

# **Honeywell**

**OPC Client/Server  
RAE Release 1.11 and Above  
Setup User's Manual**

January 2001

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# Contents

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<b>1. Introduction.....</b>	<b>1-1</b>
1.1. Purpose and Scope.....	1-1
1.2. Intended Audience.....	1-1
1.3. Related Reading .....	1-1
1.4. About This Manual.....	1-2
1.5. Definitions, Acronyms, and Abbreviations .....	1-2
<b>2. Overview .....</b>	<b>2-1</b>
2.1. OPC Specifics.....	2-2
2.1.1. Data Types.....	2-2
<b>3. Platform Setup .....</b>	<b>3-1</b>
3.1. Setting Up the RAE Server Configuration .....	3-1
3.2. Setting Up the RAE Client Configuration.....	3-2
3.3. Register OPC Server on the Client.....	3-2
3.4. DCOM Setup Example.....	3-3
3.4.1. Server and Client Setup.....	3-3
3.5. OPC Proxy and Other OPC Foundation DLL Files .....	3-8
3.6. DCOM Binding Order.....	3-8
3.7. Link and Variable Group Configuration .....	3-12
3.7.1. Da Vinci Server Connection Configuration .....	3-12
3.7.2. Da Vinci Client Connection Configuration.....	3-12
<b>4. Interface Troubleshooting.....</b>	<b>4-1</b>
4.1. NT Event Log is the First Place to Look.....	4-1
4.1.1. Enabling Security Auditing.....	4-1
4.2. Client (HCILink) Debug Flag .....	4-2
4.3. Helpful Websites .....	4-4
4.4. Security/Communication Issues .....	4-5

**Table of Tables**

Table 2-1. RAE OPC Server and Client Compliance Levels .....	2-2
Table 4-1. Helpful Websites .....	4-4

# 1. Introduction

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## 1.1. Purpose and Scope

The purpose of this manual is to describe the configuration and setup of a Da Vinci or MXProLine (RAE) application when used to interface between the RAE platform and Distributed Control System (DCS) vendor through the OPC communication interface.

## 1.2. Intended Audience

This manual is intended for use by technical personnel involved in setting up the Server/Client application and using the Da Vinci or MXProLine (RAE Release 1.11 or greater) product as the server for the communication interface between a RAE system and foreign DCS systems.

## 1.3. Related Reading

The following documents contain related reading material for field engineers setting up the server application:

<u>P/N</u>	<u>Document Title</u>
46017900	<i>Real-Time Application Environment (RAE) Common Platform User's Manual</i>
46022000	<i>Da Vinci Virtual Input/Output (VIO) Server Interface Manual</i>

In addition, Version 3.0 of *OPC Support in RAE* can be found in the RAE Version 2.0 media.

## 1.4. About This Manual

Chapter 1, **Introduction**, provides the purpose and scope of the manual, the intended audience, and related reading material.

Chapter 2, **Overview**, provides a general overview of a Client/Server application with the Da Vinci or MXProLine system.

Chapter 3, **Platform Setup**, describes the configuration of the Distributed Component Object Model (DCOM) channels on both the server and the client, server registration on the client, and other important information to make a successful OPC connection.

Chapter 4, **Interface Troubleshooting**, provides help in troubleshooting common problems with the interface, including common tools available to perform independent interface tests with servers, and helpful websites to reference for error message definitions.

## 1.5. Definitions, Acronyms, and Abbreviations

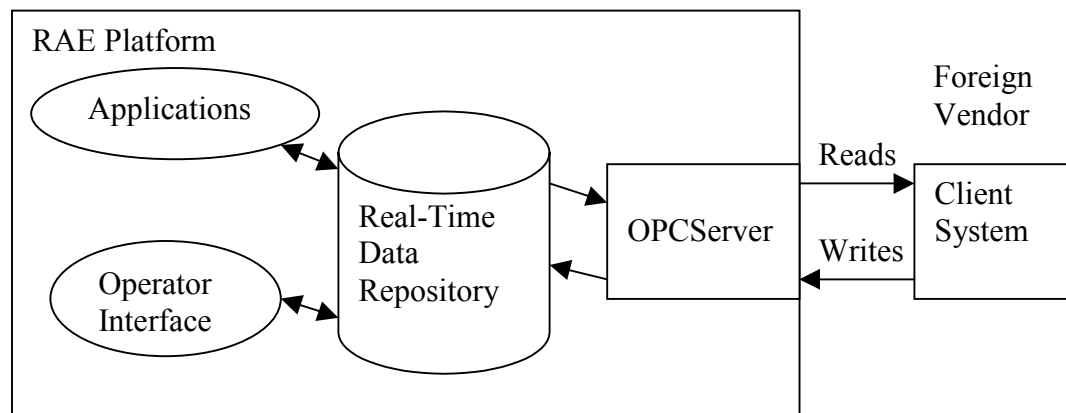
The terms listed below are used in this manual:

<u>Term</u>	<u>Meaning</u>
Da Vinci	Honeywell QCS Platform product
DCOM	<b>D</b> istributed <b>C</b> omponent <b>O</b> bject <b>M</b> odel
DCS	<b>D</b> istributed <b>C</b> ontrol <b>S</b> ystem
OLE	<b>O</b> bject <b>L</b> inking and <b>E</b> MBEDDING
OPC	<b>O</b> LE for <b>P</b> rocess <b>C</b> ontrol
RAE	<b>R</b> ead-Time <b>A</b> pplication <b>E</b> nvironment
RTDR	<b>R</b> ead-Time <b>D</b> ata <b>R</b> epository

