NS-Link

Device Driver User Guide

Windows 10
Windows Server 2016
Windows 8/8.1
Windows Server 2012R2
Windows 7

COMTROL®

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Table of Contents

Overview

This section discusses the following topics:

When to Use the DeviceMaster NS-Link Device Driver

Install the DeviceMaster NS-Link device driver to use DeviceMaster serial ports as native COM ports and to set up secure COM ports. If you install the device driver, you can also configure the ports for socket mode or serial tunneling. See *NS-Link Device Driver Configuration Considerations* on Page 29 for detailed information about the NS-Link device driver.

Comtrol Drivers Management Console

This *User Guide* discusses how to install and configure Comtrol device drivers using the *Installation Setup Wizard* and the *Comtrol Drivers Management Console* for the NS-Link device driver.

The *Comtrol Drivers Management Console* is accessible through the Windows *Control Panel* using a dedicated shortcut created during the initial device driver installation process. The *Comtrol Drivers Management Console* allows you to browse all installed and supported Comtrol products in one place and apply any changes quickly.

Note: *This User Guide discusses the DeviceMaster, see the RocketPort EXPRESS / INFINITY User Guide for Windows for adapter specific information.*

You can refer to *Using the Comtrol Drivers Management Console* on Page 31 for general information about the *Comtrol Drivers Management Console*.

Supported Operating Systems

The *Comtrol Drivers Management Console* supports the following operating systems:

- Windows 10, Windows 8.1, Windows 8, and Windows 7
- Windows Server 2016 and Windows Server 2012R2

Note: *You can refer to downloads.comtrol.com for older operating system support.*

Products Supported

These are the products supported by the *Comtrol Drivers Management Console*:

- DeviceMaster LT
- DeviceMaster DM-models, DeviceMaster PRO, DeviceMaster RTS, and DeviceMaster Serial Hub
- RocketPort EXPRESS
- RocketPort EXPRESS SMPTE
- RocketPort INFINITY

Conventions

In the remainder of this *User Guide*, the products are referred to accordingly:

- **Comtrol device** unless there is model-specific information
- **DeviceMaster** means all DeviceMaster models listed in the previous subsection, unless there is model specific information
- **RocketPort** means any RocketPort model
- **RocketPort EXPRESS/INFINITY** means RocketPort EXPRESS, RocketPort EXPRESS SMPTE, and RocketPort INFINITY

The paths in this Guide to locate DeviceMaster software and documentation point to the DeviceMaster RTS paths on the ftp site. All supported DeviceMasters (*Products Supported*) models use the same software and documentation.

PortVision DX Overview

PortVision DX automatically detects Comtrol Ethernet attached products physically attached to the local network segment so that you can configure the network address, upload firmware, and manage the following products:

- DeviceMaster family, including:
  - DeviceMaster LT
  - DeviceMaster DM-models, DeviceMaster PRO, DeviceMaster RTS, and DeviceMaster Serial Hub
  - DeviceMaster UP
- IO-Link Master
- RocketLinx

PortVision DX may require that you have the latest Microsoft Service pack for your operating system.

In addition to identifying Comtrol Ethernet attached products, you can use PortVision DX to display any third-party switch and hardware that may be connected directly to those devices. All non-Comtrol products and unmanaged RocketLinx devices are treated as non-intelligent devices and have limited feature support. For example, you cannot configure or update firmware on a third-party switch.

Downloading the Latest Software and User Guides

You can use the following table to locate the latest version of the software and documentation.

Software		Description	Document
Configuration Application	PortVision DX	Install on a Windows host to program the IP address and manage your DeviceMaster. Refer to on Page 7 for more information.	*DeviceMaster Installation and Configuration Guide*
Firmware	Bootloader	Bootloader is the operating system that runs on the DeviceMaster hardware during the power on phase, which then loads NS-Link/ SocketServer. Update the Bootloader on your DeviceMaster, if advised by Technical Support.	
	SocketServer	SocketServer is the name of the TCP/IP socket web page that is integrated in the firmware that comes pre-installed on your DeviceMaster. ***Note:*** *Make sure you upload the latest version of SocketServer before configuring the device driver.*	
Device Driver	Windows 7/8/8.1 Windows Server 2016	Install if you want COM ports (native or secure).	*(This Guide)*

Before Installing the Comtrol Drivers Management Console

This section provides an overview for the procedures that you may need to perform before installing the *Comtrol Drivers Management Console* for the device driver.

This section contains the following discussions:

Initial Installation Overview

If you have already performed the following procedures, you can skip to the next section, *NS-Link Device Driver Installation* on Page 17.

You may also refer to the *DeviceMaster Installation and Configuration Guide*, which provides detailed information about the following procedures:

1. Install the hardware (below).
2. Install PortVision DX (below).
3. *Program* the network information using PortVision DX (Page 11).
4. *Check* the SocketServer version and determine whether you need to download an updated version (Page 14).
5. If necessary, *upload* the latest version of SocketServer (Page 15).

Install the Hardware

If you have not done so, install the DeviceMaster:

1. Connect an Ethernet cable between the DeviceMaster and a host PC NIC or to the same Ethernet network segment using a standard Ethernet cable. Refer to *Connectivity Requirements* on Page 68 for cabling information.
2. Connect the power supply or cable to the DeviceMaster and apply power.
3. Check the DeviceMaster LEDs to verify that it is ready. Refer to *DeviceMaster LEDs* on Page 70 to determine the LED status.

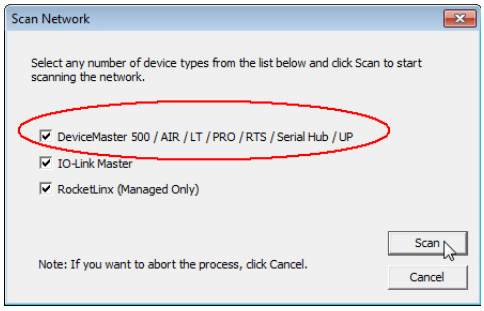
Install PortVision DX

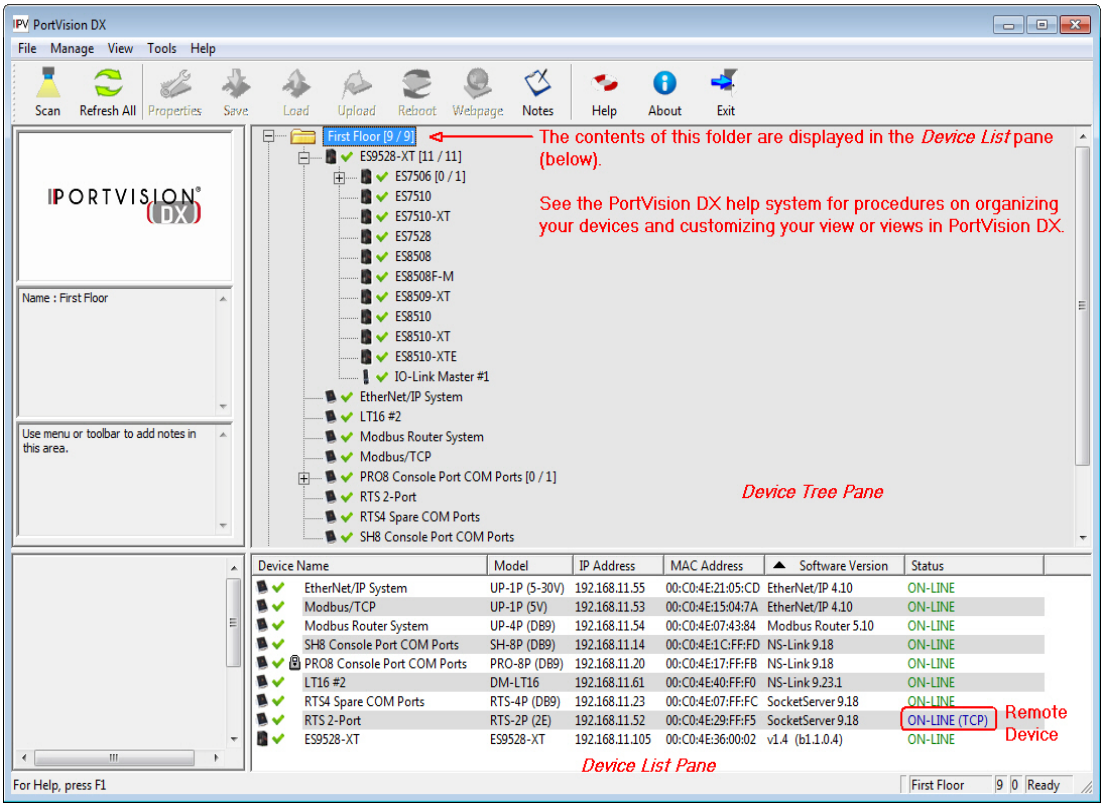
Use the following procedure to install PortVision DX.

1. Download PortVision DX from http://downloads.comtrol.com/dev_mstr/portvision_dx.
2. Execute the **PortVision_DX_[*version*].msi** file and follow the *Installation wizard*.
3. Click **Launch PortVision DX** and **Finish** in the last installation screen.
4. Click **Scan** so that PortVision DX locates the DeviceMaster.

   PortVision DX displays the Comtrol Ethernet attached products for which you chose to scan. See the PortVision DX help system detailed information about how to use it to tailor your view.
5. Go to the next discussion to program the network information into the DeviceMaster.

You can save time if you only scan for DeviceMasters.



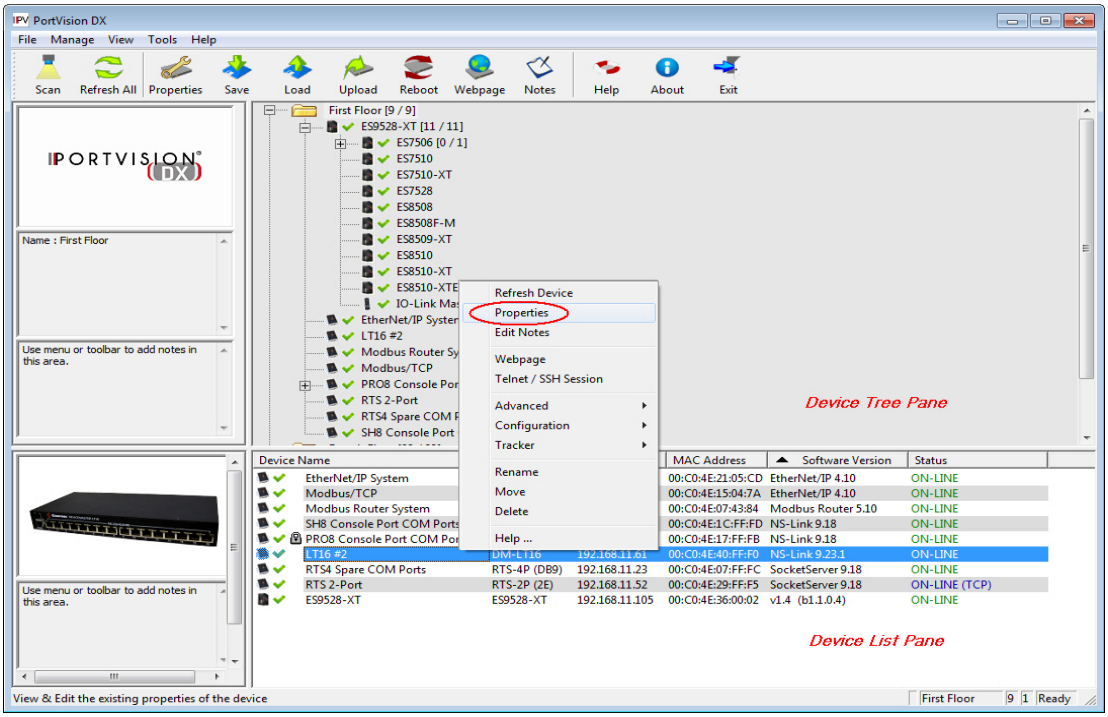


Program the IPv4 Address (Network Information)

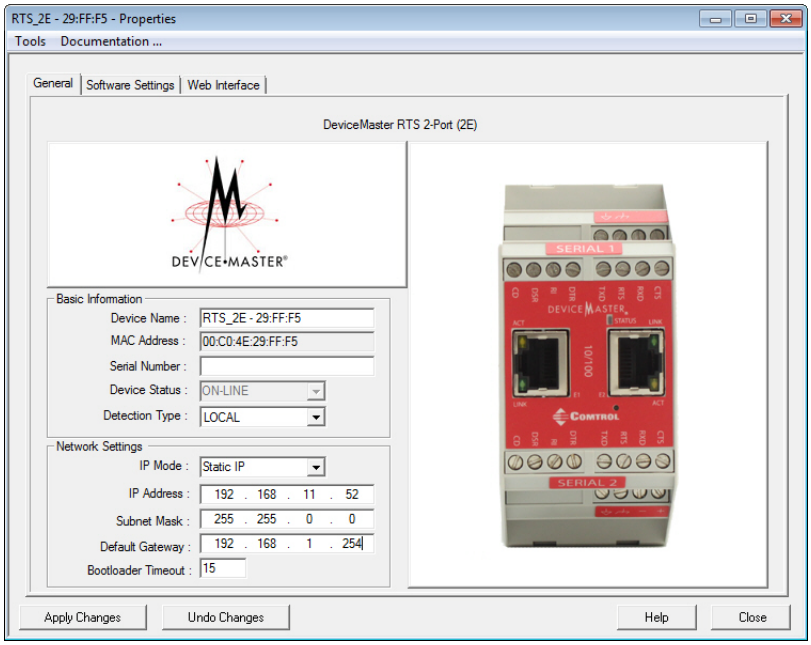
If you have not done so, program the IPv4 address for your network. The following procedure is to program a single DeviceMaster, if you want to program IPv4 addresses into multiple DeviceMasters, refer to the PortVision DX help system or the *DeviceMaster Installation and Configuration Guide*.

1. If necessary, start PortVision DX, **Start > Comtrol > PortVision DX**.
2. If the DeviceMaster that you want to program is not displayed, click **Scan**.
3. Right-click the DeviceMaster in the *Device Tree* or *Device List* pane for which you want to program network information and click **Properties**.

   Note: *Optionally, you can double-click the DeviceMaster and PortVision DX opens the* **Properties** *page.*



4. Optionally, enter a friendly device name in the **Device Name** list box. The default name is **Device** and the last three pairs of digits from the MAC address.



5. Optionally, enter the DeviceMaster serial number in the event you need to contact Comtrol.

   Note: *The device status from the main screen displays in the Device Status list box.*

6. Select the appropriate **Detection Type** for this DeviceMaster.
   - **REMOTE** means that IP communications are used instead of MAC communications. This is generally an indication the DeviceMaster is not on the local Ethernet segment
   - **LOCAL** means that the MAC communications level is used and the DeviceMaster must be on the local segment for MAC mode to be used. An IP address is not required but Technical support recommends using an IP address.
7. Select the appropriate **IP Mode** for your installation:
   - If you want to disable IP communications on the DeviceMaster, click **Disable IP**.
   - To use the DeviceMaster with DHCP, click **DHCP IP**, and make sure that you provide the MAC address of the device to the network administrator. Make sure that the administrator reserves the IP address, subnet mask and gateway address of the DeviceMaster in the DHCP server.
   - To program a static IP address, click **Static IP** and enter the appropriate values for your site.
8. Leave the **Bootloader Timeout** set to the default 15.
9. Click **Apply Changes** and **Close**.
10. Go to *Check the SocketServer Version* on Page 14 to verify that you have the latest SocketServer version.

Program the IPv6 Address (Network Information)

Default Network Settings

IPv4 address: 192.168.250.250

IPv4 Subnet mask: 255.255.0.0

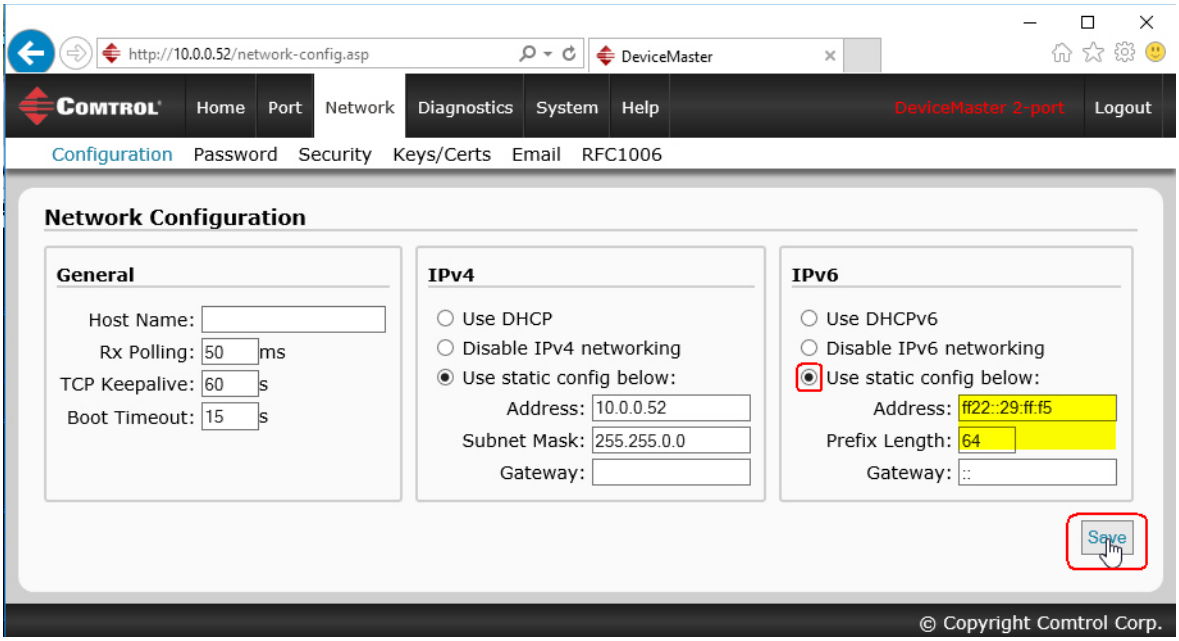
IPv4 Gateway address: 192.168.250.1

You must use NS-Link/SocketServer (DeviceMaster web page) to program an IPv6 address. You can refer to www.ipv6.com for information about IPv6.

You may want to use PortVision DX to program an IPv4 address so that you can open the DeviceMaster web page without changing your system IP settings to communicate with DeviceMaster.

Use the following procedure to program an IPv6 address.

1. Open your browser and enter the DeviceMaster's IP address.
2. Click the **Network** tab.
3. Optionally, configure a **Host Name** or change any of the **General** options.
4. Under IPv6, either select **Use DHCPv6** or **User static config below** option.
5. If you selected a static address, enter the IPv6 address, Prefix Length, and if necessary, the Gateway.
6. Click the **Save** button.



Note: *You must reboot for changes on this page to take affect.*

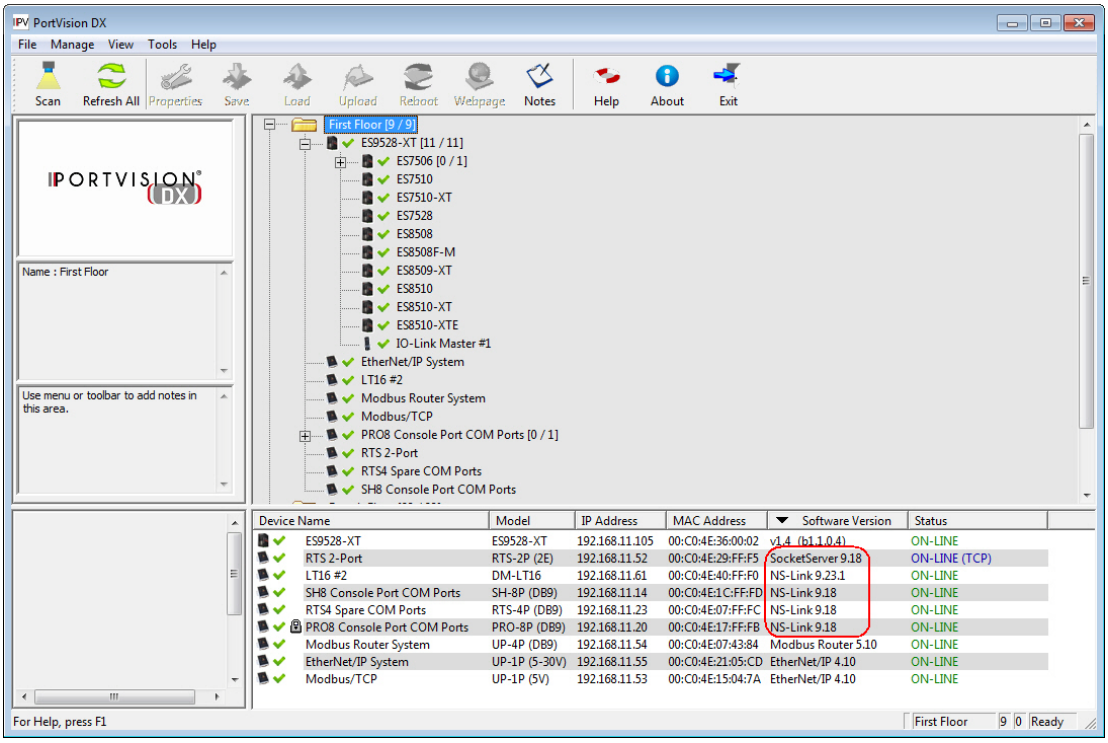
7. Click the **System** tab and then click the **Reboot** option.
8. Optionally, click the **Reboot Now** button or let the web page reboot using the timer.
9. Go to *Check the SocketServer Version* on Page 14 to verify that you have the latest SocketServer version.

Check the SocketServer Version

Check the SocketServer version installed on the DeviceMaster against the latest SocketServer version on the ftp site.

1. If necessary, start PortVision DX: **Start > Comtrol > PortVision DX**.

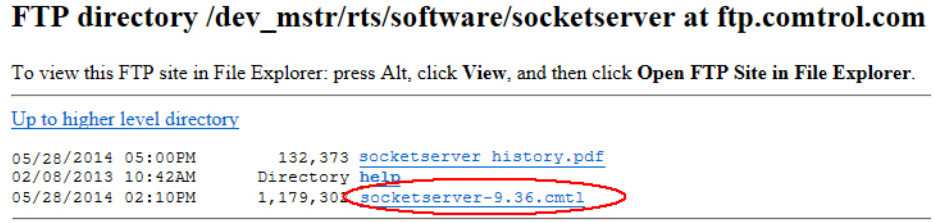
   Note: *The SocketServer version displays for the DeviceMaster under the Software Version column..*



2. Check for the latest SocketServer version.

   Note: *Although these paths point to the DeviceMaster RTS subdirectory, the software (applications, firmware, and drivers) and documentation works on the DeviceMaster LT, DeviceMaster PRO and DeviceMaster Serial Hub.*

   Downloads subdirectory: **http://downloads.comtrol.com/dev_mstr/rts/software/socketserver**.



   This images shows the ftp path, which is the same as the downloads site.

3. If necessary, download SocketServer, and then use the next subsection to upload SocketServer. If you do not need to upload the latest version of SocketServer, you are ready to install the device NS-Link device driver using *NS-Link Device Driver Installation* on Page 17.

Uploading SocketServer

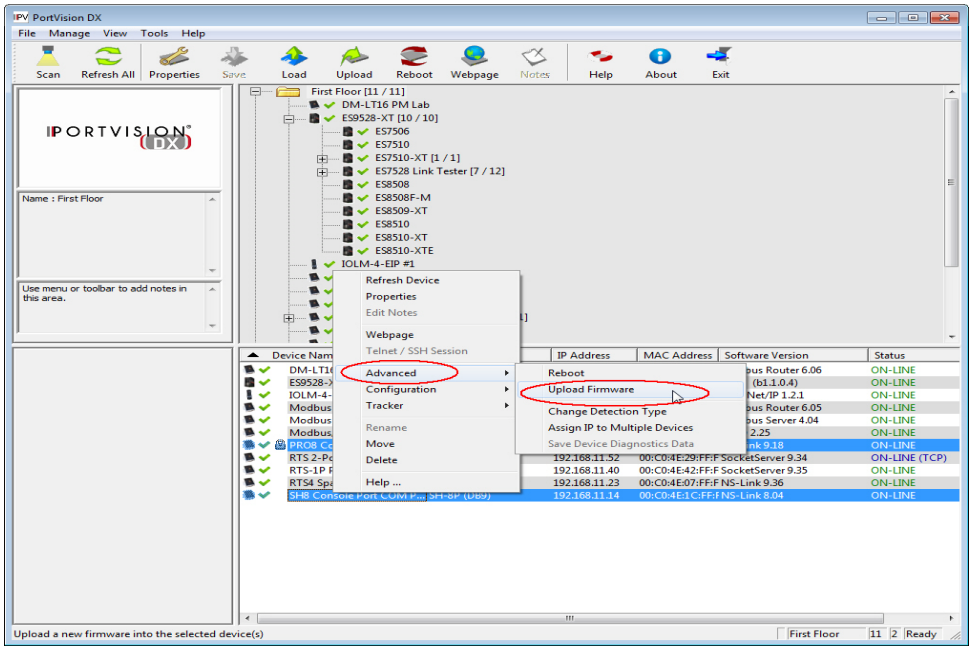
The NS-Link device driver loads the current firmware but not until the DeviceMaster has shown that an old version of the SocketServer (older than 8.00) or any firmware other than NS-Link Updater is running. The driver does not upload anything unless it first connects to the default application (SocketServer) on the DeviceMaster.

Note: *If you are familiar with the NS-Link driver, you may want to review information for existing customers.*

Optionally, you can upload the appropriate version of SocketServer after running the NS-Link device driver *Installation Setup Wizard*.

