



# Ethernet MBX Driver Help

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*Ethernet MBX Driver for  
Modbus TCP Networks*

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## **ETHERNET MBX DRIVER HELP**

### **Ethernet MBX<sup>®</sup> Driver for Modbus TCP Networks**

#### **Version 9**

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## INTRODUCTION

The Ethernet MBX Driver emulates Modbus Plus over TCP/IP. It allows virtually all Modbus Plus compatible software products to gain access to TCP/IP-based communications with no code modifications. This includes both 32/64-bit Windows and 16-bit legacy DOS/Windows applications.

This driver is part of Cyberlogic's MBX Driver Suite, MBX OPC Server Suite, MBX OPC Premier Suite, MBX OPC Enterprise Suite and MBX Bridge Suite, providing Ethernet connectivity for these products.

## Remote Connectivity

The Ethernet MBX Driver includes the MBX Gateway Server. When enabled, the MBX Gateway Server allows other computers on your network access to the MBX devices on your system. The remote system, which can be any Windows node running the MBX Gateway Driver, will then have full Ethernet MBX Driver functionality just as though the MBX device in the server system were installed in the remote system. For more information, refer to the [MBX Gateway Driver](#) section.

The Ethernet MBX Driver can also be used with the Mbx.Net Server. The Mbx.Net Server along with the [Mbx.Net Gateway Driver](#) can provide secure remote connectivity to MBX devices on a local network or over the Internet. Just like with the MBX Gateway Server, you will have full Ethernet MBX Driver functionality on the remote system.

## Running 16-Bit Software

The Virtual MBX Driver, which is included with all MBX products, allows all 16-bit NETLIB/NetBIOS-compatible applications, such as Modsoft, to run concurrently with all 32-bit applications in the same computer. For more information, refer to the [Virtual MBX Driver](#) section.

## Compatibility

The Ethernet MBX Driver is implemented as part of the Cyberlogic MBX architecture, which is the foundation used in other Cyberlogic drivers such as the MBX Driver, the Serial MBX Driver, the MBX Gateway Driver and the Mbx.Net Gateway Driver. Consequently, these drivers consistently support identical programming interfaces: MBXAPI, MBXAPI.Net and NETLIB. Supporting these existing standards protects the software and R&D investments of end-users and OEMs.

Software developers can use the MBX Software Development Kit (MBX SDK) to obtain connectivity to Modbus, Modbus Plus and Modbus TCP networks for their applications. Applications developed with the MBX SDK can be used with all MBX family drivers and can execute under all current Windows operating systems.

Note that the Ethernet MBX Driver does not sacrifice or eliminate any functionality available in direct communications through the Winsock API. On the contrary, Ethernet MBX solves certain critical problems that the Winsock interface creates.

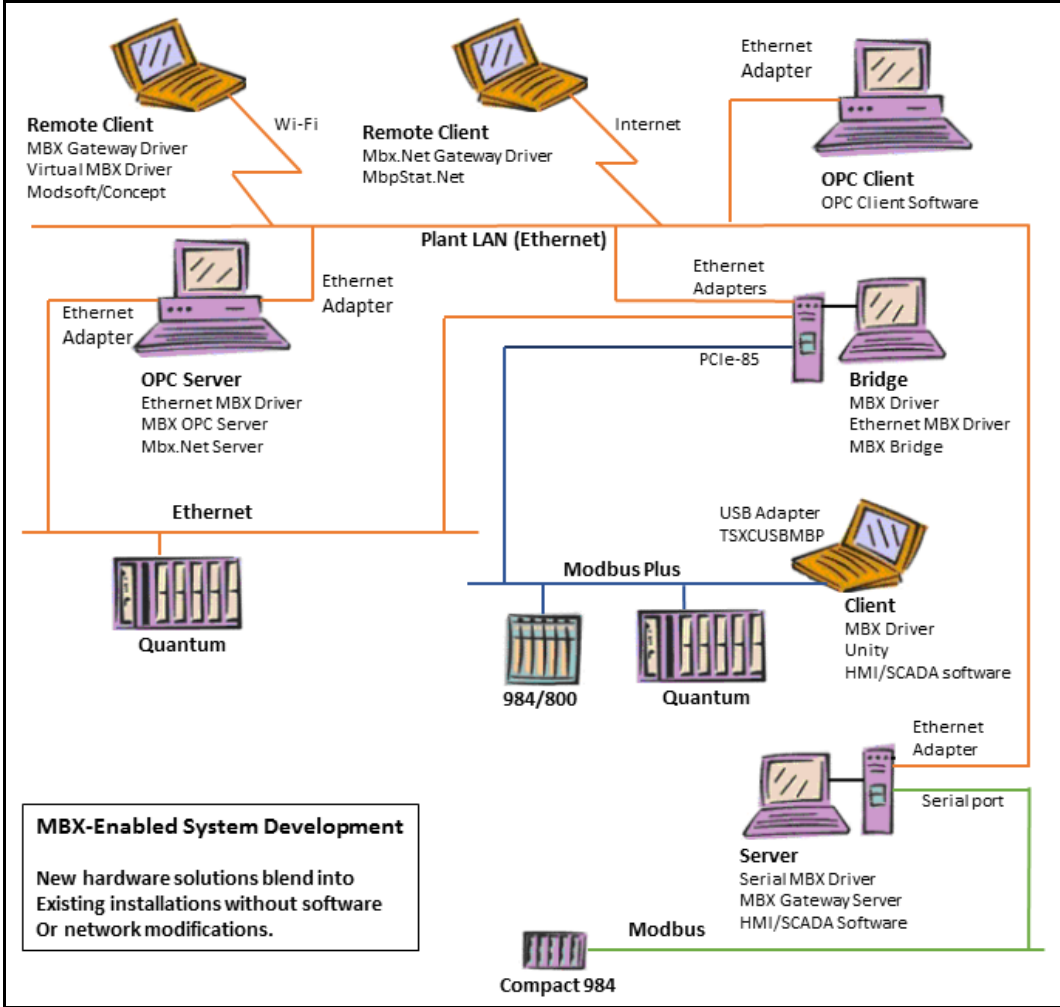
## Blending MBX-Supported Networks

The MBX driver family provides support for all Modicon networks through a common architecture, with identical programming interfaces. This means that an application that operates with one of the MBX family drivers, such as the Ethernet MBX Driver, will work with the rest of them as well. Thus, virtually all Modbus Plus compatible software programs can operate over all Modicon-supported networks with no code modifications. You will find a complete description of the MBX family in the [Appendix: MBX Architecture and Companion Products](#).

Migration of existing installations to new hardware products does not require the user to discard working, proven software solutions. As depicted in the diagram below, a user can mix Modbus, Modbus Plus and Modbus TCP based hardware products in existing installations without losing software, network or integration investment.

The MBX family of products includes:

- [MBX Driver](#) is Cyberlogic's device driver for Modbus Plus interface adapters.
- [Ethernet MBX Driver](#) provides Modbus TCP communication.
- [Serial MBX Driver](#) provides Modbus RTU/ASCII communication.
- [MBX Gateway Driver](#) works with the other MBX drivers, giving access to Modbus, Modbus Plus and Modbus TCP networks from remote locations.
- [Mbx.Net Gateway Driver](#) works with the other MBX drivers, giving secure access to Modbus, Modbus Plus and Modbus TCP networks from remote locations, including over the Internet.
- [Virtual MBX Driver](#) works with the other MBX drivers to permit 16-bit legacy software to run in current 32-bit Windows operating systems.
- [MBX Bridge](#) allows you to bridge any combination of Modicon networks by routing messages between MBX devices.
- [MBX OPC Server](#) connects OPC-compliant client software applications to data sources over all Modicon networks.
- [MbpStat.Net](#) is the Modbus Plus network diagnostic utility. It provides the same functionality as the original DOS-based MBPSTAT application.
- [Mbx.Net Server](#) a WCF server that provides secure remote access to all MBX devices.
- [MBX SDK](#) is a software development kit for MBXAPI, MBXAPI.Net and NETLIB compliant development.



## WHAT SHOULD I DO NEXT?

The links below will take you directly to the section of this manual that contains the information you need to configure, use and troubleshoot the Ethernet MBX Driver.

### Learn How Addressing Works

If you are not familiar with the way that the Ethernet MBX Driver handles addressing, including the differences between the Ethernet MBX Driver and Modbus Plus, you should begin by reading [Communication Using the Ethernet MBX Driver](#).

### Read a Quick-Start Guide

First-time users of the Ethernet MBX Driver will want to read the [Quick-Start Guide](#), which walks through a typical configuration session, step-by-step.

### Get Detailed Information on the Configuration Editors

Experienced users who want specific information on features of the configuration editors will find it in the [Configuration Editor Reference](#) section.

### Verify That It's Working or Troubleshoot a Problem

If you have already configured the driver, you should verify that it operates as expected. Refer to the [Validation & Troubleshooting](#) section for assistance. In case of communication problems, this section also provides problem-solving hints.

### Get Information on Related Products

The MBX family consists of several well-integrated products, which provide connectivity for Modicon networks in distributed environments. For more information about these products, refer to the [Appendix: MBX Architecture and Companion Products](#) section.

### Print a Copy of This Document

The content of this document is also provided in PDF format. PDF files can be viewed using the Adobe® Reader program, and can also be used to print the entire document.

### Contact Technical Support

To obtain support information, open the Windows **Start** menu, then navigate to the product suite you have installed. From there, select **Product Information**.



## COMMUNICATION USING THE ETHERNET MBX DRIVER

Ethernet is the most recent network supported by Schneider Electric products, such as Momentum and Quantum PLCs. The Ethernet MBX Driver allows existing Modbus Plus software applications, without modification, to communicate to these products using Modbus TCP.

This is possible because Modbus TCP communication uses the same message structure as Modbus Plus, but with a different addressing technique. This section describes how you can configure your addressing and master/slave path usage to take advantage of this compatibility.

### Routing Path and Node Addressing

Modbus Plus uses a five-byte routing path to specify the destination node. Each byte can be a number from 1 – 64, with 0 indicating that a byte is unused.

Ethernet uses a four-byte IP address to specify the destination node, and each byte can be a value from 0 – 255. In addition, Modbus TCP messages include a fifth byte, called the destination index. This byte has no predefined purpose and its value can be programmed through the MSTR function in the PLC logic.

To accommodate these addressing differences, the Ethernet MBX Driver uses two methods by which applications can map into an IP address: direct IP addressing and mapped addressing.

#### ***Direct IP Addressing***

In this method, an application uses the array of five routing address bytes to explicitly specify an IP address. The Modbus Plus routing array *mb0.mb1.mb2.mb3.mb4* is directly taken as destination index and IP address *di.ip1.ip2.ip3.ip4*.

The destination index can take values of 1-256, but the mb0 byte must be in the range of 0-255. To accommodate this, a value of 0 in this byte is taken to mean a destination index of 256.

#### ***Example***

The application specifies a Modbus Plus routing array of 1.192.168.7.54. The Ethernet MBX Driver will route this message to IP address 192.168.7.54 with destination index 1.

#### ***Recommended Use***

The direct IP addressing technique is simpler to configure and use than the mapped addressing method, so it is preferred for applications that can specify routing array bytes over the full range of 0 – 255.

However, some applications permit values only in the range of 0 – 64. These applications must use the mapped addressing approach. You must also use mapped addressing if you want to use host names rather than IP addresses.

### ***Mapped Addressing***

In this method, the user configures a mapping table that specifies an IP address or host name, and a destination index for each node address that will be used. The application will then specify a Modbus Plus routing array in the form *node.0.0.0.0*. The Ethernet MBX driver will look up the table entry for node address *node* and use the IP address or host name and destination index specified in that entry.

The Ethernet MBX Driver permits you to map node addresses in the range of 1 – 255, but your application may allow values of only 1 – 64. The IP address bytes you map into may be in the standard range of 0 – 255 and the destination index may be 0 – 255.

Because the table is limited to 255 entries and some applications will further restrict this to only 64, you may run out of mapping table entries. In such a case, you can create additional logical devices and each will provide 255 (or 64) more mappings.

#### Example

The user configures a mapping table that includes the entries shown below.

<b>Node</b>	<b>IP Address or Host Name</b>	<b>Destination Index</b>
15	10.0.15.54	1
16	192.168.0.113	1
17	192.168.0.113	2
18	wastewater	1

The application specifies a Modbus Plus routing array of 15.0.0.0.0. The Ethernet MBX Driver will route this message to IP address 10.0.15.54 with destination index 1. If the application had specified Modbus Plus routing array 16.0.0.0.0, the message would have been routed instead to IP address 192.168.0.113, also with destination index 1.

If the application specifies a Modbus Plus routing array of 17.0.0.0.0, the message would again go to IP address 192.168.0.113, but this time with destination index 2. A routing array of 18.0.0.0.0 would cause the message to be sent to the node with host name *wastewater*, with destination index 1.

Notice that the table entries may be mapped to any valid IP address or host name and destination index.

#### Recommended Use

Although mapped addressing requires more configuration, it is necessary to use it with some applications. Those applications that restrict the value of routing array bytes to the Modbus Plus range of 0 – 64 will generally not permit you to specify the IP addresses

your destination nodes require. In such cases, you must use mapped addressing. You must also use mapped addressing if you want to use host names instead of IP addresses.

If, on the other hand, you do not use host names and your application allows you to directly specify all of the IP addresses you will need, then direct IP addressing is preferred.

## **MBX Devices and Physical Network Adapters**

An Ethernet MBX device is distinct from the physical network adapters it uses. Your computer may have two or more physical Ethernet adapters, and the driver will select the correct adapter as needed by the destination's IP address. Whether mapped or direct IP addressing is used, the driver will handle the task of resolving the address specified by the application into the correct IP address and sending the message to its proper destination.

## **Master Paths**

Modbus Plus uses data and program master paths as logical channels for solicited communication. Modbus Plus interface adapters allow up to eight data master and eight program master paths. Both data and program commands can be sent on program master paths, and will be received on program slave paths. Only data commands can be sent on data master paths, and they will be received on data slave paths.

Each Ethernet MBX Device allows up to 65,535 data master paths and 65,535 program master paths.

To be compatible with Modbus Plus applications, the Ethernet MBX Driver defaults to allowing eight data master paths and eight program master paths per device. However, applications that use the MBXAPI can use the full range of master paths.

## **Slave Paths**

The Modbus Plus architecture uses data/program slave paths when receiving unsolicited messages. Modbus Plus interface adapters allow up to eight data slave and eight program slave paths. Both data and program commands can be sent on program master paths. They will be received on program slave paths. Only data commands can be sent on data master paths, and they will be received on data slave paths.

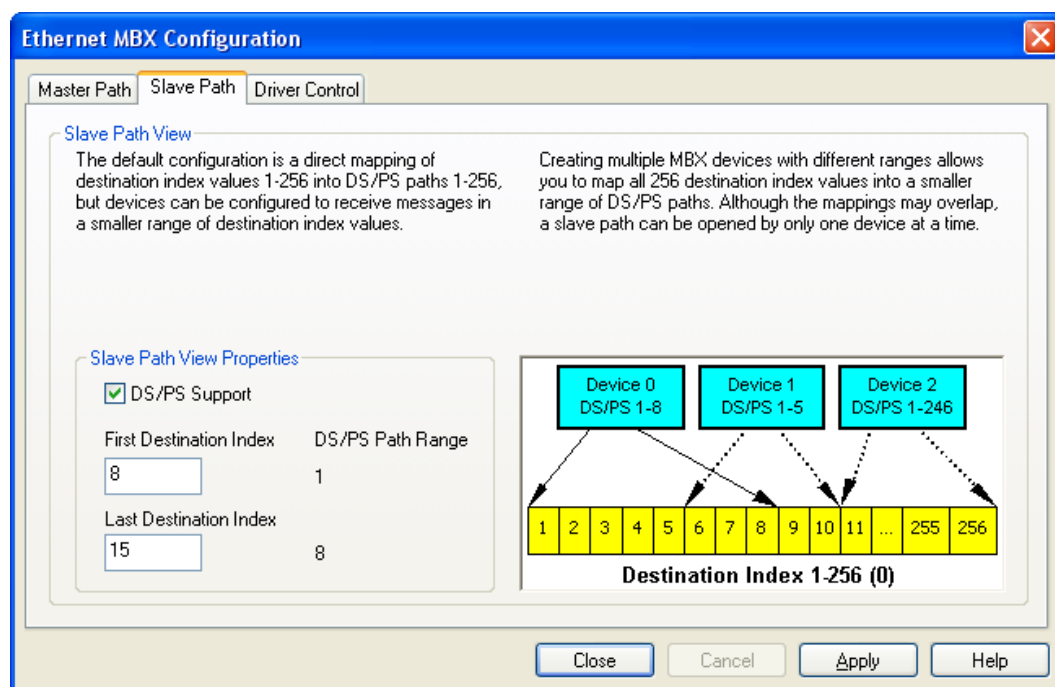
The Ethernet MBX Driver uses 256 data slave mailboxes and 256 program slave mailboxes to handle incoming unsolicited messages. The type of command received determines whether the message goes to a program slave mailbox or to a data slave mailbox: programming commands are sent to program slave mailboxes and all other commands are sent to data slave mailboxes. The destination index of the incoming message determines the slave mailbox number that will be used. The mapping is one-to-one, that is, destination index 1 goes to mailbox 1, destination index 2 goes to mailbox 2 and so on. The exception to this is that destination index 0 is mapped to mailbox 256.

### ***Default Slave Path Mapping***

The Ethernet MBX Driver Configuration Editor allows you to define how the slave mailboxes will be mapped to slave paths. The default configuration maps mailbox numbers 1 – 256 into slave paths 1 – 256. This provides up to 256 data slave and program slave paths.

### ***Custom Slave Path Mapping***

In some cases, you may want to create a custom slave path mapping. For example, applications that use the NETLIB library can support only 63 slave paths. If you need to use destination index values outside of the range 1 – 63 with a NETLIB application, you must create multiple logical devices. Each of these can then map a different range of up to 63 destination indexes into the first 63 slave paths. The editing screen is shown below.



### ***Example***

The user creates two logical Ethernet MBX devices. For device 0, destination index values 1 – 63 are mapped into slave paths 1 – 63. For device 1, destination indexes 64 – 126 are mapped into slave paths 1 – 63.

