Virtual DHX Driver Help

Virtual DHX Driver for Allen-Bradley Networks

Version 9

VIRTUAL DHX DRIVER HELP

Virtual DHX® Driver for Allen-Bradley® Networks

Version 9

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INTRODUCTION

The Virtual DHX Driver emulates Allen-Bradley 1784-KT and 1784-KTX adapter cards for 16-bit DOS/Windows 3.x applications. As a result, it allows legacy DOS and Windows 3.x applications that use these cards to run under current Windows operating systems in their original binary form. This includes programs such as Allen-Bradley's 6200, AI and ODS software and hundreds of other custom applications written by software developers and system integrators. With the Virtual DHX Driver installed, you can execute 16-bit programs exactly the same way as in their original environment.

These applications can run concurrently with other 16/32/64-bit applications, sharing the same 32/64-bit device driver. In addition, you can concurrently execute multiple instances of the same application. For example, you can run multiple instances of the 6200 programming software and monitor the operation of multiple Data Highway Plus networks.

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.

This driver is part of Cyberlogic's DHX Driver Suite, DHX OPC Server Suite, DHX OPC Premier Suite and DHX OPC Enterprise Suite, providing 16-bit application compatibility for these products.

Remote Connectivity

The DHX Gateway Driver, which is included with all DHX products, allows applications on your system to access DHX devices in other computers on your network. Your system will then have full driver functionality, just as though the DHX device in the other system were installed in your system. The Virtual DHX Driver is compatible with the DHX Gateway Driver, providing this remote connectivity to the 16-bit applications in your system. For more information, refer to the DHX Gateway Driver section.

Compatibility

The Virtual DHX Driver is implemented as part of the Cyberlogic DHX architecture, which is the foundation used in other DHX family drivers such as the DHX Driver, the Ethernet DHX Driver, the Serial DHX Driver and the DHX Gateway Driver. Consequently, the Virtual DHX Driver works with all of these drivers, supporting nearly all DOS and Win16 applications that worked with the 1784-KT and/or 1784-KTX adapter cards.

Blending DHX Supported Networks

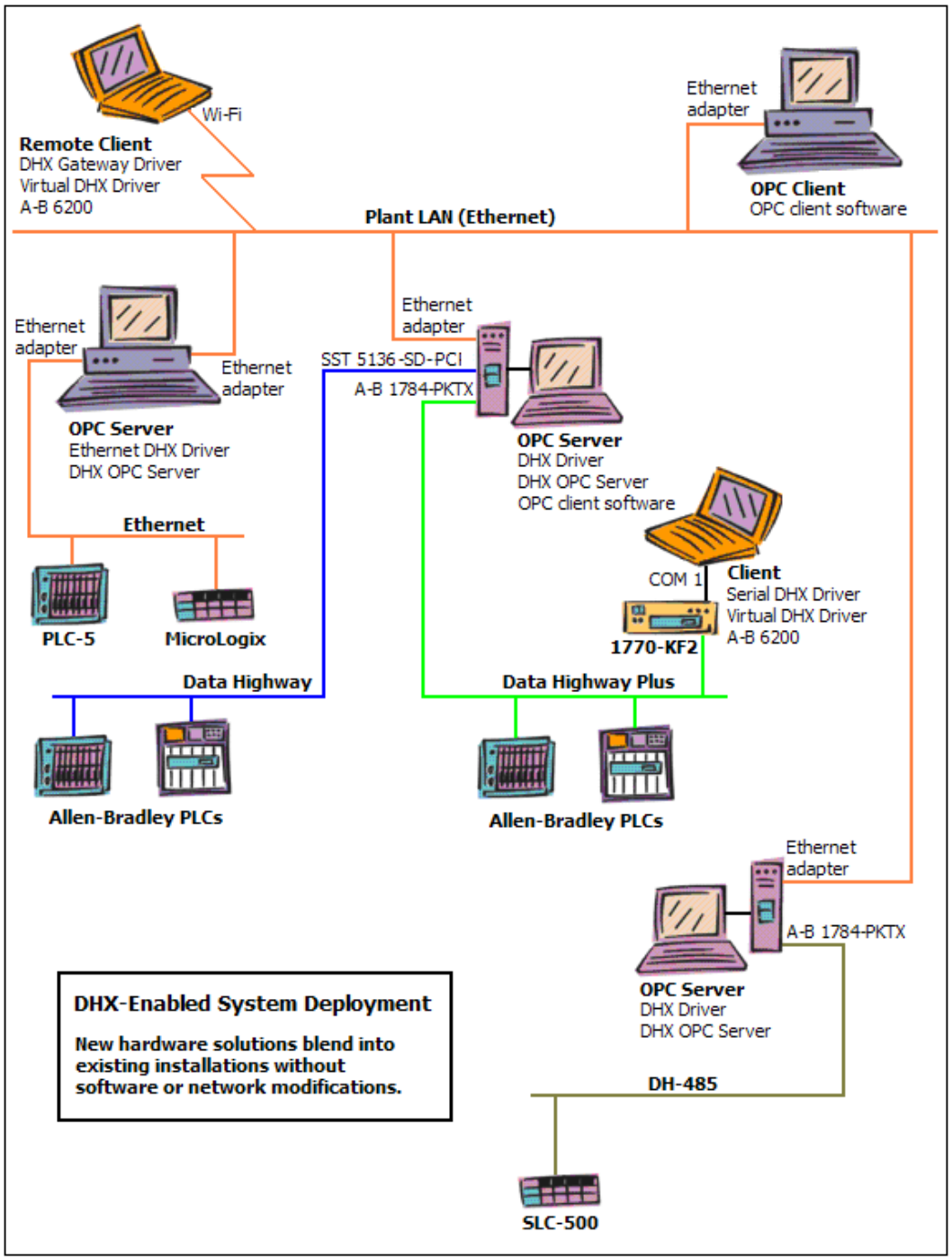
The DHX driver family provides support for all Allen-Bradley networks through a common architecture, with identical programming interfaces. This means that an application that operates with one of the DHX family drivers, such as the DHX Driver, will work with the rest of them as well. Thus, virtually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


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

WHAT SHOULD I DO NEXT?

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

Learn How the Driver Works

If you are not familiar with the way that the Virtual DHX Driver works, you should begin by reading Communication Using the Virtual DHX Driver.

Read a Quick-Start Guide

First-time users of the Virtual 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 Editor

Experienced users who want specific information on features of the configuration editor 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 VIRTUAL DHX DRIVER

This section is intended to familiarize you with the main features of the Virtual DHX Driver.

Device Drivers for 16-Bit Applications

The purpose of the Virtual DHX Driver is to allow legacy 16-bit applications to run under current Windows operating systems. The 1784-KT and 1784-KTX cards are the most popular adapter cards that are used to interface to Allen-Bradley's Data Highway Plus network, and the Virtual DHX Driver fully emulates the operation of these cards for DOS and 16-bit Windows applications. This guarantees that nearly all 16-bit applications that support these cards can run under current Windows operating systems in their original binary form.

The Prior Art: 16-Bit Communication

Prior to the introduction of 32-bit Windows operating systems, DOS and 16-bit Windows applications communicated to the adapter cards in several different ways. Some products, such as 6200 and AI programming software, communicated directly to the card. Other products, such as 6001-F1E Library and Interchange™, used a separate DOS driver to control the card's operation.

There was no clearly-defined software standard for interfacing to these cards. However, all of these software solutions had one thing in common: they had to communicate to the physical adapter card.

Achieving Compatibility Using the Virtual DHX Driver

For 16-bit applications, the Virtual DHX Driver can be configured to make any DHX device appear to be a 1784-KT/KTX on a Data Highway Plus network. The actual DHX device may be:

- A 1784-KT on Data Highway Plus
- A 1784-KTX on DH-485
- A 1784-KTC on ControlNet
- A 5136-SD on Data Highway
- An Ethernet DHX device on a TCP/IP network
- A DHX Gateway Device on a TCP/IP network
- Or any other DHX Device

In every case, the application will see the device as a 1784-KT or 1784-KTX on Data Highway Plus.

A virtual 1784-KT/KTX card can emulate both interrupt and polled mode. However, because multiple virtual cards can be mapped to the same DHX device, unsolicited communication is not supported.

The Virtual DHX Driver uses the DHX Driver, Ethernet DHX Driver, Serial DHX Driver, ControlLogix Gateway Driver and Ethernet DHX/CIP Driver for all of its local I/O functions. It can also use the DHX Gateway Driver for network-based installations. At least one of these drivers is required for the proper operation of the Virtual DHX Driver.

Virtual DOS Machine for 16-Bit Applications

When the user opens a DOS or Windows 3.x application, Windows launches a Virtual DOS Machine (VDM) instance within the Win32 subsystem. Several copies of the VDM may run simultaneously without interfering with each other, and the applications run independently, as they would in a native MS-DOS/Windows 3.x environment.

The VDM creates an environment where unmodified 16-bit software can execute without threatening the security and integrity of the Windows system. The standard VDM has built-in support for commonly-used hardware, such as serial communication ports, video, mouse and keyboard. Within this environment, virtual device drivers, such as the Virtual DHX Driver, can execute to extend the I/O capabilities of the VDM. By doing so, the Virtual DHX Driver provides support for the 1784-KT and 1784-KTX cards.

When the VDM is launched, it does the following:

1. Allocates memory to create a virtual DOS machine
2. Reads the config.nt and autoexec.nt files
3. Loads drivers and executes batch files as specified
4. Loads the application and executes it

The config.nt and autoexec.nt files located in the system32 directory are global for the entire Windows system. If you use a shortcut to launch a DOS application, you can specify private versions of these files, which may be located in any directory.

Running DOS Applications

When multiple DOS applications are launched, they execute inside separate VDMs. Therefore, there are never resource conflicts among these applications. For example, multiple DOS applications or multiple instances of the same DOS application, can use the same virtual 1784-KT or 1784-KTX card without conflicts. As a result, only one virtual card is normally required for each DHX device that your DOS applications need to use.

Although DOS applications do not require a shortcut to run, we recommend that you use a shortcut for them. Doing so allows you to configure each VDM for a specific application using different autoexec.nt and config.nt files. For instructions on how to create these shortcuts, including instructions on how to configure the paths to the desired autoexec.nt and config.nt files, refer to the Creating and Configuring Shortcuts section.

Caution!

The Virtual DHX Driver emulates only the interface card; it does not emulate any DOS device driver. However, some 16-bit applications require a DOS device driver in order to run. For these applications, you must still use the original DOS driver. Loading this driver may require modifications to the autoexec.nt or config.nt files used with your application.

Refer to the Virtual DOS Machine for 16-Bit Applications section for more information.

Running 16-Bit Windows Applications

When multiple Windows 3.x applications are launched, they all execute inside the same VDM. To prevent virtual card access conflicts between these applications, each Windows program must use a different virtual 1784-KT or 1784-KTX card. If more than one application must communicate through the same DHX device, you must create multiple virtual cards and map them all to the same DHX device. Refer to the Virtual Cards Tab section for information on how to do this.

If your Windows 3.x application requires a DOS driver to be loaded before the application starts, you must configure this by modifying the autoexec.nt and config.nt files that are located in the system32 directory. These global config.nt and autoexec.nt files are the only ones that Windows 3.x applications can use.

Caution!

When running Windows 3.x applications, you must reboot the system each time the Virtual DHX Driver is reconfigured.

All Windows 3.x applications run inside a single VDM that may already have been started. If the VDM is already running, your configuration changes will not take effect until you reboot the system.

QUICK-START GUIDE

You must configure the Virtual DHX Driver before using it. 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.

Note

In this section we assume that you have already configured and tested the DHX device. For instructions on creating DHX Devices, refer to the Configuration section of the appropriate DHX family driver: DHX Driver, Ethernet DHX Driver, Serial DHX Driver or DHX Gateway Driver.

