**AN-X2-AB-DHRIO**
**Data Highway Plus**
**Communication**

# *User Manual*

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

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

These warnings help to:

**WARNING!**

- 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-X2-AB-DHRIO (DH+)

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# AN-X2-AB-DHRIO Data Highway Plus Module

The AN-X2-AB-DHRIO module running Data Highway Plus (DH+) firmware connects a computer or other device to an Allen-Bradley Data Highway Plus network, using Ethernet.

The AN-X2-AB-DHRIO (DH+) 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

The AN-X2-AB-DHRIO (DH+) module functions exactly the same as the original AN-X-AB-DHRIO (DH+) module on Data Highway Plus. Only the underlying hardware is slightly different.

You can use the AN-X2-AB-DHRIO (DH+) module with Rockwell programming software to communicate with PLCs such as the PLC-5 over Data Highway Plus. Refer to page 17 for details.

You can use a DDE or OPC server , for example, RSLinx, on Ethernet to access Data Highway Plus using the AN-X2-AB-DHRIO (DH+). Refer to page 21 for details.

The AN-X2-AB-DHRIO (DH+) 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.

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 selected and updated using the web interface.

## 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

- a microSD card for storage of configuration data and firmware

## Package Contents

- AN-X2-AB-DHRIO (DH+) module

- CD containing software and documentation

## Identifying the AN-X2 versus the Original AN-X

The label on the bottom toward the front says AN-X2.

There is a slot at the back for the microSD card.

When initially powered up:

- AN-X2 railroads (alternates) SYS and NET LEDs green as it starts up
- without the Ethernet cable attached, the Ethernet 10/100 (upper) LED is on for AN-X2 (both Ethernet LEDs are off for the original AN-X)

## Differences from the Original AN-X

AN-X2 modules have a microSD card for storage of firmware and configuration data.

You no longer need AnxInit; everything can be done from the web interface or by editing files on the microSD card.

Operation is simplified, there are production and maintenance modes only.

The AN-X2 requires firmware version 4 and above.

The AN-X2 uses the same hardware interface to the automation networks.

There are no difference for applications once Ethernet and firmware have been configured.

## Using the MicroSD Card

The AN-X2 microSD card stores configuration data and firmware.

The are no restrictions on the size or speed of the card. The format must be FAT-16 or FAT-32.

An adapter is provided so you can insert the microSD card in an SD slot in your computer.

The card must be present while the AN-X2 is running.

**WARNING!**  Do not remove the card while the AN-X2 is powered on!

If the AN-X2 is inaccessible from Ethernet because of its settings, you can remove the card and edit the file config.txt. Refer to page 12 for details.

Reinsert the card in the slot at the back of the AN-X2, with the pins facing up.

**WARNING!**  If you remove the card to edit the configuration file, push the card in straight or the card might fall inside the case and you will have to

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disassemble the AN-X2 to retrieve it .

## AN-X2 Modes of Operation

There are two AN-X2 modes of operation:

- Maintenance mode.  The AN-X2 runs the maintenance firmware at startup.  It performs diagnostics (memory tests, etc), copies any changes from the microSD card.  If there are no errors, it starts the AN-X2 in production mode.

- Production mode. This is the normal runtime mode of operation.

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# *Installation*

## Prevent Electrostatic Discharge
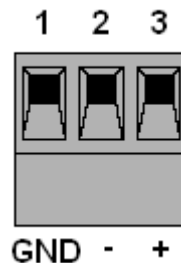
The module is sensitive to electrostatic discharge.

**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 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.  Pin 1 is closest to the Ethernet connector.

The chassis ground should be connected.

Power consumption internally is 200 mA @ 12VDC or 100 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 Data Highway Plus network.

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On the AN-X module, the Data Highway Plus connections should be line 1, shield, line 2.
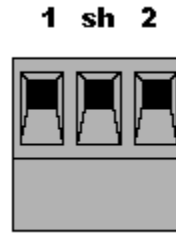


Line 1 on the AN-X is closest to the power connector.

Check the wiring to ensure that line 1 on the AN-X is connected to line 1 on the PLC, and so on.

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

The most common causes of Data Highway Plus connection errors are:

- wiring reversed (lines 1 and 2)
- incorrect baud rate
- other cabling and termination problems
- duplicate station

## 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.

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## CE Installations

If you are installing the AN-X2 in a location which requires CE, install the following ferrites or their equivalents on the cables:

Steward 28A2024-0A2 on Ethernet cable close to module, one loop

Steward 28A2024-0A2 on power cable

Steward 28A2025-0A2 on DH+/RIO Cable

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# *Configuration*

The AN-X2-AB-DHRIO (DH+) module connects a computer or other device on Ethernet to a Data Highway Plus network.

Before you can use the AN-X2-AB-DHRIO (DH+), you must configure its network properties, first on Ethernet and then on Data Highway Plus.

## Initial Ethernet Configuration

AN-X can be configured:

- to use a static (unchanging) IP address

- to obtain its IP address from a DHCP server

- to use the fixed link-local address 169.254.42.84

AN-X modules are shipped with the link-local address 169.254.42.84.

Unless you have control of the DHCP server, in most applications you will assign the AN-X 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.

If you are using multiple AN-X modules, connect and configure one at a time, since initially they will all be set to the same link-local IP address.

**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 or to obtain a static IP address for AN-X.

You configure the Ethernet properties using the web interface.
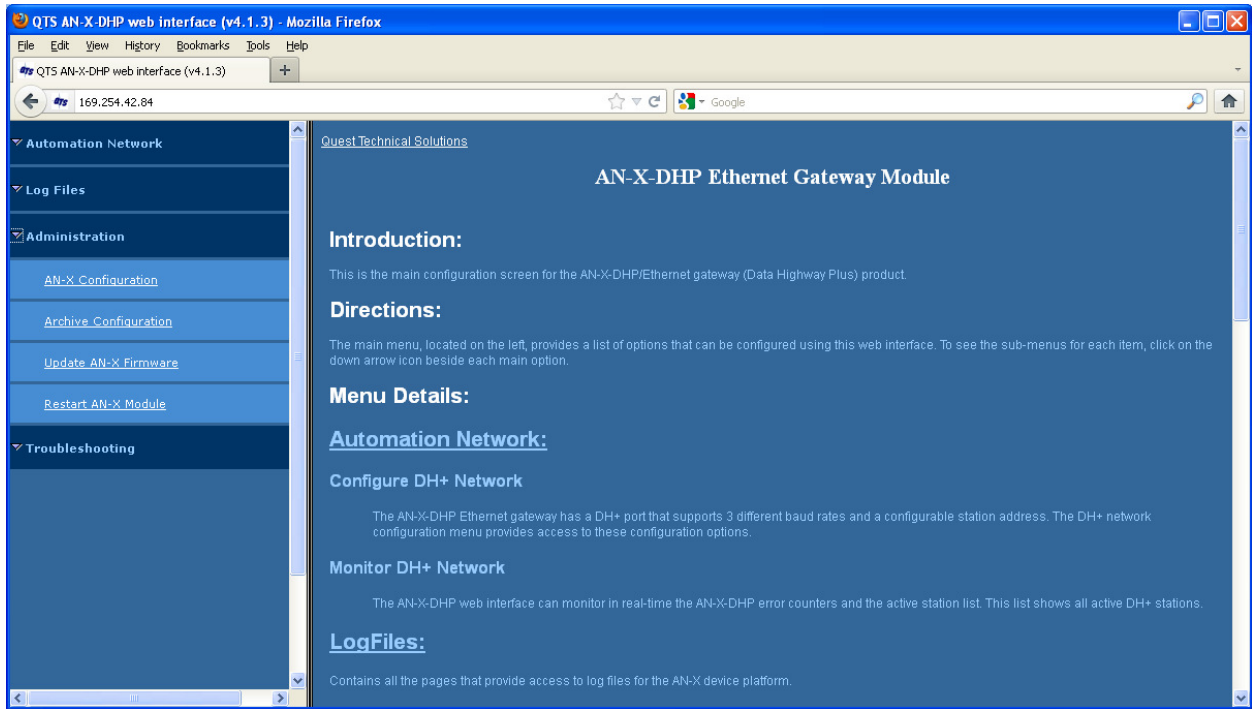
Start a web browser and enter the address 169.254.42.84
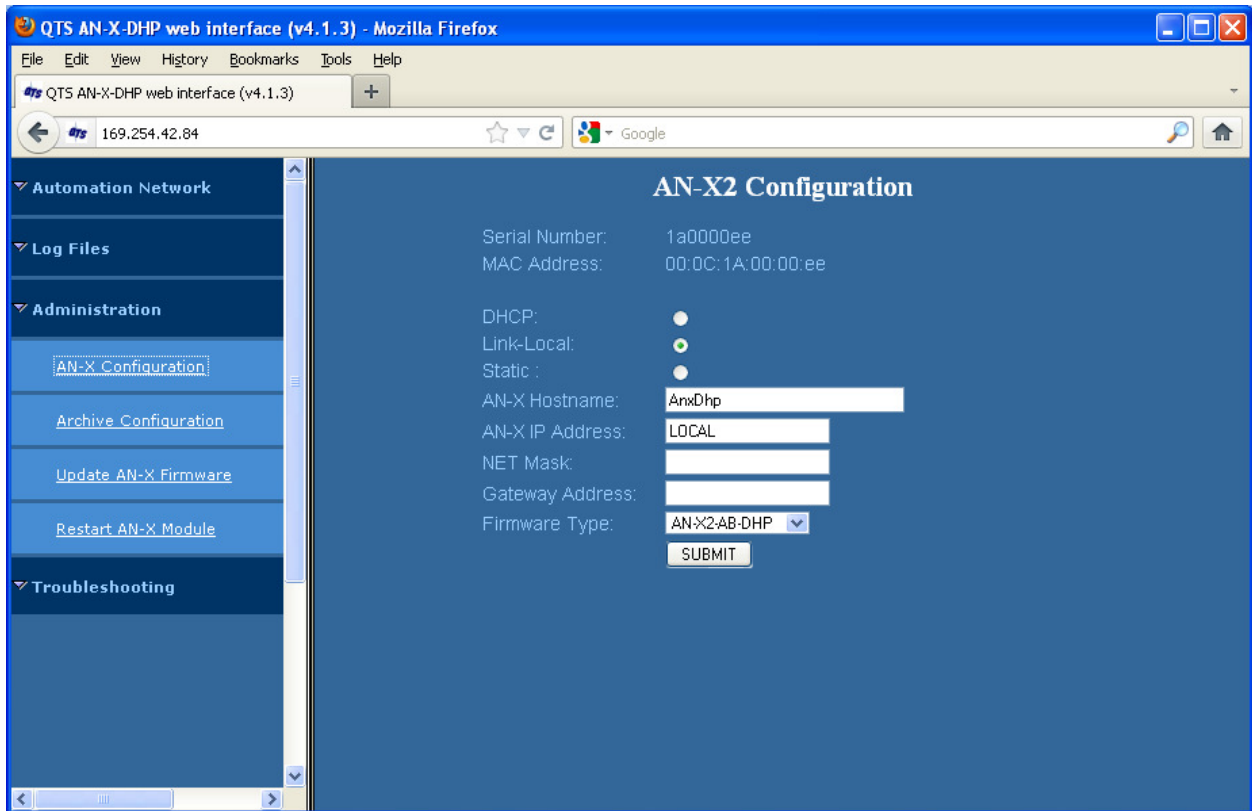
**TIP**

