AN-X4-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-X4 gateway

Module Overview

The AN-X4-ABRIO-EIPSCN communications module connects a controller 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-X4-ABRIO-EIPSCN is a solution that makes it possible to 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.

AN-X also makes it possible to communicate from remote I/O to devices that support only Ethernet/IP, such as Point I/O.

On Ethernet the AN-X emulates a ControlLogix scanning I/O. On remote I/O AN-X emulates one or more racks.

AN-X is supplied with template files for I/O modules on Ethernet. These template files contain information about connection and other parameters for the modules. When you perform an autoconfiguration on Ethernet to identify the adapters and I/O modules present, AN-X uses the template files to build a default configuration based on the modules it has found. You then upload and edit this configuration to suit your application.

All I/O module 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 also 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 passed to 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 Kbits/second
- 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 rack adapter and its associated discrete I/O requires one connection. Each analog I/O module requires one connection. In some cases, a discrete module will require a separate connection if desired functionality is available only if the module has its own connection.

If your application requires more than 16 connections, you will need an additional AN-X module.

The AN-X4-ABRIO-EIPSCN module has a web interface for configuring the module, for monitoring I/O and logs, and for performing administrative functions. You can communicate with the module using any standard web browser.

The module firmware can be selected and updated using the web interface. Refer to page 54 for details.

Current firmware and Ethernet device templates can be found at

http://qtsusa.com/dist/AN-X4/AB/RIO-EIPSCN/

Hardware Features

The module has:

- LEDs to indicate the status of the connection to the Ethernet, its own internal state (MS), and the state of the connection to the remote I/O network (NS)
- an Ethernet connector
- a 3-pin Phoenix connector to connect to the remote I/O network
- a 3-pin Phoenix power connector
- a microSD card for storage of configuration data and firmware

The pinouts on the power and the remote I/O connectors match those on the AN-X2. Cables for the AN-X2 can be connected to the AN-X4 without change, though they are rotated 180 degrees.

Package Contents

- AN-X4-ABRIO module
- Phoenix power and network connectors
- microSD card

Using the MicroSD Card

The AN-X4 microSD card stores configuration data and firmware.

There are no restrictions on the size or speed of the card.

The microSD card must be present while the AN-X4 is running.

WARNING! Do not remove the microSD card while the AN-X4 is powered on.

There are several configuration files on the SD card.

Function	File
Ethernet configuration	IPCfg\IPConfig.txt
Configuration file	RioEipScn\AnxAbRioEipScnCfg.txt
Firmware to run	Firmware\FirmwareCfg.txt

Use a plain text editor such as Windows Notepad to create or edit these files.

If the AN-X4 is inaccessible from Ethernet because of its settings, or is in an unknown state, you can power down the AN-X4, remove the microSD card and edit the file IPConfig.txt. Refer to page 17 for details.

When you have finished editing the file, reinsert the card in the slot at the back of the AN-X4 and restart the AN-X4.

WARNING! If you remove the card to edit the configuration files, push the card in straight or the card might fall inside the case and you will have to disassemble the AN-X4 to retrieve it.

Comparison with the AN-X2

If you are familiar with the AN-X2, or are replacing an AN-X2 with an AN-X4, you should be aware of the following:

EIPSCN

- The power and remote I/O cables are the same, but the connectors on the AN-X are rotated 180 degrees.
- Improved detection of remote I/O timeouts
- The web interface is improved, it now has data displays for discrete and block transfer data, as well as live data updates

General

- The status and errors displayed on the LEDs have changed
- You can run different versions of the same firmware, e.g., Ethernet/IP scanner firmware, for testing and debugging
- As shipped, the AN-X searches for a DHCP IP address at startup for 10 seconds, then reverts to static IP address 192.168.0.246
- The case is smaller

Installation

Prevent Electrostatic Discharge

The module is sensitive to electrostatic discharge.

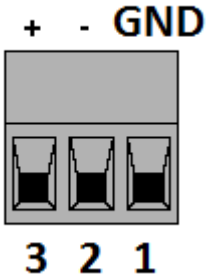
WARNING!

Electrostatic discharge can damage integrated circuits and 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



The pins on the power connector are chassis ground, negative voltage and positive voltage. Pin 1 is closest to the Ethernet connector.

Power consumption is 240 mA @ 12VDC or 120 mA @ 24VDC.

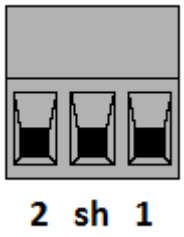
The part number for the power connector is Phoenix MSTB 2.5/3-ST-5.08 (1757022)

The power connector is the same as the AN-X2 but is rotated 180 degrees.

Remote I/O 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.

The network cable must be terminated with terminating resistors 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 remote I/O network.



On the AN-X module, the remote I/O connections should be as shown. The wiring in the connector is that same as for the AN-X2 but the connector is rotated 180 degrees on the AN-X4. A remote I/O cable for the AN-X2 can be used without change on the AN-X4.

Line 2 on the AN-X is closest to the Ethernet connector and the NS LED.

Check the wiring to ensure that line 1 on the AN-X is connected to line 1 on the PLCs, and other devices.

The part number for the connector is Phoenix MSTB 2.5/3-ST-5.08 (1757022)

The most common causes of Remote I/O connection errors are:

- wiring reversed (lines 1 and 2)
- incorrect baud rate
- other cabling and termination problems
- terminating resistors shorted to shield wires
- duplicate racks

Usually, but not always, the wire colors are:

	Data Highway Plus	Remote I/O
Line 1	Clear	Blue
Line 2	Blue	Clear

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.

Hazardous Location Considerations

This equipment is suitable for use in Class I, Division 2, Groups A, B, C and D hazardous locations or non-hazardous locations.

Device is to be mounted inside an environmentally suitable enclosure that requires a tool to access.

Device is for indoor use only.

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	15
3	Connect AN-X to the Remote I/O network	12
4	Autoconfigure the AN-X (Ethernet)	19
5	Check the configuration. Did the AN-X find all adapters and modules?	
6	Transfer the configuration file from AN-X to your computer	19
7	Edit the configuration file and save it	21
8	Transfer the modified configuration file to the AN-X	29
9	Make any required changes to the control program and I/O configuration	
10	Check all I/O data, module configurations, etc.	
11	Scan I/O, read inputs and write outputs	

Ethernet Configuration

Before you can use the AN-X, you must configure it on Ethernet.

IMPORTANT!

The AN-X is shipped with the factory default setting, where AN-X waits for 10 seconds for a DHCP server to assign it an IP address. If it does not obtain an IP address within 10 seconds, it reverts to a static address of 192.168.0.246.

The AN-X must be configured to use DHCP or a static IP address before you can use it.

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 factory default setting, where AN-X waits for 10 seconds for a DHCP server to assign it an IP address. If it does not obtain an IP address within 10 seconds, it reverts to a static address of 192.168.0.246.

AN-X4 modules are shipped with the factory default setting.

Unless you have control of the DHCP server, in most applications you will assign 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 them one at a time.

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.

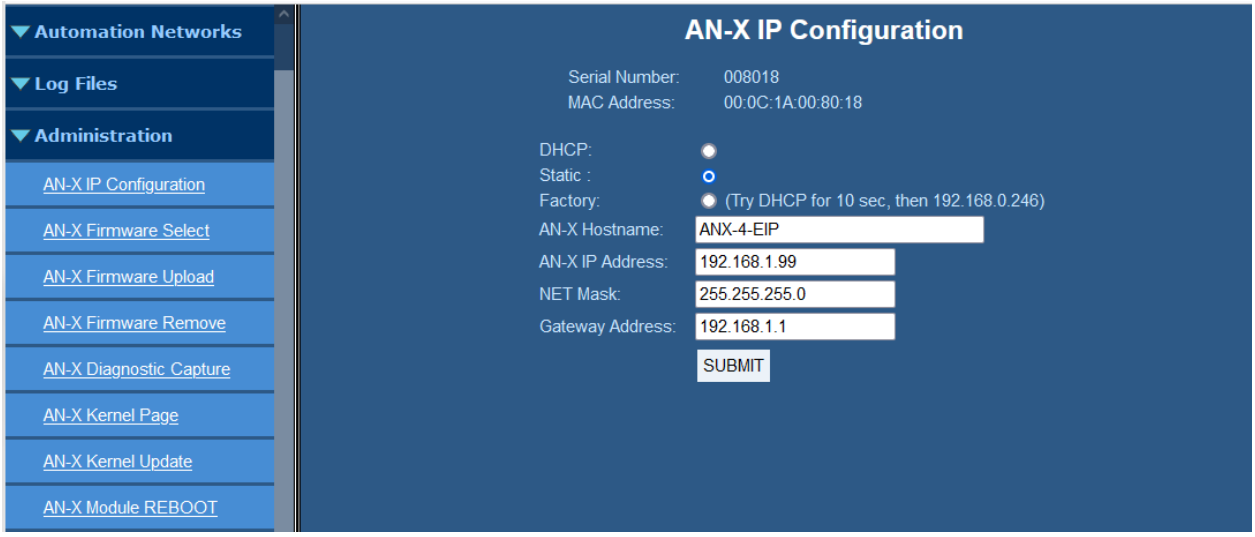
You configure the Ethernet properties by either:

- using the web interface
- editing files on the microSD card

To use the web interface, you must know the IP address of the AN-X, either the address assigned by the DHCP server or the default address of 192.168.0.246. If the address was assigned by a DHCP server, you can look at the DHCP server configuration or logs to determine the IP address assigned.

