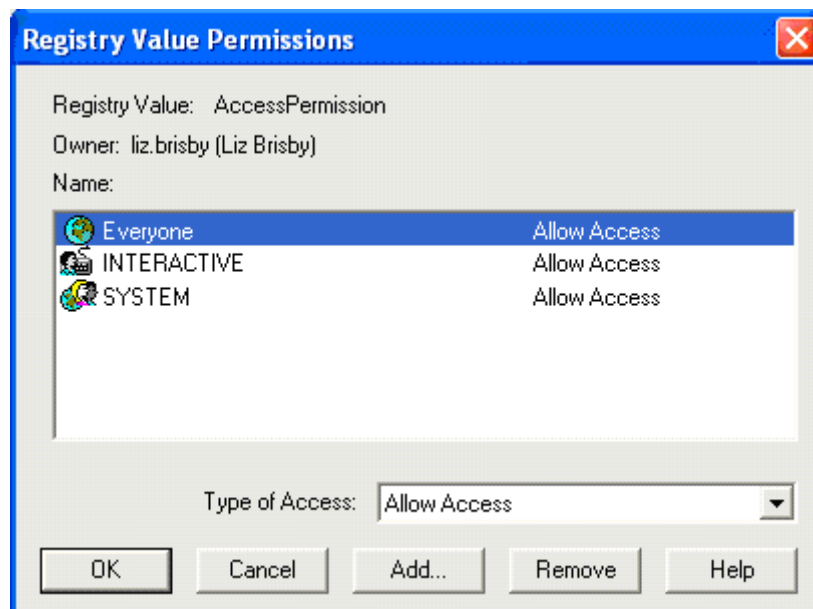


Figure 73 - Registry Value Permissions Window

9. To add users to the list click **Add**.
10. The **Add Users and Groups** window (Figure 74) appears.

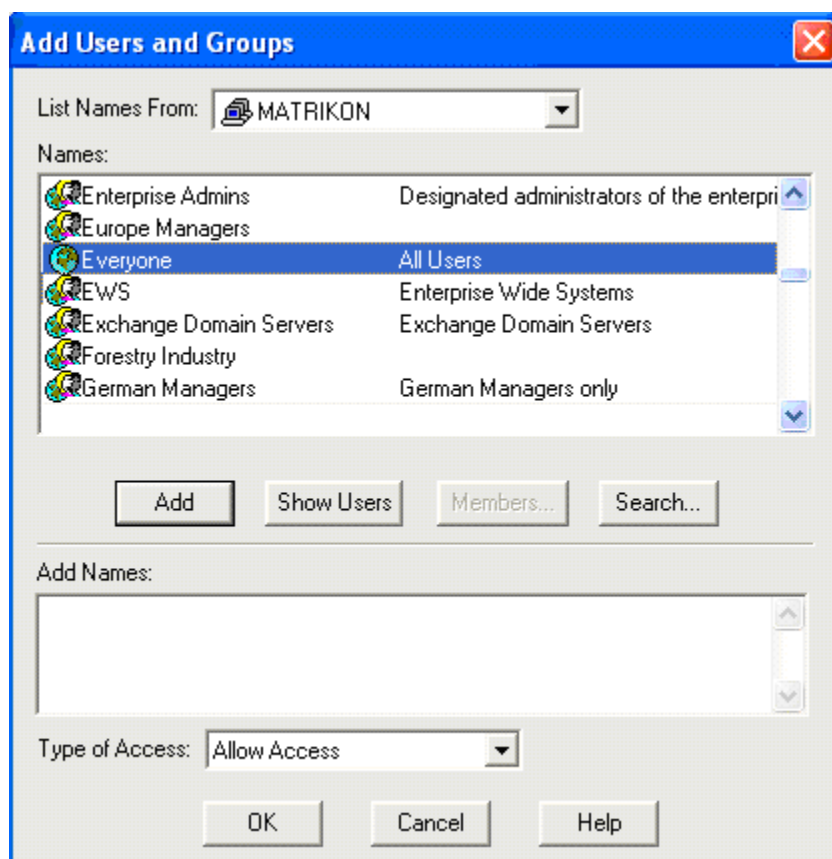


Figure 74 - Add Users and Groups Window

11. To add a user to the list, select the user, and then click **Add**. If the user you wish to add does not appear then click **Show Users**.

12. When you are done adding users, click **OK** to close the **Add Users and Groups** window. You can then choose to **Allow Access** or **Deny Access** for each user.

Notes:

- The procedure to set the launch permissions is similar to the above, but instead of choosing **Allow Access** for a user you would choose **Allow Launch**.
 - The Configuration Permissions contain an *Access Control List* of principals that are allowed to modify the configuration information for a server. In other words, it indicates who is allowed to alter the registry entries for installed servers as well as who is able to access the registry for the purposes of installing new servers. It is usually simpler to install and configure servers as a user with local administrative rights.
13. To connect to an OPC server from outside of the domain, create a local user account on both the server and the client machine with identical *username* and *password*. Then, add the local user on the OPC server to the DCOM permissions. Use the local account on the client machine to connect to the OPC server.

Server Identity

The **Identity** tab for a selected COM (or OPC) server specifies the user account that should be used when COM starts up the process. The available settings are different for servers that run as local executables as opposed to those that run as NT services.



Note: It is strongly recommended that OPC servers should be installed to run as NT services if they are going to be accessed by remote clients via DCOM. This ensures that the server can always be accessed even if no one is presently logged on to the machine, and only one server process ever starts up. It also adds a greater degree of security in terms of who is able to shut down the server process.

Servers that run as local executables have the option of running as the launching user (the calling client—this is the default), the interactive user (the one currently logged onto the machine), or a specified user. It is usually best to use the interactive user or a specified user. Otherwise, remote clients might start up multiple separate server processes that are not accessible to others.

Servers that run as NT services should generally run as the local **System** account. Alternatively, the server can be set to run as a specified user, although this is usually done from the **Service Control Manager** applet rather than DCOMCNFG. *Access* and *Launch* permissions are particularly important when installing a server to run as an NT service.

Default Protocols

The **Default Protocols** tab specifies the communication protocols available to DCOM. The order that protocols appear in the list indicates the priority in which they will be used (the topmost having the highest priority).

The more protocols that appear in the list, the better the chances of connecting to an OPC server on an unknown remote machine (such as at an OPC Interoperability Workshop). However, it may also take longer for DCOM to time out if a server machine is not present since it has to try each protocol in turn.

For most situations, it is best to remove all unused protocols from the list and only include those that are necessary for your network. For example, on a TCP/IP network, one would include the **Connection-oriented TCP/IP** protocol. Contact your IT personnel for more information about your network.



Note: Evidence indicates that there are problems with the datagram-oriented protocols (such as UDP/IP) that can cause memory leaks in DCOM. Therefore, it is strongly recommended that these protocols be removed from the list of default protocols. Datagram-oriented protocols are not supported under Windows 2000 at all (although the DCOM configuration utility still allows you to configure them).

Remote Program ID

Before the **OPC Server Browser** became available, OPC client applications had to search the registry to generate a list of available OPC servers. Therefore, some older OPC clients need to have a program ID in the local registry in order to connect to a particular OPC server.

The simplest solution is to install the OPC server software on the client machine even if it is not used. Alternatively, use the following steps to copy a program ID to the client machine.

Note: This method may not work for every OPC client. Please check the client documentation for more information.



WARNING: Any changes made to the registry must be made with **extreme caution!**

1. Back up your registry.
2. On the server machine, run **REGEDIT** as a user that has access rights to the local registry.
3. Expand the **HKEY_CLASSES_ROOT** key.
4. Find the program ID(s) for the desired OPC server(s).

Note: In the case of MatrikonOPC OPC servers, the ID has the form *Matrikon.OPC.Device*. If you quickly type the first few letters then **REGEDIT** should jump to the location of that key. Some servers may have both a version-specific as well as a version-independent program ID. In this case both IDs should be copied to the client machine.

5. For each program ID, select the key and choose **Export Registry File** from the **Registry** menu. Enter a file name, and then click **Save**. Be careful not to overwrite other export files that you are creating.
6. Copy the exported **REG** files to the client machine.
7. Merge the **REG** files into the registry of the client machine.

Note: This should simply be a matter of double clicking on the file from the desktop of the client machine. Alternatively, run **REGEDIT** on the client machine and choose **Import Registry File** from the **Registry** menu, selecting each file in turn. This must be done as a user who has write access to the local registry.

8. Use **REGEDIT** to check that the program IDs have in fact, been copied.
9. Delete the **REG** files since they are no longer needed.

Appendix B Aliases

Scaling Expressions

Alias scaling expressions may use any of the expression constructs listed in Table 55.

Construct	Description	Examples
'text'	Text value (single quotation marks).	'hello' 'Joe's Alias'
+ - * /	Addition (or Append), Subtraction, Multiplication, and Division.	(3 * 7 + 1) / 8 - 2 'hi' + 'there'
= < > <> <= >=	Equal To, Less Than, Greater Than, Unequal To, Less or Equal To, Greater or Equal To.	3 < 4
Not And Or	Logical Not, Logical And, Logical Or. May also be used for binary math.	(7 >= 3) And (1 <> 0) (12 And 5) = 4
TIME	Current time as text.	'The time is' + TIME
DATE	Current date as text.	'Today is' + DATE
INT(x)	Returns the integer part of x.	INT(3.14) = 3
FRAC(x)	Returns the fractional part of x.	FRAC(3.14) = 0.14
SQRT(x)	Returns the square root of x.	SQRT(16) = 4
DIV(x, y)	Divides x by y.	DIV(42, 7) = 6
IF(expr, x, y)	Returns x if expression evaluates to TRUE, otherwise returns y.	IF(6 <= 12, 'OK', 'Bad') = 'OK'
TRUE FALSE	Constant Boolean true and false.	(5 > 6) = FALSE
TYPEOF(x)	Returns the data type of x as a text description ('STRING', 'INTEGER', 'FLOAT', 'BOOLEAN', 'ERROR').	TYPEOF('hello') = 'STRING'
STR(x)	Converts the numeric value x to text.	STR(3.14) = '3.14'
UPPER(x) LOWER(x) PRETTY(x)	Converts the text value x to all upper case or lower case letters, or the first letter upper case and the rest lower.	UPPER('alarm') = 'ALARM' LOWER('ALARM') = 'alarm' PRETTY('ALARM') = 'Alarm'
COPY(x, start, length)	Returns a sub-string of the x, copying length characters starting at start.	COPY('FIDDLE', 2, 4) = 'IDDL'
FORMATNUMERIC(mask, x)	Converts the numeric value x to text using the format mask.	FORMATNUMERIC('####.#', 123.4567) = '123.5'
INPUT	The incoming value read from OPC.	INPUT * 3.1415
OUTPUT	The outgoing value written to OPC.	OUTPUT / 3.1415

Construct	Description	Examples
'text'	Text value (single quotation marks).	'hello' 'Joe''s Alias'

Table 55 - Expressions Constructs for Alias Scaling

CSV File Format

The alias import/export file contains lines of comma-separated values. Values containing commas or spaces are enclosed in double-quotation marks (" "). Double-quotation marks occurring inside quoted values are escaped with an extra double-quotation mark. Lines beginning with a hash mark (#) are ignored (used for comments). Each line contains the fields listed in Table 56.

