



OPC DataLink Tutorial – Reading and Writing Information to a PLC

OPC is the newly adopted standard for communicating with plant floor control equipment including PLC's, PC-based controllers, and HMI (Human Machine Interface) packages. The OPC (OLE for Process Control) DataLink allows I/Gear to send and receive data to and from any OPC Server. This exercise will walk you through creating an OPC DataLink to get data from an Allen Bradley ControlLogix[®] PLC using Rockwell Software's RSLinx[®].

Requirements

In order to complete this exercise you must have the following:

- PC with Windows 2000 Professional or Windows 2000 Server
- I/Gear v5.2 or greater Installed
- RSLinx[®] v2.20.02 (Build 126) or greater
- Rockwell Software RSLogix Emulate 500[®] w/ the I/Gear training program

Goals

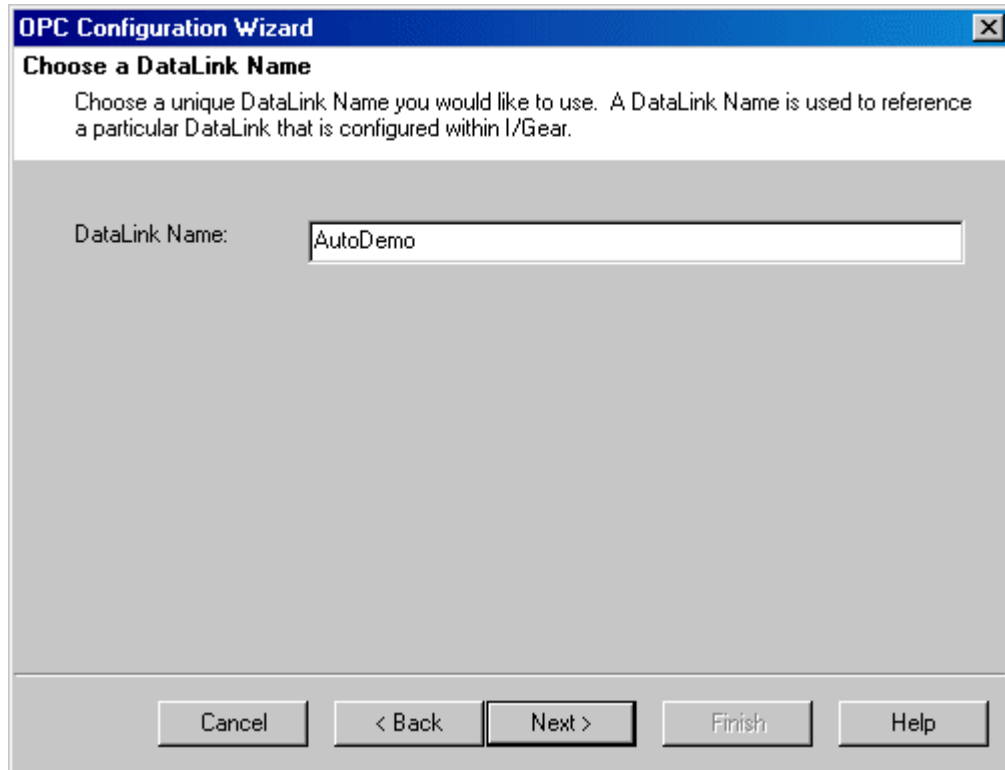
By the end of this exercise, you will know how to:

- Create a New OPC DataLink
- Get data from a PLC Emulator through RSLinx[®] and the OPC Input Command.