An unsolicited message that uses destination index 2 would then be handled by slave path 2 of device 0. A message using destination index 65 would be handled by slave path 2 of device 1. This allows an application to access 126 mailboxes even if it is limited to 63 slave paths.

By using this technique with multiple logical devices, you can map the full range of destination index values you need into a narrower range that your application requires. It is possible to create mappings that overlap, so that a single destination index may map to slave paths on two or more logical devices. In such a case, the first application that opens the mailbox will "own" it, and all other applications will be locked out.

### Recommended Use

Slave path communication is needed only if your applications require unsolicited messaging. If slave path communication is not needed, it can be disabled.

## **Global Data**

Each Modbus Plus network adapter can read 64 bytes of global data from each node on the network. Each node can write to its own 64 bytes of global data, which will be immediately available for reading by other nodes on the network.

The Ethernet MBX Driver does not support global data, because global data does not exist in the Modbus TCP architecture. If an application attempts to write global data, the Ethernet MBX Driver will return a success indication. If an application attempts to read global data, the Ethernet MBX Driver will return a success code with a data length of zero.

## **Peer Cop**

Modbus Plus network adapters provide access to global inputs, specific inputs and specific outputs.

There is no support for global inputs, specific inputs and specific outputs in Modbus TCP, so access to these is not possible through the Ethernet MBX Driver. Applications attempting to access global inputs, specific inputs, or specific outputs will receive errors.

## QUICK-START GUIDE

Before the Ethernet MBX Driver can be used, it must be properly configured. The configuration procedure involves creating one or more Ethernet MBX devices and configuring them to work with your network's addressing scheme. An Ethernet MBX device is a logical device that emulates the behavior of a Modbus Plus network adapter card. Your software applications will then use this logical device to communicate over the network.

To accomplish this, you must run the MBX Driver Configuration Editor after you install the software. The MBX Driver Configuration Editor is a common component of all drivers in the MBX family. When configuring an Ethernet MBX device, the MBX Driver Configuration Editor automatically dispatches the Ethernet MBX Configuration Editor.

The following steps show a typical configuration session. Use it only as a guideline of how to configure the most common features. For detailed descriptions of all of the available features, refer to the [Configuration Editor Reference](#) section.

The procedure is broken into several short segments:

- [Creating an Ethernet MBX Device](#)
- [Configuring Master Path Communication](#)
- [Configuring the Ethernet MBX Slave Paths](#)
- [Configuring the Ethernet MBX Driver Control](#)
- [Configuring the MBX Gateway Server](#)
- [Verifying Your Driver Configuration](#)
- [Backing Up Your Configuration](#)

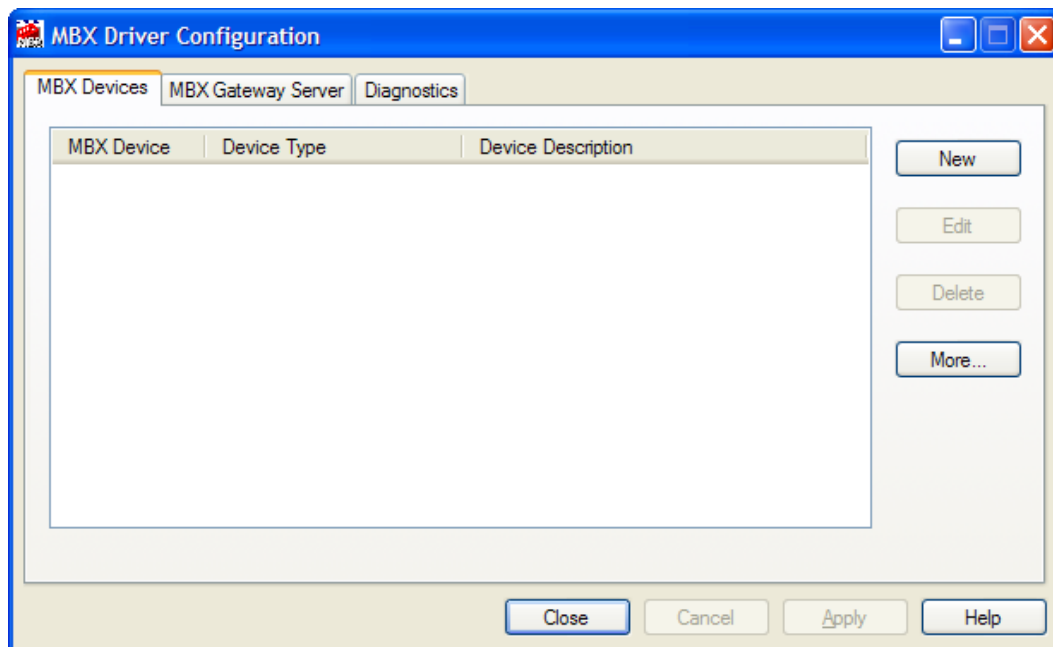
After completing this procedure, you will have a fully-configured Ethernet MBX device and will be able to confirm that the driver is running and communicating with other nodes on your network.

To begin, go to [Creating an Ethernet MBX Device](#).

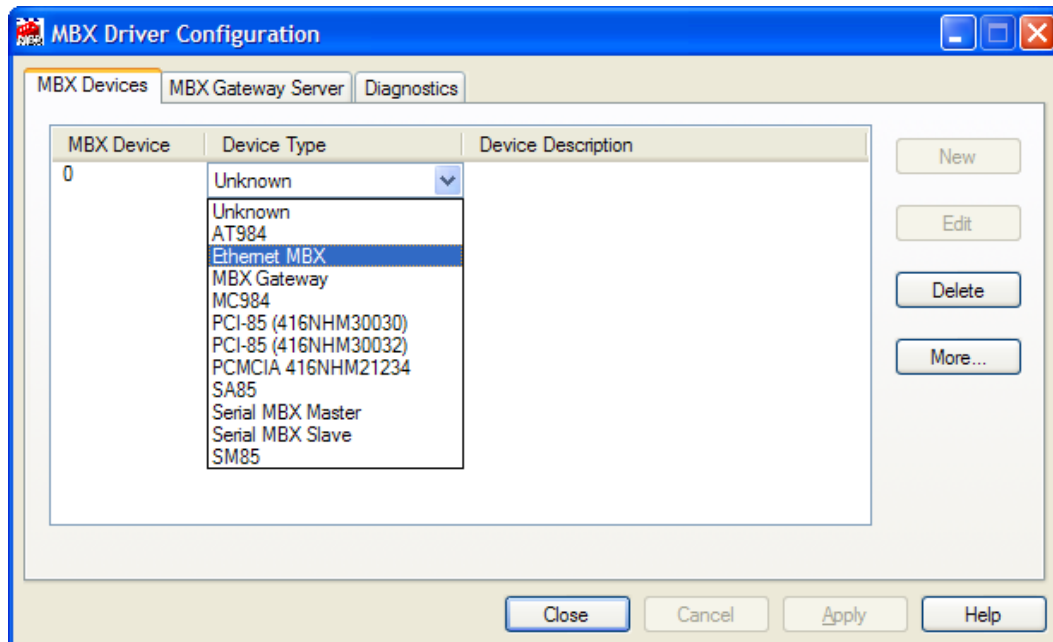
## Creating an Ethernet MBX Device

The first step in configuring the Ethernet MBX Driver is to create an Ethernet MBX device. This is a logical device that emulates a host interface adapter, such as a PCIe-85 card. It is not related to an actual, physical network card. Refer to the [Communication Using the Ethernet MBX Driver](#) section for more information.

1. From the Windows **Start** menu, locate the product suite you have installed and open the **Configuration** submenu. From there, select **MBX Device Drivers**.



Running the editor for the first time displays the above screen.



2. Click **New** and select **Ethernet MBX** from the drop-down list.

This creates an Ethernet MBX device and launches the Ethernet MBX Configuration Editor.

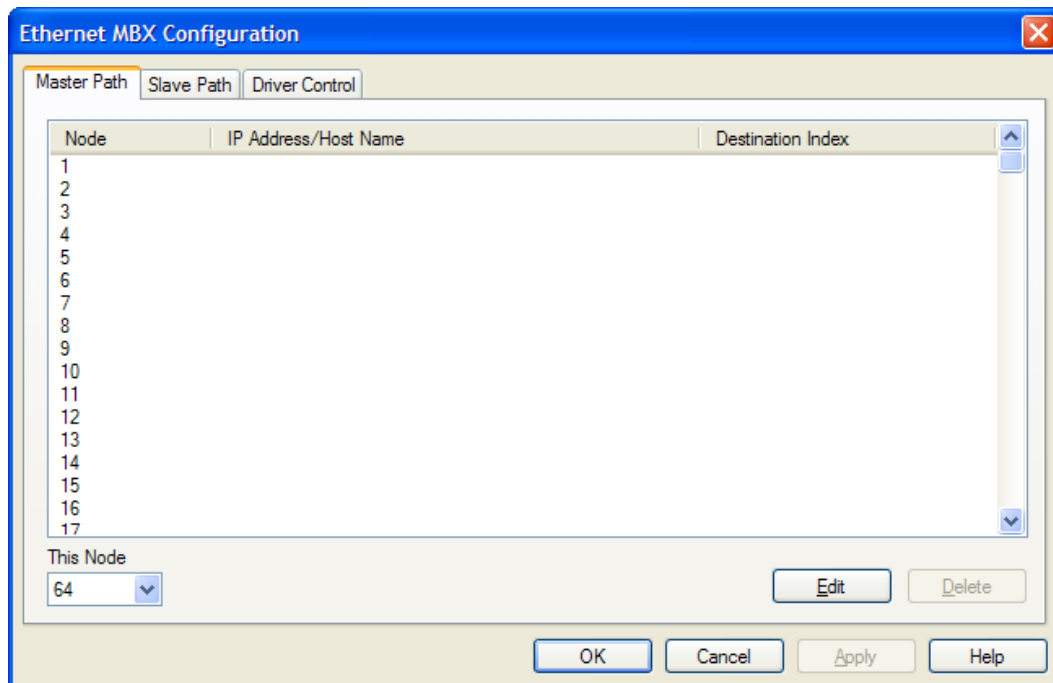
For the next part of the procedure, go to the [Configuring Master Path Communication](#) section.

## Configuring Master Path Communication

The Master Path tab serves two functions that may be necessary for your configuration.

First, it allows you to configure mapped addressing, which must be used for those applications that do not support direct IP addressing.

Second, it allows you to assign a Modbus Plus equivalent node address for your device.



1. Upon selecting the Ethernet MBX device type, the MBX Driver Configuration Editor automatically dispatches the Ethernet MBX Configuration Editor.

The Ethernet MBX Configuration Editor has three configuration tabs. By default, the Master Path tab is selected.

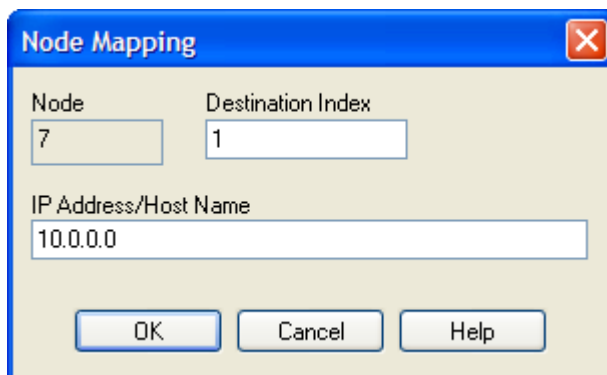
2. Because the Ethernet MBX device emulates the behavior of a Modbus Plus adapter card, you must assign a Modbus Plus equivalent node address to this device by selecting the address from the ***This Node*** drop-down list. The default value of 64 will work for most applications and usually need not be changed.
3. Refer to the [Routing Path and Node Addressing](#) section for an explanation of the two addressing techniques, direct IP and mapped.

If your application supports direct IP addressing, you need not configure additional Master Path parameters. You can skip the rest of this section and go right to [Configuring the Ethernet MBX Slave Paths](#).

If your application requires the use of mapped addressing, then continue with the next step.



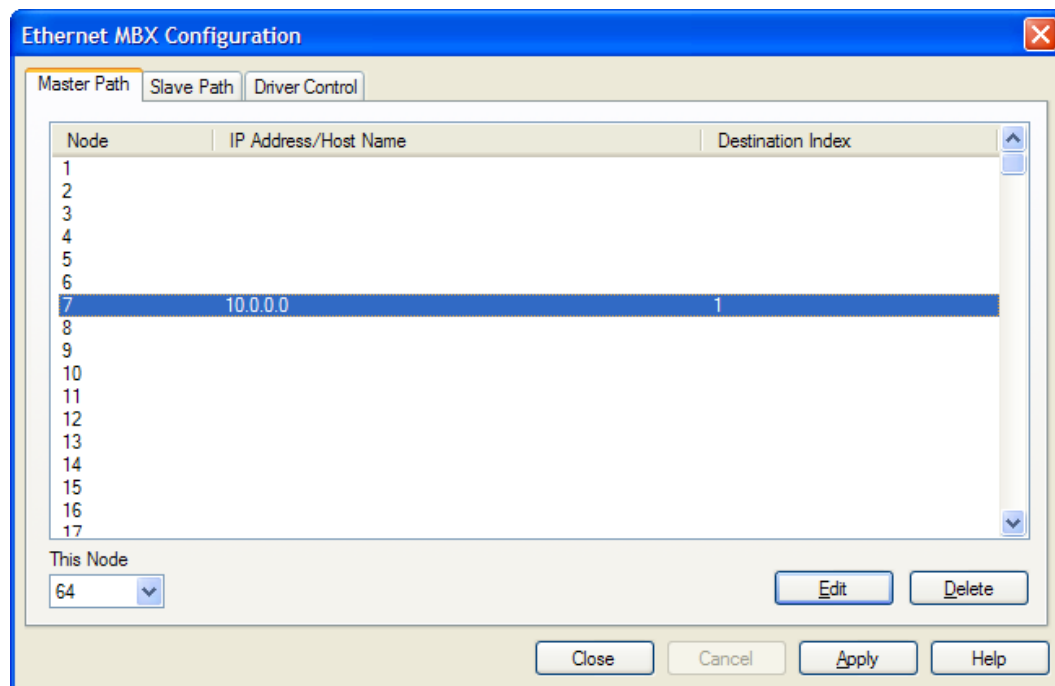
4. Select a **Node** to map to an IP address or host name, and then click **Edit**. The MB+ Node Mapping dialog window appears.



5. Enter the desired IP address or host name in the **IP Address/Host Name** box.
6. If your destination is another Ethernet MBX node, you may need to enter a **Destination Index** value. This value is used for mapping into the Data/Program Slave path number of your destination Ethernet MBX device. Refer to the [Slave Paths](#) section for more information.

The Destination Index value is ignored when communicating to Modicon PLCs.

7. Click **OK** to return to the Ethernet MBX Configuration Editor.

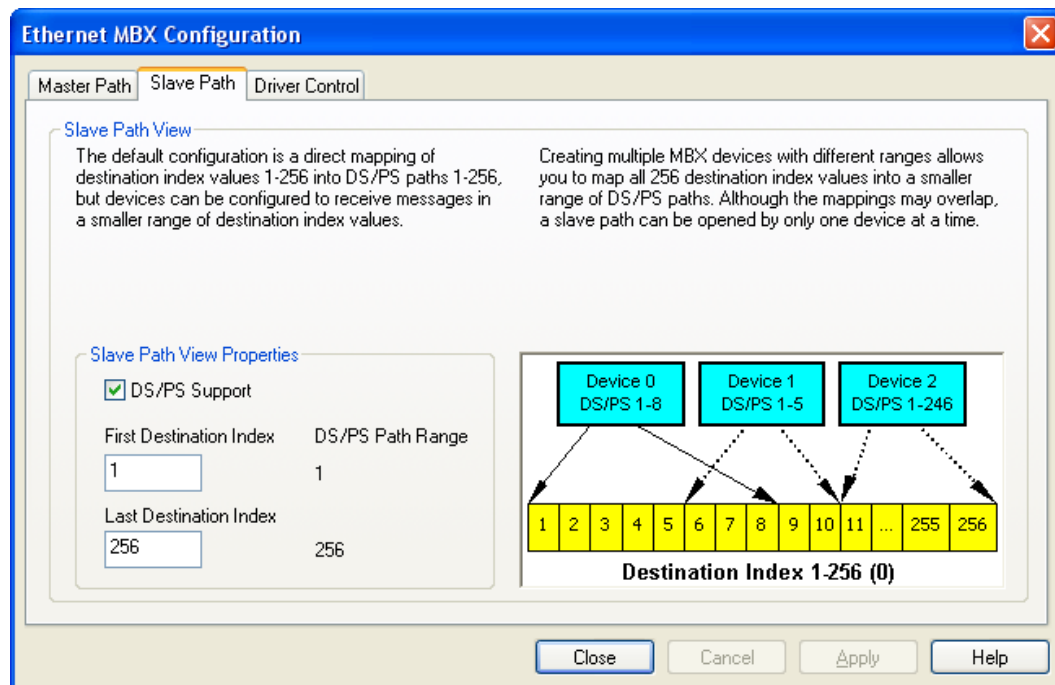


8. Repeat this procedure until all destination nodes are properly mapped.

When you have finished mapping nodes, proceed to the [Configuring the Ethernet MBX Slave Paths](#) section.

## Configuring the Ethernet MBX Slave Paths

Slave path support should be enabled only if your application supports and requires unsolicited communications. By default, support for this type of communication is enabled. Refer to the [Slave Paths](#) section for information on how and when to use slave paths.



