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OPC Gateway for ACE Interface Reference

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1 About This Document

This document provides information for using an OPC Gateway to interface an OPC server with an ACE supervisory controller.

Revision	Date	Description
A	December 2013	Initial release of the document.

Related topics

“Release Information” on page 6

1.1 Release Information

Document Name	Document ID	Release Number	Publication Date
OPC Gateway for ACE Interface Reference - opcgr	EPDOC-XX79-en-431A	431	December 2014

2 Using OPC Gateway to Interface ACE to an OPC Server

1. The OPC Gateway serves as a communication bridge between the Application Control Environment (ACE) and/or Simulation-Application Control Environment (SIM-ACE) supervisory controllers in an Experion system and an OPC server.

The OPC Gateway supports OPC Data Access Standard versions 2.0 and 1.0. It does not support the OPC Alarms and Events or OPC Historical Data Access Standards.

This book includes the following topics to help you apply and use the OPC Gateway function.

Topic
“Getting Started” on page 9
“OPC Quick Reference” on page 18
“Reviewing OPC Gateway Functional Characteristics” on page 20
“OPC Data References” on page 22
“OPC Data Type Conversions” on page 24
“Creating OPC Gateway Block” on page 28
“Enabling OPC Gateway Simulation Support” on page 30
“Loading OPC Gateway Block” on page 31
“Using Color Coded Icon to determine OPC Gateway status” on page 32
“Changing State of OPC Gateway” on page 33
“Monitoring OPC Gateway Status through Control Builder” on page 34
“Migration Considerations” on page 43
“Maintenance and Troubleshooting” on page 47

Related topics

- “Getting Started” on page 9
- “OPC Gateway Configuration Guidelines” on page 10
- “Configuring ACE to Communicate with OPC Servers” on page 12
- “OPC Quick Reference” on page 18
- “Reviewing OPC Gateway Functional Characteristics” on page 20
- “OPC Data References” on page 22
- “OPC Data Type Conversions” on page 24
- “Creating OPC Gateway Block” on page 28
- “Enabling OPC Gateway Simulation Support” on page 30
- “Loading OPC Gateway Block” on page 31
- “Using Color Coded Icon to determine OPC Gateway status” on page 32

“Changing State of OPC Gateway” on page 33

“Monitoring OPC Gateway Status through Control Builder” on page 34

2.1 Getting Started

This section identifies the tasks that you need to complete to prepare the OPC Gateway for operation. The following table lists the tasks in the order that they are to be completed and includes a link to reference data, where applicable.

Task	Link or Reference
Install and set up the OPC server.	See OPC server manufacturer's documentation.
Install the Experion R210 or greater software on the Experion Server.	See the <i>Software Installation and Upgrade Guide</i> .
Install the Application Control Environment (ACE) software version R210 or greater on the computer to be designated as the ACE node. You install the OPC Gateway executable with the ACE software.	See the <i>Software Installation and Upgrade Guide</i> .
Review OPC Gateway Configuration Guidelines	"OPC Gateway Configuration Guidelines" on page 10
Configuring ACE to Communicate with OPC Servers	"Configuring ACE to Communicate with OPC Servers" on page 12

2.2 OPC Gateway Configuration Guidelines

- You install the OPC Gateway as part of the ACE software on an ACE computer.
- In a system with only one ACE node, you must host the OPC Gateway on the ACE node.
- In a system with more than one ACE node, we recommend that you host the OPC Gateway(s) on a single ACE node, reducing configuration work. You must configure each computer hosting an OPC Gateway for the proper DCOM security settings.
- If the OPC server is on the same computer as an ACE, we recommend that you host the OPC Gateway on that ACE node to avoid DCOM configuration issues.
- Each Experion server can support up to ten (10) OPC Gateways. For Experion R300 or greater, up to 30 OPC Gateways per Server.
- Each OPC Gateway connects to one OPC server.
- Each ACE node can support up to four (4) OPC Gateways. For Experion R300 or greater, up to 15 OPC Gateways per ACE node.
- ACE is the only supported peer environment to the OPC Gateway
- Possible OPC Gateway configurations on ACE nodes, as shown in the following illustration, include, but are not limited to, the following.
 - Hosting four (4) OPC Gateways on one ACE node (*Node 5* in illustration). This saves configuration time since only one node needs to be configured for DCOM communication with the OPC Server.
 - Hosting OPC Gateways on more than one ACE node (*Nodes 4* and *5* in illustration).
 - Hosting one or more OPC Gateways on the same node as an ACE that will be communicating with them (*Nodes 4* and *5* in illustration).
 - An ACE node communicating with one or more remote OPC Gateways on a single remote node (*Node 3* to *Node 5* in illustration).
 - An ACE node communicating with multiple OPC Gateways on multiple nodes (*Node 2* to *Nodes 4* and *5* in illustration).
 - An OPC Gateway responding to multiple ACE nodes (*Node 5* to *Nodes 1*, *2*, and *3* in illustration).
 - Two OPC Gateways communicating with a single OPC Server (*Nodes 4* and *5* to *OPC 4* in illustration).

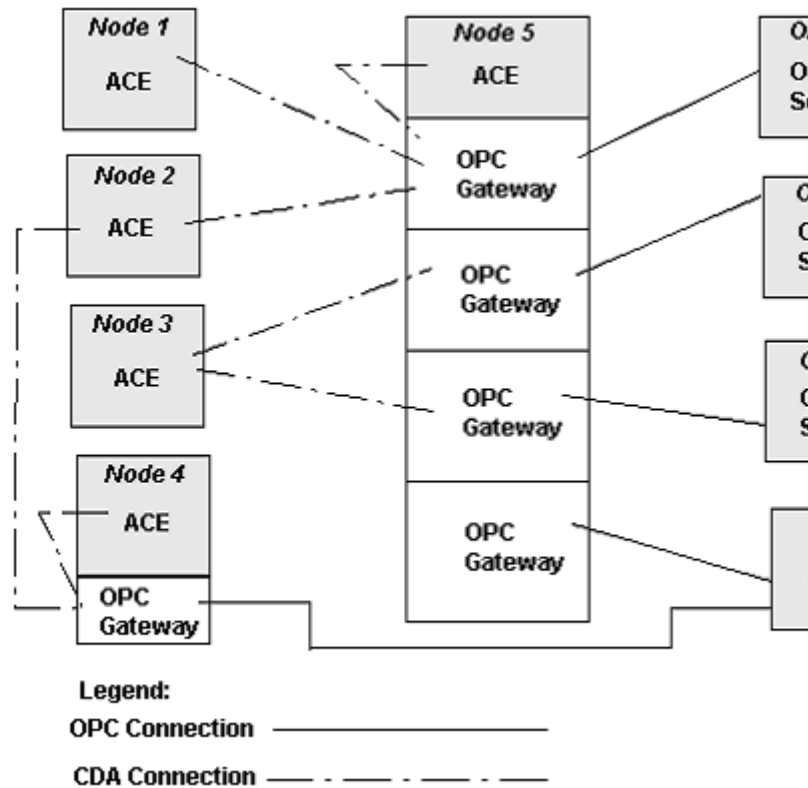


Figure 1: Multiple Gateways on Single ACE Node

The OPC Gateway is configured with OPC Gateway host name and OPC Gateway server name to a local ACE node which is configured to read and write data. If you change the OPC server name (HOSTNAMEPRI only) from local ACE node to another ACE node (in the same LCN network), and perform the load operation for OPC Gateway from project to monitor side, the OPC Gateway establishes the communication with the remote server. But however, the OPC Gateway cannot re-establish read/write operation after changing OPC server location to remote ACE node. Reloading the CMs allows a peer connection being established to OPC Gateway loaded with a new IP address.

! Attention

- In the event of an unexpected loss of connection to an OPC Server, the reconnection times vary based on whether the OPC server is in local connection or remote connection.
 - Local - The reconnection time will be fast (possibly few seconds).
 - Remote - The reconnection time will be slow (possibly longer than a minute).
- For ACE-T, OPC Gateway is on the same node as TPN Server. Therefore, reconnection time is same as that for local connections (possibly few seconds).
- For uninterrupted communication in remote connection topologies, it is recommended to use Redirection Manager (RDM), if possible.

2.3 Configuring ACE to Communicate with OPC Servers

This section includes procedures for setting up the ACE node to enable OPC communication from the Control Data Access - supervisory platform (CDA-sp). Complete the procedures in the order presented.

Related topics

- “Configuring CDA-sp for OPC” on page 12
- “Adding OPC server account to ACE Node” on page 13
- “Preventing local logon of OPC server account to ACE node” on page 14
- “Adding mngr user account to OPC server node” on page 14
- “Adding mngr to OPC server permissions” on page 15

2.3.1 Configuring CDA-sp for OPC



Use this procedure to set up a user account that CDA-sp can be run under.


For OPC communications, the account that CDA-sp runs under must be a user account that can be configured on several computers.

Prerequisites

- You have installed ACE R210 or greater software.
- You have logged on the ACE node with administrator privileges.

To Configure CDA-sp for OPC

- 1 Click the **Start** button, and then point to **Settings** and click **Control Panel**.
- 2 In the **Name** column, double-click the **Administrative Tools** icon.
- 3 In the **Name** column, double click the **Services** icon.
 - a Scroll the open window to locate the **Experion CDA-SP** service in the **Name** column.
 - b Double-click the **Experion CDA-SP** service.
 - c Click the **Log On** tab.
 - d Click the **This Account** option.
 - e Click the **Browse** button.
 - f Scroll the list box to find **mngr** user in the **Name** column.
 - g Click **mngr** and then click the **OK** button to return to the **Log On** tab.
 - h In the **Password** field, type the **mngr** password.
 - i Press the **Tab** key.
 - j In the **Confirm Password** field, type the In the **Confirm Password** field, type the **mngr** password again.
 - k Click the **Apply** button.
 - l Click the **OK** button.
- 4 Acknowledge any informational messages that appear regarding permissions being granted to the **mngr** user account.
- 5 Click the  close button to exit the **Services** dialog box.
- 6 On the **Administrative Tools** dialog box, double-click the **Local Security Policy** icon.
 - a On the **Tree** pane, click the  plus sign for **Local Policies** folder to expand its directory.
 - b Click the **User Rights Assignment** folder.

