AN-X4-ABRIO-SCAN

Remote I/O

Scanner Module

User Manual

Because of the variety of uses for the products described in this publication, those responsible for the application and use of these products must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards. In no event will Quest Technical Solutions be responsible or liable for indirect or consequential damage resulting from the use or application of these products.

Any illustrations, charts, sample programs, and layout examples shown in this publication are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Quest Technical Solutions does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

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

Microsoft is a registered trademark of Microsoft Corporation.

Windows is a trademark of Microsoft Corporation.

ControlLogix, RSLinx and RSLogix 5000 are trademarks of the Allen-Bradley Company, Inc.

The AN-X4-ABRIO-SCAN communications module connects a ControlLogix PLC or other device to an Allen-Bradley remote I/O network.

The module acts as a scanner on the remote I/O network, reading inputs and writing outputs.

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

- up to 32 physical adapters
- Baud rates 57.6, 115.2, and 230.4 Kbits/second
- Rack numbers 0 to 76 octal
- Block transfers at all allowable locations

A ControlLogix processor communicates with the module using scheduled connections over Ethernet, to read inputs from the remote I/O network and write outputs.

A Windows utility, AnxAbRioScanCfg, is used for configuring and monitoring the remote I/O network and mapping the remote I/O data to ControlLogix scheduled data.

The AN-X4-ABRIO-SCAN 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.

Current firmware and Ethernet device templates can be found at

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

Hardware Features
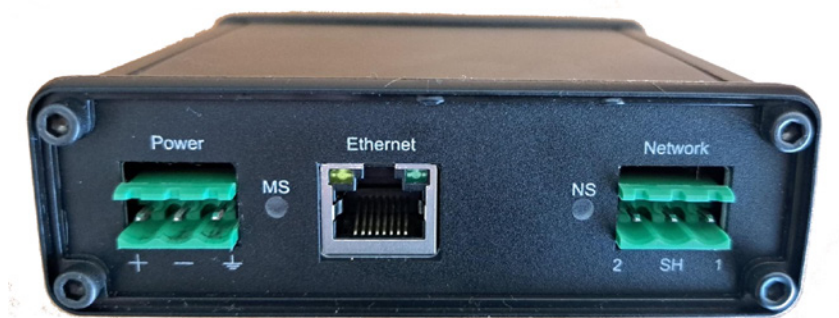
The module has:

- 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
Firmware to run	Firmware\FirmwareCfg.txt

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 18 for details.

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

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 (requires a 7/64 inch Allen wrench)

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:

Scanner

- The power and remote I/O cables are the same, but the connectors on the AN-X are rotated 180 degrees.

- The web interface is improved, it now has data displays for discrete and block transfer data, as well as live data updates

- The AN-X4 uses the same Windows configuration program, the same template files and the same configuration files as the AN-X2. A configuration file for the AN-X2 will work with the AN-X4.

- LEDs support only debug mode

- The Ethernet diagnostics mapped to connection 15 in the ControlLogix have changed

General

- The status and errors displayed on the LEDs have changed

- It does not support listen-only connections

- You can run different versions of the same firmware, e.g., remote I/O 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.

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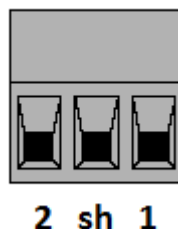
On the AN-X module, the remote I/O connections should be as shown. The wiring in the connector is that same as for the AN-X2 but the connector is rotated 180 degrees on the AN-X4. A remote I/O cable for the AN-X2 can be used without change on the AN-X4.

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.

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Quick Start

Step	Operation	See page
1	Install the AN-X Windows software	20
2	Power up the AN-X, connect it to Ethernet and assign it an IP address	13
3	Connect AN-X to the Remote I/O network	13
4	Use the AN-X Windows utility to autoconfigure the remote I/O network and ControlLogix configuration	20
5	Add and configure any required block transfer modules	25
6	Map the remote I/O data	27
7	Configure the AN-X in RSLogix 5000	39
8	Scan I/O, read inputs and write outputs	43
9	Create aliases for RSLogix 5000	36
10	Import the aliases into RSLogix 5000	42
11	Use the aliases to access data	41

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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 on remote I/O.

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 it a static IP address. Otherwise the DHCP server may assign a different IP address when the 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.

AN-X IP Configuration

Home Page

▼ Automation Network

▼ Log Files

▼ Administration

    AN-X IP Configuration

    AN-X Firmware Select

    AN-X Firmware Upload

    AN-X Firmware Remove

    AN-X Diagnostic Capture

    AN-X Kernel Page

    AN-X Kernel Update

    AN-X Module REBOOT

▼ Support

Serial Number: 008019
MAC Address: 00:0C:1A:00:80:19

DHCP: ●
Static :   ○
Factory: ● (Try DHCP for 10 sec, then 192.168.0.246)
AN-X Hostname: ANX4scanner
AN-X IP Address: 192.168.1.93
NET Mask: 255.255.255.0
Gateway Address: 192.168.1.1

SUBMIT

The top of 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.

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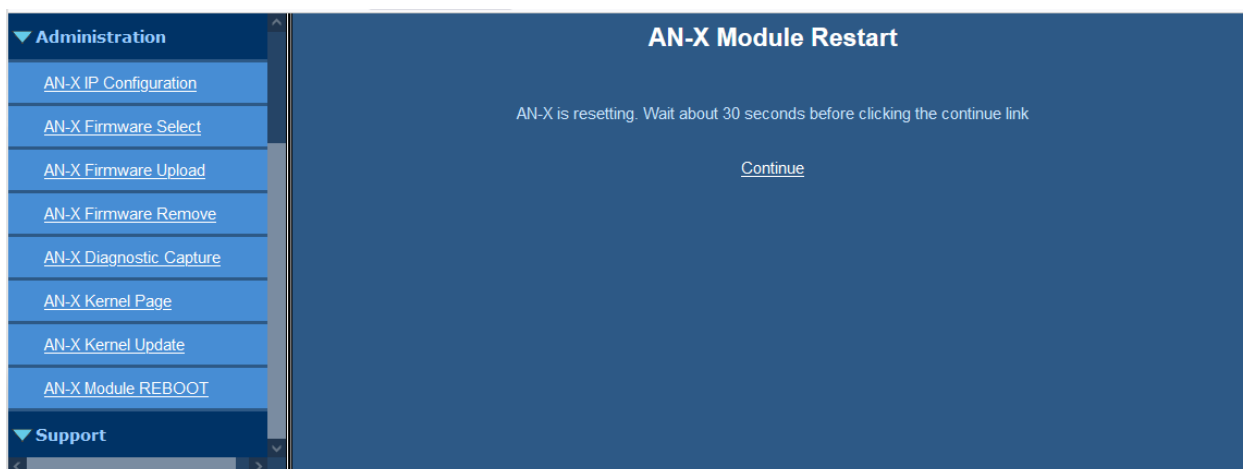
Wait until the AN-X has completely restarted, then click *Continue*.

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 previously been 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 plain 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 73.