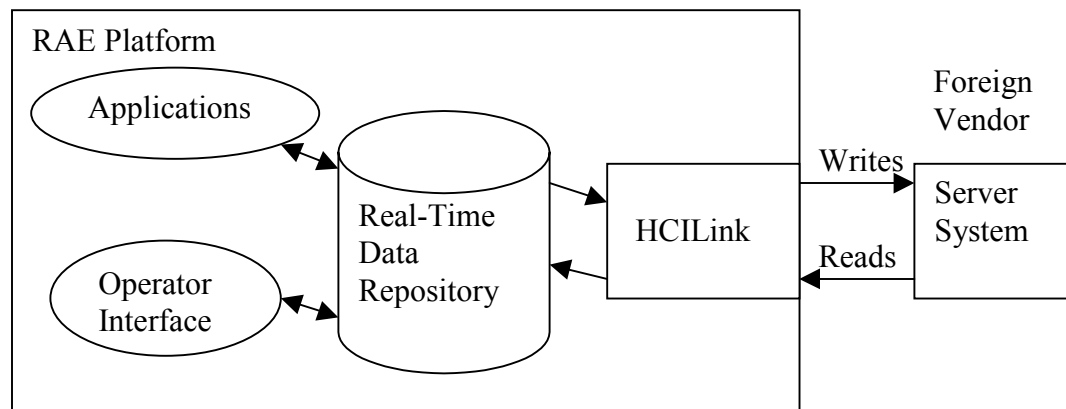
## 2. Overview

The Da Vinci or MXProLine system can be used as a RAE OPC server or client in an OPC server/client interface.

The Da Vinci or MXProLine system as a server can be simplified into the figure below. The client system would connect to the RAE OPC server (OPCServer.exe).



The Da Vinci or MXProLine system as a Client can be simplified into the figure below. The RAE Client (HCILink.exe) will connect to the foreign vendor server.





This manual is designed for PCs using Windows NT 4.0. At the time of this printing, there is a known issue with the setup instructions using the Windows 2000 operating system. This has to do with the DCOM binding. It is the only known issue at this time. This manual will be updated with the Windows 2000 upgrade to RAE. Until that update is available, this document is a good guideline for OPC setups.

## 2.1. OPC Specifics

Table 2-1 lists the compliance levels for the RAE OPC server and client.

**Table 2-1. RAE OPC Server and Client Compliance Levels**

Update Revision Level	OPC Specification Compliance
RAE OPC Client (for RAE Release 1.11 and 2.0)	v1.0A specification dated September 11, 1997
RAE OPC Server before RAE 1.11 add-on 5 of update 8	v1.0A specification dated September 11, 1997
RAE OPC Server in RAE 1.11 update 8 and above, and RAE 2.0	v2.04 OPC specification

In addition to the required interfaces, the server also supports the optional IOPCServerBrowseServerAddressSpace interface with a hierarchical namespace. This allows the RAE database to be browsed by OPC clients.

The RAE OPC server can be referenced by the Program ID (PROGID) Hmx.RaeServer\_O. The RAE client must contain the PROGID and the machine name in the link record of the RTDR. The client must also be registered on the server machine. Since OPC is based on Microsoft's Distributed Component Object Model (DCOM), all remote connections are subject to NT security.

### 2.1.1. Data Types

Data types in OPC are polymorphic. A server returns a canonical data type for each item (for example, VT\_I2). The client can choose to accept this and use it for all read/write operations. Alternatively, a client can request that a given item be treated as a requested data type. In this case, the server will perform all necessary data conversions if the requested type is convertible to the canonical type.

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## 3. Platform Setup

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OPC clients and servers largely depend on the Distributed Component Object Model (DCOM) setup. If DCOM is not set up correctly, the communication between the server and client systems will not operate properly. The overall network configuration determines the configuration of the DCOM for this application. The setup for a workgroup configuration is slightly different from that of a domain setup. The configuration and installation personnel must know the configuration of a given system before beginning this section.

Both the client and server must be a part of the same workgroup or NT domain for this client/server DCOM setup to work. An exception to this is if the OPC client can be run as a service. If so, the client machine can be in a domain and the RAE server can be in a workgroup. The DCOM configuration for this system configuration would be like a workgroup configuration in that a user must be added on the client machine in the context of the local account. This user would then be added to the DCOM settings as in the workgroup case.

When working on the Workgroup-to-Workgroup configuration, the addition of the User accounts is extremely important. Read and follow carefully the instructions in Section 3.4.1, "Server and Client Setup."

### 3.1. Setting Up the RAE Server Configuration

To succeed in a RAE server to foreign client connection, the following steps must be completed. Most of these steps should be completed with a clean install, but all steps should be verified when debugging a problem.

1. Register the RAE OPC server on the client system. (Section 3.3)
2. Set up DCOM on both the client and server systems to allow launch and access of the OPC connection. (Section 3.4)
3. Ensure that the OPC proxy files are on the client PC. These should be provided by the client and are OPC Foundation supplied. (Section 3.5)
4. Ensure that the DCOM is bound to the correct network channel if a dual network card is used. (Section 3.6)
5. Configure the server name and the machine name on the client system. (Section 3.7)

## 3.2. Setting Up the RAE Client Configuration

To succeed in a RAE client to foreign server connection, the following steps must be completed. Most of these steps should be completed with a clean install, but all steps should be verified when debugging a problem. Check the server documentation for procedures that need to be played into the RAE PC.