Field	Description
Alias Group	Name of the alias group folder where the alias belongs. Periods in the name indicate subfolders below the root (e.g., North.FIC101 = alias group North under the Alias Configuration root and alias group FIC101 under that).
Alias Name	Name of the alias. Full alias path name composed of the alias group path, a period, and the alias name (e.g., North.FIC101.CV for an alias named CV).
Item Path	Fully qualified item ID for the OPC item to which the alias refers.
Data Type	Decimal number indicating the data type for the alias.
Read-only	Specifies whether the alias is read-only or read-write. 0 = read-write 1 = read-only
Poll Always	Specifies whether the alias is polled continuously or not. 0 = only poll as requested by an OPC client (normal) 1 = poll continuously at the specified update rate
Update Rate	Update rate (milliseconds) to use with the Poll Always option.
Scaling	Scaling type for the alias. 0 = none 1 = linear 2 = square root 3 = gain/offset 4 = expression

Table 56 - File Import/Export Field Descriptions

When the scaling field specifies linear (1) or square root (2) scaling, the line contains the additional fields listed in Table 57.

Field	Description
High Raw	Raw value range (double-precision real).
Low Raw	
High Scaled	Scaled value range (double-precision real).
Low Scaled	
Clamp	Clamp options. 0 = none 1 = clamp low value

Field	Description
	2 = clamp high value 3 = clamp both high and low values

Table 57 - Additional File Import/Export Field Descriptions - Linear/Square Root Scaling

When the scaling field specifies gain/offset (3) scaling, the line contains the additional fields listed in Table 58.

Field	Description
Gain	Scaling factor (double-precision real).
Offset	Scaling offset (double-precision real).

Table 58 - Additional File Import/Export Field Descriptions - Offset Scaling

When the scaling field specifies expression (4) scaling, the line contains the additional fields listed in Table 59.

Field	Description
Input Expression	Simple formula applied to the value read from the OPC item.
Output Expression	Simple formula applied to values written to the OPC item. The output formula should be the reciprocal of the input formula.

Table 59 - Additional File Import/Export Field Descriptions - Expression Scaling

Scaling Algorithms

For each type of scaling, a different algorithm (Table 60) is applied to values read from the OPC item. A reverse algorithm is applied to any values written to the OPC item.

Scaling	Algorithm/Example	Reverse Algorithm/Example
Linear	$(x - Raw_{Low}) \left(\frac{Scaled_{High} - Scaled_{Low}}{Raw_{High} - Raw_{Low}} \right) + Scaled_{Low}$	$(x - Scaled_{Low}) \left(\frac{Raw_{High} - Raw_{Low}}{Scaled_{High} - Scaled_{Low}} \right) + Raw_{Low}$
Square Root	$\sqrt{x - Raw_{Low}} \left(\frac{Scaled_{High} - Scaled_{Low}}{\sqrt{Raw_{High} - Raw_{Low}}} \right) + Scaled_{Low}$	$(x - Scaled_{Low})^2 \left(\frac{Raw_{High} - Raw_{Low}}{(Scaled_{High} - Scaled_{Low})^2} \right) + Raw_{Low}$
Gain/Offset	$Gain \cdot x + Offset$	$\frac{x - Offset}{Gain}$
Expression	$SQRT(INPUT) + 5$	$(OUTPUT - 5) * (OUTPUT - 5)$

Table 60 - Scaling Algorithms

Appendix C Standard Data Types

The Standard data types and their descriptions are listed in Table 61.

Hex	Dec	Data Type	Description
0000	0	VT_EMPTY	Default/Empty (nothing)
0002	2	VT_I2	2-byte signed integer
0003	3	VT_I4	4-byte signed integer
0004	4	VT_R4	4-byte (single-precision) real
0005	5	VT_R8	8-byte (double-precision) real
0006	6	VT_CY	Currency
0007	7	VT_DATE	Date
0008	8	VT_BSTR	Text (UNICODE)
000A	10	VT_ERROR	Error code
000B	11	VT_BOOL	Boolean (TRUE = -1, FALSE = 0)
0011	16	VT_I1	1-byte signed integer
0012	17	VT_UI1	1-byte unsigned integer
0013	18	VT_UI2	2-byte unsigned integer
0014	19	VT_UI4	4-byte unsigned integer
2002	8194	VT_ARRAY VT_I2	Array of 2-byte signed integers
2003	8195	VT_ARRAY VT_I4	Array of 4-byte signed integer
2004	8196	VT_ARRAY VT_R4	Array of 4-byte (single-precision) real
2005	8197	VT_ARRAY VT_R8	Array of 8-byte (double-precision) real
2006	8198	VT_ARRAY VT_CY	Array of currency values
2007	8199	VT_ARRAY VT_DATE	Array of dates
2008	8200	VT_ARRAY VT_BSTR	Array of text values
200A	8202	VT_ARRAY VT_ERROR	Array of error codes
200B	8203	VT_ARRAY VT_BOOL	Array of Boolean values
2011	8208	VT_ARRAY VT_I1	Array of 1-byte signed integers
2012	8209	VT_ARRAY VT_UI1	Array of 1-byte unsigned integers
2013	8210	VT_ARRAY VT_UI2	Array of 2-byte unsigned integers
2014	8211	VT_ARRAY VT_UI4	Array of 4-byte unsigned integers

Table 61 - Standard Data Types

Appendix D Microsoft Excel as a DDE Client

Microsoft Excel can act as both DDE client and DDE server. When using Excel as the client, DDE items can be bound to specific cells in a spreadsheet, creating a read-only “hot link” to the DDE items. Using Visual Basic, Excel can also be used to transmit (write) the data contained in a specific cell of a spreadsheet to a DDE server.

DDE Read

To perform a DDE Read using Excel, simply enter a DDE Item as a formula in some spreadsheet cell:

=SERVICE|TOPIC! NAME

Excel will initiate a DDE Advise loop, or “hot link”, to the topic and item within the service. The DDE Management system (in this case, Windows) will forward any update sent by the DDE service, to the appropriate DDE client (in this case, Microsoft Excel). The DDE service is responsible for update rate/behaviour.

To disable a specific hotlink in Excel, use the **Links** menu option under the **Edit** menu.

Special Characters in Excel

Excel reserves the use of specific characters for use in any cell. If a **SERVICE**, **TOPIC**, or **NAME** contains any special characters, surround the specific field with single quotation characters (' '):

=SERVICE|TOPIC!'NAME'

=SERVICE|'TOPIC'!'NAME'

=SERVICE|'TOPIC'!NAME

To include single quotation characters in the name, enter two simultaneous single quotation characters:

=matrikon_opc_simulation_1|'Power.Generator's Value'!'1000\'

DDE Write

To perform any DDE command other than requests (read) or advise (hot link), a Visual Basic (VB) function must be used. Most DDE commands are available by using the application object. For example, the following function will poke (write) the contents of column 1, row 1 to an item in the OPC Simulation server:

```
Sub WriteToDDE()  
  
' open a DDE channel. Field 1 = SERVICE, Field 2 = TOPIC  
'channel = DDEInitiate("matrikon_opc_simulation", "Bucket Brigade.Real4")  
  
' poke to the Item 1000\, the value of cell A1  
DDEPoke channel, "1000\", Worksheets("Sheet1").Range("A1")  
  
' close the channel  
DDETerminate channel  
  
End Sub
```

Net DDE

Since DDE commands are routed by the operating system, it is not possible to establish a DDE session between two computers unless some transport mechanism is used. This is usually supplied as a plug-in component of the operating system. In the Windows Environment, the NetDDE Windows Service allows DDE communication between two computers.

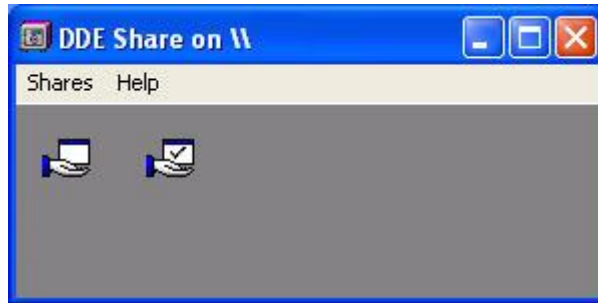


Figure 75 - DDE Share

NetDDE must first be configured using the DDEShare application (*DDEShare.exe*) as shown in Figure 75. Each SERVICE and TOPIC pair, or "NetDDE Share", that is to be available through NetDDE must be assigned a unique name.

Appendix E Security

Introduction

The OPC Framework has implemented the OPC Security Customer Interface version 1.0 of the specification. Both the *IOPCSecurityNT* and *IOPCSecurityPrivate* interfaces are fully supported (there are no optional pieces).

IOPCSecurityNT describes how NT authentication is used in OPC Security. *IOPCSecurityPrivate* describes how proprietary user credentials are used in OPC Security. The OPC Security specification defines how user credentials are passed from client to server, but very little else. The type of functionality in an OPC server that is controlled by OPC Security is vendor-determined.

Appendix Structure

This appendix is structured as follows:

- **Introduction** – this introductory section.
- **OPC Security Implementation** – description of user access dependencies.
- **MatrikonOPC Tag Security Configuration Utility** – describes the utility that is used to configure security for MatrikonOPC servers.
- **Security Details** – describes how permissions are applied, how security settings are stored, and other important details.

OPC Security Implementation

Whether a user has access or not will depend on:

1. **Identity** – the user behind the OPC client's actions.
2. **Location** – the OPC item ID or hierarchy path being accessed.
3. **Type** – the type of functionality the user is trying to perform.

Identity

Using the *IOPCSecurityNT* interface for OPC Security, the identity of the OPC client is the domain user that is running the OPC client and connecting to the OPC server. The OPC Framework will attempt to impersonate the client that is connected to the server, and use the name from those credentials for access control. This method does not require any implementation of OPC Security by the OPC client, since no interface calls are necessary.

Using the *IOPCSecurityPrivate* interface for OPC Security, the OPC client must make a call to the OPC server to log on with a user name and password. In this scenario, the OPC client must implement and follow the OPC Security specification in terms of following the calls necessary to provide credentials. The credentials provided through the private interface override those provided from the NT interface. The OPC client may choose to log off, at which point the NT credentials are used until the log on call is made again.

Location

Some of the interface calls made from an OPC client to an OPC server require the client to provide an OPC item ID. The OPC Framework will take the OPC item ID provided, and determine whether access to that location is allowed or not. A particular server installation may want to control access to a particular device or branch in the hierarchy, and is able to do so by setting permissions for a partial item ID or path.

Other interface calls do not provide an ID, but may depend on the state of the server with respect to previous calls. OPC Browsing (DA 2.0) is an example of this. In this case, the full path up to that particular location is used for determining access rights.