Enter the IP address in the address bar of your browser.

Select *Administration/AN-X IP Configuration*. The *AN-X IP Configuration* page appears.



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-X4 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 or use a network tool that displays devices on the network.

If the AN-X has been configured for DHCP and it does not find a DHCP server, it waits indefinitely for a DHCP server and repeatedly flashes the MS LED yellow 2 times followed by a pause. The NS LED will be solid red.

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.

Factory Default Setting

The AN-X is shipped with a factory default setting that looks for a DHCP server for 10 seconds, then reverts to an IP address of 192.168.0.246. Note that if the AN-X is later able to obtain an IP address from a DHCP server, it will take the DHCP assigned address.

The network must be set to DHCP or a static IP address before you can use the AN-X for an application.

Hostname

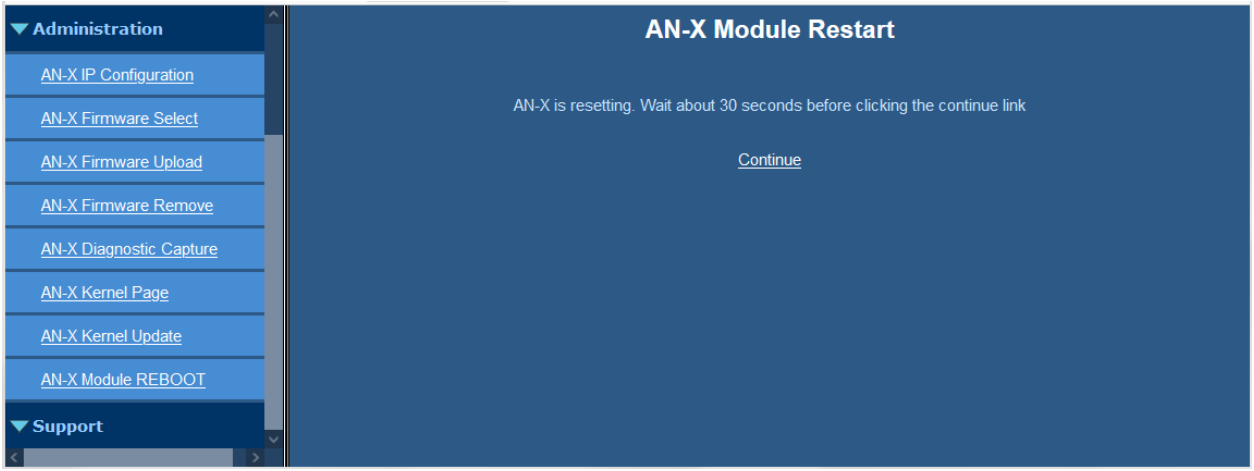
Enter a *Hostname* for the AN-X4. This name is used internally by AN-X and may be used to identify the AN-X if you have a DNS server on your network. The name can be from 1 to 30 characters long.

The default hostname is ANXxxxxxx, where xxxxxx is the serial number of the AN-X module.

Submitting the Configuration

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

The following page appears when you click REBOOT.



Wait until the AN-X has completely restarted, then click *Continue*.

If you have changed the IP address, 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 that the IP address is unknown.

Remove the microSD card and edit the file IPCfg\IPConfig.txt, using a text editor such as Windows Notepad, to set the AN-X4 to the desired Ethernet configuration.

The Configuration File IPCfg\IPConfig.txt

The Ethernet configuration is stored in the file IPCfg\IPConfig.txt on the microSD card.

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

Each line consists of a keyword followed by a value.

Example:

```
IP: 192.168.1.14
```

```
NetMask: 255.255.255.0
DefGtwy: 192.168.1.1
```

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

Keyword	Possible Values
IP:	Factory DHCP static IP address, e.g., 192.168.1.187
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

If you edit the file and AN-X finds an error in the file contents during startup, it flashes an error code on the MS LED, see page 57.

Example IPCfg\IPConfig.txt files

Example: Factory default

```
IP: Factory
Hostname: ANX4
```

Example: DHCP

```
IP: DHCP
Hostname: ANX4
```

Example: Static IP address

```
IP: 192.168.1.14
NetMask: 255.255.255.0
DefGtwy: 192.168.1.1
HostName: ANX4
```

Firmware to Run

In addition to the Ethernet configuration, you may also need to edit the file *Firmware\FirmwareCfg.txt* to select the firmware file to run. The contents of the file must exactly match the name of one of the firmware files on the AN-X or the AN-X will not start up.

Example:

```
AN-X4-ABRIO-EIPSCN.v4.05.48.qtf
```

Configuring the AN-X4-ABRIO-EIPSCN

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

Typically you create a starting configuration by performing an autoconfiguration, then editing the configuration the AN-X generates and sending the modified file to the AN-X.

You can also create a configuration manually and send it to the AN-X (page 27).

AN-X configurations are built using the device template files shipped with the AN-X. Device template files contain all the information needed to connect to the devices, as well as information about adjustable parameters for each device. In addition, there is an index file that lists all the supported adapter and I/O modules.

Refer to page 36 for details.

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

Perform an Auto Configuration

To perform an autoconfiguration, in the web interface first select *Automation Networks/Configure RIO-EIPSCN*.

Click the *Auto Configure* button.

AN-X displays a warning message:

Caution: The Auto Configure operation disrupts RIO and Ethernet/IP communication and should NOT be performed while a process is in production mode. Are you sure you want to Auto-Configure?

Click OK to continue.

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 I/O modules connected to that adapter and builds a default configuration based on the replies it receives.

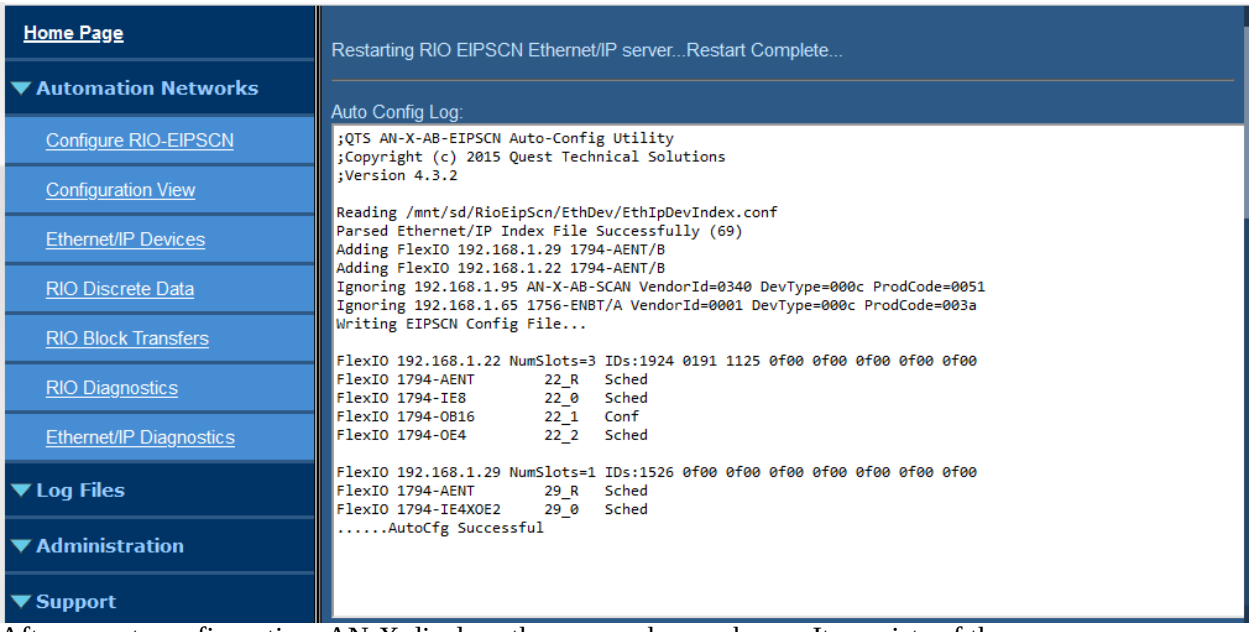
It can determine only the module types; it cannot obtain any configuration information from the modules.

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 bytes in their IP addresses. When you edit the configuration file generated by the AN-X, edit the duplicate name so that all names are unique.



After an autoconfiguration, AN-X displays the screen shown above. It consists of three panes:

- The upper pane is the Auto Config log and shows the result of the autoconfiguration.
- The middle pane is the Configuration file and shows the configuration file the AN-X built as a result of the autoconfiguration
- The lower pane is the Configuration Log and shows the result of downloading the configuration file created by the autoconfiguration.