1. Register the OPC server on the RAE PC. This procedure should be part of the server installation instructions. (Section 3.3)
2. Add the appropriate users needed for the server connection. Some servers have specific users that are used to launch the server; these must be defined in the RAE PC or the domain, depending on the configuration. Refer to the foreign server documentation for any specific server needs.
3. Set up DCOM on both the client and server systems to allow launch of and access to the OPC connection. (Section 3.4)
4. Ensure that the OPC proxy files are on the server PC. These should be provided by the server and are included in the RAE install CD for RAE Release 2.0. These files are OPC Foundation supplied. (Section 3.5)
5. Ensure that the DCOM is bound to the correct network channel if a dual network card is used. (Section 3.6)
6. Configure the server name and the machine name on the client system. (Section 3.7)

## 3.3. Register OPC Server on the Client

RAE OPC server must be registered on the client system. There is a reg file on the RAE server system set up to do this. Copy the OPCServer.reg file from directory \ResourceKit\Setups\DCOMClients\OPCServer for Release 2.0 or above systems to the client system. For Release 1.11 systems, copy the RAEOPCServer.reg file from the directory \HMX\RAE\Bin\Setups\OPC\_Files to the client system. Double-click on the copied file to execute it. This will register the RAE server on the client machine.

Foreign OPC servers must be registered on the RAE system. Instructions to do this should be found in the OPC server section of the vendor's documentation.

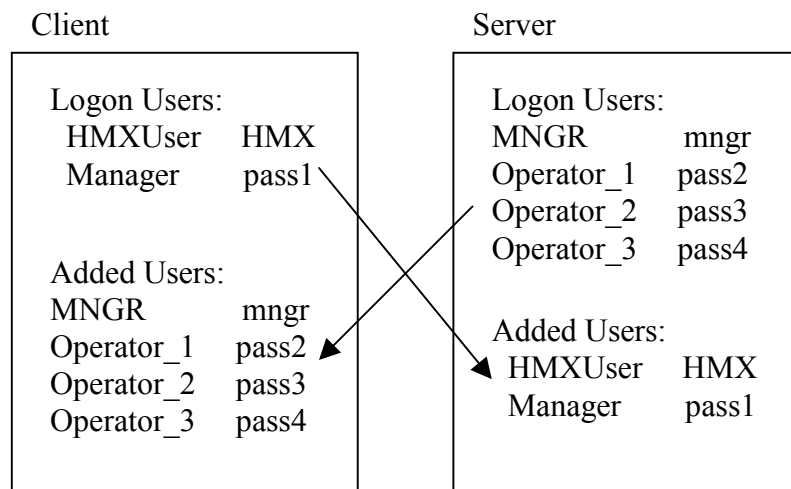
### 3.4. DCOM Setup Example

The configuration detailed below is very open and is known to work. If the security of the system needs to be tighter, use the custom setups under the application's Security tab. The details of this tightened security are not given in this manual. Consult DCOM documentation for details on tightening the security. This is only one of many working examples. It is given here as the recommended DCOM configuration when interfacing to either the OPC server or client on a RAE platform.

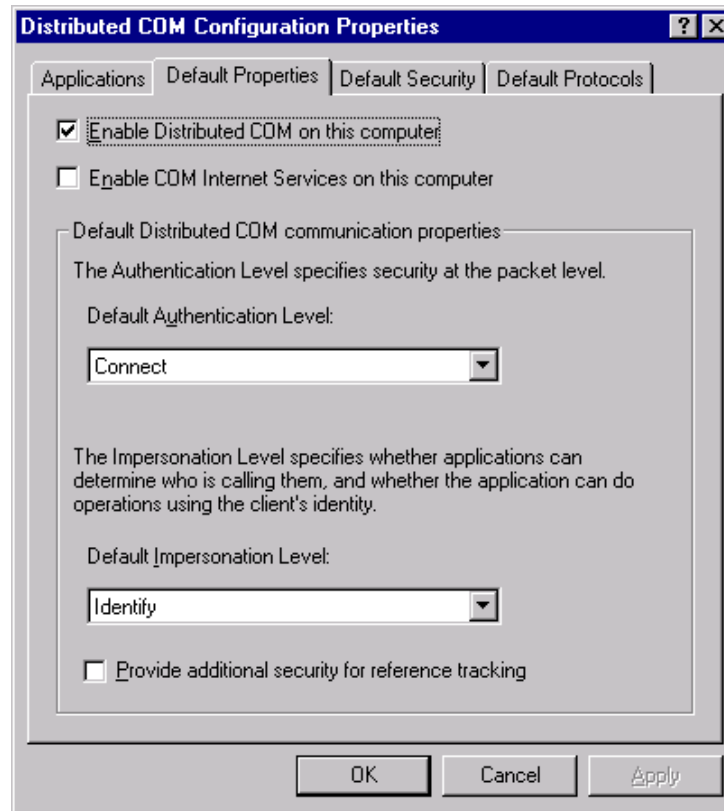
#### 3.4.1. Server and Client Setup

Perform this procedure on both the client and server PCs. Some or all of this setup may have been completed by the installation procedures of the client and server.