Type

There are four types of interface functionality in the OPC Framework (specifically the OPC Outer Layer) that are controlled using OPC Security:

1. Browsing
2. Adding items
3. Reading
4. Writing

Browsing is the least intrusive, followed by adding items, reading values from the items, and finally writing to the items being the most intrusive. There are multiple interfaces, and functions within those interfaces, that can be used to perform the types of functionality listed above. Thus, security control has been added to each possible entry. For example, read control has been added to group subscriptions call-backs as well as synchronous reads and asynchronous reads – denying read control would disable reads for the possible types.

A location that is being accessed by an OPC client may have different permissions for the different types of access. For example, one particular item may be browseable, added, and read, but the writing permissions might be restricted so that the user cannot interfere with the operation of the end device.

Note: Of the four functionality types listed above, three of them make use of the full OPC item ID when an interface call is made from the client to the server: Adding Items, Reading, or Writing. When browsing, only a partial path leading to an OPC item may be known at any location in the browsing hierarchy.

MatrikonOPC Tag Security Configuration Utility

Note: Microsoft Windows 2000 does **not** support The **MatrikonOPC Tag Security Configuration Utility**. If Windows 2000 is in use, refer to **ACL File Modification for Microsoft Windows 2000 Users** for information on using a command-line utility to change the ACL file.

The tag security settings for MatrikonOPC servers are configured and managed via the **MatrikonOPC Tag Security Configuration Utility**, a tool that is installed with the server. This utility allows users to define, per MatrikonOPC server, the following:

- Who has permission
- Which tags/locations they have permissions for
- The type of permissions for those locations

Security settings configured using this utility are read by the OPC Framework and populated in memory upon server start-up, and are monitored for changes.

Note: In order for the **MatrikonOPC Tag Security Configuration Utility** to work properly, the windows user running the utility must have Administrator rights to the computer.

The **MatrikonOPC Tag Security Configuration Utility** is a component of an OPC server installation, and is installed in the following location:

C:\Program Files\Common Files\MatrikonOPC\Common\ACLConfig.exe

The **MatrikonOPC Tag Security Configuration Utility** can be run either directly from its installed location, or from a shortcut found in the **Start Menu**. If the utility is run from the installed location, then the user must select the OPC server for which security will be configured. If the **MatrikonOPC Tag Security Configuration Utility** is run from the shortcut, then it will configure security for the OPC server to which the shortcut belongs.

To run the MatrikonOPC Tag Security Configuration Utility from its shortcut:

1. Click on the Windows **Start** button.
2. Select **Programs -> MatrikonOPC -> <OPC Server Name> -> Tag Security**.

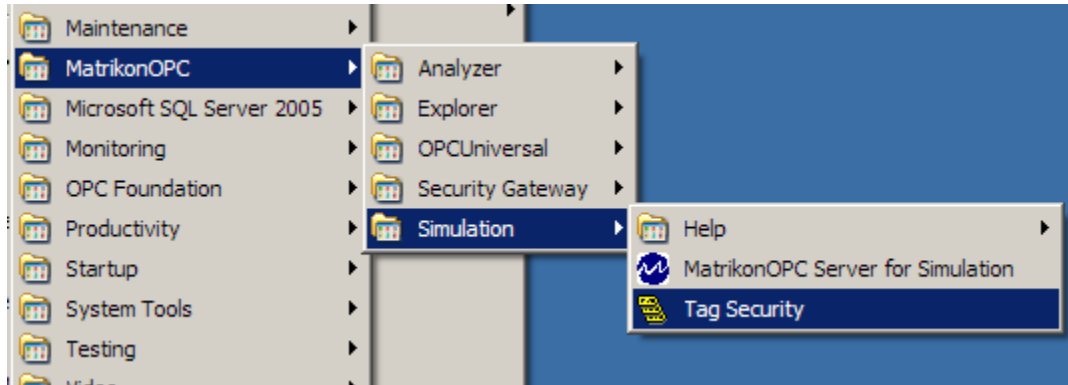


Figure 76 - Start Menu Navigation

After the MatrikonOPC Tag Security Configuration Utility is run:

1. A window appears asking for a password to be entered. This protects the security settings and prevents unauthorized individuals from accessing these settings. For servers that required a security password to be entered during their installation, the **Enter server password** window (Figure 77) appears.



Figure 77 - Enter Server Password Window

2. Enter the password created during the installation of the OPC server.
Note: The default password provided for you during installation (if you chose to use the default) is **MatrikonOPC**.
3. Click on the **OK** button.
4. The **MatrikonOPC Tag Security Configuration Utility** screen (Figure 78) appears.

Layout

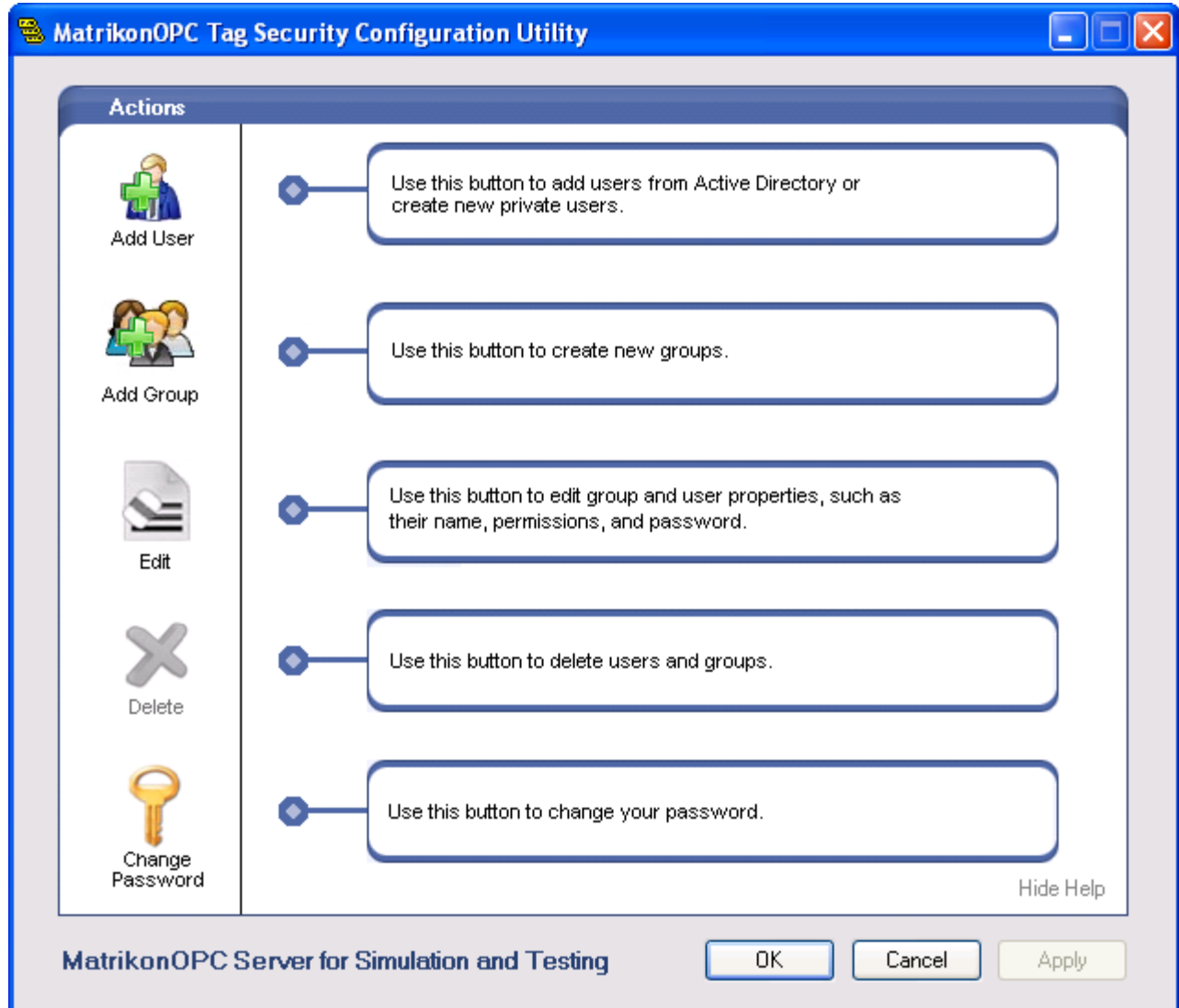


Figure 78 - MatrikonOPC Tag Security Configuration Utility Main Screen

The bottom left-hand side of the **MatrikonOPC Tag Security Configuration Utility** screen displays the name of the OPC server that is being configured for tag security. In Figure 78 above, the **Utility** screen shows that the **MatrikonOPC Server for Simulation and Testing** tag security is being configured.

The left-hand side of the **Utility** screen shows a column of action icons that can be clicked upon. These actions are further described later in this appendix. Some actions may not be applicable, depending on the context in which they are used, and are identified by greyed-out icons.

In the center of the **Utility** screen there are descriptions for each of the actions that can be performed. These descriptions are removed once users or groups are added. Their appearance can also be toggled at any time by clicking on the **Hide Help** link that exists in the bottom-right corner of the **Utility** screen. Once the descriptions are removed, a list of users and groups that have been added appears (Figure 79). By default, there is always a user named **Everyone** in the **Users & Groups** list. This user defines the permissions used for other NT users that are not configured.

