Ethernet DHX Driver Help

Ethernet DHX Driver for Allen-Bradley TCP/IP Networks

Version 9

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INTRODUCTION

The Ethernet DHX Driver emulates Data Highway Plus (DH+™) over TCP/IP. It allows virtually all DH+ compatible software products to gain access to TCP/IP-based communications with no code modifications. This includes both 32-bit Windows and 16-bit legacy DOS/Windows applications.

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

Remote Connectivity

The Ethernet DHX Driver includes the DHX Gateway Server. When enabled, the DHX Gateway Server allows other computers on your TCP/IP network to access the DHX devices on your system. The remote system, which can be any Windows node running the DHX Gateway Driver, will then have full DHX Driver functionality just as though the DHX device in the server system were installed in the remote system.

Running 16-Bit Software

The Virtual DHX Driver, which is included with all DHX products, allows 16-bit applications to run concurrently with all 32-bit applications on the same computer. It is compatible with all 16-bit DOS/Windows that communicate through the 1784-KT or 1784-KTX adapter cards, such as 6200 programming software. For more information, refer to the Virtual DHX Driver section.

Compatibility

The Ethernet DHX Driver is implemented as part of the Cyberlogic DHX architecture, which is the foundation used in other DHX family drivers such as the Serial DHX Driver, the DHX Driver and the DHX Gateway Driver. Consequently, these drivers consistently support identical programming interfaces: DHXAPI, DHXAPI.Net and 6001-F1E. Supporting these existing standards protects the software and R&D investments of end-users and OEMs.

Software developers can use the DHX Software Development Kit (DHX SDK) to obtain connectivity to DH, DH+, DH-485, ControlNet and Ethernet TCP/IP networks for their applications. Applications developed with the DHX SDK can be used with all DHX family drivers and can execute under all current Windows operating systems.

Blending DHX Supported Networks

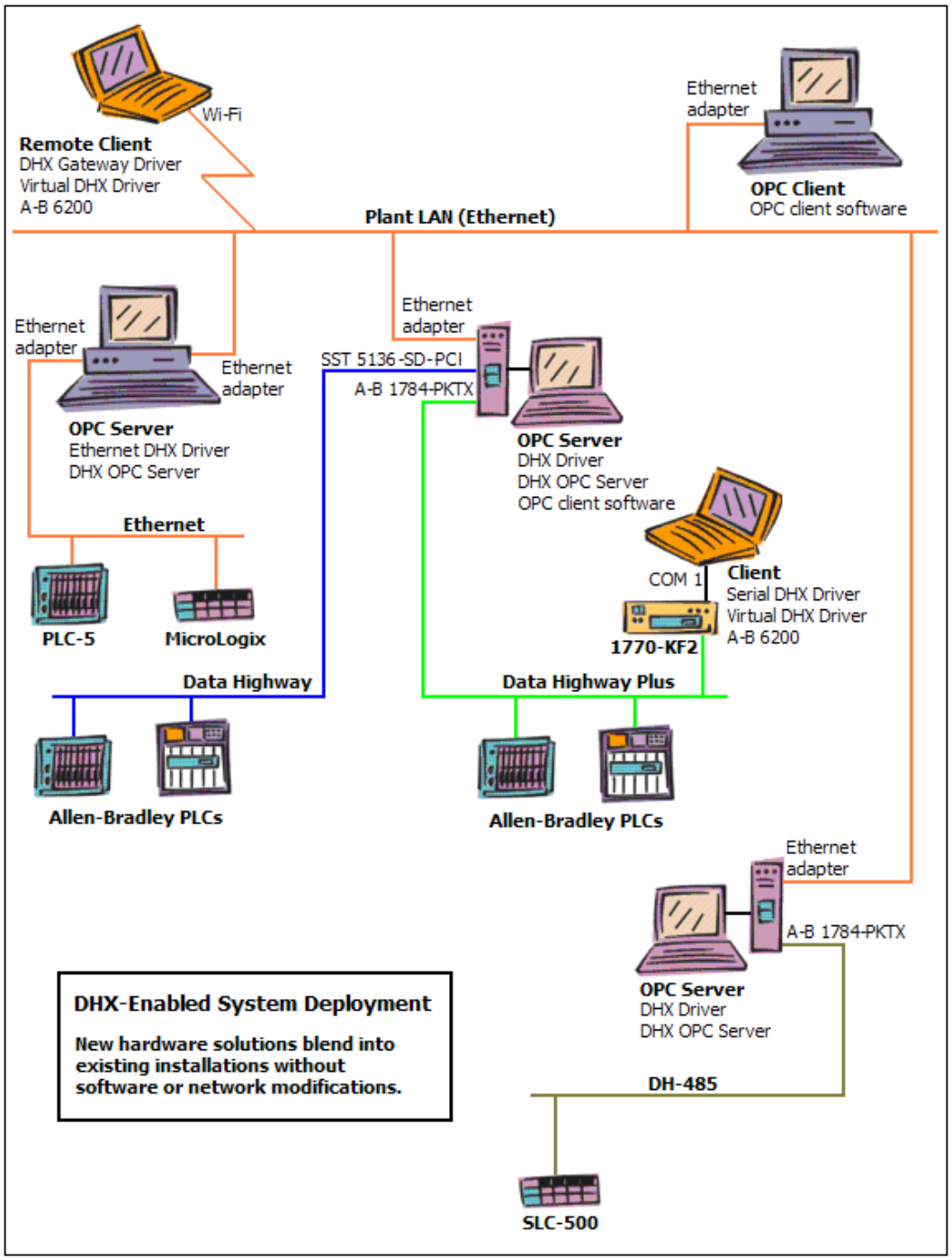
The DHX driver family provides support for all Allen-Bradley networks through a common architecture, with identical programming interfaces. This means that an application that operates with one of the DHX family drivers, such as the Ethernet DHX Driver, will work

with the rest of them as well. Thus, virtually all Allen-Bradley compatible software programs can operate over all networks supported by A-B with no code modifications. You will find a complete description of the DHX family in the Appendix B: DHX 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 Data Highway, Data Highway Plus, DH-485, ControlNet and Ethernet based hardware products in existing installations without losing software, network or integration investment.

The DHX family of products includes:

- DHX Driver is Cyberlogic's device driver for Data Highway, Data Highway Plus and DH-485 adapter cards from Allen-Bradley and SST.
- Ethernet DHX Driver provides Data Highway Plus emulation over TCP/IP.
- Serial DHX Driver is a full-duplex DF1 protocol driver for Data Highway, Data Highway Plus, DH-485 and ControlNet networks over serial COM port connections.
- DHX Gateway Driver works with the other DHX drivers, giving access to Data Highway, Data Highway Plus, DH-485, ControlNet and Ethernet networks from remote locations.
- ControlLogix Gateway Driver provides remote access to Allen-Bradley's Data Highway Plus network by letting you access 1756-DHRIO gateway modules in a ControlLogix chassis from a remote location.
- Virtual DHX Driver works with the other DHX drivers to permit 16-bit legacy software to run in current Windows operating systems.
- DHX OPC Server connects OPC-compliant client software applications to data sources over all Allen-Bradley networks.
- DHX SDK is a software development kit for DHXAPI, DHXAPI.Net and 6001-F1E compliant development.


Wi-Fi
Remote Client
DHX Gateway Driver
Virtual DHX Driver
A-B 6200
Ethernet adapter
OPC Client
OPC client software
Plant LAN (Ethernet)
Ethernet adapter
Ethernet adapter
OPC Server
Ethernet DHX Driver
DHX OPC Server
Ethernet
PLC-5
MicroLogix
Data Highway
Allen-Bradley PLCs
Ethernet adapter
SST 5136-SD-PCI
A-B 1784-PKTX
OPC Server
DHX Driver
DHX OPC Server
OPC client software
COM 1
Client
Serial DHX Driver
Virtual DHX Driver
A-B 6200
1770-KF2
Data Highway Plus
Allen-Bradley PLCs
Ethernet adapter
A-B 1784-PKTX
OPC Server
DHX Driver
DHX OPC Server
DH-485
SLC-500
DHX-Enabled System Deployment
New hardware solutions blend into existing installations without software or network modifications.

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 DHX Driver.

Learn How the Driver Works

If you are not familiar with the way that the Ethernet DHX Driver handles communication, you should begin by reading Communication Using the Ethernet DHX Driver.

Read a Quick-Start Guide

First-time users of the Ethernet DHX 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 DHX family consists of several well-integrated products, which provide connectivity for Allen-Bradley networks in distributed environments. For more information about these products, refer to the Appendix B: DHX 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 and go to ***Cyberlogic Suites***, and then select ***Product Information***.

COMMUNICATION USING THE ETHERNET DHX DRIVER

Rockwell Automation (Allen-Bradley) provides a number of network solutions that allow communication to a variety of its own, as well as third party, hardware products. The main communication networks are:

- Data Highway (DH)
- Data Highway Plus (DH+)
- DH-485
- ControlNet
- Ethernet

Ethernet is the most recent network supported by Rockwell Automation products. The Ethernet DHX Driver allows existing Data Highway Plus software applications, without modification, to communicate to the traditional Allen-Bradley Programmable Logic Controllers (PLCs) over Ethernet. It also allows access to the new Programmable Automation Controllers, such as ControlLogix, CompactLogix and FlexLogix, when used in conjunction with the Cyberlogic DHX OPC server.

This section describes how the Ethernet DHX Driver handles key communication issues and how you can configure it to take advantage of its capabilities.

What Device Type Should I Use?

There are several ways to set up communication using the Ethernet DHX Driver, and the one you will use depends on the hardware and the networks you are using. This is required because Rockwell Automation products use different data structures and two different Ethernet protocols.

Determining which type of device to use is not always easy, so the DHX Configuration Editor includes a wizard that can help you. If you are connected to the network when you do the configuration, the wizard can determine the correct device type for you to configure.

To determine the type of device without using the wizard, you must consider the addressing style and protocol used by the controller or module you will communicate with.

Conventional Addressing Style

If your controller uses the conventional style of addressing, such as N7:3 and I0:15/2, you must use either an Ethernet DHX or an Ethernet DHX/CIP device. Which of these two types you must use will depend on the specific protocol used by the Rockwell product you are communicating with.

Ethernet/IP (EPIC) Protocol

Newer controllers and modules use the EtherNet/IP (EPIC) protocol, which is implemented in the Ethernet DHX/CIP type of device. You must use this device type with:

- MicroLogix 1100 controllers
- 1761-NET-ENI module
- Routers created by using two Ethernet modules in a ControlLogix chassis

You should also use Ethernet DHX/CIP devices with the more recent versions of:

- SLC controllers
- PLC-5 controllers

CSP Protocol

Older controllers and modules use the legacy CSP protocol, which is implemented in the Ethernet DHX type of device. These include:

- All MicroLogix controllers except the 1100
- 5820-EI Pyramid Integrator Ethernet module

You must also use an Ethernet DHX device with older versions of:

- SLC controllers
- PLC-5 controllers

The Ethernet DHX and Ethernet DHX/CIP Devices section describes the operation of these types of devices.

"Plain English" or Object-Oriented Addressing

If your tags use the more "plain English" or object-oriented names, such as Sta3PartPresent and PartCount.ACC, then you must use an Ethernet CLX device. This is the style used with the newer Programmable Automation Controllers.

Note

Ethernet CLX and CLX over DHX devices are used only with the Cyberlogic DHX OPC Server and are available only if you have installed the DHX OPC Server Suite, DHX OPC Premier Suite or DHX OPC Enterprise Suite. Otherwise, the Ethernet CLX and CLX over DHX device types will not be available, and this tab will not appear in the editor. For more information on CLX devices, refer to the DHX Driver help.

The Ethernet CLX Devices section describes the operation of this type of devices.

Ethernet DHX and Ethernet DHX/CIP Devices

Ethernet DHX and Ethernet DHX/CIP devices use the conventional style of addressing, such as N7:3 and I0:15/2, but differ in the protocol they use and in their support for unsolicited communication.

Ethernet DHX devices use the older CSP protocol, and support both solicited and unsolicited communication. Ethernet DHX/CIP devices use the newer EtherNet/IP (EPIC) protocol and support only solicited communication.

Solicited Communications

Solicited requests are I/O requests that are initiated by an application program. These transactions are carried over abstract communication ports called solicited channels.

Each solicited channel is capable of carrying out one solicited transaction at a time. Once a command message is sent through a channel, no more command messages are allowed through this channel until a reply message is received, a timeout occurs, or the transaction is canceled.

A single solicited channel can be used to communicate to multiple network nodes. Therefore, simple applications can perform all of their solicited communications through a single channel. However, applications can typically achieve much greater performance by using multiple solicited channels, because the transactions carried over these channels are executed simultaneously.

Although the Ethernet DHX Driver emulates Data Highway Plus over TCP/IP, there are a number of important differences in the way that Data Highway Plus handles communication as compared to Ethernet. The Ethernet DHX Driver provides a means to accommodate these differences, which affect node addressing, the maximum number of nodes permitted on a network and the selection of the physical network card to use when two or more are available.

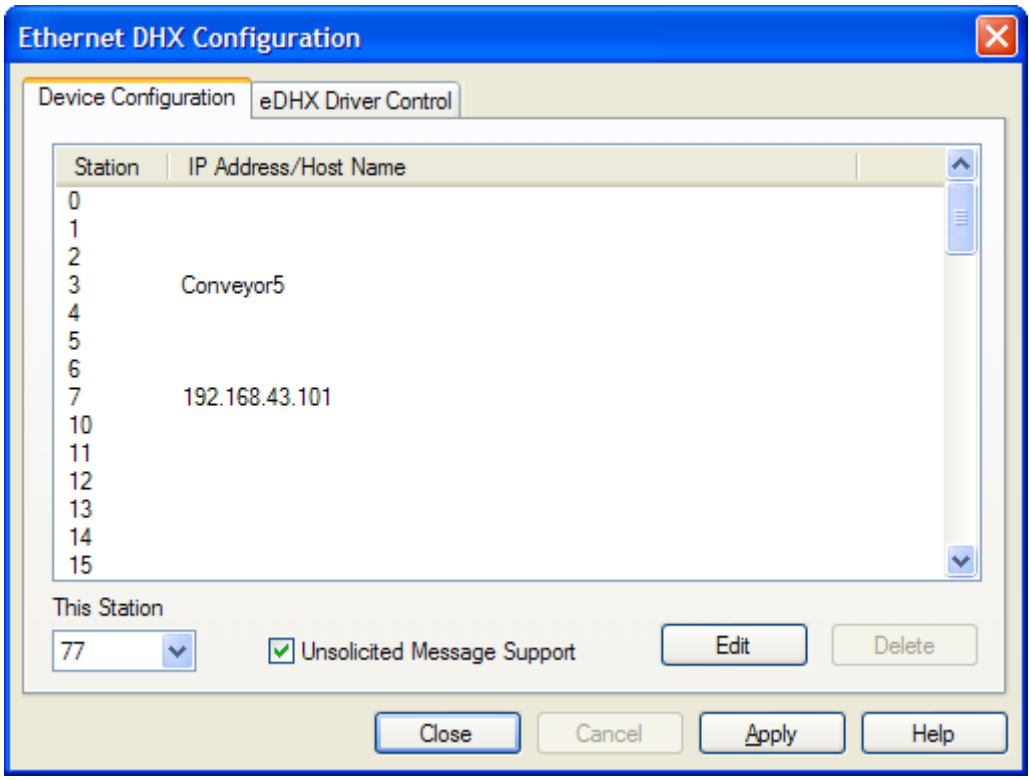
Node Addressing

Data Highway Plus uses a one-byte station address for local network communications, and a three-byte address for remote (off-link) communications. On the other hand, solicited messages used by Ethernet communications require either an IP address or a CIP path to specify the destination node.

To accommodate the DH+ architecture, Ethernet DHX supports only local addressing and uses a mapping table to relate the one-byte station address in the PCCC command message to either a an IP address or a CIP path.

The editor allows users to configure a mapping table for each device. Each station address byte that may be found in a PCCC message is mapped to the appropriate path or address on the Ethernet network. For Ethernet DHX devices, mapping table entries contain either an IP address, which the server uses as is, or a host name, which the server converts to an IP address. For Ethernet DHX/CIP devices, mapping table entries contain a CIP path to the destination node.

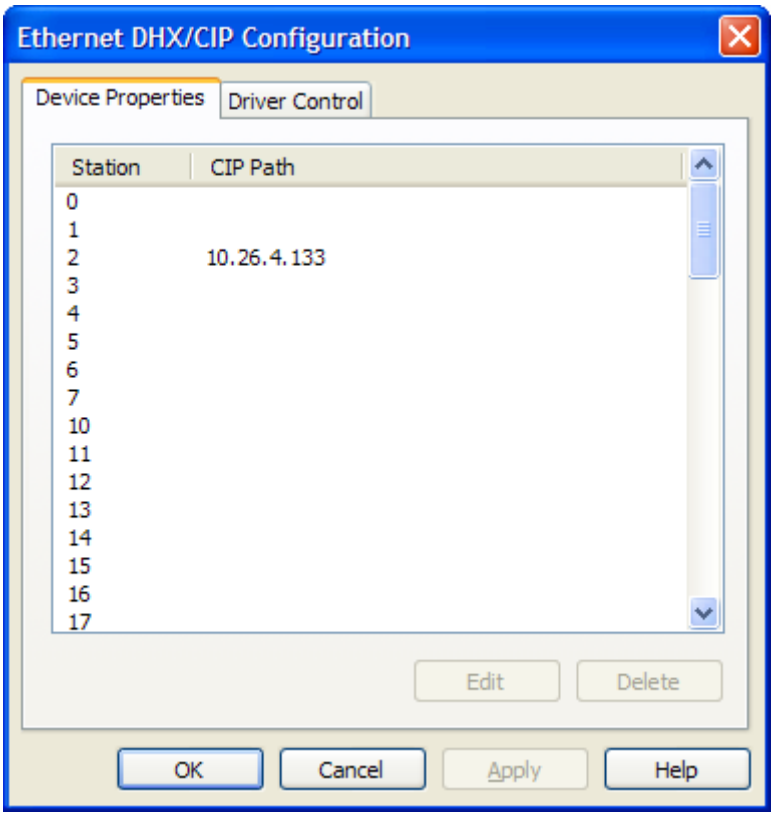
Example: Ethernet DHX



You want to communicate to an older PLC-5 at IP address 192.168.43.101, and an older SLC that uses the host name Conveyor5.

You would create an Ethernet DHX device and set up its mapping table as shown above. In this example, the host name of the SLC is mapped into station address 3 and the IP address of the PLC-5 is mapped into station address 7. You would then set up your application to communicate over DH+, and address the SLC as station 3 and the PLC as station 7.

Example: Simple Ethernet DHX/CIP

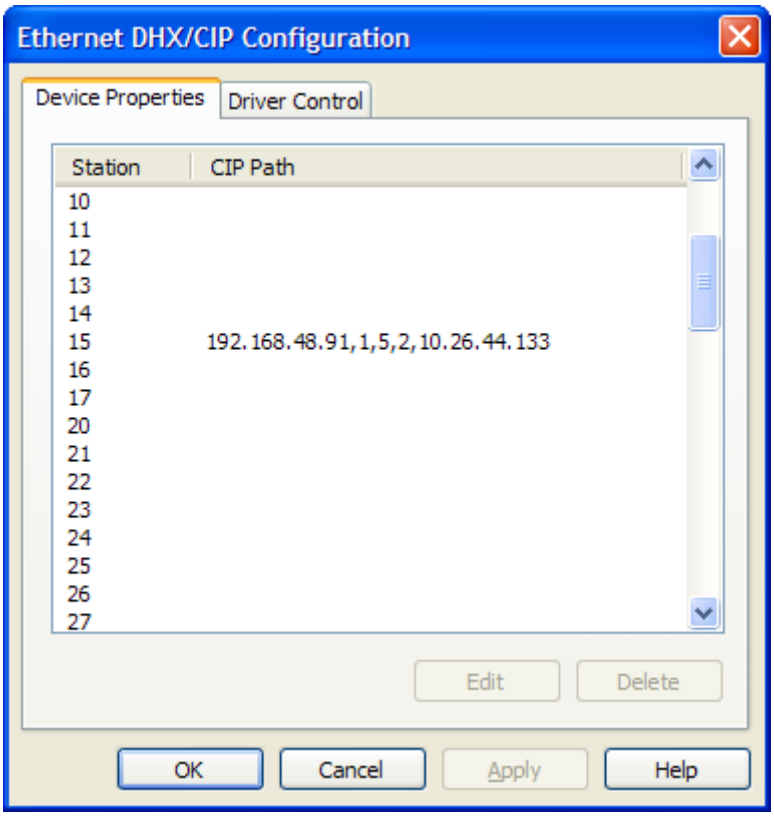


You want to communicate to a MicroLogix controller at IP address 10.26.44.133.

You would create an Ethernet DHX/CIP device and set up its mapping table as shown above. Here, we have mapped the CIP path into station address 2. The CIP path in this example is simply the controller's IP address.

You must now set up your application to communicate over DH+, and it can then address the controller as station 2.

Example: Ethernet DHX/CIP with More Complex Routing



You want to communicate to the same MicroLogix processor as in the previous example, but you are on a different Ethernet network. To do this, you wish to create a router using ControlLogix chassis that has two Ethernet modules. In this chassis, one of the Ethernet modules is in slot 4 and has an IP address of 192.168.48.91 on your local Ethernet. The other is in slot 5 and is connected to the same Ethernet network as the target controller.

You would create an Ethernet DHX/CIP device and set up its mapping table as shown above. Here, we have mapped the CIP path into station address 15.

The CIP path in this example starts with the IP address of the Ethernet module in slot 4 of the chassis serving as the router. Note that, for configuration purposes, the fact that it is in slot 4 is not relevant. Next is a 1, which sends the message to the backplane of the router chassis. The 5 sends it to slot 5, the other Ethernet module. The 2 specifies the module's port number that is connected to the second Ethernet network. Following that is the IP address of the target controller, as in the previous example.

You must now set up your application to communicate over DH+, and it can then address the controller as station 15.

Maximum Node Count

A local DH+ network may have node addresses in the range of 0-77 octal, limiting it to a maximum of 64 nodes. An Ethernet network does not have this limitation, because it uses a global IP address.

The mapping table for each logical Ethernet DHX or Ethernet DHX/CIP device contains 64 entries, corresponding to the 64 nodes on a local DH+ network. To communicate with more than 64 nodes, the user can simply create additional devices. Each of these will then be able to communicate with an additional 64 nodes.

Example: Communicating with 100 Nodes

Your plant has 100 controllers on your Ethernet network, and you want to communicate with them using the Ethernet DHX Driver. You cannot configure all 100 nodes on a single Ethernet DHX device, because only 64 node addresses are available.

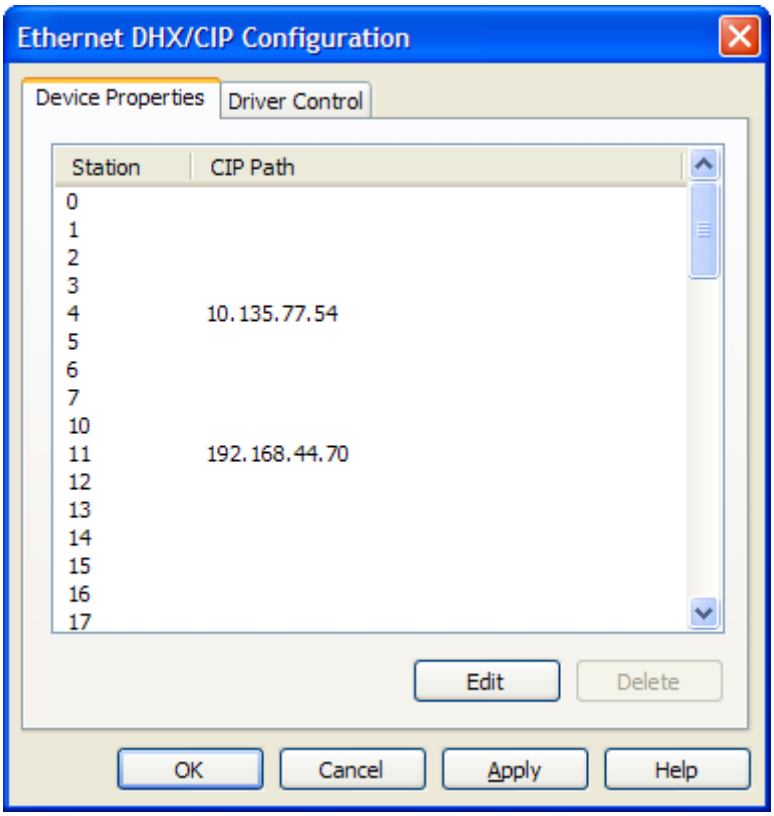
You must create two Ethernet DHX devices, let's say device 0 and device 1. You can then configure 50 of the nodes on device 0 and the other 50 on device 1. (Actually, you can divide these between the devices any way you want, provided that neither device has more than 64 nodes. Doing it this way, however, is desirable because it leaves spare station addresses on both devices.) You can then configure your applications to talk to the first 50 nodes using device 0 and the other 50 using device 1.