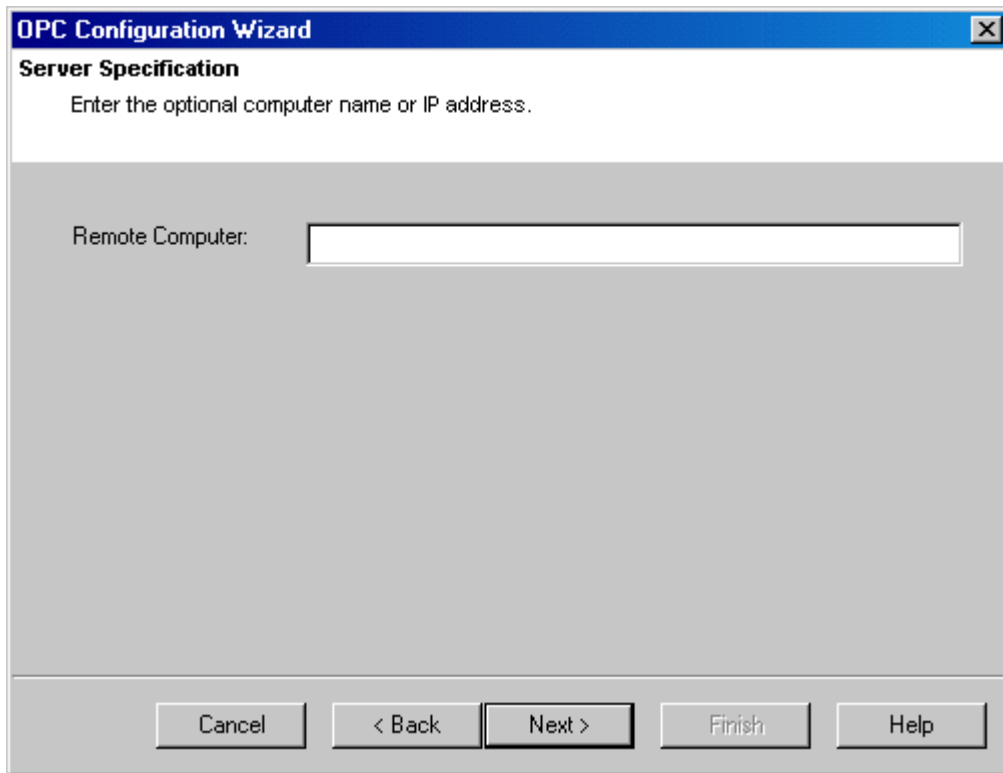
Step 1 - Creating the OPC DataLink

You will now create a new OPC DataLink to RSLinx®.

1. Right-click the **DataLinks** node in the tree.
2. On the pop-up menu, select **New DataLink...**
3. Select **OPC** from the list of DataLinks.
4. When the Configuration Wizard opens, click Next.
5. On the **Choose a DataLink Name** screen, type **AutoDemo** and click Next.

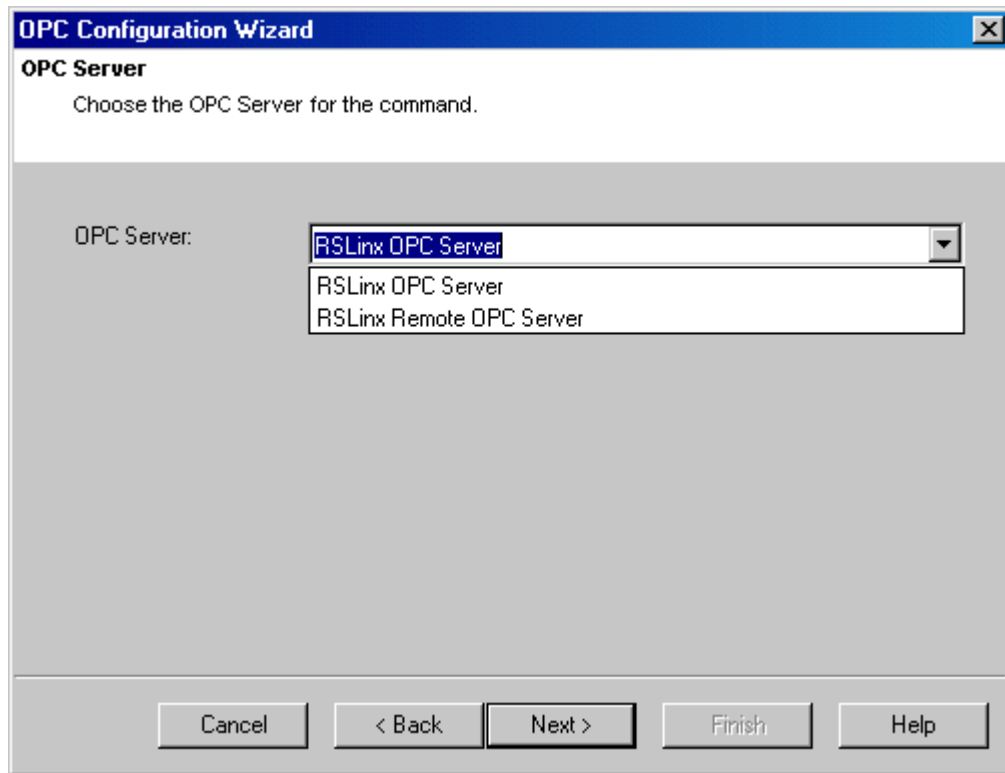


6. On the **Server Specification** screen, leave the **Remote Computer** field blank and click Next. This setting is used when the OPC Server is not running on the same machine as I/Gear. In that case, you can enter an IP Address or Computer Name to specify the OPC Server to use.



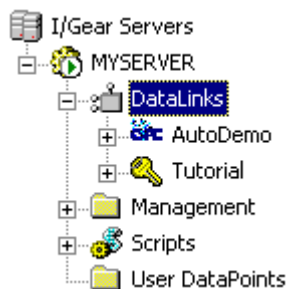
The screenshot shows a window titled "OPC Configuration Wizard" with a sub-header "Server Specification". Below the sub-header, there is a text prompt: "Enter the optional computer name or IP address." The main area of the window contains a label "Remote Computer:" followed by a large, empty text input field. At the bottom of the window, there is a row of five buttons: "Cancel", "< Back", "Next >", "Finish", and "Help".

7. On the **OPC Server** screen, select **RSLinx OPC Server** from the list and click Next. The OPC Server combo box contains a list of any OPC servers installed on the local machine. You will be using RSLinx for this tutorial, but the OPC DataLink does support other OPC servers as well.



