

KB2011-01: TROUBLESHOOTING MBX COMMUNICATION

This article explains how to troubleshoot communication problems that may arise when using the MBX family of drivers for Modicon networks. You will learn a systematic procedure to help you verify that:

- The software is updated to the latest version.
- The software is properly activated.
- You have configured the correct device type for your hardware.
- The driver is running.
- The driver is able to communicate with the PLC.

Applies To:

All installations that use the MBX family of drivers:

- MBX Driver Suite
- MBX OPC Server Suite
- MBX OPC Premier Suite
- MBX OPC Enterprise Suite
- MBX Bridge Suite
- OEM version of the MBX device drivers supplied with Schneider Electric network adapters

Issues:

Common problems with MBX communication result from:

- Software that is not activated
- Drivers that are not configured for automatic startup
- Missing or incorrectly configured MBX devices
- MBX device type that is incorrect for the network or PLC in use
- Hardware problems

Procedure:

The general steps in the troubleshooting procedure are these:

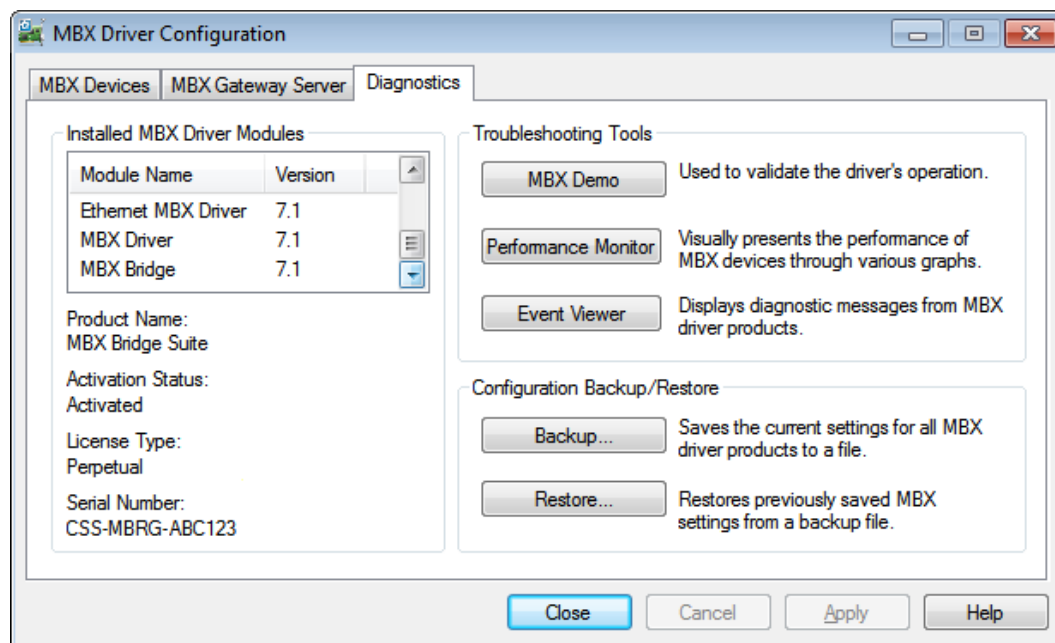
- Verify that the needed drivers are installed and that they are at the current revision level.
- Determine whether the software is activated, in evaluation mode, or in demo mode.
- Verify that the Virtual MBX Driver is configured, if needed.
- Verify that an MBX device is configured and that it is the right type for the target PLC.
- Verify that the driver reports itself as running and is configured for automatic startup.
- Verify that the MBX Gateway Server is configured for automatic startup, if needed.
- Verify that the driver is running and can "see" the target PLC.
- Read data from the PLC.
- Use Telnet to check Ethernet connections.
- Get error information from the Windows Event Viewer.
- Check the OPC server network configuration, if used.

Note

If the system you are troubleshooting uses the MBX Gateway Driver to communicate through an interface in another computer, you must first verify that the other computer works properly. Go to that system and use these procedures to verify that its communication works and that the MBX Gateway Server is running. After that, you can return to the local computer and repeat the process.

What drivers are installed?

Open the Windows **Start** menu and locate the submenu for the MBX product you have installed. From there, open the **Configuration** submenu, and then select **MBX Device Drivers**. The MBX Driver Configuration editor will open.



Select the **Diagnostics** tab. On the left side, you will see a list of installed MBX Driver modules. This list includes not only the drivers themselves, but also other Cyberlogic software modules that use those drivers, such as the MBX Bridge or MBX OPC Server.

You should see one or more of these drivers:

- *MBX Driver*, for Modbus Plus networks
- *Ethernet MBX Driver*, for Ethernet networks
- *Serial MBX Driver*, for Modbus networks
- *Virtual MBX Driver*, to support legacy 16-bit applications
- *MBX Gateway Driver*, to provide access to MBX devices in other systems

Verify that the drivers you need are listed.

What if a driver is missing?

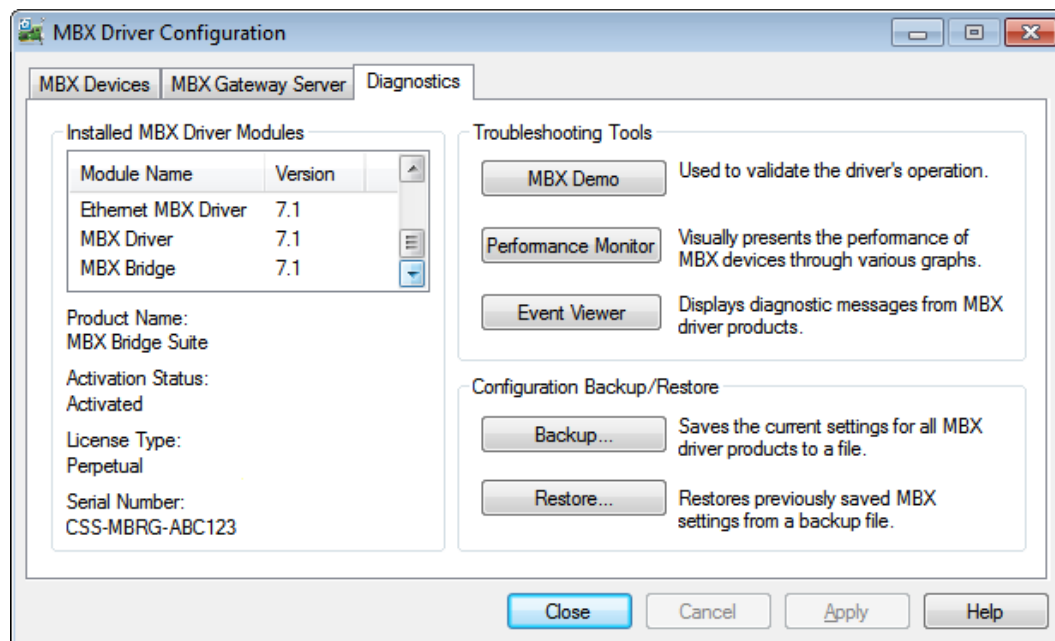
If the driver you need is not on the list, you'll have to install it. To do that, check the **Product Name** that is shown below the module list to see what MBX product is installed. In this example, it is the MBX Bridge Suite. You can run the installation wizard from the product disk to add the missing drivers.