The procedures in this guide are broken into several sections, covering the steps you will need to perform to configure the Virtual DHX Driver for your application:

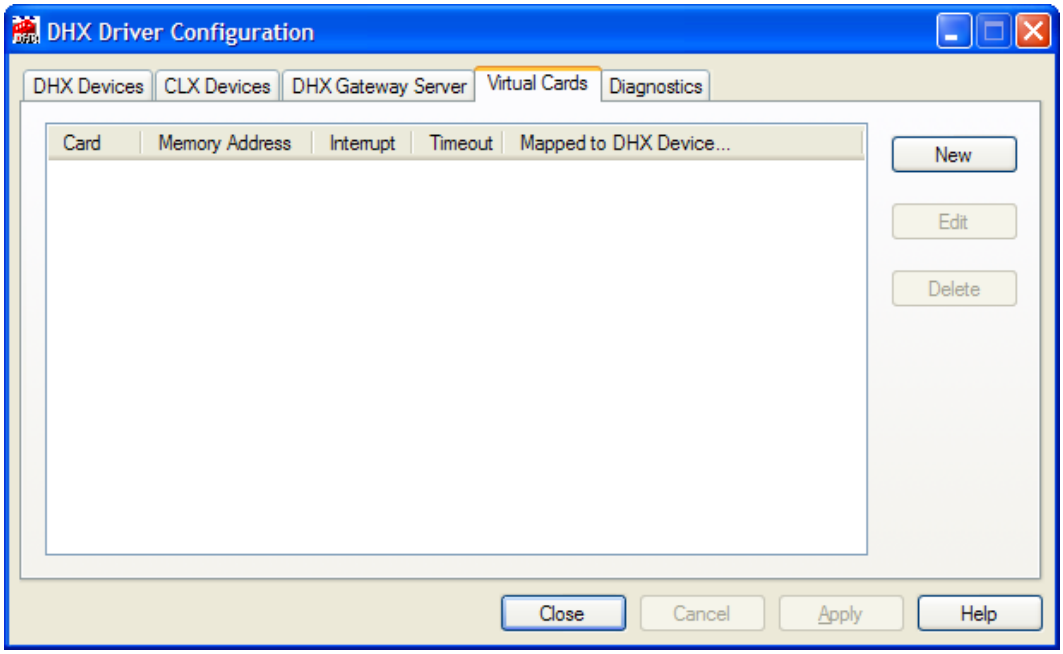
- Creating a Virtual Adapter Card
- Configuring Virtual Adapter Card Properties
- Backing Up Your Configuration
- Creating and Configuring Shortcuts
- Configuring Allen-Bradley DOS Programming Software

To begin, go to Creating a Virtual Adapter Card.

Creating a Virtual Adapter Card

For this demonstration, we will create a single virtual 1784-KT card that will be mapped to an Ethernet DHX device.

1. Open the Windows ***Start*** menu, go to ***Cyberlogic Suites***, then open the ***Configuration*** sub-menu, and then select ***Virtual DHX Driver***.

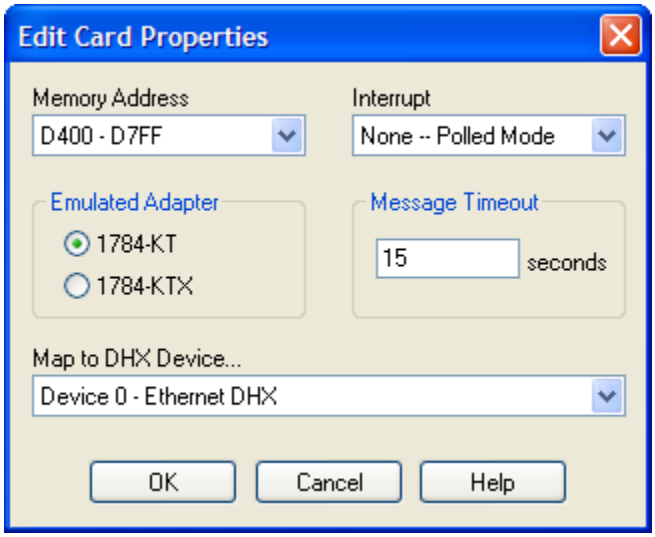


2. Select the ***Virtual Cards*** tab, then click the ***New*** button.

   The editor will create a new virtual card and open the card properties editor.

To continue, proceed to the Configuring Virtual Adapter Card Properties section.

Configuring Virtual Adapter Card Properties



1. For the Emulated Adapter selection, choose ***1784-KT***.
2. Use the ***Memory Address*** list to select the base address for the card.
3. Under ***Map to DHX Device...***, select the DHX device to be used by this virtual card.

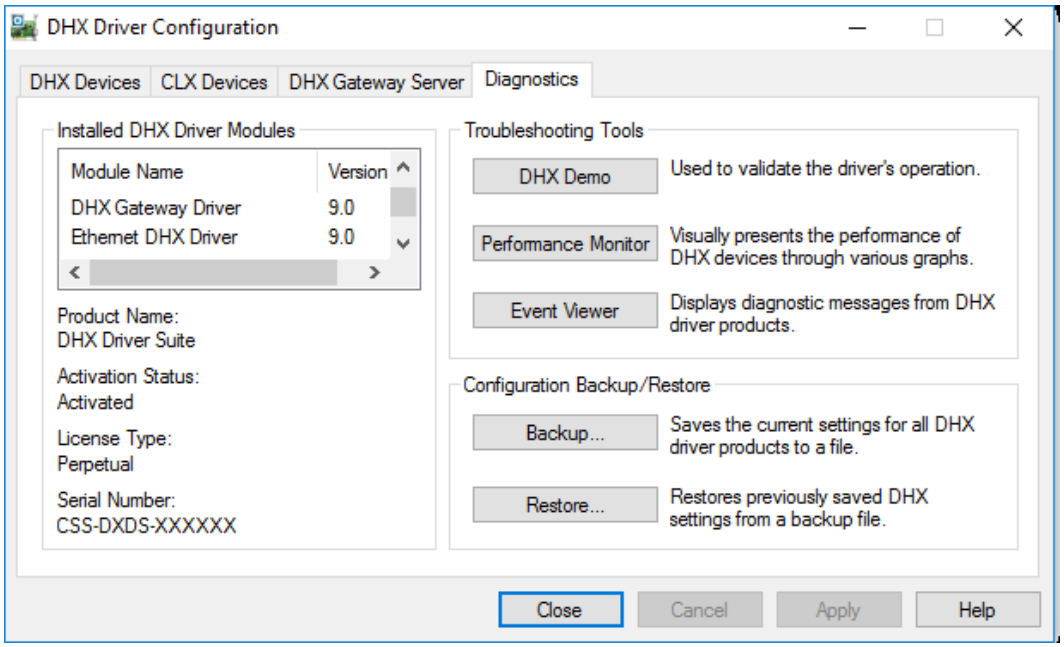
In this case, the Ethernet DHX device we wish to use is device 1. The actual choices you will see on the list will depend on the devices you have configured in your system.

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

The virtual card configuration is complete. To protect your work, go to the Backing Up Your Configuration section.

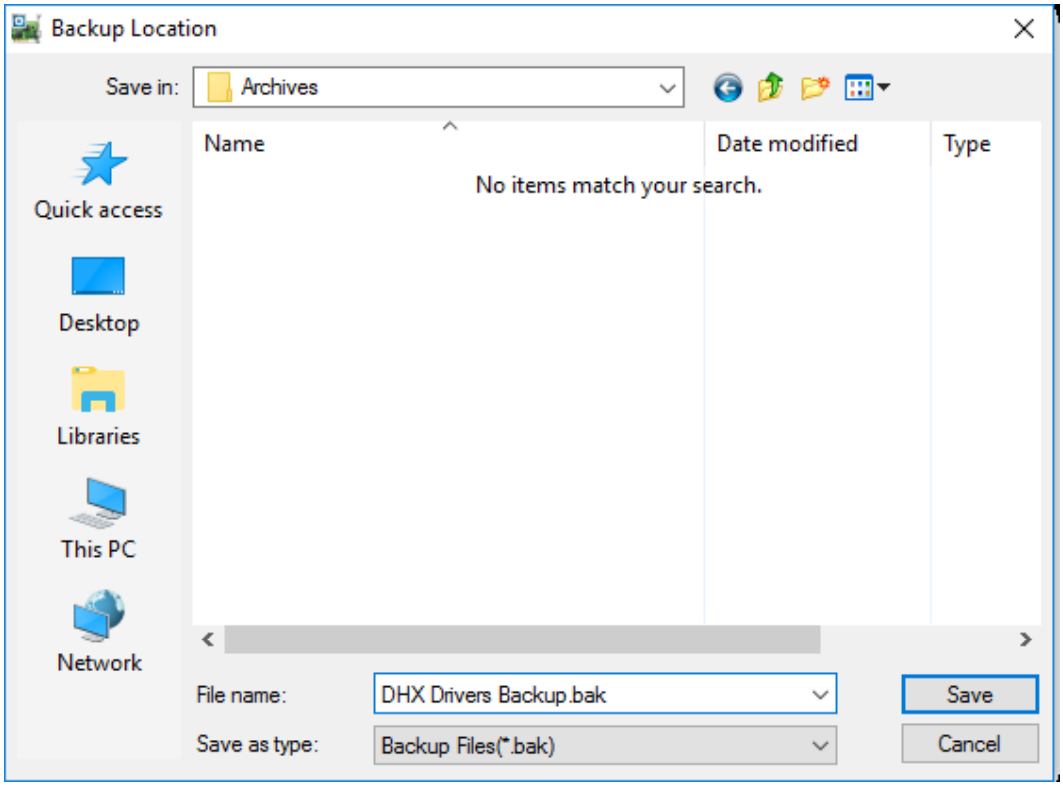
Backing Up Your Configuration

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.

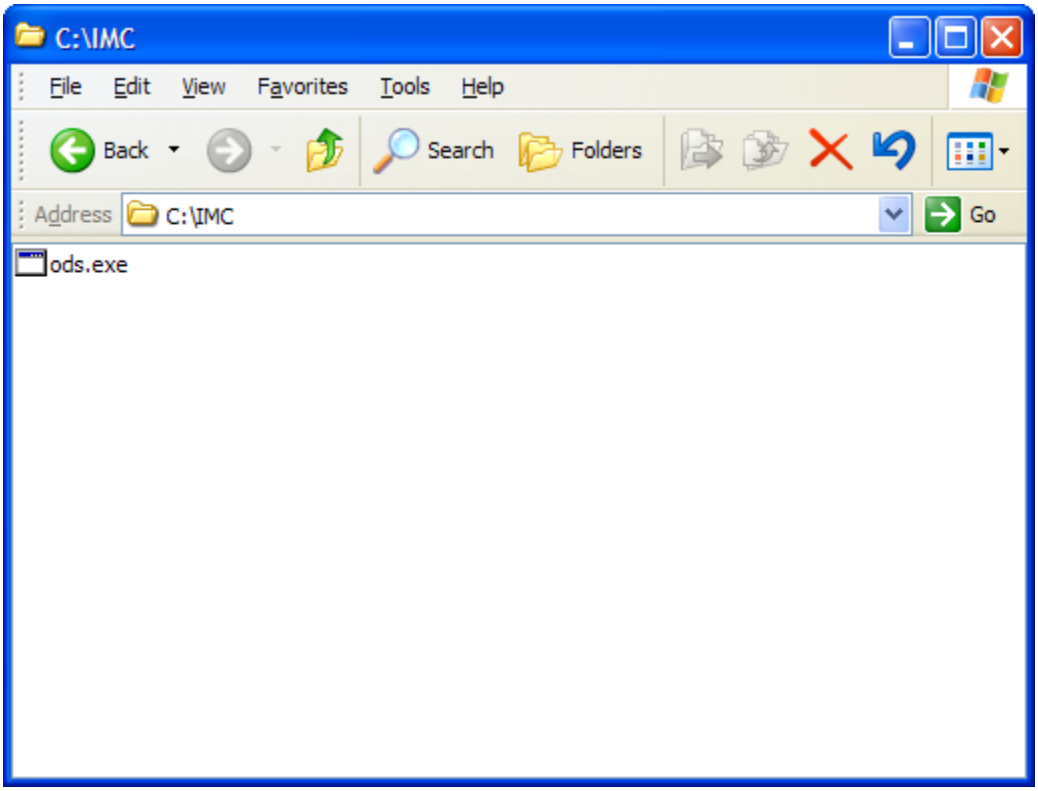
To create shortcuts for your DOS applications, continue with the Creating and Configuring Shortcuts section.