The AN-X2 must be on the same subnet as the computer to use the link-local IP address. It cannot be connected through a router.

Select *Administration/AN-X Configuration*.

The *AN-X2 Configuration* page appears.



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At the top the screen shows the serial number and MAC address of the AN-X being configured.

Check either DHCP or Static.

## DHCP

If the AN-X2 finds a DHCP server on the network, it obtains an IP address and other network parameters (netmask and default gateway) from the DHCP server.

To find the address assigned, you have to look at DHCP server.

When you submit the changes, if the AN-X2 does not find a DHCP server, it reverts to the default link local address 169.25.42.84 and repeatedly flashes the SYS LED 3 times red followed by a pause.

## Static IP Address

If you select static IP address, enter:

• the IP address for the AN-X.

• the netmask 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.

## Hostname

Enter a *Hostname* for the AN-X2.  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 30 characters long

## Firmware

Select the firmware the AN-X is to load from the list provided.  AN-X builds the list from the firmware files on the microSD card that are compatible with the AN-X hardware.

## Submitting the Configuration

Once you have entered all required parameters, click SUBMIT to write the configuration to the file config.txt on the microSD card.  The changes do not take effect until the AN-X restarts.
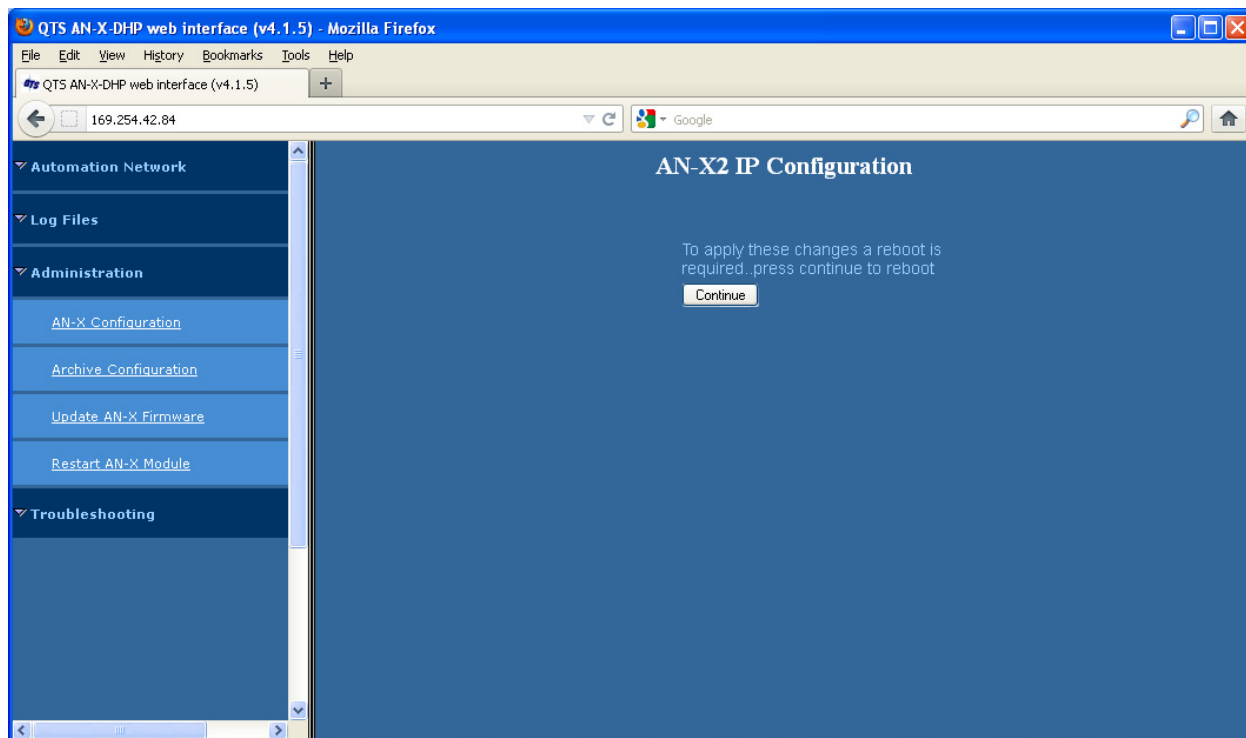
The following page appears when you click SUBMIT.

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Click *Continue* to restart the AN-X2, then wait until the AN-X has completely restarted before continuing.

If you have changed the IP address, you will have to enter the new IP address in the browser's address field.

## 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 or the IP address is unknown.

Remove the microSD card and edit the file config.txt using a text editor such as Windows Notepad to set the AN-X2 to the desired configuration.

## The Configuration File

The Ethernet configuration and the name of the production firmware file to load are stored in the file config.txt on the microSD card.

The file config.txt is a text file that contains the Ethernet configuration and the name of the firmware file to load.

When you perform the *Administration/AN-X Configuration* command from the web interface, it writes the results to config.txt.

Each line consists of a keyword followed by a colon and then a value.

Example:

IP: 192.168.1.12

Anything after a semicolon on a line is treated as a comment.

| Keyword | Possible Values |
|---------|-----------------|
| IP | LOCAL<br>DHCP<br>static IP address |
| Netmask | Ethernet netmask, used only if IP is a static IP address |
| DefGtwy | default gateway, used only if IP is a static IP address |
| Hostname | Ethernet host name, from 1 to 30 characters |
| Firmware | Firmware file to run at startup, must be present on microSD card |

If you edit the file and AN-X2 finds an error during startup, it flashes an error code on the SYS LED, see page 33.

## Example config.txt files

Example: Link- Local IP address

```
IP: LOCAL
Hostname: ANX2Dhp
Firmware: AN-X2-AB-DHP
```

Example: DHCP

```
IP: DHCP
Hostname: ANX2Dhp
Firmware: AN-X2-AB-DHP
```

Example: static IP address

```
IP: 192.168.1.14
NetMask: 255.255.255.0
DefGtwy: 192.168.1.1
HostName: ANX2Dhp
Firmware: AN-X2-AB-DHP
```

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## If the link-local address is not accessible…

Addresses 169.254.1.0 to 169.254.254.255 are reserved for use on a local network. AN-X2 modules are shipped set to the address 169.254.42.84 for initial configuration. This address is almost always accessible from a computer on the same local Ethernet as the AN-X.