Note

The OEM driver disk that comes with Schneider Electric network adapters does not include the Serial MBX Driver. If you need that driver, contact Cyberlogic to purchase the full version of the MBX Driver Suite.

Are the drivers up to date?

The Installed MBX Driver Modules list also tells you the version of each module that is installed.



In this case, the version 7.1 drivers are installed. If you have applied any updates, the update number will appear also. It will look like: *6.0.0+Update20080314*, for example.

Cyberlogic's website, www.cyberlogic.com, has the latest updates and patches for all of our software products available for download. On the download page, you can determine if the version on your system is up to date.

What if my drivers are outdated?

Updates within a major release level, such as version 6 or 7, may be applied at no cost. If your installation is not up to the current service release for your major version level, you should download the update and apply it. Update packages are cumulative, so you need only apply the most recent one. Updates do not need activation, and applying an update will not affect the activation status of your software.

If your software is not at the current major release level, you should consider upgrading. You will be required to purchase a license for the new version, but you may be eligible for an upgrade discount. Contact Cyberlogic' sales department for price and discount information.

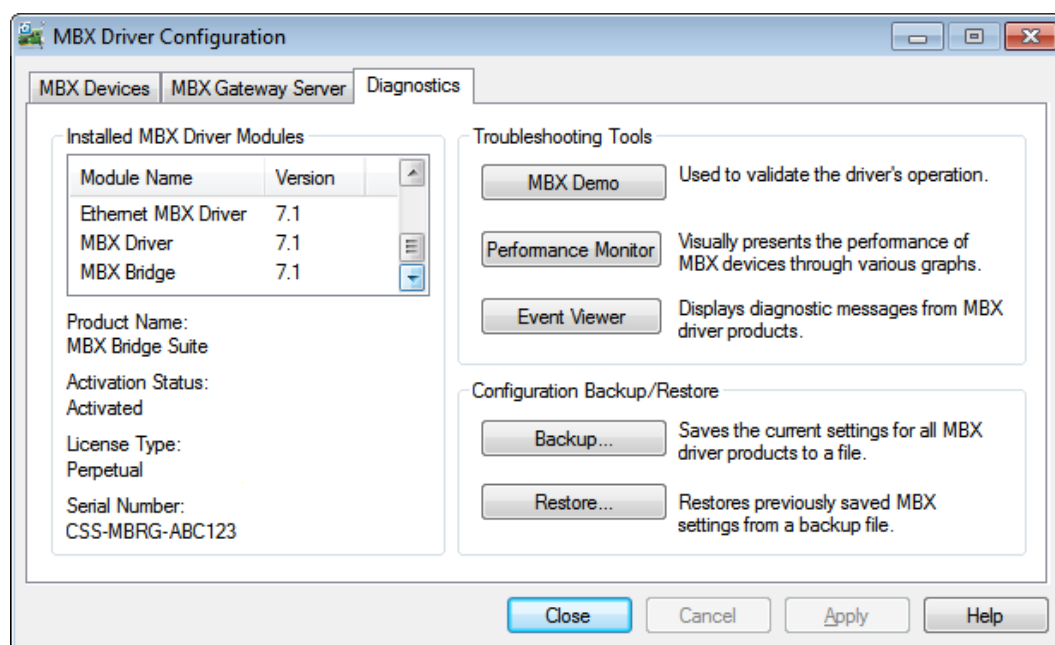
Caution!

Before you upgrade to a new major release level, be sure that the new release level supports the Windows version that is installed on your system. All Cyberlogic products on a given system must be at the same release level, so you may have to upgrade more than one product. In addition, if you currently use the legacy Remote MBX Driver, the upgrade may affect other systems as well. Contact Cyberlogic technical support for complete information about upgrading.

This caution note does not apply to updates within a major release level. Such updates always maintain operating system and product compatibility.

Is the software activated?

Cyberlogic software products must be activated to enable continuous operation. Unactivated products can run continuously for a two-week evaluation period after they are installed. After the two weeks, they enter a demonstration mode, in which they will run for only two hours at a time. You can check the activation status from the diagnostics tab.



On the left side of the screen, we see that this MBX Bridge Suite is activated and the license type is perpetual. The serial number for the license is also displayed. This is typical of a normal installation with an activated product.

If your product is not activated, this section may indicate the expiration date of the two-week evaluation period. In that case, you can run continuously until the given date. It may instead indicate that the evaluation period is over and you are in the two-hour demo mode.

What if my software is not activated?

If you're still in the two-week evaluation period, you should have no problems running normally for the remainder of that period.

If you are in the two-hour demo mode, the drivers will stop after two hours and you will not be able to restart them until after you reboot the computer. After that, you will be able to run for another two hours. Therefore, if you are in this mode and have communication problems, always reboot before you continue. This will ensure that you are within the allotted two hours.

In either case, for continuous, long-term operation, contact Cyberlogic's sales department to purchase a license, and then run the Activation Wizard to activate the product.

Is the Virtual MBX Driver configured, if needed?

The Virtual MBX Driver allows you to run legacy 16-bit applications, both DOS and Windows, under 32-bit Windows operating systems. If you don't plan to use 16-bit applications, then you don't need the Virtual MBX Driver, and you can skip this section.

Note

None of the 64-bit editions of Windows support the use of 16-bit applications, and none of these operating systems permit the Virtual MBX Driver to be installed. The 32-bit editions of Windows 7 and Vista support the Virtual MBX Driver, but do not support all 16-bit applications.