Creating and Configuring Shortcuts

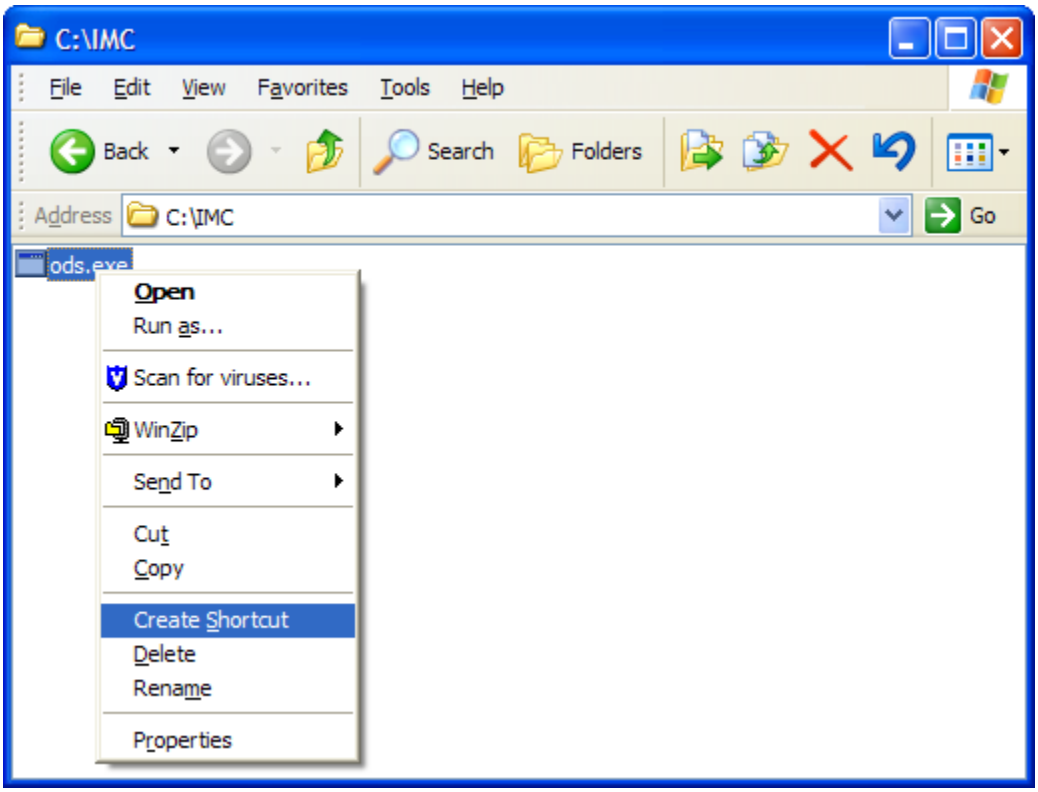
Although it is possible to run DOS applications from the command prompt, we recommend that you use shortcuts for all 16-bit DOS applications. This allows you to configure your application's Virtual DOS Machine by using private versions of the autoexec.nt and config.nt files.

This example shows how to create a shortcut to the Allen-Bradley ODS programming software. We will assume that the ods.exe program has been placed in its standard C:\IMC directory. The ODS software requires Interchange to operate, so we will use the autoexec.ods and config.ods files that are located in the C:\RSI\IC directory to start Interchange.

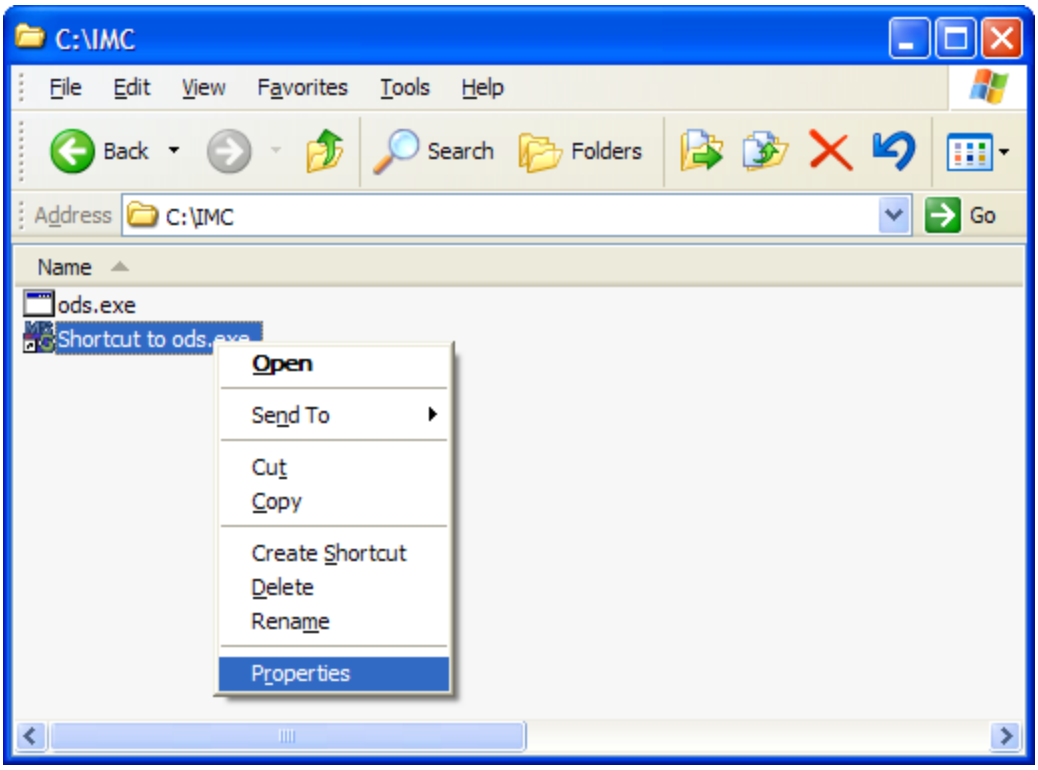
1. Start Windows ***Explorer***.



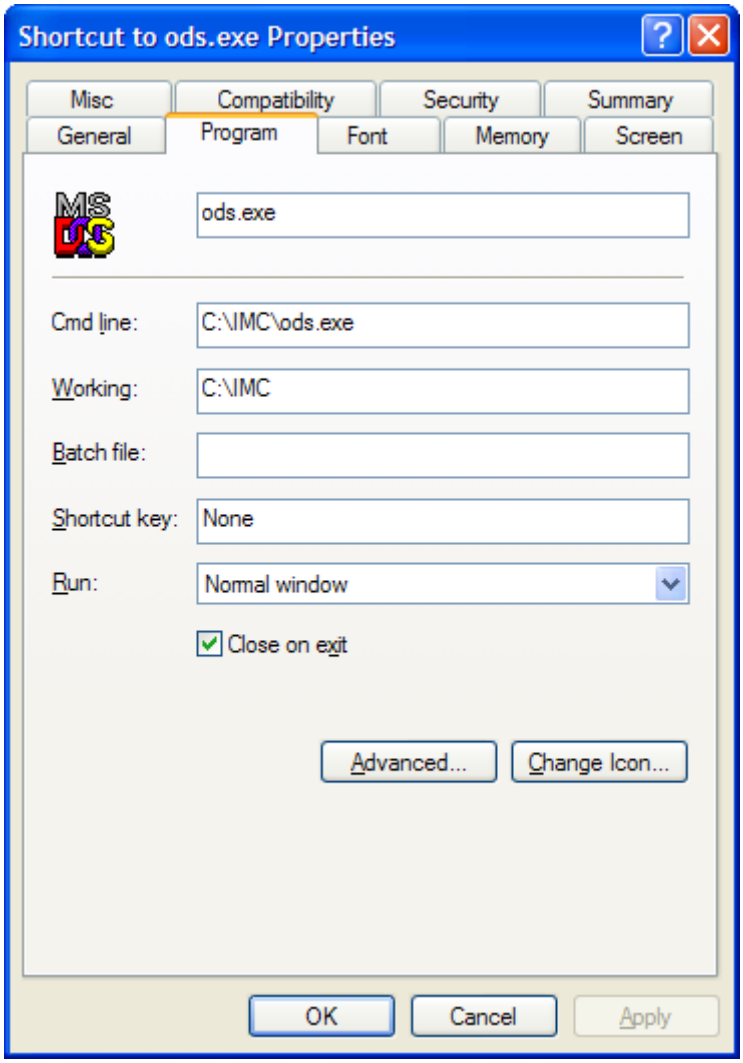
2. Browse to the ***C:\IMC*** directory and select ***ods.exe***.



3. Right-click on ***ods.exe*** and select ***Create Shortcut*** from the context menu.



4. Right-click on ***Shortcut to ods.exe***, and then select ***Properties*** from the menu.

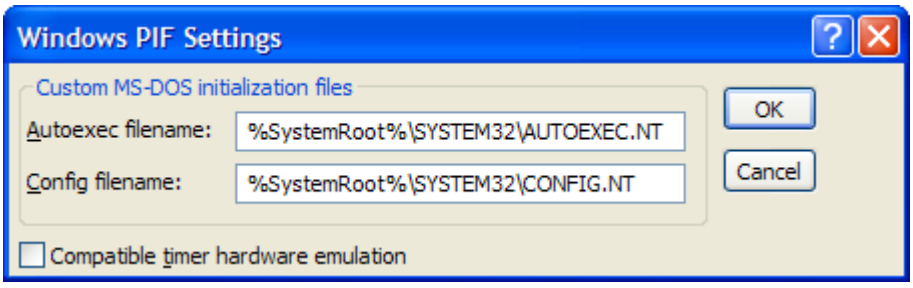


5. Select the ***Program*** tab.

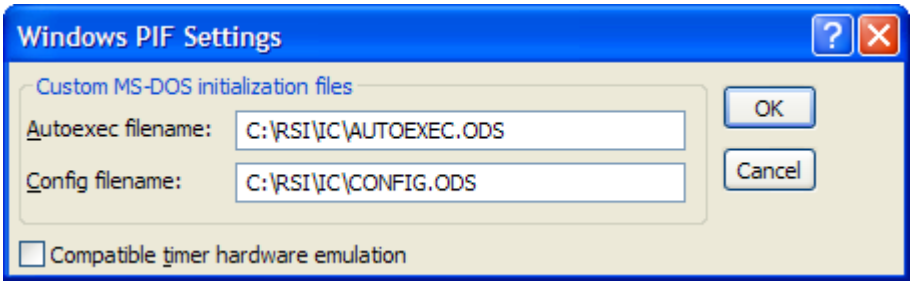
6. Some applications require command line switches. These must be added to the end of the ***Cmd line*** field.

   The ods.exe program used in this example does not require any switches to operate.

