

ICONICS **OPC Servers**

GENESIS OPC Server



Your comments and suggestions on the operation of this software are welcome. Please address them to:

ICONICS

100 Foxborough Blvd.

Foxborough, MA 02035

Tel: 508-543-8600

FAX: 508-543-1503

E-MAIL: support@iconics.com

WEB: <http://www.iconics.com>

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Notes:

Introduction

1

1.1 Introduction

The ICONICS Genesis OPC Server is an OPC compliant Server able to communicate with Genesis for Windows 3.5x and Genesis-32 as well as serve data to OPC clients. This Genesis OPC server was implemented using advanced programming concepts of the most current version of the OPC specification (Version 1.0a, July 30, 1997) for use in developing next generation industrial software applications.

The ICONICS Genesis OPC Server shows how to easily communicate with OPC clients and real time I/O devices. The Genesis OPC Server is a great way to learn about the new emerging OPC standard and can also be used to test against other OPC compliant OPC Servers.

1.2 Genesis OPC Server features

The OPC Server is extremely flexible, and can be demonstrated and used with DCOM for networked applications.

- Server makes use of data quality and data conversion to client's requested type.
- Supports multiple data types.
- View Tag values within the Server interface.
- Supports communication of data with RTS, 16 bit I/O Servers and Scripts.
- Able to communicate to Genesis DOS nodes 3.x and 4.x via GFW 3.5.

1.3 System Requirements

The following are the system requirements for installing Genesis OPC server application:

Windows NT 4.0 with Service Pack 3 or Windows 95 with Internet Explorer 3.02 or later and DCOM is required to use the Genesis OPC server.

Software requirements: Genesis for Windows 3.x

Hardware requirements: Pentium 166, 32 MB RAM, 50 MB HDD space, Serial Port or Network for device communication.

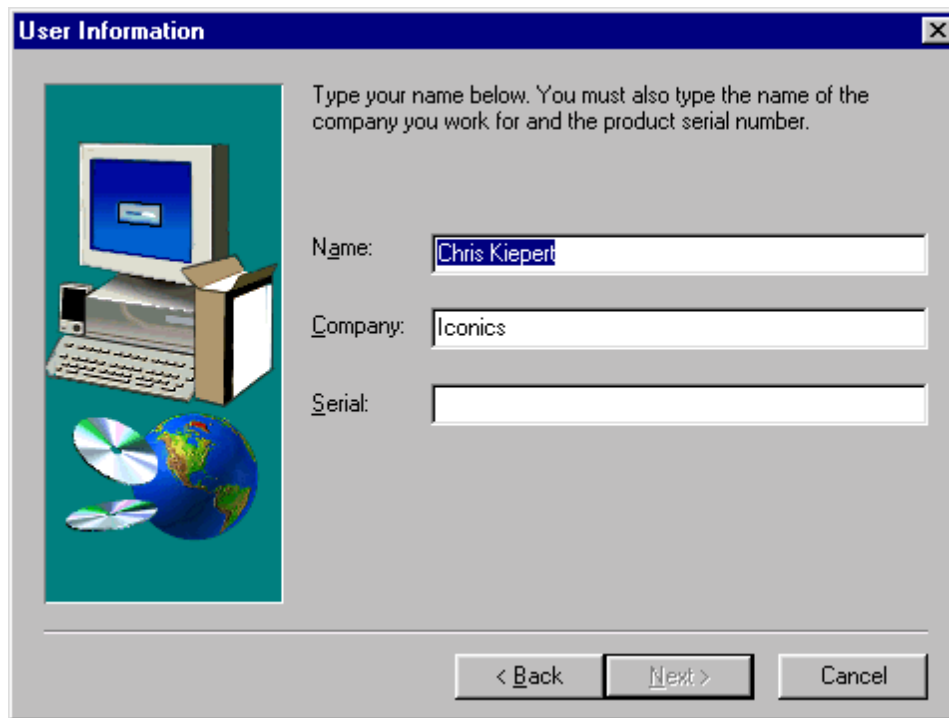
Note: If you have installed Internet Explorer 4.0 (or wish to install it), it is required to read installation notes of IE4.0 since DCOM is part of IE4.0 and may have an old version of DCOM.

1.4 Genesis OPC Server Disk Contents

The ICONICS Genesis OPC Server comes on two 3.5-inch disks. Later versions can be obtained by downloading them from the ICONICS OPC WEB site. Visit the ICONICS WEB site at <http://www.iconics.com/opc> for up to date information on Genesis as well as other popular OPC Servers.

1.5 Installing the Genesis OPC Server

1. Insert the ICONICS Genesis OPC disk 1 in the 3.5-inch disk drive.
2. Windows NT 4.0 or Windows 95, click Start, and choose Run.
3. In the Run dialog box, type the following: **A:\Setup** (replacing "A" with the actual drive letter of your 3.5-inch floppy disk drive).
4. In order to proceed with the installation you will need to provide the serial number for Genesis OPC Server. Which can be obtained from the ICONICS Order Entry Department.



The image shows a Windows-style dialog box titled "User Information". On the left side, there is a graphic depicting a computer monitor, keyboard, and a globe with two CD-ROMs. To the right of the graphic, the text reads: "Type your name below. You must also type the name of the company you work for and the product serial number." Below this text are three input fields. The first field is labeled "Name:" and contains the text "Chris Kiepert". The second field is labeled "Company:" and contains the text "Iconics". The third field is labeled "Serial:" and is currently empty. At the bottom of the dialog box, there are three buttons: "< Back", "Next >", and "Cancel".