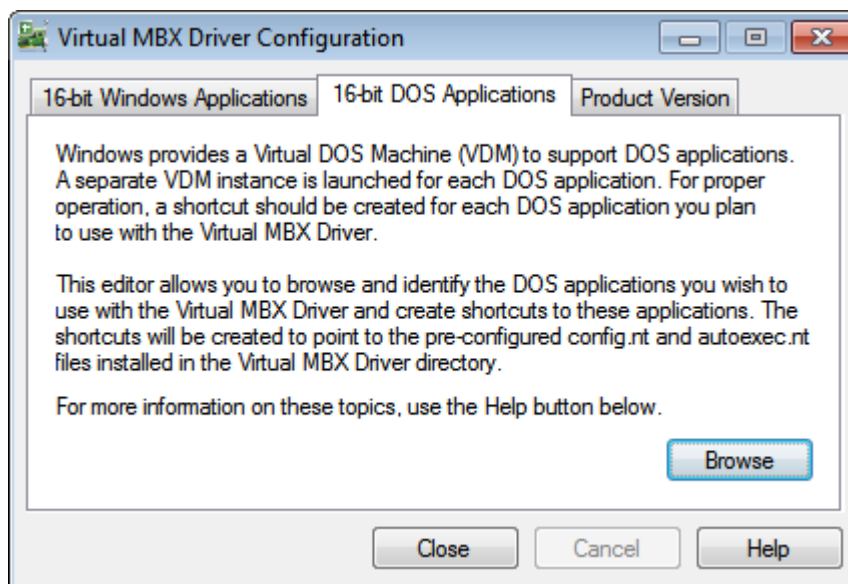
If you want to run a 16-bit application that your operating system does not support, refer to Cyberlogic Knowledge Base article *KB2010-02 Running 16-Bit Applications* for information on a technique that will allow you to run these applications.

To set up the Virtual MBX Driver, open the Windows **Start** menu and locate the submenu for the MBX product you have installed. From there, open the **Configuration** submenu, and then select **Virtual MBX Driver**.

The Virtual MBX Driver Configuration editor will open.

What if I want to run a DOS application?

You can run a DOS application from the command prompt, but we recommend using a shortcut.



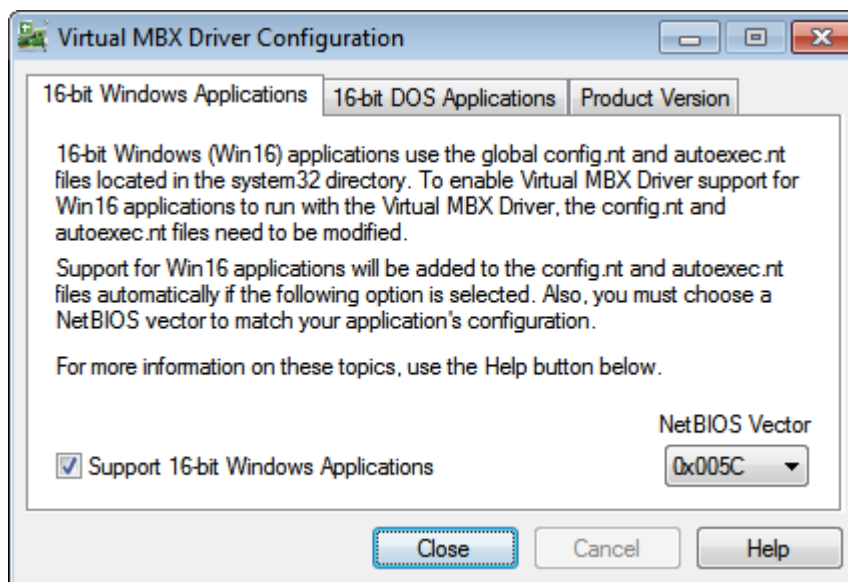
Select the **16-bit DOS Applications** tab, then click the **Browse** button, and then browse for the application you want to run. The editor will create a shortcut for you.

Two popular DOS applications are Modsoft and MBPSTAT. All Cyberlogic MBX software products install shortcuts for these applications, and you can access them from the **Start** menu.

Refer to the *Virtual MBX Driver Help* file for complete information on configuring the Virtual MBX Driver.

What if I want to run a 16-bit Windows application?

To run a 16-bit Windows application, such as Concept or ProWorx, you must make certain changes to the autoexec.nt and config.nt files. The Virtual MBX Driver Configuration editor will do this for you.



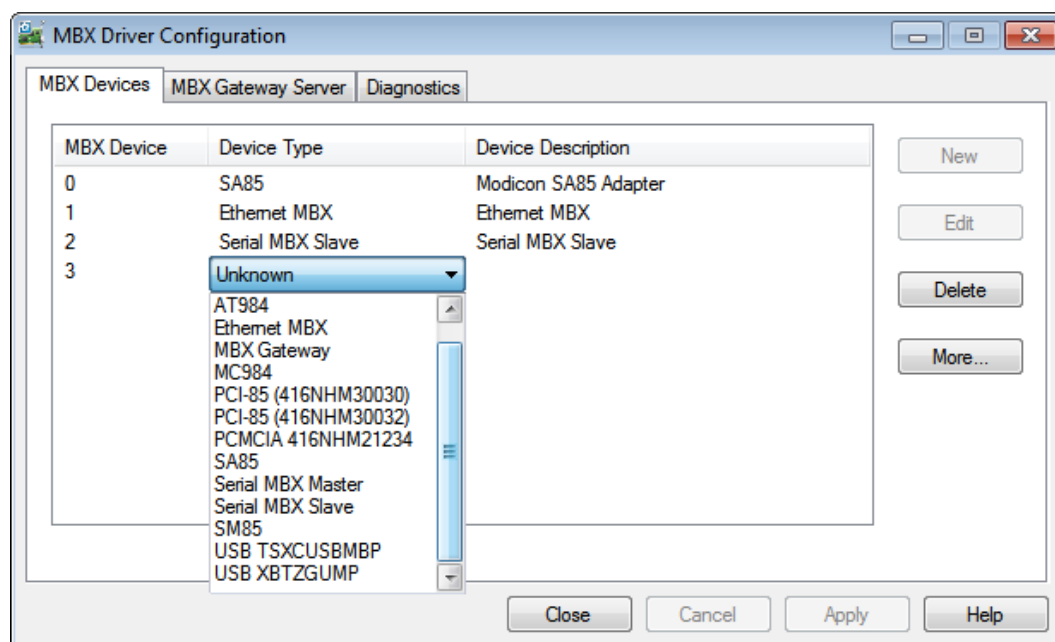
Select the **16-bit Windows Applications** tab and check the **Support 16-bit Windows Applications** box. From the **NetBIOS Vector** drop-down box, select the vector to match your application's configuration. Normally, the default value of 0x005C is correct.

Reboot your system to allow these changes to take effect.

Refer to the *Virtual MBX Driver Help* file for complete information on configuring the Virtual MBX Driver.

Is the correct MBX device type configured?

Each network adapter or port must be configured as an MBX device before you can use it to communicate to other network nodes. The specific device type and configuration depends on your interface hardware and network type. To view and configure these devices, select the **MBX Devices** tab.



This tab shows all of the configured devices and allows you to add and edit devices. In the above figure, the user is adding MBX Device 3 to the configuration, and is selecting the device type from the drop-down menu. Several types are available.