Physical Network Card Selection

Under Data Highway Plus, applications select the interface adapter card to use before they attempt to communicate to the destination device. With Ethernet, applications have no control over which network card is used for communication, because Winsock (an API used for TCP/IP communication) automatically selects the network card based on the IP address.

The logical DHX devices created by the Ethernet DHX Driver configuration editor emulate physical DH+ interface adapter cards. The application can then select the DHX device it wants to use and specifies the DH+ node address, just as it normally would. After the node address is mapped into an Ethernet address, Winsock assigns it to a physical network card based strictly on the IP address.

Example: Two Ethernet Cards in the System



Your system has two Ethernet cards on separate networks. Each network has on it controllers you wish to communicate with using Ethernet DHX/CIP.

Even though you have two physical Ethernet adapters, it is not necessary to configure two Ethernet DHX/CIP devices. You can create a single device, and configure CIP path mappings to both networks. In the figure shown above, the IP addresses used for the station 4 and 11 mappings are on different networks that use different IP address ranges. Your application would communicate to these controllers using the same Ethernet DHX/CIP logical device, addressing messages to station 4 or 11. The driver will determine the proper physical device to use, based on the mapped IP address in the CIP path.

Note

In this example, we have one logical device associated with multiple physical devices. In the previous example, we had multiple logical devices associated with a single physical device. Together, these examples illustrate the important fact that there is not a direct, one-to-one connection between the physical network adapters in your system and the logical Ethernet DHX and Ethernet DHX/CIP devices in your driver configuration.

Unsolicited communications

Unsolicited requests are I/O requests initiated by external devices, such as PLCs. The Ethernet DHX Driver can handle an unlimited number of simultaneous unsolicited subscriptions for every configured Ethernet DHX device. These subscriptions are carried over abstract communication ports called unsolicited channels.

Note Unsolicited messaging is currently supported by Ethernet DHX devices only. It is not currently available for Ethernet DHX/CIP or Ethernet CLX devices.

Message Buffering

Each unsolicited channel has an associated first-in-first-out (FIFO) buffer. If an unsolicited message arrives while the application is busy processing another message, the new message will be placed in this buffer for later processing.

Message Filtering

The listening application provides each of its unsolicited channels with a message filter. The channel is then capable of receiving unsolicited command messages that meet the filter criteria. These criteria are based on various characteristics of the command message, such as the source station address, command code, message type and message data signature.

Physical Network Card Selection

Under Data Highway Plus, applications select the interface adapter card through which they expect to receive unsolicited messages. With Ethernet, the Winsock API automatically selects the network card based on the IP address, and all unsolicited messages are received through a single port (2222).

The logical DHX devices created by the Ethernet DHX Driver configuration editor emulate physical DH+ interface adapter cards. The application can then select the DHX device it wants to use for unsolicited messages, just as it normally would. Winsock is then free to select the physical network card based on the IP address, as it normally would.

Active Node Table

The DHX architecture is modeled on the DH+ architecture, and so the Ethernet DHX Driver allows applications to read the active node table. This table identifies all active nodes on the local network.

However, Ethernet protocols do not maintain active node table information. Therefore, each Ethernet DHX and Ethernet DHX/CIP device shows all configured nodes as active, even if they are not physically present. In addition, nodes that are physically present, but have not been configured will not be included in the active node table. Refer to the Ethernet DHX Configuration Editor for more information on how to configure each node.

Note

The nodes in the active node table may not be the same as those shown by the WHO ACTIVE function in the DHX Demo program. Although the WHO ACTIVE function polls the nodes in the active node table, only the ones that are physically present will be shown.

The same is true of the Active Nodes Poll function in the DHX Demo.

Ethernet CLX Devices

The Ethernet CLX devices support communication to the new Programmable Automation Controllers, such as ControlLogix, CompactLogix and FlexLogix. These devices are used only with the Cyberlogic DHX OPC Server and are available only if you have installed the DHX OPC Server Suite, DHX OPC Premier Suite or DHX OPC Enterprise Suite.

Solicited Communication

Once created, Ethernet CLX devices require no addition configuration to operate in solicited mode.

For more information on how to configure solicited communication through the Cyberlogic DHX OPC Server, refer to the DHX OPC Server Help.

Unsolicited Communication

Unsolicited messaging is not supported by the Ethernet CLX devices.

QUICK-START GUIDE

Before the Ethernet DHX Driver can be used, it must be properly configured. The configuration procedure involves creating one or more Ethernet DHX, Ethernet DHX/CIP or Ethernet CLX devices and configuring them to work with your network's addressing scheme. These devices are logical devices that emulate the behavior of a Data Highway Plus network adapter card. Your software applications will then use the logical DHX devices to communicate over the network.

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

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:

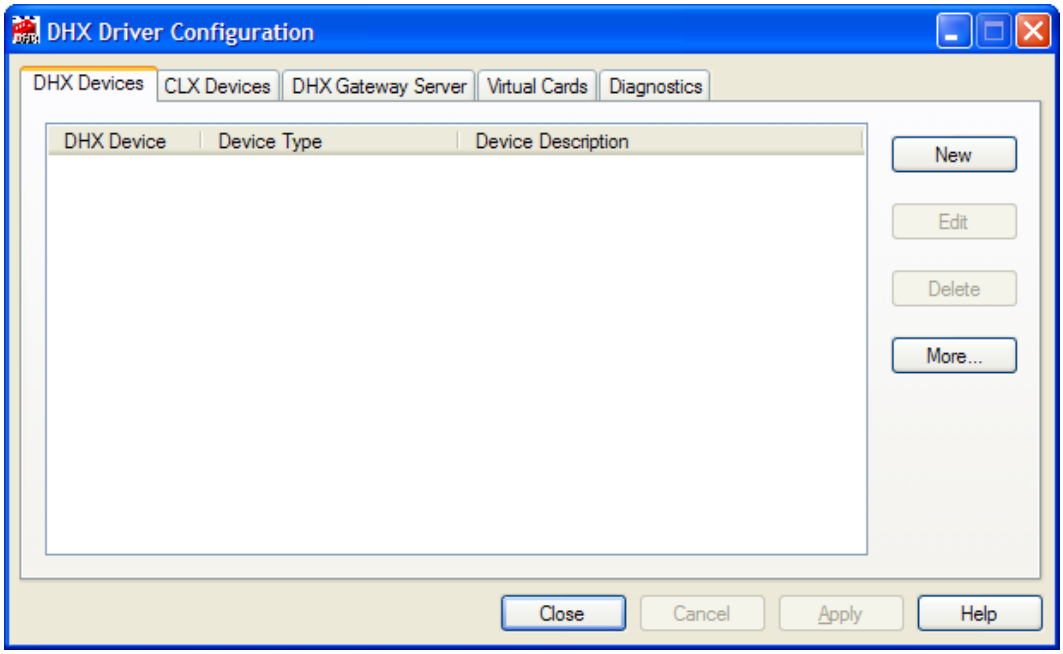
- Creating a Device
- Configuring the Ethernet DHX Device
- Configuring the Ethernet DHX/CIP Device
- Configuring the Driver Control
- Configuring the DHX Gateway Server
- Verifying Your Driver Configuration
- Backing Up Your Configuration

After completing this procedure, you will have a fully-configured 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 a Device.

Creating a Device

From the Windows ***Start*** menu, go to ***Cyberlogic Suites***, then open the ***Configuration*** menu and select ***DHX Device Drivers***.



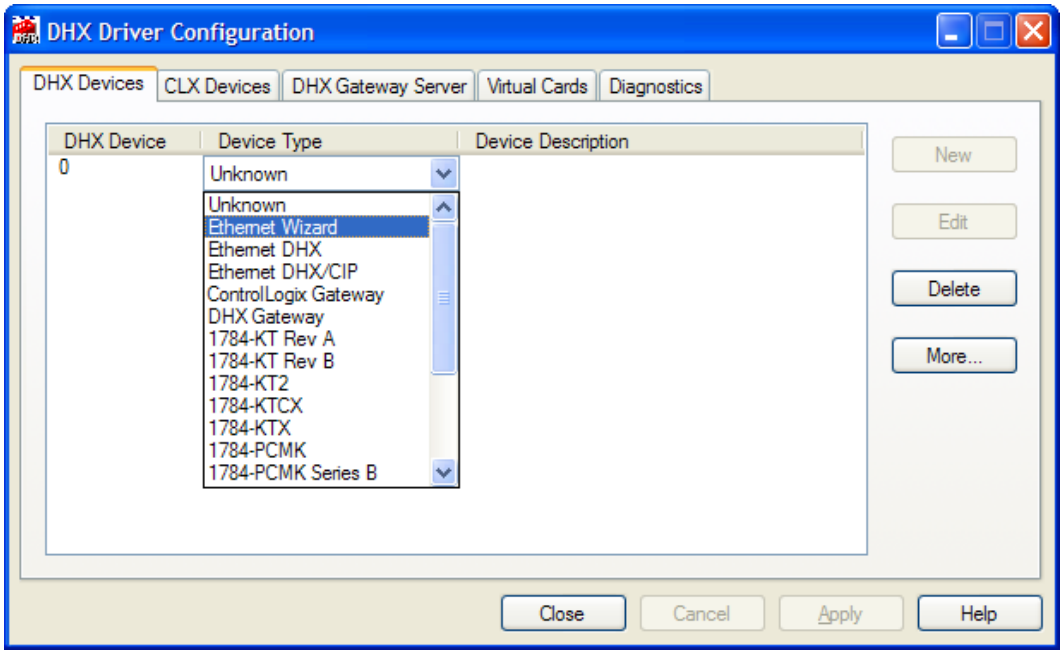
Running the editor for the first time displays the above screen.

The specific procedure you will use to create a device depends on the type of device you need. Accordingly, this section is divided into two parts, and you can skip to the part you need:

- Creating an Ethernet DHX or Ethernet DHX/CIP Device
- Creating an Ethernet CLX Device

Creating an Ethernet DHX or Ethernet DHX/CIP Device

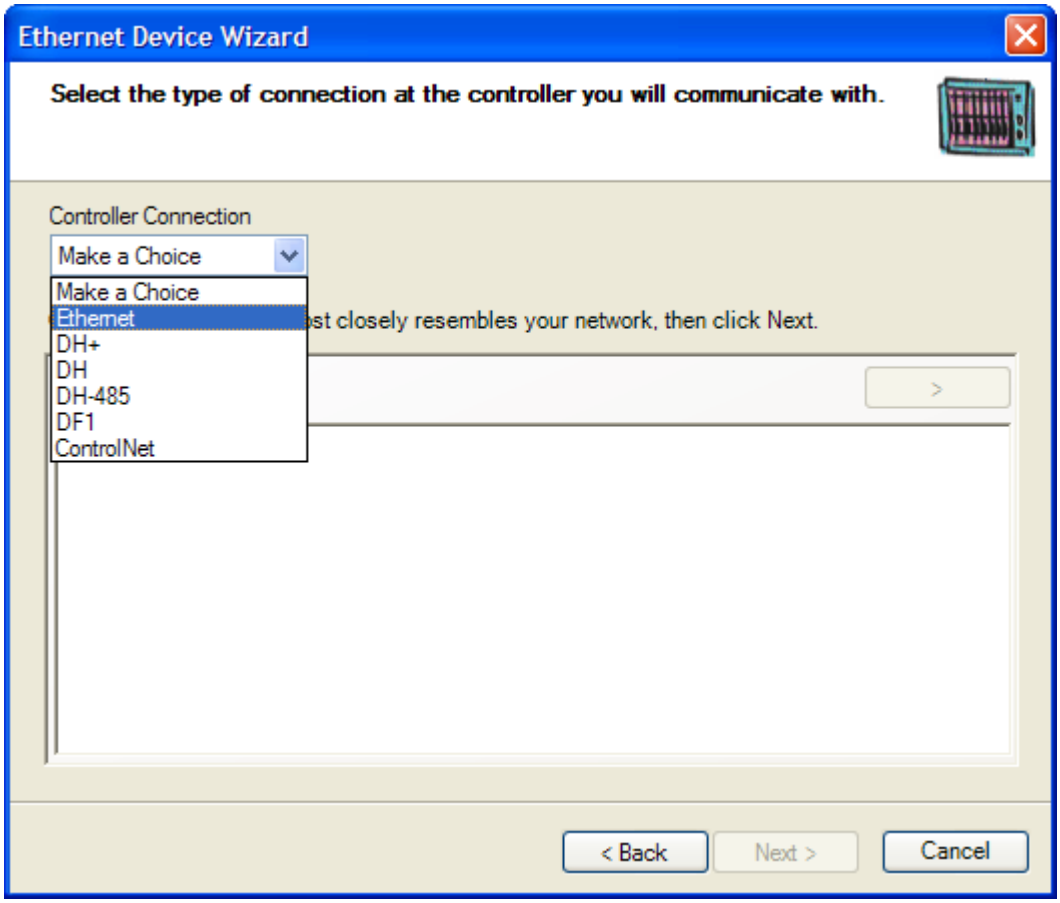
While you can simply select the type of device you need, we will use the Ethernet Wizard, which can help you decide the proper device type for your installation.



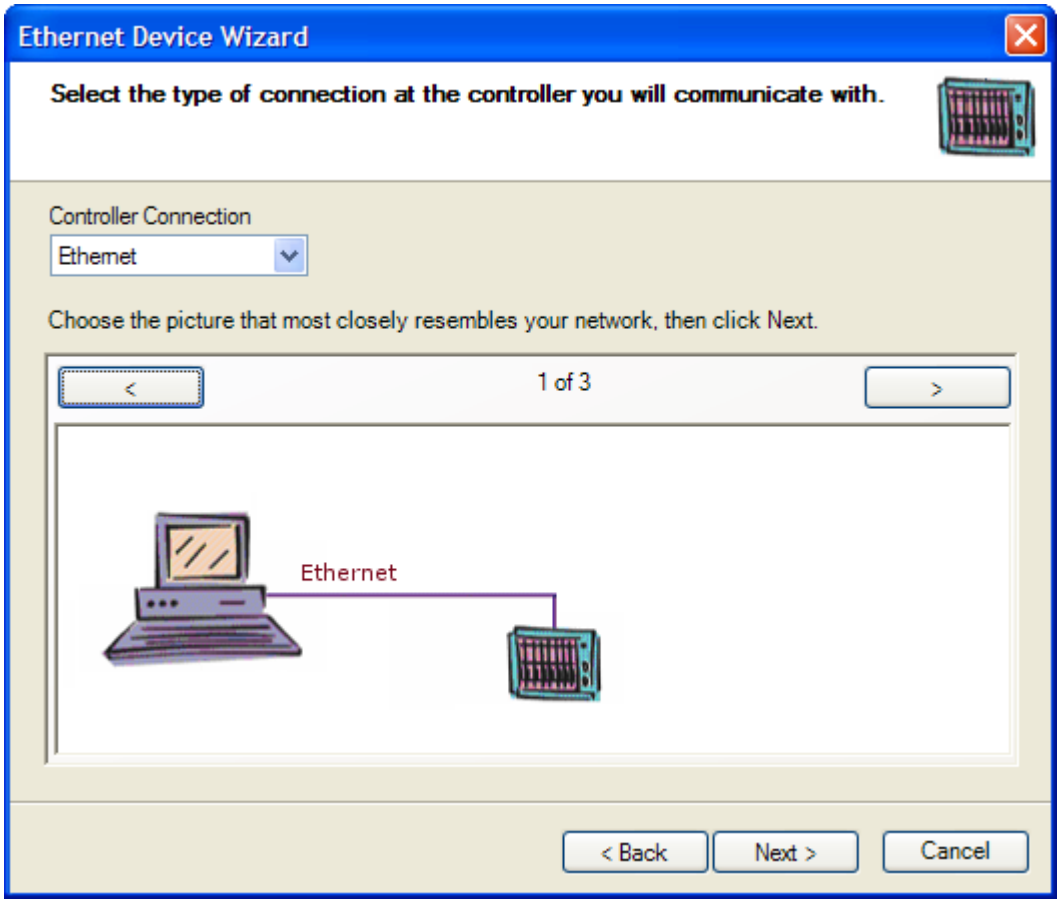
1. Select the ***DHX Devices*** tab.
2. Click ***New***.
3. From the drop-down list, select ***Ethernet Wizard***.

The editor will launch the wizard.

4. Click ***Next*** to continue.



5. From the ***Controller Connection*** drop-down list, select ***Ethernet*** as the type of network connection that is used at the controller you wish to communicate with.



The wizard will show you one or more pictures that illustrate the types of setups that are supported under the controller connection you chose.

6. If two or more possibilities are available, use the ***arrow buttons*** to scroll through them to find the picture that resembles your network.

   In this case, we chose a direct Ethernet connection from the PC to the target controller.

7. Click ***Next*** to continue.

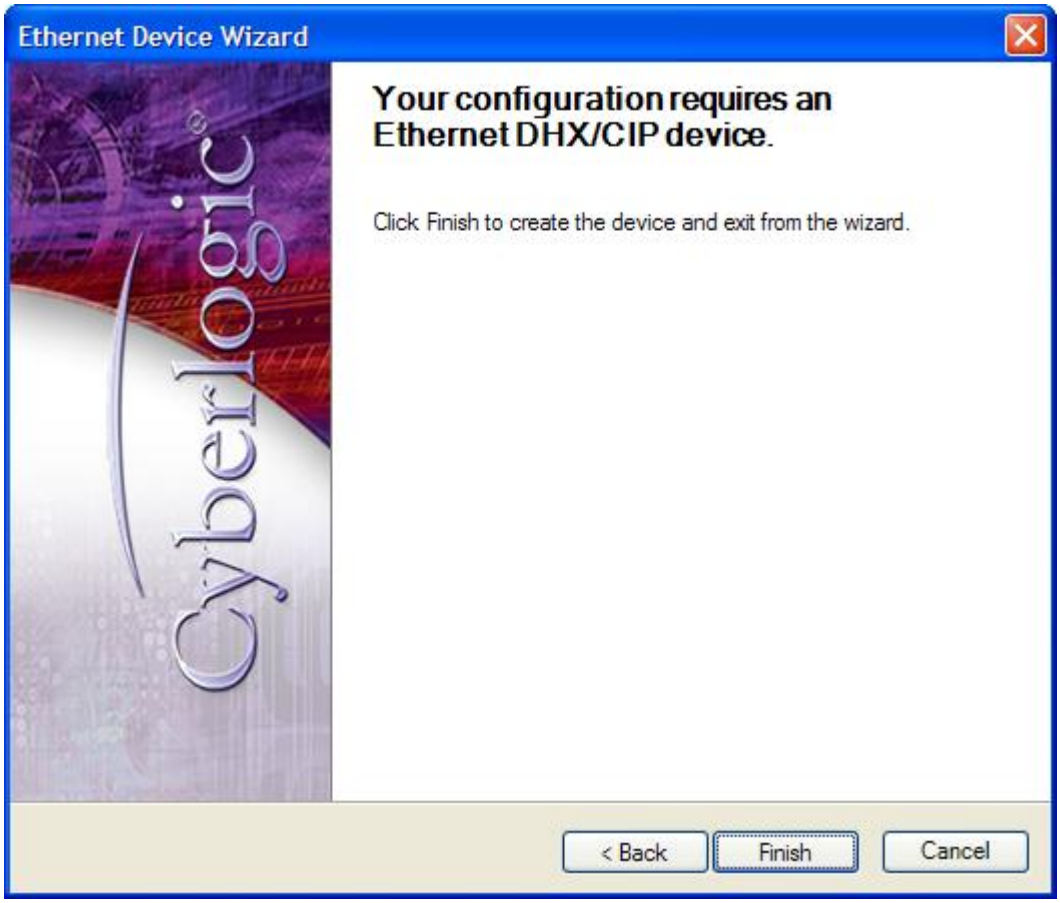
The wizard may report that there are two possible device types that may be suitable.

8. If you are connected to the network, enter the ***IP address or Host Name*** of the device. This will allow the wizard to perform a test that will determine the proper device type.

9. If you are not connected to the network, you must select the device type from the radio buttons.

   For this example, we chose the ***Ethernet DHX/CIP Driver***.

10. Click ***Next*** to continue.



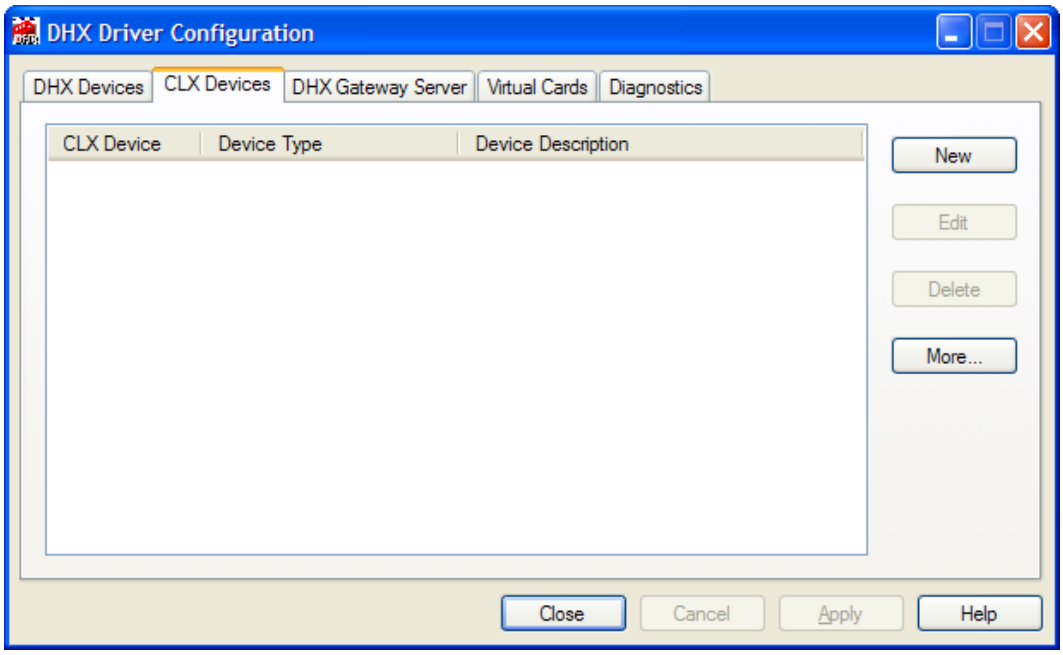
If you entered an IP address or host name in the previous step, the wizard will conduct a test to determine the device type to use. In any case, the device type to be created will be reported on this screen.

11. Click ***Finish*** to create the device and exit from the wizard.

If the wizard created an Ethernet DHX device, it will launch its configuration editor. Go to Configuring the Ethernet DHX Device to continue.

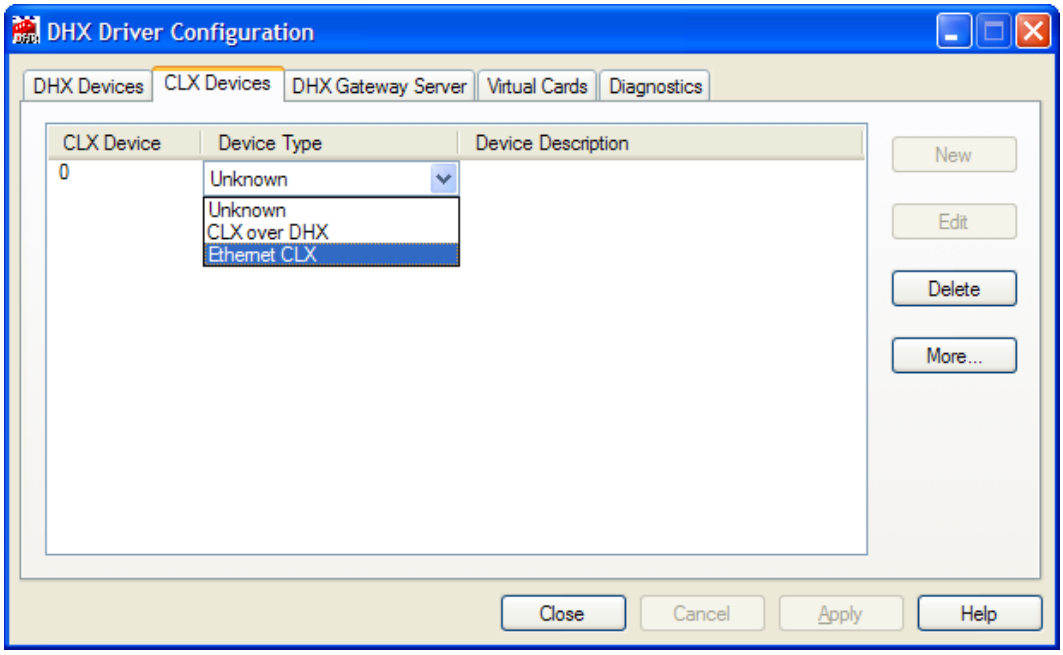
If the wizard created an Ethernet DHX/CIP device, it will launch its configuration editor. Go to Configuring the Ethernet DHX/CIP Device to continue.

