AN-X2-ABRIO-EIPSCN
Remote I/O to
Ethernet/IP
Scanner 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-X2-ABRIO-EIPSCN

AN-X2-ABRIO-EIPSCN Module Overview

The AN-X2-ABRIO-EIPSCN communications module connects a scanner such as a PLC-5 on an Allen-Bradley remote I/O network to I/O modules on Ethernet/IP.

As parts become obsolete and remote I/O adapters become unavailable, the AN-X2-ABRIO-EIPSCN is a solution that lets you retain the original controller, I/O modules and field wiring and replace remote I/O adapters with Ethernet adapters. The existing remote I/O scanner talks to the AN-X, which maps discrete and analog I/O on remote I/O to Ethernet data.

The AN-X emulates a ControlLogix scanning I/O over Ethernet.

All configuration data comes from the AN-X, not from remote I/O. Configuration options correspond to what's available in a ControlLogix, not to what is available in remote I/O. No configuration data gets passed from remote I/O to Ethernet. If your program dynamically changes configuration data, or if it contains logic to configure a module, the program will have to be modified to remove or disable that logic.

You may need to make some changes to the control application related to addresses, logic and timing.

Some behaviour that is set by switches on the remote I/O adapter is set in parameters for Ethernet modules. For example, hold last state is set on a module-by-module basis when you scan over Ethernet.

In addition, you may need to make changes because Ethernet does not support complementary I/O, or standard 32 or complementary 32 addressing.

For example, 32 bit discrete Flex I/O modules require a separate Ethernet connection. You must communicate with them from remote I/O using block transfers, not as discrete data.

On remote I/O the AN-X module supports:

- Baud rates 57.6, 115.2, and 230.4 Kbaud
- Rack numbers 0 to 76 octal
- Block transfers at all allowable locations

On Ethernet, the AN-X supports up to 16 Ethernet/IP connections. Each Ethernet adapter and the associated discrete I/O requires one connection. Each analog module requires one connection. In some cases, a discrete module will require a separate connection, for example, if desired functionality is available only if the module has its own connection.

The AN-X2-ABRIO-EIPSCN module has a web interface for configuring the module, for monitoring logs and for performing administrative functions. You can communicate with the module using any standard web browser such as Internet Explorer.

The module firmware can be selected and updated using the web interface. Refer to page 41 for details.

Hardware Features

The module has:

- two LEDs to indicate the status of the connection to the Ethernet (100 and Link/Act)
- an LED to indicate the module's internal state and the state of Ethernet communication (MS or SYS)
- an LED to indicate the state of communications on the Remote I/O network (NS or NET)
- an Ethernet connector
- a power connector
- a 3-pin Phoenix connector to connect to the remote I/O network

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.

Package Contents

- AN-X2-ABRIO module
- microSD to SD card adapter
- CD containing software and documentation
- rubber feet for desktop use

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 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.

.

Installation

Prevent Electrostatic Discharge

The module is sensitive to electrostatic discharge.

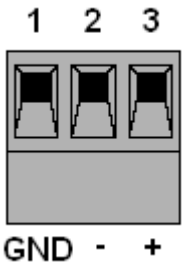
WARNING!

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 is 200 mA @ 12VDC or 100mA @ 24VDC.

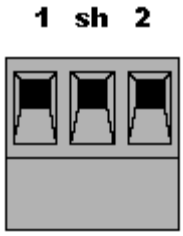
The part number for the power connector is Phoenix MSTB 2.5/3-ST-5.08

Contact us if you need a suitable wall adapter.

Cabling and Termination

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

On the AN-X module, the 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.

Terminate both ends of a remote I/O network by using external resistors attached to the physical ends of the network. There should be two and only two terminators on the network.

Use 82 ohm resistors if the network operates at 230.4 kbps or if the network operates at 57.6 kbps or 115.2 kbps and none of the devices in the table below are present. The maximum number of physical devices on the network is 32.

Use 150 ohm resistors if the network contains any of the devices in the table below, or if the network operates at 57.6 kbps or 115.2 kbps and you do not require the network to support more than 16 physical devices.

Device Type	Catalog Number	Series
Adapters	1771-AS	All
	1771-ASB	Series A and B
	1771-DCM	All
Miscellaneous	1771-AF	All
	1771-AF1	All

Baud Rate	Maximum Cable Length
57.6 Kbaud	10000 ft
115.2 Kbaud	5000 ft
230.4 Kbaud	2500 ft

Ethernet Cabling

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

If you are connecting to the AN-X 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.

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

Quick Start

Step	Operation	See page
1	Replace remote I/O adapter modules with Ethernet adapters.	
2	Power up the AN-X, connect it to Ethernet and assign it an IP address	9
3	Connect AN-X to the Remote I/O network	5
4	Autoconfigure the AN-X	16
5	Check the configuration. Did the AN-X find all adapters and modules?	
6	Transfer the configuration file from AN-X to your computer	23
7	Edit the configuration file and save it	
8	Transfer the modified configuration file to the AN-X	23
9	In the control program, make any required changes	
10	Check all I/O data	
11	Scan I/O, read inputs and write outputs	27

Ethernet Configuration

The AN-X2-ABRIO-EIPSCN module connects a controller on remote I/O such as a PLC-5 to scan I/O modules on Ethernet.

Before you can use the AN-X2-ABRIO-EIPSCN, you must configure its network properties on Ethernet.

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.

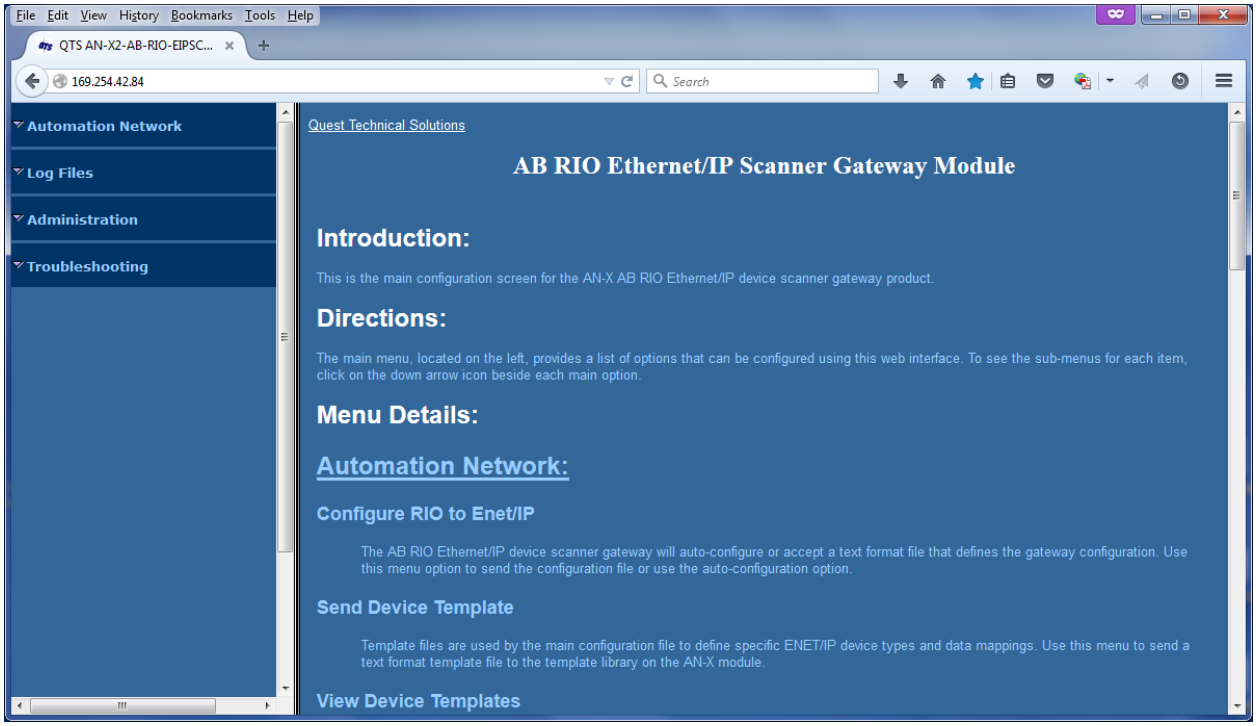
IMPORTANT! If you are connecting AN-X to an existing Ethernet network, consult the network administrator to obtain information about how you should configure AN-X or to obtain a static IP address for AN-X.

You configure the Ethernet properties using the web interface.