1. Select the **Slave Path** tab.

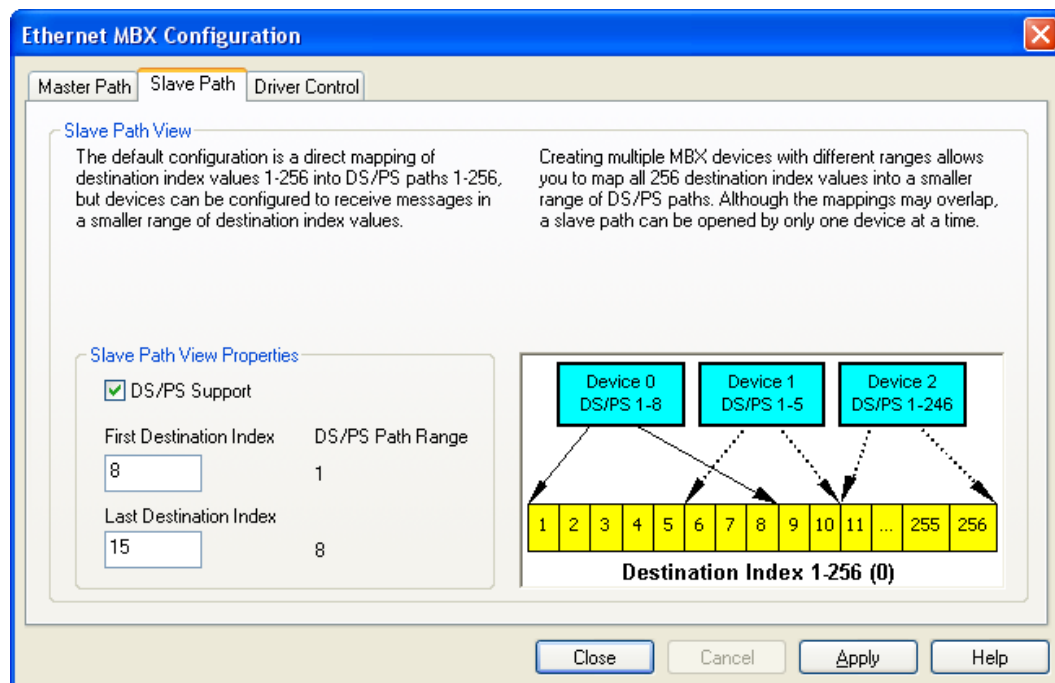
### Caution!

Checking or clearing the DS/PS Support box enables or disables support for unsolicited communications for all Ethernet MBX devices on the system.

2. If your application does not require slave path support, clear the **DS/PS Support** check box. You can then skip the rest of this section and go directly to [Configuring the Ethernet MBX Driver Control](#).

If your application does require slave path support, check the **DS/PS Support** check box and continue with the rest of this section.

3. If your system uses a firewall, you must configure it to allow unsolicited messages to get through. For details of how to do this, refer to the [Slave Path Tab](#) section of the Ethernet MBX Driver Configuration Editor discussion.



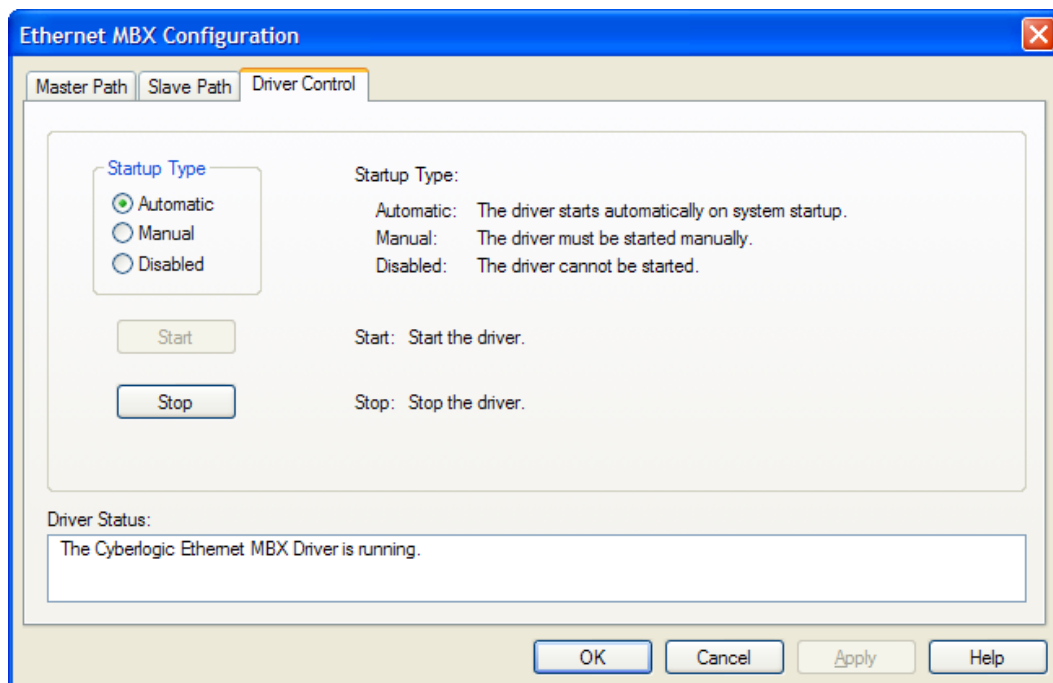
- The First Destination Index and the Last Destination Index fields allow proper mapping of messages into the data and program slave path numbers. The First Destination Index value will always be mapped to slave path 1. When you enter the Last Destination Index value, the editor will calculate and display the last slave path number so that a one-to-one mapping of destination index and slave path value is maintained.

Enter proper values for the **First Destination Index** and the **Last Destination Index**.

Proceed to the [Configuring the Ethernet MBX Driver Control](#) section.

## Configuring the Ethernet MBX Driver Control

Here, you will determine how the Ethernet MBX Driver will be started. Most users should select the Automatic startup type. In this mode, the driver starts automatically when the operating system boots.

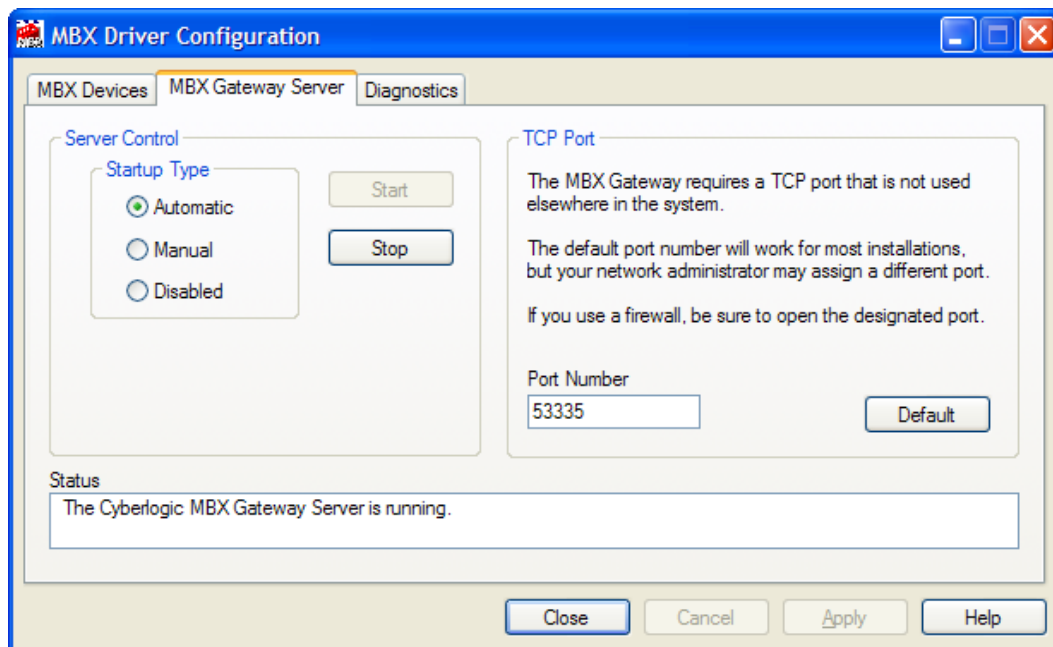


1. Choose the **Driver Control** tab.
  2. Select the desired mode of operation among the **Startup Type** choices.  
  
If you want the driver to start automatically when Windows boots, select **Automatic**. This is the recommended setting.  
  
If you want to control the driver manually, select **Manual**.  
  
To prevent the Ethernet MBX Driver from running, select **Disabled**.
  3. Click **Apply**, then click **OK** to return to the MBX Driver Configuration editor.
- Your Ethernet MBX device is now fully configured. Next, go to [Configuring the MBX Gateway Server](#).

## Configuring the MBX Gateway Server

The Ethernet MBX Driver comes with the MBX Gateway Server. The MBX Gateway Server allows remote nodes to access all configured MBX devices present on the system that is running the MBX Gateway Server. Refer to the [MBX Gateway Driver](#) section for more information on this capability.

You must enable and configure the MBX Gateway Server if you plan to use the MBX Gateway Driver on other systems on your network and you want them to be able to access the MBX devices on this system. Otherwise, you should disable the MBX Gateway Server.



1. Select the **MBX Gateway Server** tab.
2. Select the desired mode of operation among the **Startup Type** choices.

If you want to use the MBX Gateway Server and you want it to start whenever the system is booted, select **Automatic**. This is the recommended setting for systems that will use the Gateway Server.

If you want to use the MBX Gateway Server and want to control it manually, choose **Manual**.

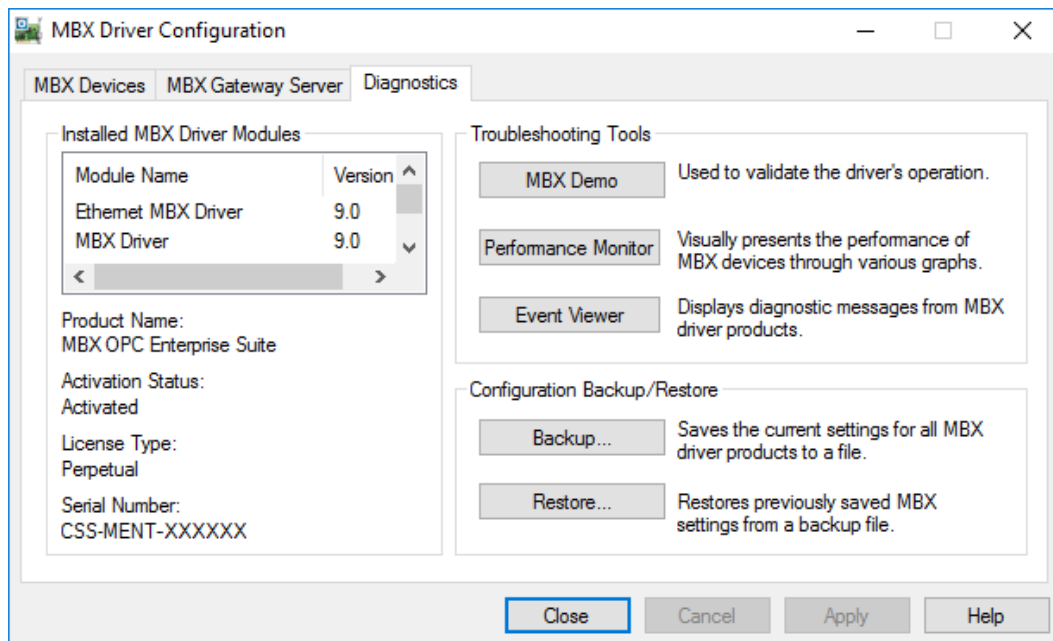
If you do not want to use the MBX Gateway Server, choose **Disabled**. You can then skip the rest of this section and go directly to [Verifying Your Driver Configuration](#).

3. You must enter a TCP port that is not used elsewhere in the system. The default, 53335, will work for most installations, but this port may be taken in some unusual cases. If that applies to your system, the system administrator will assign a different port value that you must enter in the **Port Number** field.
4. If your system uses a firewall, you must configure it to permit MBX Gateway communication. The procedure will depend upon the firewall you are using. Refer to the [MBX Gateway Server Tab](#) discussion in the MBX Driver Configuration Editor section for more information.

Now go to the [Verifying Your Driver Configuration](#) section, which will introduce you to the diagnostic features of the product.

## Verifying Your Driver Configuration

The Diagnostics tab features will help you to confirm that the driver is running and is properly configured. They will also provide important help in case troubleshooting or technical support is needed.



1. Select the ***Diagnostics*** tab.
2. The left pane of this screen shows all MBX product components installed on your system. This information, including the version numbers, may be requested if you call for technical support.

This screen also tells you if the software has been activated or if it is running in the two-hour demo mode.

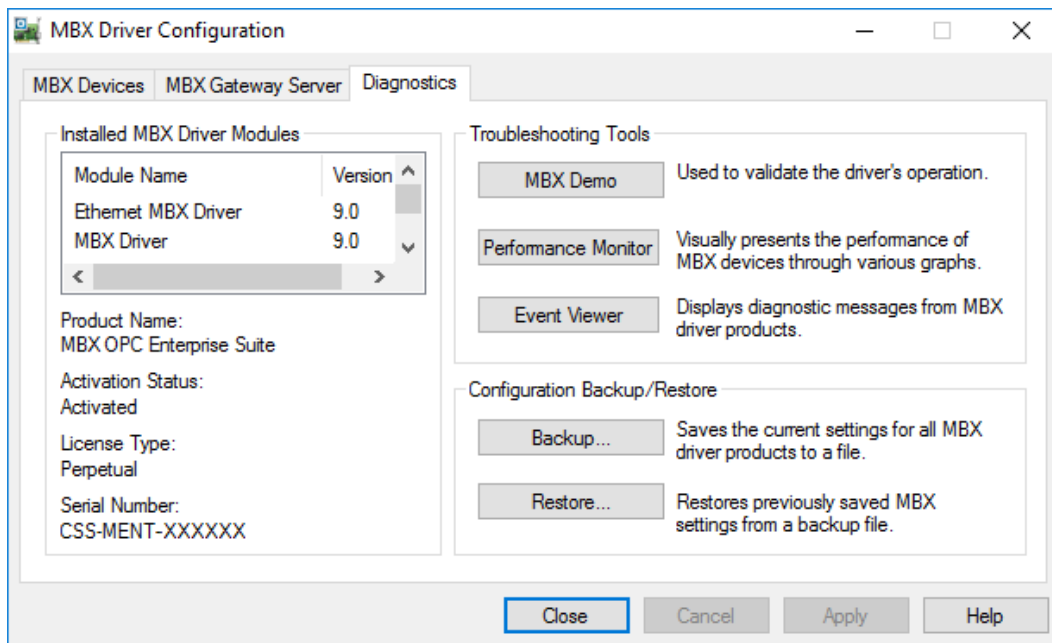
**Caution!** If you are running in demo mode, the MBX products will stop after two hours of operation and will resume after the system is restarted.

3. The right pane of the screen provides shortcuts to troubleshooting and backup/restore tools. Run the ***MBX Demo*** program after configuring the Ethernet MBX Driver to verify that the driver is configured and running properly. Detailed instructions for running this utility are included in the [Validation & Troubleshooting](#) section.

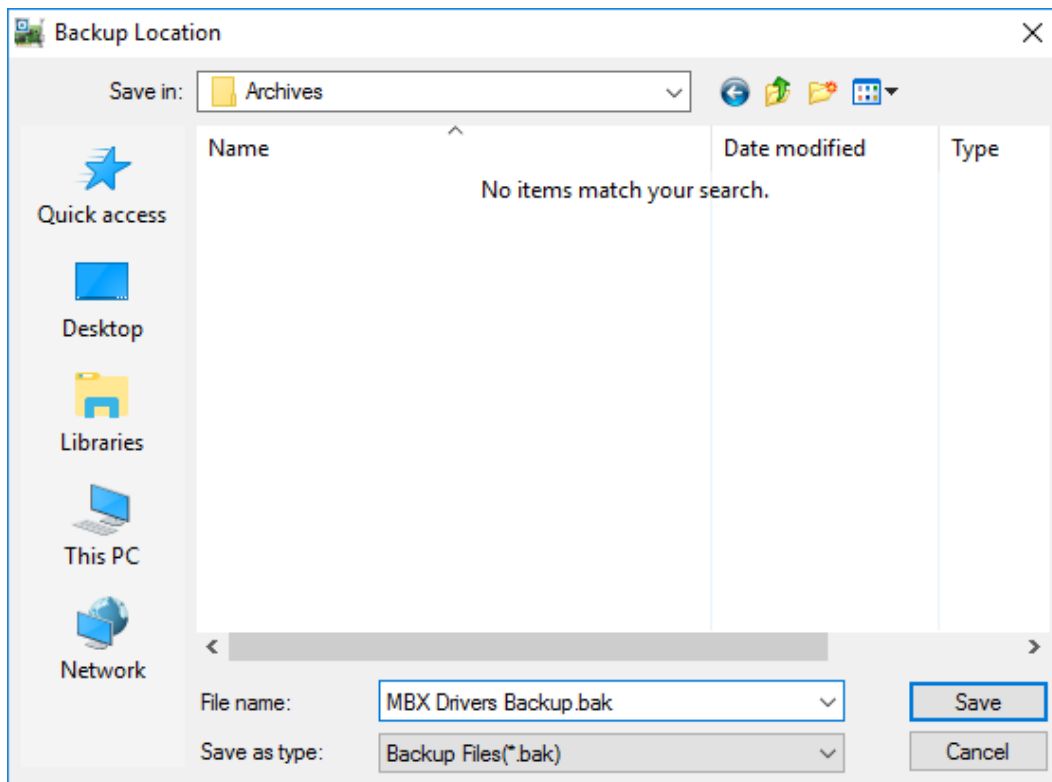
When you are satisfied that the driver is correctly configured, proceed to [Backing Up Your Configuration](#).

## Backing Up Your Configuration

To protect the work that you put into configuring and testing the driver, we strongly recommend that you back up the configuration.



1. Select the **Diagnostics** tab of the MBX Driver Configuration editor.
2. Click the **Backup...** button.



3. Browse for the desired backup directory. By default, the last-used directory will be selected.
4. Enter the ***File name*** you want to use for your configuration backup file, and then click the ***Save*** button to complete the backup operation.



## CONFIGURATION EDITOR REFERENCE

Before the Ethernet MBX Driver can be used, it must be properly configured. The configuration procedure involves creating one or more Ethernet MBX devices and configuring them to work with your network's addressing scheme. An Ethernet MBX device is a logical device that emulates the behavior of a Modbus Plus network adapter card. Your software applications will then use this logical device to communicate over the network.

This section provides a detailed description of each of the configuration editor features. If you are a new user and want a procedure to guide you through a typical configuration session, refer to the [Quick-Start Guide](#).

To create an Ethernet MBX device, you must run the [MBX Driver Configuration Editor](#) after you install the software. The MBX Driver Configuration Editor is a common component of all drivers in the MBX family.