Creating an Ethernet CLX Device

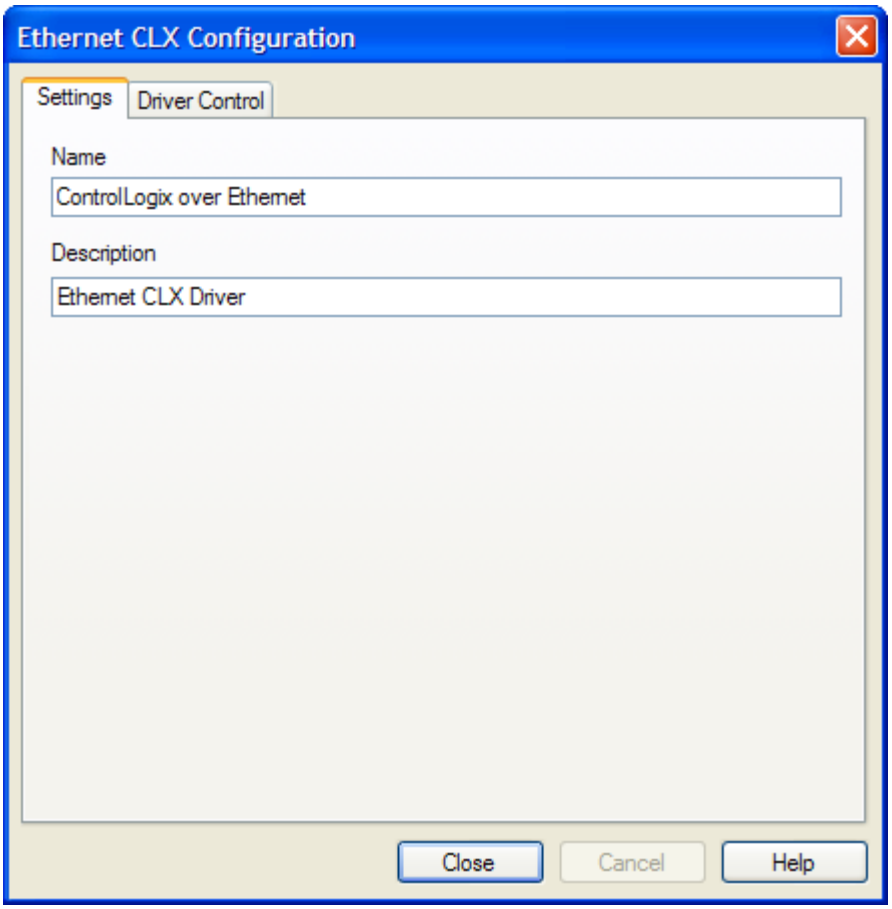


1. Select the ***CLX Devices*** tab.

2. Click ***New***.



3. From the drop-down box, select ***Ethernet CLX***.



A device is created and the Ethernet CLX Configuration editor is launched.

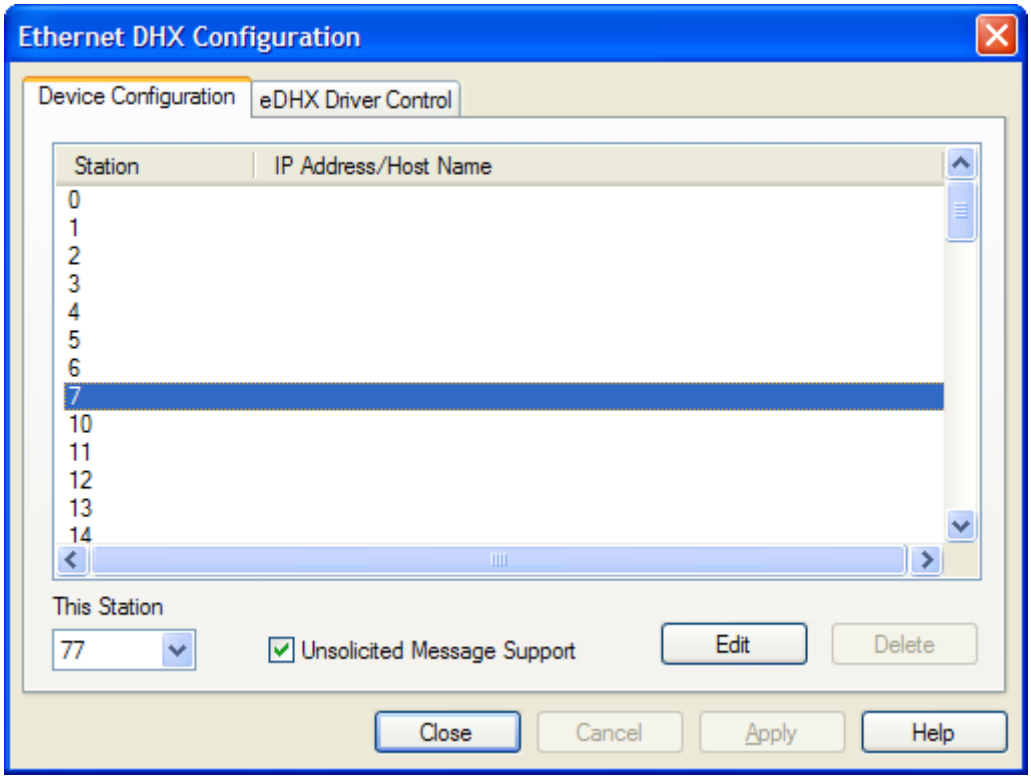
4. If you wish, you may edit the ***Name*** and ***Description*** fields.

No further configuration is needed for Ethernet CLX devices, so you may proceed directly to Configuring the Driver Control.

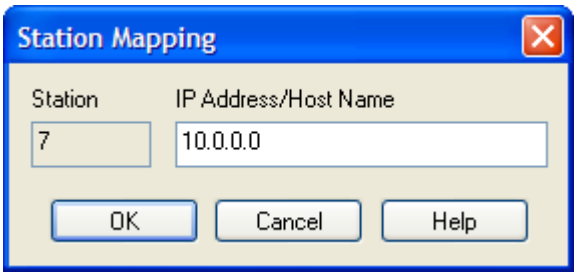
Configuring the Ethernet DHX Device

When you edit an Ethernet DHX device, the DHX Driver Configuration editor automatically dispatches the Ethernet DHX Configuration editor. On the Device Configuration tab, you will be able to configure the mapping table, select the node address for the device and enable unsolicited message support.

The mapping table allows you to map the DH+ node addresses supplied by your software applications into IP addresses or host names used by the Ethernet DHX device.

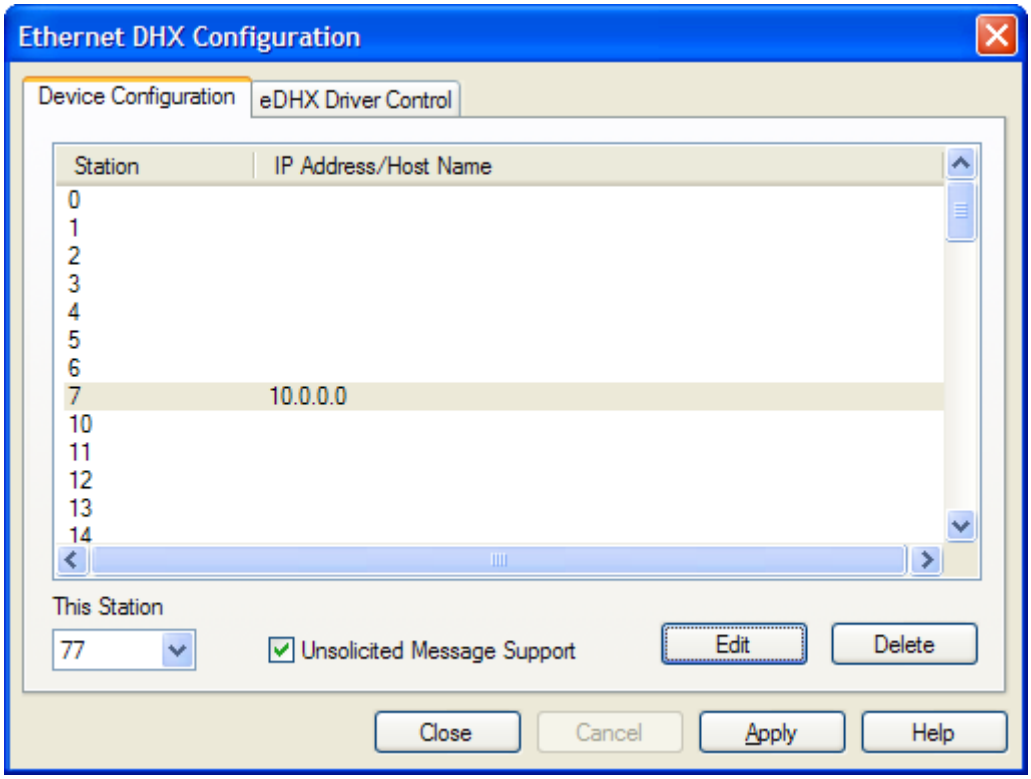


1. Select a ***Station*** to map to an IP address or host name.
2. Click ***Edit***.



   The Station Mapping window will open.

3. Enter the ***IP Address*** or the ***Host Name***.
4. Click ***OK*** to return to the Ethernet DHX Configuration editor.



5. Repeat this procedure until you have mapped all of your stations.

6. Select the desired station number from the ***This Station*** drop-down list.

   The Ethernet DHX device emulates the behavior of a DH+ adapter card, and this value is the node address of the emulated card.

7. If your application supports and requires unsolicited communication, check the ***Unsolicited Message Support*** box.

   If your application does not support or does not require unsolicited communication, uncheck the ***Unsolicited Message Support*** box.

Caution!

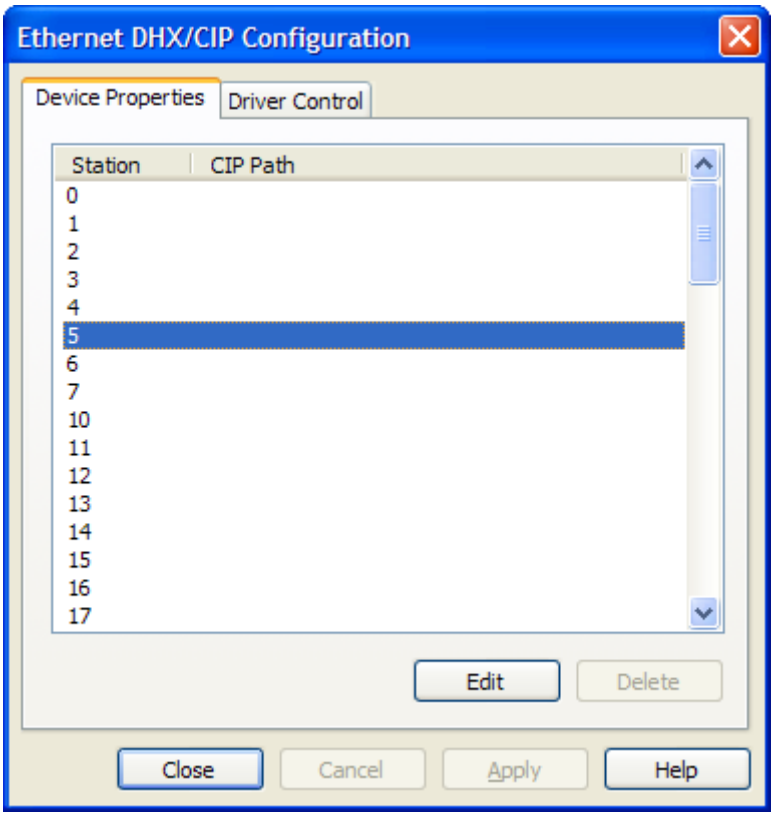
Checking or clearing the Unsolicited Message Support box enables or disables support for unsolicited communication for all Ethernet DHX devices on this computer.

If you created an Ethernet DHX/CIP device, go to Configuring the Ethernet DHX/CIP Device to continue.

Configuring the Ethernet DHX/CIP Device

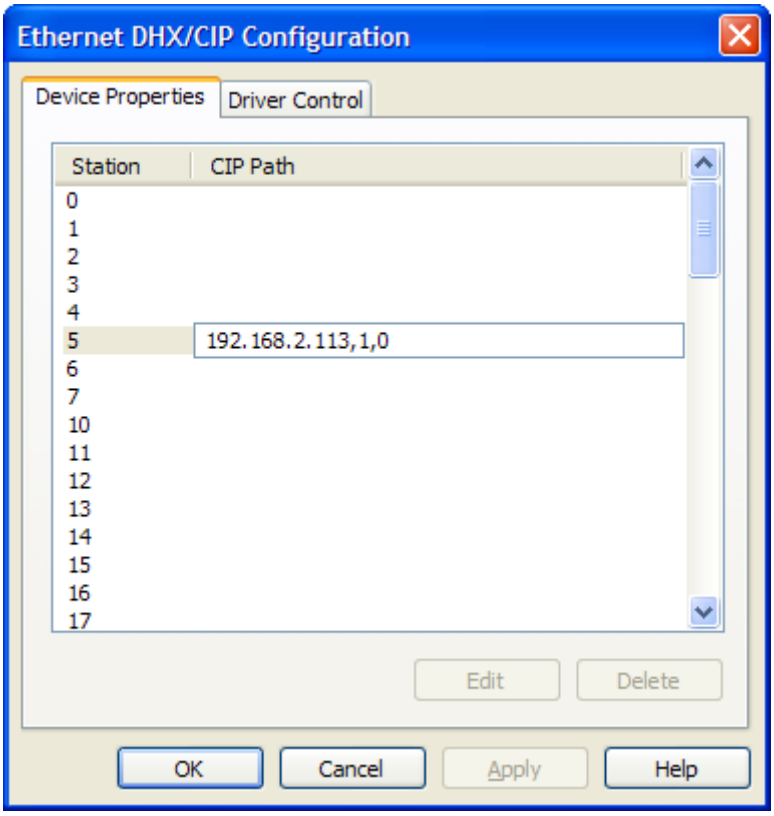
When you edit an Ethernet DHX/CIP device, the DHX Driver Configuration editor automatically dispatches the Ethernet DHX/CIP Configuration editor. On the Device Properties tab, you will be able to configure the mapping table.

The mapping table allows you to map the DH+ node addresses supplied by your software applications into CIP paths used by the Ethernet DHX/CIP device.



1. Select a ***Station*** address to map to a CIP path.

2. Click the ***Edit*** button.

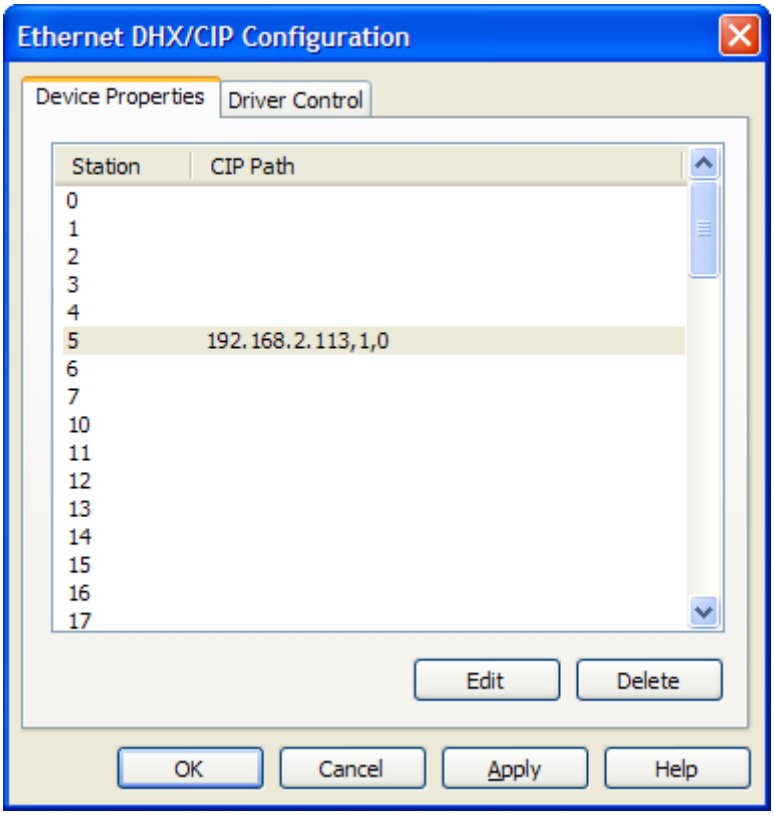


The CIP Path editing field will open.

3. Enter the ***CIP path***.

   For a discussion and examples of how to determine the CIP path you must use, refer to Appendix A: CIP Paths.

4. Press the ***Enter*** key.



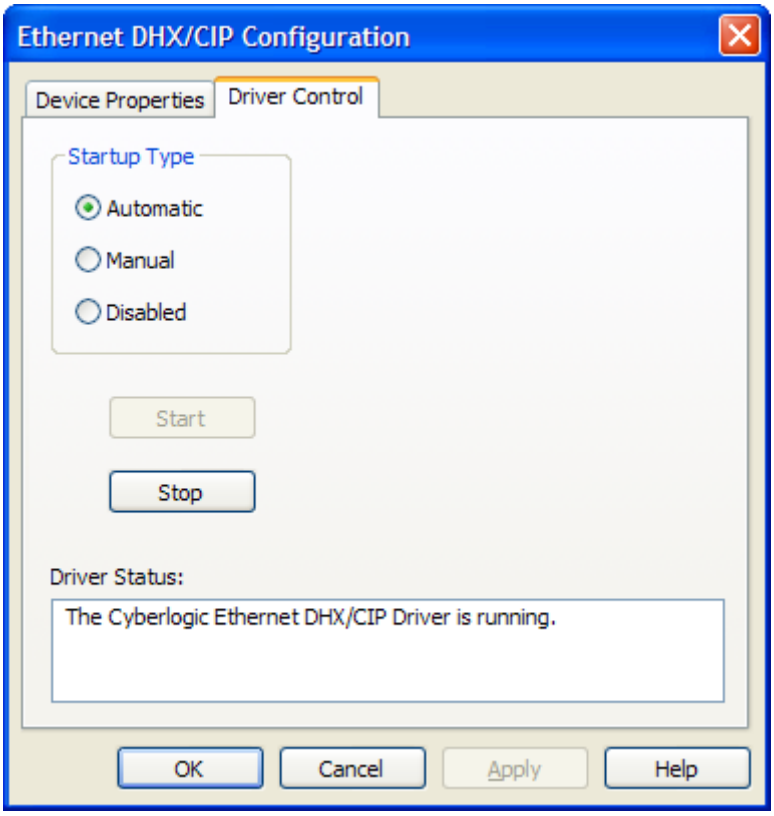
5. Repeat this procedure until you have mapped all of your stations.

Proceed to Configuring the Driver Control to continue.

Configuring the Driver Control

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

The Ethernet DHX Driver, Ethernet DHX/CIP Driver and Ethernet CLX Driver are controlled separately, but the choices and procedures are identical. Here we will look at the Ethernet DHX/CIP Driver.



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 driver from running, select ***Disabled***.

3. Click ***Apply***, and then click ***OK*** to return to the DHX Driver Configuration editor.

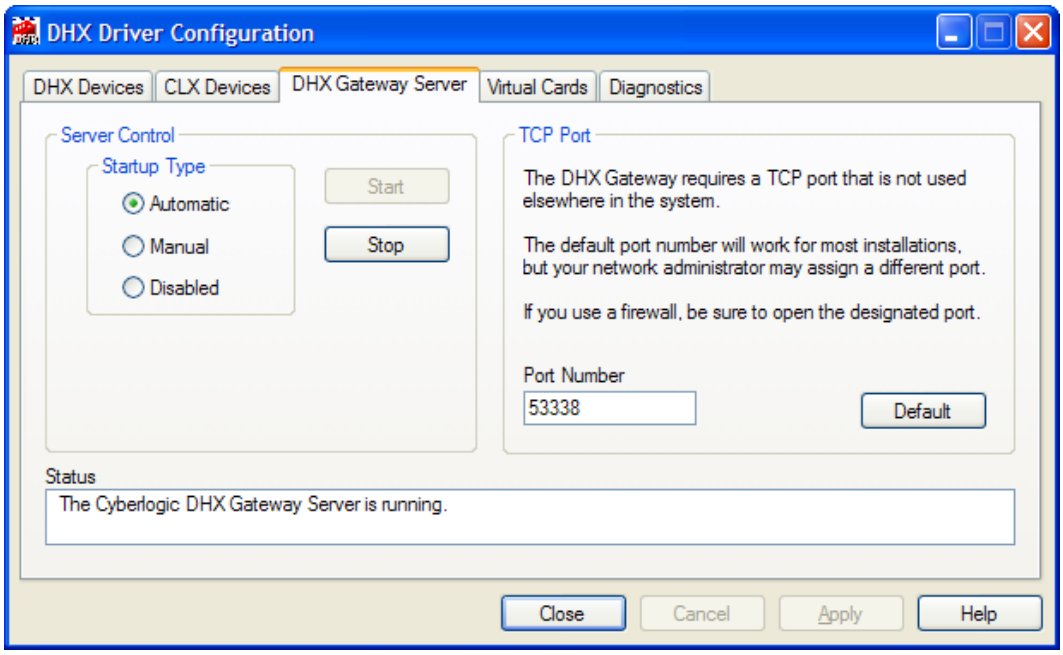
Your device is now fully configured. Next, go to Configuring the DHX Gateway Server.

Configuring the DHX Gateway Server

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

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

1. Select the ***DHX Gateway Server*** tab.



2. Select the desired mode of operation among the ***Startup Type*** choices.

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

   If you do not want to use the DHX 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, 53338, 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.

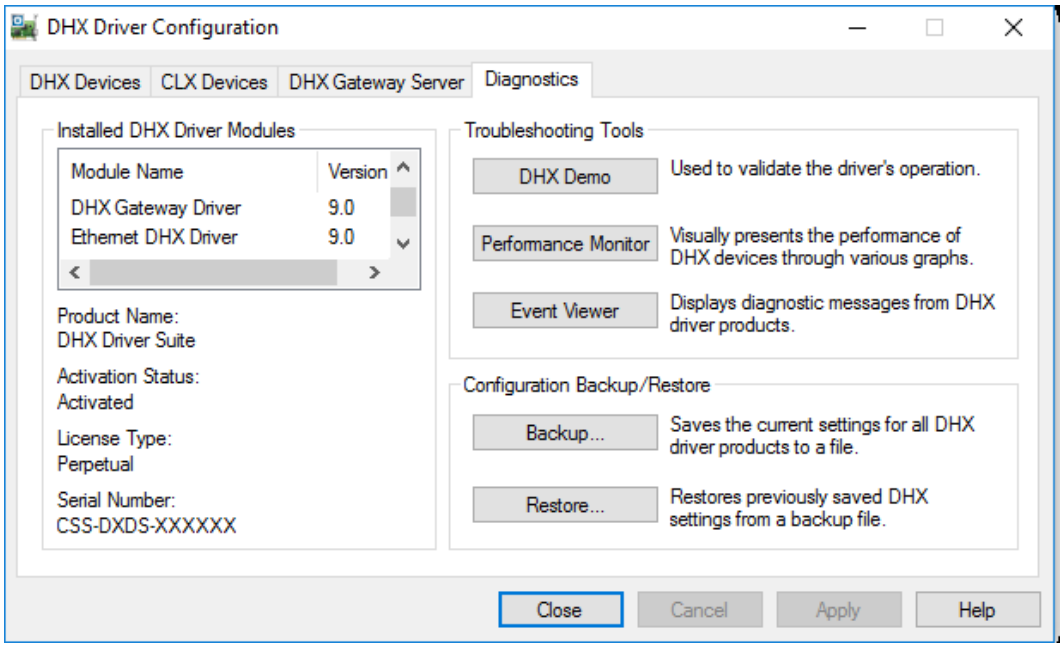
4. If your system uses a firewall, you must configure it to permit DHX Gateway communication. The procedure will depend upon the firewall you are using. Refer to the DHX Gateway Server Tab discussion in the DHX Driver Configuration Editor section for more information.

5. If the DHX Gateway Server is not already running, click ***Start***.

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 DHX 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.

