

**AN-X3-GENI**  
**Genius I/O**  
**Communication Module**

# ***User Manual***



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

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

**WARNING!**

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-X3-GENI gateway

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## Module Overview



The AN-X3-GENI allows an Ethernet/IP Client such as ControlLogix to control Genius I/O and exchange data on a GE Genius network.

The module supports scheduled connections with a ControlLogix processor, over Ethernet, so the ControlLogix processor can read inputs from the Genius network and write outputs.

The AN-X module can act as a scanner on the Genius network. It supports up to 31 Genius blocks.

The module can also receive and send Genius global data.

You can use a DDE or OPC server such as RSLinx to access the DCS data directly on the AN-X3-DCSNet. The module "emulates" PLC-5 integer files N100-N131. N100 maps to node 0, N101 to node 1 etc. Input, output and global data can be accessed this way. Refer to page 41 for details.

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

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

The AN-X3-GENI module has a web interface for configuration, for monitoring logs, and for performing other administrative functions. You can communicate with the module using any standard web browser such as Chrome or Firefox.

The module firmware can be updated over Ethernet using the web interface. Refer to page 59 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 (SYS)
- a LED to indicate the state of communications on the Genius network (NET)
- an Ethernet connector
- a Genius network connector
- a power connector

## Package Contents

- AN-X3-GENI module
- 3 pin Phoenix power connector
- 5 pin Phoenix Genius network connector

Current firmware and documentation are at [qtsusa.com/dist](http://qtsusa.com/dist)



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## Using the microSD Card

The AN-X3 microSD card stores configuration data and firmware.

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

The card must be present while the AN-X3 is running.

**WARNING!** Do not remove the card while the AN-X3 is powered on!

If the AN-X3 is inaccessible from Ethernet because of its settings, you can remove the card and edit the file config.txt. Refer to page 16 for details.

Insert the card in the slot at the back of the AN-X3, 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-X3 to retrieve it (7/64 Allen wrench).

## AN-X3 Modes of Operation

There are two AN-X3 modes of operation:

- Maintenance mode. The AN-X3 runs the maintenance firmware at startup. It performs diagnostics (memory tests, etc), and copies any changes from the microSD card. If there are no errors, it starts the AN-X3 in production mode.
- Production mode. This is the normal runtime mode of operation.



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## Installation

### Prevent Electrostatic Discharge

The module is sensitive to electrostatic discharge.

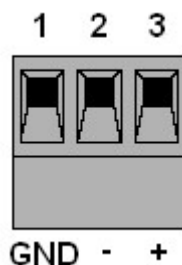
Electrostatic discharge can damage integrated circuits or semiconductors. Follow these guidelines when you handle the module:

**WARNING!**

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

### Power

AN-X requires DC power input of anywhere from 12 to 24 VDC



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

The chassis ground should be connected.

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

The part number for the power connector is:

Phoenix 1757022

(Old part number: MSTB 2.5/3-ST-5.08)



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## Genius Cabling and Termination

Refer to *Genius I/O System and Communications User's Manual*, GEK-90486F-1 for detailed information on Genius cabling and installation.

The module has a 5-pin Phoenix connector for connection to the Genius I/O network. The part number for the Genius bus connector is:

Phoenix 1757048

(Old part number: MSTB 2.5/5-ST-5.08)



| Pin | Assignment |
|-----|------------|
| 1   | Not used   |
| 2   | Shield out |
| 3   | Shield in  |
| 4   | Serial 2   |
| 5   | Serial 1   |

Ensure that the physical ends of the Genius I/O network are properly terminated. The AN-X module does not have any internal termination.

### **WARNING!**

Set the baud rate and serial bus address for the AN-X3-GENI module before connecting it to the Genius network so the module does not interfere with the existing nodes on the Genius network.

## 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 a computer or PLC directly to an AN-X3, you may need a crossover cable.



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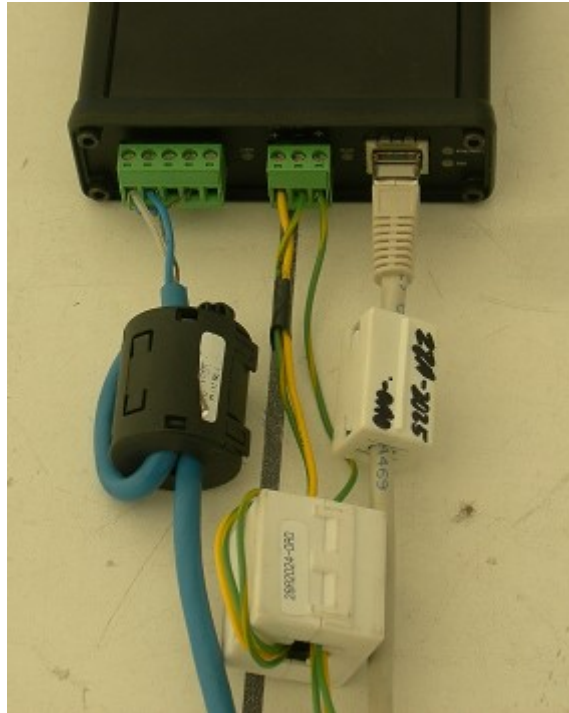
## CE Installations