If you cannot access the AN-X2 at address 169.254.42.84 using a web browser, open a command prompt window and type

route print

The routing table appears

```
===========================================================================
Interface List
0x1 ......................... MS TCP Loopback interface
0x2 ...00 18 8b c5 9d f7 ...... Broadcom 440x 10/100 Integrated Controller -
Packet Scheduler Miniport
===========================================================================
===========================================================================
Active Routes:
Network Destination        Netmask          Gateway       Interface  Metric
          0.0.0.0          0.0.0.0        10.10.0.1       10.10.0.20      20
         10.10.0.0    255.255.255.0       10.10.0.20      10.10.0.20      20
        10.10.0.20  255.255.255.255        127.0.0.1       127.0.0.1      20
    10.255.255.255  255.255.255.255       10.10.0.20      10.10.0.20      20
    64.215.255.122  255.255.255.255        10.10.0.1       10.10.0.20      20
        127.0.0.0        255.0.0.0        127.0.0.1       127.0.0.1       1
```
**169.254.0.0       255.255.0.0       10.10.0.20      10.10.0.20      20**
```
        224.0.0.0        240.0.0.0       10.10.0.20      10.10.0.20      20
   255.255.255.255  255.255.255.255      10.10.0.20      10.10.0.20       1
Default Gateway:       10.10.0.1
===========================================================================
Persistent Routes:
  None
```

If there is no entry in the network destination column that starts with 169.254.0.0 (highlighted above), add a route using

route add 169.254.0.0 mask 255.255.0.0 10.10.0.20 metric 20

where 10.10.0.20 is replaced with the IP address of the interface in your computer that is connected to the AN-X2.

Repeat the route print command and confirm that the table now has an entry similar to the one shown.

Now try pinging the AN-X2 at 169.254.42.84. You should now be able to access it using a browser to set the desired Ethernet configuration.
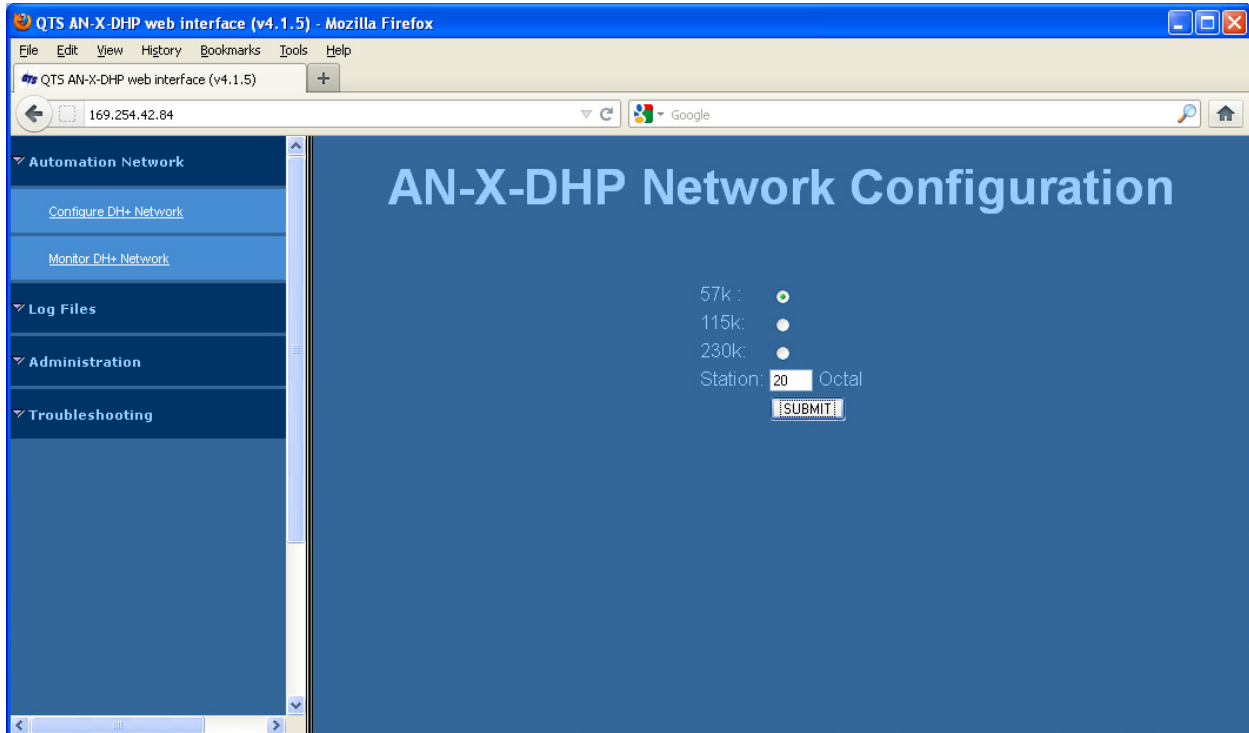
## Data Highway Plus Configuration

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

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

Select the baud rate.

Enter the Data Highway Plus station number, in octal.



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.

You can use *Automation Network/Monitor DH+ Network* to see the active station list and confirm that you can see other stations on the network.

# *Using Programming Software*

## Configuring the AN-X2-AB-DHRIO (DH+) in RSLinx

To use an AN-X2-AB-DHRIO (DH+) module with Rockwell programming software such as RSLogix 5, you must first configure a driver in RSLinx to access the AN-X module.
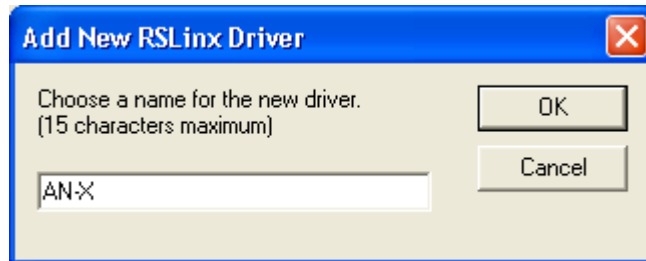
The following instructions assume that:

- 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 Data Highway Plus network
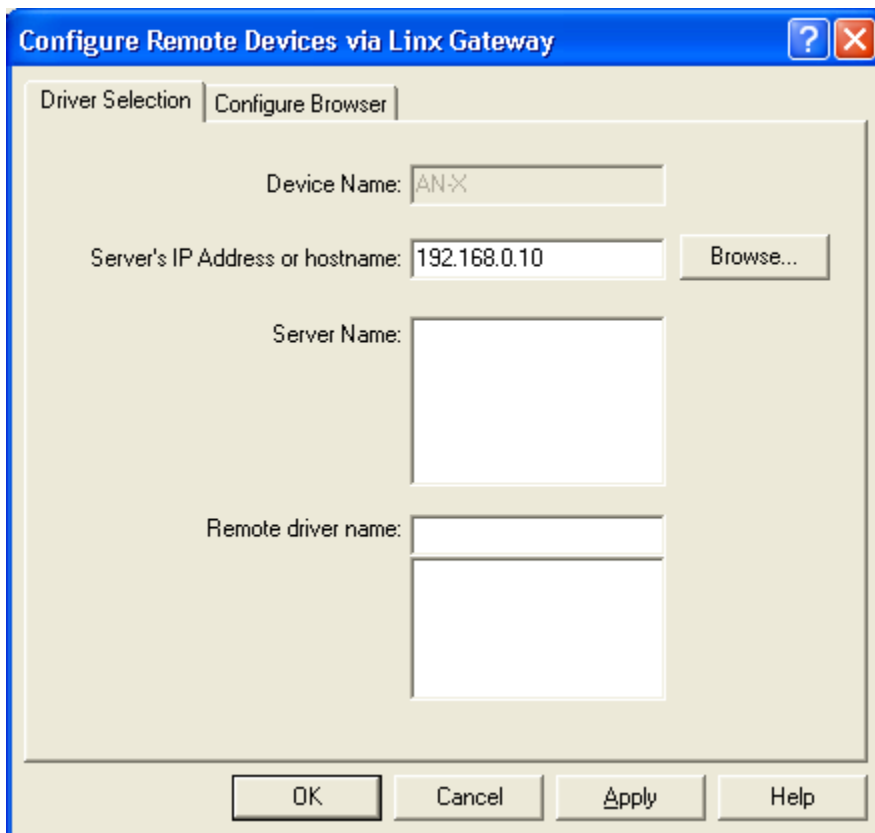
## Remote Devices via Linx Gateway Driver