User Information

Type your name below. You must also type the name of the company you work for and the product serial number.

Name:

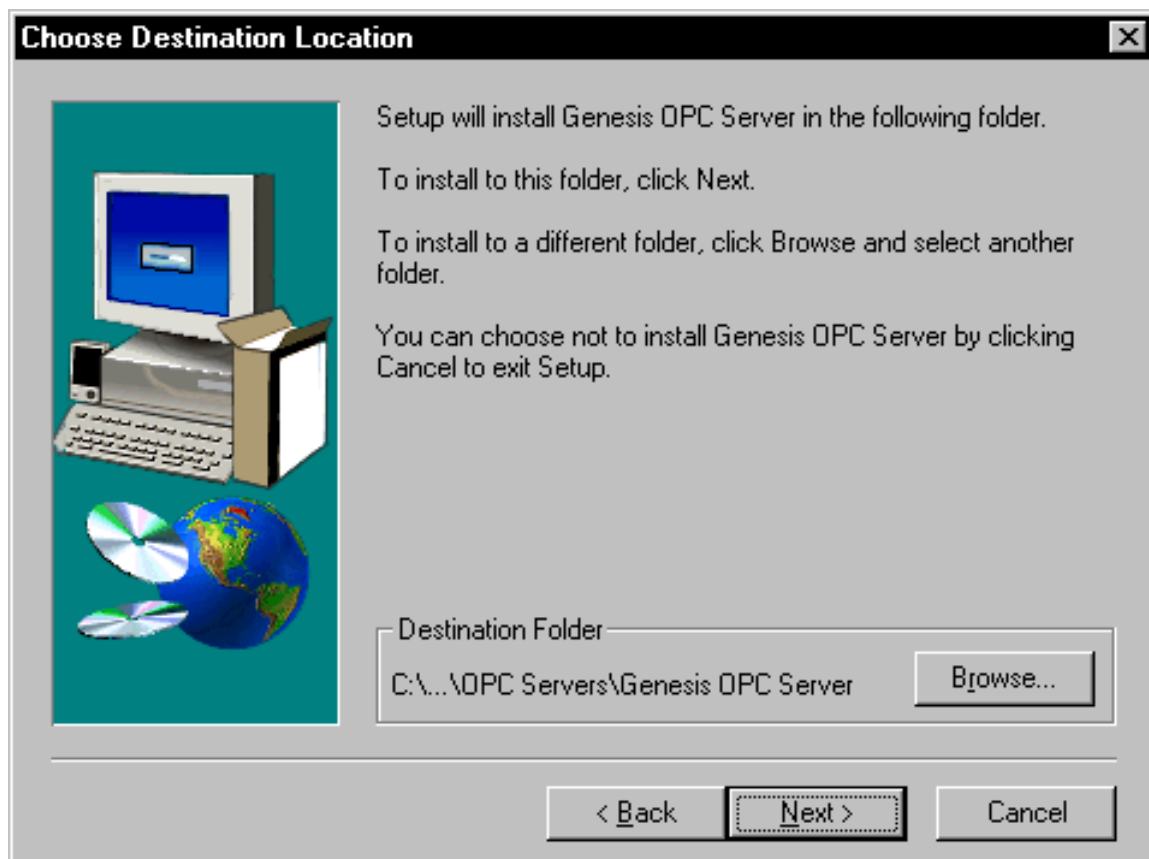
Company:

Serial:

< Back Next > Cancel

User Information

5. The setup program will then ask you for the folder where most of the files will be located, as on following figure.



Destination Location

6. The Setup program will also ask you to choose a program folder.

Note: As explained in the installation section of this manual, Windows NT 4.0 or Windows 95 with DCOM and Genesis for Windows 3.x are required to run the Genesis OPC server.

Using Genesis OPC Server

2

2.1 The Purpose

The Genesis OPC Server is designed to access process points and scripting variables from the 16-bit Genesis for Windows and Genesis systems. The user can access those points via the standard OPC interface by any OPC client, e.g. any products in the GENESIS-32 suite, such as GraphWorX32 and/or TrendWorX32.

The Genesis OPC Server is a software component that communicates with the TalX subsystem of Genesis for Windows and translates the requests and data into the standard OPC form. Even though the Genesis OPC Server interacts with the 16-bit TalX, it is a 32-bit application using multithreaded architecture.

2.2 Configuration

Before you start configuring the Genesis OPC Server, make sure that the underlying 16-bit Genesis for Windows is set up properly and is properly working.

All points you want to access via the Genesis OPC Server must be accessible by the 16-bit tools (such as DataSpy). The points you want to be displayed by the OPC browse interface must be displayed by the 16-bit Tag Browser.

See the Genesis for Windows User's Guide for more details.

2.2.1 OPC Options

All the options you may set are located in the OPC Options dialog box, however in most cases you probably will use the defaults.