If you are installing the AN-X3 in a location which requires CE, install the following ferrites or their equivalents on the cables:

Steward 28A3851-0A2 two passes on serial cable 2

Steward 28A2025-0A0 on Ethernet cable

Steward 28A2024-0A0 two passes on power cable



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## Quick Start

| Step |   | See page |
|------|---|----------|
| 1    | Power up the AN-X, connect it to Ethernet and assign it an IP address   | 13       |
| 2    | (Not needed for existing installations) Use the Genius handheld monitor to assign serial bus addresses to Genius devices and perform any other necessary configuration. |          |
| 3    | Use the AN-X web interface to set the baud rate and serial bus address for the AN-X3-GENI   | 21       |
| 4    | Connect AN-X to the Genius network  | 11       |
| 5    | Use the AN-X web interface to autoconfigure the Genius network and ControlLogix configuration   | 22       |
| 6    | Configure the AN-X in RSLogix 5000  | 35       |
| 7    | Use the web interface to obtain aliases for RSLogix 5000  | 37       |
| 8    | Import the aliases into RSLogix 5000  | 38       |
| 9    | Use the aliases to access data  |          |



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## IP Address Configuration

Before you can use the AN-X3-GENI, you must configure its IP address on Ethernet.

For the options and best procedures to configure AN-X3 modules, see:

[https://qtsusa.com/dist/AN-X3/AN-X3\\_ReadMe\\_and\\_QuickStart.txt](https://qtsusa.com/dist/AN-X3/AN-X3_ReadMe_and_QuickStart.txt)

### Initial IP 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

All 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.

#### **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.

\*\* Since link-local IP addresses are not always accessible, the recommended method to set the initial IP address is with the Prosoft Discovery Service (PDS).



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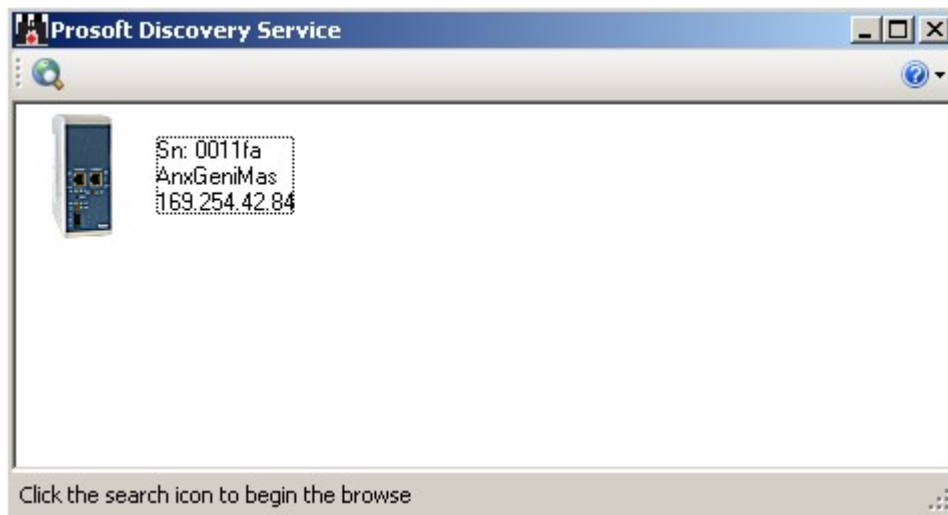
## Prosoft Discovery Service

Prosoft Discovery Service (PDS) is a free Windows application available from Prosoft's web page:

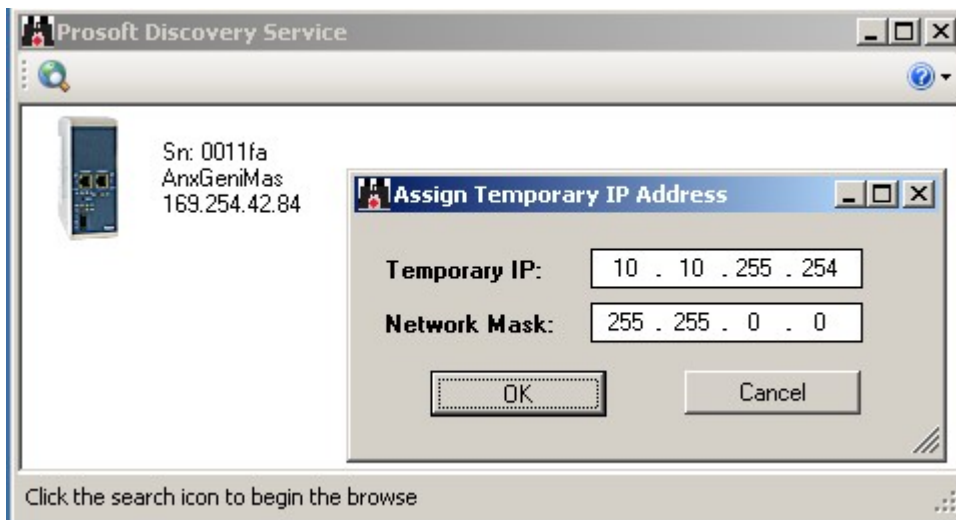
<https://www.prosoft-technology.com/Products/ProSoft-Software/ProSoft-Discovery-Service>

