AN-X2-AB-DHRIO

A-B Remote I/O

Adapter

Module

User Manual

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

WARNING!

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

These warnings help to:

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

IMPORTANT!

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

TIP

Identifies information that explains the best way to use the AN-X2-AB-DHRIO Gateway

The RIO-ADPT communications module connects a ControlLogix PLC or other device to an Allen-Bradley remote I/O network.

As an adapter, the module:

- has one remote I/O channel

- emulates one or more racks

- supports all remote I/O baud rates: 57.6, 115.2, 230.4 kbaud

- supports rack numbers from 0 to 76 octal

- supports all combinations of partial racks

- supports block transfers at all possible locations

- monitors discrete I/O and block transfer reads and writes on the same remote I/O network

- updates all I/O via scheduled connections

The AN-X2-AB-DHRIO module is supplied with a Windows utility, AnxAbRioCfgAdpt, for configuring and monitoring the remote I/O network and mapping the remote I/O data to ControlLogix scheduled data.

The AN-X2-AB-DHRIO communicates with the ControlLogix processor using scheduled connections over Ethernet. Remote I/O data is mapped into the scheduled input and output data by the configuration program.

On monitored racks, a ControlLogix processor reads remote I/O inputs and outputs, and data from block transfer reads and writes on the remote I/O network. All remote I/O data is mapped to scheduled inputs in the ControlLogix.

On emulated (active) racks, a ControlLogix processor writes remote I/O inputs and block transfer read data and reads remote I/O outputs and block transfer write data.

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

The module firmware can be selected and updated using the web interface. Refer to page 57 for details.

Hardware Features

The module has:

• two LEDs to indicate the status of the connection to the Ethernet (100 and Link/Act)

• a LED to indicate the module's internal state and the state of communication with the ControlLogix (SYS)

• a LED to indicate the state of communications on the Remote I/O network (NET)

• an Ethernet connector

• a power connector

• a 3-pin Phoenix connector to connect to the remote I/O network

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

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

Package Contents

• AN-X2-AB-DHRIO module

• microSD to SD card adapter

• CD containing software and documentation

• rubber feet for desktop use

Identifying the AN-X2 versus the Original AN-X

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

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

When initially powered up:

- AN-X2 railroads (alternates) SYS and NET LEDs green as it starts up

- without the Ethernet cable attached, the Ethernet 10/100 (upper) LED is on for AN-X2 (both Ethernet LEDs are off for the original AN-X)

Differences from the Original AN-X

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

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

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

The AN-X2 requires firmware version 4 and above.

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

Differences in Remote I/O Operation

The diagnostic counters are slightly different. The diagnostic tags for the AN-X2 are different to match the diagnostic counters.

The module uses listen only connections instead of input only connections. You can now have more than one listen only connection. Listen only connections require an owning connection (input only connections do not).

The AN-X2 module now supports unicast as well as multicast connections.

Using the MicroSD Card

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

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

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

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

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

If the AN-X2 is inaccessible from Ethernet because of its settings, you can remove the card and edit the file config.txt. Refer to page 14 for details.

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

WARNING!   If you remove the card to edit the configuration file, push the card in straight or the card might fall inside the case and you will have to disassemble the AN-X2 to retrieve it .

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AN-X2 Modes of Operation

There are two AN-X2 modes of operation:

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

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

.

Installation

Prevent Electrostatic Discharge

The module is sensitive to electrostatic discharge.

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

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

Power

AN-X requires a DC power input of anywhere from 12 to 24 VDC.
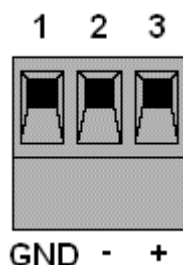
Left to right the pins on the power connector are chassis ground, negative voltage and positive voltage.

The chassis ground should be connected.

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

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

Contact us if you need a suitable wall adapter.

Cabling and Termination

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

On the AN-X module, the connections are line 1, shield, line 2.

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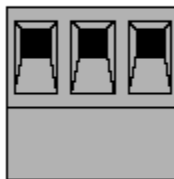
Line 1 on the AN-X is closest to the power connector.

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

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

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

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

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

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

Ethernet Cabling

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

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

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

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Software Installation

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

Run the program AnxAbRioSetup.msi in the AB\RIO folder to install the configuration and monitoring software.

CE Installations

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

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

Steward 28A2024-0A2 on power cable

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

Quick Start

Step	Operation	See page
1	Install the AN-X Windows software	8
2	Power up the AN-X, connect it to Ethernet and assign it an IP address	11
3	Connect AN-X to the Remote I/O network	6
4	Use the AN-X Windows utility to autoconfigure the remote I/O network and ControlLogix configuration	18
5	Configure the AN-X in RSLogix 5000	33
6	Verify operation on the remote I/O network	
7	Create aliases for RSLogix 5000	38
8	Import the aliases into RSLogix 5000	38
9	Use the aliases to access data	

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Ethernet Configuration

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

Ethernet Configuration

AN-X can be configured:

- to use a static (unchanging) IP address

- to obtain its IP address from a DHCP server

- to use the fixed link-local address 169.254.42.84

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

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

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

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

You configure the Ethernet properties using the web interface.

Start a web browser and enter the address 169.254.42.84

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

TIP   The module is shipped configured for use with the Data Highway Plus firmware. The initial screen you see will be slightly different from that shown below.

Select *Administration/AN-X Configuration*.
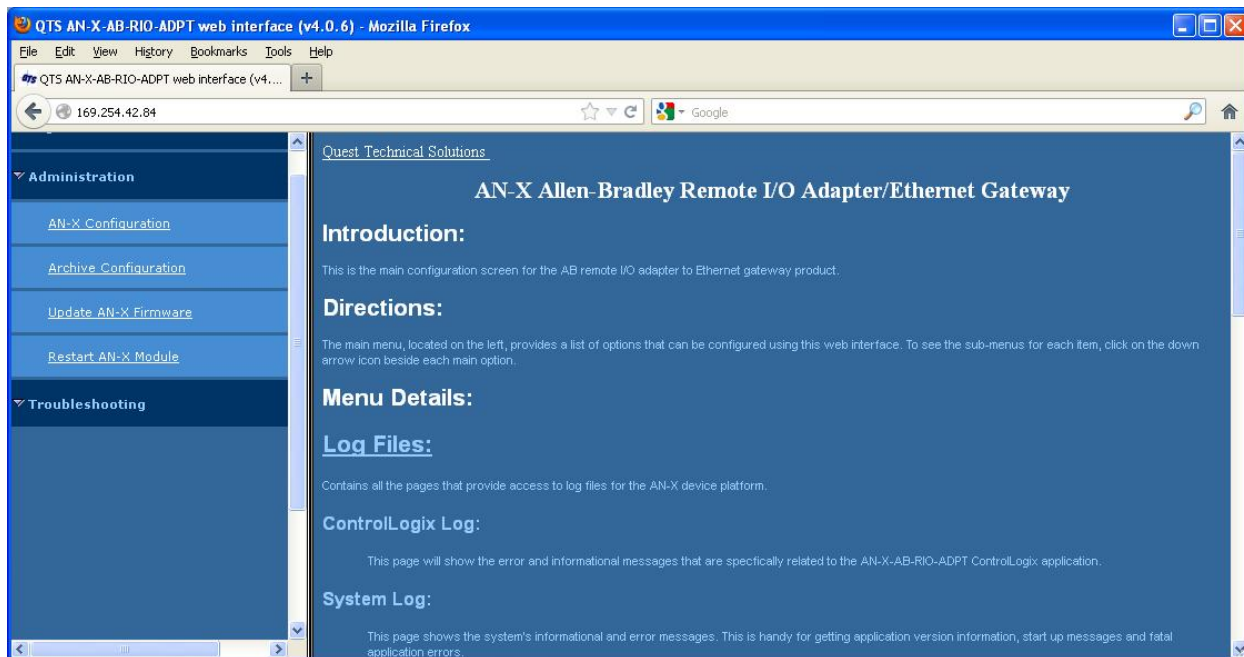
The *AN-X2 Configuration* page appears.
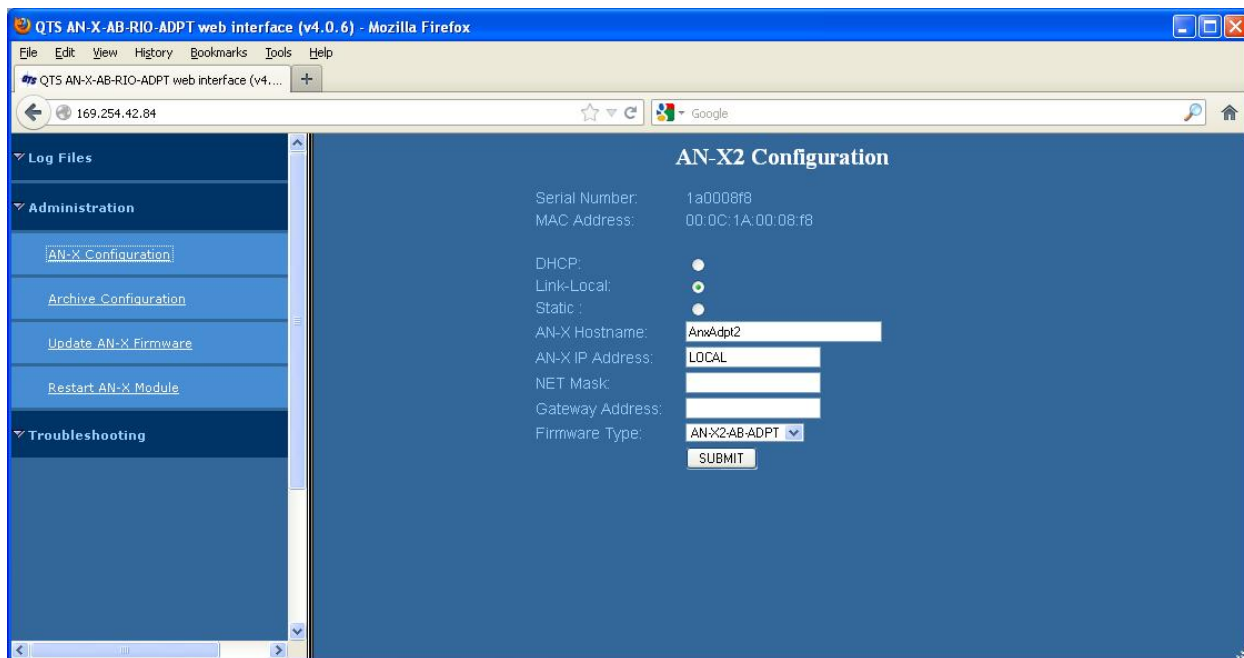
At the top, the screen shows the serial number and MAC address of the AN-X2 being configured.

Check either DHCP or Static.

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DHCP

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

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

When you submit the changes, if the AN-X2 does not find a DHCP server, it reverts to the default link local address 169.254.42.84 and repeatedly flashes the SYS LED 3 times red followed by a pause.

Static IP Address

If you select static IP address, enter:

- the IP address for the AN-X.
- the netmask for the AN-X
- the default gateway for your network.

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

Hostname

Enter a *Hostname* for the AN-X2. This name is used internally by AN-X and may be used to identify the AN-X if you have a DNS server on your network. The name can be from 1 to 30 characters long

Firmware

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

IMPORTANT! Make sure that the firmware selected is AN-X2-AB-ADPT to load the firmware for remote I/O adapter use.