Examine the logs carefully for the modules found, error messages, and warnings.

Edit the Configuration File

1. 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 Networks/Configuration view*. Right click the link below the configuration file (right-click - save link as) and save the file to your computer.
2. Edit the file in a plain text editor such as Windows Notepad.
3. Set the global parameters (see page 22)
4. In the Ethernet devices section of the configuration file, set the parameters for all modules.
5. In the remote I/O section of the configuration file:
   - Set the remote I/O baud rate
   - Set the rack numbers and starting and ending I/O groups to match what's configured in the remote I/O scanner (or modify the remote I/O scanner configuration to match the AN-X).
   - 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.
6. Make any required changes to the I/O configuration
   - No complementary I/O
   - No standard 32 or complementary 32 addressing
   - Make provision for 32 bit discrete modules. They will communicate using block transfers
   - options such as hold last state that are set with switches in the 1794-ASB are now set on a module-by-module basis in the configuration file
7. Save the file.
8. Transfer the file to the AN-X. From the web interface, select *Automation Networks/Configure RIO-EIPSCN*. Click the *Browse* button and select the modified configuration file. Click the *Send Config .txt file to AN-X* button to transfer the file to the AN-X. Check the log for error messages.
9. In the PLC or other remote I/O scnner:
   - 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, program logic
   - 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-X4-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 31 for a sample configuration file.

Global Parameters

Global parameters affect the overall behaviour of the AN-X4-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.

LED Override Options

Normally when a remote I/O error occurs, AN-X increments a diagnostic counter and flashes the NS LED.

Add one or more of the following options to the configuration file to override flashing the LED if the corresponding network error occurs. AN-X still increments the diagnostic counter.

Option	Counter
LedIgnNoise	RX NOISE ERRORS
LedIgnAbort	RX ABORT ERRORS
LedIgnCrc	RX CRC ERRORS
LedIgnTout	RX PACKET TIMEOUTS
LedIgnPrcl	RX PROTOCOL ERRORS

Rack Status Poll

The AN-X monitors the run status on each remote I/O rack. If the rack isn't being scanned in run mode or times out, the AN-X scans the corresponding Ethernet device in program mode.

The rack status poll option, RackStsPoll, controls the polling period. It can be used to tune the responsiveness of the polling.

Option	Description
RackStsPoll	This is the poll period for clearing the run status for the racks. The default is 250 ms, the allowed range is 10-44000 ms It may take 2 poll periods to clear the status bits, since the polling and the I/O scan are asynchronous.

TIP Make the RackStsPoll time at least twice the remote I/O scan time.

If the AN-X receives 20 bad packets or timeouts without a good packet, for example if the remote I/O network stops updating, the AN-X clears all the status bits immediately. This is much more responsive than the polling method.

Note: previous versions of the AN-X-EIPSCN firmware used a less responsive method of monitoring remote I/O racks, using the keyword RioTimeout. RioTimeout now does nothing and generates a warning in the configuration log

RioTimeout Ignored. Use RackStsPoll

Block Transfer Status Poll

Block transfer status polling is similar to rack status polling and monitors block transfers. The default is 2000ms, the allowed range is 10-44000 ms

Option	Description
BtStsPoll	This is the poll period for clearing the status for the block transfers. The default is 2000 ms, the allowed range is 10-44000 ms It may take 2 poll periods to clear the status bits, since the polling and the I/O scan are asynchronous.

Ethernet Devices

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

IMPORTANT! Discrete modules usually (but not always) share an Ethernet connection with the rack adapter.

Each analog module requires a separate Ethernet connection.

Each Ethernet device refers to a template file where properties and parameters for the module type are defined. Refer to page 36 for details.

Each Ethernet device begins with the keyword that identifies the device type, 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 initial keyword can be one of:

- FlexIO: 1794 I/O device
- PntIo: Point I/O device
- EthDev: included for compatibility with older configuration files, superseded by FlexIO

The device name can be from 1 to 15 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 must beUnicast.

RPIs can range from 1 to 750 ms, and must be greater than the minimum RPI in the device template file.

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.

Example configuration files are shown beginning on page 31

Ethernet I/O Adapters

The definition for an Ethernet adapter consists of the keyword FlexIO or PntIO, the name of the device template file, the module name, the IP address, the slot, the connection type (always Unicast) and the RPI. For Flex I/O, the slot for an adapter is always entered as NA (as a placeholder). For Point I/O, the slot value indicates the number of slots in the rack.

Examples:

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

PntIO  1734-AENTR 86_R   10.10.0.86     8 Unicast  20
```

The module name, e.g., 22_R, 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.

Example: the name 22_R links the Ethernet adapter to rack 1

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

Rack  01 0 3 22_R
```

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 FlexIO or PntIO, the name of the device template file, the module name, NA for IP address, and the slot number.

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

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:

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

Analog I/O Modules

Each analog I/O module communicates with the AN-X using a separate Ethernet connection.

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

The module name, e.g., 22_0, links the I/O module on Ethernet with a block transfer read and write on remote I/O.

```
FlexIO 1794-IE8 22_0   192.168.1.22     0 Unicast      50

BtMod   0 0 22_0
```

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 Analog Module:

```
FlexIO 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/remote I/O scanner.

Example:

```
Baud 57k
```

Rack Definitions

Rack definitions consist of the keyword Rack, the rack number, 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 15 characters long and is not case sensitive.

The name associates the rack with an Ethernet adapter. 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 15 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.

Complementary I/O

If the controlling PLC uses complementary I/O, it is necessary to understand how complementary I/O works on the remote I/O network in order to configure the primary and complementary racks on the AN-X.

If the primary rack is, for example, rack 3 octal, the PLC communicates with the complementary rack as the primary rack number plus 10 octal, or, in this case, rack 13 octal.

In the AN-X configuration file, define both primary and complementary racks.

Example:

```
Rack 03 0 7 87_P

Rack 13 0 7 87_C
```

The primary and complementary racks must have unique names.

Add input masks to each rack definition that show the location of the discrete input modules. The bits in the input mask are 1 if the location contains a discrete input module and 0 if the location contains a discrete output module, block transfer read or write module, or is empty. The input mask consists of the keyword InpMsk, and equals sign, and the mask value in hexadecimal.

Example:

A rack has discrete input modules in slots 0, 2, 5 and 7. The input mask is 10100101 binary or A5 hexadecimal

```
Rack  03 0 7 InpMsk=a5 87_P
```

The complementary rack has a discrete input module in slot 1. The input mask is 00000010 or 02 hexadecimal.

```
Rack  13 0 7 InpMsk=02 87_C
```

The input mask tells the AN-X where to get the inputs to send to the PLC.

IMPORTANT!

If you are using complementary I/O, it is essential that the configuration does not contain a rack at the same address as the complementary rack.

For example, if the primary rack is rack 3 octal, the complementary rack is 13 octal. There cannot be a rack 13 octal on the same remote I/O network.

Manual Configuration

The configuration file is described in detail in the section beginning on page 22.

To create a configuration file:

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

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

or

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

Examples:

```
FlexIO 1794-AENT  22_R 192.168.1.22 NA Unicast 10
PntIO  1734-AENTR 86_R  10.10.0.86   8 Unicast 20
```

Note that the slot is set to NA for Flex I/O as a placeholder. For point I/O the slot indicates the number of occupied slots.

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

```
FlexIO device template file name, module name, NA (IP address), slot
```

Examples:

```
FlexIO 1794-IB16 22_4 NA  4
PntIO  1734-IB2  86_2 NA  2
```

The IP address is set to NA as a placeholder.

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

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

ExampleS:

```
FlexIO 1794-IE4XOE2 22_0 192.168.1.22 0 Unicast 20
PntIO  1734-IE2C    86_3  10.10.0.86  3 Unicast 50
```

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)
5. Set appropriate parameter values.
6. Add the remote I/O section:

Add the baud rate

Example:

```
Baud 230k
```

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.

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-X4-ABRIO-EIPSCN, first select *Automation Networks/Configure RIO-EIPSCN* in the web interface.

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

To transfer a configuration from the AN-X4-ABRIO-EIPSCN to your computer, first select *Automation Networks/Configuration View* in the web interface.

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

Configuration Log

The configuration log contains information about the configuration you have downloaded.