Use the following steps to configure the AN-X2-AB-DHRIO (DH+) 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…*
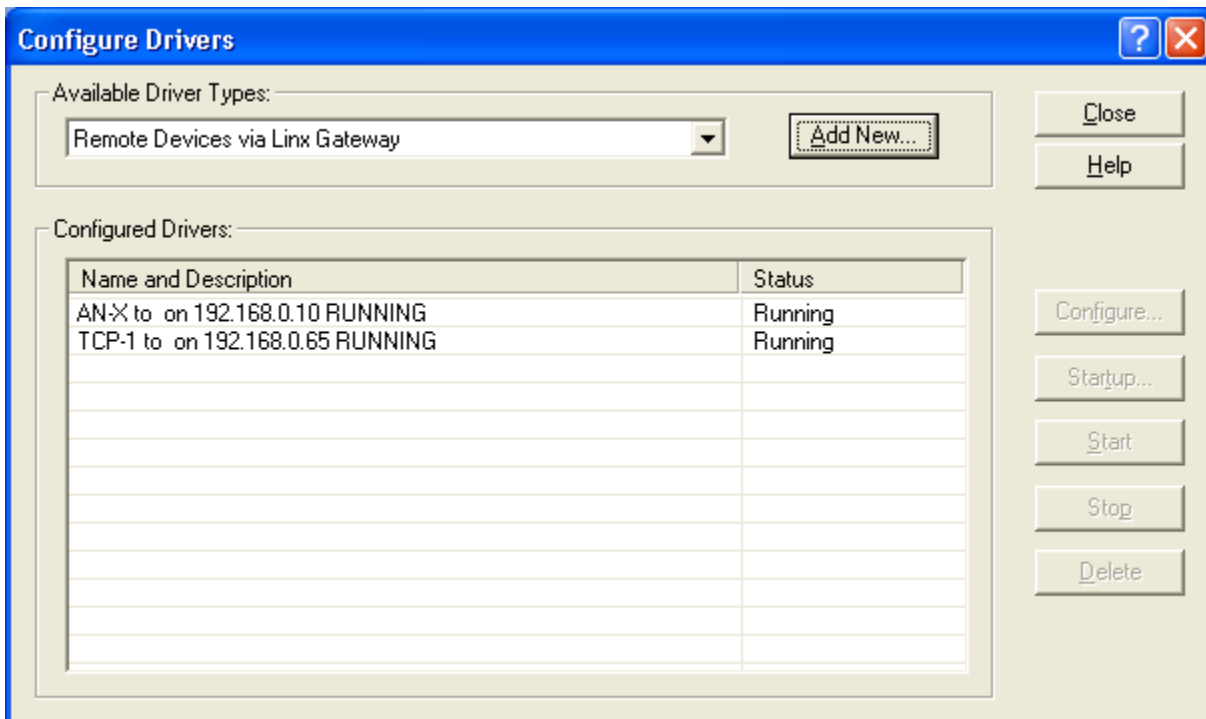
3. Give the driver a name



4. For Server's IP Address or hostname: enter the IP address of the AN-X2-AB-DHRIO (DH+) and click OK.

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5. Check that the driver has status Running



6. Click Close

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**Ethernet Devices Driver**

Use the following steps to configure the AN-X2-AB-DHRIO (DH+) in RSLinx.

1. Select *Communications/Configure Drivers…*

2. From the list of *Available Driver Types:*, select *Ethernet devices* 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-X2-AB-DHRIO (DH+) and click OK.

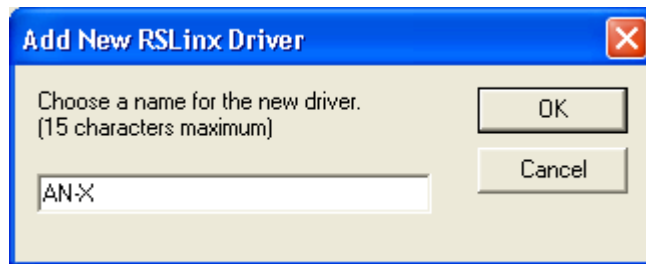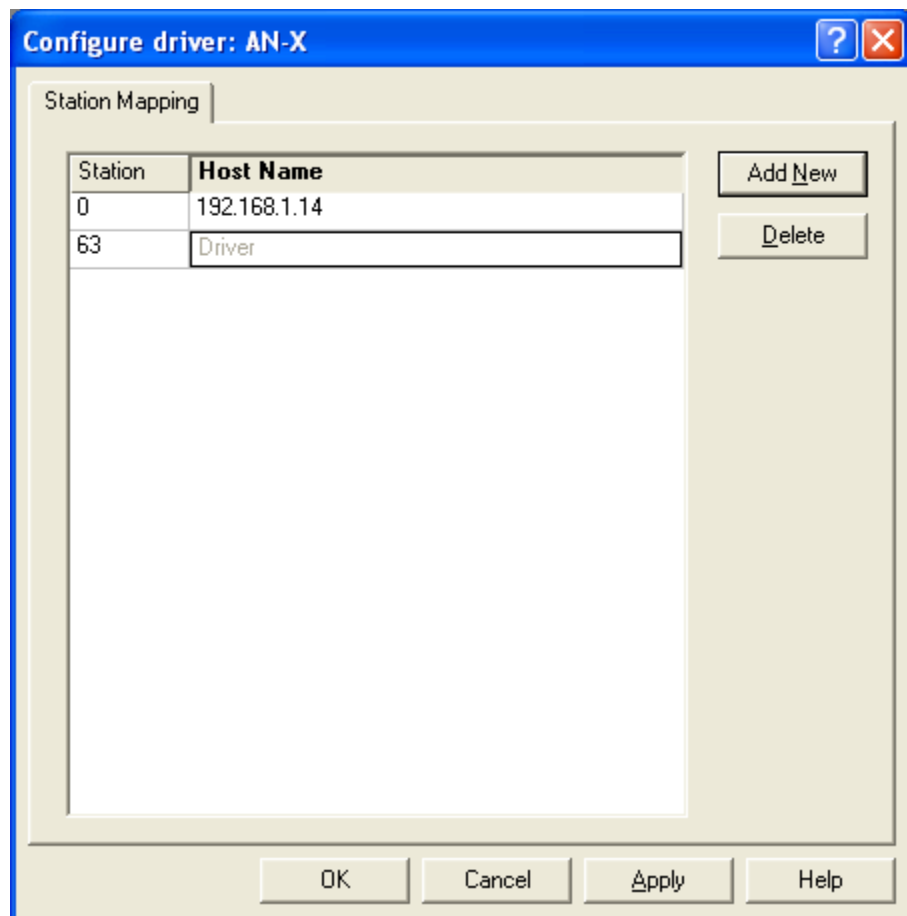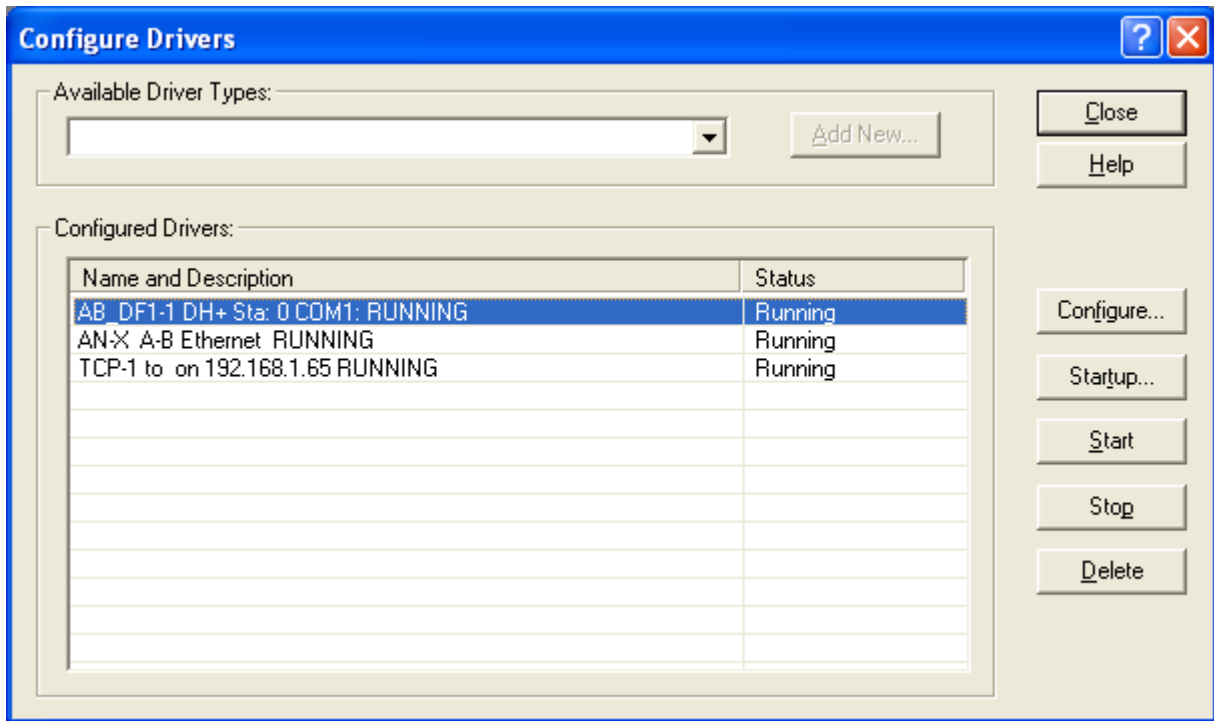5. Check that the driver has status Running

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-X2-AB-DHRIO (DH+).

Multiple applications on a computer can connect to a Data Highway Plus network through the same AN-X2-AB-DHRIO (DH+).

# Using DDE/OPC and Unscheduled Messages

You can use a DDE or OPC server, such as RSLinx, to access data using the AN-X2-AB-DHRIO (DH+).