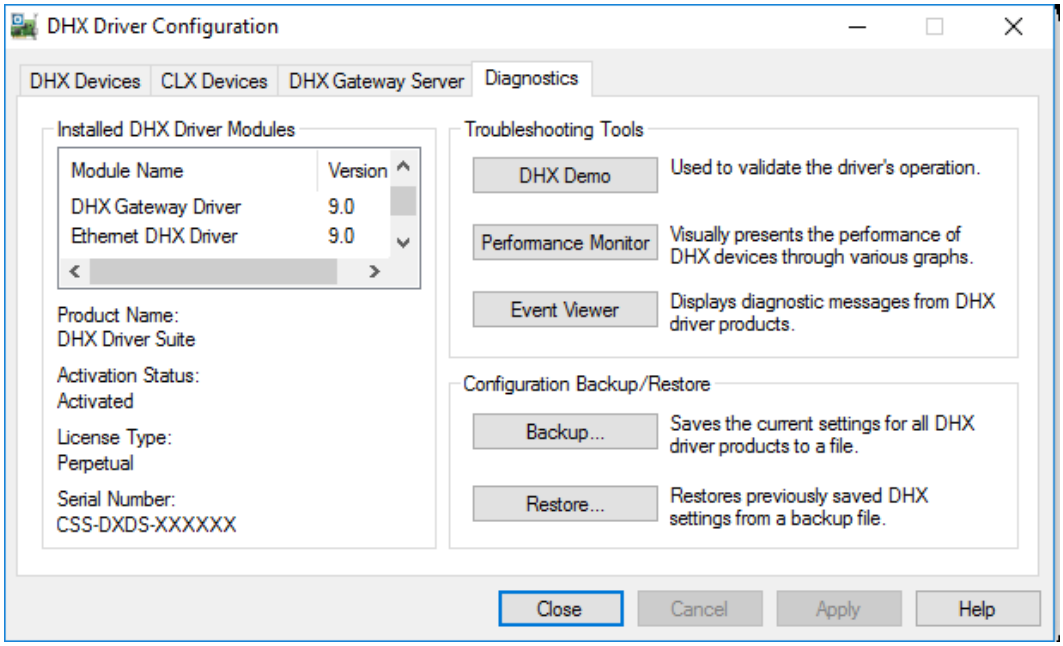
Caution! If you are running in demo mode, the DHX products will stop after two hours of operation and will resume after the system is restarted.

3. The right pane of the screen provides shortcuts to troubleshooting and backup/restore tools. Run the ***DHX Demo*** program after configuring the DHX 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.

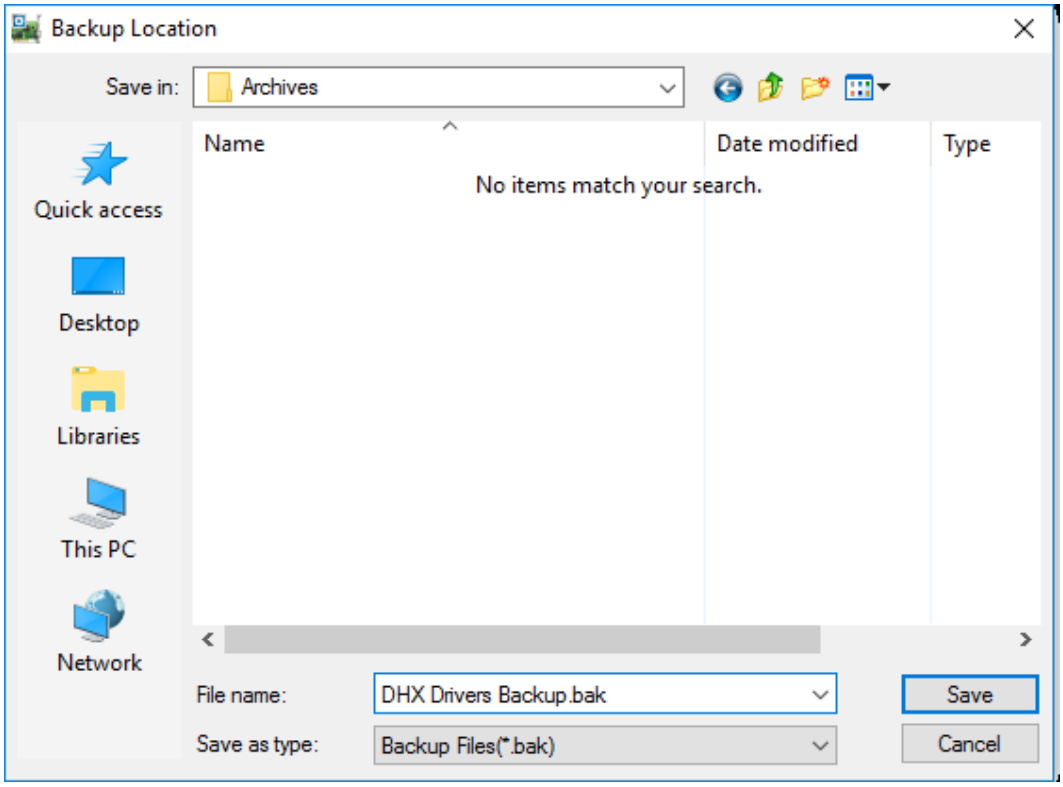
Backing Up Your Configuration

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 DHX Driver Configuration editor.

2. Click the ***Backup...*** button.



3. Browse for the desired backup directory. By default, the last-used directory is 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 DHX Driver can be used, it must be properly configured. The configuration procedure involves creating one or more Ethernet DHX, Ethernet DHX/CIP or Ethernet CLX devices and configuring them to work with your network adapter cards. For a discussion of when to use each type, refer to What Device Type Should I Use?

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 a DHX device, you must run the DHX Driver Configuration Editor after you install the software. The DHX Driver Configuration Editor is a common component of all DHX family drivers.

When configuring an Ethernet DHX device, the DHX Driver Configuration Editor automatically dispatches the Ethernet DHX Configuration Editor. When configuring an Ethernet DHX/CIP device, the DHX Driver Configuration Editor automatically dispatches the Ethernet DHX/CIP Configuration Editor. When configuring an Ethernet CLX device, the DHX Driver Configuration Editor automatically dispatches the Ethernet CLX Configuration Editor.

DHX Driver Configuration Editor

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

The DHX Driver Configuration editor consists of five tabs:

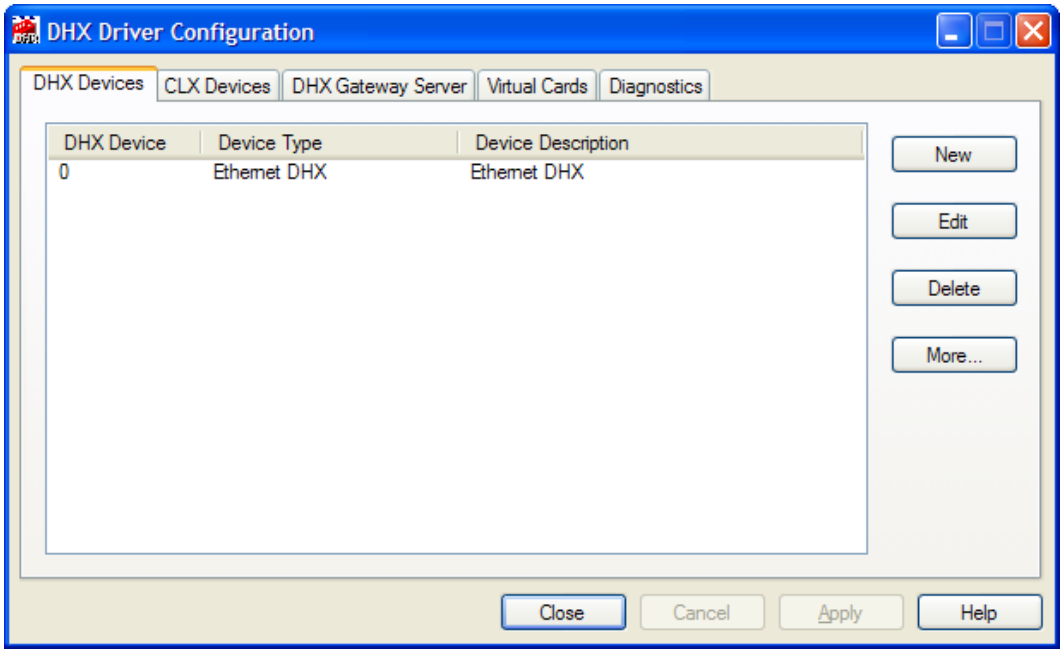
- DHX Devices Tab
- CLX Devices Tab
- DHX Gateway Server Tab
- Virtual Cards Tab
- Diagnostics Tab

The following sections provide complete descriptions of these tabs.

DHX Devices Tab

DHX devices are logical devices that are used to communicate to Programmable Logic Controllers, such as MicroLogix, SLC-500, PLC-5, PLC-3 and PLC-2. Every DHX device must be configured on the DHX Devices tab before it can be used by client applications, such as the DHX OPC Server. The DHX Devices tab lists all currently configured DHX devices in your system, including Ethernet DHX and Ethernet DHX/CIP devices. To view

and edit Ethernet CLX devices, go to the CLX Devices Tab. The information is shown in three columns: DHX Device, Device Type and Device Description.



DHX Device

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

Device Type

This column identifies the type of the DHX device, such as 1784-KTX, Ethernet DHX or DHX Gateway.

Device Description

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

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

New

Click this button to create a new DHX device.

Edit

Select a DHX device and click this button to edit it.

Delete

Select a DHX device and click this button to delete it.

More...

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

Creating a New DHX Device

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

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

Deleting an Existing DHX Device

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

Editing an Existing DHX Device Configuration

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

Changing Device Description

Select the device, 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 Device Type

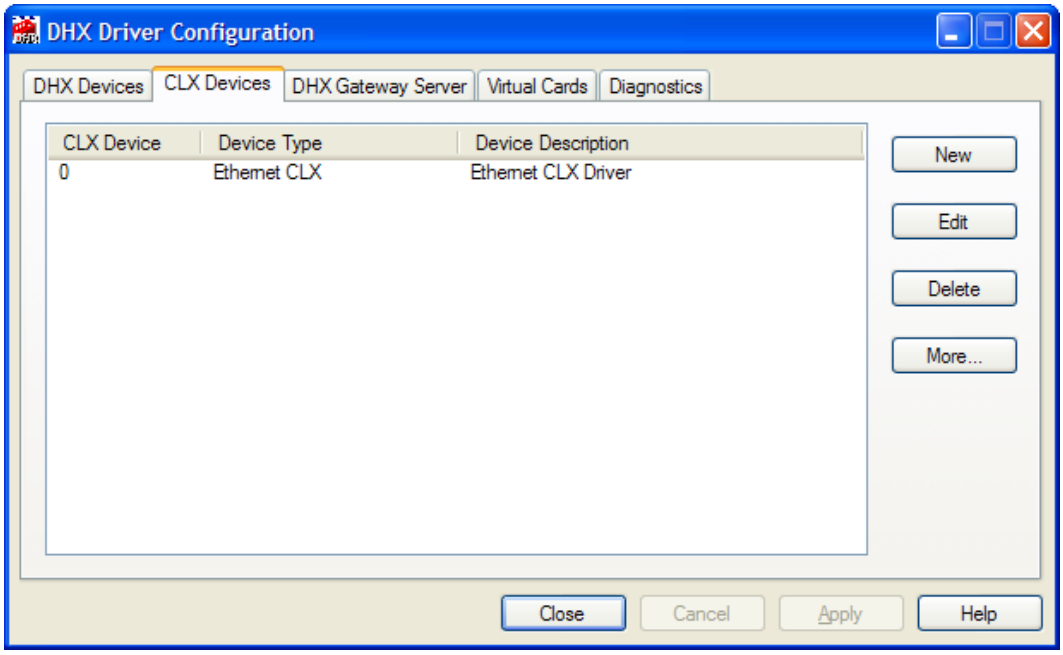
Select the device and click the ***More...*** button or right-click and select ***Change Type*** from the context menu. From the drop-down list, select the new device type for the DHX device. Upon selecting the new device type, the DHX Driver Configuration editor will automatically dispatch the appropriate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

CLX Devices Tab

CLX devices are logical devices that are used to communicate to the Logix family of Programmable Automation Controllers, such as ControlLogix, CompactLogix and FlexLogix. Every CLX device must be configured on the CLX Devices tab before it can be used by the DHX OPC Server. The CLX Devices tab lists all currently configured CLX devices in your system. To view and edit Ethernet DHX and Ethernet DHX/CIP devices, go to the DHX Devices Tab. The information about each device is shown in three columns: CLX Device, Device Type and Device Description.

Note

Ethernet CLX and CLX over DHX devices are used only with the Cyberlogic DHX OPC Server and are available only if you have installed the DHX OPC Server Suite, DHX OPC Premier Suite or DHX OPC Enterprise Suite. Otherwise, the Ethernet CLX and CLX over DHX device types will not be available, and this tab will not appear in the editor. For more information on CLX devices, refer to the DHX Driver help.



CLX Device

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

Device Type

This column identifies the type of the CLX device, such as Ethernet CLX or CLX over DHX.

Device Description

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

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

New

Click this button to create a new CLX device.

Edit

Select a CLX device and click this button to edit it.

Delete

Select a CLX device and click this button to delete it.

More...

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

Creating a New CLX Device

Click the ***New*** button or right-click inside the list window and select ***New*** from the context menu. Then select the desired device type from the drop-down list.

Upon selecting the device type, the DHX Driver Configuration editor will automatically dispatch the appropriate device editor.

Deleting an Existing CLX Device

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

Editing an Existing CLX Device Configuration

Select the device, click the ***Edit*** button or right-click and select ***Edit*** from the context menu. The DHX Driver Configuration editor will automatically dispatch the appropriate device configuration editor. The screen that follows will depend upon the selected device type.

Changing 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.

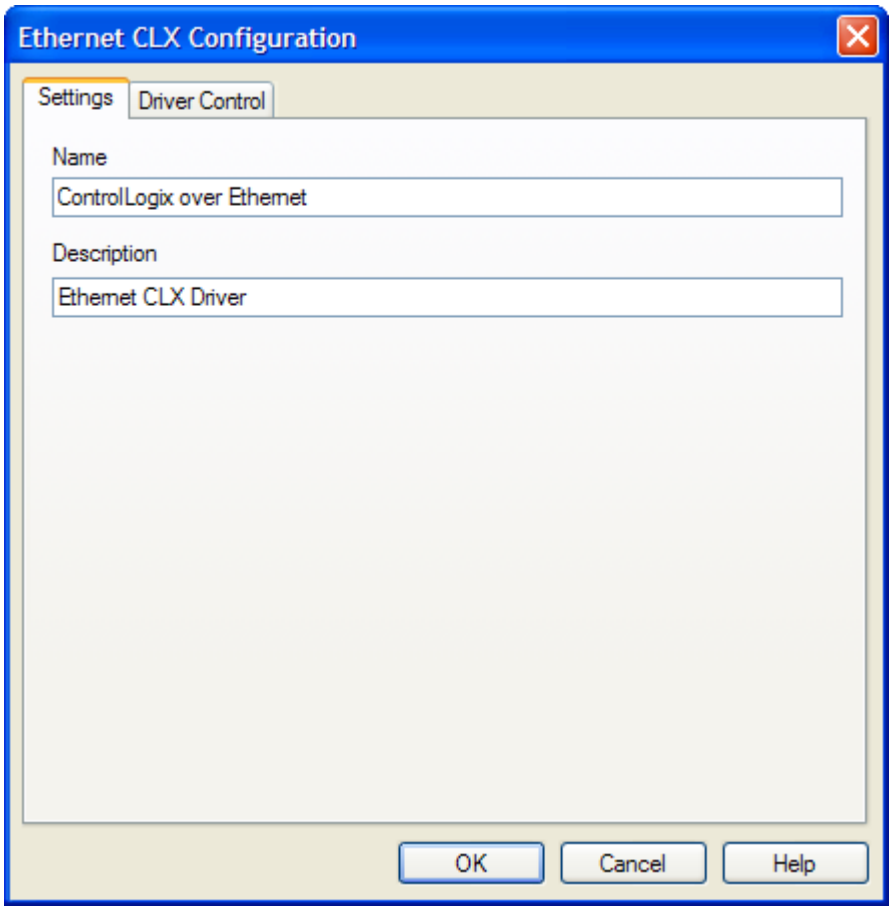
Changing Device Type

Select the device, 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 the CLX device. Upon selecting the new device type, the DHX Driver Configuration editor will automatically dispatch the appropriate device configuration editor. The screen that follows will depend upon the device type selected.

Ethernet CLX Configuration

An Ethernet CLX device allows communications to the Logix family of Programmable Automation Controllers over Ethernet network. This type of a device does not require an Ethernet DHX device to operate.

When you create or edit an Ethernet CLX device, the Ethernet CLX Configuration editor is launched. This editor consists of two tabs, Settings and Driver Control.



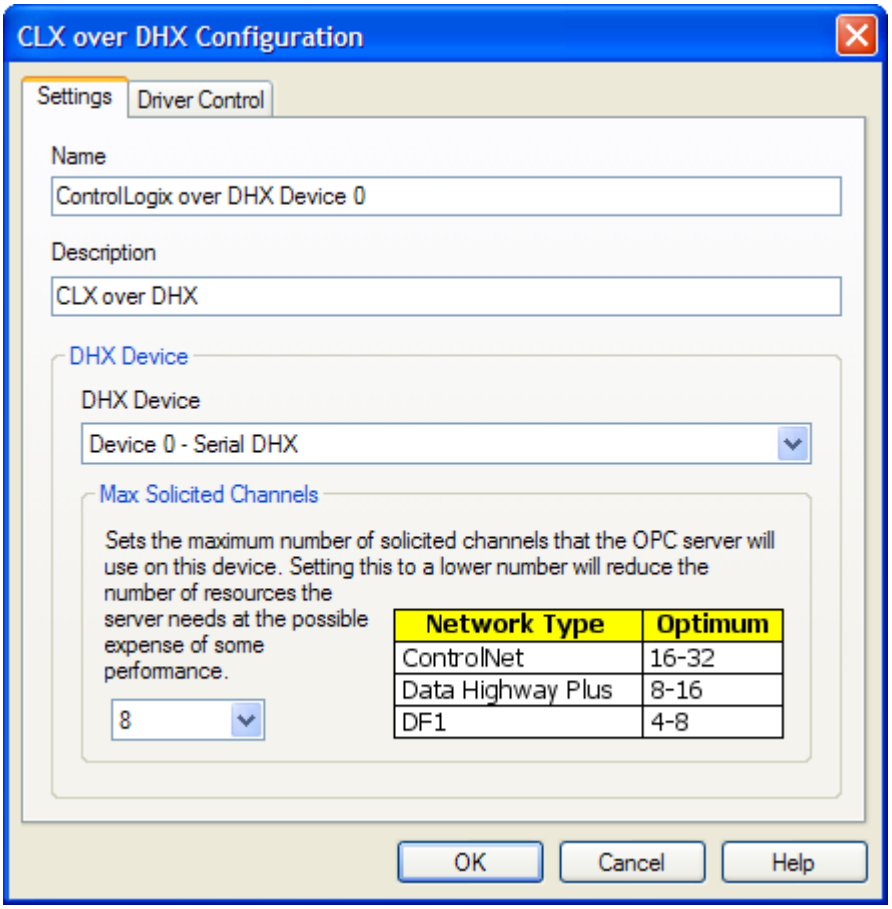
On the Settings tab, you can edit the name and description of the device. No other configuration is needed.

The Driver Control tab controls the startup and shutdown of the Ethernet CLX driver. This configuration is identical to that used for the Ethernet DHX/CIP driver, as explained in Configuring the Driver Control.

CLX over DHX Configuration

A CLX over DHX device allows communications to the Logix family of Programmable Automation Controllers over networks other than Ethernet. This type of a device requires an appropriate DHX device, such as a 1784-PKTX, to operate.

When you create or edit a CLX over DHX device, the CLX over DHX Configuration editor is launched. This editor consists of two tabs, Settings and Driver Control.



On the Settings tab, you can edit the name and description of the device. You must also edit the items in the DHX Device section.

DHX Device

Every CLX over DHX device must have an associated DHX device. You may select the desired device from this drop-down box.

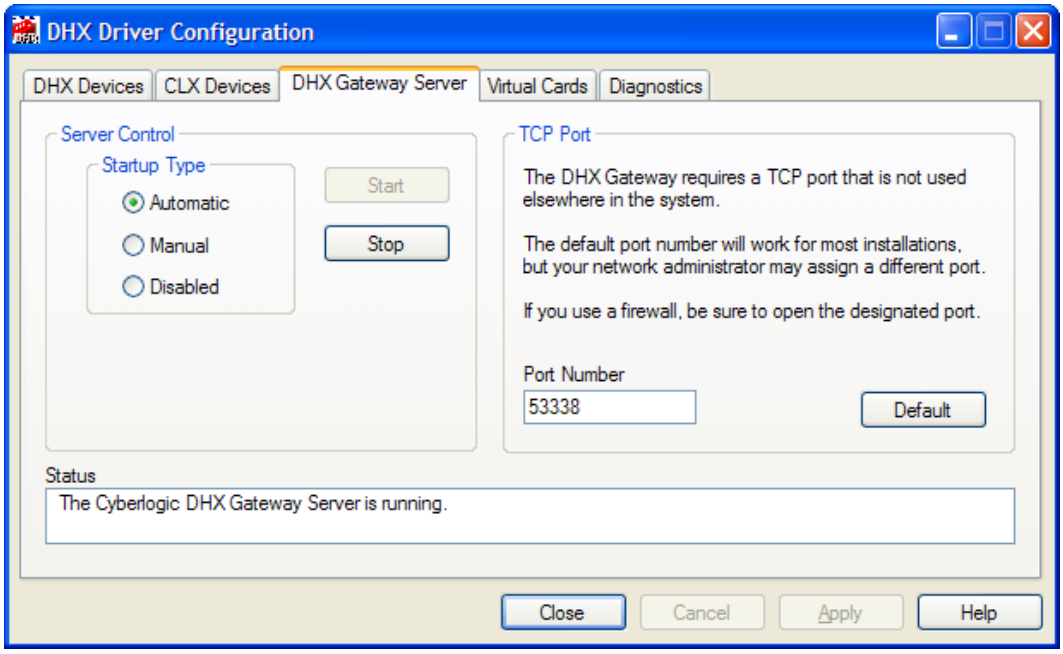
Max Solicited Channels

This setting allows you to select the maximum number of solicited channels that the OPC server will use for this device. This allows you to trade-off speed and system resource usage. The optimum value depends on the network type.

The Driver Control tab controls the startup and shutdown of the CLX driver. This configuration is identical to that used for the Ethernet DHX/CIP driver, as explained in Configuring the Driver Control.

DHX Gateway Server Tab

All DHX suites include the DHX Gateway Server, a remote connectivity component of the DHX family. The DHX Gateway Server allows remote nodes to access all configured DHX devices present on the system that is running the DHX Gateway Server. Refer to the DHX Gateway Driver help file for more information on this capability.



Server Control

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

Automatic

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

Manual

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

Start

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

Stop

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

Status

This tells you whether the DHX 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 be opened in the firewall configuration. Refer to the Configuring the Firewall section for details.

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 53338.

Selecting the Startup Type

If you want to use the DHX 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 DHX 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 DHX Gateway Server, choose ***Disabled***.

Start/Stop the Gateway Server

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

Selecting the TCP Port

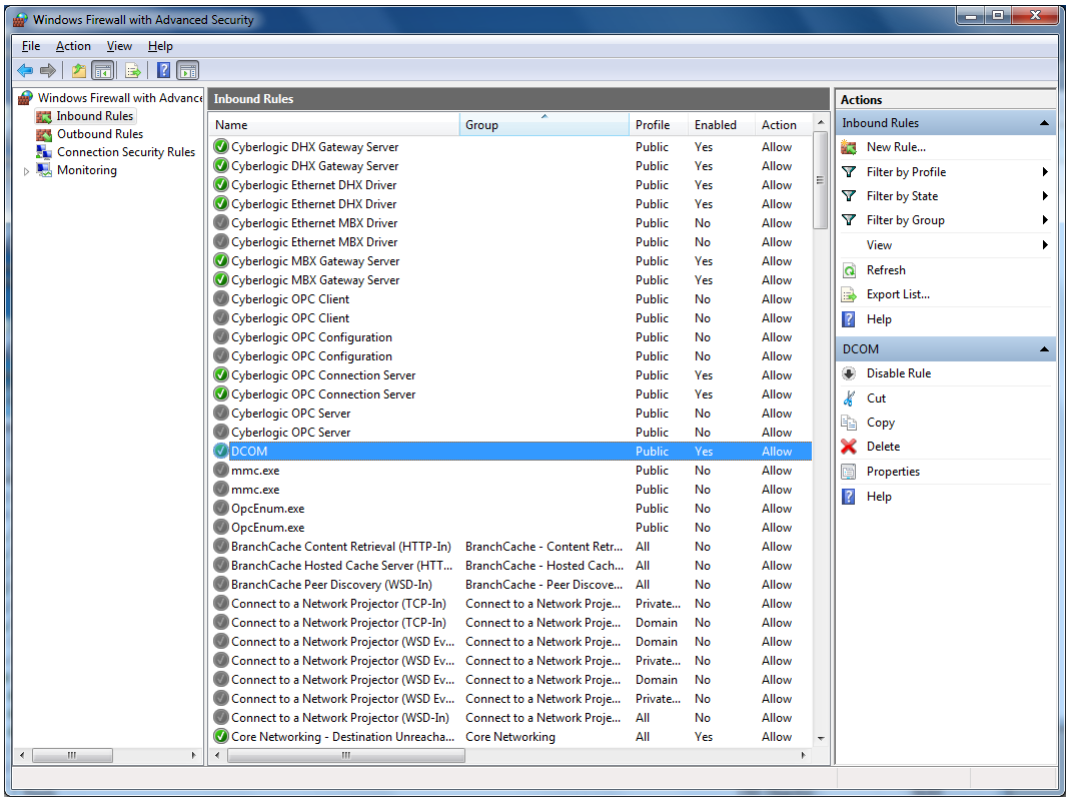
Enter the desired port number in the Port Number field.