```
AN-X-AB-RIO-EIP-SCN Configuration 4.4.6

IOType  File         Name   IP Address     Slt ConType OutB InpB RPI Tout Con# Flg Oofs Iofs

FlexIO: 1794-AENT    22_R   192.168.1.22    NA Unicast   22   22  10  160    0  0f    0    0

FlexIO: 1794-IE8     22_0   192.168.1.22     0 Unicast    6   24  50  200    1  0b    0    0

FlexIO: 1794-OB16    22_1   NA               1

FlexIO: 1794-OE4     22_2   192.168.1.22     2 Unicast   14    8  50  200    2  0b    0    0

IOType  File         Name   IP Address     Slt ConType OutB InpB RPI Tout Con# Flg Oofs Iofs

FlexIO: 1794-AENT    29_R   192.168.1.29    NA Unicast   22   22  10  160    3  0f    0    0

FlexIO: 1794-IE4XOE2 29_0   192.168.1.29     0 Unicast   10   16  50  200    4  0b    0    0

Baud 230k

Rack:   01 G0-3 EthDev: 22_R Con#= 0 InpMsk=0f

 BtMod: 01 G0S0 EthDev: 22_0 Con#= 1 Btw= 0 Btr= 9 RackCon#= 0

 BtMod: 01 G2S0 EthDev: 22_2 Con#= 2 Btw= 4 Btr= 1 RackCon#= 0

Rack:   02 G0-1 EthDev: 29_R Con#= 3 InpMsk=03

 BtMod: 02 G0S0 EthDev: 29_0 Con#= 4 Btw= 2 Btr= 5 RackCon#= 3

RackStsPoll 249

BtStsPoll   2000

Configuration Successful: 5 of 16 Scheduled Connections Used
```

For block transfer modules, the log shows the lengths of the required block transfers.

```
BtMod: 02 G0S0 EthDev: 29_0 Con#= 4 Btw= 2 Btr= 5 RackCon#= 3
```

Sample Configuration Files

Flex I/O

```
;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 connection is not active

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

FlexIO 1794-AENT 22_R 192.168.1.22 NA Unicast  2


FlexIO 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


FlexIO 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


FlexIO 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
```

Point I/O

```
;      File             Name   IPAddr         Slt ConType     RPI

PntIO  1734-AENTR       86_R   10.10.0.86       8 Unicast      20 ; 1734-AENTR

PntIO  1734-IB2         86_2   NA               2                 ; 1734-IB2

  ParmSet       FiltOffOn0   1000 ; Point 0 Input Filter Time Off->On in us

  ParmSet       FiltOnOff0   1000 ; Point 0 Input Filter Time On->Off in us

  ParmSet       FiltOffOn1   1000 ; Point 1 Input Filter Time Off->On in us

  ParmSet       FiltOnOff1   1000 ; Point 1 Input Filter Time On->Off in us


PntIO  1734-IE2C        86_3   10.10.0.86       3 Unicast      50 ; 1734-IE2C

  ParmSet         Ch0LoEng   3277 ; Ch 0 Low Engineering

  ParmSet         Ch0HiEng  16383 ; Ch 0 High Engineering

  ParmSet       Ch0DigFilt      0 ; Ch 0 Digital Filter 0-10000 ms

  ParmSet       Ch0LAlmLim   3113 ; Ch 0 Low Alarm Limit

  ParmSet       Ch0HAlmLim  16547 ; Ch 0 High Alarm Limit

  ParmSet      Ch0LLAlmLim   2867 ; Ch 0 Low Low Alarm Limit

  ParmSet      Ch0HHAlmLim  16793 ; Ch 0 High High Alarm Limit

  ParmSet        Ch0RngTyp      3 ; Ch 0 Range Type 3=4 to 20mA, 8=0 to 20mA

  ParmSet     Ch0LmtAlmLch      0 ; Ch 0 Limit Alarm Latch 1=Latch Limit Alarms

  ParmSet       Ch0AlrmDis      0 ; Ch 0 Disable All Alarms 1=Disable All Alarms

  ParmSet         Ch1LoEng   3277 ; Ch 1 Low Engineering

  ParmSet         Ch1HiEng  16383 ; Ch 1 High Engineering

  ParmSet       Ch1DigFilt      0 ; Ch 1 Digital Filter 0-10000 ms
```

```
   ParmSet       Ch1LAlmLim   3113 ; Ch 1 Low Alarm Limit
   ParmSet       Ch1HAlmLim  16547 ; Ch 1 High Alarm Limit
   ParmSet      Ch1LLAlmLim   2867 ; Ch 1 Low Low Alarm Limit
   ParmSet      Ch1HHAlmLim  16793 ; Ch 1 High High Alarm Limit
   ParmSet        Ch1RngTyp      3 ; Ch 1 Range Type 3=4 to 20mA, 8=0 to 20mA
   ParmSet     Ch1LmtAlmLch      0 ; Ch 1 Limit Alarm Latch 1=Latch Limit Alarms
   ParmSet       Ch1AlrmDis      0 ; Ch 1 Disable All Alarms 1=Disable All Alarms
   ParmSet        NotchFilt      2 ; Notch Filter 1=50Hz, 2=60Hz, 4=250Hz, 6=500Hz
   ParmSet      RealTmeSamp    100 ; Real Time Sample, 0-10000 ms


Baud 230k  ; 57k, 115k or 230k
Rack  01 0 3 86_R
BtMod   1 1 86_3
```

Scanning I/O

Program/Run

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

In run mode, the AN-X-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-X-ABRIO-EIPSCN scans I/O modules and reads discrete inputs. AN-X still sends discrete outputs in program mode, it does not set the "Run" bit in the header. Block transfers do not update.

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.

The communication timeout depends on the setting of the option RackStsPoll, see page 23

It may take several poll periods 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 several global parameters that you can include in the configuration file to override the default behaviour on loss of communication. See page 22.

Block Transfers

Block transfer timeouts are determined by BtStsPoll. See page 23

Locating the Data:Point I/O Discrete Data

Each slot has 8 bits (1 byte) of data. There are 16 possible slots, which map into 8 16-bit words, or one full discrete rack.

The point I/O adapter module is always in slot 0, so the discrete data for slot 1 is found in the high byte of word 0.

Slot	Location
1	Word 0, high byte
2	Word 1, low byte
3	Word 1, high byte
4	Word 2, low byte
5	Word 2, high byte
6	Word 3, low byte
7	Word 3, high byte
8	Word 4, low byte
9	Word 4, high byte
10	Word 5, low byte
11	Word 5, high byte
12	Word 6, low byte
13	Word 6, high byte
14	Word 7, low byte
15	Word 7, high byte

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

To view the device templates, from the web interface select *Automation Networks/Ethernet/IP Devices*. Right click on the (right-click - save link as) link and save the zip file to your computer. Unzip the file into a separate folder to view or edit the device files.

Template files also contain the information you would need to manually create a configuration file for the AN-X4-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.

Template File Contents

The first part of the template file contains the information used to create the Ethernet/IP connection. The following is taken from the template file for the 1794-IE4XOE2.

```
ConnType    $Arg3

MinRpi      2

Descr "1794-IE4XOE2 Analog Module"

Name        $Arg0

IpAddr      $Arg1

RPI         $Arg4

CipSlot     $Arg2

AssemIns    3

OutConnPt   1

InpConnPt   2

Key 0x0001 0x000a 0x0018 c1.1
```

Values shown as $Argn are passed in from the configuration file.

ConnType is the connection type and must always be Unicast.

The MinRpi is the minimum RPI that the module supports, in milliseconds.

Name, IpAddr, RPI (in ms) and CipSlot are passed in from the configuration file.

AssemIns, OutConnPt, InpConnPt and keying information must match the module. The ‘c’ in the Key tells the I/O module to accept a compatible revision, and not to require an exact match..

The next section of the file contains the adjustable parameters for the module. Again, from the file for the 1794-IE4XOE2:

```
CfgInt 0x0001 0x0002 0x0020 0x0c7d 0x0004 0x0040 0x0a7d 0x0010 0x0b7d 0x0008 0x1526

CfgInt  0x0000

;       Bits    Name       Def Desc

CfgParm 0-3     ProgState    0 "Program Mode Behavior - 0=ResetOutputs, 1=Hold
Last, 2=Apply Safe State Values"

CfgParm 4-7     FaultState   0 "Fault   Mode Behavior - 0=ResetOutputs, 1=Hold
Last, 2=Apply Safe State Values"

…
```

The first line shows the default values for the parameters. The following line break down the parameters and show what the bits and words mean.

Finally, the parmset section contains lines that you would copy to the configuration file and uncomment if you are creating a configuration file manually.

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

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

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

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

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

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

;  ParmSet         SafeOut0     0 ; Ch 0 Output Safe State Value

;  ParmSet         SafeOut1     0 ; Ch 1 Output Safe State Value
```

Index File

The zip file also contains the AN-X index file, EthIpDevIndex.conf, which contains a list of supported I/O modules.

When you perform an autoconfiguration, AN-X uses the index file 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, then zip up the device files and modified index file.

In the web interface, select *Automation Networks/Ethernet/IP Devices*, browse to select the updated device zip file, then click the *Send zip file to AN-X* button to transfer the device file to the AN-X.

AN-X unzips the file and transfers it to the destination on the AN-X.

The template and index zip file is generally provided by QTS but if you add add or modify a template file, you will also need to modify the index file.

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 when 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.