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-SCAN.v4.05.01.qtf
```

Configuring the Remote I/O Scanner

AnxAbRioCfgScan Software

The AN-X4-ABRIO-SCAN module is configured with a Windows utility, AnxAbRioCfgScan.exe.

You can download the Windows installation file from

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

Use this configuration tool to:

- Set the baud rate
- Autoconfigure from an attached remote I/O network
- Manually configure racks
- Add and configure block transfer modules
- Map I/O data to ControlLogix scheduled connections
- Export aliases for import into RSLogix 5000
- Save and load configuration files
- Download and upload configurations
- Archive block transfer templates
- Monitor diagnostics, rack status, block transfers and discrete data

Configuring a Remote I/O Network

Use the following steps to configure the AN-X:

1. Set the baud rate.
2. Configure the racks, either manually or automatically.
3. Add and configure block transfer modules.
4. Map the remote I/O modules to ControlLogix scheduled data.
5. Download the configuration to the AN-X.

Baud Rate

To set the network baud rate, first right click on the root of the network tree.
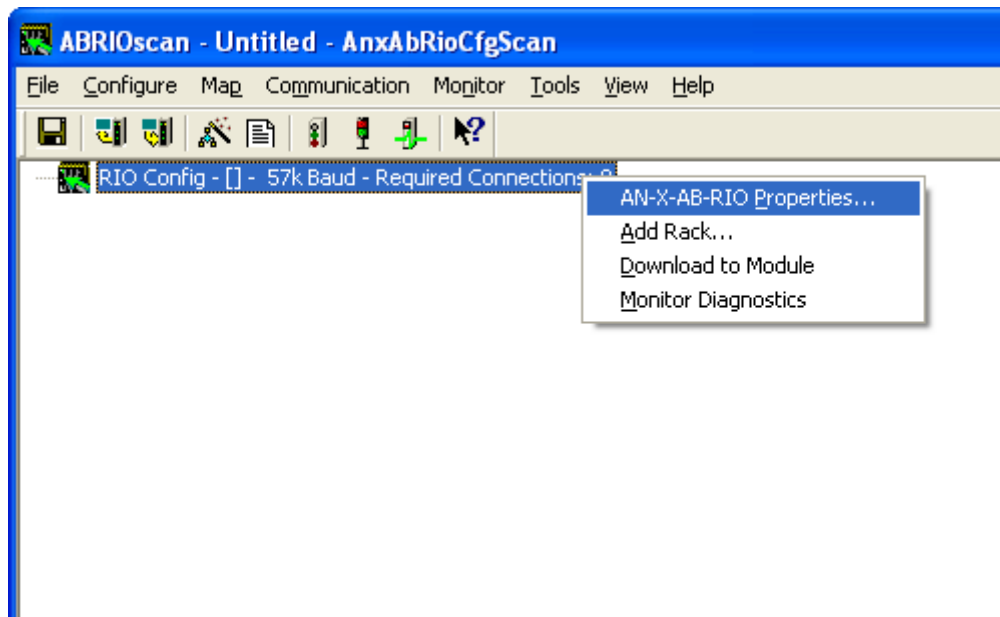
Select *AN-X-AB-RIO Properties* to display the *AN-X-AB-RIO Module Properties* dialog box.
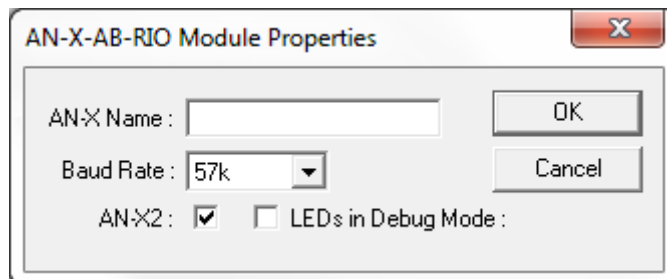
Select the *Baud Rate* from the list. Choices are:

Selection	Baud Rate, kbits/second
57k	57.6
115k	115.2
230k	230.4

The default baud rate is 57.6 Kbits/second.

Note: If you perform an autoconfiguration, the AN-X4-ABRIO-SCAN automatically detects the baud rate from the attached network.

The AN-X Name can be from 0 to 15 characters long. It is not used elsewhere.

The AN-X2 checkbox is used when exporting aliases for import into RSLogix 5000 (see page 36) and should be checked.

The *LEDs in Debug Mode* setting is not used by the AN-X4. The default is unchecked.

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Configuring Racks

You can add racks manually or by autoconfiguring from an attached remote I/O network.

Manually Adding Racks

To add a rack manually to the remote I/O configuration, first right click on the root of the network tree.
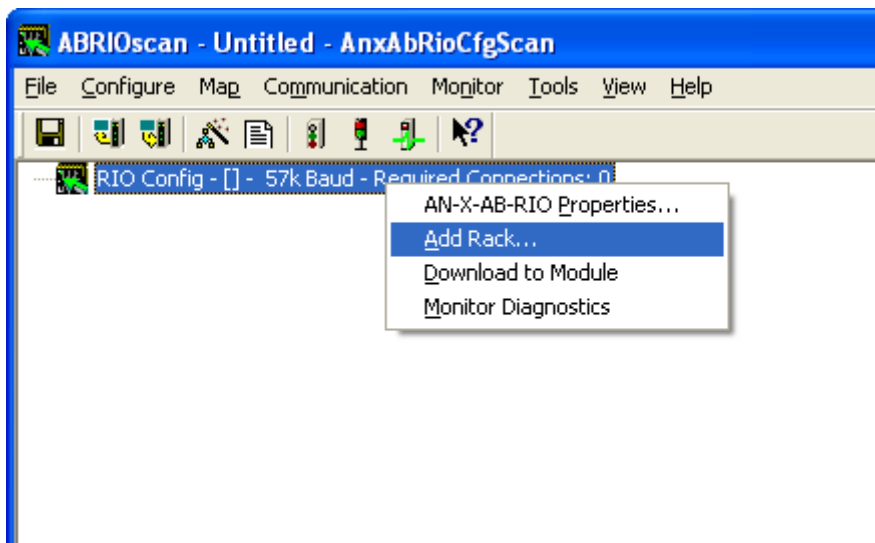
Select *Add Rack* to display the *Add/Resize Rack* dialog box.
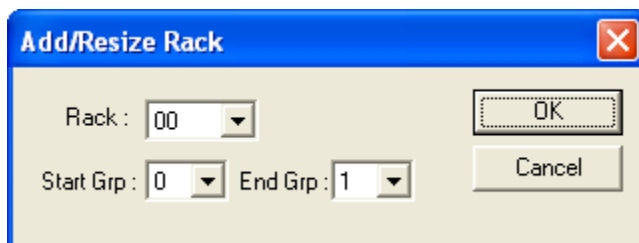
Select the *Rack* number (in octal), the Start I/O Group and the End I/O Group for the rack you are adding and click OK.

To add a partial rack to an existing rack number, right click on the rack and select *Add Rack*.

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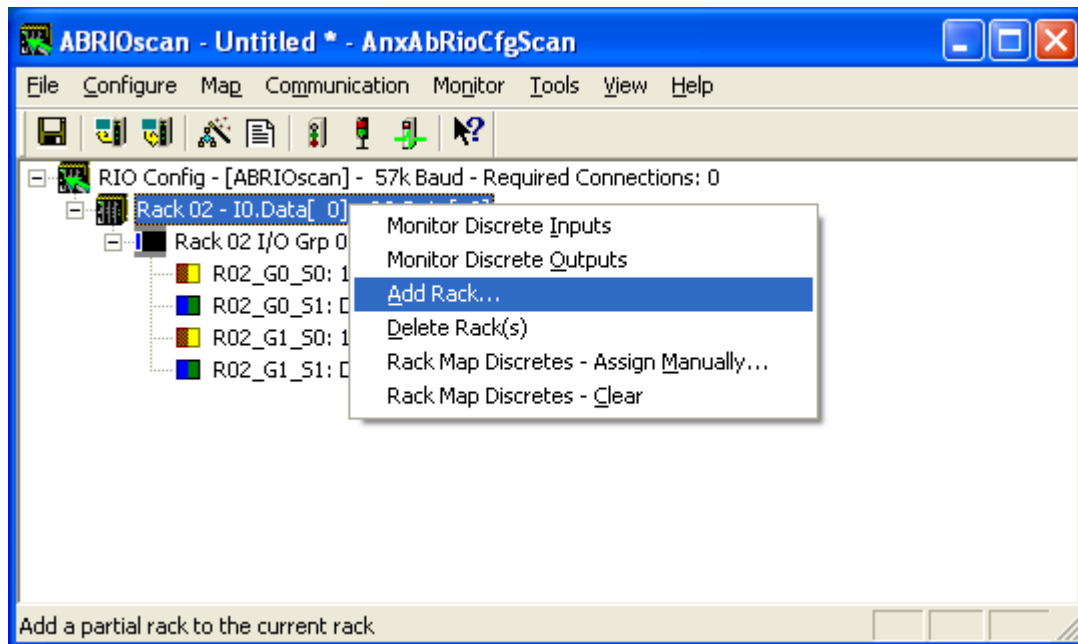
The *Add/Resize Rack* dialog appears, with the rack number set.
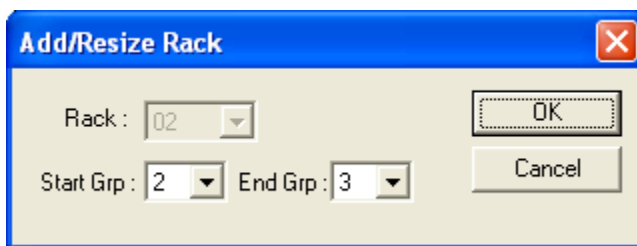
Select the the Start I/O Group and the End I/O Group for the rack you are adding and click OK.

Autoconfiguration

The AN-X4-ABRIO-SCAN supports autoconfiguration, which automatically detects the network baud rate and the racks on an attached remote I/O network. Autoconfiguration cannot detect block transfer modules. You must add and configure them manually.

The controller with the Ethernet connection to the AN-X4-ABRIO-SCAN must not be in run mode when you perform an autoconfiguration.

To autoconfigure, select *Configure/Autoconfigure* or use the Autoconfigure button on the toolbar.

The AN-X4-ABRIO-SCAN first detects the network baud rate, then sends messages to all possible racks, builds a network configuration from the replies it receives, and displays the network configuration.

Any configuration previously stored in the AN-X4-ABRIO-SCAN is overwritten by the data from the autoconfiguration.

If the autoconfiguration does not find any racks, the remote I/O configuration on the AN-X is invalid.

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Resizing Racks

To resize a rack, first right click on the rack in network tree.
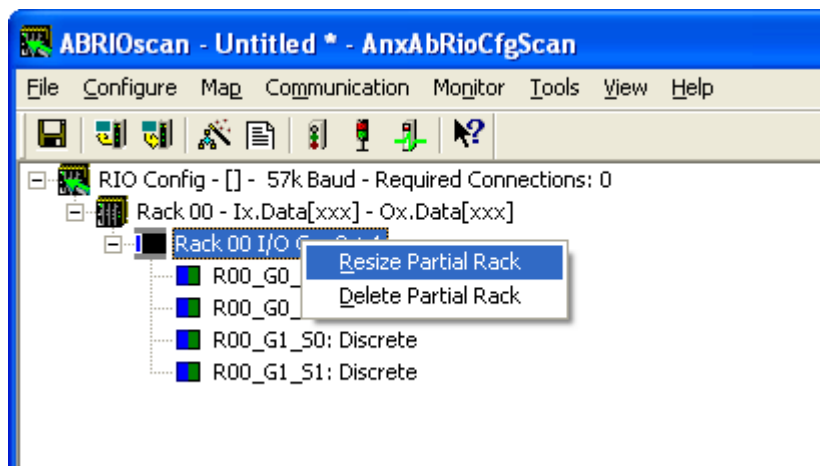
Select *Resize Partial Rack* to display the *Add/Resize Rack* dialog box.
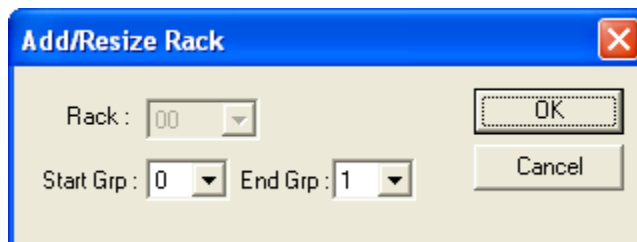
You cannot change the rack number when you resize a rack.

Select the *Start I/O Group* and the *End I/O Group* and click OK.

If resizing the rack results in an overlap with another rack, the resize will fail and you will get an error message.

If resizing the rack results in deleting block transfer modules, you will be given the option of cancelling or proceeding with the resize and deleting the block transfer modules.

Deleting Racks

To delete an entire rack, right click on it in the network tree and select *Delete Rack(s)*.

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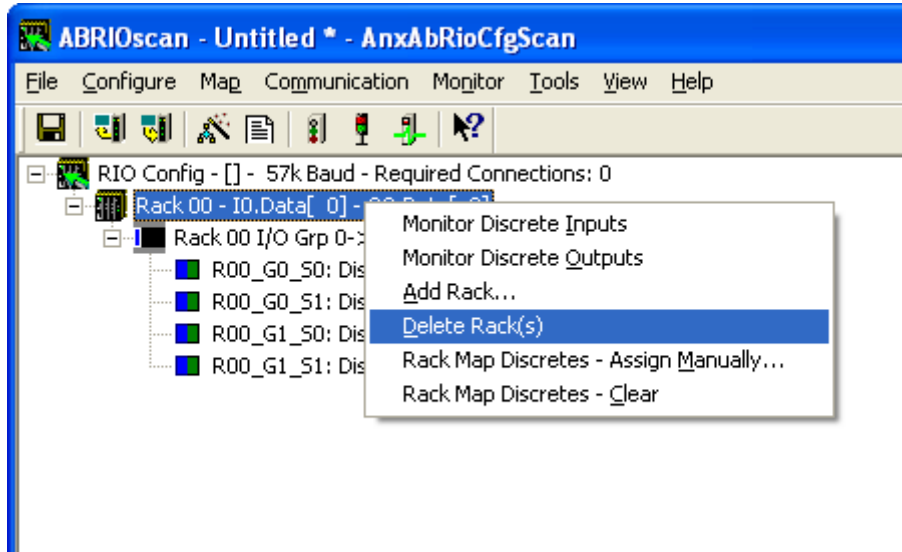
To delete a partial rack, right click on it in the network tree and select *Delete Partial Rack*.
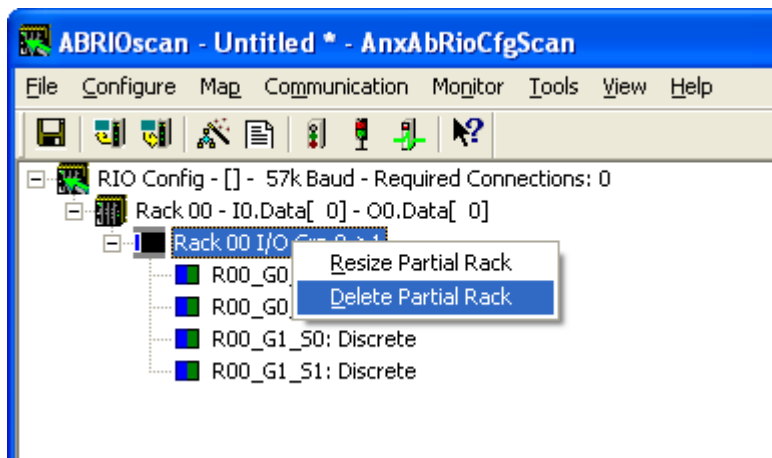
The program asks for confirmation before deleting.

Block Transfer Modules

To add a block transfer module, first expand the network tree to show the location where you want to add the module.
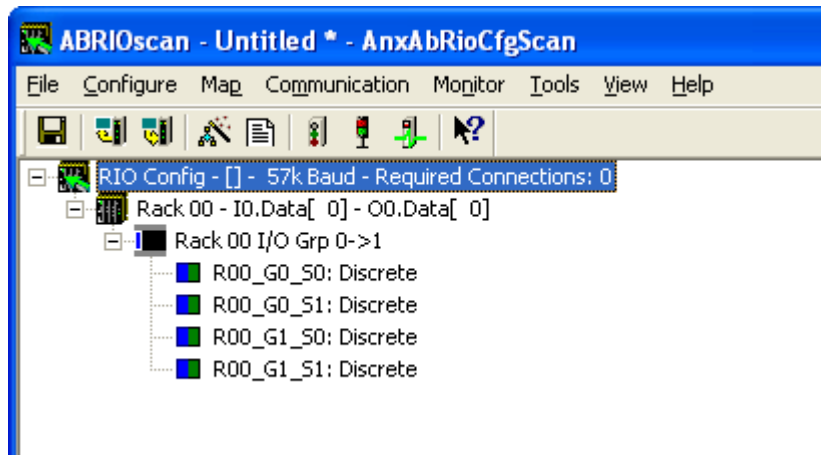
Right click on the location where you want to add the module and select *Module Properties*.
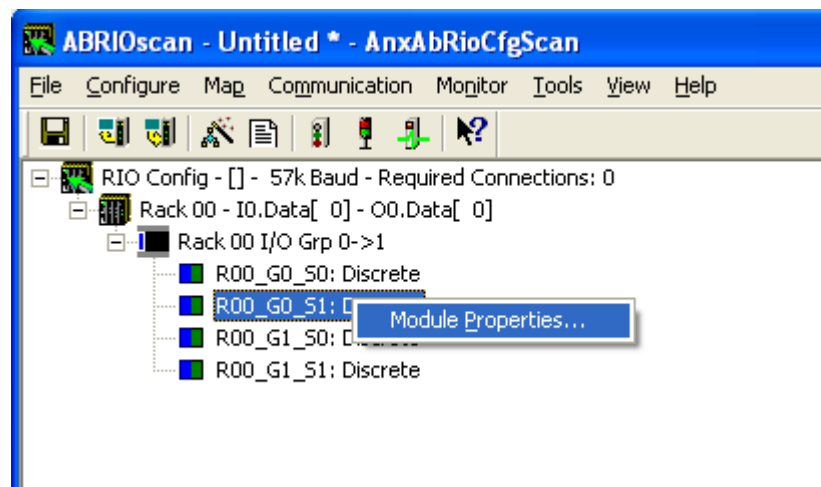
IMPORTANT!   When you are scanning remote I/O, you must only write 0 location of the block transfer module.

Select the *Module Type* from the list

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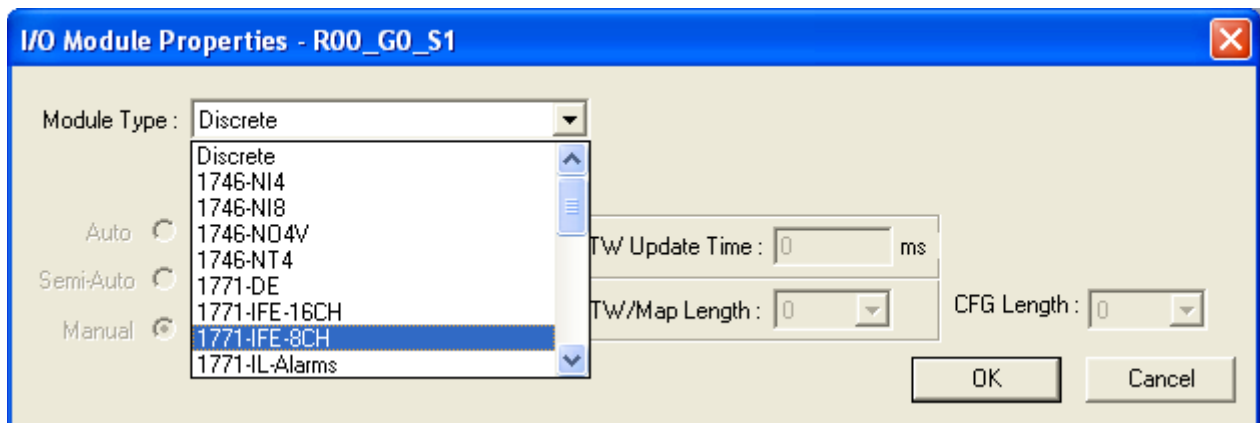
Most block transfer modules have parameters that you can select. Click the *Configure* button to display a dialog box to configure the module. For example, here is the configuration dialog for an 8-channel 1771-IFE module.
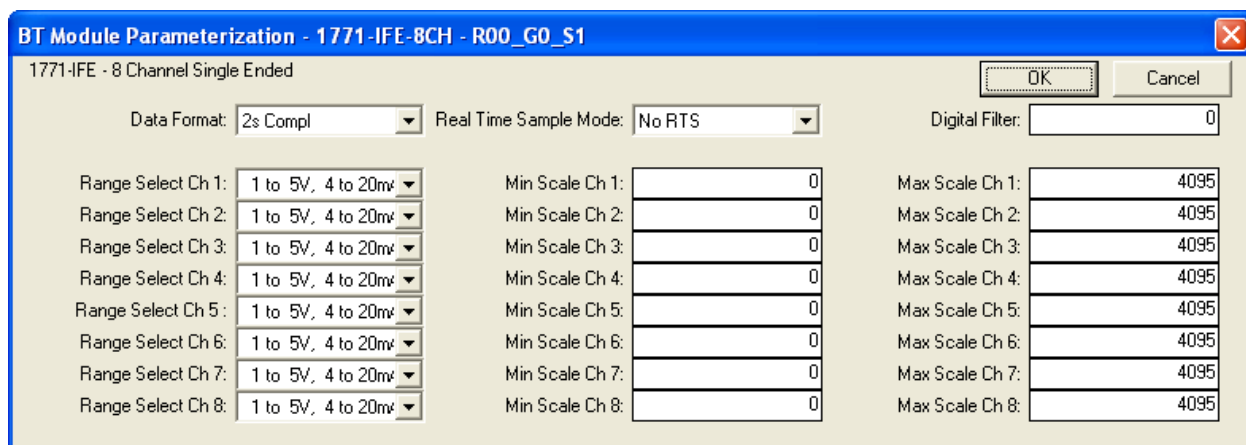
Enter the configuration data and click OK.

Select how you want the block transfer to update. There are three update modes: automatic, semi-automatic and manual.

Mode	Description
Automatic	AN-X4-ABRIO-SCAN controls block transfer update
	I/O module configuration data comes from AN-X configuration tool
Semi-automatic	AN-X4-ABRIO-SCAN controls block transfer update
	I/O module configuration data comes from the ControlLogix
Manual	ControlLogix controls block transfer update
	I/O module configuration data comes from the ControlLogix

For automatic and semi-automatic modes, enter the block transfer read and write update rates, from 0 to 16383 ms. A rate of 0 means the AN-X4-ABRIO-SCAN updates the block transfer as fast as the remote I/O network and the block transfer module allow.

For manual mode, enter the lengths of the block transfer read and write data mapped to the ControlLogix.

Mapping the I/O Data

You must map the I/O data to locations in the ControlLogix scheduled input and output data before you can scan the remote I/O network.

Unassigned I/O addresses are shown as xxxx in the network tree.

IMPORTANT!   Only mapped locations have valid data. Unmapped locations in the ControlLogix connection input data may contain non-zero values.

Automatic Mapping

To automatically map any unassigned data, select *Map/Auto-Map Any Unassigned*. The configuration tool maps all unassigned I/O to scheduled inputs and outputs. It leaves any previously assigned address unchanged.

To remap all data, select *Map/Re-Map All*. You are asked for confirmation before the mappings ar reassigned.

Manual Mapping

To manually map discrete(rack) data, expand the network tree, right click on the rack and select *Rack Map Discretes – Assign Manually*
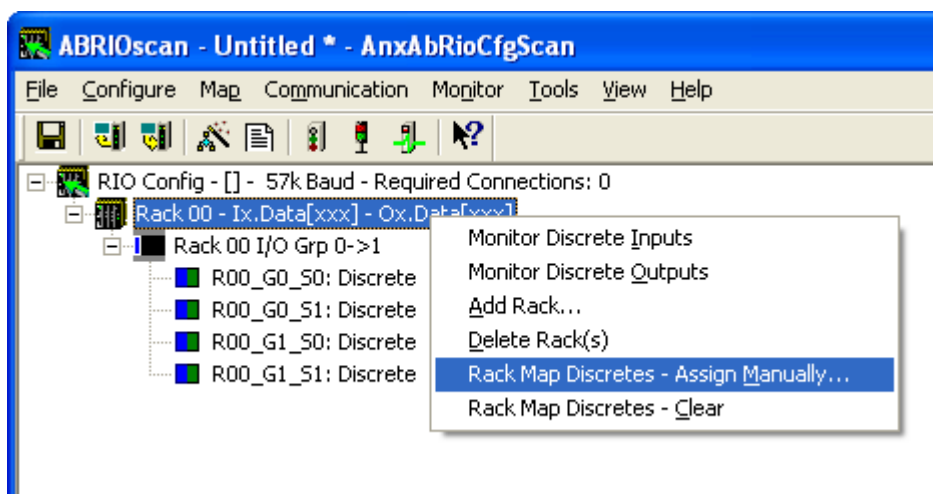
For the inputs and outputs, select the ControlLogix scheduled blocks and the offsets within the block.
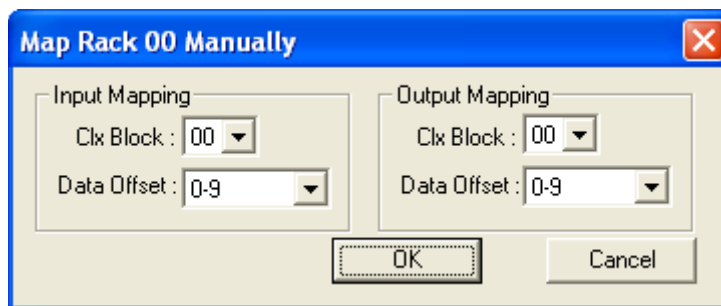
Click OK to accept the mapping.

The configuration tool checks for overlaps with previously mapped data and gives an error if it finds an overlap.

To manually map the data for a block transfer module, right click on the module and select *BT Module Clx Map – Assign Manually*.
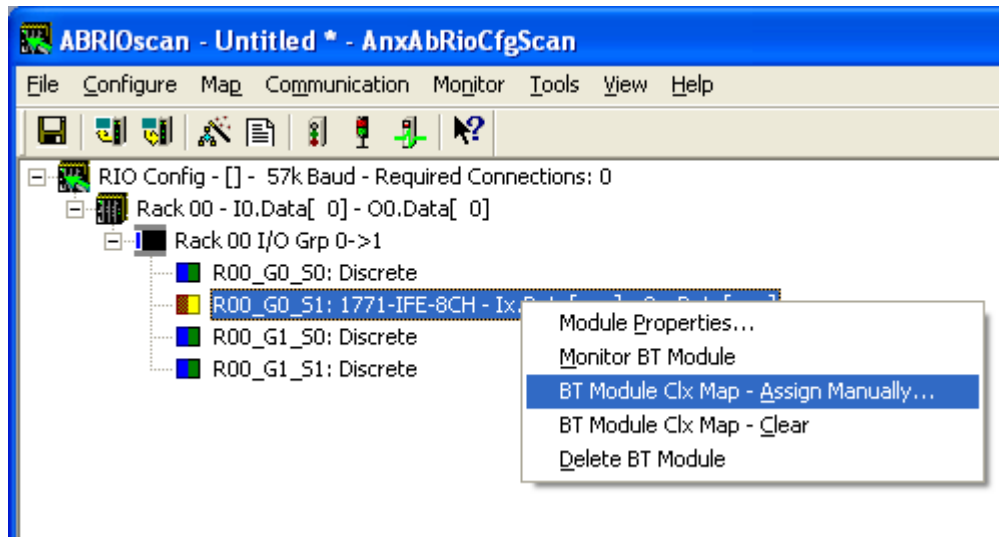
For the inputs and outputs, select the ControlLogix scheduled block and the offset within the block.
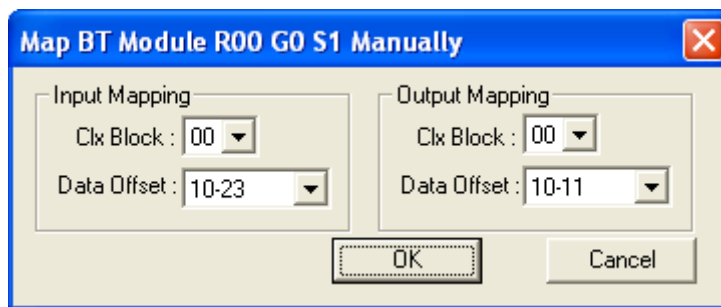
Click OK to accept the mapping.

The configuration tool checks for overlaps with previously mapped data and gives an error if it finds an overlap.

If there is insufficient space in the current block to map the data, the Data Offset is blank and the OK button is grayed out. Change the block number and select an offset.

Clearing Mappings

To clear all assigned mappings, select *Map/Clear All Mappings*.

To clear the mapping of the discrete data for a rack, right click on the rack and select *Rack Map Discretes – Clear*.
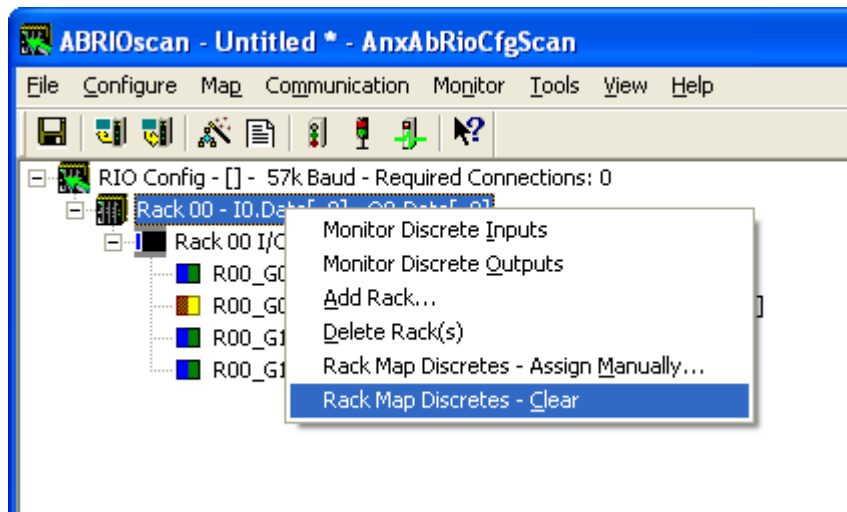
The configuration tool asks for confirmation before it clears the mappings.

To clear the mapping for a block transfer module, right click on the block transfer module and select *BT Module Clx Map – Clear*.
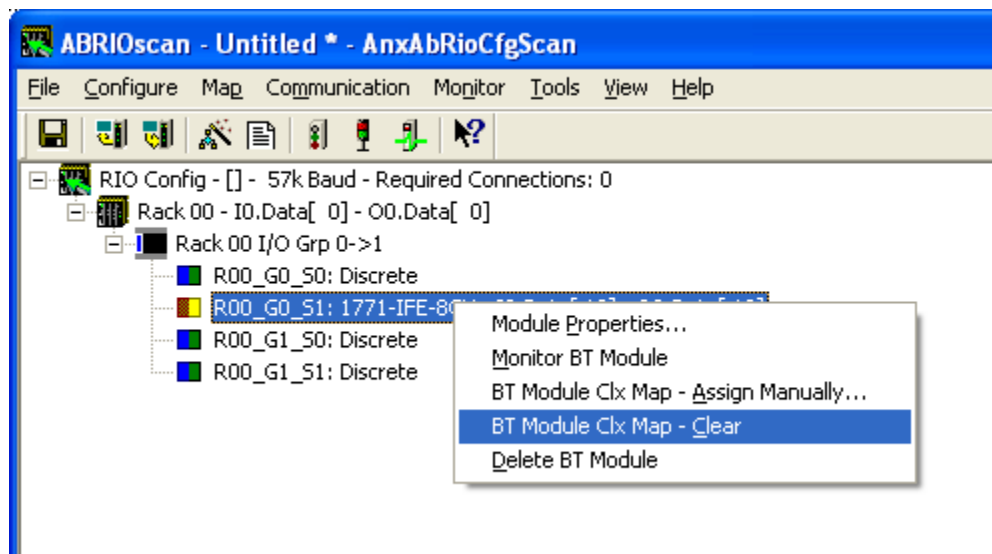
The configuration tool asks for confirmation before it clears the mapping.

What gets mapped

The following sections describe the data that gets mapped to ControlLogix scheduled data.

Rack Discrete Data

The tables show the input and output data that gets mapped when you map a rack.

When you map any part of a rack to scheduled data, the structure that gets mapped contains the data for the entire rack number. For example, if rack 1 consists of just I/O groups 0 and 1 (a quarter rack), the entire structure shown below is mapped when you map the rack. Similarly, if a rack is made up of

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several partial racks, mapping any one of those partial racks maps the structure for the entire rack; you do not need to map each partial rack.

Discrete Input Data

Offset	Bit	Description
0	0	Communication Error first quarter (I/O Group 0-1)
	1	Communication Error second quarter (I/O Group 2-3)
	2	Communication Error third quarter (I/O Group 4-5)
	3	Communication Error fourth quarter (I/O Group 6-7)
	4-15	Reserved
1	0-15	Reserved (Pad for 32 bit alignment)
2-9	0-15	Discrete input data

The discrete read structure for a rack consists of 2 status words and 8 words of discrete input data.

Only bits 0 to 3 of the first word of status data are used. They consist of error bits that are set if there is a communication error with a partial rack. Bit 0 corresponds to a rack that starts at I/O group 0, bit 1 corresponds to a rack that starts at I/O group 2, and so on.

The error bit is 1 if there's an error scanning the rack or if the rack is inhibited, and is 0 otherwise.

Words 2-9 contain the discrete input data for the rack. Words 2 and 3 contain the data for I/O groups 0 and 1 (first ¼ rack), words 3 and 4 contain the data for I/O groups 2 and 3 (second ¼ rack), and so on.

Refer to page 36 for information on the aliases the configuration program creates for the discrete data.

Example aliases for discrete input data, rack 0 is a quarter rack starting I/O group 0