- c In the **Policy** column on the **View** pane, double-click the **Increase scheduling priority** entry.
- d On the **Local Security Policy Setting** dialog box, click the **Add** button.
- e On the **Select Users or Groups** dialog box, scroll list box to locate **mngmr** user in **Name** column.
- f Double-click the **mngmr** user to add it to the second list box.
- g Click the **OK** button.
- h Click the **OK** button to close the **Local Security Policy Settings** dialog box.
- 7 In the **Policy** column on the **View** pane, double-click the **Lock pages in memory** entry.
 - a On the **Local Security Policy Setting** dialog box, click the **Add** button.
 - b On the **Select Users or Groups** dialog box, scroll list box to locate **mngmr** user in **Name** column.
 - c Double-click the **mngmr** user to add it to the second list box.
 - d Click the **OK** button.
 - e Click the **OK** button to close the **Local Security Policy Settings** dialog box.
- 8 Click the  close button to exit the **Local Security Settings** dialog box.
- 9 On the **File** menu, click **Close** to exit the **Administrative Tools** dialog box.
- 10 This completes the procedure. Restart the computer for the changes to take effect.
- 11 Go to the next procedure *Adding OPC server account to ACE Node*.

2.3.2 Adding OPC server account to ACE Node

For OPC communications to work properly, both the server computer and the client computer must be able to validate the necessary user names and passwords with each other as follows.


- The server must validate the account under which the client runs. In this case, CDA-sp is the client, so sever needs to validate the **mngmr** user account.
- The client computer must validate the account under which the server runs. This is necessary for callbacks to function properly.


The following procedure assumes that the OPC Server is a TPN Server (APP Node). The default account for the TPN Server component is *DCSComServer* and the password is *password*. If you are configuring a different OPC Server and/or your user name or password is different, be sure to substitute the correct account and password entries where necessary in the following procedure.

Prerequisites

- You have completed the previous procedure *Configuring CDA-sp for OPC*.
- You have logged on the ACE node with administrator privileges.

To add OPC server account to ACE node

- 1 On the desktop, right-click the **My Computer** icon and click **Manage**.
 - a On the **Tree** pane, click the  plus sign for **Local Users And Groups** folder to expand its directory.
 - b Right-click the **Users** folder and click **New User** to open the New User dialog box.
 - c In the **User Name** field, type the server account name. For example, type *DCSComServer* for a TPN Server. Press the **Tab** key.
 - d In the **Full Name** field, press the **Tab** key to skip this entry or type desired full name and then press the **Tab** key.
 - e In the **Description** field, type desired descriptive text and then press the **Tab** key.
 - f In the **Password** field, type the account password. For example, type *password* for a TPN Server default *DCSComServer* account. Press the **Tab** key.
 - g In the **Confirm Password** field, type the account password again. Press the **Tab** key.
 - h Click the **User must change password at next logon** check box to clear it.

- i Click the **User cannot change password** check box to select it.
 - j Click the **Password never expires** check box to select it.
 - k Click the **Create** button.
 - l Click the **Close** button.
- 2 Click the  close button to exit the **Computer Management** dialog box.
 - 3 This completes the procedure. Go to the next procedure *Preventing local logon of OPC server account to ACE node*.

2.3.3 Preventing local logon of OPC server account to ACE node



Once you create an OPC server account on the ACE node, the next step is to prevent that account from being used to log on at the keyboard. This is done for security reasons.

The following procedure assumes that the OPC Server is a TPN Server (APP Node). The default account for the TPN Server component is *DCSComServer* and the password is *password*. If you are configuring a different OPC Server and/or your user name or password is different, be sure to substitute the correct account and password entries where necessary in the following procedure.

Prerequisites

- You have completed the previous procedure *Adding OPC Server Account to ACE Node*.
- You have logged on the ACE node with administrator privileges.

To prevent local logon of OPC server account to ACE node

- 1 Click the **Start** button, and then point to **Settings** and click **Control Panel**.
- 2 In the **Name** column, double-click the **Administrative Tools** icon.
- 3 On the **Administrative Tools** dialog box, double-click the **Local Security Policy** icon.
 - a On the **Tree** pane, click the  plus sign for **Local Policies** folder to expand its directory.
 - b Click the **User Rights Assignment** folder.
 - c In the **Policy** column on the **View** pane, double-click the **Deny logon locally** entry.
 - d On the **Local Security Policy Setting** dialog box, click the **Add** button.
 - e On the **Select Users or Groups** dialog box, confirm that the local computer is listed in the **Look in** field. If it is not listed, click the arrow button in the field and select it from the list.
 - f Scroll the list box to locate **DCSComServer** user in the **Name** column.
 - g Double-click the **DCSComServer** user to add it to the second list box.
 - h Click the **OK** button.
- 4 Click the  close button to exit the **Local Security Policy Settings** dialog box.
- 5 On the **File** menu, click **Close** to exit the **Administrative Tools** dialog box.
- 6 This completes the procedure. Restart the computer for the changes to take effect.
- 7 Go to the next procedure, *Adding mngr user account to OPC server node*.

2.3.4 Adding mngr user account to OPC server node

For OPC communication to work properly there must be authentication from client to server and also from server back to client. Adding the *DCSComServer* account to the ACE Node with the same password as the *DCSComServer* account on the OPC Server node allowed authentication from server.




The procedure in this section allows authentication from the client to the server.

Be sure you are working on the OPC server node.

Prerequisites

- You have completed the previous procedure *Preventing local logon of OPC server account to ACE node*.
- You have logged on the OPC server node with administrator privileges.

To add mngr user account to OPC server node

- 1 On the desktop, right-click the **My Computer** icon and click **Manage**.
 - a On the **Tree** pane, click the  plus sign for **Local Users And Groups** folder to expand its directory.
 - b Right-click the **Users** folder and click **New User** to open the **New User** dialog box.
 - c In the **User Name** field, type *mngr* as the server account name. Press the **Tab** key.
 - d In the **Full Name** field, press the **Tab** key to skip this entry or type desired full name and then press the **Tab** key.
 - e In the **Description** field, type desired descriptive text and then press the **Tab** key.
 - f In the **Password** field, type the *mngr* account password. This password must be the same as the one used for the *mngr* account on the ACE node.
 - g In the **Confirm Password** field, type the account password again. Press the **Tab** key.
 - h Click the **User must change password at next logon** check box to clear it.
 - i Click the **User cannot change password** check box to select it.
 - j Click the **Password never expires** check box to select it.
 - k Click the **Create** button.
 - l Click the **Close** button.
- 2 On the **Tree** pane under the **Local Users and Groups** directory, click the  **Users** folder.
- 3 On the View pane, double-click the *mngr* account in the **Name** column.
- 4 On **mngr Properties** dialog box, click the **Member Of** tab.
 - a Click the **Add** button.
 - b On the **Select Groups** dialog box, double-click the **Administrators** group in the top list box to add it to the second list box.
 - c Click the **OK** button.
- 5 Confirm that **Administrators** group now appears in the list box on the **Member Of** tab and click the **OK** button to close the **mngr Properties** dialog box.
- 6 Click the  close button to exit the **Computer Management** dialog box.
- 7 This completes the procedure. Go to the next procedure *Adding mngr to OPC server permissions*.

2.3.5 Adding mngr to OPC server permissions

Once you add the *mngr* account to the OPC server computer you must configure the OPC server component so that *mngr* has permissions to launch, access, and configure the OPC server. The OPC communication may not function properly without these permissions.

- This procedure assumes that the OPC server is a TPN server (APP Node). The name for the TPN server component in the DCOM Configuration Utility is *HCI_TPNServer - exe Server*. If you are configuring a different OPC server and/or the name for the OPC server component is different, be sure you substitute the correct name where necessary in the following procedure.
- If the TPN server has System Management software, the launch and configuration permissions set in Steps 6 and 7 of the following procedure should be handled by the System Management configuration.
- Note that this configuration is installed with workstation security. See the Using High Security Policy section in the Server and Client Configuration Guide for more information.

Prerequisites

- You have completed the previous procedure *Adding mngr user account to OPC server node*.
- You have logged on the OPC server node with administrator privileges.

