**AN-X-DHP**
**Data Highway Plus**
**Communication**
**Module**

# *User Manual*

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Throughout this manual we use notes to make you aware of safety considerations.

**WARNING!**

Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss.

These warnings help to:

- identify a hazard
- avoid the hazard
- recognize the consequences

**IMPORTANT!**

Identifies information that is especially important for successful application and understanding of the product.

**TIP**

Identifies information that explains the best way to use the AN-X-DHP

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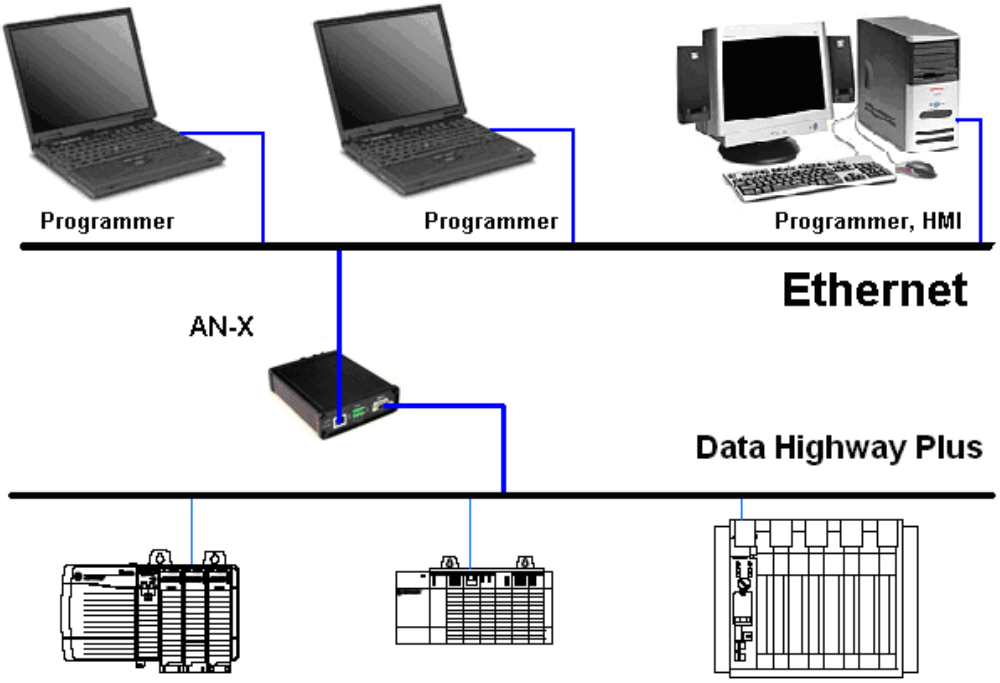
# *AN-X-DHP Module Overview*




The AN-X-DHP communications module connects a computer or other device to an Allen-Bradley Data Highway Plus network, using Ethernet.

The module:

- Can act as any valid Data Highway Plus station number, from 0 to 77 octal
- Supports all Data Highway Plus baud rates, 57.6, 115.2 and 230.4 Kbaud
- Maintains Data Highway Plus diagnostic counters

You can use the AN-X-DHP module with Rockwell programming software to communicate with PLCs such as the PLC-5 or ControlLogix over Data Highway Plus. Refer to page 17 for details.

You can use a DDE or OPC server such as RSLinx to access Data Highway Plus using the AN-X-DHP. Refer to page 20 for details.

The AN-X-DHP module has a web interface for configuration of Data Highway Plus station number and baud rate and for monitoring diagnostic counters and the active station list. You can communicate with the module using any standard web browser such as Internet Explorer or Netscape.

A watchdog timer is implemented in the module's hardware. If the firmware does not kick the watchdog within the timeout period the watchdog times out and places the module into a safe fatal failure state.

A jabber inhibit timer is implemented in the module's hardware. If the network transmitter is on longer than 150% of the longest network frame time, the transmitter is forced off and the module is placed into a safe fatal failure state.

The module firmware can be updated over Ethernet using the Windows utility supplied. Refer to page 41 for details.

## Hardware Features

The module has:

- LEDs to indicate the status of the connection to the Ethernet, its own internal state, and the connection to the Data Highway Plus network
- an Ethernet connector
- a Phoenix connector to connect to the Data Highway Plus network
- a power connector

## Package Contents

- AN-X-DHP module
- CD containing software and documentation

## Modes of Operation

There are three AN-X modes of operation:

- Boot mode. The AN-X is running its low level startup firmware.
- Configuration mode. This is the mode when you are updating the firmware in the AN-X.
- Production mode. This is the normal runtime mode of operation.

# *Installation*

## Prevent Electrostatic Discharge

The module is sensitive to electrostatic discharge.

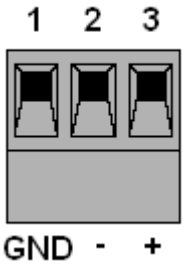
**WARNING!**

Electrostatic discharge can damage integrated circuits or semiconductors. Follow these guidelines when you handle the module:

- Touch a grounded object to discharge static potential
- Do not touch the connector pins

## Power

AN-X requires a DC power input of anywhere from 12 to 24 VDC




Left to right the pins on the power connector are chassis ground, negative voltage and positive voltage.

The chassis ground should be connected.

Power consumption internally is 300 mA @ 12VDC or 150 mA @ 24VDC.

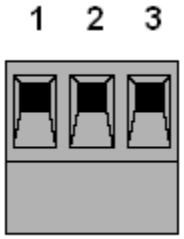
The part number for the power connector is Phoenix MSTB 2.5/3-ST-5.08

## Data Highway Plus Cabling and Termination

Follow Allen-Bradley cabling recommendations for Data Highway Plus. Refer to Approved Vendor List for DH, DH+, DH-485, and Remote I/O Cables, publication ICCG-2.2, February 1996.

The network cable must be terminated with terminating loads attached to the physical ends of the network, usually 82 ohm, but refer to Allen-Bradley documentation since some devices require 150 ohm terminators. There should be two and only two terminators on the network.

From left to right on the AN-X module, the Data Highway Plus connections should be line 1, shield, line 2.




The part number for the connector is Phoenix MSTB 2.5/3-ST-5.08

## Ethernet Cabling

AN-X has a standard RJ-45 connector for connecting to Ethernet.

If you are connecting AN-X to an existing network through a router or switch, use a standard Ethernet cable.

If you are connecting directly between a computer and AN-X, use a crossover cable.

## Software Installation

You must uninstall any previous version of the software before you can install a new version. Use the Windows Control Panel Add and Remove Programs to remove the old version.

Insert the CD supplied with the AN-X module and run the program setup.exe on the CD.

# Basic Configuration

The AN-X-DHP module connects a computer or other device on Ethernet to a Data Highway Plus network.

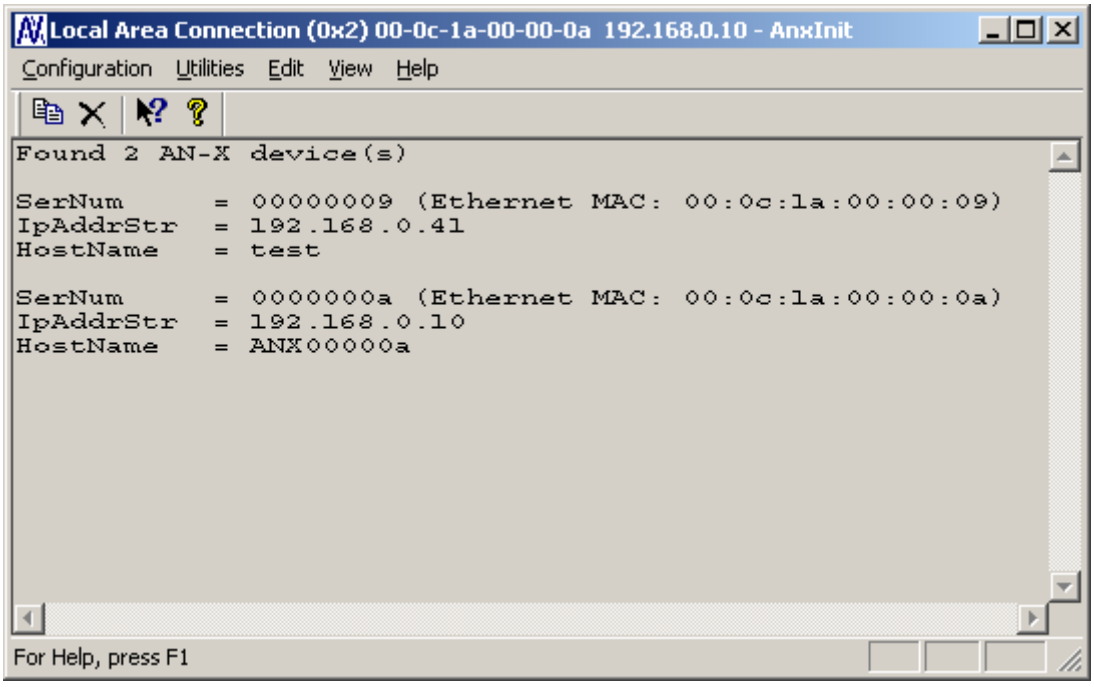
Before you can use the AN-X-DHP, you must configure its network properties, first on Ethernet and then on Data Highway Plus.

## Ethernet Configuration

AN-X can be configured to use a static (unchanging) IP address or it can be configured to obtain its IP address from a DHCP server.

Unless you have control of the DHCP server, in most applications you will want to configure AN-X to use a static IP address. Otherwise the DHCP server may assign a different IP address each time AN-X powers up, and any software that accesses the AN-X module would have to be reconfigured.

AN-X is shipped with DHCP enabled. If it finds a DHCP server on the network, the DHCP server assigns it an IP address. You can use the utility AnxInit to find the IP address that the DHCP server has assigned. Select *Utilities/Locate All AN-X Modules* and AnxInit will locate the AN-X and display its IP address.




If AN-X does not find a DHCP server within about three minutes of starting up, it reverts to a temporary static IP address of 192.168.0.41 If AN-X is using this temporary IP address, it repeatedly flashes the SYS LED three times followed by a pause.

**IMPORTANT!**

Use this temporary IP address only for initial setup of AN-X. AN-X will not function for its intended purpose at the temporary IP address.

If you are using multiple AN-X modules, configure one at a time, especially if there is no DHCP server on the network, since they will all revert to the same temporary IP address when they fail to find a DHCP server.

**IMPORTANT!**

If you are connecting AN-X to an existing Ethernet network, consult the network administrator to obtain information about how you should configure AN-X and to obtain a static IP address for AN-X.

**IMPORTANT!**

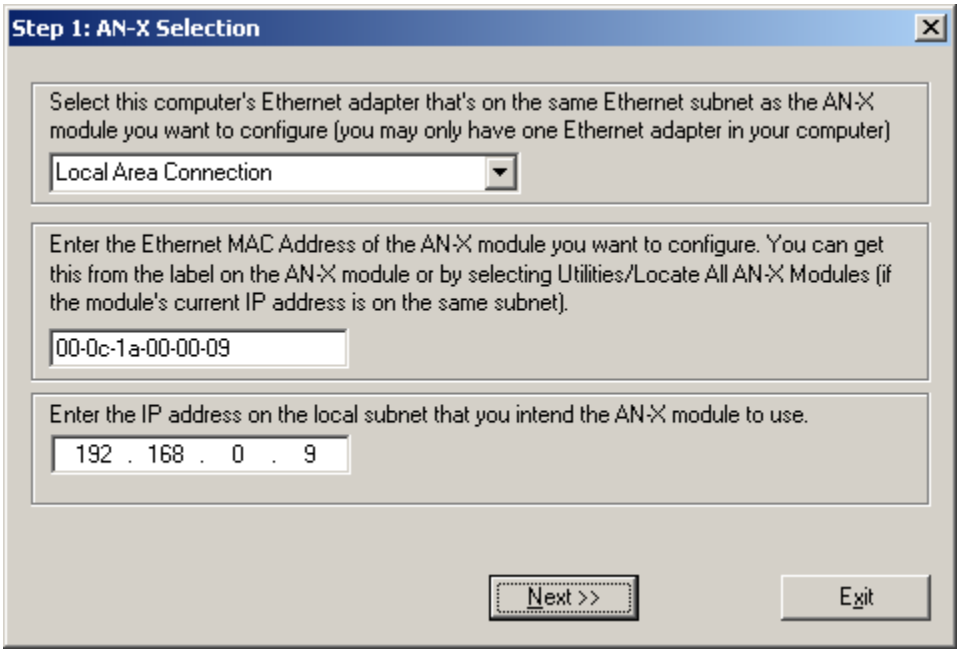
The AN-X must be on the local Ethernet (same subnet) when you set its IP address.