7. Click the ***Advanced...*** button.



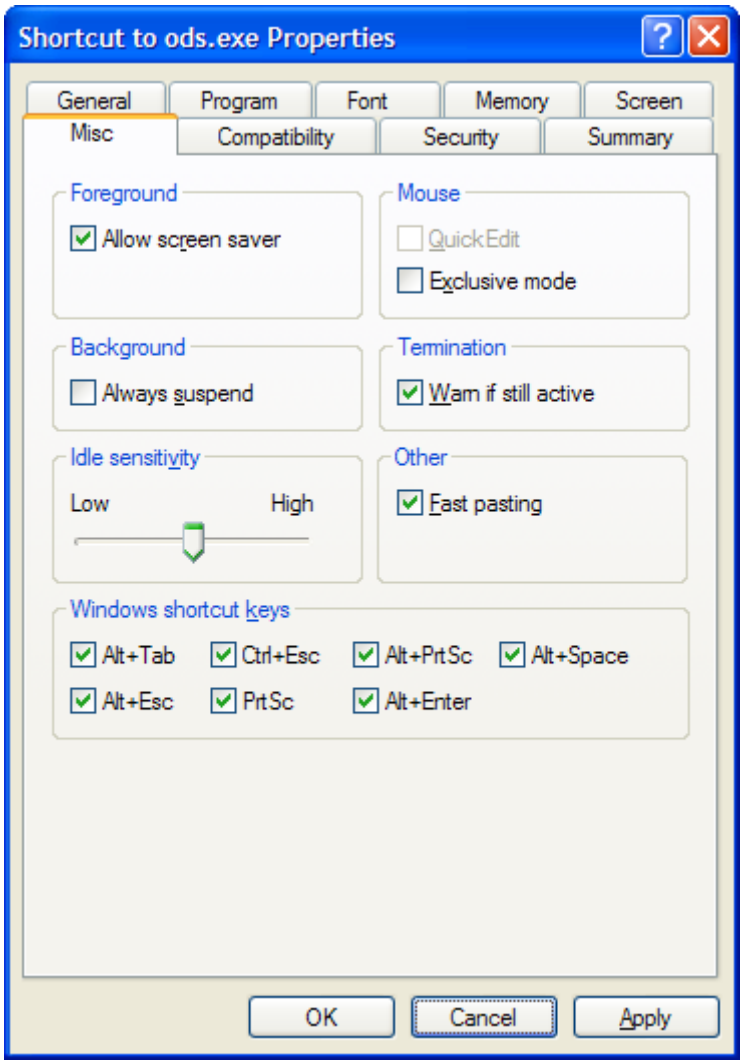
The above screen will appear. By default, Windows selects the autoexec.nt and config.nt files that are located in the system32 directory.



8. Enter ***C:\|RSI\|IC\|AUTOEXEC.ODS*** in the ***Autoexec filename*** field.

9. Enter ***C:\|RSI\|IC\|CONFIG.ODS*** in the ***Config filename*** field.

10. Click ***OK***.



11. Select the ***Misc*** tab.

12. Uncheck the ***Always suspend*** check box.

Caution!

When a new shortcut is created, the default configuration is to suspend the application when the focus is moved away from the application's window. If your application constantly communicates to multiple devices, you will want it to run continuously, even when the focus is moved away. To do this, you must uncheck the ***Always suspend*** check box.

13. Click ***OK*** to complete the shortcut configuration.

For additional information on configuring shortcuts for Allen-Bradley's 6200, AI5 and ODS software, continue with the Configuring Allen-Bradley DOS Programming Software section.

Configuring Allen-Bradley DOS Programming Software

The Virtual DHX Driver installation includes shortcuts for three common Allen-Bradley programming software products: 6200, AI5 and ODS. These shortcuts have been created using Allen-Bradley default directories and program names. Shortcut parameters may need to be modified depending upon your system. For example, the shortcuts assume that the software is installed in the default directories, but you may have installed the software in another directory.

In addition to creating the shortcuts, you must properly configure your application to match the configuration of the virtual adapter cards. The following examples show how to accomplish this for a few commonly-used DOS products:

- Allen-Bradley 6200 Programming Software
- Allen-Bradley AI5 Programming Software
- Allen-Bradley ODS Programming Software

Caution!

When viewing the Properties of a shortcut to a 16-bit DOS application, the name field under the Program tab will typically show unreadable text. After editing a shortcut, be sure to edit this field in order to have a readable name. This a Windows bug that may be fixed in future releases of the operating system.

Note

Some programming commands take long enough that the default mesage timeout of 15 seconds is insufficient. In this case, you will get communication timeouts or other unexpected behavior. If this happens, go to the Virtual Cards tab of the DHX Configuration Editor and increase the Timeout value.

Allen-Bradley 6200 Programming Software

The 6200 programming software must be setup in On Line Configuration to communicate with a 1784-KT at the same address that was configured in the Virtual DHX Driver. No IRQ interrupts are required.

Allen-Bradley AI5 Programming Software

The AI5 programming software must be setup in Configure Program Parameters -> Communication Hardware to communicate with a 1784-KT/KT2 at the same memory address that was configured in the Virtual DHX Driver. No IRQ interrupts are required.

Allen-Bradley ODS Programming Software

To communicate with Data Highway Plus, the ODS programming software requires Allen-Bradley Interchange for DOS. Interchange must be started from an autoexec.nt prior to starting ODS.

An example shortcut in the Virtual DHX Driver group uses autoexec.ods and config.ods located in the C:\RSI\IC directory to start Interchange. These files may need to be modified depending upon your system. The Interchange configuration file (cfg_kt.ini) must be modified to match the Virtual DHX driver configuration.

Interchange requires an interrupt IRQ to run. Interchange and the Virtual DHX driver must be configured to use the same interrupt IRQ value.

CONFIGURATION EDITOR REFERENCE

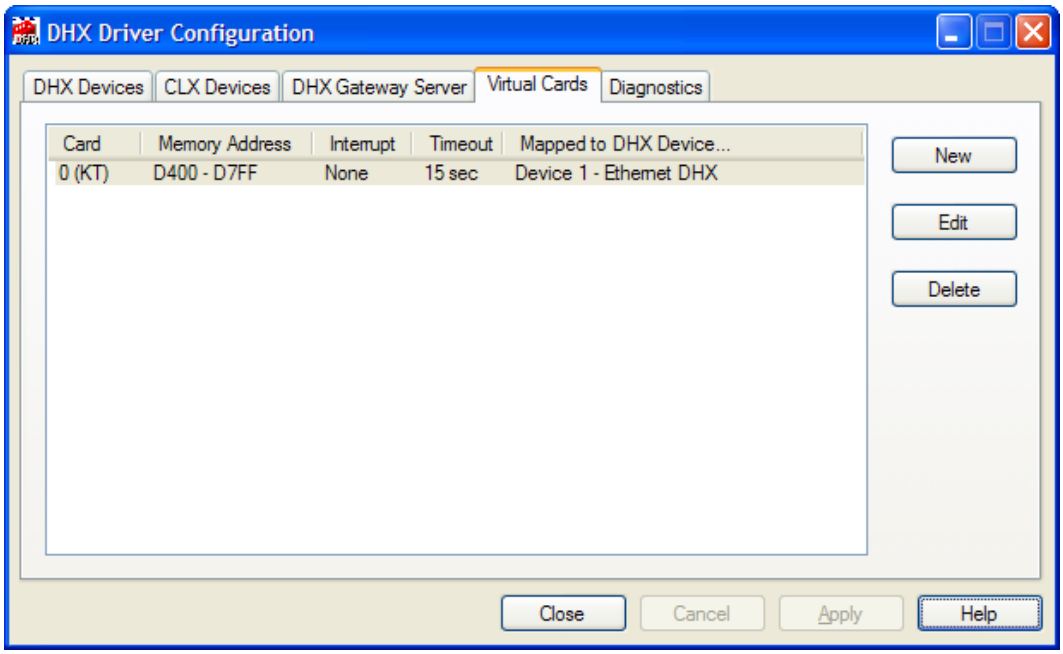
The DHX Driver Configuration editor is a common component of all DHX driver products. It consists of five property tabs. Most of these tabs are used when configuring DHX devices. Only two tabs are of interest when configuring the Virtual DHX Driver: the Virtual Cards Tab and the Diagnostics Tab.

This section provides a detailed description of both of these tabs. If you are a new user and want a procedure to guide you through a typical configuration session, refer to the Quick-Start Guide.

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 operate in polled mode.

Timeout

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

Mapped to DHX Device…

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

New

Click this button to create a new virtual card.

Edit

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

Delete

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

Creating a New Virtual Card

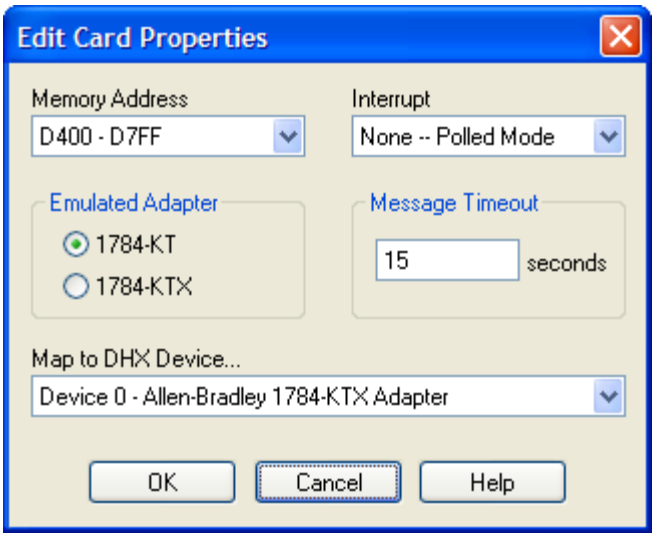
Click the ***New*** button or right-click inside the list window and select ***New*** from the context menu. The Edit Card Properties window will open to allow you to configure the new virtual card.

Deleting an Existing Virtual Card

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

Editing an Existing Virtual Card

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



Memory Address

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

Interrupt

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

Emulated Adapter

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

Message Timeout

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

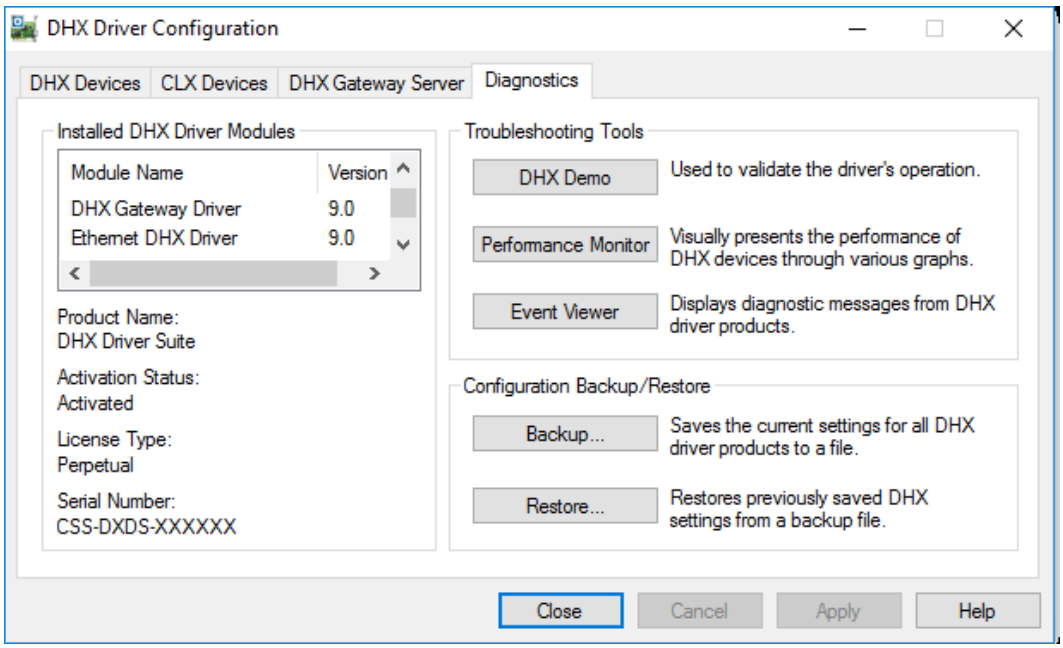
If you encounter communication timeouts, you should increase this value. For most applications, a 15-second timeout value is adequate.

Mapped to DHX Device…

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

Diagnostics Tab

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



Installed DHX Driver Products

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

Product Package

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

Activation Status

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

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

License Type

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

Serial Number

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

Troubleshooting Tools

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

For details on how to use these tools, refer to the Validation & Troubleshooting section.