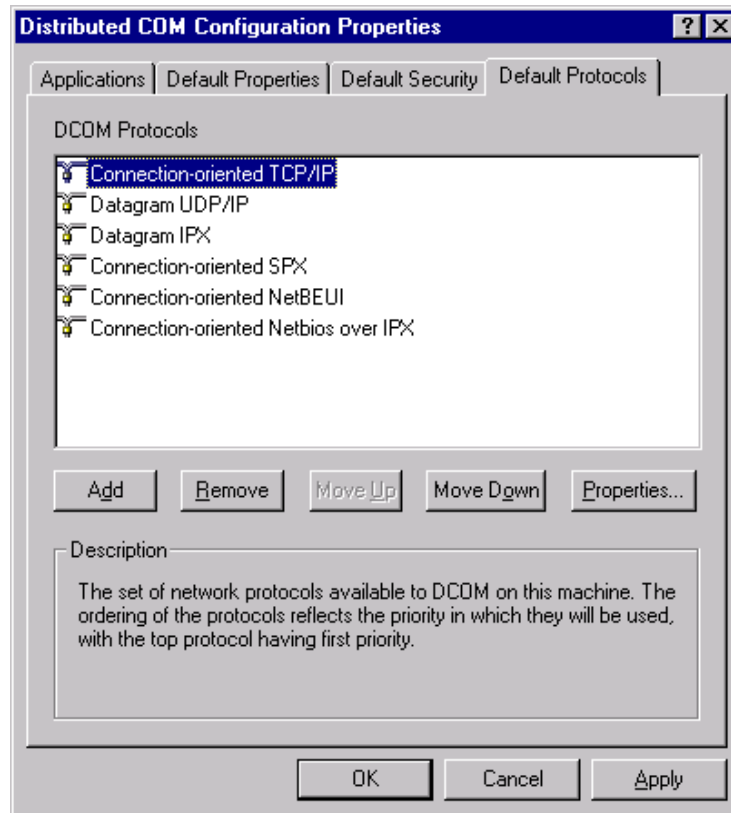
1. Add user(s) to be used to authenticate the DCOM privileges on the client and server for the OPC component.
  - If in a domain: Add a domain user to the domain using the User Manager on the NT server system.
  - If in a workgroup: On the server, configure users that have the same username and password as the logon users of the client. On the client, configure users that have the same username and password as the logon users of the server. Add all of these users through the User Manager. If multiple users are added, a group of these users can be used in the DCOM configuration.



2. Run **DCOMCNFG** from the “Run” menu.
3. Under the **Default Properties** tab, make sure that **Enable Distributed COM on this computer** is checked, the **Default Authentication Level** is “Connect,” and the **Default Impersonation Level** is “Identify.”

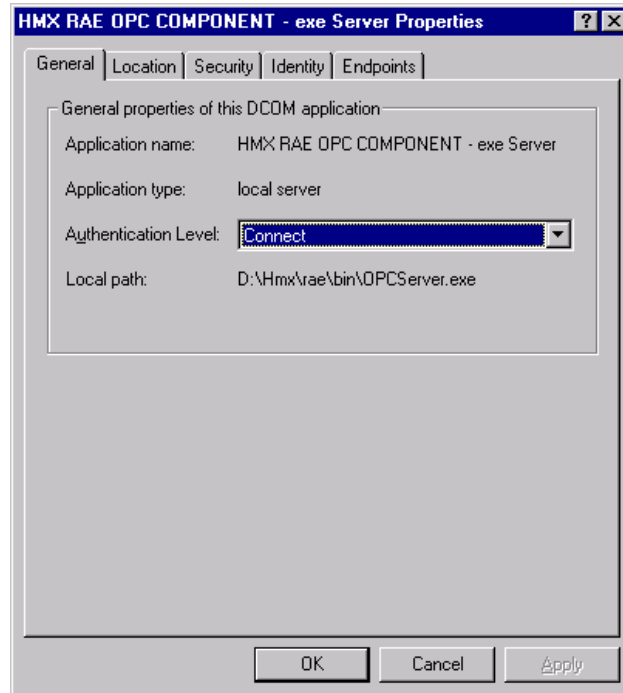


4. Under the **Default Protocols** tab, move the **Connection-oriented TCP/IP** protocol to the top of the list by selecting it and using the **Move Up** button.



5. Under the **Applications** tab, highlight the **HMX RAE OPC COMPONENT – exe Server** application for the RAE server or the foreign server application name if RAE is the client. Select **Properties**.

- The **General** tab should look like the following in the RAE as OPC server environment:

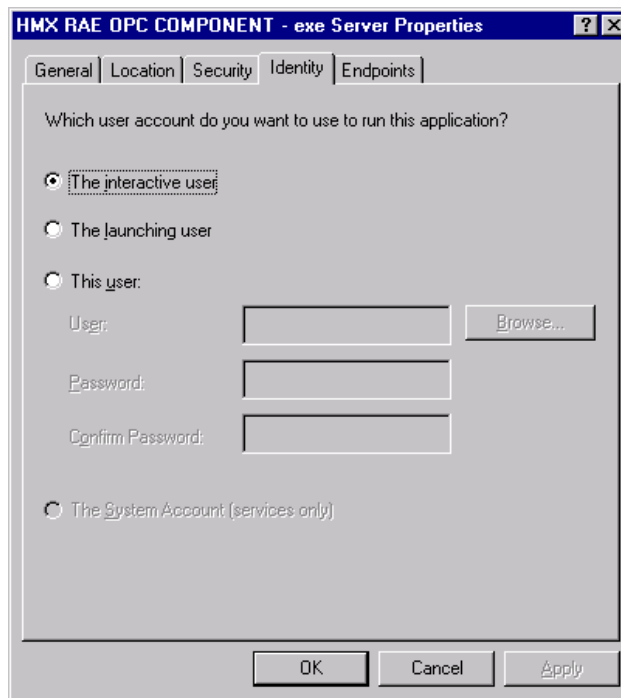


**Note:**

The Local path may have a %mxroot% in the path name instead of D:\HMX on the client system. This is normal.

- Make sure that the **Run application on this computer** box is checked under the **Location** tab.
- Under the **Security** tab, select **Use custom access permissions**, and then select **edit**.
- Add SYSTEM, NETWORK, ADMINISTRATOR, Authenticated Users, and INTERACTIVE, if not already there, and give them an access of **Allow Access** on the Registry Value Permissions window. Click **OK**.
- Select **Use custom launch permissions**, and then select **edit**.