You configure the Ethernet properties using the Windows utility AnxInit supplied with AN-X.

Use the *Configuration/AN-X IP Settings* command to start the AN-X IP configuration wizard, which takes you step by step through the IP configuration process.

### Step 1

In step 1, you identify the AN-X you are configuring.




1. Select the Ethernet adapter that's connected to the AN-X. In most cases there will be just one Ethernet adapter in the computer. The AN-X must be on the same subnet as the computer.

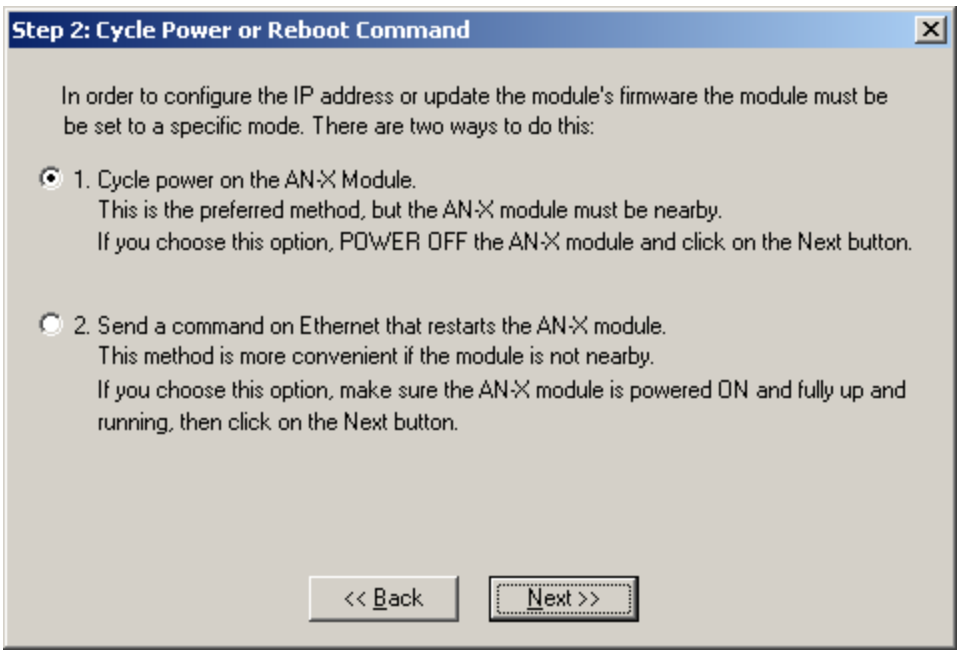
2. Enter the MAC address of the AN-X you are configuring. This is printed on the AN-X label. It consists of six pairs of hexadecimal digits, separated by hyphens. In the example above, it's 00-0c-1a-00-00-09.

If the AN-X is already online, you can obtain its MAC address using the *Utilities/Locate All AN-X Modules* command.

3. Enter the IP address you intend the AN-X to use.

### Step 2

In step 2, you choose a method of restarting AN-X to put it in boot mode.

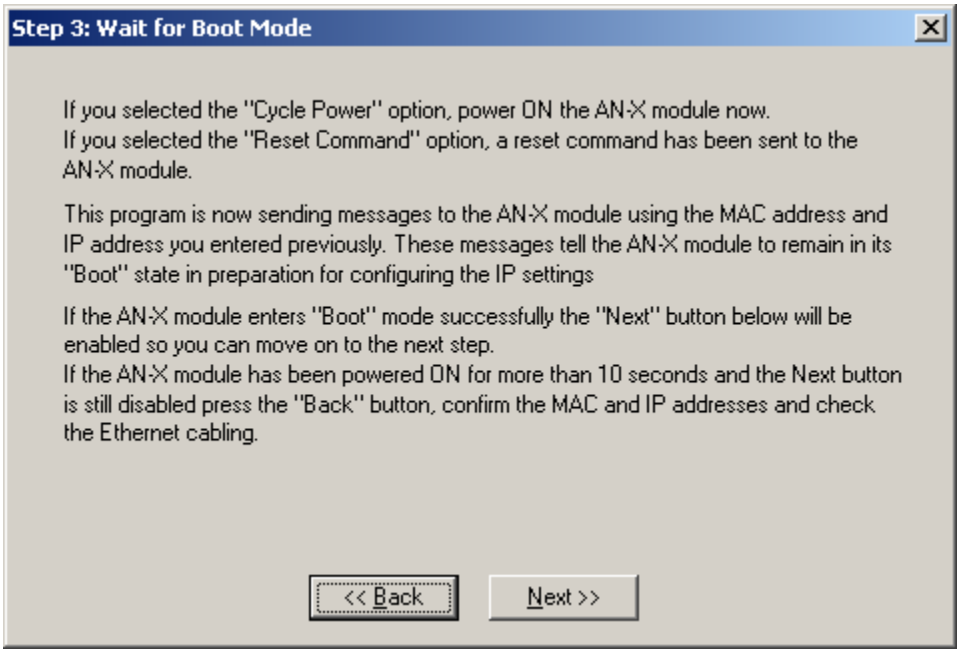



The preferred method is to cycle power on the AN-X. Select the first option on the screen and click the *Next* >> button.

The second method, useful if the AN-X in not easily accessible, is to send it a command over Ethernet. The AN-X must be powered on and completely running for this method to work. For example, if this is the first time you are configuring a new AN-X, allow sufficient time for it to acquire an IP address from a DHCP server or to time out and use its default IP address (about 3 minutes). Select the second option on the screen and click the *Next* >> button.

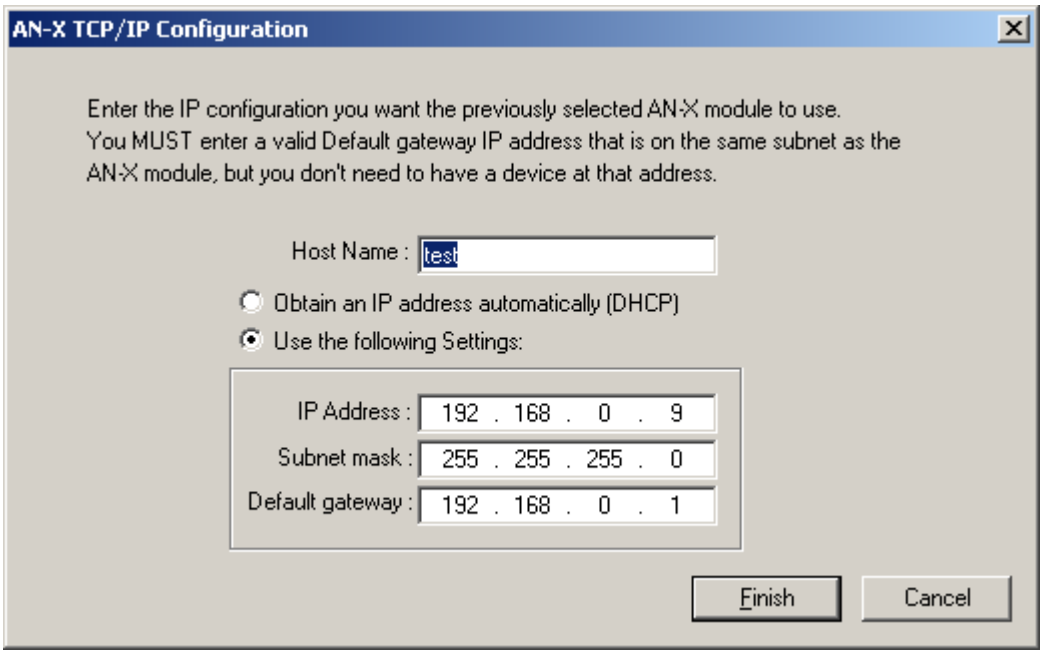
**Step 3:**

Wait for AN-X to enter boot mode. While AnxInit is waiting, the *Next>>* button will be disabled. When AN-X is in boot mode, the *Next>>* button will be enabled.




If the AN-X does not enter boot mode within about 10 seconds, return to the previous screens and check the entries.

The *AN-X TCP/IP Configuration* dialog appears.



Enter a *Host Name* for the AN-X. This name is used internally by AN-X and may be used to identify the AN-X if you have a DNS server on your network. The name can be from 1 to 31 characters long.

To configure the AN-X to obtain its IP address from a DHCP server on the network, select *Obtain an IP address automatically (DHCP)*

To configure the AN-X to use a static IP address, select *Use the following Settings* and enter:

- the desired IP address for the AN-X.
- the Subnet mask for the AN-X
- the default gateway for your network.

You must enter a valid default gateway address even if there is no device at the gateway address on the network.

Click OK to complete the configuration.

If you Cancel the *Configuration/AN-X IP Settings* command, AN-X is left running the boot code. Use the *Utilities/Restart AN-X* command to restart the AN-X.

## Example: Standalone Computer

A typical example is a laptop computer running programming software and connecting directly to an AN-X to program a PLC.

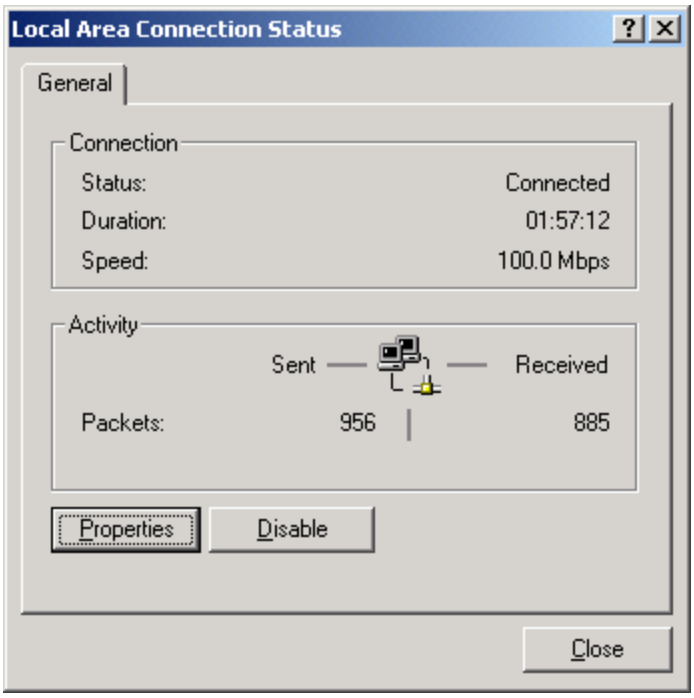
Since you are connecting directly from the computer to AN-X, use a crossover Ethernet cable.

The following instructions assume Windows 2000. The procedure for Windows NT and Windows XP is very similar. They also assume that an Ethernet network card has been installed in the computer and that AnxInit has been installed on the computer.