For Modbus Plus networks,

- AT984
- MC984
- PCI-85 (single or dual channel)
- PCMCIA 416NHM21234
- SA85
- SM85
- USB TSXCUSBMBP
- USB XBTZGUMP (supported only in 2-hour demo mode)

For Ethernet (Modbus TCP/IP) networks,

- Ethernet MBX

For Modbus (RTU or ASCII) networks,

- Serial MBX Master
- Serial MBX Slave

For access to Modicon networks in remote systems,

- MBX Gateway

Locate the MBX device for the network you are troubleshooting. Double-click on the device to open it and check the configuration to be sure that it is correct. The configuration items vary greatly from one device type to another. You can find details for each device type in the help files for its driver.

Note

Some plug-and-play network adapters will require you to open the Windows Device Manager to gain access to their configuration editor.

What if no device is configured or if the configured device is the wrong type?

If you don't see a device that matches your network and interface hardware, you must create one. Refer to the help file for the driver type you need: MBX Driver, Ethernet MBX Driver, Serial MBX Driver or MBX Gateway Driver. There you will find complete information and configuration examples.

Is the driver startup mode configured properly?

The drivers are normally configured to start automatically when the system boots. However, this configuration may have changed, and so the driver may not be running.

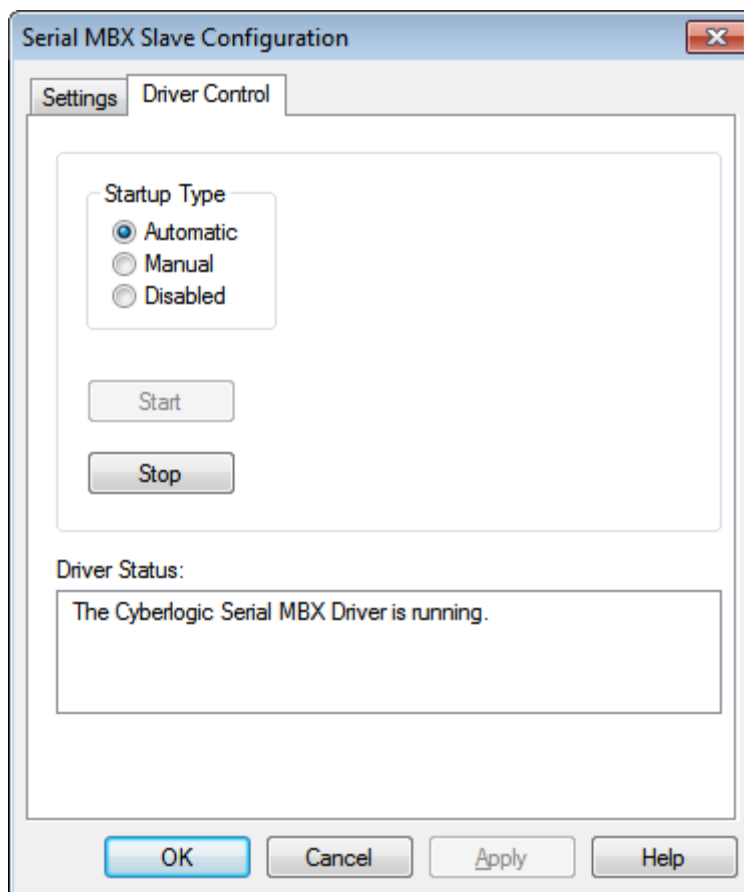
Caution!

If your software is in demo mode and the two-hour period has expired, the driver may be running, but still will not support communication. You must reboot to obtain another two hours of communication.

Note

The driver for plug-and-play Modbus Plus network interface adapters is controlled by the operating system. The procedure in this section does not apply to these adapters.

From the **MBX Devices** tab, double-click on the device you are troubleshooting to open its editor.



Select the **Driver Control** tab.

The above figure shows the Driver Control tab for the Serial MBX Driver. The tab's appearance will be somewhat different for other drivers, but the controls and settings work the same.

In the **Startup Type** group, verify that **Automatic** is selected, and select it if it is not. This setting causes the driver to start whenever the system starts.

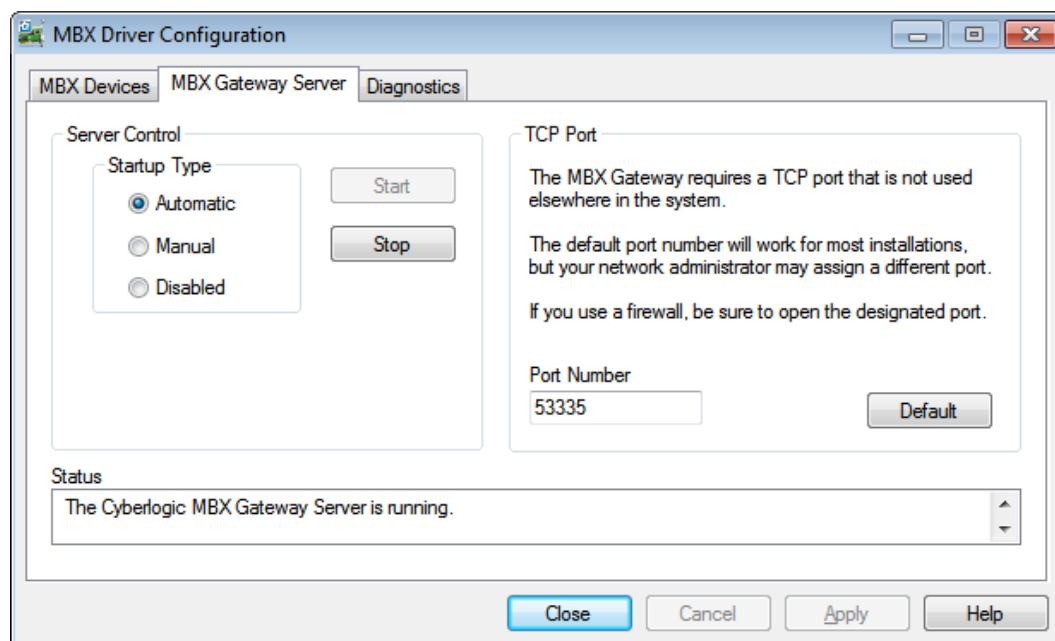
Check the **Driver Status** window to see if the driver is running. If it is not, click the **Start** button. Check the status window again to verify that the driver is now running.

Is the MBX Gateway Server configured to run if needed?

The MBX Gateway Server allows other computers to access the MBX devices in your computer. To do that, the other computers use the MBX Gateway Driver to communicate with your MBX Gateway Server.

Note If no other systems will use the MBX Gateway Driver to access the devices in this system, then there is no reason to run the MBX Gateway Server, and it should be disabled.

Select the **MBX Gateway Server** tab.