Submitting the Configuration

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

The following page appears when you click SUBMIT.
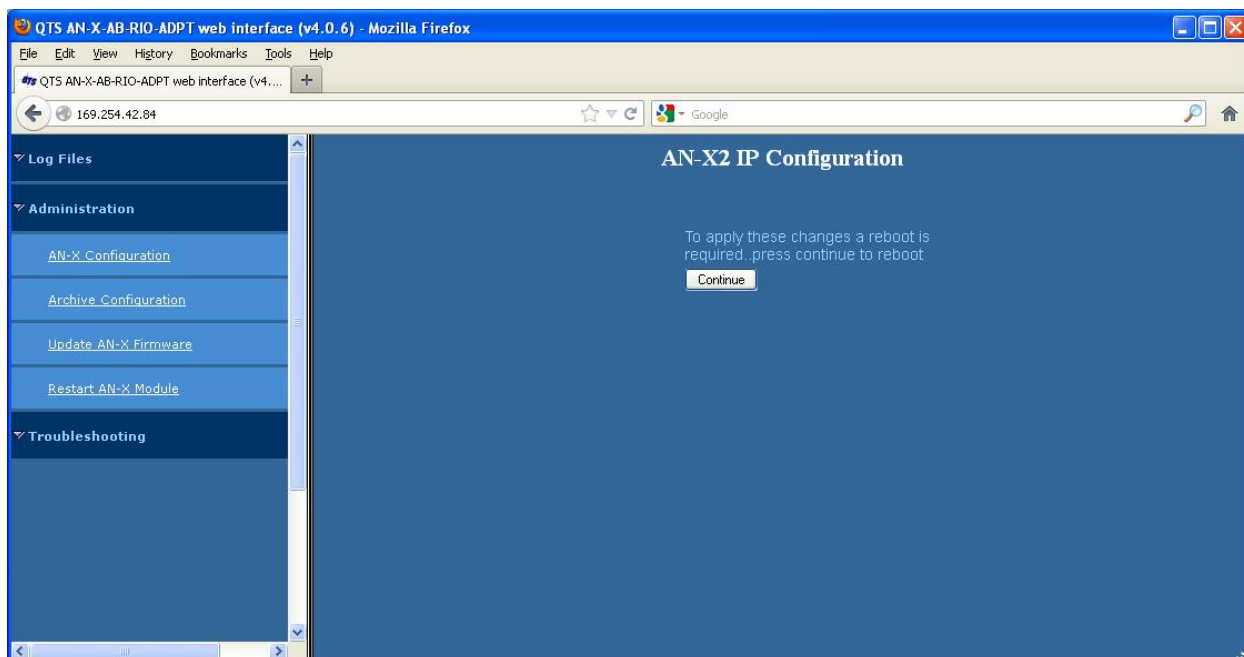
Click *Continue* to restart the AN-X2, then wait until the AN-X has completely restarted before continuing.

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

Reconfiguring an AN-X from an Unknown State

It sometimes happens that an AN-X has been previously configured with an IP address that causes it to be inaccessible on the current Ethernet network or the IP address is unknown.

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

The Configuration File

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

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

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

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

Example:

IP: 192.168.1.12

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

Keyword	Possible Values
IP	LOCAL DHCP static IP address (e.g., 192.168.1.12)
Netmask	Ethernet netmask, used only if IP is a static IP address
DefGtwy	default gateway, used only if IP is a static IP address
Hostname	Ethernet host name, from 1 to 30 characters
Firmware	Firmware file to run at startup, must be present on microSD card

If you edit the file and AN-X2 finds an error during startup, it flashes an error code on the SYS LED, see page 59.

Example config.txt files

Example: Link- Local IP address

```
IP: LOCAL
Hostname: ANX2RioAdpt
Firmware: AN-X2-AB-ADPT
```

Example: DHCP

```
IP: DHCP
Hostname: ANX2RioAdpt
Firmware: AN-X2-AB-ADPT
```

Example: static IP address

```
IP: 192.168.1.14
NetMask: 255.255.255.0
DefGtwy: 192.168.1.1
HostName: ANX2RioAdpt
Firmware: AN-X2-AB-ADPT
```

If the link-local address is not accessible…

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

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

route print

The routing table appears

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

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

```
route add 169.254.0.0 mask 255.255.0.0 10.10.0.20 metric 20
```

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

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

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

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A Note on AN-X Names

You assign a name to the AN-X module in several places:

- Ethernet hostname

- name assigned to the ENBT module that the AN-X emulates in RSLogix 5000

- base tag name when exporting aliases from the configuration tool for import into RSLogix 5000

- name in the Module Properties dialog in the configuration tool

The first three names should all be the same. The name is first set when you configure the Ethernet properties of the AN-X.

The name in the Module Properties dialog is not used elsewhere and does not have to match the other names.

Configuring the Remote I/O Network

AnxAbioCfgAdpt Software

The AN-X2-AB-DHRIO module is supplied with a Windows configuration utility.

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

- Save and load configuration files

- Download and upload configurations

- Archive block transfer templates

- Monitor diagnostics, rack status, block transfers and discrete data

The configuration utility must be version 4.x.x or above for use with the AN-X2-AB-DHRIO module.

Configuring a Remote I/O Network

Use the following steps to configure the AN-X2-AB-DHRIO as an adapter on a remote I/O network:

1. Set the baud rate

2. Configure racks
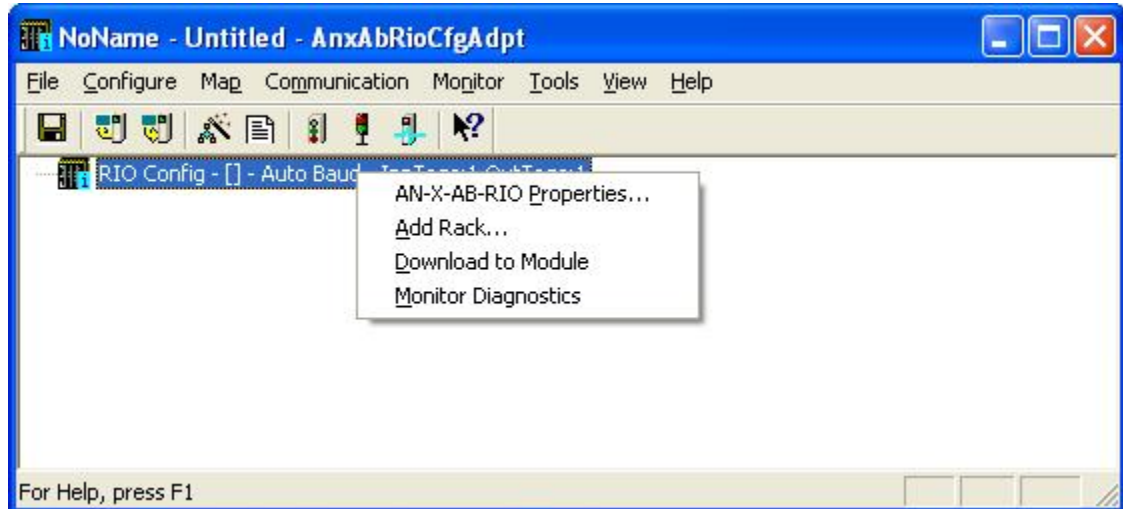
3. Add and configure block transfer modules

4. Map the remote I/O data to ControlLogix scheduled data

5. Download the configuration to the AN-X2-AB-DHRIO.

You can also autoconfigure the AN-X2-AB-DHRIO if you are using it to monitor and existing remote I/O network. See page 20 for details.

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-X2-AB-DHRIO Modules 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
Auto	Automatic detection

The default baud rate is Auto (automatic baud rate detection).

The *AN-X Name* can be from 0 to 31 characters long. It is not used elsewhere.

The *AN-X2* checkbox is used when exporting aliases for import into RSLogix 5000 (see page 30). It is checked automatically when you perform any online operation with an AN-X2. If you export aliases offline, first make sure that it is checked.

The *Clear Active Inputs if CLX is in PROG* checkbox determines the discrete input data AN-X sends when the remote I/O scanner is in program mode. If the box is checked, AN-X sends 0 for input data on active racks. If the box is unchecked, it sends whatever values it receives from the ControlLogix outputs mapped to the discrete inputs

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Configuring Racks

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

Racks can be either active (emulated by the AN-X2-AB-DHRIO) or monitored (real racks on the same 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.
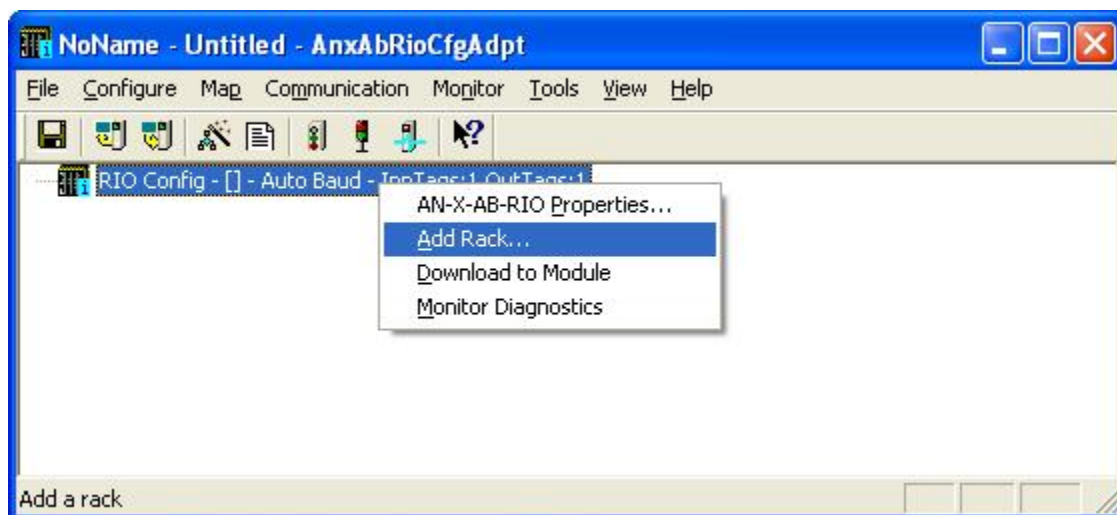
Select *Add Rack* to display the *Add/Resize Rack* dialog box.

Select the *Rack* number (in octal), the Start I/O Group and the End I/O Group for the rack you are adding. Select the rack mode, Active or Monitor. Click OK.

Autoconfiguration

The AN-X2-AB-DHRIO supports autoconfiguration.

The AN-X2-AB-DHRIO first detects the network baud rate, then monitors messages to and from racks on the network, builds a network configuration from the observed network traffic, and displays the network configuration.

The AN-X2-AB-DHRIO also adds block transfer modules from observed block transfer updates. The AN-X2-AB-DHRIO cannot detect the type of block transfer module; it adds modules of the generic type BT-MODULE.

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To autoconfigure:

1. Clear the old configuration. Select *File/New* to create a new, empty configuration file and set the baud rate to automatic (default for a new configuration).

2. Select *Configure/Download Configuration* to download the empty configuration to the AN-X2-AB-DHRIO. The remote I/O scanner should be in program mode when you download.

3. If you want to automatically add block transfers, put the remote I/O scanner in run mode and wait until all the block transfers have executed. Put the scanner back in program mode.

4. Select *Configure/Autoconfig* to build a configuration from the observed network traffic.

Resizing Racks

To resize a rack, right click on the rack in the network tree and select *Resize Partial Rack*.
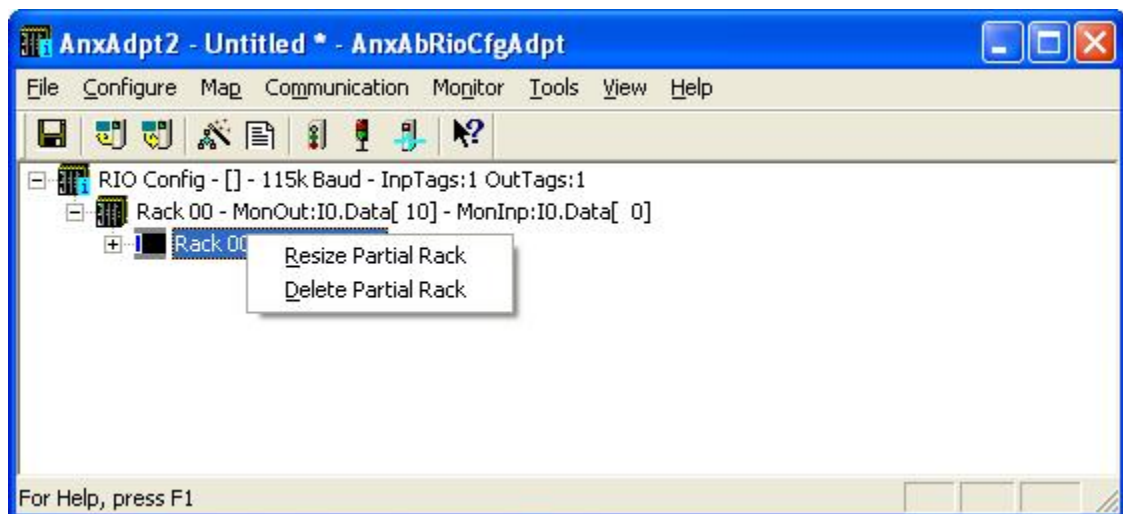
The *Add/Resize Rack* dialog appears

You cannot change the rack number or the rack type (active or monitored).

Select the Start I/O Group and the End I/O Group.

If resizing the rack results in an overlap with an existing rack, the resize fails, with an error message.

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

Deleting Racks

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

Block Transfer Modules

TIP   Refer to page 49 for detailed information on block transfer module templates.