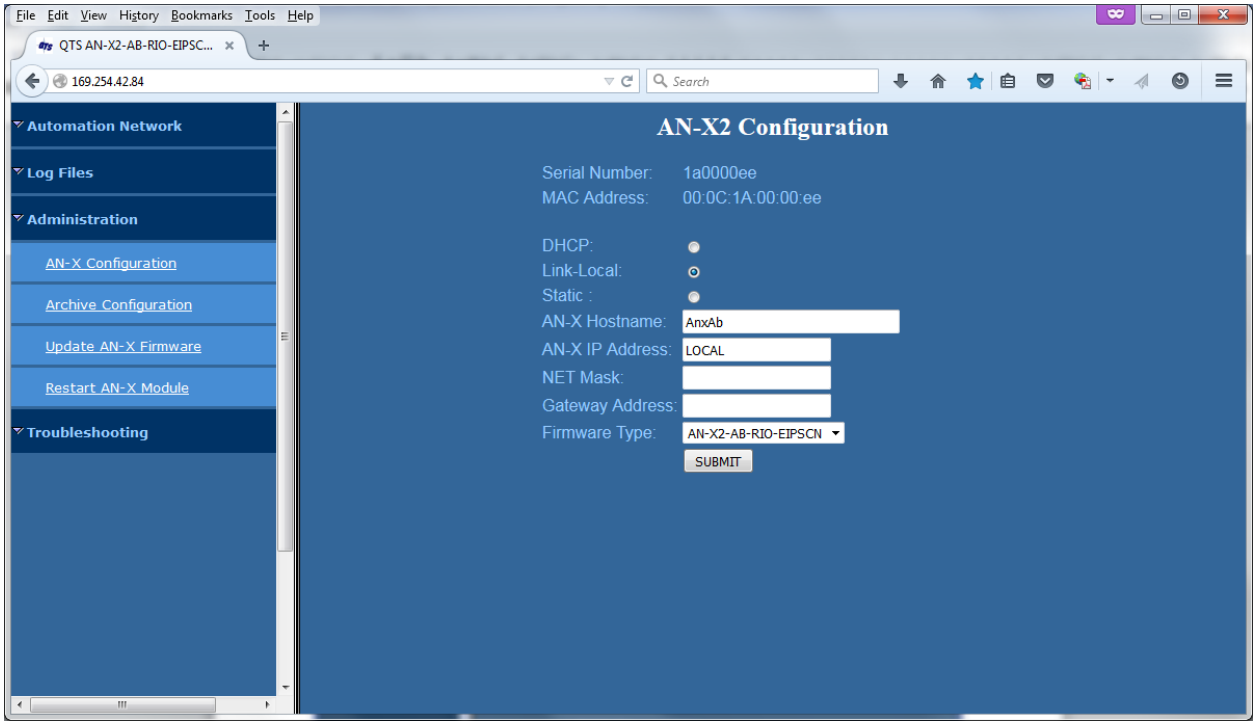
Start a web browser and enter the address 169.254.42.84

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.



At the top, 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, look at the 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 169.254.42.84 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

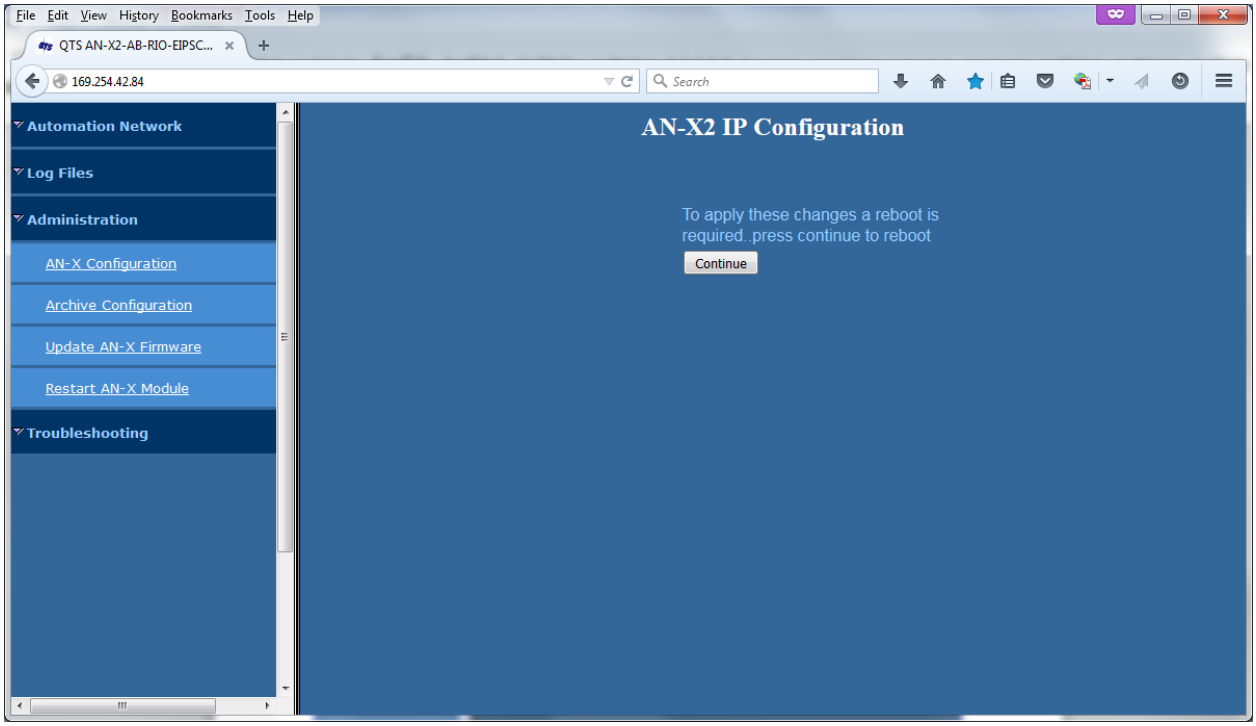
Firmware

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.



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 text file config.txt on the microSD card.

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 DHCP 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 43.

Example config.txt files

Example: Link- Local IP address

```
IP: LOCAL
Hostname: ANX2EipScan
Firmware: AN-X2-AB-RIO-EIPSCN
```

Example: DHCP

```
IP: DHCP
Hostname: ANX2EipScan
Firmware: AN-X2-AB-RIO-EIPSCN
```

Example: static IP address

```
IP: 192.168.1.14
NetMask: 255.255.255.0
DefGtwy: 192.168.1.1
HostName: ANX2EipScan
Firmware: AN-X2-AB-RIO-EIPSCN
```

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

TIP It may be necessary to start the command prompt as administrator.

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.

Configuring the AN-X2-ABRIO-EIPSCN

All the configuration information required for the AN-X2-ABRIO-EIPSCN is contained in a text file.

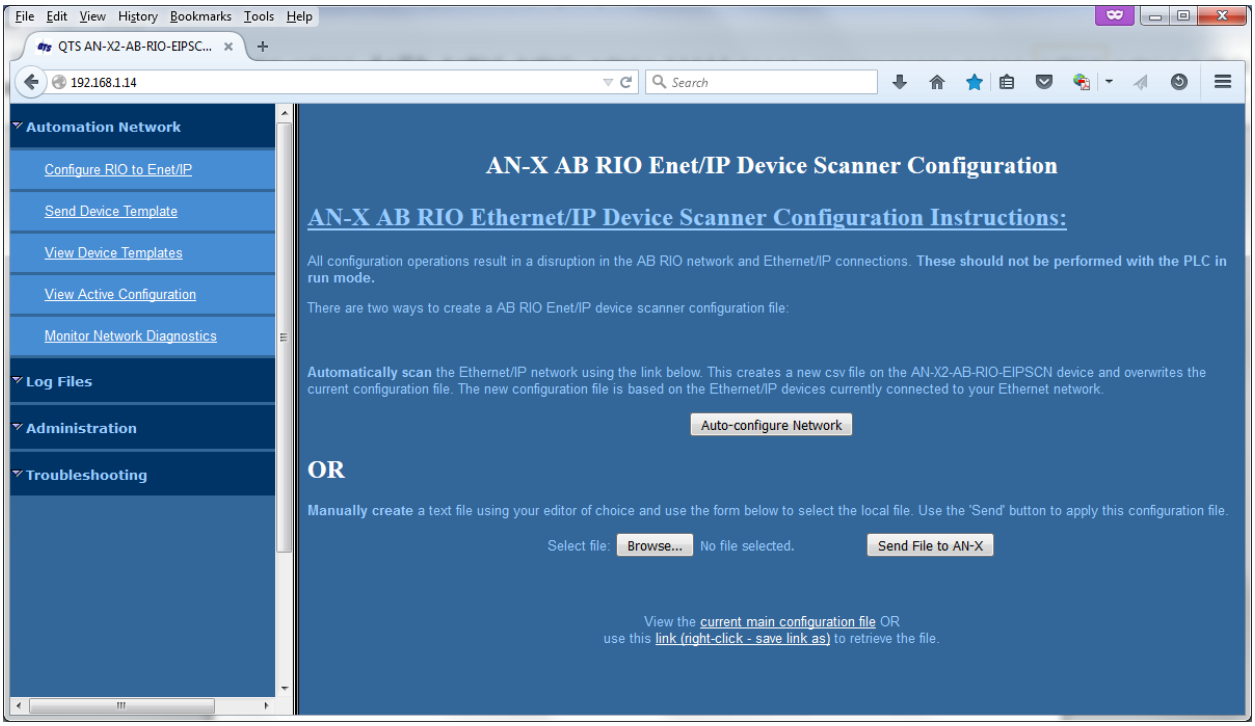
Typically you create a starting configuration by autoconfiguration, then edit the configuration the AN-X generates and send the modified to the AN-X.

You can also create a configuration manually and send it to the AN-X.

The following steps assume that you have replaced the remote I/O adapter modules with Ethernet adapters.

Auto Configuration

To perform an autoconfiguration, in the web interface first select *Automation Network/Configure RIO to Enet/IP*.



Click the *Auto-configure Network* button.

AN-X scans the local Ethernet subnet and locates all Ethernet adapter modules, for example, Flex I/O 1794-AENT modules.

It then queries each adapter for the modules connected to that adapter and builds a default configuration based on the replies it receives.