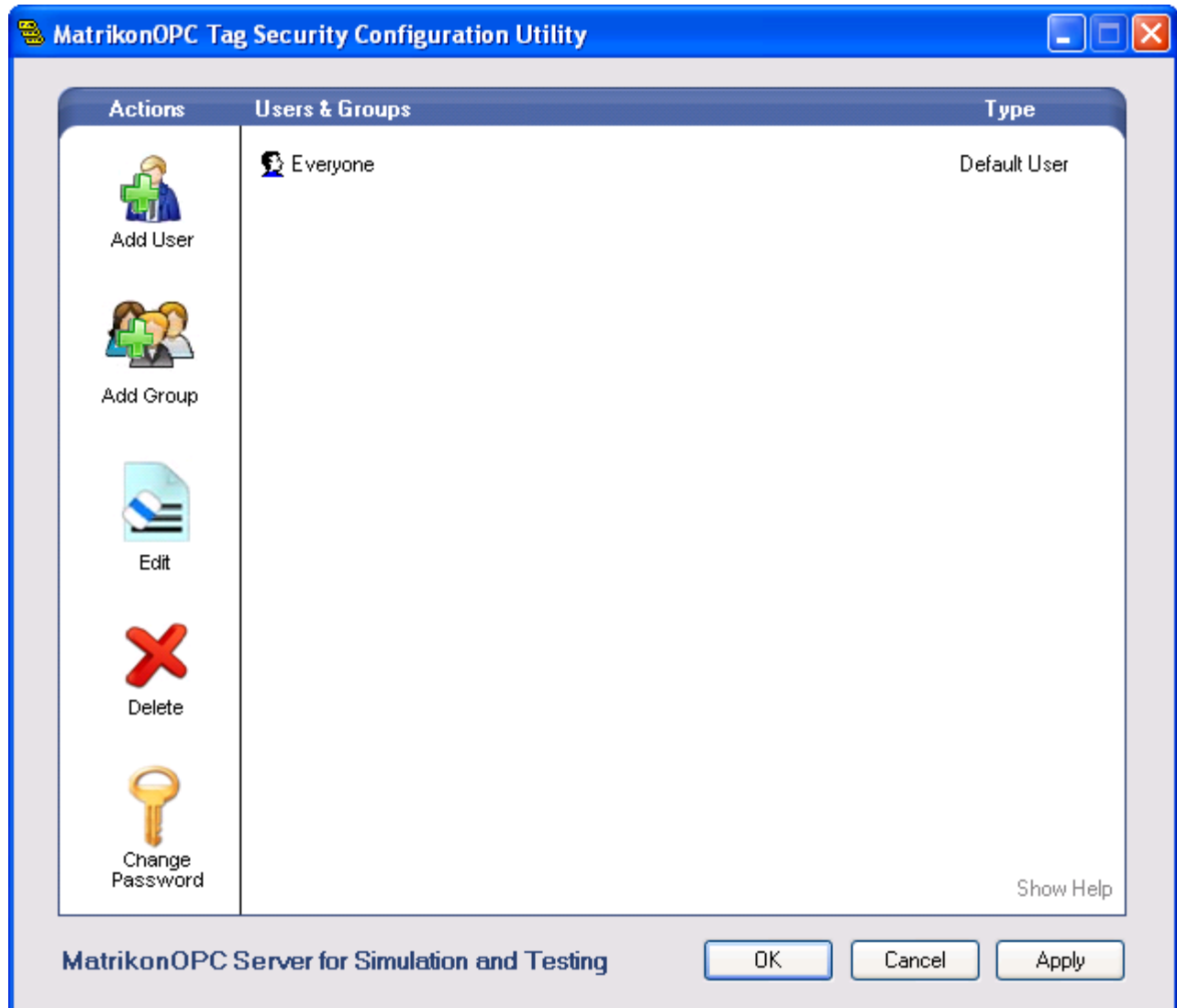


Figure 79 - MatrikonOPC Tag Security Configuration Utility Main Screen (Descriptions Removed)

Note: After any action is performed, the changes made do not take effect until either the **OK** or **Apply** button has been selected. Clicking on the **OK** button saves the changes and closes the **Utility** screen. Clicking on the **Apply** button saves the changes and keeps the **Utility** screen open. Clicking on the **Cancel** button or the **X** button on the top-right of the screen, discards any changes made.

Add User

There are two types of users for which security can be configured: *NT Users* and *Private Users*. Adding a user to the configuration will allow permissions to be defined for that user. For NT users, the *IOPCSecurityNT* interface is used, and for Private users, the *IOPCSecurityPrivate* interface is used.

NT User

To add an NT user:

1. From the **MatrikonOPC Tag Security Configuration Utility** main screen, click on the **Add User** button.

2. The **Add User** window (Figure 80) appears. The **NT User** option button is selected by default. This will allow the addition of a user from a Windows NT Domain.

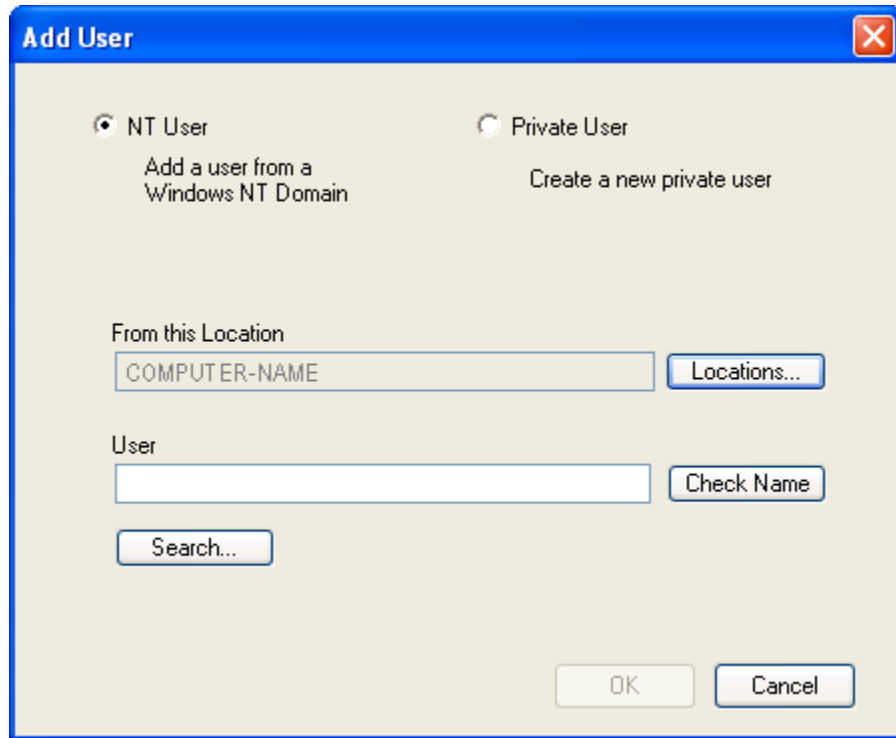


Figure 80 - Add User Window (NT)

3. By default, the local machine name appears in the **From this Location** field. To browse to a different location, click the **Locations** button.
4. The **User** field can be entered manually. Clicking on the **Check Name** button performs validation on the entered user. The user names are the same as the Windows NT domain names used on the network. To avoid manually entering a user, click on the **Search** button, and select a user from the displayed list of users.
5. To add the selected user, click on the **OK** button. The user is then added to the list of users and/or groups currently defined (refer to Figure 81 for a sample list of defined users and groups).
6. The **Edit <Username>** window (Figure 85) appears. Follow the instructions in the **Edit User** section for adding permissions.

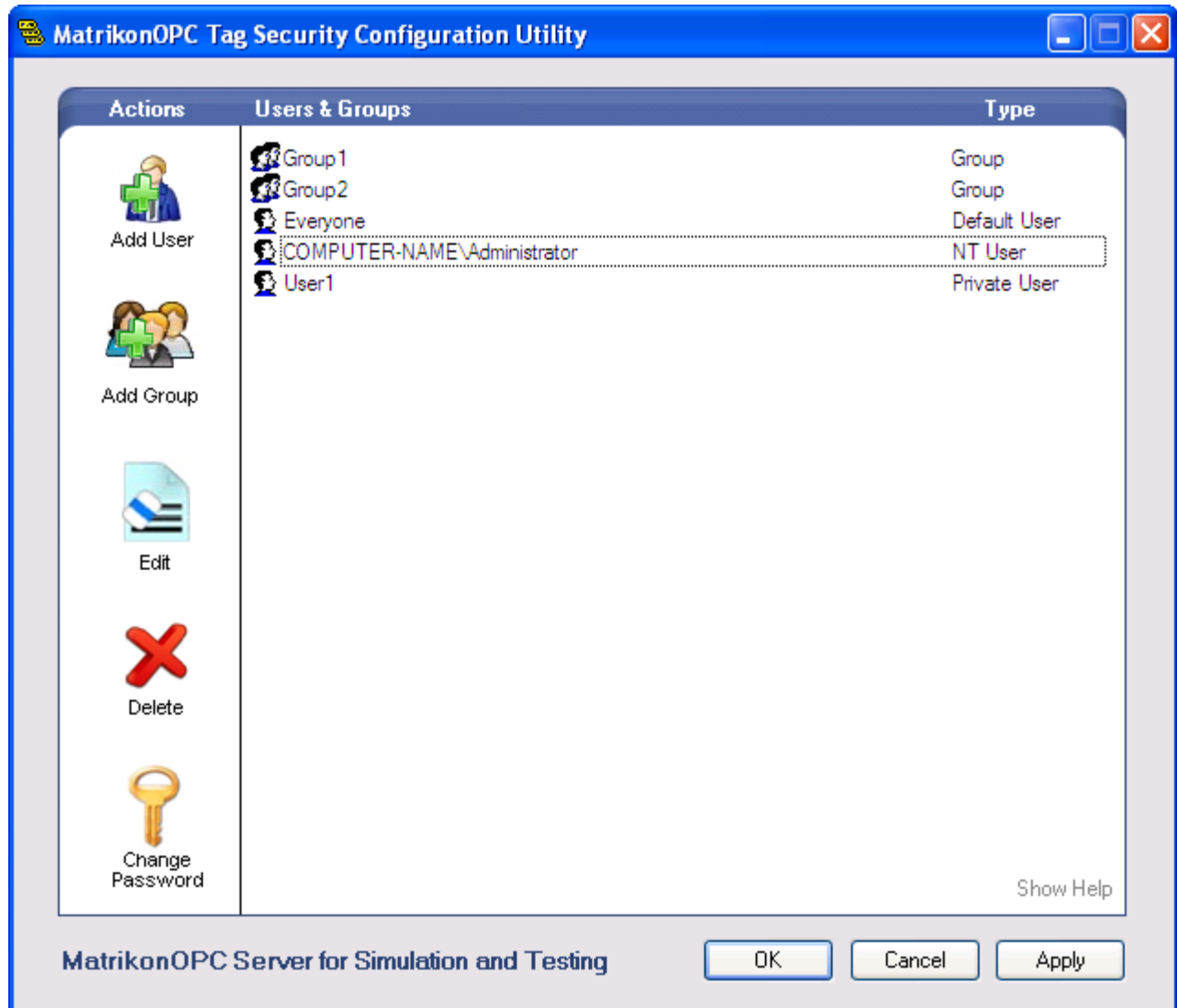


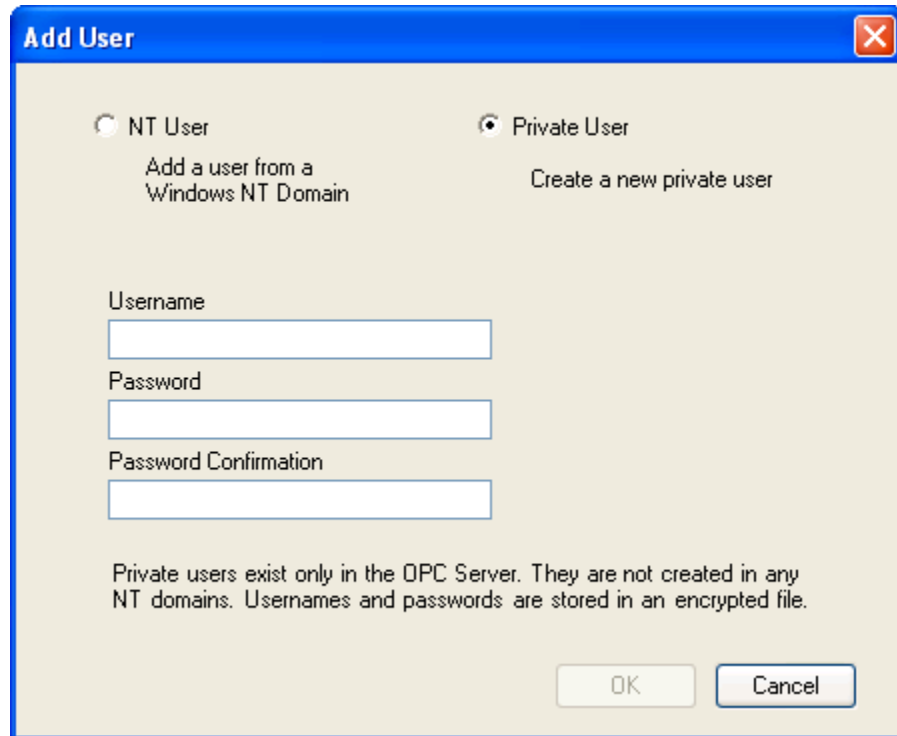
Figure 81 - Defined Users and Groups

Private User

Private users have names and passwords associated with them, custom to the OPC client application, which must implement the OPC Security Private interface for this section to be meaningful. Private users exist only in the OPC server. They are not created in any NT domains.