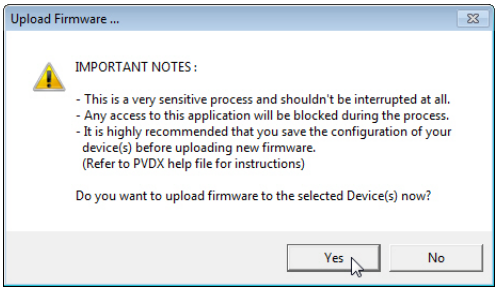
Use the following procedure to upload the latest SocketServer version using PortVision DX.

1. Start PortVision DX, click: **Start > Comtrol > PortVision DX**.
2. Right-click the DeviceMaster or DeviceMasters of which you want to upload the latest version of SocketServer and then click **Advanced > Upload Firmware**.



3. Browse to the location where you downloaded SocketServer, highlight the file, and click **Open**.
4. Click **Yes** to the *Upload Firmware* popup.
5. Click **Yes** to the second *Upload Firmware* popup.

   You can click **Refresh** to verify that the upload has been successfully completed.



If the upload fails, use the PortVision DX **General** tab on the *Properties* screen to change the **Bootloader Timeout** to 45 seconds and then repeat Steps 2 through 5.

NS-Link Device Driver Installation

This section discusses the following topics:

Overview

If there is an NS-Link device driver already installed on your system for the DeviceMaster, use the following discussions:

- *Updating the Driver* on Page 23 if you want to update the existing driver.
- *Adding a DeviceMaster (Existing Installation)* on Page 27 to add more DeviceMasters to the existing installation.

If you have performed the following procedures, you can skip to *Installation Setup Wizard* to start NS-Link device driver installation.

You can use *Before Installing the Comtrol Drivers Management Console* on Page 9 for procedures for these steps.

1. Install the DeviceMaster.
2. Install PortVision DX.
3. Program the network information (IP address) using PortVision DX.
4. Upload the appropriate version of SocketServer firmware.

Installation Setup Wizard

You can use the following procedure to install the device driver and the *Comtrol Drivers Management Console*, which is used to configure the driver.

1. Locate the latest driver assembly (**.exe**) for your product and copy it to a location that is available to the host.

   Note: *Administrative privileges are required to install device drivers on Windows operating systems.*

2. Close any applications that are using serial ports before the device driver installation.

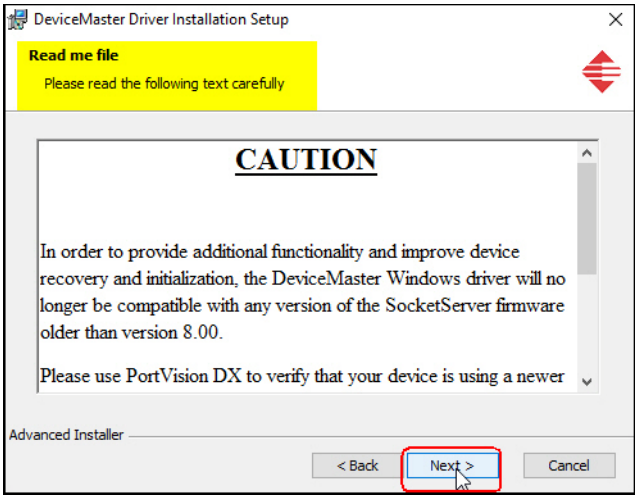
   Do not connect RS-422/485 devices until the appropriate port interface type has been configured in the device driver. The DeviceMaster default port setting is RS-232, except for the DeviceMaster Serial Hub.

3. Start the installation by executing the **.exe** file for your device.

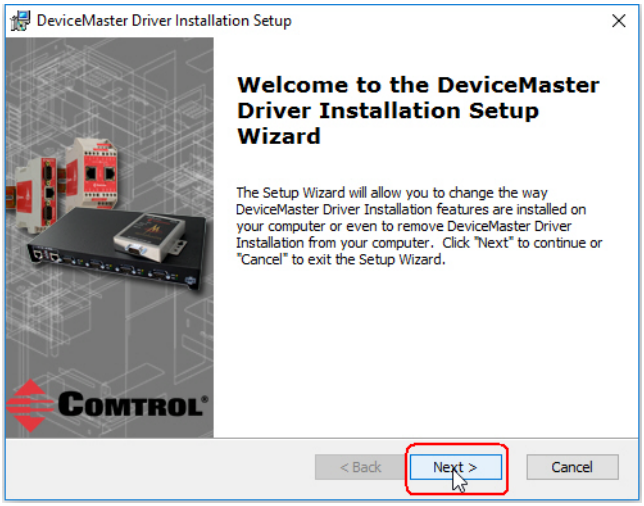
   Driver assembly file names include the driver version number. For example, **DeviceMaster_Windows_*x.xx*.exe**, where ***x.xx*** is the driver assembly version.

4. If necessary, click the **Yes** button to the *Do you want to allow this app to make changes to your device* message.

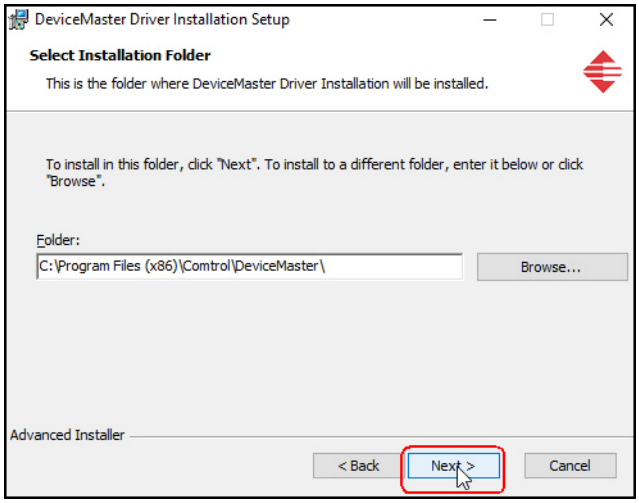
5. Read the *Caution* and then click **Next**.



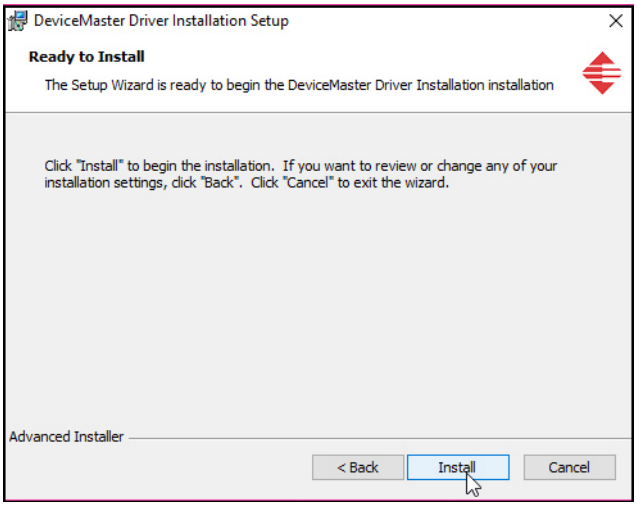
6. Click **Next** to start the installation.



7. Optionally, enter a different location to install the driver files.



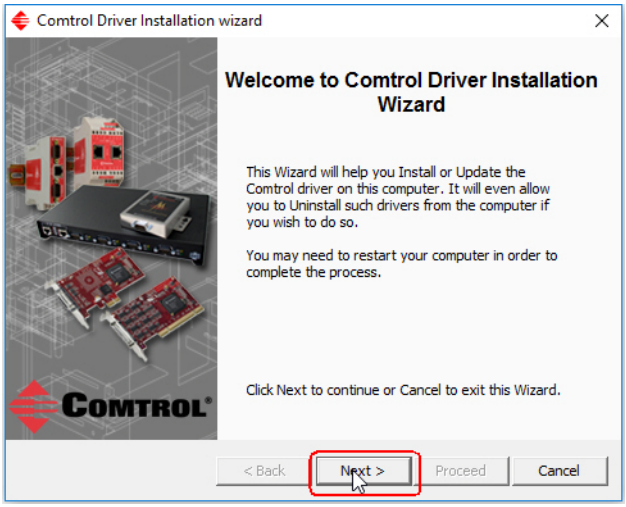
8. Click **Install**.



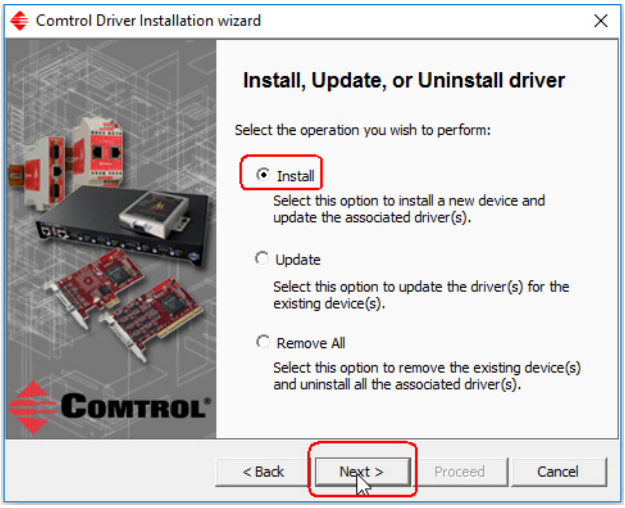
9. Leave the **Launch DeviceMaster Driver Installation** box checked and click **Finish**.

If you do not check this box, you can use the shortcut under **Start > Comtrol > DeviceMaster Driver Installation Wizard** to install the device driver.

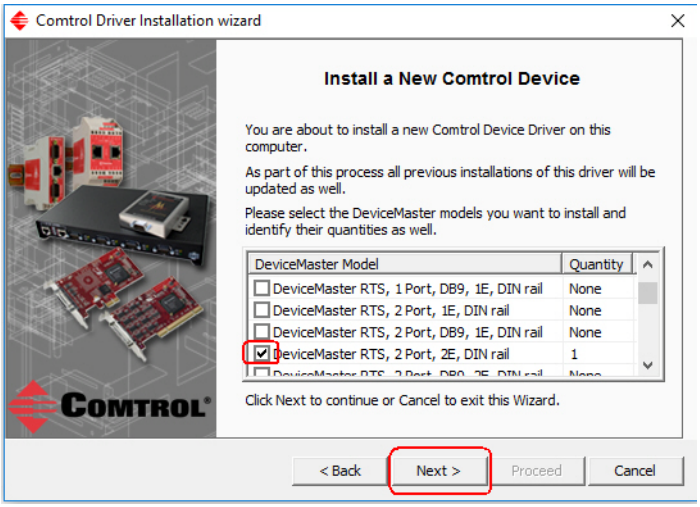
10. Click **Next** to install the driver.



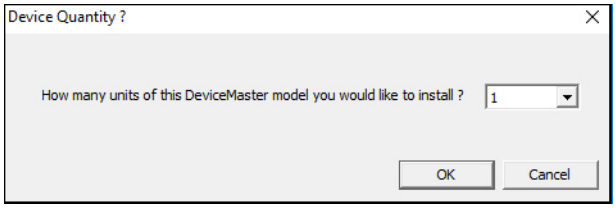
11. Click **Install** and **Next**.



12. Select the DeviceMaster model that you want to install.

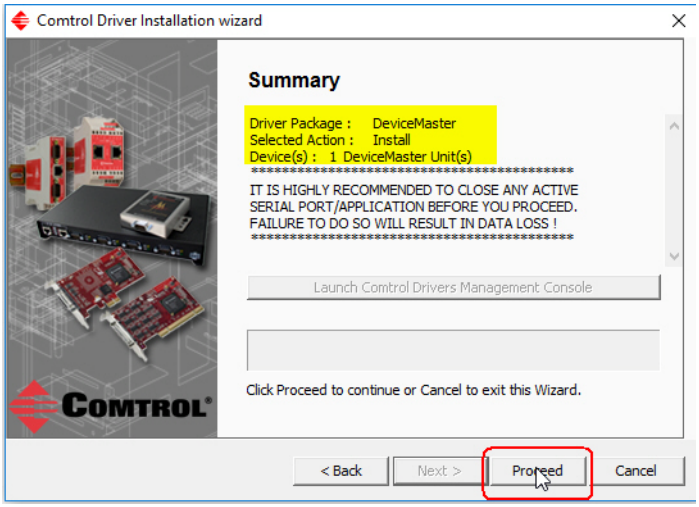


13. Enter the number of this DeviceMaster model that you want to install and click **Ok**.

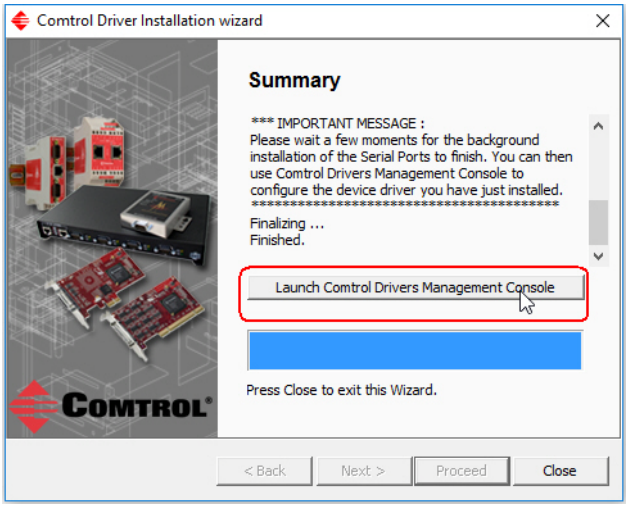


14. Repeat Steps 12 and and 13 for each DeviceMaster that you want to install and click **Next**

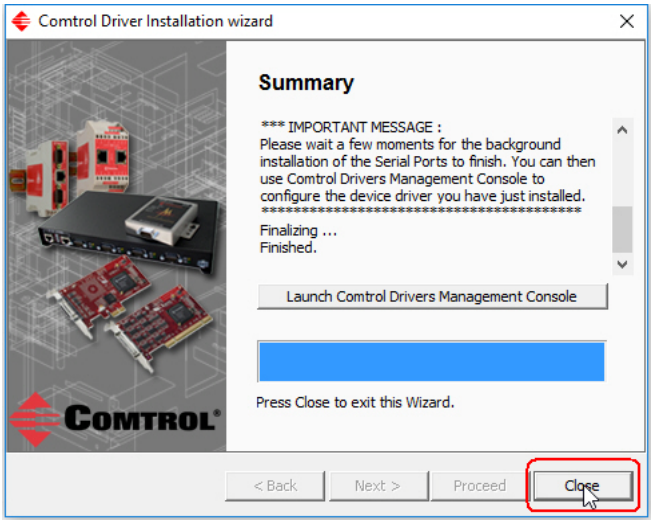
15. Click **Proceed**.



16. Click the **Launch Comtrol Drivers Management Console** button.



17. Return to the *Installation wizard* and click **Close** to exit the wizard.



18. Go to *NS-Link Device Driver Configuration* on Page 29 to start NS-Link device driver configuration.

    The device driver installation is not complete until you have *associated the MAC address to the DeviceMaster*.

19. After associating the MAC address, go to *Configuring Device Settings* on Page 42 to set up device properties (device name and starting COM port number).

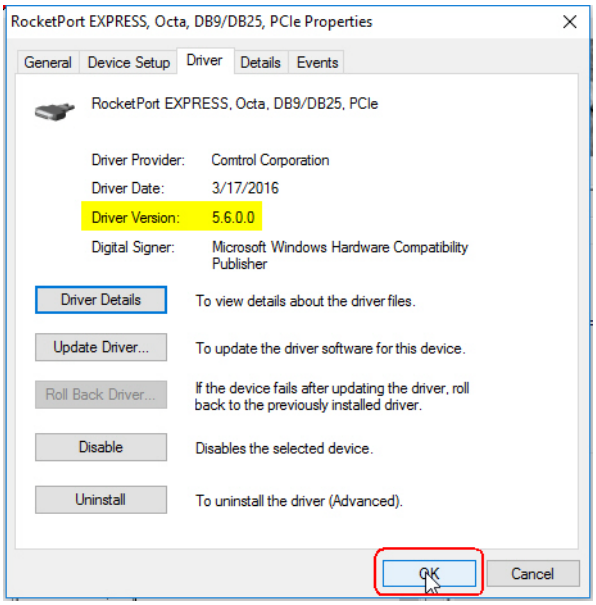
20. Go to *Configuring COM Port Properties* on Page 45 to configure any necessary COM port characteristics.

After driver installation and configuration, connect the serial devices to the ports. For information about the DeviceMaster connectors, refer to the *DeviceMaster Installation and Configuration User Guide* (Page 7).

Checking the Device Driver Version

You can check the driver version using the following procedure.

1. In the **Comtrol Drivers Management Console**, right-click the Comtrol device and click **Properties**.
2. If necessary, click the **Driver** tab to view the NS-Link device driver version.



Note: *Please note that Microsoft truncates leading zeros in the versions number. The above driver version is 5.06.*

If necessary, you can update the device driver using the next subsection.

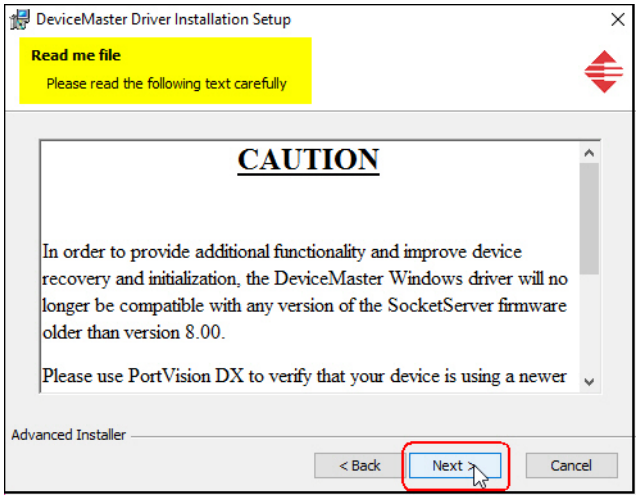
Updating the Driver

Use the following procedure to update the *DeviceMaster* NS-Link device driver after initial installation.

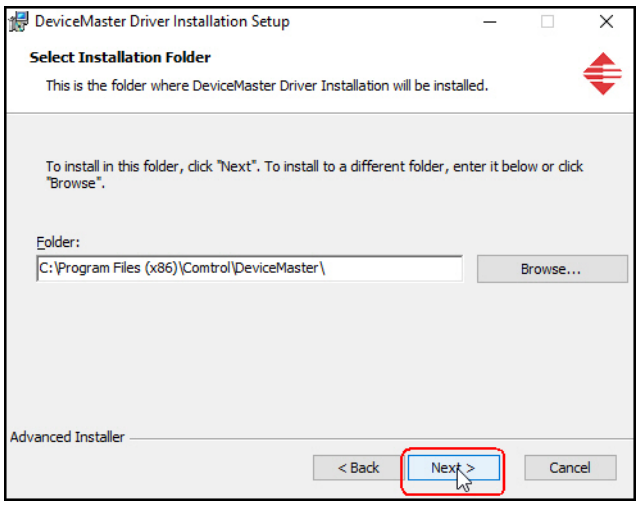
If you are unsure what driver version is running, see *Checking the Device Driver Version* on Page 22.

1. Locate the latest NS-Link device driver assembly (Page 7) and copy it to a location that is available to the host.
2. Close any applications that are using serial ports before the NS-Link device driver installation.
3. Start the update by executing the **.exe** file.
4. Click the **Yes** button to the *Do you want to allow this app to make changes to your device* message.
5. Click **Next** to start the *Installation Setup Wizard*.

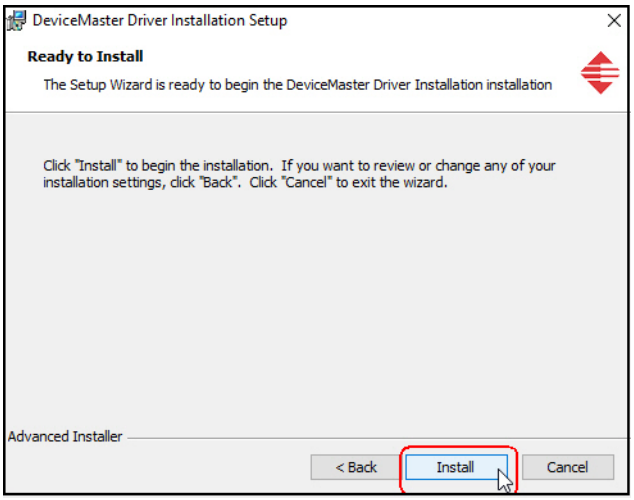
6. Read the *Caution* and click **Next**.



7. Optionally, enter a different location to install the latest NS-Link device driver files.

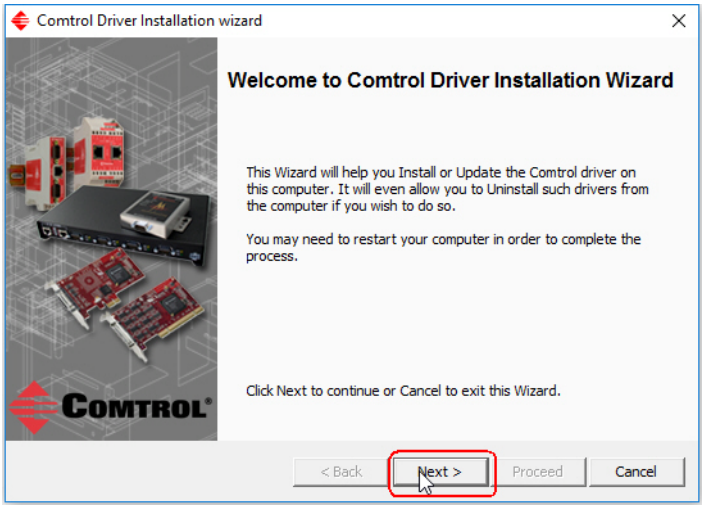


8. Click **Install**.

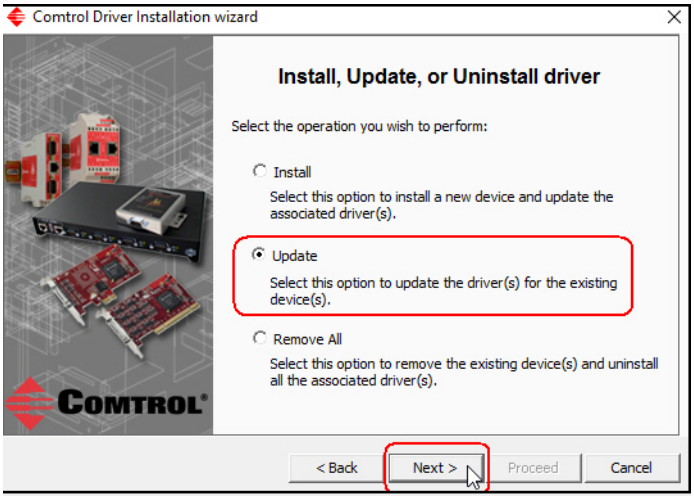


9. Leave the **Launch DeviceMasterDriver Installation** box checked and click **Finish**.

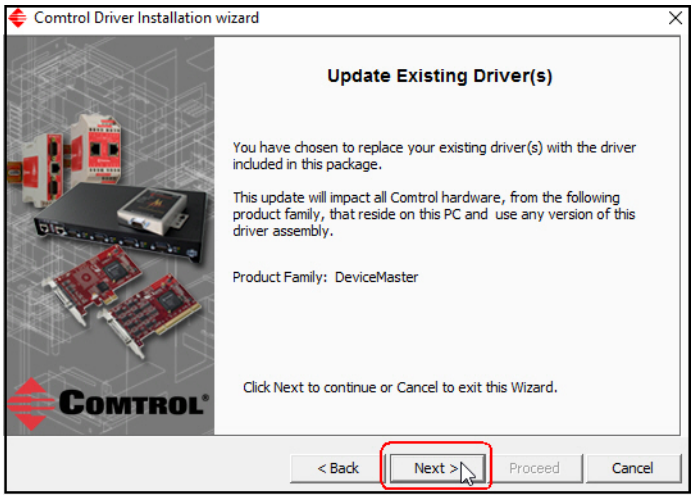
10. If you do not check this box, you can use the shortcut under the **Start** button at: **Comtrol > DeviceMaster Driver Installation Wizard**. Click **Next** to update the driver.



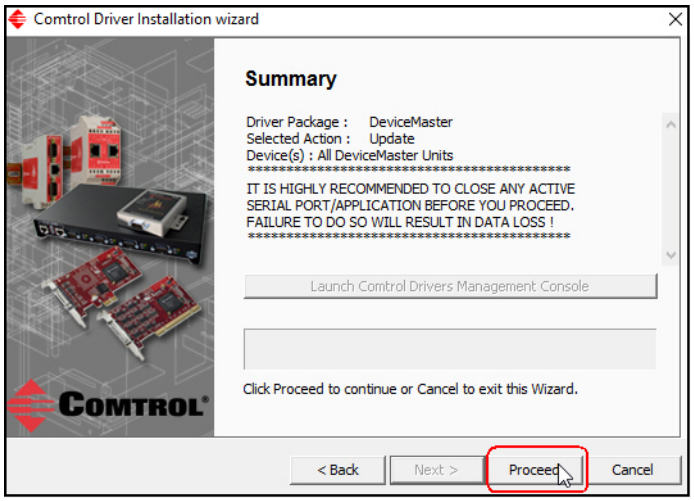
11. Click **Update** and **Next**.



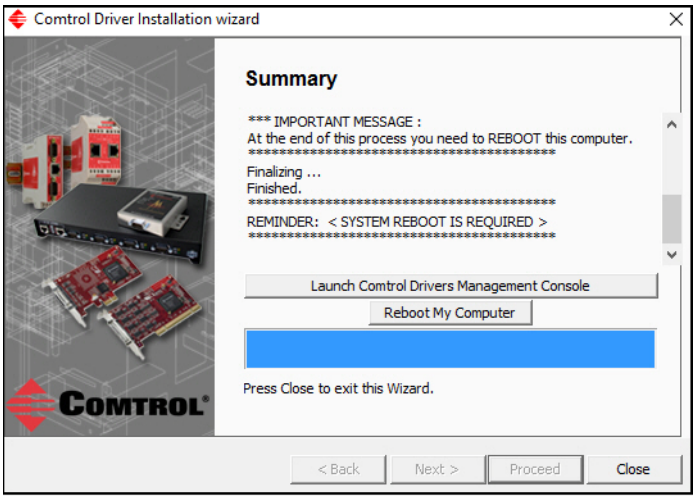
12. Click **Next** to update the driver.