**TIP**

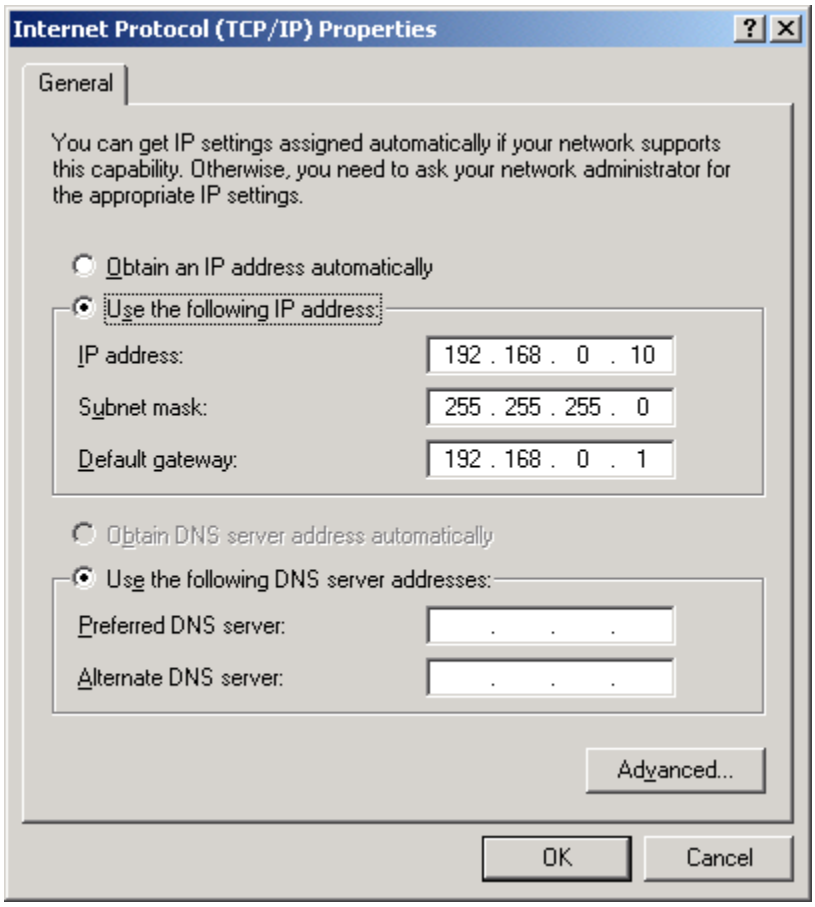
The parameters in this example will work when you set up any standalone computer to work with AN-X.

First configure the computer to use a static IP address. From the Start menu, select *Start/Settings/Network and Dialup Connections*. Double click on *Local Area Connection*.




Click the *Properties* button.

Double click on *Internet Protocol (TCP/IP)*.



In this example, we will assign the computer an IP address of 192.168.0.10

Set the Subnet mask to 255.255.255.0 (standard mask for the Class C network address of 192.168.0.x).

Set the Default gateway to 192.168.0.1 (this address does not exist on the Ethernet network but AN-X requires a valid default gateway entry).

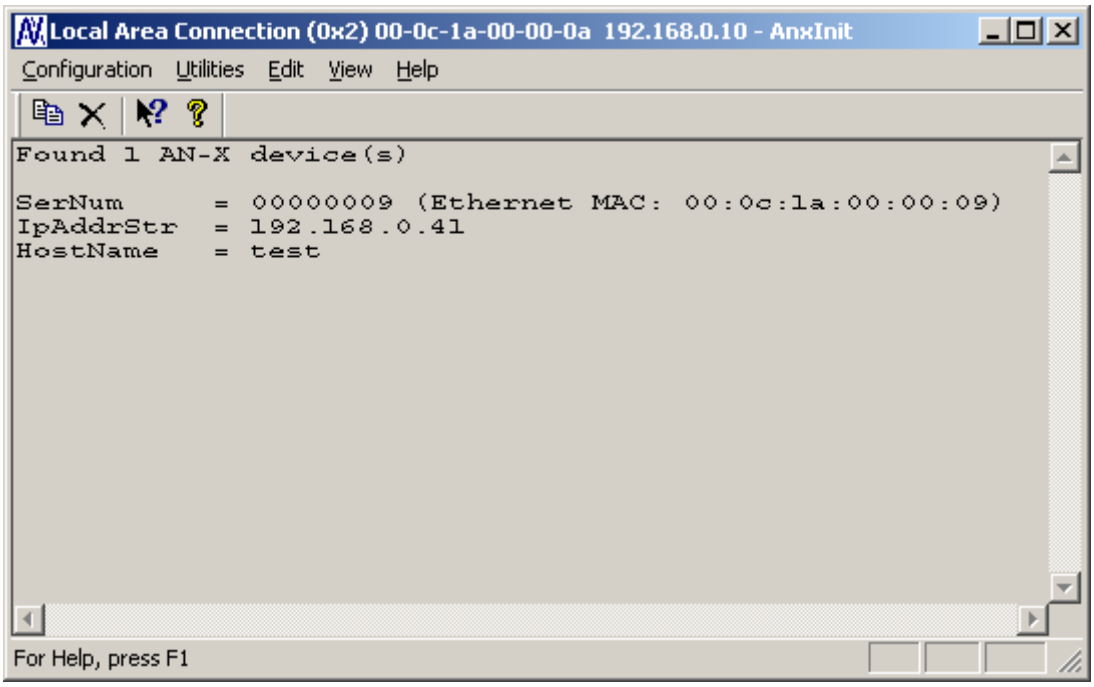
Click OK to accept the settings

Connect the computer to AN-X using the crossover cable.

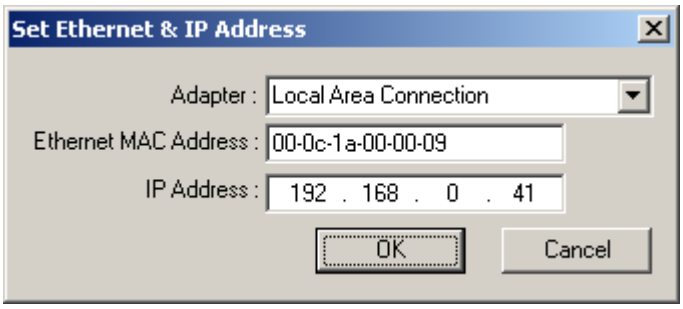
If this is the first time you have used the AN-X module, it will look for a DHCP server on the network. It waits about three minutes, then reverts to a default IP address of 192.168.0.41

Power up the AN-X and wait for the search for a DHCP server to time out. When the search for a DHCP server times out, AN-X will flash the SYS LED red three times followed by a pause repeatedly.

Run AnxInit. Select *Utilities/Locate All AN-X Modules* and confirm that the AN-X is found.

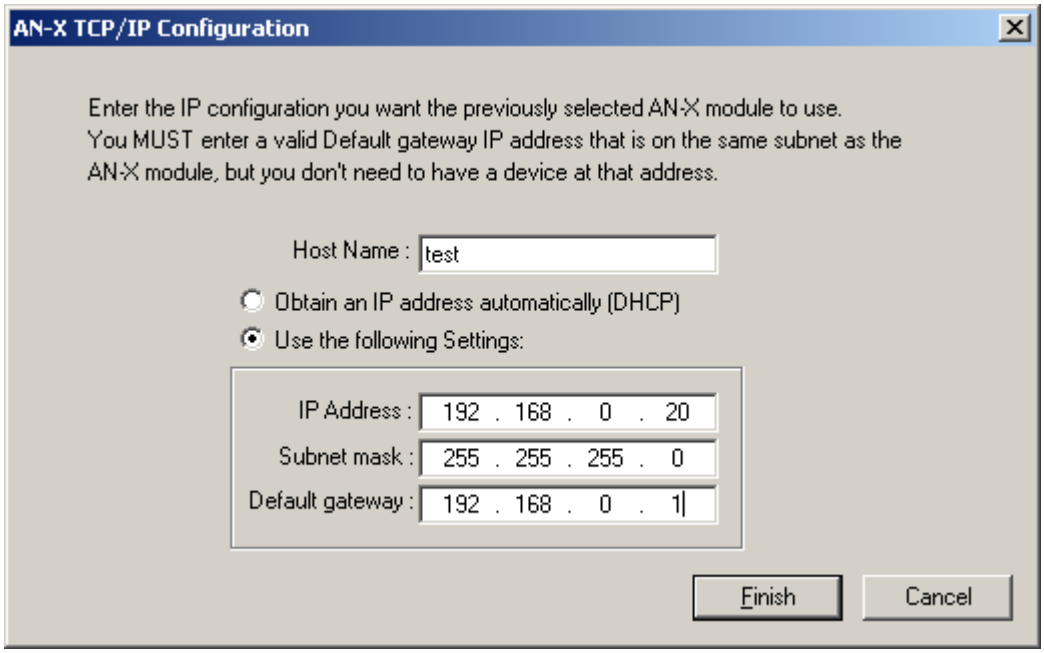


Select *Utilities/Select An AN-X* and enter the MAC Address and IP address.




Click *OK* to accept the setting.

Select *Utilities/AN-X IP Configuration*.



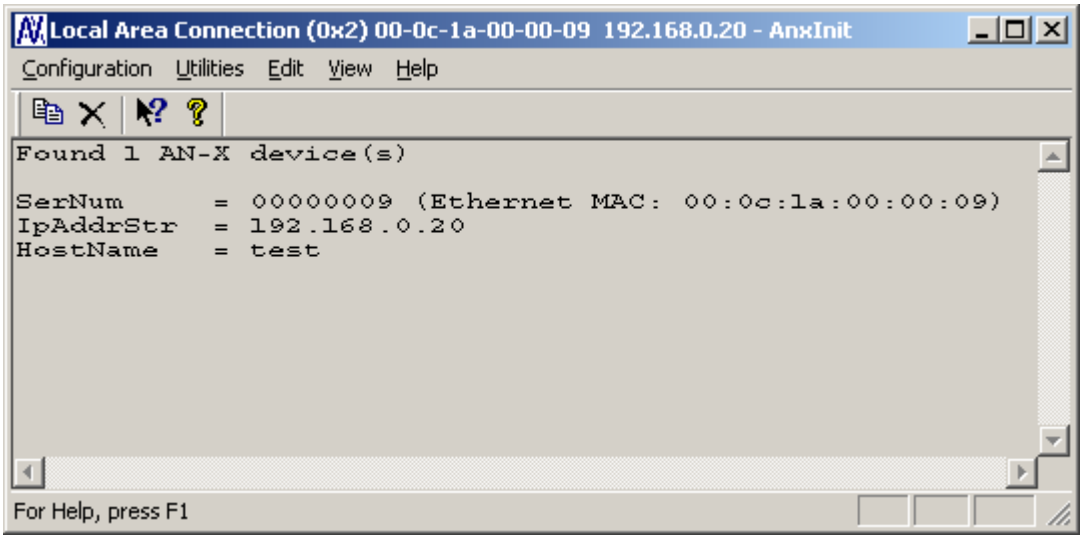

Enter an IP Address. In this case we chose 192.168.0.20

Enter the same Subnet mask and Default gateway that you entered for the computer. The default gateway address does not exist on the network but AN-X requires that the field have a valid entry.

Click *Finish* to accept the settings.

Select *Utilities/Restart AN-X* to restart AN-X with the new parameters.

When the AN-X has restarted (SYS LED is solid green), select *Utilities/Locate All AN-X Modules* and confirm that the AN-X is found with the new parameters.




## Reconfiguring an AN-X from an Unknown State

It sometimes happens that an AN-X has been previously configured with an IP address that causes it to be inaccessible on the current Ethernet network. To reconfigure it to a known state, run the command *Configuration/AN-X IP Settings* to start the AN-X IP Configuration Wizard and reconfigure AN-X.