To add a Private user:

1. From the **MatrikonOPC Tag Security Configuration Utility** main screen, click on the **Add User** button.
2. The **Add User** window (Figure 80) appears.
3. Select the **Private User** option button (Figure 82).



The 'Add User' dialog box has a blue title bar with a close button. It contains two radio buttons: 'NT User' and 'Private User'. The 'Private User' option is selected. Below the radio buttons are two columns of text: 'Add a user from a Windows NT Domain' and 'Create a new private user'. There are three text input fields labeled 'Username', 'Password', and 'Password Confirmation'. At the bottom, there is a note about private users and two buttons: 'OK' and 'Cancel'.

Figure 82 - Add User Window (Private)

4. In the **Username** field, enter a user name.
5. In the **Password** field, enter a password.
6. In the **Password Confirmation** field, re-enter the new password.
7. Click **OK** to create the Private user. It will be added to the list of users and/or groups currently defined (refer to Figure 81 for a sample list of defined users and groups).

Note: The user name cannot be added if there is already a configured User or Group with that same name.

Add Group

Groups are used to group NT users and/or Private users together so that they can share common permissions. Groups are not necessary to use OPC Security. However, they are convenient when you need to apply common permissions to multiple users. A group must contain at least one user, and any combination of users can be grouped together.

Note: A user can exist in multiple groups, but if two or more of the groups have the same configured path (refer to the **Edit User** section), and each group defines a permission (Allow/Deny) for the type of access, then the group whose name alphabetically comes first is used.

To add a Group:

1. From the **MatrikonOPC Tag Security Configuration Utility** main screen, click on the **Add Group** button.
2. The **Add New Group** window (Figure 83) appears.

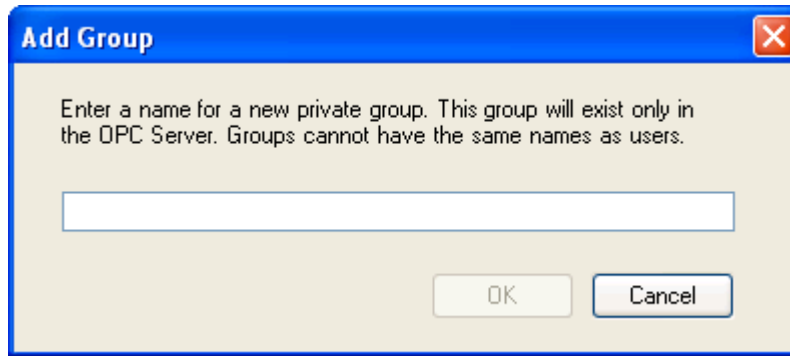


Figure 83 - Add New Group Window

3. Enter a name for the group to be created. The group is private and will only exist in the OPC server. The group cannot be created if there is already a configured user or group with that same name.
4. Click on the **OK** button to create the group. It will be added to the list of users and/or groups currently defined (refer to Figure 81 for a sample list of defined users and groups).

Duplicate

Another way to create a new user or group is to duplicate an existing one.

To create a new user or group via duplication:

1. From the **MatrikonOPC Tag Security Configuration Utility** main screen, right-click your mouse on the user or group you wish to duplicate.
2. From the displayed menu, select **Duplicate**.
3. The **Enter New Name** window (Figure 84) appears.

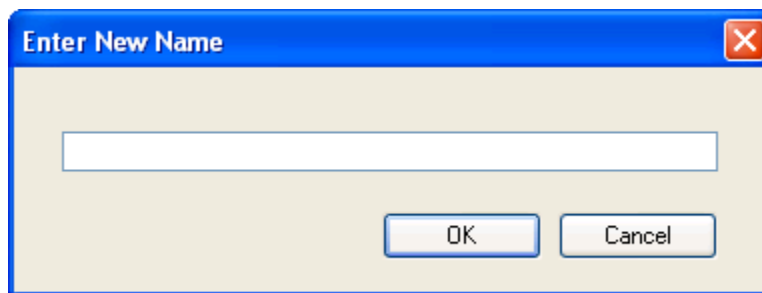


Figure 84 - Enter New Name Window

4. Enter a name for the new user or group to be created.
5. Click on the **OK** button. There must not already be a configured user or group with that same name. The new user or group will then appear in the list, and will contain the same properties as the duplicated parent (i.e., original) user or group.

Edit

Once the desired users and/or groups are defined, they must be edited to configure their respective permissions.

Note: Permissions can also be defined for the user **Everyone**, which is defined as the default user. For every NT user not configured in the MatrikonOPC Tag Security Configuration Utility, the user **Everyone** is used for determining security permissions.

Permissions for allowing/denying browsing, adding items, reading items, and writing items can be configured. Permissions are defined for users and groups for a particular location in the server's address space hierarchy. A location can either be a tag (i.e., OPC Item ID) or a path leading up to an item.

Edit User

To edit a user:

1. From the **MatrikonOPC Tag Security Configuration Utility** main screen, either:
 - Double-click your mouse on the user you wish to edit, or
 - Right-click your mouse on the required user and select **Edit User** from the displayed menu, or
 - Click your mouse on the required user, and then select the **Edit** button.
2. The **Edit <Username>** window (Figure 85) appears.

Notes:

- In this example, the user being edited is **User1** so the window's title reads **Edit User1**.
- There are two tabs on this window: **Permissions** and **General**. The **General** tab only appears for private users.

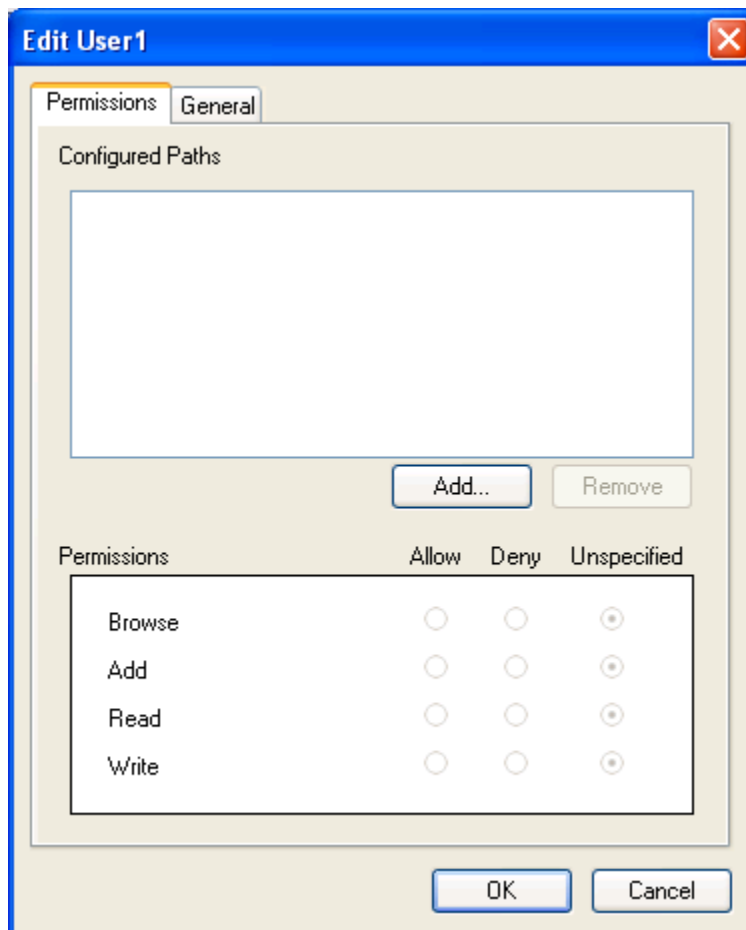


Figure 85 - Edit <Username> Window (Permissions Tab)

Permissions

On the **Permissions** tab, the permissions associated with this user relating to browsing, adding, reading, and writing for any specific paths or OPC items are configured. The **Configured Paths** screen section lists the paths and/or OPC items for which permissions are defined. The **Permissions** screen section indicates those permissions with option buttons, which can be set to **Allow**, **Deny**, or **Unspecified**. Selecting **Unspecified** directs the OPC Framework to look for the permission higher up in the hierarchy.

From the **Permissions** tab, when the **Add** button is selected, the **Add Permission** screen is displayed. In the **Server Address Space** screen section, folders and items are shown as nodes are selected and expanded.

Red folders indicate a null branch. This means that the item names below this branch do not contain the branch name, so permissions set on the branch will not reflect on **Add**, **Write**, and **Read** permissions for the items below the branch. To properly set permissions on the items below the branch, they have to be set on the items themselves.

Figure 86 provides an example of a null branch and items below it, all of which are outlined in black.

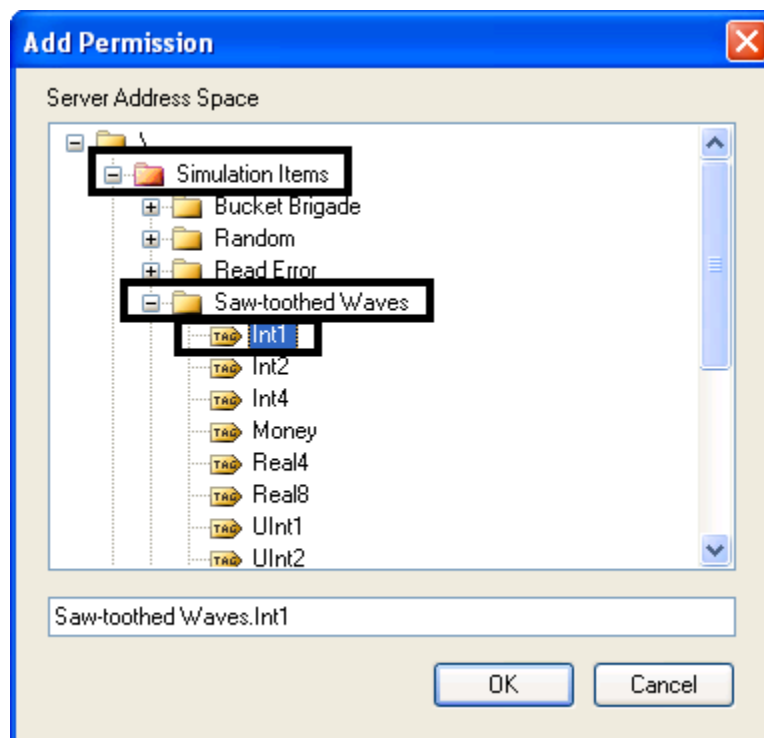


Figure 86 - Add Permission Screen (Server Address Space)

When browsing, using the example in the diagram above, **Simulation Items** is a null branch (identified by the red folder), **Saw-toothed Waves** is a non-null branch, and **Int1** is an item.