NOTE: you must also modify the index file to use the NOPT file, not the standard one

Using the Web Interface

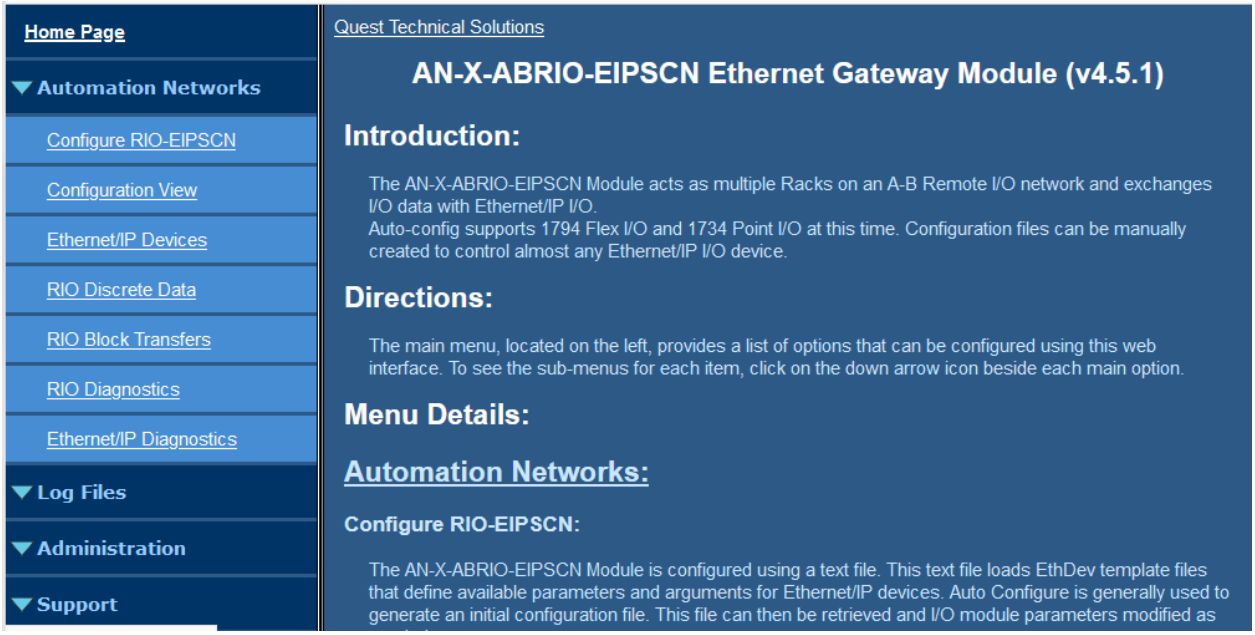
The AN-X contains a webserver capable of communicating with standard web browsers.

Use the web interface to:

- configure the Ethernet/IP devices, remote I/O and data mappings
- view the current configuration
- upload and download device files
- view remote I/O discrete and block transfer data
- monitor remote I/O and Ethernet diagnostic and error counters
- view AN-X logs
- perform administrative functions such as assigning the IP parameters, uploading or selecting firmware, updating the kernel, and so on

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.

Automation Network

Configure RIO-EIPSCN

Select *Automation Network/Configure RIO-EIPSCN* to autoconfigure the AN-X from attached Ethernet devices or to download a configuration file to the AN-X.

Auto Configure

Autoconfiguration scans the attached Ethernet network for Ethernet/IP adapter modules, then sends messages to the adapters that it found to determine the rack contents. It then builds a configuration file based on the results.

Autoconfiguration is described in more detail on page 19

Download a Configuration File

First create a configuration file. Refer to page 22 for details on the file format.

Use the *Browse* button to select the file.

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

AN-X parses the file and displays either the configuration log that contains an indication of success or messages that indicate the source of the errors if it fails.

Configuration View

Use *Automation Networks/Configuration View* to:

- Display the last configuration downloaded

- Display the configuration log, which shows the result to the last download
- Upload the current configuration from the AN-X

The screen consists of two panes. The upper pane shows the last configuration downloaded. The lower pane shows the configuration log. It shows the result of the last configuration download.

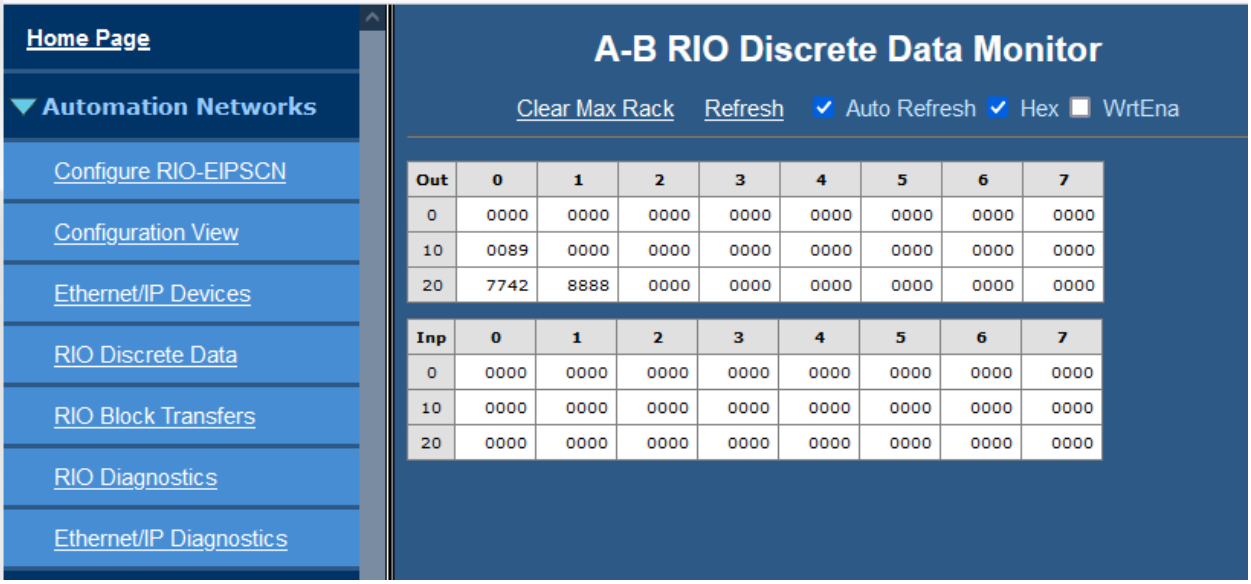
Example:

```
AN-X-AB-RIO-EIP-SCN Configuration 4.4.6

IOType  File       Name  IP Address  Slt ConType OutB InpB RPI Tout Con# Flg Oofs Iofs

FlexIO: 1794-AENT  22_R  192.168.1.22 NA Unicast   22   22  10  160    0  0f    0    0

FlexIO: 1794-IE8   22_0  192.168.1.22  0 Unicast    6   24  50  200    1  0b    0    0

FlexIO: 1794-OB16  22_1  NA            1

FlexIO: 1794-OE4   22_2  192.168.1.22  2 Unicast   14    8  50  200    2  0b    0    0


IOType  File       Name   IP Address   Slt ConType OutB InpB RPI Tout Con# Flg Oofs Iofs

FlexIO: 1794-AENT  29_R   192.168.1.29  NA Unicast   22   22  10  160    3  0f    0    0

FlexIO: 1794-IE4XOE2 29_0 192.168.1.29   0 Unicast   10   16  50  200    4  0b    0    0


Baud 230k

Rack:   01 G0-3 EthDev: 22_R Con#= 0 InpMsk=0f

 BtMod: 01 G0S0 EthDev: 22_0 Con#= 1 Btw= 0 Btr= 9 RackCon#= 0

 BtMod: 01 G2S0 EthDev: 22_2 Con#= 2 Btw= 4 Btr= 1 RackCon#= 0

Rack:   02 G0-1 EthDev: 29_R Con#= 3 InpMsk=03

 BtMod: 02 G0S0 EthDev: 29_0 Con#= 4 Btw= 2 Btr= 5 RackCon#= 3

RackStsPoll 249

BtStsPoll   2000

Configuration Successful: 5 of 16 Scheduled Connections Used
```

Click on the link (right-click - save link as) to upload and save the current configuration file.

RIO Discrete Data

Use *Automation Network/RIO Discrete Data* to display the discrete data on all active and monitored



By default, the display shows the data in hexadecimal. Uncheck Hex to change the display to decimal.

If Auto Refresh is on, the display refreshes once a second.

You can refresh the screen at any time by clicking Refresh.

If values change, they are shown with a light green background for one display update after they have changed.

Check WrtEna to write RIO I/O data directly.

WARNING! WrtEna is meant to be used for commisioning and testing by qualified personnel only.