With the AN-X3 module connected to Ethernet and powered up, run PDS.

It should find any AN-X modules on the network.



Right click on the module icon and choose "Assign Temporary IP".



Generally you can just use the default PDS Temporary IP.

Select OK, then use the Temporary IP address in your web browser to access the module and configure a permanent IP address.



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## Link-Local IP Configuration

\*\* Many computers do not allow access to link-local addresses by default.

If you are using link-local IP addresses to configure multiple AN-X3 modules, connect and configure one at a time, since initially they will all be set to the same link-local IP address.

Enter the AN-X3's link-local IP address (169.254.42.84) in your web browser.

### TIP

The AN-X3 must be on the same subnet as the computer to use the link-local IP address. It cannot be connected through a router.

If the AN-X3's web page does not load, it's likely your computer is not configured to allow access to link-local IP addresses.

You can add a link-local route to your computer or use Prosoft Discovery Service or remove the microSD and edit Config.txt.

## microSD Config.txt

The microSD card contains a text configuration file named Config.txt.

Config.txt contains the IP configuration and the name of the firmware file to load.

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

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

Example:

```
IP: 192.168.1.12
```

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

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





If you edit the file and AN-X3 finds an error during startup, it flashes an error code on the SYS (or MS) LED, see page 58.

### **Example config.txt files**

#### **Example: DHCP**

```
IP: DHCP
Hostname: AnxGeni
Firmware: AN-X3-GENI-MAS
```

#### **Example: static IP address**

```
IP: 10.10.2.141
NetMask: 255.255.0.0
DefGtwy: 10.10.0.1
HostName: AnxGeni
Firmware: AN-X3-GENI-MAS
```



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## Web Page IP Configuration

Select *Administration/AN-X Configuration*.

The *AN-X Configuration* page appears.

The serial number and MAC address of the AN-X being configured are shown.

Check either DHCP or Static. If Static, fill in the required fields.

### DHCP

If the AN-X3 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 log.

When you submit the changes, if the AN-X3 does not find a DHCP server, it reverts to the default link local address 169.254.42.84 and repeatedly flashes the SYS (or MS) 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-X3. 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 hostname assigned is also used as the default ClxName when you autoconfigure.

## 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.

The firmware file for Genius operation is AN-X3-GENI-MAS.v4.x.x.qtf

## 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-X3, then wait until the AN-X has completely restarted before continuing.

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



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## 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.

In most cases, the Prosoft Discovery Service will be able to find the AN-X3 module, even if its IP address is not accessible on the computer's subnet.

If not, remove the microSD card and edit the Config.txt file. See pg 16.

## Non-Booting AN-X3 or Factory Reinitialize

If the AN-X3 microSD becomes corrupted and the AN-X3 will no longer boot, or if you want to reinitialize the AN-X3 to factory state:

- Download the appropriate factory image file from the QTS web site.  
[qtsusa.com/dist/AN-X3](https://qtsusa.com/dist/AN-X3) (AN-X3-GENI-uSD.v4.01.01.img.zip for example).

WARNING: This process will erase all AN-X3 configuration files.

If possible, make copies of any configuration files on the microSD you need to preserve before initializing it.

There are many ways to Flash .img.zip files to the microSD. We recommend Balena Etcher. It's free and seems to work very well.

<https://www.balena.io/etcher>

This factory image will have the LOCAL IP address.

The individual microSD files are available on [qtsusa.com/dist/AN-X3](https://qtsusa.com/dist/AN-X3) in the appropriate uSD\_Files directory.