DHX Demo

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

Performance Monitor

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

Event Viewer

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

Configuration Backup/Restore

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

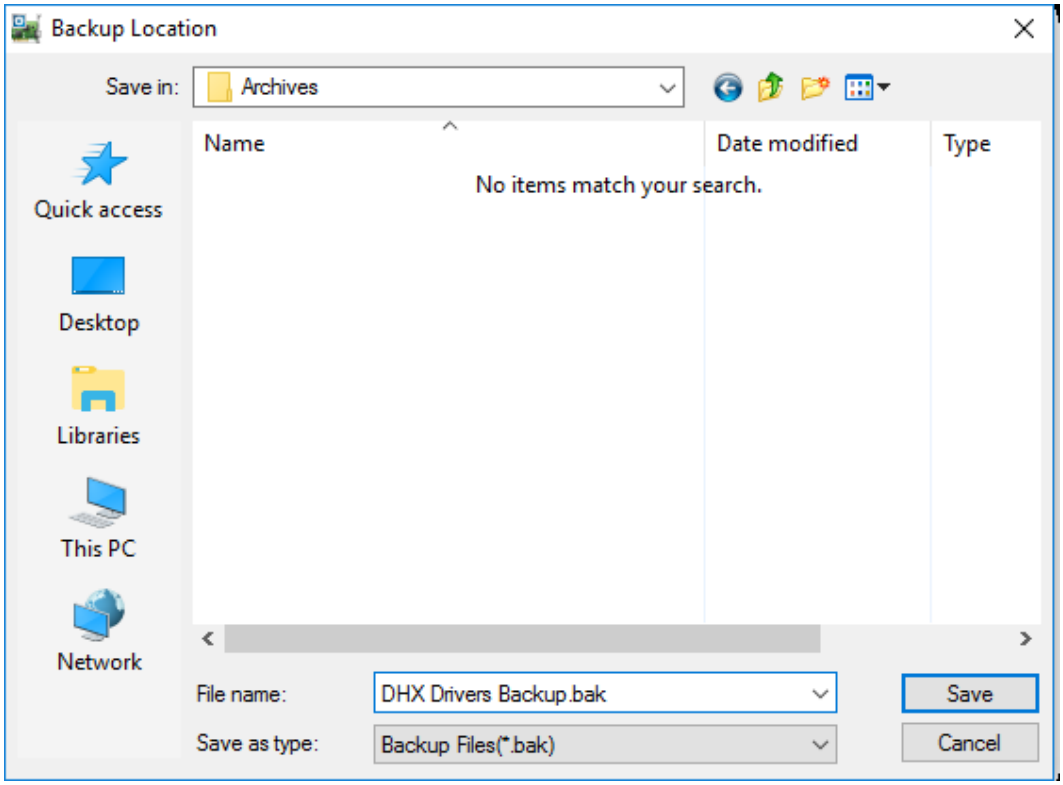
Note

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.



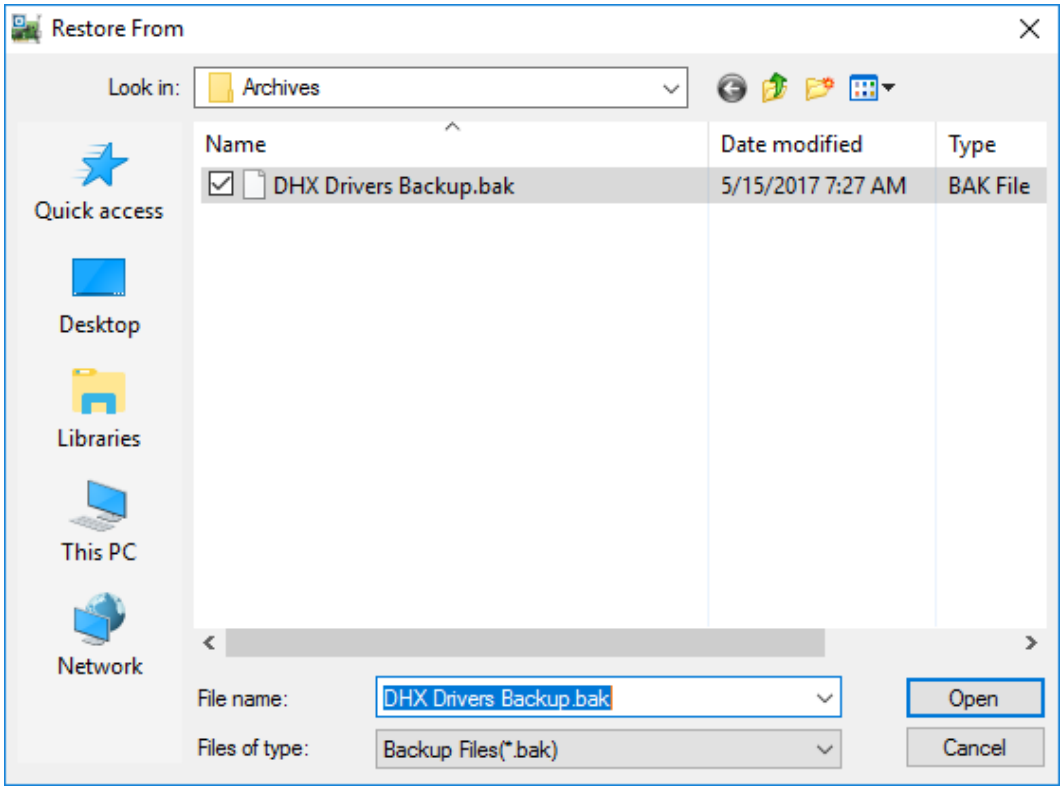
2. Browse for the backup directory. By default, the last-used directory will be selected.

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

The utility accepts the following command line switches:

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

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

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

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

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

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

VALIDATION & TROUBLESHOOTING

The Virtual DHX Driver Setup program installs example shortcuts to Allen-Bradley's 6200, AI5 and ODS programs. These examples have been created using Allen-Bradley default directories and program names. Icons and shortcut parameters may need to be modified, depending upon your system.

If you plan to use one of these programs, use the example shortcuts to verify that the Virtual DHX Driver works. Be sure that a 32-bit driver, such as the DHX Driver, DHX Gateway Driver or Ethernet DHX Driver, is already installed and properly configured.

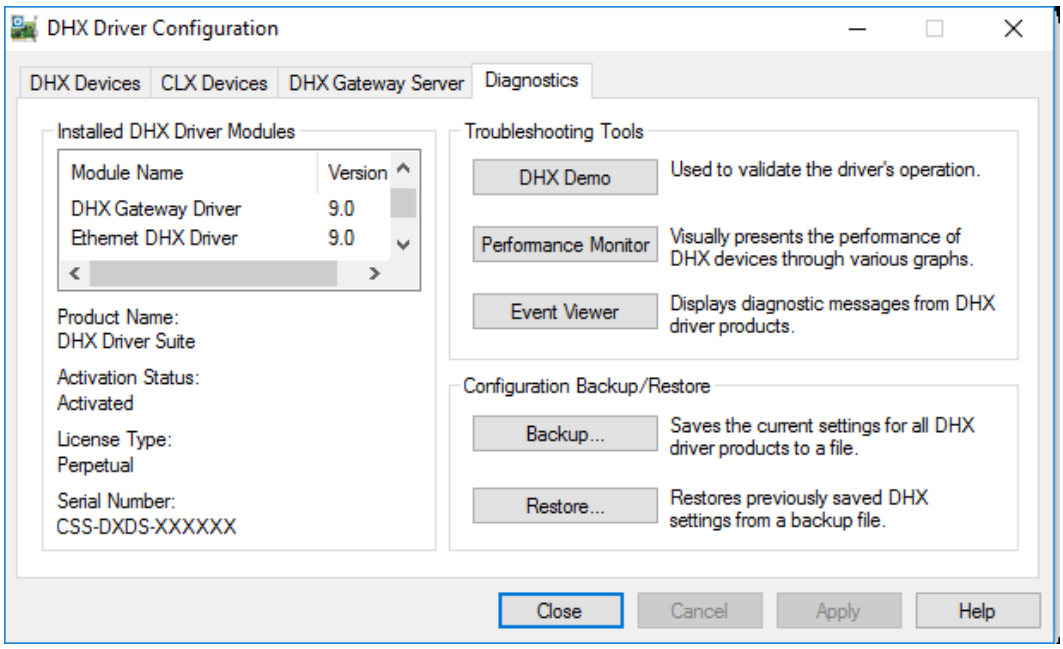
The following sections describe how the DHX Demo and Performance Monitor are used to verify that the DHX devices are configured correctly.

The troubleshooting tools provided with the Virtual DHX Driver include Event Viewer support. There is also a list of Virtual DHX Driver Messages and a Frequently Asked Questions section.

DHX Demo

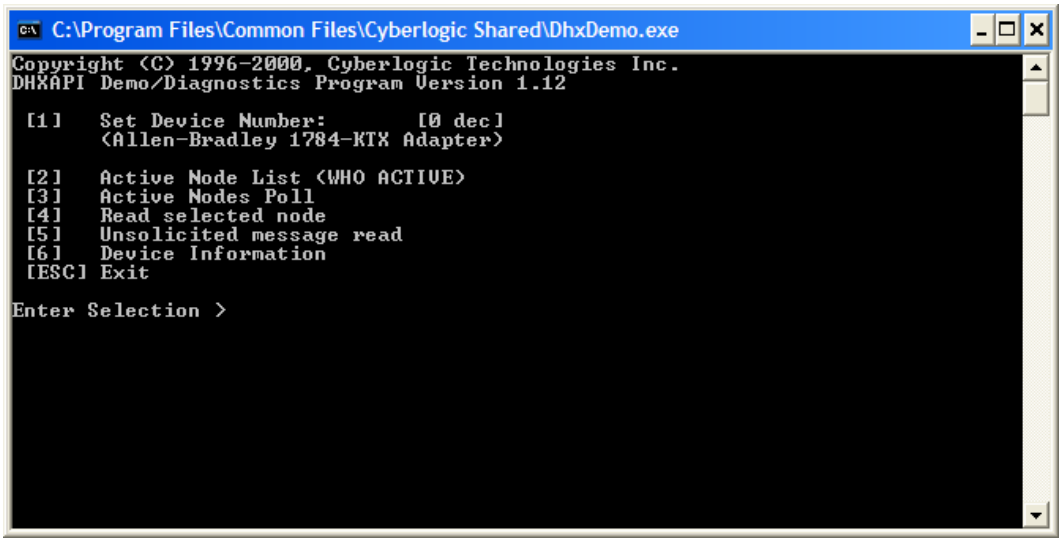
The DHX Demo program can be used to test all configured DHX devices in a system for proper operation. To run the program, open the Windows ***Start*** menu and go to ***Cyberlogic Suites***, then open the ***Diagnostics*** sub-menu and select ***DHX Demo***.

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



Main Menu

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



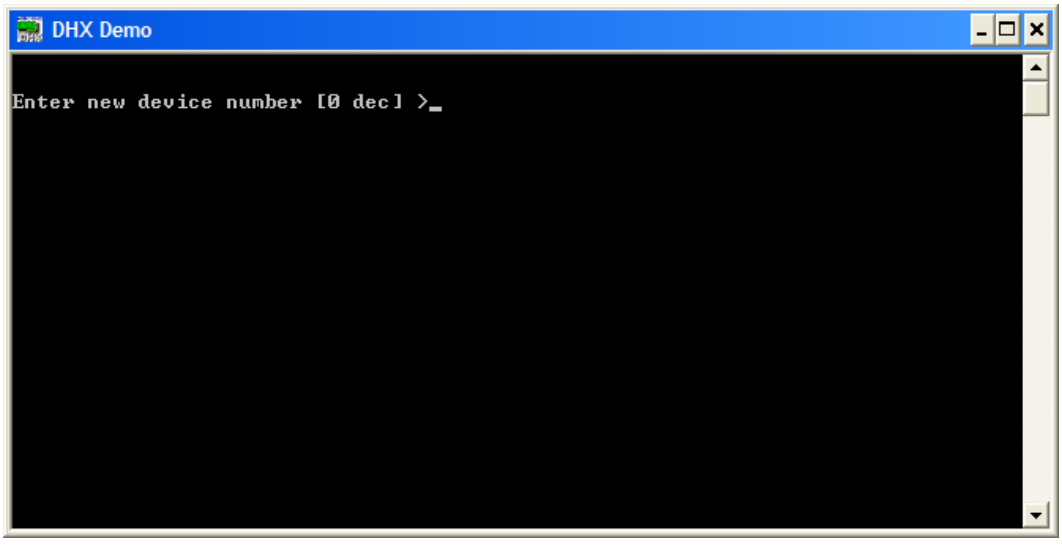
The simple command-line interface displays menu choices that take the user to secondary level screens.