To add a block transfer module, first expand the network tree to show the location where you want to add the module.
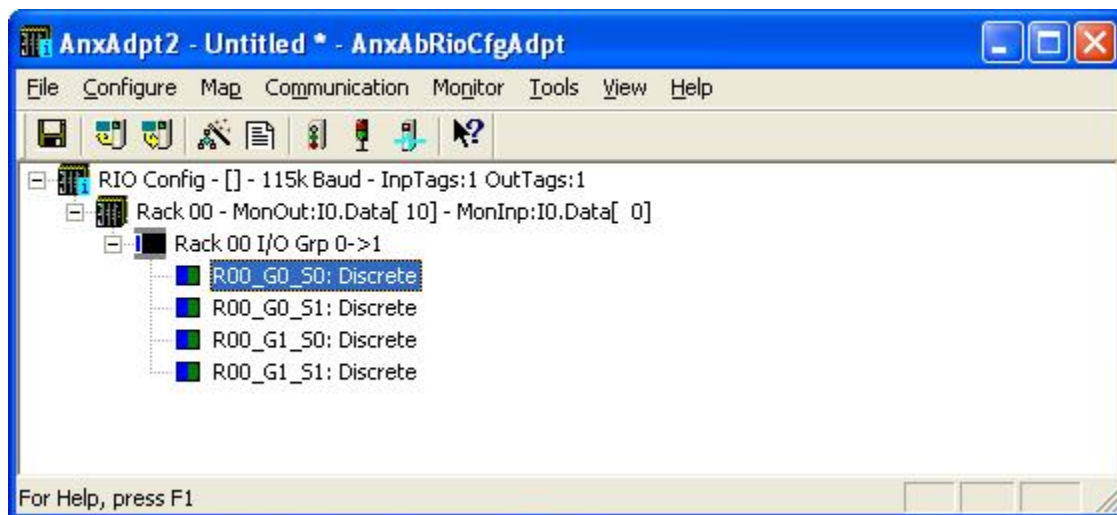
Right click on the location where you want to add the module and select *Module Properties*.

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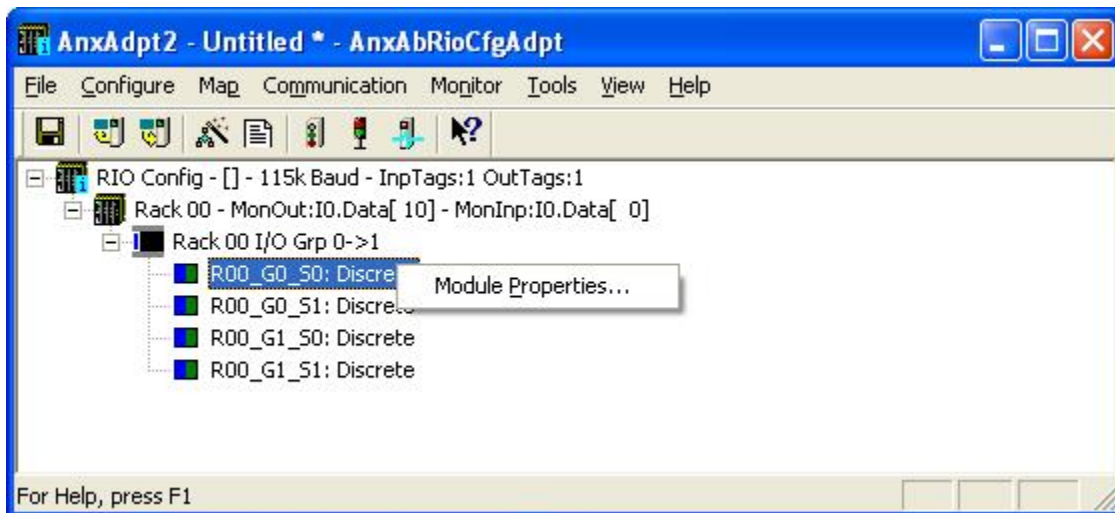
Active Racks

On active racks, the only block transfer module type is BT-MODULE.
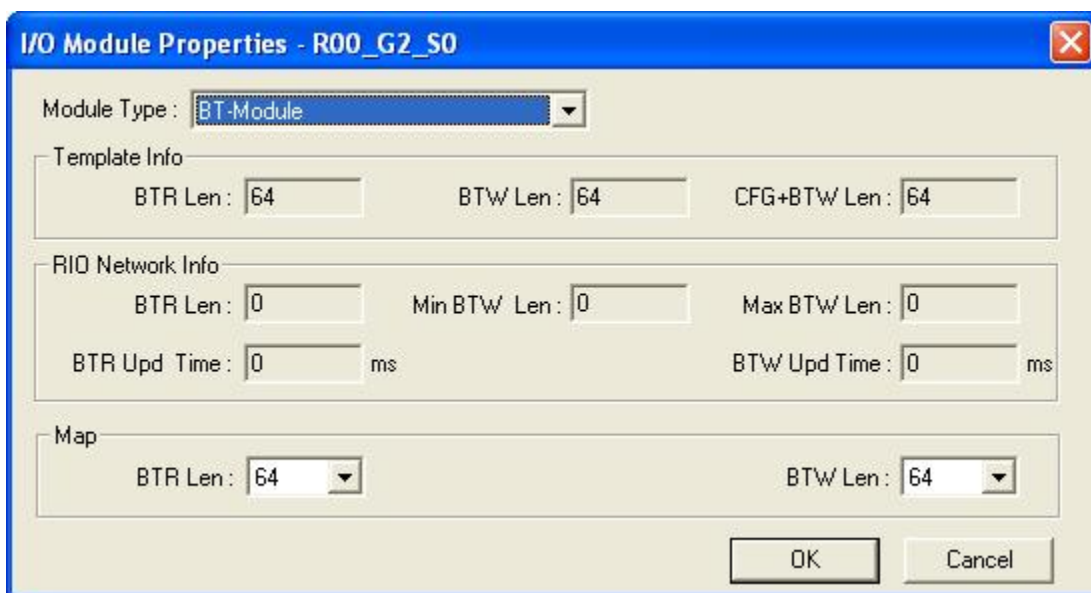
Select the BTR and BTW mapped lengths and click OK.

Monitored Racks

On monitored racks, there are many block transfer types to choose from.

Select the *Module Type* from the list.

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Select the BTR and BTW mapped lengths and click OK.

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 is shown with address xxxx in the network tree.

WARNING!   If you change mappings, make sure you clear the output table in the ControlLogix to prevent inadvertently writing to an incorrect location!

Automatic Mapping

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

Manual Mapping

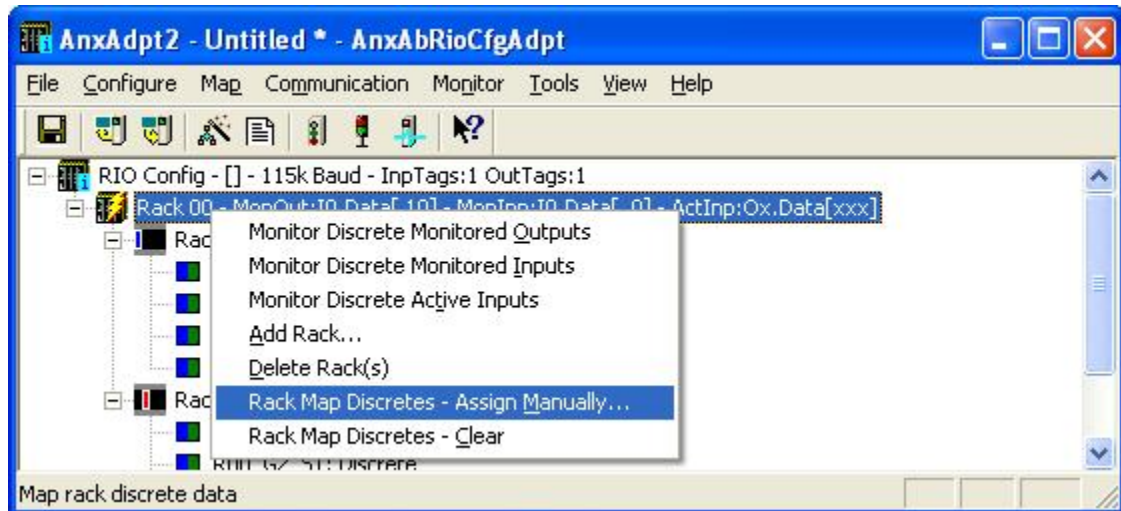To manually map discrete(rack) data, right click on the rack and select *Rack Map Discretes – Assign Manually*

For the inputs and outputs, select the ControlLogix scheduled block and the offset within the block.
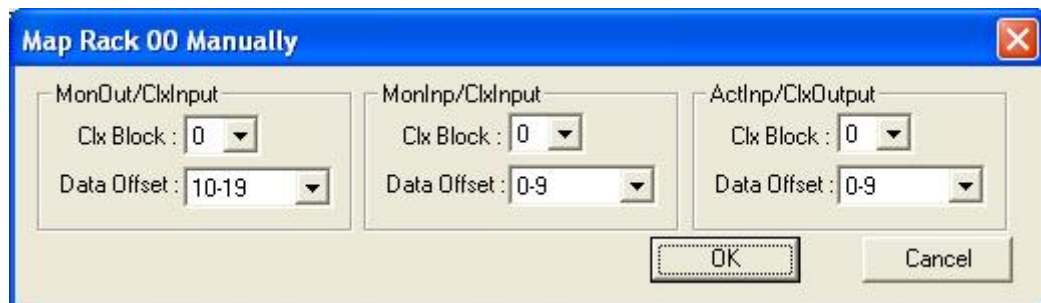
On active racks, remote I/O inputs are mapped to ControlLogix outputs (the ControlLogix writes the data which the AN-X2-AB-DHRIO sends to the remote I/O scanner as remote I/O inputs). Remote I/O outputs are mapped to ControlLogix inputs.

On monitored racks, both remote I/O inputs and outputs are mapped to ControlLogix inputs.

If the rack number consists of active and monitored partial racks, monitored inputs and outputs are mapped to ControlLogix inputs, and active inputs are mapped to ControlLogix outputs. You cannot map partial racks separately; the mapping applies to the entire rack.

Click OK to accept the mapping.

To manually map the data for a block transfer module, right click on the module and select *BT Module Clx Map – Assign Manually*.

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For the block transfer read and write data, select the ControlLogix scheduled block and the offset within the block.

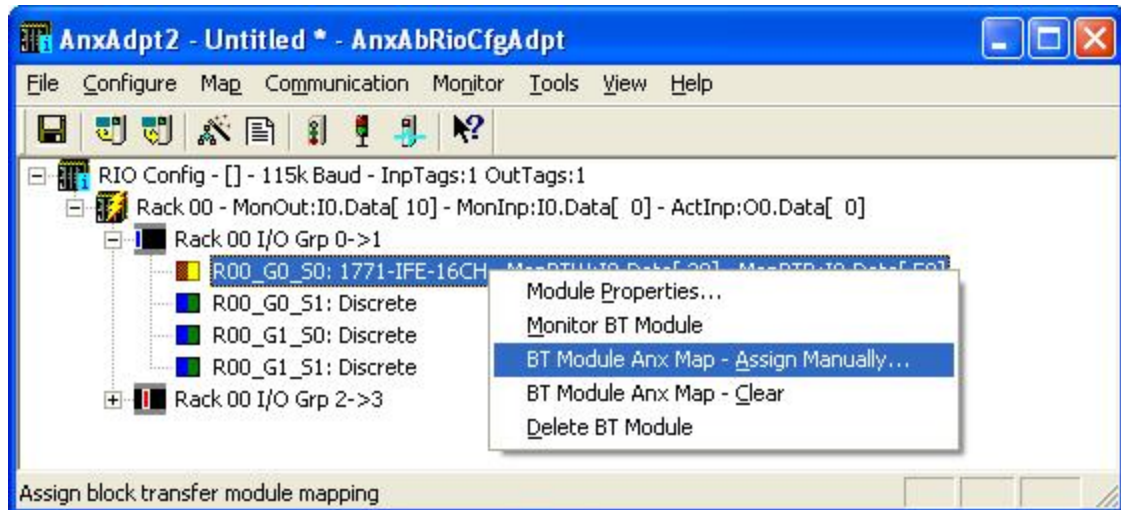On active racks, block transfer read data is mapped to ControlLogix outputs (the ControlLogix writes the data which the AN-X2-AB-DHRIO sends to the remote I/O scanner). Block transfer write data is mapped to ControlLogix inputs.
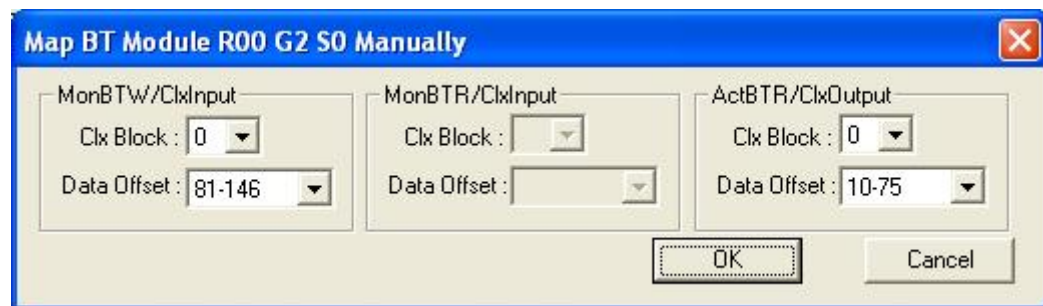
On monitored racks, both block transfer read and write data is mapped to ControlLogix inputs.
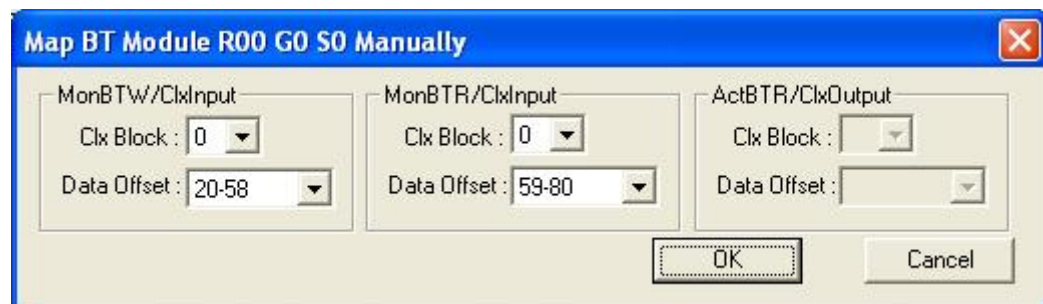
Click OK to accept the mapping.