Browse Interface options

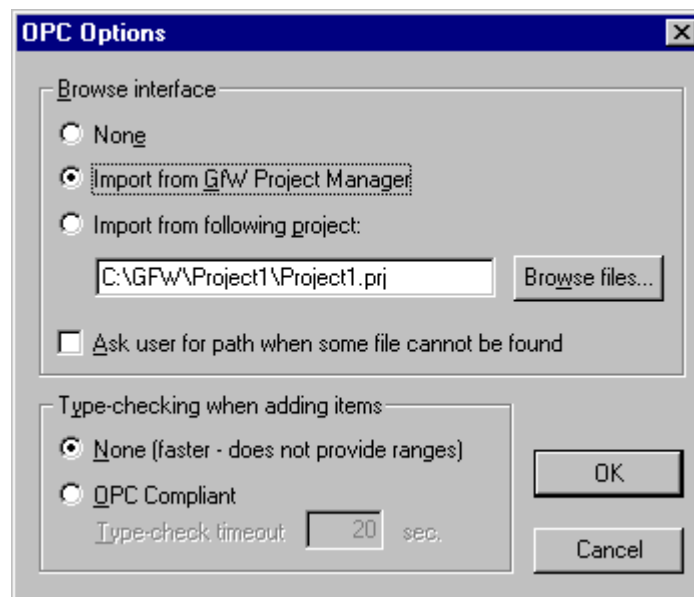
The options in the upper pane specify the source for importing point names for browsing.

- **None:**

This will disable the browsing option.

- **Import from GFW Project Manager:**

If you select 'Import from GFW Project Manager', all the points listed in the GFW's Tag Browser will be displayed in the tag browser of your OPC client.



The OPC Options Dialog

- **Import from the following project:**

If the 'Import from the following project' option is selected, tags and points specified in the given project will appear in the OPC client's tag browser rather than the ones from the current project.

This option can be useful in cases, when the project contains a large amount of points, but only a few of them are to be accessed over OPC. (You may read all the points in the 16-bit TrendWorX, but some of them you may want to display in GraphWorX32.) In such case you may create a 'subproject' containing only the points you want to access by the OPC client and specify that subproject as the file to import from.

This option is not valid for browsing a project file on another computer/node on the network, since this will browse the file as if it were a local project file. In order to use a project from a remote computer, you have to copy the project file locally and define a new Node-Servers Binding in the enterprise manager of GFW 3.5x. For further explanation read Chapter 3 of the Genesis OPC Server Manual as well as Chapter 3 in the Genesis for Windows 3.5x Networking Manual.

- **Ask User for path when some file cannot be found**

The GFW project consists of several files (.prj, .dds) located in the same directory. When one of those files is not found, the user is prompted, if you checked the 'Ask user for path...' checkbox.

Note 1: Since the import is made during the startup of the server and prompting the user suspends the startup procedure, it is recommended to check this option only when testing the client-server system.

Note 2: The purpose of the point names provided by the browse interface is to make the point name selection easy for the user. In your OPC client you can specify any point that is accessible in Genesis for Windows, even if the tag browser does not display it.

Type checking options

According to OPC specification, the server should return the type information when an item is requested and range information should be available at the same time, while the update of the actual value can be delayed or may not appear at all.

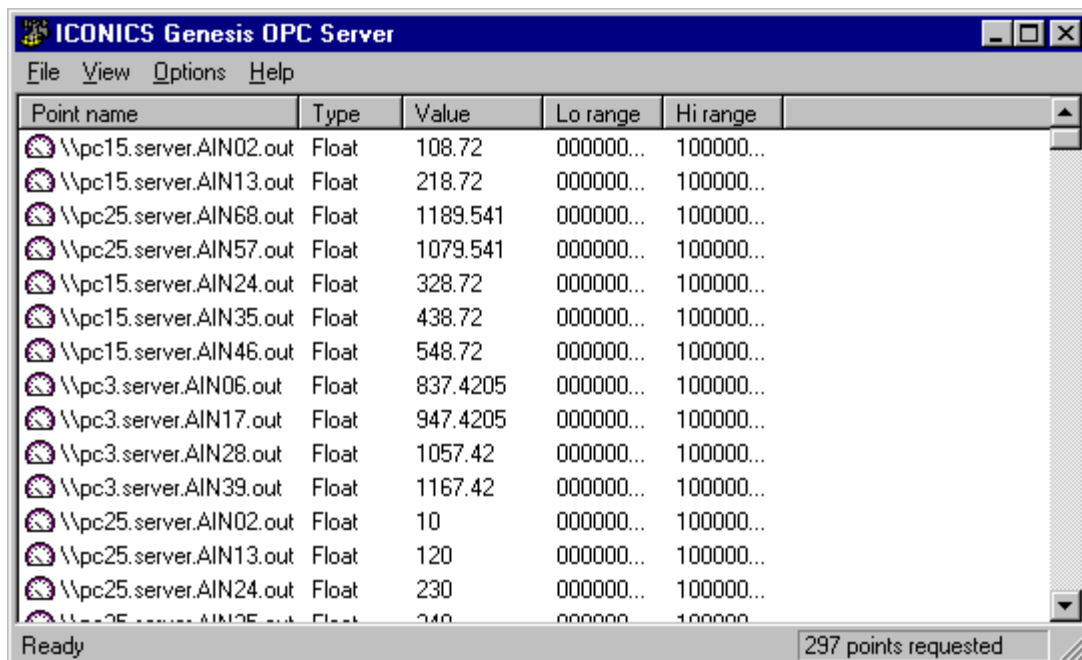
In the **TalX** subsystem of Genesis for Windows the type and range information is bound to the actual value thus it is available with the first

value update. This can take a long time, especially when accessing points on networked nodes.

To meet the OPC requirements, check the 'OPC compliant' radio button. The type and range information will be available as soon as adding items is completed, although it can take a longer time. If the type and range information cannot be obtained for the particular point, the mechanism that adds items will retry until the specified timeout elapses. Figure 2 shows a Genesis OPC Server displaying type and range information.