To add mngr to OPC server permissions

- 1 Click the **Start** button and click **Run**.
- 2 In the **Open** field, type *dcomcnfg*. Click the **OK** button.
- 3 On **Distributed COM Configuration Properties** dialog box, scroll list box on the **Applications** tab to find the **HCI_TPNServer - exe Server** entry.
- 4 Click **HCI_TPNServer - exe Server** in list and click the **Properties** button.
- 5 On **HCI_TPNServer - exe Server Properties** dialog box, click the **Security** tab.
 - a Click the option **Use Custom Access Permissions**.
 - b Click the **Edit** button.
 - c On the **Registry Value Permissions** dialog box, click the **Add** button.
 - d On the **Add Users and Groups** dialog box, be sure the local computer is listed in the **List Names From** field. If it is not listed, click the arrow button in the field and select it from the list.
 - e Click the **Show Users** button.
 - f Scroll the **Names** box to find the **mngr** user account. Double-click the **mngr** entry to add it to the **Add Names** box.
 - g Check that **Allow Access** appears in the **Type of Access** field. If it does not, click the arrow button in the field and select it from the list.
 - h Click the **OK** button to close the **Add Users and Groups** dialog box.
 - i Click the **OK** button to close the **Registry Value Permissions** dialog box.
- 6 On the **Security** tab, click **Use custom launch permissions**.
 - a Click the **Edit** button.
 - b On the **Registry Value Permissions** dialog box, click the **Add** button.
 - c On the **Add Users and Groups** dialog box, be sure the local computer is listed in the **List Names From** field. If it is not listed, click the arrow button in the field and select it from the list.
 - d Click the **Show Users** button.
 - e Scroll the **Names** box to find the **mngr** user account. Double-click the **mngr** entry to add it to the **Add Names** box.
 - f Check that **Allow Access** appears in the **Type of Access** field. If it does not, click the arrow button in the field and select it from the list.
 - g Click the **OK** button to close the **Add Users and Groups** dialog box.
 - h Click the **OK** button to close the **Registry Value Permissions** dialog box.
- 7 On the **Security** tab, click **Use custom configuration permissions**.
 - a Click the **Edit** button.
 - b On the **Registry Key Permissions** dialog box, click the **Add** button.
 - c On the **Add Users and Groups** dialog box, be sure the local computer is listed in the **List Names From** field. If it is not listed, click the arrow button in the field and select it from the list.
 - d Click the **Show Users** button.
 - e Scroll the **Names** box to find the **mngr** user account. Double-click the **mngr** entry to add it to the **Add Names** box.
 - f Check that **Full Control** appears in the **Type of Access** field. If it does not, click the arrow button in the field and select it from the list.
 - g Click the **OK** button to close the **Add Users and Groups** dialog box.
 - h Click the **OK** button to close the **Registry Key Permissions** dialog box.

- i On **HCI_TPNServer - exe Server Properties** dialog box, click the **Apply** button.
- j Click the **OK** button to close the dialog box.
- 8 Click the OK button to close the **Distributed COM Configuration Properties** dialog box.
- 9 This completes the procedure.

2.4 OPC Quick Reference

OPC provides data from a data source and communicates the data to any client application in a standard way. This assures interoperability by eliminating the requirement for an application to have specific knowledge about a particular data source, such as internal structure and communications protocols.

An OPC server and an OPC client can reside either on the same computer (local server) or on different computers (remote server).

2.4.1 Description of some OPC related Terms

Term	Description
CLSID	The class identifier that identifies an object. An object registers its CLSID in the system registration database so the object can be loaded and programmed by other applications.
COM	Stands for the Component Object Model. It is a collection of services that let software components interoperate in a networked environment.
DCOM	Stands for Distributed Component Object Model. It is a protocol that enables software components to communicate directly over a network. DCOM is designed for use across multiple network transports, including Internet protocols such as HTTP.
group	A number of items with the same update rate and deadband.
item	A single data source of the OPC server.
OLE	Stands for Object Linking and Embedding - a Microsoft technology.
OPC	Stands for OLE for Process Control. It is a set of standards that define sets of COM interfaces (based on Microsoft's COM/OLE technology) to be observed by OPC clients and servers. This set of standards was established by the OPC Foundation to foster greater interoperability between automation and control applications, field systems and devices, and business and office applications. When the term OPC is used in this Reference, it refers specifically to the OPC Data Access Standard.
ProgID	A programmatic identifier. A registry entry that can be associated with a class identifier (CLSID). The format of a ProgID is <Honeywell>.<Component>.<Version>, separated by periods and with no spaces. The ProgID identifies a class, but with less precision. The ProgID is used to identify the OPC server from other COM/DCOM components on the same computer. For more details, see any setup and installation instructions provided by the OPC server manufacturer.
update rate	The internal update rate of the items in the OPC Server

2.4.2 About OPC data transfer

OPC server data is available to the OPC client as items. To receive items from the OPC server, the OPC client must gather one or more items into a group.

The OPC client requests the OPC server to create a group with a client-specified maximum (at most) update rate and a deadband. The OPC client then requests the OPC server to add items to the group. The update rate and the deadband of a group apply to all items in that group.

When working with OPC data, remember the following two things:

- There is no concept of hardware in the OPC Data Access Standard; there are just items. An OPC server may represent a piece of hardware as an item and the item's value may indicate the state of the hardware. However, whether or not such representation is available is server-specific.
- Although the OPC client can specify any update rate for a group, the OPC server decides whether the request is honored.

2.4.3 Callback function

Generally, the OPC server sends data to OPC clients through callbacks. Once a group is created, the OPC server creates a cache for the group items. The cache is updated according to the group's update rate. The OPC server sends only updated values to the OPC client for items in the group if there has been significant change since the last cache update (based on the group's deadband).

This method of data update significantly reduces traffic between the OPC client and the OPC server as there is no need for periodic read requests to the OPC server. An OPC client gets data when there is a significant change. The OPC client defines the level of change required to trigger an update from the OPC server.

2.4.4 Synchronous read request action



Attention

- Since synchronous read requests are blocking operations, the OPC Gateway does **not** do synchronous reads in order to preserve determinism.
-

The OPC client can also send synchronous read requests to the OPC server, independent of the server callbacks. The OPC client specifies whether the data should come from the OPC server's internal cache or from the field/hardware device. This method of scanning is less efficient than callback.

2.5 Reviewing OPC Gateway Functional Characteristics

The OPC Gateway operates as a bridge/translator between the Control Data Access (CDA) communications protocol in the Experion system and the standardized OPC communications protocol in the OPC server. It converts CDA handles to OPC parameter names and makes the appropriate requests (reads/writes).

The OPC Gateway depends on the CDA-supervisory platform (CDA-sp) for its communications link to the rest of the Experion system, but it runs in its own process space as shown in the following figure.

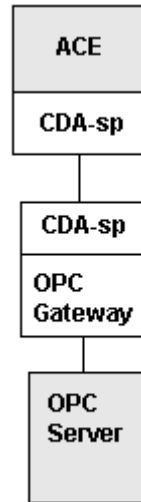


Figure 2: OPC Gateway Functional Architecture

2.5.1 OPC connectivity

The OPC Gateway provides a single point of connectivity to an OPC Server regardless of how many controllers have peer references to that OPC server. All ACE and SIM-ACE controllers share a single instance of the OPC Gateway, so there is only one set of OPC connections to the OPC server, as shown in following figure.

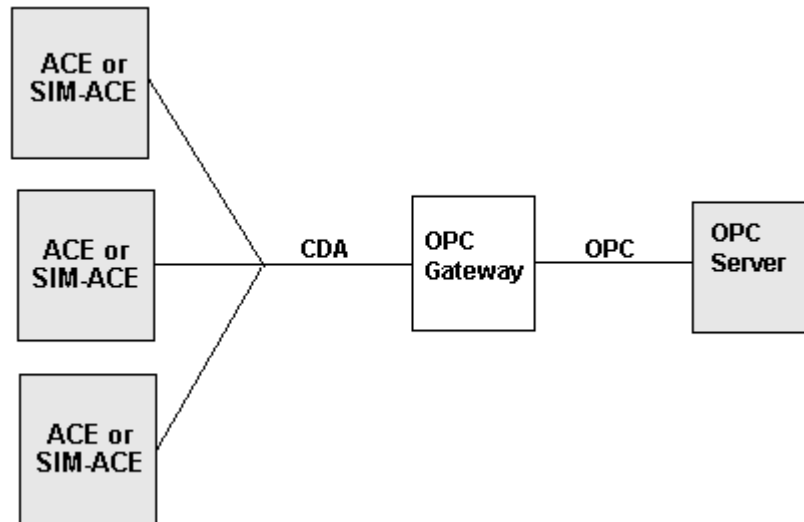


Figure 3: Multiple Controllers and Single OPC connection

2.5.2 OPC redundancy support

You can use an intermediate OPC server, such as the Honeywell Transparent Redirection Manager, to provide redundancy from the OPC Gateway to the OPC server as shown in the following illustration.

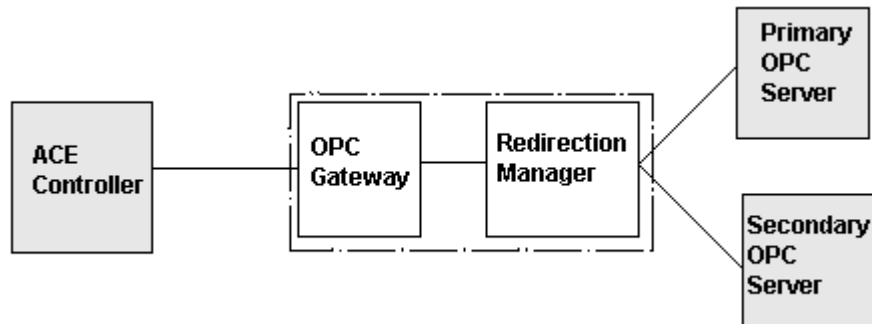


Figure 4: Redundancy Support through Redirection Manager

2.5.3 Status monitoring and reporting

The OPC Gateway can monitor and report its own status, the status of the communications with the target OPC server, and various other communications related statistics, such as CDA peer/display statistics, that other supervisory controllers provide. It can issue alarms and notifications through the following common system venues.

- Color changes in block icons on the **Monitoring** tab
- Alarm Summary display in Station
- Event Summary display in Station
- Error messages
- Error handling log files
- Applicable tabs on the block's Parameters form in the Monitoring mode.

2.6 OPC Data References

2.6.1 OPC Data Name Syntax

Use the following naming syntax to identify the data of interest in the OPC server.