Clearing Mappings

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

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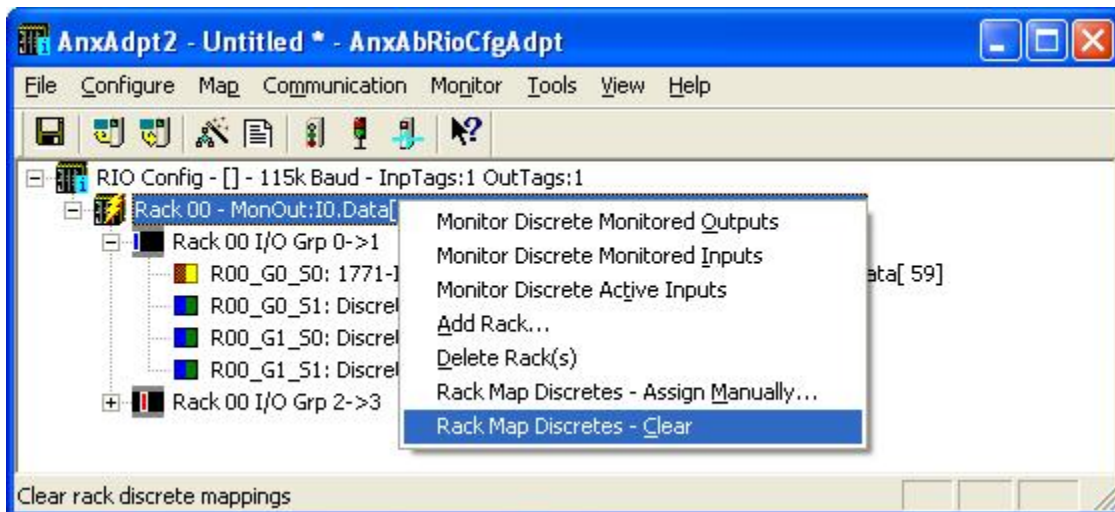
The configuration program asks for confirmation before it clears the mapping.

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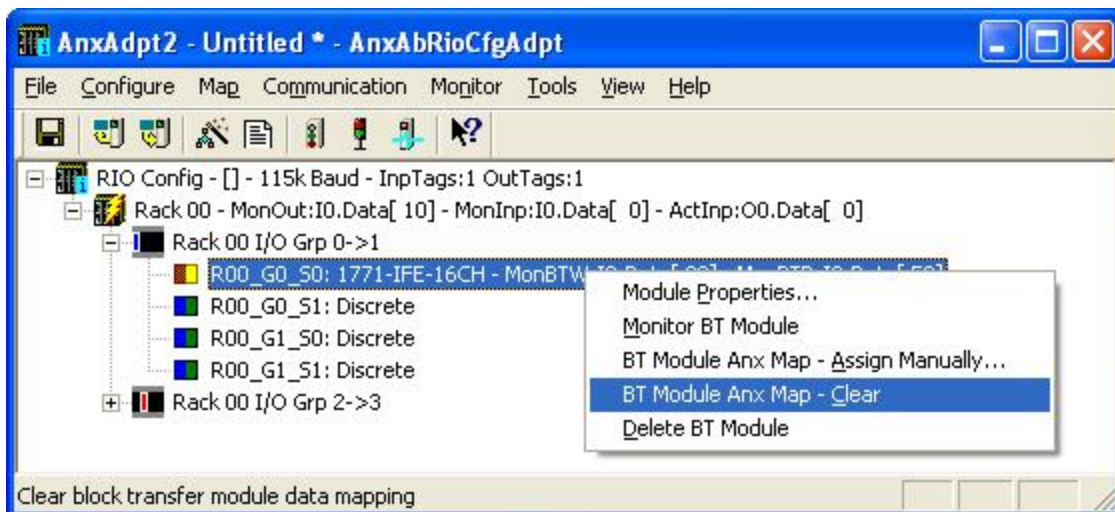
The configuration program asks for confirmation before it clears the mapping.

What gets mapped

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

Rack Data

When you map any part of a rack to scheduled data, the structure that gets mapped is the structure for the entire rack number.

On monitored racks, both remote I/O inputs and outputs are mapped to ControlLogix inputs.

On active racks, remote I/O inputs are mapped to ControlLogix outputs. Remote I/O outputs are mapped to ControlLogix inputs.

The data structure mapped for discrete outputs on monitored or active racks consists of:

Offset	Bit	Description
0	0-15	Reserved
1	0-15	Reserved
2-9	0-15	Discrete output data

The data structure mapped for discrete inputs on monitored racks consists of:

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

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 bit is set if there's an error scanning the rack and is 0 otherwise.

The data structure mapped for discrete inputs on active racks consists of:

Offset	Bit	Description
0	0-15	Reserved
1	0-15	Reserved
2-9	0-15	Discrete input data

There are no status bits on active racks.

Block Transfer Modules

On monitored racks, both block transfer read and write data is mapped to ControlLogix inputs.

On active racks, block transfer read data is mapped to ControlLogix output data. Block transfer write data is mapped to ControlLogix input data.

The data mapped for block transfer writes on monitored or active racks consists of:

Offset	Bit	Description
0	0-7	BTR Update Counter (increments each time BTR executes, 0-255)
	8-10	BTR Error Code
	11	BTR.ERR, block transfer read error, see table
	12-15	Reserved
1	0-7	BTW Update Counter (increments each time BTW executes, 0-255)
	8-10	BTW Error Code, see table
	11	BTW.ERR, block transfer write error
	12-15	Reserved
2-n	0-15	BTW Data (64 INTs max)

Offset 0 bits 0-7 contain a free-running counter that increments each time a block transfer read executes successfully.

The AN-X2-AB-DHRIO 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.

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

Block transfer reads on monitored racks are mapped to ControlLogix inputs. Block transfer reads on active racks are mapped to ControlLogix outputs.

The data mapped for block transfer reads on active or monitored racks consists of:

Offset	Description
0	Reserved, always 0
1	Reserved, always 0
2-n	Up to 64 words of BTR Data

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Uploading and Downloading

To download a configuration to the AN-X2-AB-DHRIO, select *Communication/Download Configuration* or use the *Download Configuration to Module* button on the toolbar

To upload a configuration from the AN-X2-AB-DHRIO, select *Communication/Upload Configuration* or use the *Upload Configuration from Module* button on the toolbar

Saving Configurations

To save a configuration to disk, select *File/Save*

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 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 is not stored in the directory where the configuration is stored.

Aliases

The configuration program exports aliases for discrete and block transfer data that can be imported into RSLogix 5000. Each alias points to the corresponding location within the ControlLogix scheduled data blocks.

Write 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 program will point to the new data locations.

To export aliases, select *Tools/Export Aliases…*
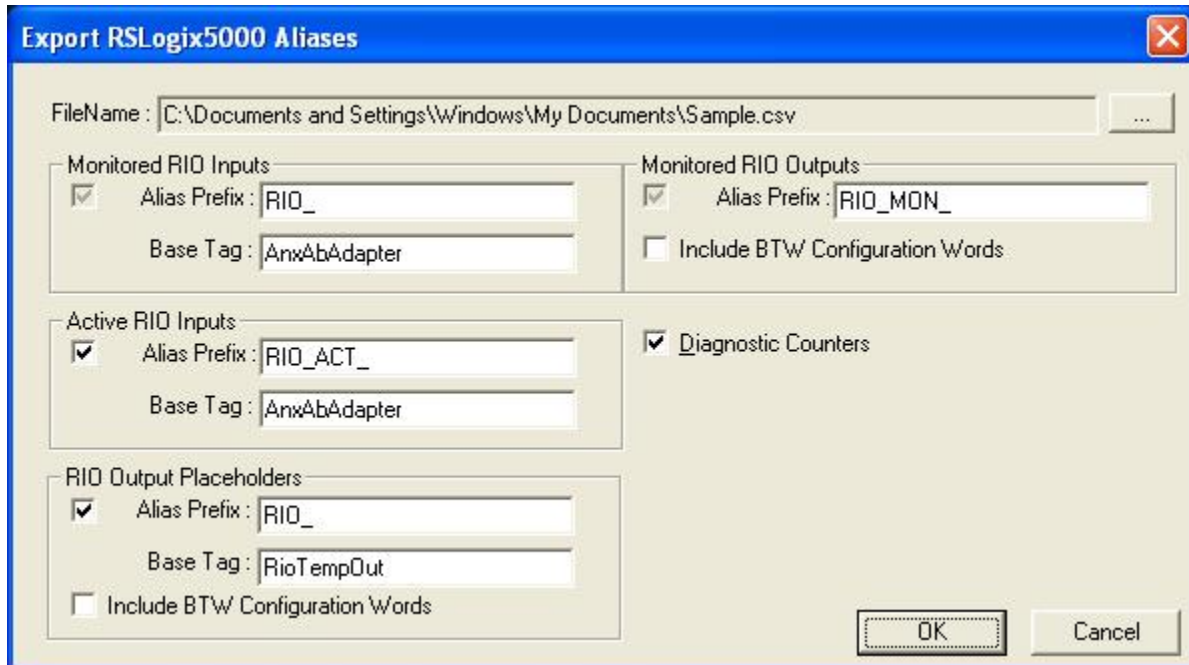
Use the browse button (three dots…) to change the file location.

The *Alias Prefixes* are used to distinguish between aliases for different AN-X2-AB-DHRIO modules and to help identify groups of data items. If you have more than one AN-X2-AB-DHRIO in the RSLogix configuration, assign each one a different Alias Prefix so that the tags for each one are unique.

The *Base Tag*s identify the AN-X2-AB-DHRIO in RSLogix 5000. Refer to the Tags section in RSLogix 5000 to find the format of the Base Tag. For example, if the emulated ENBT on the AN-X module is named Anxadapt12, set the base tags for I/O data to the same thing.

The program also exports another set of tags for use with Ghost Mode (see page 32). These output placeholders are aliases that point monitored remote I/O output data to a ControlLogix internal array. If you are using ghost mode, you can write your new application to write to this placeholder array and compare the monitored outputs to the outputs written by the new control program.

You can choose to include aliases for block transfer write configuration data by checking the appropriate checkbox.