If you need adding items to be as fast as possible select 'None'. In this case, however, the type and range information may not be available as soon as the points are successfully added.

Note: The method that is the best for you also depends on your OPC client. If your client does not need the range information, you can use 'None' to improve the performance. If you only access the points from the local node, both methods are in fact the same speed, so it is recommended that you use the OPC compliant one.



The screenshot shows the 'ICONICS Genesis OPC Server' window. It has a menu bar with 'File', 'View', 'Options', and 'Help'. Below the menu is a table with the following columns: 'Point name', 'Type', 'Value', 'Lo range', and 'Hi range'. The table contains 15 rows of data, each preceded by a small icon. The status bar at the bottom shows 'Ready' and '297 points requested'.

Point name	Type	Value	Lo range	Hi range
\\pc15.server.AIN02.out	Float	108.72	000000...	100000...
\\pc15.server.AIN13.out	Float	218.72	000000...	100000...
\\pc25.server.AIN68.out	Float	1189.541	000000...	100000...
\\pc25.server.AIN57.out	Float	1079.541	000000...	100000...
\\pc15.server.AIN24.out	Float	328.72	000000...	100000...
\\pc15.server.AIN35.out	Float	438.72	000000...	100000...
\\pc15.server.AIN46.out	Float	548.72	000000...	100000...
\\pc3.server.AIN06.out	Float	837.4205	000000...	100000...
\\pc3.server.AIN17.out	Float	947.4205	000000...	100000...
\\pc3.server.AIN28.out	Float	1057.42	000000...	100000...
\\pc3.server.AIN39.out	Float	1167.42	000000...	100000...
\\pc25.server.AIN02.out	Float	10	000000...	100000...
\\pc25.server.AIN13.out	Float	120	000000...	100000...
\\pc25.server.AIN24.out	Float	230	000000...	100000...
\\pc25.server.AIN25.out	Float	240	000000...	100000...

Genesis OPC Server Statistics

2.2.2 Other settings

In the 'View' menu you can select whether the actually accessed points should be displayed in the Genesis OPC Server's window by toggling the 'Scan Point Values' item. You can also select whether the status bar should be visible or not.

Scanning many points can affect the server performance, so it is recommended that you switch this off when you have a large amount of points.

Note: You may notice a question mark sign appearing in the leftmost column. This means that the point's type has not yet been resolved. Depending on the type checking option selected those points may be removed after the timeout elapses or they may change to another icon when the type is actually obtained from TalX.

2.3 Using Genesis OPC Server

2.3.1 Point name syntax

The point name syntax is the same as in Genesis for Windows, e.g.. See GFW User's Guide for details.

2.3.2 Running Genesis OPC Server

As mentioned above, the Genesis OPC Server needs Genesis for Windows to be running. If your server starts and GFW is not running, the user is prompted to confirm starting it and then the server starts GFW automatically.

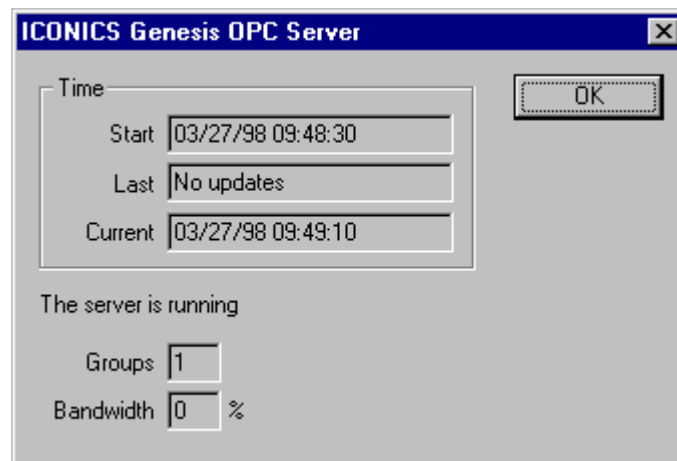
2.4 OPC Client

The OPC Client is used to test and debug an OPC Compliant Server as well as access some of the OPC variables and parameter configurations.

- Start the OPC Client.

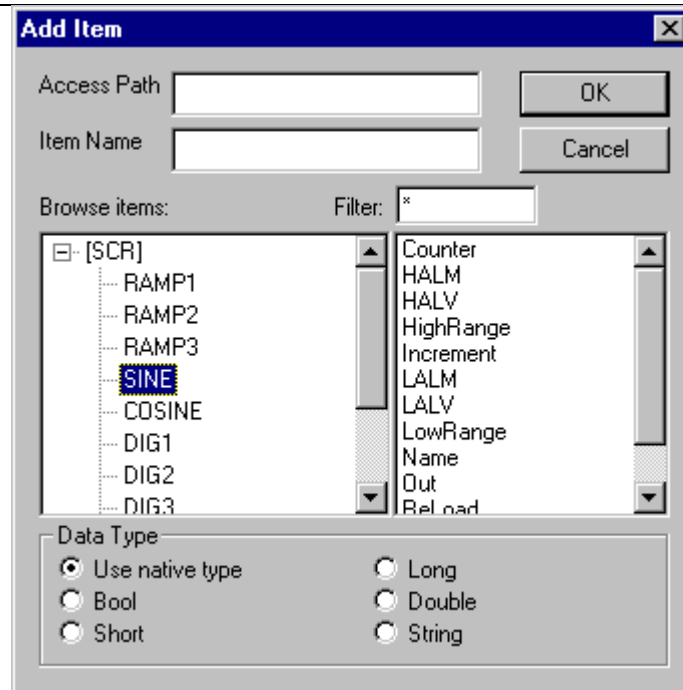
-
- From the OPC menu, Choose Connect. The OPC Server menu appears showing all registered OPC servers.