11. Add SYSTEM, NETWORK, ADMINISTRATOR, Authenticated Users, and INTERACTIVE, if not already there, and give them an access of **Allow Launch** on the Registry Value Permissions window. Click **OK**.
12. Select **Use custom configuration permissions**, and then select **edit**.
13. Add the Administrators group for this PC with **Full Control** access to the Registry Key Permissions window. Click **OK**.
14. Select **The interactive user** from the **Identity** tab.



15. Click **Apply** and **OK** to exit the application properties page (HMX RAE OPC COMPONENT – exe Server Properties in a RAE OPC server configuration).
16. Click **Apply** and **OK** to exit **dcomcnfg**.
17. Shut down and restart the PC.



### 3.5. OPC Proxy and Other OPC Foundation DLL Files

The following files are required on both client and server:

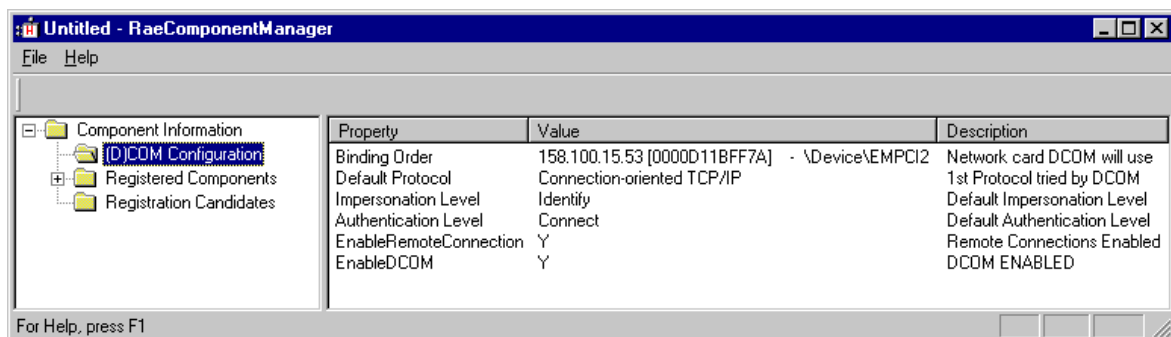
- OPCproxy.dll
- opccomm\_ps.dll
- Opcenum.exe

These standard OPC foundation files are automatically loaded with the RAE install for either a Da Vinci or MXProLine system. Most, if not all, clients and servers provide these files. If, for some reason, these files are not present on the foreign vendor system, they are provided on the RAE 2.0 install CD as part of the Resource Kit. They can be found in the directory \ResourceKit\Setups\DCOM Clients\OPCServer. Copy all of these files to any directory in the client machine, and run the register.bat file on that machine to register all of the DLLs and EXEs. This will also register the OPCServer on the client machine.

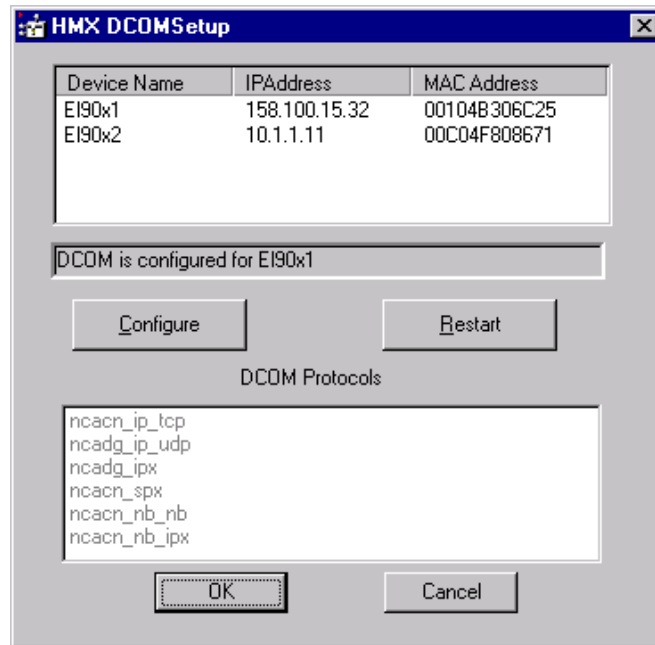
The standard files can also be found on the OPC foundation website. The user must register them because register.bat is not available from this site.

### 3.6. DCOM Binding Order

This section should only be completed for PCs running Windows NT 4.0. To verify the binding order of DCOM in a RAE 2.0 system, start the RaeComponentManager.exe found in the directory \HMX\RAE\BIN\Utilities. Select the (D)COM Configuration folder. The value of the Binding Order property must be the Network device used for the OPC connection. If this is not the case, double-click on the entry and select the correct choice from the Network card selection pop-up window. The PC must be restarted before this change takes effect.



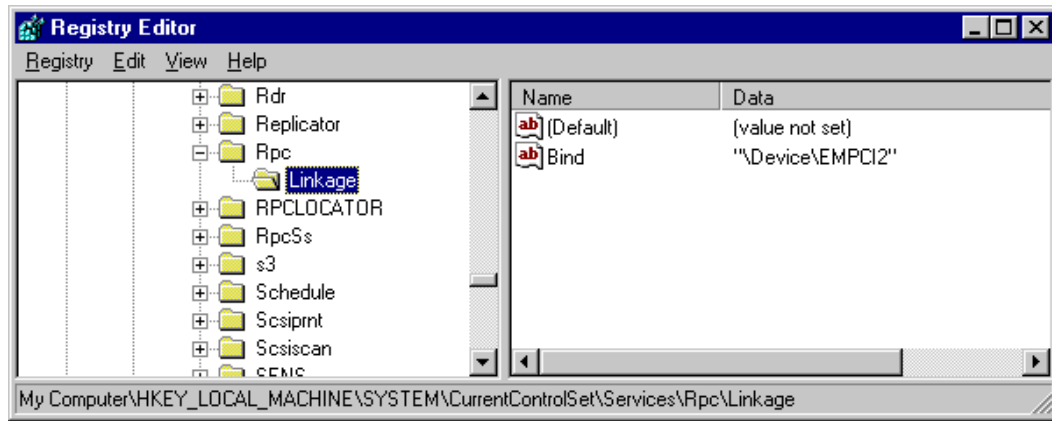
In a RAE 1.11 system, the binding can be checked using a similar program to the one above. In directory \HMX\RAE\BIN\Setups, double-click **dcomsetup.exe**. The pop-up window displays the Network device names available and shows which device is now bound to DCOM. To change this device, select Configure, type the device name required into the configuration pop-up window, and then restart the PC by selecting Restart.