This tab shows you the configuration and status of the MBX Gateway Server.

What should I do if I need the MBX Gateway Server?

If any of your other systems will use the MBX Gateway Driver to access MBX devices on this system, go to the **Startup Type** group and select **Automatic**. Check the **Status** window to verify that the server is running. If not, click the **Start** button. Check the **Status** window again to verify that the server is now running.

On the right side of the screen, enter a TCP port in the **Port Number** field. This must be a port that is not used elsewhere, and it must be open in your system's firewall. The default port, 53335, is recommended for most installations.

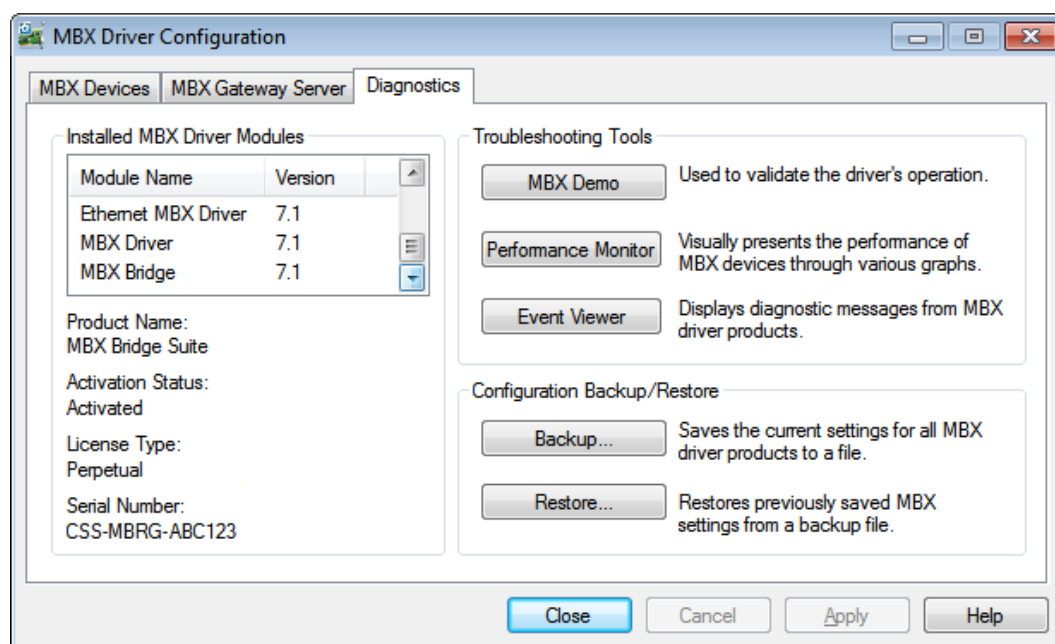
What if I don't need the MBX Gateway Server?

If none of your other systems will use the MBX Gateway Driver to access MBX devices on this system, you can set the **Startup Type** to **Manual** or **Disabled**, and then click the **Stop** button.

Is the driver running?

In an earlier step, we confirmed that the driver reports itself as running. Now we will use a simple test program, MBX Demo, to confirm that it is running and can communicate to the controllers.

Return to the editor's **Diagnostics** tab.



On the right side, click **MBX Demo**.

```

C:\Program Files\Common Files\Cyberlogic Shared\MbxDemo.exe
Schneider Electric
Copyright (C) 1996-2009, Cyberlogic Technologies, Inc.
MBXAPI Demo/Diagnostics Program Version 1.17

[1] Set device number: [1 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 >_

```

From the utility's main menu, choose **[1] Set device number** to select the MBX device number you want to troubleshoot. In the above example, we will test device 1, which, in this configuration, is an Ethernet MBX device.

Now select **[C] Device information** to view detailed information about the device.

```

C:\Program Files\Common Files\Cyberlogic Shared\MbxDemo.exe
Device Type: TCP/IP Device Network Protocol: TCP/IP
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: 201
Device Open Count: 1 Total Error Calls: 0
DM Open/Active Count: 0/0 PM Open/Active Count: 0/0
Total DM Cmd Packets: 0 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: 0/0
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: 0
Total XMT Packets: 0 Total Device Faults: 0
Total RCU Packets: 0 Last Crash code: 0x0

```

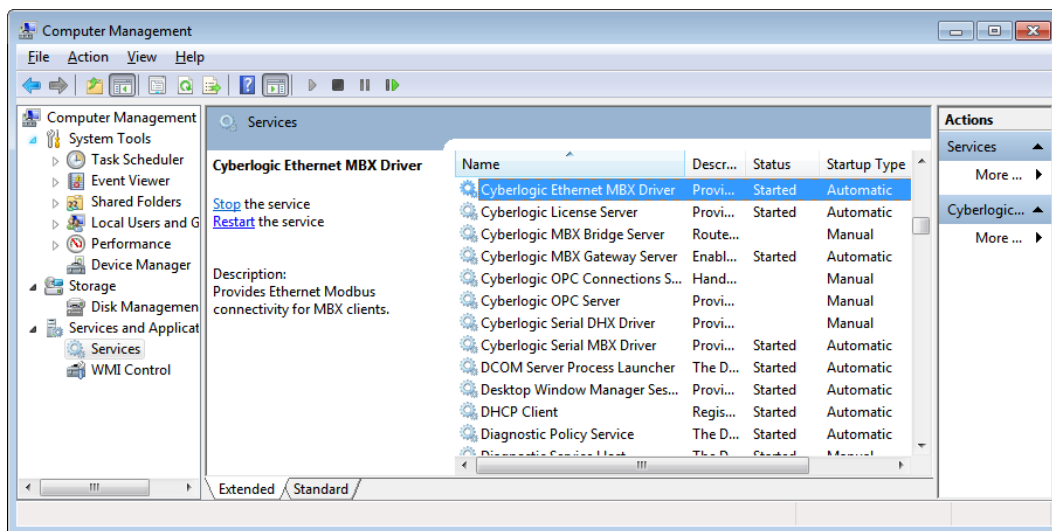
The top portion of the screen provides information on the configuration of the driver, while the bottom portion gives runtime status information.

Things to look for here:

- *Device Status* should be On-Line.
- *Total Dev Driver Calls* should be constantly counting up.
- *Total Error Calls* should be 0 or very low.
- *Total Device Faults* should be 0.
- *Last Crash Code* should be 0x0.

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

What if the status shown is abnormal?



If the driver does not appear to be running, you can open your system's **Computer Management** utility and go to **Services**. Locate the driver in the list, and verify that its **Startup Type** is **Automatic**, then stop and restart it.

Note

The location of Services and how to access it will vary depending on which version of Windows you are running. Typically, it can be accessed by going to the **Windows Control Panel** and opening **Administrative Tools**.

