



DHX Driver Help

*DHX Driver for A-B and SST
Network Adapters*

DHX DRIVER HELP

DHX® Driver for Allen-Bradley® DH, DH+™, DH-485 Networks

Version 9

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Document last revision date May 30, 2017

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INTRODUCTION

The DHX Driver provides device driver support under Windows for all DH, DH+ and DH-485 interface adapters from both Allen-Bradley and SST. The kernel mode device driver of the DHX Driver is the highest performance driver for Allen-Bradley networks in the industry, and supports both 32/64-bit Windows and 16-bit legacy DOS/Windows applications.

The driver supports all current Allen-Bradley and SST interface adapters for PCI and PCMCIA buses. Multiple interface cards can be installed at the same time, limited only by the number of available slots. Full implementation of all network features provides support for solicited and unsolicited communications.

This driver is part of Cyberlogic's DHX Driver Suite, DHX OPC Server Suite, DHX OPC Premier Suite and DHX OPC Enterprise Suite, providing DH, DH+ and DH-485 connectivity for these products.

Remote Connectivity

The 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 applications 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 DHX Driver is implemented as part of the Cyberlogic DHX architecture, which is the foundation used in other DHX family drivers such as the Ethernet DHX Driver, the Serial 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.

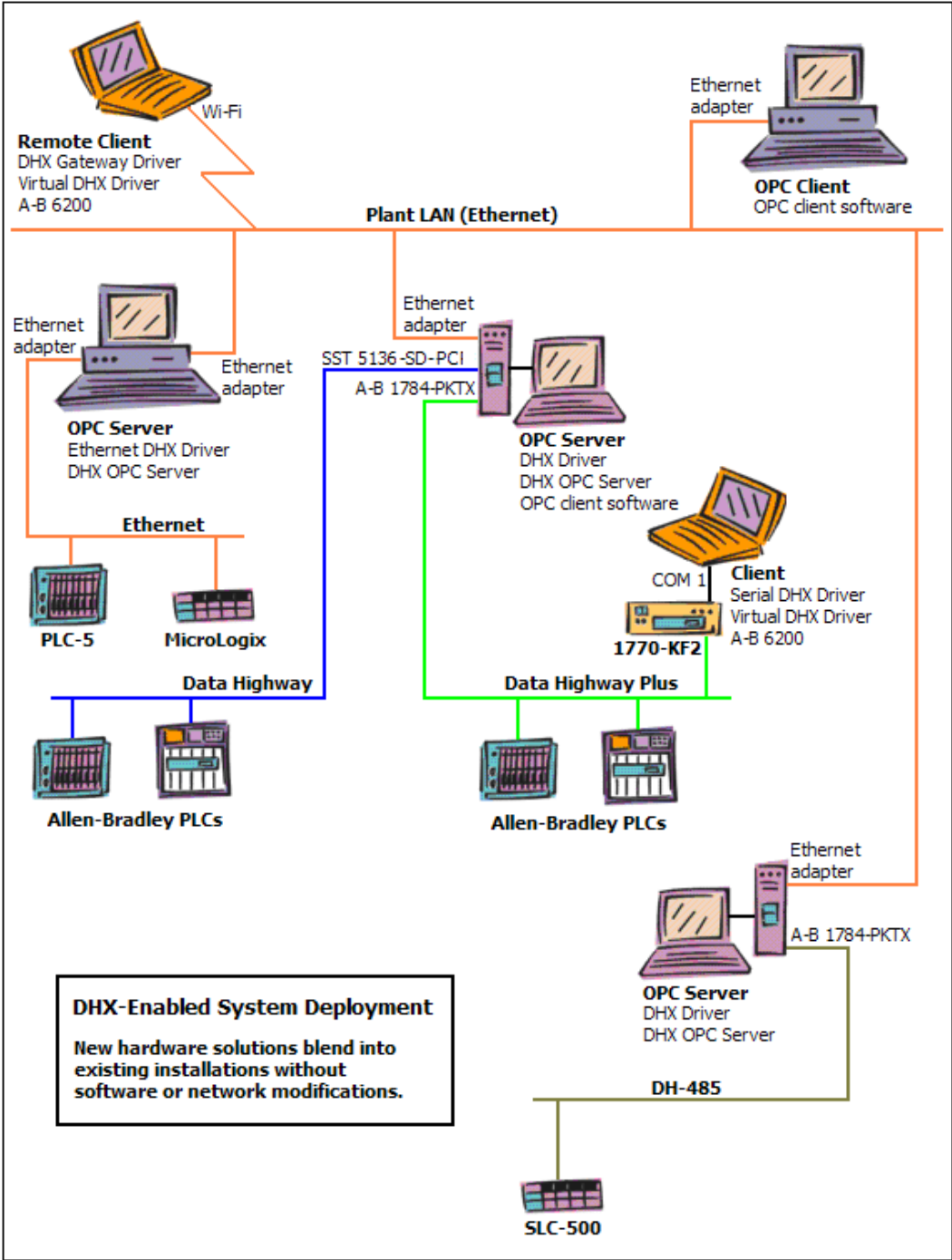
Blending DHX Supported Networks

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 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: 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.



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 DHX Driver.

Learn How the Driver Works

If you are not familiar with the way that the DHX Driver handles communication, you should begin by reading [Communication Using the DHX Driver](#).

Read a Quick-Start Guide

First-time users of the 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: 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 DHX DRIVER

The DHX Driver supports all current Allen-Bradley and SST interface adapter cards for Allen-Bradley supported networks (DH, DH+ and DH-485). This includes cards for PCI and PCMCIA buses. Multiple interface cards can be installed at the same time, limited only by the number of available slots. Each adapter card can operate in either interrupt or polled mode. The driver supports all underlying communication network features, including solicited and unsolicited communications.

The high-performance native API of the DHX Driver takes full advantage of the event-driven, multitasking, multithreaded features of Windows. For legacy applications, a simpler 6001-F1E interface is also provided.

Solicited Communications

Solicited requests are I/O requests that are initiated by an application program. The DHX Driver can handle up to 256 simultaneous solicited transactions for each interface adapter card. 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.

In a multitasking environment such as Windows, multiple applications can operate concurrently and each can carry out I/O requests through the solicited channels. Increasing the number of applications that require concurrent solicited communications may increase the required number of solicited channels. Because each channel allocates various system resources, users may want to limit the number of solicited channels that these applications may use. Refer to the [Configuration Editor Reference](#) section for more information on how to configure this limit.

Unsolicited Communications

Unsolicited requests are I/O requests initiated by external devices, such as PLCs. The DHX Driver allows up to 256 simultaneous unsolicited subscriptions for every configured interface adapter card. These subscriptions are carried over abstract communication ports called unsolicited channels.

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.

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. Because each channel allocates various system resources, users may want to limit both the number of unsolicited subscriptions that all applications can issue and the sizes of the FIFO buffers associated with the unsolicited channels. Refer to the [Configuration Editor Reference](#) section for more information on how to configure these limits.

ControlLogix Communication

The DHX Driver includes a CLX over DHX feature to permit communication to the Logix family of Programmable Automation Controllers, such as ControlLogix, CompactLogix and FlexLogix. To do this, the user creates a CLX over DHX device, and selects a DHX device for it to work with. The driver will then send messages in ControlLogix format embedded within the DHX protocol, using the selected DHX device.

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. They will not be available for configuration if you have installed only the DHX Driver Suite.

QUICK-START GUIDE

Before the DHX Driver can be used, it must be properly configured. The configuration procedure involves creating one or more DHX devices and configuring them to work with the interface adapter card. Your software applications will then use these logical devices to communicate over the network.

Adapter Card Quick-Start

This section describes the procedure for the following adapter cards.

- 1784-PCMK
- 1784-PCMK Series B
- 1784-PKTX/A or /B
- 1784-PKTXD/A or /B
- 5136-SD-PCI
- SST-DHP-PCI

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 Device Settings](#)
- [Configuring the DHX Gateway Server](#)
- [Verifying Your Driver Configuration](#)
- [Backing Up Your Configuration](#)

To begin, go to the [Creating a Device](#) section.

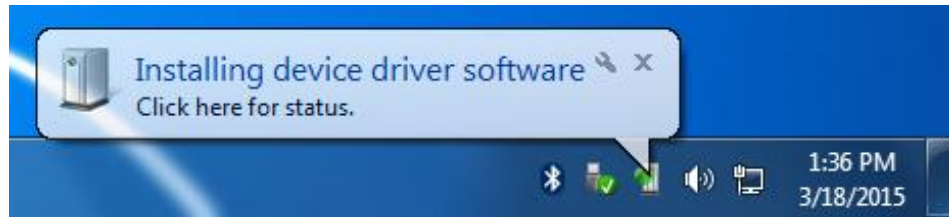
Creating a Device

1. Verify that the DHX Driver software is installed.

Windows automatically detects and configures the adapter when it is newly installed in the system. For this process to work correctly, the DHX Driver must be installed on your system before you install the adapter.

2. For a PCI adapter, turn off power, insert the adapter into an empty PCI slot, and turn the power back on.

For a PCMCIA adapter, insert the adapter into an empty PCMCIA slot.



Windows will detect that new hardware has been added and display an Installing device driver software message.

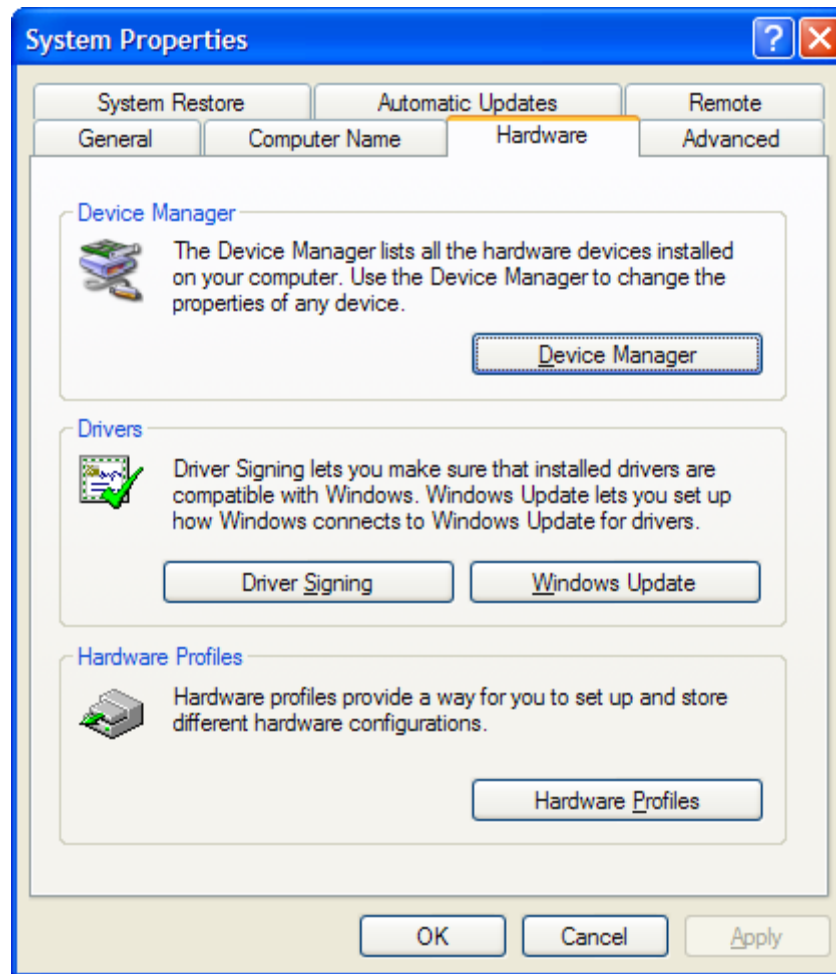
The system will automatically allocate resources for the adapter and create an DHX device with the next available device number. All parameters for the new device will default to standard settings, which may or may not fully match the desired settings. Therefore, the next step is to access the Device Manager to modify these settings as needed.

Proceed to [Configuring Device Settings](#) to continue.

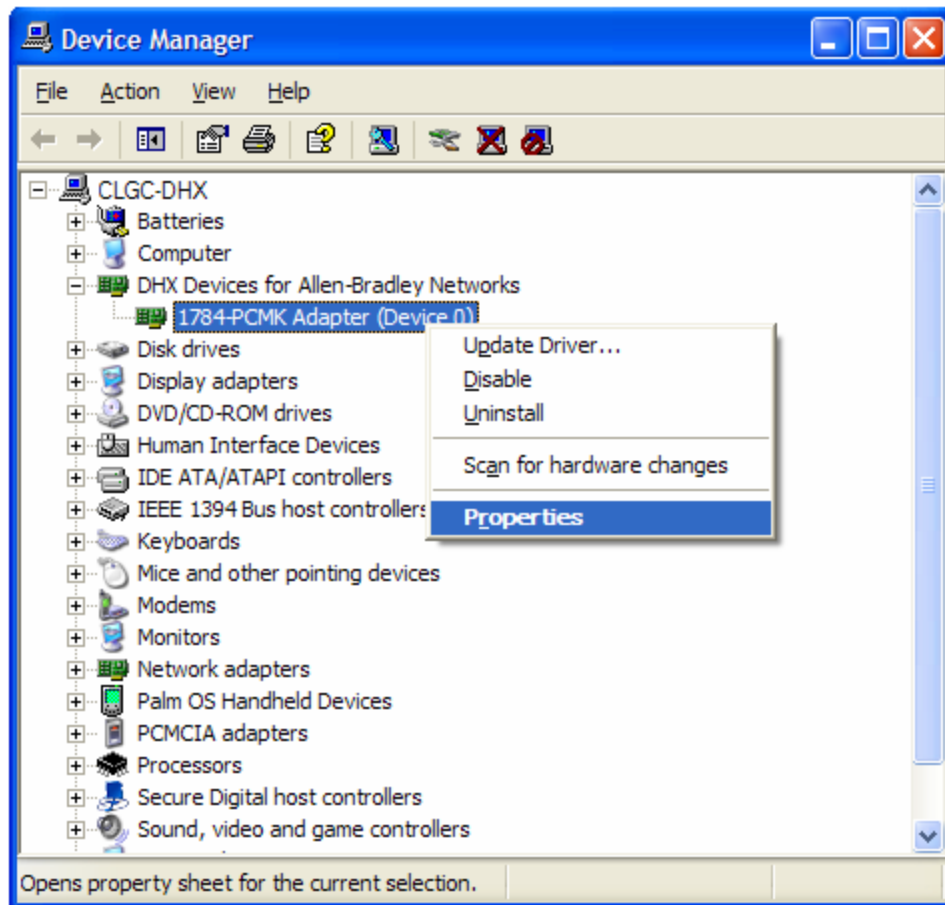
Configuring Device Settings

When Windows creates a new device, its parameters will default to standard settings, which may or may not fully match the desired settings. Therefore, the next step is to access the Device Manager and modify these settings as needed.

1. Go to the Windows **Control Panel** and double-click on the **System** icon.



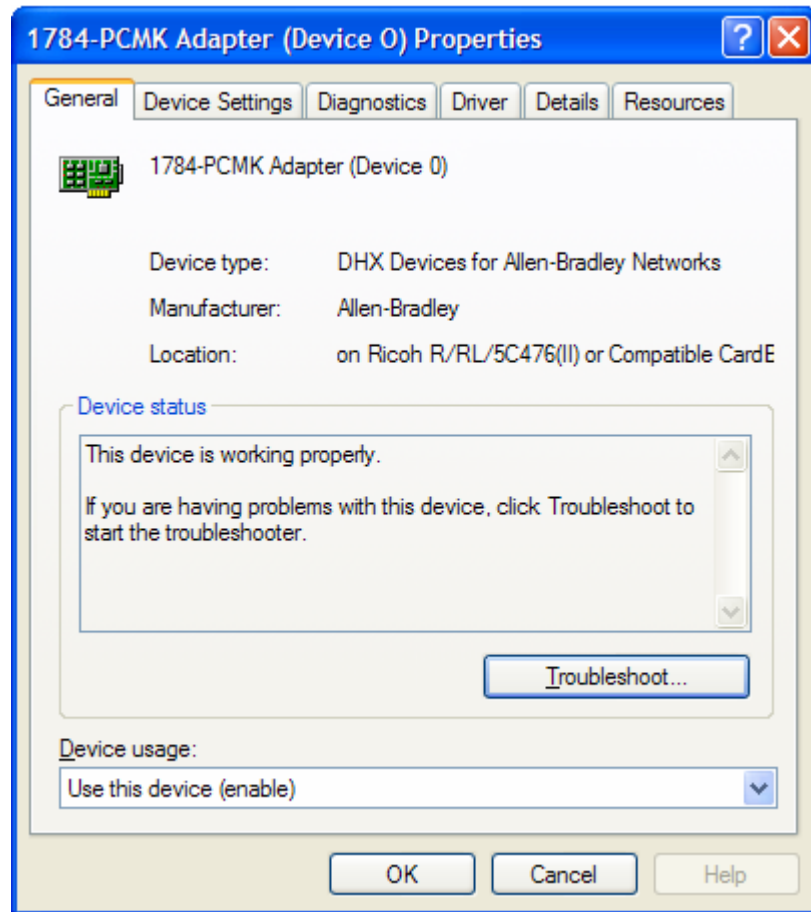
2. Choose the **Hardware** tab and then click the **Device Manager** button.