```
ALIAS,"","RIO_R00_STS","Rack-00 Status","","NoName:0:I.Data[0]"
ALIAS,"","RIO_I000","Rack-00 Grp-0 Discrete Input","","NoName:0:I.Data[2]"
ALIAS,"","RIO_I001","Rack-00 Grp-1 Discrete Input","","NoName:0:I.Data[3]"
ALIAS,"","RIO_I002","Rack-00 Grp-2 Discrete Input","","NoName:0:I.Data[4]"
ALIAS,"","RIO_I003","Rack-00 Grp-3 Discrete Input","","NoName:0:I.Data[5]"
```

Discrete Output Data

Offset	Bit	Description
0	0	Inhibit rack that starts at first quarter (I/O Group 0-1)
	1	Inhibit rack that starts at second quarter (I/O Group 2-3)
	2	Inhibit rack that starts at third quarter (I/O Group 4-5)
	3	Inhibit rack that starts at fourth quarter (I/O Group 6-7)

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Offset	Bit	Description
	4-15	Reserved
1	0-15	Reserved (Pad for 32 bit alignment)
2-9	0-15	Discrete output data

The discrete write structure for a rack consists of 2 control words and 8 words of discrete output data.

Bits 0-3 of the first word of control data are used to inhibit racks. Set bit 0 to inhibit the scan of the rack starting at I/O group 0; set bit 1 to inhibit the scan of the rack starting at I/O group 2; and so on. Inhibiting a rack stops all communications with that rack and all outputs revert to their programed state.

Only the bit for the starting I/O group need to be set to inhibit the rack. For example, if a rack is a full rack starting at I/O group 0, only bit 0 needs to be set to inhibit the scan of the rack.

Words 2-9 contain the discrete output data for the rack. Words 2 and 3 contain the data for I/O groups 0 and 1 (first ¼ rack), words 3 and 4 contain the data for I/O groups 2 and 3 (second ¼ rack), and so on.

Refer to page 36 for information on the aliases the configuration program creates for the discrete data.

Example aliases for discrete output data, rack 0 is a quarter rack starting I/O group 0