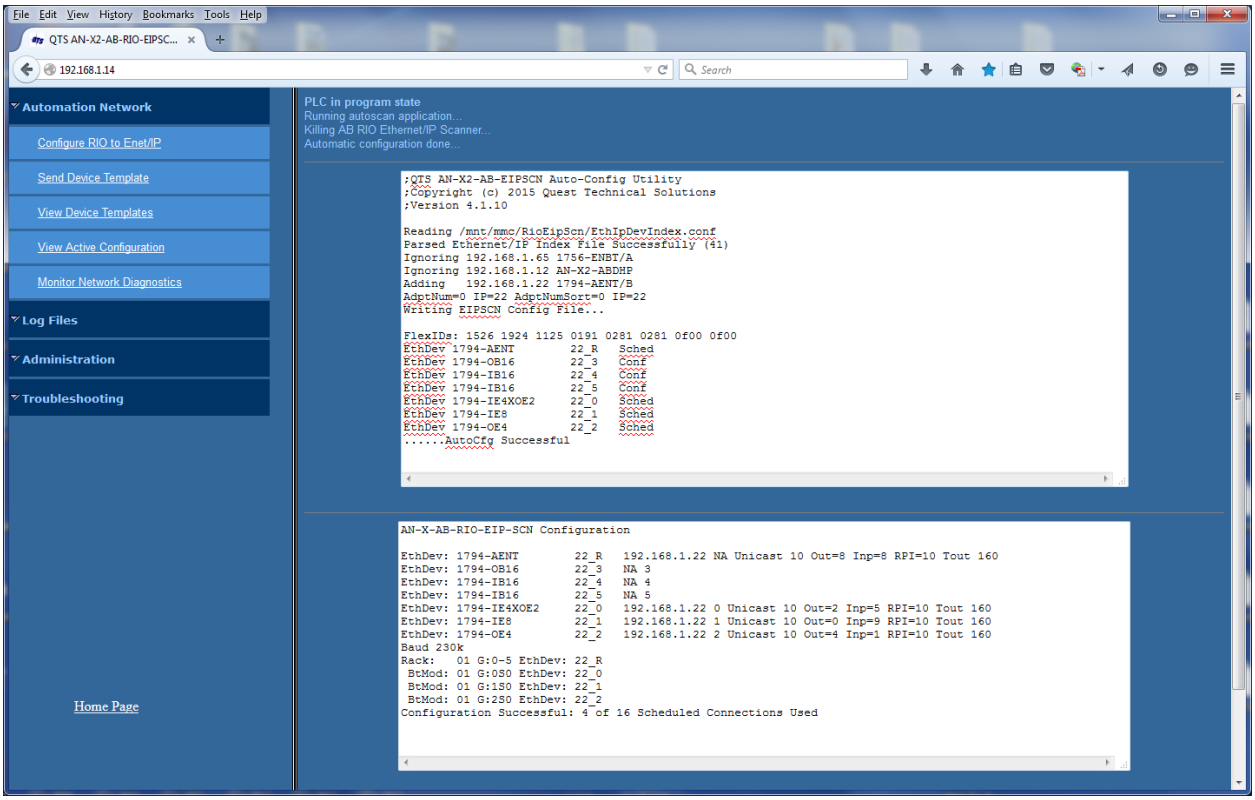
It can determine only the module types; it cannot determine any configuration information from the modules.

It builds a default remote I/O configuration that includes a remote I/O rack for each adapter module it found, and a block transfer for each analog module. It assumes that discrete modules are scanned as part of the adapter (rack optimized) connection.

After the autoconfiguration is complete, check that all racks and analog modules have been found.

TIP

AN-X generates default names for adapters and analog modules based on the low byte of the IP address. On a large subnet, e.g., netmask 255.255.0.0, it generates duplicate names if two modules have the same low byte in their IP addresses. When you edit the configuration file the AN-X generated, edit the duplicate name so that all names are unique.



After an autoconfiguration, AN-X displays the screen shown above. The upper pane shows the result of the autoconfiguration. The lower pane shows the result of AN-X loading the configuration created by the autoconfiguration.

Editing the Configuration File

Begin by transferring the configuration that AN-X created following the autoconfiguration from the AN-X to your computer. From the web interface, select *Automation Network/Configure RIO to Enet/IP*. Right click the link at the bottom of the page and save the file to your computer.

Edit the file in a text editor such as Windows Notepad.

Set the global parameters (see page 19)

In the Ethernet devices section of the configuration file, set the parameters for all modules.

In the remote I/O section of the configuration file:

- Set the baud rate
- Set the rack numbers and starting and ending I/O groups to match what's configured in the remote I/O scanner.
- Check that the names assigned to the remote I/O racks correspond to the correct Ethernet adapters.
- Set the block transfer locations (I/O group and slot) to match the block transfers programmed in the remote I/O scanner
- Check that the names assigned correspond to the correct Ethernet devices.

Save the file.

Transfer the file to the AN-X. From the web interface, select *Automation Network/Configure Rio to Enet/IP*. Click the *Browse* button and select the modified configuration file. Click the *Send* button to transfer the file to the AN-X. Check for error messages.

In the PLC:

- make any required changes to the I/O configuration and program. For example, you may need to change rack sizes, discrete and block transfer addresses
- check that all block transfers are running
- check the values for all discrete input and output data
- check the values of all block transfer read and write data
- check all logic in the controller

Configuration File Contents

The configuration file is a text file that contains all the information required to configure the AN-X2-ABRIO-EIPSCN.

It consists of three sections:

- Global parameters
- Ethernet devices
- Remote I/O configuration

Fields can be separated by any whitespace characters such as spaces or tabs, or by commas.

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

Refer to page 25 for a sample configuration file.

Global Parameters

Global parameters affect the overall behaviour of the AN-X2-ABRIO-EIPSCN.

NoRackFaults

If the connection to an Ethernet adapter, e.g. 1794-AENT, is not open or is faulted, the AN-X faults the corresponding remote I/O rack.

You can override this behaviour by including the global parameter NoRackFaults. This may be useful during development but should not be used in a production system.

NoBtFaults

If the connection to an Ethernet I/O module, e.g. 1794-IE4XOE2, is not open or is faulted, the AN-X does not respond to requests for the corresponding block transfers on remote I/O.

You can override this behaviour by including the global parameter NoBtFaults. This may be useful during development but should not be used in a production system.

Ethernet Devices

The Ethernet devices section of the configuration file identifies the adapters and I/O modules that the AN-X will scan over Ethernet.

Each Ethernet device refers to a template file where parameters for the module type are defined.

Each Ethernet device begins with the keyword EthDev, followed by the name of the template file, the name of the device, the IP address, the slot, the connection type, and the RPI.

The device name can be from 1 to 31 characters long and is not case sensitive. The name associates the Ethernet device with the corresponding remote I/O rack or block transfer.

Slot numbers start at 0.

The connection type is usually Unicast. It can also be Multicast but this is not recommended.

This is followed by any parameters for the module. Parameter definitions begin with the keyword ParmSet , followed by the parameter name, the parameter value and usually a comment that shows the possible parameter values.

Ethernet I/O Adapters

The definition for an Ethernet adapter consists of the keyword EthDev, the name of the device template file, the module name, the IP address, the slot, the connection type and the RPI. The slot for an adapter is always entered as NA.

Example:

```
EthDev 1794-AENT  22_R   192.168.1.22  NA Unicast  10
```

The module name links the Ethernet adapter and the discrete I/O in the associated rack optimized connection with the discrete input and output data on a remote I/O rack.

Discrete I/O Modules

Since discrete I/O modules usually share an Ethernet connection (referred to as the rack optimized connection) with the adapter, the IP address is entered as NA and the RPI is omitted.

The definition for a discrete module consists of the keyword EthDev, the name of the device template file, the module name, NA for IP address, and the slot number.

Discrete I/O modules in a rack must be placed immediately after the adapter in the configuration file and before any analog modules in the rack.

The discrete module definition is followed by any parameters for the device. Parameters consist of the keyword Parmset, the parameter name, and the value. Refer to the device template file for allowed parameter values and what they mean.

Example:

```
EthDev 1794-IB16  22_4   NA  4
ParmSet   FilterTme00_11     0
ParmSet   FilterTme12_15     0
ParmSet   DisCounter     0
ParmSet   DisFilter     0
```

The discrete module name is used only for messages in the logs.

Analog I/O Modules

Analog I/O modules communicate with the AN-X using a separate Ethernet connection.

The definition for an analog module consists of the keyword EthDev, the name of the device template file, the module name, the IP address, and the slot number, the connection type, and the RPI.

The module name links the I/O module on Ethernet with a block transfer read and write on remote I/O.

The IP address must match that of the adapter for the rack. The RPI does not have to match the RPI for the adapter.

The analog module definition is followed by any parameters for the device. Parameters consist of the keyword Parmset, the parameter name, and the value. Refer to the device template file for allowed parameter values and what they mean.

In the following example, the first parameter (ProgState) sets what the module does in program mode. Possible values are 0 (reset outputs), 1 (hold last state) and 2 (use the safe state value), as shown. The default is 0, which corresponds to reset outputs. To select hold last state, change the 0 to 1.

Example:

```
EthDev 1794-IE4XOE2     22_0   192.168.1.22     0 Unicast      10

ParmSet ProgState 0 ; Program Mode Behavior - 0=ResetOutputs, 1=Hold Last, 2=Apply
Safe State Values
```

```
ParmSet FaultState 0 ; Fault   Mode Behavior - 0=ResetOutputs, 1=Hold Last,
2=Apply Safe State Values

ParmSet InpRange0  3 ; Input 0 Range: 0=Off, 1=0to10Vdc/0to20mA, 2=4to20mA, 3=-
10to10Vdc

ParmSet InpRange1  3 ; Input 1 Range: 0=Off, 1=0to10Vdc/0to20mA, 2=4to20mA, 3=-
10to10Vdc

ParmSet InpRange2  3 ; Input 2 Range: 0=Off, 1=0to10Vdc/0to20mA, 2=4to20mA, 3=-
10to10Vdc

ParmSet InpRange3  3 ; Input 3 Range: 0=Off, 1=0to10Vdc/0to20mA, 2=4to20mA, 3=-
10to10Vdc

ParmSet OutRange0  0 ; Output 0 Range: 0=Off, 1=0to10Vdc/0to20mA, 2=4to20mA, 3=-
10to10Vdc

ParmSet OutRange1  3 ; Output 1 Range: 0=Off, 1=0to10Vdc/0to20mA, 2=4to20mA, 3=-
10to10Vdc

ParmSet  SafeOut0  1000 ; Ch 0 Output Safe State Value

ParmSet  SafeOut1  2000 ; Ch 1 Output Safe State Value
```

Remote I/O Configuration

The remote I/O section of the configuration file consists of:

- The baud rate
- Rack definitions
- Block transfer definitions

Baud Rate

The baud rate definition consists of the keyword Baud, followed by one of 57k, 115k, or 230k. Set the AN-X baud rate to match the PLC.