Exporting a Scanner Configuration

The configuration program can export a configuration file that can be loaded by the AN-X2-AB-DHRIO scanner.
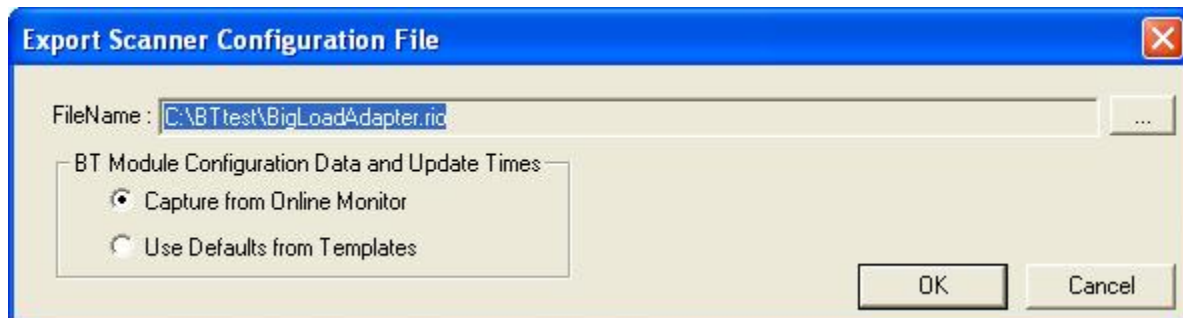
It consists of:

- baud rate

- monitored racks

- block transfers on monitored racks

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It does not contain active racks, block transfers on active racks or mappings.

To export a scanner configuration, select *Tools/Export Scanner Configuration File…*

Export Scanner Configuration File

FileName : C:\BTtest\BigLoadAdapter.rio   ...

BT Module Configuration Data and Update Times
  ○ Capture from Online Monitor
  ○ Use Defaults from Templates

                                                                    OK   Cancel

The configuration data for block transfers can be based on the default configuration data from the block transfer module templates or on the configuration data the adapter has observed on the network.

If you are using the AN-X2-AB-DHRIO in a ghost mode application, you can monitor the existing system to capture block transfer timing and configuration data, then export a scanner configuration that contains that data. Convert the AN-X2-AB-DHRIO to scanner mode and load the exported configuration to scan the remote I/O network.

Ghost Mode

The AN-X2-AB-DHRIO provides tools to upgrade an existing remote I/O application to ControlLogix with a minimum of downtime and startup time. This process is sometimes referred to as "Ghost Mode".

To use ghost mode:

1. Use the AN-X2-AB-DHRIO in adapter mode to monitor data and timing on the existing system.

2. Create the new application and compare the data and timing on the new system with the still-running old system.

3. When you are satisfied that the new system accurately duplicates the behaviour of the existing system, replace the old application with the new one, using the AN-X2-AB-DHRIO as the remote I/O scanner.

The replacement will have been tested before the switchover. It will use the same field wiring as the old system. Best of all, if unanticipated problems arise, you can switch back to the old system in minutes.

Configuring the AN-X Module in RSLogix 5000

The AN-X2-ABDHRIO 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 46).

To configure the AN-X2-ABDHRIO in RSLogix 5000:

1. Right click on the ControlLogix Ethernet bridge module that will communicate 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.

2. Add Generic modules for each required connection, usually at least slot 0 for data and slot 15 for diagnostics. Right click on the backplane and select *New Module*. From the *Other* category, select 1756-MODULE and click OK.
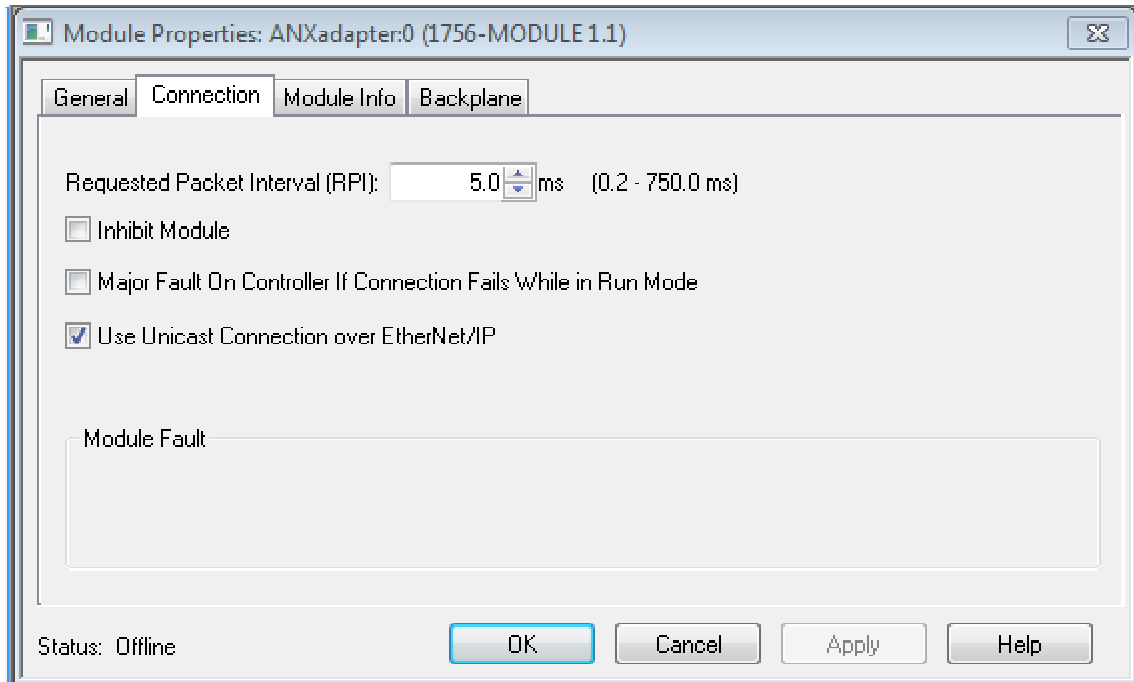

Set the Name and Description as desired.

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.

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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 44) to obtain the remote I/O network scan time.

TIP	The AN-X2-AB-DHRIO supports Unicast connections from the ControlLogix. The original AN-X did not.

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

Listen Only Connections

The AN-X2-ABDHRIO supports listen only connections from a ControlLogix processor. The ControlLogix will be able to read the same input data as the ControlLogix processor with the exclusive owner connection to the AN-X2-ABDHRIO.

The AN-X2-AB-DHRIO uses listen only connections. The original AN-X supported one input only connection.

TIP	Important differences:

-   listen only connections require an owning exclusive owner connection. The owning connection must be multicast, not unicast.

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- there can be multiple listen only connections to the same AN-X2; the original AN-X supported only a single input only connection from another ControlLogix

To configure a listen only connection to the AN-X2-ABDHRIO 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.
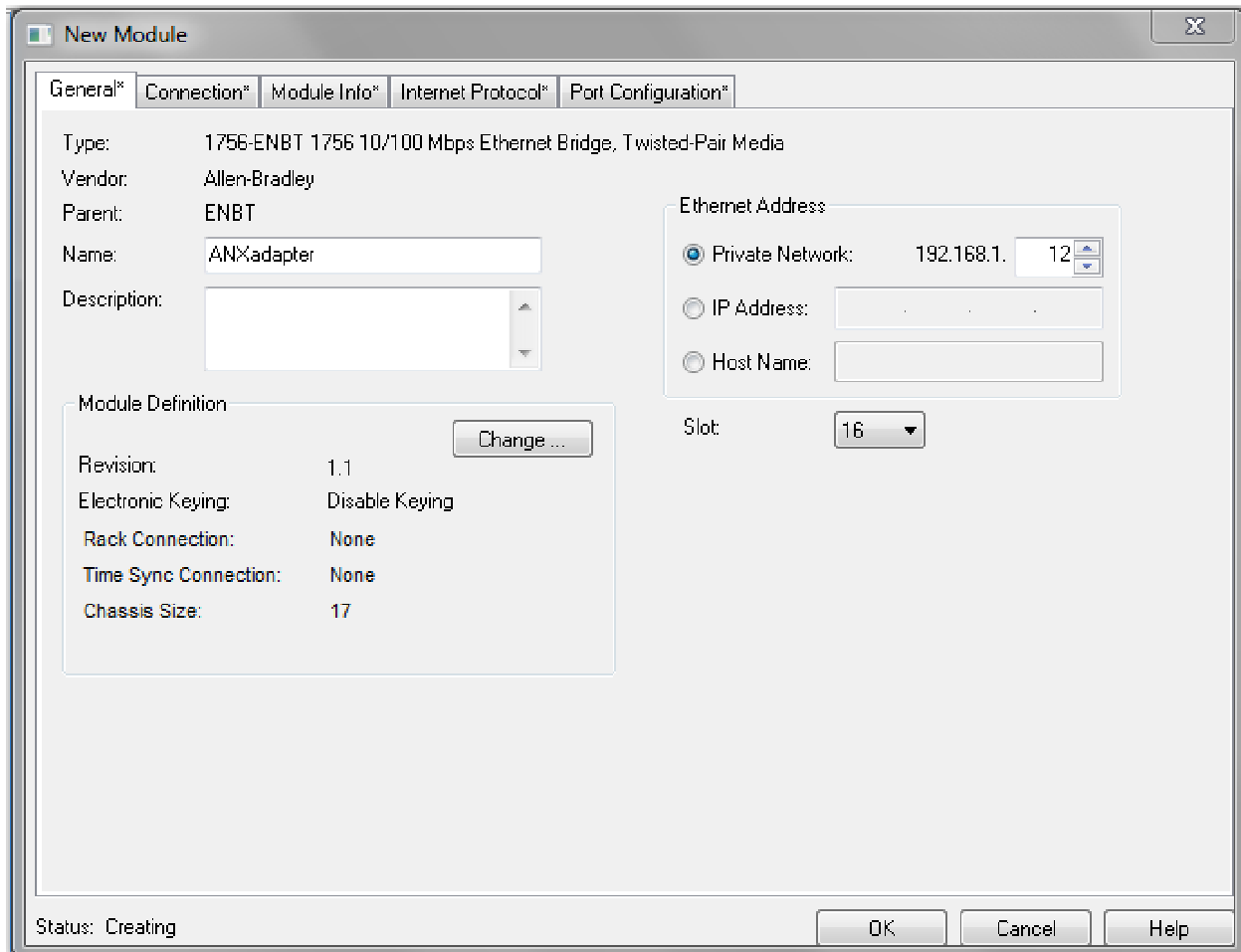
Set the Slot to 16. Set the chassis size to 17.

Set the *Comm Format* to None.

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

Set *Electronic Keying* to *Disable Keying*.

Record the *Name* as you will use it if you create aliases to access the data.

2. Add Generic modules for each required connection

Set the parameters as shown.

Set the Comm Format to Input Data – INT.

Set the Slot to 0 for the first connection, 1 for the second connection, and so on.
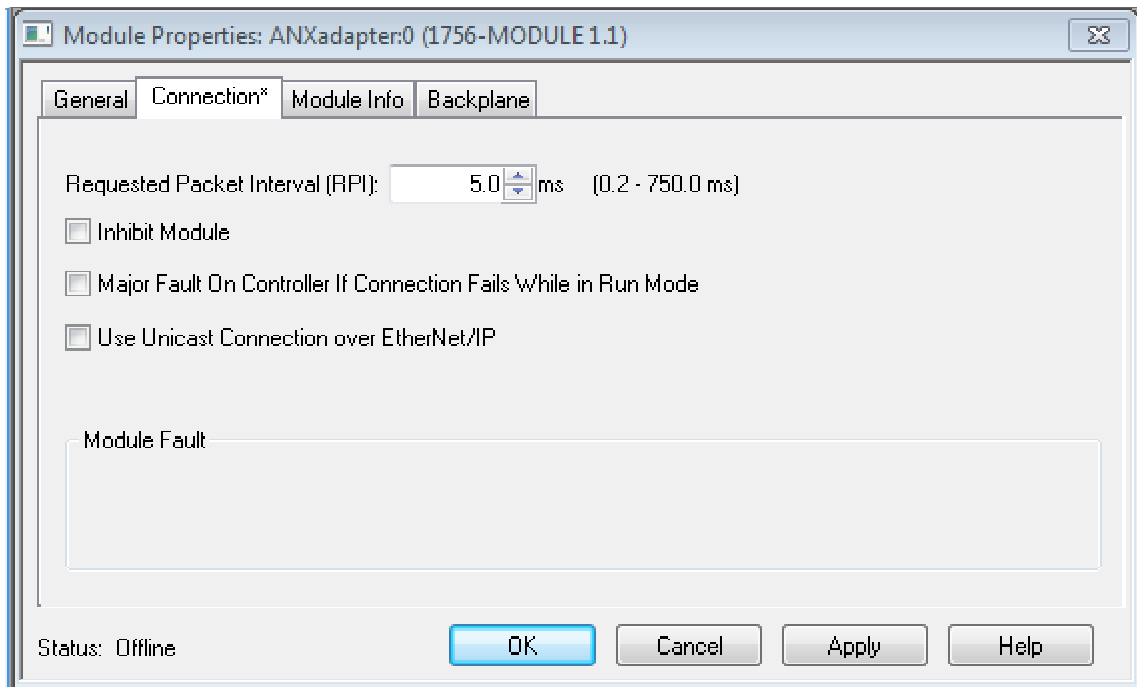
3. Set the RPI for each connection to match the RPI of the exclusive owner connection.