13. Click **Proceed**.



14. Click the **Launch Comtrol Drivers Management Console** button to configure the ports or device properties.
15. Return to the *Installation wizard* and click **Close**.



16. If necessary, go to *Configuring COM Port Properties* on Page 45 to configure the NS-Link COM port properties.

Adding a DeviceMaster (Existing Installation)

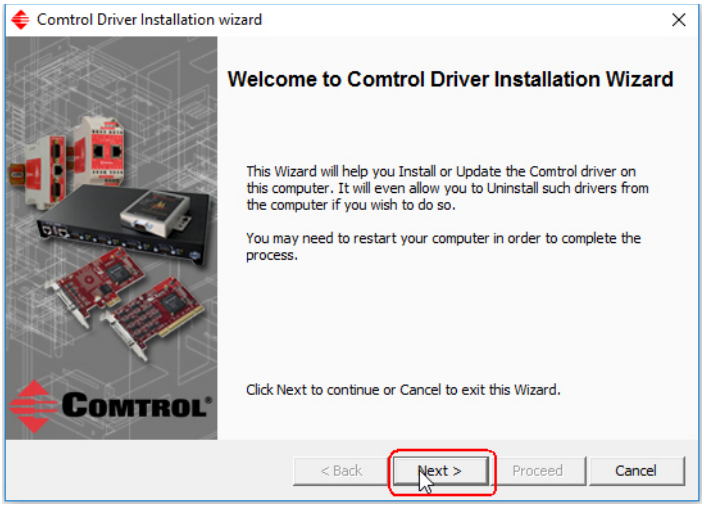
Use the following procedure to add aDeviceMaster to an existing *DeviceMaster* installation.

1. Close any applications that are using serial ports before the device driver installation.
2. Connect the DeviceMaster to your network and use PortVision DX to program the IP address.

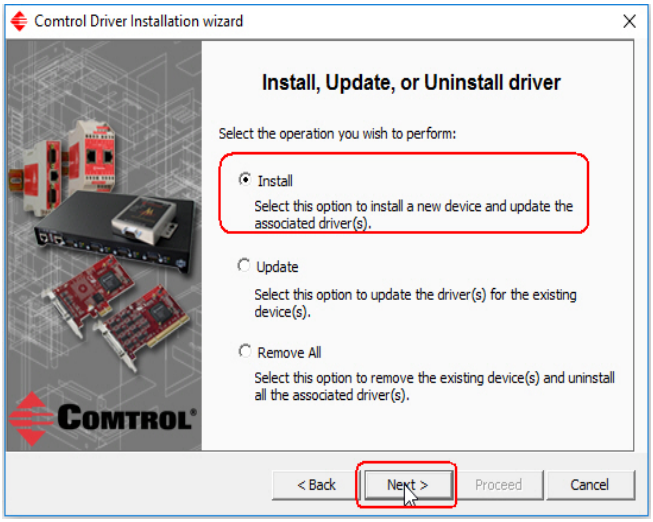
   If you need hardware installation procedures, see *Downloading the Latest Software and User Guides* on Page 7).

   Caution

   Do not connect RS-422/485 devices until the appropriate port interface type has been configured in the device driver. The default port setting is RS-232.
3. From the **Start** button, click **Comtrol> DeviceMaster Driver Installation Wizard**.
4. Click the **Yes** button to the *Do you want to allow this app to make changes to your device* message.
5. Click **Next** to start the *Comtrol Driver Installation Wizard*.



6. Click **Install** and **Next**.



7. Click **Next** and follow the *Installation Wizard*. Refer to Step 12 on Page 20, for the remainder of the installation steps if needed.

NS-Link Device Driver Configuration

If you programmed an IPv4 address into the *DeviceMaster* for your network using PortVision DX before installing the NS-Link device driver; first associate the MAC address to the DeviceMaster and then configure the driver with the IPv4 address that you programming into the DeviceMaster using PortVision DX.

This section discusses the following topics:

NS-Link Device Driver Configuration Considerations

The following subsections discuss the NS-Link device driver features and topics that you may want to review before driver configuration.

IP or MAC Addressing Issues

This is an overview of IP and MAC addressing issues that may affect how you configure the DeviceMaster with a brief discussion of advantages of each method.

Note: *The default IPv4 address for the DeviceMaster is 192.168.250.250.*

The IPv4 and IPv6 addressing scheme (IP mode) has the following advantages:

- Uses an IEEE industry standard protocol.
- Allows you to configure systems to use ports on the DeviceMaster that are outside of the host system's local Ethernet segment.

Note: *This IP address must be a unique reserved IP address. Do not use an address from a dynamic address pool. If necessary, see the system administrator for an IP address.*

The MAC addressing method (MAC mode) has the following advantages:

- Simplifies implementation and ongoing support by eliminating the address administration issues inherent in network protocols. MAC addresses are predefined by DeviceMaster and there is no potential for an *address conflict* at setup.
- It is isolated from foreign LAN segments minimizing potential security issues.
- Maximizes throughput of serial data.

NS-Link Device Driver Features

During initial installation and configuration of the NS-Link device driver, Comtrol recommends that you associate the MAC address to the DeviceMaster. If you do not do so, you will not be able to use the following device driver features:

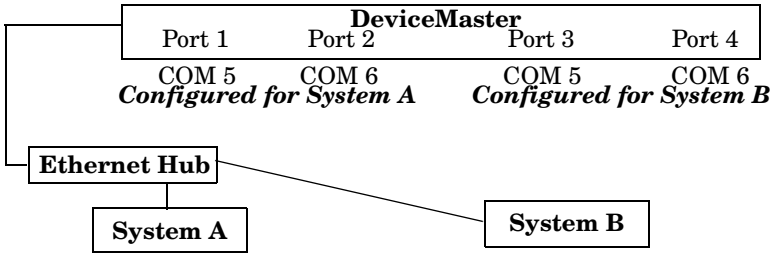
- Access the *Advanced* tab to review PC network or device network interface statistics
- Program or change an IP address using through the **Network Settings** button
- Reboot the DeviceMaster from the *Comtrol Drivers Management Console*

After associating the MAC address, you can then program the DeviceMaster for IP or DHCP usage.

You can refer to *IP or MAC Addressing Issues* on Page 29 for information about MAC addressing and IP addressing issues.

Using the Port Sharing Feature

DeviceMaster ports can be shared by installing the NS-Link device driver on multiple systems or through socket mode, or combination of both. To do so, install the NS-Link driver on each system that you want to permit access to the serial ports. You can share the same port with multiple systems (only one system can have an open connection to a port at any given time) or you can set up multiple systems to share specific ports on the device driver..



Multiple systems can use the same COM port names.

Example:

To configure two ports for System A and two ports for System B, you could configure the drivers like this:

1. When installing the device driver on System A, click “Not Configured” for the COM port names for Ports 3 and 4.
2. When installing the device driver on System B, click “Not Configured” for the COM port names for Ports 1 and 2.

Use port sharing to configure redundant PCs or fail-over protection.

Port	System A	System B
1	COM5	Not Configured
2	COM6	Not Configured
3	Not Configured	COM5
4	Not Configured	COM6

Note: *Most applications do not release ports, so you may not be able to use port sharing across multiple systems with the same port. Also, if using port sharing, make sure that two computers do not try to access the same port at the same time. Only one computer can control a given port at a given time.*

Using the Comtrol Drivers Management Console

This subsection discusses basic *Comtrol Drivers Management Console* operations, such as:

- *Accessing the Comtrol Drivers Management Console*
- *Displaying All Installed Devices* on Page 31
- *Collapsing the View* on Page 32
- *How to Configure Device Properties* on Page 32
- *Customizing the Device Name* on Page 33
- *Customizing the COM Port Name* on Page 33
- *How to Configure COM Port Properties* on Page 34
- *How to Save Changes* on Page 35

See *Associating the MAC Address* on Page 36 to start DeviceMaster configuration procedures.

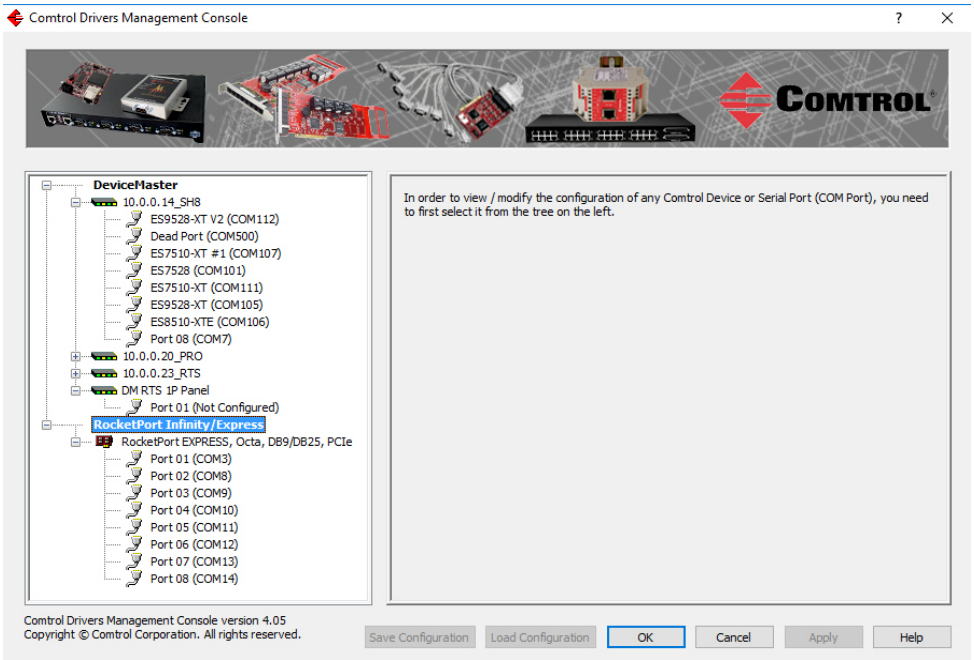
Accessing the Comtrol Drivers Management Console

Accessing the *Comtrol Drivers Management Console* can be done using one of the following methods:

- *Windows Control Panel*; go to your *Control Panel* and click on the **Comtrol Drivers Management Console**.
- *Shortcut*; located under **Start > Comtrol > DeviceMaster Driver Management Console**.

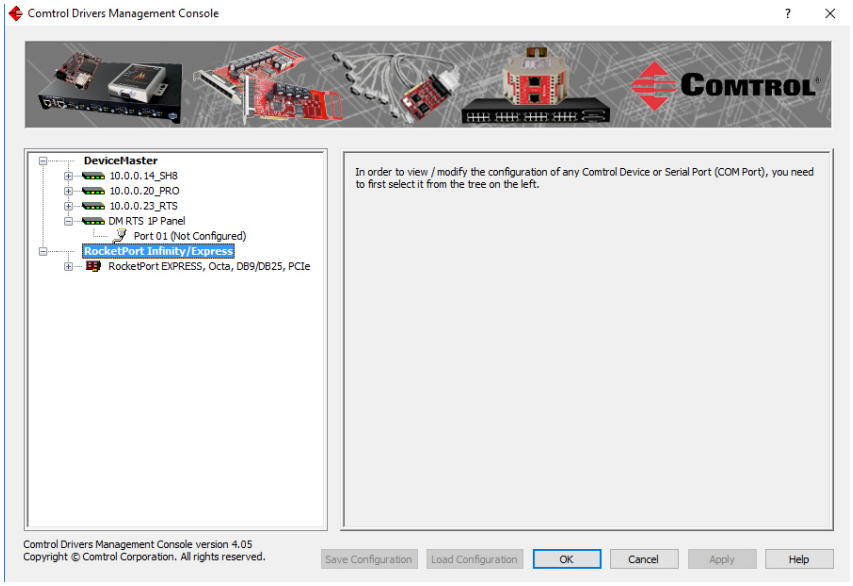
Displaying All Installed Devices

The *Comtrol Drivers Management Console* opens and displays all products for which a device driver was installed.



Collapsing the View

To collapse the view, click **-** in the *Tree View* pane to close the selected family. To view a family or device, click the **+** to open the selected family.



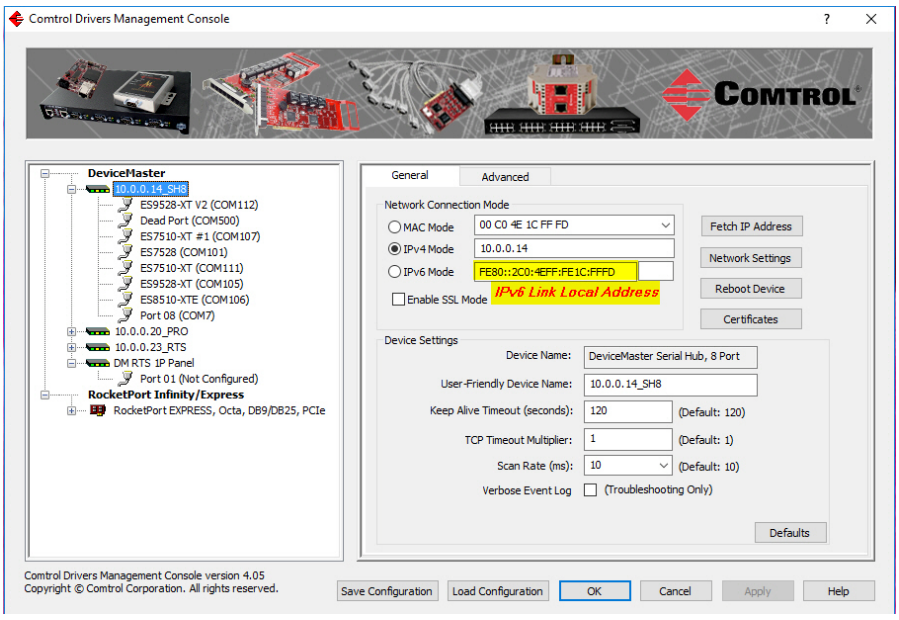
How to Configure Device Properties

This overview discusses changing device properties for a product. Highlight the device name of the product that you want to configure in the *Tree View* pane. Make any necessary changes.

- Click **Apply** to save the changes, which saves the changes and leaves the *Comtrol Drivers Management Console* open.
- Click **Ok** to save the changes and close the *Comtrol Drivers Management Console*.
- Click **Cancel** to close the *Comtrol Drivers Management Console* without saving the changes.

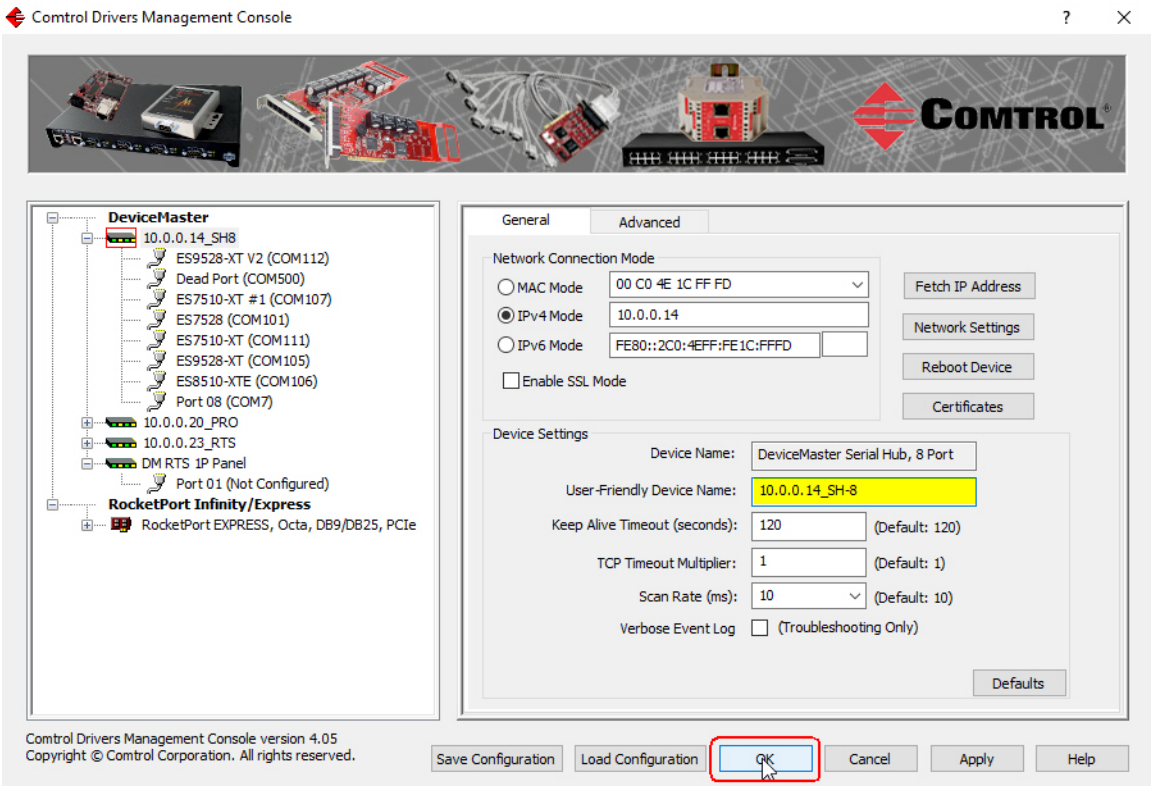
If you click a port or device name without saving the changes, the *Comtrol Drivers Management Console* prompts you to **Apply**, **Ignore**, or **Cancel** the changes.

For more information, see *Configuring Device Settings* on Page 42.



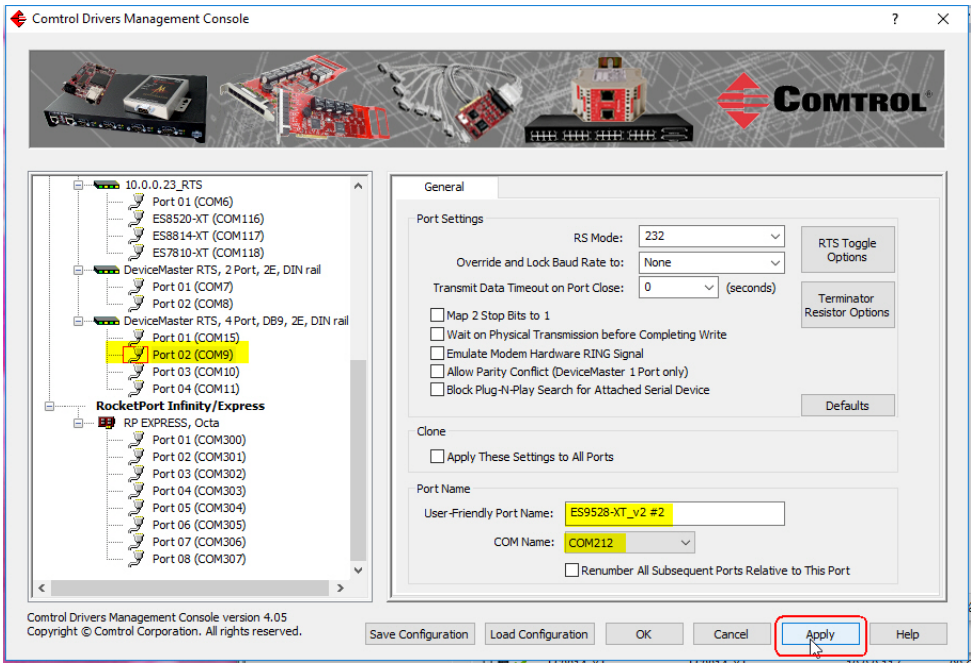
Customizing the Device Name

Change the default *Device Name* on the **Device General** tab by changing the name in the **User-Friendly Device Name** field and saving the change.



Customizing the COM Port Name

Change the default *Port Name* on the **Port Settings General** tab by changing the name in the **User-Friendly Port Name** field and saving the change.



How to Configure COM Port Properties

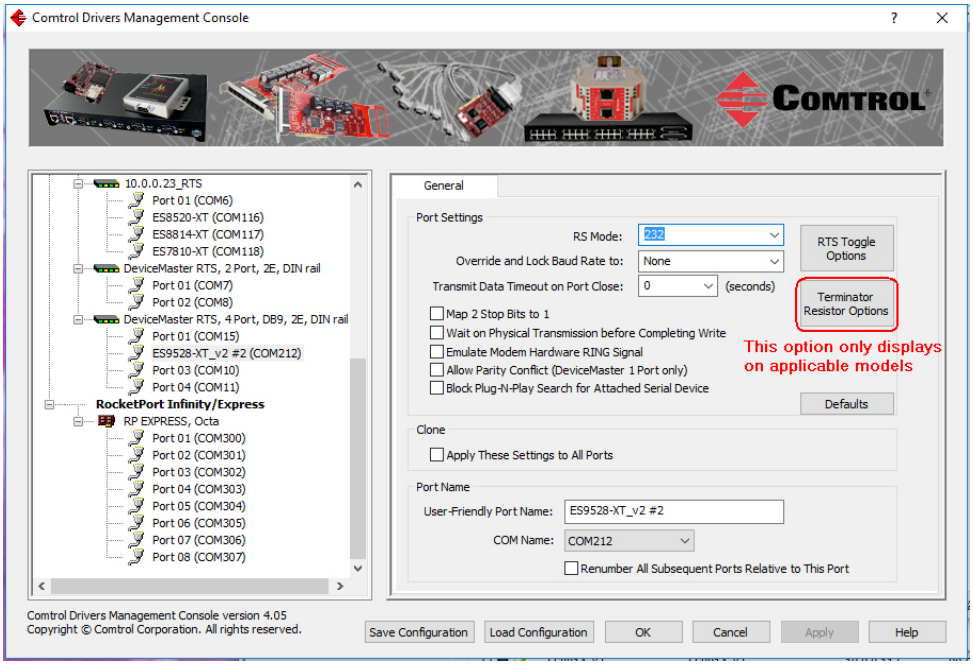
To change a port's properties for a product, highlight the port of the product that you want to configure in the *Tree View* pane. Make any necessary changes:

- Click **Apply** to save the changes, which saves the changes and leaves the *Comtrol Drivers Management Console* open.
- Click **Ok** to save the changes and close the *Comtrol Drivers Management Console*.
- Click **Cancel** to undo the changes and close the *Comtrol Drivers Management Console*.

If you click another port or device name without saving the changes, the *Comtrol Drivers Management Console* will prompt you to **Apply**, **Ignore**, or **Cancel** the changes.

For more information, see *Configuring COM Port Properties* on Page 45.

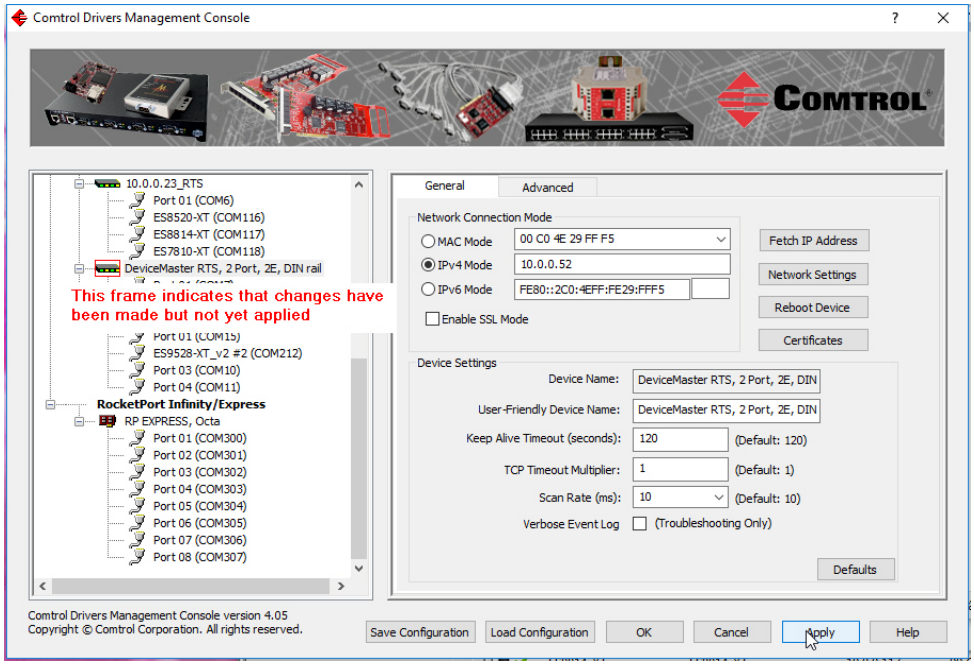
After saving the port changes, if desired, you can click **Apply These Settings to All Ports** to populate the remaining ports with these NS-Link COM properties.



How to Save Changes

The *Comtrol Drivers Management Console* indicates that changes have been made on this screen with a red frame that identifies which device's **General** tab you are editing.

- Clicking the **Apply** button saves the changes on the tab and leaves the *Comtrol Drivers Management Console* open for further configuration.
- Clicking the **Ok** button saves the changes on that tab and closes the *Comtrol Drivers Management Console*.
- Clicking the **Cancel** button cancels the changes on that tab and closes the *Comtrol Drivers Management Console*.



Associating the MAC Address

The first step to configuring the NS-Link device driver is to associate the MAC address of the DeviceMaster to the device driver.