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

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

[1] Set Device Number

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

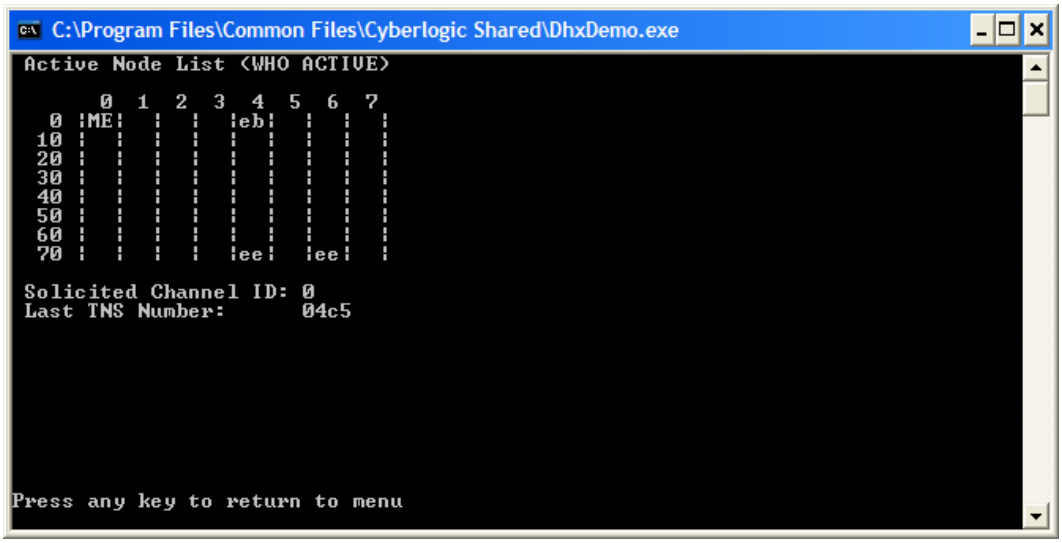


At the prompt, enter the desired device number and press the ***Enter*** key to change the selected device and return to the main menu.

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

[2] Active Node List (WHO ACTIVE)

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

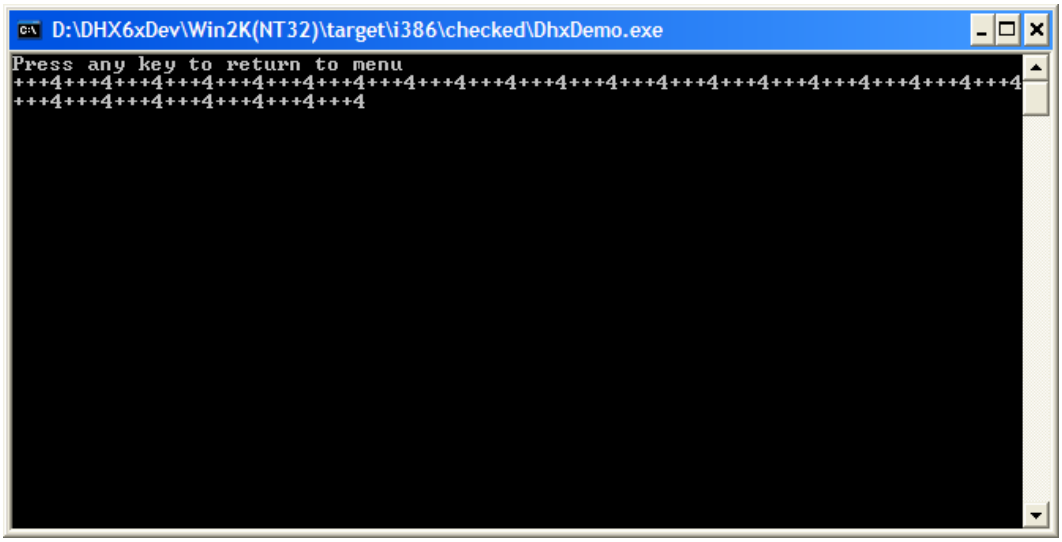


In the Active Node List grid, ME designates the node you are working from, and the identifier codes are shown for other nodes found on the network.

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.



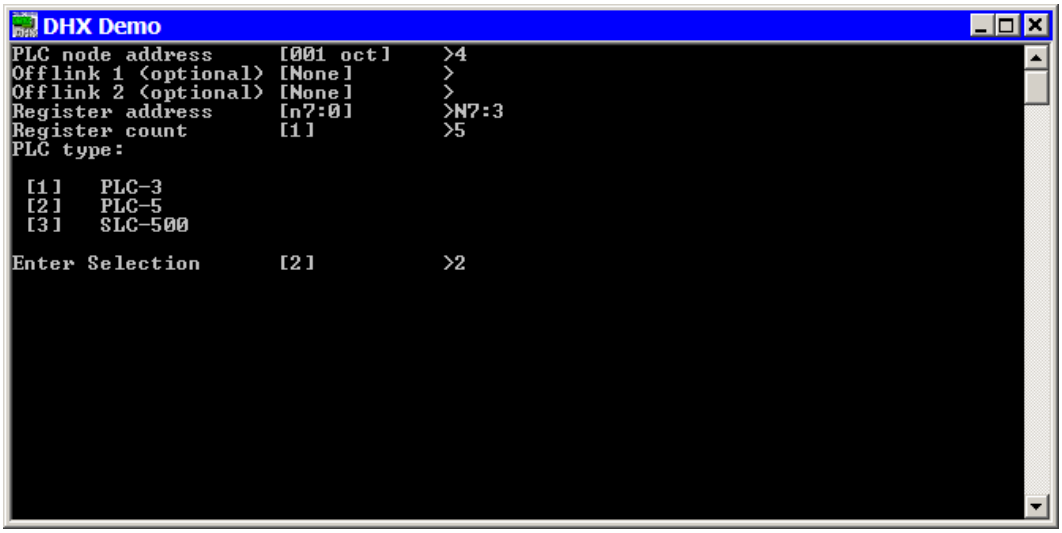
The software will continuously send diagnostic status commands to each of the other nodes on the network. If they respond properly, the software displays "+", otherwise it displays "?". After polling each node, the software displays the total number of active nodes, including the local node.

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.

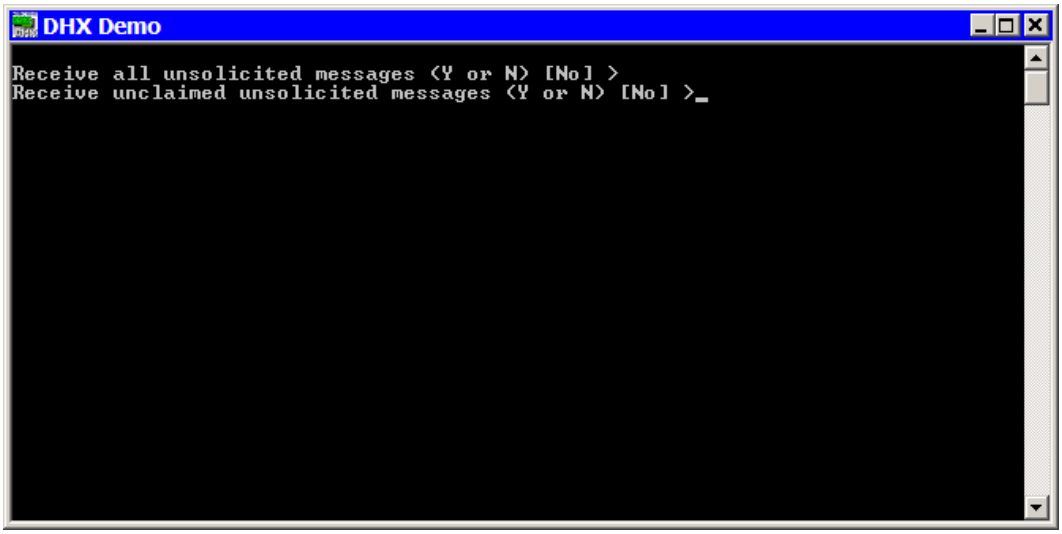
Press ***Enter*** to initiate the read. The requested data will be displayed on the screen. Press ***Esc*** to return to the main menu.

[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



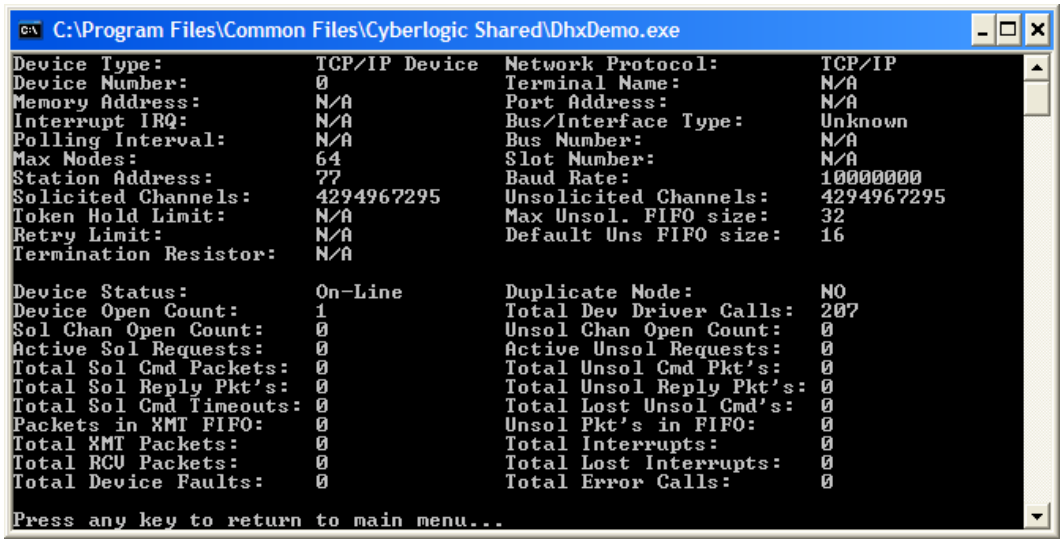
To receive all unsolicited messages, answer ***Y*** for the first question. The software will immediately begin receiving messages.

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.



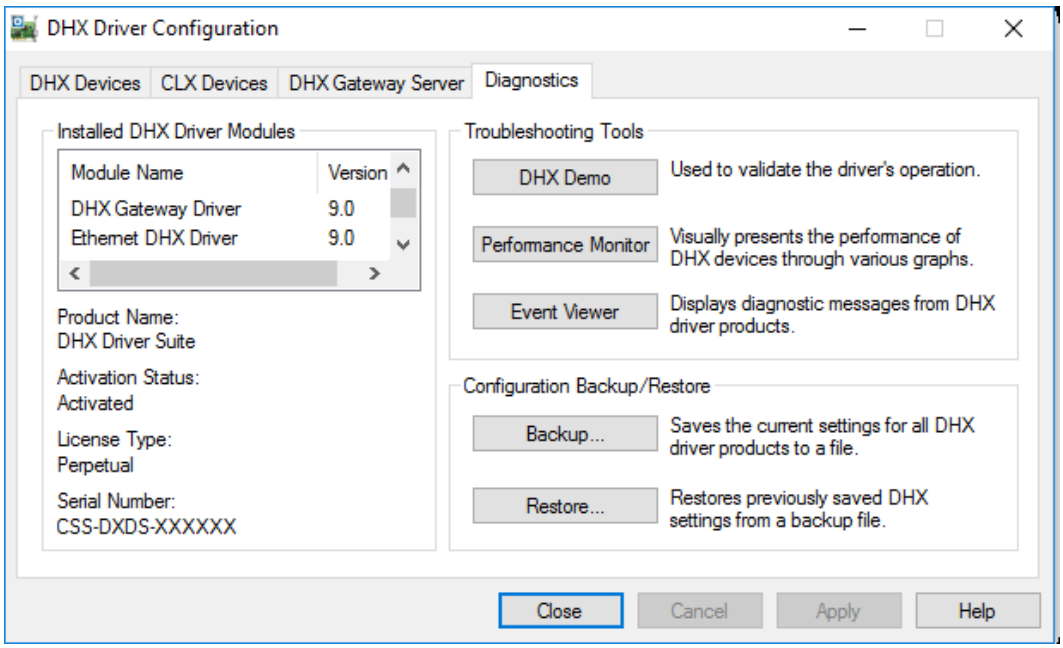
This screen shows configuration, statistical and diagnostic information about the driver, the device and the network.