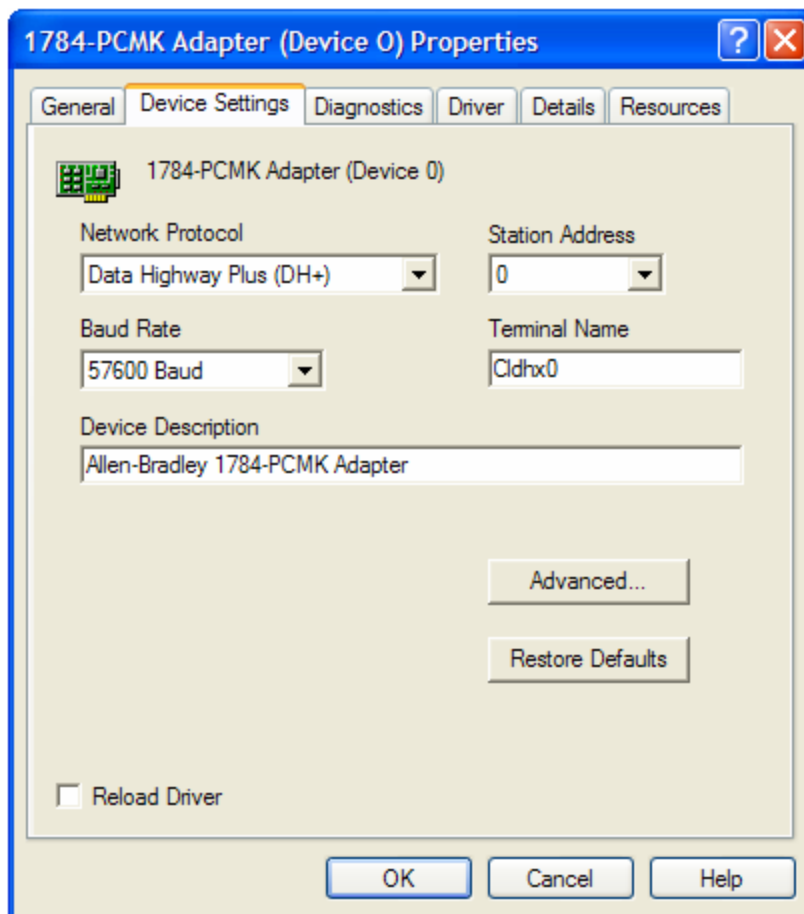
3. Locate the **DHX Devices for Allen-Bradley Networks** branch and expand it.

Note The 1784-PKTXD card consists of two identical channels. If this is the card you are using, a DHX device is created for each channel on each card. In addition, a parent device, under the Multifunction Adapters tree, is created.

4. Select the device to be configured, right-click, and then select **Properties** from the context menu.



5. Choose the **Device Settings** tab.



The fields and options you will see, and the settings you should use, will depend on the specific card you are editing. In this example, we are using a 1784-PCMK.

6. Select the **Network Protocol** that you intend to use and the **Station Address** for your adapter card.
7. Verify that the **Baud Rate** selection matches the baud rate for your network.
8. Enter the **Terminal Name** for your card.

This name will identify the device on the Who Active screens of most PLC logic programmers.

9. Your adapter card is now fully configured. Click the **OK** button and then close the Device Manager.

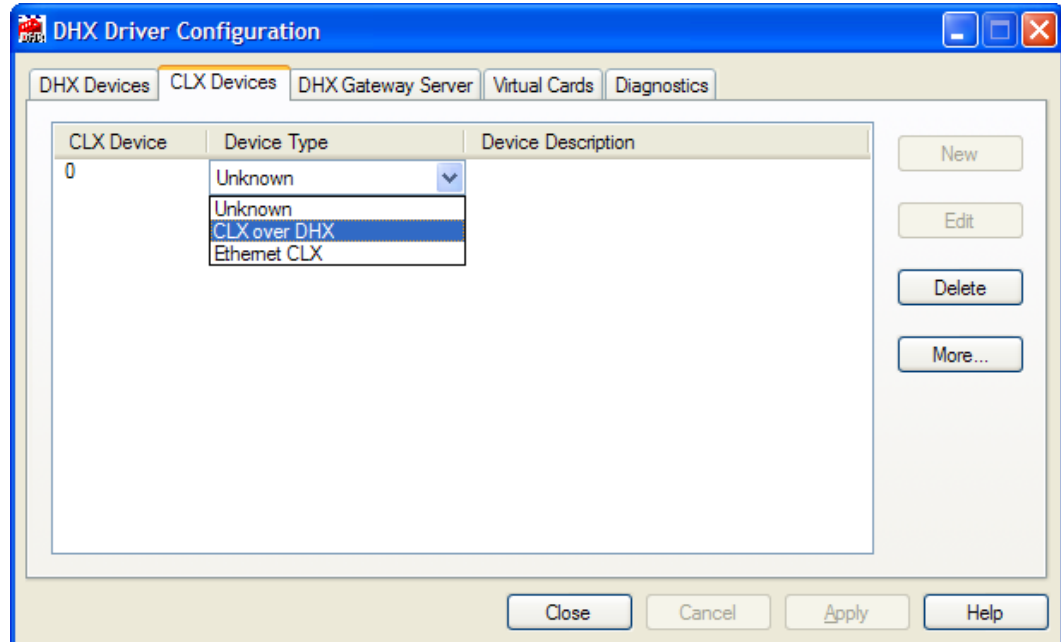
Proceed to [Configuring ControlLogix Devices](#) to continue.

Configuring ControlLogix Devices

The devices configured in this section are used only to permit the Cyberlogic DHX OPC Server to communicate with the Logix family of Programmable Automation Controllers, such as ControlLogix, CompactLogix and FlexLogix. If you are not using the DHX OPC

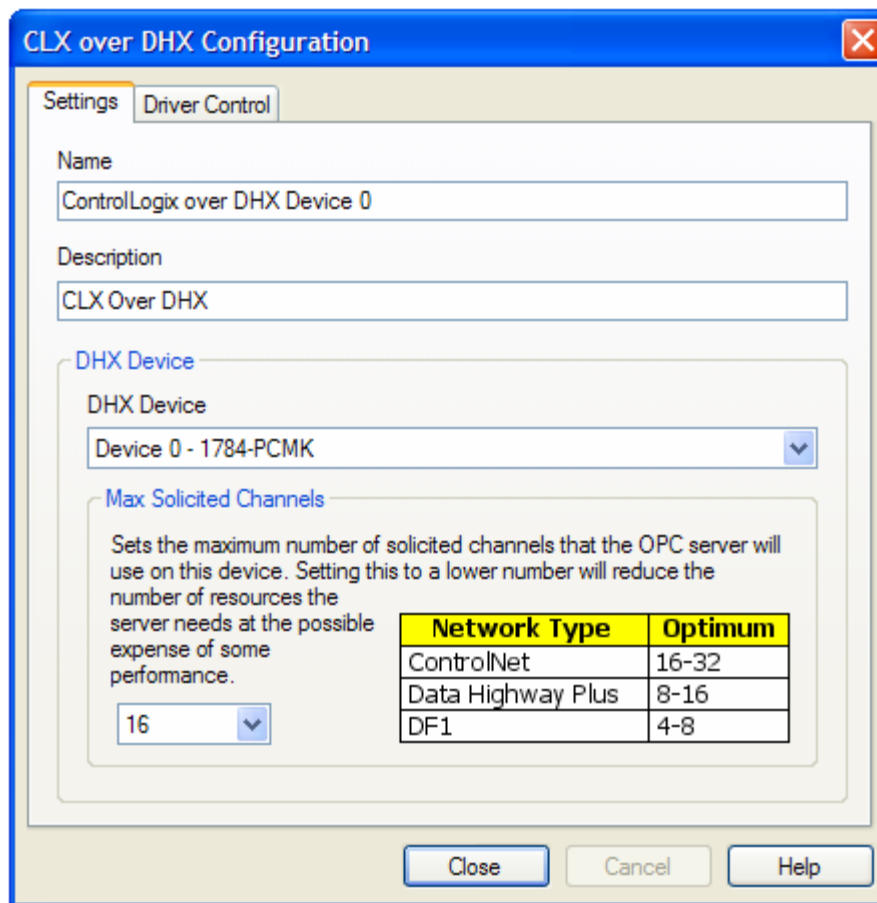
Server or do not need to communicate with these types of devices through your adapter card, you can skip this section and proceed directly to [Configuring the DHX Gateway Server](#).

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



2. Click **New**.
3. From the drop-down list, select **CLX over DHX**.

The device will be created and the CLX over DHX Configuration editor will open.



- From the **DHX Device** drop-down box, select **Device 0 – 1784-PCMK**, the device you created in the previous section.

This configures the driver to use the 1784-PCMK as the physical device for the ControlLogix messages handled by this virtual device.

- Click **Close**.

Proceed to [Configuring the DHX Gateway Server](#) to continue.

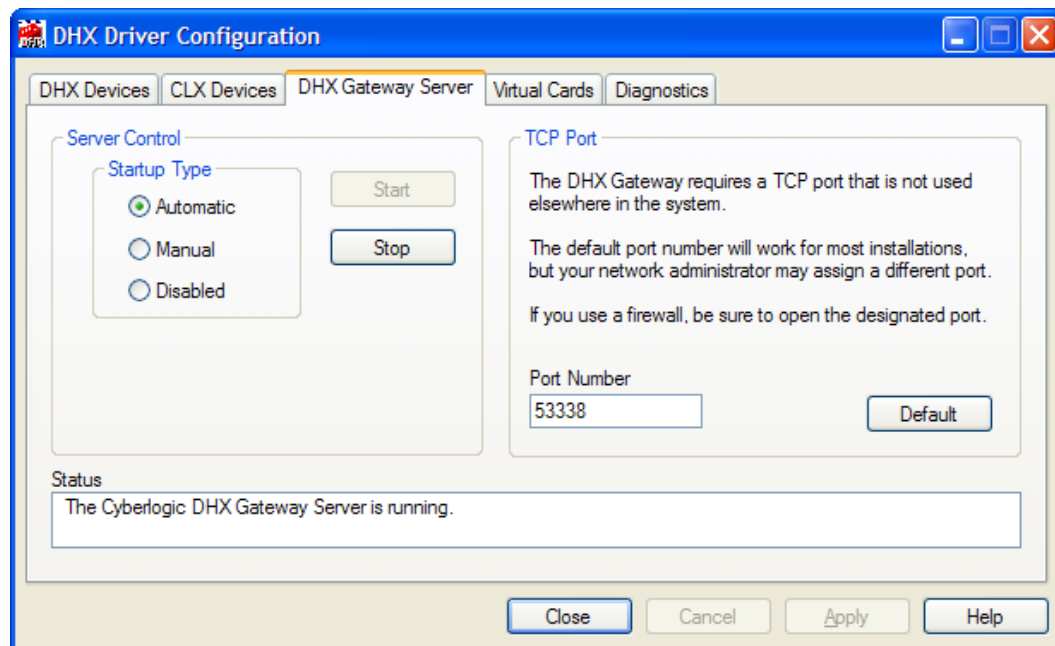
Configuring the DHX Gateway Server

The 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. Open the Windows **Start** menu, go to **Cyberlogic Suites**, then open the **Configuration** sub-menu, and then select the **DHX Device Drivers** menu item.

The DHX Driver Configuration Editor will open.



2. Select the **DHX Gateway Server** tab.
3. 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**.

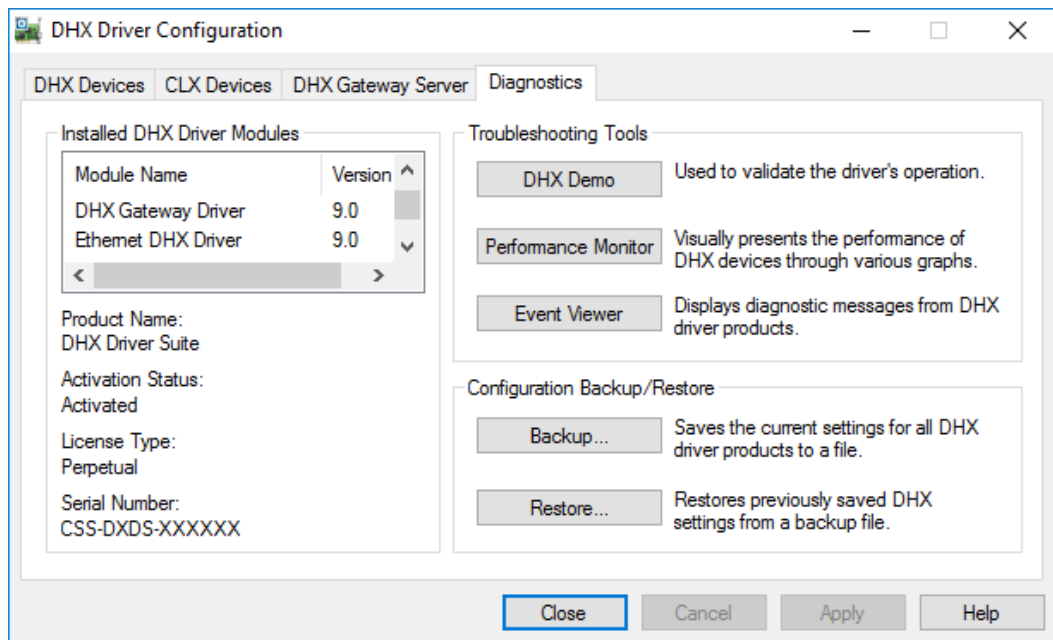
If you do not want to use the DHX Gateway Server, choose **Disabled**. You can then skip the rest of this section and go directly to [Verifying Your Driver Configuration](#).

4. 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.
5. 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 [Configuring the Firewall](#) discussion in the DHX Driver Configuration Editor section for more information.
6. 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!

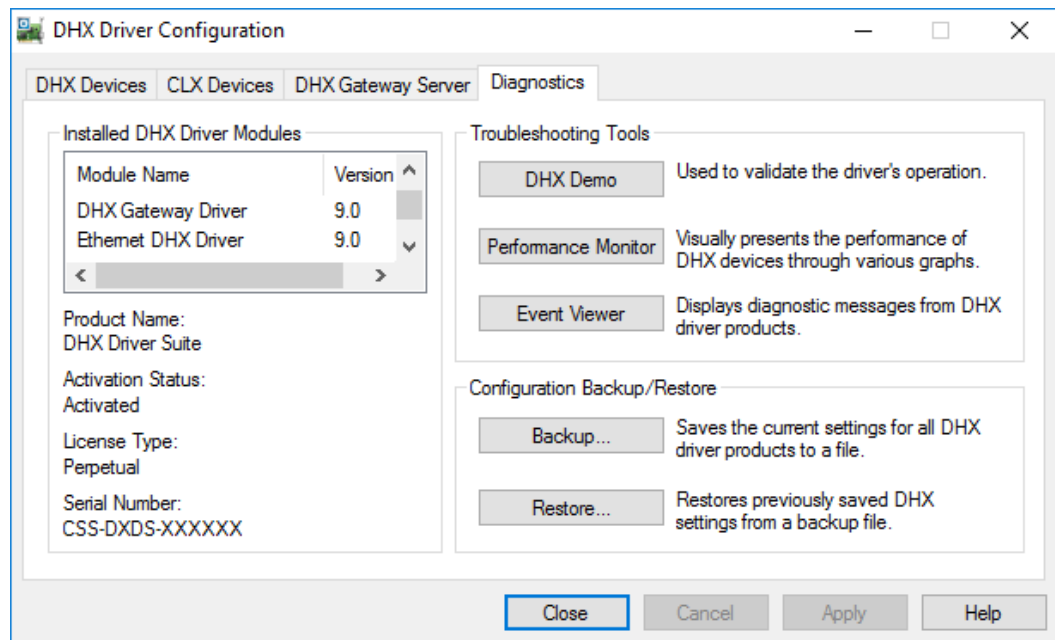
If you are running in demo mode, the DHX products will stop after two hours of operation and will resume after the system is restarted.

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.

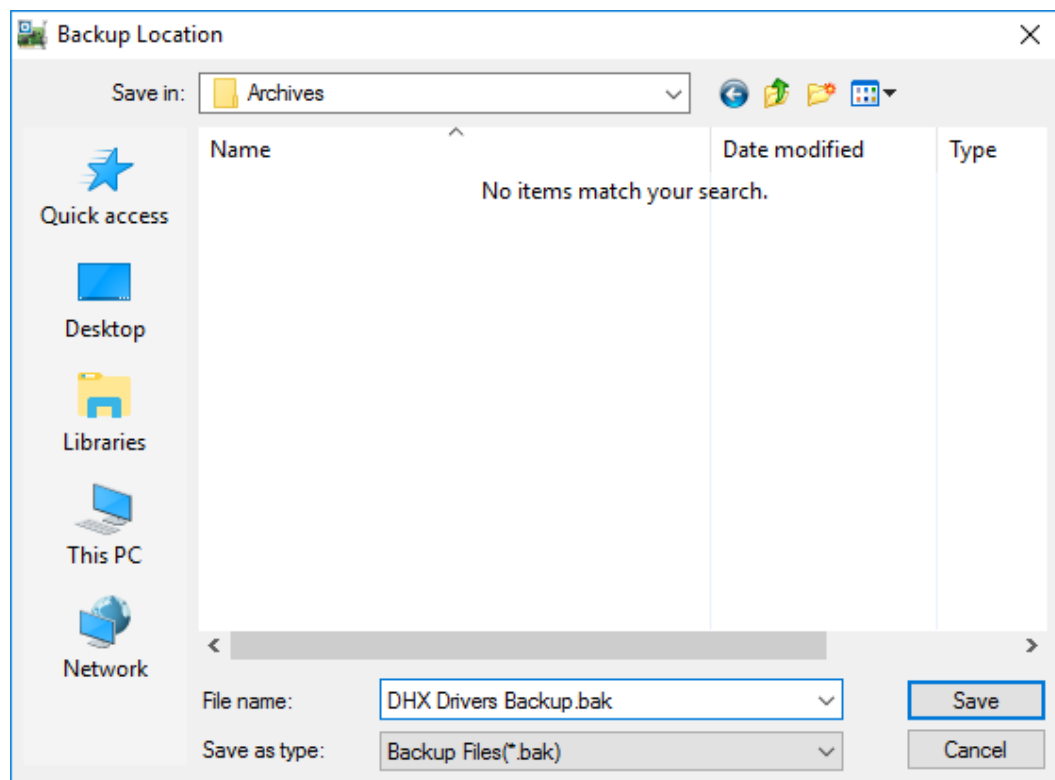
When you are satisfied that the driver is correctly configured, proceed to [Backing Up Your Configuration](#).