Note: I/O data entered here may be overwritten by:

- RIO Outputs from the remote I/O scanner
- RIO Inputs monitored from other I/O racks

When WrtEna is on, select a location to edit data and an edit box opens at the top of the screen. Type the new value in the edit box, and press:

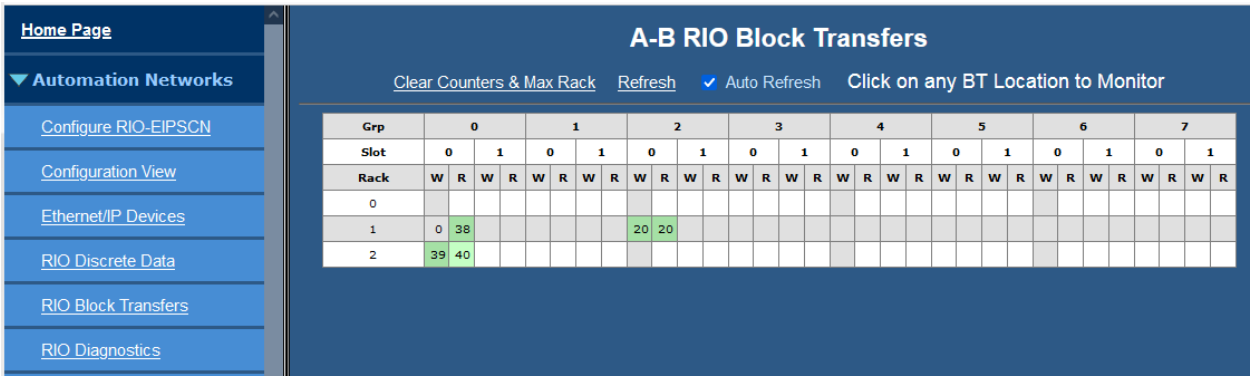
- enter to accept the value, clear the edit window and remain at the same place
- shift-enter to accept the value, leave the value in the edit box and move to the next editable space

- ctrl-enter to accept the value, increment the value in the edit box, and move to the next editable space

At the start, the display is based on configured racks. If the AN-X hears other racks, for example higher numbered racks, it resizes the display to show those racks as well. If you click on *Clear Max Rack*, the display reverts to the initial display, based on the configured racks.

RIO Block Transfers

Use *Automation Network/RIO Block Transfers* to display a table of all possible block transfer locations, organized by rack, I/O group and slot, and whether the block transfer is a read or write.



Grp	0				1				2				3				4				5				6				7			
Slot	0		1		0		1		0		1		0		1		0		1		0		1		0		1		0		1	
Rack	W	R	W	R	W	R	W	R	W	R	W	R	W	R	W	R	W	R	W	R	W	R	W	R	W	R	W	R	W	R	W	R
0																																
1	0	38							20	20																						
2	39	40																														

Any cell in the table with a number indicates a location where a block transfer has been defined on an active or monitored rack. The numbers are counters, from 0-63, that indicate how many times the block transfer has been updated. The counters wrap around to 0 after they reach 63.

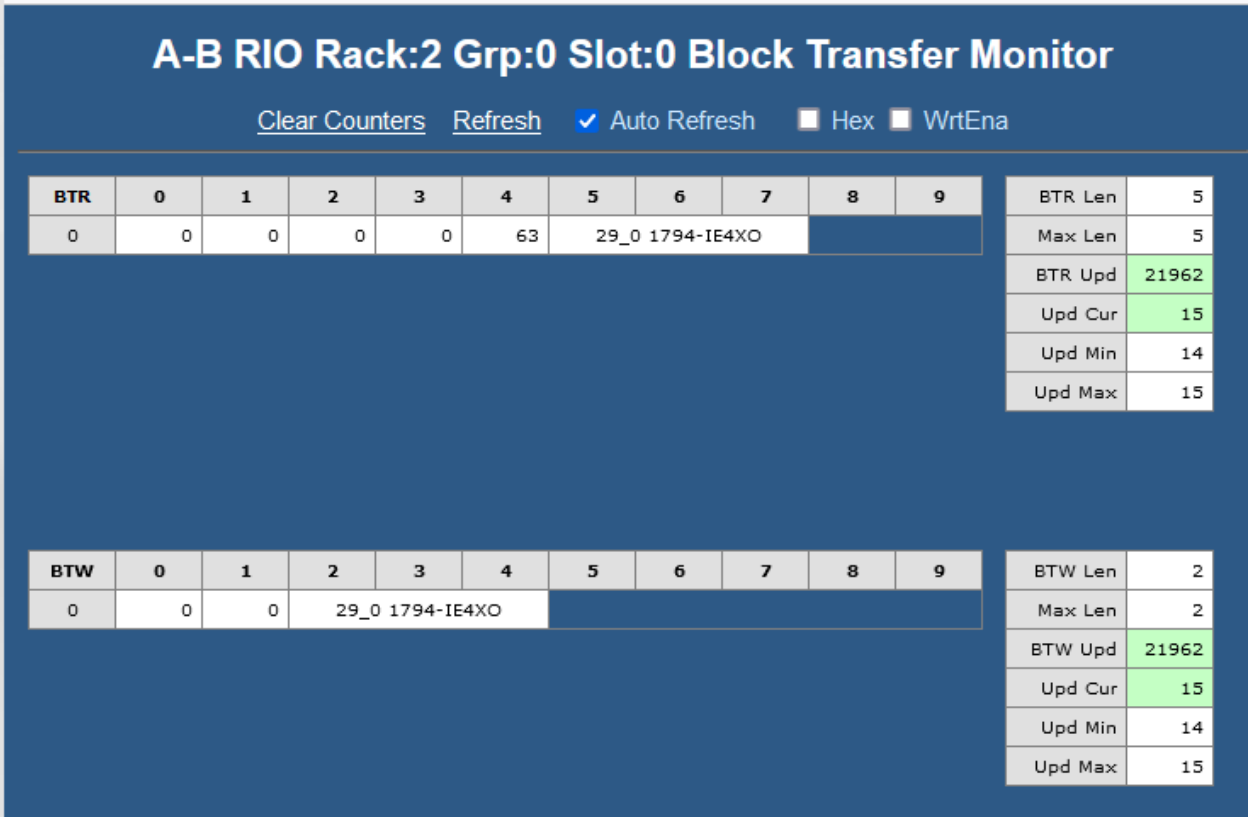
If *Auto Refresh* is on, the display refreshes once a second.

You can refresh the screen at any time by clicking *Refresh*.

If values change, they are shown with a light green background for one display update after they have changed.

At the start, the display is based on configured racks. If the AN-X hears other racks, for example higher numbered racks, it resizes the display to show those racks as well. If you click the *Clear Counters & Max Rack* link, the display reverts to the initial display, based on the configured racks.

Click on any location in the table to display the Block Transfer Monitor web page for that location. If Auto Refresh is on, you may have to click several times if the screen is being updated at the time you click.



The screen shows the block transfer read and write data for the selected location (rack, I/O group and slot). The last data field shows the first 15 characters of the module name and module type, in this case, 29_0 1794-IE4XO. The last 2 characters of 1794-IE4XOE2 have been truncated.

By default, the display shows the data in decimal. Check Hex to change the display to hexadecimal.

If *Auto Refresh* is on, the display refreshes once a second.

You can refresh the screen at any time by clicking *Refresh*.

If values change, they are shown with a light green background for one display update after they have changed.

Check WrtEna to write RIO I/O data directly.

WARNING! WrtEna is meant to be used for commisioning and testing by qualified personnel only.

When WrtEna is on, select a location to edit data and an edit box opens at the top of the screen. Type the new value in the edit box, and press:

- enter to accept the value, clear the edit window and remain at the same place
- shift-enter to accept the value, leave the value in the edit box and move to the next editable space

- ctrl-enter to accept the value, increment the value in the edit box, and move to the next editable space

Note: I/O data entered here may be overwritten by block transfer reads or writes on the remote I/O network.

The screen shows statistics for the block transfer reads and writes at that location (rack, I/O group and slot).

The statistics consist of:

Item	Description
BTR/BTW Len	The length of the most recent block transfer
Max Len	The maximum length observed since the last reset
BTR/BTW Upd	Count of the number of updates
Upd Cur	The current update time, in ms
Upd Min	The minimum update time, in ms, since the last reset
Upd Max	The maximum update time, in ms, since the last reset

The minimum update time is set to 65535 when you clear the counters.

RIO Diagnostics

Use *Automation Network/RIO Diagnostics* to display:

- the IO Group Status table
- the diagnostic counters for the currently selected rack
- the Network Diagnostic counters

IO Group Status Table

The IO Group status table shows the current rack numbers and the rack structure.

Active racks are shown as they are configured. Monitored racks are shown as they are observed on the remote I/O network.

	IO Group Status			
Rack	0	2	4	6
0	MRUN			
1	RUN	RUN	RUN	RUN
2	RUN	RUN	RUN	RUN
3	RUN	MRUN	RUN	MRUN
7	MRUN			
76	MRUN			

The states shown in the table are:

State displayed	Explanation
RUN	Active Rack - Good Status - Run Mode
PROG	Active Rack - Good Status - Prog Mode
*TOUT	Active Rack - Timeout - not being scanned (may be configuration mismatch)
RST	Active Rack - Scanner sending reset (may be configuration mismatch)
*MERR	Monitored Rack - Scanner sending reset
MRUN	Monitored Rack - Good Status - Run Mode
MPROG	Monitored Rack - Good Status - Prog Mode
---	Empty Rack Location

If *Auto Refresh* is on, the display refreshes once a second.