When configuring an Ethernet MBX device, the MBX Driver Configuration Editor automatically dispatches the [Ethernet MBX Configuration Editor](#).

### MBX Driver Configuration Editor

The MBX Driver Configuration Editor is a common component of all drivers in the MBX family. It is used to create MBX devices, configure the MBX Gateway Server and provide access to diagnostic information and utilities. When you create or edit an Ethernet MBX device, the MBX Driver Configuration Editor automatically dispatches the Ethernet MBX Configuration Editor.

To start the MBX Driver Configuration Editor, open the Windows Start menu and go to the product suite you have installed. Next, open the Configuration submenu and select MBX Device Drivers.

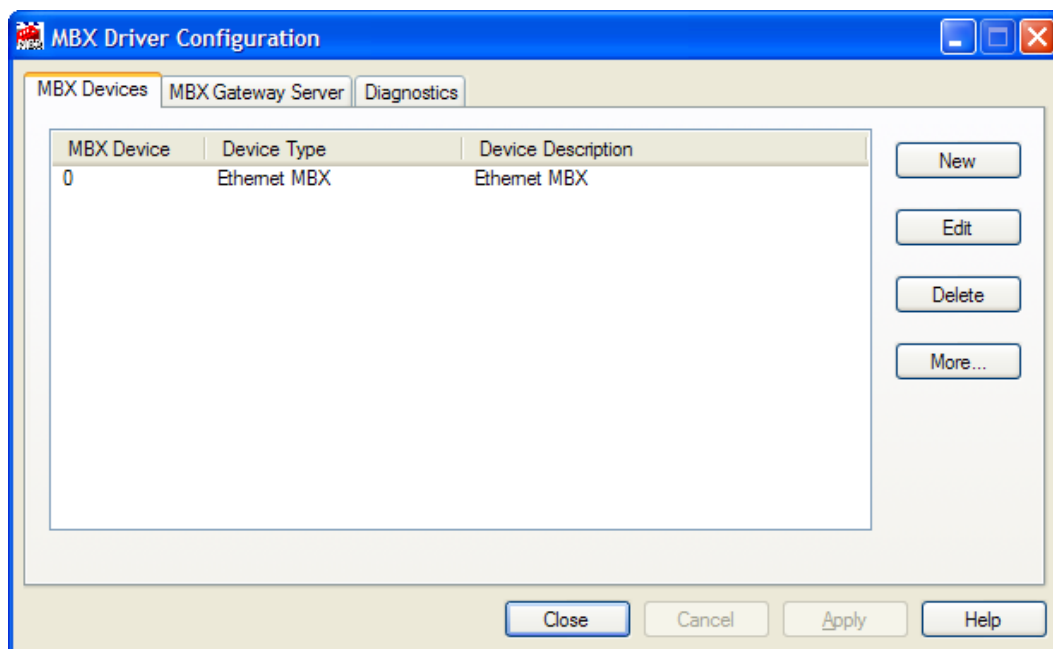
The MBX Driver Configuration Editor consists of three tabs:

- [MBX Devices Tab](#)
- [MBX Gateway Server Tab](#)
- [Diagnostics Tab](#)

The following sections provide complete descriptions of these tabs.

#### MBX Devices Tab

Every MBX device must be configured on the MBX Devices tab before it can be used by client applications. The MBX Devices tab lists all currently configured MBX devices in your system. The information is provided in three columns: MBX Device, Device Type and Device Description.



### MBX Device

This column contains a device number that the editor assigns to every MBX device installed in the system. This is not the Modbus node address. By default, the editor will try to use consecutive numbers for the devices starting from 0. However, this is not a requirement.

### Device Type

This column identifies the type of the MBX device, such as PCIe-85, Ethernet MBX or MBX Gateway.

### Device Description

This is a user-assigned text for device description. During device creation, a default description text will be assigned. Refer to the Changing the Device Description section, below, for information on how to modify this text.

The device description text has no effect on the MBX device operation. However, some applications using this device may be able to show this text.

### New

Click this button to create a new MBX device.

### Edit

Select an MBX device and click this button to edit it.

### Delete

Select an MBX device and click this button to delete it.

### More...

Select an MBX device and click this button for additional editing features. You can change the device type or edit the Device Description field.

### **Creating a New MBX Device**

Click the **New** button or right-click inside the list window and select **New** from the context menu. Then select a host interface adapter or other device type from the drop-down list.

Upon selecting the device type, the MBX Driver Configuration Editor will automatically dispatch the configuration editor that is appropriate for that device.

### **Deleting an Existing MBX Device**

Select the device and click the **Delete** button or right-click and select **Delete** from the context menu.

### **Editing an Existing MBX Device configuration**

Select the device and click the **Edit** button or right-click and select **Edit** from the context menu. The MBX Driver Configuration Editor will automatically dispatch the appropriate device configuration editor. The screen that follows will depend on the type of device you selected.

### **Changing the Device Description**

Select the device and click the **More...** button or right-click and select **Edit Description** from the context menu. Modify the device description and press the **Enter** key when you are done.

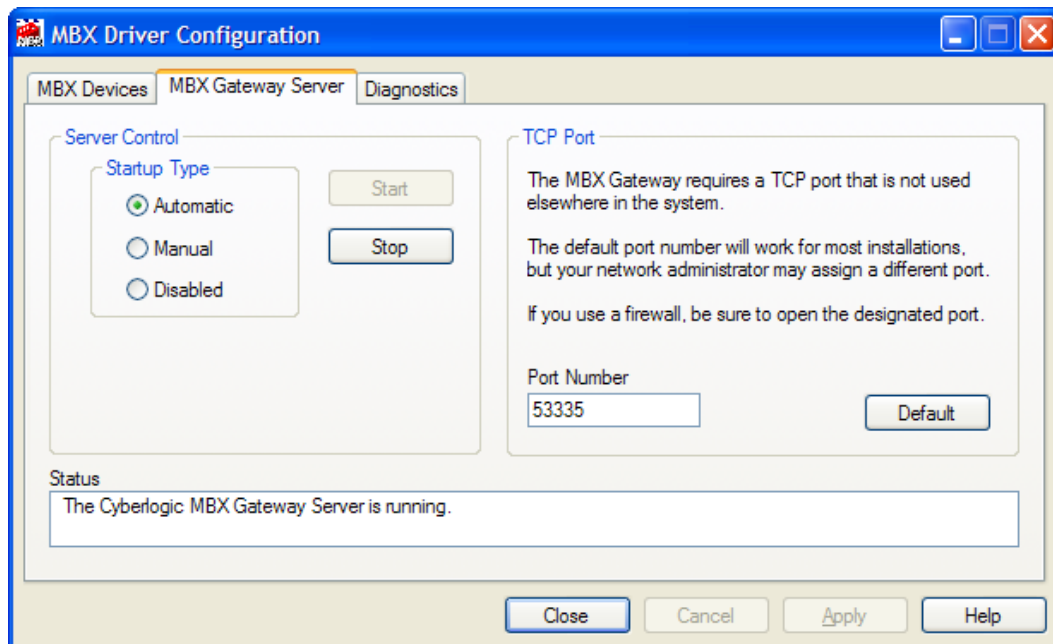
### **Changing the Device Type**

Select the device and click the **More...** button or right-click and select **Change Type** from the context menu. From the drop-down list select the new device type for your MBX device. Upon selecting the new device type, the MBX Driver Configuration Editor will automatically dispatch the appropriate device configuration editor. The screen that follows will depend on the device type selected.

## **MBX Gateway Server Tab**

The Ethernet MBX Driver comes with the MBX Gateway Server, a remote connectivity component of the MBX family. The MBX Gateway Server allows remote nodes to access

all configured MBX devices present on the system that is running the MBX Gateway Server. Refer to the [MBX Gateway Driver](#) section for more information on this capability.



### ***Server Control***

This section allows you to designate if and how you want the MBX Gateway Server to start.

#### ***Automatic***

When this option is selected, the MBX Gateway Server will start when Windows boots.

#### ***Manual***

When this option is selected, the MBX Gateway Server will not start when Windows boots, but you can control it manually using the Start and Stop buttons.

#### ***Disabled***

When this option is selected, the MBX Gateway Server will not run.

#### ***Start***

In Automatic or Manual mode, click this button to start the MBX Gateway Server.

#### ***Stop***

In Automatic or Manual mode, click this button to stop the MBX Gateway Server.

### ***Status***

This tells you whether the MBX Gateway Server is running, stopped, starting or stopping.

### ***TCP Port***

The port used here must not be used elsewhere in the system. If your system uses a firewall, the port must also be opened in the firewall configuration. For details, refer to the [Configuring the Firewall](#) section.

### ***Port Number***

Enter the number of the TCP port you wish to use.

### ***Default***

Click this button to restore the TCP port value to its default setting of 53335.

### ***Selecting the Startup Type***

If you want to use the MBX Gateway Server and want it to start whenever the system is booted, select ***Automatic***. This is the recommended setting for systems that will use the Gateway Server.

If you want to use the MBX Gateway Server and want to control it manually, choose ***Manual***. The Server will not start on boot-up; instead you must use the Start and Stop buttons to control it.

If you do not want to use the MBX Gateway Server, choose ***Disabled***.

### ***Start/Stop the Gateway Server***

Click the ***Start*** or ***Stop*** button.

### ***Selecting the TCP Port***

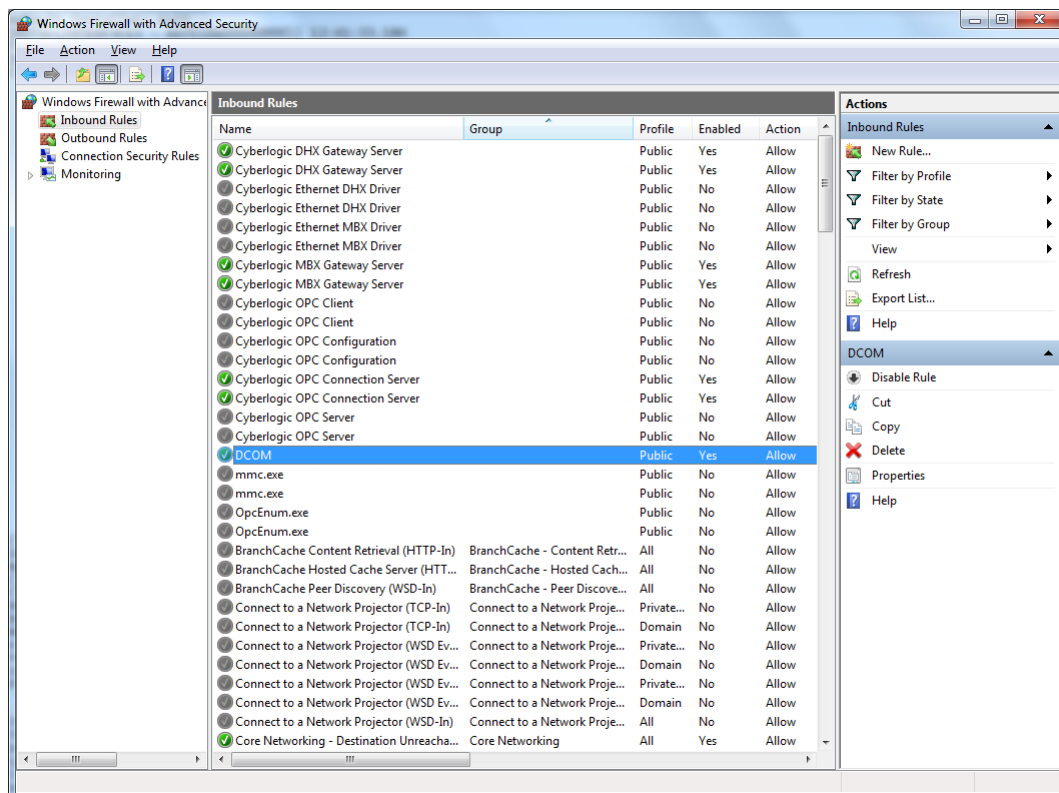
Enter the desired port number in the Port Number field.

You must enter a TCP port that is not used elsewhere in the system. The default, 53335, will work for most installations, but this port may be taken in some unusual cases. If that applies to your system, the system administrator will assign a different port.

### ***Configuring the Firewall***

If your system uses a firewall, you must configure it to permit MBX Gateway communication. The procedure shown here is for the Windows 7 firewall. The exact procedure for your system will depend upon the firewall you are using, but the issues are the same for all firewall types.

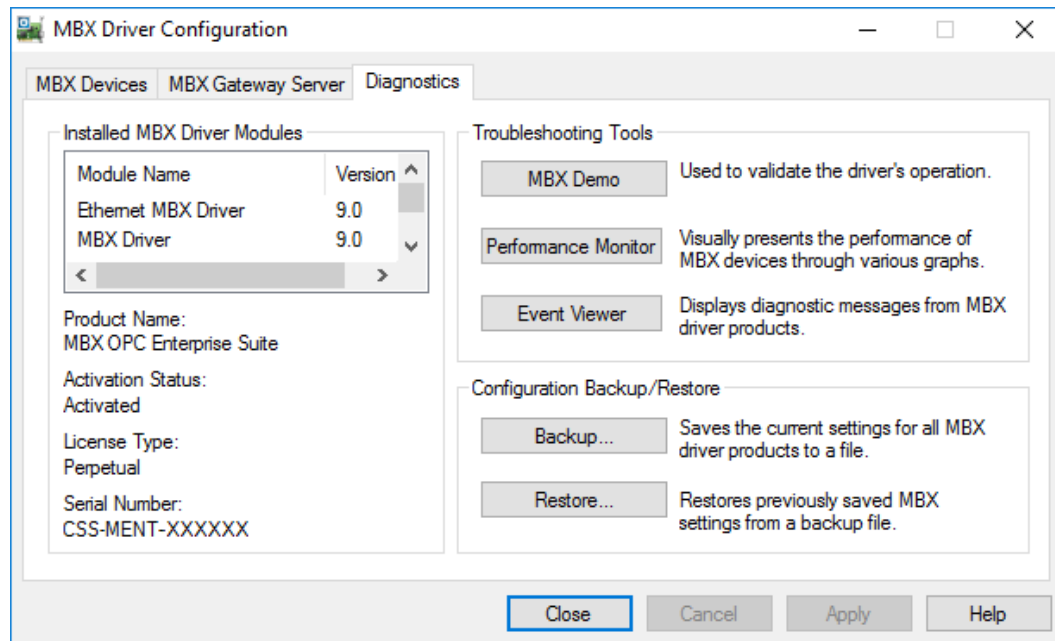
1. To configure Windows 7's firewall, go to **Control Panel** and open **Windows Firewall** and select **Advanced Settings**.



2. Select **Inbound Rules**.
3. Verify that the rules **Cyberlogic MBX Gateway Server** and **DCOM** are enabled. If not, enable them.
4. Close the window to exit.

## Diagnostics Tab

The diagnostic features will help you to confirm that the driver is running and is properly configured. They will also provide important help if troubleshooting or technical support is needed.



### ***Installed MBX Driver Modules***

This area shows all MBX product components installed on your system, along with their version numbers. This information may be requested if you call for technical support. This screen also tells you if the software has been activated or if it is running in demo mode.

#### Product Name

MBX products are sold and installed as packaged suites, such as the MBX Driver Suite and MBX OPC Server Suite. This field indicates one of the MBX family suites that is installed on your system. For complete information on all installed Cyberlogic products go to the **Product Information** app accessible from the Windows **Start** menu.

#### Activation Status

Most Cyberlogic software products operate in a time-limited demonstration mode until they are activated. This field tells you whether or not the installed product has been activated.

If your product requires activation, run the **Activation** wizard, which you will find in the Windows **Start** menu under **Cyberlogic Suites**. You will need the serial number and password that were assigned when you purchased your license for the software.

#### **Note**

Some OEM versions of MBX products are pre-activated and do not require you to take any additional activation steps.

### License Type

This field shows the licensing mode that the software is operating under. If the type displayed is *2 Hour Demo*, the software will run for only two hours at a time, after which you must restart the system to obtain another two hours of use. To enable continuous, uninterrupted operation, you must activate the software.

### Serial Number

If you have activated the software by entering the serial number and password, the serial number used will be shown here. This will help you to determine which license goes with which of your systems.

### **Troubleshooting Tools**

The Troubleshooting Tools group provides shortcuts to diagnostic tools that will help you to verify that your drivers are operating as expected. In case of communication problems, these tools will help in the diagnosis.

For details on how to use these tools, refer to the [Validation & Troubleshooting](#) section.

### MBX Demo

Run this program after configuring the driver to confirm that it is configured correctly and running properly.

### Performance Monitor

Click this button to launch the Windows Performance Monitor, which will allow you to observe numerous performance parameters in graphical form.

### Event Viewer

In case of communication difficulties, the Windows Event Viewer may provide error messages to guide you in troubleshooting problems.

### **Configuration Backup/Restore**

The Backup... and Restore... buttons in this group can be used to backup and restore configurations of all MBX family drivers on your system.