You can use the method that is appropriate to your installation:

- *Same Network Segment* (below)
- *Different Physical Segment* on Page 37

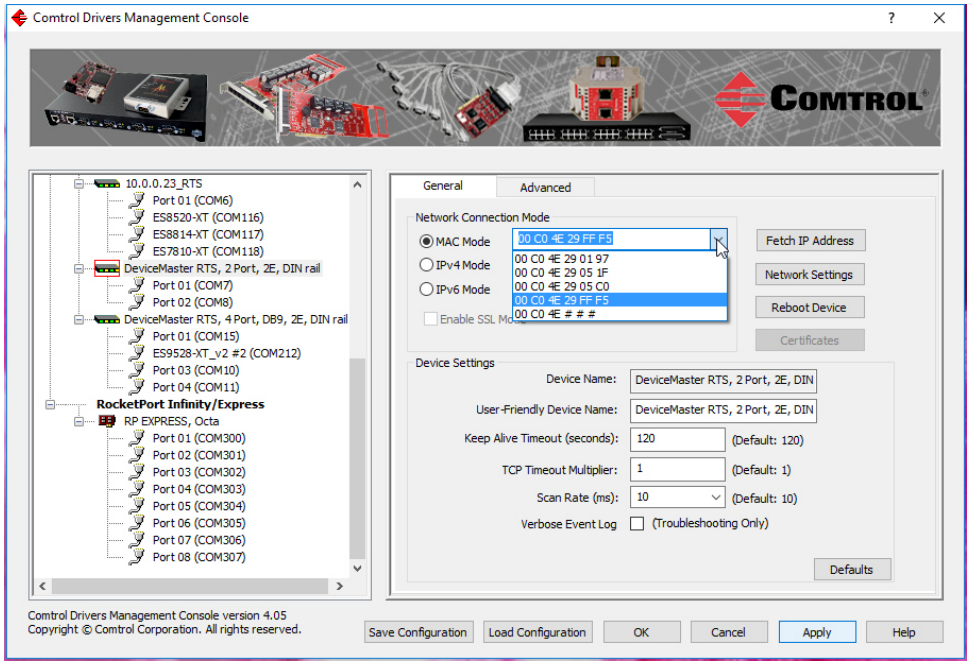
Although you can and should associate a MAC address on a different physical segment, the DeviceMaster must be connected to the local network segment or directly to a NIC on the host system for the NS-Link driver to **operate** in *MAC Mode*.

Same Network Segment

The DeviceMaster must be connected to the local network segment or directly to a NIC on the host system to operate in MAC mode and in order for PortVision DX to detect the MAC address, otherwise you must enter the MAC address manually.

Use the following procedure to associate a MAC address to a DeviceMaster.

1. If necessary, access the *Comtrol Drivers Management Console,* click **Start > Comtrol > DeviceMaster Driver Management Console**.
2. Highlight the *Device Name* of the DeviceMaster that you want to configure.



3. Select the MAC address from the drop-down list or enter the address from the MAC address label on the DeviceMaster.

   If the appropriate MAC address is not displayed in the drop-down list, then it can be one of the following reasons:

   - The DeviceMaster is not on the same network segment
   - The DeviceMaster not powered on or connected to the network
   - The DeviceMaster wrong model was selected during the driver installation
   - Device failure

   Note: *If you enter the MAC address, make sure that you use the correct format:* ***00 C0 4E xx xx xx****. A space must separate each pair of digits. The MAC address is located on a label on the DeviceMaster.*

If you programmed the IPv4 address using PortVision DX, the IPv4 address displays in the **IPv4 Mode** text box.

4. Click **Apply** to program the driver with the MAC address of the DeviceMaster.

   If you do not **Apply** the changes before leaving this screen, you will be prompted to **Apply**, **Ignore**, or **Cancel** the changes.

5. Optionally, you can click the *Advanced* tab and verify that the *Device Status* message indicates that the DeviceMaster is active and *Ok*.

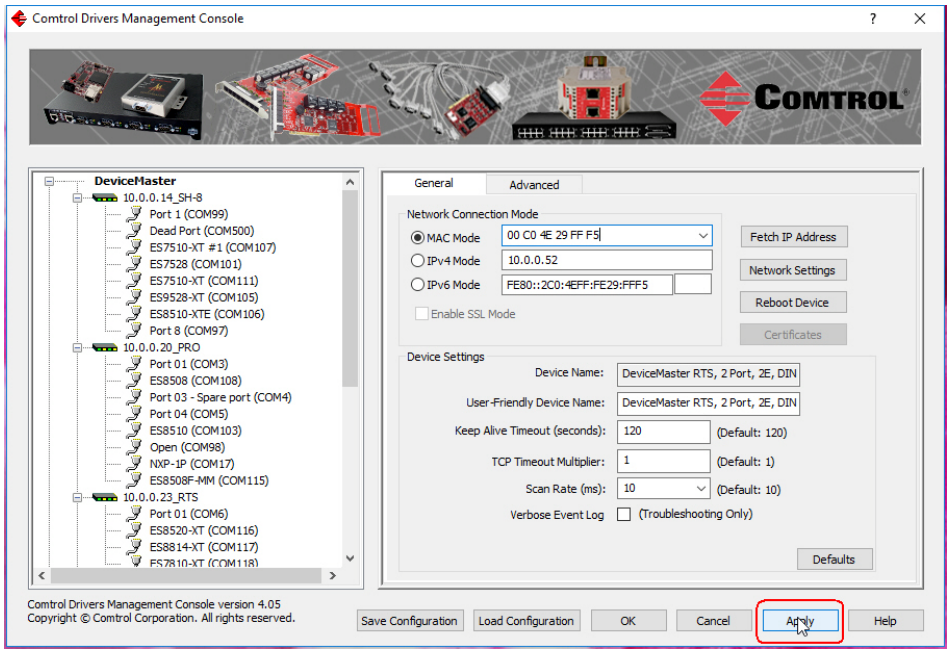
6. You may need to perform some of the following tasks to complete the driver configuration process.

   - Configure the DeviceMaster for IP Mode, see the appropriate discussion:
     - *Using the Driver in IPv4 Mode* on Page 38
     - *Using the Driver in IPv6 Mode* on Page 40
   - Enable SSL, see *Enabling SSL* on Page 41
   - Configure device properties, see *Configuring Device Settings* on Page 42.
   - Configure COM port properties, see *Configuring COM Port Properties* on Page 45.
   - Configure any of the DeviceMaster ports as sockets, see *Configuring DeviceMaster Ports as Sockets* on Page 54.

Different Physical Segment

Use the following procedure to associate a MAC address to a DeviceMaster that is not on the same physical network segment or not connected directly to the NIC.

1. If necessary, start the *Comtrol Drivers Management Console*.
2. Highlight the *Device Name* of the DeviceMaster that you want to configure.
3. Enter the MAC address in the **MAC Mode** text box.



Note: *When you enter the MAC address, make sure that you use the correct format: 00 C0 4E xx xx xx. A space must separate each pair of digits. A MAC address is located on a label on the DeviceMaster or use PortVision DX to scan the network, which will display the MAC address.*

4. Click **Apply** to program the driver with the MAC address of the DeviceMaster or **Ok** to save the change and close the *Comtrol Drivers Management Console*.

   If you do not **Apply** the changes, you will be prompted to **Apply**, **Ignore**, or **Cancel** the changes.

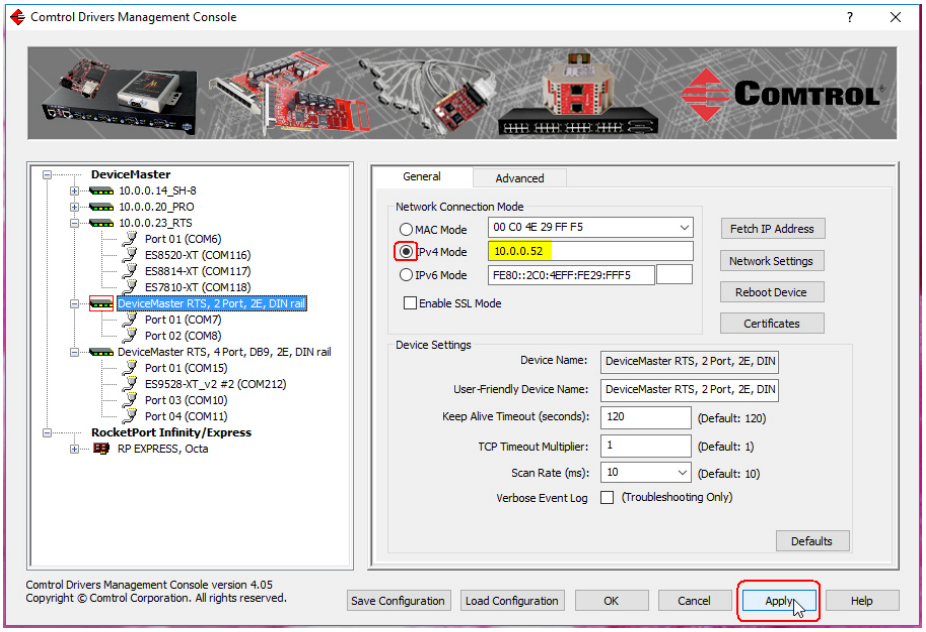
5. You may need to perform some of the following tasks to complete the driver configuration process.
   - Configure the DeviceMaster to operate in IPv4 Mode using the next subsection.
   - Configure the DeviceMaster to operate in IPv6 mode using *Using the Driver in IPv6 Mode* on Page 40.
   - Configure a DHCP addressing, refer to *Network Configuration in Comtrol Drivers Management Console* on Page 50
   - Configure device properties, see *Configuring Device Settings* on Page 42.
   - Configure COM port properties, see *Configuring COM Port Properties* on Page 45.
   - Configure any of the DeviceMaster ports as sockets, see *Configuring DeviceMaster Ports as Sockets* on Page 54.

Using the Driver in IPv4 Mode

After associating the DeviceMaster with the MAC address you can set the DeviceMaster to run in IPv4 Mode.

1. First associate a MAC address (Page 36) to the DeviceMaster.
2. Highlight the DeviceMaster.
3. If the DeviceMaster is not on the same network segment, enter the IP address of the DeviceMaster in the **IP Mode** text box.

   If the DeviceMaster is on the same network segment, the driver populates the **IP Mode** text box with the DeviceMaster IP address.
4. Click the **IPv4 Mode** radio button.



5. If you do not have any other configuration changes, click **Apply**. If you have other configuration changes, refer to the appropriate subsection:
   - *Enabling SSL* on Page 41
   - *Configuring Device Settings* on Page 42

Using the Driver in IPv6 Mode

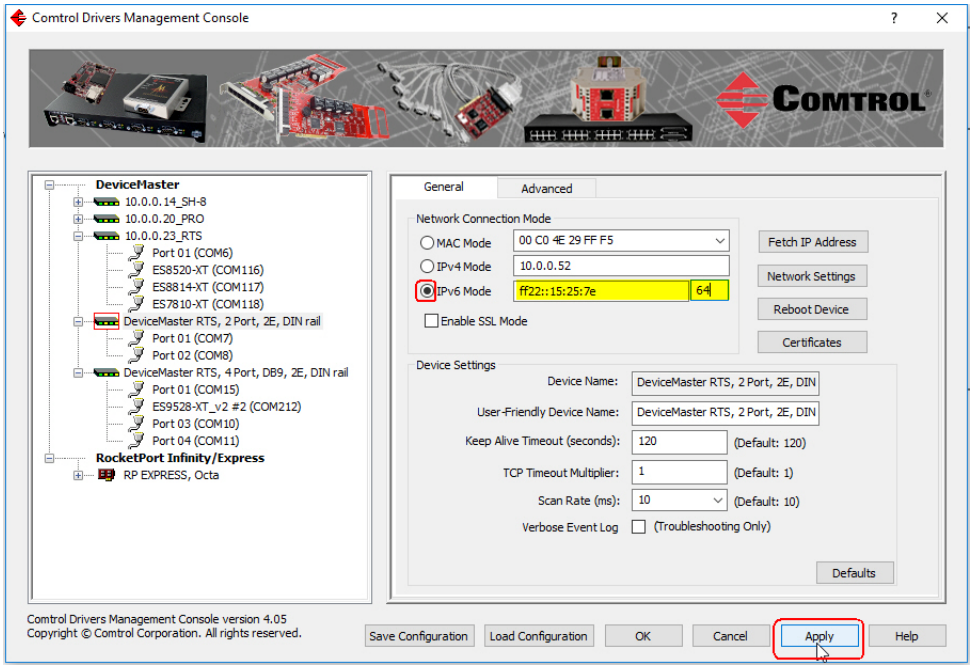
After associating the DeviceMaster with the MAC address you can configure the DeviceMaster to run in IPv6 Mode.

Note: *You must first program the IPv6 address in the DeviceMaster. Refer to* *Program the IPv6 Address (Network Information) on Page 13* *for IPv6 programming procedures.*

You can refer to www.ipv6.com for information about IPv6.

1. First associate a MAC address (Page 36) to the DeviceMaster.
2. Highlight the DeviceMaster.
3. Click the **IPv6 Mode** radio button.
4. Enter the IPv6 address and the subnet mask prefix length.
   - After driver installation, the Comtrol Drivers Management Console may display the *link-local address* for the DeviceMaster in the **IPv6 Mode** field.

     You can identify the link-local address by the prefix: **FE80**. The link-local address is a network address that is valid only for communications within the network segment or the broadcast domain to which the host is connected. Link-local addresses are usually not guaranteed to be unique beyond a single network segment. Routers do not forward packets with link-local addresses.
   - The subnet mask prefix length is 1 - 128. The smallest recommended subnet is 64.



5. If you do not have any other configuration changes, click **Apply**. If you have other configuration changes, refer to the appropriate subsection:
   - *Enabling SSL* on Page 41
   - *Configuring Device Settings* on Page 42

Enabling SSL

After associating the DeviceMaster with the MAC address and configuring it to run in IP Mode, you can configure **SSL Mode**.

1. Click **Enable SSL Mode** or go to *Step 4*.

   The DeviceMaster must be configured using IP Mode before you can **Enable SSL Mode**. If SSL Mode is enabled, TCP connections that carry data to/from the serial ports are encrypted using SSL or TLS security protocols. This includes the following:

   - TCP connections to the per-serial-port TCP ports (default is 8000, 8001, 8002, ...) are encrypted using SSL/TLS.
   - TCP connections to TCP port 4606 on which the DeviceMaster implements the Comtrol proprietary serial driver protocol are encrypted using SSL/TLS.
   - Since SSL/TLS can not be used for either UDP data streams or for the Comtrol proprietary MAC mode Ethernet driver protocol, both UDP and MAC mode serial data transport features are disabled.

   In addition to encrypting the data streams, it is possible to configure the DeviceMaster so that only authorized client applications can connect using SSL/TLS.

   For this option to function, you must also *Enable Secure Data Mode* in the NS-Link web page.

2. If you are using a server certificate, click the **Server Certificate** check box and enter the name in the **Server Certificate** text box.

   This is the RSA identity certificate that the DeviceMaster uses during SSL/TLS handshaking to identify itself. It is used most frequently by SSL server code in the DeviceMaster when clients open connections to the DeviceMaster's secure web server or other secure TCP ports.

   If a DeviceMaster serial port configuration is set up to open (as a client) a TCP connection to another server device, the DeviceMaster also uses this certificate to identify itself as an SSL client, if requested by the server.

3. If you are using a client certificate, click the drop list and browse to the appropriate client certificate file.

   When configured with a CA certificate, the DeviceMaster requires all SSL/TLS clients to present an RSA identity certificate that has been signed by the configured CA certificate. As shipped, the DeviceMaster is not configured with a CA certificate and all SSL/TLS clients are allowed.

   If desired, controlled access to SSL/TLS protected features can be configured by uploading a client authentication certificate to the DeviceMaster.

   When a CA certificate is uploaded, the DeviceMaster only allows SSL/TLS connections from client applications that provide to the DeviceMaster an identity certificate that has been signed by the CA certificate that was uploaded to the DeviceMaster.

   This uploaded CA certificate that is used to validate a client's identity is sometimes referred to as a *trusted root certificate*, a trusted *authority certificate*, or a *trusted CA certificate*. This CA certificate might be that of a trusted commercial certificate authority or it may be a privately generated certificate that an organization creates internally to provide a mechanism to control access to resources that are protected by the SSL/TLS protocols.

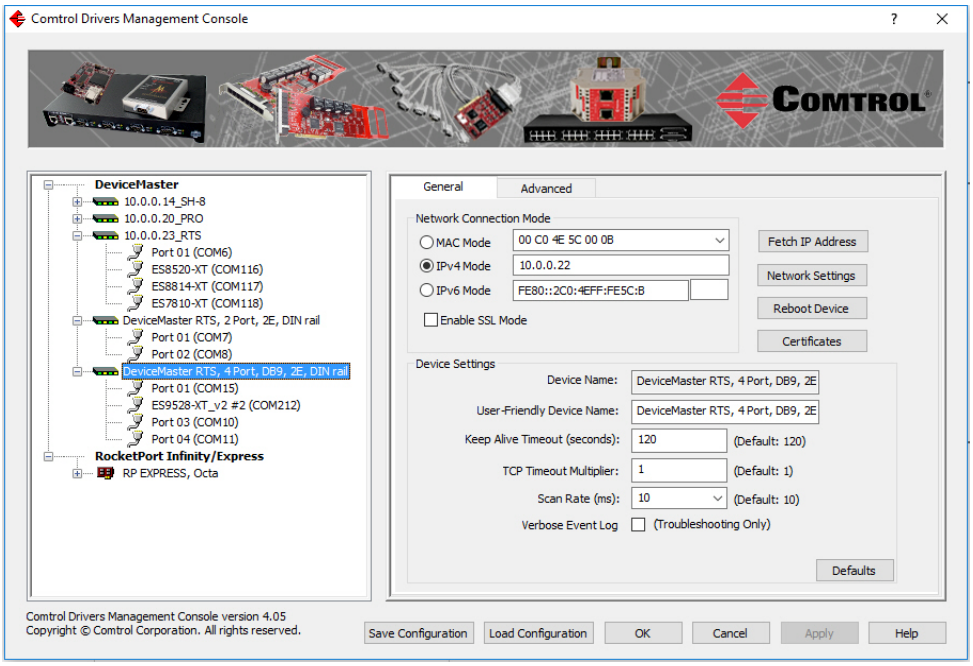
   To control access to the DeviceMaster's SSL/TLS protected resources you should create your own custom CA certificate and then configure authorized client applications with identity certificates signed by the custom CA certificate.

4. Click **Apply** or **Ok** to save the change and close the *Comtrol Drivers Management Console*
5. You may need to perform some of the following tasks to complete the configuration process.
   - Configure device properties, see *Configuring Device Settings* on Page 42.
   - Configure COM port properties, see *Configuring COM Port Properties* on Page 45.
   - Configure any of the DeviceMaster ports as sockets, see *Configuring DeviceMaster Ports as Sockets* on Page 54.
   - Enable **Secure Data Mode** in the NS-Link web page, see *Enabling Secure Data Mode* on Page 55.

Configuring Device Settings

Use the following procedure to change device settings on a *DeviceMaster*.

1. Open *Comtrol Drivers Management Console* (*Accessing the Comtrol Drivers Management Console* on Page 31).
2. Highlight the *DeviceMaster* device name that you want to configure.



3. If desired, change the **User-Friendly Device Name**.
4. Optionally, set a different *Keep Alive Timeout* (Page 43) period. You can set the amount of time in seconds that this DeviceMaster waits until it closes this connection and frees all the ports associated with it.

   Note: *This value may be set to less than 5 seconds, however the DeviceMaster may not operate at any value less than 5. A recommended value to begin experimentation with is 10.*

5. Optionally, set the *TCP Timeout Multiplier* (Page 44) value.

   Note: *This value should not be modified unless the network connection to the DeviceMaster is very slow, such as, if a satellite uplink connection is involved. It is recommended that a value over 3 never be used.*

6. Optionally, click a different *Scan Rate (ms)* (Page 44).
7. Optionally, click **Verbose Event Log** if you want to log additional DeviceMaster information into the event log.
8. After making your changes, click **Apply** if you have additional configuration procedures or click **Ok** if you have completed configuring your Comtrol devices.

   Note: *If you do not **Apply** the changes, you will be prompted to **Apply**, **Ignore**, or **Cancel** the changes.*

The following table provides detailed information about **Device General** tab options for the DeviceMaster.

Device General Tab	Description
Device Name	This is the default name assigned by the driver and it cannot be changed. You can use the **User-Friendly Device Name** field to provide custom device names for your installation.
User-Friendly Device Name	Use this field to enter a more descriptive name. The name that you assign is not saved until you click **Apply** or **OK.**
Keep Alive Timeout (seconds) **Default = 120 seconds**	Use this option to set the amount of time in seconds that this DeviceMaster waits until it closed this connection and frees all the ports associated with it. The *Keep Alive feature* works in the following way. During normal operation the driver periodically sends a connection check to the DeviceMaster, and the DeviceMaster then returns a response. There are two timers: one in the driver, and one in the DeviceMaster. These timers are reset when a connection check signal is received. If a connection is broken, that is, a check is not received, the data is stored in the computer and/or the DeviceMaster. Depending on the amount of time that has expired since the connection was lost, the following happens: • When the computer loses its connection to the DeviceMaster but re-establishes it before the time-out period expires, any data transmitted during this period is queued and sent when the connection resumes. • When the computer loses its connection to the DeviceMaster and does not re-establish it before the time-out period expires; the driver then purges any pending I/O data for ports on that connection and returns all pending, and future I/O commands, with the exception of the **Close** command, to the application with an error indicating the disconnected status. This is similar to the processing which occurs when the computer receives a notification from the DeviceMaster that a port release request was processed on a port it owns with the exception that a different status is returned. When the connection is re-established, the computer will attempt to re-acquire the ports that were open when the connection was lost. If the attempt is successful, normal operations resume for the port. If any port fails to be acquired, then the computer will continue to fail all further I/O operations, with the exception of a **Close** request. When the **Close** request is received, the port can then be re-opened. • If the computer loses its connection and the time period expires, the DeviceMaster places the port into a state that another computer can establish a connection, locking out the original driver when a connection is made. The driver will respond to all I/O commands, with the exception of the **Close** command, with an error indicating the disconnected status. If the port is still available when the driver re-establishes a connection, then it will claim the port and allow I/O to resume.

Device General Tab	Description
TCP Timeout Multiplier **Default = 1ms**	Use the **TCP Timeout Multiplier** option to modify two timers used in TCP/IP socket communications. The first identifies how long the TCP protocol should wait before timing out an attempt to open a TCP channel. The **TCP Timeout Multiplier** default is 1 and the timer defaults to 500 ms when the TCP/IP address method is used to communicate with a device. If the **TCP Timeout Multiplier** is set to 2, the timer would now be 1000 ms, or 1 sec. If the multiplier is 4, the new time-out period would be 2000 ms, or 2 sec. The second timer defines how long the driver will wait for a response from the DeviceMaster when a forced release of a port is requested. This timer defaults to 8 seconds. If the **TCP Timeout Multiplier** is changed to 2, the timer would now be 16 seconds. If the multiplier is 4, the new time-out period would be 32 seconds.
Verbose Event Log **Default = Disabled**	Selecting this option causes detailed messages to be sent to the operating system *Event Log*. This added information can be useful when debugging communications and configuration problems
Scan Rate (ms)] **Default = 10ms**	Typically, you should leave the scan rate set to the default value (10 ms) for most applications. To adjust latency for time-critical applications, select a longer or shorter interval from the droplist, or type in the rate (2 to 50). If a value larger than 50 is entered, the maximum of 50 is implemented. ***Note:*** *The faster the scan rate (lower number), the higher the load on the system processor.*
Save Configuration	Click *Save Configuration* to save the *Device Settings* for use on another similar Comtrol device or to archive a copy of your environments settings.
Load Configuration	Click to *Load Configuration* to load the *Device Settings* previously saved using the **Save Configuration** feature. ***Note:*** *Configuration files must be for the same model with the same port density. For example, you cannot load a DeviceMaster PRO configuration file onto a DeviceMaster RTS or a configuration file for a 32-port DeviceMaster RTS onto a 4-port DeviceMaster RTS.*
Ok	Click **Ok** to save the changes made on this page and close the *Comtrol Drivers Management Console*.
Cancel	Cancels any changes made on this page.
Apply	Click **Apply** to save the settings on this page. If you do not click **Apply** before leaving this page, you will be prompted to **Apply** or **Cancel** the changes.
Defaults	Resets this screen to its default values.

Configuring COM Port Properties

This section discusses COM port configuration procedures for *DeviceMaster* NS-Link ports. If you want to change the starting NS-Link COM port number on the DeviceMaster, see *Configuring Device Settings* on Page 42.

If your application does not set COM port properties, use the *Device Manager* to access Ports (COM & LPT) to change the port parameters. If the application sets COM port properties, those settings take precedence over Windows COM port settings. The exception to this guideline is if you use the **Override and Lock Baud Rate** to option.