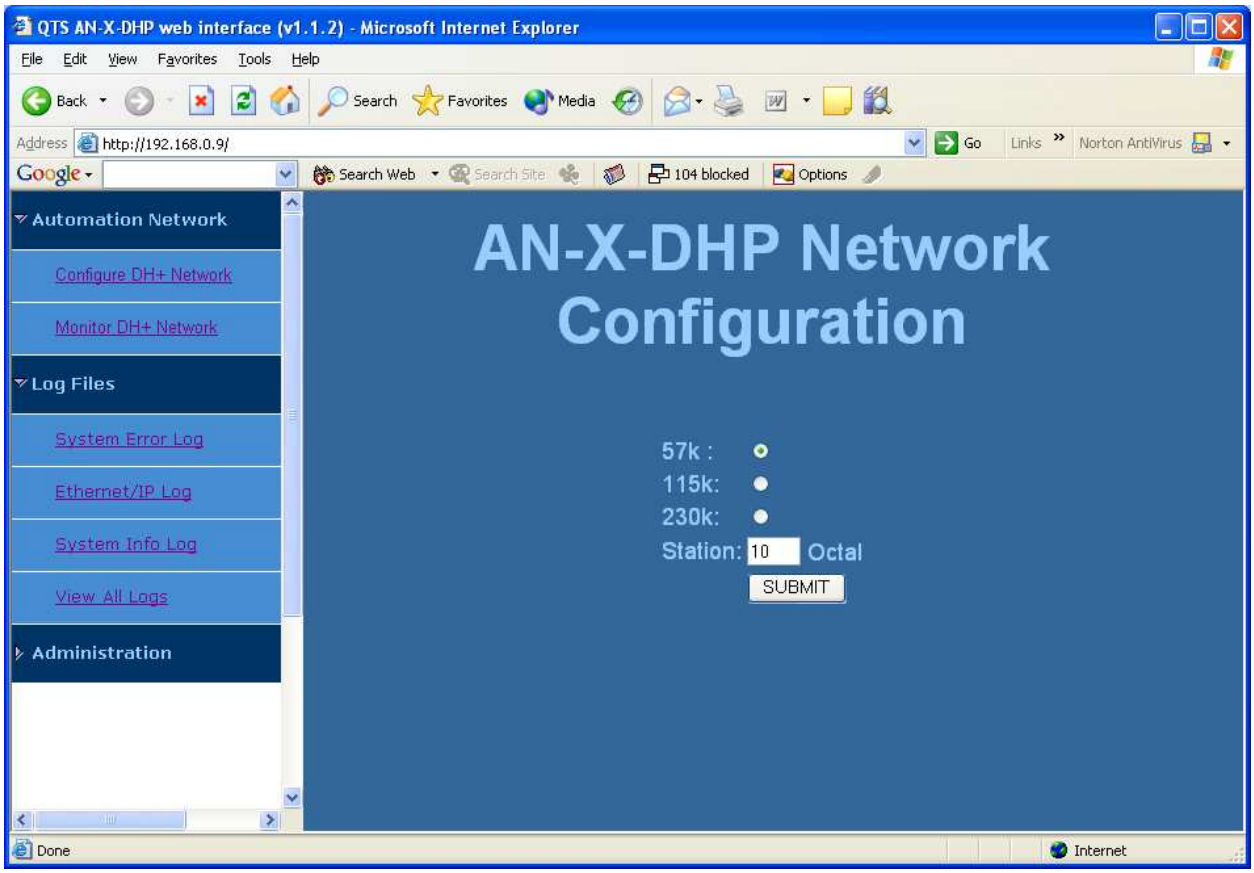
## Data Highway Plus Configuration

You set the station number and baud rate using the web interface.

Start your web browser and enter the AN-X IP address as the address.

Enter the Data Highway Plus station number, in octal.

Select the baud rate.




Click the SUBMIT button to send the values to AN-X.

AN-X defaults to a station address of 20 octal and a baud rate of 57.6 Kbaud.

# Using the AN-X-DHP with Programming Software

## Configuring the AN-X-DHP in RSLinx

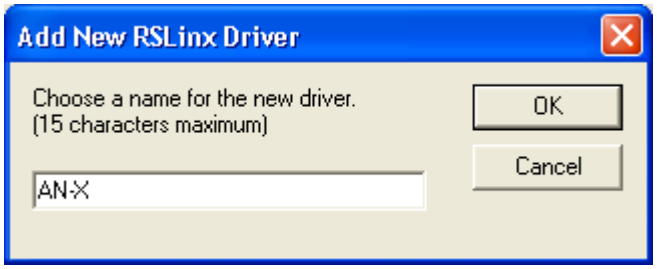
To use an AN-X-DHP module with Rockwell programming software such as RSLogix 5, you must first configure a driver in RSLinx to access the AN-X module.

The following instructions assume that:

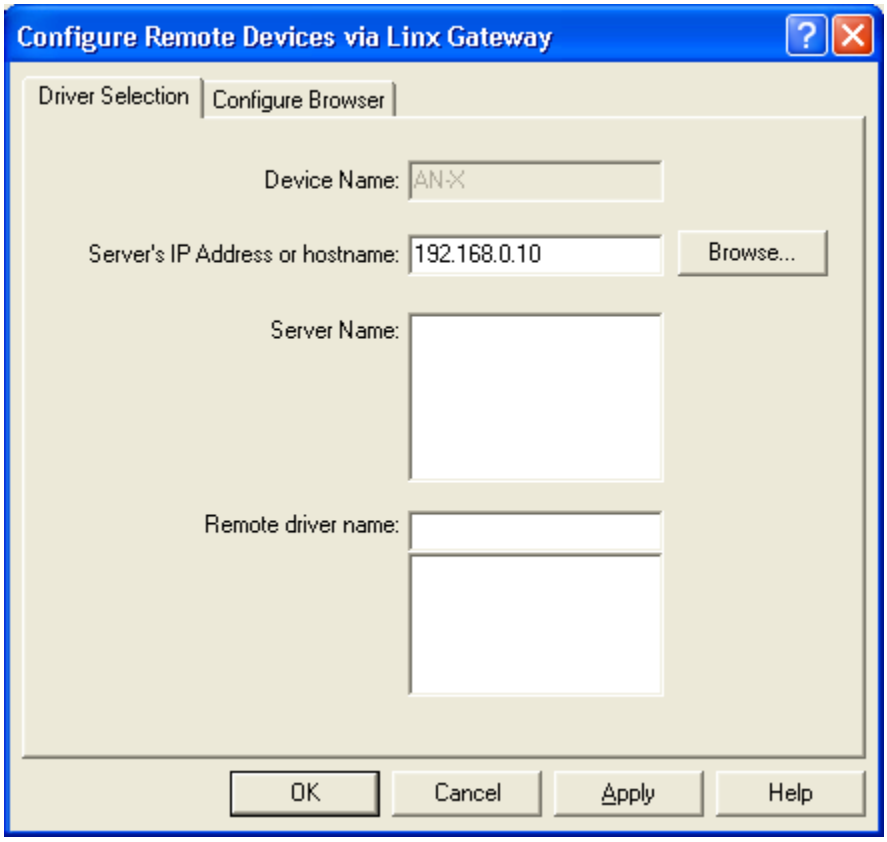
- AN-X has been configured and is active on the Ethernet network
- AN-X has been connected to the Data Highway Plus network
- the AN-X Data Highway Plus station number and baud rate have been assigned and are compatible with the existing network

Use the following steps to configure the AN-X-DHP in RSLinx.

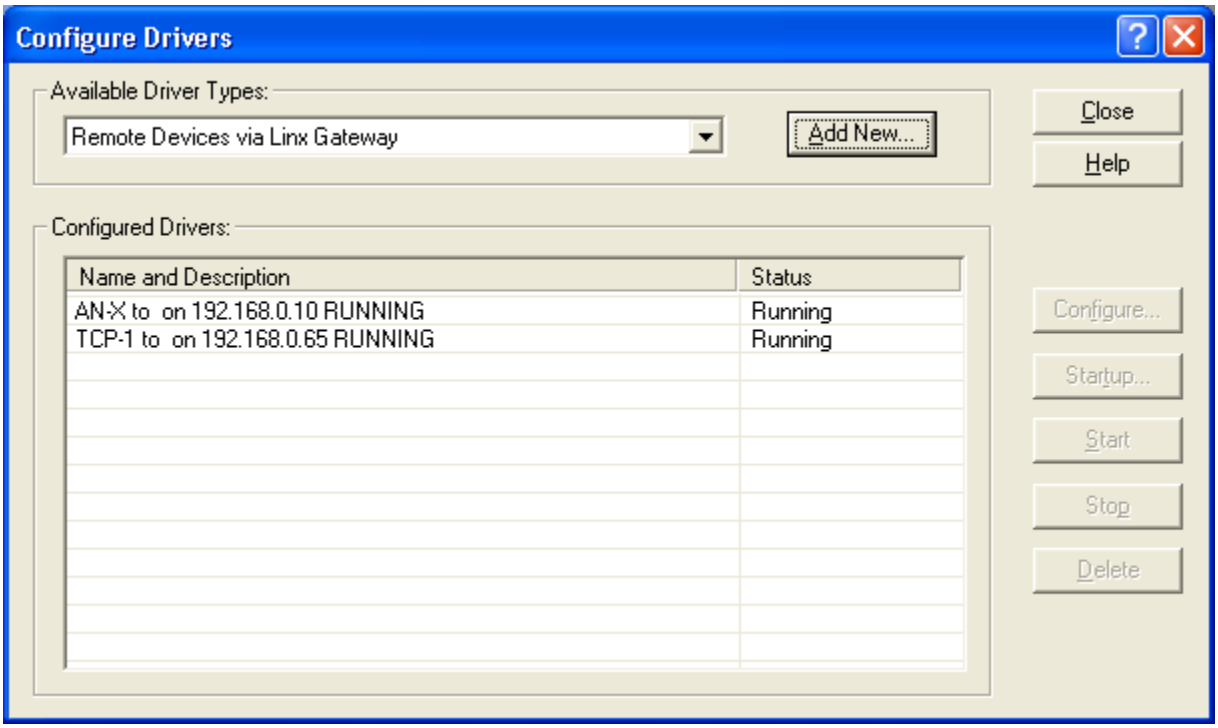
1. Select *Communications/Configure Drivers…*
2. From the list of *Available Driver Types:*, select *Remote Devices via Linx Gateway* and click *Add New…*
3. Give the driver a name




4. For Server's IP Address or hostname: enter the IP address of the AN-X-DHP and click OK.




5. Check that the driver has status Running




6. Click Close

## Using the Programming Software

To go online with programming software such as RSLogix 5, browse the network and go online.

## Multiple Programmer Access

Multiple computers can connect to a Data Highway Plus network through a single AN-X-DHP.

Multiple applications on a computer can connect to a Data Highway Plus network through the same AN-X-DHP.

# Using DDE/OPC and unscheduled Messages

You can use a DDE or OPC server, such as RSLinx, to access data using the AN-X-DHP.

Configure the AN-X module as you would a ControlLogix 1756-ENET Ethernet module and 1756-DHRIO Data Highway Plus module.

### Example: RSLinx

To configure a topic in RSLinx to access data on the AN-X-DHP:

1. Create a new topic. From the main menu select *DDE/OPC/Topic Configuration*. Click New and give the topic a name.
2. For the *Data source*, browse the path to the AN-X module and click Apply.
3. On the Data Collection tab, set the *Processor Type* to PLC-5. Check *Polled Messages* and select an appropriate update rate. Leave everything else unchecked. Click Apply
4. You do not need to set anything on the Advanced Communication tab.
5. Click Done to complete the topic configuration.

You should now be able to access data using any DDE or OPC client capable of communicating with RSLinx.

Details for configuring other OPC servers are found in technical notes on the QTS website, www.qtsusa.com

# Using AnxInit

AnxInit is a 32-bit Windows application supplied with AN-X to perform the following functions:

- Locate and identify AN-X modules on the Ethernet network
- Select a specific AN-X for configuration
- Set the IP address and other network parameters for an AN-X
- Restart an AN-X
- Display information about the selected AN-X
- Read the kernel parameters for the selected AN-X
- Update the flash (low level firmware) on the selected AN-X
- Update the firmware on the selected AN-X
- Patch the firmware on the selected AN-X

In addition, it can be used to:

- clear the AnxInit log
- copy the contents of the log to the clipboard for use by another application. This is often useful for technical support

## AnxInit Log

AnxInit logs messages in its main window. These messages are often useful for determining the cause of errors or for technical support.

To clear the log, select *Edit/ClearLog*.

To copy the contents of the Log to the Windows clipboard so that they can be pasted into another application, select *Edit/Copy*.