- From the OPC menu, choose Server Status to view the Genesis OPC Server status window. Refer to the following figure.



Server status window for the Genesis OPC Server

- From the OPC menu, choose Add Item. The Add Item dialog box appears, as shown in the figure below.

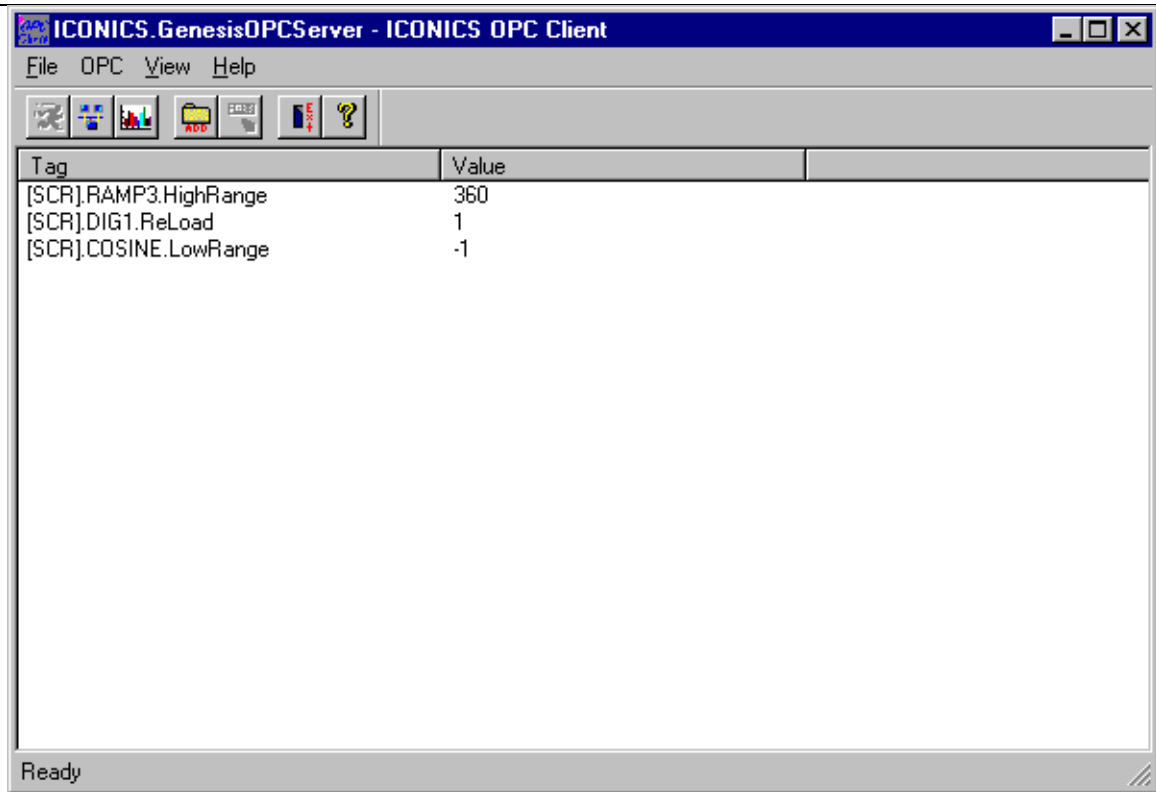


Add Item dialog box listing devices defined in connected server

The Add Item dialog box displays the devices, groups, and tags defined in the current server configuration. These are filtered by expression "*" and data type. You can enter an access path, type or select an item name, and choose the data type in which you want to view the requested tag.

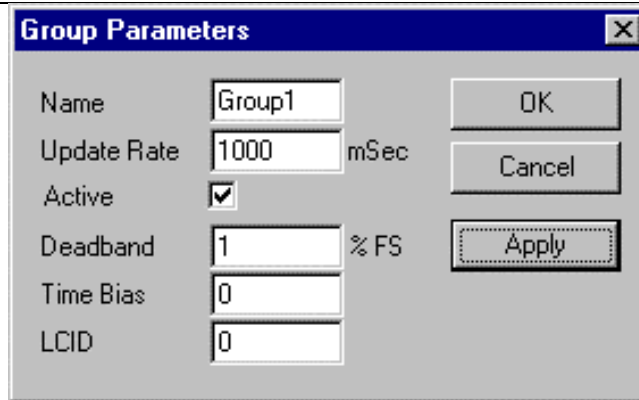
In the Browse Items list, select the device, group, and tag. The full name appears in the Item Name field. For example, "Simulate.Float.Ramp".

- Click OK. The item appears in the OPC Client window with updating data values.
- Add more tags repeating previous steps. An example of the OPC Client displaying three sample server items is shown in below:



OPC Client shown with three items

- From the OPC menu, choose Group Parameters. This command displays the parameters of the group of tags.



Group Parameters dialog box for the selected sample server

- The Update Rate determines how fast data is sent to the client, in milliseconds (mSec). The Active state initiates active communications between the client and the server. You can change the Active state or the Update Rate, for example, and click Apply to send changes to the server.
- If the group does not have active data it is not sent to the client. You can choose Disconnect from the OPC menu to clean up all selections and disconnect from the server.
- While a client is connected to a server, you cannot exit the server or open new configurations in the server. You can modify the existing server configuration while client(s) are connected; however, you cannot delete any device or tag in use. For example, you can take a device off-line or change a tag's scaling values, without shutting down a client that may be controlling many devices.
- Start another instance of the OPC Client and make the same server connection as those defined in the first Client instance.
- You can add items, change the group update rate and active status, and view the server status in each instance of the OPC Client independently of the other instance. For example, the number of groups is "1" in each client because each one only has one group.