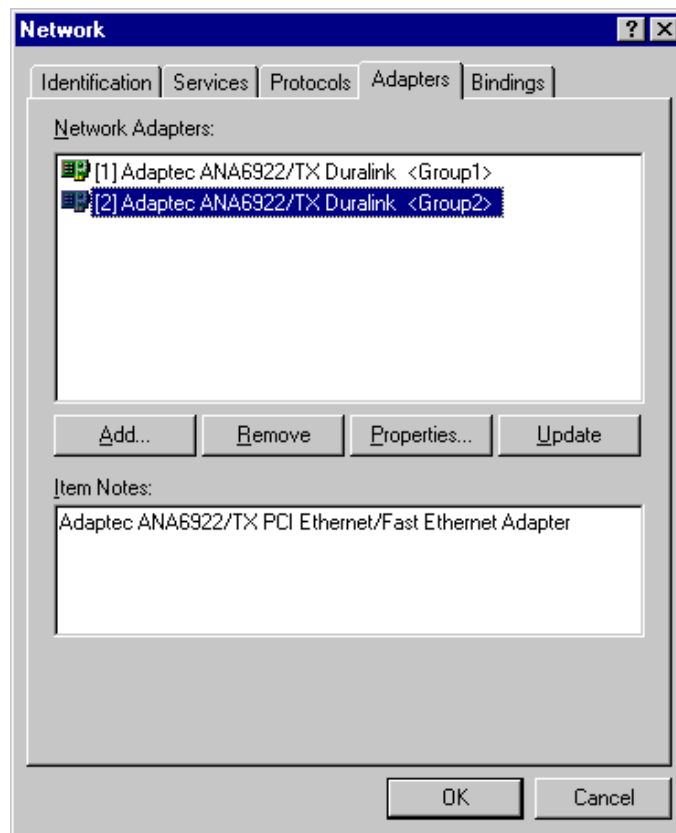
A foreign vendor's binding of a dual LAN card or any RAE binding settings can be checked using the regedit program. Check for instructions in the foreign vendor's documentation about binding before executing this step on the vendor's PC. If DCOM is not bound, the key:

My Computer\HKEY\_LOCAL\_MACHINE\SYSTEM\CurrentControlSet\Services\RPC\Linkage

will not exist. If the key does exist, verify that the key value is the correct device.

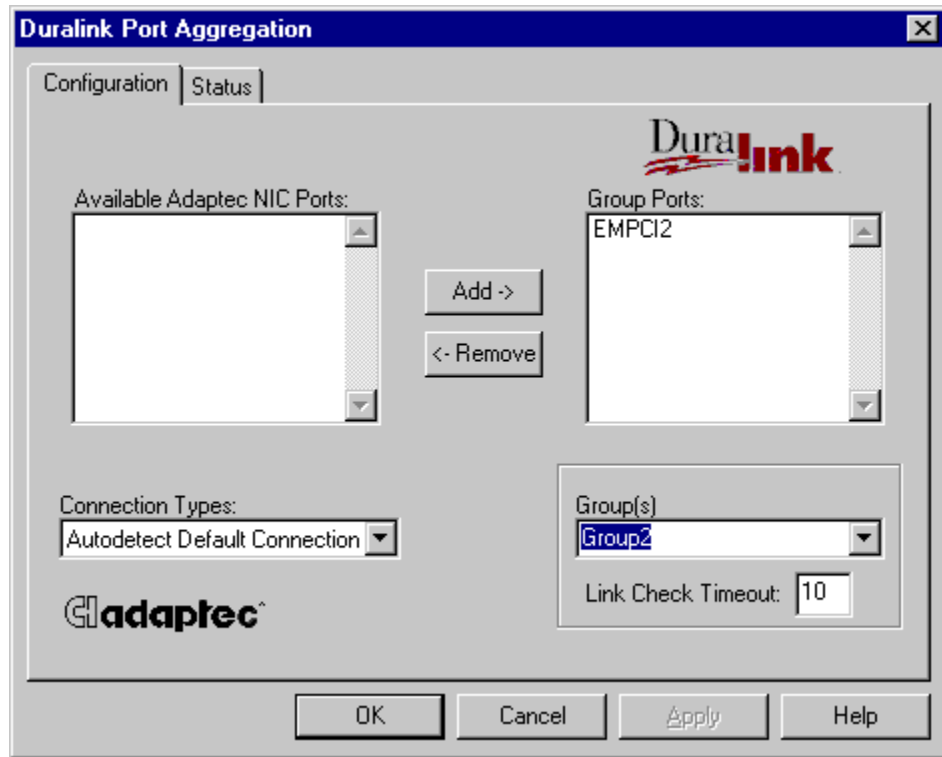


Device names are found under the **Network** icon **Adapter** tab of the control panel.



Highlight an entry in the Network Adapters window and select Properties.