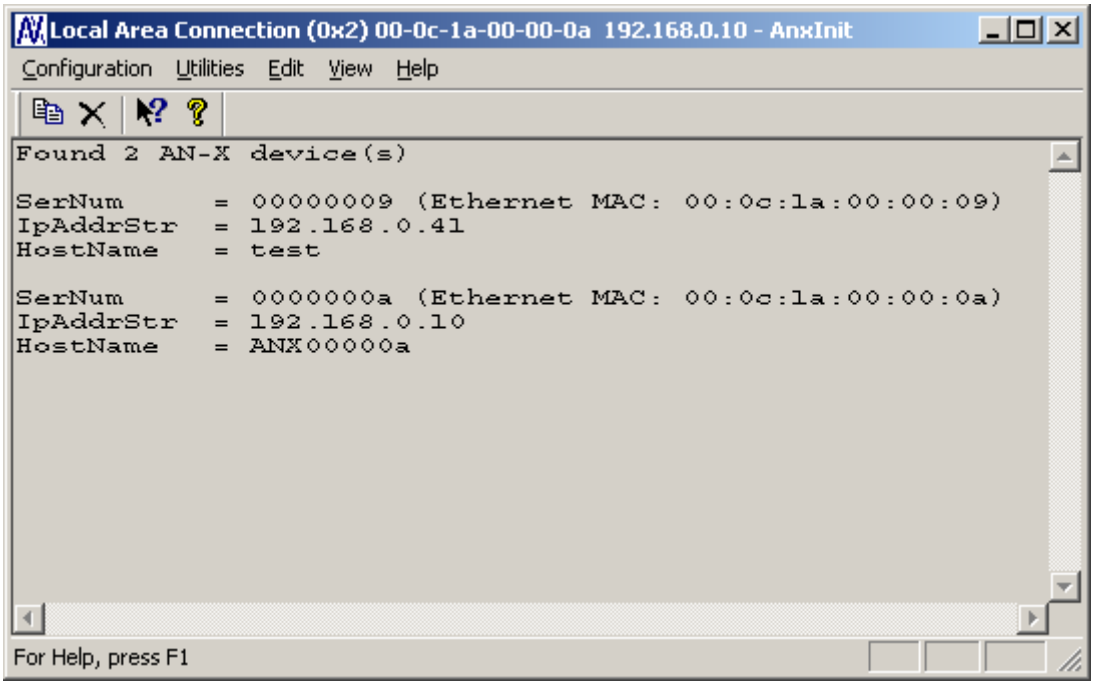
**AN-X Log**

## Locating Available AN-X Modules

To locate all accessible AN-X modules on the Ethernet network, select *Utilities/Locate All AN-X Modules.*

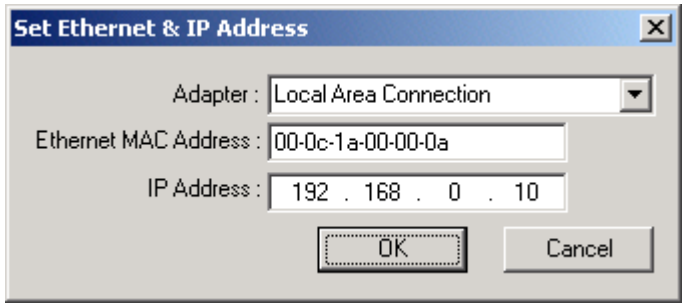
AnxInit displays a list of the AN-X modules it finds, showing their MAC IDs, IP addresses and host names.

This command is useful for determining IP addresses when they have been set by a DHCP server or for confirming that an AN-X is accessible.




## Selecting an AN-X

Before you can perform an operation on an AN-X, you must select it. Choose *Utilities/Select An AN-X* to select a specific AN-X.




From the Adapter list, select the network adapter that connects to the Ethernet network that contains the AN-X.

In the *Ethernet MAC Address* field, enter the MAC Address of the AN-X you wish to select. It can be found on the AN-X label or using the *Locate All AN-X Modules* command. The format is as shown above, six pairs of hexadecimal digits separated by hyphens.

In the *IP Address* field, enter the Ethernet IP address of the AN-X you wish to select. It can be found using the *Locate All AN-X Modules* command. The format is as shown above, four decimal numbers each in the range 0 to 255.

Both MAC address and IP address must match the settings on the AN-X in order for communication to occur.

Click OK to select the AN-X.

The title bar of AnxInit shows the MAC Address and IP Address of the currently selected AN-X.

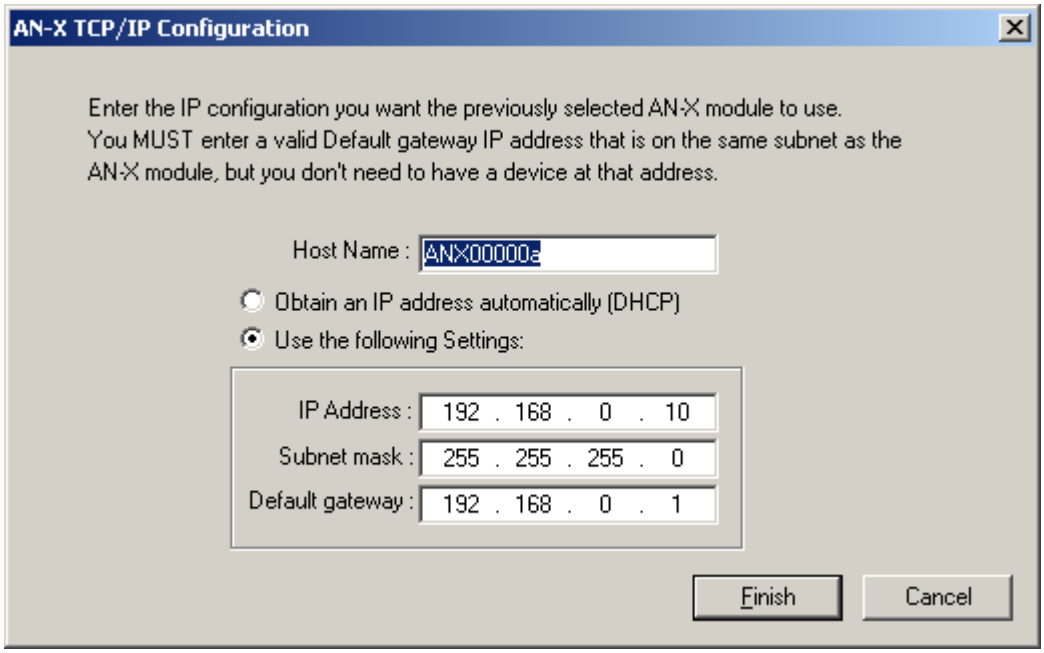
## Set AN-X IP Configuration

*Utilities/AN-X IP Configuration* sets the AN-X IP address and hostname.

The AN-X must be on the local Ethernet to set its IP address.

First select the AN-X using the *Utilities/Select An AN-X command.*

Next select *Utilities/AN-X IP Configuration.* The *AN-X TCP/IP Configuration* dialog appears.




Enter a *Host Name* for the AN-X. This name is used internally by AN-X and may be used to identify the AN-X if you have a DNS server on your network. The name can be from 1 to 31 characters long.

To configure the AN-X to obtain its IP address from a DHCP server on the network, select *Obtain an IP address automatically (DHCP)*

To configure the AN-X to use a static IP address, select *Use the following Settings* and enter the following:

- the desired IP address for the AN-X.
- the Subnet mask for the AN-X
- the default gateway for your network.

You must enter a valid default gateway address even if there is no device at the gateway address on the network.

Click OK to complete the configuration.

*Utilities/AN-X IP Configuration* resets the selected AN-X. Use the *Utilities/Restart AN-X* to restart the AN-X in production mode.

If you Cancel the *Utilities/AN-X IP Configuration* command, AN-X is left running the boot code. Use the *Utilities/Restart AN-X* command to restart the AN-X.

## Restart an AN-X

Use the *Utilities/Restart AN-X* command to restart the currently selected AN-X.

## AN-X Info

The *Utilities/AN-X Info* command provides information about the currently selected AN-X in the log window.

The information shown:

| | |
|---|---|
| AN-X Info | Ethernet MAC address |
| SerNum | Serial number |
| DaughterID | Daughterboard ID, 3 for AN-X-DHP |
| BootRev | Boot code version |
| ConfigRev | Configuration kernel version |
| ProdRev | Production kernel version |
| HwRev | Hardware version |
| FirmwRev | Firmware release version (depends on current operating mode) |
| Status | see below |
| VendorId | Vendor ID |
| ProdId | Product ID |
| IpAddrStr | IP address assigned using Utilities/AN-X IP Configuration |
| HostName | name assigned using Utilities/AN-X IP Configuration |

In boot mode, FirmwRev, Vendor ID and Product ID and not valid, and IpAddrStr and HostName are not shown.

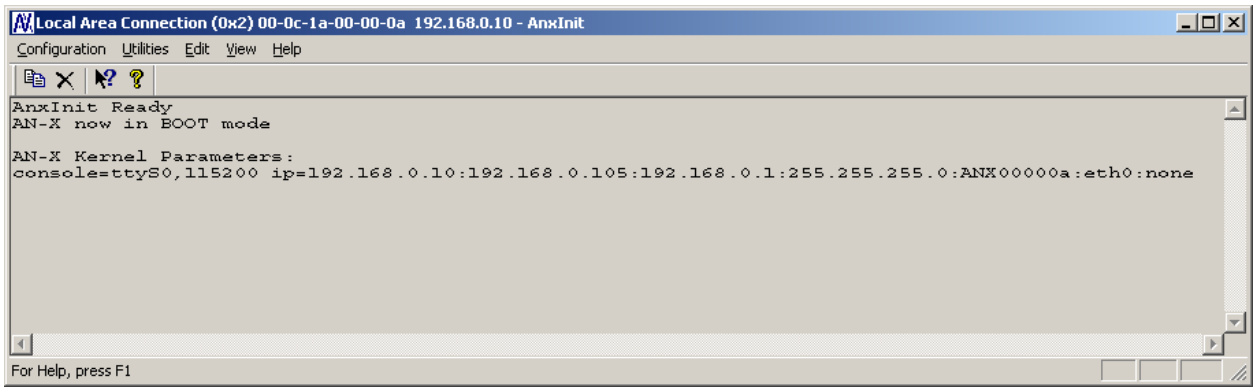
Possible status values are:

| Value | Meaning |
|---|---|
| 1 | Boot mode |
| 2 | Configuration mode |
| 4 | Production mode |

## Read Kernel Parameters

The *Utilities/Read Kernel Parameters* command displays various communications parameters for the currently selected AN-X

This command resets the AN-X. You will be warned and given the opportunity to cancel the command.




The *Utilities/Read Kernel Parameters* command leaves the AN-X running the boot code. Use the *Utilities/Restart AN-X* command to restart the AN-X in production mode.

## Run Config Mode

The *Utilities/Run Config Mode* command is used to restart the currently selected AN-X in configuration mode (normally used internally for updating firmware).

This command is not used in normal operation but may be required for technical support.

The AN-X is in configuration mode when the SYS LED flashes red twice, followed by a pause.

To exit configuration mode, use the *Utilities/Restart AN-X* command to restart AN-X in production mode.

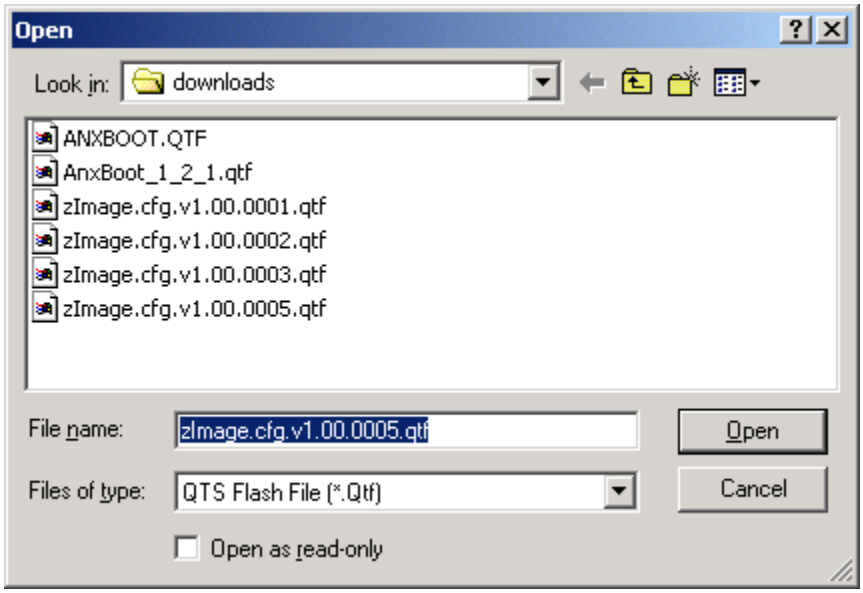
## Update AN-X Flash

The *Utilities/Update AN-X Flash* command updates the low-level firmware (boot code, configuration kernel, production kernel).