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 DHX Driver can be used, it must be properly configured. The configuration procedure involves creating one or more DHX devices and configuring them to work with your network adapter cards.

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](#).

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.

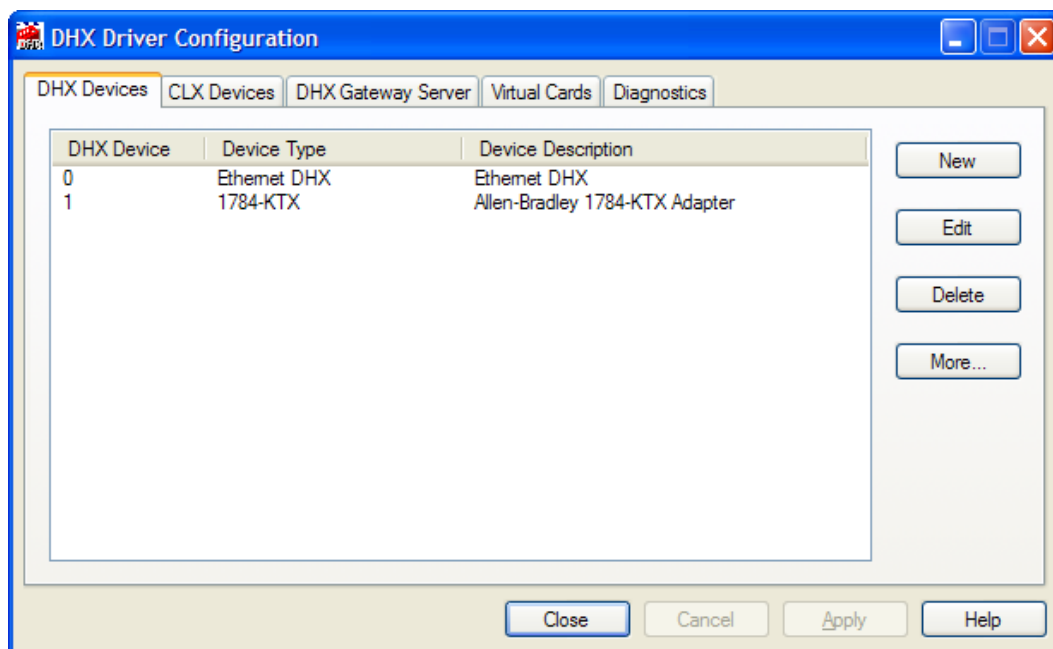
The DHX Driver Configuration editor consists of five tabs:

- [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. 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

To create other types of devices, click the **New** button or right-click inside the list window and select **New** from the context menu. Then select a 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.

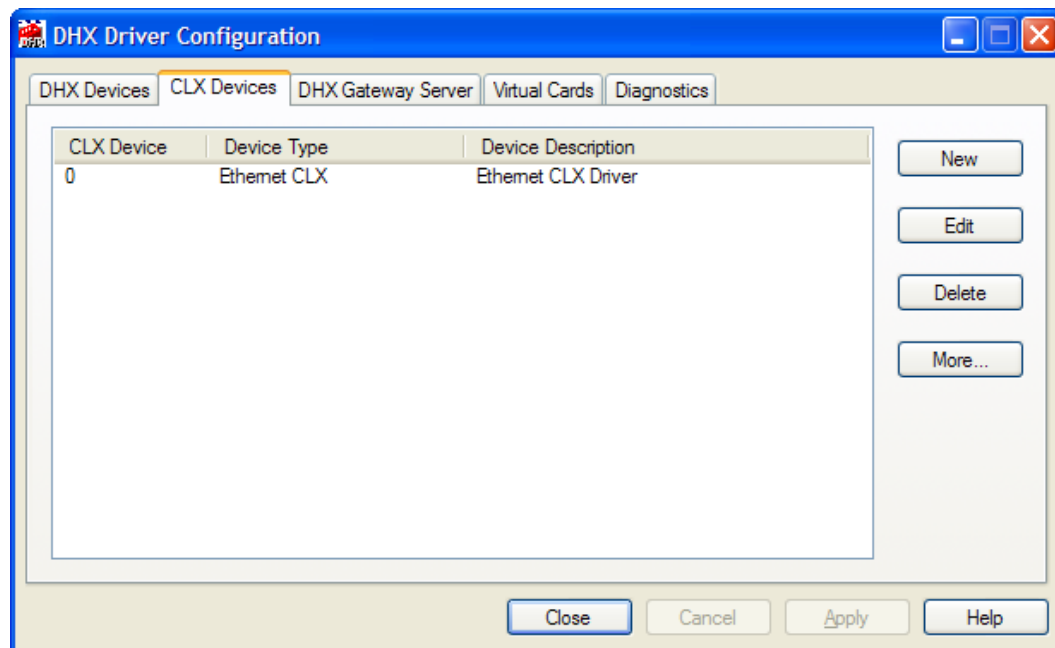
CLX Devices Tab

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 client applications, such as the DHX OPC Server.

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.

The CLX Devices tab lists all currently configured CLX devices in your system. The information about each device is shown in three columns: CLX Device, Device Type and Device Description.



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.

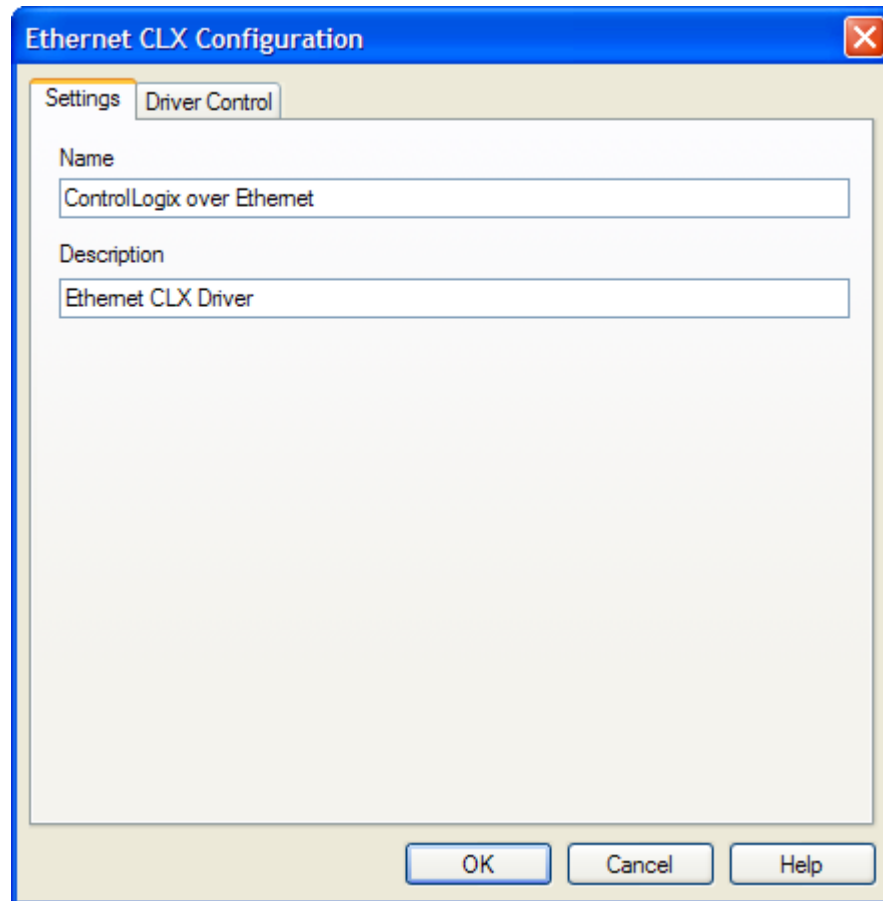
Changing Device Type

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.



The screenshot shows a dialog box titled "Ethernet CLX Configuration" with a close button (X) in the top right corner. The dialog has two tabs: "Settings" (selected) and "Driver Control". Under the "Settings" tab, there are two text input fields. The first is labeled "Name" and contains the text "ControlLogix over Ethernet". The second is labeled "Description" and contains the text "Ethernet CLX Driver". At the bottom of the dialog, there are three buttons: "OK", "Cancel", and "Help".

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

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.

Network Type	Optimum
ControlNet	16-32
Data Highway Plus	8-16
DF1	4-8

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

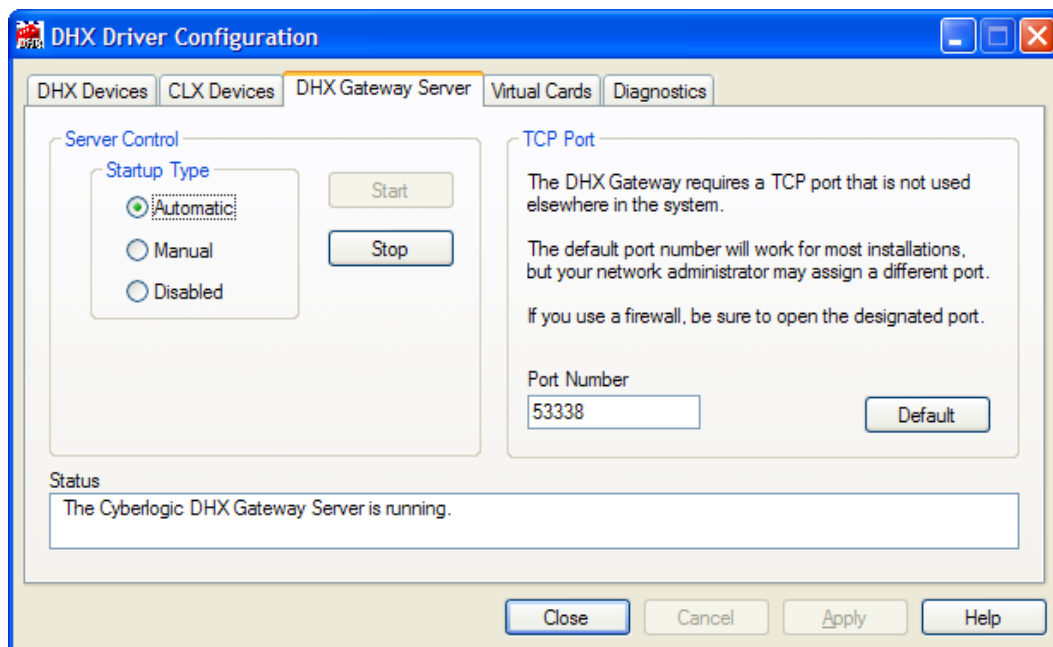
Every CLX over DHX device must have an associated DHX device. You may select the desired device from this drop-down box.

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.

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, as described in the [Configuring the Firewall](#) section.

Port Number

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

Default

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

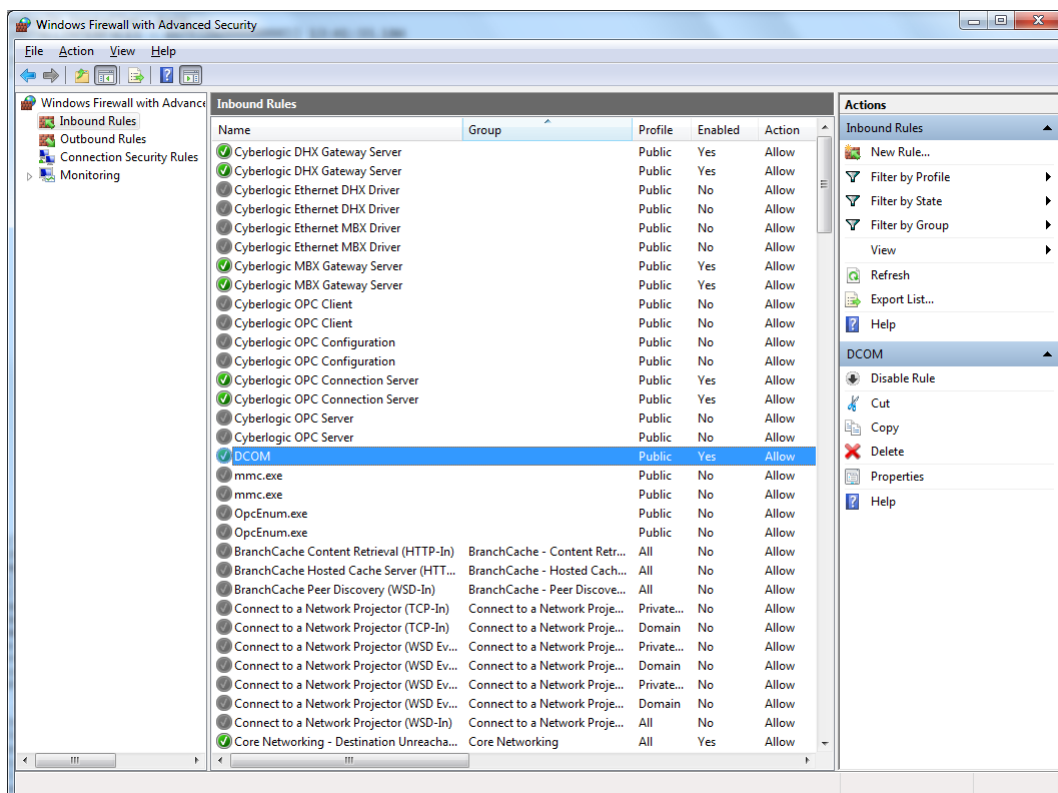
Enter the desired port number in the Port Number field.

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**.

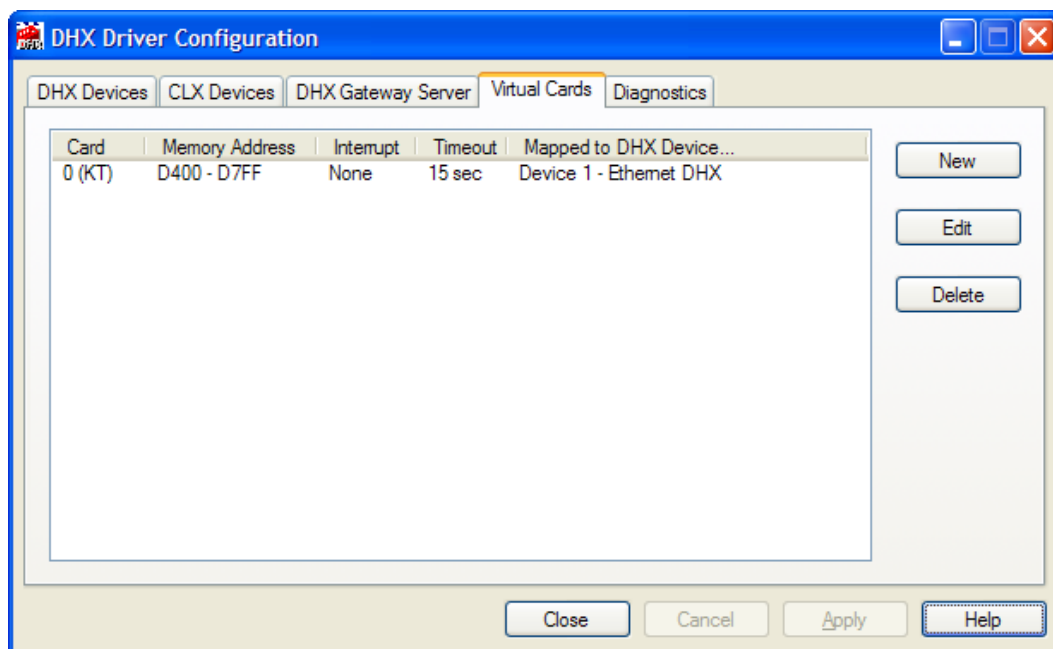


2. Select **Inbound Rules**.
3. Verify that the rules **Cyberlogic DHX Gateway Server** and **DCOM** are enabled. If not, enable them.
4. Close the window to exit.

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.

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 not generate interrupts.

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

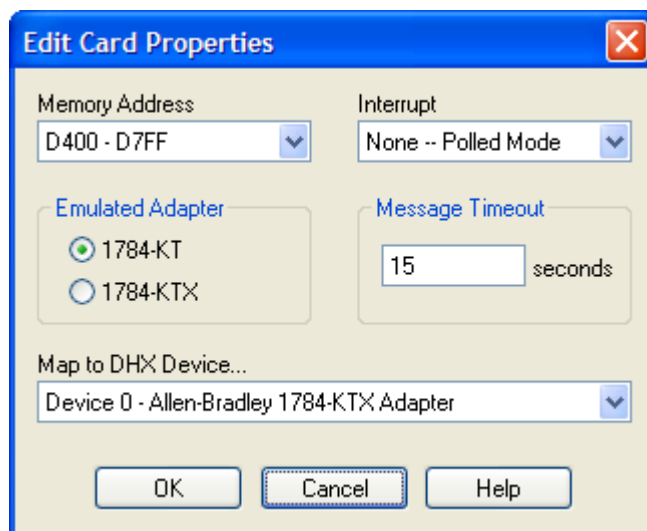
Click the **New** button or right-click inside the list window and select **New** from the context menu. The Edit Card Properties window will open to allow you to configure the new virtual card.

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.