8. Click **Finish** on the **Completing the OPC Configuration Wizard** screen.

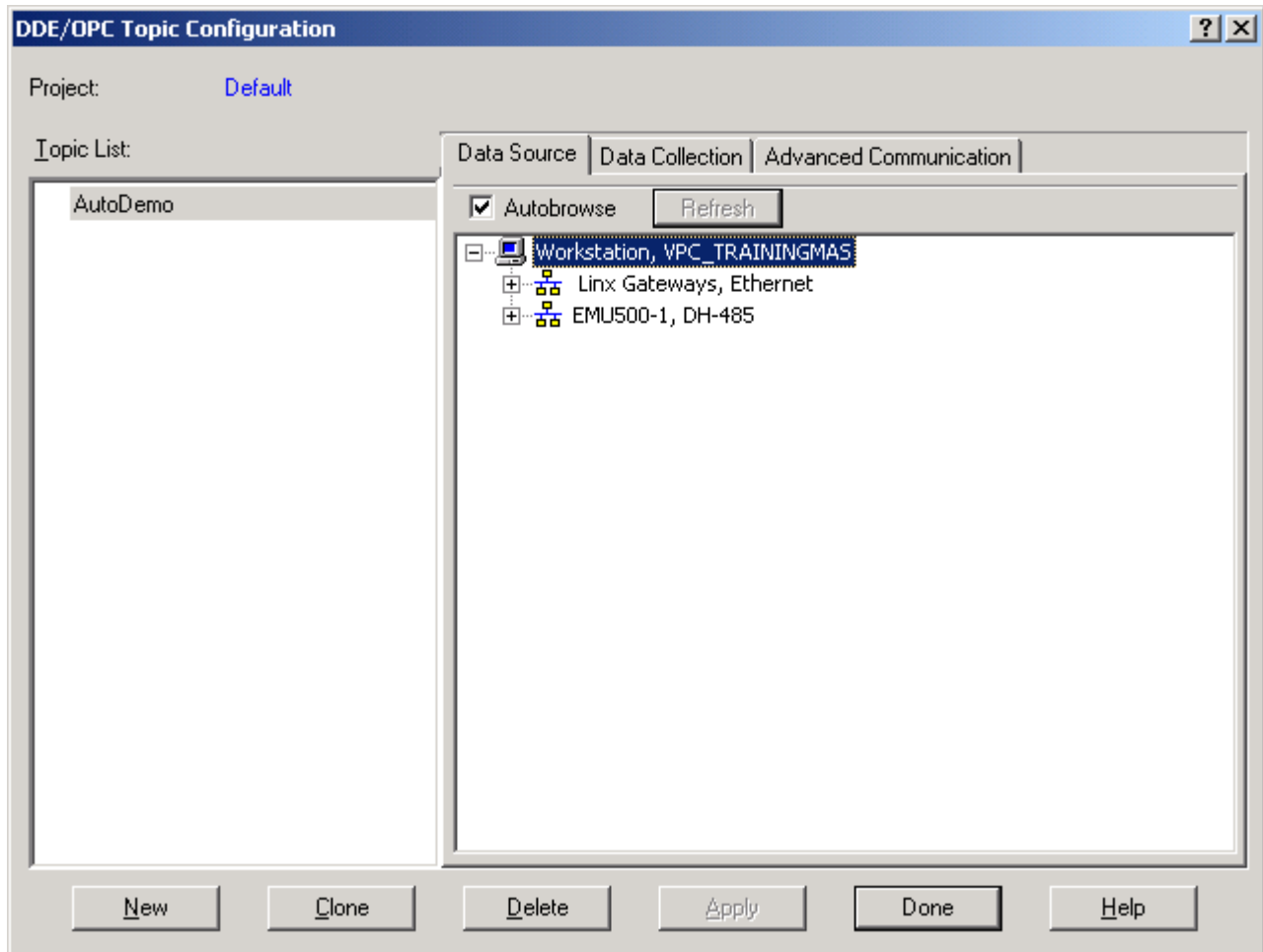
The new **AutoDemo** OPC DataLink should now be in the server tree under DataLinks as shown.