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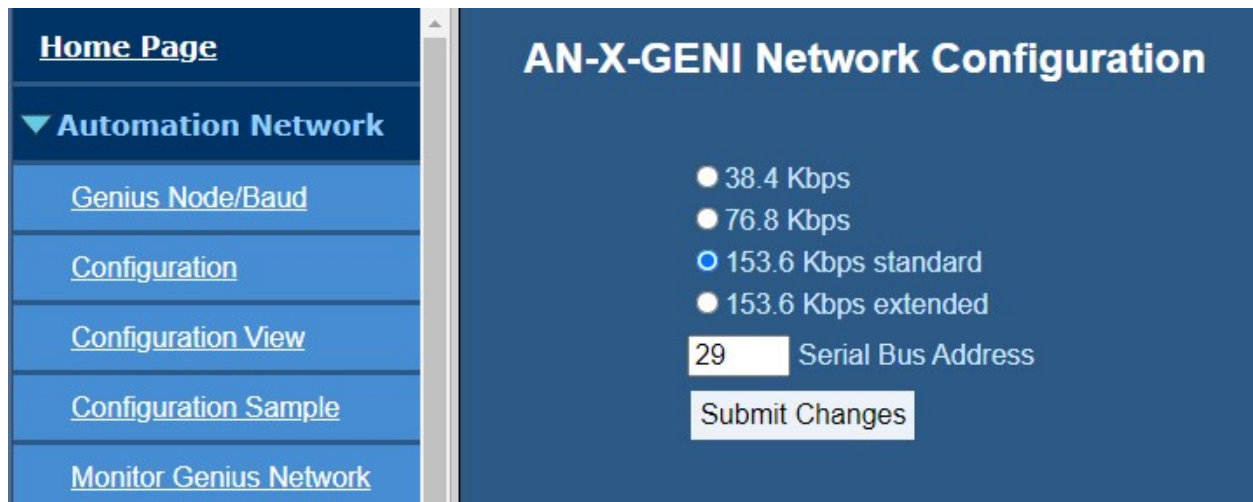
## Genius Network Configuration

Before you can scan a Genius I/O network, you must set the AN-X module's serial bus address (node number) and baud rate and configure the network in the AN-X3-GENI.

Set the baud rate and serial bus address before connecting to the Genius network.

### Setting the Bus Address and Baud Rate

From the AN-X web interface, select *Automation Network/Genius Node/Baud Settings*.



Check the desired baud rate from the four supported baud rates: 38.4Kbps, 76.8 Kbps, 153.6 KBPS standard or 153.6 Kbps extended. This setting **MUST** match the existing Genius network settings.

Enter the serial bus address (SBA) for the AN-X, in the range 0 to 31. This must be a free node number on the existing Genius Network.

Click the *Submit Changes* button to set the Genius bus properties of the AN-X3-GENI.



## Configuring Genius I/O and Ethernet/IP Scheduled Data

The AN-X-GENI uses two text files for configuration. The I/O configuration text file defines the Genius I/O Blocks and Devices the AN-X will scan. The Ethernet/IP configuration file defines data mapping between the Ethernet/IP Scheduled Owner and the I/O Blocks and Devices.

The AN-X-GENI Module is generally configured with 'Auto Config' which generates I/O and Ethernet/IP config files. Auto Config sends Init messages to all Genius nodes. If a node exists, it replies with it's device type. The drop's configuration information is used to build the I/O and Ethernet/IP text configuration files.

The Auto Config text configuration files may be used as is, or retrieved, modified and sent to the AN-X.

### AN-X-GENI GE Genius Configuration

#### GE Genius Configuration Instructions:

Configuration operations disrupt Remote I/O and Ethernet/IP communication.

The Ethernet/IP Scheduled Owner MUST be in PROGRAM mode for configuration operations.

**Caution: Configuration should not be performed while the process is in production mode.**

The AN-X-GENI uses two text files for configuration. The I/O configuration text file defines the Genius I/O Blocks and Devices the AN-X will scan. The Ethernet/IP configuration file defines data mapping between the Ethernet/IP Scheduled Owner and the I/O Blocks and Devices.

The AN-X-GENI Module is generally configured with 'Auto Config' which generates I/O and Ethernet/IP config files. Auto Config sends Init messages to all Genius nodes. If a node exists, it replies with it's device type. The drop's configuration information is used to build the I/O and Ethernet/IP text configuration files. The Auto Config text configuration files may be used as is, or retrieved, modified and sent to the AN-X.

The AN-X generates a ControllLogix alias tag csv file when it's configured. A link is provided to retrieve this csv file. Use 'Tools/Import/Tags and Logix Comments' in RSLogix5000.

Auto Config

Configure with modified or manually created text configuration files:

Select file:  No file chosen

Select file:  No file chosen



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## Manual Configuration

It is recommended that you start with an autoconfig, even if it's just part of your I/O in a lab, or a network you have access to.

If that's not possible, it is recommended that you start with the Sample Configuration.

Retrieve the sample configuration by selecting *Automation Network/Configuration Sample*. This shows sample I/O and Ethernet I/P configuration files.

Edit the configuration files using a text editor. The file format is described on page 25.

To send the files configuration to AN-X:

1. From the AN-X web interface, select *Automation Network/Configuration*.
2. Browse to either the I/O config file or the Ethernet/IP config file.
3. Click the *Send I/O Config to AN-X* or *Send Ethernet/IP Config to AN-X* button.