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

From the Ethernet side, the AN-X2-AB-DHRIO (DH+) looks like a 4-slot ControlLogix rack with an ENET module in slot 0 and a DH/RIO in slot 1.

### Example: RSLinx

To configure a topic in RSLinx to access data on the AN-X2-AB-DHRIO (DH+):

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.


# Sending Messages

You can send messages from devices such as a ControlLogix to destinations on Data Highway Plus using MSG instructions. For example, you can send messages to read or write data on a PLC-5.
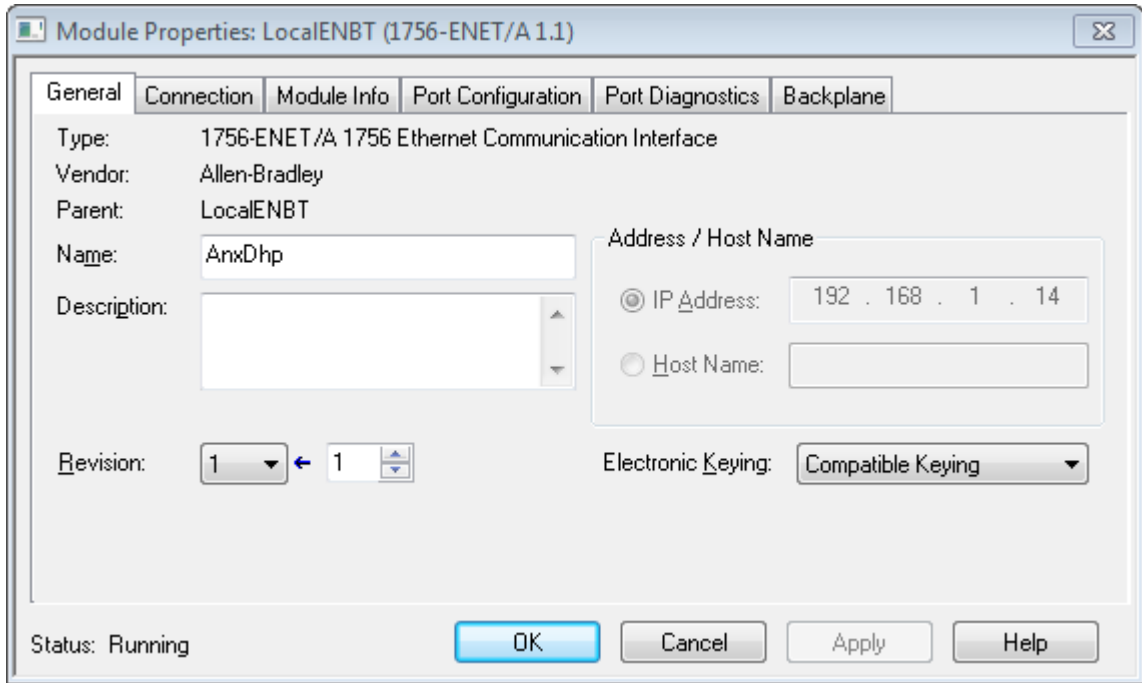
You cannot initiate messages from the Data Highway Plus side.
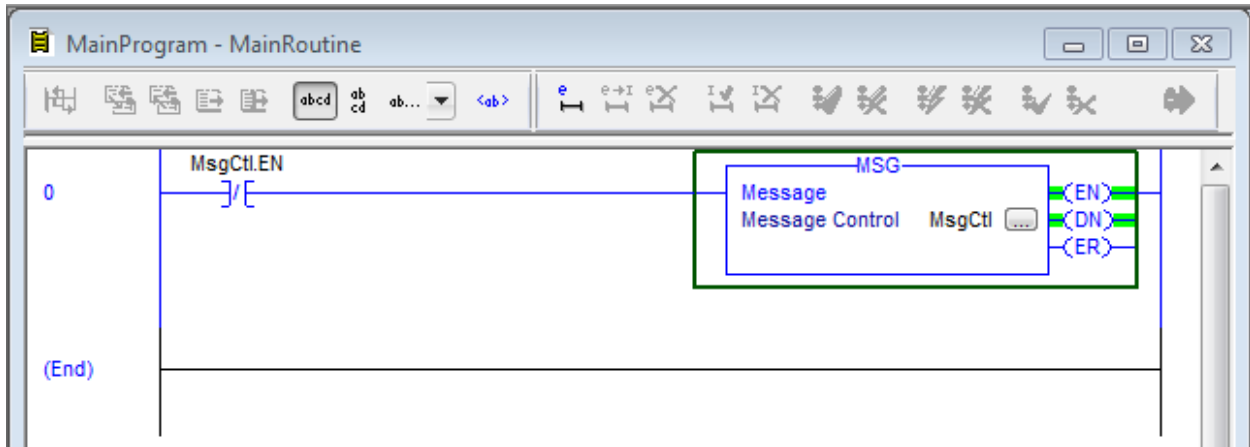
### Example: Sending Messages to a PLC-5

In this example, a ControlLogix is using the AN-X to send PLC-5 Typed Read commands that read 100 integers from file N7:0 in PLC-5 at address 77 octal on Data Highway Plus.

Add an AN-X to the ControlLogix Ethernet

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Add a MSG instruction in the ControlLogix, along with any logic required to control it

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Configure the MSG instruction.

On the *Configuration* tab, select the *Message Type* (PLC5 Typed Read), *Source Element* (N7:0), *Number of Elements* and *Destination*.

On the Communication tab:



For the path, type or browse the AN-X name, followed by 1,1 (backplane and slot number of the emulated DHRIO)

For the communication path, select DH+.  Set the Channel to A and the destination node to the PLC-5 Data Highway Plus station address. Set the other fields as shown.

# Using the Web Interface

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

Use the web interface to:

- set the Data Highway Plus station number and baud rate
- monitor Data Highway Plus diagnostic counters and the active station list
- view AN-X logs
- configure the Ethernet settings and select firmware
- archive the AN-X configuration
- update the AN-X firmware
- restart the AN-X

It also contains contact information for support.

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.
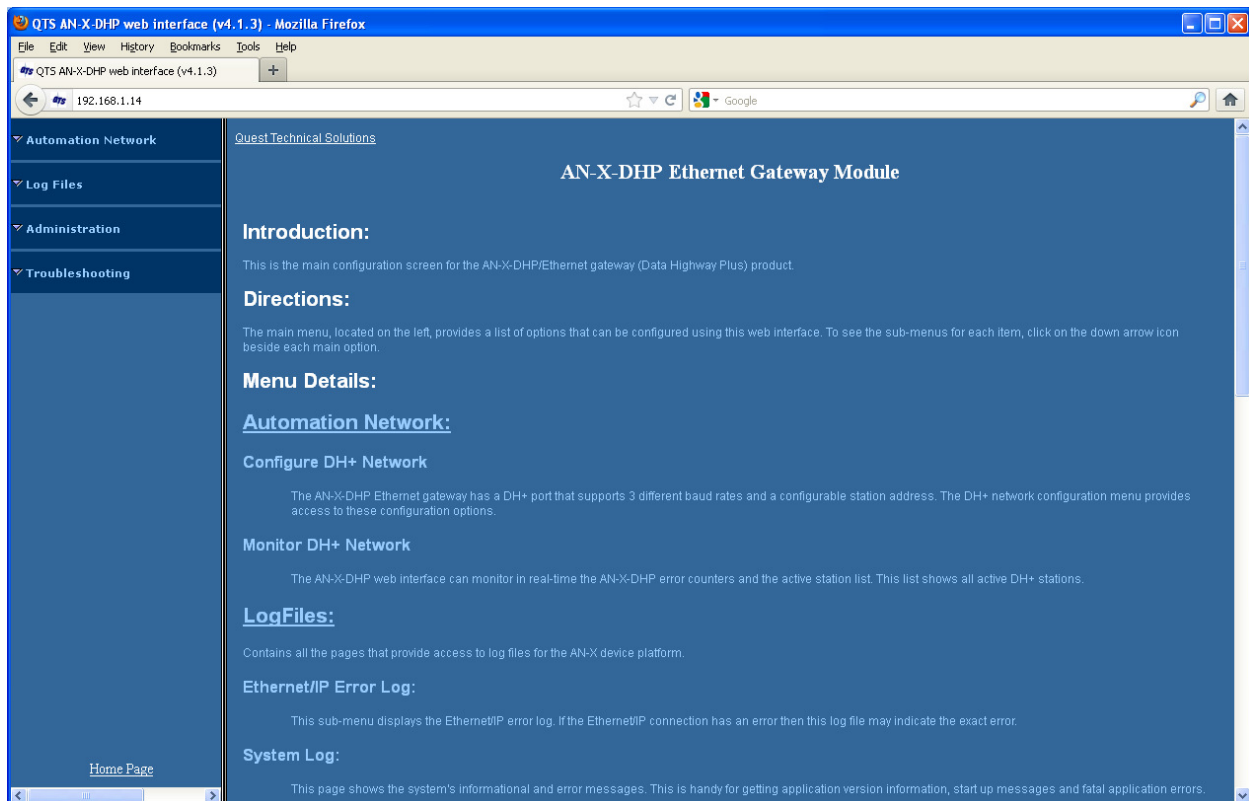


The left pane contains commands. Click on the arrows at the left of the main headings to expand or contract the sections.