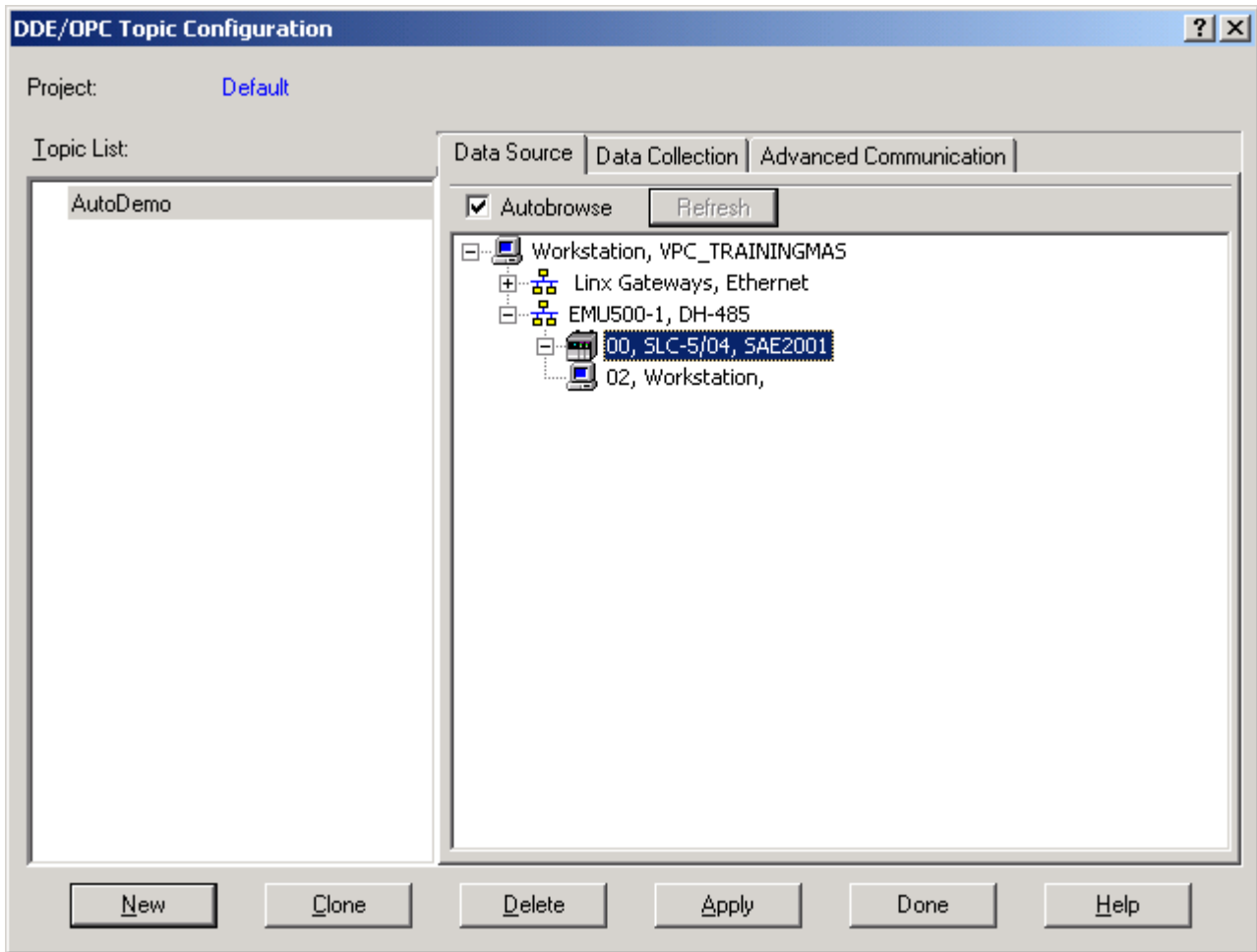
Step 2 - Connecting to the Emulator using RSLinx®

For this tutorial, your PC should have Rockwell Software RSLogix Emulate 500 installed and the I/Gear training program running. To communicate with the Emulator, you must configure a driver and topic in RSLinx®.

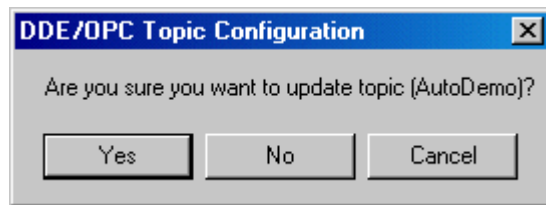
1. Start **RSLogix Emulate 500** by going to **Rockwell Software->RSLogix Emulate 500->RSLogix Emulate 500** under Programs in the Start menu.
2. Start **RSLinx®** by going to **Rockwell Software->RSLinx->RSLinx** under Programs in the Start menu.
3. In RSLinx®, select **Topic Configuration** from the **DDE/OPC** menu.
4. On the **DDE/OPC Topic Configuration** window, select **New**.
5. Enter **AutoDemo** as the Topic Name as shown above. This name will be associated with the data of the PLC in the next step.



6. Drill down the **EMU500-1, DH-485** tree in the right-hand pane and select **00, SLC-5/04, SAE2001**. This will associate the **AutoDemo** topic with the Emulator.