AN-X parses the files and displays the current configuration and configuration logs.

AN-X also reloads the ControlLogix configuration and regenerates tags when you download a Genius bus configuration.

## Configuration Sample Files

Sample I/O and Ethernet/IP configuration files are available by selecting *Automation Network/Configuration Sample*.

### Sample I/O Configuration File

```
;QTS AN-X-GENI Scan Configuration Utility
;Copyright (c) 2005 Quest Technical Solutions
;Auto Config Geni I/O File
```

```
Block=1,Inp=32,Out=2,Scan,Part="IC660BBD120",Desc="High-speed Counter Block",EndBlock
Block=2,Inp=2,Out=2,Scan,Part="IC660BBR101",Desc="16-Ckt Normally-open Relay Block",EndBlock
Block=3,Inp=4,Out=4,Scan,Part="IC660BBD024",Desc="12/24VDC 32 Ckt Source I/O Block",EndBlock
Block=4,Inp=2,Out=2,Scan,Part="IC660BBD020",Desc="24/48VDC 16 Ckt Source I/O Block",EndBlock
Block=5,Inp=8,Out=4,Scan,Part="IC660BBA020",Desc="24/48VDC 4In/20Out Analog Block",EndBlock
Block=10,Inp=24,Out=24,Scan,Part="IC670GBI001",Desc="Field Control Genius Bus Interface Unit",EndBlock
Block=11,Inp=1,Out=3,Scan,Part="IC200GBI001",Desc="VersaMax Genius Network Interface Unit",EndBlock
```

```
;GlobSend=4,; Global Data Sent by AN-X (16 bit words)
```



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## Sample Ethernet/IP Configuration File

```
;QTS AN-X-GENI Scan Configuration Utility
;Copyright (c) 2005 Quest Technical Solutions
;Auto Config Ethernet/IP File (AutoScan Ver 4.1.6)

;ScanGeniProg
LedModeDebug

ClxName,AnxGeniMas
ClxPrefix,GENI_
ClxSlot,0

DataOutput ; Outputs from ControlLogix
,b1,b01_Out, ; Ofs= 0 Len= 1 IC660BBBD120 High-speed Counter Block
,b2,b02_Out, ; Ofs= 1 Len= 1 IC660BBR101 16-Ckt Normally-open Relay Block
,b3,b03_Out, ; Ofs= 2 Len= 2 IC660BBBD024 12/24VDC 32 Ckt Source I/O Block
,b4,b04_Out, ; Ofs= 4 Len= 1 IC660BBBD020 24/48VDC 16 Ckt Source I/O Block
,b5,b05_Out, ; Ofs= 5 Len= 2 IC660BBA020 24/48VDC 4In/20Out Analog Block
,b10,b10_Out, ; Ofs= 7 Len=12 IC670GBI001 Field Control Genius Bus Interface Unit
,b11,b11_Out, ; Ofs= 19 Len= 2 IC200GBI001 VersaMax Genius Network Interface Unit

;,,GlobSend; Global Data Sent by AN-X-GENI

DataInput ; Inputs to ControlLogix
,BlockErr ; Map BlockErr here since Clx sets to -0xffffffff on Connection Failure
,b1,b01_Inp, ; Ofs= 2 Len=16 IC660BBBD120 High-speed Counter Block
,b2,b02_Inp, ; Ofs= 18 Len= 1 IC660BBR101 16-Ckt Normally-open Relay Block
,b3,b03_Inp, ; Ofs= 19 Len= 2 IC660BBBD024 12/24VDC 32 Ckt Source I/O Block
,b4,b04_Inp, ; Ofs= 21 Len= 1 IC660BBBD020 24/48VDC 16 Ckt Source I/O Block
,b5,b05_Inp, ; Ofs= 22 Len= 4 IC660BBA020 24/48VDC 4In/20Out Analog Block
,b10,b10_Inp, ; Ofs= 26 Len=12 IC670GBI001 Field Control Genius Bus Interface Unit
,b11,b11_Inp, ; Ofs= 38 Len= 1 IC200GBI001 VersaMax Genius Network Interface Unit

;The following map 'Ghost Mode' Monitored Outputs to ClxSlot 8
;They must be 'uncommented' for 'Ghost Mode' Monitoring
;
;ClxSlot,8 ; This maps monitored 'Ghost Mode' outputs to Slot 8
;
;DataInput ; Inputs to ControlLogix
;,,BlockErr ; Map BlockErr here since Clx sets to -0xffffffff on Connection Failure
;,,m31>1[1],b01_OutMon, ; Ofs= 2 Len= 1 IC660BBBD120 High-speed Counter Block
;,,m31>2[1],b02_OutMon, ; Ofs= 3 Len= 1 IC660BBR101 16-Ckt Normally-open Relay Block
;,,m31>3[2],b03_OutMon, ; Ofs= 4 Len= 2 IC660BBBD024 12/24VDC 32 Ckt Source I/O Block
;,,m31>4[1],b04_OutMon, ; Ofs= 6 Len= 1 IC660BBBD020 24/48VDC 16 Ckt Source I/O Block
```





```
;,m31>5[2],b05_OutMon, ; OfS= 7 Len= 2 IC660BBA020 24/48VDC 4In/20Out Analog Block
;,m31>10[12],b10_OutMon, ; OfS= 9 Len=12 IC670GBI001 Field Control Genius Bus Interface Unit
;,m31>11[2],b11_OutMon, ; OfS= 21 Len= 2 IC200GBI001 VersaMax Genius Network Interface Unit
```

```
;The following lines map Diagnostics into ClxSlot 15
```

```
ClxSlot,15
```

```
DataInput ; Inputs to ControlLogix
```

```
0,BlockFlt, ; OfS= 0 Len=2
```

```
2,ConnDiag, ; OfS= 2 Len=8
```

```
10,DiagCtrs, ; OfS= 10 Len=10
```

```
;ControlLogix Connection Statistics
```

```
,ConnStats0, ; OfS= 20 Len=10
```