```
ALIAS,"","RIO_R00_CTL","Rack-00 Control","","NoName:0:O.Data[0]"
ALIAS,"","RIO_O000","Rack-00 Grp-0 Discrete Output","","NoName:0:O.Data[2]"
ALIAS,"","RIO_O001","Rack-00 Grp-1 Discrete Output","","NoName:0:O.Data[3]"
ALIAS,"","RIO_O002","Rack-00 Grp-2 Discrete Output","","NoName:0:O.Data[4]"
ALIAS,"","RIO_O003","Rack-00 Grp-3 Discrete Output","","NoName:0:O.Data[5]"
```

Block Transfer Modules

The tables show the structures that get mapped to ControlLogix scheduled input or output data when you map a block transfer module.

Even if a module has only a block transfer read or a block transfer write, you should always map the module to both scheduled input and output data, so that the control and status data gets mapped.

BT Read Structure

Offset	Bit	Description
0	0-7	BTR Update Counter (increments each time BTR executes, range 0-255)
	8-10	BTR Error Code
	11	BTR.ERR, block transfer read error bit, see table of error codes
	12	BTR.DN, block transfer read done (manual mode only)
	13-15	Reserved
1	0-7	BTW Update Counter (increments each time BTW executes, range 0-255)
	8-10	BTW Error Code, see table of error codes
	11	BTW.ERR, block transfer write error bit

Offset	Bit	Description
	12	BTW.DN, block transfer write done (manual mode only)
	13-15	Reserved
2-n	0-15	BTR Data (64 INTs max)

Offset 0 bits 0-7 contain a counter that increments each time a block transfer read executes successfully on the remote I/O network. Based on the configuration of the AN-X4-ABRIO-SCAN and its RPI, the controller may see this value increment by more than 1 count per program scan.

The AN-X4-ABRIO-SCAN sets the BTR error bit, offset 0 bit 11, when an error occurs executing a block transfer read. It clears the bit when the block transfer read enable bit bit is reset in the coresponding BT Control Write Structure.

When a block transfer read error occurs, offset 0 bits 8-10 contain an error code (see table below).

When you execute a block transfer read in manual mode, the AN-X4-ABRIO-SCAN sets the done bit, offset 0 bit 12, to indicate that the block transfer read executed successfully. It resets the done bit when the coresponding BTR.EN bit is reset in the BT write control file.

Offset 1 bits 0-7 contain a counter that increments each time a block transfer write executes successfully on the RIO network. Based on the configuration of the AN-X4-ABRIO-SCAN and its RPI, the controller may see this value increment by more than 1 count per program scan.

The AN-X4-ABRIO-SCAN sets the BTW error bit, offset 1 bit 11, when an error occurs executing a block transfer write. It clears the bit when the block transfer write enable bit is reset in the coresponding BT Control Write Structure.

When a block transfer write error occurs, offset 1 bits 8-10 contain an error code (see table below).

When you execute a block transfer write in manual mode, the AN-X4-ABRIO-SCAN sets the done bit, offset 1 bit 12, to indicate that the block transfer write executed successfully. It resets the bit when the coresponding BTW.EN bit is reset in the BT write control file.

Word offsets 2-n contain the read data returned by the block transfer module.

BT Write Structure

Offset	Bit	Description
0	0-5	BTR Length (1-63 word, 0 for 64)
	6-7	Reserved
	8	BTR.EN, block transfer read enable (manual mode only)
	9	BTR.CONT (manual mode only) BT Inhibit (Automatic modes – inhibits config BTW, data BTW and data BTR)
	10-15	Reserved
1	0-5	BTW Length (1-63 word, 0 for 64)
	6-7	Reserved
	8	BTW.EN, block transfer write enable (manual mode only)

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Offset	Bit	Description
	9	BTW.CONT, continuous mode (manual mode only)
	10-15	Reserved
2-n	0-15	BTW Data (64 INTs max)

Offset 0 bits 0-5 contain the block transfer read length for manual mode

Offset 0 bit 8 contains the block transfer read enable bit for manual mode block transfers.

Offset 0 bit 9 is used in two different ways:

- in manual mode, this bit is the block transfer read continuous bit. If this bit is set and the block transfer read enable bit is set, the AN-X4-ABRIO-SCAN re-enables block transfer reads when they have executed successfully

- in automatic and semi-automatic modes, this bit is used to inhibit both read and write block transfers to the I/O module

Offset 1 bits 0-5 contain the block transfer write length for manual mode.

Offset 1 bit 8 contains the block transfer write enable bit for manual mode block transfers.

Offset 1 bit 9 is the block transfer write continuous bit for manual mode. If this bit is set and the block transfer write enable bit is set, the AN-X4-ABRIO-SCAN re-enables block transfer writes when they have executed successfully.

Word offsets 2-n contain the write data sent to the block transfer write module.

Example aliases for a block transfer module at rack 0, I/O group 0 slot 0, with 4 words of read data