You can refresh the screen at any time by clicking *Refresh*.

If values change, they are shown with a light green background for one display update after they have changed.

Click on any rack or partial rack to select it in the diagnostic counters table. If Auto Refresh is on, you may have to click several times if the screen is being updated when you click.

Diagnostic Counters for the Selected Rack

This table shows the counters for the currently selected rack. The rack number and starting I/O group are shown in the table heading.

The counters increment for discrete input and output packets, and do not include block transfer packets.

Rack 01 Grp 0 Counters	
Out Rx	2250
Inp Rx	0
Rack Upd Cur	7
Rack Upd Min	6
Rack Upd Max	7

The counters displayed are:

Counter	Description
Out Rx	Count of received good packets from the scanner to this rack
Inp Rx	Count of received good input packets from a monitored rack
Rack Upd Cur	Most recent update time, in ms, for the selected rack
Rack Upd Min	Minimum update time, in ms, observed for the selected rack
Rack Upd Max	Maximum update time, in ms, observed for the selected rack

If *Auto Refresh* is on, the display refreshes once a second.

You can refresh the screen at any time by clicking *Refresh*.

If values change, they are shown with a light green background for one display update after they have changed.

Click *Clear Counters* to reset the counters. All are set to 0 except the minimum update time which is set to 65535.

Network Diagnostic Counters

The network diagnostic counters are diagnostic and error counters for the entire remote I/O network.

Network Diagnostic Counters			
Tx Frames	5656	Rx Frames	5657
Crc Errors	0	Abort Errors	0
Noise Errors	0	Timeouts	0
Net Upd Cur	7	Net Upd Avg	6
Net Upd Min	6	Net Upd Max	7
Prot Errors	0	Prot Err Mask	0000
Prot Desc	None		

The counters are:

Counter	Description
Tx Frames	Count of frames transmitted by the AN-X
Rx Frames	Count of frames received by the AN-X
Crc Errors	Count of frames with CRC errors
Abort Errors	Count of frames with abort errors
Noise Errors	Count of frames with noise errors
Timeouts	Count of timeouts
Net Upd Cur	Update time for the last scan, in ms
Net Upd Avg	Average scan time of the last 32 scans, in ms
Net Upd Min	Minimum scan time, in ms, since the last reset
Net Upd Max	Maximum scan time, in ms, since the last reset
Prot Errors	Count of frames with protocol errrors
Prot Error Mask	16 bit mask that indicates the cause of the protocol errors

You can override turning the NS LED on for specific network errors with options in the configuration file. Refer to page 22. The counters still increment if the NS LED display is off.

If values change, they are shown with a light green background for one display update after they have changed.

Ethernet/IP Diagnostics

The Ethernet/IP Statistics consist of two portions:

- Scheduled Ethernet Counters
- Statistics for each connection

The Scheduled Ethernet Counters consist of:

Scheduled Ethernet Counters			
Tx Frames	1491	Rx Frames	1491
Tx Errors	0	Rx Errors	0
Tx ErrMask	0000	Rx ErrMask	0000
Tx Ovrruns	0		

Counter	Description
TX Frames	Count of transmitted frames
RX frames	Count of received frames
Tx Errors	Count of Ethernet transmit errors
Rx Errors	Count of Ethernet receive errors
Tx ErrMask	Transmit error mask, bits set to indicate type of transmit error
RxErrMask	Receive error mask, bits set to indicate type of receive eror
Tx Ovrruns	Count of transmit overruns

Transmit Error Mask	Bit	Description
TX_ERR_BAD_START	0	Internal State error
TX_ERR_OPER_INV	1	TX Copy table operation invalid

Receive Error Mask	Bit	Description
RX_ERR_CID_MISM	0	Connection ID Mismatch - Could happen if we close a connection, then receive more data
RX_ERR_LEN_MISM	1	The length of the RX UDP packet doesn't match what we expect
RX_ERR_OPER_INV	2	RX Copy table operation invalid

The Scheduled Ethernet Connections table contains information for each connection:

Scheduled Ethernet Connections											
Connection				Tx Tme		Rx Tme		Tx Count		Rx Count	
Num	Name	State	RPI	Cur	Max	Cur	Max	Good	Bad	Good	Bad
0	22_R	Act/RUN	10.0	10.0	10.1	10.0	11.2	15421	0	47629	0
1	22_0	Act/RUN	50.0	50.0	50.1	50.1	51.3	55513	0	35740	0
2	22_2	Act/RUN	50.0	50.0	50.1	50.2	50.8	55513	0	35741	0
3	29_R	Act/RUN	10.0	10.0	10.1	10.0	10.5	15421	0	47863	0
4	29_0	Act/RUN	50.0	50.0	50.1	50.2	50.6	55513	0	35787	0
5		Idle	0.0	0.0	0.0	0.0	0.0	0	0	0	0
6		Idle	0.0	0.0	0.0	0.0	0.0	0	0	0	0
7		Idle	0.0	0.0	0.0	0.0	0.0	0	0	0	0
8		Idle	0.0	0.0	0.0	0.0	0.0	0	0	0	0

Counter	Description
Num	Connection number, 0 to 15
Name	The name for the connection, from the configuration file
State	Active or Idle, run or program
RPI	The configured RPI for the connection
Cur Tx Time	The most recent transmit time
Max Tx Time	The maximum transmit time since the last counters reset
Cur Rx Time	The most recent receive time
Max Rx Time	The maximum receive time since the last counters reset
Tx Count Good	Count of good transmit frames
Tx Count Bad	Count of transmit frames with errors
Rx Count Good	Count of good receive frames
Rx Count Bad	Count of receive frames with errors

Statistics are invalid after a configuration download. Clear the counters to reset them.

If values change, they are shown with a light green background for one display update after they have changed.

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.

RIO-EIPSCN Log

The Ethernet/IP log shows messages and errors associated with the Ethernet communication.

When the current log file becomes full, AN-X renames it so you can access it as the previous log file.

Click the *Refresh Log* button to refresh the display.

System Info Log

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

When the current log file becomes full, AN-X renames it so you can access it as the previous log file.

Click the *Refresh Log* button to refresh the display.

View All Logs

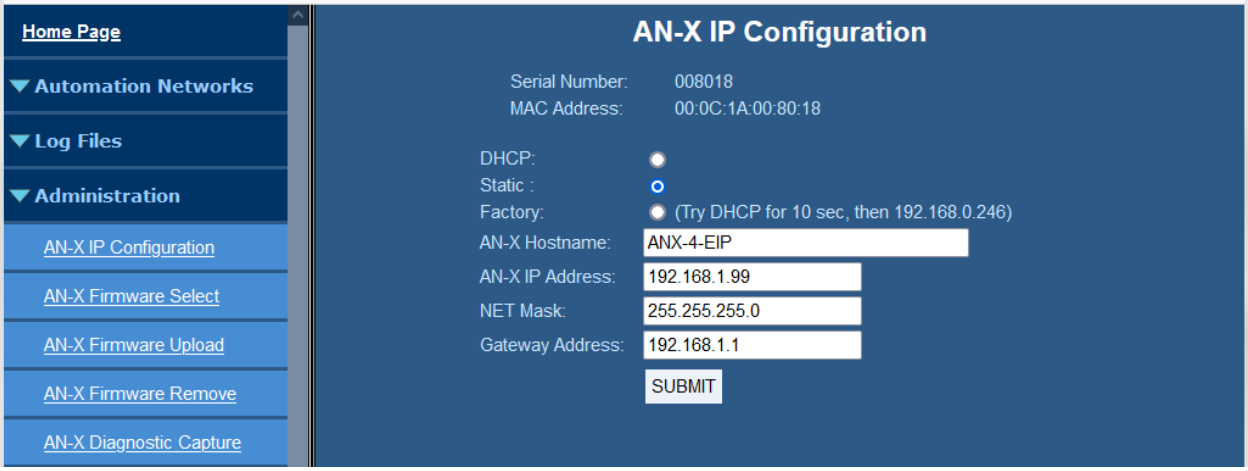
Use *View All Logs* to list and view all the AN-X logs. To view a log file, click on the file name.

Administration Menu

The *Administration* menu contains items used to configure, control and update the AN-X.

AN-X IP Configuration

Use *Administration/AN-X IP Configuration* to set the AN-X Ethernet properties.



The top of the screen shows the serial number and MAC Address of the AN-X4 being configured.

To configure Ethernet on the AN-X, check DHCP, Static or Factory.

DHCP

If the AN-X4 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 or use a network tool that displays devices on the network.

If the AN-X has been configured for DHCP and it does not find a DHCP server, it waits forever for a DHCP server and repeatedly flashes the MS LED yellow 2 times followed by a pause. The NS LED will be solid red.

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.

Factory

Select Factory to return AN-X to its initial state as shipped. In Factory mode, the AN-X waits 10 seconds for a DHCP server to assign it an IP address. If it fails to obtain an IP address, it reverts to a static IP address of 192.168.0.246.