**Note**

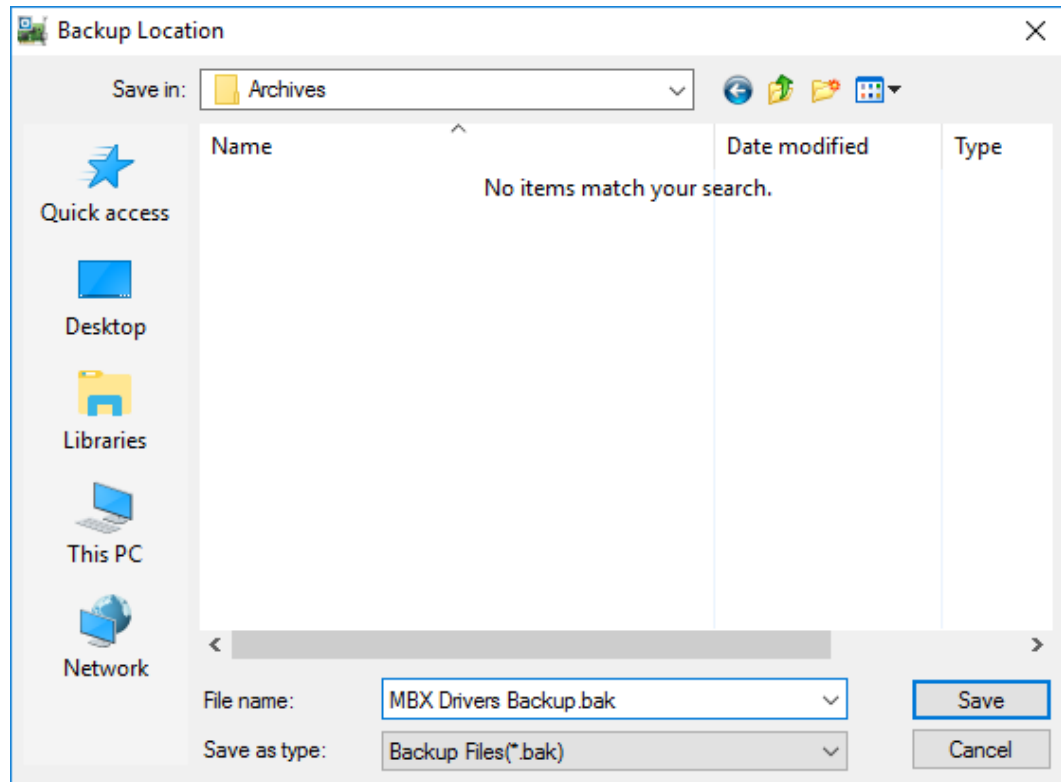
We strongly recommend that you backup your configuration data after the initial configuration and that you maintain up-to-date backups after every configuration change.

### Backup Configuration

Use this procedure to backup your configuration.



1. Click the **Backup...** button.

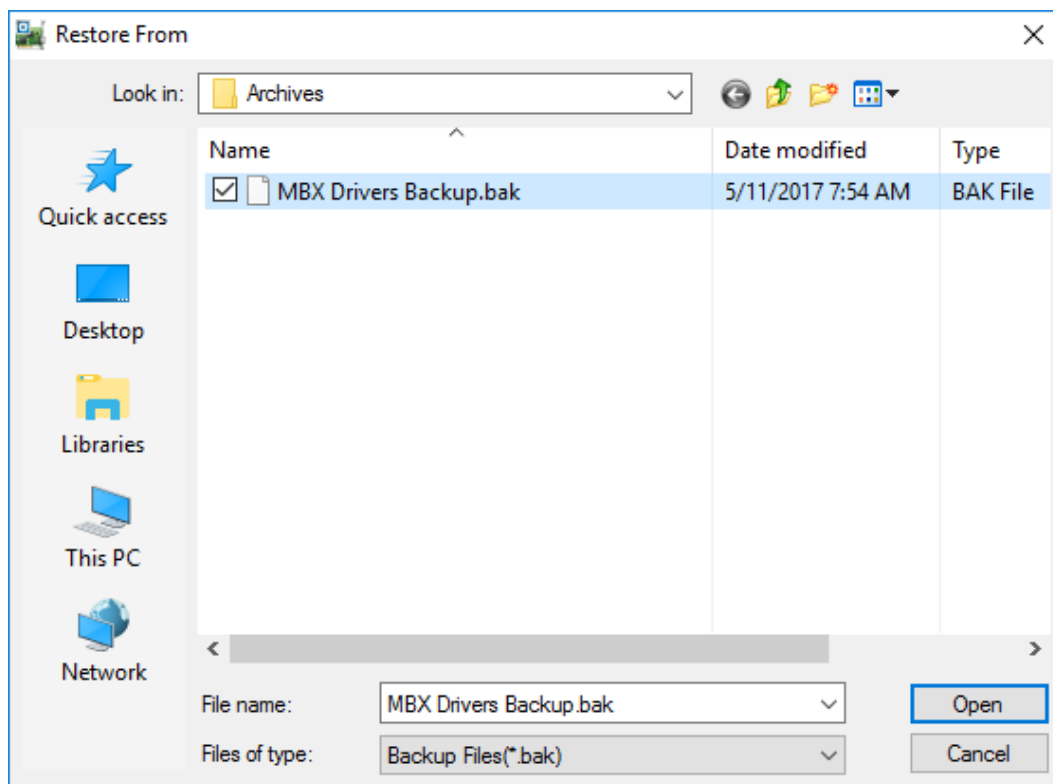


2. Browse for the backup directory. By default, the last-used directory will be selected.
3. Enter the **File name** you want to use for your configuration backup file, and then click the **Save** button to complete the backup operation.

### Restore Configuration

To restore a configuration that was previously backed up, use this procedure.

1. Click the **Restore...** button.



2. Browse for your configuration backup file. By default, the last used directory will be selected.
3. Select the backup file and click the ***Open*** button to complete the restore operation.

**Caution!**

After you finish restoring the configuration, restart the system to ensure proper operation of the restored devices.

### ***Configuration Backup/Restore Utility***

The MBX driver products include a utility program, CIMbxCfg.exe, that you can use to backup and restore MBX device configurations. The program is located in the \Program Files\Common Files\Cyberlogic Shared\ directory.

The utility accepts the following command line switches:

<i>/Save FileName</i>	Save configuration
<i>/Restore FileName</i>	Restore configuration
<i>/Q</i>	Quiet operation (No error or warning messages)
<i>/?</i>	Help
<i>/H</i>	Help

For example, to backup the configuration of all MBX devices to a file named MbxCfg.bak, located in the directory C:\Program Files\Common Files\Cyberlogic Shared\, use the following command line:

```
>CIMbxCfg /Save C:\Program Files\Common Files\Cyberlogic Shared\MbxCfg.bak
```

To restore the configuration that the previous command saved, use the following command:

```
>CIMbxCfg /Restore C:\Program Files\Common Files\Cyberlogic Shared\MbxCfg.bak
```

You can use different file names to maintain different versions of your backups. However, for most users, a single backup is sufficient.

## Ethernet MBX Configuration Editor

When editing Ethernet MBX devices, the MBX Driver Configuration Editor dispatches the Ethernet MBX Configuration Editor.

The Ethernet MBX Configuration Editor consists of three tabs:

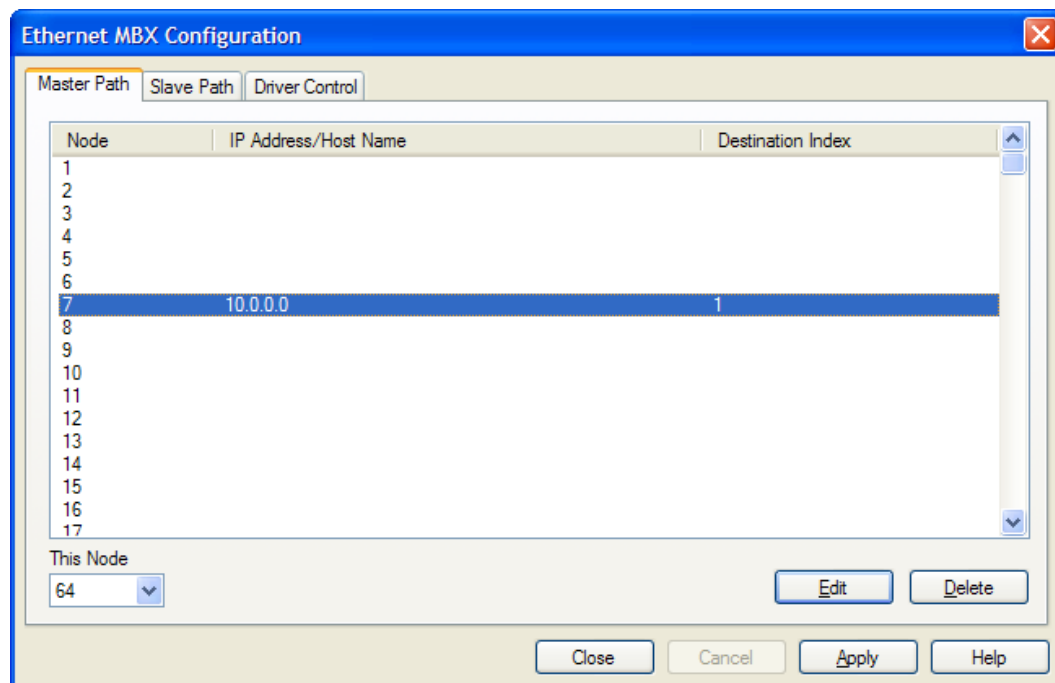
- [Master Path Tab](#)
- [Slave Path Tab](#)
- [Driver Control Tab](#)

The following sections provide complete descriptions of these tabs.

### Master Path Tab

Because the Ethernet MBX device emulates the behavior of a Modbus Plus host adapter card, you must assign it a Modbus Plus equivalent node address. This is done on the Master Path tab. In addition, the Master Path tab allows you to set up a mapping table used for mapped addressing.

To accommodate the Modbus Plus architecture, the Ethernet MBX Driver allows two methods that applications can use to map into an IP address: direct IP addressing and mapped addressing. Refer to the [Routing Path and Node Addressing](#) section for a detailed discussion of addressing methods and considerations.



### Node

This is the Modbus Plus equivalent node address for each row in the table. To create an address mapping table, you must enter an IP address or host name for each Modbus Plus node that your applications will address.

The Ethernet MBX Driver allows node numbers in the range of 1-256. However, some applications limit the value in the first routing byte to a range of 1-64. Therefore, node addresses in the range of 65-256 should be used only if your application permits the use of addresses in that range. If you need more mapping entries, you can create additional Ethernet MBX devices.

### IP Address/Host Name

For every Modbus Plus node address, you can assign either an IP address or a host name to the node your applications will communicate with.

### Destination Index

The Destination Index value is ignored when communicating to Modicon PLCs. If your destination is another Ethernet MBX node, you may need to specify a Destination Index value. This value is used for mapping into the data or program slave path number of the destination Ethernet MBX device. Refer to the [Slave Paths](#) section for details.

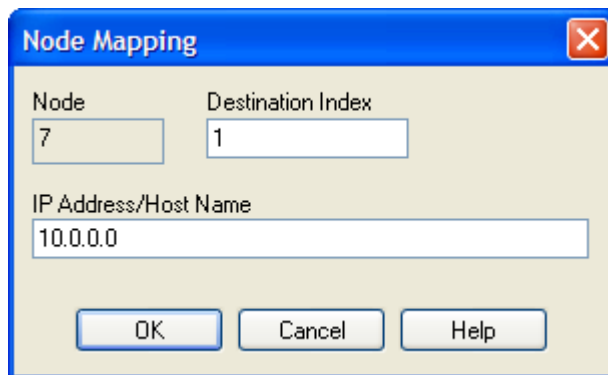
### This Node

Because the Ethernet MBX device emulates the behavior of a Modbus Plus adapter card, you must assign a Modbus Plus equivalent node address to this device by selecting the

address from the This Node drop-down list. The default address is 64 and is appropriate for most applications.

### ***Creating an Address Mapping***

Select a node address to map to an IP address or host name. Click ***Edit*** or double-click the selected entry to open the MB+ Node Mapping dialog window.

A screenshot of a Windows-style dialog box titled "Node Mapping". The dialog has a blue title bar with a close button (X) in the top right corner. Inside the dialog, there are three input fields: "Node" with the value "7", "Destination Index" with the value "1", and "IP Address/Host Name" with the value "10.0.0.0". At the bottom of the dialog, there are three buttons: "OK", "Cancel", and "Help".

Node	Destination Index
7	1

IP Address/Host Name  
10.0.0.0

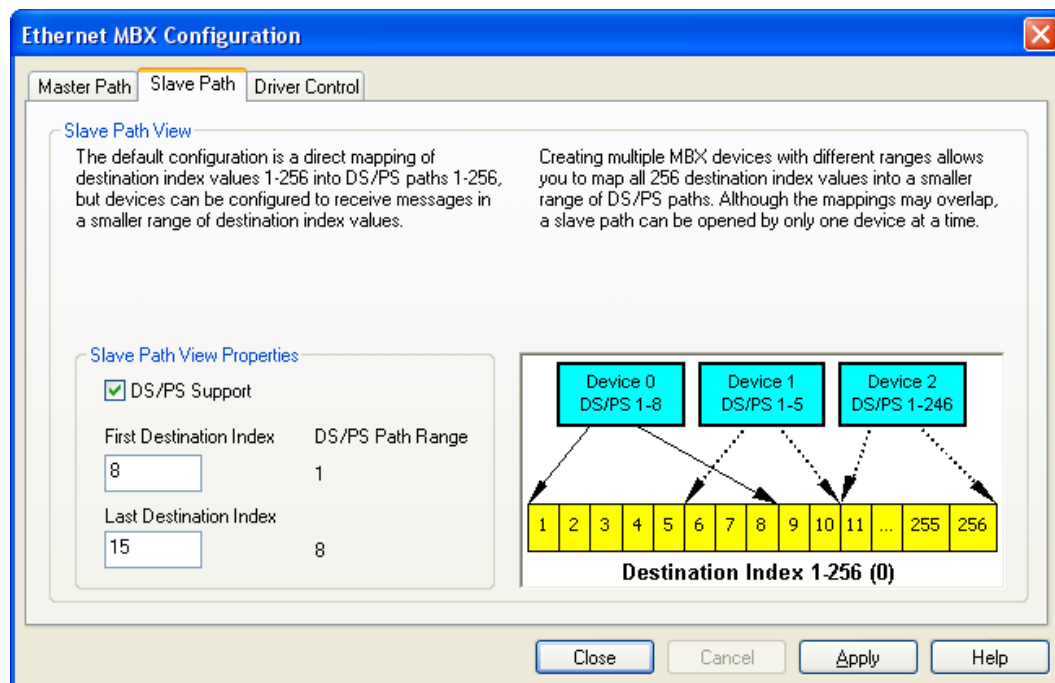
OK Cancel Help

Enter the ***Destination Index*** value and then enter the IP address or host name in the ***IP Address/Host Name*** box.

Click ***OK*** to return to the Ethernet MBX Configuration editor.

### **Slave Path Tab**

Slave path communication is needed only if your applications use and require unsolicited messaging. The Slave Path tab allows you to enable and configure slave path support if it is needed, and to disable it otherwise. For details of how to configure slave path support, refer to the [Slave Paths](#) discussion.



### DS/PS Support

Check this box to enable slave path support.

If your application does not support or does not require unsolicited (Data/Program Slave Path) communications, you can uncheck the box to disable slave path support. In the default configuration, this box is checked and slave path support is enabled.

### First Destination Index

Enter the first destination index value in the range that you wish to map. This value will be mapped to slave path 1, as shown in the DS/PS Path Range column.

### Last Destination Index

Enter the last destination index value in the range that you wish to map. This value will be mapped to the slave path shown in the DS/PS Path Range column.

### DS/PS Path Range

This column shows the range of slave paths that will be mapped by the destination index values you configured in the First Destination Index and Last Destination Index fields. The first value is always 1 and the last depends on the number of destination index values you are mapping.

### **Enabling and Disabling Slave Path Support**

Clear the **DS/PS Support** checkbox to disable slave path support.

Check the **DS/PS Support** checkbox to enable slave path support.

**Caution!**

If you enable slave path support and your system uses a firewall, you must configure the firewall to allow unsolicited communication.

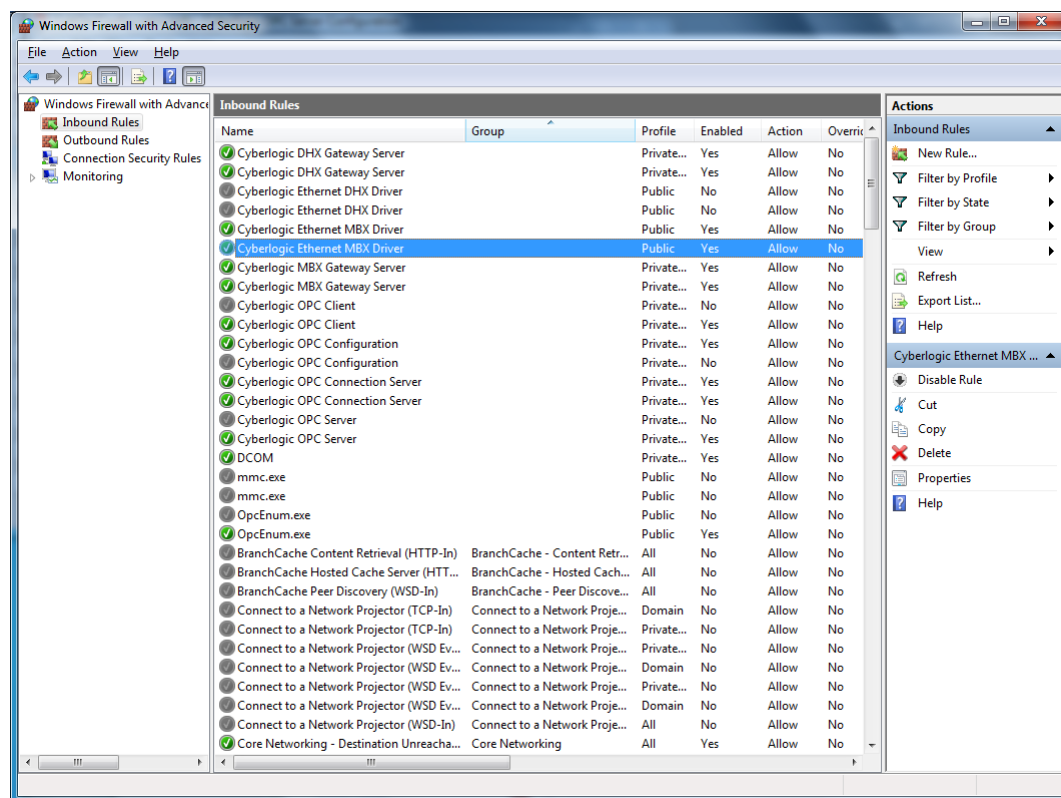
**Caution!**

Checking or clearing the DS/PS Support box enables or disables support for unsolicited communications for all Ethernet MBX devices on the system.

### Configuring the Firewall

If you enable slave path support on a system that uses a firewall, the firewall will block unsolicited communications unless the Ethernet MBX Driver is listed among the exceptions. The exact procedure will depend on the firewall you are using, but will be similar to the method used for the Windows 7 firewall, as described here.