<OPC Gateway function block name>.<OPC server data specific name>

For example, you configure an OPC Gateway block in Control Builder with the name OPC1 and you want to access data named InterlockA.Active in the configured OPC server. You would format the correct reference to this data as follows:

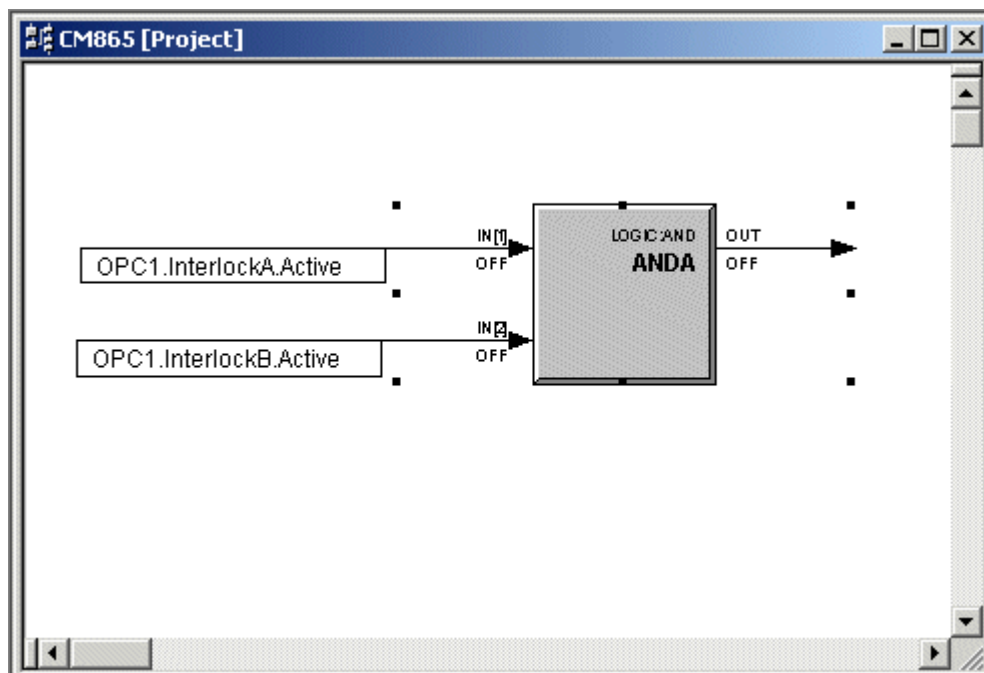
OPC1.InterlockA.Active

Note: If the OPC server data specific name contains illegal characters of Experion namespace, you must use the following syntax.

<OPC server function block name>.'<OPC server data specific item name>'

2.6.2 Parameter connectors or Parameter References

Since an OPC server block cannot be contained in a Control Module (CM), you must use parameter connectors to route OPC server data elements to applicable native block connections or to read/write parameter references for CAB instances in the control strategy. The following figure shows two parameter connectors being used to connect data elements named InterlockA.Active and InterlockB.Active from the configured OPC Gateway named OPC1 to inputs 1 and 2 of an AND function block in a Control Module named CM865 for reference. This strategy is only valid if loaded to an ACE/CEE environment.



Refer to the Custom Algorithm Block and Custom Data Block User's Guide for more information about *>parameter references*.

2.6.3 OPC references in expressions

You configure OPC data references in SCM Step Output, SCM Transition, AUXCALC block, or REGCALC block the same as other system parameters using the valid naming syntax for the OPC data elements. The following figure shows a SCM Step Output expression used to read the 'Count.PV' data from an OPC Gateway named OPC2, add 1.0 to the read value, and store the new value to the Count.PV data in OPC2.

#	Step Outputs
1	OPC2.Count.PV := OPC2.Count.PV + 1.0

Down Up Del Add

2.6.4 OPC references in SCM Alias table

Use the following guidelines to configure OPC data references in the Aliases table for a SCM block.

- Choose the OPC Gateway block as the Model Block for the given Alias.
- Choose either the External Reference (EXTREF) or the External Reference Structure (EXTREFSTRUCT) parameters of the OPC Gateway block for the given Alias.
 - For an Alias with the EXTREF parameter, the instance references can be references to either OPC Gateway data or FLOAT64 type system Server data.
 - For an Alias with the EXTREFSTRUCT parameter, the instance references can be references to either the OPC Gateway data or EXTREF_STRUCT type system Server data.

The following figure shows a sample reference to OPC Gateway data in a SCM Aliases table. The first alias is for an OPC Gateway block with an EXTREF parameter for an Instance 1 data reference from an OPC Gateway named OPC46. The second alias is for a Numeric block with a PV parameter for an Instance 1 data reference from a Numeric block named n1 in a Control Module named cm42.

SYSTEM:SCM Block, example_scm - Parameters [Project]

Main | Handlers | Alarm | Recipe | History | Aliases | Security/History | Displays | Status

☒ Enable Alias Configuration

Number of Aliases:

Number of Instances: Instance Selected:

#	Alias	Model Block	Model Param	Status	Instance 1
1	alias1	SYSTEM.OPCSERVER	EXTREF		OPC46.ref1
2	alias2	UTILITY.NUMERIC	PV		cm42.n1.PV

2.6.5 Validation of OPC references

With R410, a new feature is introduced in the Control Builder/Recipe Builder to validate blocks with OPC references after loading the OPC gateway. This feature can also be used for validating OPC references, if the OPC gateway is configured through the Redirection Manager (RDM). For the validation to be successful, the OPC gateway must be loaded. For more information about validation of block references, refer to the *Control Building User's Guide*.

2.7 OPC Data Type Conversions

Related topics

“About data type” on page 24

“Gets conversions” on page 24

“General data conversion considerations” on page 25

“Stores conversions” on page 27

2.7.1 About data type

Since the data type of the OPC server data reference is not known at configuration time, it is possible that the actual data type accessed at run time will not match the data type expected by the control strategy in the ACE controller. Please review the following sections for a summary of the guidelines covering data type conversions for OPC data Gets and Stores.

2.7.2 Gets conversions

The ACE controller receives the actual OPC data type for 'gets' at run time and translates the value into a system data type based on the following translation table.



Tip

- For a Whole Array Transfer, the OPC Vartype is the variant type of the individual array elements ORed with the VT_ARRAY type. In the case of an EXTREF_STRUCT (used in the UCNOUT function block), the OPC Vartype is VT_VARIANT ORed with VT_ARRAY.
- For DELTATIME parameter considerations, see the *Time Support in Experion System* section in the *Control Builder Components Theory* book.

If OPC VARTYPE Is ...	Then, System Data Type Is ...
VT_BOOL	BOOL
VT_UI1	UINT8
VT_UI2	UINT16
VT_UI4	UINT32
VT_UI8	UINT64
VT_I1	INT8
VT_I2	INT16
VT_I4	INT32
VT_I8	INT64
VT_R4	FLOAT32
VT_R8	FLOAT64
VT_BSTR	STRING
VT_FILETIME	TIME
VT_ARRAY VT_BLOB	EXTREF_STRUCT
Other VT_ data types	Bad Value Status

The general translation scenario is as follows.

- The CDA-sp performs the interface specific translation of external reference type to system type.
- The system value status is set according to the quality bit field of the OPC item state quality.
- The sub status and limits bit fields of the OPC item are ignored.
- The OPC array and blob variant types are forced into a system External reference structure type to distinguish them from internal system structures. A specific purpose function block, such as the UCNOUT block, is required to use an External reference structure type.
- The OPC variant types that are not supported result in a data type mismatch error.
- The CDA-sp delivers a system value to the appropriate function block.
- When the data types do not match, the function block receiving the data makes an attempt to convert between the actual and expected data types.

2.7.3 General data conversion considerations

The following table shows the data type conversions that the system does or does not support. A Yes means that the conversion is supported or not required, when the data types match, and a No means that the data type conversion is not supported.

From To	BOOL	UINT8 UINT16 UINT32	UINT 64	INT8 INT16 INT32	INT 64	ENUM SD_ENUM	FLOAT 32 FLOAT 64	STRING	TIME
BOOL	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
UINT8	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
UINT16	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
UINT32	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
UINT64	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
INT8	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
INT16	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
INT32	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
INT64	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
FLOAT 32	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
FLOAT 64	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
STRING	No	No	No	No	No	No	No	Yes	No
TIME	No	No	No	No	Yes	No	No	No	Yes
EXTREF_ STRUCT	No	No	No	No	No	No	No	No	No

Keep the following considerations in mind when dealing with data conversions.

- Be aware that down casting occurs when conversions involve a type that supports a wider range of values to a type with a more narrow range of values.
 - For example, an INT16 value of 333 is converted to INT8 value of 255.
 - For example, an INT32 value of 100,000 is converted to the maximum Enumeration value of 65,535. The function block that receives the Enumeration ordinal of 65,535 will likely reject this value, since it is out of range for the applicable Enumeration parameter. This is consistent with the current behavior where

an out of range store to an Enumeration parameter does not cause the destination parameter to assume the fail-safe value.

- For example, an OPC server data type of Integer is connected to a PID block's MODE parameter. If the Integer value is 7 at run time, the MODE parameter rejects the value because it is outside the MODE enumeration range of 0 to 5.
- Float to integer conversions use truncation instead of rounding. For example, a Float of 3.75 is converted to the Integer 3.
- The underlying type for system Boolean values is unsigned character. Since the underlying type for Boolean external references cannot be assumed, all external Boolean references are converted in the context of the system, which uses 0 for False and 1 for True. For example:
 - Boolean True converts to Integer 1 or Float 1.0
 - Boolean False converts to Integer 0 or Float 0.0
 - Integer 7 converts to Boolean True
 - Integer 0 converts to Boolean False
 - Integer -336 converts to Boolean True
 - Float 33.33 converts to Boolean True
 - Float -0.567 converts to Boolean True
 - Float 0.0 converts to Boolean False
 - Float 0.0001 converts to Boolean True (Similar to expressions, no threshold value is used in the test for zero. The TypeConvert block does provide a threshold for Float compares to zero, so use this block when this conversion is a concern.)
 - Enumeration ordinal 0 converts to Boolean False
 - Enumeration ordinal 8 converts to Boolean True
 - Float 5.82 converts to Enumeration ordinal 5
 - Float -11.0 converts to Enumeration ordinal 0
- Conversions between Strings and Integers and between Strings and Floats are not supported

The following table summarizes the fail-safe data value that is substituted when a given data type conversion is not supported.