Setting permissions on the **Simulation Items** branch does not affect **Read**, **Write**, and **Add** permissions for the **Saw-toothed Waves** branch of the **Int1** item below that. This is because when adding the **Int1** item, the item ID of the **Int1** item is actually **Saw-toothed Waves.Int1** and not **Simulation Items\Saw-toothed Waves.Int1**.

Setting **Read**, **Write**, and **Add** permissions for the **Saw-toothed Waves** branch will affect the items below as **Saw-toothed Waves** is part of the item ID of the **Int1** item (**Saw-toothed**

Waves.Int1), and therefore the **Saw-toothed Waves** folder does not appear as a red folder like the **Simulation Items** folder does.

To edit a user's permissions:

1. Click on the **Add** button to begin configuring permissions for the current user.
2. The **Add User Permission** window (Figure 87) appears. This window allows you to browse the OPC server address space to find either a path in the hierarchy, or a particular OPC item.

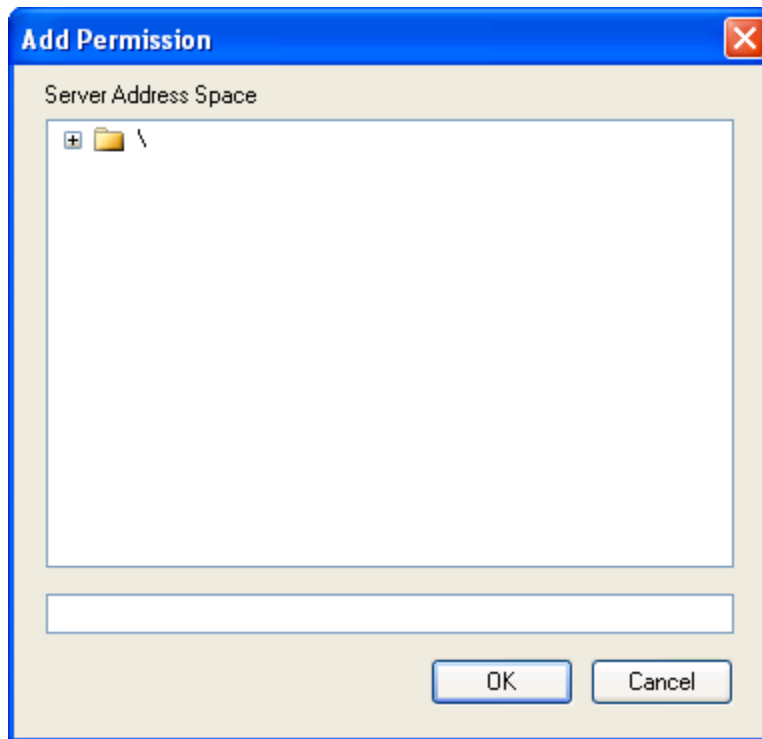


Figure 87 - Add User Permission Window

3. Expand on the server address space's root node and continue to browse to the desired path in the hierarchy, or the desired OPC item.

Note: Branches (i.e., folders) that are red in colour (see Figure 88) are not part of an item's path, but rather are used for browsing organization. Configuring permissions for adding, reading, and writing will not affect items below it. For more information, refer to **Permissions**.

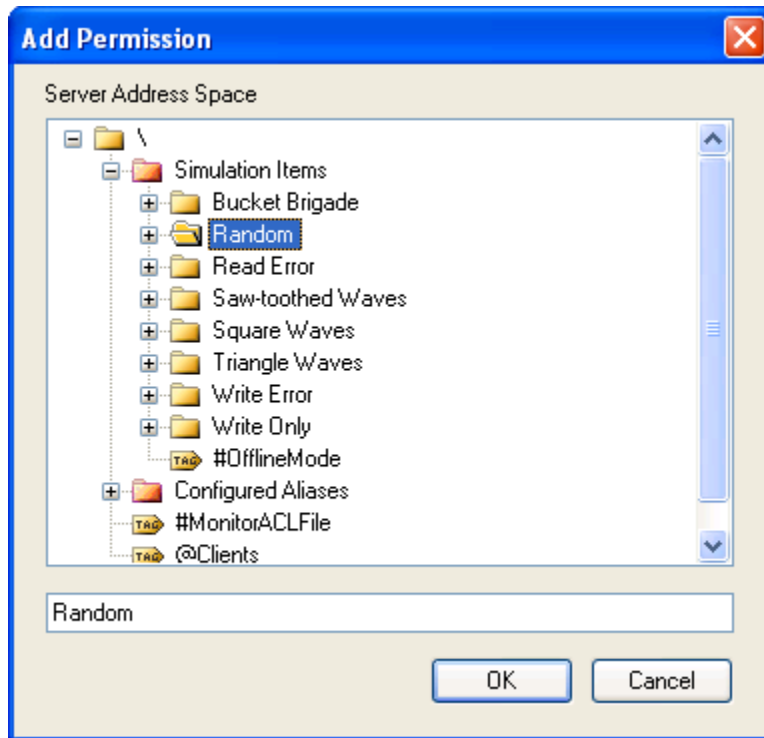


Figure 88 - Add Permission Window: Browsing Server Address Space

4. Click on the **OK** button.
5. The selected path or item will be listed in the **Configured Paths** screen section of the **Edit User** window. Permissions can now be assigned, as in the example depicted in Figure 89.

Note: In this example, **User1** is allowed to browse the **Random** path of the OPC server's address space. Adding privileges are denied, and Reading and Writing privileges are unspecified.

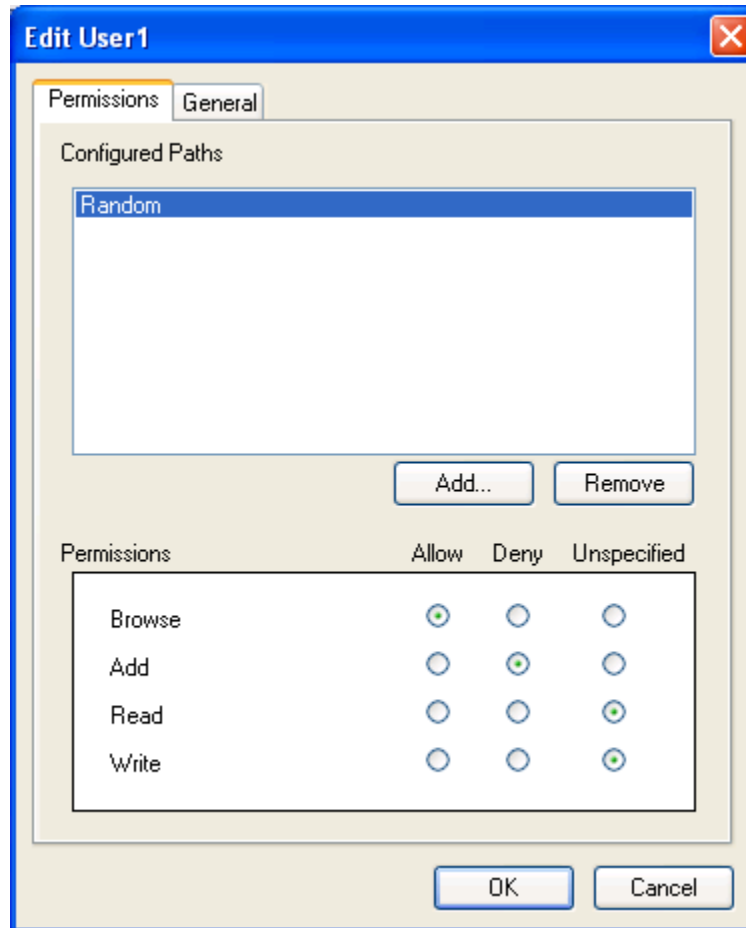


Figure 89 - Edit <Username>: Example

On the **General** tab (Figure 90) of the **Edit <Username>** window, the name and password of the user can be changed.

To edit a user's name:

1. Enter a new name in the **Name** field.
2. Click on the **OK** button.



Figure 90 - Edit <Username> Window (General Tab)

To change the user's password:

1. Click on the **Reset Password** button. The **Reset Password** window (Figure 91) appears.

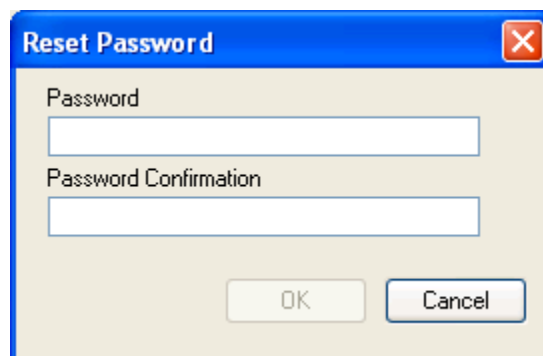


Figure 91 - Reset Password Window

2. Enter the new password in the **Password** field.
3. Re-enter the password in the **Password Confirmation** field.
4. Click on the **OK** button.

Edit Group

To edit a group:

1. From the **MatrikonOPC Tag Security Configuration Utility** main screen, either:
 - Double-click your mouse on the group you wish to edit, or
 - Right-click your mouse on the required group and select **Edit Group** from the displayed menu, or
 - Click your mouse on the required group and then select the **Edit** button.
2. The **Edit <Groupname>** window (Figure 92) appears.

Notes:

- In this example, the group being edited is **Group1** so the window's title reads **Edit Group1**.
- There are three tabs on this window: **Permissions**, **General**, and **Members**.