Example:

```
Baud 57k
```

Rack Definitions

Rack definitions consist of the keyword Rack, followed by the starting I/O group, the ending I/O group, and a name.

Example:

```
Rack  2 0 1  22_R
```

Allowed rack numbers are from 0 to 76 octal.

Allowed starting I/O groups are 0, 2, 4, 6. Allowed ending I/O groups are 1, 3, 5, 7. The ending I/O group must be larger than the starting I/O group.

The name can be from 1 to 31 characters long and is not case sensitive.

The name associates the rack with an Ethernet device.

AN-X uses the name to map discrete I/O data on remote I/O with the Ethernet data on the Ethernet adapter.

The rack size defined here must match the rack size defined in the remote I/O scanner.

Block Transfer Definitions

Block transfer definitions consist of the keyword BtMod, followed by the I/O group and slot, then a name.

Example:

```
BtMod   0 0 22_0
```

Block transfer definitions must follow the rack in which the block transfer is located.

AN-X accepts block transfer reads and writes of any length at that location.

The name can be from 1 to 31 characters long and is not case sensitive.

The name associates the block transfer with an Ethernet device.

AN-X uses the name to map block transfer read and write data on remote I/O with the module data over Ethernet.

Manual Configuration

The configuration file is described in detail in the section beginning on page 18.

To create a configuration file:

1. Add Ethernet adapters to create the rack optimized connections. Add a line of the form:

```
EthDev, template name, name, IP address, Slot, ConType, RPI
```

Example:

```
EthDev 1794-AENT 22_R 192.168.1.22 NA Unicast 10
```

Note that the slot is set to NA

2. Add the discrete modules to each adapter. Add a line of the form:

```
EthDev, device template file name, module name, NA, slot
```

Example:

```
EthDev 1794-IB16 22_4 NA  4
```

All discretes modules must come before any of the analogs for the adapter

3. Add the analog modules to each adapter. Add a line of the form:

```
EthDev, device template file name, module name, IP address, slot,
ConType, RPI
```

Example:

```
EthDev 1794-IE4XOE2 22_0 192.168.1.22 0 Unicast 20
```

4. From the device template for each module, copy the section of the file (at the end) that contains the ParmSets for the module to each discrete or analog module in the configuration file and uncomment the lines (remove semicolons)

To view the device template, from the web interface, select *Automation Network/View Device Templates*, then click on the required template in the list.

5. Set appropriate parameter values.
6. Add the remote I/O section, which consists of the following entries:
7. Add the baud rate

Example:

```
Baud 230k
```

8. Add racks. Rack definitions consist of:

Rack, rack number, starting I/O group, ending I/O group, name

Example:

```
Rack  2 0 5  22_R
```

The name must match the name assigned to the corresponding adapter in the Ethernet portion of the file.

9. Add block transfers for each rack. Block transfer definitions consist of:

BtMod, I/O group, slot, name

Example:

```
BtMod 2 0 22_0
```

The name must match the name assigned to the corresponding analog module in the Ethernet portion of the file.

Sending and Retrieving Configurations

To transfer a configuration file to the AN-X2-ABRIO-EIPSCN, first select *Automation Network/Configure RIO to ENET/IP* in the web interface.

Click the *Browse* button and select the file, then click the *Send File to AN-X* button to transfer the configuration.

To transfer a configuration from the AN-X2-ABRIO-EIPSCN, first select *Automation Network/Configure RIO to ENET/IP* in the web interface.

Right click on the link *(right-click - save link as)* link and save the file on your computer.

Sample Configuration File

```
;QTS AN-X-AB-EIPSCN Auto Config Utility

;Copyright (c) 2015 Quest Technical Solutions

;Auto Config  File

;NoRackFaults ; Do not cause rack fault if associated EthDev connection is not
active

;NoBtFaults ; Do not disable BtMod if associated EthDev connection is not
active

EthDev 1794-AENT 22_R 192.168.1.22 NA Unicast  2 ; 1794-AENT Rack Optimized
Connection


EthDev 1794-IB16 22_4  NA  4

  ParmSet FilterTme00_11 0 ; Filter Time (ms) Points  0-11: 0=.25, 1=.5, 2=1,
3=2, 4=4, 5=8, 6=16, 7=32

  ParmSet FilterTme12_15 0 ; Filter Time (ms) Points 12-15: 0=.25, 1=.5, 2=1,
3=2, 4=4, 5=8, 6=16, 7=32

  ParmSet DisCounter 0 ; 0=Enable Counter, 1=Disable Counter

  ParmSet DisFilter  0 ; 0=Enable Filter,  1=Disable Filter


EthDev 1794-IB16  22_5   NA  5

  ParmSet FilterTme00_11     0 ; Filter Time (ms) Points  0-11: 0=.25, 1=.5,
2=1, 3=2, 4=4, 5=8, 6=16, 7=32

  ParmSet   FilterTme12_15     0 ; Filter Time (ms) Points 12-15: 0=.25, 1=.5,
2=1, 3=2, 4=4, 5=8, 6=16, 7=32

  ParmSet DisCounter     0 ; 0=Enable Counter, 1=Disable Counter

  ParmSet DisFilter     0 ; 0=Enable Filter,  1=Disable Filter


EthDev 1794-IE4XOE2 22_0 192.168.1.22 0 Unicast

  ParmSet ProgState 0 ; Program Mode Behavior - 0=ResetOutputs, 1=Hold Last,
2=Apply Safe State Values

  ParmSet FaultState 0 ; Fault   Mode Behavior - 0=ResetOutputs, 1=Hold Last,
2=Apply Safe State Values

  ParmSet InpRange0 3 ; Input 0 Range: 0=Off, 1=0to10Vdc/0to20mA, 2=4to20mA,
3=-10to10Vdc

  ParmSet InpRange1 3 ; Input 1 Range: 0=Off, 1=0to10Vdc/0to20mA, 2=4to20mA,
3=-10to10Vdc
```

```
  ParmSet InpRange2 3 ; Input 2 Range: 0=Off, 1=0to10Vdc/0to20mA, 2=4to20mA,
3=-10to10Vdc

  ParmSet InpRange3     3 ; Input 3 Range: 0=Off, 1=0to10Vdc/0to20mA,
2=4to20mA, 3=-10to10Vdc

  ParmSet OutRange0     0 ; Output 0 Range: 0=Off, 1=0to10Vdc/0to20mA,
2=4to20mA, 3=-10to10Vdc

  ParmSet OutRange1     3 ; Output 1 Range: 0=Off, 1=0to10Vdc/0to20mA,
2=4to20mA, 3=-10to10Vdc

  ParmSet SafeOut0 1000 ; Ch 0 Output Safe State Value

  ParmSet SafeOut1 2000 ; Ch 1 Output Safe State Value


Baud 230k

Rack  2 0 5  22_R

 BtMod   0 0 22_0
```

Scanning I/O

Program/Run

The Ethernet scan mode (program or run) is determined by the mode of the controller communicating with the AN-X2-ABRIO-EIPSCN over remote I/O

In run mode, the AN-X2-ABRIO-EIPSCN scans I/O modules, reads discrete and analog inputs and writes discrete and analog outputs. It transfers the I/O data between Ethernet and remote I/O.

In program mode, the AN-X2-ABRIO-EIPSCN scans remote racks, reads discrete inputs but does not write discrete outputs or update block transfers.

In test mode, the AN-X2-ABRIO-EIPSCN behaves the same as it does in program mode.

Loss of Remote I/O Communication

If the AN-X loses communication with the remote I/O scanner, it scans racks and I/O modules over Ethernet in program mode.

It may take several seconds for the communication timeout to occur.

Loss of Ethernet Communication

If the AN-X cannot communicate with a rack or I/O module over Ethernet, it:

- returns a rack fault to the remote I/O scanner
- does not respond to block transfer requests for the block transfer that corresponds to the Ethernet module

Global Parameters

There are global parameters that you can include in the configuration file to override the default behaviour on loss of communication. See page 19.

Block Transfers

There are no block transfer timeouts. The PLC-5 is responsible for ensuring that block transfers are updating. If the PLC-5 remains in run mode but the block transfers for a module are not updating, the AN-X will just continue to send the last values it received from remote I/O to outputs on analog modules.

If the PLC-5 program contains block transfers of length 0, change them to use the lengths displayed by AN-X when you download the configuration

Example:

```
EthDev: 1794-IE4XOE2     22_0   192.168.1.22 0 Unicast 20 Out=2 Inp=5
RPI=20 Tout 160
```

In this example, block transfer reads for this module should use length 5. Block transfer writes should use length 2.

Note that for block transfer reads, any data beyond this length is invalid.

Ethernet/IP Device Templates

The properties of Ethernet adapters and I/O modules are defined in text files stored on the AN-X. Device template files have extension EthDev.

Device template files contain the information the AN-X uses to build the configuration file when you perform an autoconfiguration, including:

- Connection information
- Module parameters

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

To view the device templates, from the web interface select *Automation Network/View Device Templates*. Click on a file name to view its contents.

Template files also contain the information you would need to manually create a configuration file for the AN-X2-ABRIO-EIPSCN.

Scroll down to the bottom of the file and copy the commented out section to the appropriate location in the configuration file you are building, and remove the semicolons.

Index File

The AN-X index file contains a list of supported I/O modules.