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

Browsers may return cached data rather than rereading data that has changed on the AN-X.

**TIP**

If you run into a problem where data appears not to have changed, flush the cache in the browser or run the browser in the mode where it doesn't cache data (incognito in Chrome, Private browsing in Firefox and Safari, etc)

## Data Highway Plus Configuration

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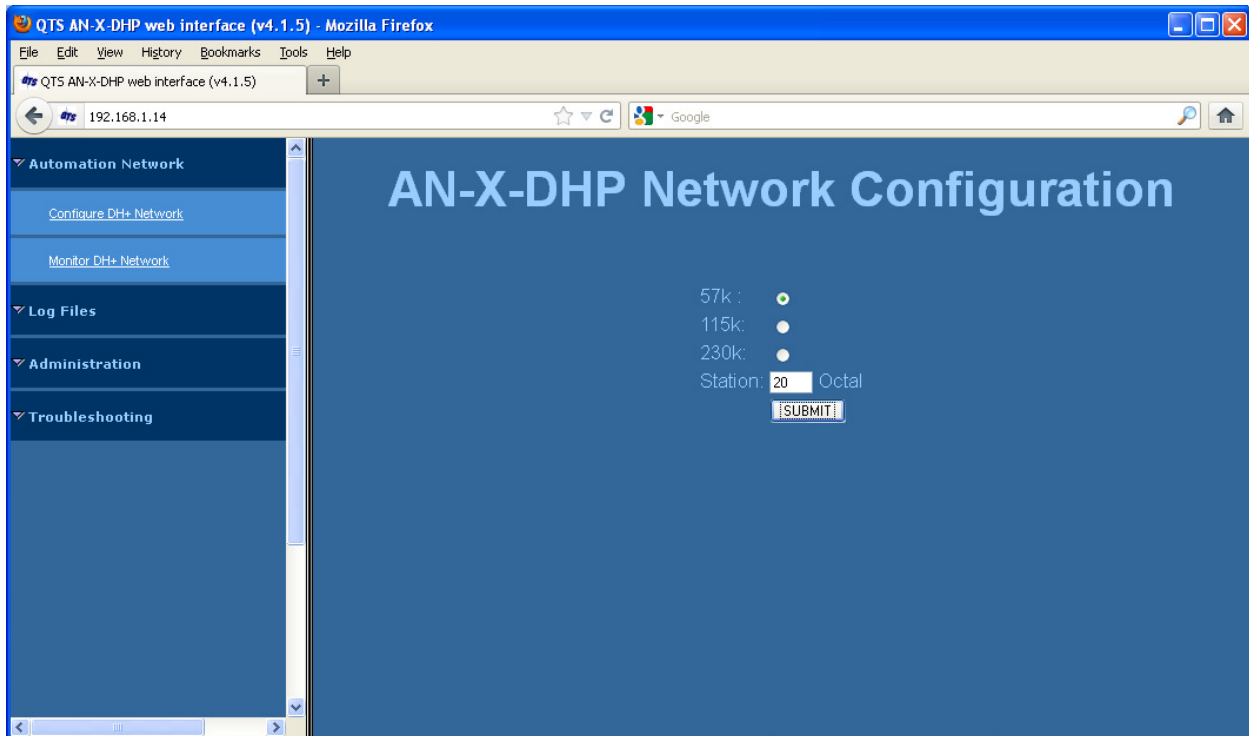


Select the baud rate.

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.

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.*
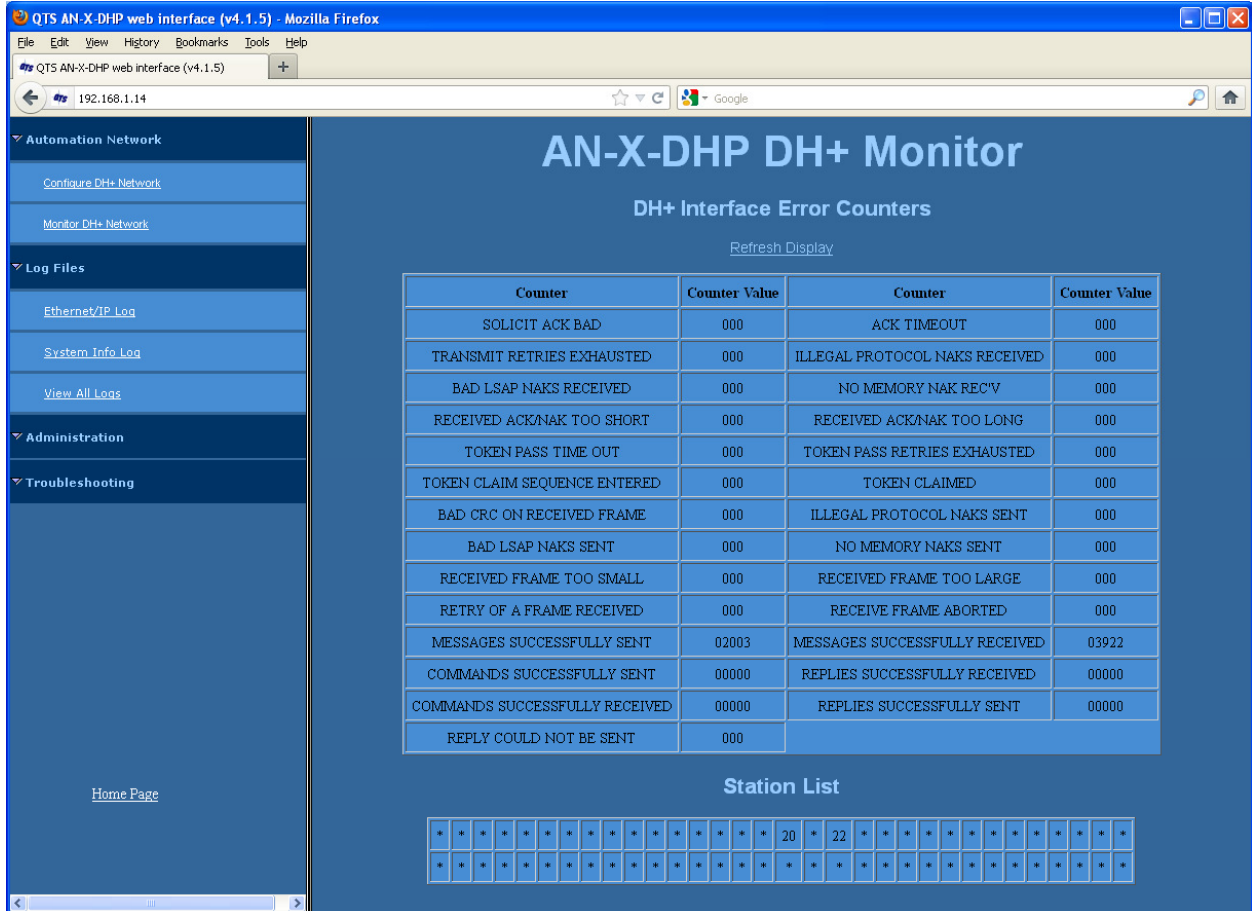


The table at the top of the screen shows the Data Highway Plus diagnostic counters. The table at the bottom of the screen shows the active station list.

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

The Data Highway Plus diagnostic counters are described on page 35.

# 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.

## Ethernet/IP Log

The Ethernet/IP log shows messages and errors associated with Ethernet/IP and 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 contains items used to configure, control and update the AN-X.

## AN-X Configuration

Use *AN-X Configuration* to set the AN-X Ethernet properties and to select the firmware the AN-X is to run.