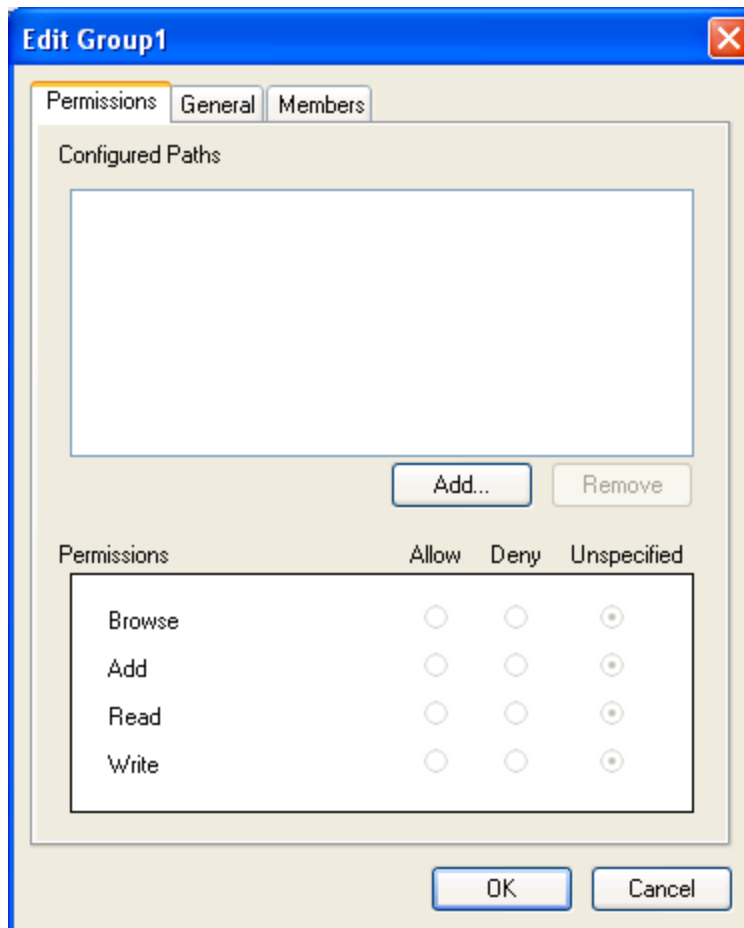


Figure 92 - Edit <Groupname> Window (Permissions Tab)

On the **Permissions** tab, the permissions associated with this group relating to browsing, adding, reading, and writing for any specific paths or OPC items are configured. Refer to the **Edit User** section regarding configuration on the **Permissions** tab. Group and user permissions are configured in the same way.

On the **General** tab (Figure 93) of the **Edit <Groupname>** window, the name of the group can be changed.

To edit a group's name:

1. Enter a new name in the **Name** field.
2. Click on the **OK** button.

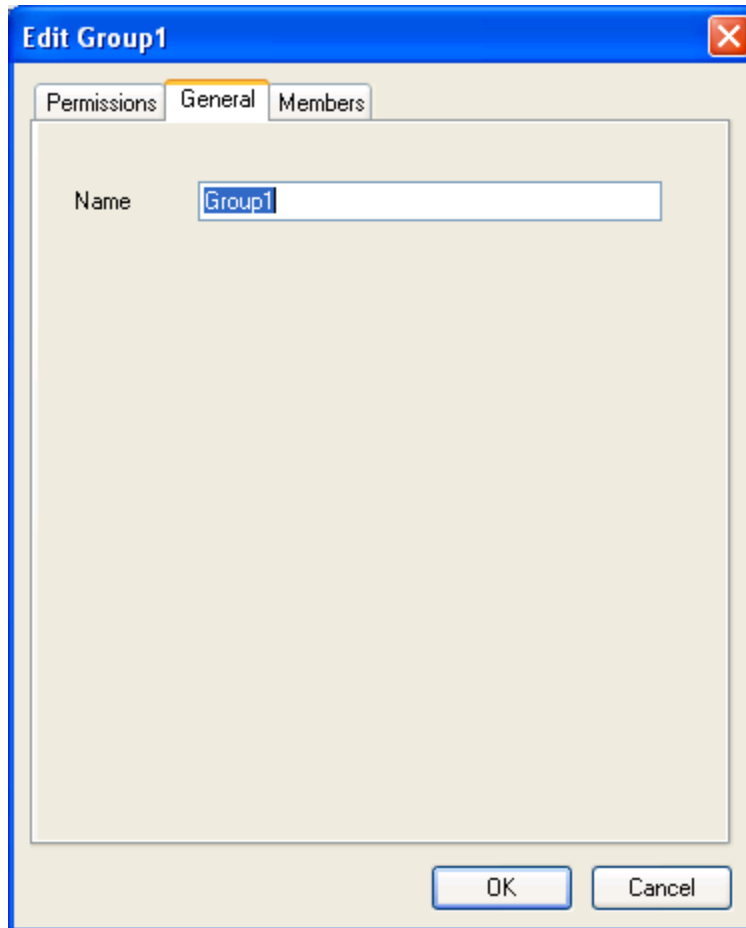


Figure 93 - Edit <Groupname> Window (General Tab)

On the **Members** tab (Figure 94), the users that are part of the current group are defined. By default, the **Group Members** screen section is empty. In Figure 94, **User1** has been added to **Group1**.

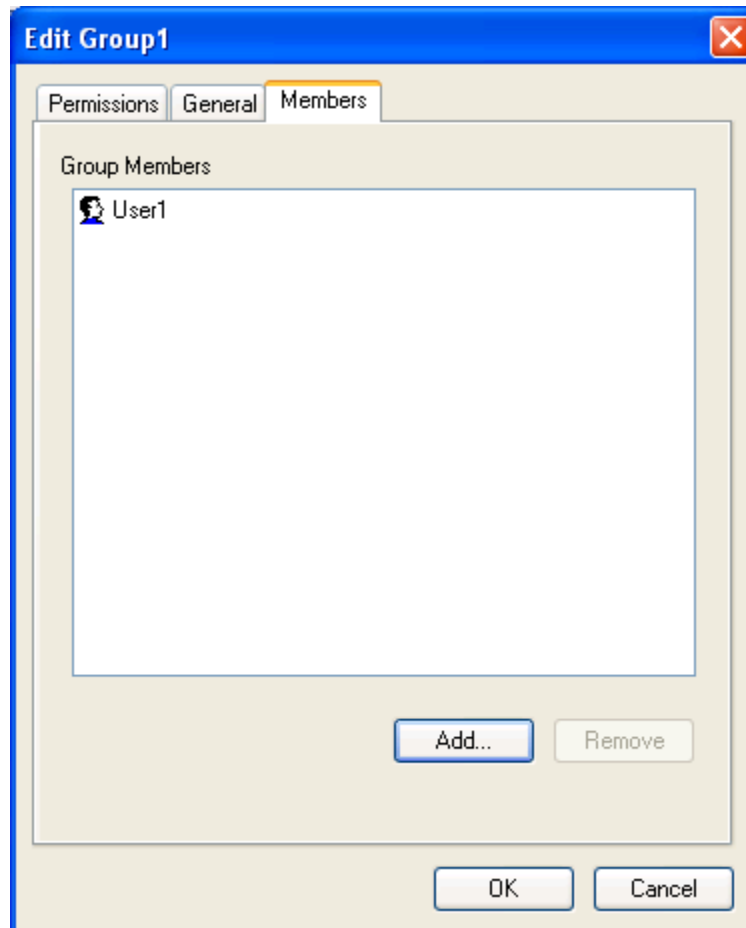


Figure 94 - Edit <Groupname> Window (Members Tab)

To add one or more members to the group:

1. Click on the **Add** button. The **Add Existing User** window (Figure 95) appears.

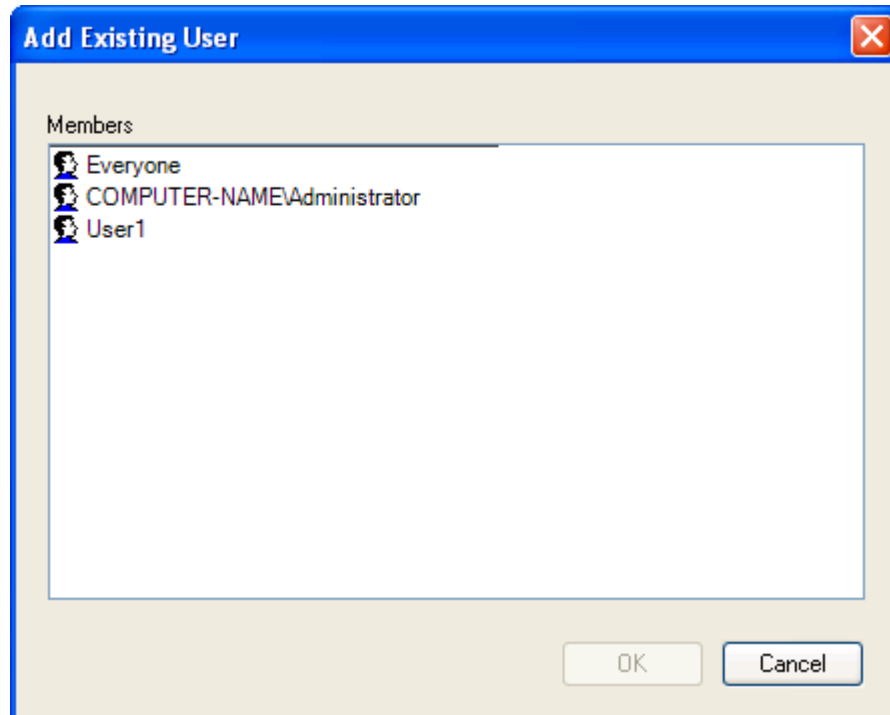


Figure 95 - Add Existing User Window

2. The **Members** screen section lists all the defined users from which you may choose. Select one or more desired users to become members of the group.
3. Click on the **OK** button. The selected user or users appear in the **Group Members** screen section on the **Members** tab (Figure 94).

To remove a user from the group:

1. Select that user in the **Group Members** screen section.
2. Click on the **Remove** button.

Notes:

- If a user name and a group name (to which the user belongs) have permissions defined for the same location, the user name will be used. If a user belongs to two groups that have permissions defined for the same location, the group that is alphabetically first will be used.
- The exact location (full item ID for reading, writing, and adding, or the full path for browsing) is always looked for first when determining the permission for a particular user. If the exact location is not found, or is found but does not contain a defined permission, then the closest match in location is looked at next, and so on. The root location (i.e., empty string) will always match, and is used if no partial location match is made.

Delete

To delete a previously added user or group:

1. From the **MatrikonOPC Tag Security Configuration Utility** main screen, either:
 - Select the required user or group from the list and click on the **Delete** button (Figure 81), or

- For a group, right-click your mouse on the required group and select **Delete Group** from the displayed menu, or
- For a user, right-click your mouse on the required user and select **Delete User** from the displayed menu

Change Password

To change the security password for the OPC server:

1. From the **MatrikonOPC Security Configuration Utility** main screen, click on the **Change Password** button (Figure 78).
2. The **Change Password** window (Figure 96) appears.



The dialog box titled "Change Password" contains three text input fields and two buttons. The first field is labeled "Please enter the old password for this OPC Server". The second field is labeled "Please enter the new password for this OPC Server". The third field is labeled "Please confirm the new password". The "OK" button is on the left and the "Cancel" button is on the right. There is a small icon of a padlock on the left side of the dialog box.

Figure 96 - Change Password Window

3. Enter the old password for the current OPC server.
4. Enter and confirm the desired new password.
5. Click on the **OK** button.

Note: Changes are applied in the Utility main window by clicking on either the **OK** or **Apply** button.

Examples

This section contains examples of tag security settings made via the MatrikonOPC Tag Security Configuration Utility, and the impact of these settings.