1. Go to **Control Panel** and open **Windows Firewall** and select **Advanced Settings**.



2. Select **Inbound Rules**.
3. Verify that the rules **Cyberlogic Ethernet MBX Driver** are enabled. If not, enable them.
4. Close the window to exit.

### **Configuring Slave Path Mappings**

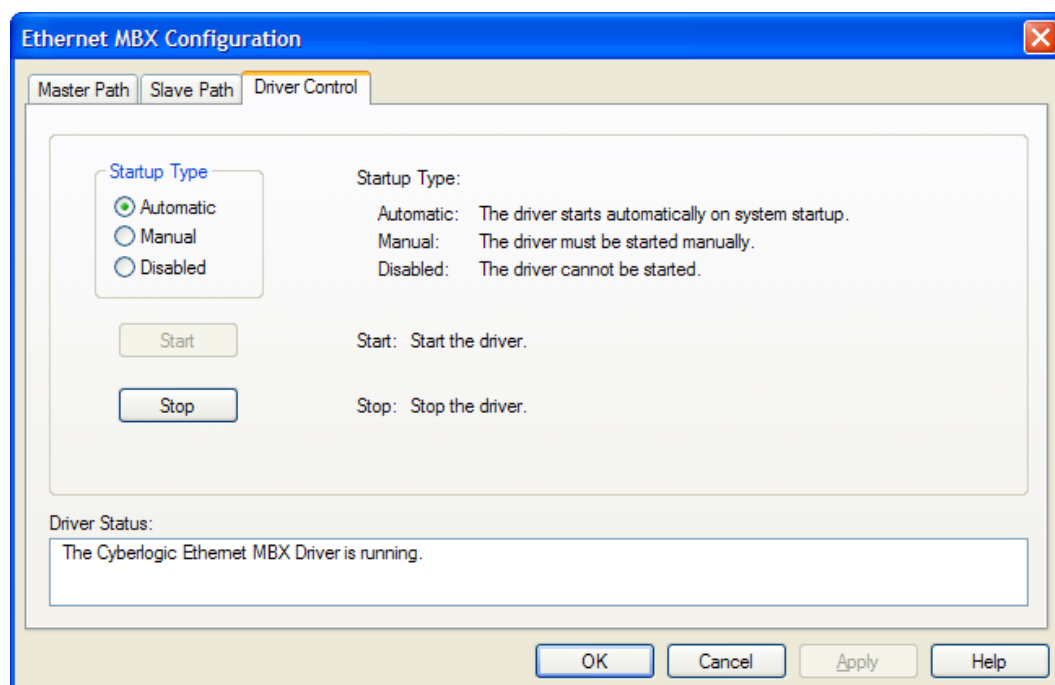
Use the **First Destination Index** and **Last Destination Index** fields to enter the range of destination index values you wish to map. The driver will map these into a range of slave paths beginning with slave path 1. This range will be displayed in the DS/PS Path Range column.

**Caution!** You can create ranges that overlap. If you do, an overlapped slave path can be opened through only one device at a time.

### **Driver Control Tab**

The Driver Control tab allows you to select the startup type and monitor the current driver status.

**Caution!** These settings are global and are common to all Ethernet MBX devices.



#### Automatic

When this option is selected, the Ethernet MBX Driver will start when Windows boots.

#### Manual

When this option is selected, the Ethernet MBX Driver will not start when Windows boots, but you can control it manually using the Start and Stop buttons.



### Disabled

When this option is selected, the Ethernet MBX Driver will not run.

### Start

In Automatic or Manual mode, click this button to start the Ethernet MBX Driver.

### Stop

In Automatic or Manual mode, click this button to stop the Ethernet MBX Driver.

### Driver Status

This tells you whether or not the Ethernet MBX Driver is running, stopped, starting or stopping.

### **Selecting the Startup Type**

Select the desired mode among the Startup Type choices.

If you want the Ethernet MBX Driver to start whenever the system is booted, select **Automatic**. This is the recommended setting for systems that will use the Ethernet MBX Driver.

If you want to use the Ethernet MBX Driver and want to control it manually, choose **Manual**. The driver will not start on boot-up; instead you must use the Start and Stop buttons to control it.

If you do not want to use the Ethernet MBX Driver, choose **Disabled**.

### **Start/Stop the Ethernet MBX Driver**

Click the **Start** or **Stop** button.

## VALIDATION & TROUBLESHOOTING

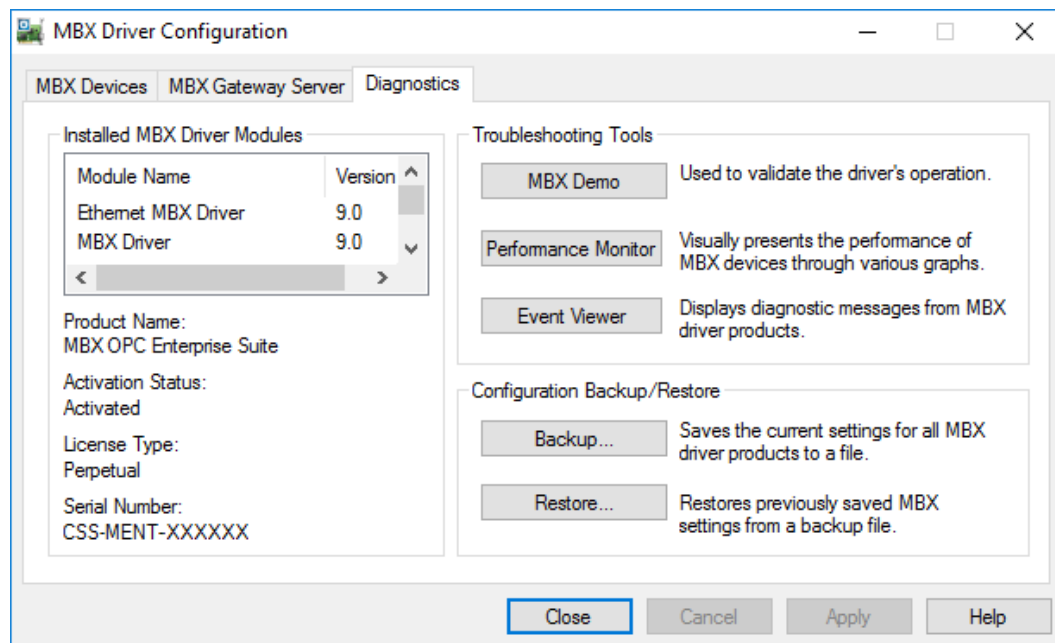
The following sections describe how the [MBX Demo](#) and [Performance Monitor](#) are used to verify that the Ethernet MBX devices are configured correctly.

If you are having difficulties communicating through an Ethernet MBX device, the troubleshooting sections can help you determine the nature of the problem. Included is a description of the [Event Viewer](#), a list of [Ethernet MBX Driver Messages](#) and a [Frequently Asked Questions](#) section.

### MBX Demo

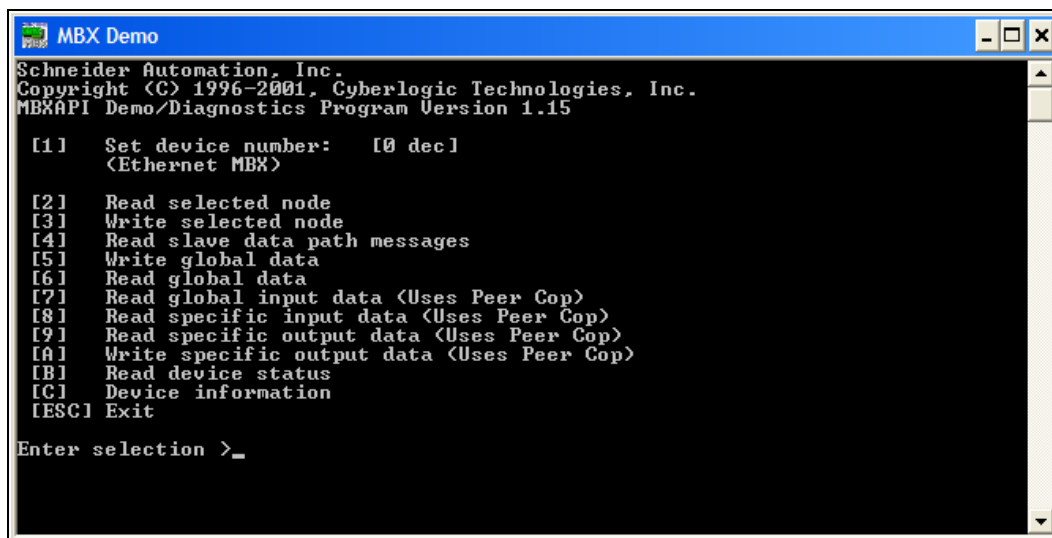
The MBX Demo program can be used to test all configured MBX devices in a system for proper operation. To run the program, open the Windows **Start** menu and locate the product suite you have installed. From there, go to **Diagnostics** and select **MBX Demo**.

Alternatively, open the **MBX Driver Configuration Editor**, go to the **Diagnostics** tab and click **MBX Demo**.



### Main Menu

The MBX Demo will quickly access all available features of the configured MBX devices in your system, allowing you to verify their operation.

A screenshot of a Windows-style window titled "MBX Demo". The window contains a text-based menu with the following options:

```
Schneider Automation, Inc.  
Copyright (C) 1996-2001, Cyberlogic Technologies, Inc.  
MBXAPI Demo/Diagnostics Program Version 1.15  
  
[1] Set device number: [0 dec]  
    (Ethernet MBX)  
  
[2] Read selected node  
[3] Write selected node  
[4] Read slave data path messages  
[5] Write global data  
[6] Read global data  
[7] Read global input data (Uses Peer Cop)  
[8] Read specific input data (Uses Peer Cop)  
[9] Read specific output data (Uses Peer Cop)  
[A] Write specific output data (Uses Peer Cop)  
[B] Read device status  
[C] Device information  
[ESC] Exit  
  
Enter selection >_
```

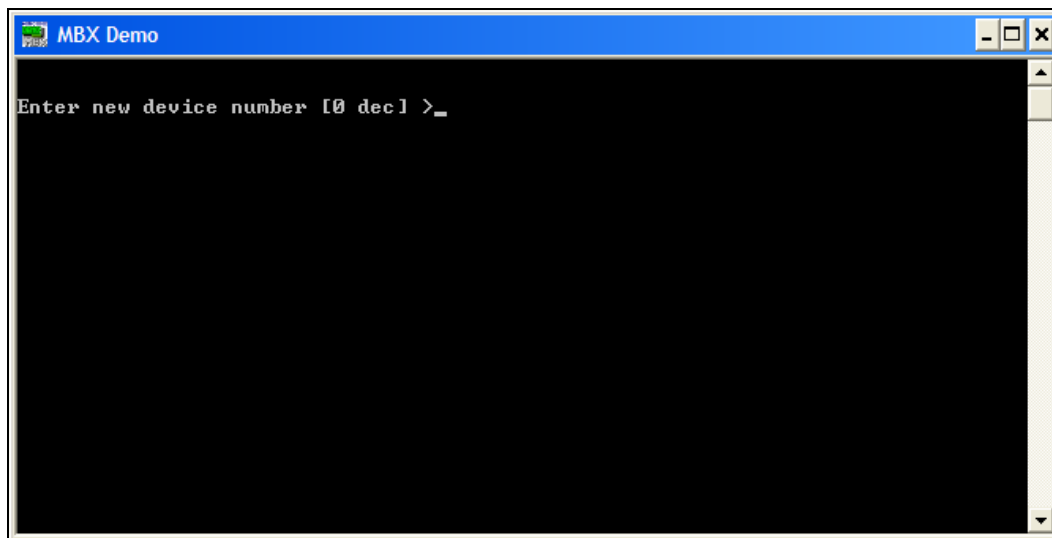
The simple command-line interface mimics earlier tools familiar to most users. It displays menu choices that take the user to secondary level screens.

Press **Esc** at any screen to return to the main menu shown above.

Press **Esc** in the main window to exit the program.

### **[1] Set Device Number**

When the MBX Demo program starts, the device number defaults to 0. To change it, press **1**.

A screenshot of the "MBX Demo" window showing a prompt for a new device number. The text in the window is:

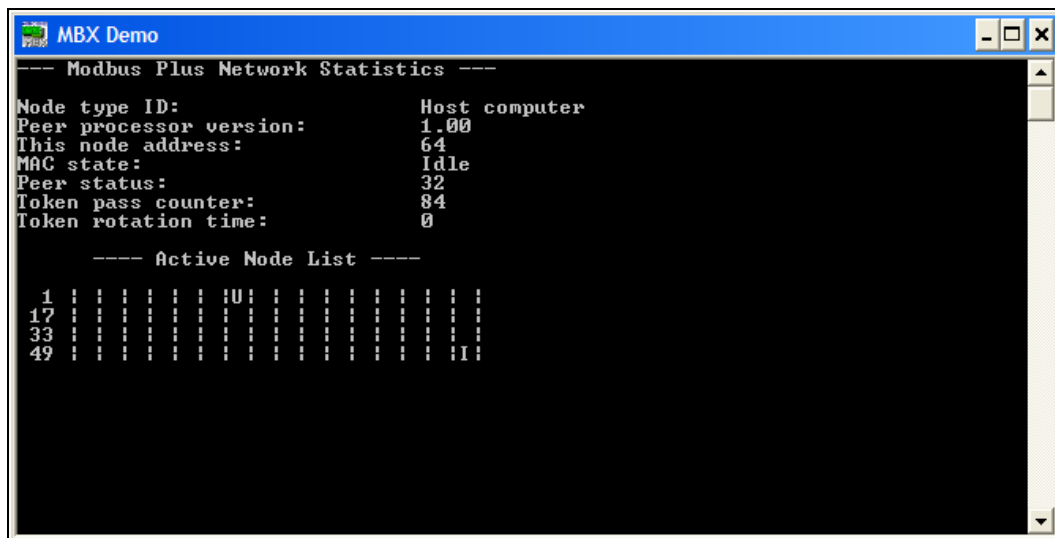
```
Enter new device number [0 dec] >_
```

At the prompt, enter the desired device number and press the **Enter** key to change the selected device and return to the main menu.

Verify that the device type shown on the main menu matches the type you configured for the selected device number.

### **[B] Read Device Status**

From the main menu, press **B**. This launches the device status screen, which shows all active nodes on the network.



In the Active Node List grid, the letter I designates the node you are working from and the letter U designates other nodes found on the network.

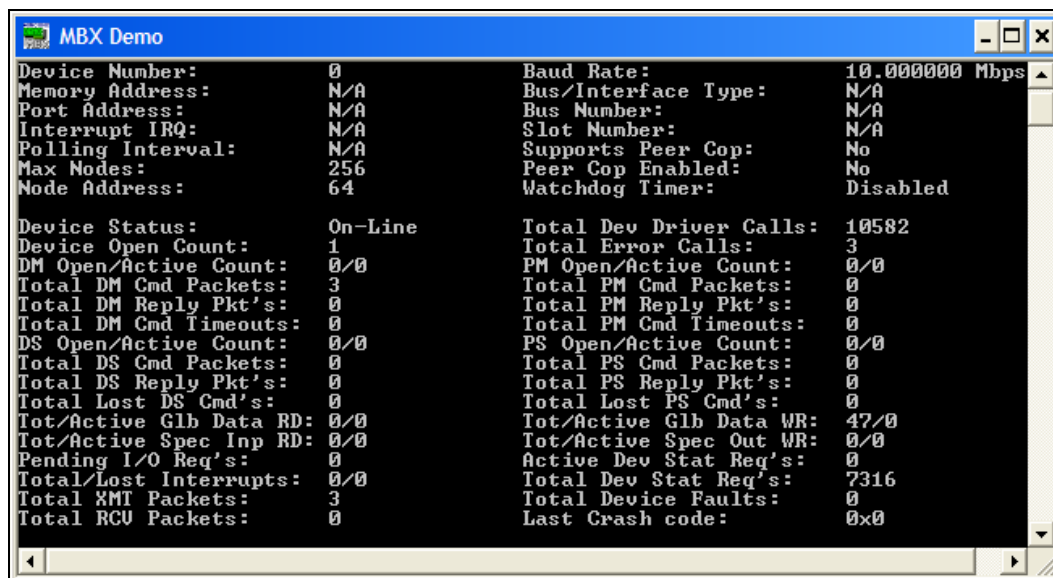
**Note** Only nodes that were configured using the mapped addressing technique will be shown here. If you have not configured mapped addressing, the only node you will see here is the one you are working from.

Verify that all expected nodes are shown, and that their node addresses are correct. The node address for I should be the value you chose for This Node on the Master Paths tab.

Press **Esc** to return to the main menu.

### **[C] Device Information**

From the main menu, press **C** to launch the Device information screen.



```

MBX Demo
Device Number:      0          Baud Rate:          10.000000 Mbps
Memory Address:    N/A        Bus/Interface Type: N/A
Port Address:      N/A        Bus Number:         N/A
Interrupt IRQ:     N/A        Slot Number:        N/A
Polling Interval:  N/A        Supports Peer Cop:  No
Max Nodes:         256        Peer Cop Enabled:   No
Node Address:      64         Watchdog Timer:     Disabled

Device Status:     On-Line    Total Dev Driver Calls: 10582
Device Open Count: 1          Total Error Calls:    3
DM Open/Active Count: 0/0    PM Open/Active Count: 0/0
Total DM Cmd Packets: 3       Total PM Cmd Packets: 0
Total DM Reply Pkt's: 0       Total PM Reply Pkt's: 0
Total DM Cmd Timeouts: 0      Total PM Cmd Timeouts: 0
DS Open/Active Count: 0/0    PS Open/Active Count: 0/0
Total DS Cmd Packets: 0       Total PS Cmd Packets: 0
Total DS Reply Pkt's: 0       Total PS Reply Pkt's: 0
Total Lost DS Cmd's: 0        Total Lost PS Cmd's: 0
Tot/Active Glb Data RD: 0/0   Tot/Active Glb Data WR: 47/0
Tot/Active Spec Inp RD: 0/0   Tot/Active Spec Out WR: 0/0
Pending I/O Req's: 0          Active Dev Stat Req's: 0
Total/Lost Interrupts: 0/0    Total Dev Stat Req's: 7316
Total XMT Packets: 3          Total Device Faults: 0
Total RCU Packets: 0          Last Crash code:     0x0

```

This screen shows configuration, statistical and diagnostic information about the driver, the device and the network.