You must enter a TCP port that is not used elsewhere in the system. The default, 53338, 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 DHX Gateway Server*** and ***DCOM*** are enabled. If not, enable them.

4. If you will be using unsolicited Ethernet DHX communication, verify that the ***Cyberlogic Ethernet DHX Driver*** rules are enabled. If not, enable them.

5. Close the window to exit.

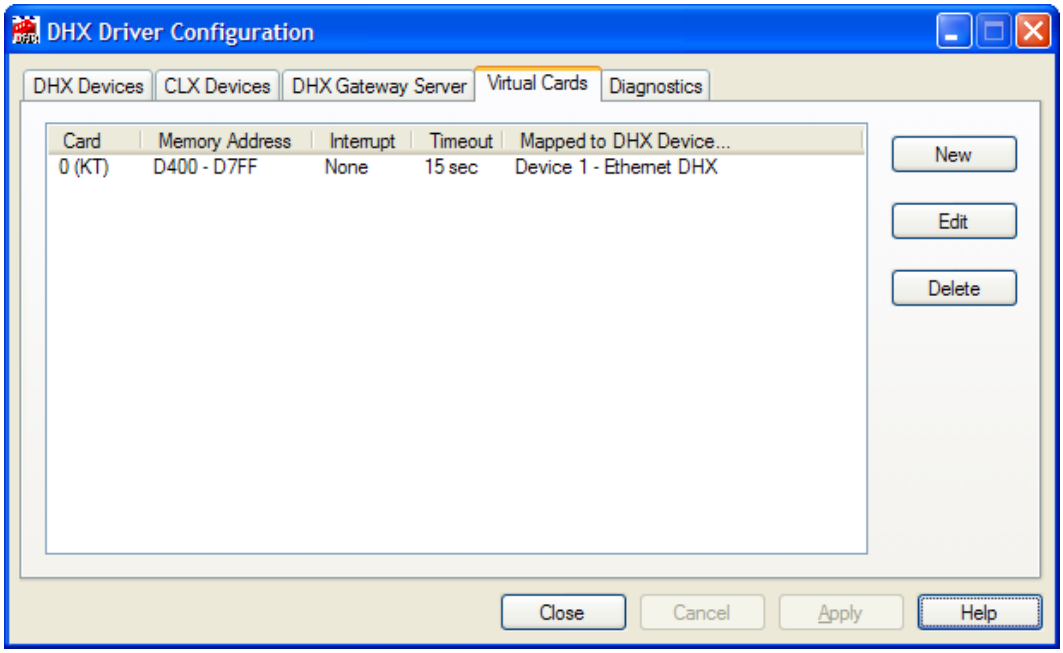
Virtual Cards Tab

Virtual cards allow legacy 16-bit DOS and Windows applications to use any of the DHX devices you have configured in your system. They do this by making those devices appear to function as 1784-KT or 1784-KTX cards.

Note

The Virtual Cards tab will appear in the editor only if the Virtual DHX Driver option is installed. For more information on the Virtual DHX Driver, refer to the Virtual DHX Driver help.

The Virtual Cards tab lists all currently-configured virtual cards. The information is provided in five columns: Card, Memory Address, Interrupt, Timeout and Mapped to DHX Device….



Card

This column displays a number that the editor assigns to every virtual adapter card and also indicates the card type (KT or KTX).

Memory Address

This is the memory address range allocated to the virtual adapter card.

Interrupt

This is the interrupt IRQ line to be emulated by the virtual adapter card. If it is *None*, then the virtual card will operate in polled mode.

Timeout

This is the message timeout value for the virtual adapter card.

Mapped to DHX Device…

This is the actual DHX device used by the virtual adapter card for all of its communications.

New

Click this button to create a new virtual card.

Edit

Select a virtual card and click this button to edit it.

Delete

Select a virtual card and click this button to delete it.

Creating a New Virtual Card

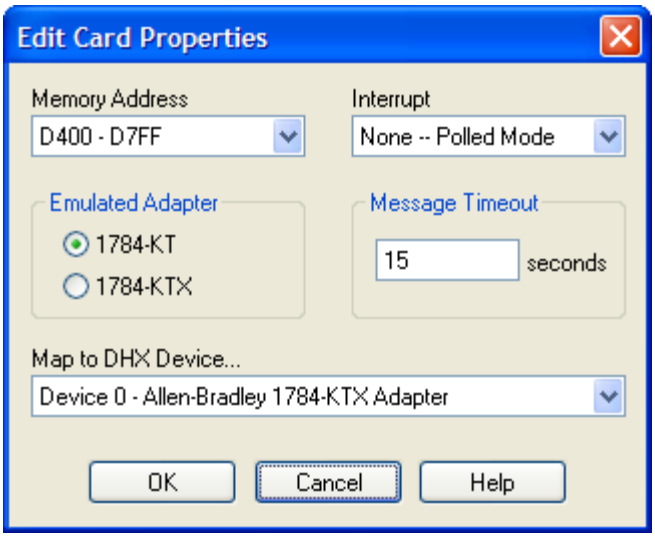
Click the ***New*** button or right-click inside the list window and select ***New*** from the context menu. The Edit Card Properties window will open to allow you to configure the new virtual card.

Deleting an Existing Virtual Card

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

Editing an Existing Virtual Card

Select an existing virtual adapter card and click the ***Edit*** button or right-click and select ***Edit*** from the context menu. In either case, the following dialog will appear.



Memory Address

This is the memory address range allocated to the virtual adapter card. This setting must match your 16-bit software configuration.

Interrupt

This is the interrupt (IRQ) line to be emulated by the virtual adapter card. Most programs do not need interrupt emulation.

Emulated Adapter

This selection determines whether the virtual adapter will emulate the 1784-KT or 1784-KTX card. The choice of adapter will affect the memory addresses and interrupts that can be chosen.

Message Timeout

This is the message timeout value for this virtual adapter card. It specifies the time that the Virtual DHX Driver should wait for reply messages before declaring a timeout condition.

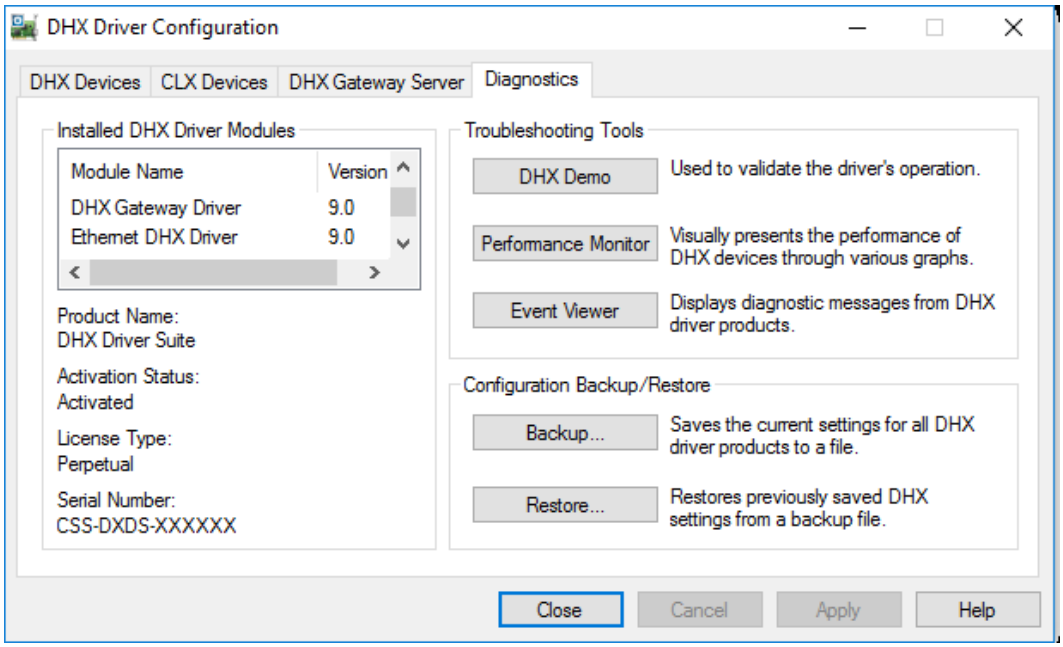
If you encounter communication timeouts, you should increase this value. For most applications, a 15-second timeout value is adequate.

Mapped to DHX Device…

This is the DHX device that is used by this virtual adapter card for all of its communications. The DHX device must already have been configured and tested. If you have not done this, refer to the Configuration section of the appropriate DHX family driver: DHX Driver, Ethernet DHX Driver or DHX Gateway Driver.

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 DHX Driver Products

This area shows all DHX 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 Package

DHX products are sold and installed as packaged suites, such as the DHX Driver Suite and DHX OPC Server Suite. This field indicates the suite that is installed on your system.

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.

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.

DHX 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 DHX driver products on your system.

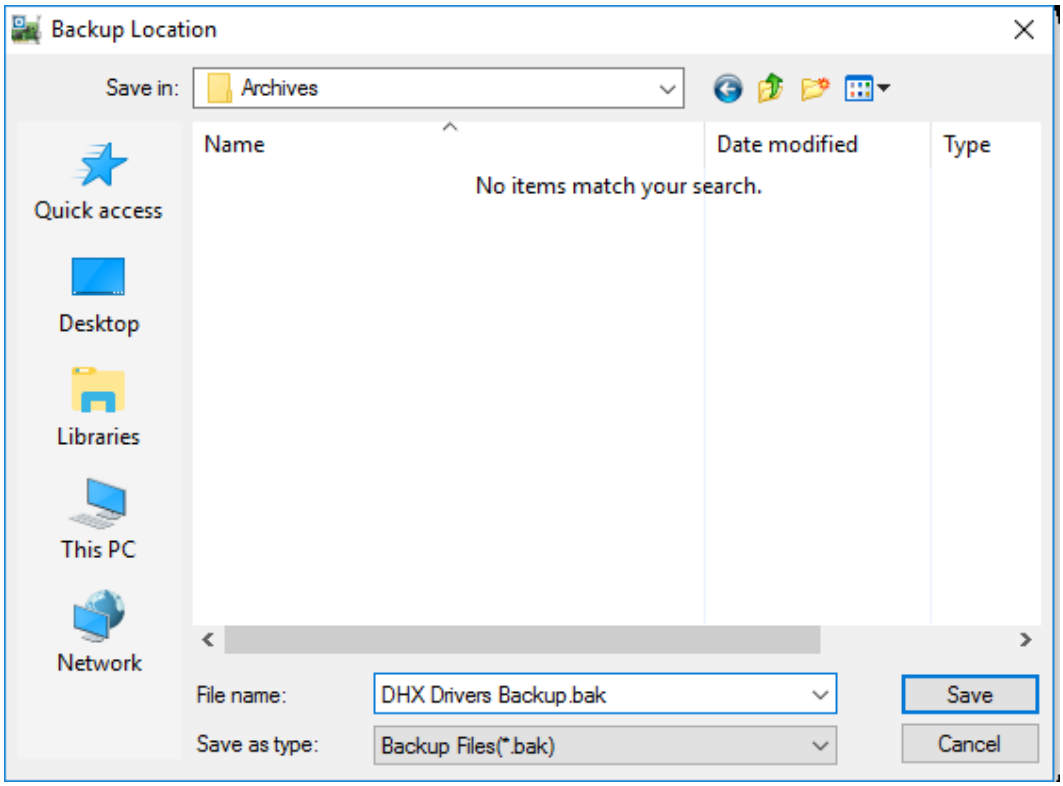
Note

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.



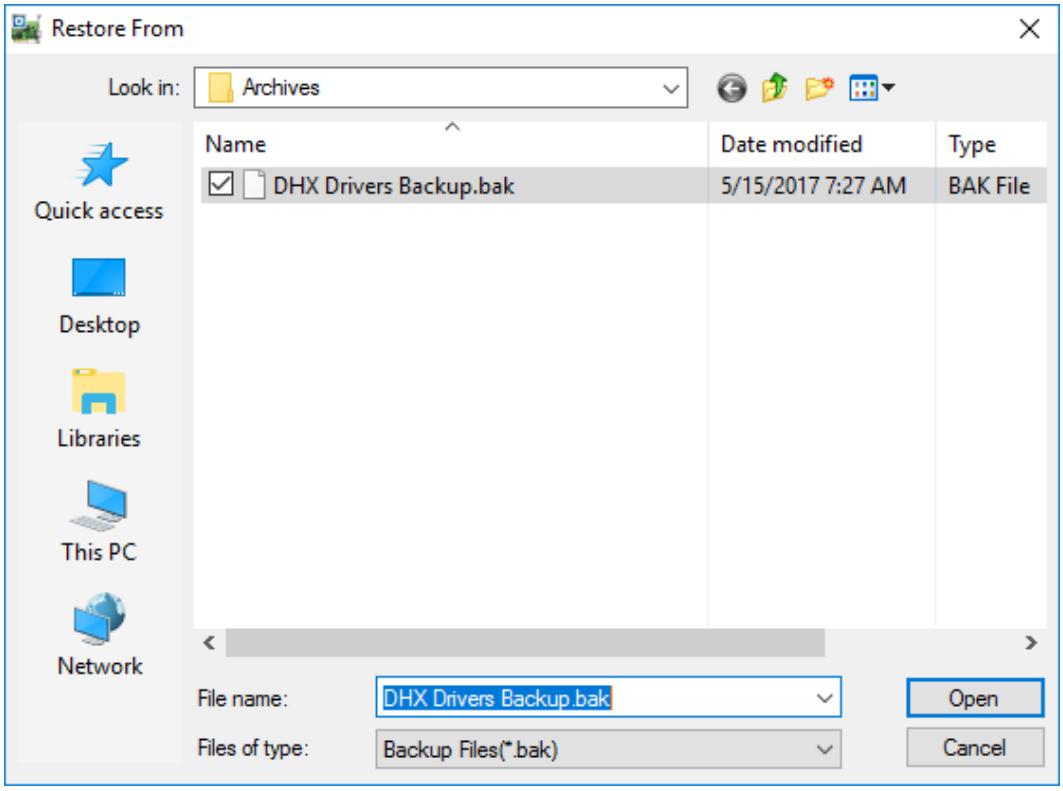
2. Browse for the backup directory. By default, the last-used directory will be selected.

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

The utility accepts the following command line switches:

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

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

> ClDhxCfg /Save C:\Program Files\Common Files\Cyberlogic Shared\DhxCfg.bak

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

> ClDhxCfg /Restore C:\Program Files\Common Files\Cyberlogic Shared\DhxCfg.bak

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

Ethernet DHX Configuration Editor

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

The Ethernet DHX Configuration editor consists of two tabs:

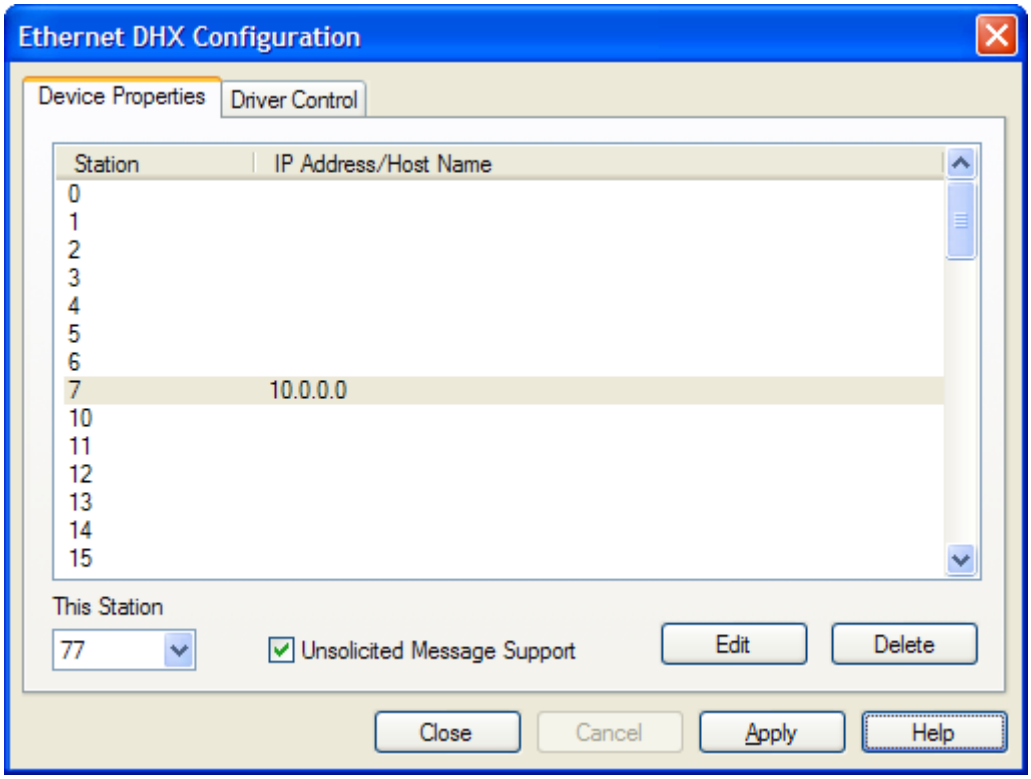
- Device Properties Tab
- Driver Control Tab

The following sections provide a complete description of these tabs.

Device Properties Tab

Because the Ethernet DHX device emulates the behavior of a Data Highway Plus interface adapter card, you must assign it a Data Highway Plus station address. This is done on the Device Properties tab. This tab is also where you set up the mapping table for station names and IP addresses or host names.

To accommodate the Data Highway Plus architecture, Ethernet DHX supports only local addressing. It then maps the one-byte station address in the command message to either an IP address, which the server uses as is, or a host name, which the server converts into an IP address. Since each logical device allows for a maximum of 64 mapping entries, more devices can be created if more entries are needed. This allows for an unlimited number of stations. For a more detailed discussion, refer to the Solicited Communications section.



Station

This is the DH+ station address for each row in the table. To configure the mapping table, you must enter an IP address or host mane for each DH+ station that your applications will address.

The Ethernet DHX device allows a maximum of 64 nodes with station addresses in the range of 0-77 octal. If you need more mapping entries, you can create additional Ethernet DHX devices.

IP Address/Host Name

For every DH+ station address, you can assign either an IP address or a host name to the node you will communicate with.

This Station

Because the Ethernet DHX device emulates the behavior of a DH+ adapter card, you must assign a station address to this device by selecting the address from the This Station drop-down list. The default address is 77 octal, and is appropriate for most applications.

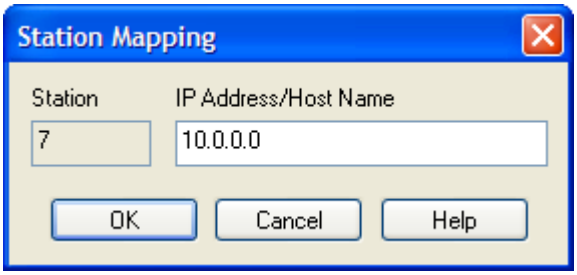
Unsolicited Message Support

Check this box to enable unsolicited message support. You should do this only if your application supports and requires unsolicited communications.

Caution! Checking or clearing the Unsolicited Message Support box enables or disables support for unsolicited communication for all Ethernet DHX devices on this computer.

Creating an Address Mapping

Select a station to map to an IP address or host name. Click ***Edit*** or double-click the selected entry to open the Station Mapping window



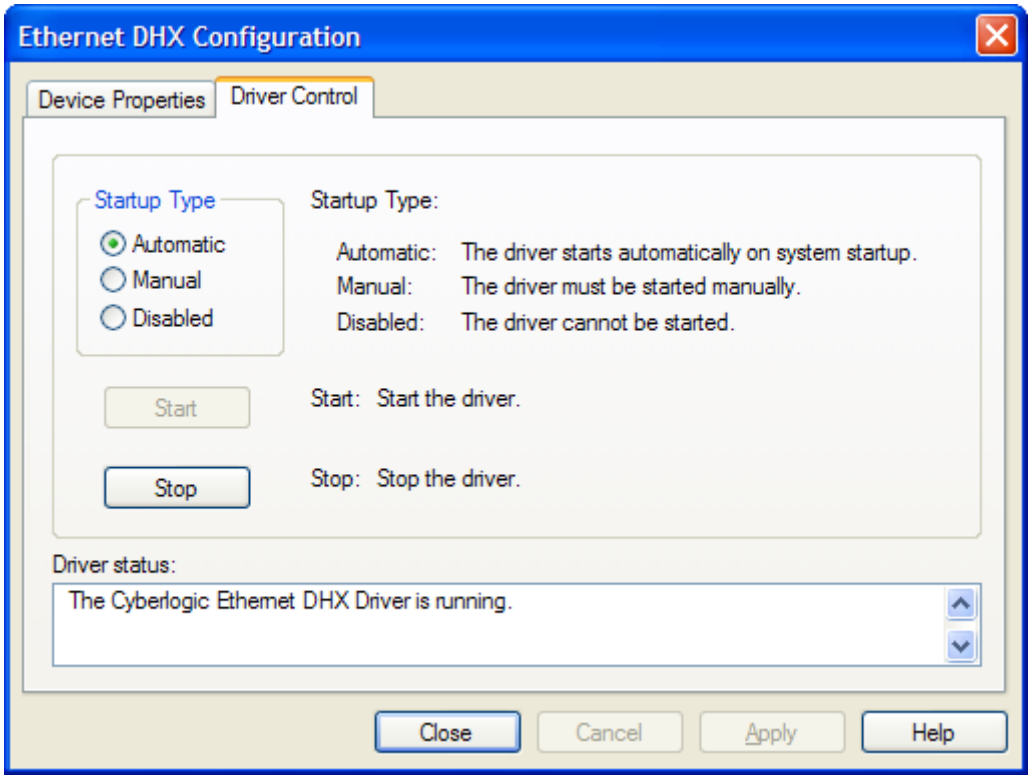
Enter the ***IP Address*** or the ***Host Name***.

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

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 DHX devices.



Automatic

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

Manual

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

Start

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

Stop

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

Driver Status

This tells you whether or not the Ethernet DHX 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 DHX Driver to start whenever the system is booted, select ***Automatic***. This is the recommended setting for systems that will use the Ethernet DHX Driver.

If you want to use the Ethernet DHX 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 DHX Driver, choose ***Disabled***.

Start/Stop the Ethernet DHX Driver

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

Ethernet DHX/CIP Configuration Editor

When editing Ethernet DHX/CIP devices, the DHX Driver Configuration Editor dispatches the Ethernet DHX/CIP Configuration Editor.

The Ethernet DHX/CIP Configuration editor consists of two tabs:

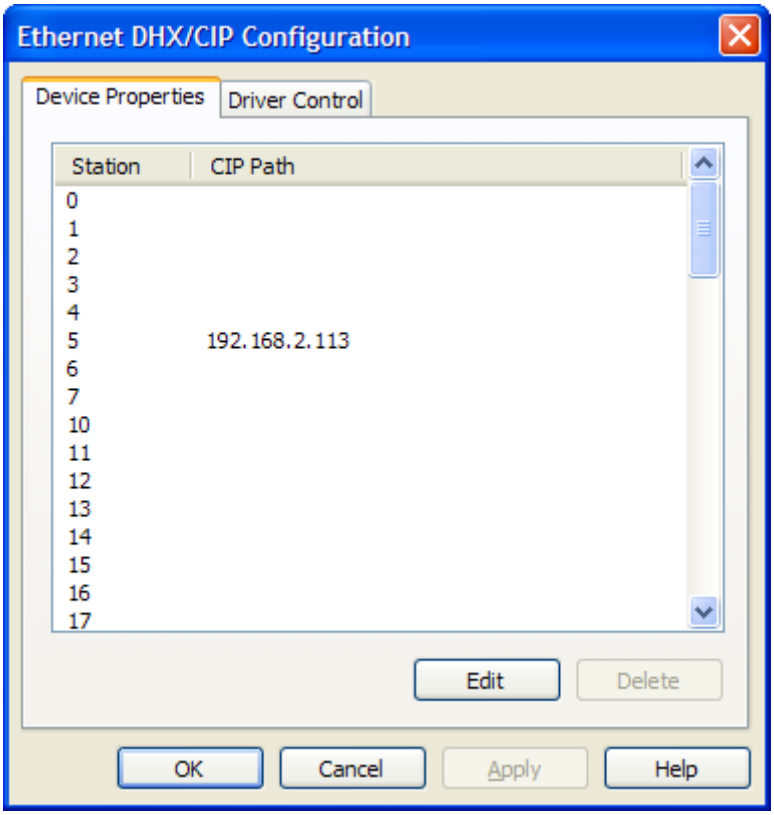
- Device Properties Tab
- Driver Control Tab

The following sections provide a complete description of these pages.