The same procedures for connecting to a server and adding tags applies to the in-process server ("ICONICS.Inproc"). Since this server has no user interface, only the client application is visible. The in-process server

also has a no tag system; it simply creates items and simulates data for them. This is why the add item dialog displays no tags to choose from. The server accepts any itemID and data type, and sends back simulated data based on the data type selected. Try adding a few items with different data types.

2.4.1 How the client connects and gets data from an OPC server

When OPC servers are installed on the system, they are registered so that clients can find them and users can view them in a list. To make a client/server connection, the user must first choose a server. The server name selected (for example, "ICONICS.GenesisOPCServer") is used to get a class ID which, in turn, is used to create a COM object. If the user selects a server that is not currently running, the system starts the server and then creates the object in that server on behalf of the client.

Once the COM object is created, the client application has an IOPCServer interface, as defined in the OPC specification. This is the main interface to the OPC server and this document refers to this as a *Server* interface. (The other interface is *Group*.) This OPC client always creates a group and registers an advise interface with it to get asynchronous data notification.

When an item is added, the dialog displays either a hierarchy or a flat list of names, depending on the server. The names are queried from the Server object using the filter string and requested data type. When the user either types or selects a name, an item by that name is added to the Group object. This item is also read immediately to get an initial value.

Items in a group are scanned by the server; when their values change, the advise interface in the client is notified. A data structure containing the data for each item whose value or quality has changed (and only those items) is passed to the client's advise interface. The client unpacks and uses the data.

2.4.2 Server status and Group parameters

The Server status dialog periodically queries the Server object for status and displays the results. The Group Parameters dialog queries the group state and displays the results. The OK or Apply buttons in the Group

Parameters dialog box write the parameters from the dialog to the Group object and read the parameters back. This primarily controls the scanning and updating of data. When a group is inactive, it does not send data notifications to the client. Typically there is no reason to scan the items when the group is inactive. The Update Rate in the Group Parameters dialog box specifies the rate at which data notifications should be sent back to the client, assuming that data has changed. This is also the rate at which items are scanned on behalf of this client.

2.4.2.1 Write a Value to an Item



To write a value to an item, select the item in the OPC Client window and choose Write Value to Item from the OPC menu. The client writes the value typed in the Write Item Value dialog box to the correct item in the Group object. The method of writing data is determined by the "Asynchronous" checkbox. When data is written synchronously, the call to the server blocks until the operation has completed, which may take a long time. When data is written asynchronously, the call to the server returns quickly and the operation is carried out on another thread. When the write has finished, the client's advise interface is notified with the results.

The user can disconnect from the selected server by choosing Disconnect from the OPC menu. The Disconnect command unregisters the advise interface, releases the Group object, and then releases the Server object. *Releasing* an object means that the client is no longer interested in the object, so the system can delete the object in the server.

Connectivity

3

3.1 Introduction

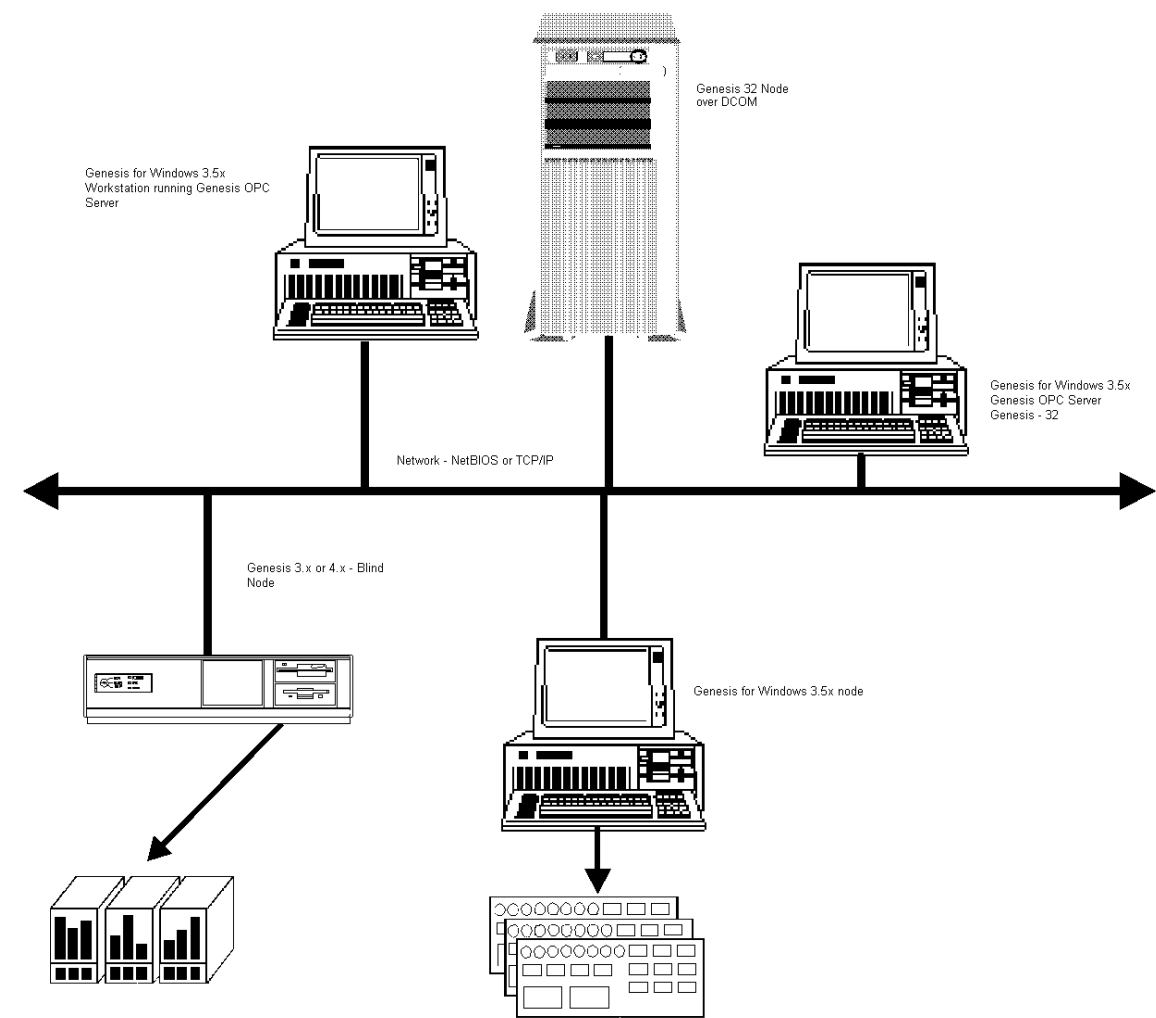
In this chapter we will explore some of the many ways in which you can connect to and connect with the Genesis OPC server. The Genesis OPC Server serves as a communications layer between 16 bit versions of ICONICS software and 32 bit versions. Previously configured nodes running ICONICS software such as Genesis for Windows 3.5x can continue to be used, with little or no changes, with newer versions of ICONICS software such as GraphWorX32.