If the driver still won't run, or if you are seeing non-zero crash codes, contact Cyberlogic technical support.

Can the driver see the other network nodes?

The next test will identify which other Modbus Plus nodes the driver sees on the network, or, for Ethernet and Modbus networks, will identify which nodes have been configured.

Select **[B] Read device status** from the main menu.

```

C:\Program Files\Common Files\Cyberlogic Shared\MbxDemo.exe
--- Modbus Plus Network Statistics ---
Node type ID:                Host computer
Peer processor version:     1.00
This node address:         64
MAC state:                  Idle
Peer status:                32
Token pass counter:        461
Token rotation time:       0

---- Active Node List ----

 1 | U | | | U | | | | | | | | | | | | | | | | | | | | | |
17 | | | | U | | | | | | | | | | | | | | | | | | | | | |
33 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
49 | | | | | | | | | | | | | | | | | | | | | | | | | | | |

```

MBX Demo will display a list of active nodes in the form of a table as show in the figure above. The top row shows nodes 1-16, the second row shows nodes 17-32, and so on.

The I for node 64 indicates that the driver itself is configured as node 64.

For each other node that the driver identifies, it displays a U in the corresponding slot. In the above figure, the driver has identified devices at node addresses 1, 4 and 19.

Note

For Modbus Plus networks, the U indication shows the address of actual devices that the driver can see on the network.

For Ethernet networks, the U indication shows the node addresses that you have configured in the IP address mapping table for the Ethernet MBX device. It does not imply that devices at these node addresses are physically present on the network, or that the driver can talk to them, but only that they have been configured.

For Modbus networks, the U indication shows the node addresses that you have marked as active in the configuration of the Serial MBX device. It does not imply that devices at these node addresses are physically present on the network, or that the driver can talk to them, but only that they have been configured.

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

What if it doesn't show a node that should be there?

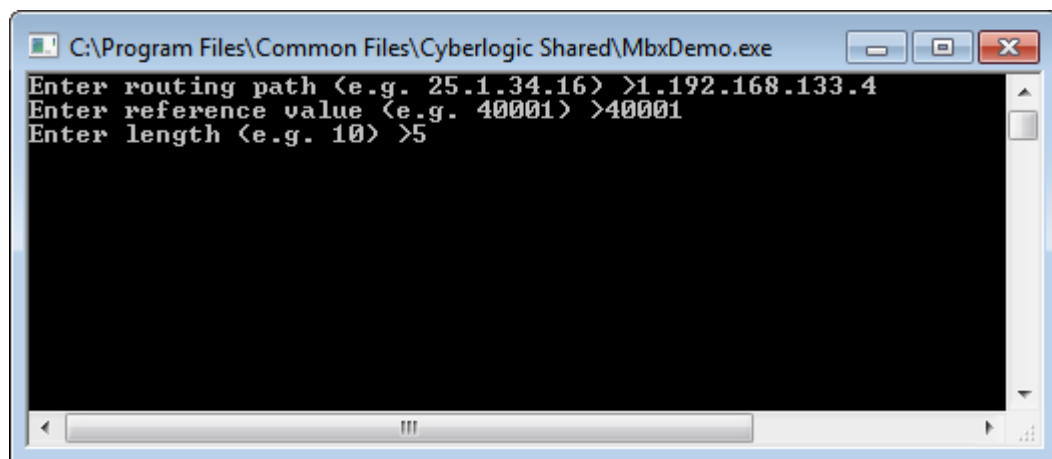
What this means and the action you should take depends on the type of network:

- *Modbus Plus:* The driver cannot communicate to the missing node. Check the device at that node to verify that it is powered-up and that its Modbus Plus port is working properly. Also verify that the cable is functional and is properly connected.
- *Ethernet:* The missing node was not configured in the IP address mapping table. Open the device in the MBX Driver Configuration Editor and add its mapping.
- *Modbus:* The missing node is not marked as active in the Serial MBX device configuration. Open the device in the MBX Driver Configuration Editor and mark the node as active.

Can the driver read data from another node?

Now we will read a register from one of the other nodes, to verify that the driver can actually obtain data from that device.

Select **[2] Read selected node** from the main menu.



The program will ask for three pieces of information:

- *Routing Path:* For Modbus Plus networks, enter the Modbus Plus routing path to the device. You may omit trailing zeros. Thus, if the routing path is 7.3.0.0.0, you could enter just **7.3**.

For Ethernet networks, if you have mapped the node's destination index and IP address to a node address, you can enter the node address. If you have not mapped the destination index and IP address, you can enter them directly. *You must enter the destination index first, followed by the IP address.* In the example shown above, the destination index is 1 and the IP address is 192.168.133.4. But if this destination index and IP address were mapped to node address 4, you could simply enter **4**.

For Modbus networks, enter the Modbus node address, which is always a single digit.

- *Reference Value:* Enter the address for a register or bit that you want to read from the device. If you want to read a series of values, enter the address of the first one. We recommend using register 40001, because that exists on nearly every device, including most third-party products.
- *Length:* Enter the number of consecutive values you want to read. Reading a single value is sufficient to confirm communication, but you can read more if you wish.

The MBX Demo will display the requested register values. If the displayed values are correct, then the driver is working. Any problems that remain must be in the application software that uses the driver.

Checking Ethernet connections with Telnet

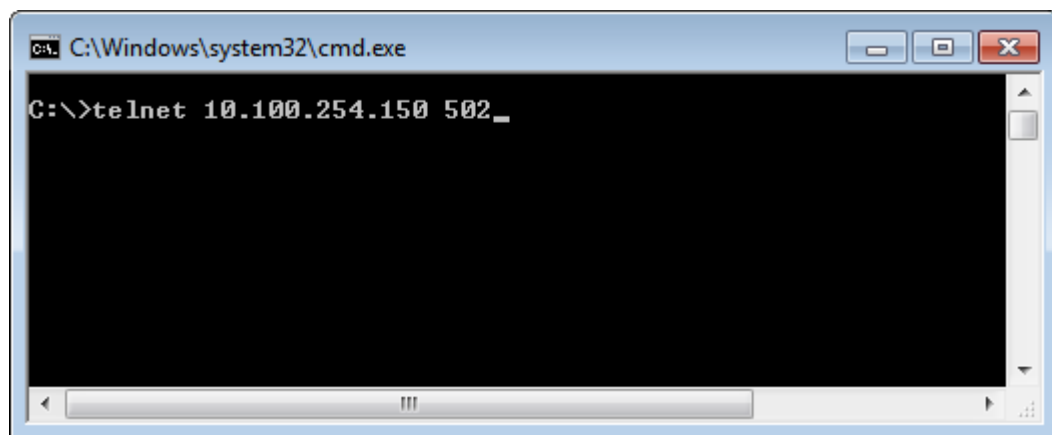
The Telnet client allows you to verify that an Ethernet node is active and listening on the correct port.