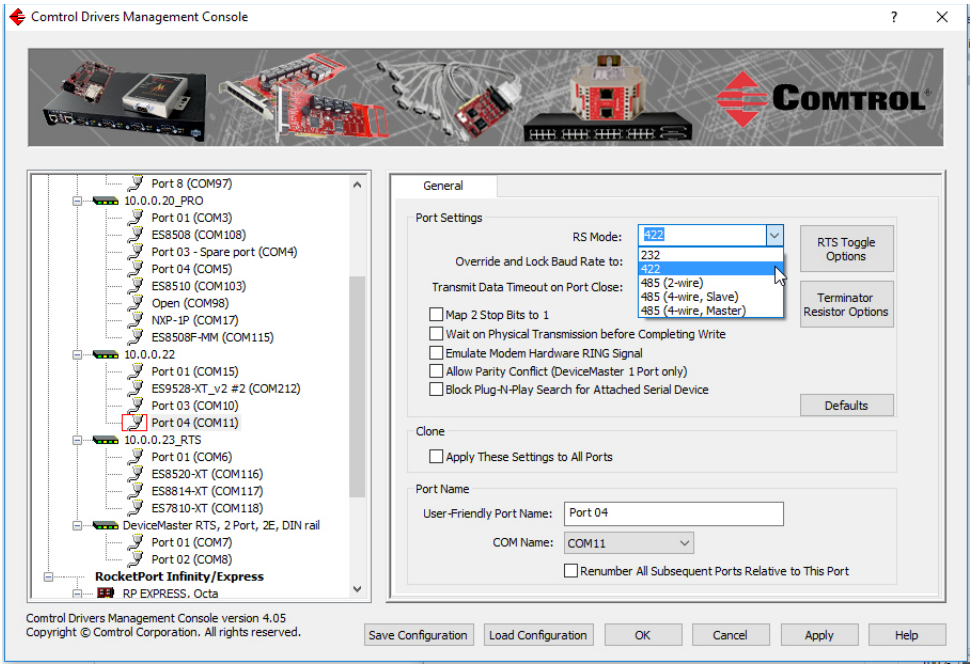
Use the following procedure to change NS-Link COM port settings on a *DeviceMaster* port or ports.

Caution

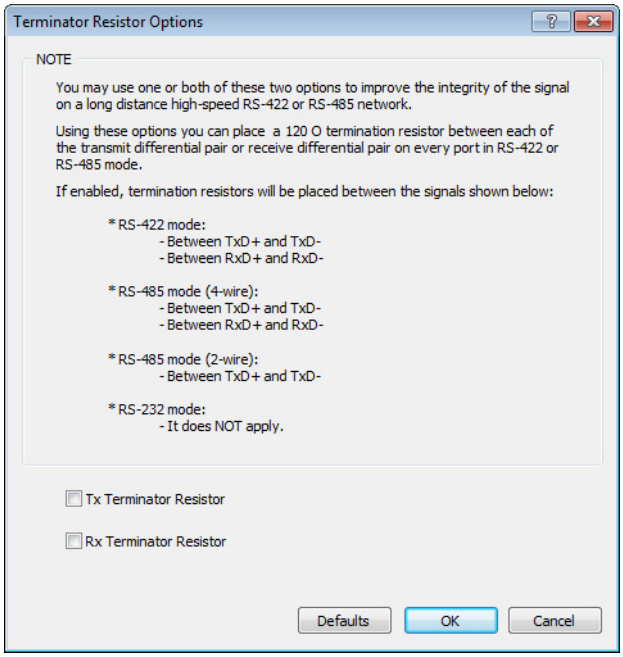
Do not connect RS-422/485 devices until the appropriate port interface type has been configured in the driver. The driver default port setting is RS-232.

1. Open *Comtrol Drivers Management Console* (Page 31).
2. Highlight the appropriate DeviceMaster.
3. Highlight the first port you want to configure.
4. Select the appropriate communications mode.

   Note: *The DeviceMaster Serial Hub only supports RS-232.*



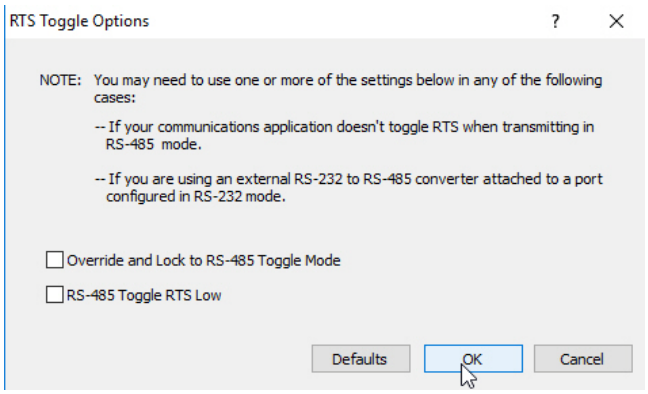
5. If your model supports Terminator Resistor Options, and you select RS-422 or RS-485, you may want to configure **Terminator Resistor** options. If so, click the *Terminator Resistor Options* button.
   a. Make the appropriate selections to reflect your configuration.
   b. Click **Ok**.



6. Enable the features that you require for your environment.

   Note: *You can use the help system or refer to the following table for information about each option.*

7. Optionally, click the *RTS Toggle Options* button:
   - If your communications application does not toggle FTS when transmitting in RS-485 mode.
   - If you are using an external RS-232 to RS-485 converter, which is attached to a port that is configured for RS-232.
   a. Click the appropriate options for your environment.
   b. Click **OK** to save the changes and return to the port **General** tab.



8. If desired, click the **Clone** check box to set all of the ports on this Comtrol device to these characteristics.
9. Optionally, change the **User-Friendly Port Name**.
10. If desired, select a different **COM Name** (NS-Link COM port number). The drop-down list displays (in use) next to COM port numbers that are already in use in this system. Do not duplicate COM port numbers as this will cause the ports to not function.

11. Click **Apply** to save these changes.

    Note: *If you selected RS-422 mode, make sure that there is not a device attached to the port and click* **Ok**.

12. Highlight the next port that you want to configure and perform Steps 4 through 11.

The following table provides information about the options on the port **General** tab.

Port Settings General Tab	Description
RS Mode **Default = RS-232**	Use this drop-down list to select the communications mode for the serial device that you will be connecting to this port. • RS-232 • RS-422 • RS-485 Mode provides these choices, depending on the model. ***Note:*** *The DeviceMaster LT and DeviceMaster RTS DIN rail models support RS-485 4-wire, Slave or Master. The DeviceMaster PRO and other DeviceMaster RTS models only support RS-485 2-wire.* - **RS-485 2-wire (half-duplex)** supports transmit and receive data. When data is transmitted, the Transmit Enable signal is activated, and the transmit receive device switches from receive to transmit automatically. - **RS-485 4-wire Master (full-duplex master)** supports transmit and receive data, which means both signals are always active. The DeviceMaster is enabled by the Transmit Enable signal. This mode is the same as RS-422. - **RS-485 4-wire Slave (full-duplex slave)** supports transmit and receive data. When data is transmitted, the Transmit Enable signal is activated, the transmit device goes active and starts sending data. When the data is not being sent, the transmit device is inactive. The receive device is always active. If you click RS-485, you may need to change settings in the *RTS Toggle Options* screen. ***Note:*** *The DeviceMaster Serial Hub only supports RS-232, the default value is RS-232 for other DeviceMasters.*
Override and Lock Baud Rate to **Default = None**	This option allows you to lock selected ports. You can select a value from the drop-down list or enter an appropriate value from the following standard baud rates: 300, 600, 1200, 1800, 2400, 3600, 4800, 7200, 9600, 14400, 19200, 38400, 57600, 115200, 230400, 460800, or 921600. After locking a baud rate, no matter what baud rate is selected in a host application, the *actual* rate used is the rate specified here.
Transmit Data Timeout Port Close **Default = 0**	This option allows you to select the length of time to wait for data to clear the transmit buffer after a host application has closed the port. This is typically used with serial devices such as printers, to give the data sufficient time to flush through the system.

Port Settings General Tab	Description
RTS Toggle Options	This button opens the RTS Toggle Options popup, which provides the following features: • **Override and Lock to RS-485 Toggle Mode** Use the **Override and Lock to RTS Toggle Mode** option to lock the port in RTS (Request to Send) toggle mode, then set the mode (low or high) as desired for RS-485 mode. • **RS-485 Toggle RTS Low** Use the **RTS Toggle RTS Low** option to toggle the RTS output signal low during data transmission, which may be needed for relay devices for RS-485. If the option box is not checked, RTS is toggled high (asserted) during data transmission for RS-485 mode. • **Defaults** Clicking the **Defaults** button returns all the values in the **RTS Toggle Options** popup to their default state: - **Override and Lock to RTS Toggle Mode** = Disabled - **RTS Toggle RTS Low** = Disabled
Terminator Resistor Options **(Specific Models, Only)**	Optionally, click the **Terminator Resistor** button to enable termination resistors. To ensure the best signal integrity on a long distance high-speed RS-422 or RS-485 network, sometimes it is required to place a 120Ω termination resistor between each of the transmit differential pair or receive differential pair. Signal reflection is reduced and a reliable communication is ensured by placing the 120Ω termination resistor. The DeviceMaster provides software controllable 120Ω termination resistor for each differential pair on every port in RS-422 and RS-485 mode. Use the Termination Resistor Options popup to place 120Ω termination resistors between the signals shown below: • RS-422 Mode - Between TxD+ and TxD- (Pins 5 and 7) - Between RxD+ and RxD- (Pins 4 and 2) • RS-485 Mode – Between TxD/RxD+ and TxD/RxD- (Pins 5 and 7)
Map 2 Stop Bits to 1 **Default = Disabled**	If your application is hard-coded to use two stop bits and you receive framing errors, click this check box to map 2 stop bits to 1 bit. Leave this check box blank to enable stop bits to pass through unchanged.
Wait on Physical Transmission before Completing Write **Default = Disabled**	This option forces all write packets to wait until the transmit data has physically completed the transmission before returning completion to the host application. The default mode (check box not clicked) is to buffer the data in the transmit hardware buffer, and return completion as soon as the packet is in the buffer.
Emulate Modem Hardware RING Signal **Default = Disabled**	Click this check box to emulate the ring indicator signal. If this box is checked and the port receives a *RING* signal (or an alternate code, as defined in the AT command set for the modem), it sends an *RI* signal to the communications application.
Allow Parity Conflict (DeviceMaster 1-Port only) **Default = Disabled**	Use this option to allow a parity conflict on a DeviceMaster 1-port. It may be necessary to use this option after you have determined that the cabling is correct and you are able to transmit data but not receive proper data.

Port Settings General Tab	Description
Block PnP search for attached serial device **Default = Disabled**	This option disables plug and play from searching for a device attached to the serial port. For example, data received during device discovery on a device is assumed to be a mouse to plug and play.
Clone: Apply all the settings to all ports **Default = Disabled**	If this check box is *not* clicked, changes apply to the selected port only. If this check box *is* clicked, changes apply to all ports on this board.
User-Friendly Port Name	You can enter a custom COM port name to identify this DeviceMaster in the *Comtrol Drivers Management Console*.
COM Name	The **COM Name** drop list allows you to renumber this COM port. If you see a COM port number followed by (in use), this means that Plug and Play sees those COM port numbers in use by another device. If you renumber this COM port and click the **Renumber All Subsequent Ports Relative to The Port** option, the device driver will renumber all of the ports on the DeviceMaster, starting with the number you select in this drop list. If you rename the port to a COM name used by another port, a dialog appears indicating that the port is already in use.
Renumber All Subsequent Ports Relative to the Port **Default = Disabled**	Use the **Renumber All Subsequent Ports Relative to This Port** option to renumber all subsequent ports on the DeviceMaster relative to the port displayed in the COM name drop list.
Defaults **Default = Disabled**	Click the **Defaults** button to return to the driver default values.

Network Configuration in Comtrol Drivers Management Console

Comtrol recommends using PortVision DX to configure network settings.

Note: *Use NS-Link / SocketServer (DeviceMaster web page) to configure IPv6 network settings.*

Optionally, you can use the *Comtrol Drivers Management Console* to:

- Disable IP communications.
- Change the IP address (if the MAC address has been associated to the DeviceMaster), see *Changing a Static IPv4 Address* on Page 51.
- Configure the DeviceMaster for use with DHCP, see *Setting Up DHCP (IPv4)* on Page 52.

Disabling IPv4 Mode

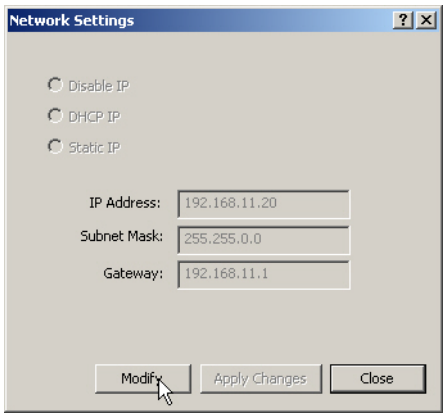
Use this procedure if you want to disable IP communications.

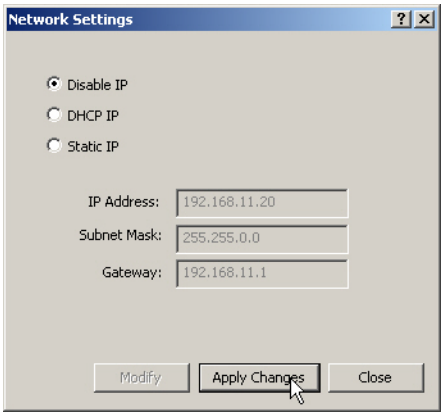
1. If necessary, access the *Comtrol Drivers Management Console*.

   Note: *The DeviceMaster must be operational in MAC mode on a local network segment or connected directly to the PC (Associating the MAC Address on Page 36).*

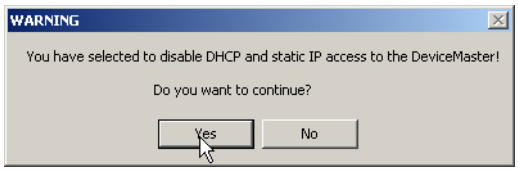
2. Make sure that the **MAC Mode** radio button has been selected.
3. Highlight the *Device Name* of the DeviceMaster that you want to configure.
4. Click the **Network Settings** button.
5. Click the **Modify** button.
6. Click **Disable IP**.

   You can use the **Disable IP** option if you are not using IP addressing (DHCP or static) and operating the DeviceMaster in MAC mode.





7. Click the **Apply Changes** button.
8. Click **Yes** to the *Warning* popup.



After the DeviceMaster is rebooted, the following occurs:

- In PortVision DX, the IP address displays as 0.0.0.0.
- In the *Comtrol Drivers Management Console*:

- The IP address in the *Network Settings* popup displays 255.255.255.255.
- If the DeviceMaster had been set to *IP Mode*, the previously programmed IP address will appear in the **IP Mode** text box. You can delete the IP address from the **IP Mode** text box and click **Apply** to clear the IP address from the text box.

9. Click **Close** to return to the *Comtrol Drivers Management Console*.

After disabling IP communications, you may need to do the following:

- Configure device properties, see *Configuring Device Settings* on Page 42.
- Configure COM port properties, see *Configuring COM Port Properties* on Page 45.
- Configure any of the DeviceMaster ports as sockets, see *Configuring DeviceMaster Ports as Sockets* on Page 54.

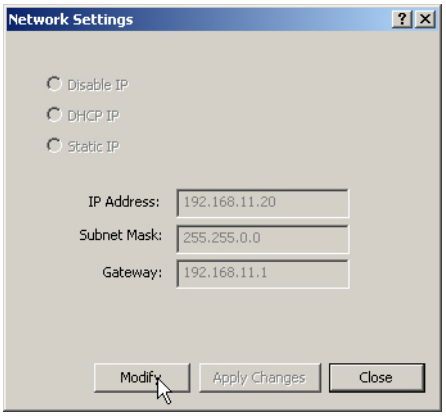
Changing a Static IPv4 Address

Typically, PortVision DX is used to program the IP address into the DeviceMaster during initial configuration. After associating the DeviceMaster with the MAC address you can change the IP address using the *Comtrol Drivers Management Console*.

1. Before programming an IP address it is critical that the DeviceMaster be *operational* (the PWR or Status LED is lit) when configured for the MAC address (*Associating the MAC Address* on Page 36).

   Note: *If the DeviceMaster is NOT operational, do NOT attempt to program or use an IP address with the DeviceMaster.*

2. Highlight the *Device Name* of the DeviceMaster that you want to configure.
3. Click the **Network Settings** button.
4. Click the **Modify** button.
5. Click **Static IP**.
6. Enter static IP address information in the fields below.

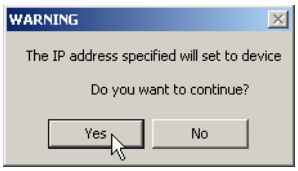


   a. **IP Address**: Enter a valid IP address for your network. The IP Address field is the IP address programmed into the DeviceMaster after applying the changes and rebooting the DeviceMaster. See your network administrator for a valid IP address.

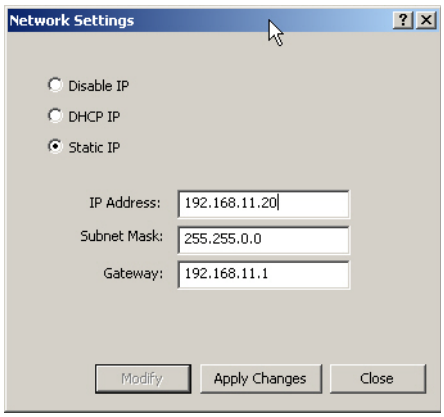
   b. **Mask**: The subnet mask is a 32-bit value (255.x.x.x) that enables IP packets to distinguish the network ID and host ID portions of the IP address that filters traffic.

   c. **Gateway**: The default gateway is a TCP/IP configuration item that is the IP address of a directly reachable IP router.

7. Click **Apply Changes** to begin programming the DeviceMaster.
8. Click **Yes** to the *WARNING* popup message.



9. Click **Yes** to the next *WARNING* popup message about rebooting the DeviceMaster.



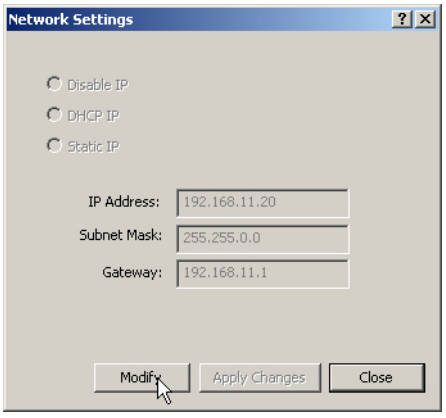
   If you do not reboot the DeviceMaster at this time, the IP address is not implemented on the DeviceMaster. Failure to reboot at this time can cause network communication problems later, if the IP address is not programmed into the DeviceMaster. Comtrol support recommends rebooting the DeviceMaster at this point.
10. Click **Close** to return to the **Device General** tab.
11. Optionally, you can click the *Advanced* tab and verify that the *Device Status* message indicates that the Device is active and Ok.
12. After programming the IP address, you may need to do the following:
    - Configure device properties, see *Configuring Device Settings* on Page 42.
    - Configure COM port properties, see *Configuring COM Port Properties* on Page 45.
    - Configure any of the DeviceMaster ports as sockets, see *Configuring DeviceMaster Ports as Sockets* on Page 54.

Setting Up DHCP (IPv4)

After associating the DeviceMaster with the MAC address you can configure the driver to work using DHCP.

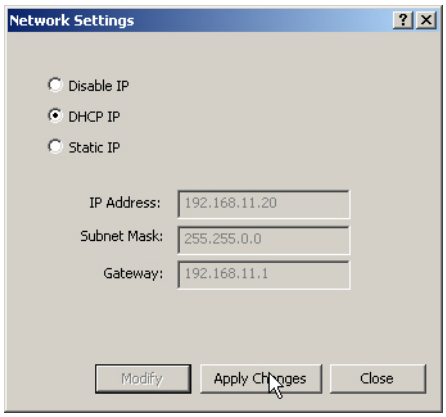
1. Before programming an IP address it is critical that the DeviceMaster be *operational* (the PWR or Status LED is lit) when configured for the MAC address (*Associating the MAC Address* on Page 36).

   Note: *If the DeviceMaster is NOT operational, do NOT attempt to program or use an IP address with the DeviceMaster.*

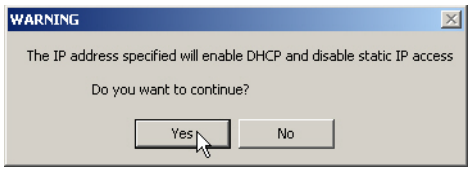


2. Highlight the *Device Name* of the DeviceMaster that you want to configure.
3. Click the **IPv4 Mode** radio button.
4. Click the **Network Settings** button.
5. Click the **Modify** button.

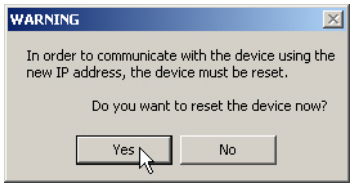
6. Click **DHCP IP**. This option allows DHCP to assign the IP address. Make sure that you provide the MAC address of the DeviceMaster for the network administrator to assign a static IP address from the pool. The DHCP server should assign the IP address, mask, and IP gateway.



7. Click **Apply Changes**.
8. Click **Yes** to the *WARNING* popup message.



9. Click **Yes** to the next *WARNING* popup message.



   If you do not reboot the DeviceMaster at this time, the IP address is not implemented on the DeviceMaster. Failure to reboot at this time can cause network communication problems. Comtrol support recommends resetting the DeviceMaster.

   After the DeviceMaster reboots, the following occurs:

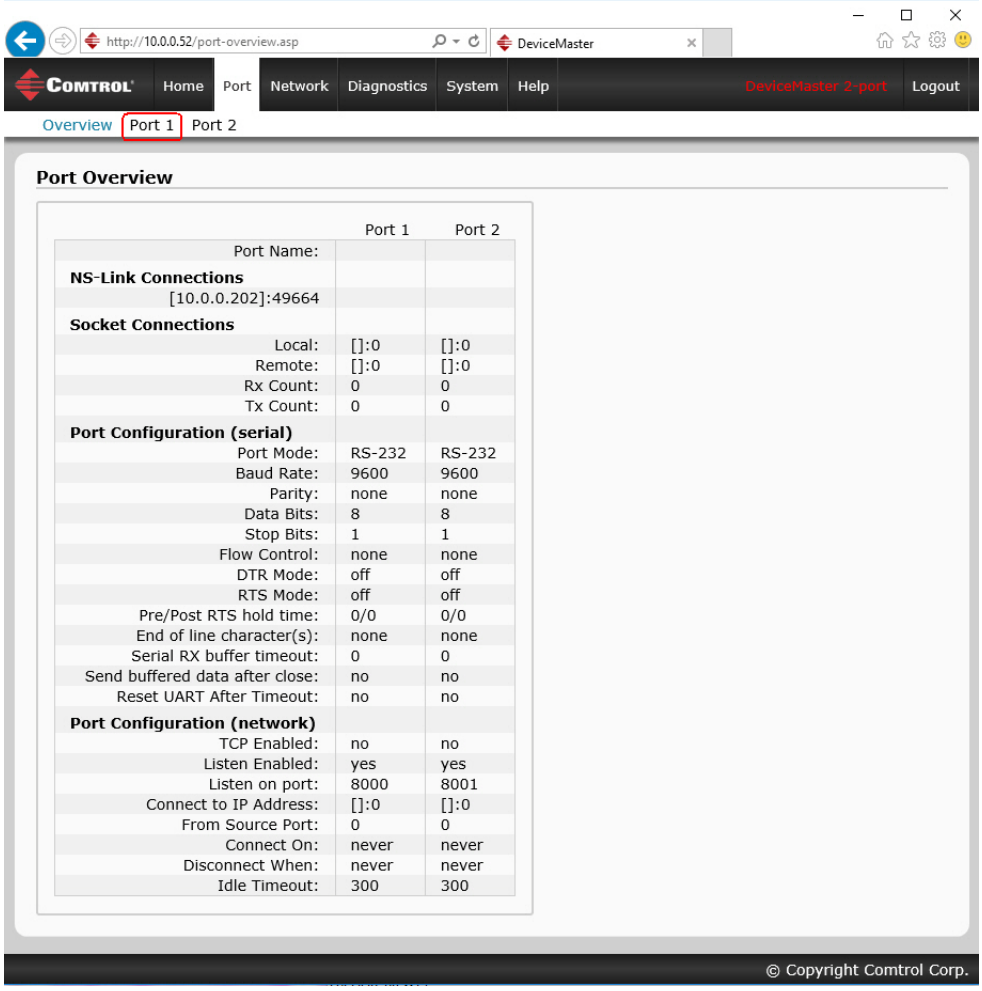
   - The *Comtrol Drivers Management Console* displays the IP address (0.0.0.0) and subnet mask (255.255.0.0) values in the *Network Settings* popup.
   - PortVision DX will display the IP address assigned by DHCP.

10. Click **Close** to return to the **Device General** tab.
11. Optionally, you can click the *Advanced* tab and verify that the *Device Status* message indicates that the *Device is active and Ok*.
12. After programming the IP address, you may need to do the following:
    - Configure device properties, see *Configuring Device Settings* on Page 42.
    - Configure COM port properties, see *Configuring COM Port Properties* on Page 45.
    - Configure any of the DeviceMaster ports as sockets, see *Configuring DeviceMaster Ports as Sockets* on Page 54.

Configuring DeviceMaster Ports as Sockets

DeviceMaster ports can also be configured as sockets. To configure sockets, use the following procedure:

1. Use one of these methods to open the socket configuration web interface (SocketServer).
   - In PortVision DX, right-click the DeviceMaster and click **Webpage**.
   - Enter the IP address of the DeviceMaster in your web browser URL field or highlight the DeviceMaster in PortVision DX and click **Web Manager**.
2. Click the **Port** tab and click the port number that you want to configure as a socket in the *Port Overview* page.