If, after AN-X has reverted to the static address and a DHCP server comes online, AN-X obtains an IP address from the DHCP server.

You cannot use the AN-X in factory mode. It must be set to a static IP address or DHCP before you can use it for applications.

Hostname

Enter a *Hostname* for the AN-X4. 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. The default hostname is ANXxxxxxx, where xxxxxx is the serial number of the AN-X module.

AN-X Firmware Select

Use *Administration/AN-X Firmware Select* to select a firmware (*.qtf) file the AN-X is to run from the list. AN-X builds the list from the firmware files on the microSD card that are compatible with the AN-X hardware.

Click SUBMIT to run the firmware you have selected. You must REBOOT the AN-X to run the firmware you selected.

AN-X Firmware Upload

Use *Administration/AN-X Firmware Upload* to upload a firmware (*.qtf) file to the AN-X. Uploading a qtf file automatically selects the file. You must REBOOT the AN-X to run the firmware you uploaded.

WARNING! Updating the AN-X firmware disrupts RIO and Ethernet communication.

Make sure your process is in a safe state.

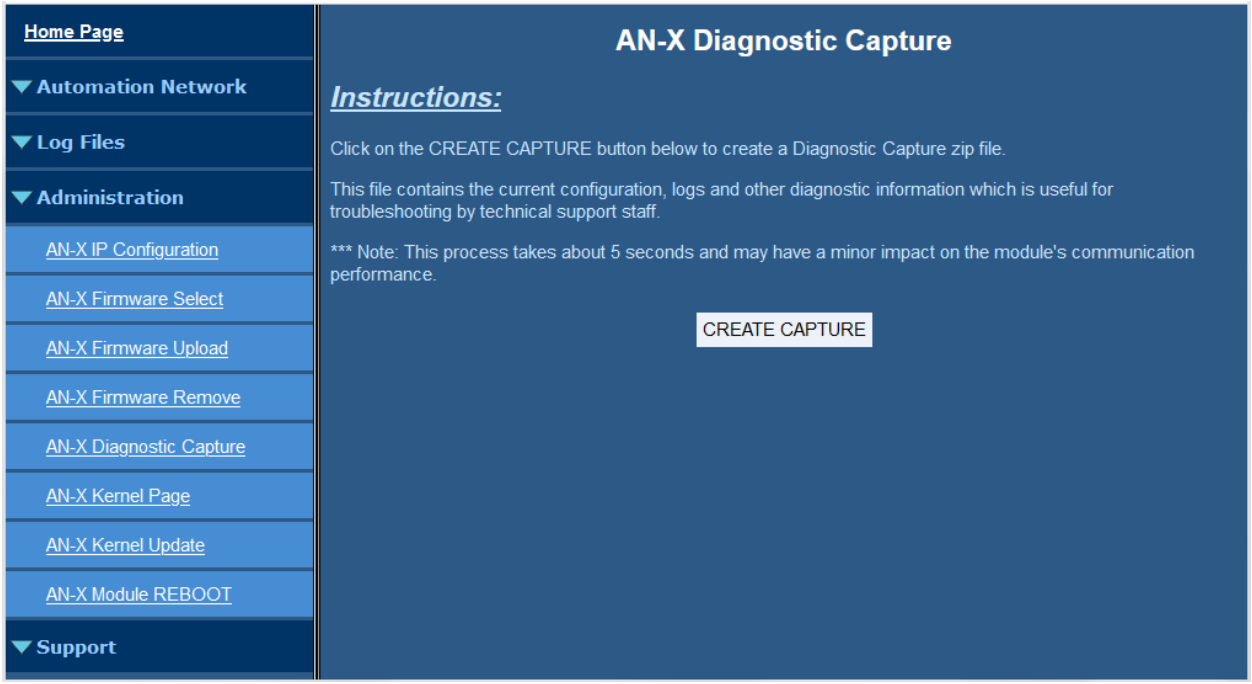
AN-X Firmware Remove

Use *Administration/AN-X Firmware Remove* to remove a firmware (*.qtf) file from the AN-X.

You cannot remove the file that is currently running on the AN-X.

AN-X Diagnostic Capture

Use *Administration/AN-X Diagnostic Capture* to create a zip file that contains the current AN-X configuration and logs, for use by technical support.



Click the CREATE CAPTURE button to create the file. There is a slight delay while AN-X builds the file.

Once AN-X has built the file it displays a second web page. Click the *Download Capture File* button to save the file to your computer.

AN-X Kernel Page

Use *Administration.AN-X Kernel Page* to display the version of the Linux kernel on the AN-X.

This page is also displayed if the AN-X fails to load firmware at startup. If that happens, use *Administration/Firmware Select* to select a firmware file, then REBOOT the AN-X.

AN-X Kernel Update

Occasionally we release a new version of the Linux kernel for the AN-X. Use *Administration/AN-X Kernel Update* to send the kernel (*.qtk) file to the AN-X.

Click the Browse button to select the file, then click Send Kernel to transfer the file.

AN-X displays a progress bar as the file is transferred. When the transfer is complete, the AN-X still has to copy the kernel file to the microSD card. When the file copy is complete, the AN-X displays a message to indicate that the file was copied successfully. Stay on this web page until AN-X indicates that the file has been written to the microSD card, then click the REBOOT button to restart the AN-X.

AN-X Module REBOOT

Use the *Administration/AN-X Module REBOOT* to restart the AN-X module.

Support Menu

Contact Information

The contact information contains information and links if you need support for the AN-X.

Troubleshooting

LEDs

The AN-X4-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, above the Ethernet connector.

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

The green LED is off if the link is inactive and is on if the link is active. If activity is detected, the link blinks and continues blinking as long as activity is present.

If the AN-X4 is not connected to Ethernet, both LEDs are off.

MS (Module Status) and NS (Network Status) LEDs

The MS 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 for example means three red flashes followed by a pause.

Powerup/Reboot

MS LED	NS LED	Meaning
RED	RED	Initial Boot Code / Secondary Program Loader (SPL)
YELLOW	RED	U-Boot
RED	RED	Kernel Starting
YELLOW/2	RED	Waiting for IP (DHCP) or invalid IPConfig.txt
YELLOW/3	RED	Factory Mode, could not find AN-X4-TEST-xx Firmware
YELLOW/4	RED	Firmware/FirmwareCfg.txt Not Found
YELLOW/5	RED	Firmware image in FirmwareCfg.txt Not Found
YELLOW/6	RED	Firmware Image Invalid (Bad ChkPat)
YELLOW/7	RED	Firmware Image Board ID Mismatch
YELLOW/8	RED	Startup Script Not Found
GREEN/2	OFF	Factory mode

Remote I/O Operation

MS LED	Meaning
GREEN	Configured successfully
Slow red flash	Errors in configuration file
Red Pulse (250 ms)	Ethernet/IP Error (see RIO-EIPSCN Log)
RED/5	Ethernet/IP server shutdown

NS LED	Meaning
GREEN	All Active racks are being scanned
YELLOW	Receiving good packets, but not all active racks are being scanned
RED	Receive packet error, or not receiving any good packets
RED/YELLOW alternating	RIO watchdog

Updating the Firmware

The AN-X4 firmware files are supplied in files that begin with AN-X4 and have extension *qtf*.

AN-X4 can have multiple versions of the same firmware, for example, different versions of the AN-X4-ABRIO-RIO-EIPSCN.*.qtf. You can use the web interface to:

- download firmware files to the AN-X4
- select which version is to run
- remove firmware files using the web interface.

WARNING! Updating the AN-X firmware will disrupt RIO and Ethernet communication. Make sure your process is in a safe state.

Run the command *Administration/Firmware Upload* to upload a qtf file to the AN-X. Uploading a file automaticallly selects that file.

To change the firmware the AN-X is running, run the command *Administration/Select AN-X Firmware* to select the file you wish to run.

You must restart the AN-X4 to run the firmware that you selected or transferred to the AN-X.

You can also copy firmware files to the directory /Firmware on the microSD card using a card reader in your computer. If you do so, you will also need to update the file FirmwareCfg.txt in the same directory to run the file you copied over. The contents of FirmwareCfg.txt must match exactly the name of one of the firmware files on the AN-X, including the version.

Example

```
AN-X4-ABRIO-EIPSCN.v4.05.48.qtf
```

In addition, it is occasionally necessary to update the kernel on the AN-X. Kernel files have extension *.qtk. Refer to page 56 for information on how to update the kernel.

You can obtain latest firmware from http://qtsusa.com/dist/AN-X4/AB/

Specifications

Parameter	Specification
Function	Bridge between Ethernet and Remote I/O network
Typical Power Consumption	240 mA @ 12 VDC or 120 mA @ 24 VDC
Maximum Power dissipation	2.9W
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 (Brasil)

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Latin America (Spanish Speaking Countries)

Languages Spoken: Spanish, English

+52.222.399.6565, latinam@prosoft-technology.com

The latest support contact information is found at

https://www.prosoft-technology.com/Services-Support/Customer-Support

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.