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.

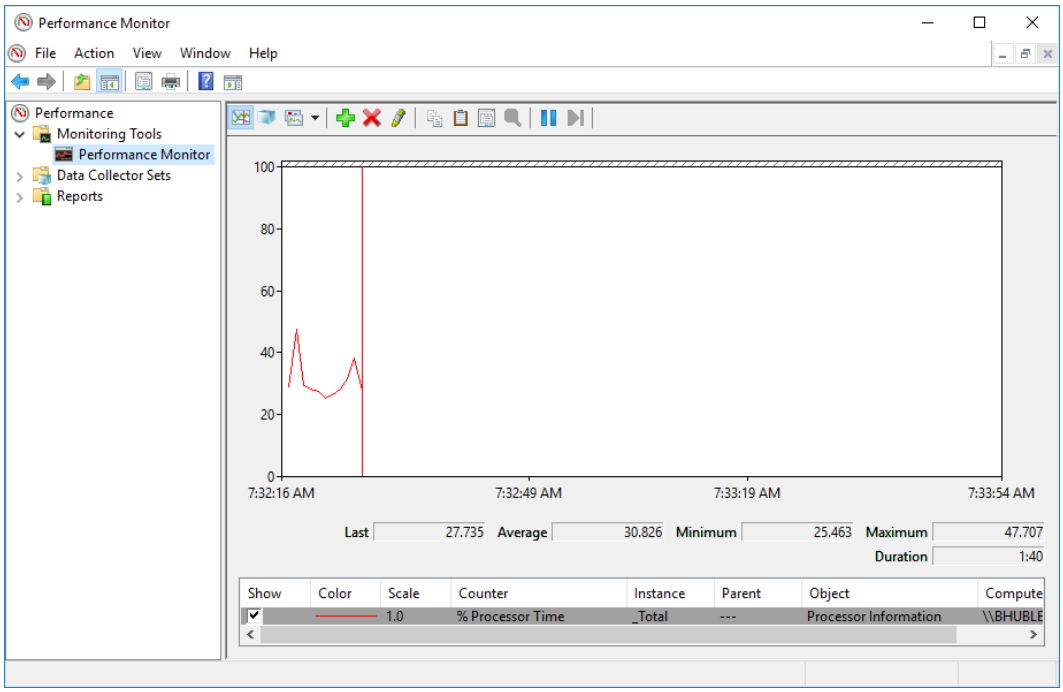
To run the program, open the Windows ***Start*** menu and go to ***Cyberlogic Suites***, then open the ***Diagnostics*** sub-menu and select ***Performance Monitor***.



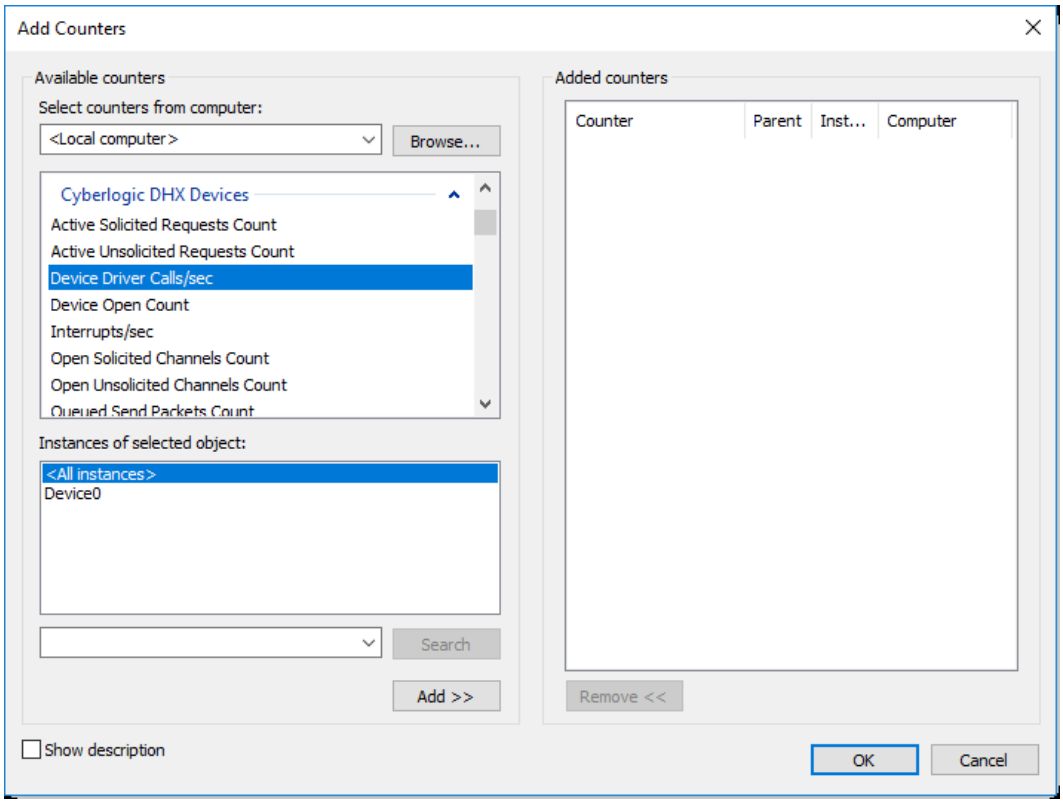
Alternatively, go to the Diagnostics tab of the DHX Driver Configuration Editor and click the ***Performance Monitor*** button.

How to Use the Performance Monitor

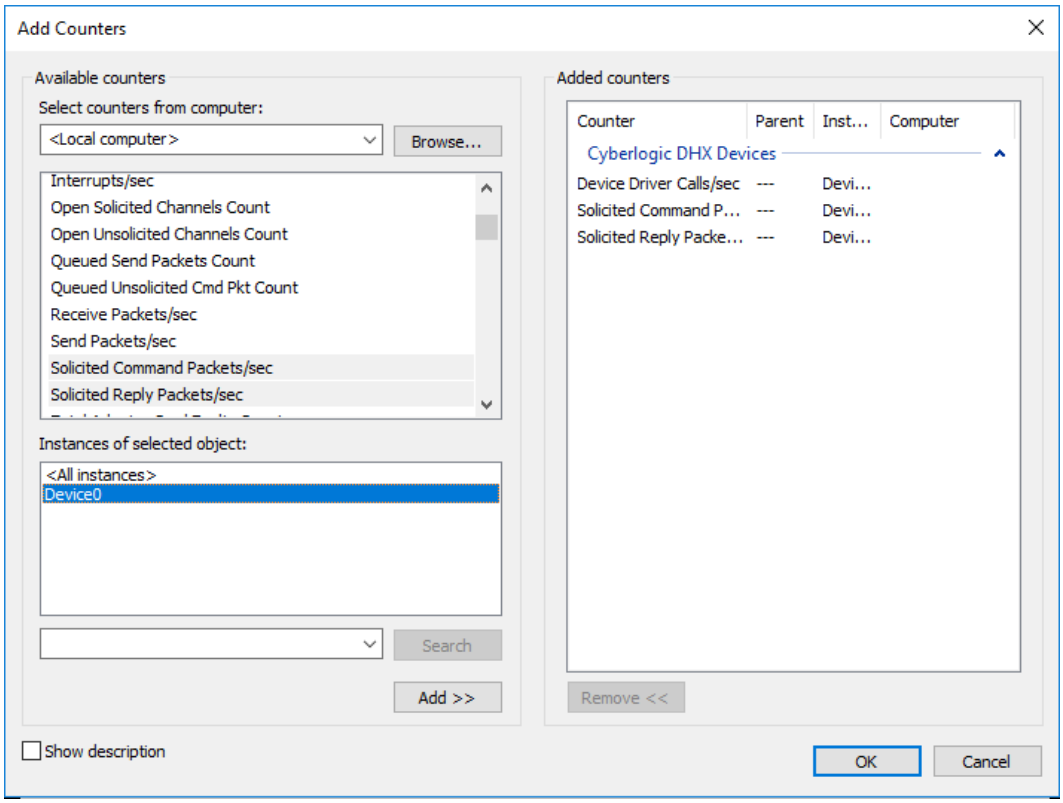
Since extensive help is provided for this program by Microsoft, only a few points relevant to the DHX family drivers are shown here.



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

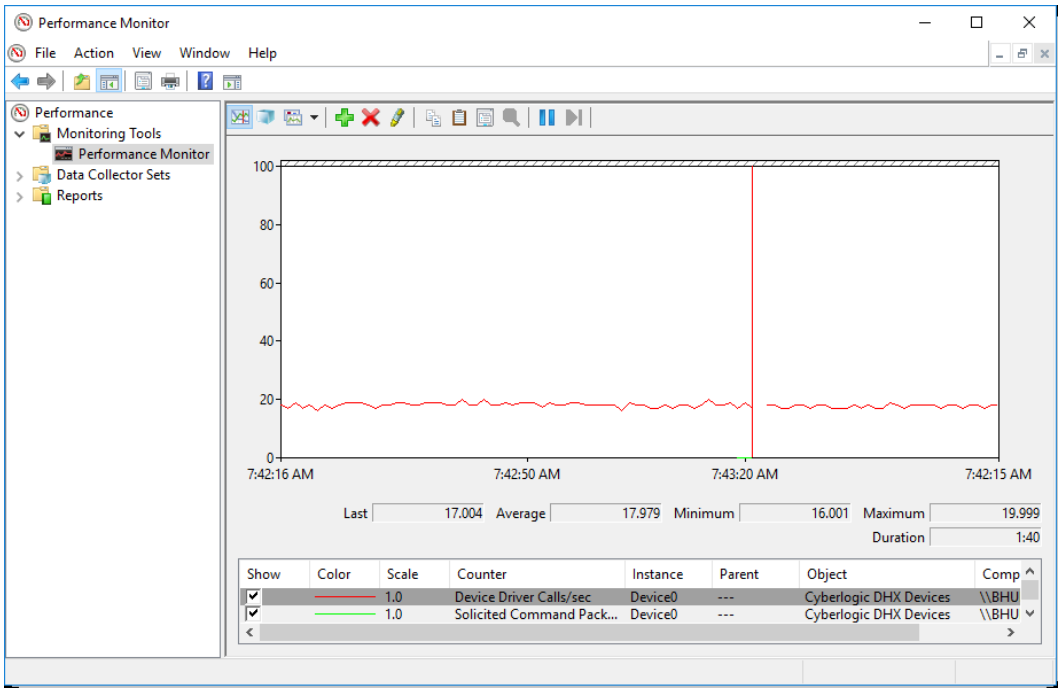


2. Select ***Cyberlogic DHX Devices*** from the ***Available counters*** list.



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

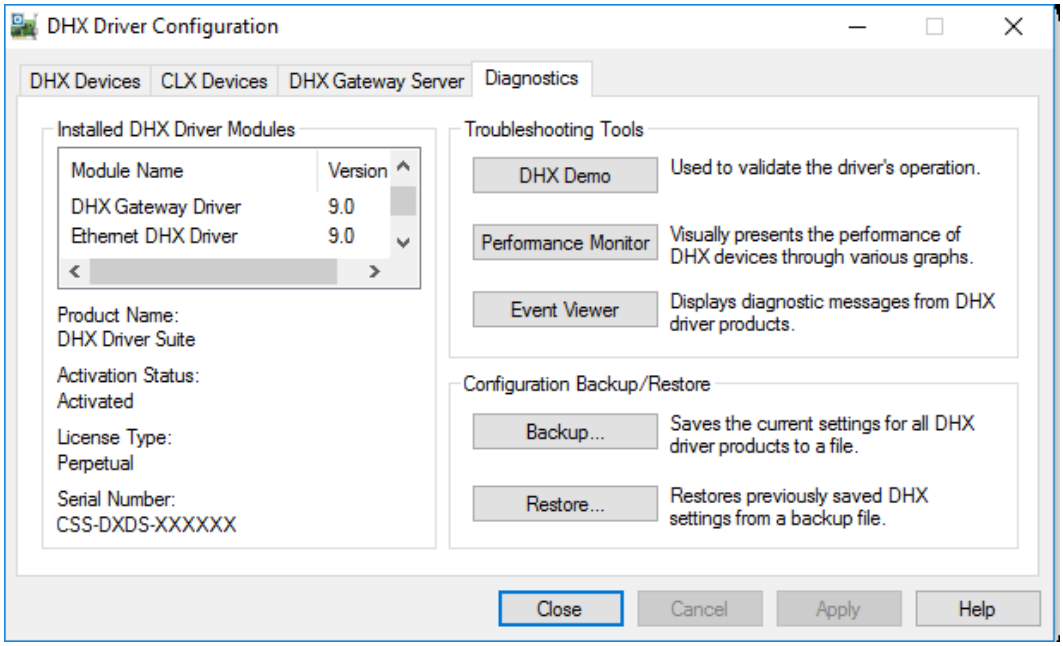
4. Click ***Close***. The counters you chose will then be displayed in graphical format.