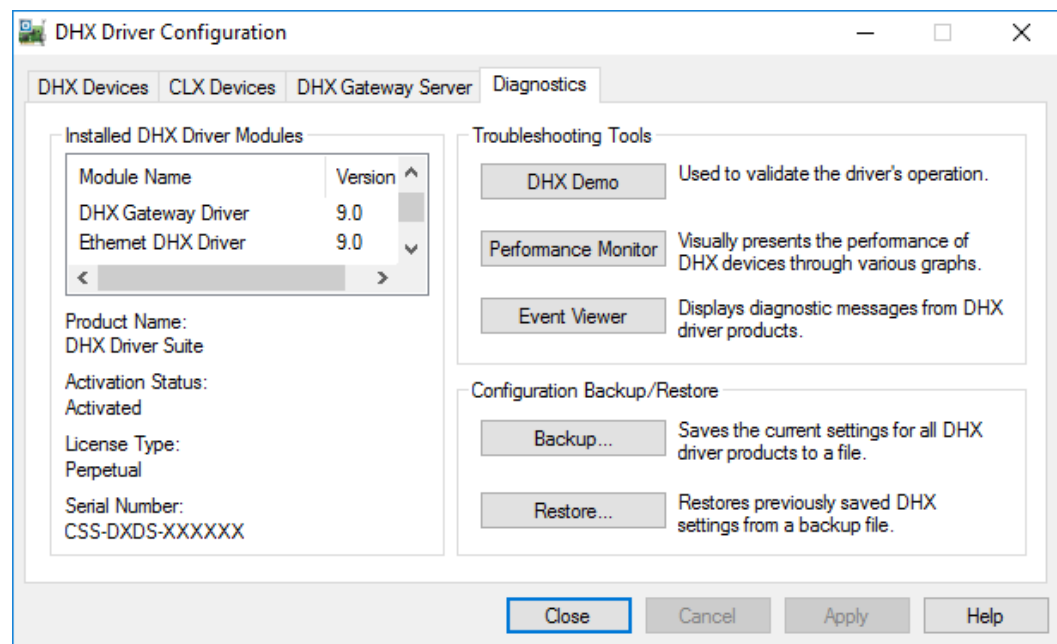
If you encounter communication timeouts, you should increase this value. For most applications, a 15-second timeout value is adequate.

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.

Diagnosics 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

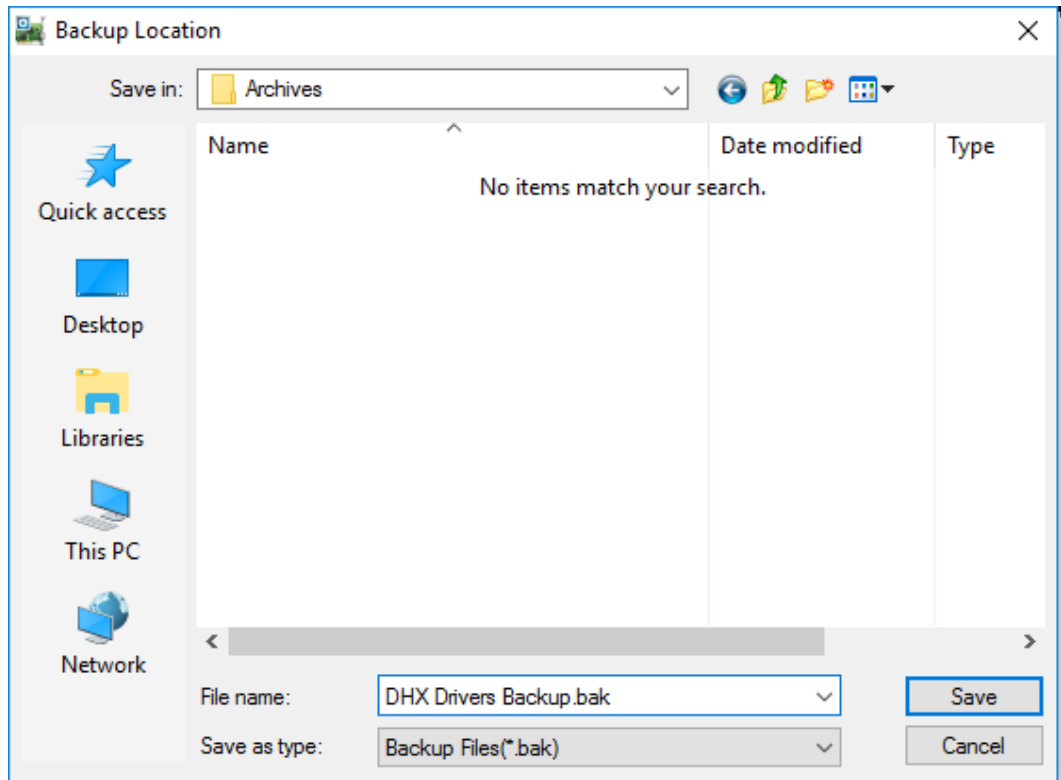
The Backup... and Restore... buttons in this group can be used to backup and restore configurations of all DHX family drivers on your system.

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

Backup Configuration

Use this procedure to backup your configuration.

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

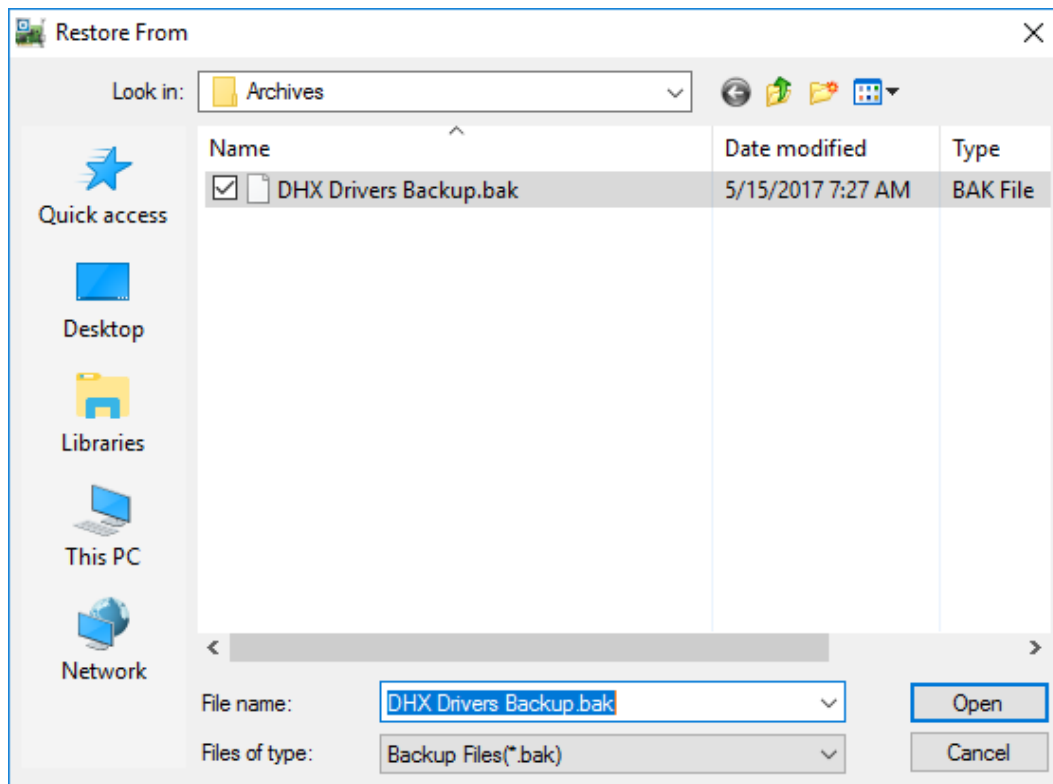


2. Browse for the backup directory. By default, the last-used directory will be selected.
3. Enter the **File name** you want to use for your configuration backup file, and then click the **Save** button to complete the backup operation.

Restore Configuration

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

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



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

Caution!

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

Configuration Backup/Restore Utility

The DHX products also provide a utility program, CIDhxCfg.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:

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

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

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

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

```
> CIDhxCfg /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.

Adapter Card Editor

Configuration for all adapter cards can only be edited through the Window's Device Manager. Once you start the Device Manager, locate the ***DHX Devices for Allen-Bradley Networks*** branch and expand it. Select the device to be configured, right-click, and then select ***Properties*** from the context menu.

When you edit a adapter card configuration, the Device Manager dispatches the Adapter Card Configuration editor. The editor consists of five tabs.

Some tabs are standard for all device types and are automatically provided by the Device Manager. Of concern for configuration purposes are the Device Settings Tab and Resources Tab, which are specific to each adapter, and the Diagnostics Tab, which is common to all.

The following sections describe the configuration details for each supported card type.

- [1784-PCMK and 1784-PCMK Series B](#)
- [1784-PKTX/A or /B and 1784-PKTXD/A](#)
- [SST-DHP-PCI and 5136-SD-PCI](#)

Following those is a section covering the [Diagnostics Tab](#).

The last section covers the procedure for [Deleting DHX Devices](#).

1784-PCMK and 1784-PCMK Series B

The 1784-PCMK and 1784-PCMK Series B are PCMCIA adapter cards for Data Highway Plus and DH-485. From a configuration perspective, the two cards are identical.

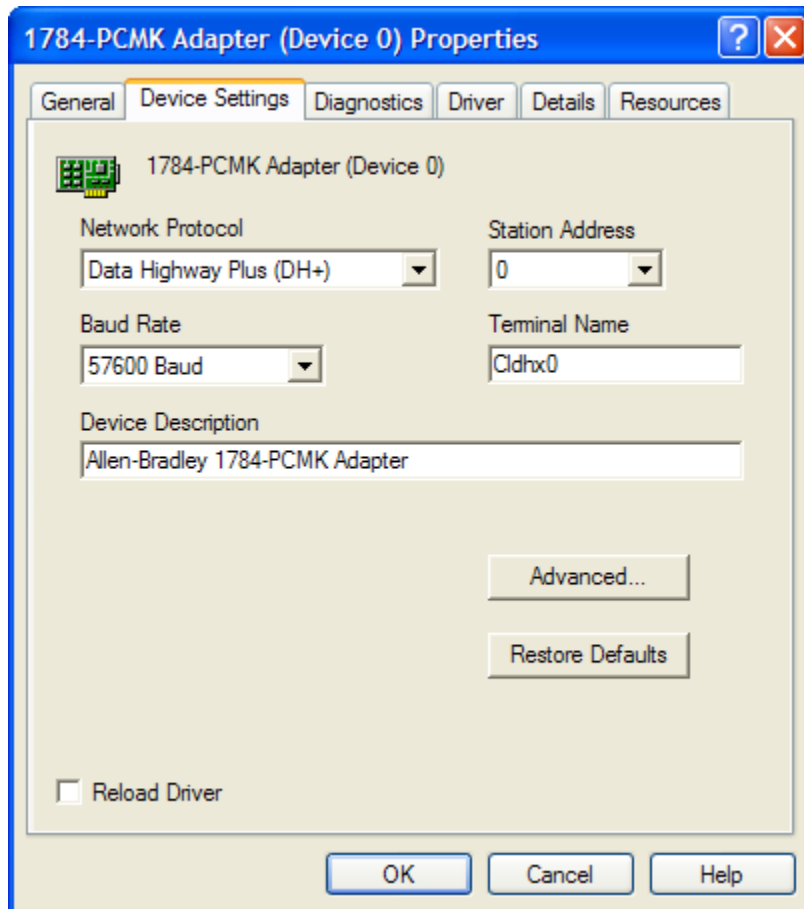
Installation and Removal

These cards support Plug and Play and can be plugged in at any time, before or after the system boot. For this process to work correctly, the DHX Driver must be installed on your system before you insert the card.

However, before removal, you must exit all applications that are using the card and stop the driver. Use the following procedure to stop the driver.

1. Click on the ***Safely Remove Hardware*** icon in the system tray.
2. From the pop-up menu, select the adapter you wish to remove.
3. Windows will notify you when it is safe to remove the card.

Device Settings Tab



Network Protocol

This allows you to select the protocol used by the network.

The default network protocol is Data Highway Plus (DH+).

Station Address

This allows you to select the DH+ or DH-485 network node address for this device, which must be unique on the network.

The default station address is 0.

Baud Rate

This setting allows you to select the baud rate to match your network.

The default baud rate for DH+ is 57,600 and the default baud rate for DH-485 is 19,200.

Terminal Name

You may enter a name that will identify the device on the Who Active screens of most PLC logic programmers.

The default for the terminal name is CLDhx#, where # is the device number.

Device Description

You may enter text that describes the device. This text has no effect on the DHX device operation, but some applications may be able to display this description.

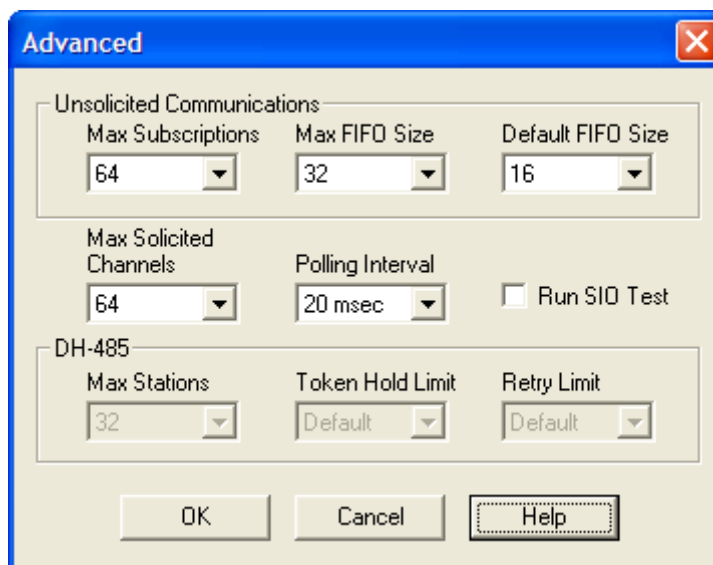
The default device description is: Allen-Bradley 1784-PCMK Adapter.

Reload Driver

When this box is checked and the OK button is clicked, the driver will reload using the new configuration parameters.

Advanced...

Clicking the Advanced... button opens the Advanced Settings screen.



The default settings will typically provide for optimum operation of the driver. However, some situations may require these parameters to be changed. Refer to the [Communication Using the DHX Driver](#) section for more information.

Unsolicited Communications

Max Subscriptions

This number defines how many unsolicited message requests the driver can process simultaneously. The valid range for this parameter is 1 – 255.

The default value is 64.

Max FIFO Size

This parameter specifies the maximum size of the FIFO buffer that your applications can request for an unsolicited channel. Refer to the [Unsolicited Communications](#) section for more information on these buffers.

The default value is 32.

Default FIFO Size

This parameter specifies the default size of the FIFO buffer for an unsolicited channel. Refer to the [Unsolicited Communications](#) section for more information on these buffers.

The default value is 16.

Additional Advanced Settings

Max Solicited Channels

This number limits the number of solicited message requests that the driver can process simultaneously. The valid range is 1 – 255.

The default value is 64.

Polling Interval

This parameter specifies the polling interval, in milliseconds, that the driver will use when running in polled mode. The valid range for the polling interval is 20-1000 msec.

The default value is 20 msec.

Run SIO Test

During startup, the DHX Driver runs a series of diagnostic tests on the adapter card. If this box is checked, the driver will run the Serial I/O (SIO) test in addition to the standard tests.

By default, the SIO test is disabled.

Caution!

Enable this test only for diagnosing a card that you suspect to be faulty. Disconnect the adapter card from the network or other communications may be disturbed by the test.

DH-485

Max Stations

This parameter allows you to set the maximum number of nodes allowed on the DH-485 network. The value must be in the range of 2 – 32. Lowering this number will slightly speed up the network, but will limit the number of devices and addresses allowed on the network.

The default value is 32 nodes.

Token Hold Limit

This setting limits the number of packets the device can send each time it has the token. Permitted values are in the range of 1 – 3, or you can select the Default setting, which allows the board's firmware to set the limit.

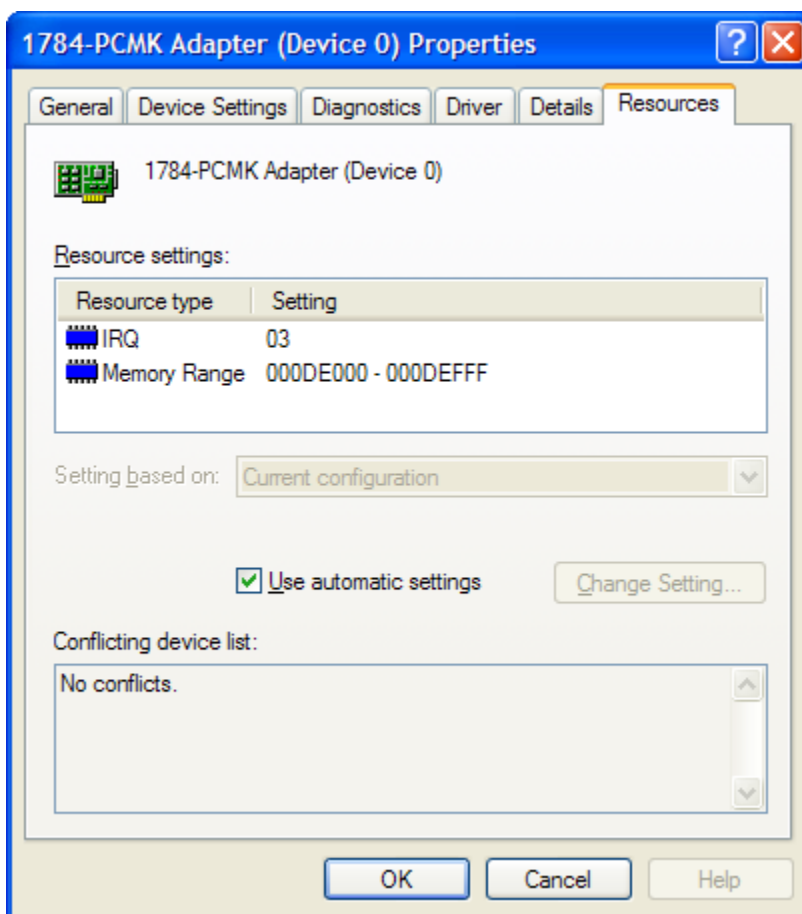
The default setting is Default.

Retry Limit

This setting specifies the number of retries that may be attempted by the adapter card. Permitted values are in the range of 1 – 3, or you can select the Default setting, which allows the board's firmware to set the limit.

The default setting is Default.

Resources Tab



Resource Settings

The operating system will assign system resources, such as memory, input/output and interrupts, to the board and display the results here. An IRQ will be assigned, if one is available. If not, the card will operate in polled mode.

The user should not attempt to change these settings.

Use automatic settings

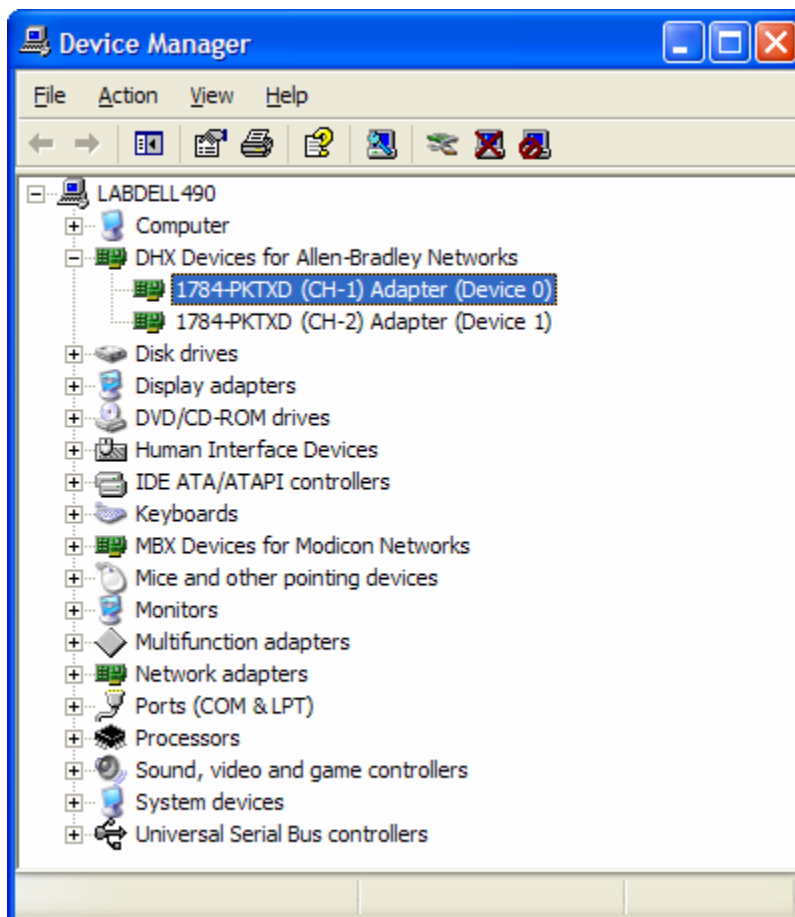
This box should always be checked to indicate that the system should automatically allocate the needed resources.

1784-PKTX/A or /B and 1784-PKTXD/A or /B

The 1784-PKTX and 1784-PKTXD are PCI bus adapter cards for Data Highway Plus and DH-485. The PKTX is a single-channel board, while the PKTXD is a dual-channel board. On the PKTXD, channel 1 may be configured as either Data Highway Plus or DH-485, but channel 2 can be configured only as Data Highway Plus. From a configuration perspective, the boards are nearly identical.

Plug and Play Installation

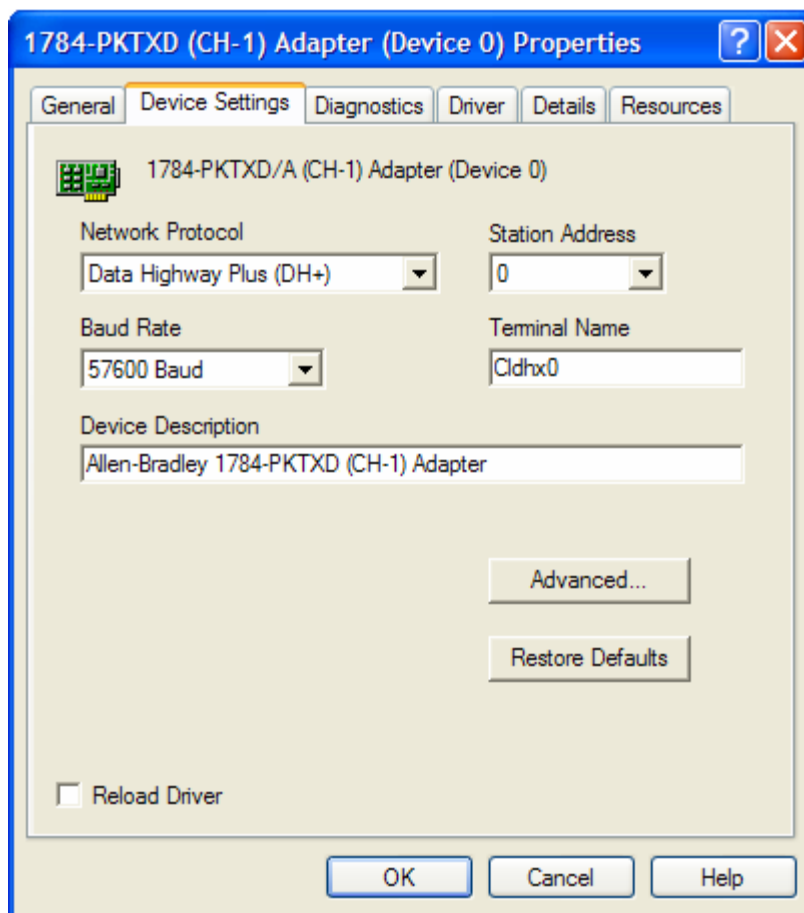
Because these cards support Plug and Play, the system automatically detects and configures them when they are newly installed in the system. For this process to work correctly, the DHX Driver must be installed on your system before you install the card.



The 1784-PKTX has one channel, which results in the creation of a single DHX device for each card.

The 1784-PKTXD card has two channels available. Consequently, for each card, two DHX devices are created, one for each channel. In addition, a parent device is created in the Multifunction adapters tree.

In either case, you simply choose the desired DHX device to be edited.

Device Settings Tab**Network Protocol**

This allows you to select the protocol used by the network.

The default network protocol is Data Highway Plus (DH+).

Note

The second channel (CH-2) of the PKTXD adapter card does not support the DH-485 protocol, so Data Highway Plus (DH+) will be the only selection available for CH-2 devices.

Station Address

This allows you to select the DH+ or DH-485 network node address for this device, which must be unique on the network.

The default station address is 0.

Baud Rate

This setting allows you to select the baud rate to match your network.

The default baud rate for DH+ is 57,600 and the default baud rate for DH-485 is 19,200.

Terminal Name

You may enter a name that will identify the device on the Who Active screens of most PLC logic programmers.

The default for the terminal name is CLDhx#, where # is the device number.

Device Description

You may enter text that describes the device. This text has no effect on the DHX device operation, but some applications may be able to display this description.

The default device description for the PKTX is: Allen-Bradley 1784-PKTX Adapter.

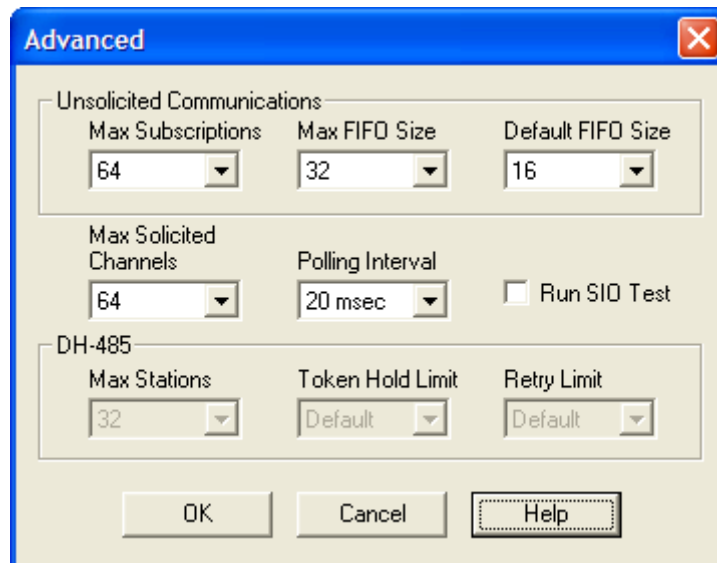
For the PKTXD, the default is: Allen-Bradley 1784-PKTXD (CH-#) Adapter, where # is the device's channel number.

Reload Driver

When this box is checked and the OK button is clicked, the driver will reload using the new configuration parameters.

Advanced...

Clicking the Advanced... button opens the Advanced Settings screen.



The default settings will typically provide for optimum operation of the driver. However, some situations may require these parameters to be changed. Refer to the [Communication Using the DHX Driver](#) section for more information.

Unsolicited Communications

Max Subscriptions

This number defines how many unsolicited message requests the driver can process simultaneously. The valid range for this parameter is 1 – 255.

The default value is 64.

Max FIFO Size

This parameter specifies the maximum size of the FIFO buffer that your applications can request for an unsolicited channel. Refer to the [Unsolicited Communications](#) section for more information on these buffers.

The default value is 32.

Default FIFO Size

This parameter specifies the default size of the FIFO buffer for an unsolicited channel. Refer to the [Unsolicited Communications](#) section for more information on these buffers.

The default value is 16.

Additional Advanced Settings

Max Solicited Channels

This number limits the number of solicited message requests that the driver can process simultaneously. The valid range is 1 – 255.

The default value is 64.

Polling Interval

This parameter specifies the polling interval, in milliseconds, that the driver will use when running in polled mode. The valid range for the polling interval is 20-1000 msec.

The default value is 20 msec.

Run SIO Test

During startup, the DHX Driver runs a series of diagnostic tests on the adapter card. If this box is checked, the driver will run the Serial I/O (SIO) test in addition to the standard tests.

By default, the SIO test is disabled.

Caution!

Enable this test only for diagnosing a card that you suspect to be faulty. Disconnect the adapter card from the network or other communications may be disturbed by the test.

DH-485

Max Stations

This parameter allows you to set the maximum number of nodes allowed on the DH-485 network. The value must be in the range of 2 – 32. Lowering this number will slightly speed up the network, but will limit the number of devices and addresses allowed on the network.

The default value is 32 nodes.

Token Hold Limit

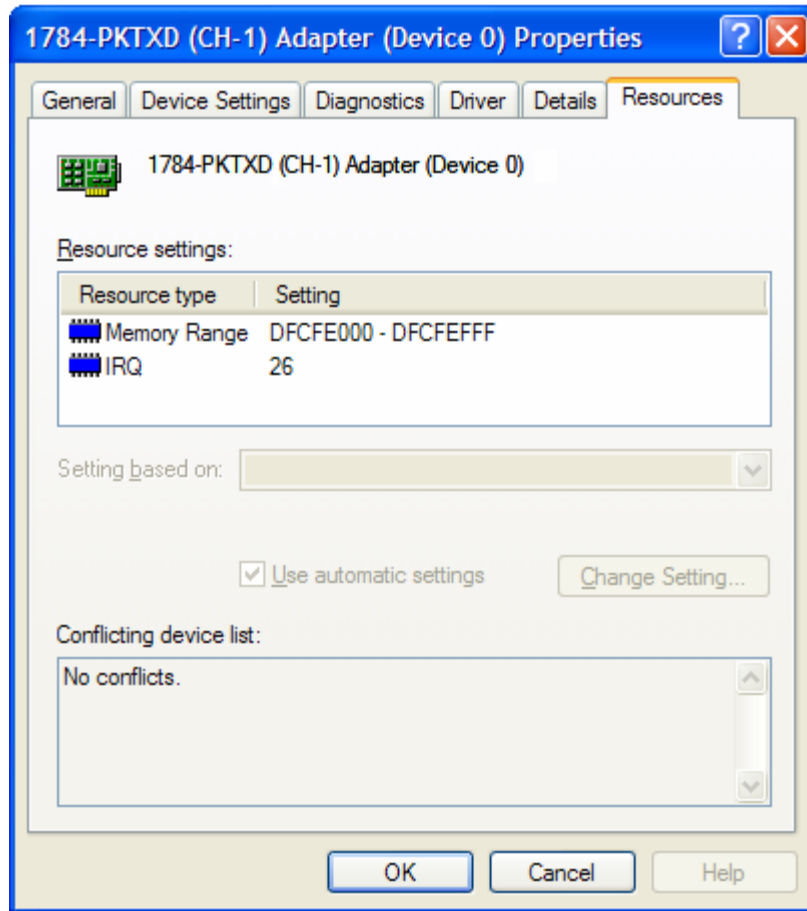
This setting limits the number of packets the device can send each time it has the token. Permitted values are in the range of 1 – 3, or you can select the Default setting, which allows the board's firmware to set the limit.

The default setting is Default.

Retry Limit

This setting specifies the number of retries that may be attempted by the adapter card. Permitted values are in the range of 1 – 3, or you can select the Default setting, which allows the board's firmware to set the limit.

The default setting is Default.

Resources Tab**Resource Settings**

The operating system will assign system resources, such as memory, input/output and interrupts, to the board and display the results here. An IRQ will be assigned, if one is available. If not, the card will operate in polled mode.

The user should not attempt to change these settings.

Use automatic settings

This box should always be checked to indicate that the system should automatically allocate the needed resources.

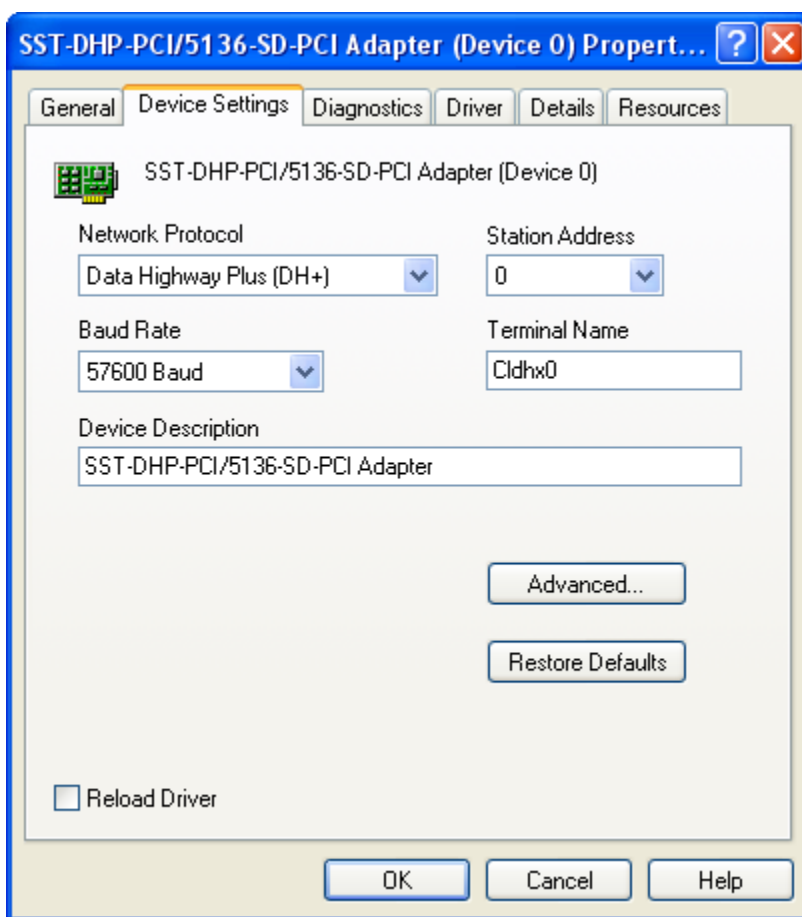
SST-DHP-PCI and 5136-SD-PCI

The SST-DHP-PCI and 5136-SD-PCI are PCI adapter cards for Data Highway Plus. They use the same driver, and their configuration procedures are identical.

Plug and Play Installation

Because these cards support Plug and Play, the system automatically detects and configures them when they are newly installed in the system. For this process to work correctly, the DHX Driver must be installed on your system before you install the card. The device will then appear in the Windows Device Manager, and you can select it for editing.

Device Settings Tab



Network Protocol

This allows you to select the protocol used by the network.

Only Data Highway Plus (DH+) can be selected here, because that is the only protocol that these adapters support.

Station Address

This allows you to select the DH+ network node address for this adapter card, which must be unique on the network.

The default station address is 0.

Baud Rate

This setting allows you to select the baud rate to match your network.

The default baud rate for DH+ is 57,600 baud.

Terminal Name

You may enter a name that will identify the device on the Who Active screens of most PLC logic programmers.

The default for the terminal name is CLDhx#, where # is the device number.

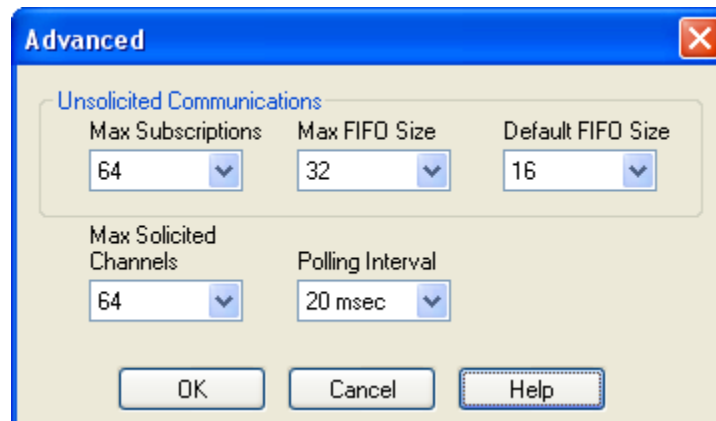
Device Description

You may enter text that describes the device. This text has no effect on the DHX device operation, but some applications may be able to display this description.

The default description is: SST-DHP-PCI/5136-SD-PCI Adapter.

Advanced...

Clicking the Advanced... button opens the Advanced Settings screen.



The default settings will typically provide for optimum operation of the driver. However, some situations may require these parameters to be changed. Refer to the [Communication Using the DHX Driver](#) section for more information.

Unsolicited Communications

Max Subscriptions

This number defines how many unsolicited message requests the driver can process simultaneously. The valid range for this parameter is 1 – 255.

The default value is 64.

Max FIFO Size

This parameter specifies the maximum size of the FIFO buffer that your applications can request for an unsolicited channel. Refer to the [Unsolicited Communications](#) section for more information on these buffers.

The default value is 32.

Default FIFO Size

This parameter specifies the default size of the FIFO buffer for an unsolicited channel. Refer to the [Unsolicited Communications](#) section for more information on these buffers.

The default value is 16.

Additional Advanced Settings

Max Solicited Channels

This number limits the number of solicited message requests that the driver can process simultaneously. The valid range is 1 – 255.

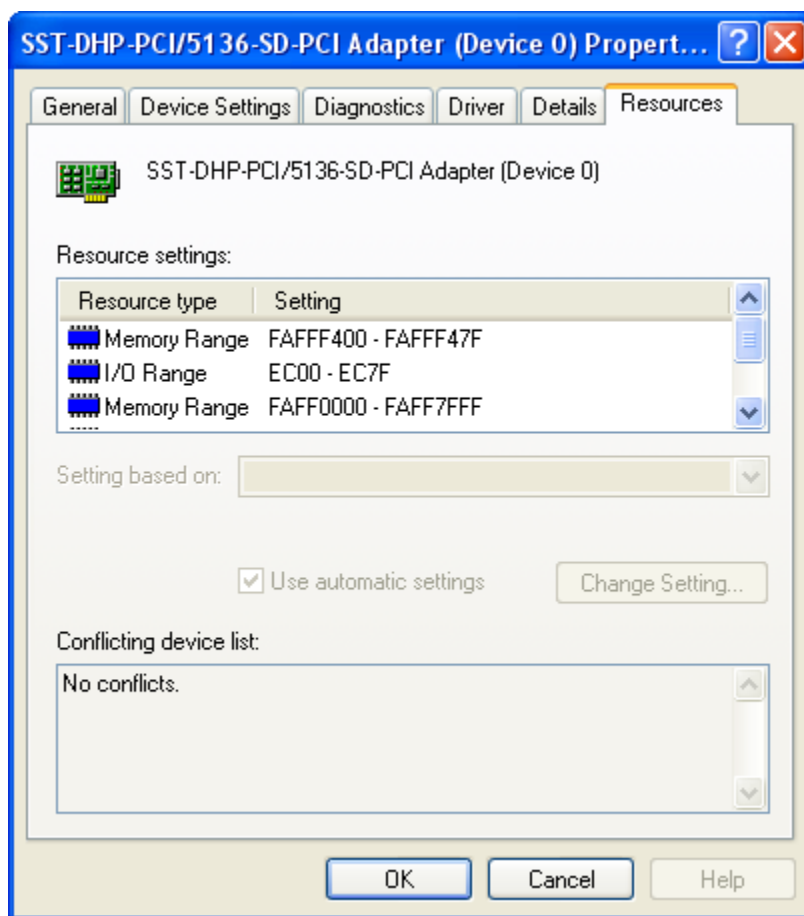
The default value is 64.

Polling Interval

This parameter specifies the polling interval, in milliseconds, that the driver will use when running in polled mode. The valid range for the polling interval is 20-1000 msec.

The default value is 20 msec.

Resources Tab



Resource Settings

The operating system will assign system resources, such as memory, input/output and interrupts, to the board and display the results here. An IRQ will be assigned, if one is available. If not, the card will operate in polled mode.

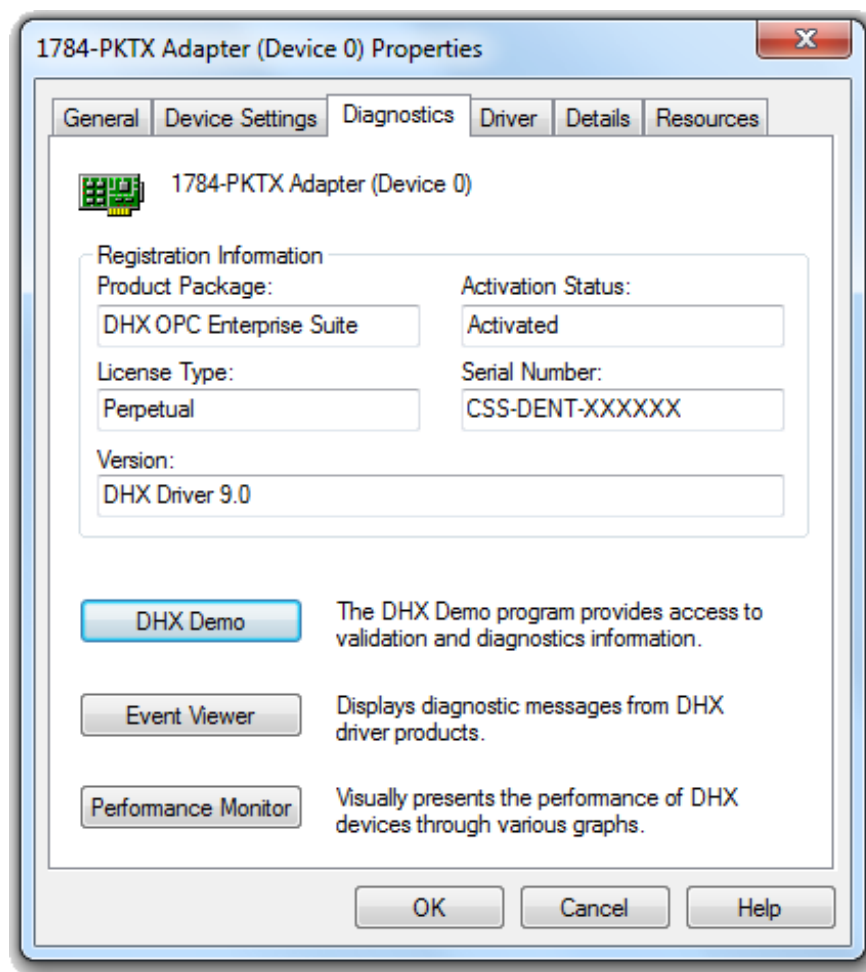
The user should not attempt to change these settings.

Use automatic settings

This box should always be checked to indicate that the system should automatically allocate the needed resources.

Diagnostics Tab

The Diagnostics Tab settings are common to all adapter types. The features on this tab 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.



Registration Information

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.

Version

This field identifies the version number of the installed software. This will help you to determine if your software has been updated to the current revision level.

Troubleshooting Tools

The troubleshooting tools buttons at the bottom of the screen provide access 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.

Event Viewer

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

Performance Monitor

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

Deleting DHX Devices

To delete a DHX device from the Device Manager, right-click and select **Uninstall** from the menu.

Hidden Devices

When you remove a PnP (PCI or PCMCIA) card from the system or move it to a different slot, Windows does not uninstall the corresponding DHX device, but merely makes it a hidden device. This makes it difficult to uninstall the device from the Device Manager.

To view these hidden devices, you must do the following procedure.

1. Open a command prompt window and enter:

```
>set DEVMGR_SHOW_NONPRESENT_DEVICES=1
```

2. In the Device Manager, open the **View** menu and select **Show hidden devices**.

The removed device will now be visible.

3. Right-click on the device and select **Uninstall...** from the context menu to uninstall the device.

Note

To make DEVMGR_SHOW_NONPRESENT_DEVICES=1 a permanent environment value, right-click on **My Computer** and select **Properties**. Select the **Advanced** tab and click on **Environment Variables**. From there, you can add the variable and its value.

VALIDATION & TROUBLESHOOTING

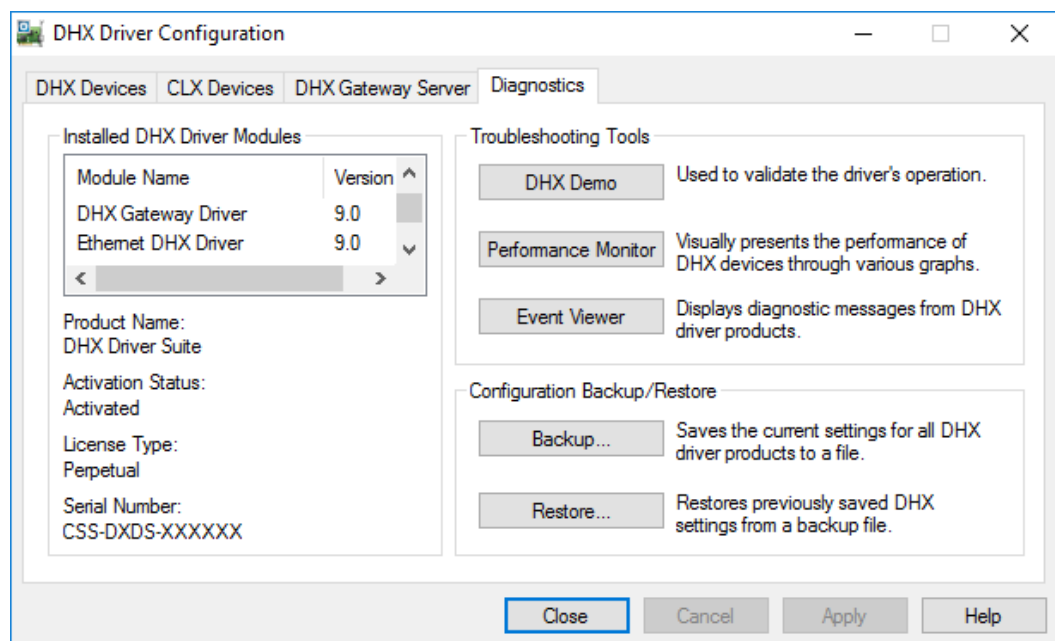
The following sections describe how the [DHX Demo](#) and [Performance Monitor](#) are used to verify that the DHX devices are configured correctly.

If you are having difficulties communicating through a 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 [DHX Driver Messages](#) and a [Frequently Asked Questions](#) section.

DHX Demo

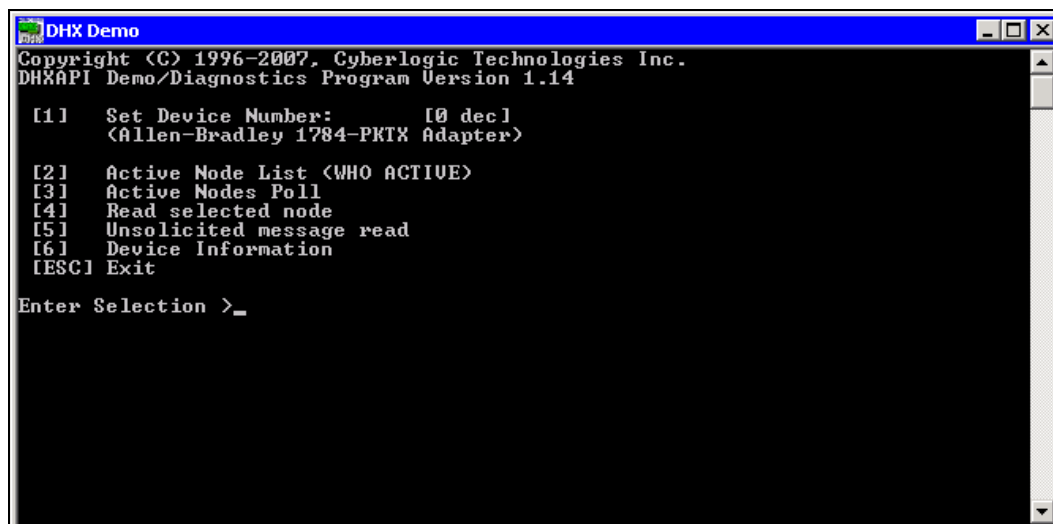
The DHX Demo program can be used to test all configured DHX devices in a system for proper operation. To run the program, open the Windows **Start** menu and locate the **Cyberlogic Suites** sub-menu. From there, go to **Diagnostics** and select **DHX Demo**.

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.

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

```
Copyright (C) 1996-2007, Cyberlogic Technologies Inc.  
DHXAPI Demo/Diagnostics Program Version 1.14  
  
[1] Set Device Number:      [0 dec]  
    <Allen-Bradley 1784-PKT Adapter>  
  
[2] Active Node List <WHO ACTIVE>  
[3] Active Nodes Poll  
[4] Read selected node  
[5] Unsolicited message read  
[6] Device Information  
[ESC] Exit  
  
Enter Selection >_
```

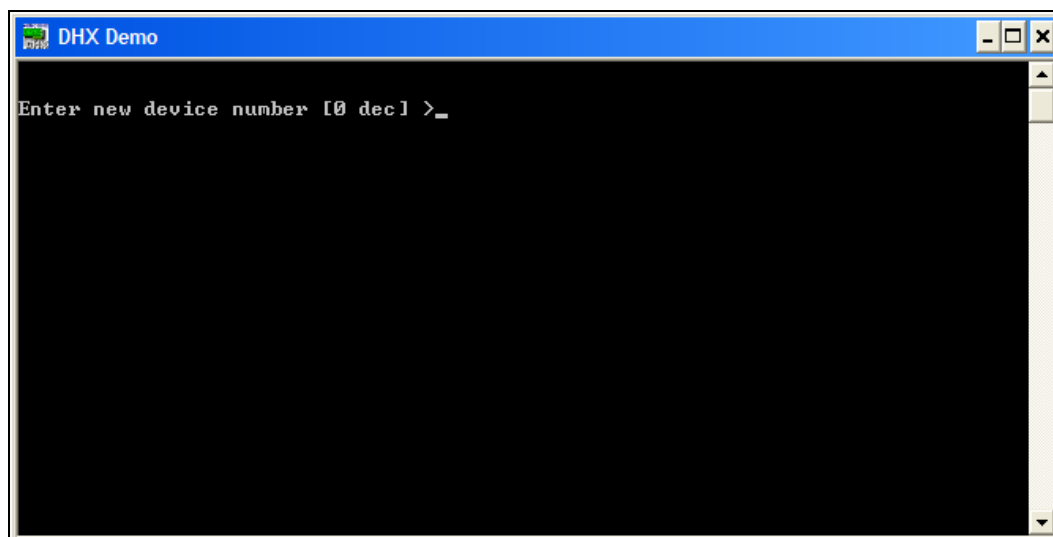
The simple command-line interface displays menu choices that take the user to secondary level screens.

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**.

A screenshot of a Windows-style window titled "DHX Demo". The window displays a prompt for entering a device number:

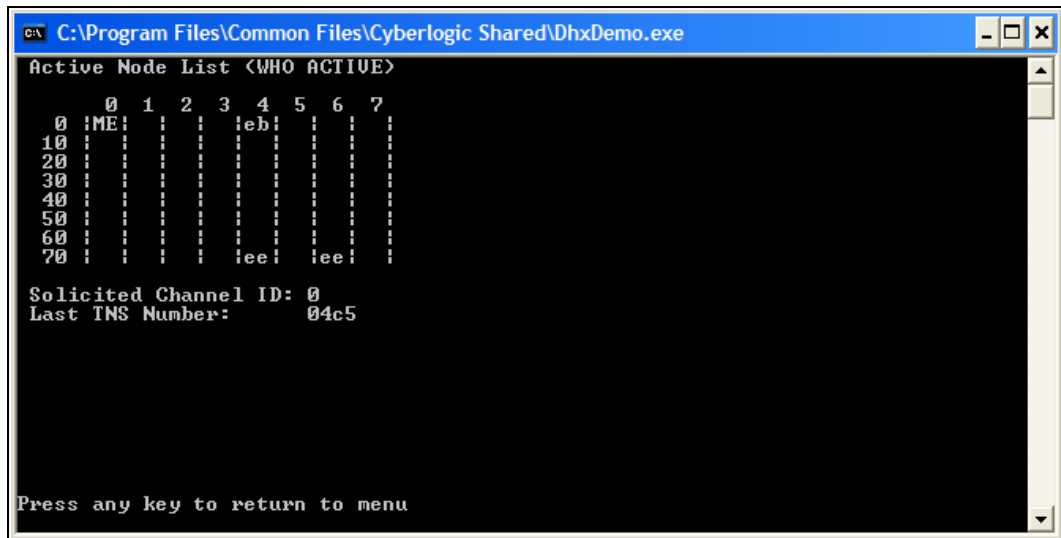
```
Enter new device number [0 dec] >_
```

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

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

[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.

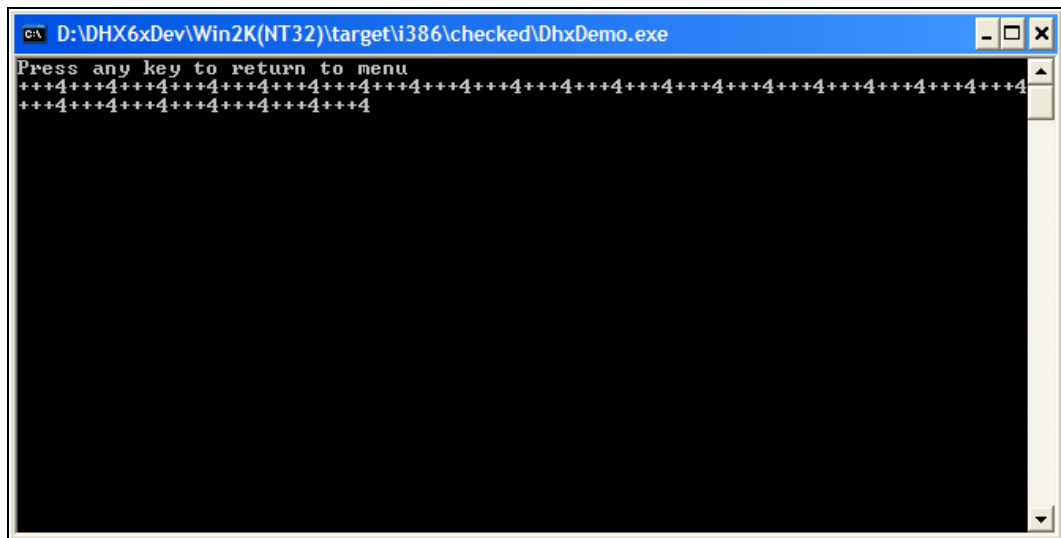


In the Active Node List grid, ME designates the node you are working from, and the identifier codes are shown for other nodes found on the network.

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.



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

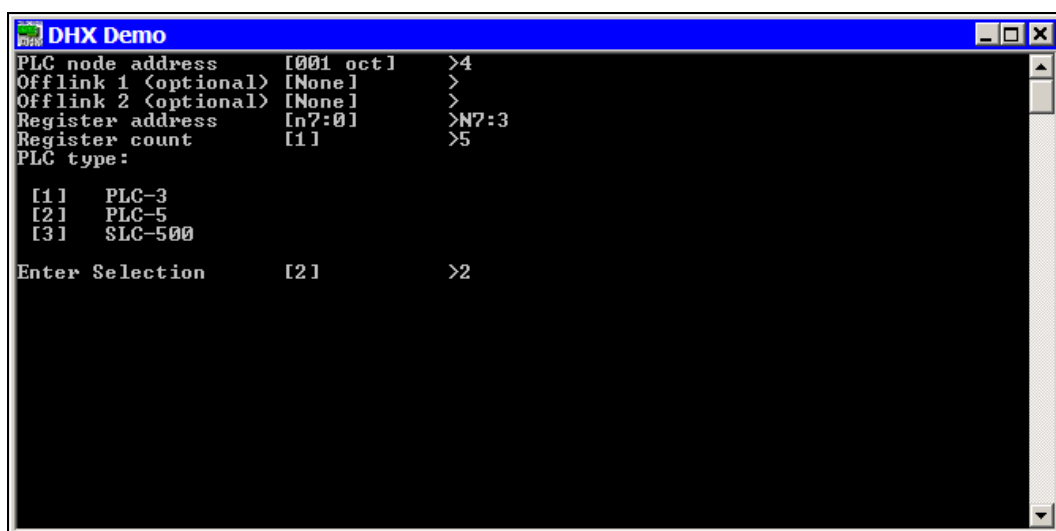
displays "?". After polling each node, the software displays the total number of active nodes, including the local node.

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.

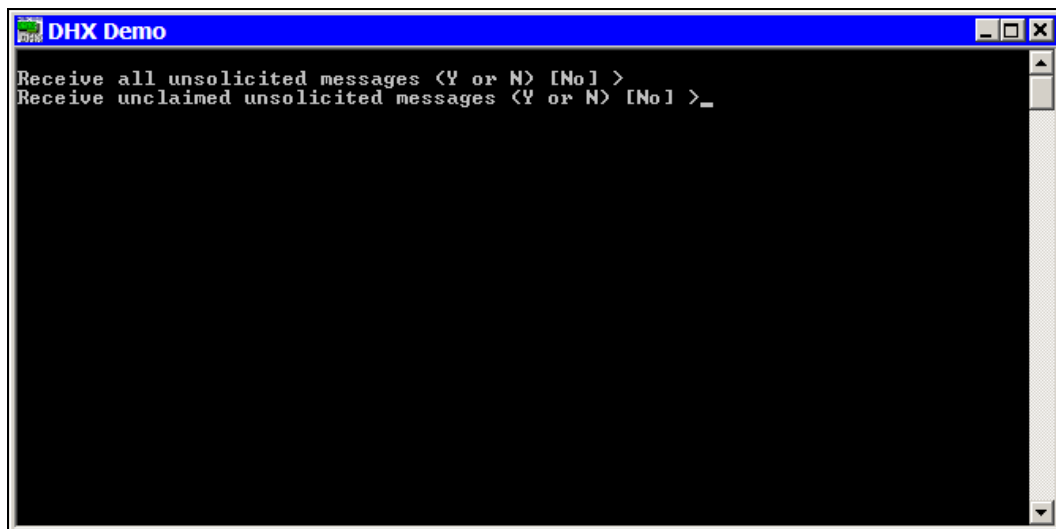
Press **Enter** to initiate the read. The requested data will be displayed on the screen. Press **Esc** to return to the main menu.

[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.