Note

Beginning with Windows Vista, Telnet is disabled by default.

To enable Telnet in Windows 7 or Vista, open the **Windows Control Panel**, then select **Programs and Features**, then select **Turn Windows features on or off**, then check **Telnet Client**, and then click **OK**.

To enable Telnet in Windows Server 2008, open **Server Manager**, then click **Features** in the left panel, then click **Add Features**, then select **Telnet Client** from the list, then click **Next**, and then click **Install**. When the installation completes, click **Close**.



Open a command prompt window and type the following command:

```
telnet<SP><IP address><SP>502
```

and then press **Enter**.

If the window clears and shows just a blinking cursor, then the test succeeded. The device is listening on port 502, as is required for Ethernet MBX communication.

Press **Enter** several times until the Telnet session ends and the command prompt returns. Type **exit** and press **Enter** to close the command prompt window.

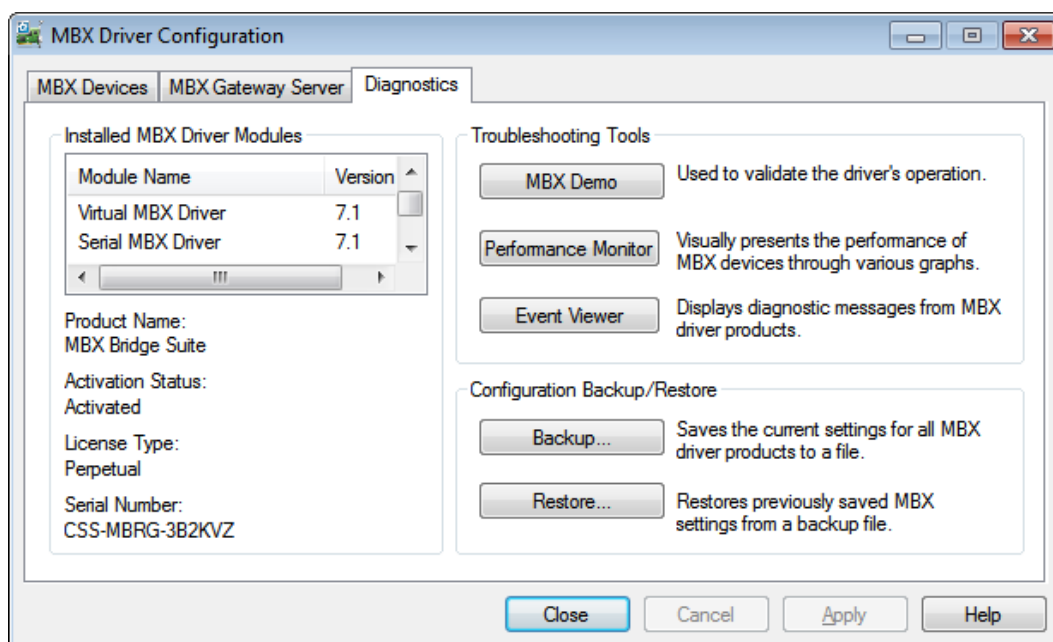
What if it responds with a communication timeout?

If the response is a connection timeout, then the other device is not listening on port 502. Check the device to be sure that it is running, connected to Ethernet and operating properly.

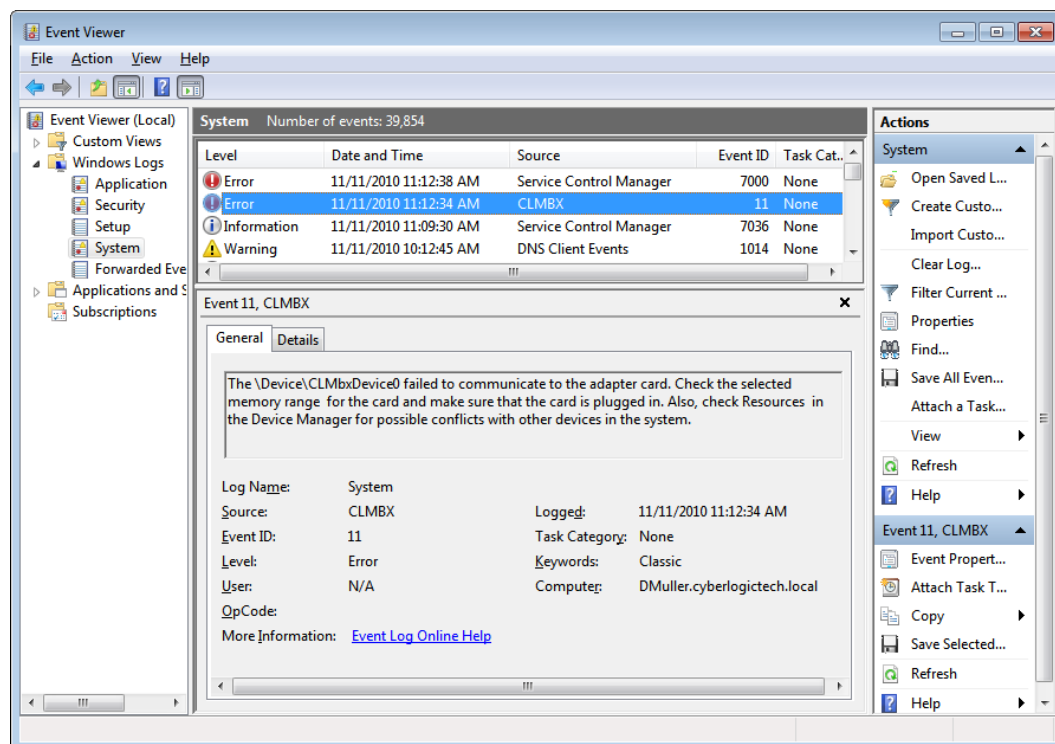
Getting error information from the Windows Event Viewer

Many common problems with the drivers will cause the driver to save a message in the Windows event log. You can use the Windows Event Viewer to read these messages.

Open the **MBX Driver Configuration Editor** and go to the **Diagnostics** tab.



Click the **Event Viewer** button. The Windows Event Viewer will open.