Files have extension qtf.

This command resets the AN-X. You will receive a warning and be given the opportunity to Cancel the command.

If you cancel at the filename dialog, the AN-X has already been reset and is in boot mode. Use the *Utilities/Restart AN-X* command to restart it in production mode.




## Update Firmware

There are two ways to update all the firmware in an AN-X module.

1. The *Configuration/Firmware Update* command starts the firmware update wizard, which takes you step by step through the firmware update process.
2. The *Utilities/Update Firmware* command updates all the firmware on an AN-X you have selected using the *Utilities/Select An AN-X* command.

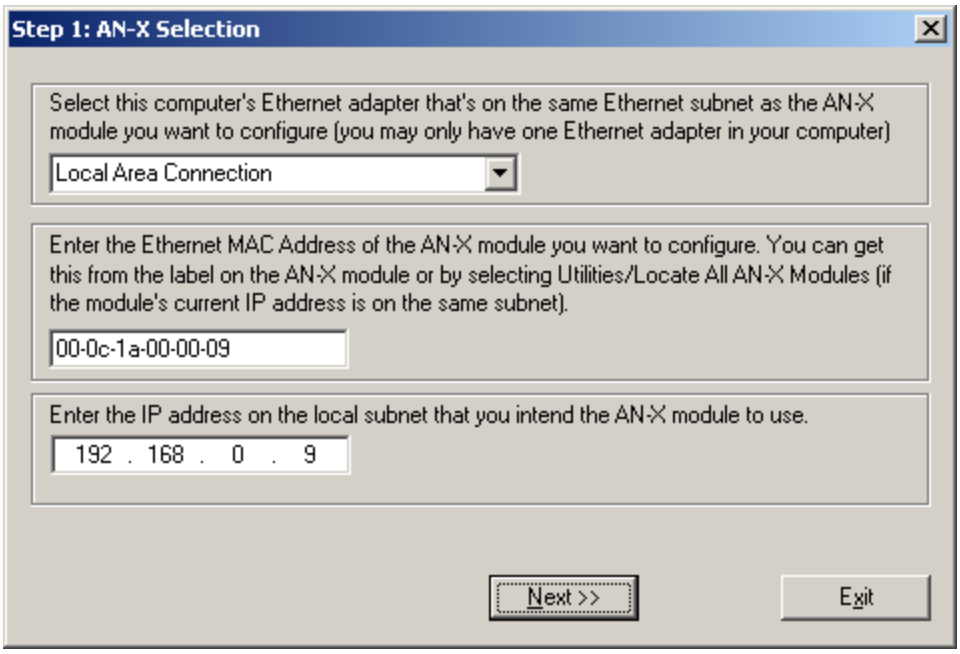
Firmware files have extension *bin*.

### Firmware Update Wizard

Select the *Configuration/Firmware Update* command to start the firmware update wizard.

#### Step 1:

In step 1, you identify the AN-X you are configuring.




1. Select the Ethernet adapter that's connected to the AN-X. In most cases there will be just one Ethernet adapter in the computer. The AN-X must be on the same subnet as the computer.

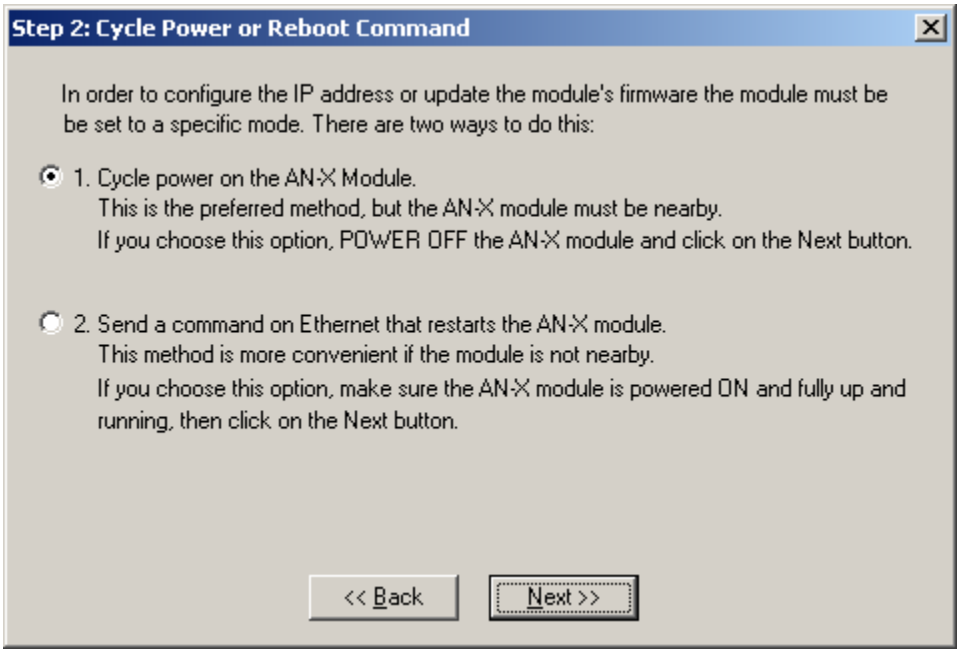
2. Enter the MAC address of the AN-X you are updating. This is printed on the AN-X label. It consists of six pairs of hexadecimal digits, separated by hyphens. In the example above, it's 00-0c-1a-00-00-09.

If the AN-X is already online, you can obtain its MAC address using the *Utilities/Locate All AN-X Modules* command.

3. Enter the IP address of the AN-X you want to update

### Step 2

In step 2, you choose a method of restarting AN-X to put it in config mode.

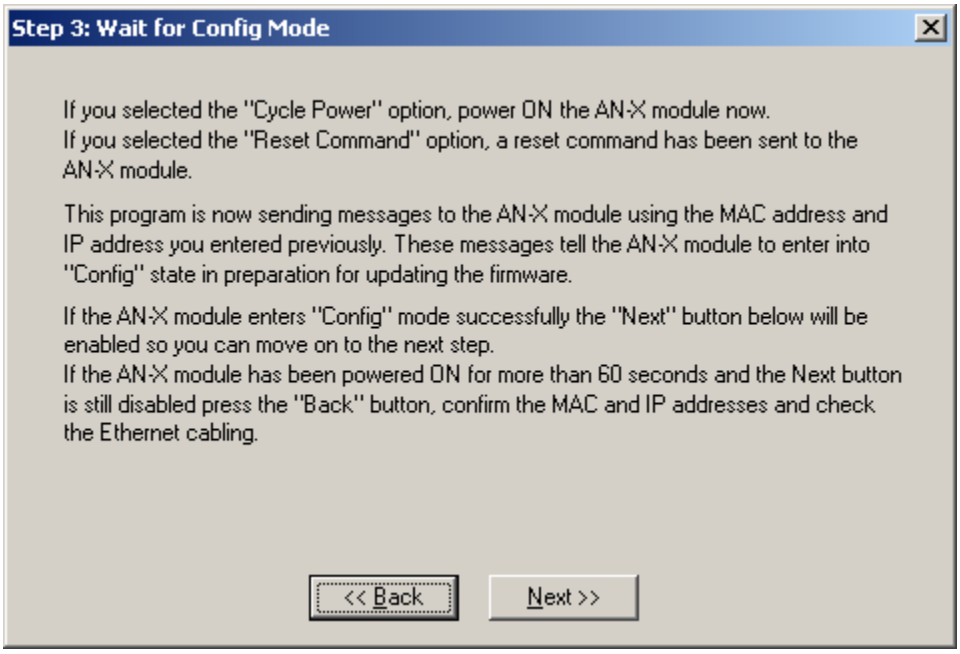



The preferred method is to cycle power on the AN-X. Select the first option on the screen and click the *Next* >> button.

The second method, useful if the AN-X in not easily accessible, is to send it a command over Ethernet. The AN-X must be powered on and completely running for this method to work. For example, if this is the first time you are configuring a new AN-X, allow sufficient time for it to acquire an IP address from a DHCP server or to time out and use its default IP address (about 3 minutes). Select the second option on the screen and click the *Next* >> button.

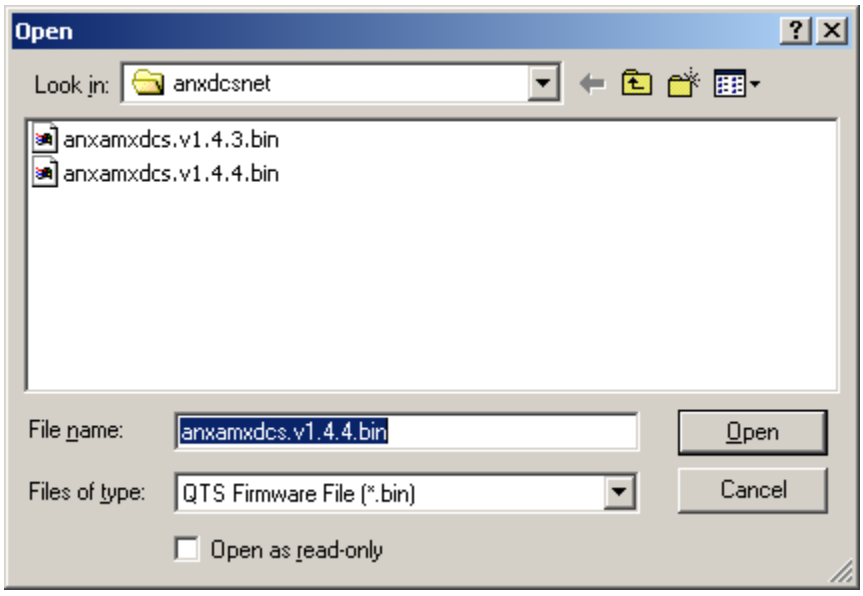
### Step 3:

Wait for AN-X to enter config mode. While AnxInit is waiting, the *Next*>> button will be disabled. When AN-X is in boot mode, the *Next*>> button will be enabled.




If the AN-X does not enter config mode within about 60 seconds, return to the previous screens and check the entries.

Click the *Next>>* button, and select the firmware file you want to download and click *Open*.




AnxInit transfers the firmware file and restarts the AN-X.

After you run update the firmware, you must reconfigure the AN-X and restore the Data Highway Plus station number and baud rate

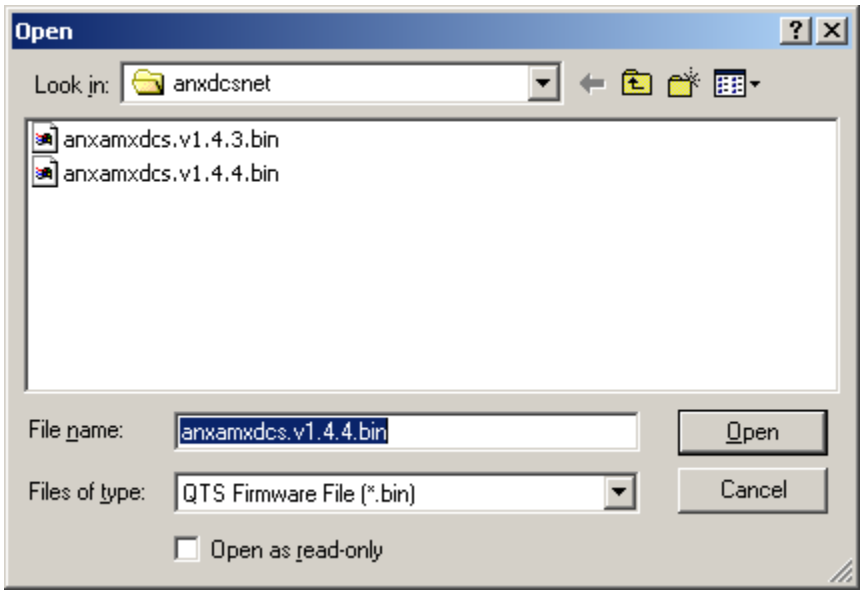
## Update Firmware Command

The *Utilities/Update Firmware* command updates all the firmware on an AN-X you have previously selected using the *Utilities/Select An AN-X* command.