```

DHX Demo
Device Type: 1784-PKTX/A      Network Protocol: DH+
Device Number: 0             Terminal Name: C1dHx0
Memory Address: FE000000     Port Address: N/A
Interrupt IRQ: 56            Bus/Interface Type: PCI
Polling Interval: N/A        Bus Number: 0
Max Nodes: 64                Slot Number: 0
Station Address: 0           Baud Rate: 57600
Solicited Channels: 64       Unsolicited Channels: 64
Token Hold Limit: N/A        Max Unsol. FIFO size: 32
Retry Limit: N/A             Default Uns FIFO size: 16
Termination Resistor: N/A

Device Status: On-Line       Duplicate Node: NO
Device Open Count: 1         Total Dev Driver Calls: 5189
Sol Chan Open Count: 0       Unsol Chan Open Count: 0
Active Sol Requests: 0       Active Unsol Requests: 0
Total Sol Cmd Packets: 0     Total Unsol Cmd Pkt's: 0
Total Sol Reply Pkt's: 0     Total Unsol Reply Pkt's: 0
Total Sol Cmd Timeouts: 0    Total Lost Unsol Cmd's: 0
Packets in XMT FIFO: 0       Unsol Pkt's in FIFO: 0
Total XMT Packets: 0         Total Interrupts: 0
Total RCU Packets: 0         Total Lost Interrupts: 0
Total Device Faults: 0       Total Error Calls: 0