Device Properties Tab

The Device Properties tab is also where you set up the mapping table for station names and IP addresses or host names.

To accommodate the Data Highway Plus architecture, Ethernet DHX/CIP supports only local addressing. It then maps the one-byte station address in the command message to a CIP path. Since each logical device allows for a maximum of 64 mapping entries, more devices can be created if more entries are needed. This allows for an unlimited number of stations. For a more detailed discussion, refer to the Solicited Communications section.



Station

This is the DH+ station address for each row in the table. To configure the mapping table, you must enter a CIP path for each DH+ station that your applications will address.

The Ethernet DHX device allows a maximum of 64 nodes with station addresses in the range of 0-77 octal. If you need more mapping entries, you can create additional Ethernet DHX devices.

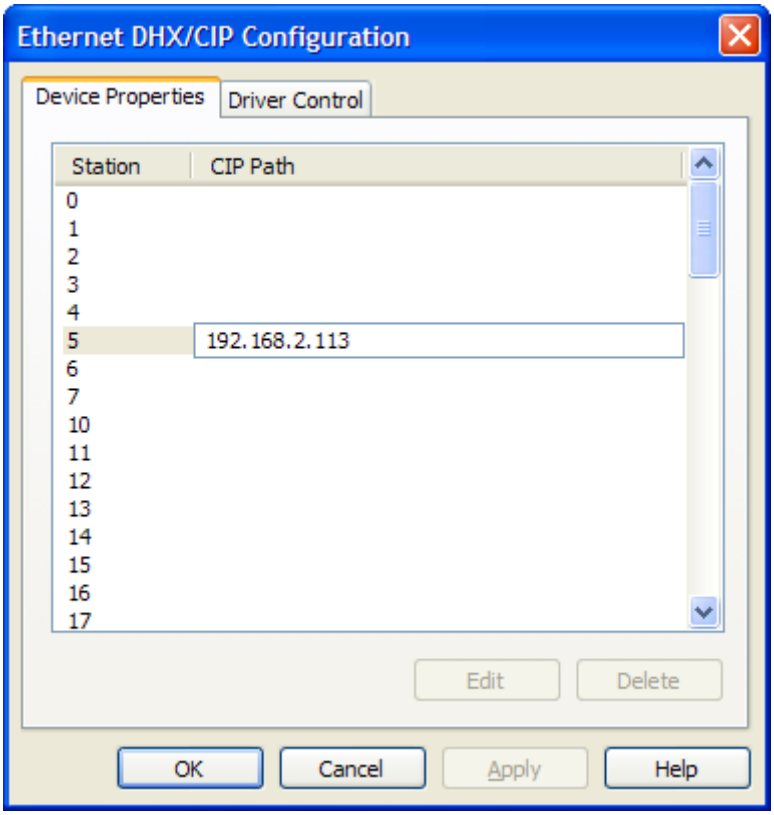
CIP Path

For every station address, you can assign a CIP path to specify the node you will communicate with.

The simplest CIP path is just the IP address of a PLC to which the messages should be sent. A more complex CIP path is needed if you wish to communicate through a ControlLogix backplane configured as a router. For a detailed discussion of CIP paths and their configuration, refer to Appendix A: CIP Paths.

Creating an Address Mapping

Select a station to map to a CIP path. Click the ***Edit*** button or double-click the selected entry. The screen will change to show the edit field.



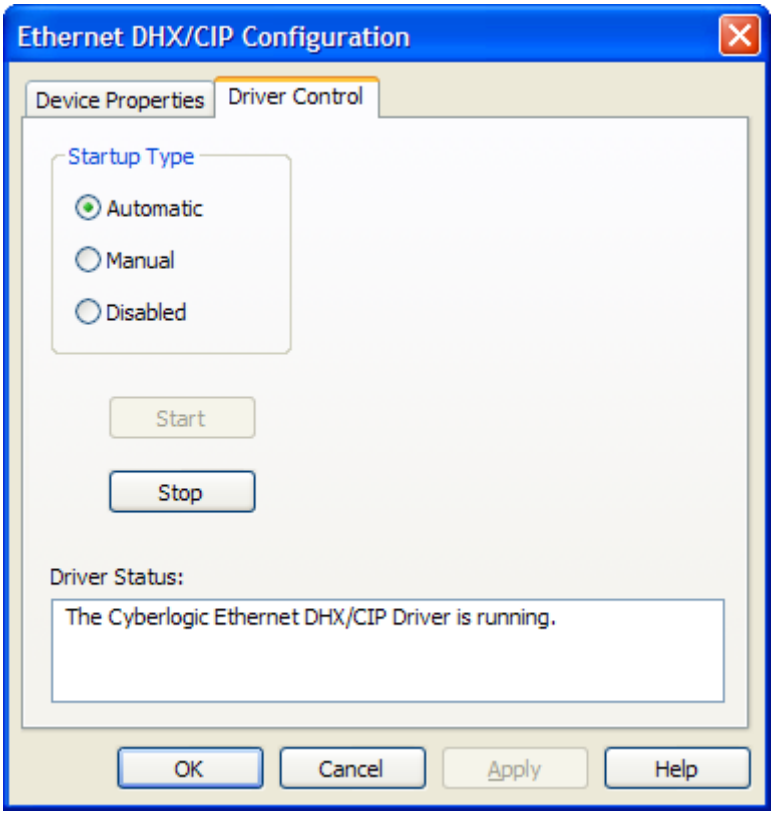
Enter the ***CIP path*** in the box and then press the ***Enter*** key.

Click ***OK*** to return to the DHX Driver Configuration editor.

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 DHX/CIP devices.



Automatic

When this option is selected, the Ethernet DHX/CIP Driver will start when Windows boots.

Manual

When this option is selected, the Ethernet DHX/CIP 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 DHX/CIP Driver will not run.

Start

In Automatic or Manual mode, click this button to start the Ethernet DHX/CIP Driver.

Stop

In Automatic or Manual mode, click this button to stop the Ethernet DHX/CIP Driver.

Driver Status

This tells you whether or not the Ethernet DHX/CIP 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 DHX/CIP Driver to start whenever the system is booted, select ***Automatic***. This is the recommended setting for systems that will use the Ethernet DHX/CIP Driver.

If you want to use the Ethernet DHX/CIP 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 DHX/CIP Driver, choose ***Disabled***.

Start/Stop the Ethernet DHX/CIP Driver

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

Ethernet CLX Configuration Editor

When editing Ethernet CLX devices, the DHX Driver Configuration Editor dispatches the Ethernet CLX Configuration Editor.

Note

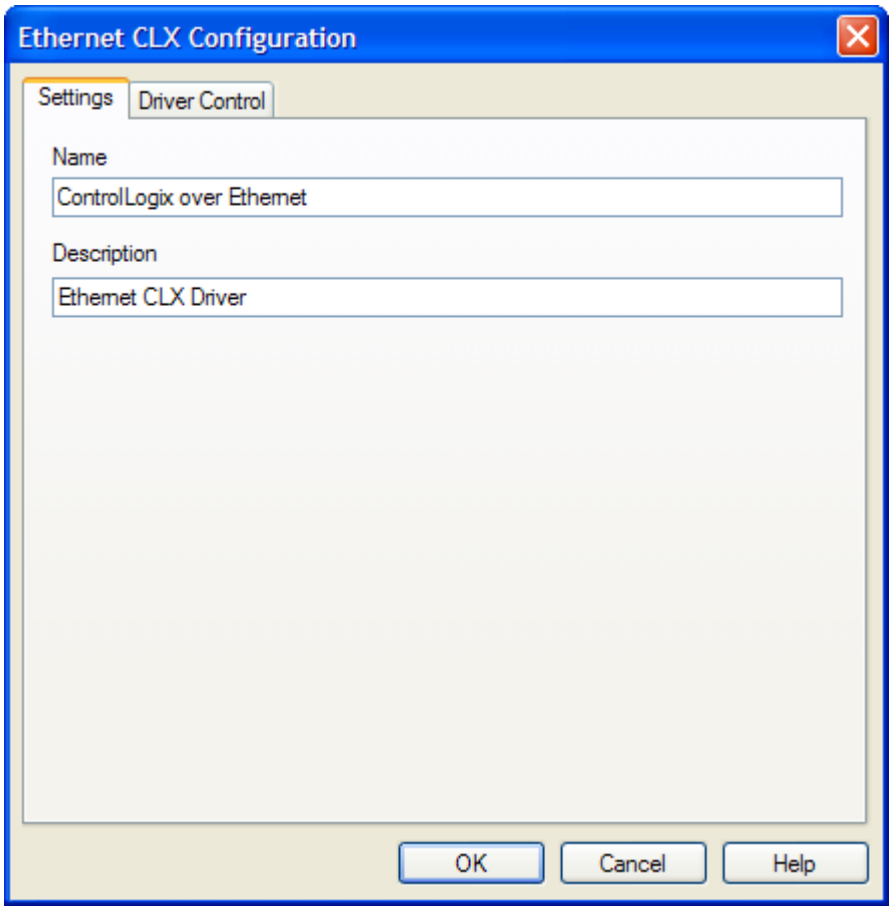
Ethernet CLX and CLX over DHX devices are used only with the Cyberlogic DHX OPC Server and are available only if you have installed the DHX OPC Server Suite, DHX OPC Premier Suite or DHX OPC Enterprise Suite. Otherwise, the Ethernet CLX and CLX over DHX device types will not be available, and this tab will not appear in the editor. For more information on CLX devices, refer to the DHX Driver help.

The Ethernet CLX Configuration editor consists of two tabs:

- Settings Tab
- Driver Control Tab

The following sections provide a complete description of these pages.

Settings Tab



Name

This is the name you wish to give to the Ethernet CLX device.

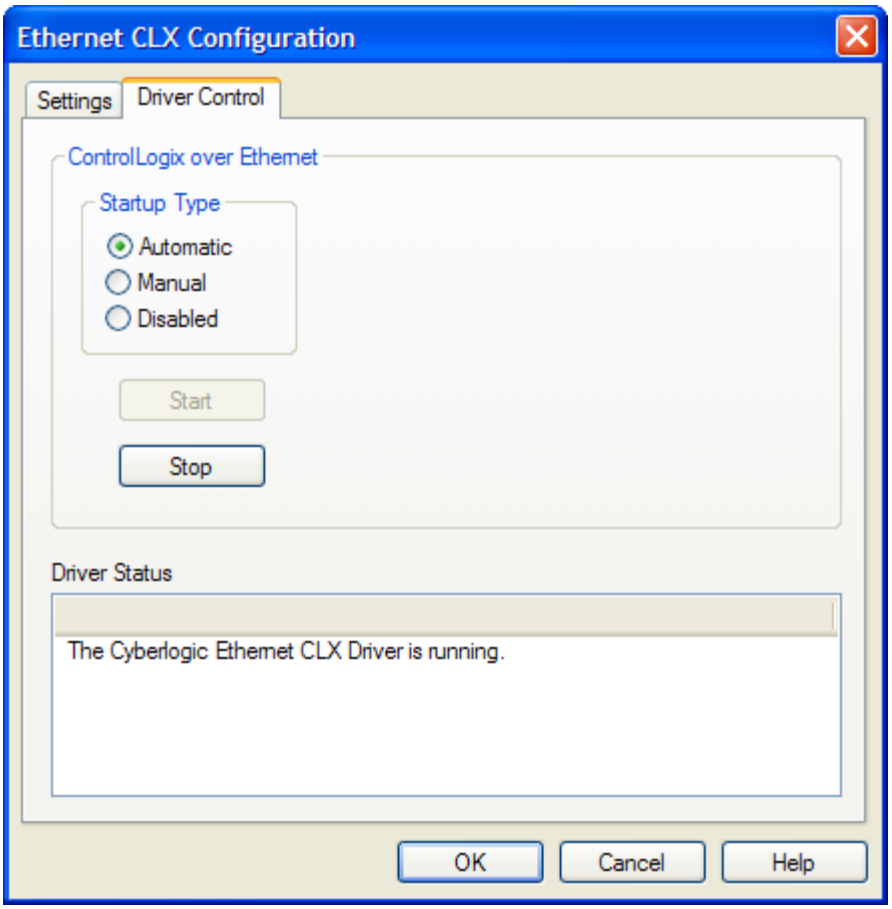
CIP Path

This is an optional description of the device.

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 CLX devices.



Automatic

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

Manual

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

Start

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

Stop

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

Driver Status

This tells you whether or not the Ethernet CLX 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 CLX Driver to start whenever the system is booted, select ***Automatic***. This is the recommended setting for systems that will use the Ethernet CLX Driver.

If you want to use the Ethernet CLX 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 CLX Driver, choose ***Disabled***.

Start/Stop the Ethernet CLX Driver

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

VALIDATION & TROUBLESHOOTING

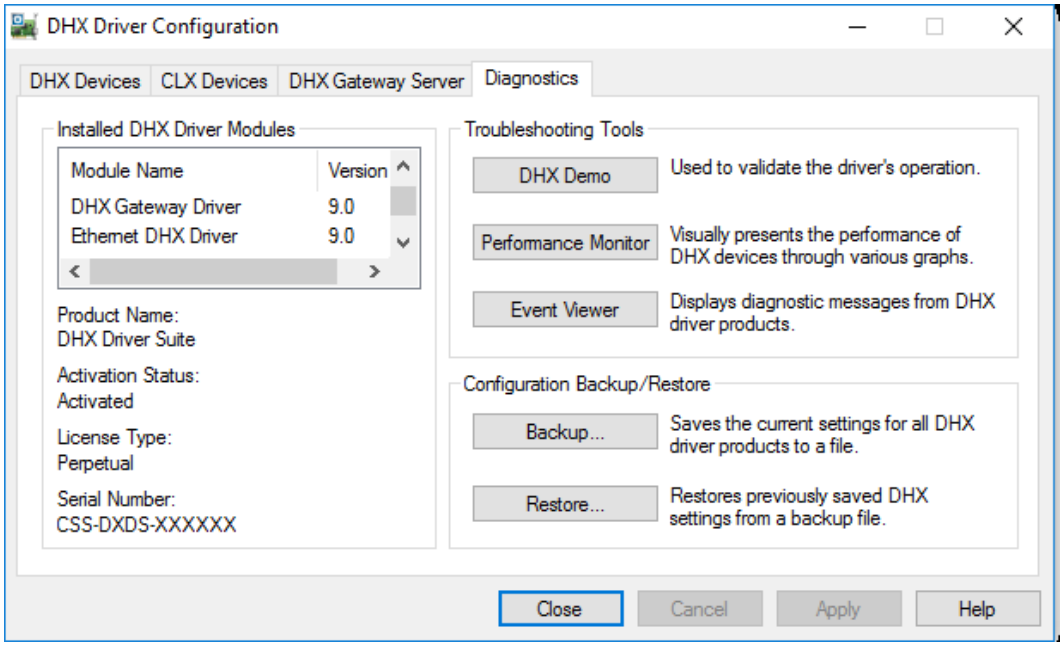
The following sections describe how the DHX Demo and Performance Monitor are used to verify that the DHX devices are configured correctly.

If you are having difficulties communicating through any DHX 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 DHX Driver Messages and a Frequently Asked Questions section.

DHX Demo

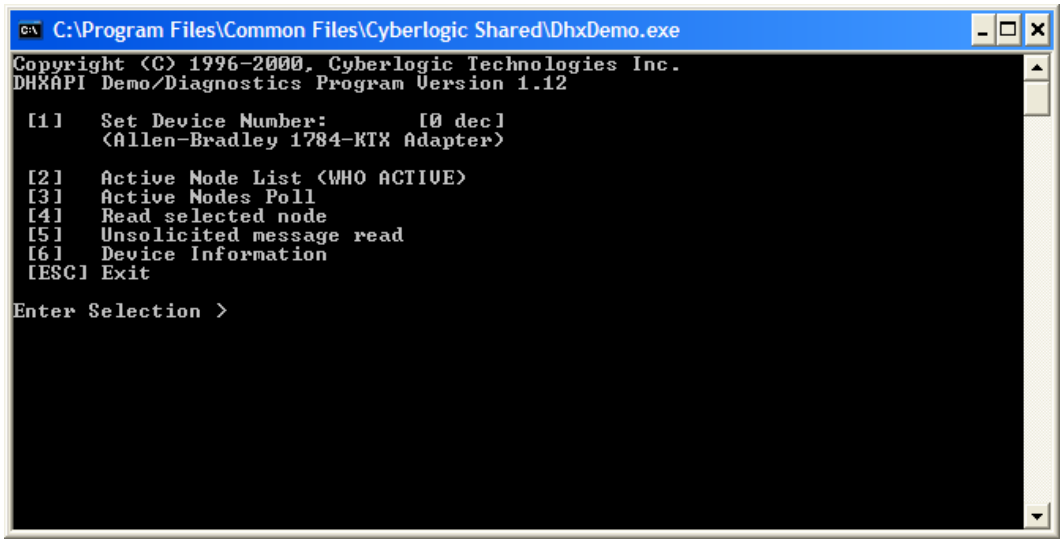
The DHX Demo program can be used to test all configured DHX devices in a system for proper operation. To run the program, open the Windows ***Start*** menu and locate the ***Cyberlogic Suites*** sub-menu. From there, go to the ***Diagnostics*** sub-menu and select ***DHX Demo***.

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



Main Menu

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



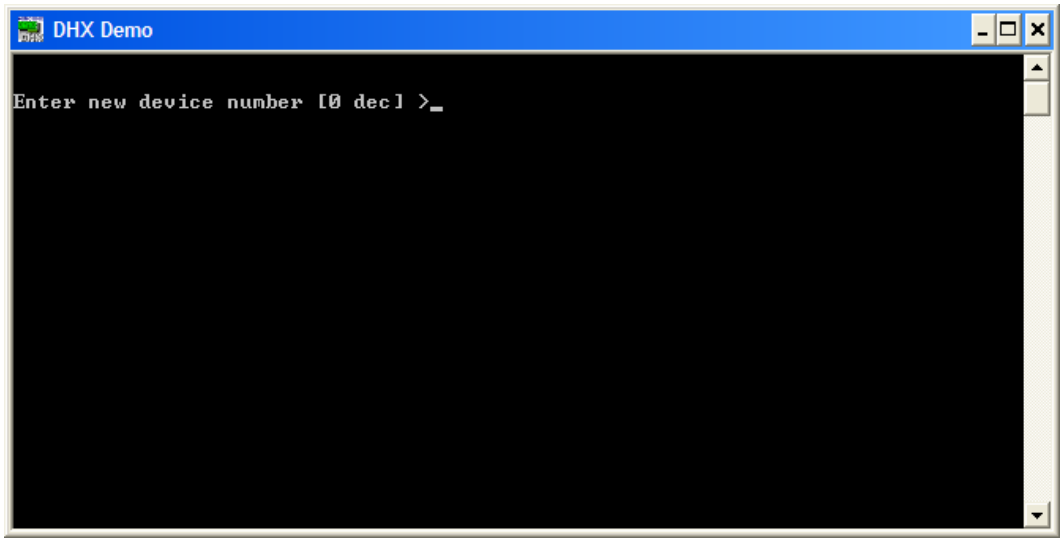
The simple command-line interface displays menu choices that take the user to secondary level screens.

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



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.

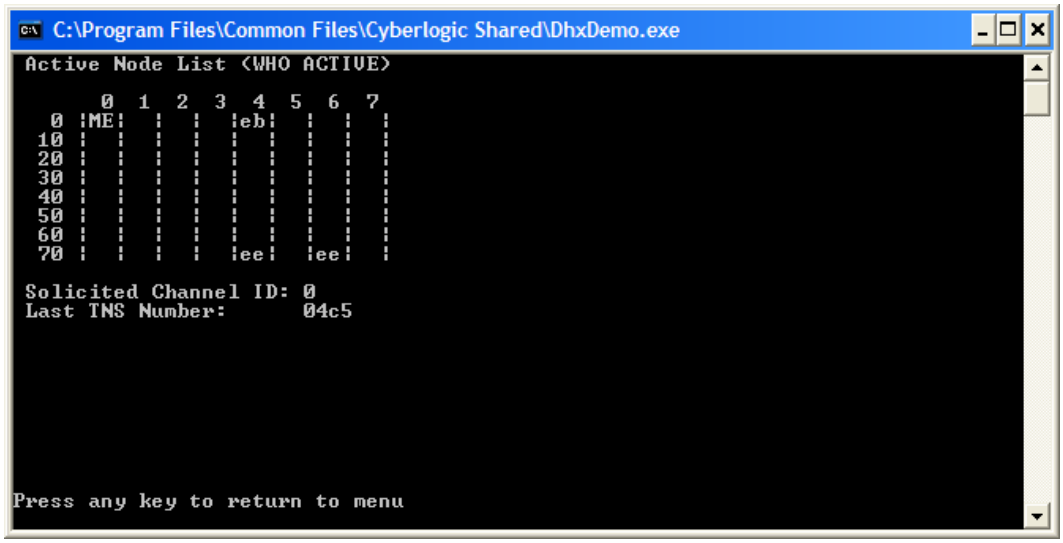
[2] Active Node List (WHO ACTIVE)

From the main menu, press ***2***. This launches the Active Node List (WHO ACTIVE) screen, which shows all active nodes on the network.

Note

The WHO ACTIVE function will poll only those nodes that are listed in the active node table, that is, only those nodes that are configured.

Refer to the Active Node Table section for more details.



In the Active Node List grid, ME designates the node you are working from, and the identifier codes are shown for other nodes found on the network.

Verify that all expected nodes are shown and that the node addresses are correct, then press ***Esc*** to return to the main menu.

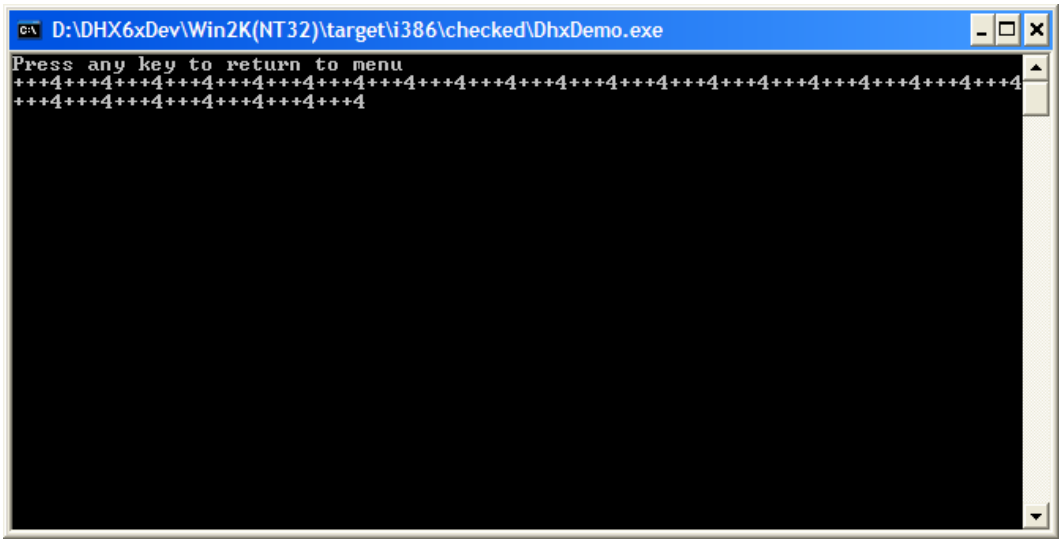
[3] Active Nodes Poll

Press ***[3]*** to poll the nodes on the network.

Note

The Active Nodes Poll function will poll only those nodes that are listed in the active node table, that is, only those nodes that are configured.

Refer to the Active Node Table section for more details.