Default

The default tag security configuration provided is quite simplistic as is shown in Table 62:

User/Group	Configured Paths	Browse	Add	Read	Write
Everyone	\	Allow	Allow	Allow	Allow

Table 62 - Default Tag Security

As no users or groups are defined, any NT user connecting to the OPC server will use the **Everyone** default user for permissions. Only the root level location is defined under the **Configured Paths** list, which gives full permissions to the entire OPC server. An administrator will want to change these default settings for the OPC server to provide more security on its tags.

Example 1

Table 63 contains a possible tag security configuration enforces complete restricted access except for the NT user **DOMAIN\Admin**:

User/Group	Configured Paths	Browse	Add	Read	Write
Everyone	\	Deny	Deny	Deny	Deny
DOMAIN\Admin	\	Allow	Allow	Allow	Allow

Table 63 - Example 1

At this point, more users can be added which belong to a more restricted group. This group may be denied write capability or restricted to certain areas in the server hierarchy.

Example 2

Following is an example of a tag security configuration for the MatrikonOPC Server for Simulation and Testing, with sample use-cases. Table 64 lists all defined users and groups and their associated permissions. Table 65 indicates which users are members of the defined groups.

Unspec. permission indicates *Unspecified*.

User/Group	Configured Paths	Browse	Add	Read	Write
Everyone	\	Allow	Deny	Deny	Deny
Everyone	Configured Aliases	Deny	Unspec.	Unspec.	Unspec.
DOMAIN\john.doe					
DOMAIN\fred.stone					
DOMAIN\sally.simpson					
DOMAIN\the.admin					
Supervisor	\	Deny	Allow	Allow	Deny
Restricted (group)					
Common (group)	\	Allow	Allow	Allow	Deny
Common (group)	Triangle Waves	Deny	Deny	Deny	Deny
Admin (group)	\	Allow	Allow	Allow	Allow
Admin (group)	Bucket Brigade.Int4	Unspec.	Unspec.	Unspec.	Deny

Table 64 - Example 2: Permissions

User/Group	Configured Paths
Restricted	DOMAIN\john.doe
Common	DOMAIN\fred.stone, DOMAIN\sally.simpson
Admin	DOMAIN\the.admin

Table 65 - Example 2: Groups and Members

Tip 1

Adding a user name and not defining any permissions for that user name (or any group it belongs to), will completely restrict their access to information in the OPC server.

Case 1

User **DOMAIN\john.doe** connects. The user is unable to perform any function at any level, since no permissions have been defined for this user name or the **Restricted** group to which it belongs.

Tip 2

Use the root location to define permissions for locations that have not been defined. Use the default user to define permissions for users that are not listed.

Case 2

User **DOMAIN\no.name** connects. This name is not defined so the default user permissions are used. At the root level location, the default user can browse but no more. The only other location where permissions are defined for the default user is **Configured Aliases** – here browsing is denied and adding, reading, and writing permissions are not defined. Thus, **DOMAIN\no.name** will be able to browse the entire server except the **Configured Aliases** branch and all aliases under it. Also, **DOMAIN\no.name** will not be able to do any item addition, reading, or writing. Since item addition, reading, and writing permissions were not defined for the default user for under **Configured Aliases**, it would use the permissions defined at the root level.

Case 3

User **DOMAIN\fred.stone** connects. This user belongs to the defined group **Common**. At the root level, the group Common can browse, add, and read items, but writing is denied. The only other location which defines permissions for this group is **Triangle Waves**. This location has denied all permissions for the **Common** group.

Case 4

User **Supervisor** connects through the private security interface and logs on. This user does not belong to any group, but its name has a root level permission which allows it to add and read items. No other locations have permissions defined. Since the user cannot browse, it will need to know the item syntax for any items it wishes to add and read.

Case 5

User **DOMAIN\the.admin** connects. This user belongs to the **Admin** group, which at the root level has all permissions allowed. The only other location where the **Admin** group has permissions defined, is the full item ID **Bucket Brigade.Int4**. This user is unable to write to that item. However, the root permissions for browsing, adding, and reading the item apply as they are not defined at this level.

Security Details

ACL File

The permissions that the **MatrikonOPC Tag Security Configuration Utility** creates are stored in a file named **ACL.sec** that is located in the same directory as the MatrikonOPC server executable: **C:\Program Files\Matrikon\OPC\< OPC Server Name >**.

ACL.sec is encrypted with 256-bit AES using the password key that was provided during installation (or changed in the security utility).

If **ACL.sec** is missing from its location above, then the OPC server will deny all users access to all browsing, adding, reading, and writing functionality.

Note: It is advised that this file is backed up and stored somewhere safe, once tag security configuration has been completed. In the event that this file is lost or deleted by accident, simply transfer the stored backup (if one was made) to the directory stated above. If **ACL.sec** becomes deleted and no backup was made, tag security will need to be re-configured.

ACL File Modification for Windows 2000 Users

Note: The command-line utility is to be used by Microsoft Windows 2000 users for ACL file modification. Non-Microsoft Windows 2000 users are to use the graphical user interface as described above in this appendix.

To modify the ACL file (e.g., add/remove users, add/remove groups, add/remove permissions), it must first be in its unencrypted form. The *ACLSecure.exe* utility is a command-line encryption utility used to both encrypt and decrypt the ACL file. The usage of the utility is as follows:

ACLSecure.exe [-e | -d] [key]

-e Encrypts the data from *ACL.txt* and writes it to the file *ACL.sec*.

-d Decrypts the data from *ACL.sec* and writes it to the file *ACL.txt*.

key The key used when encrypting or decrypting the ACL file.

The same key used to encrypt an ACL file must be used when decrypting the file for modifications (i.e., when an OPC product is first installed, the key requested by the installation is used to encrypt a default ACL file). Once modifications have been made, the file needs to be encrypted again for the OPC Framework to read the modifications. A new key can be used whenever an ACL file is encrypted.

Decrypting *ACL.sec* creates *ACL.txt*. *ACL.sec* remains in its current form so that the OPC product can continue to use OPC Security functionality. Encrypting *ACL.txt* updates *ACL.sec* (or creates it if it does not exist) and deletes *ACL.txt*. This is intended to prevent unauthorized users from seeing the ACL information. Thus, it is important to always encrypt the ACL file after you decrypt it and make the necessary modifications.

If the encrypted ACL file is updated, then the OPC Framework will update its OPC Security permissions based on those changes in real-time. If the encrypted ACL file does not exist when the OPC Framework starts, then creating the encrypted ACL file will cause the security permissions to be added to the OPC product.

Run-Time Tag Security Configuration

Tag security can be configured and updated while a MatrikonOPC server is running. This run-time security configuration can be controlled using the **#MonitorACLFile** OPC item (found in the root branch when browsing the server).

The **#MonitorACLFile** is a boolean OPC tag that has a default value of **True** when the server starts which indicates that the tag security permissions are monitored and applied while the server is running. By adding this item to an OPC group and writing a value of **False** to this item, the server no longer applies tag security configuration changes while the server is running. The server would need to be stopped and restarted for the changes to take effect.

By disabling the ability of run-time tag security configuration, a malicious user that has access to the machine cannot delete the ACL file and thus remove all user permissions for OPC security. Run-time tag security configuration can be re-enabled when changes to the tag security need to be made, and then disabled again once they have been applied.

Security should be applied to the **#MonitorACLFile** tag so that unauthorized users are unable to control this ability described above.

Client Connections and Private Log On

When an OPC client connects to the server, the OPC Framework impersonates the client and determines the name of the NT user that is running the client. This client name (consisting of the domain name and the user for that domain) is what the OPC Framework uses when checking

permissions set in the **MatrikonOPC Tag Security Configuration Utility**. If this NT user was not added in the **Users & Groups** list (Figure 81), then the user **Everyone** is used instead.

If the OPC client chooses to use the *IOPCSecurityPrivate* interface, it must call the *Logon()* function and provide a name and password. The OPC Framework will immediately look for the private user in the **Users & Groups** list (Figure 81). If the user is found and the password provided is correct, the *Logon()* result is successful and the user name provided replaces the NT user that was obtained through impersonation. If not found, the *Logon()* result is failure and the NT user remains as the name used for security permissions. When the OPC client calls *Logoff()*, the NT user becomes the name used for security permissions.

Determining Permission

Whenever a browsing, item addition, read, or write operation is performed by the OPC client, the OPC Framework will call a permission routine to determine if permission is allowed or denied. Three pieces of information are always sent to this routine call:

1. Identity
2. Location
3. Type

Identity is the user name described in the previous section – either the NT domain name or a private name. Location is either the full item ID or a partial path in the server hierarchy. Type is the access type: browsing, item addition, reading, or writing. Each piece of information is checked in the order listed above. The following information details the procedure used in determining permission rights:

1. Check whether the user name (identity) exists in the **Users & Groups** list (Figure 81). If so, that name is used. Otherwise, the user **Everyone** is used. A private user will always exist in this list since they will be unable to successfully log on otherwise.
2. Check whether the exact location is found in the **Configured Paths** list for the **user** (Figure 85). If found:
 - a. Check if the permission type (browse, add, read, or write) is specified (Figure 89). If the permission type is specified for the action being performed, the permission (either allow or deny) is used.
3. If either steps 2 or 2a fail, check whether the exact location is found in the **Configured Paths** list for a **group** that contains the user (Figure 92). If found, go to step 2a.

Note: If the user is a member of multiple groups that have the exact location in its list, step (a.) is applied for each group until it is successful, in alphabetical order by group name.

4. If either steps 3 or 2a fail, check whether a partial match of the location is found in the **Configured Paths** list for a **user** or a **group** that contains the user. A partial match is always a sub-string of the given location that starts with the same characters. This represents starting from the root location and moving down the browsing hierarchy.

For example, the location **Random** is a partial match of the full item ID **Random.String**. However, **String** is not a partial match (even if it is a sub-string) because it does not match the first seven characters. The root location \ is considered a partial match for every full item ID.

5. For each partial match from step 4, apply step 2a. The best partial match (the one that has the most characters) that is successful in step 2a is the one whose permission is used. If a **user** and a **group** that contains that user both match for the best partial match, it is the user permission that is used.

Example

The following is an example of a tag security configuration. Table 66 lists all defined users and their associated permissions.

User/Group	Configured Paths	Browse	Add	Read	Write
Everyone					
DOMAIN\john.doe	\	Allow	Allow	Allow	Allow
DOMAIN\john.doe	Random	Allow	Deny	Deny	Deny
DOMAIN\john.doe	Random.Int	Allow	Allow	Allow	Allow

Table 66 - Example 2: Permissions

The user **DOMAIN\john.doe** wants to read the item **Random.Int4**. The permission routine would not be able to find an exact location match under the **Configured Paths** list. However, it would loop through each partial match in the Configured Paths list looking for a defined permission. The location **Random.Int** would be the closest match and the permission would be **ALLOW**.

The user **DOMAIN\john.doe** wants to read the item **Random.Real4**. The permission routine would not be able to find an exact location match under the **Configured Paths** list. However, it would loop through each partial match in the Configured Paths list looking for a defined permission. The location **Random** would be the closest match and the permission would be **DENY**.