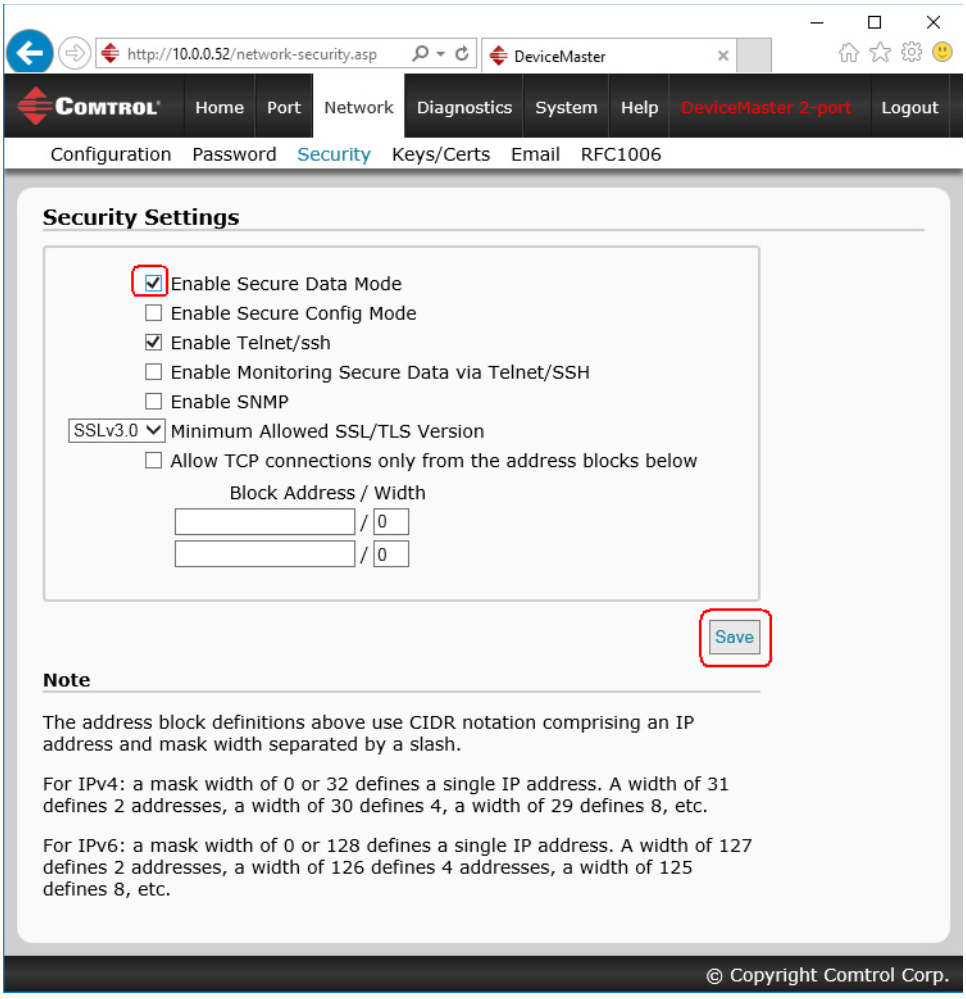
See the web page help system, if you need information about configuring sockets or serial tunneling. Optionally, you can refer to the *DeviceMaster Installation and Configuration Guide*.

The web page help is also available separately if you want a local copy on your host system. The help files can be downloaded at: http://downloads.comtrol.com/dev_mstr/rts/software/SocketServer/help/ssvr_help.zip.

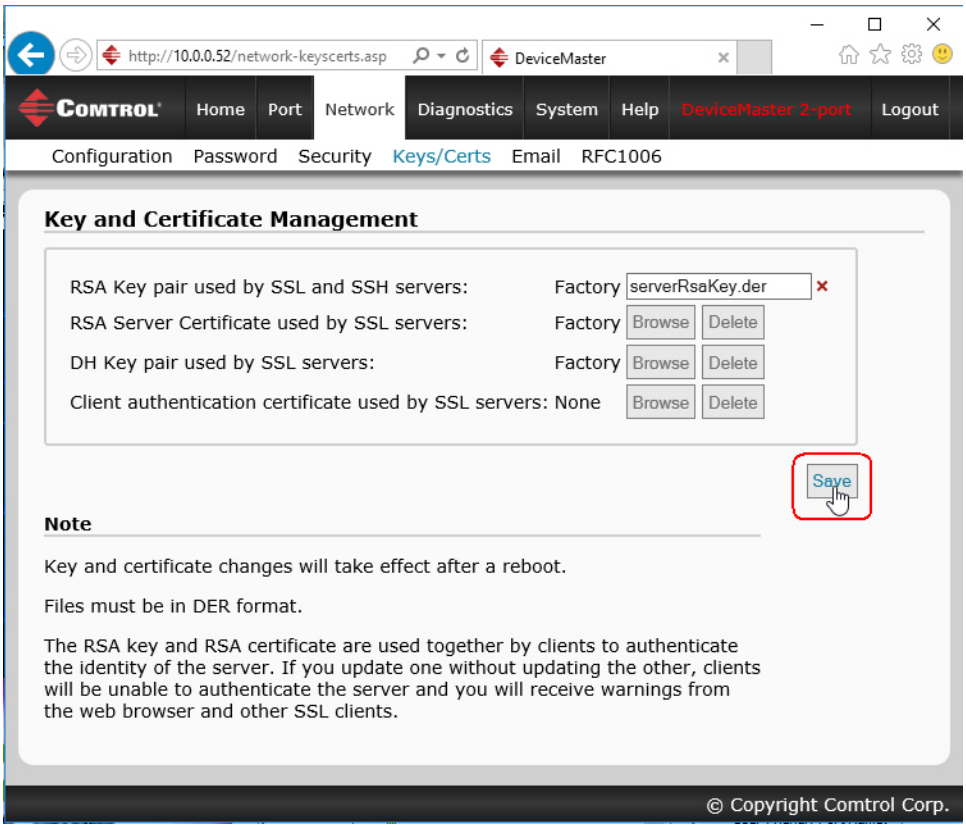
Enabling Secure Data Mode

In addition to enabling SSL mode in the driver, you must **Enable Secure Data Mode** in the NS-Link web page. Use the following procedure to implement the **Enable Secure Data Mode** option.

1. Access the NS-Link web page using one of these methods:
   - Open your web browser, enter the IP address, and click enter.
   - Right-click the DeviceMaster in the *Device Tree* or *Device List* pane in PortVision DX and click **Webpage**.
2. Click the **Network** tab.
3. Click the **Security** tab.
4. Click **Enable Secure Data Mode**.
5. Optionally, set other security options and then click **Save**.



6. Click **Keys/Certs** to configure your security key and certificate.
7. Use the **Browse** button to locate your key or certificate and when you are done, click **Save**.



Click the **Help** button if you need information about key and certificate management.

Using Driver Configuration Files

The *Comtrol Drivers Management Console* supports saving device driver configuration files, which provides:

- Back-up for existing driver configuration settings
- Ability to configure multiple of the same devices with the same configuration parameters
- Save the driver configuration settings because you need to remove a driver version to install a new driver version and you want to reload the driver configuration settings into the new driver

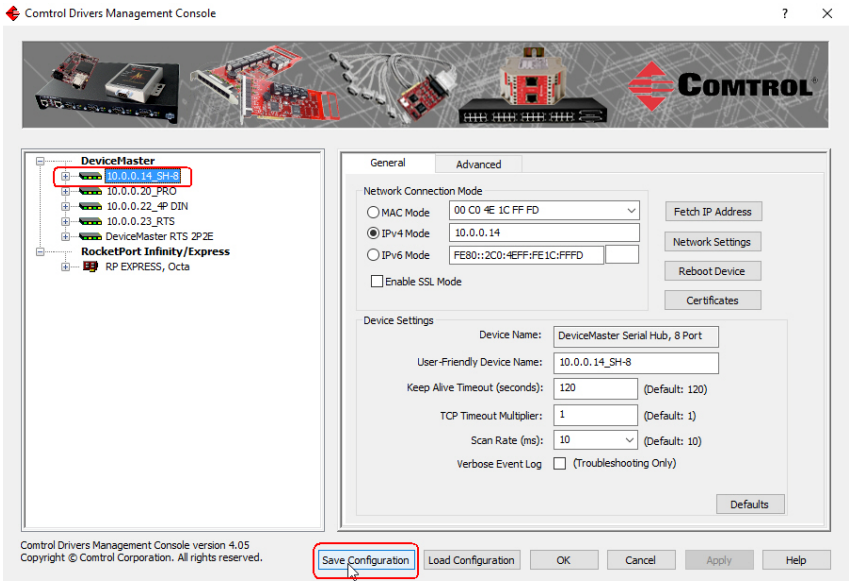
Note: *Configuration files must be for the same model with the same port density. For example, you cannot load a DeviceMaster PRO configuration file onto a DeviceMaster RTS or a configuration file for a 32-port DeviceMaster RTS onto a 4-port DeviceMaster RTS.*

Configuration files are saved with a **.DCF** extension.

Saving Driver Configuration Files

Use the following procedure to create and save a configuration file.

1. After configuring the device and ports, click **Save Configuration**.



2. Optionally, change the default file name and click **Save**.

Loading a Driver Configuration File

You must have previously saved a configuration file before you can load a configuration file. The driver configuration file uploads in portions:

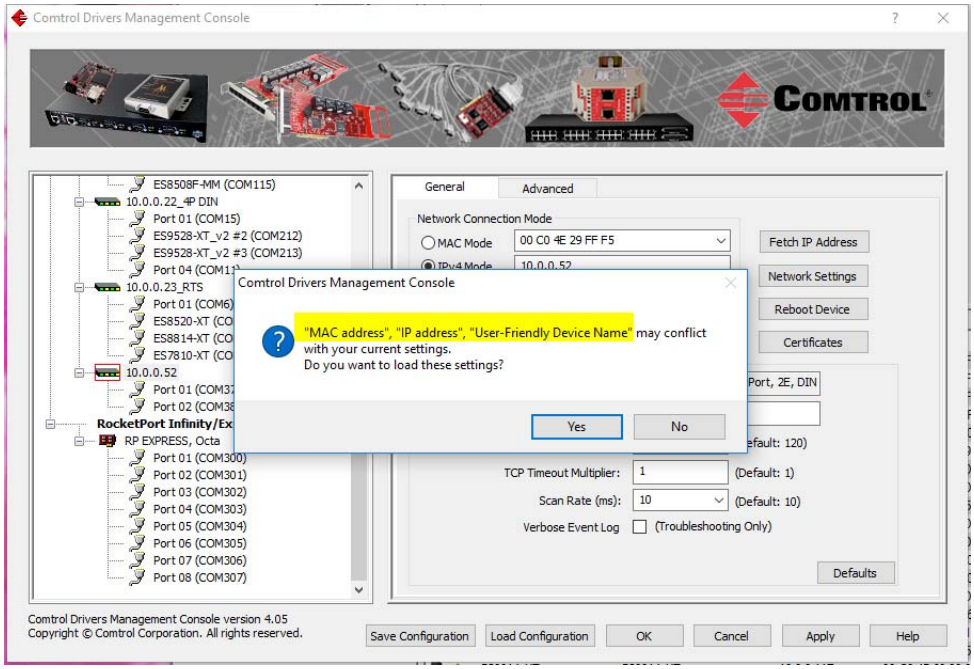
- If you highlight a device and click **Load Configuration** and **Apply** for the *device-level* configuration parameters to reload on the device.
- To load *port-level* configuration parameters, you must highlight a single port and click **Load Configuration** and **Apply**. You must upload each port's configuration parameters separately.

Loading Device Configuration

Use the following procedure to load the configuration file for device-level information for your device.

1. If necessary, open the *Comtrol Drivers Management Console*.
2. Depending on your operating system, you may need to click **Yes** to the *Do you want to allow the following program to make changes to this computer?* User Account Control message.
3. In the left pane, highlight the device for which you want to load the device-level settings from the configuration file.
4. Click **Load Configuration**.
5. Browse to the location of the configuration file that you want to load.
6. Highlight the configuration file and click **Open**. The configuration file loads in a few moments.
7. Make the appropriate choice for your situation:
   - Click **No** to the *ComtrolApplet* message, if you are using the file to set up multiple devices with the same device-level settings.
   - Click **Yes** to the *ComtrolApplet* message, if you are using the file to restore a specific device.

   Note: *Make sure that if this a configuration from another DeviceMaster, you must either select the correct MAC address from the drop list or enter the correct MAC address. In addition, make sure that the correct IP associated with this DeviceMaster.*



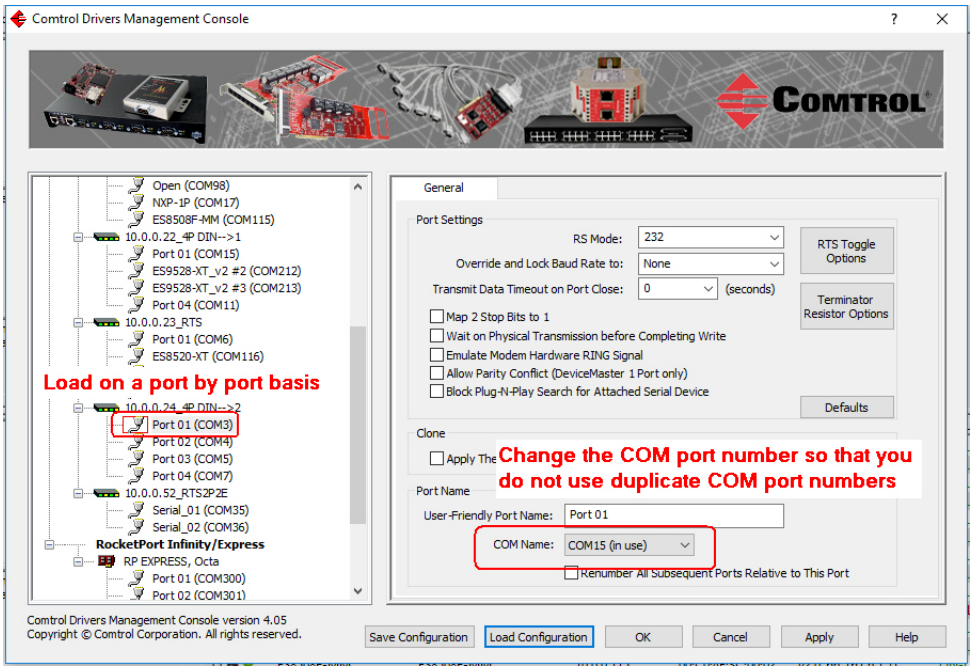
8. Click **Apply** so that the configuration is saved on the device.
9. Go to the next procedure if you want to restore port settings from a configuration file.

Loading Port Configuration

Use the following procedure to load the configuration file for port-level settings for your device.

Note: *Device driver configuration files must be for the same model with the same port density. For example, you cannot load a DeviceMaster PRO configuration file onto a DeviceMaster RTS or a configuration file for a 32-port DeviceMaster RTS onto a 4-port DeviceMaster RTS.*

1. If necessary, open the *Comtrol Drivers Management Console*.
2. Depending on your operating system, you may need to click **Yes** to the *Do you want to allow the following program to make changes to this computer?* User Account Control message.
3. In the left pane, highlight the port for which you want to load the port-level settings from the configuration file.
4. Click **Load Configuration**.
5. Browse to the location of the configuration file that you want to load.
6. Highlight the configuration file and click **Open**. The configuration file loads in a few moments.
7. Make the appropriate choice for your situation:
   - Click **No** to the *ComtrolApplet* message, if you are using the file to set up multiple devices with the same port-level settings.
   - Click **Yes** to the *ComtrolApplet* message, if you are using the file to restore a specific device.



Note: *Make sure that you do not duplicate COM port numbers. Simply change the COM port number assignment before applying the changes.*

8. Click **Apply** so that the configuration is saved on the device.
9. Repeat Steps 3 through 8 for each port that you want to restore.

Removing the DeviceMaster and Driver

This section discusses:

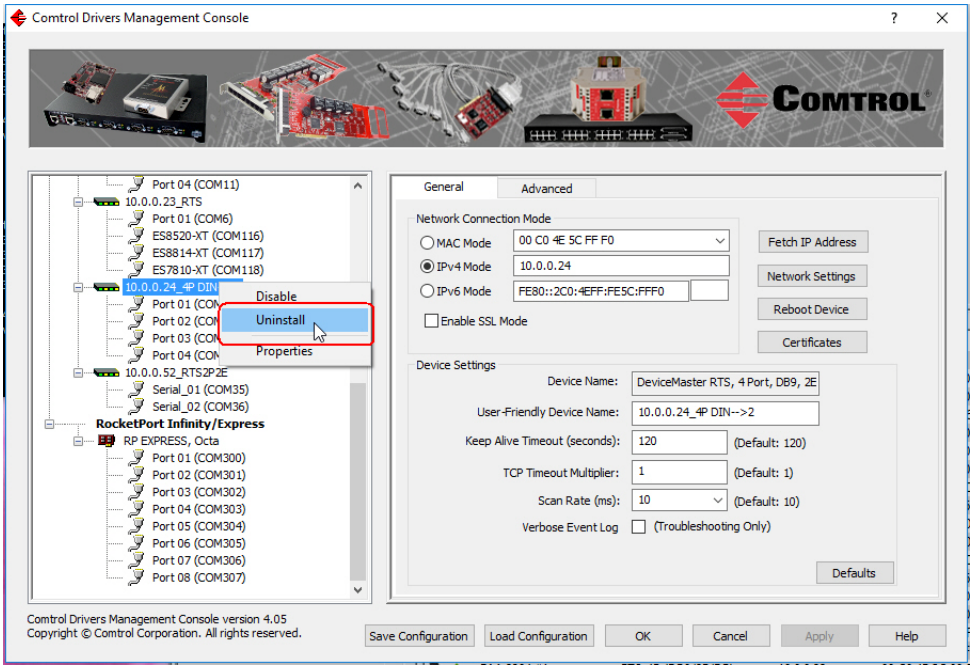
- Removing a DeviceMaster from an installation without removing the NS-Link device driver from your system
- *Removing the NS-Link Device Driver* from your system

Removing a DeviceMaster

Use the following procedure to uninstall the device driver.

Note: *Administrative privileges are required to remove device drivers on Windows operating systems newer than Windows Server 2003.*

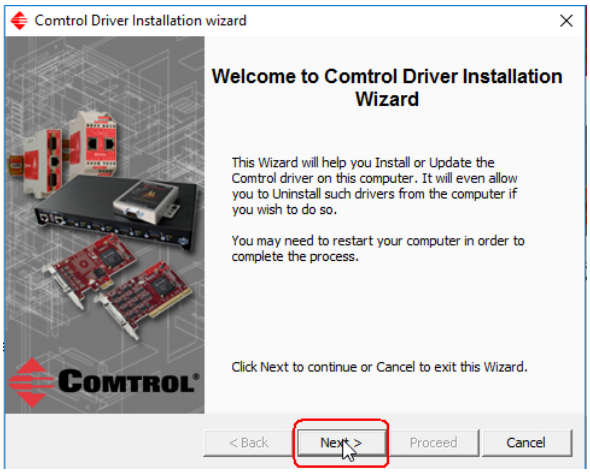
1. Right-click the DeviceMaster that you want to uninstall in the *Tree View* pane.
2. Click **Uninstall**.



Removing the NS-Link Device Driver

Use the following procedure to remove the DeviceMaster device driver.

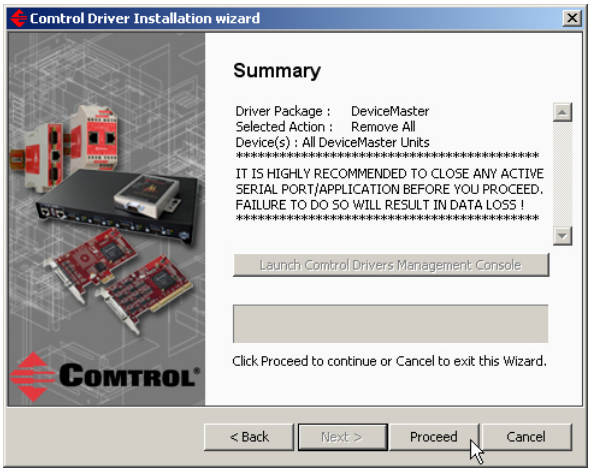
1. From the **Start** button, click the shortcut for your DeviceMaster: **Comtrol >DeviceMasterDriver Installation Wizard**.
2. Click **Yes** to the *Do you want to allow this app to make changes to your device?* message.
3. Click **Next** to start the *Comtrol Driver Installation Wizard*.
4. Click **Remove All** and **Next**.



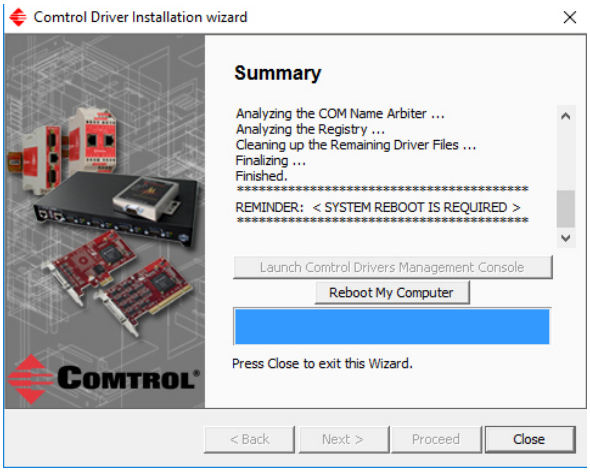
5. Click **Next** to remove the driver.

6. Click **Next** to clean up the driver removal.

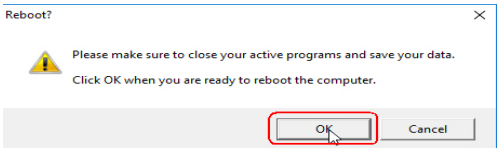
7. Click **Proceed** to continue the driver removal process.



8. Click the **Reboot My Computer** button or **Close**.



- If you click **Close**, make sure that you reboot the system and remove the adapter to complete the driver removal.
- If you click **Reboot My Computer**, click **Ok**.



9. Shutdown the system and disconnect the DeviceMaster from your network.
10. If you want to totally remove the **.exe** driver assembly:
    a. Delete any copies of the **.exe** driver assembly file residing on the system.
    b. Delete the driver and devices using the **Add > Remove Programs** *Control Panel*.

Troubleshooting and Technical Support

This section contains troubleshooting information for your DeviceMaster and the NS-Link device driver. You should review the following subsections before calling Technical Support because they will request that you perform many of the procedures or verifications before they will be able to help you diagnose a problem.

If you cannot diagnose the problem, you can contact *Technical Support* on Page 87.

How to Find Diagnostic Tools and Utilities

There are several tools and utilities that Comtrol provides to diagnose serial port problems or to monitor data.

- The **Advanced** tab in the *Comtrol Drivers Management Console* (*Using the Advanced Tab* on Page 72), which may provide valuable information about the DeviceMaster and your network, in the event that you are having problems.
- PortVision DX (Page 7) that provides the following features:
  - Auto-discover and organize Comtrol Ethernet attached products on your network.
  - Remotely access, manage, and configure Comtrol Ethernet attached products from a central console.
  - Load network configuration settings onto multiple Comtrol Ethernet attached products - quickly and easily.
  - Instantly view connection status, firmware revision, and network settings of all servers.
  - Configure serial ports using TCP sockets, port communication, and interface settings.
  - Visualize each server and port with instant links to connector, power, and serial pinout information.
  - Conveniently customize and save your network view and commands for replication across all servers.
  - Includes the **Test Terminal** (WCom2) and **Port Monitor** (PMon2) programs for easy access.
    - **Test Terminal** can be used to troubleshoot communications on a port-by-port basis.
    - **Port Monitor** can check for errors, modem control, and status signals. In

addition, it provides you with raw byte input and output counts

Test Terminal and Port Monitor are installed and available if you install PortVision DX. You can refer to the *Port Monitor and Test Terminal User Guide* for testing procedures.

Troubleshooting Checklist

Most customer problems reported to Comtrol Technical Support are eventually traced to cabling or network problems.

Reboot the system and reset the power on the DeviceMaster, watch the **PWR** or **Status** light activity. See *DeviceMaster LEDs* on Page 70 for information about the diagnostic LEDs.

- If the DeviceMaster has a power switch, turn the DeviceMaster power switch off and on.
- If the DeviceMaster does not have a power switch, disconnect and reconnect the power cord.

PWR or Status LED	Description
5 sec off, 3 flashes, 5 sec off, 3 flashes ...	Redboot checksum failure.
5 sec off, 4 flashes, 5 sec off, 4 flashes ...	SREC load failure.
5 quick flashes	The default application is starting up.
10 sec on, .1 sec off, 10 sec on .1 sec off ...	The default application is running.

The following table may help you diagnose your problem:

Issue	Check
Cabling?	Verify that you are using the correct types of cables on the correct connectors and that all cables are connected securely using the *DeviceMaster Installation and Configuration Guide* (Page 7).
Network?	• Isolate the DeviceMaster from the network by connecting the DeviceMaster directly to a NIC in a host system. • See *Connectivity Requirements* on Page 68 for network cabling information. • Reduce network traffic by installing a second NIC in the host and connect directly to the DeviceMaster. • Verify that the Ethernet hub, switch, or router and any other network devices between the system and the DeviceMaster are powered up and operating.
Correct MAC address?	Verify that the hardware MAC address in NS-Link matches the address on the DeviceMaster label. You can also use PortVision DX to verify the MAC and IP addresses.
Correct IP address?	• Verify that the network IP address is correct. If IP addressing is being used, the system should be able to ping the DeviceMaster. • Verify that the IP address programmed into the DeviceMaster matches the unique reserved IP configured address assigned by the system administrator.

Issue	Check
Correct port addressing?	If using the NS-Link device driver with an in-house application, verify that you are addressing the port correctly. In many applications, device names above COM9 require the prefix **\\.** in order to be recognized. For example, to reference COM20, use **\\.\COM20** as the file or port name.
Is this the Latest Driver?	See *Checking the Device Driver Version* on Page 22.
Test the Port or Ports?	Install PortVision DX (Page 10) and use Test Terminal (Page 81).
Comtrol Drivers Management Console?	Verify that the DeviceMaster has installed using the Comtrol Drivers Management Console to confirm that the DeviceMaster displays. Install the device driver, if the DeviceMaster is not displayed.
Enable Verbose mode	Enable the **Verbose Event Log** feature on the **Device General** and then reboot the system.

Note: *If you have a spare DeviceMaster, try replacing the DeviceMaster.*

General Troubleshooting

This table illustrates some general troubleshooting tips.