If Data Type Is . . .	Then, Failsafe Value Is . . .
BOOL	Off
UINT8 UINT16 UINT32 UINT64	0
INT8 INT16 INT32 INT64	0
ENUM SD_ENUM	Ordinal value of 0
FLOAT32 FLOAT64	NaN
STRING	Blank
TIME	0

If Data Type Is . . .	Then, Failsafe Value Is . . .
EXTREF_STRUCT	Bad Status

For example, if the OPC1.InterlockA.Active parameter used as the input to an AND block in the previous figure in section “Parameter connectors or Parameter References” on page 22 returns a Boolean, Integer, or Float data type at run time, the appropriate conversion is made and the data get is completed successfully. If the OPC1.InterlockA.Active parameter returns a String data type, the Boolean fail-safe value of Off is applied to the AND block input.

2.7.4 Stores conversions

The CDA-sp receives the store value from the initiating function block and converts it as needed before storing the value to the OPC server. The CDA-sp executes a one time read of the value from the OPC server to learn its actual data type before initiating the Store.

The ACE supervisory controller supports the UCNOUT block, PUSH block, and SCM Step Output expressions for initiating stores to the OPC server.

2.8 Creating OPC Gateway Block

Use the following procedure to create an OPC Gateway block to represent the OPC Gateway software installed on an ACE node in the **Project** tab of Control Builder.

- You have used Control Builder before to create function blocks in the **Project** tab.
- You know what the Internet Protocol (IP) addresses are for the computers hosting the OPC Gateway and the OPC server.
- You can use the names for the computers hosting the OPC Gateway and the OPC server and let the system resolve the names into IP addresses. However, using the IP address results in a more robust configuration and minimizes the possibility of many error conditions occurring.
- You know what the PROGID is for the OPC server that is to communicate with the OPC Gateway.

Prerequisites

You have installed R210 software or greater on your Experion server.

You have logged on with sufficient privileges required to configure a control strategy in Control Builder.

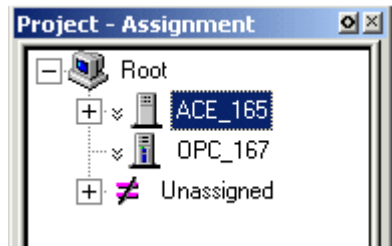
You have configured assets through the Enterprise Model Builder.

You have launched Control Builder through Configuration Studio.

To create OPC Gateway Block

- 1 On the **File** menu, click **New > External Servers > OPC - OPC Gateway**
- 2 In the **Tag Name** field, type a unique name for the block or accept the default name. Press the **Tab** key.
- 3 In the **Item Name** field, type the name of the Entity that this node will be associated with in the Enterprise Model Builder hierarchy
- 4 In the OPC Gateway Location **Host IP Address** field, type the IP address for the computer hosting the OPC Gateway function. Press the **Tab** Key.
- 5 In the OPC Gateway Location **Host Name** field, check that the name of the computer is correct for the entered IP Address. The name should be entered automatically, if the Server is connected to the ACE node containing the OPC Gateway. If not, type the name of the host computer. Press the **Tab** key.
- 6 In the **OPC Server Host IP Address** field, type the IP address for the computer hosting the OPC Server that is communicating through this OPC Gateway. Press the **Tab** Key.
- 7 In the **OPC Server Host Name** field, check that the name of the computer is correct for the entered IP Address. The name should be entered automatically, if the Server is connected to the ACE node containing the OPC Gateway that is connected to the OPC server. If not, type the name of the host computer. Press the **Tab** key.
- 8 In the **OPC Server PROGID** field, type the PROGID for the named OPC Server.
- 9 Click the **Simulation Enable** check box to select (enable) the simulation mode to allow a SIM-ACE to interact with any OPC Server as if it were a simulation node. Leave the check box blank for a non-simulation or on-process mode. See the following procedure “Enabling OPC Gateway Simulation Support” on page 30 for more information.
You can only change this selection at load time. Once the OPC Gateway is loaded and running, it must be shutdown for it to accept a change in simulation mode.
- 10 Click the **Alarming Enabled** check box to select (enable) the option. Or, clear the check box to disable the option.
- 11 Click the **Alarming JOURNAL ONLY** check box to select (enable) the option. Or, clear the check box to disable the option
- 12 Click the **Convert Time Values to UTC** check box to select (enable) the option. Or, clear the check box to disable the option.

- 13 Click the down-arrow button in the **OPC Subscription Rate** field to select the desired rate at which the OPC Gateway subscribes to data from OPC Server communications; or accept the Default setting.
- 14 Click the remaining tabs in succession and click the **Help** button for more information about a parameter entry field on a given tab.
- 15 Click the **OK** button to close the **OPC Block Parameters** form and save your configuration entries.
- 16 Check that the icon for the OPC Gateway block now appears in the **Project** tab. For example:



This completes the procedure.

2.9 Enabling OPC Gateway Simulation Support

Prerequisites

- You have logged on with sufficient privileges required to configure a control strategy in Control Builder.
- You have launched Control Builder through Configuration Studio.
- You have created an OPC Gateway block.

The OPC Gateway supports simulation by allowing a SIM-ACE to interact with any OPC Server as if it were a simulation node. We use the term *On Process* to refer to a non-simulation node. The following table outlines the rules for interaction of OPC Gateway in a given simulation mode.

ACE Simulation State	OPC Gateway Simulation State	Result
On Process	On Process	ACE can read and write to the OPC Gateway
Simulation	On Process	ACE can read from the OPC Gateway. Writes will be marked successful but will not be processed by the OPC Gateway.
On Process	Simulation	ACE can write to the OPC Gateway. Reads from the OPC Gateway will be marked as failed and the value returned will be a fail-safe value.
Simulation	Simulation	ACE can read and write to the OPC Gateway

The Simulation Enable (SIMENABLE) parameter is a configuration only parameter that can only be changed at load time.


If the OPC Gateway is loaded and running, you must shut it down for it to accept a change to the SIMENABLE parameter.

To enable OPC Gateway simulation

- 1 In the **Project** tab of Control Builder, double-click the OPC Gateway block icon to call up its configuration form.
- 2 Click the check box for the **Simulation Enable**(SIMENABLE) parameter to select it.
- 3 Click the **OK** button to save the change and close the OPC Block configuration form.
- 4 Right-click the OPC Gateway block icon and select **Load** from the shortcut menu to initiate a configuration load to the server. See the next section for more information about loading.
- 5 In the **Monitoring** tab, double-click the OPC Gateway icon to call up its configuration form.
- 6 Click the down arrow in the **Gateway Command** box and select **RUN** from the list. Click the **OK** button to acknowledge the change.
- 7 Click the **OK** button to close the OPC Block configuration form.
- 8 This completes the procedure. Go to the next section.

2.10 Loading OPC Gateway Block

Use the following procedure to load an OPC Gateway block to its host computer.

- You can right-click the OPC Gateway block icon and select **Load** from the shortcut menu or just click the **Load**  button in the toolbar with the block selected, as alternate methods to open the **Load Dialog box**.
- Control Builder does not validate the addresses for the hosting computers when the OPC Gateway block is configured. If you configure an invalid address for the OPC Gateway host computer, the OPC Gateway block will fail to load and Control Builder will generate the appropriate error message during load. If you configure an invalid address for the OPC server host computer, the OPC Gateway block will load but it will report a communications error when trying to establish connections to the OPC server.
- If any load error is detected, it is best to resolve the error before continuing with the load.
- The OPC Gateway has a fixed 2-second execution cycle after it is loaded. The execution cycle is just for calculating statistics and polling for incoming requests from CDA. It does not have any implications for determinism within the OPC Gateway. Communications between the OPC Gateway and the OPC server are not bound by an execution cycle.
- The following procedure assumes that this is the initial load of an OPC Gateway block. The procedure for a reload is similar but the loaded OPC Gateway must be in its **Idle** state and the data fields on the **Load** dialog box will reflect current operation status.

Prerequisites







- You have created an OPC Gateway block as outlined in the previous section.
- You have installed the OPC Gateway executable on the host computer.
- You have made the network medium connections.

To load OPC Gateway Block

- 1 On the **Controller** menu, click **Load**.
- 2 On the **Load Dialog box**, be sure the check box in the **Load** column is selected, the name of the OPC Gateway block appears in the **Load List** column, Not Loaded appears in the **Current State** column for initial block load, N/A appears in the **State to Load** column, and N/A appears in the **Post Load State** column
- 3 Click the **OK** button.
- 4 Monitor load progress through the **Load** dialog box. Any detected load errors will appear in the **Errors** list box on the dialog box.
- 5 Once the load completes, click the **Monitoring** tab to view the loaded OPC Gateway block icon. This completes the procedure.





2.11 Using Color Coded Icon to determine OPC Gateway status

The following table defines the state of the OPC Gateway based on the color of its block icon in the **Monitoring** tab.