## Viewing and Retrieving the Current Configuration

To view the Genius configuration currently in AN-X, access the web interface and select *Automation Network/ Configuration View*.

Links are provided to retrieve the I/O and Ethernet/IP configuration text files.

Links are also provide to retrieve ControlLogix aliases. Select *Logix Aliases*, either *Owner* or *ListenOnly*.

## Genius Configuration File Format

The Genius I/O configuration file defines the contents of the Genius network to be scanned.

It is a text file, which can be created and edited with a text editor such as Windows Notepad.

Anything after a semicolon on a line is treated as a comment. Comments can be inserted at the end of a line or on a separate line.

### Genius Block Definitions

Each Genius block on the network is defined by a line in the configuration file. The line contains various parameters that describe the block.

Parameters are identified by keywords and are separated by spaces or commas.

Each definition begins with the parameter that defines the serial bus address of the block being configured, for example, `Block=7`. The serial bus address can be from 0 to 31.

The input length is defined by the keyword `Inp=` and can range from 0 to 128 bytes. If the input length definition is omitted, the input length defaults to a length of 0.



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The output length is defined by the keyword `Out=` and can range from 0 to 128 bytes. If the output length definition is omitted, the output length defaults to a length of 0.

If the AN-X3-GENI is to control the outputs on a module, include the keyword `Scan`. If the AN-X3-GENI is only to monitor the inputs on a module, omit the keyword `Scan`.

The part number for a module is defined by the keyword `Part=` and can be from 1 to 15 characters long. The part number text must be enclosed in double quotes, for example `Part="IC660BBD024"`.

The description for a module is defined by the keyword `Desc=` and can be from 1 to 95 characters long. The description text must be enclosed in double quotes, for example `Desc="12/24VDC 32 Ckt Source I/O Block"`.

The part number and description are used for comments only. You can put whatever you want in them.

Each definition ends with the keyword `EndBlock`, which is required.

| Parameter               | Keyword               | Valid entries                                    |
|-------------------------|-----------------------|--|
| Serial bus address      | <code>Block=</code>   | 0-31   |
| Input length, bytes     | <code>Inp=</code>     | 0-128  |
| Output length, bytes    | <code>Out=</code>     | 0-128  |
| Scan mode               | <code>Scan</code>     | Scan   |
| Part number             | <code>Part=</code>    | Maximum 15 characters, enclosed in double quotes |
| Description             | <code>Desc=</code>    | Maximum 95 characters, enclosed in double quotes |
| End of block definition | <code>EndBlock</code> |  |

Examples:

```
Block=0,Inp=0,Out=0,Part="IC660HHM501",Desc="Hand-held Monitor",EndBlock
```

```
Block=1,Inp=2,Out=2,Scan,Part="IC660BBR101",Desc="16-Ckt Normally-open Relay Block",EndBlock
```

When AN-X creates a Genius I/O configuration file after an autoconfiguration, it inserts part numbers and descriptions from its internal module database.

### Global Data Sent by AN-X3-GENI

If the AN-X3-GENI is to send global data on the Genius network, add a line of the form

```
GlobSend=length
```



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to the configuration file. The length can be from 1 to 64. The length of global data is in 16-bit words, not bytes.

Example:

```
GlobSend=4
```

## Ethernet/IP Configuration File Format

The AN-X3-GENI supports scheduled connections with a ControlLogix processor over Ethernet.

The AN-X3-GENI behaves like a 17-slot ControlLogix rack with an ENBT/A module in slot 16 and generic modules in slots 0 to 15.

A ControlLogix processor can open a scheduled connection to each of these 16 generic modules. Each scheduled connection consists of up to 248 words of output data from the ControlLogix processor to the AN-X and up to 250 word of input data from the AN-X to the ControlLogix processor.