Depending on the adapter card, the device name will be displayed there. As seen with the Adaptec Duralink Port Aggregation window, the device name is found in the Group Ports selection box.



As always when changing the registry, use extreme care because a wrong entry could cause the PC to not operate or even to not boot correctly. The PC must be restarted for the change to take effect.

## 3.7. Link and Variable Group Configuration

The OPC client must establish a connection with the server and add groups of transfer variables to read, write, or subscribe to updates on the server. The subsections below give the link information needed in the RAE platform for both a server and client application.

The variables in the RAE platform can be referenced by the foreign client either with the hierarchical path name or an alias name configured in the Configuration Browser. These alias names can be verified by viewing the Alias.xml file in a RAE 1.11 system or through the HMXOnlineLinkConfiguration.exe tool found in the HMX\RAE\Bin\Tools directory of RAE 2.00 systems.

If the RTDR path names are changed or modified for some reason, the alias definition must be updated also. This is done automatically when using the Configuration Browser to make the changes. If this is not the case, the above tools must be used to modify the alias names. If the client is referencing the variables by the hierarchical path on the client database, these paths must be changed to match the updated paths in the RAE platform.

### 3.7.1. Da Vinci Server Connection Configuration

The server can be referenced by the Program ID (PROGID) Hmx.RaeServer\_O. OPC servers are addressed by a combination of PROGID and machine name unless the client is on the same machine as the server, in which case only the PROGID is required. Since OPC is based on Microsoft's Distributed Component Object Model (DCOM), all remote connections are subject to NT security.

### 3.7.2. Da Vinci Client Connection Configuration

The client must have the PROGID and the machine name in the links record of the RTDR. The machine name can be left blank if the server is on the local machine. Using the Configuration Browser, enter the server PROGID in the "server progid" attribute and the machine name in the "host name" attribute. Using the Database or HMX RAE Browser, enter the server PROGID in the "hostname" field and the machine name in the "ascii parameter 1" field. As with the server, all remote connections are subject to NT security.

## 4. Interface Troubleshooting

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This section is provided to help troubleshoot typical problems encountered when configuring and setting up a Real-Time Application Environment (RAE) OPCServer or client (HCILink) application.

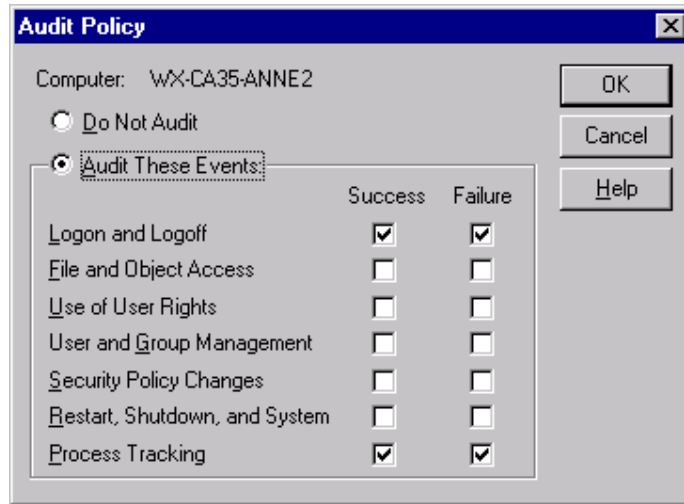
### 4.1. NT Event Log is the First Place to Look

When faced with a problem on an NT-based machine, one of the first places to look for information is the NT event viewer. The RAE OPC server, client, and RAE application all use the event log to capture error messages. Most of the messages of interest are found under the application section of the log, but all 3 sections should be viewed when debugging a problem. In addition, both the client and server logs should be viewed.

#### 4.1.1. Enabling Security Auditing

Another tool that can be used for debugging a non-working connection is the auditing feature on the NT operating system. This must be enabled to log the information in the NT event viewer in the Security tab. To enable the auditing, do the following:

1. Start the **User Manager** from the start menu.
2. Select **Policies** and **Audit...** from the tool bar.
3. Select the **Audit These Events** selection, and check **Logon and Logoff** and **Process Tracking**.
4. Click **OK** and exit the User Manager.



With security auditing enabled, any logons and logoffs of the server or client are recorded in the event viewer. Information such as the success or failure of the logon plus the username and machine name can be found in these entries.

## 4.2. Client (HCILink) Debug Flag

There is a debug switch in the HCILink client. This flag enables status messages that are printed in the HCILink window. This can be used to check symbol resolution, data transfer rate, and receipt of server call-back messages.

To set the flag:

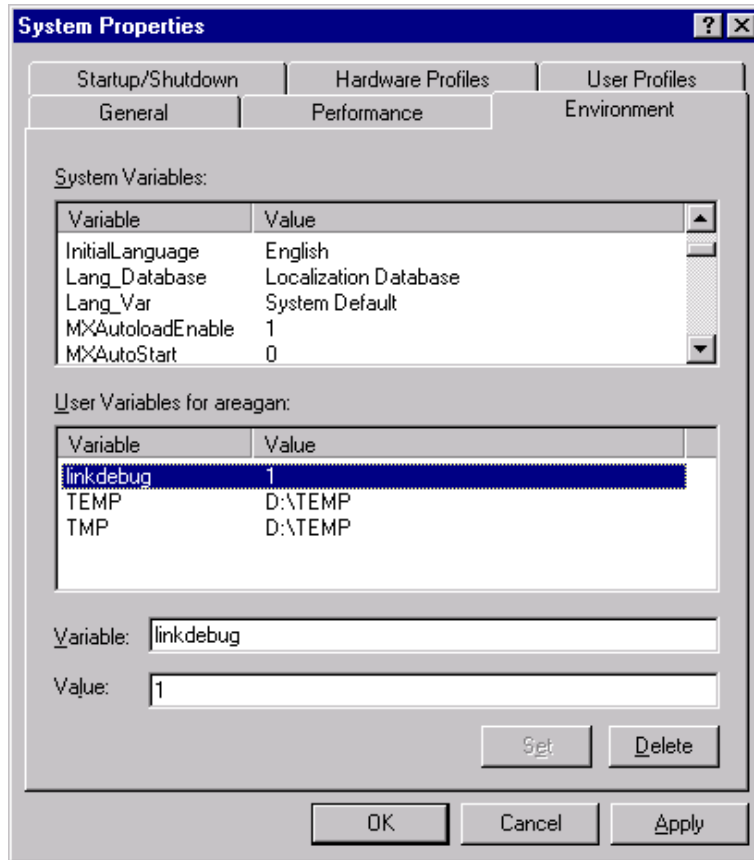
1. Select the **System** icon from the control panel.
2. Select the **Environment** tab and highlight a user variable.
3. Change the **Variable** name and **Value** at the bottom of the window to **linkdebug** and **1**, respectively.

4. Click **Set**.

The window should look like the one below.

5. Click **Apply** and **OK**.

HCILink must be restarted before the flag is recognized and the messages appear.





### 4.3. Helpful Websites

There are websites that can be used to download test clients, view the OPC specification, or look up an error message. Refer to Table 4-1.

**Table 4-1. Helpful Websites**

Site Name	Information Description
<a href="http://www.opcfoundation.org/">http://www.opcfoundation.org/</a>	This is the OPC Foundation main site. Here you can find the latest OPC proxy files, OPC specification, links to demo clients, and much more.
<a href="http://www.factorysoft.com/">http://www.factorysoft.com/</a>	This site is a location of a test client that HMX has used often. Downloading this demo client as a troubleshooting tool is highly recommended.
<a href="http://search.microsoft.com/us/SearchMS25.asp">http://search.microsoft.com/us/SearchMS25.asp</a>	The Microsoft site is the place to find the DCOM error message number definitions and other Microsoft-related information.
<a href="http://discuss.microsoft.com/archives/dcom.html">http://discuss.microsoft.com/archives/dcom.html</a>	This is another site to research DCOM errors.
<a href="http://www.intellution.com/opchub/whitepapers.asp">http://www.intellution.com/opchub/whitepapers.asp</a>	This site has “White Papers” on different OPC topics. It can be used to expand knowledge of OPC and DCOM ideals.

## 4.4. Security/Communication Issues

**Problem:** What should I do when the communications keep denying access to the server or client?

**Advice:** Verify that the Distributed Component Object Model (DCOM) is set up properly. If the systems are part of a workgroup, ensure that the client's logon user name and password are the same as the "configured user" on the server system and vice versa. Refer to Section 3.4, "DCOM Setup Example," for more details.

**Problem:** It looks like the 2 systems are communicating, but the server is not updating variables set up for periodic updates.

**Advice:** It is most likely that the server does not have DCOM access privileges on the client system. Verify that DCOM is configured correctly by checking Section 3.4, "DCOM Setup Example," for more details. If DCOM is set up correctly and one or both systems have dual network cards, check the DCOM binding. Refer to Section 3.6, "DCOM Binding Order," for more details.

**Problem:** I have checked the DCOM setup on both computers, and I am still not able to connect to the server. What should I look at next?

**Advice:** Verify that the username and password are the same on both client and server for the common users. Look for the OPCproxy.dll file on the non-RAE-based system. If the "proxy" files were copied over from the RAE resource kit, was the registry.bat file executed? Refer to Section 3.4, "DCOM Setup Example," for more details.

**Problem:** After connecting the server with a test client PC, I cannot connect to the server with another client PC.

**Advice:** This may be a problem with PCs having multi-channel LAN cards. Make sure the DCOM server and/or client is bound to the correct device. Refer to Section 3.6, "DCOM Binding Order," for more details.

**Problem:** I have a workgroup environment, and the OPC link was working for months. Now, after a reboot, the server is not accessible to the client.

**Advice:** Review the changes done on both systems. Has the logon username or password changed on either system since the last reboot? If so, was the corresponding user account on the other system updated also? Was there any software upgrade installed on either system? Check the DCOM settings and the DCOM binding, and verify that they have not changed. Use a third-party client and verify that it can connect.

**Problem:** I have a workgroup environment, and the OPC link will only work with specific operator logon accounts.

**Advice:** Verify that all of the operator NT user accounts are defined on both the server and client systems with the same username and password. Note that if a password on any of these accounts is changed in either system, it must be changed in both so that the passwords match.

**Problem:** I have checked all of the OPC setup twice, and the client still cannot connect.

**Advice:** Verify that the connection between the 2 computers exists. This can be done using the Command Prompt window and a simple ping command. Try using the IP address and the computer name to ping the server from the client. If the ping does not work, check the network connections for the 2 computers.

**Problem:** I just updated the RAE system from 1.11 to 2.00. I believe I have the connection to the RAE server, but I get no variable information back. In the NT event viewer, I see messages such as: *The description for Event ID ( 27 ) in Source ( HCI Comp Base ) could not be found. It contains the following insertion string(s): RaeOutOfProcOpcServer.*

**Advice:** There are 2 files used by the server that must be deleted and regenerated by the server when this upgrade is performed. Delete the RaeOPCServer\_I.hci and RaeOPCServer\_O.hci files in the \HWIAC\Checkpoints directory. Note that the server will take longer to start up the first time after the deletion of these files. This is normal because the server must rebuild these files instead of using the existing ones.