If Icon Appears Like This. . .	Then, State Name Is. . .	And, It Means This. . .
	Unable To Determine State	Control Builder is unable to get state information for the OPC Gateway from CDA Server. This is typical of a CDA Server failure.
	Idle	The OPC Gateway is loaded and ready to be put into the active state. The connection with the OPC Server is not open. Store requests received in this state will be marked as StoreFailed and fetch requests will be marked with a bad status and set to fail-safe values.
	Loaded But Not Available	The OPC Gateway has been loaded but the executable (opcgtwy.exe) is not running. This is typical if the execution program fails but CDA-sp remains active.
	No Communication	The OPC Gateway node is not communicating with the CDA Server. This is typical if CDA-sp (and possibly the OPC Gateway execution program as well) has failed or stopped running.
	Active	The OPC Gateway is active and processing data.
	OPC Communications Error	Need to alert the operator that some OPC communications error has occurred at the OPC Gateway.

2.12 Changing State of OPC Gateway

The following table summarizes how to change the state of the OPC Gateway through the loaded OPC Gateway block in the **Monitoring** tab of Control Builder. You can also make the same changes though the Detail Display for the OPC Gateway in Station

If Current State Is. . .	And You Want to Change State to. . .	Then, Do This. . .
Idle 	Active 	Click OPC Gateway icon in Monitoring tab. On the Runtime menu, Click Activate > Selected Item(s) .
Active 	Idle 	Click OPC Gateway icon in Monitoring tab. On the Runtime menu, Click Inactivate > Selected Item(s) .

2.13 Monitoring OPC Gateway Status through Control Builder

The Parameters form for the OPC Gateway block includes various tabs that provide access to parameters for configuration through the **Project** tab and for monitoring through the **Monitoring** tab. Use the following procedure to access the Parameters form for a loaded OPC Gateway block in the **Monitoring** tab. This procedure assumes that you have logged on to Control Builder and have loaded your control strategy to the controller.

- You can only view OPC Gateway blocks in **Monitoring** tab set for the **Assignment** view. The **Assignment** view shows the relationship among all blocks while the **Containment** view only shows templates that contain other templates or Control Modules (CM), Sequential Control Modules, (SCM) and basic blocks. To toggle the view, right-click in an open area of the tab window and select **Assignment View** or **Containment View** from the shortcut menu, as applicable.
- You can right-click the OPC Gateway block icon and select **Module Properties** from the shortcut menu or on the **Edit** menu, click **Module Properties** with the block selected, as alternate methods to open the **Parameters** form.

Prerequisites

- You have launched Control Builder through Configuration Studio.
- You have loaded the OPC Gateway block to the ACE node.

To monitor OPC Gateway Status through Control Builder

1. In Control Builder, click the **Monitoring** tab.
2. Double-click the OPC Gateway block icon.
3. On the **OPC Block Parameters** form, click the tab you want to view. The **Main** tab opens by default.
4. Repeat Step 3 to view other tabs, as desired.
5. When finished viewing, click the **OK** button.
6. This completes the procedure.

Refer to the *Control Builder Parameter Reference* for more details on a given parameter.

2.13.1 Viewing Main tab

The following table summarizes the parameter data you can monitor on the **Main** tab of the **Parameters** form for the selected OPC Gateway block. See “Monitoring OPC Gateway Status through Control Builder” on page 34 for details on accessing the **OPC block Parameters** form **Main** tab through the **Monitoring** tab.

Plain Text	Parameter Name	User Configurable	Notes
Tag Name	NAME	Project Only	System assigned or user configured unique name. Consisting of up to 16 characters and at least one character must be a letter (A-Z).
Item Name	ITEMNAME	Project Only	The name of the item that this object will be associated with in the Enterprise Model Builder hierarchy. The name can be up to 40 characters long and at least one character must be a letter (A-Z).
Description	DESC	Project Only	Specify descriptive text for the function block. Appears on both detail and group displays.

Plain Text	Parameter Name	User Configurable	Notes
OPC Gateway Process ID	GWPID	No	The windows process ID is assigned to the OPC Gateway when it was created.
Image Version	IMAGEVER	No	Identifies current personality image version loaded
Host IP Address	GWHOSTIPPRI	Project Only	Defines host computer IP address for OPC server. Valid IP address entry results in the system automatically determining the Host Name, when given node is online.
Host Name	GWHOSTNAMEPRI	Project Only	Defines host computer name for OPC server. Valid host name entry results in the system automatically determining the IP address, when given node is online.
OPC Server Host IP Address	HOSTIPPRI	Project Only	Defines host computer IP address for OPC Gateway. Valid IP address entry results in the system automatically determining the Host Name, when given node is online.
OPC Server Host Name	HOSTNAMEPRI	Project Only	Defines host computer name for OPC Gateway. Valid host name entry results in the system automatically determining the IP address, when given node is online.
OPC Server PROGID	PROGID	Project Only	Defines the Microsoft COM object Program ID for the intended OPC server.
Gateway Command	GWCOMMAND	Monitoring Only	Lets user issue applicable command to the OPC Gateway executable.
Gateway State	GWOPCGSTATE	No	The current state of the OPC Gateway (Idle, Active, etc.)
Simulation Enable	SIMENABLE	Project Only	Lets you enable simulation.
Simulation State	SIMSTATE	No	Shows current simulation state.
Alarming Enabled	ALMENBSTATE	Yes	Lets user enable or disable alarming option for block.
In-Alarm Flag	INALM	No	Shows current status of in-alarm flag.
Alarming JOURNAL ONLY	JOURNALONLY	Yes	Lets you specify if alarms are to be sent to the Journal only.
Convert Time Values to UTC	GWUTCCONVERT	Yes	Lets you specify if OPC Gateway is to convert all VT_DATE variable types to UTC time.
Server State	GWOPCSRVSTATE	No	Shows current state of the OPC server.
HCI Capability	GWHCIFLAG	No	Shows whether HCI is On or Off.
OPC Version in Use	GWOPCVERSION	No	Identifies version of OPC being used by server.
Connection Status	GWOPCCONNSTATUS	No	Shows current connection status.
Connection Status String	GWOPCCONNSTR	No	Shows applicable connection status string.

Plain Text	Parameter Name	User Configurable	Notes
OPC Subscription Rate	GWSUBPERIOD	Yes	The rate at which the OPC Gateway subscribes to data from OPC Server communications.
Current OPC Subscription Rate	GWCURSUBPERIOD	No	Defines the current OPC Subscription Rate to the OPC Server.

2.13.2 Viewing Statistics tab

The following table summarizes the parameter data you can monitor on the **Statistics** tab of the **Parameters** form for the selected OPC Gateway block. See “Monitoring OPC Gateway Status through Control Builder” on page 34 for details on accessing the OPC Gateway block **Parameters** form **Statistics** tab through the **Monitoring** tab.

Plain Text	Parameter Name	User Configurable	Notes
Statistics Reset Flag	GWSTATSRESET	No	Lets user reset the statistics values.
Responding to ACEs	NUMACEOUTCON	No	Defines number of originator Application Control Environments
<i>OPC Server Status</i>			
Active Parameters	GWOPCPARAMCNT	No	Number of active Gateway OPC Parameters.
Data Change Rate	GWOPCDCPS	No	View Only
Store Rate	GWOPCSTOREPS	No	View Only
Read Errors	GWOPCGETERR	No	View Only
Store Errors	GWOPCSTOREERR	No	View Only
<i>CDA Statistics</i>			
Total Responder Rate	NUMPARRSPAVG	No	View Only
Peer Responder Rate	CPEERAVGPPS	No	View Only
Display Responder Rate	CDISPAVGPPS	No	View Only
Push/Store Response Rate	NUMACCRQUAVG	No	View Only
Notifications Rate	NUMNTFRQUAVG	No	View Only
Max Total Responder Rate	NUMPARRSPMAX	No	View Only
Max Peer Responder Rate	CPEERMAXPPS	No	View Only
Max Display Responder Rate	CDISPMAXPPS	No	View Only
Max Push/Store Rate	NUMACCRQUMAX	No	View Only
Max Notifications Rate	NUMNTFRQUMAX	No	View Only

2.13.3 Viewing QVCS tab

The **QVCS** tab is common to all **Parameters** forms for tagged blocks in Control Builder. If you have a Qualification and Version Control System (QVCS) license, this tab shows current QVCS information for the selected OPC Gateway block. Please refer to the online help and the Qualification and Version Control System User's Guide for more information about the data on this tab. See “Monitoring OPC Gateway Status through Control Builder” on page 34 for details on accessing the OPC Gateway block **Parameters** form **Version** tab through the **Monitoring** tab.

2.13.4 Viewing Server History tab

The **Server History** tab is common to all **Parameters** forms for tagged blocks in Control Builder. The following table summarizes the parameter data you can monitor on this tab of the **Parameters** form for the selected OPC Gateway block. See “Monitoring OPC Gateway Status through Control Builder” on page 34 for details on accessing the OPC Gateway block **Parameters** form **Server History** tab in the **Monitoring** tab.



Attention

The configuration settings you make for Server Load Options on the **System Preferences** dialog box determines whether or not the data entered on the **Server History** tab is loaded to the Experion server. See the *Control Building Guide* for information about setting system preferences.

Plain Text	Parameter Name	User Configurable	Notes
<i>Access Levels</i>			
Control Level	SCANCTRLVL	Yes	Indicates Server control level to be associated with this function.
<i>History Configuration</i>			
Number of History Parameters	HIST.NUMPARAMS	Yes	Defines number of history parameters to be included in History Configuration table.
Parameter	HIST.PARAM	Yes	Valid parameter name for a parameter associated with the given point that is to be collected and stored as historical data at predetermined intervals.
Description		No	Provides a brief description of the entered parameter.
FAST	HIST.FAST	Yes	Select the Fast type of history collection.
STD	HIST.STD	Yes	Select the Standard type of history collection.
EXTD	HIST.EXTD	Yes	Select the Extended type of history collection.
EXC	HIST.EXC	Yes (Station only)	Select the Exception type of history collection.
Gating Parameter	HIST.GATEPARAM	Yes	Optional gating parameter to define conditions under which data for this parameter should be collected.
Gate State	HIST.GATEVALUE	Yes	Defines gate state for configured gating parameter.
Create New or Edit Existing Server Scripts (Button)		N/A	Launch the Server scripting configuration utility.