This command resets the AN-X. You will receive a warning and be given the opportunity to Cancel the command.

If you cancel at the filename dialog, the AN-X has already been reset and is in configuration mode. Use the *Utilities/Restart AN-X* command to restart it in production mode.

Click the *Next>>* button, and select the firmware file you want to download and click *Open*.



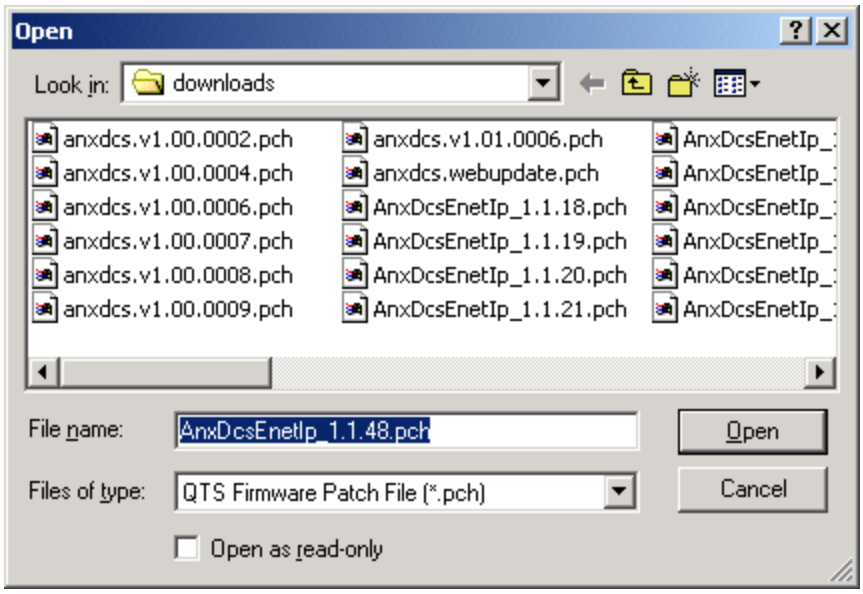

AnxInit transfers the firmware file and restarts the AN-X.

After you run update the firmware, you must reconfigure the AN-X and restore the Data Highway Plus station number and baud rate.

## Patch Firmware

The *Utilities/Patch Firmware* command applies small patches to the firmware running on the AN-X.

These patch files files have extension *pch*.




This command resets the AN-X. You will receive a warning and be given the opportunity to Cancel the command.

You do not have to reconfigure the AN-X after applying a patch. All configuration information will be left intact.

When the patch has been applied, AnxInit restarts the AN-X in production mode.

If you cancel at the filename dialog, the AN-X has already been reset and is in configuration mode. Use the *Utilities/Restart AN-X* command to restart it in production mode.

# Using the Web Interface

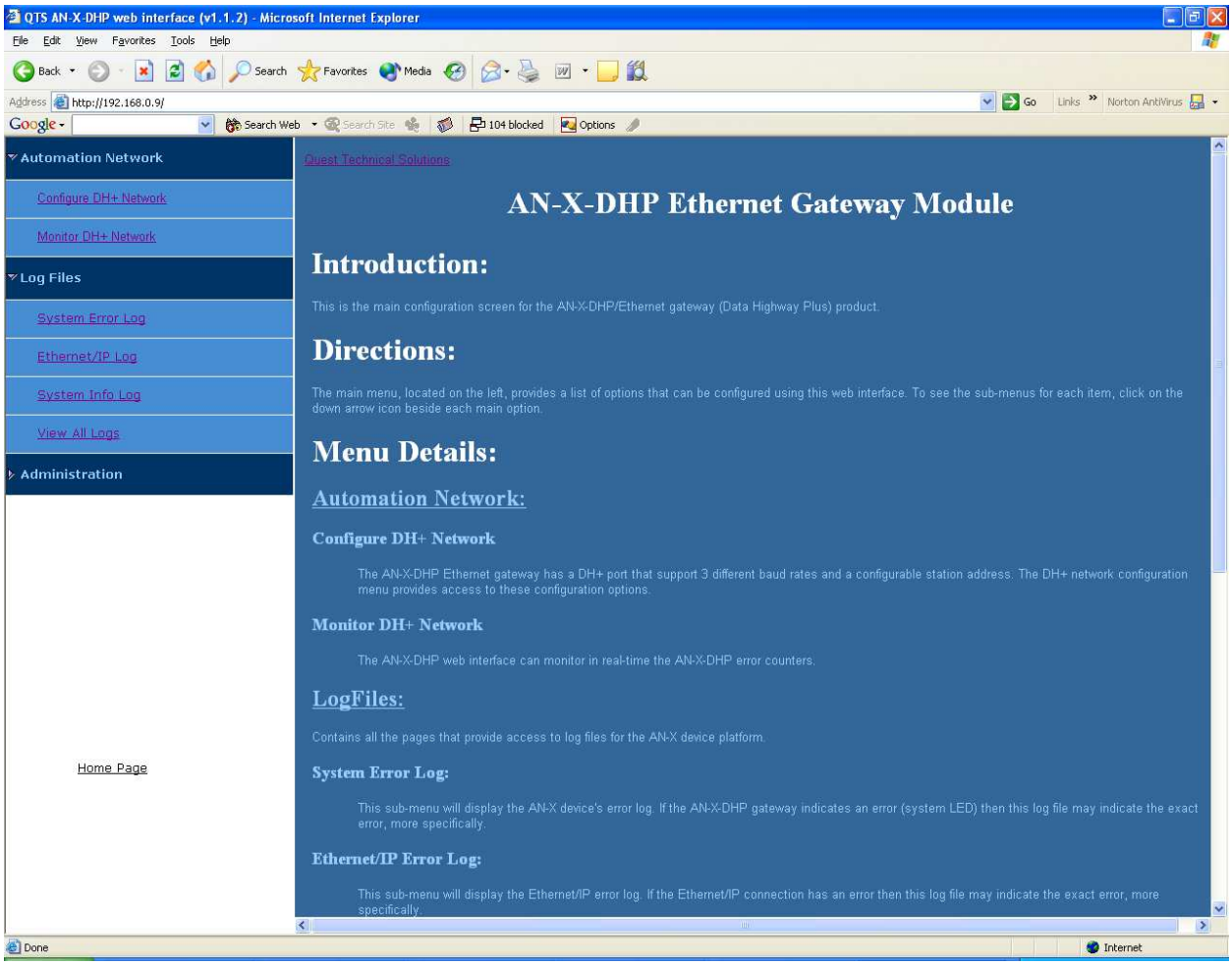
The AN-X module contains a webserver capable of commuincating with standard web browsers such as Internet Explorer or Netscape.

Use the web interface to:

- set the Data Highway Plus station number and baud rate
- monitor Data Highway Plus diagnostic counters
- view AN-X logs

To use the web interface, you need to know the IP address of the AN-X. Use the *Utilities/Locate All AN-X Modules* command in AnxInit to find all AN-X modules on the Ethernet network.

To access the web interface, start your web browser and type the AN-X IP address where you normally enter web addresses in the browser.

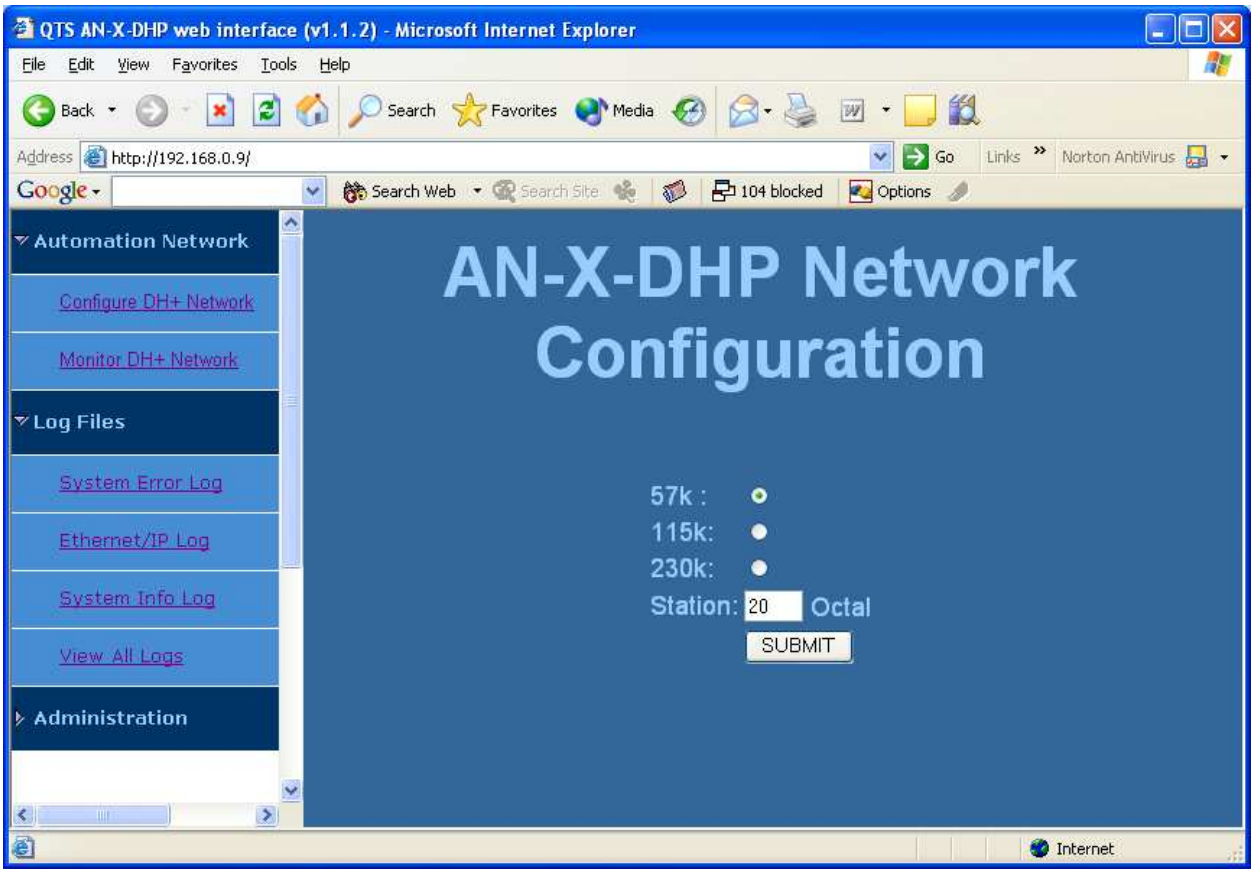



The left pane contains commands. Click on the arrows at the left of the main headings to expand or contract the sections.

The contents of the right pane depend on the current command being executed.

## Data Highway Plus Configuration

Select *Automation Network/Configure DH+ Network* to set the station number and baud rate.




Enter the station number in the Station field. It can range from 0 to 77 octal. 0 is not recommended as a Data Highway Plus station number.