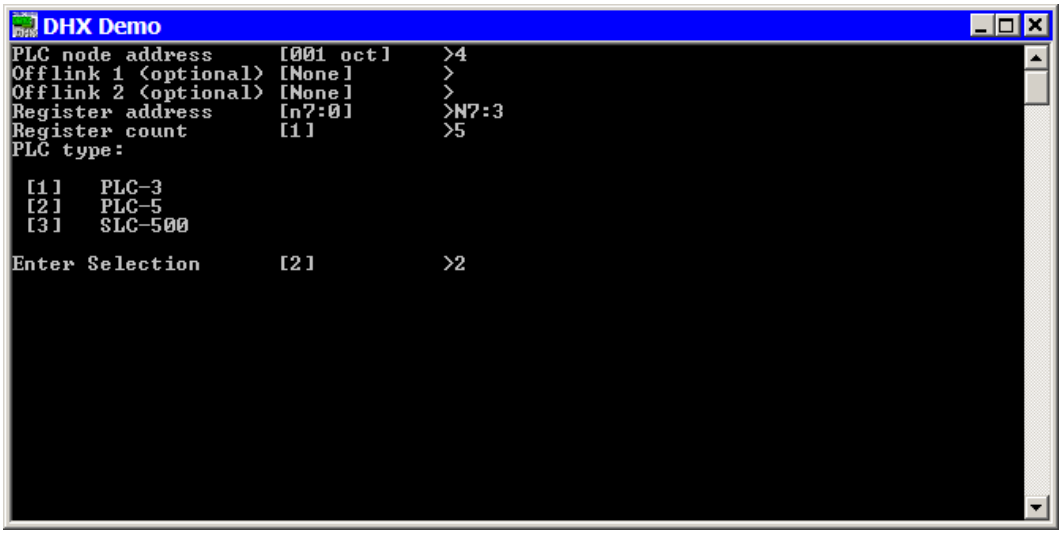
The software will continuously send diagnostic status commands to each of the other nodes on the network. If they respond properly, the software displays "+", otherwise it displays "?". After polling each node, the software displays the total number of active nodes, including the local node.

In the example shown, the three remote nodes have responded correctly, so there are three + signs followed by a 4 to indicate that there are four nodes—three remote and one local.

This function continuously interrogates the nodes with no delays between nodes or repetitions. Therefore, it is useful if you need a simple way to put a high load on the network.

[4] Read Selected Node

To read data from registers on a specific node, press ***4***.



Enter the ***PLC node address*** you want to read from. Note that this value is entered in octal.

If you are using offlink addressing, enter the values for ***Offlink 1*** and ***Offlink 2***.

Enter the ***Register address*** for the register you want to read. If you want to read from more than a single register, enter the first register's address.

Enter the ***Register count***, which is the number of consecutive registers you want to read.

Enter your selection for the ***PLC type*** you are reading from.

In the example shown, we want to read from the PLC-5 at node address 4, without offlink addressing. We will read five consecutive registers beginning with N7:3, that is, registers N7:3 through N7:7.

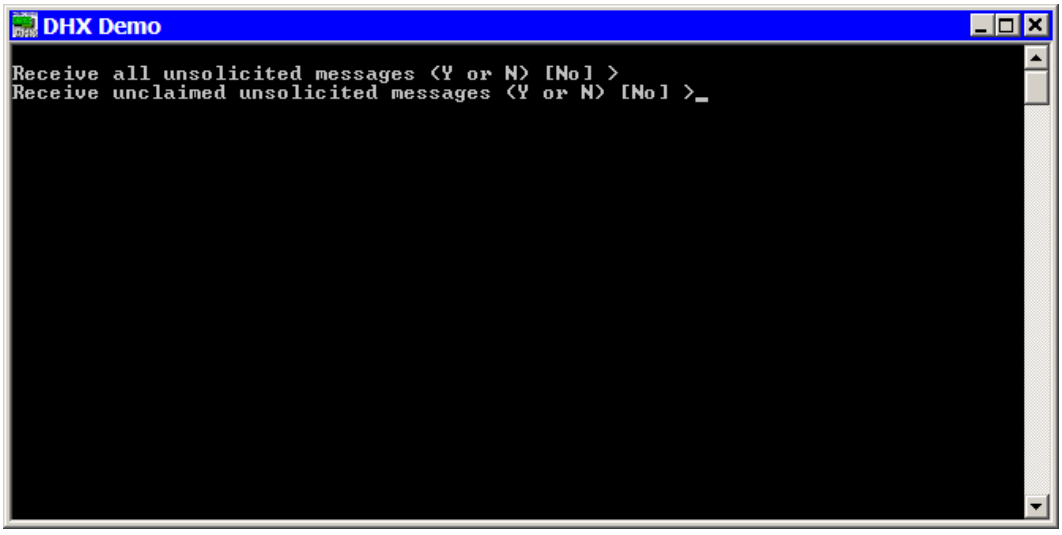
Press ***Enter*** to initiate the read. The requested data will be displayed on the screen. Press ***Esc*** to return to the main menu.

[5] Unsolicited Message Read

To read unsolicited messages, press ***5***.

This is an advanced feature of DHX Demo and is primarily intended for use by software developers. Only the most basic operation is shown here.

To receive all unsolicited messages, press ***Y***. If you want to receive only unclaimed messages, press N



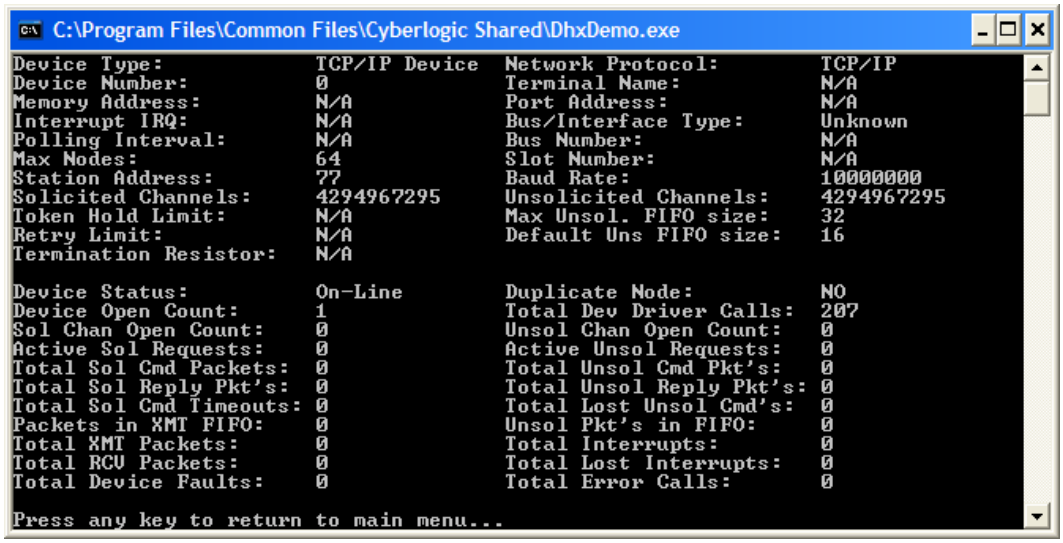
To receive all unsolicited messages, answer ***Y*** for the first question. The software will immediately begin receiving messages.

If you want to receive only unclaimed messages, answer ***N*** for the first question, then ***Y*** for the second. Again, the software will immediately begin receiving messages.

When an unsolicited message arrives, it will be displayed on the screen and the software will send a "success" response to the originating node. You may then press ***N*** to see the next message or ***Esc*** to return to the main menu.

[6] Device Information

From the main menu, press ***6*** to launch the Device Information screen.



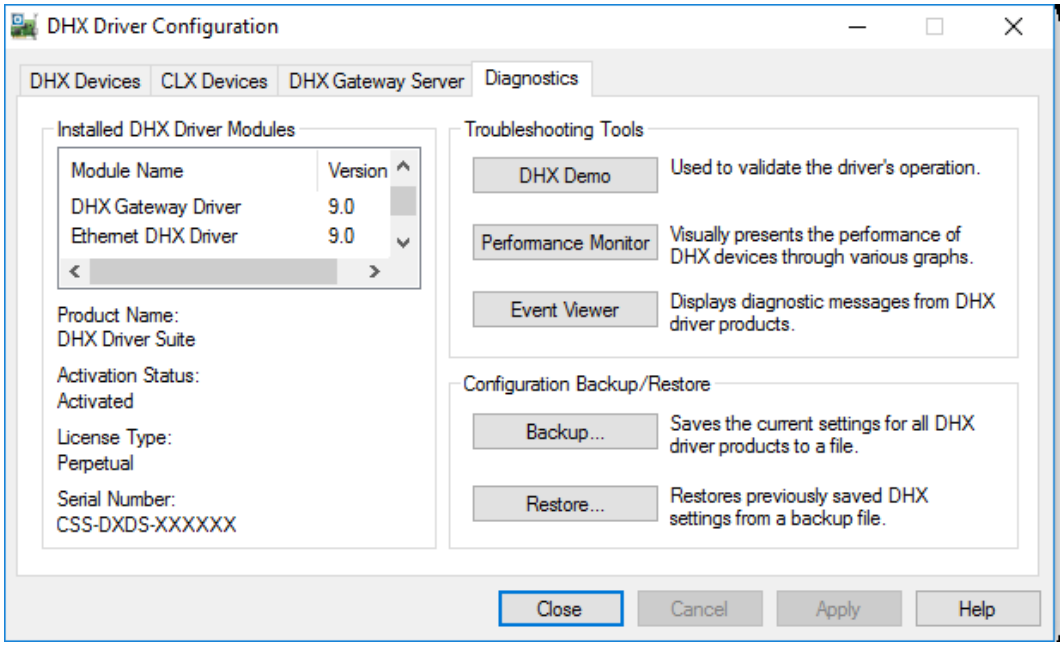
This screen shows configuration, statistical and diagnostic information about the driver, the device and the network.

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

Performance Monitor

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

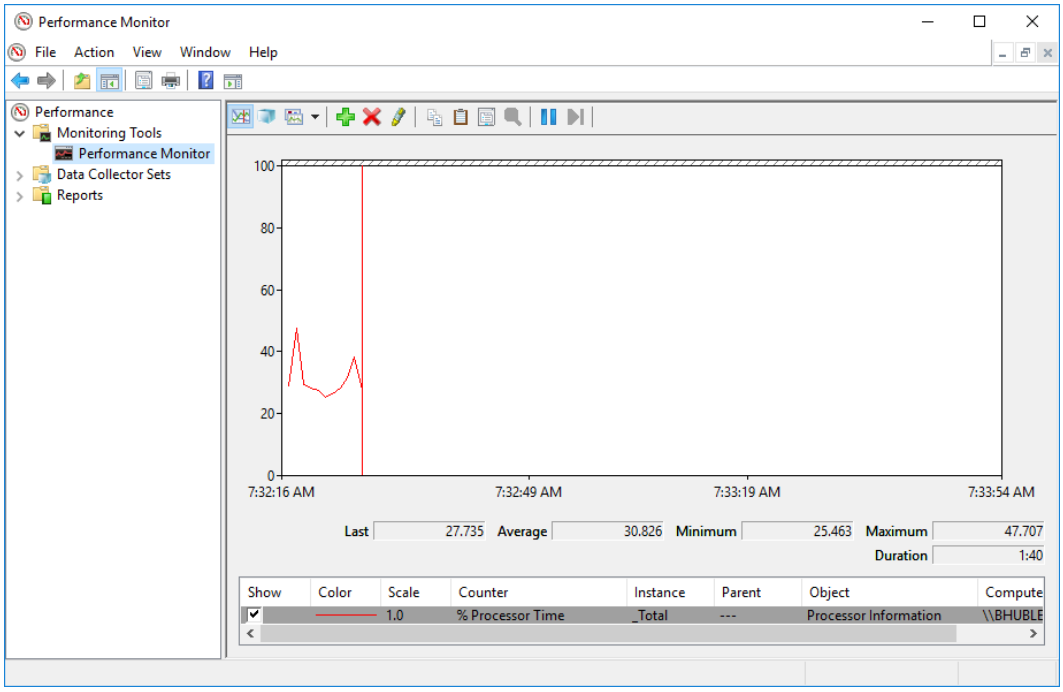
To run the program, open the Windows ***Start*** menu and locate the ***Cyberlogic Suites*** sub-menu. From there, go to the ***Diagnostics*** sub-menu and select ***Performance Monitor***.



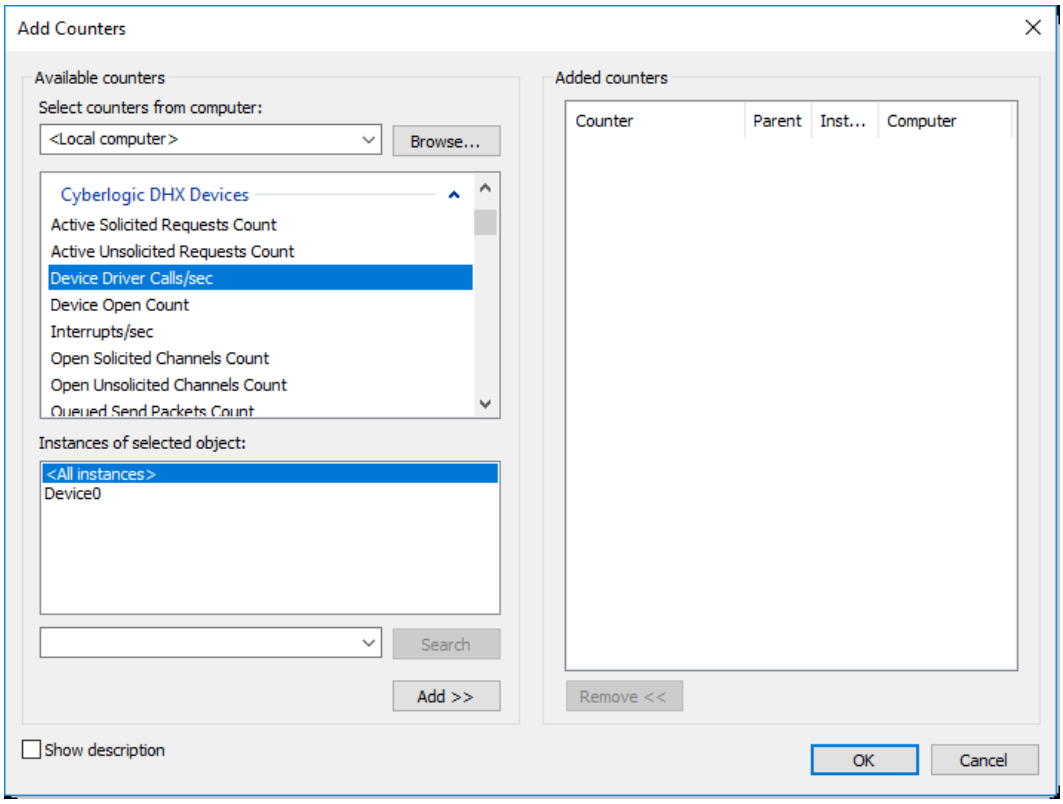
Alternatively, go to the Diagnostics tab of the DHX Driver Configuration Editor and click the ***Performance Monitor*** button.

How to Use the Performance Monitor

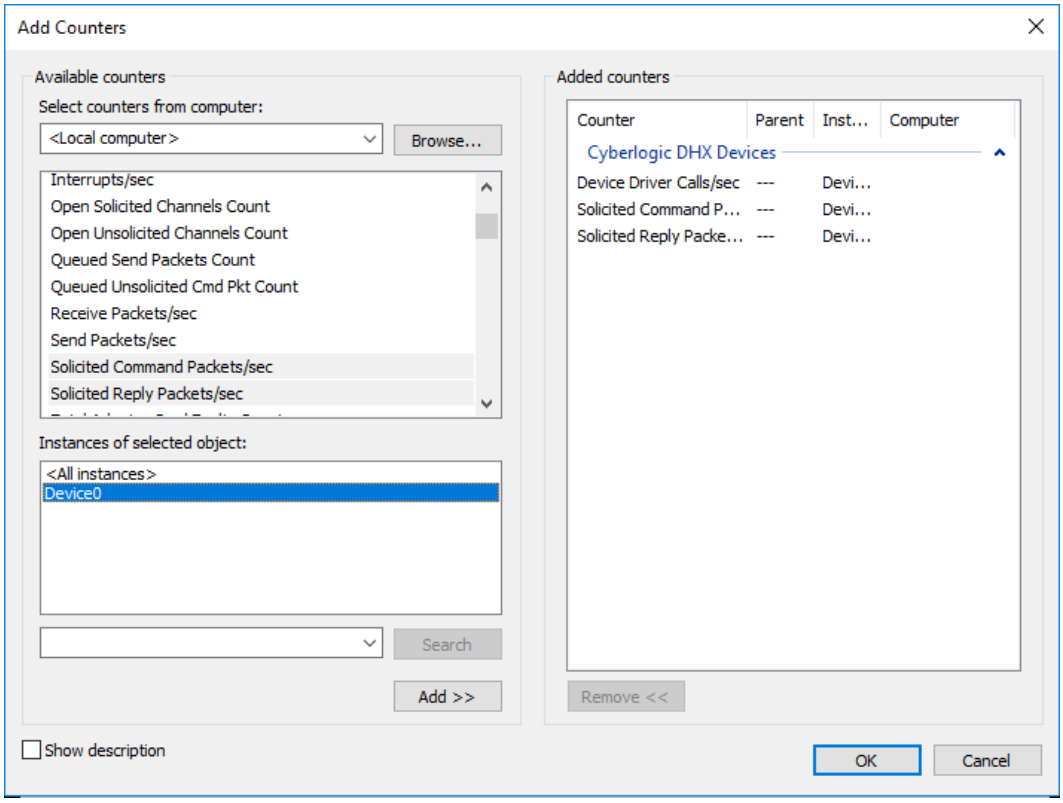
Since extensive help is provided for this program by Microsoft, only a few points relevant to the DHX Driver products are shown here.



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

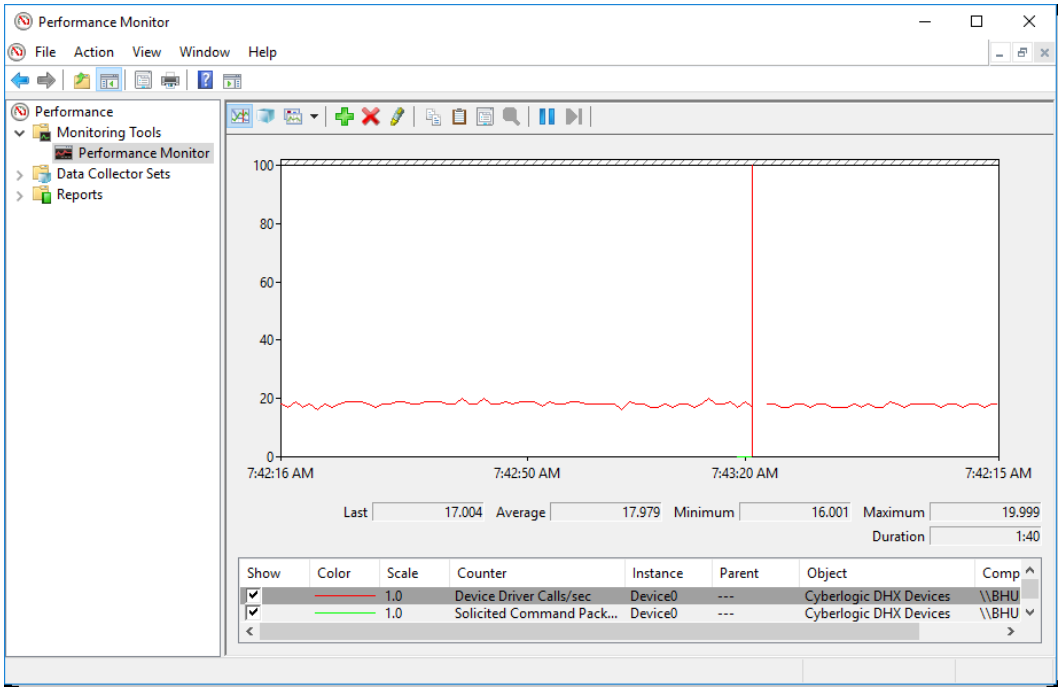


2. Select ***Cyberlogic DHX Devices*** from the ***Available counters*** list.



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

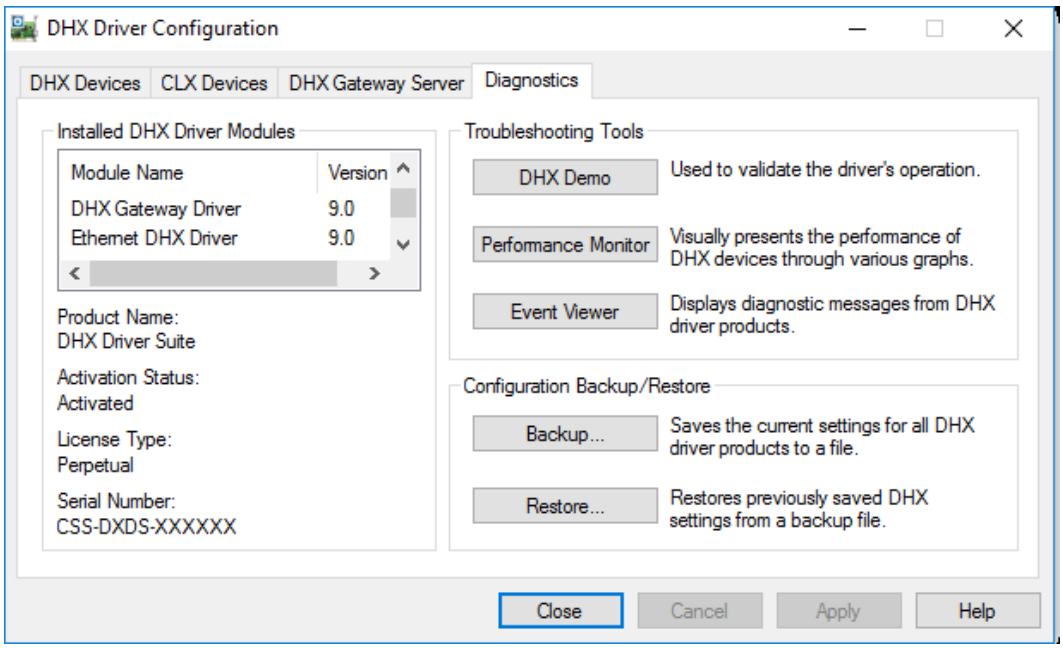
4. Click ***OK***. The counters you chose will then be displayed in graphical format.



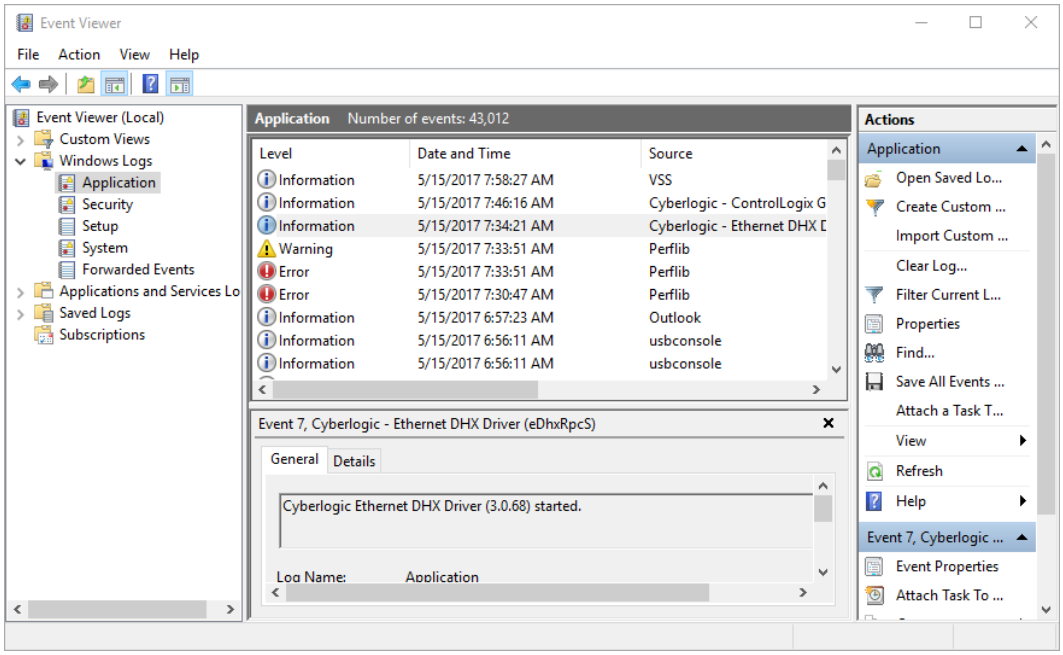
Event Viewer

During startup and operation, the DHX 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 ***Cyberlogic Suites*** sub-menu. From there, go to the ***Diagnostics*** sub-menu and select ***Event Viewer***.