When you perform an autoconfiguration, AN-X uses the index file, EthIpDevIndex.conf, to match the modules it finds to the corresponding Ethernet device template file and to add parameters for the device to the configuration file it creates.

If you add a device template, you must also add an index file that contains the device template.

In the web interface, select *Automation Network/Send Device Template*, select the updated index file, then click the *Send* button to transfer the index file to the AN-X

Alternative Device Template Files

In some cases, discrete I/O modules have two associated Ethernet device files.

The first is the standard file, where the module shares the rack optimized connection with the Ethernet adapter module. If you use this file in the configuration, the discrete data is mapped to discrete data on remote I/O. When you perform an autoconfiguration, AN-X assigns the standard (rack optimized) file to the module.

The second file is used where the module has additional features that are available only if there is a separate connection to the module. These files have _NOPT (non-optimized) as part of the name. If you use this file in the configuration, the module is mapped to block transfer data on remote I/O.

Using the Web Interface

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

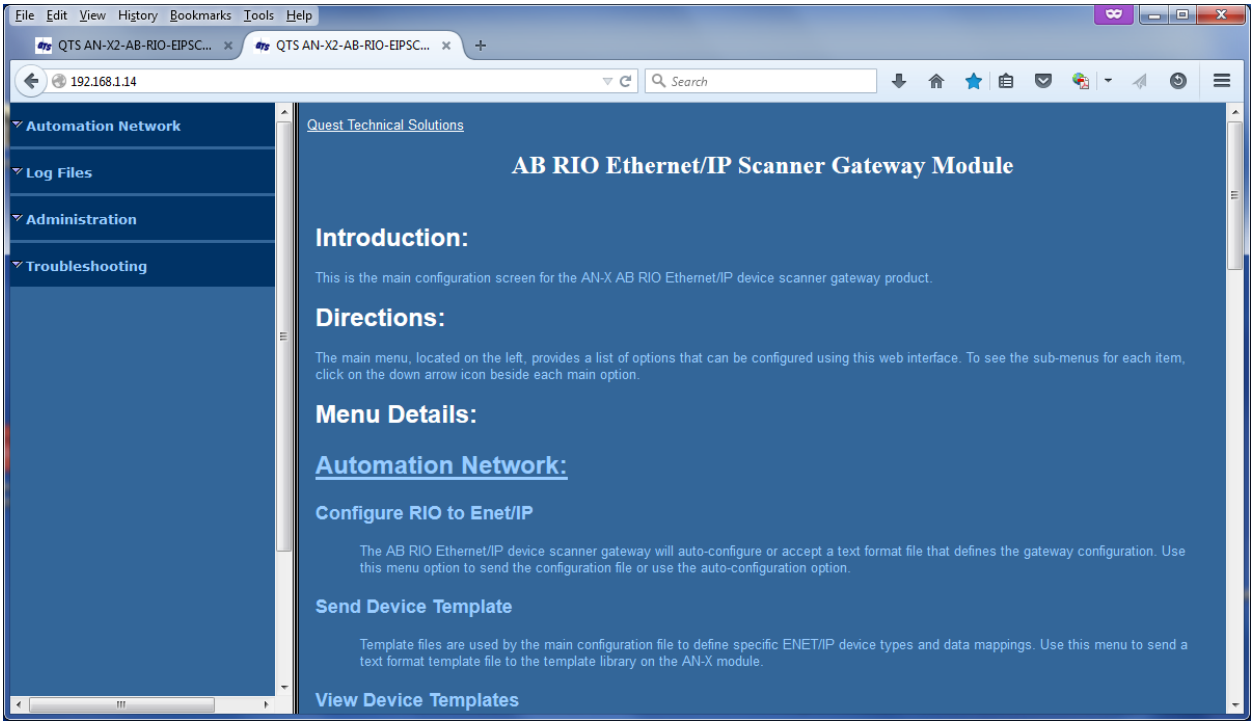
Use the web interface to:

- Configure the AN-X, either by autoconfiguration or manually
- Transfer configuration files to and from the AN-X
- Transfer a device template file to the AN-X
- View the device templates on the AN-X
- View the results of the last configuration
- Monitor remote I/O and Ethernet diagnostic counters
- Configure the Ethernet settings and select firmware
- Archive the AN-X configuration
- Update the AN-X firmware
- Restart the AN-X
- View AN-X logs

It also contains contact information for support.

To use the web interface, you must know the IP address of the AN-X.

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 display cached data rather than rereading data that has changed on the AN-X.

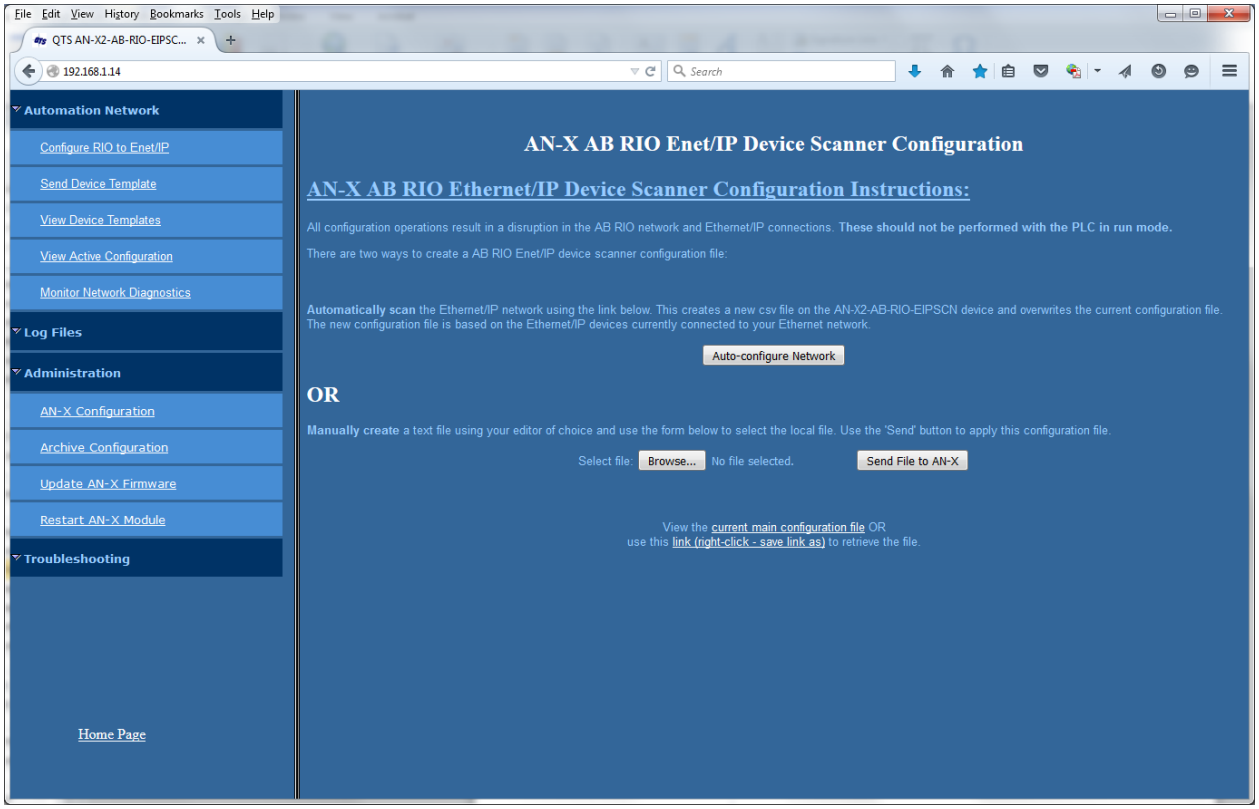
TIP

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.)

Automation Network

Configure RIO to Enet/IP

Select *Automation Network/Configure RIO to Enet/IP* to autoconfigure the AN-X or to send a configuration file to the AN-X.



First create a configuration file. Refer to page 18 for details on the file format.

Use the *Browse* or *Choose File* button to select the file.

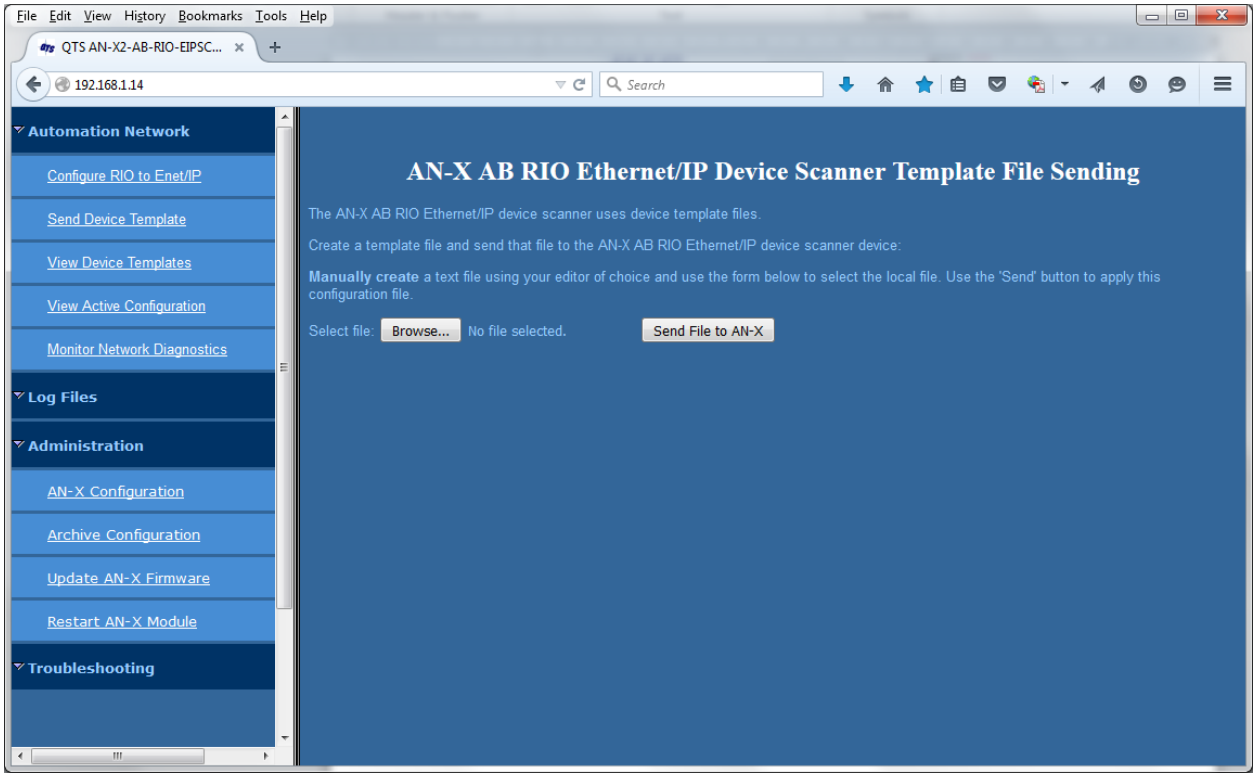
Click the *Send File to AN-X* button to send the file to the AN-X.