```
ALIAS,"","RIO_r00g0s0_BTR_STS","0-7:BtrCtr, 8-10:BtrErrCde, 11:BTR.ER,
12:BTR.DN","","NoName:0:I.Data[10]"
ALIAS,"","RIO_r00g0s0_BTW_STS","0-7:BtwCtr, 8-10:BtwErrCde, 11:BTW.ERR,
12:BTW.DN","","NoName:0:I.Data[11]"
ALIAS,"","RIO_r00g0s0_BTR_ER","BTR Error Bit","","NoName:0:I.Data[10].11"
ALIAS,"","RIO_r00g0s0_BTW_ER","BTW Error Bit","","NoName:0:I.Data[11].11"
ALIAS,"","RIO_r00g0s0_BTR_Ch0","Data - Channel 1","","NoName:0:I.Data[12]"
ALIAS,"","RIO_r00g0s0_BTR_Ch1","Data - Channel 2","","NoName:0:I.Data[13]"
ALIAS,"","RIO_r00g0s0_BTR_Ch2","Data - Channel 3","","NoName:0:I.Data[14]"
ALIAS,"","RIO_r00g0s0_BTR_Ch3","Data - Channel 4","","NoName:0:I.Data[15]"
ALIAS,"","RIO_r00g0s0_BTR_CTL","0-5:BtrLen, 8:BTR.EN,
9:BTR.CONT/AutoInh","","NoName:0:O.Data[10]"
ALIAS,"","RIO_r00g0s0_BTW_CTL","0-5:BtwLen, 8:BTW.EN,
9:BTW.CONT","","NoName:0:O.Data[11]"
ALIAS,"","RIO_r00g0s0_BT_INH","BT Inhibit","","NoName:0:O.Data[10].9"
```

Block Transfer Error Codes

Error Code	Description
0	OK
1	BTR/BTW request ignored by block transfer module
2	Block Transfer state mismatch
3-6	Reserved, not currently used
7	Block transfer disabled

Required Connections

The configuration tool shows the ControlLogix connections to which data has been mapped, at the root of the network tree.

For each required connection, you must create a Generic module in the ControlLogix configuration with that slot number. See page 39.

Required connections need not be contiguous.

In the example shown, data has been mapped to blocks 0 and 1 and so connections 0 and 1 must exist in the ControlLogix in order for the AN-X4-ABRIO-SCAN to scan I/O.
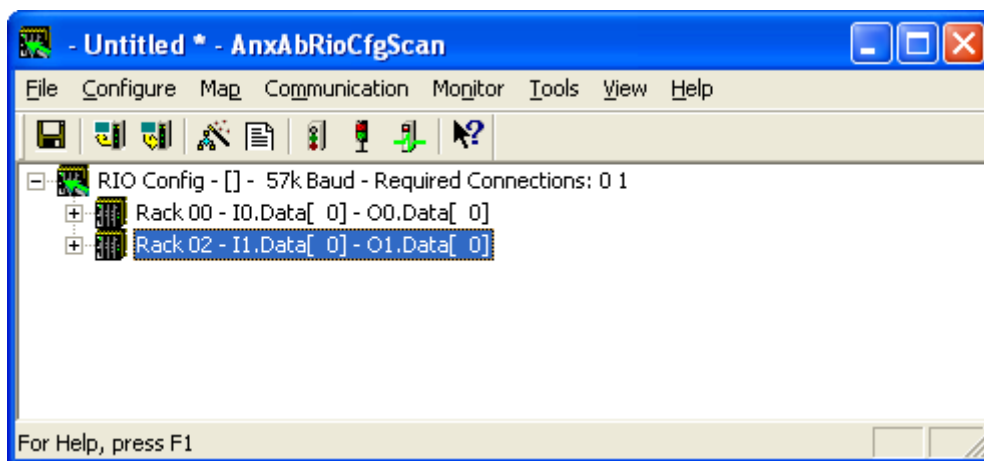
Uploading and Downloading Configurations

To download a configuration to the AN-X4-ABRIO-SCAN, select *Communication/Download Configuration* or use the *Download Configuration to Module* button on the toolbar.

To upload a configuration from the AN-X4-ABRIO-SCAN, select *Communication/Upload Configuration* or use the *Upload Configuration from Module* button on the toolbar.

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Saving Configurations

To save a configuration to your computer, select *File/Save* or *File/Save As.*

Aliases

The configuration tool exports aliases for discrete and block transfer data that can be imported into RSLogix 5000.

You should write control programs in terms of these aliases rather than using absolute addresses. If the mapping of the I/O data changes, simply reimport the new aliases and the control program will point to the new data locations.

To export aliases, select *Tools/Export Alias File…*
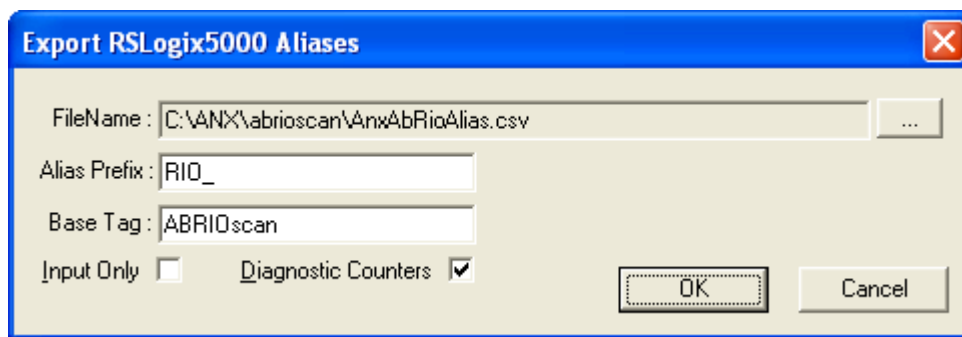
Use the browse button […] to change the file location.

The *Alias Prefix* is used to distinguish between aliases for different AN-X4-ABRIO-SCAN modules. If you have more than one AN-X4-ABRIO-SCAN in the RSLogix configuration, assign each one a different Alias Prefix so that the aliases for each module are unique.

The Base Tag identifies the AN-X the aliases are being created for. It should match the name you give the emulated ENBT module in the ControlLogix chassis. Refer to the Tags section in RSLogix 5000 to find the format of the Base Tag.

Check the *Input Only* box if you want aliases only for input data.

Check the *Diagnostic Counters* box if you want descriptions for diagnostic counters to be included in the file. They contain only comments; they do not contain alias names.

IMPORTANT! The diagnostic counters for Ethernet statistics have changed in the AN-X4. The counter descriptions generated by the configuration program are not valid.

Click OK to create the alias file.

Alias Example

In this example, the remote I/O configuration contains a single quarter rack, rack 1, starting I/O group 0.
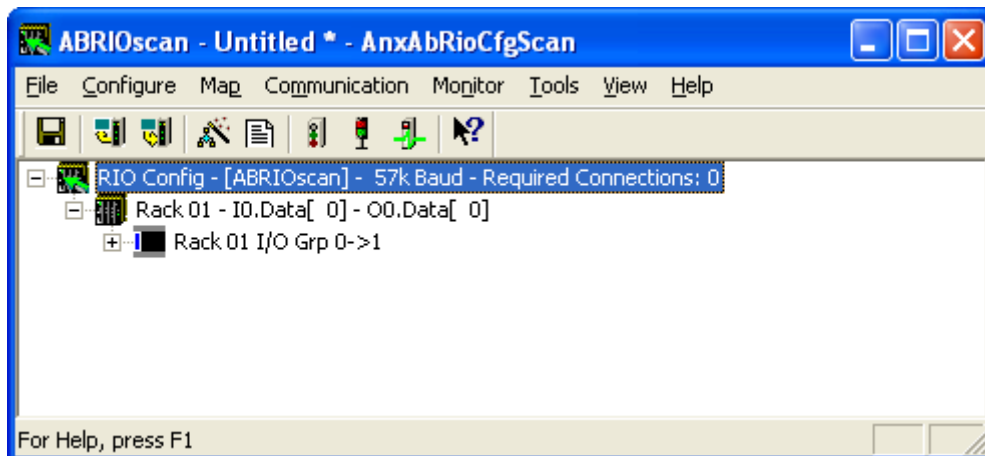
We export aliases from the configuration tool using the Alias Prefix RIO_ and base tag ABRIOscan
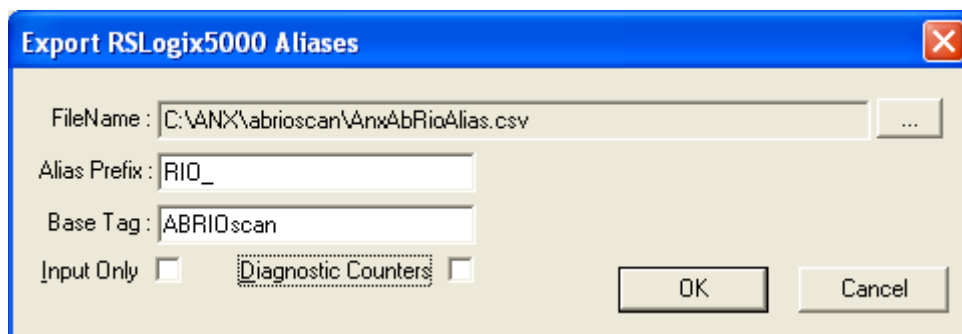
The aliases that are created are:

Alias Name	Comment	Address
RIO_R01_STS	Rack-01 Status	ABRIOscan:0:I.Data[0]
RIO_R01_CTL	Rack-01 Control	ABRIOscan:0:O.Data[0]
RIO_I010	Rack-01 Grp-0 Discrete Input	ABRIOscan:0:I.Data[2]
RIO_O010	Rack-01 Grp-0 Discrete Output	ABRIOscan:0:O.Data[2]
RIO_I011	Rack-01 Grp-1 Discrete Input	ABRIOscan:0:I.Data[3]
RIO_O011	Rack-01 Grp-1 Discrete Output	ABRIOscan:0:O.Data[3]

The name is built from the Alias Prefix and the I/O address. The data address is built from the Base tag and the data mapping. The configuration tool creates comments that describe the data.

If we check the Diagnostic Counters box in the Export RSLogix 5000 aliases dialog, the alias file also includes comments that refer to the diagnostic data in connection 15.

These comments are displayed when you view the connection 15 data in RSLogix 5000 and help identify the data.

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Examples:

Address	Comment
ABRIOscan:15:I.Data[2]	RIO_ Active Rack Table - Racks 00-03, Start Mod Group 0,2,4,6
ABRIOscan:15:I.Data[18]	RIO_ Receive - Good Frames
ABRIOscan:15:I.Data[29]	RIO_ Scan Time Average (ms)

Archiving Configurations

File/Archive Templates

The *File/Archive Templates* command copies any block transfer module templates used in the current configuration file into the directory where the configuration file is stored.

File/Archive Template Check

The *File/Archive Template Check* command checks whether any block transfer module templates used in the current configuration file are not stored in the directory where the configuration file is stored.

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Configuring the AN-X Module in RSLogix 5000

The AN-X4-ABRIO-SCAN emulates a 17-slot 1756 chassis with an ENBT/A in slot 16 and up to 16 generic modules in slots 0 to 15.

Connections to slots 0 to 14 are used for I/O data; the connection to slot 15 is reserved for diagnostic data (see page 50).

To configure the AN-X4-ABRIO-SCAN in RSLogix 5000:

1. Right click on the ControlLogix Ethernet module that will be communicating with the AN-X and select *Add Module*. Add a 1756-ENBT/A module. Set the Major Rev to 1.
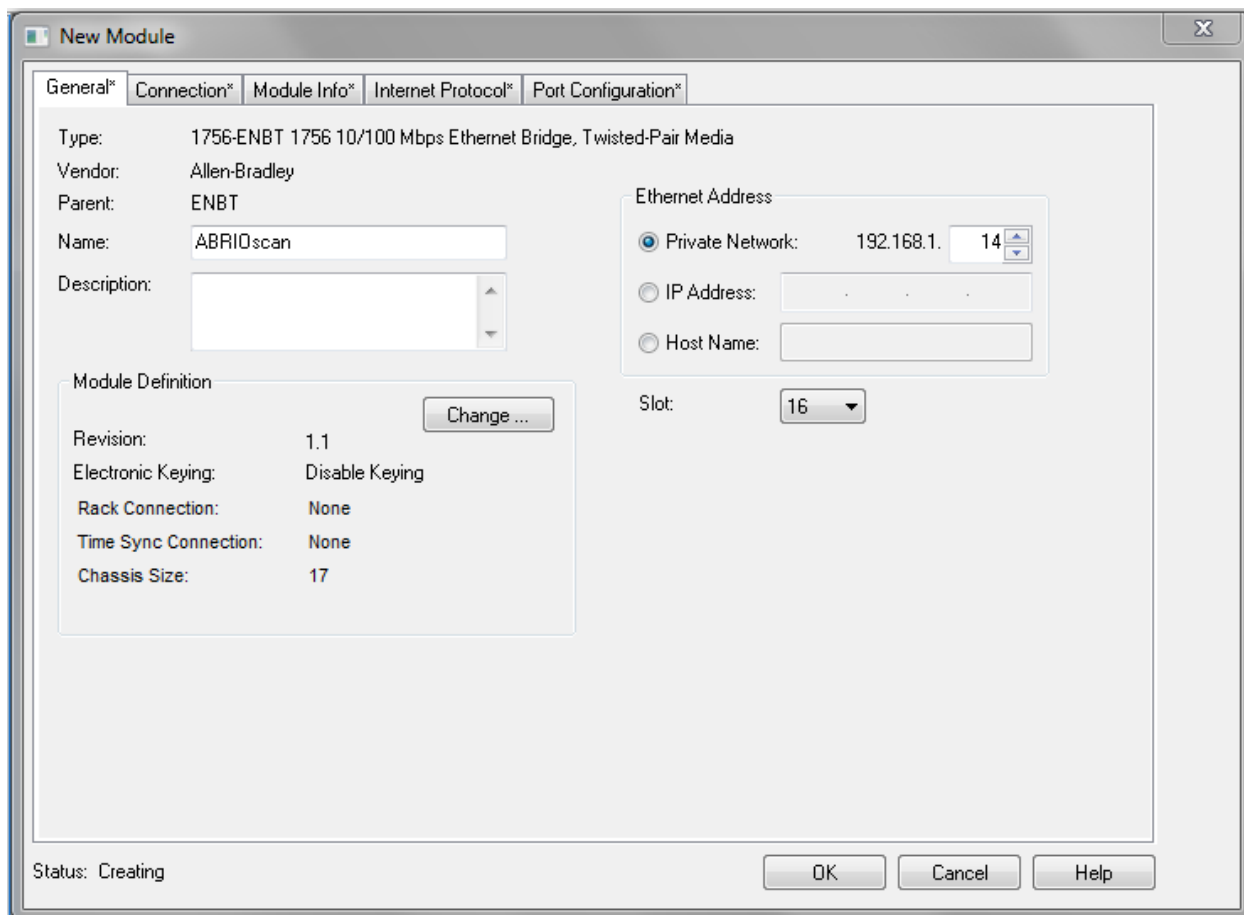
Enter the *Name*. Use the host name you assigned to AN-X when you configured its IP properties.

Set the Slot to 16. Set the chassis size to 17.

Set the *Rack Connection* to None.

Set the IP address to match the AN-X module.

Set *Electronic Keying* to *Disable Keying*.

Record the *Name* as it is used to create aliases to access the data.

Click OK to accept the module.

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2. Add Generic modules for each required connection, usually at least slot 0 for data and slot 15 for diagnostics. The AN-X configuration tool shows which connections are required (see). Right click on the backplane and select *New Module*. From the *Other* category, select 1756-MODULE and click OK.

New Module					☒
Type:	1756-MODULE Generic 1756 Module				
Parent:	ABRIOscan		**Connection Parameters**		
				Assembly Instance:	Size:
Name:	AnxSlot0		Input:	1	250 ⬍ (16-bit)
Description:		▲	Output:	2	248 ⬍ (16-bit)
		▼	Configuration:	4	0 ⬍ (8-bit)
Comm Format:	Data - INT	▼	Status Input:		
Slot:	0 ⬍		Status Output:		
☑ Open Module Properties			OK	Cancel	Help
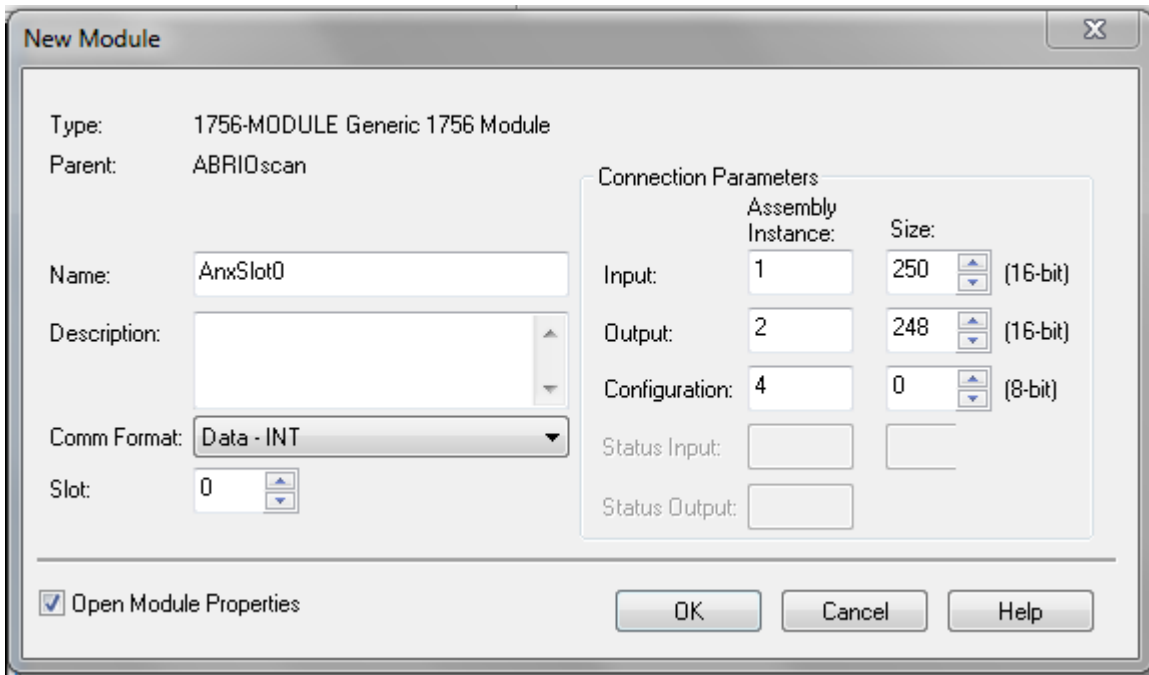
Set the Name and Description as desired.

Set the Comm Format to Data – INT.

Set the other parameters as shown. Set the Slot to 0 for connection 0, 1 for connection 1, and so on.

3. Set the RPI for each connection.
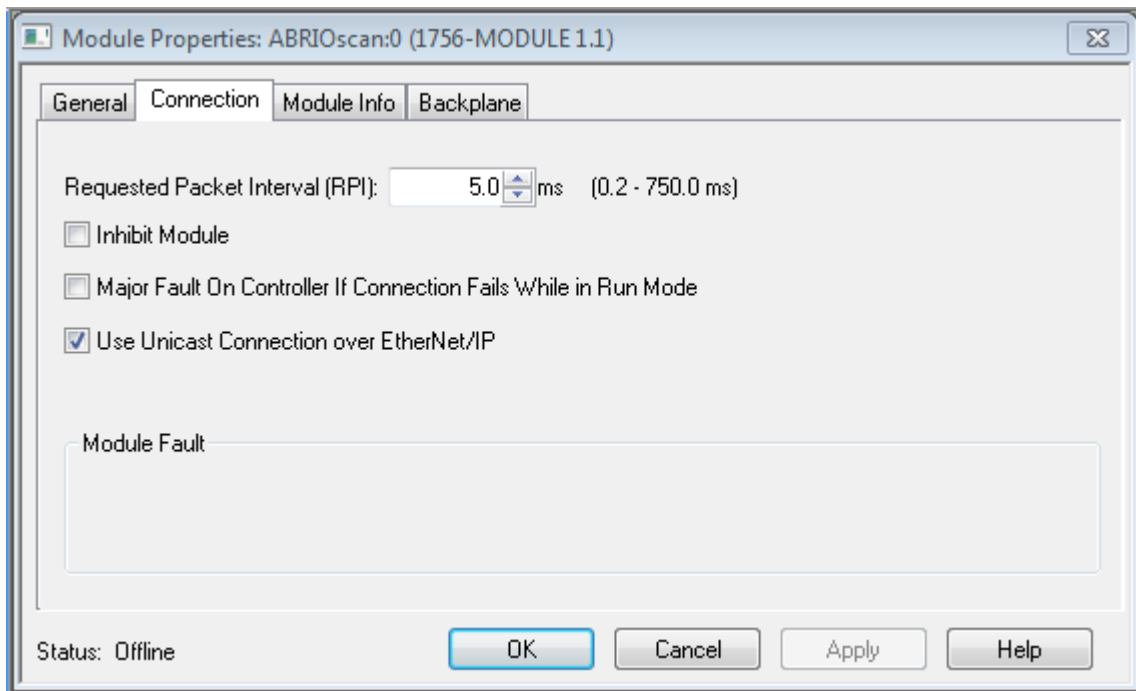
AN-X accepts RPIs from 1 to 750 ms.

Select an RPI appropriate to the remote I/O network scan time and to your application. You can use the diagnostic counters (see page 48) to obtain the remote I/O network scan time.

TIP	Use the web interface of the ENBT or other Ethernet module that connects the ControlLogix to the AN-X to view the loading of the ENBT module.

ControlLogix Aliases

AN-X uses the Ethernet/IP configuration to create aliases that can be imported into RSLogix 5000. Use these aliases in your RSLogix 5000 program to access the data on the AN-X. Even if the ControlLogix address for an I/O address changes, all you have to do is export the aliases and re-import them into RSLogix 5000.

WARNING!	Before you export aliases, right click on the root of the network tree and select *AN-X-AB-RIO Properties…*
	Make sure that the AN-X2 checkbox is checked.

WARNING!	If you change the remote I/O or ControlLogix configuration, export aliases and re-import them so that the ControlLogix processor uses the correct addresses.

In the configuration tool, select *Tools/Export Alias File...*

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The alias name is built from the Alias Prefix and the remote I/O address.

The ControlLogix address is built from the Base Tag and the data mapping.

Importing Aliases in RSLogix 5000