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



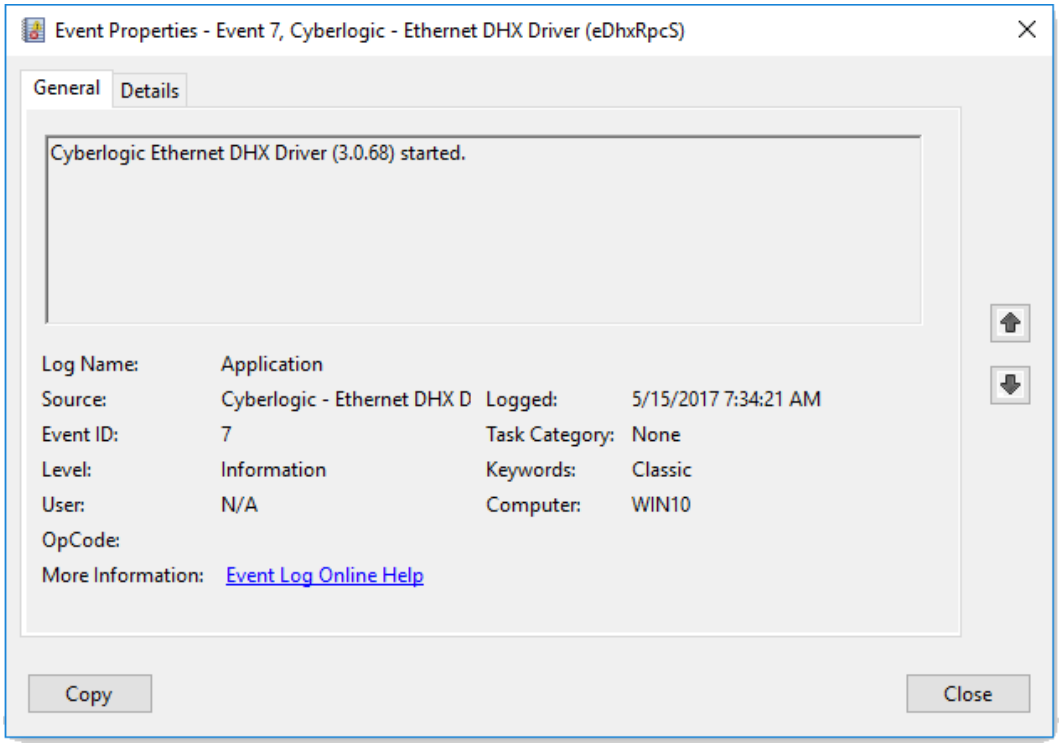
2. If you are looking for entries relating to the DHX Driver, select ***System*** from the Event Viewer tree. For other drivers, such as the Ethernet DHX Driver or Serial DHX Driver, select ***Application***.

3. Look for entries with the name of the driver you are using in the ***Source*** column.

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.

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



5. For further descriptions of the event log messages, refer to the Ethernet DHX Driver Messages section.

Ethernet DHX 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 DHX Driver is already running.

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

Cyberlogic Ethernet DHX 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.

Unsolicited message support is unavailable because the unsolicited message ports are in use by another application.

The driver will be unable to receive unsolicited messages because the TCP port required is in use by another application. To allow the driver to receive unsolicited messages, stop the application using the TCP port and restart the driver.

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

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

Registration DLL failed to load. The I/O operations of the Ethernet DHX 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 DHX 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 DHX 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 DHX Driver. The allowed operation time has expired. The I/O operations of the Ethernet DHX 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 DHX 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.

Ethernet DHX/CIP Driver Messages

Helper 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 DHX/CIP Driver is already running! Server start operation has been aborted.

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

Cyberlogic Ethernet DHX/CIP 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.

Cyberlogic Ethernet DHX/CIP Driver service stopped because there are no Ethernet DHX/CIP devices configured.

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

Registration DLL failed to load. The I/O operations of the Ethernet DHX/CIP 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 DHX/CIP 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 DHX/CIP 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 DHX/CIP Driver. The allowed operation time has expired. The I/O operations of the Ethernet DHX/CIP 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 DHX/CIP 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 have installed the software. What's next?

The next step is to configure a logical device. Refer to the Quick-Start Guide section. After this is done, run the DHX Demo to test the driver.

I have configured an Ethernet DHX device. How do I know that it is working?

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

In the DHX Demo, when I select "Active Node List" 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 DHX device has been configured. If not, refer to the Quick-Start Guide for details on setting up an Ethernet DHX device.
- *Cause 2:* The Ethernet DHX Driver could not find the DHX device specified under Device Number. Refer to the DHX Devices Tab section for details on finding and entering this information.

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

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

APPENDIX A: CIP PATHS

The configuration of Ethernet DHX/CIP devices requires you to specify the Control and Information Protocol (CIP) path to be used for communication. This appendix discusses the syntax of the CIP path and provides examples of typical paths.

For additional information on CIP path configuration, refer to Allen-Bradley's *ControlLogix Data Highway Plus-Remote I/O Communication Interface Module 1756-DHRIO User Manual*, available as A-B publication number 1756-UM514B-EN-P.

General Syntax

This section explains the general syntax used for all CIP paths. The specific format used for a given configuration will depend on the driver, hardware and network setup. Refer to the example sections for details.

The CIP path is an addressing method used to identify a target device by specifying each step of the route to that device. By default, all numeric values in the CIP path are assumed to be decimal, unless specified otherwise. Path fields are separated by commas.

A CIP path can have two forms:

- address, port, address, etc.
- port, address, port, address, etc.

Extra <port, address> pairs can be added as necessary to either form.

In the second form, the leading port number is disregarded by the Cyberlogic drivers. This form is supported for compatibility with RSLinx/RSLogix 5000.

Address Fields

The address fields can take many forms, depending on the type of network used. These are shown below with examples of each.

Ethernet

Form	Example
<IP Address>	192.168.1.12
<IP Address>:<IP Port>	192.168.1.12:32767
<DNS Name>	sta3r
<DNS Name>:<IP Port>	sta3r:16385

Note In the table above, the forms that include <IP Port> are to be used when it is necessary to override the default IP port. The specified IP port is part of the address field and does not take the place of the port field in the CIP path syntax.

Data Highway Plus Node

Form	Example
<Octal station number>	8#17
<Decimal station number>	15

DF1 Network

Form	Example
<Decimal station number>	254

ControlNet Network

Form	Example
<Decimal station number>	99

ControlLogix backplane

Form	Example
<Decimal slot number>	1

Port Fields

PLCs, modules and other components may have ports associated with them, through which the message can be routed to another address. The most common port assignments are shown in the table below.

In the case of Data Highway Plus ports, an alternative method is to use .A or .B appended to the slot number instead of using the number to specify the port. Thus, to address channel A of a 1756-DHRIO module in slot 3, you could use either 3, 2 or 3.A. For channel B, your choices would be 3, 3 or 3.B.

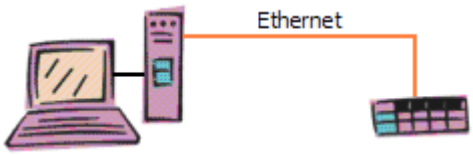
DH-485 ports are always addressed using the .A or .B notation.

Component	Port	Assigned Number
All ControlLogix chassis	Backplane	1
Processor	DF1 Port	2
1756-ENET or 1756-ENBT	Ethernet Port	2
1756-CNB	ControlNet Port	2
1756-DHRIO	DH+ Port (Channel A)	2
1756-DHRIO	DH+ Port (Channel B)	3
1761-NET-ENI	DF1 Port	3
1756-DH485	DH-485 Ports	Use .A or .B notation

Ethernet DHX/CIP Examples

These are examples of how to configure CIP paths for an Ethernet DHX/CIP device.

Ethernet to MicroLogix 1100, SLC5/05 or PLC-5



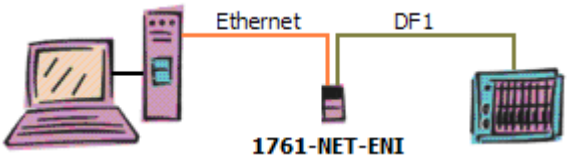
In this example, we are addressing a MicroLogix 1100, SLC5/05 or PLC-5 processor using an Ethernet DHX/CIP device.

192.168.33.117

There is no backplane port or slot to address, so the CIP path is simply the IP address.

Caution! Only the more recent versions of SLC5/05 and PLC-5 controllers can use the Ethernet DHX/CIP Driver. The older versions use the Ethernet DHX Driver.

1761-NET-ENI Module



The Allen-Bradley 1761-NET-ENI module is used to bridge from an Ethernet network to the serial port on a PLC. In this example, an Ethernet DHX/CIP device communicates to

the 1761-NET-ENI module, which then passes the information through its serial DF1 port to the serial port on the processor.

The CIP path you must use with this module depends on its firmware revision level and whether or not the attached device understands the Ethernet/IP protocol. For example, current SLC5/05 processors are Ethernet/IP-aware. MicroLogix 1500 and SLC5/04 processors are not.

Firmware Rev. A and Enternet/IP-aware device

192.168.1.77

For firmware revision A, simply use the IP address of the module.

Firmware Rev. B-D and Enternet/IP-aware device

192.168.1.77, 3, 1

For firmware revisions B-D, the IP address alone may work, but it may be necessary to use *<IP address>, 3, 1*. In this case, the 3 is the port number for the DF1 port, and 1 is the default address for the device connected via the serial link.

Firmware Rev. A-D and non-Enternet/IP-aware device

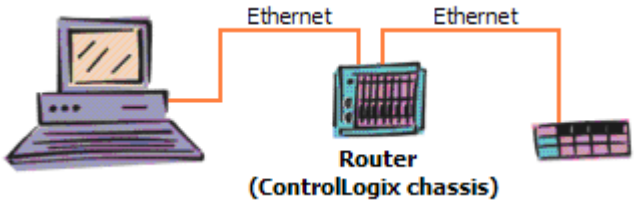
192.168.1.77

Simply use the IP address of the module.

Note

The 1761-NET-ENI supports a limited number of incoming TCP/IP connections. The exact number is determined by the firmware and the number of connections the module needs for outbound communications.

ControlLogix Chassis Ethernet Router



For this example, we have created a router by installing two Ethernet modules in a ControlLogix chassis, and will use this to pass messages from an Ethernet DHX/CIP device on one Ethernet network to a logic controller on another Ethernet network.

Caution!

When used with the Ethernet DHX/CIP Driver, this type of router can be used only for configurations in which the final destination device is a MicroLogix 1100, SLC5/05 or PLC-5.

10.3.54.101, 1, 5, 2, 192.168.65.6

The message is sent to one of the modules, which passes it along the ControlLogix backplane to the other module, which then sends it along to the final destination.

10.3.54.101: Addresses an Ethernet module at this IP address

1: Uses the ControlLogix backplane port

5: Addresses the Ethernet module in slot 5

2: Specifies the module's Ethernet port

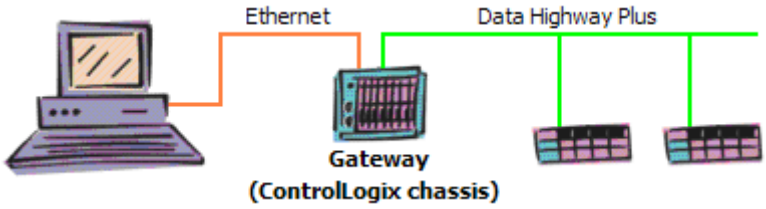
192.168.65.6: The IP address of the final destination of the message

ControlLogix Gateway Driver Examples

The ControlLogix Gateway Driver uses a special syntax in its configuration. It is of the form *address, port, address, port*. Note that this is an incomplete CIP path, because it ends with a port, rather than an address.

When you configure the CIP path for the ControlLogix Gateway Driver, you are really configuring only the beginning of the path. That is, you are specifying the path only up to the port on the 1756-DHRIO or 1756-DH485 module in the gateway chassis, omitting the final address. This address is the destination node for the message, and it will be appended to the configured CIP path by the driver, as it processes the message.

IP Address and Typical Port Syntax



In this example, a ControlLogix Gateway Driver device is configured to send messages to controllers on a Data Highway Plus network by passing them through a 1756-DHRIO module in a ControlLogix chassis.

192.168.9.2, 1, 4.B

The message is addressed to the Ethernet module in the chassis used as the gateway, then it goes across the backplane to the Data Highway Plus module. Notice that the path does not specify the DH+ node address of the destination device.

192.168.9.2: Addresses an Ethernet module at this IP address

1: Uses the ControlLogix backplane port

4.B: Addresses the 1756-DHRIO module in slot 4, and uses its DH+ port B

(The destination DH+ node address is not specified, but will be appended by the driver at runtime.)

IP Address and Alternative Port Syntax

This is the same as the previous example, but here we use the alternative method of specifying the DH+ channel.

192.168.9.2, 1, 4, 3

The message routing is identical to the previous example, because the 4, 3 form is exactly the same as the 4.B form.

192.168.9.2: Addresses an Ethernet module at this IP address

1: Uses the ControlLogix backplane port

4: Addresses the 1756-DHRIO module in slot 4

3: Uses DH+ port B of the 1756-DHRIO module

(The destination DH+ node address is not specified, but will be appended by the driver at runtime.)

DNS Name

In this example, the message goes to an Ethernet module with the DNS name AssemblyLineA, and is routed through the gateway chassis in the same manner as in the previous example.

AssemblyLineA, 1, 2.A

The routing in this case is handled the same way as the previous examples, but this time using the DNS name. Notice also that in this example we use port A of the DH+ module, which is in slot 2.

AssemblyLineA: Addresses an Ethernet module with this DNS name

1: Uses the ControlLogix backplane port

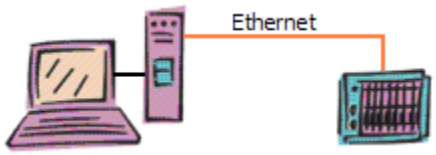
2.A: Addresses the 1756-DHRIO module in slot 2, and uses its DH+ port A

(The destination DH+ node address is not specified, but will be appended by the driver at runtime.)

Ethernet CLX Examples

These are examples of how to configure CIP paths for an Ethernet CLX device. This type of device is available only on systems that have the DHX OPC Server Suite, DHX OPC Premier Suite or DHX OPC Enterprise Suite installed.

Ethernet to ControlLogix Processor



In this example, the Ethernet CLX device sends a message directly to a ControlLogix chassis that is the final destination.

192.168.1.2, 1, 0

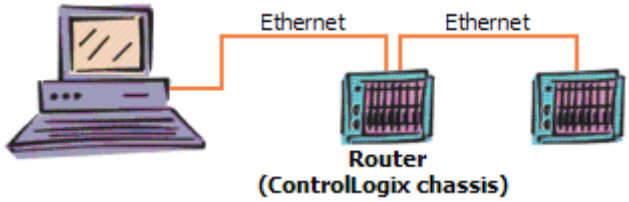
The message goes to an Ethernet module at the specified IP address. It must then go across the backplane to the processor module.

192.168.1.2: Addresses an Ethernet module at this IP address

1: Uses the ControlLogix backplane port

0: Addresses the processor module in slot 0

ControlLogix Chassis Ethernet Router



This example has the Ethernet CLX device send the message to a ControlLogix chassis, which routes it to another Ethernet network, and on to its final destination.

10.8.2.124, 1, 3, 2, 10.9.2.78, 1, 0

The message goes to an Ethernet module in a ControlLogix chassis, then goes across its backplane to another Ethernet module. From there, the message goes to another ControlLogix chassis, where it crosses the backplane to a processor module.

10.8.2.124: Addresses an Ethernet module at this IP address

1: Uses the ControlLogix backplane port

3: Addresses the second Ethernet module, which is in slot 3

2: Uses the module's Ethernet port

10.9.2.78: Addresses an Ethernet module at this IP address

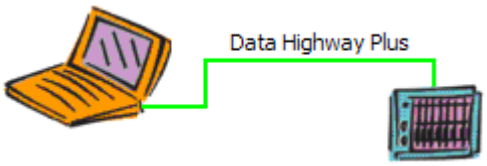
1: Uses the ControlLogix backplane port

0: Addresses the processor module in slot 0

CLX over DHX Examples

These are examples of how to configure CIP paths for a CLX over DHX device. This type of device is available only on systems that have the DHX OPC Server Suite, DHX OPC Premier Suite or DHX OPC Enterprise Suite installed.

Data Highway Plus to ControlLogix Processor – Decimal Address



This is a simple example in which the CLX over DHX device directly addresses a ControlLogix processor on a DH+ network.

31, 1, 2

Here we address a Data Highway Plus module in a chassis, then go across the backplane to the processor module.

31: Addresses a DH+ module at station address 31

1: Uses the ControlLogix backplane port

2: Addresses the processor module in slot 2

Data Highway Plus to ControlLogix Processor – Octal Address

This is identical to the previous example; only the addressing method is different.

8#37, 1, 2

This is functionally the same as the previous example, except here we specify the address in octal.

8#37: Addresses a DH+ module at octal station address 37

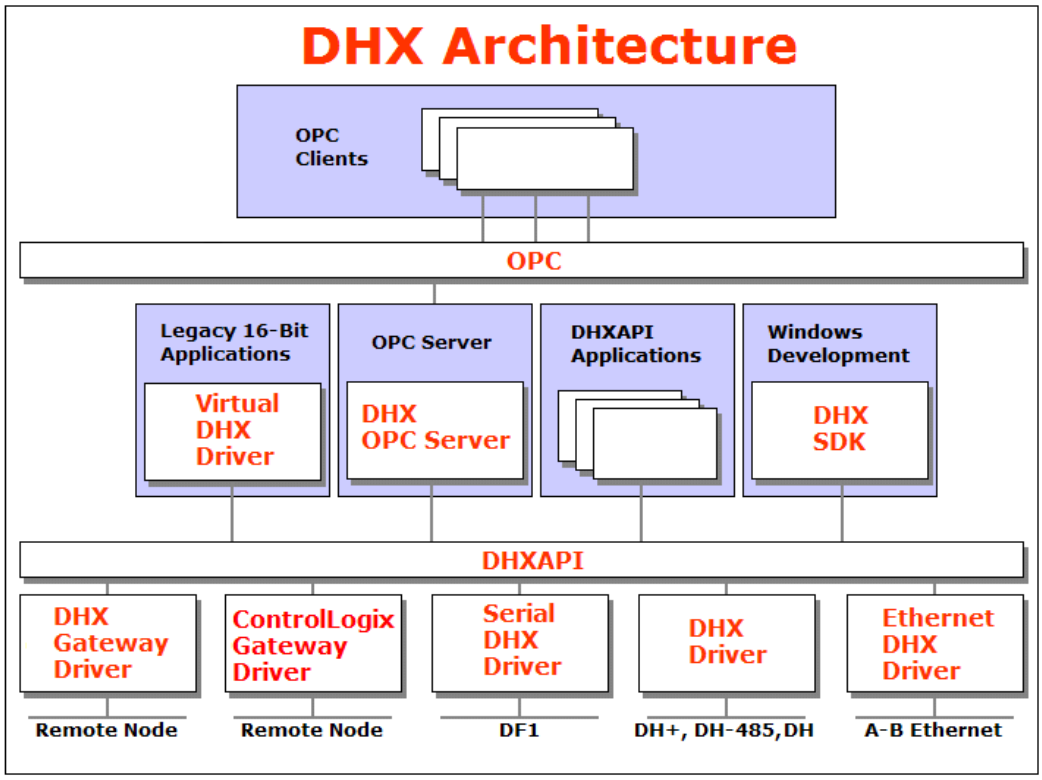
1: Uses the ControlLogix backplane port

2: Addresses the processor module in slot 2

APPENDIX B: DHX ARCHITECTURE AND COMPANION PRODUCTS

The Ethernet DHX Driver is part of the Cyberlogic DHX family. This family consists of several well-integrated products that provide connectivity for Data Highway, Data Highway Plus, DH-485, ControlNet and Ethernet networks in distributed environments.

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



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

DHX Driver

The DHX Driver provides connectivity between Windows-based applications and interface adapter cards from Allen-Bradley and SST. A few of the many cards supported are the 1784-PKTX and 1784-PCMK from Allen-Bradley, as well as the SST DHP-PCI and 5136-SD-PCI from SST. These provide communication over Data Highway, Data Highway Plus and DH 485.

The kernel mode device driver of the DHX Driver has exceptional performance and stability. It operates in either interrupt or polled mode and fully implements all network features, including solicited and unsolicited communication. The high performance native

API (DHXAPI) of the DHX Driver takes full advantage of the event-driven, multitasking, multithreaded features of Windows operating systems.

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

The DHX Driver is included in the following products:

- DHX OPC Enterprise Suite
- DHX OPC Premier Suite
- DHX OPC Server Suite
- DHX Driver Suite

Ethernet DHX Driver

The Cyberlogic Ethernet DHX Driver emulates Data Highway Plus over the Ethernet TCP/IP protocol. It supports most DHXAPI and 6001-F1E-compatible software, providing instant access to Ethernet TCP/IP compatible devices without code modifications. It is compatible with all Ethernet cards supported by Windows.

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

The Ethernet DHX Driver is included in the following products:

- DHX OPC Enterprise Suite
- DHX OPC Premier Suite
- DHX OPC Server Suite
- DHX Driver Suite

Serial DHX Driver

The Cyberlogic Serial DHX Driver provides connectivity to full-duplex DF1-compatible devices through standard serial COM ports. These devices include the 1770-KF2, 1785-KE, 1770-KF3 and 1770-KFC15 interface modules for Data Highway, Data Highway Plus, DH-485 and ControlNet, as well as direct connection to devices with full-duplex DF1-compatible ports. The Serial DHX Driver supports both the DF1 BCC and DF1 CRC-16 protocols.

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

The Serial DHX Driver is included in the following products:

- DHX OPC Enterprise Suite
- DHX OPC Premier Suite
- DHX OPC Server Suite
- DHX Driver Suite

DHX Gateway Driver

The DHX Gateway Driver lets applications use DHX devices on remote DHX Gateway Server nodes as though they were on the local system. The client system running the DHX Gateway Driver must be a Windows node connected over a standard LAN to another system running the DHX Gateway Server. It can then access the Data Highway, Data Highway Plus, DH-485 and ControlNet networks that are connected to the server node.

For example, the DHX Gateway Driver provides complete DHX Driver functionality to the client node applications. An interface adapter, such as a 1784-PCMK card, is not required on the client node. DHX Gateway Driver nodes can communicate with multiple remote servers and all Windows-compatible TCP/IP networks are supported.

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

The DHX Gateway Driver is included in the following products:

- DHX OPC Enterprise Suite
- DHX OPC Premier Suite
- DHX OPC Server Suite
- DHX Driver Suite

ControlLogix Gateway Driver

The ControlLogix Gateway Driver lets applications access Data Highway Plus networks from a remote location through a ControlLogix gateway module. With this driver, a remote system can communicate over a standard Ethernet network to a ControlLogix chassis containing a 1756-DHRIO module. That module then acts as a gateway to a Data Highway Plus network. This allows the remote system to access the PLC-5s, SLC-500s and any other devices on the Data Highway Plus network as though it were connected directly to that network.

The ControlLogix Gateway Driver is fully compatible with all other components of the DHX family.

The ControlLogix Gateway Driver is included in the following products:

- DHX OPC Enterprise Suite
- DHX OPC Premier Suite
- DHX OPC Server Suite
- DHX Driver Suite

Virtual DHX Driver

The Virtual DHX Driver allows 16-bit DOS and Windows applications using 1784-KT/KTX interface adapters 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 Windows operating systems. By emulating the physical 1784-KT/KTX adapters, the Virtual DHX Driver will work with all legacy software, regardless of which DOS driver is used.

If your computer uses Windows 7 or the 64-bit edition of any Windows version, refer to Cyberlogic Knowledge Base article *KB2010-02 Running 16-Bit Applications* for important information on using the Virtual DHX Driver on your system.

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

- DHX Driver
- Ethernet DHX Driver
- Serial DHX Driver
- DHX Gateway Driver
- ControlLogix Gateway Driver

The Virtual DHX Driver is included in the following products:

- DHX OPC Enterprise Suite
- DHX OPC Premier Suite
- DHX OPC Server Suite
- DHX Driver Suite

DHX OPC Server

The Cyberlogic DHX OPC Server connects OPC-compliant clients to Data Highway, Data Highway Plus, DH-485, ControlNet and Ethernet networks. It supports the latest OPC Data Access and OPC Alarms and Events specifications and uses the DHX drivers for connectivity to Allen-Bradley networks.

The DHX 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 DHX 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 DHX OPC Server is included in the following products:

- DHX OPC Enterprise Suite
- DHX OPC Premier Suite
- DHX OPC Server Suite

DHX SDK

Software developers can use the DHX Software Development Kit to provide connectivity to Data Highway, Data Highway Plus, DH-485, Ethernet and ControlNet networks from their 32-bit and 64-bit C/C++/C# applications.

The SDK supports 6001-F1E and Cyberlogic's high-performance DHXAPI and DHXAPI.Net interfaces. The 6001-F1E interface 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 6001-F1E specification, contact any Allen-Bradley distributor.

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