The top of the screen shows the serial number and MAC Address of the AN-X2 being configured.
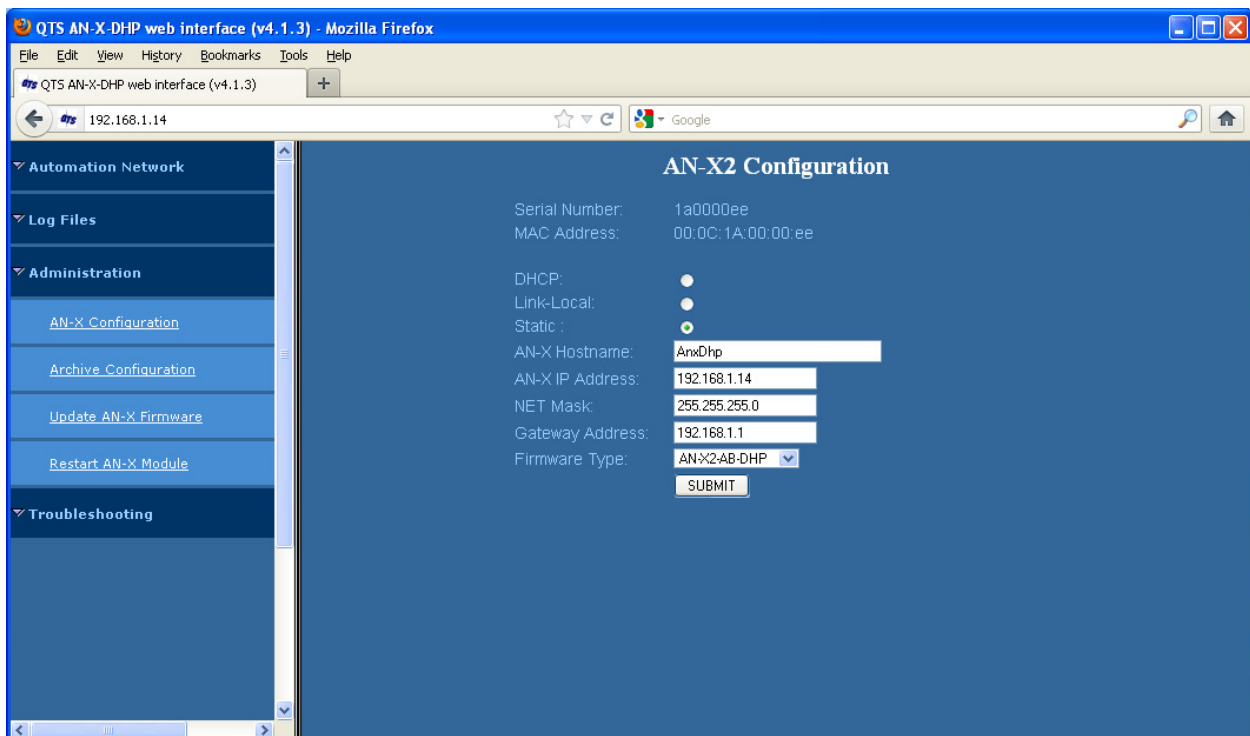
Check either DHCP or Static.

## DHCP

If the AN-X2 finds a DHCP server on the network, it obtains an IP address and other network parameters (netmask and default gateway) from the DHCP server.

To find the address assigned, you have to look at DHCP server.

When you submit the changes, if the AN-X2 does not find a DHCP server, it reverts to the default link local address 169.25.42.84 and repeatedly flashes the SYS LED 3 times red followed by a pause.

## Static IP Address

If you select static IP address, enter:

• the IP address for the AN-X.

• the netmask 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.

## Hostname

Enter a *Hostname* for the AN-X2.  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 30 characters long

## Firmware

Select the firmware the AN-X is to load from the list provided.  AN-X builds the list from the firmware files on the microSD card that are compatible with the AN-X hardware.

## Submitting the Configuration

Once you have entered all required parameters, click SUBMIT to write the configuration to the file config.txt on the microSD card.  The changes do not take effect until the AN-X restarts.

## Archive Configuration

Use *Archive Configuration* to create an archive that contains the current AN-X configuration and logs, for use by technical support.

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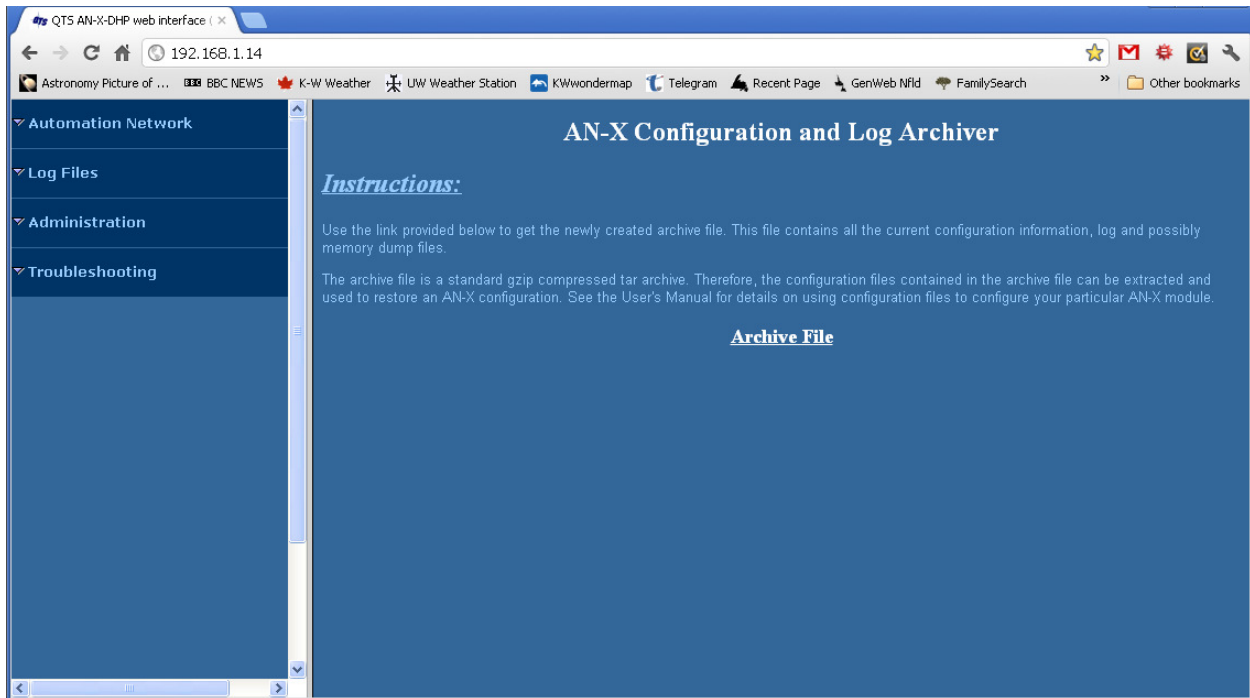
Click the *Archive File* link and enter a filename and location.

## Update AN-X Firmware

Use *Update AN-X Firmware* to download a firmware file to the microSD card on the AN-X.  Firmware files for the AN-X2 have names that begin with AN-X2 and have extension *.qtf.

**WARNING!**      Do not download firmware to the AN-X while applications that use the AN-X are running.
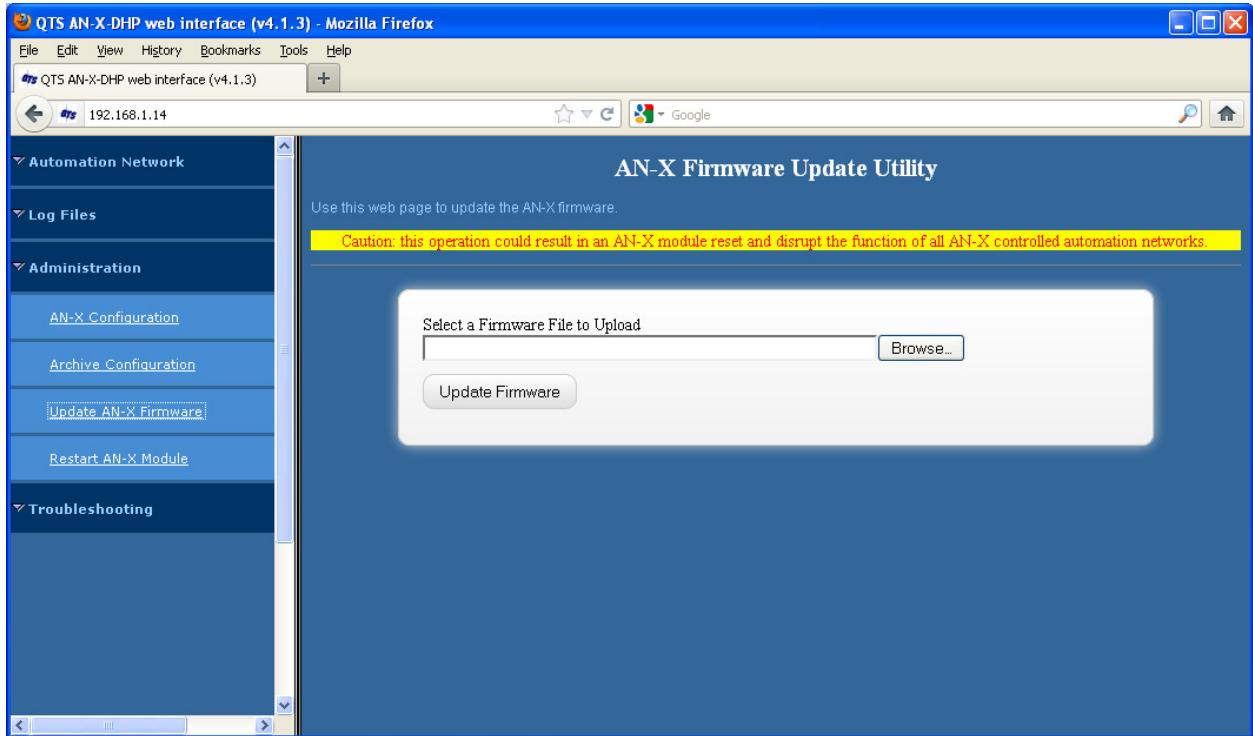
Browse to select the file, then click the *Update Firmware* button to transfer the file.