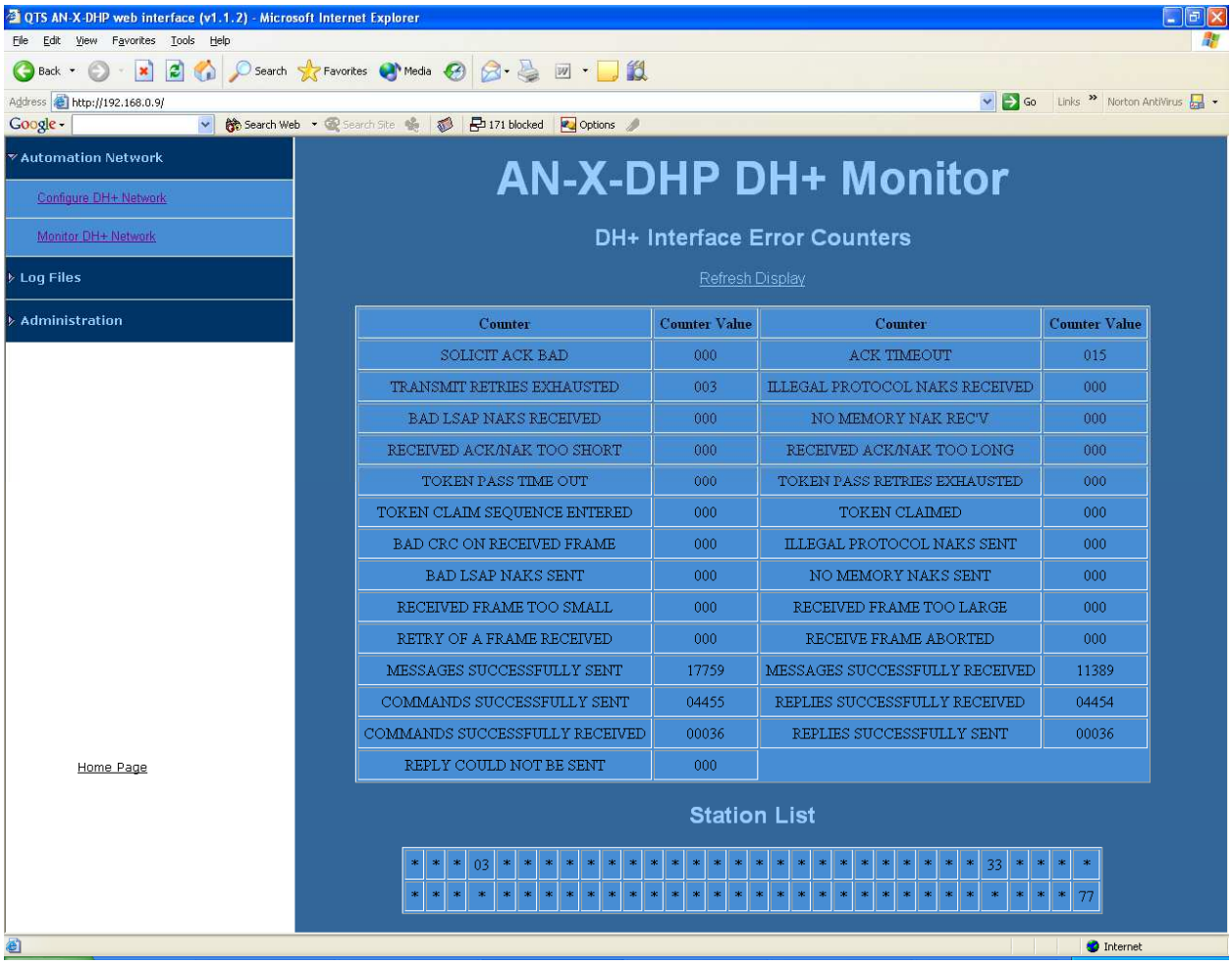
Select the baud rate.

The default AN-X configuration is station 20 octal, baud rate 57.6 Kbaud.

Click the SUBMIT button to send the values to AN-X.

## Monitor Diagnostic Counters

To use the web interface to view the Data Highway Plus diagnostic counters and active station list on AN-X, select *Automation Network/Monitor DH+ Network.*




The table at the top of the screen shows the Data Highway Plus diagnostic counters. The table at the bottom of the screen shows the active station list.

To update the display, click the *Refresh Registers* button.

The Data Highway Plus diagnostic counters are described on page 38.

## Log Files

AN-X maintains various logs to record diagnostic and error messages. Use the Log Files menu in the web interface to view these logs.

### System Error Log

The System Error log records errors that occur during AN-X operation. This log is normally empty.

### Ethernet/IP Log

The Ethernet/IP log shows messages and errors associated with Data Highway Plus operation.

### System Info Log

The System Info Log records informational messages during startup and normal operation.

### View All Logs

Use View All Logs to list and view all the AN-X logs. To view a log file, double click on the file name.

## Administration Menu

The Administration Menu is used to view and edit files on AN-X. It is password protected and is used only for AN-X technical support.

# Troubleshooting

## LEDs

The AN-X-DHP has LEDs that indicate the state of the Ethernet connection, the connection to Data Highway Plus, and the overall module state.

### Ethernet LEDs

There are two LEDs that indicate the state of the Ethernet connection.

The orange LED, labelled 100, is on if the link is running at 100 Mbits/second and is off otherwise.

The green Link/Act LED is off if the link is inactive and is on if the link is active. If activity is detected, the link blinks at 30 ms intervals and continues blinking as long as activity is present.

### SYS LED

The SYS LED is used by the AN-X operating system and software to indicate the state of operations and errors.

It should be used in conjunction with the logs to locate the cause of problems.

In the following, red 3 means three red flashes followed by a pause, and so on.

| SYS LED State | Possible cause |
|---|---|
| Red 2 | AN-X is in config mode |
| Red 3 | DHCP configuration failed |
| Red 4 | Fatal application error, check logs for cause |
| Red 5 | Application memory access violation, check logs |
| Red 6 | Application failed, illegal instruction, check logs |
| Red 7 | Application crashed, unknown cause, check logs |
| Fast red flash | Reconfiguration (set station number and baud rate) failed |
| Single red flash | Unscheduled messaging, addressing or connection problem |
| Slow red flash | script or application problem during startup |

At startup, the SYS LED sequence is:

- boot code starts – fast flashing red
- boot code loads a kernel – solid red
- if the configuration kernel is loaded, 2 red flashes followed by a pause
- if the production kernel loads with no errors, solid green

### NET LED – Network Status

The NET LED indicates the status of the Data Highway Plus network connection.

| | |
|---|---|
| All stations operating correctly | Solid green |
| No other stations | Yellow |
| Network error | Flashes red |

## Data Highway Plus Diagnostic Counters

AN-X maintains Data Highway Plus diagnostic counters. Use *Automation Network/Monitor DH+ Network* in the web interface to view the diagnostic counters.

The counters are:

| Counter | Description |
|---|---|
| Solicit ACK Bad | Solicit ACK bad (not to AN-X, bad ACK value, or source is not the station AN-X solicited) |
| Transmit retries exhausted | AN-X retries messages up to 3 times (4 in total). If it still hasn't successfully sent the message, it discards the message and returns an error. |
| Bad LSAP NAKs received | AN-X sent a message and got a bad LSAP NAK in response. Usually caused by routing problems. |
| Received ACK/NAK too short | AN-X was waiting for an ACK and received a frame that was less than 3 characters long instead. |
| Token pass timeout | AN-X passed the token but there was no response from the destination in the timeout period. AN-X retries the token pass up to 3 times. |
| Token claim sequence entered | AN-X increments this counter when there is no network activity (no token passing, etc.). It then starts soliciting for stations to pass the token to. |
| Bad CRC on received frame | AN-X received a frame with a bad CRC. Usually caused by |

| Counter | Description |
|---|---|
| | cabling and termination. |
| Bad LSAP NAKs sent | AN-X uses this counter as a noise counter. If it detects a carrier on the network and then the carrier disapperas before a frame starts, it increments this counter. |
| Received frame too small | AN-X recievied a frame smaller that the minimum possible size. |
| Retry of a frame received | AN-X received a frame with the same transaction number as a previous frame. It discards the duplicate frame. |
| Messages successfully sent | AN-X increments this counter when it sends a message (command or reply) successfully. It also increments the commands successfully sent or replies successfully sent counter. |
| Commands successfully sent | AN-X increments this counter when it successfully sends a command to another station. |
| Commands successfully received | AN-X increments this counter when it receives a command from another station. |
| Reply could not be sent | AN-X increments this counter when it receives a command but could not deliver the reply. |
| ACK timeout | AN-X was expecting an ACK in response to a message but nothing was received in the timeout period. Sometimes caused by sending messages to stations that do not exist. |
| Illegal protocol NAKs received | AN-X sent a message and got an illegal protocol NAK in response. |
| No memory NAK received | AN-X sent a message and got a no memory NAK in response. |
| Received ACK/NAK too long | AN-X was expecting an ACK and received a frame that was longer than 3 characters instead. |
| Token pass retries exhausted | AN-X retries the token pass up to 3 times. If it still fails, it increments this counter, removes the destination from its active station list, and tries to pass the token to its successor. |
| Token claimed | Not used. |
| Illegal protocol NAKs sent | If AN-X receives a message that is shorter than the minimum length (6 characters), it increments this counter and sends an illegal protocol NAK to the sender. |
| No memory NAKs sent | IF AN-X receives a message and is out of buffer space, it increments this counter and sends a no memory NAK to the sender. |
| Received frame too large | AN-X received a frame that was larger than the maximum possible size (308 bytes, including the 2 CRC bytes). |
| Receive frame aborted | AN-X increments this counter when it receives a message that |

| Counter | Description |
|---|---|
| | doesn't finish, either because the source aborted the message or because the source went offline. |
| Messages successfully received | AN-X increments this cunter when it receives a message (command or reply). It also increments the commands successfully received or replies successfully received counter. |
| Replies successfully received | AN-X increments this counter when it receives a reply to a command it sent to another station. |
| Replies successfully sent | AN-X increments this counter when it successfully sends a reply to another station. |

Counters roll over when they reach their maximum value.

The diagnostic counters are cleared when you reconfigure the Data Highway Plus network parameters on AN-X.

# Updating the Firmware

The AN-X operating software consists of several parts:

- boot code, runs at startup
- configuration kernel, runs when you update firmware
- production kernel, runs in normal operation
- application software, for Data Highway Plus communication and unscheduled messaging

The boot code and kernels are supplied in file with extension *qtf* and are updated using the AnxInit utility. Run the command *Utilities/Update AN-X Flash* and select the file you wish to download. Refer to page 26 for details.

Firmware files contain the application programs for AN-X and have extension *bin.* They are downloaded using the command *Configuration/Firmware Update* or *Utilities/Update Firmware* in AnxInit. Refer to page 27 for details.

Occasionally individual patch files are released. They have extension *pch* and are downloaded using the *Utilities/Patch Firmware* command in AnxInit. Refer to page 31 for details.

## Reading Version Numbers

To read the version numbers of the various software components:

| | |
|---|---|
| Boot code | AnxInit – AN-X Info |
| Configuration kernel | AnxInit – AN-X Info |
| Production kernel | AnxInit – AN-X Info |
| Firmware | AnxInit – AN-X Info (version depends on current mode, boot, configuration or production) |
| Individual applications | |
| | Web interface, System Info Log |
| Unscheduled messaging | Web interface, Ethernet/IP Log |

## Obtaining the Latest Software

Version numbers and software for the most recent AN-X releases are available from the QTS website, www.qtsusa.com

# *Specifications*

| Parameter | Specification |
|---|---|
| Function | Bridge between Ethernet and Data Highway Plus network |
| Description | Processor: 100MHz IDT MIPS<br>FLASH memory: 64M<br>RAM: 64M |
| Typical Power Consumption | 300 mA @ 12 VDC or 150 mA @ 24 VDC |
| Maximum Power dissipation | 3.6W |
| Environmental Conditions: | |
| Operational Temperature | 0-50°C (32-122°F) |
| Storage Temperature | –40 to 85°C (–40 to 185°F) |
| Relative Humidity | 5-95% without condensation |

# *Support*

Technical support is available from Quest Technical Solutions.

Quest Technical Solutions

4110 Mourning Dove Court
Melbourne FL 32934
321 757-8483

website: www.qtsusa.com

email: support@qtsusa.com

If you need to make a return, contact QTS to obtain a return authorization number.