AN-X parses the file and displays either the configuration if it has been successful or a message that indicates the source of the error if it fails.

From this page you can also click on the link to view the *current main configuration file* or right click on the other link to save the current configuration file to your computer.

Send Device Template

Select *Automation Network/Send Device Template* to transfer a device template file (*.EthDev) to the AN-X.

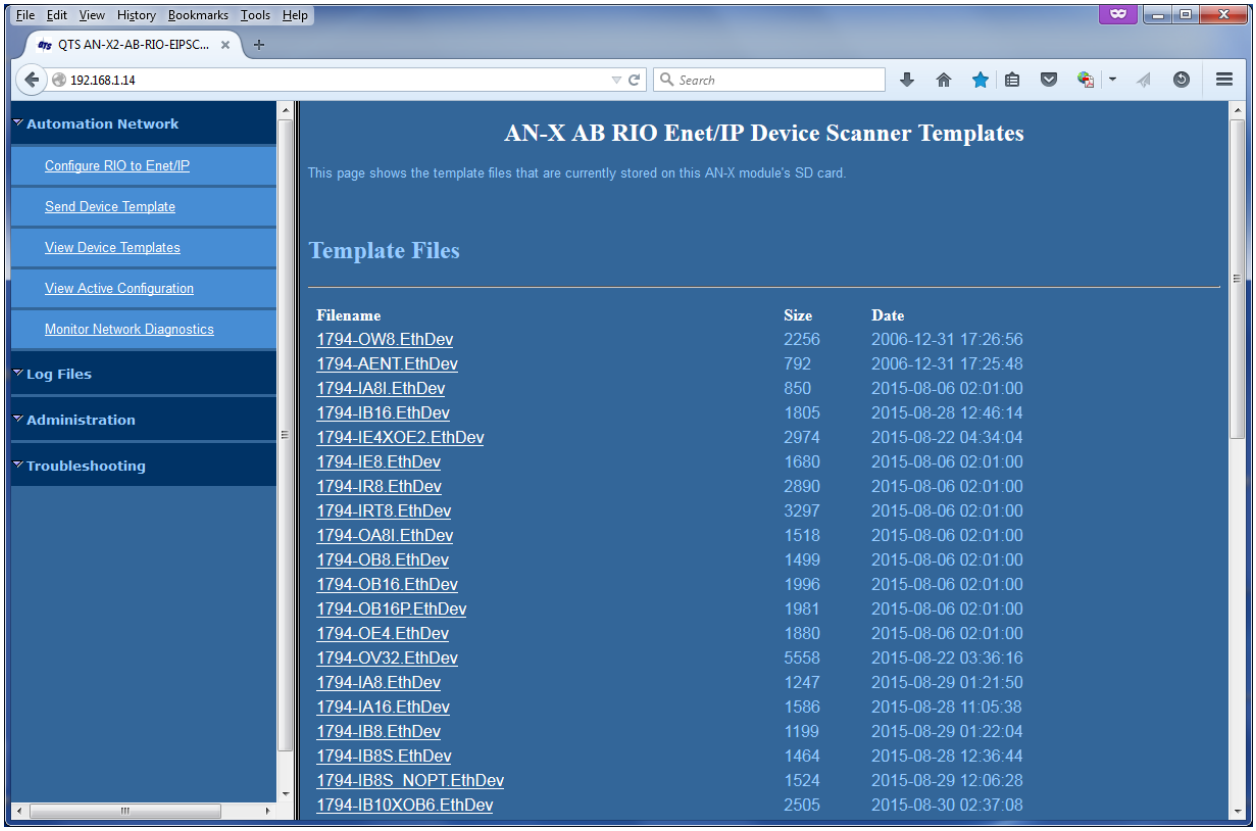


Note that you will also need to transfer an updated index file to the AN-X that contains information about the module device template file that you updated.

The index file is transferred in the same way as the device template file.

View Device Templates

Select *Automation Network/View Device Templates* to display a list of the device templates stored on the AN-X.

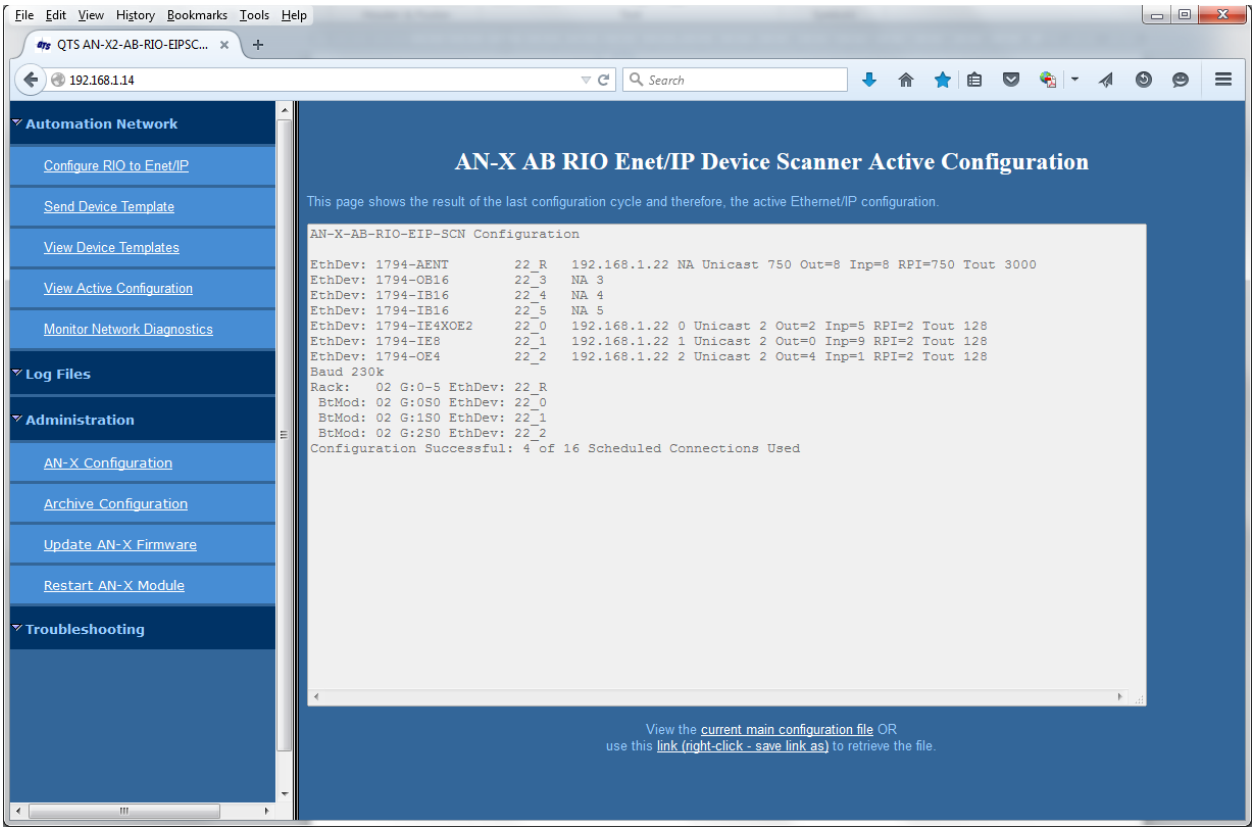


Click on any of the template files to display its contents.

Right click on a file to save the file to your computer.