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 re-import the aliases.

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, re-import aliases so that the ControlLogix processor uses the correct addresses.

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

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,

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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.

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 ControlLogix Log

If there are problems with scheduled connections to the AN-X, use the ControlLogix log to identify the cause.

From the AN-X web interface, select *Log Files/ControlLogix Log* to display the log. Look for error messages that describe in detail the cause of any problem with the current configuration.

Remote I/O Operation

Required Connections

The AN-X2-ABDHRIO does not require that all required ControlLogix connections are present. However, it holds inputs on active racks at 0 until the corresponding connection are made.

Monitoring operation

Discrete Inputs and Outputs on Monitored Racks

To monitor discrete inputs or outputs on monitored racks, do one of the following:

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

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

- use the *Monitor Discrete Monitored Inputs* or *Monitor Discrete Monitored Outputs* button on the toolbar

The Discrete Input or Discrete Output 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

Discrete Inputs and Outputs on Active Racks

Discrete outputs on active racks are just like outputs on monitored racks.

To monitor discrete inputs on active racks, do one of the following:

- from the main menu, select *Monitor/DiscreteActive Inputs*
- right click on a rack and select *Monitor Discrete Active Inputs*

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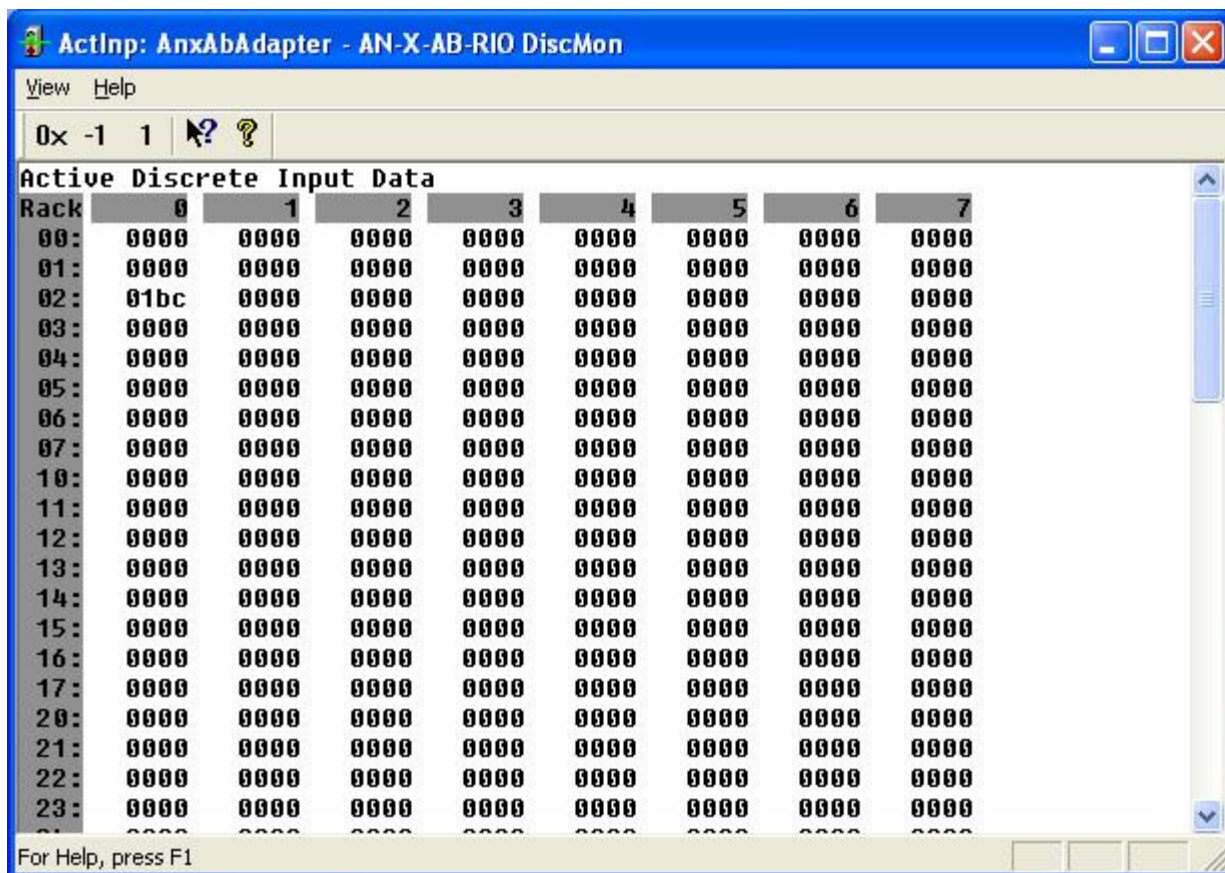
Each row corresponds to a rack. Rack numbers are given in octal. Each row shows the 8 words discrete inputs for the rack number.

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.
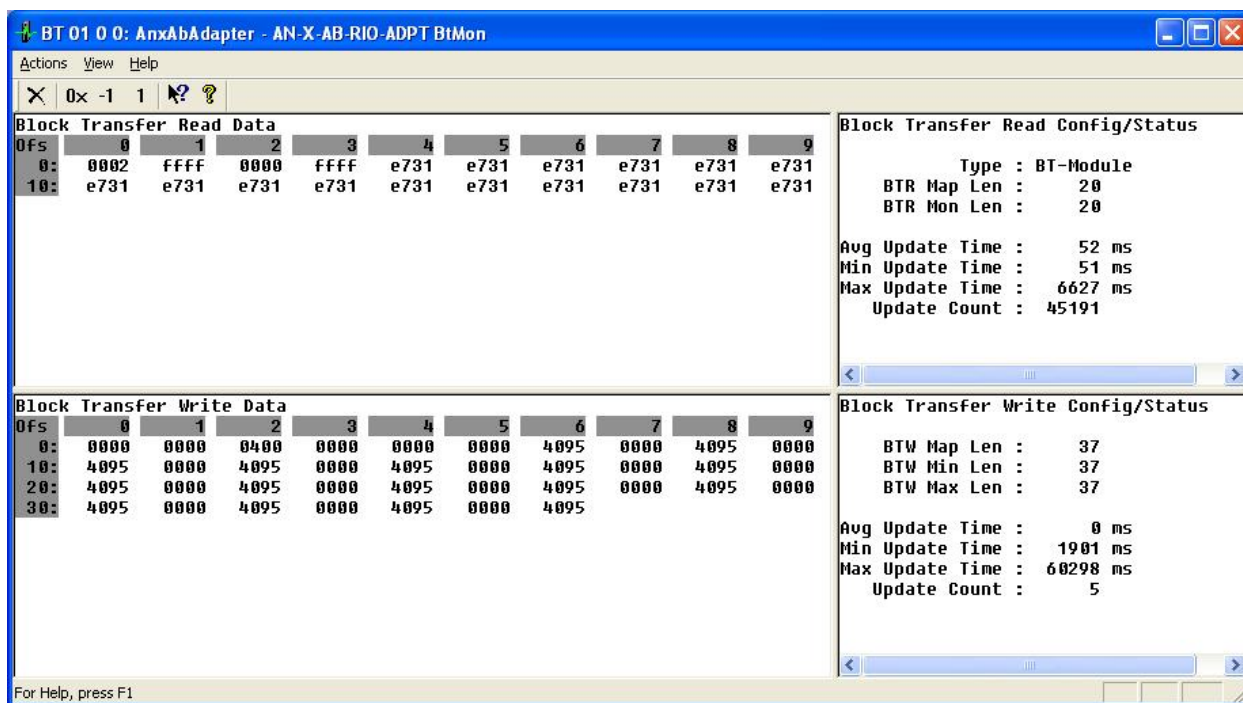
The raw data can be displayed as hexadecimal, signed or unsigned integer. The default for block transfer data is hexadecimal.

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
Type	Module type, from the module template
BTR Map Len	Block transfer read mapped length length
BTR Mon Len	Block transfer read observed length
Avg Update Time	Average update time for this block transfer read, in ms. This is the average of the previous 8 updates.
Min Update Time	Minimum update time for this block transfer read, in ms
Max Update Time	Maximum update time for this block transfer read, in ms
Update Count	Running count of updates for this block transfer read

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Block Transfer Write Diagnostics

Counter	Description
BTW Map Len	Length of mapped BTW data
BTW Min Len	Minimum observed length
BTW Max Len	Maximum observed length
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.

Rack Status and Diagnostic Counters

The AN-X2-ABSCAN 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.
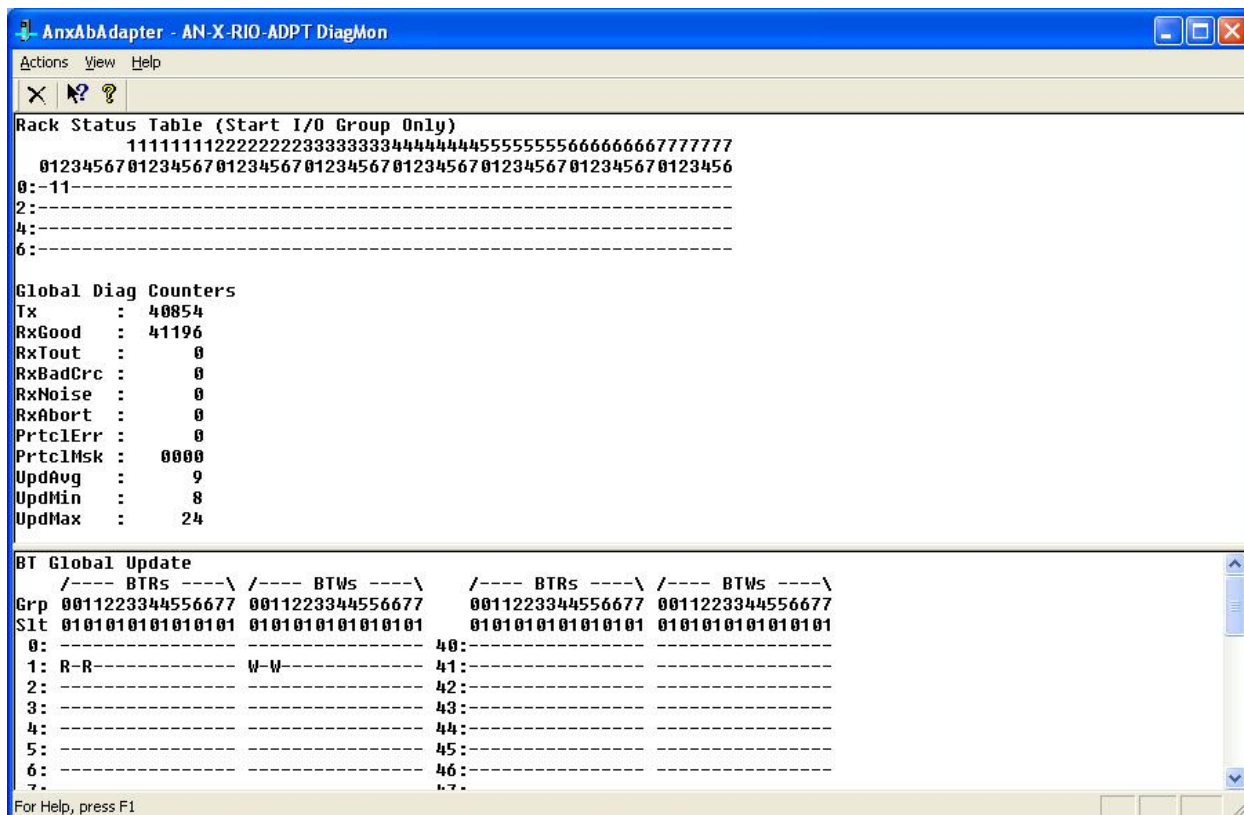
Rack Status Table

The rack status table shows where the 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
Tx	This counter increments each time the AN-X2-AB-DHRIO transmits a packet.
RxGood	This counter increments when the AN-X2-AB-DHRIO receives a good packet.
RxTout	This counter increments when the AN-X2-AB-DHRIO sends a packet but does not receive a reply.
RxBadCRC	This counter increments when the AN-X2-AB-DHRIO receives a packet with a bad CRC. Check cabling and termination on the RIO network.
RxNoise	This counter increments when the AN-X2-AB-DHRIO hears a carrier without receiving a packet. Check cabling and termination on the RIO network.
RxAbort	This counter increments when the AN-X2-AB-DHRIO receives an opening flag, then the packet ends without a closing flag.
PrtclErr	This counter increments when the AN-X2-AB-DHRIO receives a packet that makes no sense in terms of the protocol.
PrtclMsk	Protocol error type
PrtclArg	Protocol error argument
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.