It is essential that you do not disrupt power while downloading firmware, especially maintenance firmware, to the AN-X2 or while the AN-X2 is restarting following a firmware download.

**WARNING!**

Interrupting power at some points in the update process could render the AN-X inoperative and it will have to be returned to the factory for reinitialization.

AN-X displays status messages in the lower left corner of the page. When the download is complete, AN-X displays a message that indicates the success or failure of the download.
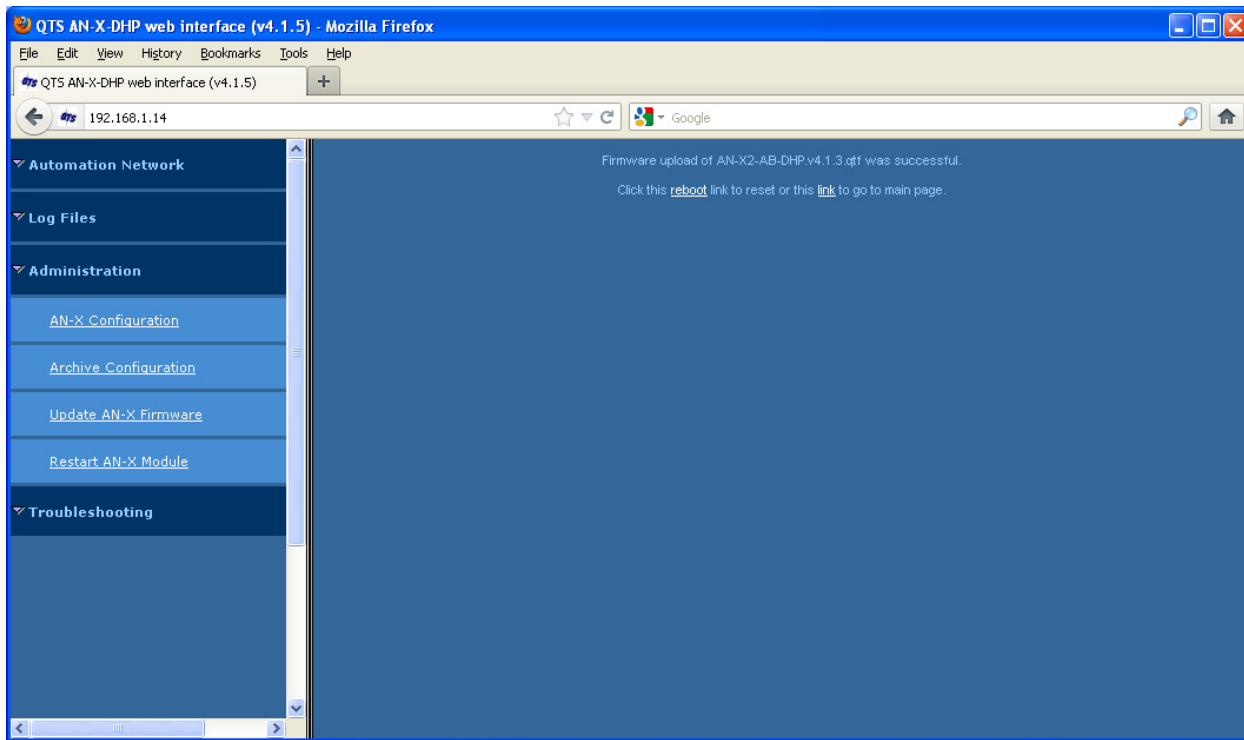
If you have other files to download, return to the main page and continue. Otherwise, restart the AN-X in order to run the downloaded firmware.

## Restart AN-X Module

Use the *Restart AN-X Module* command to restart the AN-X module, for example, after changing Ethernet parameters or after downloading firmware.

## Troubleshooting Menu

The troubleshooting menu contains information that is specific to an automation network, as well as support information.

# *Troubleshooting*

## LEDs

The AN-X2-AB-DHRIO (DH+) 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 upper, yellow LED, labelled 100, is on if the link is running at 100 Mbits/second and is off otherwise.

The lower 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.

If the AN-X2 is not connected to Ethernet, the 10/100 LED is on.

## 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.

| SYS LED State | Possible cause |
|---|---|
| Red 3 | DHCP configuration failed |
| Yellow 2 | microSD card not present |
| Yellow 3 | AN-X2 Maintenance firmware file not found on microSD card |
| Yellow 4 | config.txt file not found on microSD card or error parsing file |
| Yellow 5 | Production firmware filename was not specified in config.txt |
| Yellow 6 | AN-X2 production firmware file not found on microSD card |
| Yellow 7 | Production firmware file invalid or error programming to flash |
| Yellow 8 | Daughterboard mismatch |
| Single red flash | Unscheduled messaging, addressing or connection problem |

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| SYS LED State | Possible cause |
| --- | --- |
| Slow red flash | firmware configuration problem, the Data Highway Plus network configuration failed |

## "Railroading" – SYS and NET LEDs

AN-X2 alternates (railroads) flashing the SYS and NET LEDs to indicate its state.

It railroads the LEDs yellow while it is copying new maintenance or production firmware files from the microSD card to flash memory.

It railroads the LEDs green for 20 to 30 seconds as it starts production mode.

## NET LED – Network Status

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

| NET LED State | Description |
| --- | --- |
| Solid green | All stations operating correctly |
| Yellow | No other stations |
| Flashes red | Network error |

## Startup LED Sequence

At startup, the LED sequence is:

• fast yellow flash as maintenance boot code performs memory tests, other startup diagnostics.

• fast yellow flash as maintenance firmware runs

• railroad yellow if firmware files are being updated

• yellow error code if an error occurred in configuration

• railroad green as production firmware starts

• SYS and NET LEDs green if everything is running and the AN-X2 is active on the network

## Fatal Errors

AN-X2 monitors its operation for "impossible" conditions and generates a fatal error if it detects one. It generates a fatal error code on the SYS

LED by flashing 8 bits followed by a pause.  The least significant bit is first, with green for 1 and red for 0.

If a fatal error occurs, record the SYS LED sequence and contact technical support.

## 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 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 |

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| Counter | Description |
|---|---|
| | 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 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-X2 operating software consists of the maintenance firmware and the runtime firmware.

The maintenance firmware runs at startup. It performs diagnostics, updates any firmware that has been downloaded, and starts the runtime firmware.

The firmware files are supplied in files that begin with AN-X2 and have extension *qtf* . They are updated using the web interface. Run the command *Administration/Update AN-X Firmware* and select the file you wish to download.

**WARNING!**

Do not download firmware to the AN-X while applications that use the AN-X are running.

The web page displays the download progress at the bottom left of the page.

You must restart the AN-X2 to run the firmware that you downloaded.

**WARNING!**

It is essential that you do not disrupt power while downloading firmware, especially maintenance firmware, to the AN-X2 or while the AN-X2 is restarting following a firmware download.

Interrupting power at some points in the update process could render the AN-X inoperative and it would have to be returned to the factory for reinitialization.

The web interface displays the version of the firmware the AN-X2 is running on the tab at the top of the page.

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# *Specifications*

| Parameter | Specification |
|---|---|
| Function | Bridge between Ethernet and Data Highway Plus network |
| Maximum Power Consumption | 200 mA at 12 VDC, 100 mA at 24 VDC |
| Maximum Power dissipation | 2.4W |
| 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*

**How to Contact Us: Sales and Support**

Sales and Technical Support for this product are provided by ProSoft Technology. Contact our worldwide Sales or Technical Support teams directly by phone or email:

**Asia Pacific**

Languages Spoken: Chinese, English

+603.7724.2080, support.AP@prosoft-technology.com

**Europe – Middle East – Africa**

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**Latin America ( Spanish Speaking Countries)**

Languages Spoken: Spanish, English

+52.222.399.6565, victor@prosoft-technology.com

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# *Warranty*

Quest Technical Solutions warrants its products to be free from defects in workmanship or material under normal use and service for three years after date of shipment. Quest Technical Solutions will repair or replace without charge any equipment found to be defective during the warranty period. Final determination of the nature and responsibility for defective or damaged equipment will be made by Quest Technical Solutions personnel.

All warranties hereunder are contingent upon proper use in the application for which the product was intended and do not cover products which have been modified or repaired without Quest Technical Solutions approval or which have been subjected to accident, improper maintenance, installation or application, or on which original identification marks have been removed or altered. This Limited Warranty also will not apply to interconnecting cables or wires, consumables nor to any damage resulting from battery leakage.

In all cases Quest Technical Solutions' responsibility and liability under this warranty shall be limited to the cost of the equipment. The purchaser must obtain shipping instructions for the prepaid return of any item under this Warranty provision and compliance with such instruction shall be a condition of this warranty.

Except for the express warranty stated above Quest Technical Solutions disclaims all warranties with regard to the products sold hereunder including all implied warranties of merchantability and fitness and the express warranties stated herein are in lieu of all obligations or liabilities on the part of Quest Technical Solutions for damages including, but not limited to, consequential damages arising out of/or in connection with the use or performance of the Product.

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