Also it is briefly explained how to enable networking in GFW. This will allow you to connect GFW nodes to other GFW nodes as well as Genesis 3.x or 4.x nodes over the network, which will allow you to browse tags from the Genesis OPC Server, GFW, and Genesis nodes over the network.

3.2 Connectivity Configuration

There are several ways to connect to Genesis-32 and GFW 3.5x nodes via the Genesis OPC server.

- You may have Genesis-32, Genesis OPC Server and GFW3.5x on the same computer.
- You may have Genesis OPC Server and GFW 3.5x on the same computer, while Genesis-32 is on a separate computer. In this case Genesis-32 will access tags via DCOM over the network. You can have multiple OPC clients connected to the Genesis OPC server at the same time.

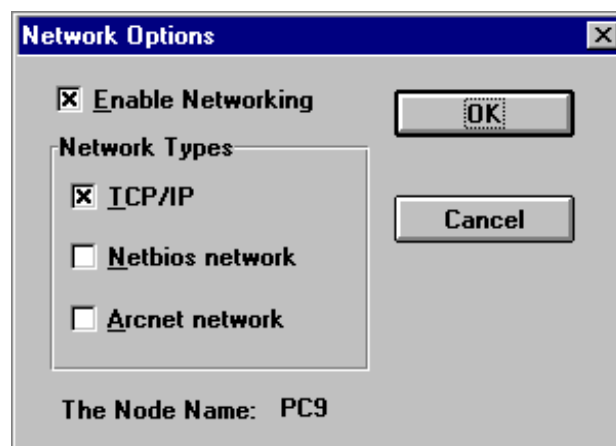


3.3 Getting Started

In order to run the Genesis OPC server, you have to have Genesis for Windows installed and running. If GFW is not currently running when you start the Genesis OPC Server, you will see a prompt asking if you want to start the Genesis for Windows. Selecting **YES** will start Genesis for Windows and the Genesis OPC Server, while **NO** will cause no programs to be started. We recommend that you start Genesis for Windows before the server (i.e.: manually), in order to reduce memory and CPU load as well as to maximize efficiency.

3.4 Enabling Networking in GFW

You are prompted to select networking options when you install your ICONICS software. After installation, if you wish to enable, disable, or change your networking options, select Network Nodes Options from the Project Manager Servers menu. The Network Options dialog box appears, as shown below.



Network Options dialog box

To Define Network Options select the Enable Networking check box to enable networking options for ICONICS software. Select the appropriate network type: TCP/IP, or NetBIOS.

Click OK or press ENTER to return to the Project Manager.

Note: You must shut down and restart the Project Manager to enable your new networking options. To change the displayed node name, or any advanced networking options, edit the Networx.ini file. Refer to the Networx.ini appendix for more information about this file and other network options.

Note: Also, you will be prompted to check and make sure that a certain file (vgnet.386) is included in you system.ini file. To check this, run "sysedit" from run on the start menu.

In order to browse points over the network with Genesis for Windows and Genesis, the software will require a file that contains your node definitions. If you are using TCP/IP, this file is called Hosts and is located in your Windows root directory. If you are using NetBIOS, this file is called Gennet.ndb and is located in your **/Gfw/Networx (Genesis for Windows) or /genesis/networx (Genesis 3.x or 4.x)** directory by default. You may choose to move it to your project directories if you need to maintain different node lists for different projects.

After your node definition file is configured, you can communicate between nodes and share data, alarms, etc.