BT Global Update Table

The BT Global Update Table shows where block transfers are occurring.

Mapping Diagnostic Counters

The scheduled I/O diagnostic counters for the AN-X2 are slightly different from the counters for the original AN-X.

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	Good frames received
3	Timeouts
4	Frames with CRC errors
5	Frames received with noise errors
6	Abort errors
7	Transmitted frames
8	Protocol errors
9	Low byte- protocol error type, high byte - error argument
10-25	Rack status table
26	Current remote I/O scan time, ms
27	Average remote I/O scan time, ms
28	Minimum remote I/O scan time, ms
29	Maximum remote I/O scan time, ms
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
40-49	Slot 0 Scheduled Connection statistics
40	Average Update time * 100 us
41	Reserved

Offset	Description
42	Minimum Update time * 100 us
43	Reserved
44	Maximum Update time * 100 us
45-49	Reserved
50-59	Slot 1 Scheduled Connection statistics
60-69	Slot 2 Scheduled Connection statistics
70-79	Slot 3 Scheduled Connection statistics
80-89	Slot 4 Scheduled Connection statistics
90-99	Slot 5 Scheduled Connection statistics
100-109	Slot 6 Scheduled Connection statistics
110-119	Slot 7 Scheduled Connection statistics
120-129	Slot 8 Scheduled Connection statistics
130-139	Slot 9 Scheduled Connection statistics
140-149	Slot 10 Scheduled Connection statistics
150-159	Slot 11 Scheduled Connection statistics
160-169	Slot 12 Scheduled Connection statistics
170-179	Slot 13 Scheduled Connection statistics
180-189	Slot 14 Scheduled Connection statistics
190-199	Slot 15 Scheduled Connection statistics

To clear the diagnostic 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.

Scheduled connection statistics are valid only for connections that exist.

IMPORTANT!

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

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Module Logs

The logs contain messages from the firmware running on the AN-X2-ABDHRIO, showing its normal operation and error messages. They may be useful in tracking down errors and for Technical Support.

Access the logs from the web interface. See page 54 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-X2-AB-DHRIO 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-X2-AB-DHRIO does not support.

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

For block transfer modules which 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

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 write sent to 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.

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 in the dialog box
- the location in the configuration data

- data value

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', and 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', and 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', and equals sign, and the mask value, usually in hexadecimal.

The value yo 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 Value

Data values can be defined as a numerical value or 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.

Using the Web Interface

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

Use the web interface to:

- • configure the Ethernet settings and select firmware

- • archive the AN-X configuration

- • update the AN-X firmware

- • restart the AN-X

- • view AN-X logs

It also contains contact information for support.

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

To access the web interface, start your web browser and type the AN-X IP address where you normally enter web addresses in the browser.
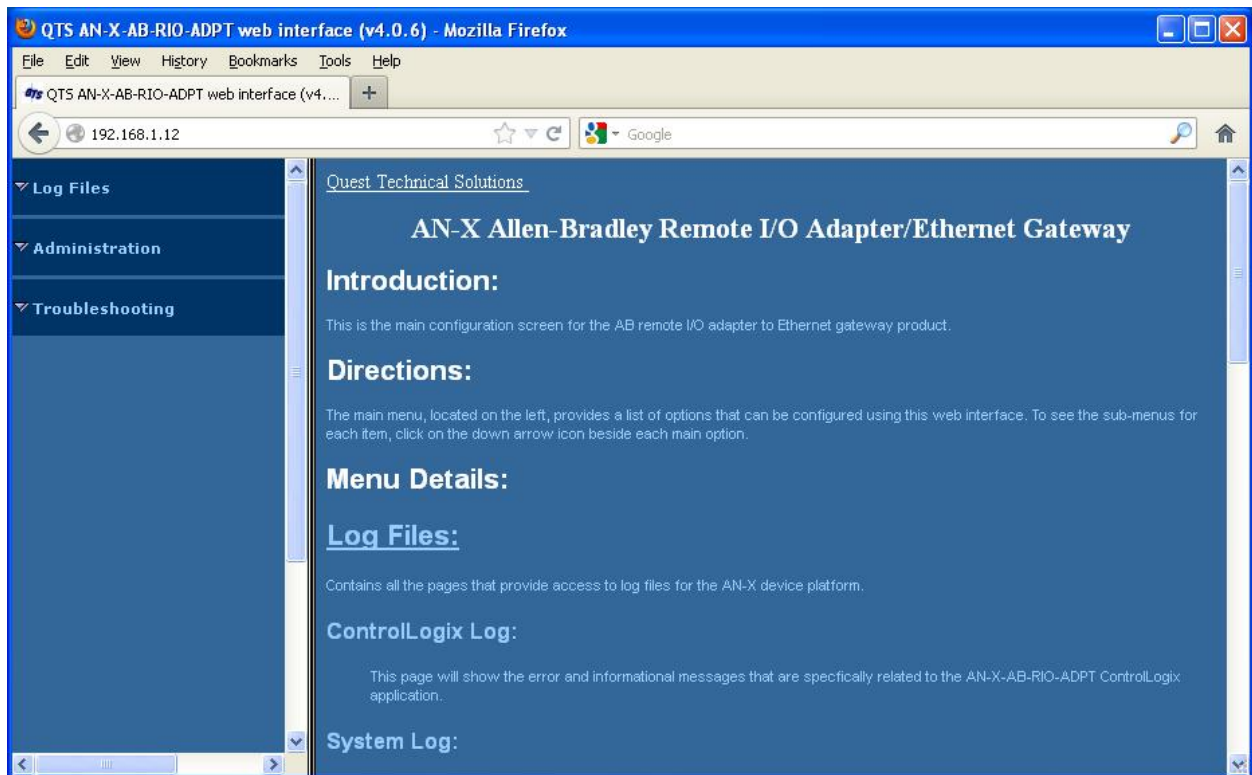
The left pane contains commands. Click on the arrows at the left of the main headings to expand or contract the sections.

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

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

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

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.

ControlLogix Log

The ControlLogix log shows messages and errors associated with the ControlLogix scheduled data operation.

System Info Log

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

View All Logs

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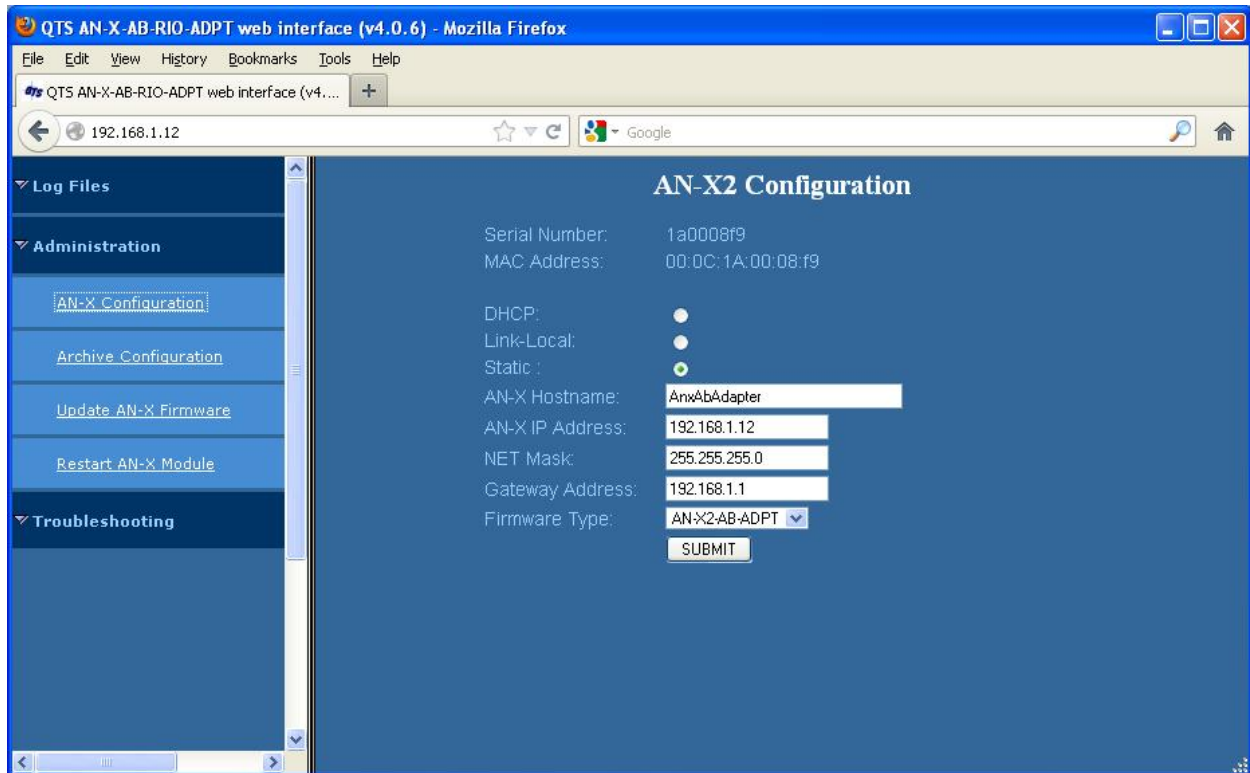
Administration Menu

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

AN-X IP Configuration

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

Select *Administration/AN-X IP Configuration*.

The top of the screen shows the serial number and MAC Address of the AN-X2 being configured.

Check either DHCP or Static.

DHCP

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

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

When you submit the changes, if the AN-X2 does not find a DHCP server, it reverts to the default link local address 169.254.42.84 and repeatedly flashes the SYS LED 3 times red followed by a pause.

Static IP Address

If you select static IP address, enter:

- the IP address for the AN-X.
- the netmask for the AN-X
- the default gateway for your network.

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

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Hostname

Enter a *Hostname* for the AN-X2. This name is used internally by AN-X and may be used to identify the AN-X if you have a DNS server on your network. The name can be from 1 to 30 characters long

Firmware

Select the firmware the AN-X is to load from the list provided. AN-X builds the list from the firmware files on the microSD card that are compatible with the AN-X hardware. For remote I/O adapter operation, the firmware must be AN-X2-AB-ADPT.