7. Click **Apply** and click **Yes** on the **DDE/OPC Topic Configuration** confirmation window.



8. Click **Done**.
9. Close RSLinx® by going to **File->Exit**.

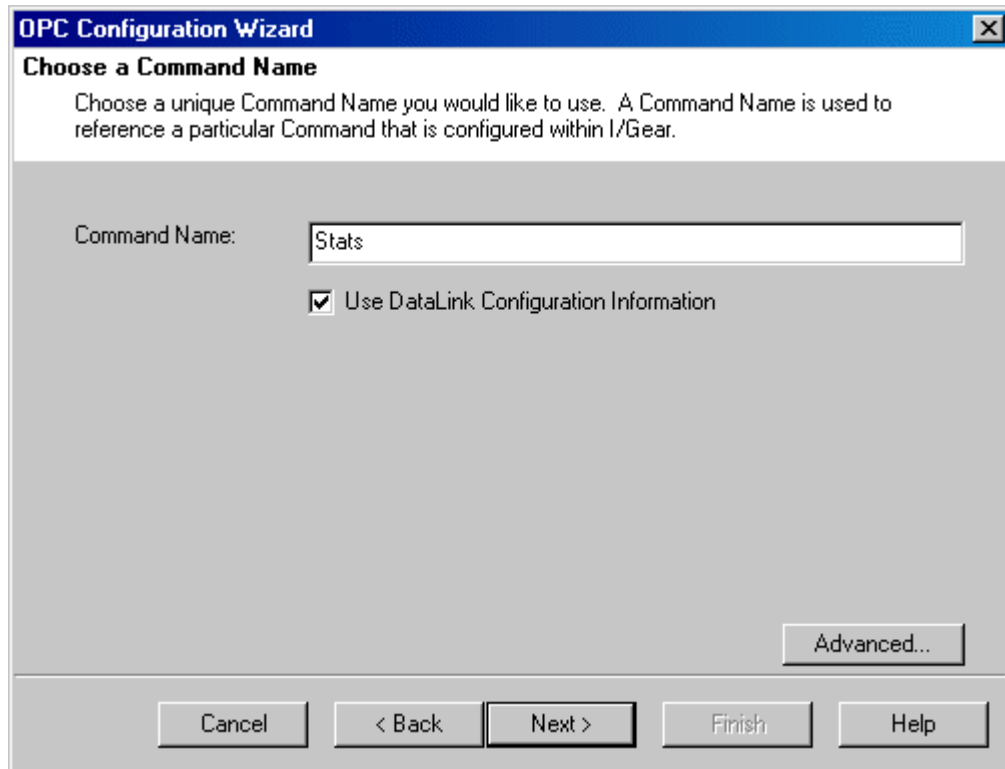
You have now created a connection from the OPC Server to the Allen Bradley Emulator. The Topic will be used to reference data from memory in the PLC.

You will use this Topic and DataLink later to read and write data in the Application Tutorials. These tutorials are more advanced and take you through the OPC DataLink in more detail.

Step 3 – Getting Data into I/Gear Using the OPC Input Command

You will first get data into I/Gear through the OPC DataLink. You will create a new OPC Input Command to retrieve data from RSLinx®.

1. Expand the **AutoDemo** DataLink tree.
2. Right-click the **Input Commands** node in the tree.
3. On the pop-up menu, select **New Command...**
4. When the Configuration Wizard opens, click Next.
5. On the **Choose a Command Name** screen, type **Stats** and click Next.



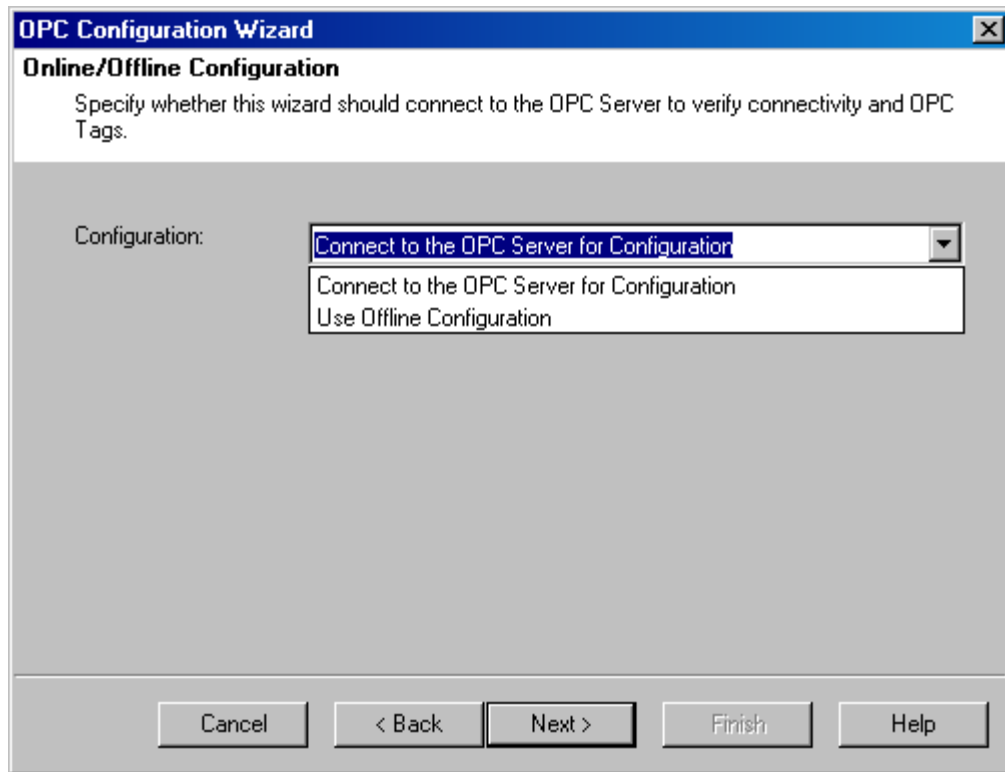
6. On the **Specify a Trigger Expression** screen, set the trigger for every 1 second as shown below using the current system time as the base time. The Command will now execute every 1 second. A Command Trigger is an expression determining when the Command will execute. There are several types of Triggering available:
- **Time Type** – Trigger occurs on a specified time interval from a specific base time such as every one second.
 - **Event Type** – Trigger occurs on certain events of an existing Command or DataPoint, such as on success of the Command or on increase of the DataPoint.
 - **Custom** – Specified by the user using specific syntax and Boolean rules.
 - **External** - The Command can only be executed from the I/Gear Object Model or through the Management Console.