Each connection can have a different RPI, up to 750 ms.

In general, keep the number of connections small. There is significant overhead in opening and maintaining each connection.

You map the inputs and outputs for the Genius blocks to these scheduled connections. AN-X can create the mappings automatically or you can create a mapping configuration manually.

You can let AN-X create a mapping file automatically, then edit the file to better suit your application. For example, in order to make the most efficient use of the available Ethernet bandwidth, you can organize the data so that items that must update quickly are mapped to connections with short RPIs and items that are less time critical are mapped to connections with longer RPIs.

In addition, the AN-X module has diagnostic data that can be mapped to ControlLogix scheduled input data.

## Mapping I/O Data

You map Genius input and output data to the ControlLogix scheduled data by creating a text file that defines the mappings and sending the file to the AN-X.

The file contains sections for each scheduled connection. Within each scheduled connection are the definitions for the input and output data for that connection. These definitions refer to the Genius module where the data is to be found.

When you create a mapping for a Genius module, all the input or output data for the module is mapped; you cannot map individual registers.

The file also contains options that apply to the whole configuration.

AN-X automatically creates mappings when you autoconfigure. See page 22 for details.



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

### ClxName

The first line in the file identifies the AN-X module. AN-X uses this name as the base tag name portion of the ControlLogix aliases for the Genius data.

The ClxName consists of a line with the keyword ClxName, followed by a space or comma and the name you give the emulated ENBT (see page 35)

Example:

```
ClxName, AnxGeniMas
```

### ClxPrefix

The ClxPrefix is used in the alias names AN-X creates for import into RSLogix 5000. AN-X prefixes each name with the ClxPrefix. The ClxPrefix can be used to distinguish aliases for the same Genius serial bus address on different Genius networks when the ControlLogix processor has connections to more than one AN-X3-GENI.

For example, if the ControlLogix has connections to two AN-X3-GENI modules, each controlling a different Genius network, each Genius network could have a block with the same serial bus address. Using a different ClxPrefix in the configuration file for each AN-X3-GENI makes the aliases for the two AN-X modules distinct.

The ClxPrefix consists of a line with the keyword ClxPrefix, followed by a space or comma and the prefix text.

Example:

```
ClxPrefix, GENI1_
```

### Scheduled Connections

Each scheduled connection to the AN-X begins with a line that consists of the keyword ClxSlot followed by a space or comma and then a number from 0 to 15

Example:

```
ClxSlot, 0
```

Each scheduled connection consists of output data and input data.

The section that defines the scheduled outputs from the ControlLogix processor for that connection begin with a line with just the keyword DataOutput.

The section that defines the scheduled inputs to the ControlLogix processor for that connection begin with a line with just the keyword DataInput.



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Data definitions consist of lines that define the mapping between the ControlLogix data table and the Genius module.

They consist of lines of the form

```
CLX_offset (optional), Genius_Node, tagname
```

The CLX\_offset is the offset into the data for the connection. You can select the offset where the data is located or you can leave it blank and AN-X will automatically assign the offset.

The Genius\_Node consists of an address in the form bSBA where SBA is the 2-digit serial bus address (SBA) of the module on the Genius bus, from 1 to 31.

Example:

To associate ControlLogix offset 27 with the outputs from the Genius module at serial bus address 4 and assign it tagname Block4Outputs, add the following line to the DataOutput section of the connection

```
27, b4, Block4Outputs
```

Example:

To map the inputs from the Genius module at address 31 to the next available ControlLogix location and assign it tagname Block31Inputs, add the following line to the DataInput section of the connection

```
, b31, Block31Inputs
```

## Global Data

### Sending Global Data

To map the Global data sent by AN-X to the output data for a connection, add the following line to the DataOutput section of the connection:

```
GlobSend
```

AN-X obtains the length of the global data to map from the Genius I/O configuration file (see page 26).

### 90-70

To configure the 90-70 to receive global data from the AN-X:

1. Add a Genius device to the bus controller as a Generic I/O device
2. Set the Config mode to manual
3. Assign a data address and set the length to match the length configured in the AN-X



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**90-30**

To configure the 90-30 to receive global data from the AN-X:

1. Add a device to the bus controller at the AN-X serial bus address
2. Set the device type to Generic
3. Set the %AI address and set the input length to match the data length configured in the AN-X

**Series Six**

If a Series Six controller will be receiving the global data from the AN-X, add a line to the beginning of the ControlLogix configuration file as follows:

```
Ge6Addr, nnnnn
```

nnnn is a number from 0 to 16383 that is the register where the data is to go in the Series Six PLC(s). All Series Six PLCs on the Genius network configured to receive global data will put it in the same place.

Set the Series Six to receive global data as you would from any other node. It will appear at the address you assigned.

**Receiving Global Data on the AN-X3-GENI**

When you perform an autoconfiguration, if the other node is producing global data when you autoconfigure the AN-X3-GENI, the autoconfiguration will include the global data.