View Active Configuration

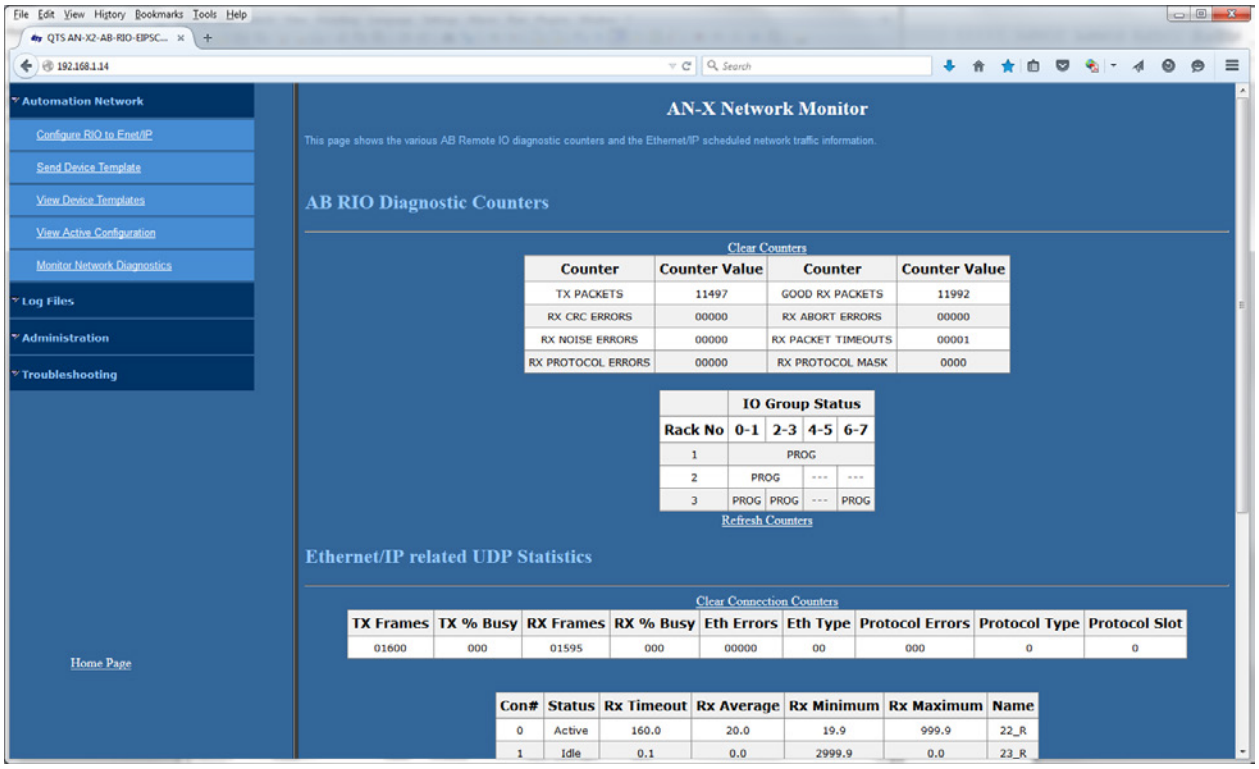
Select *Automation Network/View Active Configuration* to display the result of the last configuration transfer.



From this page you can also click on the link to view the *current main configuration file* or right click on the *link (right-click – save link as* link to save the current configuration file to your computer.

Monitor Network Diagnostics

Select *Automation Network/Monitor Network Diagnostics* to display the remote I/O network diagnostic counters, the rack status table, and the Ethernet/IP related UDP Statistics.



To refresh the counters, use the corresponding *Refresh Counters* button or click anywhere in the table.

To clear either set of counters, use the corresponding *Clear Counters* link.

After clearing the counters, refresh the counters.

Remote I/O Diagnostic Counters

Counter	Description
TX PACKETS	Count of transmitted packets
GOOD RX PACKETS	Count of good received packets
RX CRC ERRORS	Received packets with CRC errors
RX ABORT ERRORS	Received packets with abort errors
RX NOISE ERRORS	Received packets with noise errors

Counter	Description
RX PACKET TIMEOUTS	Timeouts, packet sent, no reply received
RX PROTOCOL ERRORS	Received packets with protocol errors
RX PROTOCOL MASK	Indicates cause of the last protocol error

Rack Status Table

The rack status table shows the racks configured on the AN-X and the status of those racks.

In the screen above, rack 1 is a full rack, rack 2 is a half rack starting at I/O group 0, and rack consists of three quarter racks, at I/O groups 0, 2 and 6.

Possible status values are:

Status value	Description
---	empty
RUN	Rack is being scanned in run mode
PROG	Rack is being scanned in program mode
CFG	Rack configured in ANX but not being scanned Rack inhibited in the PLC Rack reset in the PLC
PLC	Rack being scanned by the PLC but not configured in ANX
INHIBIT	Usually indicates a rack size mismatch between PLC and ANX

Ethernet/IP UDP Statistics

The Ethernet/IP Statistics consist of two portions:

- Global counters
- Statistics for each connection

The Global Counters consist of:

Counter	Description
TX Frames	Count of transmitted frames
TX % busy	Percentage of time the tranmitter is not idle
RX frames	Count of received frames
RX % Busy	Percentage of time the receiver is not idle
Eth Errors	Count of Ethernet errors

Counter	Description
Eth Type	Type of last error
Protocol Errors	Count of Ethernet protocol errors
Protocol Type	Type of last protocol error
Protocol Slot	Connection number of last protocol error

Clearing the Ethernet counters does not clear the global counters.

The Connection Statistics consist of:

Counter	Description
Connection number	0 to 15
Status	Active or Idle
Rx Timeout	The receive timeout, calculated from the RPI
Rx Average	The average of the last 32 update times, in ms.
Rx Minimum	The minimum update time since the last counter reset, in ms.
Rx Maximum	The maximum update time since the last counter reset, in ms
Name	The name for the connection, from the configuration file

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 the Ethernet/IP 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, click on the file name.

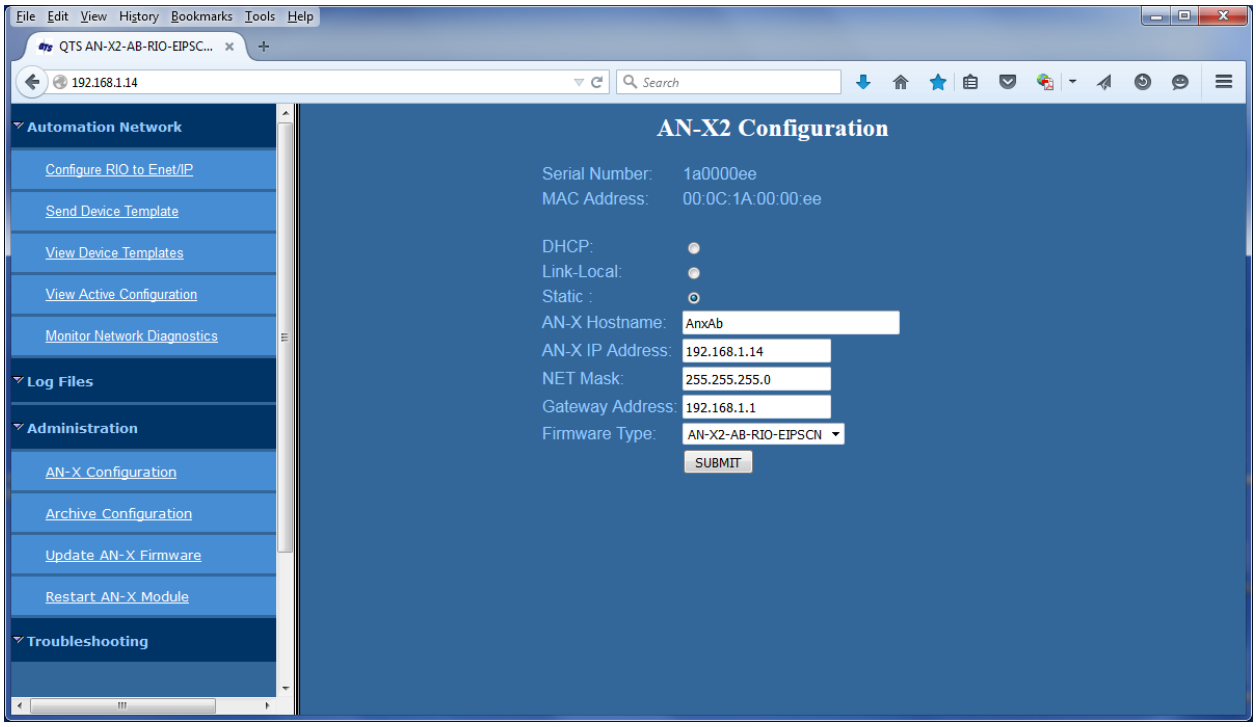
Administration Menu

The Administration Menu is used to set the AN-X IP address and to view and edit files on AN-X.

AN-X IP Configuration

You can change the AN-X IP configuration from the web interface. This requires that you know the currect IP address and can use it to access the web interface.

Select *Administration/AN-X IP Configuration*.



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 169.254.42.84 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.

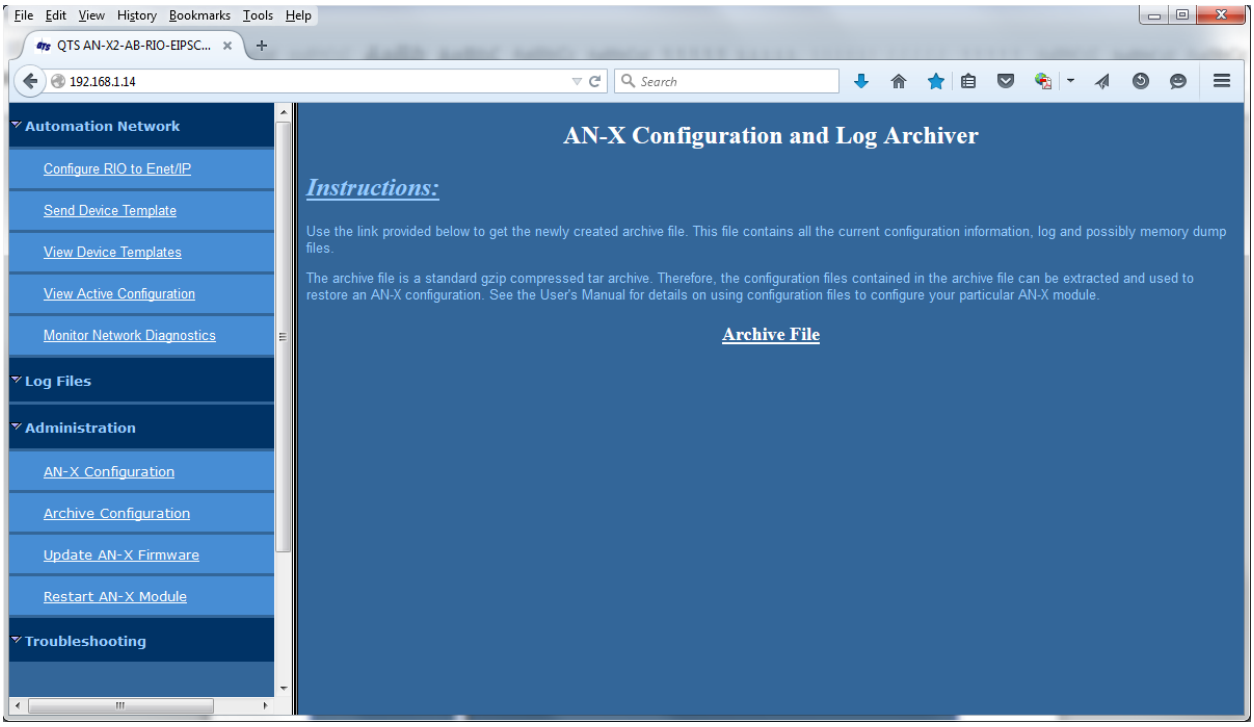
Submitting the Configuration

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

You can archive all the current AN-X configuration files and log files from the web interface. The archive file is a standard gzip compressed tar archive. It intended for technical support only.