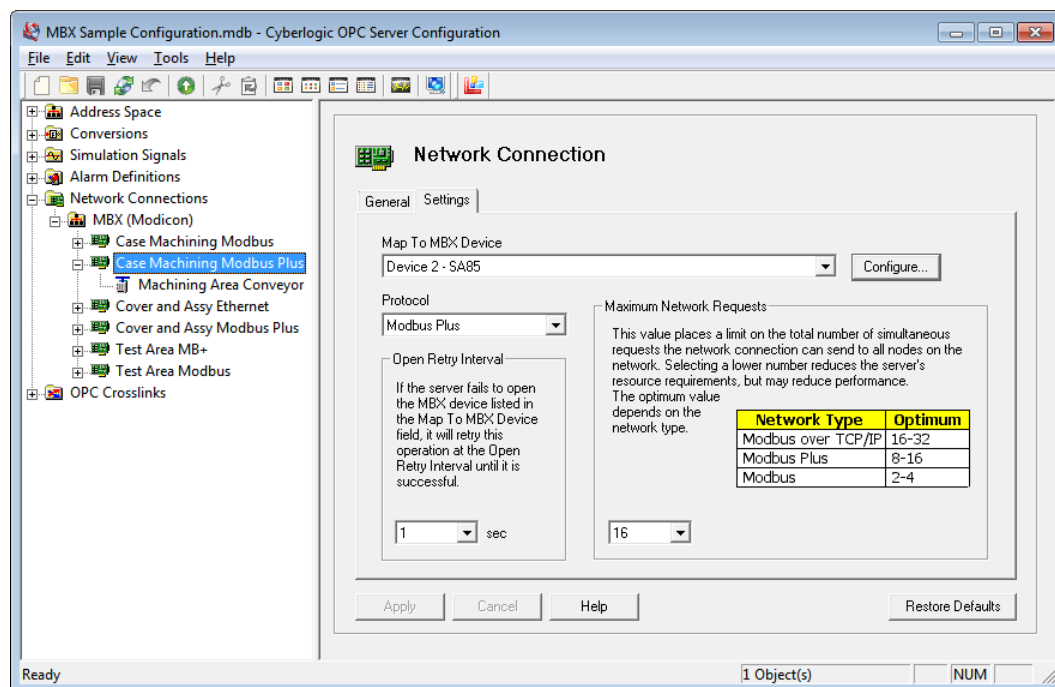
The appearance of the Event Viewer will vary depending on your operating system. Check the **System** log for error messages relating to the driver you are troubleshooting. These messages will give you detailed information about the error and may recommend actions you can take to remedy the problem.

If you decide to contact Cyberlogic technical support for help with your troubleshooting, please email a screen shot of each error message to techsupport@cyberlogic.com.

Check the OPC Server Configuration

If you can communicate using the MBX Demo utility, but have trouble with the MBX OPC Server, you must next check the OPC server configuration.

Open the **Cyberlogic OPC Server Configuration editor** and select a **network connection**.



Check the **Map to MBX Device** field to verify that it shows the correct device.

Check the **Protocol** field to verify that it shows the correct network protocol.

Verify that the **Maximum Network Requests** is set within the optimum range, as shown in the table.

Caution!

If the communication path goes through a bridge to another network type, you must select a Maximum Network Request value that is in the range for the slowest network. For example, if the network connection is for Modbus Plus, but the communication link goes through a bridge to a serial Modbus network, you must select a value in the Modbus range of 2-4, because Modbus is slower than Modbus Plus.

Repeat these checks for all of the MBX network connections that have communication problems.

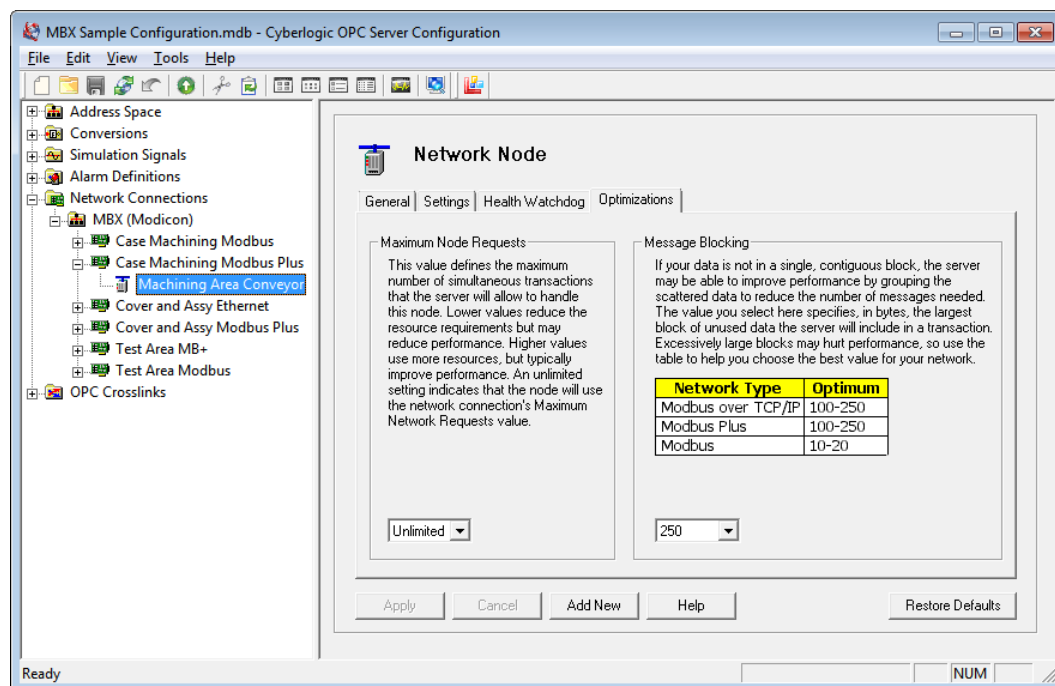
What if these settings are incorrect?

First, select the proper **Protocol**, then select the desired **MBX Device**. If the device you need is not shown, even with the correct protocol selected, click the **Configure...** button to open the MBX Driver Configuration editor and create the needed device.

If the **Maximum Network Requests** value is incorrect, simply select a value that is within the proper range.

If you change any OPC configuration settings, be sure to **Save and Update Server** to apply the changes to the running server.

Next, select a **network node**.



Check the value for **Maximum Node Requests**. If it is set very low or very high, it could reduce the communication performance for the node. The default settings are recommended for most configurations:

- Modbus: 2
- Modbus Plus: 8
- Modbus TCP: 16

Verify that **Message Blocking** is set within the optimum range, as shown in the table.

Caution!

If the communication path goes through a bridge to another network type, you must select Maximum Node Requests and Message Blocking values that are appropriate for the slowest network. For example, if the network connection is for Modbus Plus, but the communication link goes through a bridge to a node on a serial Modbus network, you must select values suitable for Modbus, because Modbus is slower than Modbus Plus.

Repeat these checks for all of the MBX network nodes that have communication problems.

Technical Support

You can get detailed information on how to install, configure and use the MBX family of drivers by referring to the help files for each specific driver.

Cyberlogic's website, www.cyberlogic.com, has information on related products, news, software downloads and contact information.

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