After you get your network installed and you have made sure that the nodes are communicating properly across the network, you are ready to use your ICONICS networking software.

Note: Node names in the Hosts file are limited to 10 characters. Node names in Gennet.ndb are limited 8 characters.

3.5 GFW to GFW Networking

3.5.1 Configuration Examples:

Once you have your particular network (TCP/IP, NetBIOS, etc.) communicating on the Windows level, adding networking to your ICONICS applications is an easy task. These examples briefly show you how to connect GFW to your existing network.

- Connecting two GFW nodes using TCP/IP and hot docking.
- Connecting a GFW node to a GFW node using NetBIOS

3.5.1.1 TCP/IP with Hot Docking

Make sure that your TCP/IP software is installed correctly and use the Ping utility, supplied by your TCP/IP vendor, to determine if your nodes are set up correctly and can communicate.

Make sure that your two nodes and addresses are listed in the Hosts file and both nodes have the identical Hosts file (located in the Windows root directory).

You might want to share your GFW directory using Explorer or File Manager. Refer to your Windows documentation for more information about sharing files. It is recommended that you share your GFW directories using the default share name assigned by Windows.

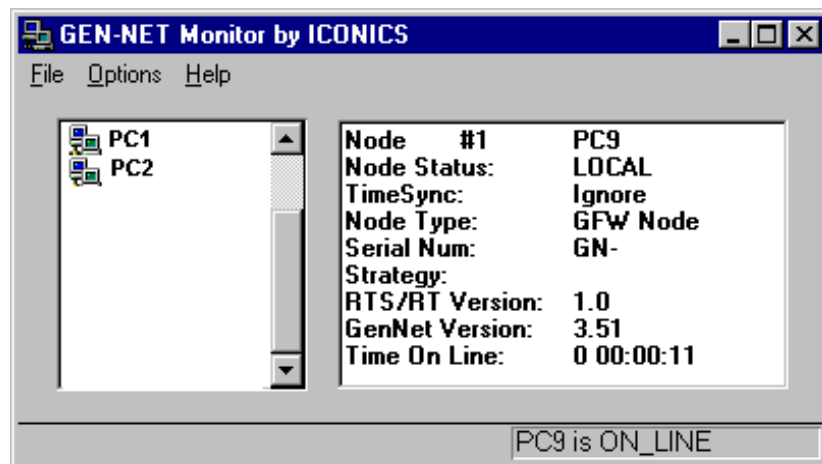
Start the Project Manager on both nodes.

The nodes should now hot dock and automatically recognize configurations in the current project file on the remote node. To determine if this is true, use the GEN-NET Monitor and Enterprise Manager.

Open the GEN-NET Monitor on each node. You should see both nodes in the node list and they should be listed as online.

Start the Enterprise Manager on PC1. PC2 should be in the Node/Servers Binding list. You can define a new node in the Server Binding by clicking on New and inputting the computer name, the node

name, and the shared directory. PC2 should be in the Node/Servers Binding list. Select the entry and click the Edit button to view the settings for this node. Refer to the following figure.



Likewise, PC1 should be in the listings on PC2.

You can now connect to data between these nodes using any application such as GraphWorX+, or the DataSpy.

3.5.1.2 NetBIOS:

To Connect GFW to GFW Using NetBIOS make sure that your NetBIOS software stack is installed correctly (as described in Chapter 2 of the Genesis for Windows 3.5x Networking Manual) and use the Session utility to determine if your nodes are set up correctly and can communicate.

Make sure that your two nodes and addresses set up correctly in the genconf utility and the identical Gennet.ndb file is located on both nodes. The Gennet.ndb file is found in your **IGfw\Networkx** directory, but you can move it to your project directory if you are running multiple configurations.

Open the GEN-NET Monitor on both GFW nodes. You should see both nodes in the node lists, they should be listed as online. Refer to Figure 3.3 for an example GEN-NET Monitor session.

Use the Enterprise Manager if you wish to develop multiple configurations or develop further nodes that are not part of the current network.

Note: Refer to the Getting Started chapter of the Genesis for Windows 3.5X Networking Manual for information about getting your network running and using the Enterprise Manager. Also, it is possible to connect to another machine without copying any files but if the hosts or gennet.ndb files are the same on both nodes, there are fewer possibilities for technical difficulties to arise.

3.6 GFW to GENESIS (NetBIOS)

3.6.1 Configuration Example:

Connecting a GFW node running to a GENESIS for DOS 3.x or 4.x node running NetBIOS.

3.6.1.1 NetBIOS

Make sure that your NetBIOS software stack is installed correctly (as described in Chapter 2) and use the Session utility to determine if your nodes are set up correctly and can communicate.

Make sure that your two nodes and addresses are set up correctly in the **genconf** utility and the identical Gennet.ndb file is located on both nodes. The Gennet.ndb file is found in your **IGfw\Networkx** directory on the Windows node or the **IGenesis\Networkx** directory on the DOS node. You can move it to your project directory if you are running multiple configurations.

Start the Project Manager on the GFW nodes and start GEN-Commander on the GEN node to view remote GFW nodes. With identical .ndb files on both nodes, the GFW and GEN nodes should now be able to share data.

Open the GEN-NET Monitor on the GFW node. You should see both nodes in the node list and they should be listed as online. Refer to Figure 3.3 (shown previously) for an example GEN-NET Monitor session.

Note: It is possible to connect to another machine without copying any files but if the hosts or gennet.ndb files are the same on both nodes there are fewer possibilities for technical difficulties to arise.