2.13.5 Viewing Server Displays tab

The **Server Displays** tab is common to all **Parameters** forms for tagged blocks in Control Builder. The following table summarizes the parameter data you can monitor on this tab of the **Parameters** form for the selected OPC Gateway block. See “Monitoring OPC Gateway Status through Control Builder” on page 34 for details on accessing the OPC Gateway block **Parameters** form **Server Displays** tab in the **Monitoring** tab.

**Attention**

The configuration settings you make for Server Load Options on the **System Preferences** dialog box determines whether or not the data entered on the **Server Displays** tab is loaded to the Experion server. See the *Control Building Guide* for information about setting system preferences.

Plain Text	Parameter Name	User Configurable	Notes
Point Detail Display	SCANPNTDTL	Yes	By default, a Display template is already entered into Point Detail Display box (for example, sysDtlOPCA.dsp). This template can be used for creating your own display or it can be used as is, provided that your function block name matches name built into detail display that is supplied as a template.
Group Detail Display	SCANGRPDTL	Yes	By default, a Display template is already entered into the Group Detail Display box (for example, sysGrpOPCA.dsp). This template can be used for creating your own display or it can be used as is, provided that your function block name matches name built into detail display that is supplied as a template.
Associated Display	SCANASSOCDSP	Yes	Name of the Server display to be associated with this function block.
<i>Trends</i>			
Number of Trends	TREND.NUMPARAMS	Yes	Defines the number of trend parameters to be included in the Trends Configuration table.
Trend #		Yes	Defines Trend number to be associated with this trend parameter.
Pen		Yes	Defines color of pen that will be used to trace assigned parameter on Station Trend display.
Trend Parameter		Yes	Valid parameter name for a parameter associated with given point that is configured for history collection.
Description		No	Provides a brief description of the entered parameter.
<i>Groups</i>			
Number of Groups	GROUP.NUMPARAMS	Yes	Defines the number of group parameters to be included in Groups Configuration table.
Group #		Yes	Defines Group number to be associated with this group parameter.
Pos #		Yes	Defines number of position configured parameter will occupy in the Station Group display.
Group Parameter		Yes	Valid parameter name for a parameter associated with the given point that is configured in the system.

Plain Text	Parameter Name	User Configurable	Notes
Description		No	Provides a brief description of the entered parameter.

2.13.6 Viewing Control Confirmation tab

The **Control Confirmation** tab is common to all **Parameters** forms for tagged blocks in Control Builder. If you have an optional Electronic Signature license, you can configure electronic signature information for the tagged block through this tab on the block's **Parameters** form in Control Builder. Please refer to the online help and the *Server and Client Configuration Guide* for information about the data on this tab.

The Electronic Signature function aligns with the identical Electronic Signatures function that is initiated through Quick Builder and Station for Server points. When this block is loaded to a controller, its control confirmation configuration (electronic signatures) is also loaded to the Server. This means you can view the control confirmation configuration for this tagged object in Station and also make changes to it. If you make changes through Station, you must initiate an **Upload** or **Upload with Contents** function through the **Load/Upload** menu in Control Builder for the object in the **Monitoring** tab to synchronize changes in the Engineering Repository Database (ERDB).

2.13.7 Viewing Identification tab

The **Identification** tab is common to all **Parameters** forms for tagged blocks in Control Builder. The following table summarizes the parameter data you can monitor on this tab of the **Parameters** form for the selected OPC Gateway block. See “Monitoring OPC Gateway Status through Control Builder” on page 34 for details on accessing the OPC Gateway block **Parameters** form **Identification** tab in the **Monitoring** tab.

Plain Text	Parameter Name	User Configurable	Notes
Name	NAME	Yes	Unique block name consisting of up to 16 characters to identify the block. At least one character in the name must be a letter (A-Z).
Description	DESC	Yes	Descriptive text appears on detail and group displays to uniquely describe this particular function block
Block Comment 1	BLCKCOMMENT1	Yes	Comment to be associated with this block consisting of up to 40 characters.
Block Comment 2	BLCKCOMMENT2	Yes	Comment to be associated with this block consisting of up to 40 characters.
Block Comment 3	BLCKCOMMENT3	Yes	Comment to be associated with this block consisting of up to 40 characters.
Block Comment 4	BLCKCOMMENT4	Yes	Comment to be associated with this block consisting of up to 40 characters.
Library		No	Identifies Control Builder Library that is source of template.
System Template		No	Identifies System Template that is source for this block.
Base Template		No	Identifies Base Template that is used for this block.

Plain Text	Parameter Name	User Configurable	Notes
Created By	CREATEDBY	No	Identifies user who created block, if operator security is implemented. Otherwise, may just show Default login.
Date Created	DATECREATED	No	Shows date and time template was created. If this block is in Version Control System, shows date and time initial version of template was created.
Last Modified By	MODIFIEDBY	No	Identifies user who made last modifications to block, if operator security is implemented. Otherwise, may just show default login. If this block is in Version Control System, modifications apply to last version of block.
Date Last Modified	VERSIONDATE	No	Shows date and time last modification was made to block's configuration. If this block is in Version Control System, modification date and time applies to last version of block.

2.13.8 Viewing Diagnostics tab

The **Diagnostics** tab on the **Parameters** forms for OPC Gateway blocks in Control Builder lets you choose the parameters you want to monitor. You just type the name of the desired parameter in a row in the **Parameter Name** column in the **Parameter Status** grid on the tab. The OPC Gateway reports the parameter status as well as any error conditions. See “Monitoring OPC Gateway Status through Control Builder” on page 34 for details on accessing the OPC Gateway block **Parameters** form **Diagnostics** tab in the **Monitoring** tab.

Plain Text	Parameter Name	User Configurable	Notes
Parameter Name	GWOPCPMONNAME	Monitoring Only	Specify name of parameter to be checked.
Status Code	GWOPCPMONERR	No	Identify current status.
Error String	GWOPCPMONSTR	No	Show applicable error data.
OPC Quality	GWOPCPMONQUAL	No	Relative quality of OPC data.

2.13.9 Viewing EEGateway tab

The following table summarizes the parameter data you can monitor on the **EEGateway** tab of the **Parameters** form for the selected OPC Gateway block. See “Monitoring OPC Gateway Status through Control Builder” on page 34 for details on accessing the OPC Gateway block **Parameters** form **EEGateway** tab through the **Monitoring** tab.

Plain Text	Parameter Name	User Configurable	Notes
<i>EEGateway Status</i>			
EEGateway State	EEGSTATE	No	Check current EEGateway state.
Total number of reads	TOTALNUMPOINTSREADS	No	Total Number of points that has been read since this server started.

Plain Text	Parameter Name	User Configurable	Notes
Number of successful reads	NUMPOINTSREADS	No	Number of points that has been successfully read since this server started.
Number of successful writes	TOTALNUMGETITEM	No	Number of points that has been successfully written since this server started.
Number of active items	NUMACTIVEPOINTS	No	The number of active items currently in this server's Active List.
Connected clients	NUMCLIENTCONN	No	Current number of clients connected to the Gateway.
<i>Initiating Statistics</i>			
Initiating to CPMs	NUMCPMINCON	No	View Only
Initiating to FIMs	NUMFIMINCON	No	View Only
Initiating to IOLIMs	NUMIOLMINCON	No	View Only
Initiating to ACEs	NUMACEINCON	No	View Only
Initiating to SCEs	NUMSCEINCON	No	View Only
Initiating to SIMIOLMs	NUMSIOLMINCN	No	View Only

2.13.10 Viewing Peer Communications Tab

The following table summarizes the parameter data you can monitor on the **Peer Communications** tab of the **Parameters** form for the selected OPC Gateway block. See “Monitoring OPC Gateway Status through Control Builder” on page 34 for details on accessing the OPC Gateway block **Parameters** form **Peer Communications** tab through the **Monitoring** tab.

Plain Text	Parameter Name	User Configurable	Notes
<i>Initiator Connections</i>			
Target Name	IPEERNAME	No	View Only
Target Path	IPEERPATH	No	View Only
Connection Status	IPEERCONNSTS	No	View Only
Connection Error Code	IPEERCONNERRCODE	No	View Only
Extended Error Info	IPEERCONNERRINFO	No	View Only
<i>Responder Connections</i>			
Originator Name	RPEERNAME	No	View Only
Average Get Rate	CPEERAVGPPSCONN	No	View Only
Maximum Get Rate	CPEERMAXPPSCONN	No	View Only
Average Store Rate	CPEERAVGSPSCONN	No	View Only
Maximum Store Rate	CPEERMAXSPSCONN	No	View Only
Degraded Messages	RPEERDEGIMRCONN	No	View Only

2.13.11 Viewing Display Communications Tab

The following table summarizes the parameter data you can monitor on the **Display Communications** tab of the **Parameters** form for the selected OPC Gateway block. See “Monitoring OPC Gateway Status through

Control Builder” on page 34 for details on accessing the OPC Gateway block **Parameters** form **Display Communications** tab through the **Monitoring** tab.

Plain Text	Parameter Name	User Configurable	Notes
<i>Responder Connections</i>			
Average Get Rate	CDISPAVGPPSCONN	No	View Only
Maximum Get Rate	CDISPMAXPPSCONN	No	View Only
Average Store Rate	CDISPAVGSPSCONN	No	View Only
Maximum Store Rate	CDISPMAXSPSCONN	No	View Only
Degraded Messages	RDISPDEGIMRCONN	No	View Only

3 Migration Considerations

This section reviews things you should consider when migrating a pre R210 system with ACE and previous OPC Server block to an R210 system with ACE and OPC Gateway block.