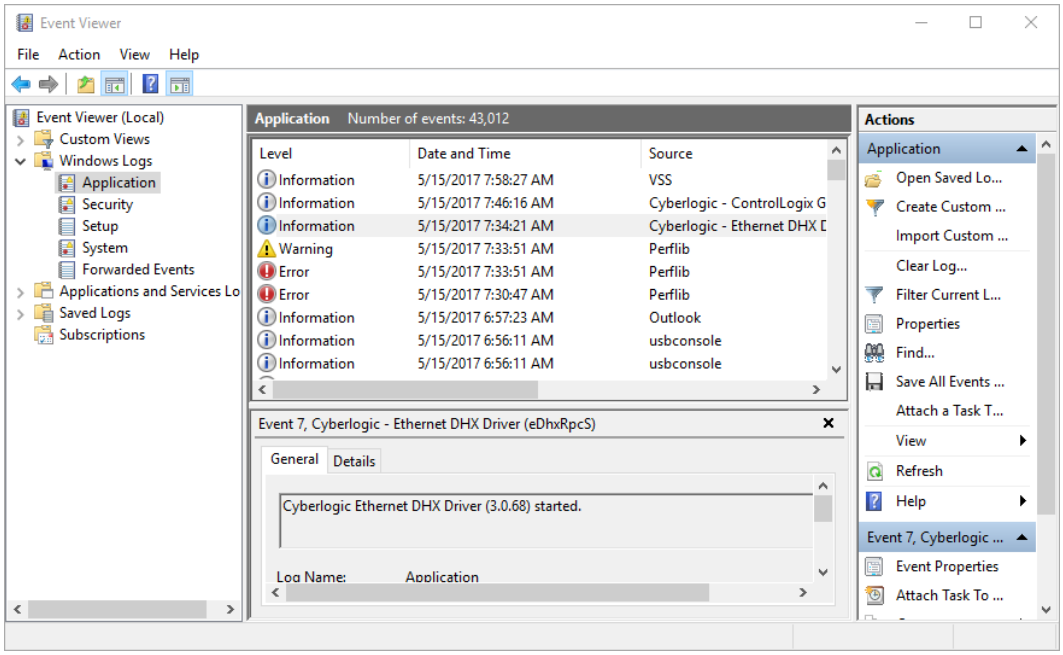
Event Viewer

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 go to ***Cyberlogic Suites***, then open the ***Diagnostics*** sub-menu and select ***Event Viewer***.



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



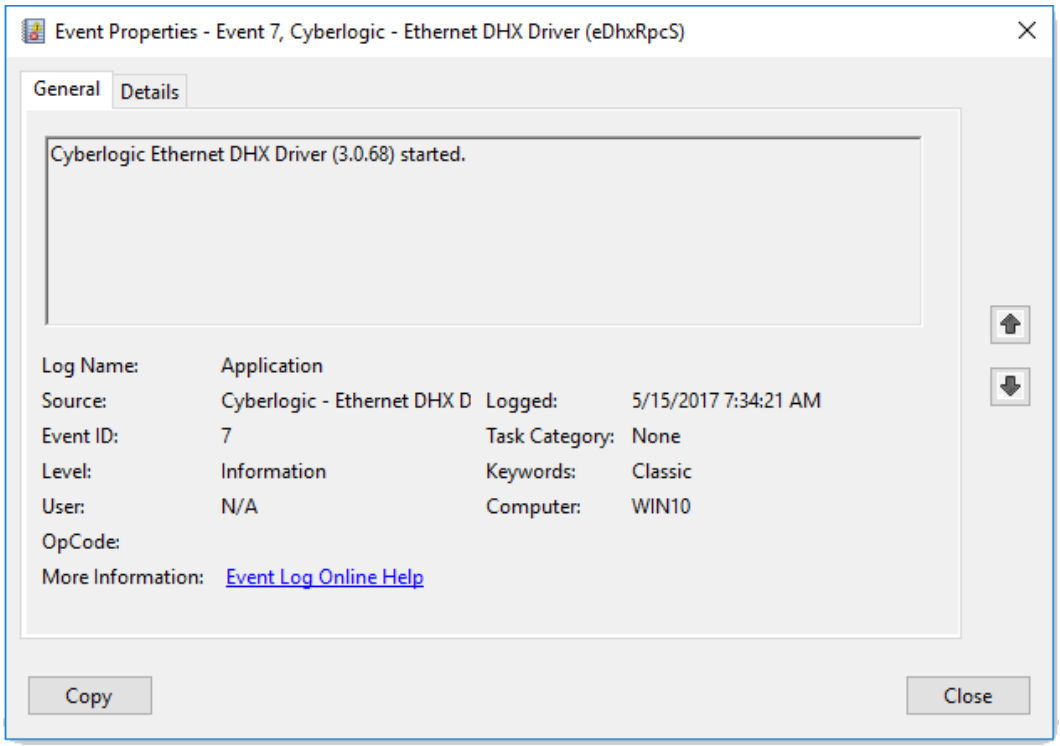
2. If you are looking for entries relating to the DHX Driver, select ***Windows Logs|System*** from the Event Viewer tree, and look for entries in the ***Source*** column named ***CLDHX*** or ***CLDhxPnP***.

   For all other DHX drivers, such as the Virtual DHX Driver, select the ***WIndows Logs|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 Virtual DHX Driver Messages section.

Virtual DHX Driver Messages

No configuration data found in registry. At least one virtual 1784-KT/KTX card should be configured for the Virtual DHX Driver to operate.

The Virtual DHX Driver has not been configured yet. To operate the Virtual DHX Driver, configure at least one virtual card. Refer to the Quick-Start Guide.

Registration verification failed. Reinstall the product.

The registration information could not be accessed. The registration information is gathered and stored during the installation process. Reinstall the product.

Invalid memory address for 1784-KT/KTX card (value returned in data).

Reconfigure the virtual adapter card. Refer to the Virtual Cards Tab section.

Invalid InterruptIRQ value in registry (value returned in data). Defaults to no interrupts.

Reconfigure the virtual adapter card. Refer to the Virtual Cards Tab section.

Invalid MappedDeviceNumber value in registry (value returned in data). Defaults to 0.

Reconfigure the virtual adapter card. Refer to the Virtual Cards Tab section.

Invalid EmulatedAdapter value in registry (value returned in data). Defaults to 0 (1784-KT).

Reconfigure the virtual adapter card. Refer to the Virtual Cards Tab section.

Invalid MsgTimeout value in registry (value returned in data). Defaults to 15 seconds.

Reconfigure the virtual adapter card. Refer to the Virtual Cards Tab section.

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

This is a <hours>-hour promotional copy of the Virtual DHX Driver. The driver started at <start time> and 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 Virtual DHX Driver. The allowed operation time has expired. The driver has 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.

Frequently Asked Questions

Can I run multiple 16-bit DOS/Windows programs at the same time?

Yes, you can. Continue reading the following questions for more information on this topic.

Can I run multiple 16-bit DOS programs that use the same virtual card?

Yes. Each DOS program will get its own, independent instance of the Virtual DHX environment. Refer to the Virtual DOS Machine for 16-Bit Applications section.

Can I run multiple 16-bit Windows programs that use the same virtual card?

No, you cannot. Each Windows program must use a different virtual device. However, multiple virtual cards can be created and mapped to the same DHX device. Refer to the Virtual DOS Machine for 16-Bit Applications section.

Do I need to configure an Interrupt IRQ number?

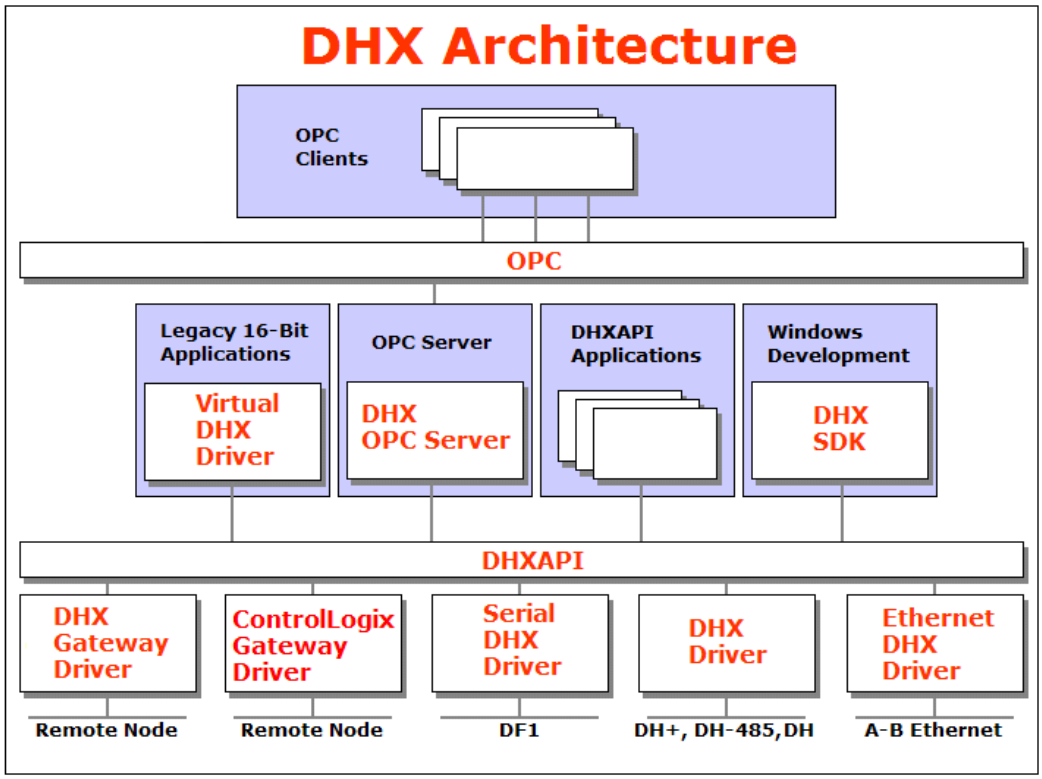
DOS-based Interchange applications require an interrupt.

If you do not plan to run any DOS-based Interchange applications, you probably do not need to configure an interrupt. If you are not sure, configure an interrupt. No harm is done to configure an interrupt that is not needed.

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 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 nearly 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.