Select *Administration/Archive Configuration.*



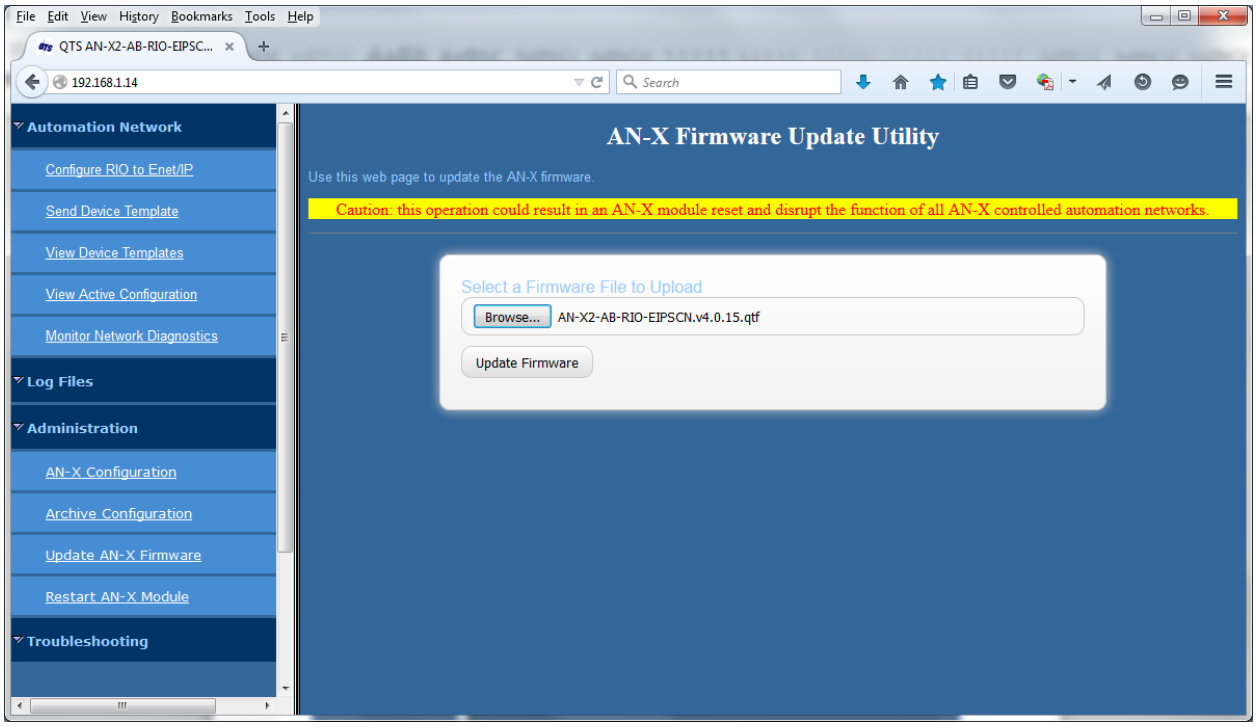
Click the *Archive File* link and save the file. Select the destination where the file will be stored.

Update AN-X Firmware

Use *Update AN-X Firmware* to transfer 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 update firmware in the AN-X while applications that use the AN-X are running.



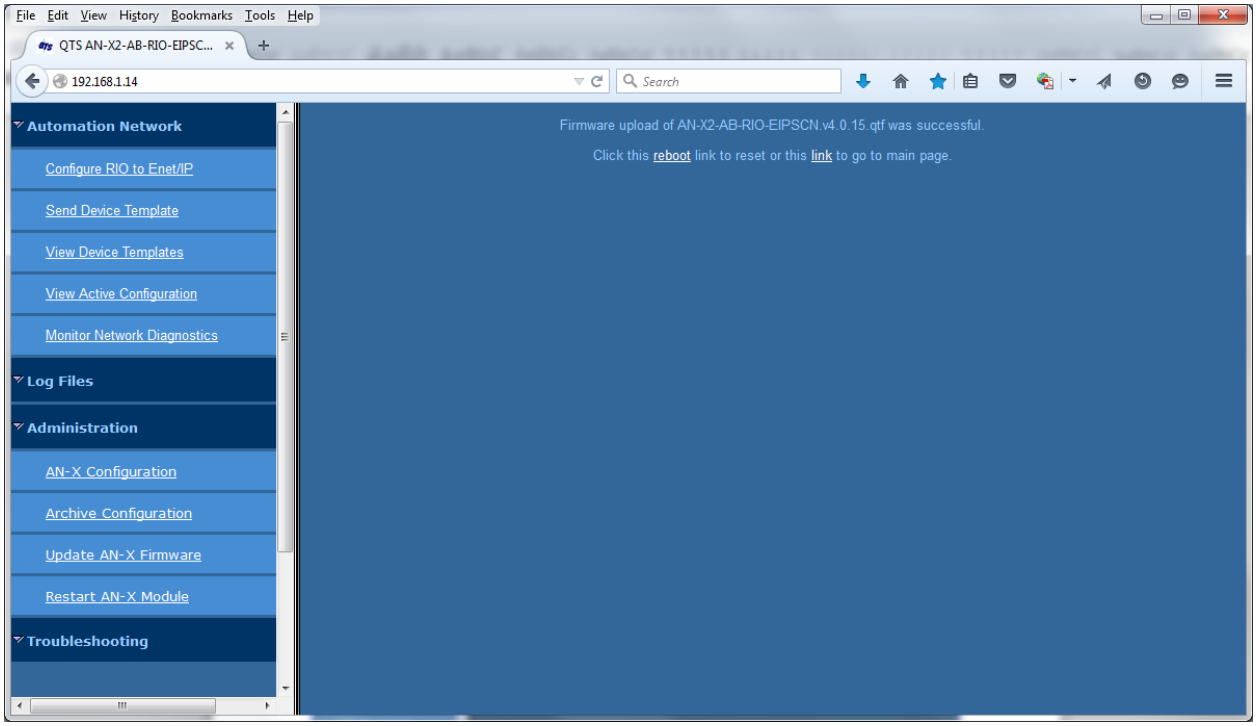
Browse to select the file, then click the *Update Firmware* button to transfer the file.

WARNING!

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

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 update is complete, AN-X displays a message that indicates the success or failure of the update.



If you have other files to transfer, return to the main page and continue. Otherwise, restart the AN-X in order to run the updated 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 updating 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-ABRIO-EIPSCN has LEDs that indicate the state of the Ethernet connection, the overall module state and the connection to the remote I/O network.

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 or MS LED

The SYS or MS LED is used by the AN-X operating system and software to indicate the state of operations and errors. Errors or status indication in boot mode cause the LED to flash yellow. Otherwise, the LED flashes red.

The SYS or MS LED 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 (or MS) 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
Yellow 9	Error processing option file or file not found
Yellow 10	Option file mismatch
Flashing red/green	Unscheduled messaging, addressing or connection problem
Flashing red/off	Configuration file problem

"Railroading" – SYS (or MS) and NET (or NS) LEDs

AN-X2 alternates (railroads) flashing the SYS (or MS) and NET (or NS) 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 or NS LED – Network Status

The NET (or NS) LED shows the status of remote I/O communication.

Color	Meaning
Red	A frame receive error has been received in the last second (CRC error, abort, or timeout), stays red for 1 second after the error occurs
Flashing	At least one rack which is being scanned is not being scanned or is in error
Green	All racks are being scanned with no errors

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 (or MS) and NET (or NS) 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 (or MS) 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 Or MS) LED sequence and contact technical support.

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 transferred to the AN-X, 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 transfer.

WARNING! Do not update firmware on the AN-X while applications that use the AN-X are running.

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

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

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

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.

You can also update the firmware by copying qtf files to the microSD card from a computer. If you do, make sure that there is only one version of each qtf file on the microSD card.

Specifications

Parameter	Specification
Function	Bridge between Ethernet and Remote I/O network
Maximum Power Consumption	200 mA @ 12 VDC or 100 mA @ 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

Languages Spoken: French, English

+33 (0) 5.34.36.87.20, support.EMEA@prosoft-technology.com

North America

Languages Spoken: English, Spanish

+1.661.716.5100, support@prosoft-technology.com

Latin America (Brazil)

Languages Spoken: Portuguese, English

+55.11.5083.3776, dalarcon@prosoft-technology.com

Latin America (Brasil)

Languages Spoken: Portuguese, English

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Latin America (Spanish Speaking Countries)

Languages Spoken: Spanish, English

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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.