After viewing the information, press **Esc** to return to the main menu.

## [2] Read Selected Node

To read data from registers on a specific node, press **2**.



```

MBX Demo
Enter routing path (e.g. 25.1.34.16) >7
Enter reference value (e.g. 40001) >40001
Enter length (e.g. 10) >5

```

Enter the **routing path** of the node you want to read from. If you are entering an IP address directly, you must include the destination index as the first byte, followed by the four-byte IP address. Otherwise, enter the mapped node address. The example shown uses mapped addressing, so entering just 7 was sufficient.

The **reference value** is the register address of the data you want to read. If you want to read from more than a single register, enter the first register's reference value.

The **length** is the number of consecutive data items you want to read.

In the example shown, we want to read from the device at mapped node 7, and will read five registers beginning with 40001, that is, registers 40001 – 40005.

Press **Enter** to initiate the read. The requested data will be displayed on the screen. Press **Esc** to return to the main menu.

### Other Operations

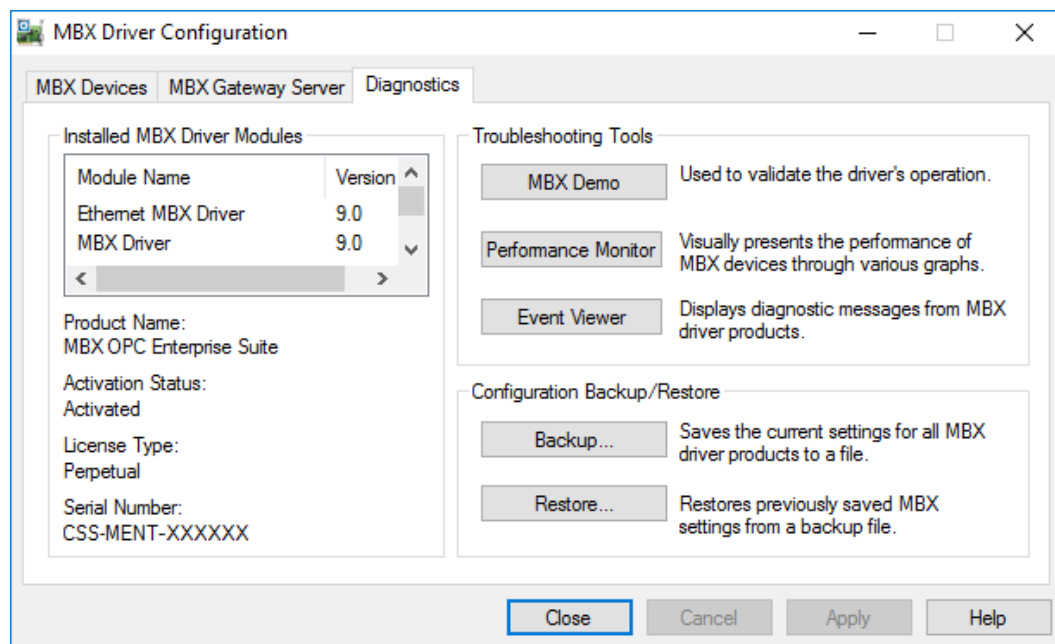
The rest of the functions available on the main menu will perform read and write operations in a manner similar to the Read Selected Node function.

## Performance Monitor

Microsoft provides a diagnostic tool, the Performance Monitor, as part of the Windows operating system. Applications supporting the Performance Monitor, including the MBX driver family, allow users to monitor relevant performance information. Multiple devices can be monitored simultaneously for comparison.

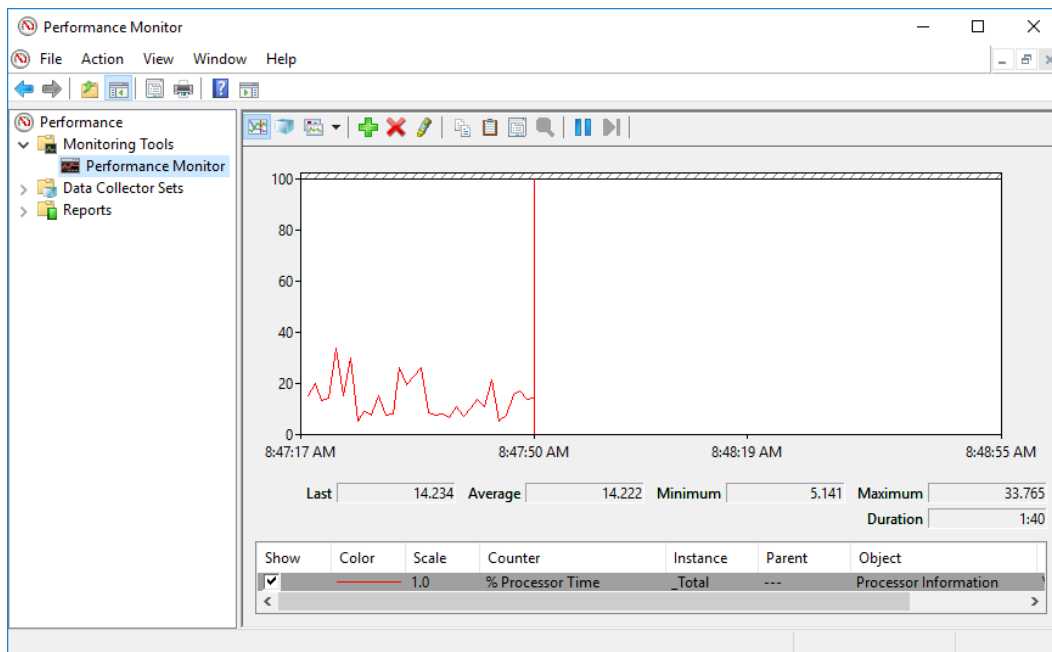
To run the program, open the Windows **Start** menu and locate the product suite you have installed. From there, go to **Diagnostics** and select **Performance Monitor**.

Alternatively, go to the Diagnostics tab of the MBX Driver Configuration Editor and click the **Performance Monitor** button.

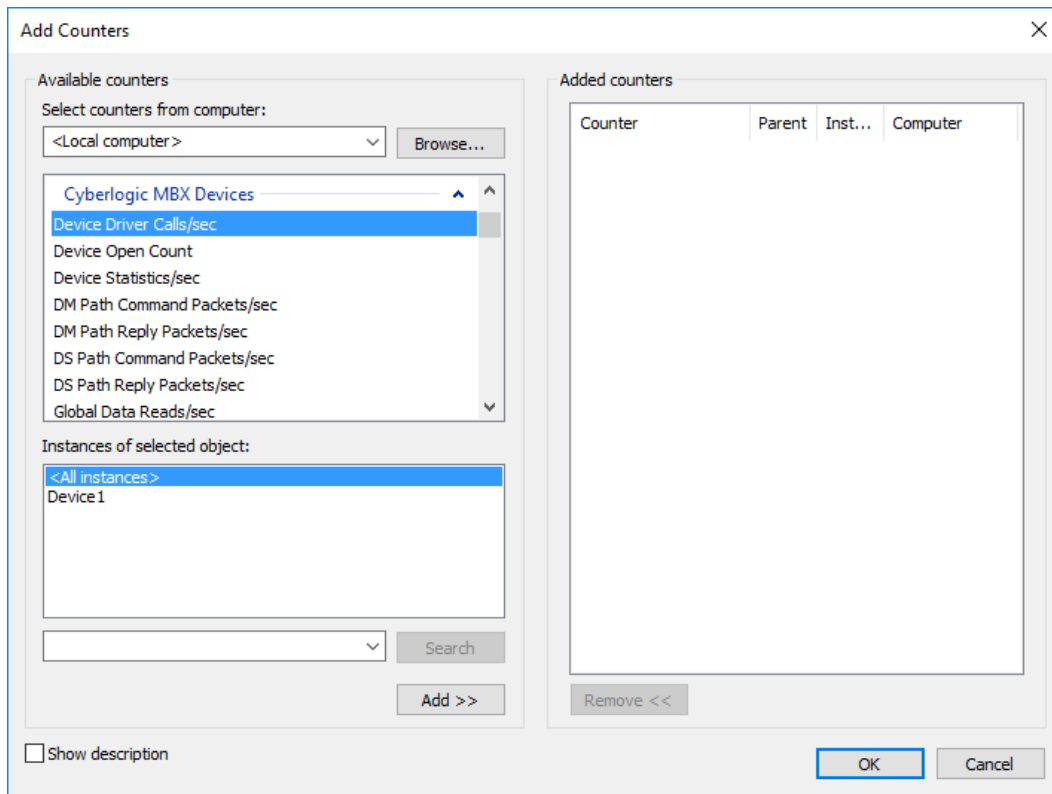


### How to Use the Performance Monitor

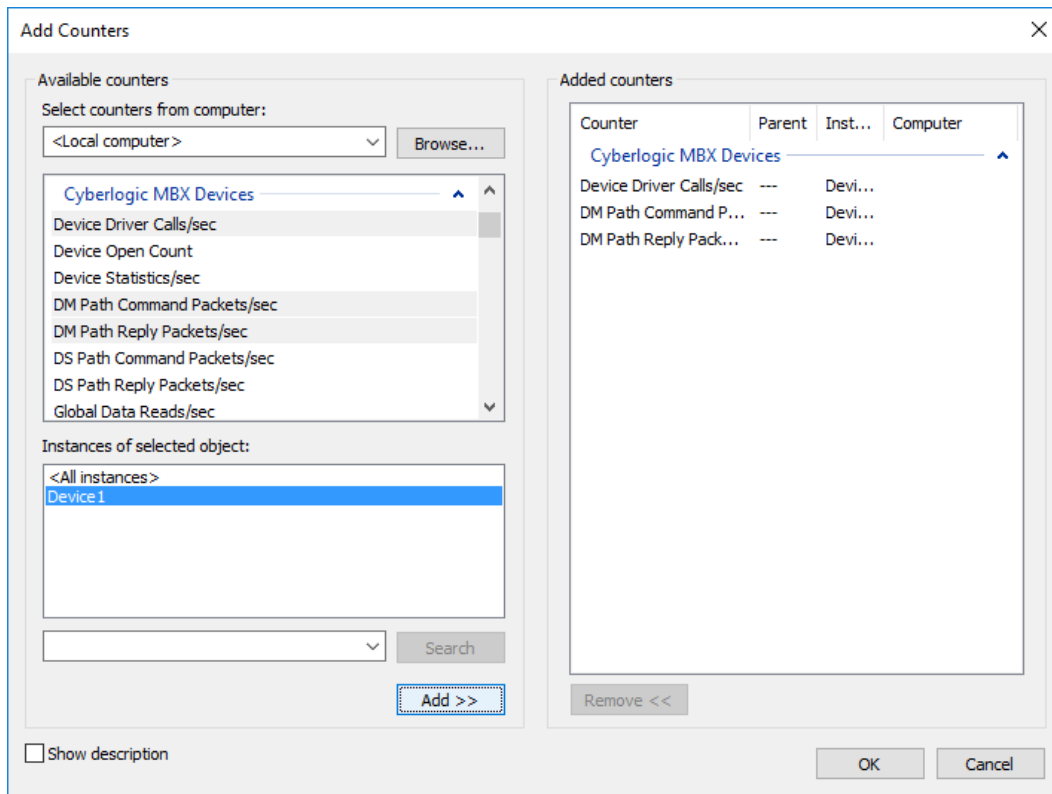
Since extensive help is provided for this program by Microsoft, only a few points relevant to the MBX Driver family are shown here.



1. When the Performance Monitor program starts, click the **+** button on the tool bar.

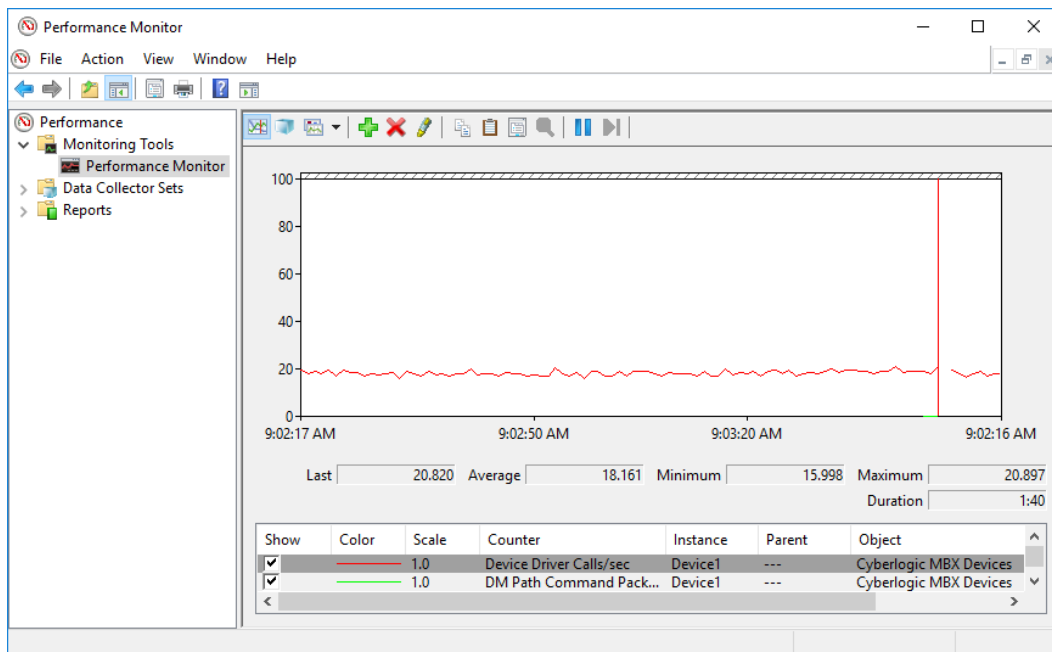


2. Select **Cyberlogic MBX Devices** from the **Available counters** list.



3. Choose a counter and the MBX device, and then click **Add**. Repeat this for all the counters you want to view.

4. Click **OK**. The counters you chose will then be displayed in graphical format.

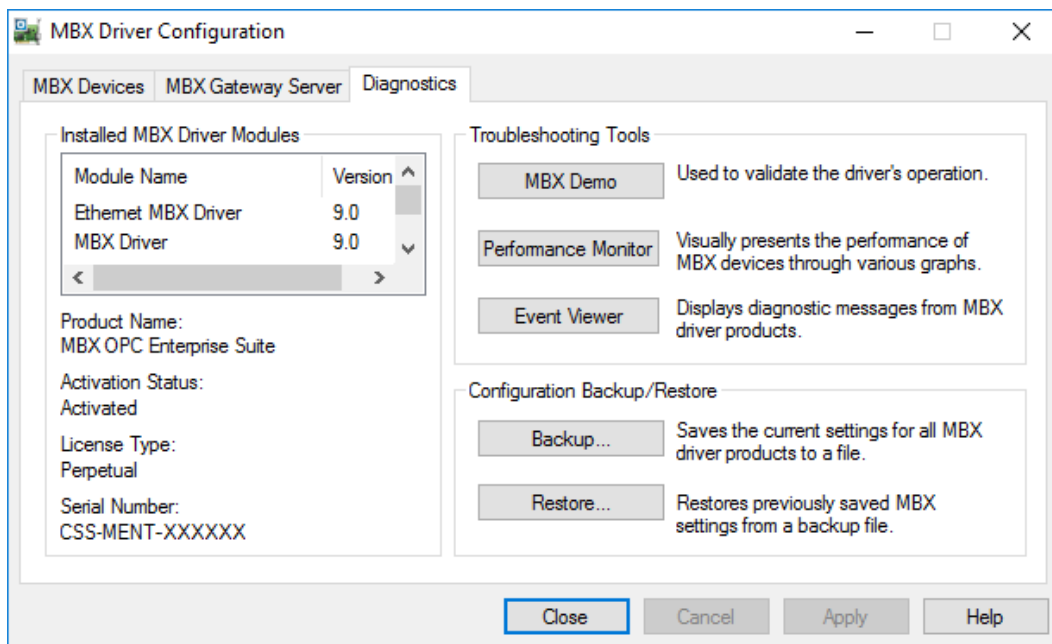




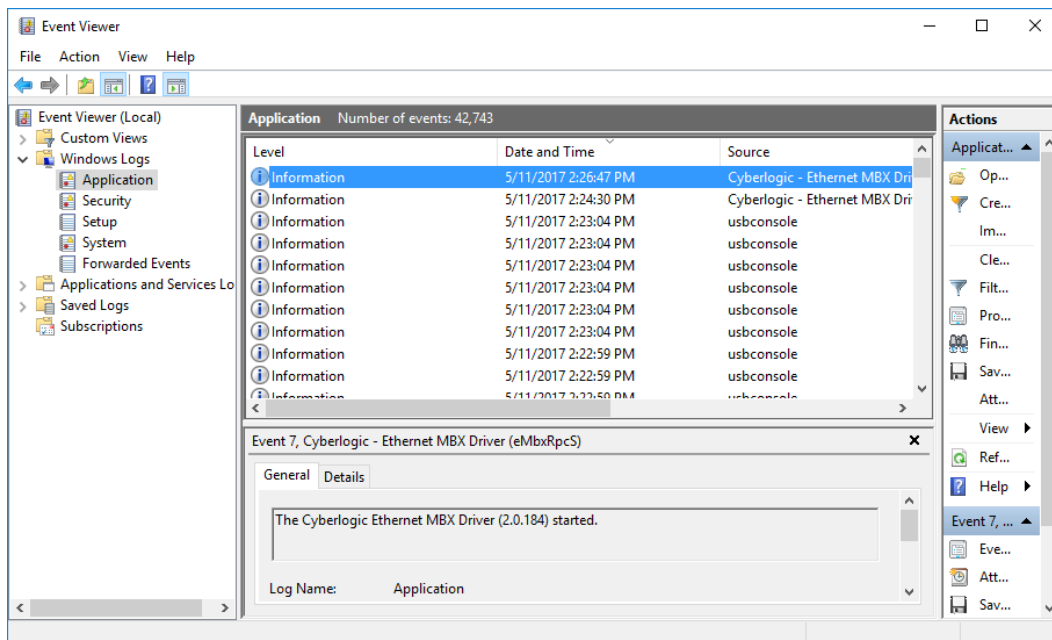
## Event Viewer

During startup and operation, the MBX drivers may detect problems or other significant events. When a noteworthy event is detected, the driver sends an appropriate message to the Windows Event Logger. You can view these messages using the following procedure.