Submitting the Configuration

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

Archive Configuration

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

Select *Administration/Archive Configuration.*

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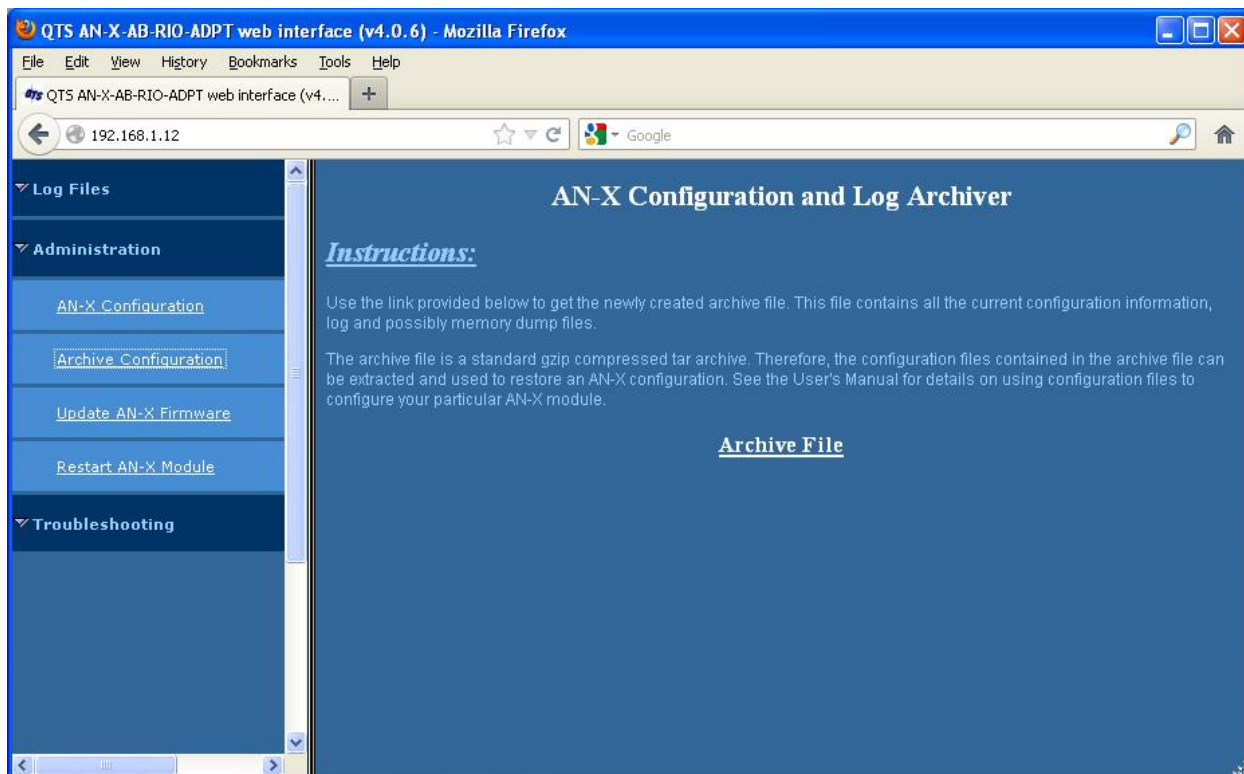
Click the *Archive File* link and save the file. Select the destination where the file will be stored.
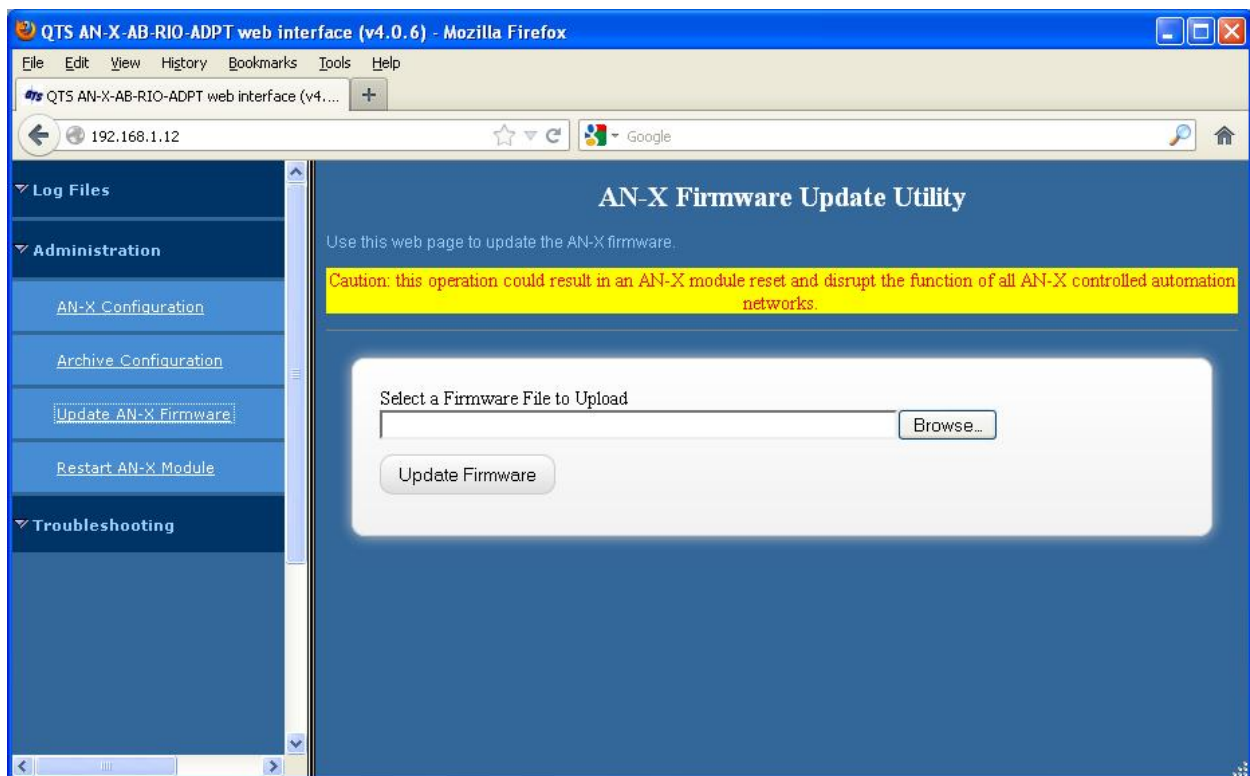
Update AN-X Firmware

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

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

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

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

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

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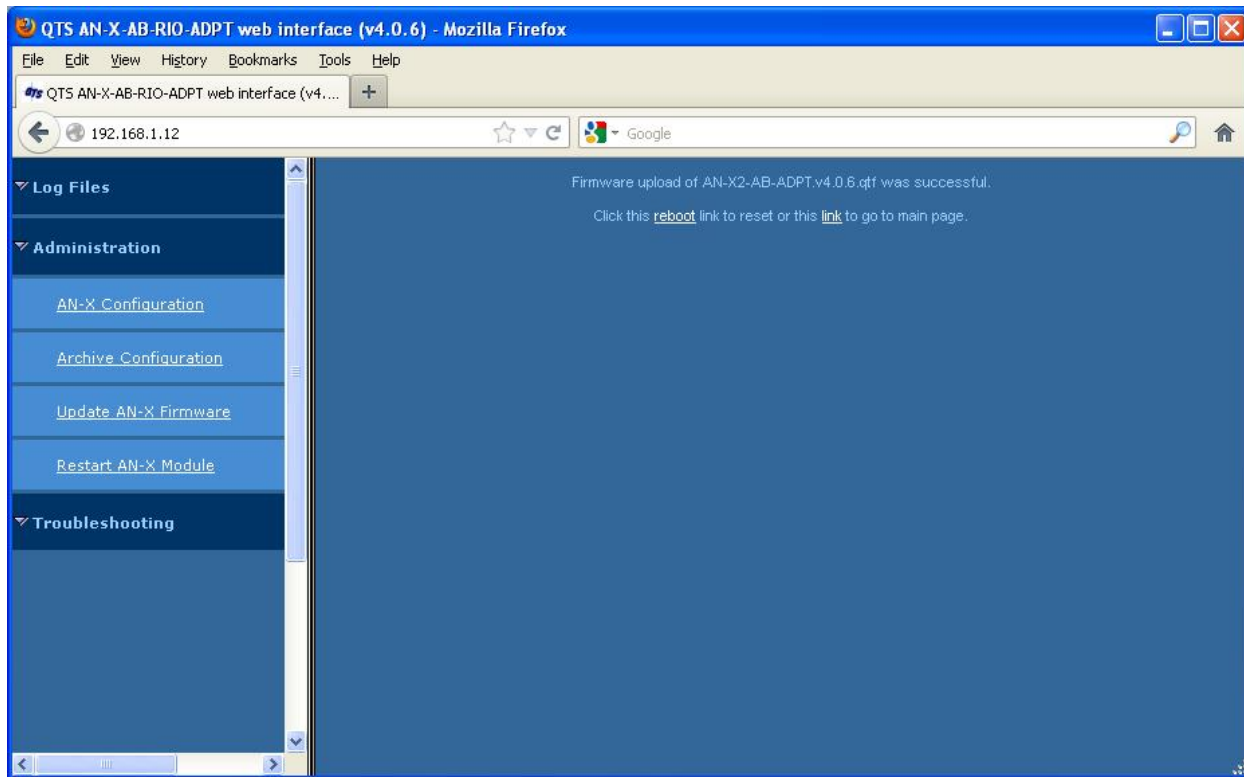
If you have other files to download, return to the main page and continue. Otherwise, restart the AN-X in order to run the downloaded firmware.

Restart AN-X Module

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

Troubleshooting Menu

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

Troubleshooting

LEDs

The AN-X2-AB-DHRIO has LEDs that indicate the state of the Ethernet connection, the overall module state and the connection to the remote I/O network.

Ethernet LEDs

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

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

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

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

SYS LED

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

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

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

SYS LED State	Possible cause
Green	Everything operating correctly
Red 3	DHCP configuration failed
Red 4, 5, 6	Internal error, contact technical support
Yellow 2	microSD card not present
Yellow 3	AN-X2 Maintenance firmware file not found on microSD card
Yellow 4	config.txt file not found on microSD card or error parsing file
Yellow 5	Production firmware filename was not specified in config.txt
Yellow 6	AN-X2 production firmware file not found on microSD card
Yellow 7	Production firmware file invalid or error programming to flash
Yellow 8	Daughterboard mismatch
Single red flash	AN-X has returned an error to a ControlLogix request. Check scheduled I/O configuration, etc. Note that this has the highest priority and may occur in combination with other error indications

SYS LED State	Possible cause
Fast flash green and off	Not all scheduled connections are open
Fast red flash and off	Errors in configuration file

"Railroading" – SYS and NET LEDs

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

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

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

NET LED – Network Status

The NET LED shows the status of remote I/O communication.

Color	Meaning
Green	Receiving good frames from the network
Red	Received a bad frame within the last 250 milliseconds
Flashing	One or more partial racks (active or monitored) not being updated
Solid Yellow	No racks configured

Startup LED Sequence

At startup, the LED sequence is:

- fast yellow flash as maintenance boot code performs memory tests, other startup diagnostics.
- fast yellow flash as maintenance firmware runs
- railroad yellow if firmware files are being updated
- yellow error code if an error occurred in configuration
- railroad green as production firmware starts
- SYS and NET LEDs green if everything is running and the AN-X2 is active on the network

Fatal Errors

AN-X2 monitors its operation for "impossible" conditions and generates a fatal error if it detects one. It generates a fatal error code on the SYS LED by flashing 8 bits followed by a pause. The least significant bit is first, with green for 1 and red for 0.

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

Updating the Firmware

The AN-X2 operating software consists of the maintenance firmware and the runtime firmware.

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

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

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

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

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

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

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

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

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

Appendix: Adapter Configuration File Format

A configuration file consists of:

File ID

Keyword "AN-X-AB-RIO-Adapter"

Baud rate

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

AN-X Name

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

Clear Active Inputs in program mode option

Keyword "ClrActInpOnClxPrg"

Rack definitions

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

Block transfer module definitions

Block transfer module definitions start with keyword BtMod, followed by:

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

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

block transfer data lengths, BtrLen and BtwLen

Data mappings

Discrete data mappings start with keyword MapRackMonInp, RackMapActInp or MapRackMonOut. 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 MapMonBtw, MapMonBtr or MapActBtr. 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 Configuration File

```
AN-X-AB-RIO-Adapter

AnxName, "AnxAbAdapter"

Baud,  57k
```

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```
ClrActInpOnClxPrg

MonRack, 0o01, 0, 1

ActRack, 0o02, 0, 1

BtMod, 0o01, 0, 0, Type="1771-IFE-16CH"   , BtrLen=20, BtwLen=37

BtMod, 0o01, 1, 0, Type="1771-OFE-Diag"   , BtrLen= 5, BtwLen=13

BtMod, 0o02, 0, 1, Type="BT-Module"       , BtrLen= 5, BtwLen=10

BtMod, 0o02, 1, 1, Type="BT-Module"       , BtrLen=64, BtwLen=64

MapRackMonInp, 0o01, 0,   0

MapRackMonOut, 0o01, 0,  10

MapRackMonOut, 0o02, 0, 103

MapRackActInp, 0o02, 0,   0

MapMonBtw, 0o01, 0, 0, 0,  20 ; Len= 39 words

MapMonBtw, 0o01, 1, 0, 0,  81 ; Len= 15 words

MapMonBtw, 0o02, 0, 1, 0, 113 ; Len= 12 words

MapMonBtw, 0o02, 1, 1, 0, 125 ; Len= 66 words

MapMonBtr, 0o01, 0, 0, 0,  59 ; Len= 22 words

MapMonBtr, 0o01, 1, 0, 0,  96 ; Len=  7 words

MapActBtr, 0o02, 0, 1, 0,  10 ; Len=  7 words

MapActBtr, 0o02, 1, 1, 0,  17 ; Len= 66 words
```

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Specifications

Parameter	Specification
Function	Bridge between Ethernet and Remote I/O network
Maximum Power Consumption	200 mA @ 12 VDC or 100 mA @ 24 VDC
Maximum Power dissipation	2.4W
Environmental Conditions:	
Operational Temperature	0-50°C (32-122°F)
Storage Temperature	–40 to 85°C (–40 to 185°F)
Relative Humidity	5-95% without condensation

Support

How to Contact Us: Sales and Support

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

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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.

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