To import the alias file into RSLogix 5000, you must be offline. Select *Tools/Import...* and import the alias file.

Alias Format

AN-X builds each alias from the Alias Prefix, Base Tag, and data mapping, for example,

ALIAS,"","RIO_I000","Rack-00 Grp-0 Discrete Input","","ANX:0:I.Data[2]"

In this example, the alias name is RIO_I000. The name is made up of the Alias Prefix (RIO_) and the I/O address, input data, rack 00, I/O group 0.

The ControlLogix data address is ANX:0:I.Data[2]. The address is made up of the Base Tag and the data location from the data mapping.

There is also a comment, ","Rack-00 Grp-0 Discrete Input", to make it easier to recognize the data.

Comments

The alias file also contains comments for data points for which there are no aliases, such as the diagnostic counters. If you view the data points in RSLogix 5000, the comments are displayed.

Using the RIO-SCAN Log

If there are problems with scheduled connections to the AN-X, use the RIO-SCAN log in the AN-X web interface to identify the cause.

Select *Log Files/RIO-SCAN Log* to display the log. Look for error messages that describe in detail the cause of any problem with the current configuration.

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Scanning Remote I/O

Required Connections

If all required ControlLogix connections are not running, the AN-X4-ABRIO-SCAN scans the remote I/O network in program mode.

Scan Mode: Program/Run

The remote I/O scan mode (program or run) is determined by the mode of the controller with the exclusive owner connection to slot 0 of the AN-X4-ABRIO-SCAN.

In run mode, the AN-X4-ABRIO-SCAN scans remote racks, reads discrete inputs and writes discrete outputs, and updates block transfers.

In program mode, the AN-X4-ABRIO-SCAN scans remote racks, reads discrete inputs but does not write discrete outputs or update block transfers.

In test mode, the AN-X4-ABRIO-SCAN behaves the same as it does in program mode.

Executing Block Transfers

Automatic

An automatic block transfer performs a configuration block transfer write once and then performs timed data block transfer read and write updates using the BTR and BTW data lengths and update times from the configuration tool.

Automatic block transfers begin as soon as the processor is in run mode; they do not have to be triggered.

Errors in block transfer execution are indicated by non-zero values in the BTR/BTW Error Code.

In automatic mode, the I/O module configuration data values come from the configuration tool, either as default values or from user parameters. The size of the configuration block transfer write is the data BTW length, BtwLen, plus the Config BTW Length, CfgLen, from the template. The data block transfer write length is BtwLen from the template and this is the length mapped to CLX scheduled output data.

The size of the data block transfer read is set by the configuration tool.

Semi-Automatic

A semi-automatic block transfer performs a configuration block transfer write once and then performs timed data block transfer read and write updates using the BTR and BTW data lengths and update times from the configuration tool.

Semi-automatic block transfers begin as soon as the processor is in run mode; they do not have to be triggered.

Any errors in BT execution are indicated by non-zero values in the BTR/BTW Error Code.

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In semi-automatic mode, the module configuration data values come from ControlLogix scheduled output data mapped to the block transfer. The size of the configuration block transfer write is the data BTW length, BtwLen, plus the Config BTW Length, CfgLen, from the template, and this is the length mapped to ControlLogix scheduled output data. The data block transfer write length is BtwLen from the template.

The size of the data block transfer read is set by the configuration tool.

If you are using a semi-automatic block transfer, ensure that the configuration data is set in the ControlLogix data table before the program starts.

Manual

To execute block transfers in manual mode:

- Fill in the BTR and/or BTW length and BTW data in the control block for the module

- Set the BTR.EN and/or BTW.EN bits (and BTR.CONT/BTW.CONT for continuous execution)

- Check the BTR.DN/BTW.DN bits that indicate BT execution is complete (BTR data is available at that time)

- Check the BTR.ERR/BTW.ERR bits. If set, read the error code to determine the cause of the problem.

Inhibiting Automatic Block Transfers

To inhibit a running automatic or semiautomatic block transfer, set bit 9 in offset 0 of the mapped block transfer output data for the module. Setting the bit inhibits both the block transfer read and the block transfer write to the module.

Monitoring operation

Discrete Inputs and Outputs

To monitor discrete inputs, do one of the following:

- from the main menu, select *Monitor/Discrete Inputs*

- right click on a rack and select *Monitor Discrete Inputs*

- use the *Monitor Discrete Inputs* button on the toolbar

The Discrete Input monitor window appears.
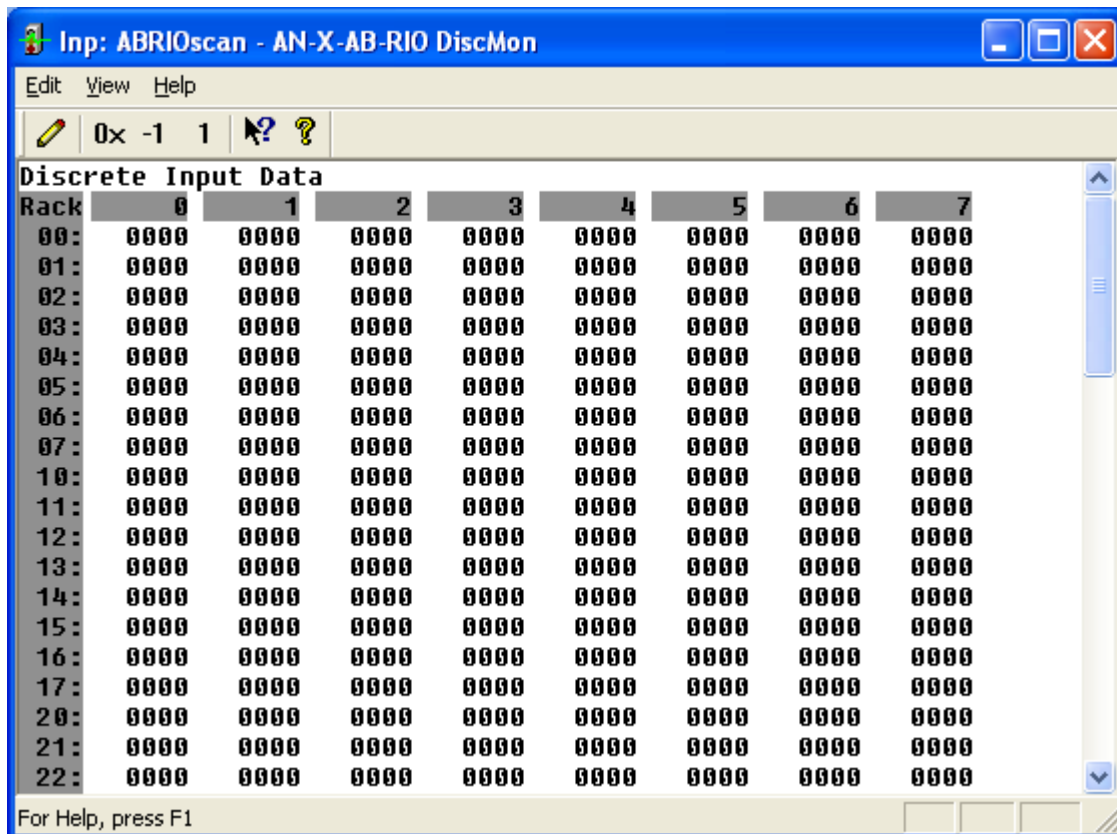
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Each row corresponds to a rack. Rack numbers are given in octal. Each row shows the 8 words discrete inputs for the rack number.

Data can be displayed in several formats:

Format	From menu…	From Toolbar
Hexadecimal	View/Hex	0x button
Signed decimal	View/Unsigned	1 button
Unsigned decimal	View/Signed	-1 button

To monitor discrete outputs, do one of the following:

- from the main menu, select *Monitor/Discrete Outputs*
- right click on a rack and select *Monitor Discrete Outputs*
- use the *Monitor Discrete Outputs* button on the toolbar

The Discrete Output monitor window appears.
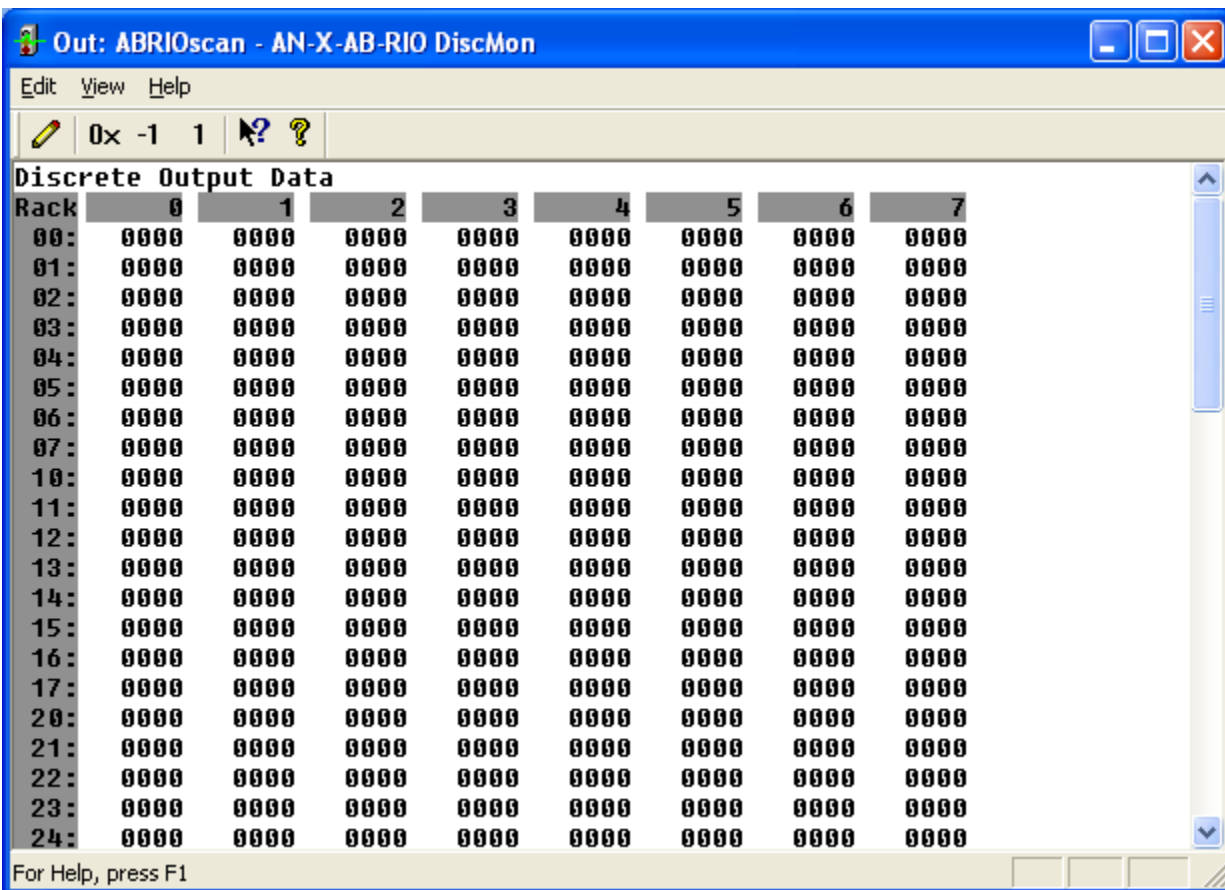
Each row corresponds to a rack. Rack numbers are given in octal. Each row shows the 8 words discrete inputs for the rack number.

Data can be displayed in several formats:

Format	From menu…	From Toolbar
Hexadecimal	View/Hex	0x button
Signed decimal	View/Unsigned	1 button
Unsigned decimal	View/Signed	-1 button

Block Transfers

To monitor a block transfer module, right click on the module in the tree and select *Monitor BT Module*. The block transfer module window appears.

The block transfer monitor displays the raw data for the block transfer and some diagnostic information.
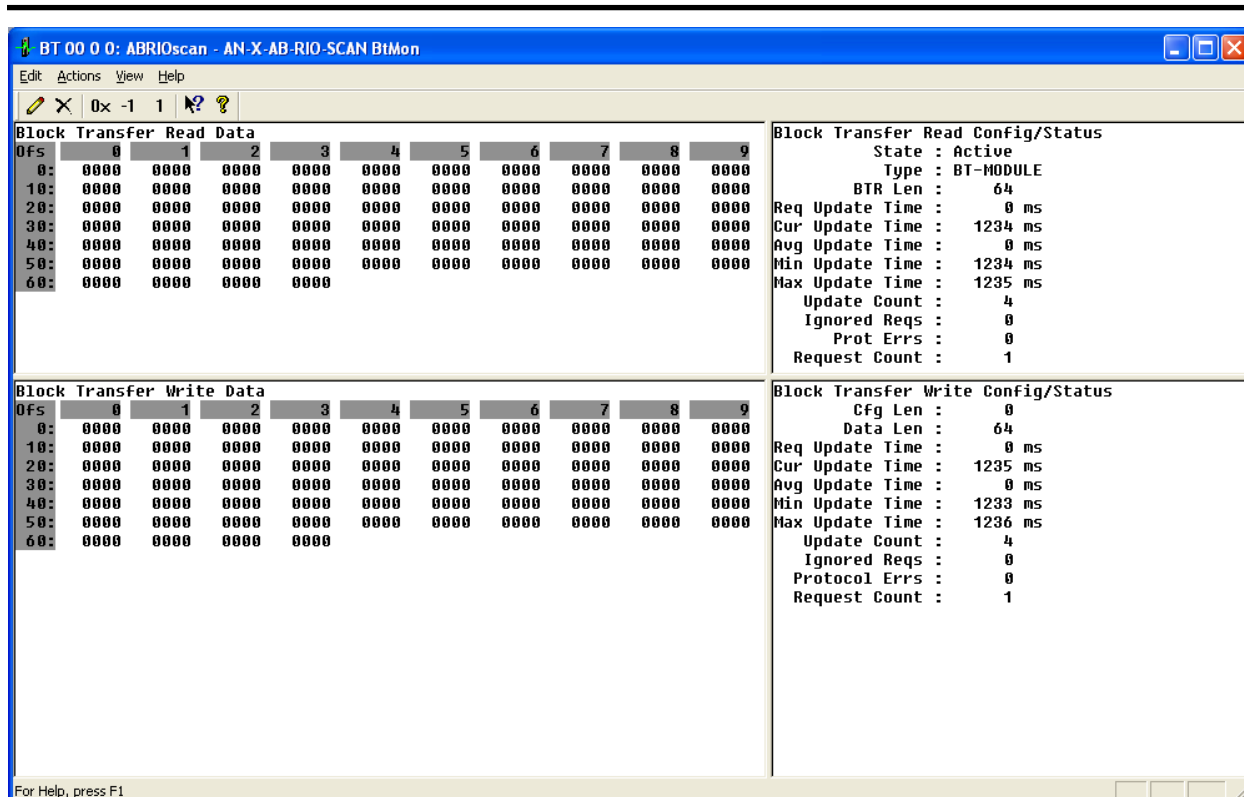
The raw data can be displayed as hexadecimal, signed or unsigned integer. The default for block transfer data is hexadecimal.

Format	From menu…	From Toolbar
Hexadecimal	View/Hex	0x button
Signed decimal	View/Unsigned	1 button
Unsigned decimal	View/Signed	-1 button

Block Transfer Read Diagnostics

Counter	Description
State	Config/Active/Inactive
Type	Module type, from the module template
BTR Len	Block transfer read length
Req Update Time	Requested update time in the module configuration, in ms
Avg Update Time	Average update time for this block transfer read, in ms. This is the average of the previous 32 updates.
Min Update Time	Minimum update time for this block transfer read, in ms

Counter	Description
Max Update Time	Maximum update time for this block transfer read, in ms
Update Count	Running count of updates for this block transfer read
Ignored Req	Running count of update requests ignored by the block transfer module.
Prot Errors	Running count of protocol errors for this block transfer read. If this counter is incrementing, the module isn't responding correctly. Possible causes are length mismatch, invalid reply.
Request Count	Count of the number of times on successive scans this block transfer was requested. If this number is consistently greater than 1, increase the requested update time - the module cannot respond quickly enough at the current requested time. The counter applies to both the BTR and BTW for this module.

Block Transfer Write Diagnostics

Counter	Description
CFG len	Length of the configuration data for this module
BTW data len	Data length
Req Update Time	Requested update time in module configuration, in ms
Avg Update Time	Average update time for this block transfer write, in ms. This is the average of the previous 8 updates.
Min Update Time	Minimum update time for this block transfer write, in ms
Max Update Time	Maximum update time for this block transfer write, in ms
Update Count	Running count of updates for this block transfer write.
Ignored Req	Running count of update requests ignored by the block transfer module
Prot Errs	Running count of protocol errors for this block transfer write

Rack Status and Diagnostic Counters

The AN-X4-ABRIO-SCAN maintains diagnostic counters that indicate the state of communication on the entire RIO network, as well as counters related to each rack. It also maintains an active rack list.

To monitor the diagnostic counters, select *Monitor/Diagnostic Counters* from the main menu or use the *Monitor Diagnostic Counters* button on the toolbar.