Click Next when finished.

The screenshot shows the 'OPC Configuration Wizard' dialog box with the title 'Specify a Trigger expression'. The instruction text reads: 'Specify the Trigger expression you would like to use. The Trigger expression is used by I/Gear to determine when to execute a particular command.' There are three radio button options: 'Basic Triggering' (selected), 'Custom Triggering', and 'External Triggering'. Under 'Basic Triggering', the 'Time Type' checkbox is checked, and the 'Event Type' checkbox is unchecked. The 'Time Type' section includes a 'Time Base' dropdown menu showing 'Wed Jun 26, 2002 11:47:43 AM' and a 'Use Local Time' checkbox which is checked. Below this is an 'Every' section with a text box containing '1' and a dropdown menu set to 'Second(s)'. The 'Event Type' section has a 'DataPoint' field with a dropdown menu and an ellipsis button, and an 'Action' dropdown menu. The 'Custom Triggering' section has a text area containing the expression: `{ TIME : BY=2002 : BM=6 : BD=26 : BH=11 : BN=47 : BS=43 : BZ=1 : ES=1 }`. At the bottom of the dialog are five buttons: 'Cancel', '< Back', 'Next >', 'Finish', and 'Help'.

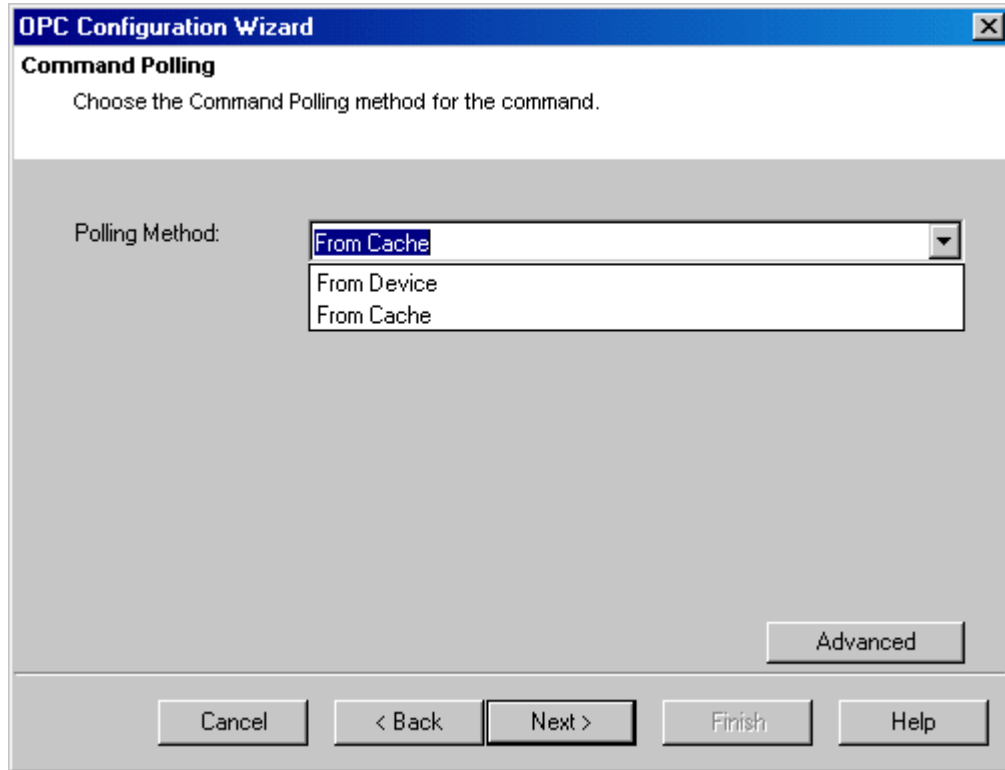
7. On the **Online/Offline Configuration** screen, you will select if the wizard should verify connectivity to the OPC Server. There are two available options:
 - **Connect to the OPC Server for Configuration** connects to the OPC Server during command configuration to validate OPC Server Items.
 - **Use Offline Configuration** does not connect to the OPC Server during configuration, allowing for a quicker configuration when the OPC Server is unavailable.

You will connect to the OPC Server for configuration. Select **Connect to the OPC Server for Configuration** from the list and click Next.