Note: *Make sure that you have reviewed the Troubleshooting Checklist on Page 66.*

General Condition	Explanation/Action
PWR or **Status** LED flashing	Indicates that boot program has not downloaded to the DeviceMaster. 1. If applicable, remove the NS-Link driver. 2. Make sure that you have downloaded the most current driver from ftp://ftp.comtrol.com/dev_mstr/rts/drivers/win7. 3. Install the driver and configure the DeviceMaster using the MAC address. Make sure that you reboot the system. Refer to *NS-Link Device Driver Installation* on Page 17 for installation information. ***Note:*** *If the PWR or Status LED is still flashing, contact Technical Support.*
PWR or **Status** LED not lit	Indicates that power has not been applied or there is a hardware failure. Contact Technical Support.

General Condition	Explanation/Action
Can ping the Comtrol device, but cannot open the ports from a remote location. (You must have previously programmed the IP address, subnet mask, and IP gateway.)	The NS-Link driver uses Port 4606 (**11FE** h) to communicate with the DeviceMaster. When using a *sniffer* to track NS-Link packets, filtering for Port 4606 will easily track the packet. The packet should also contain the MAC address of the DeviceMaster and the originating PC so that it can be determined if the packet is able to travel the full distance one way or not. If the 4606 packet is found on one side of a firewall or router, using sniffer, and not on the other side, then that port needs to be opened up to allow the 4606 to pass. This will most often be seen with firewalls, but is also seen in some routers.
Cannot ping the device through Ethernet hub, switch, or router	Isolate the DeviceMaster from the network. Connect the DeviceMaster directly to the NIC in the host system (see *Connectivity Requirements* on Page 68).
Cannot ping or connect to the DeviceMaster	The DeviceMaster family default IP address is often not accessible due to the subnet masking from another network unless **192.168** is used in the network. In most cases, it will be necessary to program in an address that conforms to your network. If you do not use the NS-Link driver to program the IP address, you only have 10 seconds to disable the bootloader with Redboot to get into the setup utility. See the *DeviceMaster Installation and Configuration Guide* (Page 7) for the Redboot method of programming an IP address.

Connectivity Requirements

An Ethernet connection: either to an Ethernet hub, switch, or router; or to a Network Interface Card (NIC) in the host system using a standard Ethernet cable. See the *DeviceMaster Installation and Configuration Guide* (Page 7) for information regarding hardware installation.

Product Type	Connected to	Connector Name
DeviceMaster RTS 1-port	Hub, switch, router, or NIC	10/100 ETHERNET
DeviceMaster RTS Embedded	Hub, switch, router, or NIC	RJ45 port (not labeled)
DeviceMaster RTS 2-port 1E	NIC Hub, switch, or router	10/100
DeviceMaster RTS 2-port 2E	NIC Hub, switch, or router	10/100 1E/2E

Product Type	Connected to	Connector Name
DeviceMaster RTS 4/8/16-port (*external* power supply)	NIC	DOWN
	Hub, switch, or router	UP
DeviceMaster RTS 16/32RM (*internal* power supply)	Hub, switch, router, or NIC	10/100 NETWORK
DeviceMaster PRO 8/16-port	NIC	DOWN
	Hub, switch, or router	UP
DeviceMaster Serial Hub 8-port	NIC	DOWN
	Hub, switch, or router	UP
DeviceMaster Serial Hub 16-port	Hub, switch, router, or NIC	10/100 NETWORK

DeviceMaster LEDs

The DeviceMaster has network and port LEDs to indicate status.

Port LEDs

Port LEDs are amber and green on 4, 8, 16, and 32-port. The 1-port and 2-port models do not have port LEDS. After a port has been opened in RS-232 mode, an amber LED means that there is link between the port and the serial device. After a port has been opened in RS-422 or RS-485 mode, an amber LED means that data is receiving data. A green port LED indicates transmit activity.

Network and Device LEDs

The LEDs indicate that the default DeviceMaster application, NS-Link/ SocketServer is running or after driver installation, that the NS-Link driver loads. If you have loaded PortVision DX, you can check the DeviceMaster status on-line.

Ports	Model	Network LEDs
1	**DeviceMaster RTS**	• The **Status** LED on the front of the unit is lit, which indicates that it has power and has completed the boot cycle. ***Note:*** *The **Status** LED flashes while booting and it takes approximately 15 seconds for the bootloader to complete the cycle. When the Bootloader completes the cycle, the LED has a solid, steady light that blinks approximately every 10 seconds.* • The red **Link Act** LED is lit, which indicates a working Ethernet connection. • If the red **Duplex** LED is lit, it indicates full-duplex activity. • If the red **100** LED is lit, it indicates a working 100 MB Ethernet connection (100 MB network, only).
1	**DeviceMaster RTS Embedded**	The LEDs are located between the RJ45 connector and the power terminal block. • The amber **Status** LED (**D1**) on the adapter is lit, which indicates that it has power and has completed the boot cycle. ***Note:*** *The **Status** LED flashes while booting and it takes approximately 15 seconds for the bootloader to complete the cycle. When the Bootloader completes the cycle, the LED has a solid, steady light that blinks approximately every 10 seconds.* • The red **Link Act** LED (**D2**) is lit, which indicates a working Ethernet connection. • If the red **Duplex** LED (**D3**) is lit, it indicates full-duplex activity. • If the red **100** LED (**D4**) is lit, it indicates a working 100 MB Ethernet connection (100 MB network, only).
2	**DeviceMaster RTS**	• The **STATUS** LED on the device is lit, indicating you have power and it has completed the boot cycle. ***Note:*** *The **STATUS** LED flashes while booting and it takes approximately 15 seconds for the Bootloader to complete the cycle. When the Bootloader completes the cycle, the LED has a solid, steady light that blinks approximately every 10 seconds.* • If the **LINK** (green) LED is lit, it indicates a working Ethernet connection. • If the **ACT** (yellow) LED flashes, it indicates network activity.

Ports	Model	Network LEDs
4 **8** **16**	**DeviceMaster PRO (8)** **DeviceMaster RTS†** **DeviceMaster Serial Hub (8)**	• The **PWR** LED on the front of the unit is lit, which indicates it has power and has completed the boot cycle. ***Note:*** *The **PWR** LED flashes while booting and it takes approximately 15 seconds for the bootloader to complete the cycle. When the Bootloader completes the cycle, the LED has a solid, steady light that blinks approximately every 10 seconds.* • The red **LNK/ACT** LED is lit, which indicates a working Ethernet connection. • If the red **100** LED is lit, it indicates a working 100 MB Ethernet connection (100 MB network, only).
16 **32**	**DeviceMaster PRO (16)** **DeviceMaster RTS††** **DeviceMaster Serial Hub (16)**	• The **Status** LED on the front of the unit is lit, which indicates it has power and has completed the boot cycle. ***Note:*** *The **Status** LED flashes while booting and it takes approximately 15 seconds for the bootloader to complete the cycle. When the Bootloader completes the cycle, the LED has a solid, steady light that blinks approximately every 10 seconds.* • The red **LNK/ACT** LED is lit, which indicates a working Ethernet connection. • If the red **Duplex** LED is lit, it indicates full-duplex activity. • If the red **100** LED is lit, it indicates a working 100 MB Ethernet connection (100 MB network, only).
† External power supply. †† Internal power supply.		

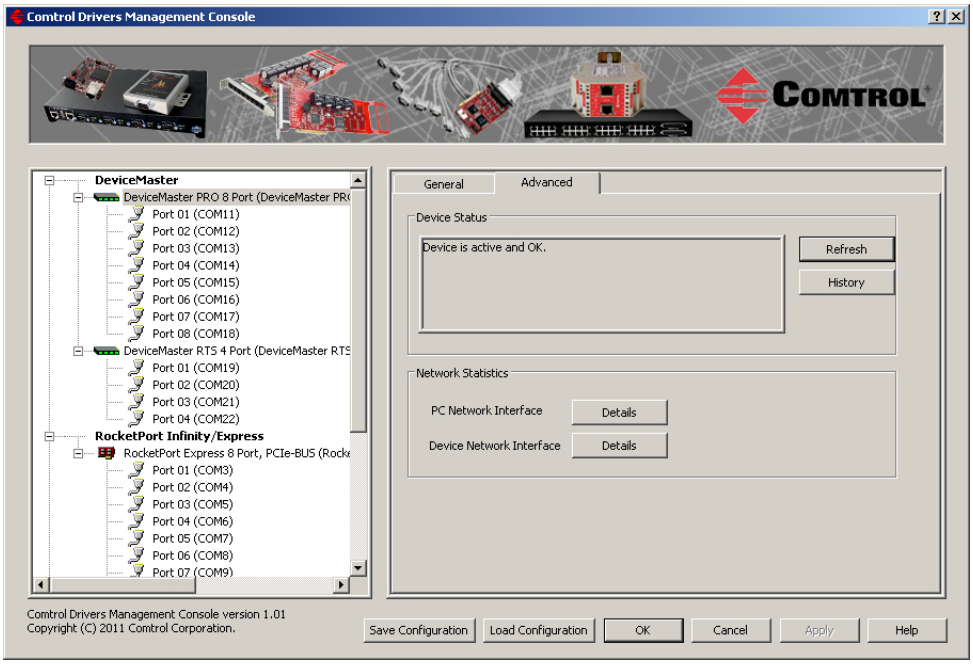
Using the Advanced Tab

You can use the **Advanced** tab to get a summary of the DeviceMaster status. The **Advanced** tab can be useful for troubleshooting network problems with your DeviceMaster.

Note: *To use the **Advanced** tab, you must associate a MAC address to the DeviceMaster before programming an IP address (Page 36).*

Use the following procedure to access the **Advanced** tab.

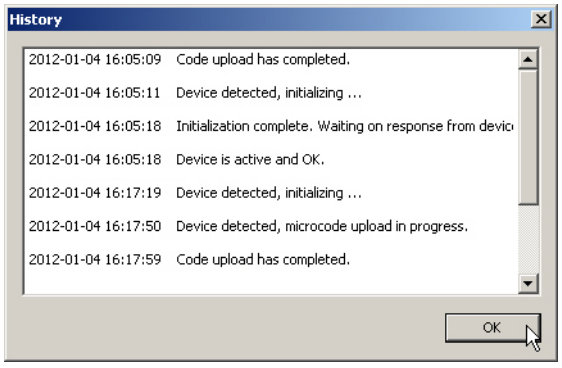
1. If necessary, access the *Comtrol Drivers Management Console*.
2. Highlight the DeviceMaster.
3. Click the **Advanced** tab.



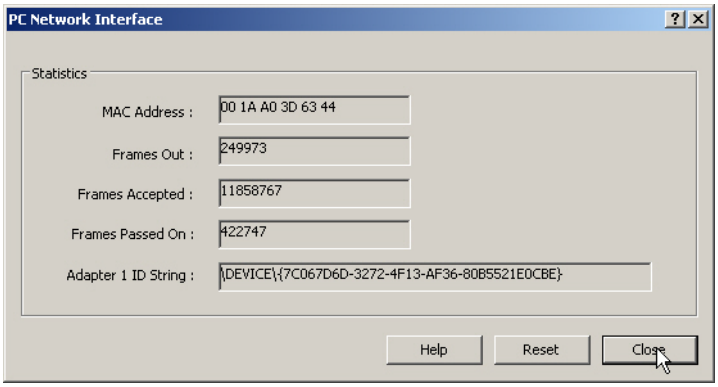
Note: *You must have previously associated a MAC address to the DeviceMaster (Associating the MAC Address on Page 36).*

Refer to the *Device Status* table (Page 75) for a list of messages and explanations.

4. You can click the **History** button to review the last ten actions on the DeviceMaster.



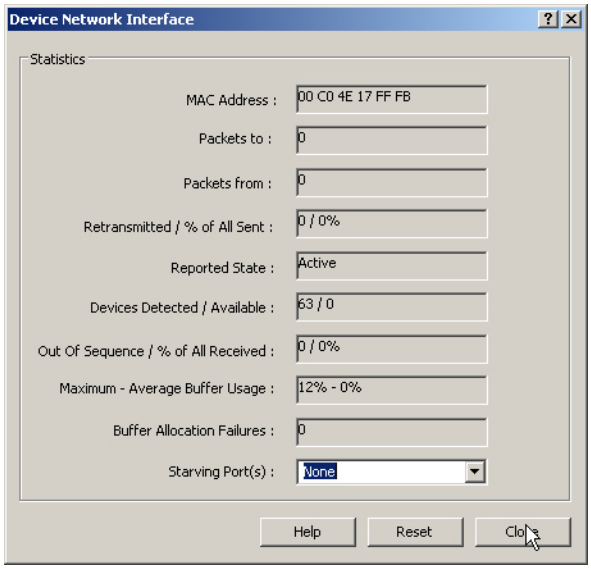
5. Click **PC Network Interface Details** for the following information.



Field	Description
MAC Address	MAC Address is the reported MAC address of the Ethernet network interface card (NIC) card in the server. Since a server may contain more than one NIC, identifying exactly which NIC is being used by the device driver may help you to identify and resolve problems.
Frames Out	Frames Out is the count of the number of frames output by the device driver through the identified network interface. This includes all administrative, data, and control frames, and should be incriminated whenever the DeviceMaster and the device driver are operating, even if the DeviceMaster is idle.
Frames Accepted	Frames Accepted is the count of the number of received frames accepted by the device driver for further processing. These must be well-formed packets with the correct protocol identifiers for the device driver.
Frames Passed On	Frames Passed On is when a NIC receives a packet, it passes the packet around to each driver or application that is bound to the NIC until one of them recognizes and accepts the packet.
Adapter 1 ID String	Adapter 1 ID String is the NIC binding string. Every network entity that needs to be uniquely identified has a Globally Unique Identifier (GUID), which is used to form unique binding strings. The presence of this string indicates that the device driver has been bound to a specific NIC.
Reset	This button resets the statistics in the PC Network Interface window.

6. Click **Close** to return to the **Advanced** tab.

7. Click the **Device Network Interface Details** button to review the following information.



Fields	Description
MAC Address	MAC Address is the network (MAC) address of the DeviceMaster that is currently selected. It should match both the MAC address on the General tab and the MAC address on the physical DeviceMaster.
Packets To	Packets To is the count of information frames sent to a layer in the device driver and indicates actual data traffic sent.
Packets From	Packets From is the count of information frames received by a layer in the device driver, and indicates actual data traffic received.
Retransmitted/% All Sent	Retransmitted/% All Sent is the percentage of information frames requiring retransmission due to network errors. If this value is not zero, you may have network problems.
Reported State	Reported State contains a message showing the status of the device driver to the selected DeviceMaster.
Devices Detected/ Available	Devices Detected/Available is the number of DeviceMasters found on the network and how many of the DeviceMasters are available.
Out of Sequence/ % of All Received	Out of Sequence/ % of All Received is the percentage of information frames received out of order, possibly due to network errors. If this value is not zero, you may have network problems.
Maximum Average Buffer Usage	Maximum and Average Buffer Usage is the percentage of the network buffer used since the driver was loaded.
Buffer Allocation Failures	Buffer Allocation Failures displays how many times the driver failed to allocate network buffers to the process because there were not enough buffers.
Starving Port(s)	If any Buffer Allocation Failure happens, the Starving Port(s) list will include the name of the COM port that could not be serviced (immediately) because of it.
Reset	Reset clears the data values from the fields. and updates the data displayed in the event that you want review data before the automatic refresh cycle occurs.

Click **Close** to return to the **Advanced** tab.

The following table provides a list of *Device Status* messages.

Device Status Message	Description
A MAC address has not yet been specified for this device. Return to the General tab, configure the device, and apply the changes.	The driver may have only been configured with an IP address. The appropriate MAC address must be input in the MAC field in the **General** tab so that the **Advanced** tab can report DeviceMaster status.
Can't detect any Comtrol devices. Check Ethernet connectors and ensure the device is powered on.	Network traffic is being received, but not from a DeviceMaster. Check the network connections and verify that the DeviceMaster is powered up.
Can't detect the device with specified the MAC address on any network. Verify the MAC address of the unit, check the Ethernet connectors and ensure the device is powered on.	Network traffic is being received from a DeviceMaster, but not the one specified on the **General** tab. Check the DeviceMaster to make sure that you are using the correct MAC address.
Code upload failed due to a timeout and the driver is attempting to re-synchronize with the device.	The device driver has not successfully uploaded the firmware to the assigned DeviceMaster.
Code upload has completed.	The driver has completed uploading the firmware to the DeviceMaster.
Code upload was restarted after a timeout.	The firmware upload process failed due to a time-out. The upload process has been restarted.
Device detected, initializing.	The server has acquired the DeviceMaster and is downloading the control program. The DeviceMaster will be available shortly.
Device detected, microcode upload in progress.	The device driver is attempting to upload the microcode to the DeviceMaster. This should complete momentarily.
Device is active and OK, no data traffic was exchanged since last inquiry.	The DeviceMaster and ports are operational. There is currently no active serial traffic.
Device is active and OK.	The DeviceMaster is okay and ready to use.
Device is detected and configured in the driver, but is not yet assigned to this server/PC.	Either the DeviceMaster is currently being controlled by another server or the DeviceMaster power has been cycled and the DeviceMaster is waiting for a server to acquire it.
Excess out-of-sequence packets received. Check for indications of high network traffic.	Click the **PC Network Interface Details** button to review the statistics, which may indicate that DeviceMaster is functioning properly. This message typically goes away on it's own but you can reboot the PC so that the network traffic is re-synchronized.
Excess packet retransmissions detected. Check for indications of high network traffic.	Click the **PC Network Interface Details** button to review the statistics, which may indicate that DeviceMaster is functioning properly. This message typically goes away on it's own but you can reboot the PC so that the network traffic is re-synchronized or reset the counters, which may cause the Advisor to change from Excess Packets to Ok. If this does not cause the DeviceMaster to go Active and Ok, then it is likely that there is a network issue involved that should be corrected.

Device Status Message	Description
Initialization complete. Waiting on response from the device before making the connection active.	Waiting for a response from the DeviceMaster.
Statistical data was reset.	This indicates the number of times that the statistics in the **PC Network Interface** and **Device Network Interface** have been reset.
The driver is not running. If you just installed the driver you will need to exit the program before the driver starts.	Close and then re-open the Comtrol Drivers Management Console.
The communications between the driver and the device has been disrupted. Check connectors, cabling, and look for indications of high network traffic.	The DeviceMaster is off-line in this state. The MAC or IP address for the DeviceMaster is known (assigned) but communications have been interrupted.
The device has failed to respond for an extended period of time. The device may have lost power or is in an unresponsive state.	The device driver is no longer able to communicate with the DeviceMaster. Check the LED status (Page 70).
The driver is not running. Make sure the driver is installed correctly and restart the PC to correct the problem.	Make sure the driver is installed correctly and restart the PC to correct the problem. The driver is most likely disabled. Enable the driver and reboot the PC.
Timeout occurred while the driver was waiting for an ADMIN command reply from the device.	There may be network traffic problems, an unresponsive DeviceMaster, or a problem with the server sending out network data. The device driver is trying to locate the DeviceMaster on the network by sending out the ID request and not receiving a response from the DeviceMaster, which may indicate that the DeviceMaster is either not on the network, on a different segment (if using MAC mode of addressing), or the bandwidth of the network (or server) is so saturated that the DeviceMaster response is not received in time.
Timeout occurred while the driver was waiting for an Assign Reply response from the device prior to making the connection active.	There may be network traffic problems, an unresponsive DeviceMaster, or a problem with the server sending out network data. A handshake that occurs after an ID response is received and the device driver is trying to establish a communication channel with the DeviceMaster.
Unable to find a Network Interface Controller (NIC) card.	Install a NIC in that PC or check that the NIC is operational.
Uninitialized.	The firmware has not uploaded to the DeviceMaster. If this message is displayed in the History file, it often means that the DeviceMaster is in the process of being rebooted.

NS-Link Driver Troubleshooting

This table includes some tips related to NS-Link drivers.

NS-Link Condition	Explanation/Action
Need to program IP address into the device.	Before programming an IP address it is critical that the DeviceMaster be operational and passes the power on tests when configured for the MAC address. ***Note:*** *If the DeviceMaster is NOT operational, do NOT attempt to program or use an IP address with the DeviceMaster.* See *Program the IPv4 Address (Network Information)* on Page 11 for more information.
Cannot open port	1. Verify that MAC address in the NS-Link driver matches the address on the DeviceMaster. 2. Verify that you are using the correct NS-Link driver. If necessary, remove and reinstall a new driver. 3. Isolate the DeviceMaster from the network (see Page 67). 4. Check to see if another program or computer is active on this port.
The Comtrol device has a lower limitation of network bandwidth requirement of 64 Kbps.	At this speed the entire available bandwidth is required for the purpose of uploading the firmware from the driver to the DeviceMaster. At lower speeds, timing issues will prevent the firmware from being successfully installed to the DeviceMaster, thus preventing the DeviceMaster from normal operation. When using the DeviceMaster over a WAN link that is less than the recommended 64 Kbps, a timing modification may be made that will allow uploading of the firmware. Load the driver locally to the DeviceMaster for the purpose of getting the firmware installed. The PC on the other side of the slow link can then “share” the port. The sharing may be exclusive as the firmware loader PC may not need to access the ports.

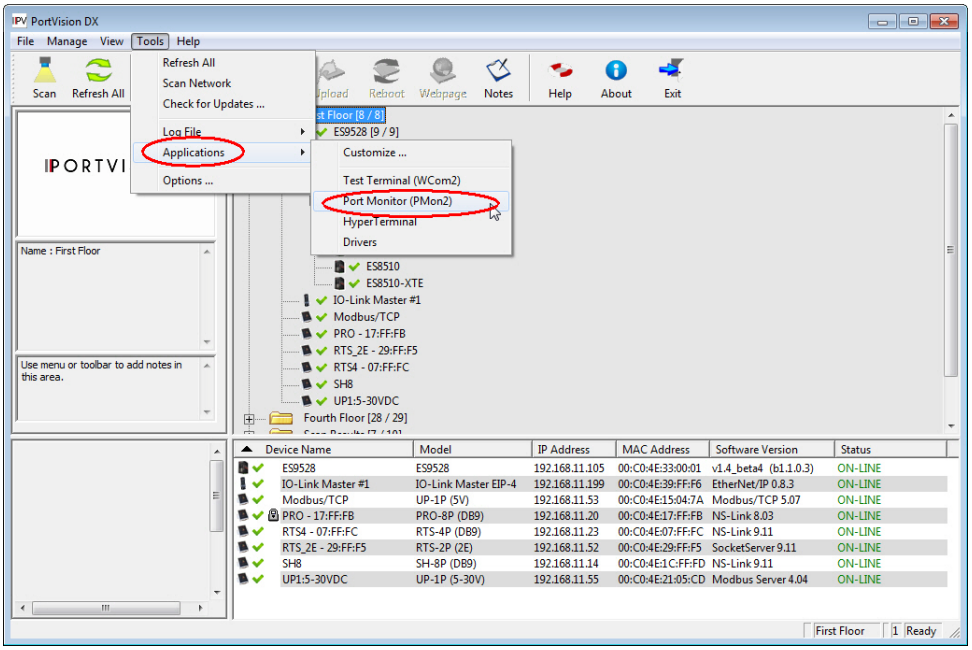
Using Port Monitor to Test Ports

This procedure will check whether the DeviceMaster can:

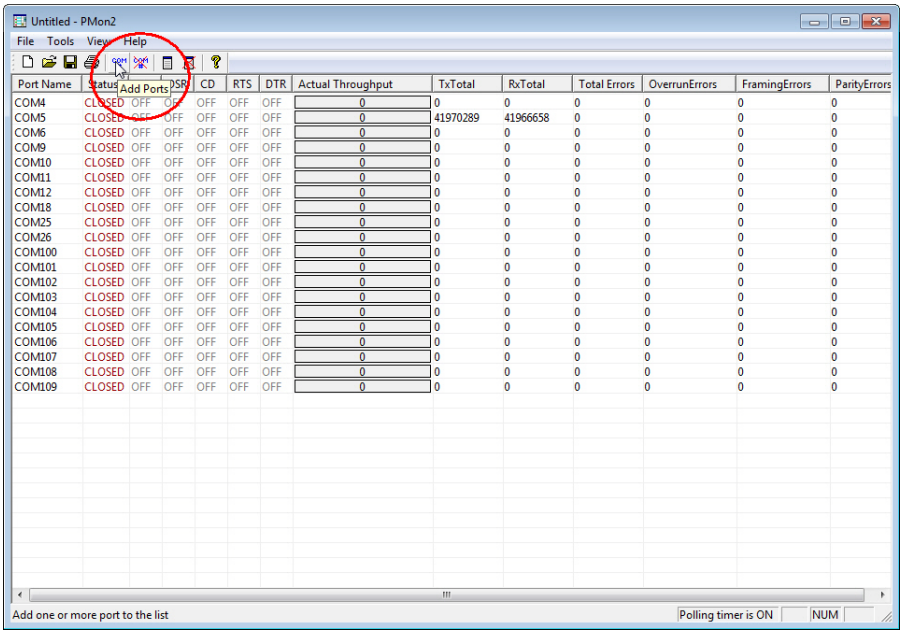
- Communicate through the NS-Link device driver
- Determine if a port is open with an application

If necessary, install PortVision DX (*Before Installing the Comtrol Drivers Management Console* on Page 9, Page 10).

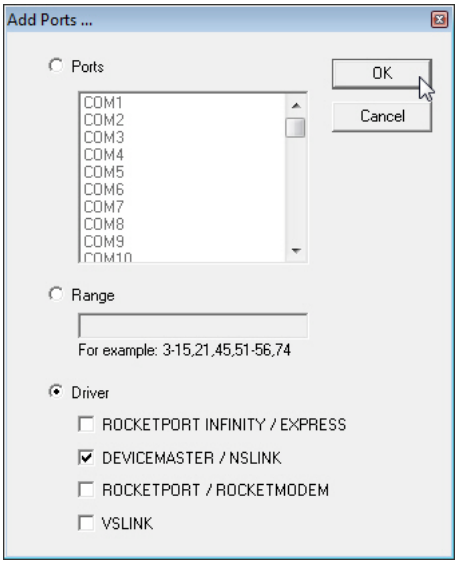
1. Open PortVision DX using the desktop shortcut.
2. Start Port Monitor by clicking **Tools > Applications > Port Monitor (PMon2)**.