```
ABRIOscan - AN-X-AB-RIO-SCAN DiagMon                                    _ □ ✕
Actions  View  Help
 ✕  ▶?  ?
Active Racks
          111111112222222233333333344444444555555556666666677777777
    01234567012345670123456701234567012345670123456701234567012345 6
0:1---111---111-11--1111-11-11-1111-----------------------------1
2:-1--1--11-11-11-1----111-11-1-1------------------------------
4:--1--1-1-11-111--11-1---111-----1----------------------------
6:---1--1-11-1111----11-11-----1-------------------------------

Global Diag Counters
TxCount  :  19823
RxGood   :  19823
RxTout   :      0
RxBadCrc :      0
RxNoise  :      0
RxAbort  :      0
PrtclErr :      0
PrtclTyp :  00
PrtclArg :  00
ErrRack  :   Rack:00 Start Group:0
ErrBtMod :   Group:0 Slot:0
UpdCur   :    617
UpdAvg   :    617
UpdMin   :    616
UpdMax   :    620

Rack Diag Counters
Qtr /--------- 0 -------\ /--------- 2 -------\ /--------- 4 -------\ /--------- 6 -------\
Rck   Rx  Crc  Tout Prtcl    Rx  Crc  Tout Prtcl    Rx  Crc  Tout Prtcl    Rx  Crc  Tout Prtcl
 0: 14676   0    0    0
 1:                       14676   0    0    0
 2:                                              14676   0    0    0
 3:                                                                     14676   0    0    0
 4: 14676   0    0    0 7338   0    0    0
 5: 14676   0    0    0                    7338   0    0    0
 6: 14676   0    0    0                                          7338   0    0    0
 7:                       14676   0    0    0 7338   0    0    0
10:                       14676   0    0    0                    7338   0    0    0
11:                                              14676   0    0    0 7338   0    0    0
12: 14676   0    0    0 14674   0    0    0 14674   0    0    0
13: 14674   0    0    0 14674   0    0    0                    14674   0    0    0
For Help, press F1
```

Active Rack List

The active rack list shows where the active racks are located. Columns represent racks, rows represent starting I/O groups. Racks are numbered in octal.

If the bit for a rack and starting I/O group is set, there is a rack at that location. The table does not show rack size.

Global Diagnostic Counters

The global diagnostic counters consist of:

Counter	Description
TxCount	This counter increments each time the AN-X4-ABRIO-SCAN transmits a packet.
RxGood	This counter increments when the AN-X4-ABRIO-SCAN receives a good packet.

Counter	Description
RxTout	This counter increments when the AN-X4-ABRIO-SCAN sends a packet but does not receive a reply.
RxBadCRC	This counter increments when the AN-X4-ABRIO-SCAN receives a packet with a bad CRC. Check cabling and termination on the RIO network.
RxNoise	This counter increments when the AN-X4-ABRIO-SCAN hears a carrier without receiving a packet. Check cabling and termination on the RIO network.
RxAbort	This counter increments when the AN-X4-ABRIO-SCAN receives an opening flag, then the packet ends without a closing flag.
PrtclErr	This counter increments when the AN-X4-ABRIO-SCAN receives a packet that makes no sense in terms of the protocol.
PrtclTyp	Protocol error type
PrtclArg	Protocol error argument
ErrRack	Rack error location
ErrBtMod	Block transfer error location
UpdCur	Current update time for all configured racks.
UpdAvg	Average update time for all configured racks. This is the average of the previous 64 updates.
UpdMin	Minimum update time for all configured racks.
UpdMax	Maximum update time for all configured racks.

Rack Diagnostic Counters

The rack diagnostic counters consist of the following counters for each partial rack.

Counter	Description
Rx	This counter increments when the AN-X4-ABRIO-SCAN receives a packet from this rack.
Crc	This counter increments when the AN-X4-ABRIO-SCAN receives a packet with a bad CRC from this rack.
Tout	This counter increments when the AN-X4-ABRIO-SCAN sends a packet to this rack and does not receive a reply within the time-out period.
Prtcl	This counter increments when the AN-X4-ABRIO-SCAN receives a packet from this rack that does not make sense in terms of the remote I/O protocol.

Mapping Diagnostic Counters

To map the diagnostic counters to ControlLogix scheduled data, add a connection to slot 15.

Since the diagnostic counters do not need to update frequently, set the RPI to a large number, such as 500 ms.

You cannot map individual diagnostic counters.

The diagnostic counters consist of:

Offset	Description
2-17	Rack status
18	Good frames received
19	Timeouts
20	Frames with CRC errors
21	Frames received with noise errors
22	Abort errors
23	Transmitted frames
24	Protocol errors
25	Low byte- protocol error type, high byte - error argument
26	Low byte – Error rack, high byte block transfer I/O group
28	Current remote I/O scan time, ms
29	Average remote I/O scan time, ms
30	Minimum remote I/O scan time, ms
31	Maximum remote I/O scan time, ms
35-38	Scheduled I/O Diagnostics (support use only)
35	Scheduled I/O Tx count
36	Scheduled I/O Rx count
37	Lo Byte: Ethernet Error Counter Hi Byte: Ethernet Error Type
38	Lo Byte: UDP or Ethernet/IP Protocol Error Counter Hi Byte, Lo Nibble: Protocol Error Type Hi Byte, Hi Nibble: Protocol Error Slot
40-44	Slot 0 Scheduled Connection statistics
40	Update counter
41	Error counter
42	Current update time
43	Maximum update time
44-47	Slot 1 Scheduled Connection statistics

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Offset	Description
48-51	Slot 2 Scheduled Connection statistics
52-55	Slot 3 Scheduled Connection statistics
56-59	Slot 4 Scheduled Connection statistics
60-63	Slot 5 Scheduled Connection statistics
64-67	Slot 6 Scheduled Connection statistics
68-71	Slot 7 Scheduled Connection statistics
72-75	Slot 8 Scheduled Connection statistics
76-79	Slot 9 Scheduled Connection statistics
80-83	Slot 10 Scheduled Connection statistics
84-87	Slot 11 Scheduled Connection statistics
88-91	Slot 12 Scheduled Connection statistics
92-95	Slot 13 Scheduled Connection statistics
96-99	Slot 14 Scheduled Connection statistics
100-103	Slot 15 Scheduled Connection statistics

To clear the diagostic counters from the ControlLogix, set bit 0 of offset 0 of the outputs for connection 15. The counters are cleared on the transition of this bit from 0 to 1.

Clearing the diagostic counters does not clear counters with offsets 35 to 38.

IMPORTANT!   Scheduled connection statistics are valid only for connections that exist.

Scheduled Connection statistics for unused connections may contain meaningless non-zero values, and they are not cleared when you clear counters.

IMPORTANT!   The scheduled connection statistics have changed from the AN-X2

Module Logs

The scanner logs contain messages from the firmware running on the AN-X4-ABRIO-SCAN, showing its normal operation and error messages. They may be useful in tracking down errors and for Technical Support.

Access the scanner logs from the web interface. See page 69 for more information.

Block Transfer Module Templates

The properties of block transfer modules are defined in files in the subdirectory 'Templates' of the directory where the AN-X4-ABRIO-SCAN software is installed. Template files have extension BtModTpl.

Template files are simple text files that define the properties of the block transfer module.

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

The following information is supplied so that you can create templates for block transfer modules that the AN-X4-ABRIO-SCAN does not support.

TIP   If you create a new template, base it on an existing template that's similar to the module for which you want to create the new template. Copy the existing template file to a new file and rename it.

For block transfer modules that do not have a specific profile, you can also use the generic profile, BT-MODULE, in automatic, semiautomatic or manual mode.

Description

A profile usually contains a description record, which consists of the keyword Desc, followed by an equals sign and then up to 79 characters of text enclosed in quotes.

The description text is displayed in the configuration dialog box for any modules created from the template.

Examples

```
Desc="1771-IFE - 8 Channel Single Ended"
Desc="1771-OFE - Binary Format, No BTR"
```

Note

A note record, which consists of the keyword Note, followed by an equals sign and then up to 79 characters of text enclosed in quotes, is used to convey information that a user needs when creating a module from this template.

The note text is displayed in the configuration dialog box for any modules created from the template.

Example:

```
Note="Always set mapped output data word 0 to 8880 hexadecimal in the ControlLogix"
```

Block Transfer Lengths

AN-X sends a configuration block transfer write to a module on the first scan in run mode. Thereafter it sends data block transfer writes to update the module's data.

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A block transfer has three lengths associated with it.

The configuration length, CfgLen, is the length of the additional configuration block transfer write data sent to the block transfer module to initialize it.

The block transfer write length, BtwLen, is the length of the block transfer write sent to the module during normal data update.

The block transfer read length, BtrLen, is the length of the block transfer read sent by the module during normal data update.

Therefore, the initial configuration block transfer write has a total length of BtwLen+CfgLen

BtwLen (I/O data)	CfgLen (Configuration data)

Default Configuration Data

The template usually contains default values for the configuration block transfer write.

Each value consists of the keyword CfgData, an offset enclosed in square brackets, an equals sign, and the data value.

For example

```
CfgData[ 8]=0x0fff
```

The offset is an offset into the configuration block transfer write and ranges from 0 to (BtwLen+CfgLen-1).

The data value can be expressed in decimal or hexadecimal (leading 0x, as shown above)

The default data definition is often followed by a comment (leading semicolon) to indicate what the value means.

The configuration tool uses the default configuration data to select the initial values when you create a block transfer module from the template and the selection initially displayed in the dialog box.

Examples

```
CfgData[4]=0x8000   ; 0-3:DataPol, 4 6 8 10:MinScaPol,  5 7 9 11:MaxScaPol,
15:BinFmt

CfgData[5]=0x0000   ; Min Scale ch 1
```

Parameters

Parameters let you assign values to the configuration data different from the default values for a specific module created from a standard template.

Parameters appear in the configuration dialog for any modules created from the template.

Parameter definitions begin with the keyword 'ParmDesc' and end with the keyword 'ParmEnd'.

Parameter definitions contain:

- a description to display in the module dialog
- the location of the parameter in the dialog box

- the location in the configuration data
- data value of the parameter

Description

Parameter definitions begin with the keyword 'ParmDesc', which is followed by an equals sign and then up to 39 characters of text to be displayed in the dialog box.

Location in Dialog Box

The screen location in terms of row (Row=0-63) and column (Col=0-2) where the parameter will be displayed in the dialog box.

Location in the Configuration Data

The location of the parameter in the configuration block transfer is defined in terms of offset, data mask and bit shift.

The offset is the offset into the configuration block transfer, from 0 to 63. It is specified by the keyword 'Ofs', an equals sign, and the offset value.

The shift is the number of bits the value you enter is shifted left, from 0 to 15. It is specified by the keyword 'Shift', an equals sign, and the shift value.

The mask is used to select bits in the value you enter. It is specified by the keyword 'Mask', an equals sign, and the mask value, usually in hexadecimal.

The value you enter is logically ANDed with the mask, shifted left by the shift value, and ORed into the configuration word given by the offset.

Example

```
Ofs= 8 Mask=0x00ff Shift=2
```

Data Definition Values

Data definition values can be a numerical value or a value from a selection list. Numerical values are defined in terms of a format (BcdSgn, BcdUns, BinSgn or BinSgn), the corresponding data value, mask and shift values, and minimum and maximum values. Selection lists can contain up to 256 selection values. The configuration dialog for a module created from the template displays the names of the selection values.

Parameter Examples

Example 1: Numeric value