1. Open the Windows **Start** menu and locate the product suite you have installed. From there, go to **Diagnostics** and select **Event Viewer**.



Alternatively, click the **Event Viewer** button on the Diagnostics tab of the MBX Driver Configuration Editor.



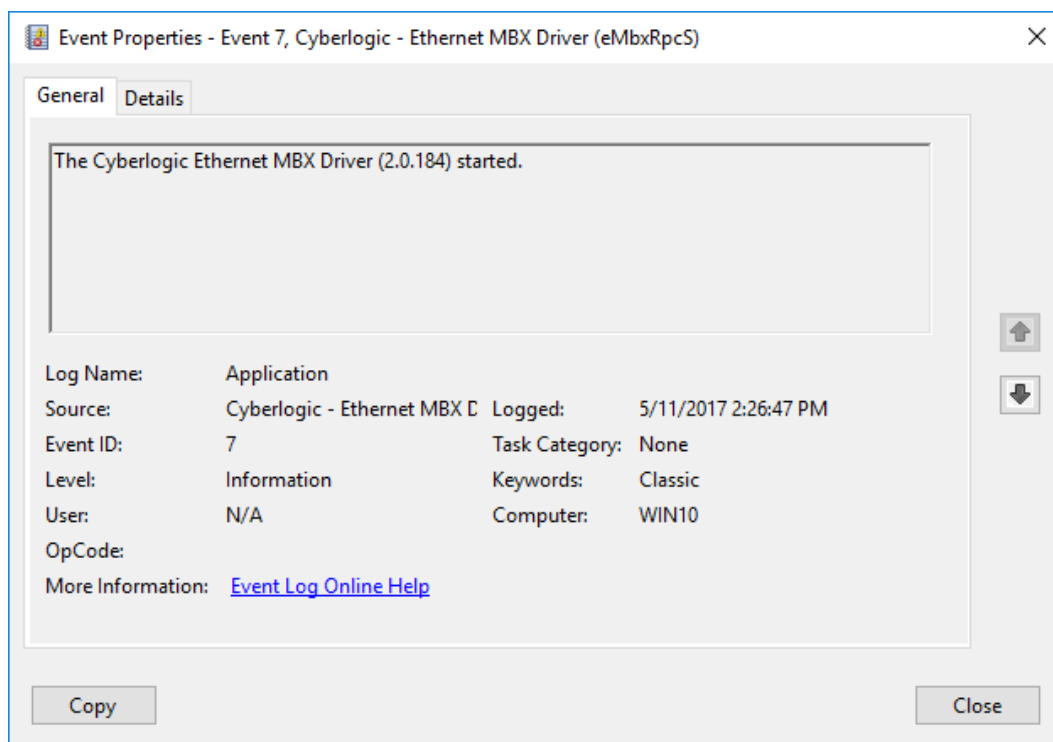
2. If you are looking for events relating to the Ethernet MBX Driver, select the **Windows Logs|Application** branch from the Event Viewer tree, and look for entries in the **Source** column named **Cyberlogic – Ethernet MBX Driver (eMbxRpcS)**.

For other types of events, select the Application branch from the Event Viewer tree, and look for entries in the **Source** column that begin with **Cyberlogic**.

**Caution!**

The Event Viewer does not clear itself after rebooting. Check the time stamps of the messages to be sure that you are not looking at an old error message.

3. Double-click on the desired entry to display a complete event message.



4. For further descriptions of the error log messages, refer to the [Ethernet MBX Driver Messages](#) section.

## Ethernet MBX Driver Messages

***EDHXAPIM.DLL failed to load. Reinstall the product.***

A necessary DLL could not be loaded. This may indicate a corrupted installation. Repair the existing installation or remove and reinstall the software.

***Cyberlogic Ethernet MBX Driver is already running! Server start operation has been aborted.***

The driver could not start because another copy of it is already running.

***The Cyberlogic Ethernet MBX Driver (<Version Number>) started.***

The driver successfully started. The driver's version number may be requested if you call Cyberlogic Tech Support.

***Unable to initialize global system resources.***

The driver was unable to allocate enough memory to start. Close other open applications or add more memory to the system, and then try to restart the driver.

***The target node (<Target IP Address>) closed the connection. This may indicate there are more connections to the target node than it can handle.***

A connection to the remote device was closed by that device. This may indicate that the target node is unable to handle any more connections. If this persists, reduce the number of master paths that access the remote device.

***Cyberlogic Ethernet MBX Driver service stopped because there are no Ethernet MBX devices configured.***

The driver shut down because there were no devices configured. To run the driver, create at least one Ethernet MBX device in the MBX Driver Configuration editor and restart the driver.

***Registration DLL failed to load. The I/O operations of the Ethernet MBX Driver have been disabled. Reinstall the product.***

A necessary registration DLL could not be loaded. This may indicate a corrupted installation. Repair the existing installation, or remove and reinstall the software.

***Product license verification failed. The I/O operations of the Ethernet MBX Driver have been disabled. Reinstall the product.***

A registration check indicated that the software's evaluation time has expired. Run the Activation Wizard to authorize further use of the software.

***This is a <Number of Hours>-hour promotional copy of the Ethernet MBX Driver. The application started at <Start Time> and the driver will stop at <Stop Time>.***

This is a time-limited installation of the software. After the stop time, the driver will not allow any further I/O operations.

***This is a promotional copy of the Ethernet MBX Driver. The allowed operation time has expired. The I/O operations of the Ethernet MBX Driver have been disabled.***

This is a time-limited installation of the software. The stop time has been reached or exceeded, so the driver will not allow any further I/O operations.

***The Cyberlogic License Server failed to respond with valid license information. The I/O operations of the Ethernet MBX Driver have been disabled. Contact the manufacturer's technical support.***

The driver experienced a problem when it tried to contact the Cyberlogic License Server. If the license server is not running, start it and then try restarting the driver. If the license server is already running, contact Cyberlogic Tech Support.

## Frequently Asked Questions

### ***I've installed the software. What's next?***

The next step is to configure an Ethernet MBX logical device. Refer to the [Quick-Start Guide](#) for detailed instructions. After this is done, run the [MBX Demo](#) to test the driver.

### ***I've configured an Ethernet MBX device. How do I know that it's working?***

To test the Ethernet MBX Driver, there are two options in the Validation & Troubleshooting section. First use the [MBX Demo](#) to confirm that the device is operating properly, and then use the [Performance Monitor](#) as a benchmark reference.

### ***I have configured my Ethernet MBX device. However, when I try to do any Peer Cop related I/O requests, I get an error. What's the problem?***

Ethernet MBX communications do not support Peer Cop.

### ***In MBX Demo, when I select Read Device Status or Device Information I get an error that says The system cannot find the file specified (Error code 1806).***

#### *Cause 1*

Verify that at least one Ethernet MBX device has been configured. If not, refer to the [Quick-Start Guide](#) for details on setting up an Ethernet MBX device.

#### *Cause 2*

The Ethernet MBX Driver could not find the MBX device specified under Device Number. Refer to the [Quick-Start Guide](#) for details on finding and entering this information.

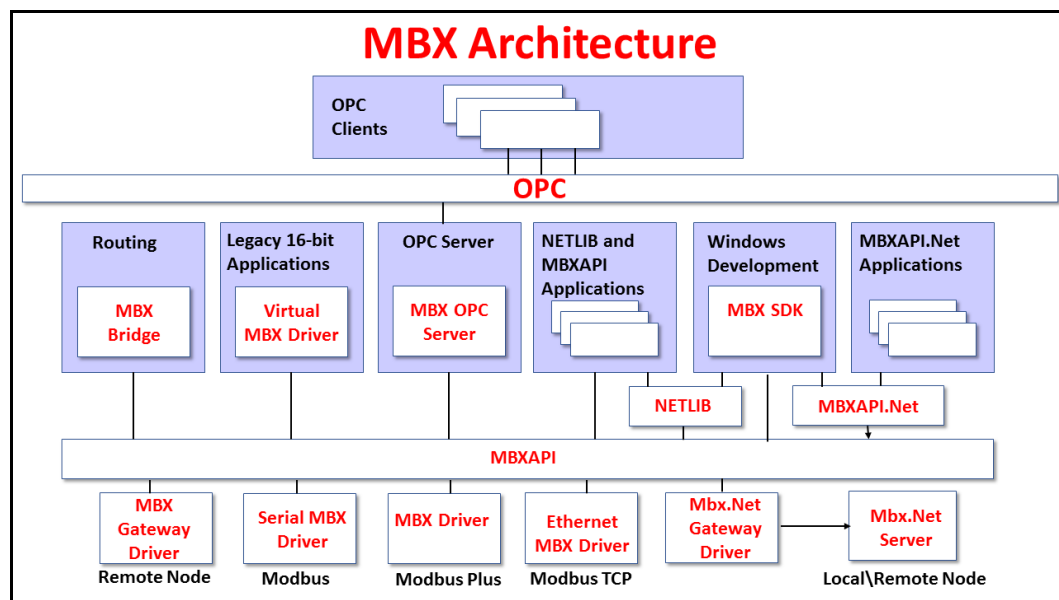
### ***I have two Ethernet MBX devices configured in the system. How do I communicate through the second one?***

MBX Demo uses the device number to determine which device to use. *[1] Set Device Number* lets you choose which configured Ethernet MBX device the utility will use. If you are using some other software product, contact the manufacturer for more information on using multiple devices.

## APPENDIX: MBX ARCHITECTURE AND COMPANION PRODUCTS

The Ethernet MBX Driver is part of the Cyberlogic MBX family. This family consists of several well-integrated products that provide connectivity for Modbus, Modbus Plus and Modbus TCP (Ethernet) networks in distributed environments.

This section illustrates the layout of the MBX architecture. It includes a description of each MBX component along with suggested methods for employing them to support Modicon networks.



*The MBX architecture presents a consistent framework to address different connectivity needs.*

### MBX Driver

The MBX Driver provides connectivity between Modbus Plus interface adapters and Windows-based applications. It supports all Modbus Plus interface adapters for PCI Express (PCIe), PCI, USB and PCMCIA buses that are compatible with the supported operating systems. For a complete list of supported adapters, refer to the MBX Driver help file. Multiple interface cards can be installed at the same time, limited only by the number of available slots.

The kernel mode device driver of the MBX Driver is the highest-performance Modbus Plus driver in the industry. The driver operates in either interrupt or polled mode and fully implements all Modbus Plus features, providing support for Data Master/Slave, Program Master/Slave, Global Data and Peer Cop. The high-performance native API (MBXAPI) of the MBX Driver takes advantage of the event-driven, multitasking, multithreaded features of Windows operating systems.

The driver includes the MBX Gateway Server for remote access by the MBX Gateway Driver and is fully compatible with all other components of the MBX family.

The MBX Driver is included in the following products:

- MBX OPC Enterprise Suite
- MBX OPC Premier Suite
- MBX OPC Server Suite
- MBX Bridge Suite
- MBX Driver Suite

## **Ethernet MBX Driver**

The Cyberlogic Ethernet MBX Driver emulates Modbus Plus over the Modbus TCP protocol. This allows most Modbus Plus-compatible software to gain instant access to Modbus TCP-enabled devices without code modifications. It is compatible with all Ethernet cards supported by Windows.

The driver includes the MBX Gateway Server for remote access by the MBX Gateway Driver and is fully compatible with all other components of the MBX family.

The Ethernet MBX Driver is included in the following products:

- MBX OPC Enterprise Suite
- MBX OPC Premier Suite
- MBX OPC Server Suite
- MBX Bridge Suite
- MBX Driver Suite

## **Serial MBX Driver**

The Serial MBX Driver provides connectivity to Modbus-compatible devices through standard serial COM ports. It supports both master and slave node communications for Modbus ASCII and Modbus RTU protocols.

The driver includes the MBX Gateway Server for remote access by the MBX Gateway Driver and is fully compatible with all other components of the MBX family.

The Serial MBX Driver is included in the following products:

- MBX OPC Enterprise Suite
- MBX OPC Premier Suite
- MBX OPC Server Suite
- MBX Bridge Suite
- MBX Driver Suite (Some OEM versions do not include the Serial MBX Driver.)

## MBX Gateway Driver

The MBX Gateway Driver lets applications use MBX devices on remote MBX Gateway Server nodes as though they were on the local system. The client system running the MBX Gateway Driver must be a Windows node connected over a standard LAN to another system running the MBX Gateway Server. It can then access the Modbus, Modbus Plus and Modbus TCP networks that are connected to the server node.

For example, the MBX Gateway Driver provides complete MBX Driver functionality to the client node applications, including support for Data Master/Slave, Program Master/Slave, Global Data and Peer Cop. An interface adapter, such as a PCIe-85 card, is not required on the client node. MBX Gateway Driver nodes can communicate with multiple remote servers and all Windows-compatible TCP/IP networks are supported.

The MBX Gateway Driver is compatible with all other components of the MBX family.

The MBX Gateway Driver is included in the following products:

- MBX OPC Enterprise Suite
- MBX OPC Premier Suite
- MBX OPC Server Suite
- MBX Bridge Suite
- MBX Driver Suite

## Mbx.Net Gateway Driver

The Cyberlogic Mbx.Net Gateway Driver provides similar functionality to the Cyberlogic MBX Gateway Driver. However, the Mbx.Net Gateway Driver uses newer and more secure infrastructure, and allows for more communication protocols.

The driver connects existing applications that use the MBXAPI, MBXAPI.Net or NETLIB to the Mbx.Net Server. The server can be on the local network or anywhere on the internet. The Mbx.Net Gateway node provides access to all MBX devices as though they were on the local system. The connection can be through Http, Net.Tcp or Net.Pipe protocols. A secure connection can be established and protected by a user name/password.

The Mbx.Net Gateway Driver is compatible with all other components of the MBX family.

The Mbx.Net Gateway Driver is included in the following products:

- Mbx.Net Suite
- Mbx.Net Premier Suite

## Virtual MBX Driver

The Virtual MBX Driver enables 16-bit NETLIB/NetBIOS-compatible applications, such as Modsoft and Concept, to run concurrently with 32-bit applications on the same computer.



It allows multiple 16-bit applications and multiple instances of a single 16-bit application to run under the latest 32-bit Windows operating systems.

If your computer uses a 64-bit edition of Windows, refer to Cyberlogic Knowledge Base article *KB2010-02 Running 16-Bit Applications* for important information on using the Virtual MBX Driver on your system.

The Virtual MBX Driver is fully compatible with all MBX components and requires at least one of these drivers to operate:

- MBX Driver
- Ethernet MBX Driver
- Serial MBX Driver
- MBX Gateway Driver
- Mbx.Net Gateway Driver

The Virtual MBX Driver is included in the following products:

- MBX OPC Enterprise Suite
- MBX OPC Premier Suite
- MBX OPC Server Suite
- MBX Bridge Suite
- MBX Driver Suite

## **MBX Bridge**

The MBX Bridge seamlessly routes messages between MBX-compatible devices. For example, the MBX Bridge can route messages between Ethernet and Modbus Plus networks, between Modbus and Modbus Plus networks or any other combination of the supported networks.

Depending on the user's needs, it requires one or more of the following drivers to operate:

- MBX Driver
- Ethernet MBX Driver
- Serial MBX Driver
- MBX Gateway Driver
- Mbx.Net Gateway Driver

The MBX Bridge is included in the MBX Bridge Suite.

## **MBX OPC Server**

The Cyberlogic MBX OPC Server connects OPC-compliant client applications to Modbus, Modbus Plus and Modbus TCP networks. It supports the latest OPC Data Access and OPC

Alarms and Events specifications and uses the MBX drivers for connectivity to Modicon networks.

The MBX OPC Server supports multiple, priority-based access paths for reliable, redundant communications. It also supports both solicited and unsolicited communications and uses an advanced transaction optimizer to guarantee minimum load on your networks. With only a couple of mouse clicks, the MBX OPC Server will automatically detect and configure the attached networks and node devices. Other noteworthy features include DirectAccess, Data Write Protection and Health Watchdog.

The MBX OPC Server is included in the following products:

- MBX OPC Enterprise Suite
- MBX OPC Premier Suite
- MBX OPC Server Suite

## **MbpStat.Net**

The MbpStat.Net provides the same functionality as the original DOS-based MBPSTAT application. It can monitor local or remote Modbus Plus by connecting to systems running the Mbx.Net Server. It can run on 32-bit and 64-bit Windows, and it does not require the Virtual MBX Driver.

The MbpStat.Net is included in the following products:

- Mbx.Net Suite
- Mbx.Net Premier Suite

## **Mbx.Net Server**

The Cyberlogic Mbx.Net Server connects applications that use the MBXAPI, MBXAPI.Net or NETLIB to Modbus, Modbus Plus and Modbus TCP networks. The client applications and server can be on the local network or connected through the Internet.

The server is a Windows Communication Foundation (WCF) server that supports Http, Net.Tcp and Net.pipe protocols. It allows connections to be secured with a user name/password. When used with an application like MbpStat.Net it allows remote monitoring of networks and devices. Existing applications can use the server along with the Mbx.Net Gateway Driver to securely connect to remote devices.

The Mbx.Net Server is included in the following products:

- Mbx.Net Suite
- Mbx.Net Premier Suite

## **MBX SDK**

Software developers can use the MBX Software Development Kit to provide connectivity to Modbus, Modbus Plus and Modbus TCP networks from their 32-bit and 64-bit C/C++/C# applications.

The SDK supports NETLIB, and Cyberlogic's high-performance MBXAPI and MBXAPI.Net interfaces. NETLIB is an excellent bridge for developers who would like to port their 16-bit applications to the latest Windows environments. Developers of new applications can use any of the three interfaces. For a complete reference of all NETLIB library functions, refer to *Modicon IBM Host Based Devices User's Guide*, available from Schneider Electric (Order #890 USE 102 00).

Since all MBX family drivers are built on the same MBX architecture, applications developed with the MBX SDK can be used with all MBX family drivers and can execute under all current Windows operating systems.