Press any key to return to main menu...

```

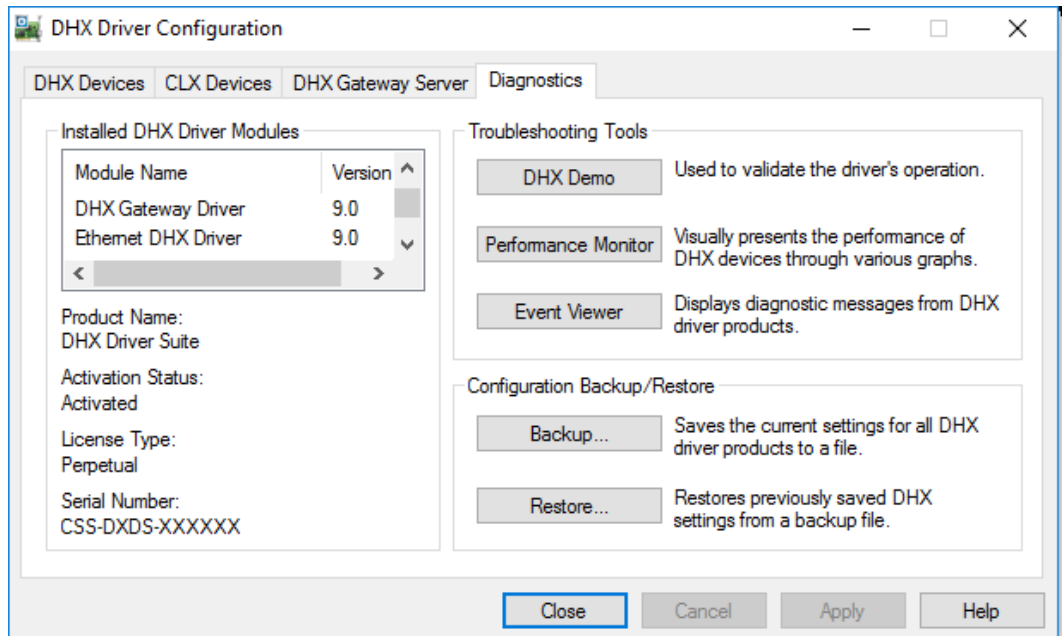
This screen shows configuration, statistical and diagnostic information about the driver, the device and the network.

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.

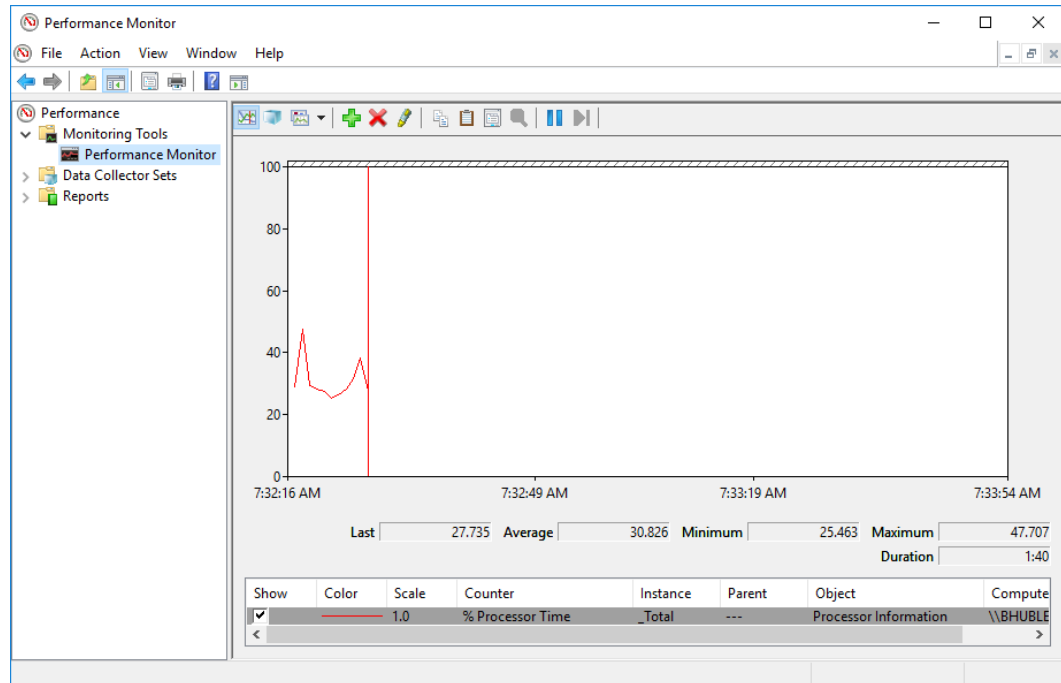
To run the program, open the Windows **Start** menu and locate the **Cyberlogic Suites** sub-menu. From there, go to **Diagnostics** and select **Performance Monitor**.



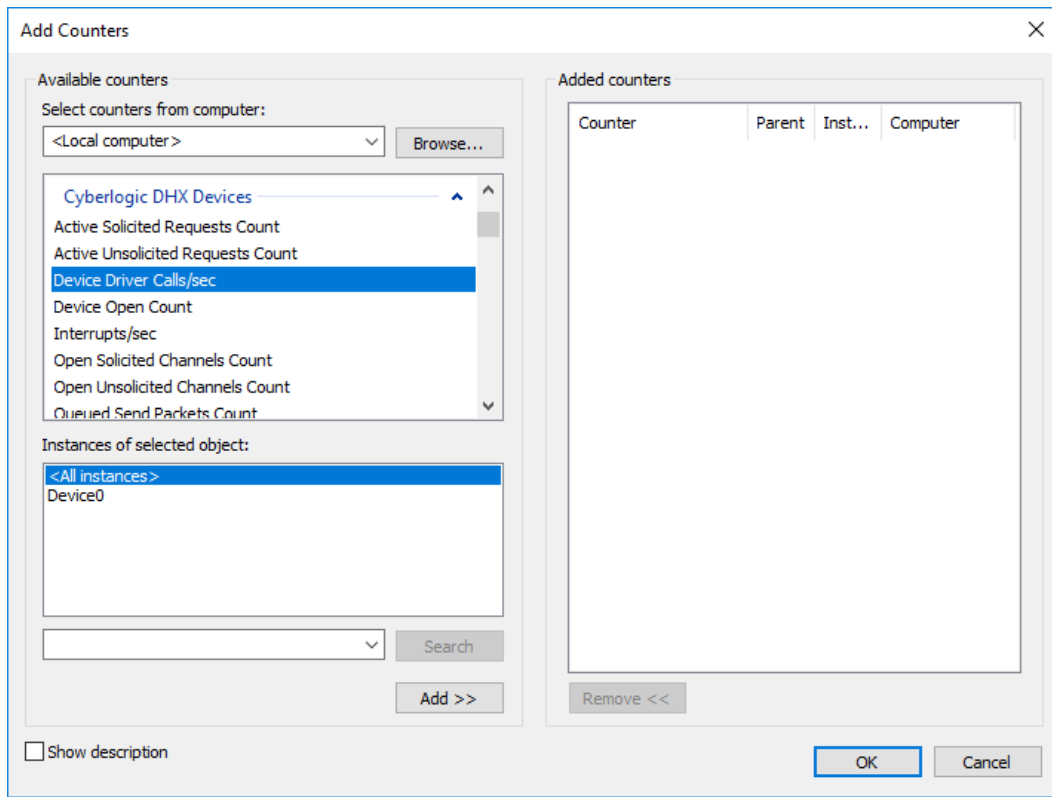
Alternatively, go to the Diagnostics tab of the DHX Driver Configuration Editor and click the **Performance Monitor** button.

How to Use the Performance Monitor

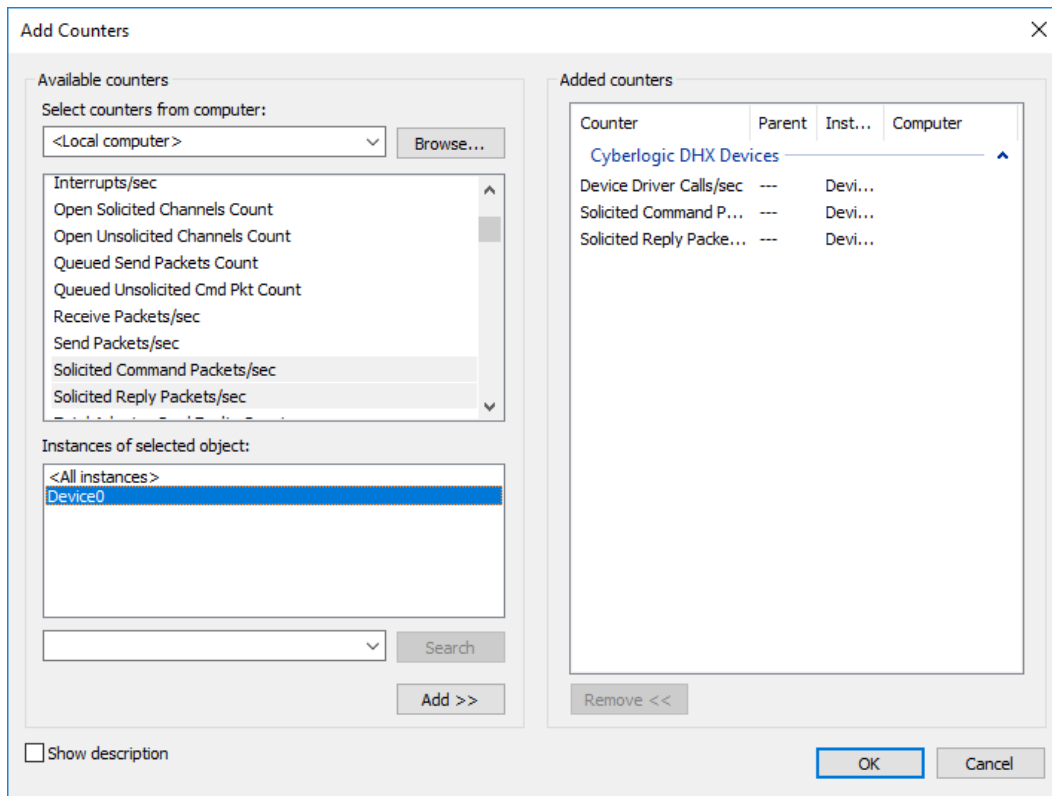
Since extensive help is provided for this program by Microsoft, only a few points relevant to the DHX family drivers are shown here.



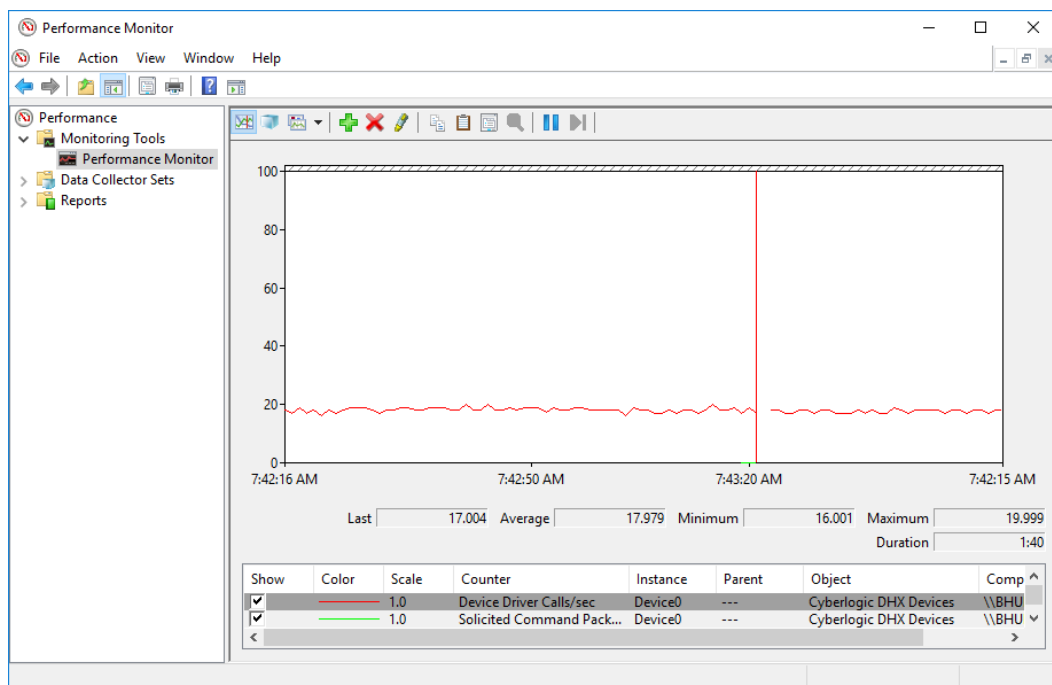
1. When the Performance Monitor program starts, click the **+** button on the tool bar.



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



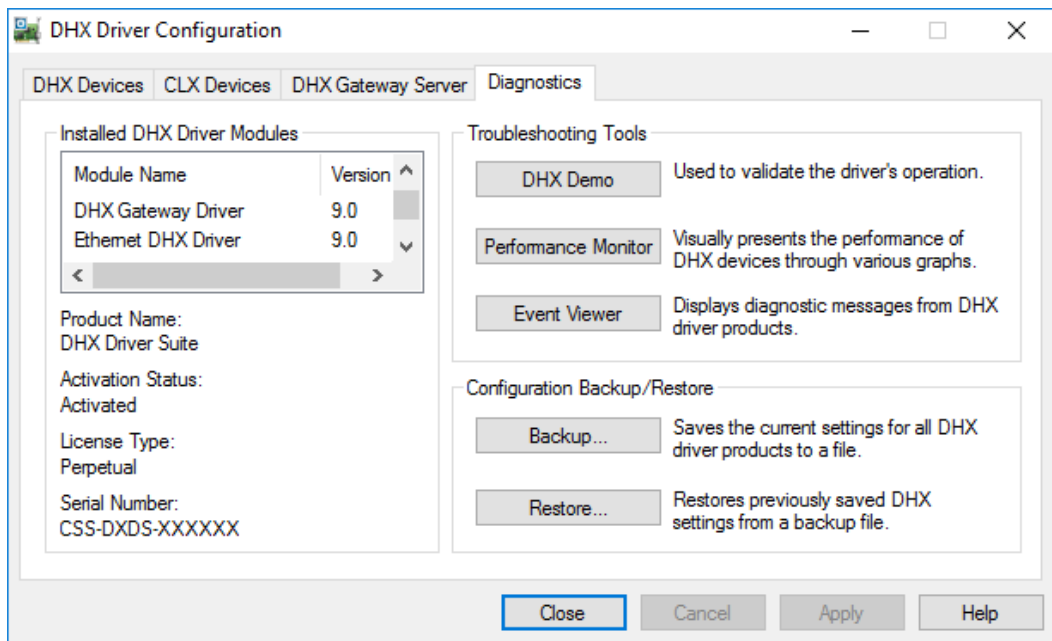
3. Choose a counter and the DHX device, and click **Add**. Repeat this for all the counters you want to view.
4. Click **OK**. The counters you chose will then be displayed in graphical format.



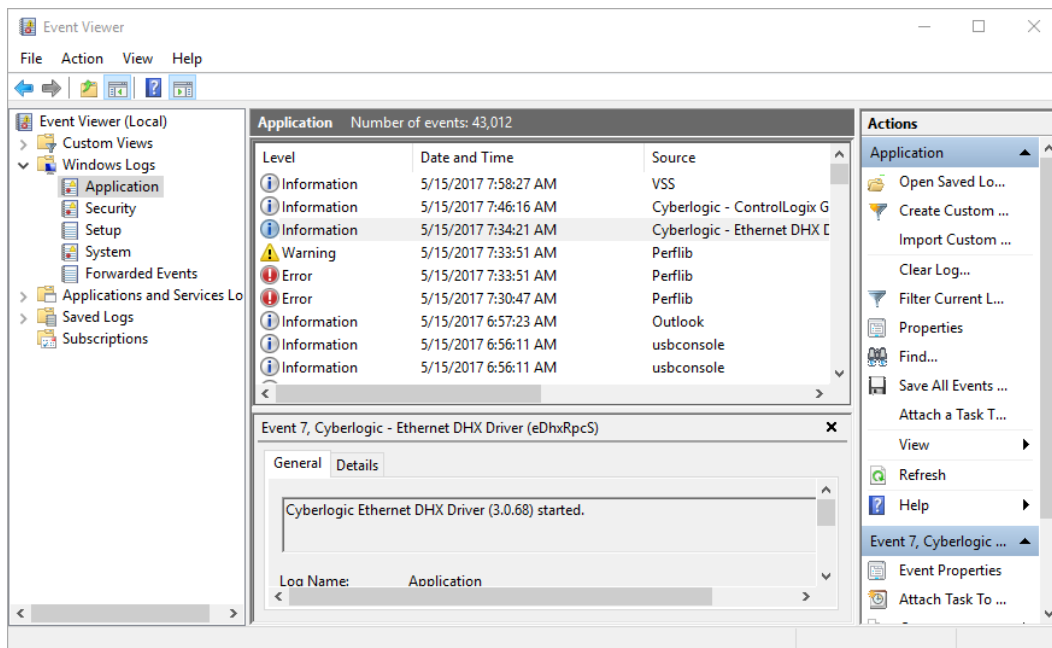
Event Viewer

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 **Diagnostics** 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 **Windows Logs|System** from the Event Viewer tree, and look for entries in the **Source** column named **CLDhxPnP**.

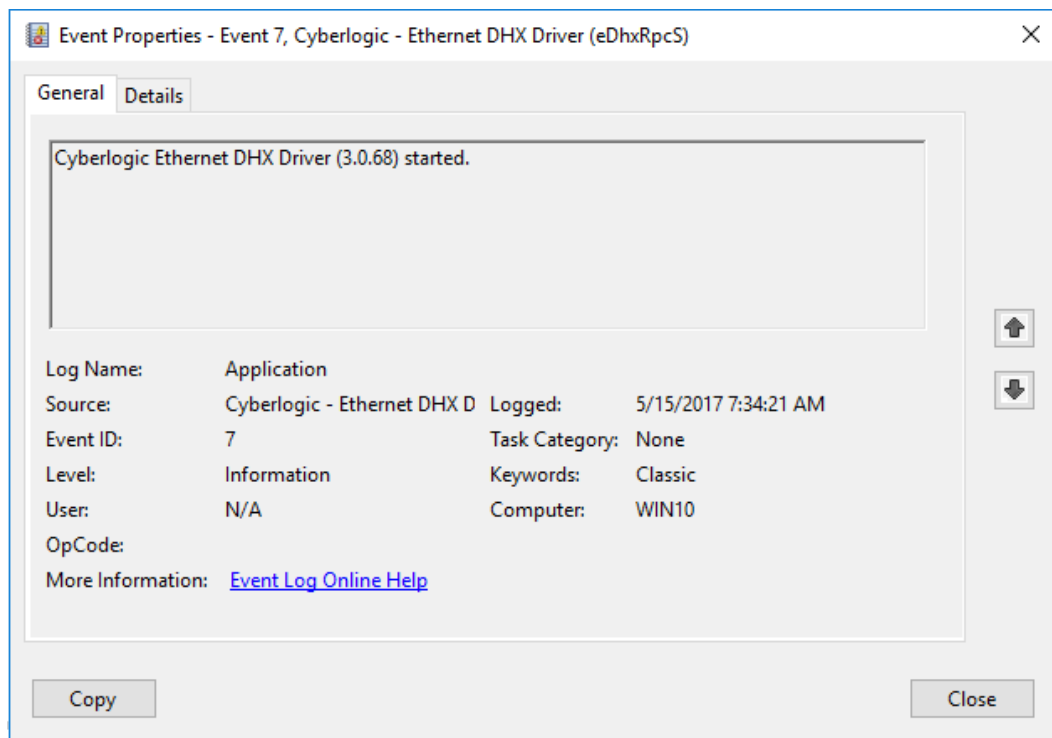
For other types of events, select the **Application** branch from the Event Viewer tree, and look for entries in the **Source** column that begin with **Cyberlogic**.

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 [DHX Driver Messages](#) section.

DHX Driver Messages

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

Memory allocation error in <function name>. Close some applications. Add more memory to your system. Contact the manufacturer's technical support.

The driver failed to allocate needed memory. This is a fatal error. Close other open applications or add more memory to the system, and then try to restart the driver.

Memory allocation error in <function name>. The DHX Driver may not operate correctly. Close some applications. Add more memory to your system. Contact the manufacturer's technical support.

The driver failed to allocate needed memory. This is a fatal error. Close other open applications or add more memory to the system, and then try to restart the driver.

Unexpected error in <function name>. Please contact the manufacturer's technical support.

Indicates a possible programming bug in the driver. Contact Cyberlogic Tech Support for more information on a possible solution.

Unexpected error in <function name> (Error code = <number>). Please contact the manufacturer's technical support.

Indicates a possible programming bug in the driver. Contact Cyberlogic Tech Support for more information on a possible solution.

The Cyberlogic License Server failed to respond with valid license information. The I/O operations of the 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.

Adapter card's dual-port memory diagnostics for <device name> at selected memory address failed (Write Pattern 0x<hex value>). Check the selected memory range for the card and make sure that the card is plugged in. Also, check Resources in the Device Manager for possible conflicts with other devices in the system. Try another adapter card.

May indicate a faulty card.

Adapter card's interface diagnostic for <device name> using binary file <file name> failed for an unknown reason. Check the selected memory range for the card and make sure that the card is plugged in. Also, check Resources in the Device Manager for possible conflicts with other devices in the system.

May indicate a faulty card.

Adapter card's <test name> test for <device name> at selected memory address failed. The test reported error code <error code> (<error message>). Check the selected memory range for the card and make sure that the card is plugged in. Also, check Resources in the Device Manager for possible conflicts with other devices in the system.

May indicate a faulty card.

Connecting ISR routine to selected interrupt line for <device name> failed. Some device driver in the system did not report its resource usage. Try to remove some questionable drivers from the system and restart this driver. You may also select another interrupt line.

Unreported interrupt already used by another device driver.

Failed to open binary file <binary file name> for <device name>. Reinstall the product and restart the driver.

During product installation, a number of binary files, required for the adapter card operation, are copied to the user's hard disk. Since the indicated file could not be found, reinstallation of the product will recopy the missing file.

Failed to read binary file <binary file name> for <device name>. Reinstall the product and restart the driver.

During product installation, a number of binary files, required for the adapter card operation, are copied to the user's hard disk. Since the indicated file could not be read, reinstallation of the product will recopy the corrupted file.

Hardware resources allocation for device <device name> failed. Check Resources in the Device Manager for possible conflicts with other devices in the system.

Invalid configuration parameter. One of the requested system resources such as the memory address or interrupt IRQ has already been allocated to a different device.

Mapping selected interrupt into system interrupt vector for <device name> failed. Check device configuration and restart the driver.

Unreported interrupt already used by another device driver.

Mapping selected physical memory address to logical address space for <device name> failed. Check device configuration and restart the driver.

Unreported memory range already used by another device driver.

Mapping selected physical port address to logical address space for <device name> failed. Check device configuration and restart the driver.

Unreported I/O port address already used by another device driver.

Not enough memory in <paged/nonpaged> pool was available to allocate internal storage needed for <Device Name>. Close some applications. Add more memory to your system.

Memory allocation from the specified memory pool failed. This is a fatal error. The driver will not load.

Parameter <parameter name> for device <device name> has invalid value (<parameter value>). Check device configuration and restart the driver.

Invalid configuration parameter. This is a fatal error.

Parameter <parameter name> for device <device name> has invalid value (End of dump data has parameter value). Check device configuration and restart the driver.

Invalid configuration parameter. This is a fatal error.

Protocol file <file name> download for <device name> failed. The loader reported error code <error code> (<error message>). Check for proper

network cable shielding. Check for possible sources of noise. Try another adapter card.

May indicate a faulty card.

The bus number selected for device <device name> is not supported by this computer system.

Invalid configuration parameter.

The slot number in selected bus for device <device name> is not supported by this computer system.

Invalid configuration parameter.

Unexpected error in <function name> for <device name>. Please contact technical support of manufacturer.

Indicates a programming bug in the device driver.

Device <device name> has no value for parameter <parameter name>.

Invalid configuration parameter.

Not enough memory in <paged/nonpaged> pool was available to allocate internal storage needed for <device name>. The driver may not operate correctly. Close some applications. Add more memory to your system.

Memory allocation from the specified memory pool failed. This is only a warning. The requested operation will fail but the driver will continue to operate.

Parameter <parameter name> for device <device name> is out of range. Defaults to <parameter value>. Check device configuration and restart the driver.

Invalid configuration parameter.

Frequently Asked Questions

Helpful Hints

- After installing the DHX Driver software, we suggest running the [DHX Demo](#) program to ensure the driver is configured correctly and running properly.
- Verify that you are communicating through the correct device.
- Verify that you selected a unique station address for your device.

I have installed the software. What's next?

The next step is to configure a device. Refer to the [Quick-Start Guide](#) for more details.

The card seems to be working, but I cannot see one of the nodes on the network. What's wrong?

There are two things to check. First, verify that the card is plugged into the network. Second, it is likely that both nodes have the same network node address. Change the card's network station address in the Interface Adapter Card Configuration editor. You should now be able to see all of the nodes.

I have a card for Data Highway (or Data Highway Plus) installed in my system. There is no communication and the DHX demo software doesn't show any of the existing nodes.

The cards for Allen-Bradley networks all default to node address 0. If there is another one of these cards anywhere on your network, it is likely that it is using this default address, resulting in a conflict. Use the DHX Configuration Editor to change the adapter's node address to a different value.

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

The [DHX Demo](#) program uses the device number to determine which card to use. The Set Device Number option lets you choose which device the demo will use. If you are using some other software, contact the manufacturer for more information on using multiple cards.

I am using the 1784-PKTX card. I had no problems with the DHX Driver until I moved the card to a different slot. When I booted the system, to my surprise, the "Found New Hardware" message came up, and a new DHX device was created. Now the DHX Configuration Editor shows that I have two DHX devices, Device 0 and Device 1, but the Device Manager shows only Device 1. I would like both editors to report only Device 0. How can I do that?

Each PCI slot has a number and Windows creates a different DHX device for each slot. When you remove a PCI card from the system, or move it to a different slot, Windows does not uninstall the corresponding DHX device, but makes it a hidden device. That makes it difficult to uninstall this device from the Device Manager.

To uninstall the hidden devices, open a command prompt window and enter:

```
>set DEVMGR_SHOW_NONPRESENT_DEVICES=1
```

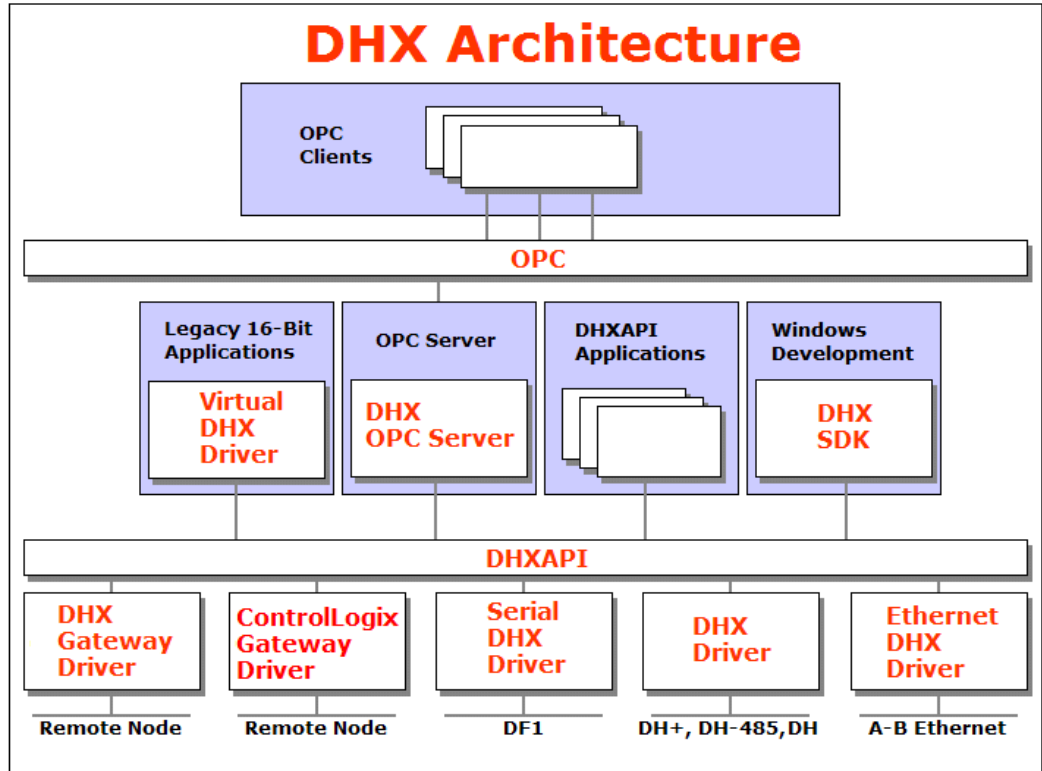
In the Device Manager, open the **View** menu and select **Show hidden devices**. The removed device will now be visible. Right-click on the device and select **Uninstall...** from the context menu to uninstall the device.

To change the new device number from Device 1 to Device 0, you must also uninstall Device 1, and then open the **Action** menu and select the **Scan for hardware changes**. The system will recreate a new device as a Device 0.

APPENDIX: DHX ARCHITECTURE AND COMPANION PRODUCTS

The 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 TCP/IP 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.