```
; Min Scale

ParmDesc="Min Scale Ch 1 :" Col=0 Row=0 Ofs=5 Mask=0xffff Shift=0

   BinSgn MinVal=-4095 MaxVal=4095

ParmEnd
```

Example 2: Selection

```
; Channel 1

ParmDesc="Range Select Ch  1:" Col=0 Row= 2 Ofs=0 Mask=0x0003 Shift=0

   Select="  1 to   5V,  4 to 20mA", 0
```

```
    Select="  0 to  5V,  0 to 20mA", 1

    Select=" -5 to  5V,-20 to 20mA", 2

    Select="-10 to 10V,  0 to 10V" , 3

ParmEnd
```

Aliases

Aliases define the names and descriptions exported from the configuration tool and imported into RSLogix 5000. They begin with keyword 'AliasInp' or 'AliasOut', an offset enclosed in square brackets, a name consisting of up to 15 characters enclosed in quotes, and a description consisting of up to 79 characters enclosed in quotes.

Sample Files

Look in the directory *Templates* where the configuration software is installed for numerous examples of template files.

Using the Web Interface

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

Use the web interface to:

- 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.

Home Page	Quest Technical Solutions
▼ Automation Network	**AN-X-ABRIO-SCAN AB-RIO Scanner (v4.1.46)**
RIO Discrete Data	**Introduction:**
RIO Block Transfers	The AN-X-ABRIO-SCAN Gateway Module acts as an A-B Remote I/O Scanner.
RIO Diagnostics	**Directions:**
Ethernet/IP Diagnostics	The main menu, located on the left, provides a list of options that can be configured using this web interface. To see the sub-menus for each item, click on the down arrow icon beside each main option.
▼ Log Files	**Menu Details:**
▼ Administration	**Automation Network**
▼ Support	**Configuration**
	The AN-X-ABRIO-SCAN is configured using a Windows Configuration tool.
	RIO Discrete Data:
	Display remote I/O Discrete Input and Output data.
	RIO Block Transfers:
	Display Block Transfers. Click on a Block Transfer location to monitor the data and counters for a specific Block Transfer.

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

Configuration

The AN-X-ABRIO-SCAN is configured using a Windows Configuration tool and not from the web interface.

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RIO Discrete Data

Use *Automation Network/RIO Discrete Data* to display the discrete data on all racks.

Home Page	A-B RIO Scanner Discrete Data Monitor
▼ Automation Network	Refresh Counters ✔ Auto Refresh ✔ Hex ■ WrtEna
RIO Discrete Data	
RIO Block Transfers	
RIO Diagnostics	
Ethernet/IP Diagnostics	
▼ Log Files	
▼ Administration	
▼ Support	

Out	0	1	2	3	4	5	6	7
0	0000	0000	0000	0000	0000	0000	0000	0000
10	0000	0000	0000	0000	0000	0000	0000	0000
20	0000	0000	0000	0000	0000	0000	0000	0000
30	0000	0000	0000	0000	0000	0000	0000	0000
Inp	0	1	2	3	4	5	6	7
0	0000	0000	0000	0000	0000	0000	0000	0000
10	0000	0000	0000	0000	0000	0000	0000	0000
20	0000	0000	0000	0000	0000	0000	0000	0000
30	0000	0000	0000	0000	0000	0000	0000	0000

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 Counters or by clicking anywhere on the table.

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: If you enter I/O data here, it may be overwritten by:

- RIO Outputs from the remote I/O scanner
- RIO Inputs from remote 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

The size of the display is based on 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.

Any cell in the table with a number indicates a location where a block transfer has been defined on a 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. The first time you open the window, all values are regarded as new and are displayed with a green background.

The size of the display is based on 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.

A-B RIO Scanner Rack:3 Grp:2 Slot:0 Block Transfer Monitor

Clear Counters   Refresh   ✔ Auto Refresh   ☐ Hex ☐ WrtEna

Mode	Auto		State	Active		Inhib	0		CfgForce	Norm

BTR	0	1	2	3	4	5	6	7	8	9					
0	0	0	0	0	-32768		1794-IE4XOE2				Req Tme	0	Upd Count	1076

Req Tme	0	Upd Count	1076
Cur Tme	109	BTR Len	5
Avg Tme	109	STS	OK
Min Tme	0		
Max Tme	8127		
Ign Req	0		
Prtcl Err	0		
Req Count	0		

BTW	0	1	2	3	4	5	6	7	8	9
0	0	0	3	0	0	0	0	0		

Req Tme	0	Upd Count	1076
Cur Tme	109	Cfg Len	5
Avg Tme	109	Data Len	3
Min Tme	0	STS	OK
Max Tme	8072		
Ign Req	0		
Prtcl Err	0		
Req Count	0		

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, 1794-IE4XOE2.

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. The first time you open the window, all values are regarded as new and are displayed with a green background.

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

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- 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: If you enter I/O data here, it 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
Req Tme	Requested update time, from the configuration program
Cur Tme	The current update time, in ms
Avg Tme	Average update time for the last 32 updates
Min Tme	The minimum update time, in ms, since the last reset
Max Tme	The maximum update time, in ms, since the last reset
Ign Req	The number of times the AN-X has requested a block transfer and the module has not responded
Prtcl Err	Count of protocol errors
Req Count	Number of requests before BT module responded
BTR/BTW Upd Count	Count of block transfer read/write updates
BTR Len	Length of the most recent block transfer read
Cfg Len	Length of the last configuration block transfer write
Data Len	Length of the last data block transfer write
STS	BTR/BTW status

In addition the BTW shows Cfg Len, the length of configuration data for the block transfer.

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

The counters update once a second when Auto Refresh is checked.

You can update the counters at any time by clicking Refresh Counters.

Click Clear Counters to reset the counters. Clear the counters when you first open the screen.

A-B RIO Scanner Diagnostic Monitor

Clear Counters   Refresh Counters   ✔ Auto Refresh   ✔ RUN Mode

IO Group Status					Rack 02 Grp 0 Counters		Network Diagnostic Counters			
Rack	**0**	**2**	**4**	**6**	Rx Good	0	Tx Frames	51602	Upd Cur	19
2	*ERR*				Crc Err	0	Rx Frames	7588	Upd Avg	17
3	RUN	---	---		Tout Err	43374	Crc Errors	0	Upd Min	11
					Prtcl Err	0	Abort Errors	0	Upd Max	25
							Noise Errors	0	Protocol Errors	1
							Timeouts	44012	Prot Err Type	1c
							Err RkMg	02-0	Prot Err Arg	30
							Err BtMod	0-0	Baud	57k6
							Prot Desc	BT Unexpected r2g0		

WARNING!

Checking RUN Mode FORCES the RIO scanner to RUN Mode. Unchecking RUN Mode FORCES the RIO scanner to program mode

This is meant for commissioning and testing by qualified personnel only.

Note: the state of RUN MODE selected here may be overwritten by Ethernet/IP Mapping

IO Group Status Table

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

IO Group Status				
Rack	**0**	**2**	**4**	**6**
1	RUN		---	---
2	RUN	---	---	---

The states shown in the table are:

State displayed	Explanation
RUN	Good Status - Run Mode
PROG	Good Status - Prog Mode
*TOUT	Timeout - not being scanned (may be configuration mismatch)
RST	Scanner sending reset (may be configuration mismatch)
---	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. The first time you open the window, all values are regarded as new and are displayed with a green background.

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	
Rx Good	33642
Crc Err	0
Tout Err	0
Prtcl Err	0

The counters displayed are:

Counter	Description
Rx Good	Count of received good packets from this rack
Crc Err	Count of CRC errors for this rack
Tout Err	Count of timeout errors for this rack

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Counter	Description
Prtcl Err	Count of protocol errors for this 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.

Network Diagnostic Counters

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

Network Diagnostic Counters			
Tx Frames	34346	Upd Cur	7
Rx Frames	34346	Upd Avg	7
Crc Errors	0	Upd Min	3
Abort Errors	0	Upd Max	8
Noise Errors	0	Protocol Errors	0
Timeouts	0	Prot Err Type	00
Err RkMg	00-0	Prot Err Arg	00
Err BtMod	0-0	Baud	230k4
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
Err RkMg	Rack and I/O group for the most recent error
ErrBtMod	Location (I/O group and slot) for the most recent block transfer error
Upd Cur	Update time for the last scan, in ms
Upd Avg	Average scan time of the last 32 scans, in ms
Upd Min	Minimum scan time, in ms, since the last reset
Upd Max	Maximum scan time, in ms, since the last reset
Protocol Errors	Count of frames with protocol errrors
Prot Err Type	Protocol error type
Prot Err Arg	16 bit mask that indicates the cause of the protocol errors
Baud	Remote I/O network baud rate, 57k6, 115k2, or 230k4
Prot Desc	A brief description of the last protocol error

If values change, they are shown with a light green background for one display update after they have changed. The first time you open the window, all values are regarded as new and are displayed with a green background.

Ethernet/IP Diagnostics

Use *Automation Network/Ethernet/IP Diagnostics* to display:

- Scheduled Ethernet Counters
- Statistics for each connection

Clear the counters when you first open the screen.

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		Act/RUN	1.0	1.0	3355.3	1.0	3373.4	38499	0	53558	1
15		Act/RUN	500.0	500.1	5247.0	500.4	4829.4	20392	0	20388	1

Counter	Description
Num	Connection number, 0 to 15
Name	Always blank
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 initially invalid. 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. The first time you open the window, all values are regarded as new and are displayed with a green background.

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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-SCAN Log

The RIO-SCAN log shows messages and errors associated with the Ethernet/IP 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.

If Auto Refresh is checked, the log refreshes once a second and displays the most recent events at the end of the log. If you select Previous Log, AN-X turns off Auto Refresh.

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.

If Auto Refresh is checked, the log refreshes once a second and displays the most recents events at the end of the log. If you select Previous Log, AN-X turns off Auto Refresh.
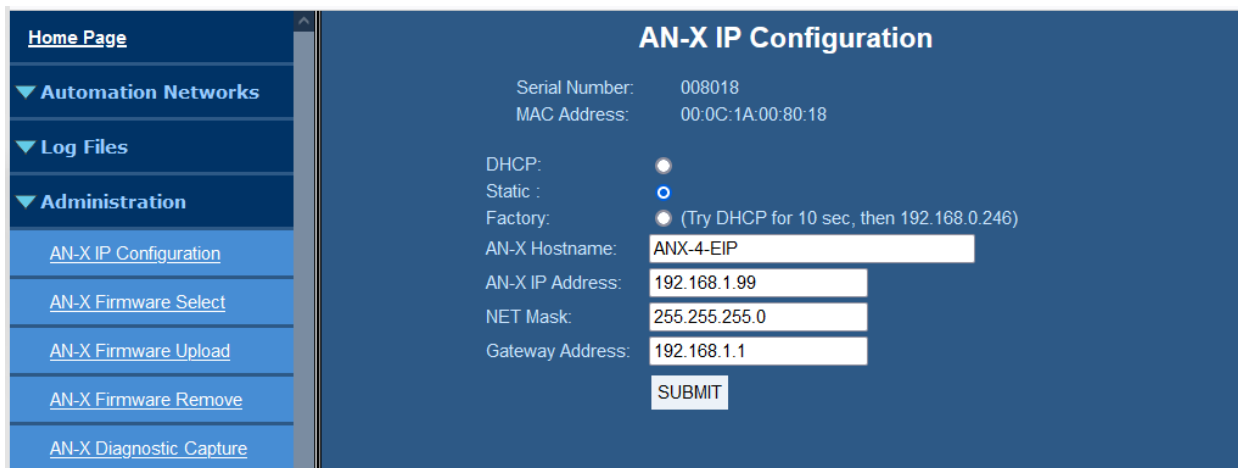
View All Logs

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.

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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, 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 to 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.
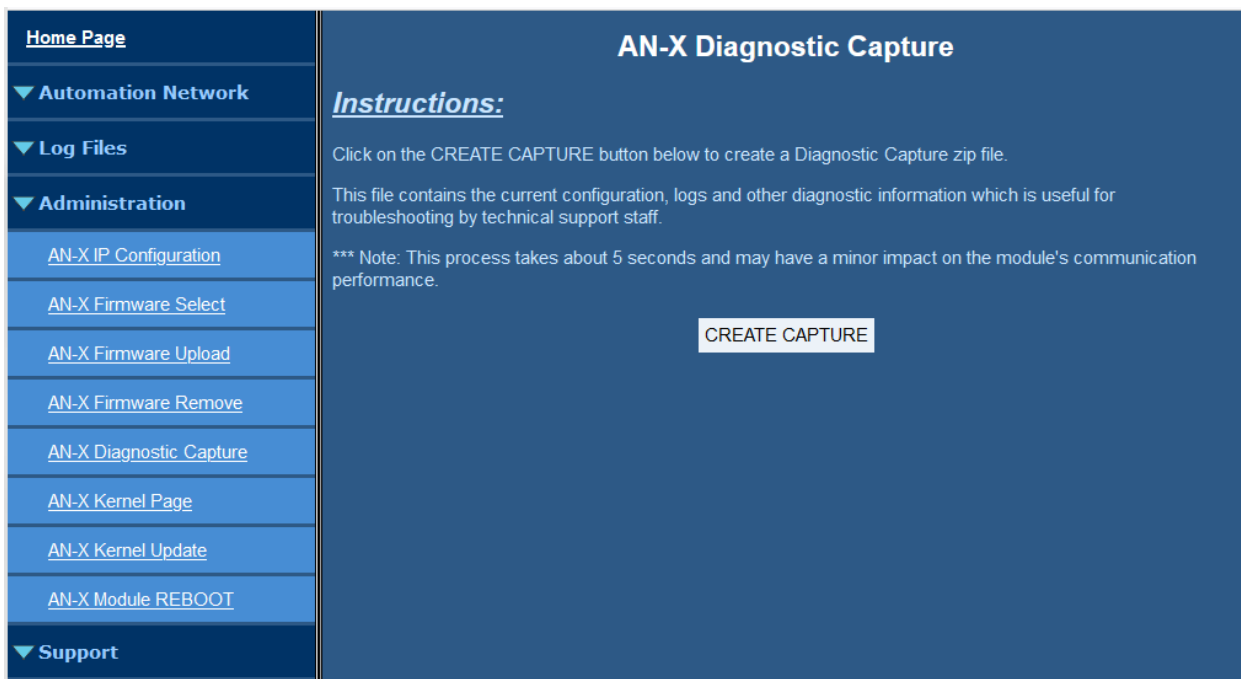
AN-X Firmware Remove

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 compressed 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.

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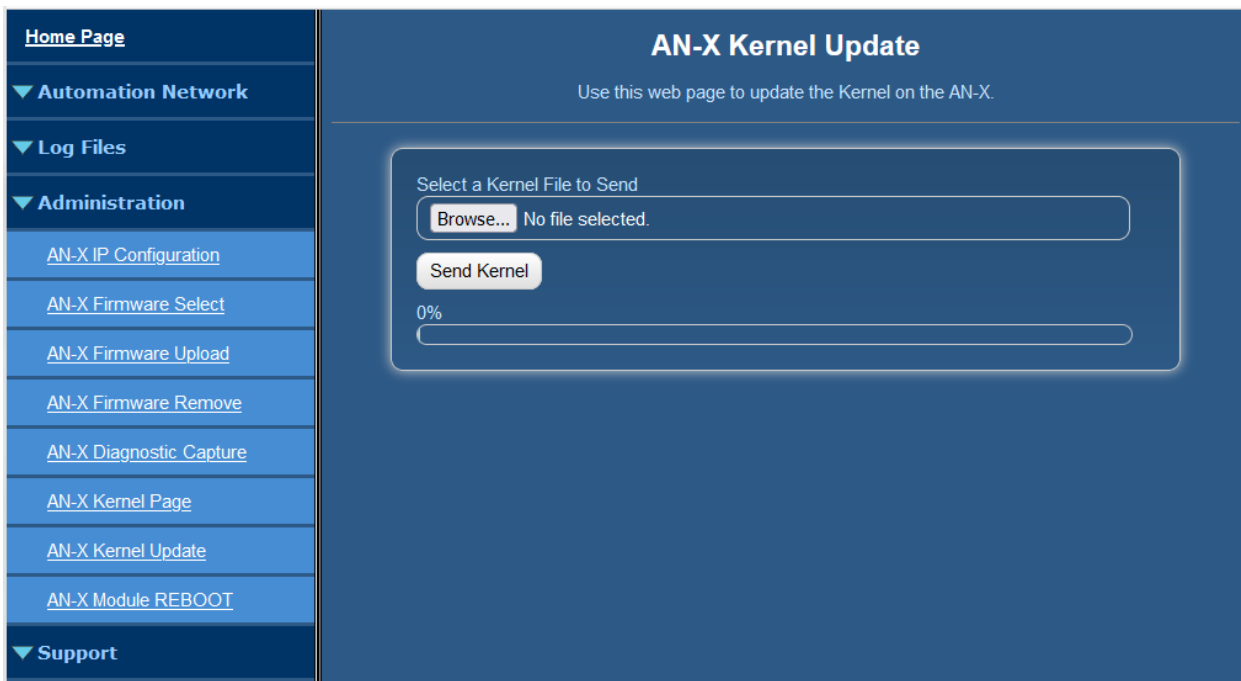
AN-X displays a progress bar as the file is transferred. When the transfer is complete, the AN-X still has to copy the kernel file to the microSD card. When the file copy is complete, the AN-X displays a message to indicate that the file was copied successfully. Stay on this web page until AN-X indicates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

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Appendix: Scanner Configuration File Format

A scanner configuration file is the text file that is stored on your computer when you save in the configuration program. It consists of:

Scanner file ID

A line with just the keyword AN-X-AB-RIO-Scanner that identifies the file as an AN-X scanner configuration file.

AN-X Name

Keyword "AnxName", comma, up to 15 characters of text, enclosed in quotes.

Baud rate

Keyword "Baud", comma, then one of 57k, 115k, 230k

LED Mode

The keyword "LedDebugMode" was used by the AN-X2 to select debug mode for the MS and NS LEDs. It is accepted by the AN-X 4 but does nothing.

Rack definitions

Keyword "Rack", comma, 0orr where rr is the rack number in octal, from 00 to 76, comma, starting I/O group, comma, ending I/O group

Example:

```
Rack, 0o01, 0, 1
```

Block transfer module definitions

Block transfer module definitions start with keyword BtMod, followed by various other elements separated by commas.

The location in the rack if given as rack, I/O group and slot.

Next is the Mode, either Auto, SemiAuto or Manual, for example, Mode=Auto

The Type is the name of the template from which the module is constructed, with the name in quotes, for example, Type="BT-Module"

Data block transfer lengths

Update times

Finally, the definition contains the configuration data length and default configuration data.

Example:

```
BtMod, 0o01, 0, 0, Mode=Auto    , Type="1771-OFE-Diag"   , BtrLen= 5, BtwLen= 4,
BtrTme=   0, BtwTme=   0, CfgForce, CfgLen= 9, 0x8000 0xf001 0x0fff 0xf001 0x0fff
0xf001 0x0fff 0xf001 0x0fff
```

Data mappings

Discrete data mappings start with keyword MapRackInp or MapRackOut. This is followed by the rack number in the form 0orr where rr is the rack number in octal, from 00 to 76, then the connection and offset, all separated by commas.

Block transfer module mappings start with keyword MapBtModInp or MapBtModOut. This is followed by the rack number in the form 0orr where rr is the rack number in octal, from 00 to 76, the I/O group and slot, then the connection and offset, all separated by commas.

Comments

Anything after a semicolon, either at the end of a line or on a separate line, is treated as a comment and is ignored.

Example Scanner Configuration File

```
AN-X-AB-RIO-Scanner

AnxName,  "ABRIOscan"

Baud,  57k

Rack,  0o01,  0,  7

BtMod,  0o01,  0,  0,  Mode=Auto     , Type="1771-IFE-8CH"    , BtrLen=12, BtwLen= 0,
BtrTme=    0,  BtwTme=     0,  CfgLen=21,  0x0000 0x0000 0x0500 0x0000 0x0000 0x0000
0x4095 0x0000 0x4095 0x0000 0x4095 0x0000 0x4095 0x0000 0x4095 0x0000 0x4095 0x0000
0x4095 0x0000 0x4095

BtMod,  0o01,  0,  1,  Mode=Auto     , Type="1771-OFE-Diag"   , BtrLen= 5, BtwLen= 4,
BtrTme=    0,  BtwTme=     0,  CfgLen= 9,  0x8000 0xf001 0x0fff 0xf001 0x0fff 0xf001
0x0fff 0xf001 0x0fff

MapRackInp,  0o01,  0,    0

MapRackOut,  0o01,  0,    0

MapBtModInp,  0o01,  0,  0,  0,   10 ; Len= 14 words

MapBtModInp,  0o01,  0,  1,  0,   24 ; Len=  7 words

MapBtModOut,  0o01,  0,  0,  0,   10 ; Len=  2 words

MapBtModOut,  0o01,  0,  1,  0,   12 ; Len=  6 words
```

Updating the Firmware

The AN-X4 firmware files have names 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-SCAN*.qtf. You can use the web interface to:

- download firmware files to the AN-X4

- select which version is to run

- remove firmware files

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-SCAN.v4.05.01.qtf
```

In addition, it is occasionally necessary to update the kernel on the AN-X. Kernel files have extension *.qtk. Refer to page 72 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

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 (Brasil)

Languages Spoken: Portuguese, English

+55.11.5083.3776, support.brazil@prosoft-technology.com

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.

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