8. On the **Command Polling** screen, you will select the method for polling the data. There are two available options:
- **From Cache** polls data from the OPC server's memory. The OPC Server has already acquired data from the PLC and stored it in memory.
 - **From Device** uses the OPC Server as a "pass-through" to the device and accesses data directly from the device.

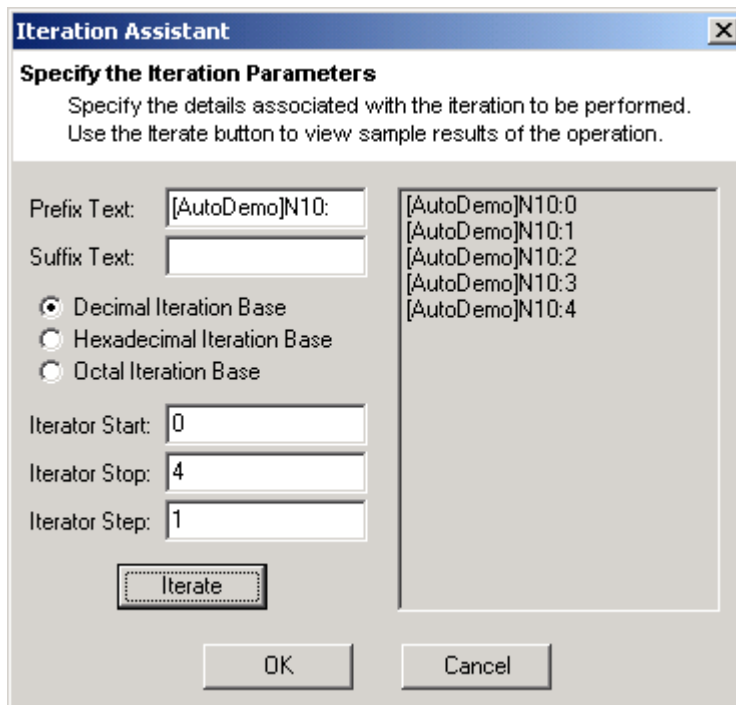
You will poll from cache memory. Select **From Cache** from the list and click Next.



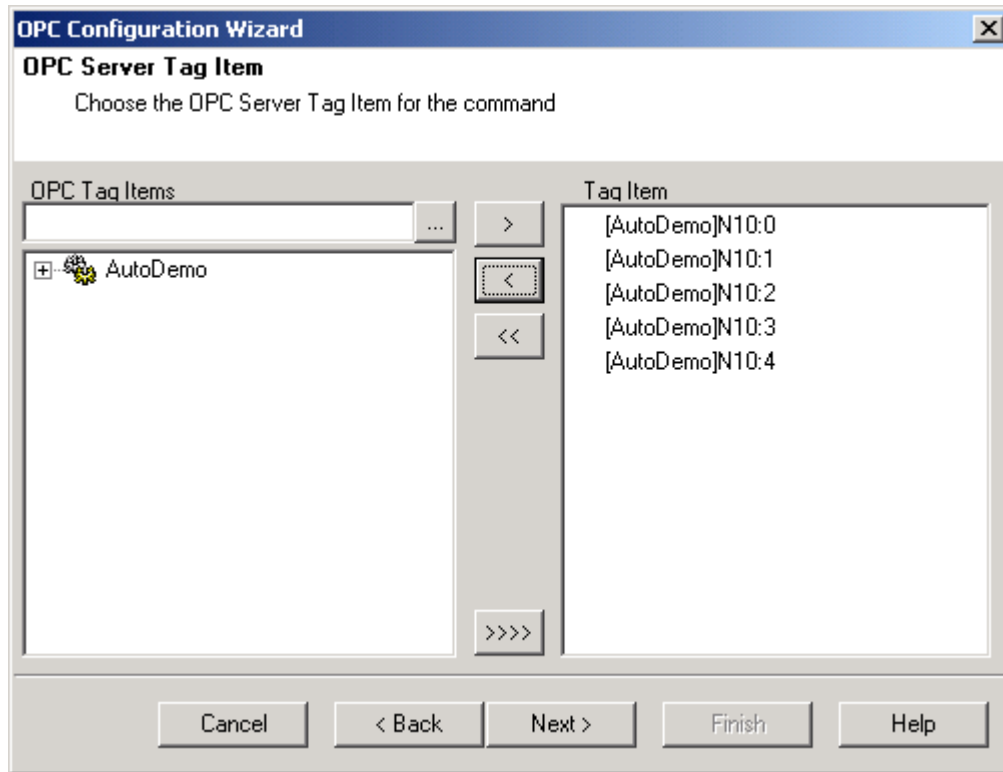
9. On the **Default DataPoint(s) Creation** screen, you will specify an array of 5 items from the AutoDemo topic to collect. You want to add OPC Tag items **[AutoDemo]N10:0** to **[AutoDemo]N10:4**. This syntax is specific to RSLinx[®]. You can use the **Iteration Assistant** to easily specify these tags by automatically iterating the array index from 0 to 4. To do this, follow the procedure below:
 - A. Click the **Iterator** button (>>>>) at the bottom of the screen. This will open the **Iteration Assistant** window.
 - B. In the **Prefix Text** text box, type **[AutoDemo]N10:**. This is the text that will begin each object and precede the index.
 - C. In the **Suffix Text** text box, clear out anything that may be there for this example. Normally this is the text that will follow the index but in this case we have no suffix.
 - D. There are three options for iteration of the index:
 - **Decimal Iteration Base** – iteration is done in decimal using or base 10.
 - **Hexadecimal Iteration Base** – iteration is done in hexadecimal or base 16.
 - **Octal Iteration Base** – iteration is done in octal or base 8.