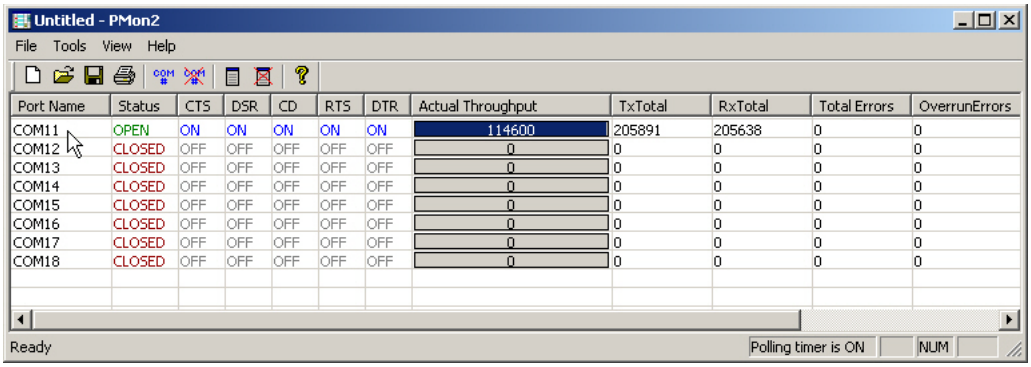
3. Click **Add Ports** using the icon or **Tools > Add Ports**,



4. Click **Driver**, **RPSHSI/NSLINK**, and click **Ok**.



5. If the DeviceMaster is communicating with the device driver for Windows, Port Monitor should display **CLOSED** status. If a port is open for an application, it displays as **OPEN**, and displays **Actual Throughput**, **TxTotal** and **RxTotal** statistics.

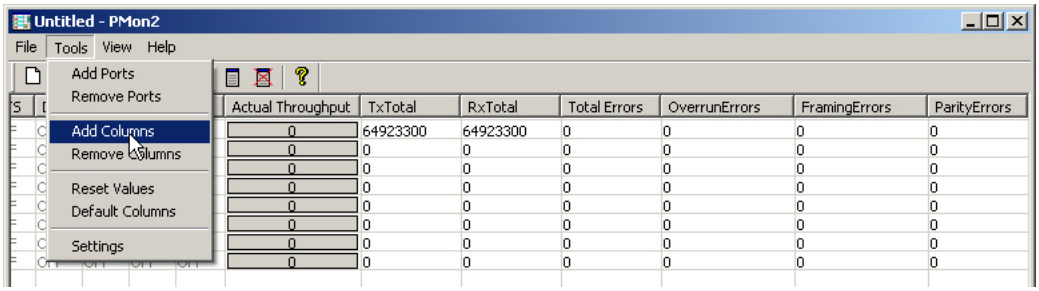


Normally, there should be no data errors recorded or they should be very small. To find out what the actual errors are, scroll to the right. You will see three columns: **Overrun Errors**, **Framing Errors**, and **Parity Errors**.

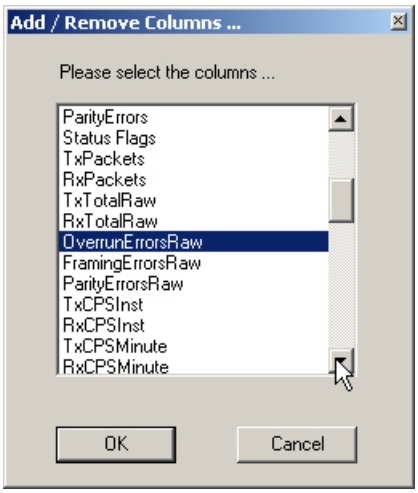
If the errors are:

- **Overrun Errors** represent receive buffer overflow errors. If this is the case, you will have to configure either software or hardware handshaking to control the flow of data. The most common errors are Overrun errors.
- **Framing Errors** indicate that there is an synchronization error between the beginning of a data frame and the end of the data frame. A frame usually consists of a start bit, 8 data bits, and a stop bit or two. The framing error occurs if the stop bit is not detected or it occurs in the wrong time frame. Most causes for framing errors are electrical noise on the data lines, or differences in the data clocks of the DeviceMaster and the connected device.
- **Parity Errors** occur when parity is used and the parity bit is not what is expected. This can also be caused by noise on the data lines.

6. You can view additional statistics to Port Monitor by adding columns. Click **Tools** and **Add Columns**.

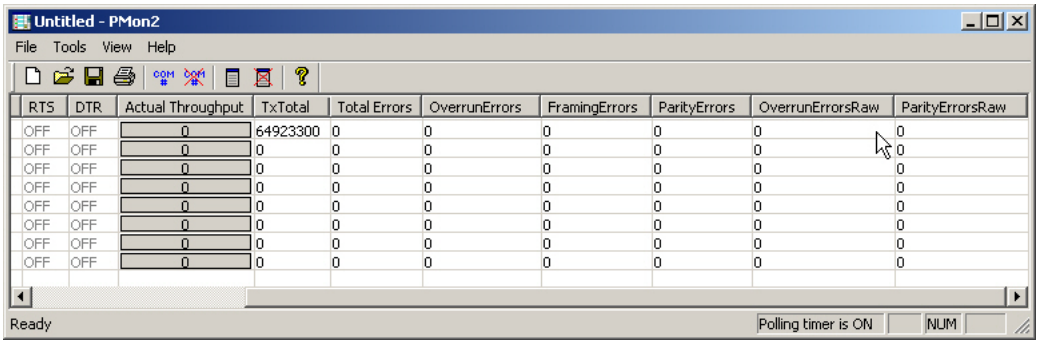


7. Highlight or shift-click to add multiple statistics and click **Ok**.



Note: *See the Port Monitor help system if you need an explanation of a column.*

8. Scroll to the right to view the new columns.



9. If you want to capture this session, you can save a current session as a report. To do this, select one of the following save options:

   - **File > Save As**
   - **File > Save** - if the report already exists in an older format
   - **Save Active Session** button

   Reports can be opened, viewed and re-used when needed. To open and view a report:

   a. **Select File > Open** or the **Open Existing Session** button. The *Open*

Session dialog appears.

b. Locate the session (table), you want to open and click the **Open** button.

Optionally, if you want to continue monitoring for an existing session, you need to activate the *Polling Interval*.

- **Select Tools > Settings** to access the PMon2 *Settings* dialog
- Change the **Polling Interval** field to a value other than zero (0)

10. Leave Port Monitor open so that you can review events when using *Test Terminal* to test a port or ports.

Using Test Terminal

Test Terminal (WCom2) allows you to open a port, send characters and commands to the port, and toggle the control signals. This application can be used to troubleshoot communications on a port-by-port basis.

- **Send and Receive Test Data**: This sends data out the transmit line to the loopback plug, which has the transmit and receive pins connected thus sending the data back through the Rx line to Test Terminal, which then displays the received data in the terminal window for that port. This test is only testing the Tx and Rx signal lines and nothing else. This test works in either RS-232 or RS-422 modes as both modes have transmit and receive capability. A failure in this test will essentially prevent the port from working in any manner.
- **Loopback Test:** This tests all of the modem control signals such as RTS, DTR, CTS, DSR, CD, and RI along with the Tx and Rx signals. When a signal is made HI in one line the corresponding signal line indicates this. The Loopback Test changes the state of the lines and looks for the corresponding state change. If it successfully recognizes all of these changes, the port passes.

  A failure on this test is not necessarily critical as it will depend on what is connected and how many signal lines are in use. For example, if you are using RS-232 in 3-wire mode (Transmit, Receive and Ground) a failure will cause no discernible issue since the other signals are not being used. If the port is configured for use as either RS-422 or RS-485 this test will fail and is expected to fail since RS-422 and RS-485 do not have the modem control signals that are present in RS-232 for which this test is designed.

The following procedures require a loopback plug to be placed on the port or ports that you want to test. A loopback plug was shipped with your DeviceMaster. If you need to build a replacement or additional loopback plugs, refer to the *DeviceMaster Installation and Configuration Guide* (Page 7), if you need to build loopback plugs.

Opening Ports

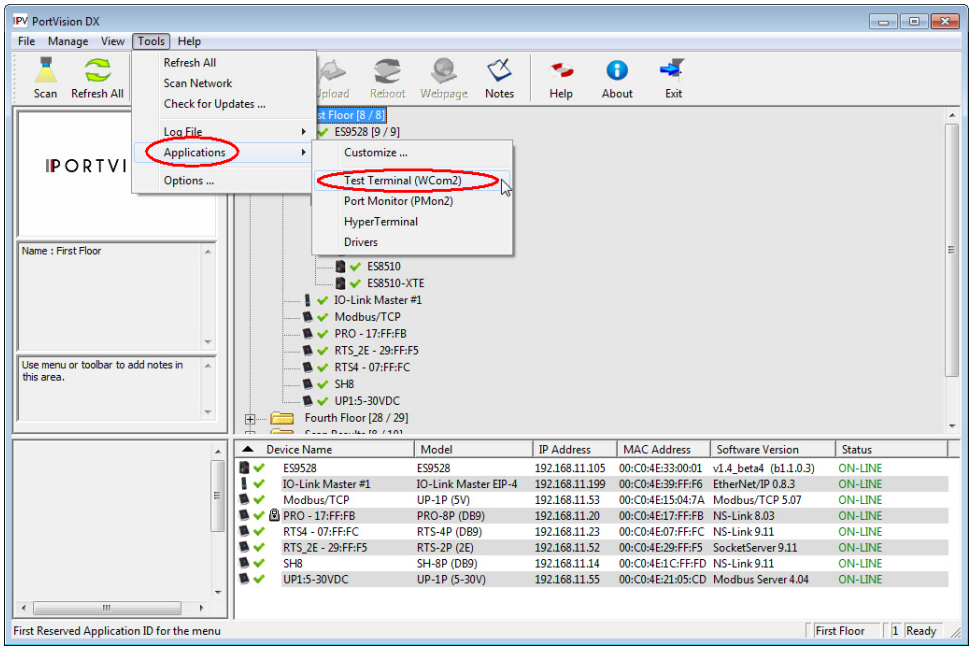
The following procedure shows how to use **Test Terminal** to send and receive test data to the serial ports. If necessary, install PortVision DX (Page 10).

1. Stop all applications that may be accessing the ports such as RRAS or any faxing, or production software. See the appropriate help systems or manuals for instructions on stopping these services or applications.

   If another application is controlling the port, then **Test Terminal** will be unable to open the port and an error message will be shown.

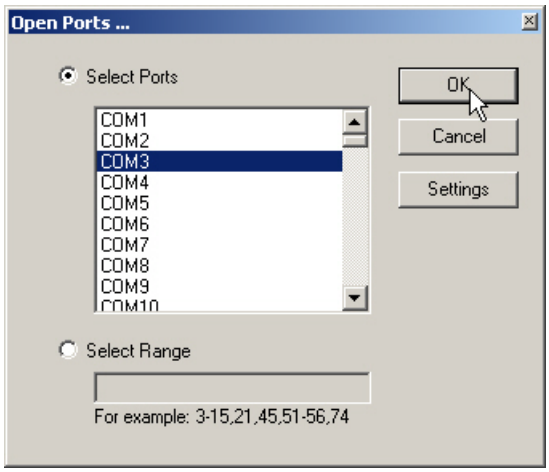
2. Open PortVision DX using the desktop shortcut.

3. Start Test Terminal (WCom2) by clicking **Tools > Applications > Test Terminal (WCom2)**.



4. Select **File > Open Port**, the appropriate port (or ports) from the *Open Ports* drop-down list and **Ok**.

   Note: *If you left Port Monitor open from the previous subsection, you should show that the port is open.*



Go to the next procedure to send and receive test data. Use the appropriate procedure:

- *Sending and Receiving Test Data (RS-232/422 and RS-485: 4-Wire)* on Page 82
- *Sending and Receiving Data (RS-485: 2-Wire)* on Page 84

Sending and Receiving Test Data (RS-232/422 and RS-485: 4-Wire)

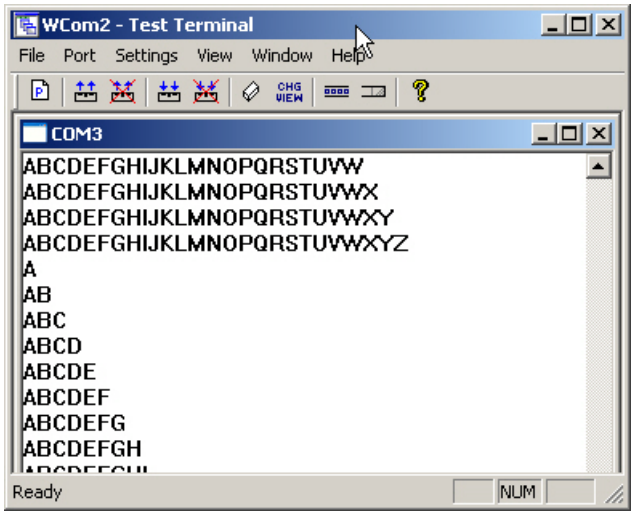
You can use this procedure to send and receive test data through the RS-232/422/485 (4-wire, full-duplex) port or ports that you want to test.

1. If you have not done so, perform Steps 1 through 3 on Page 81.
2. Install the loopback plug onto the port (or ports) that you want to test.

   See the *DeviceMaster Installation and Configuration Guide* that you can download on Page 7, if you need to build loopback plugs.
3. Select **Port > Send and Receive Test Data**.

You should see the alphabet scrolling across the port. If so, then the port installed properly and is operational.

Note: *If you left Port Monitor running, it should show data sent and received and show the average data throughput on the port.*



4. Select **Port > Send and Receive Test Data** to stop the scrolling data.
5. You can go to the next procedure to run the *Loopback Test* on Page 83 if this is an RS-232 port.

If this test successfully completed, then the port is operational as expected.

Note: *Do NOT forget to restart the communications application.*

Loopback Test (RS-232)

The **Loopback Test** tests the modem control (hardware handshaking) signals. It only has meaning in RS-232 mode on serial connector interfaces with full RS-232 signals. If performed under the following conditions, the test will always fail because full modem control signals are not present:

- RS-422
- RS-485
- RJ11 connectors

Use the following steps to run the Loopback Test.

1. If necessary, start Test Terminal (Page 81, Steps 1 through 3).
2. Click **Port > Loopback Test**.

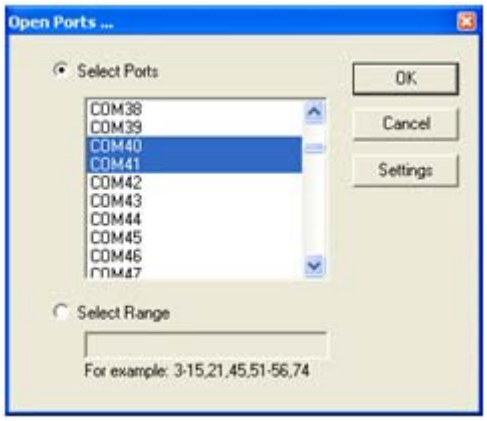
   This is a pass fail test and will take a second or two to complete. Repeat for each port that needs testing.

If the Loopback Test and the Send and Receive Test Data tests successfully complete, then the port is operational as expected.

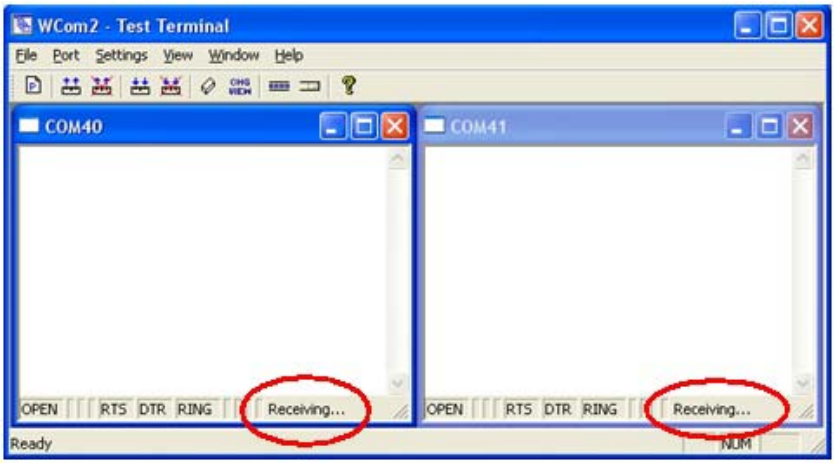
Sending and Receiving Data (RS-485: 2-Wire)

This procedure shows how to use Test Terminal (WCom2) to test two RS-485 (2-wire, half-duplex) ports.

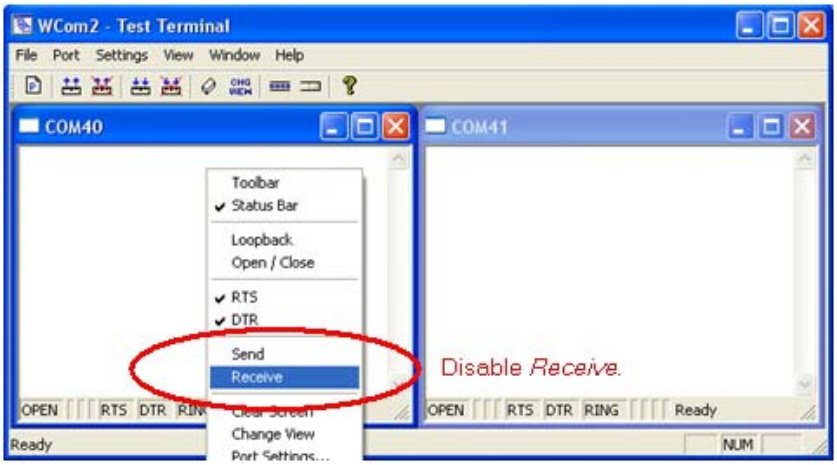
1. Start Test Terminal.
2. Open two ports RS-485 ports. This example uses COM40 and COM41.



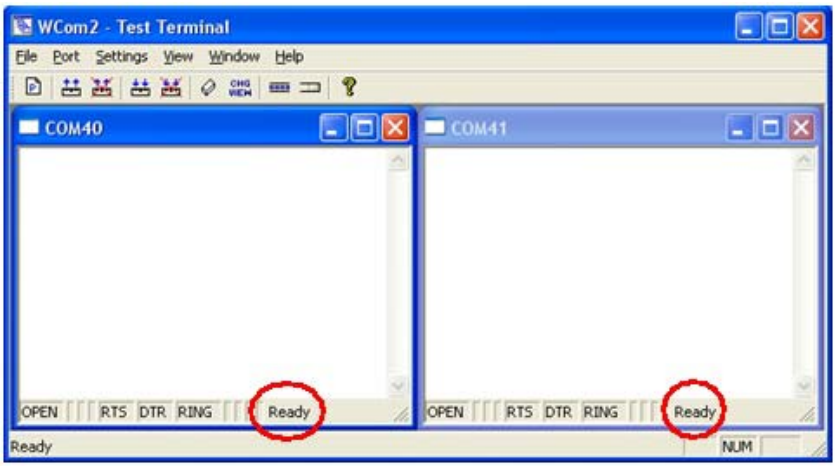
Test Terminal will open two windows, note that both ports show *Receiving* on the status bar.



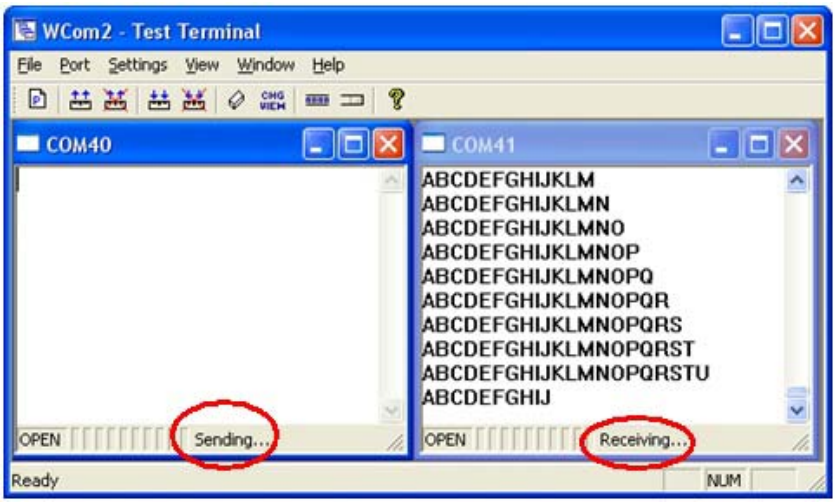
3. Right-click both COM windows and remove the check mark for **Receive**.



Both COM ports show *Ready* on the status bar.



4. Right-click in ONE window and select the **Receive** option from the pop up.
5. Right-click the OPPOSITE window and click **Send**.



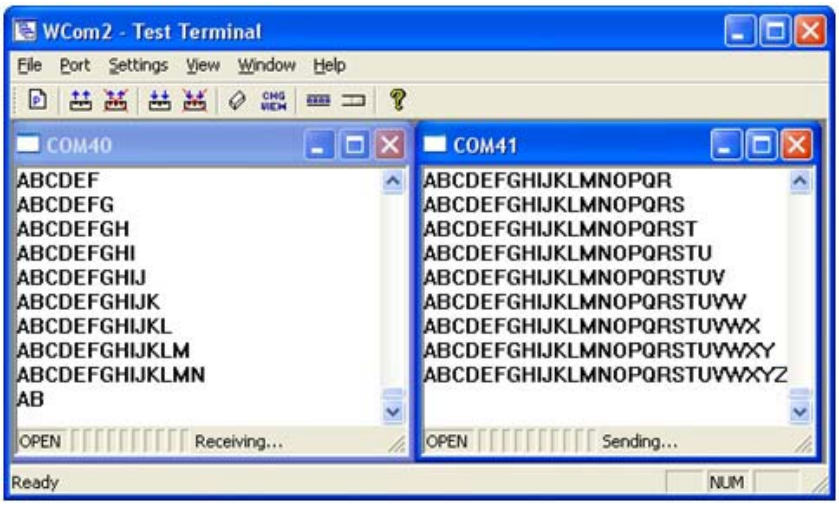
The *Status* line shows *Sending* or *Receiving*.

In this case, COM40 is sending data and COM41 is receiving the data which is visually confirmed by the data scrolling across the COM41 window.

Note: *If you do not see the data being received it MAY be necessary to also disable the RTS and DTR options from the right-click pop-up menu in each COM port.*

6. Right-click and remove the check mark on the *Sending* COM port.

7. Right-click and remove the check mark on the *Receiving* COM port.



   Neither COM port is sending or receiving data but shows *Ready* on the *Status* bar.

8. Reverse the sending/receiving windows one at a time. Set the **Receive** option first, then in the opposite window, select the **Send** option.

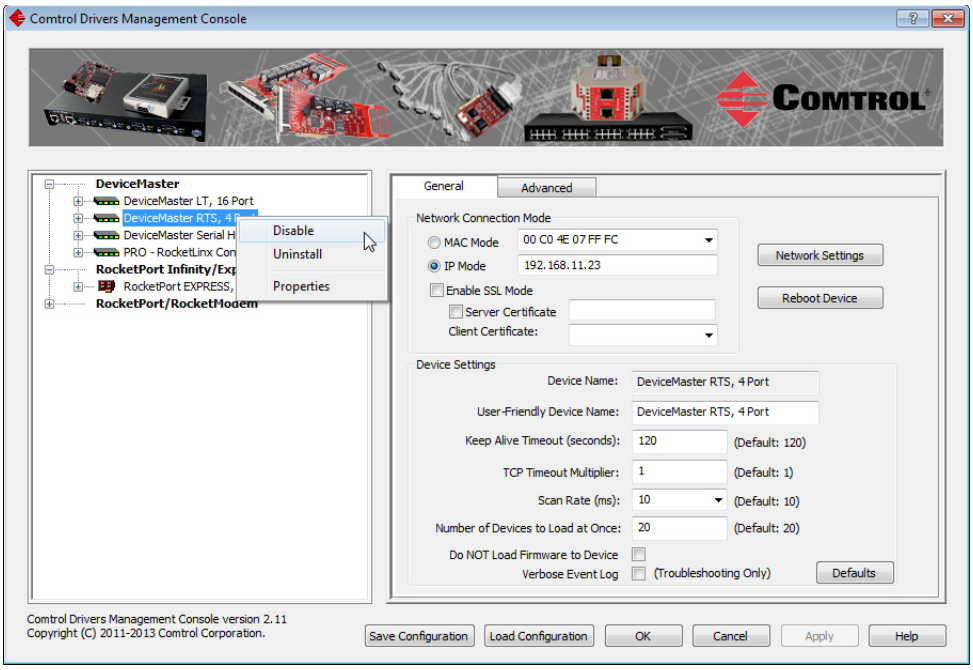
   The *Status* line shows *Sending* or *Receiving* in the reverse windows.

Data is now scrolling in the COM40 window. COM41 is static as it is not receiving data but transmitting data.

How Disable/Enable the Device Driver

Use this procedure to disable or enable the driver for a specific DeviceMaster.

1. Right-click the DeviceMaster that you want to disable (or re-enable).
2. Click **Disable** (or **Enable**).



Technical Support

If you need technical support, contact Comtrol using one of the following methods.

Contact Method	Corporate Headquarters
Downloads	http://www.comtrol.com/Support
Web site	http://www.comtrol.com
Phone	763.957.6000 CST: 8AM-6PM (Monday through Friday, excluding major US holidays)