Related topics

“Migrating One ACE Node” on page 44

“Migrating Multiple ACE Nodes” on page 45

“Migrating Some ACE Nodes” on page 46

3.1 Migrating One ACE Node

You must configure the OPC Gateway to specify the IP address for the computer hosting the OPC Gateway before you can load the block. See the “Creating OPC Gateway Block” on page 28 procedure in this section for details about setting the Host IP Address.

Prerequisites

You have used the Export/Import function to migrate pre-R210 ACE node to R210 level.

3.2 Migrating Multiple ACE Nodes

In systems with multiple ACE nodes, we recommend that you set the host IP address for the OPC Gateway to one of the following.

- If one node is already doing OPC communications, set the Host IP Address for the OPC Gateway to that node to save DCOM configuration time.
- If the OPC Server resides on the same node as an ACE, set the Host IP Address of the OPC Gateway to that node to save DCOM configuration time.

See the “Creating OPC Gateway Block” on page 28 procedure in this section for details about setting the Host IP Address

Prerequisites

You have used the Export/Import function to migrate all pre-R210 ACE nodes to R210 level.

3.3 Migrating Some ACE Nodes

Prerequisites

You have used the Export/Import function to migrate some but not all pre-R210 ACE nodes to R210 level.

If you leave one or more ACE nodes in a system at pre-R210 level, OPC references loaded to the ACE from the R210 level will be subscribed to at the OPC Gateway. The references loaded to a pre-R210 ACE will be handled by creating a new pre-R210 OPC Client within the CDA-sp memory space and connecting directly to the OPC Server as shown in the following illustration.

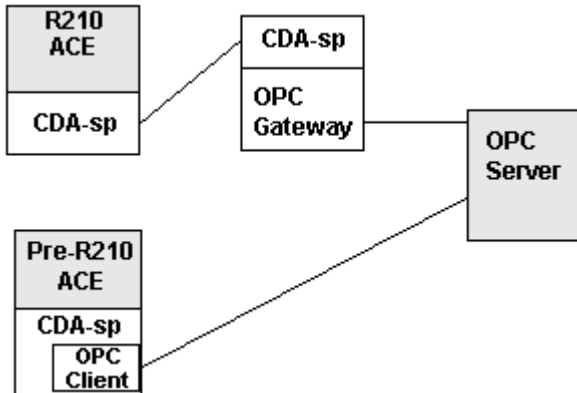


Figure 5: Mixing R210 ACE with Pre-R210 ACE

In this case, the OPC Gateway may not reflect the status of the pre-R210 OPC Client operating in a pre-R210 ACE and should not be relied upon for that purpose.

You must still set the host IP address for the OPC Gateway as outlined in the previous considerations in this section.

4 Maintenance and Troubleshooting

Related topics

“Making IP Address or PROGID Change in OPC Gateway” on page 48

“Upgrading OPC Gateway Software to New Release” on page 49

“Identifying and Fixing Common Problems” on page 50

4.1 Making IP Address or PROGID Change in OPC Gateway

Use the steps in the following procedure to change the host IP address for the OPC Gateway, the host IP address for the OPC server, or the PROGID for the OPC server for a loaded OPC Gateway.

- Be sure you evaluate any potential impact on the process before taking a loaded OPC Gateway offline and reloading it with revised configuration data.
- Be sure all strategies using the OPC Gateway as a peer data source and OPC Gateway are in unloaded state.
- It may be a good idea to initiate a Checkpoint save of the OPC Gateway before making any configuration changes just in case you would need to restore it to its current condition.
- If you change the host IP address for the OPC Gateway, be sure you reload any Control Modules or Sequential Control Modules that contain references to the OPC Gateway to refresh the communications path.

Prerequisites

You have logged on to Control Builder with sufficient privileges to make changes in a Control Strategy.

To make IP Address or PROGID Change in OPC Gateway

- 1 On the **Monitoring** tab, click the icon for the OPC Gateway block you want to change.
- 2 On the **Controller** menu, click **Inactivate > Selected Item(s)**.
 - a Wait for the OPC Gateway icon to turn blue.
 - b On the **Edit** menu, click **Delete**
 - c Click the **Project** tab.
 - d Double-click the icon for OPC Gateway block you just deleted in the **Monitoring** tab.
- 3 On the **Main** tab of the **Parameters** form, click in the field for the desired OPC Gateway Location or OPC Server Location parameter that you want to change. Type the new value. See “Creating OPC Gateway Block” on page 28 for more information.
- 4 Click **OK** to save the change and close the **Parameters** form.
- 5 With the OPC Gateway block still selected in the **Project** tab, click **Load** on the **Controller** menu. See “Loading OPC Gateway Block” on page 31 for more information.
- 6 Once the block load is completed, click the **Monitoring** tab.
- 7 Check that the loaded OPC Gateway is in its **Idle** state (icon is blue).
- 8 On the **Controller** menu, click **Activate > Selected Item(s)** to return the OPC Gateway to operation. This completes the procedure.

4.2 Upgrading OPC Gateway Software to New Release

Use the following procedure to update an operating OPC Gateway to a new software release.

- The following procedure assumes that the OPC Gateway block requires no configuration changes.
- It may be a good idea to initiate a Checkpoint save of the OPC Gateway before installing the new software.

Prerequisites

- You have received the new OPC Gateway software release installation media and instructions.
- Prepare the process involving the OPC Gateway to be taken offline.
- You have logged onto Control Builder with sufficient privileges to load a Control Strategy.

To Upgrade OPC Gateway Software to New Release

- 1 On the **Monitoring** tab, click the icon for the OPC Gateway block that represents the OPC Gateway that is being updated to a new software release.
- 2 On the **Controller** menu, click **Inactivate > Selected Item(s)**.
 - a Wait for the OPC Gateway icon to turn blue.
 - b On the **Edit** menu, click **Delete**.
- 3 Install the new OPC Gateway software on its hosting node following the instructions provided with the software. .
- 4 Click the **Project** tab.
- 5 Click the icon for the OPC Gateway block that was deleted in Step 3. On the **Controller** menu, click **Load**. See “Loading OPC Gateway Block” on page 31 for more information.
- 6 Once the block load is completed, click the **Monitoring** tab.
- 7 Check that the loaded OPC Gateway is in its **Idle** state (icon is blue).
- 8 On the **Controller** menu, click **Activate > Selected Item(s)** to return the OPC Gateway to operation.
- 9 Reload any Control Modules or Sequential Control Modules that were affected by the update.
This completes the procedure.

4.3 Identifying and Fixing Common Problems

This section lists some possible problems you may encounter in using the OPC Gateway along with some possible solutions for fixing them.

If Problem Is . . .	Then, Possible Cause is . . .	And, Possible Solution Is . . .
<p>The OPC Gateway icon turns Red,</p> <p><i>Loss of Communications with Controller</i> event is triggered, and</p> <p>Control strategies dependent on OPC Gateway for supervisory control shed to their configured backup modes.</p>	The node hosting the OPC Gateway has lost power.	<ol style="list-style-type: none"> 1. Restore power to the node hosting the OPC Gateway. 2. Restart the hosting computer. 3. Logon and launch Control Builder. 4. On Monitoring tab, select OPC Gateway block. 5. On Controller menu, click Restore from Checkpoint. 6. On Controller menu, click Activate > Selected Item(s), if OPC Gateway mode is IDLE. 7. Restore any control strategies that are dependent on the OPC Gateway.
<p>The OPC Gateway icon turns Red,</p> <p><i>Connection Timeout</i> or <i>Loss of Communications with Controller</i> event is triggered, and</p> <p>Control strategies dependent on OPC Gateway for supervisory control are set to their fail-safe values marked with BAD status.</p>	Failure of the CDA-sp service.	<ol style="list-style-type: none"> 1. Restart the hosting computer. 2. Logon and launch Control Builder. 3. On Monitoring tab, select OPC Gateway block. 4. On Controller menu, click Restore from Checkpoint. 5. On Controller menu, click Activate > Selected Item(s), if OPC Gateway mode is IDLE. 6. Restore any control strategies that are dependent on the OPC Gateway.
<p>The OPC Gateway icon turns Yellow,</p> <p><i>Connection Timeout</i> event is triggered, and</p> <p>Control strategies dependent on OPC Gateway for supervisory control are set to their fail-safe values.</p>	OPC Gateway process crashes.	<ol style="list-style-type: none"> 1. On Monitoring tab, select OPC Gateway block. 2. On Controller menu, click Restore from Checkpoint. 3. On Controller menu, click Activate > Selected Item(s), if OPC Gateway mode is IDLE. <p>Check the Windows Event Log for any related critical error listings and take appropriate action.</p>

If Problem Is . . .	Then, Possible Cause is . . .	And, Possible Solution Is . . .
<p>The active OPC Gateway icon is not Green,</p> <p><i>Connection to OPC Server Failed</i> event is triggered, and</p> <p>Control strategies dependent on OPC Gateway for supervisory control are set to their fail-safe values marked with BAD status.</p>	<ul style="list-style-type: none"> Failed communications media connection including pulled cables, damaged cables, or hub/switch failures. Failure of OPC server component. OPC Gateway process crashes. 	<ul style="list-style-type: none"> Check health of communication cables and secure connections. Repair as required. Be sure the PROGID of the server that the OPCGateway is trying to connect to is available. (Either the PROGID needs to be in the local registry or the OPCGateway must be able to read the registry of the node it is trying to connect to.) Check OPC server per manufacturer's instructions. See row above for details. Check Event Handling logs for logged OPC Gateway related messages.