You want to iterate from 0 to 4. You could use any of the above bases for a range of 0 to 4. Select **Decimal Iteration Base** since the array does use decimal indexes.

- E. **Iterator Start** is the value you would like to start iterating from. Enter **0** because you would like to iterate from **0** to 4.
- F. **Iterator Stop** is the value you would like to iterate to. Enter **4** because you would like to iterate from 0 to **4**.
- G. **Iterator Step** is the amount added on each step of the iteration. You would like to add array elements 0,1,2,3, and 4. Therefore, the step is **1**. Each number is one greater than the previous. If you only wanted 0 and 4, you would specify 4 for the step. Enter **1** to use all whole values from 0 to 4.
- H. Now click the **Iterate** button to see the 5 OPC Tag items. They should be displayed in the window on the right as shown below. If they are correct, click OK.

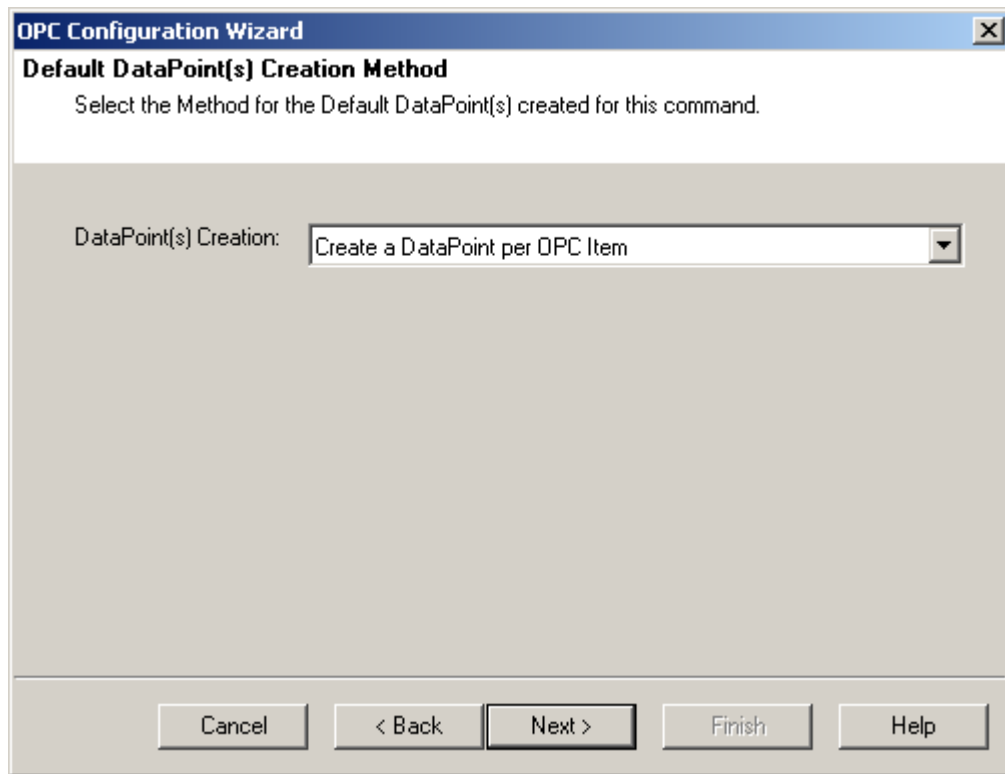


10. The screen should now appear as shown below. You will be reading the OPC Tags shown in the Selected Objects list. Click Next to continue.



11. On the **Default DataPoint(s) Creation Method** screen, you will select a method of creating DataPoints. There are two options available:
- **Create a DataPoint per OPC Item** – this method will create a DataPoint for each OPC tag Item specified.
 - **Create an Array for all OPC Items** – this method will create one DataPoint that will hold all OPC items in an array.

You want to create a separate DataPoint for each OPC tag item. Choose **Create a DataPoint per OPC Item** and click Next.



12. Click **Finish** on the **Completing the OPC Configuration Wizard** screen.

Now, un-pause the **Stats** Command. Expand the **Stats** Command and view the contents of the DataPoints. There should be 5 DataPoints labeled [AutoDemo]N10:0 through [AutoDemo]N10:4. The Command will execute every 1 second and refresh the raw data value of the DataPoints.

Congratulations! You have now completed the OPC DataLink Tutorial. For more advanced information on OPC and instruction on how to write data to the PLC, see *Application Tutorial: Collecting Data from a PLC using OPC*.