If you are configuring the Genius network manually, add a line of the form

```
Block=nn, Inp=inlength, Out=0, , Part="partnumber", Desc="description", EndBlock
```

where

Block is the Genius serial bus address of the node producing the global data

inlength is the length of the data in bytes

partnumber is a maximum of 15 characters, enclosed in double quotes

description is a maximum of 95 characters, enclosed in double quotes

partnumber and description are used for comments only. You can put whatever you want in them.

To receive the global data in the ControlLogix, you must map the received global data to the input data for a ControlLogix connection.

In the ControlLogix configuration, add a line to the DataInput section of the connection of the form:

```
CLX_offset (optional), Genius_Location, tagname
```

The CLX\_offset is the offset into the data for the connection. You can select the offset where the data is located or you can leave it blank and AN-X will automatically assign the offset.



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---

The Genius\_location consists of an address in the form bSBA where SBA is the 2-digit serial bus address (SBA) of the module on the Genius bus, from 1 to 31.

### Controlling Program Mode Behaviour

The ControlLogix processor that is the exclusive owner of the connection to the generic module in slot 0 controls how the AN-X3-GENI module scans the Genius network. For that reason, when you map the data, you must always include a connection to the generic module in slot 0.

When the ControlLogix processor with the exclusive owner connection to slot 0 on the AN-X is in program mode or the connection to slot 0 is stopped or inhibited, the AN-X stops scanning all devices on the Genius network. Even if other ControlLogix processors have exclusive owner connections to other slots on the AN-X and are in run mode, AN-X does not scan the network.

You can override this behaviour by including a line with the keyword ScanGeniProg in the configuration file. This causes the AN-X3-GENI module to continue to communicate with the Genius network when the ControlLogix processor is in program mode but set all outputs to 0. Similarly ControlLogix processors with exclusive owner connections to other AN-X slots will also update. If the exclusive owner connection to slot 0 stops, AN-X stops all communication with the Genius network.

#### **WARNING!**

This option is included for debugging since it allows inputs to update in the ControlLogix. It should NOT be used in normal operation.

### Other Mappable Data

In addition to the I/O data, there are other items that can be mapped to connection input data.

If you create the ControlLogix configuration automatically when you autoconfigure the Genius network, these items are mapped by default to ClxSlot 15.

#### **TIP**

If you map the diagnostic data to a separate connection, use a long RPI to reduce the Ethernet traffic, since the diagnostics do not need to be updated as frequently as I/O data.



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## Diagnostic Counters

The AN-X3-GENI maintains the following diagnostic counters.

| Counter      | Offset | Description                              |
|--------------|--------|--|
| TxFrames     | 0      | Transmitted network frames               |
| TxMsgs       | 1      | Transmitted network messages (datagrams) |
| RxFrames     | 2      | Received network frames                  |
| RxMsgs       | 3      | Received network messages (datagrams)    |
| RxDup        | 4      | Received duplicate frames                |
| RxCrcErr     | 5      | Received frames with a CRC error         |
| RxStopErr    | 6      | Received frames with a stop error        |
| RxAbortErr   | 7      | Received frames with an abort error      |
| RxOverrunErr | 8      | Received frames with an overrun error    |
| NoToken      | 9      | No tokens received from network          |

To map the diagnostic counters, include a line with just the keyword `DiagCtrs` in the input section of a connection. This maps all the diagnostic counters (10 words); they cannot be mapped individually.

Example:

```
, DiagCtrs
```

## Block Error Table

The block error table consists of 2 16-bit words, one bit per serial bus address. Bit 0 of the first word corresponds to serial bus address 0, bit 1 corresponds to serial bus address 1, and so on.

If a configured block is not active on the network, the bit is 1. If a configured block is active on the network, the bit is 0. The bit is always 0 for an unconfigured block.

To map the block error table, include a line with just the keyword `BlockErr`.

Example:

```
, BlockErr
```

### TIP

Map the block error table to the beginning of input data of each connection. If the connection to the AN-X module is lost, the `ControlLogix` sets the first 2 words of the connection to FFFF



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hexadecimal. If your program is monitoring the block error table, it will see all the error bits as set.

## Block Fault Table

A Genius block can generate fault messages for a variety of error conditions. If the AN-X3-GENI receives a fault message from a Genius block, it sets the corresponding bit in the block fault table.

The block fault table consists to 2 16-bit words, one bit per serial bus address. Bit 0 of the first word corresponds to serial bus address 0, bit 1 corresponds to serial bus address 1, and so on.

To map the block fault table, include a line with the keyword `BlockFlt` in the input section of a connection.

Example:

```
,BlockFlt
```

If the block fault bit is set for a block, use the web interface on the AN-X3-GENI to view and clear the fault. Refer to page 50 for details.

## Connection Diagnostics

The AN-X3-GENI maintains diagnostics related to the UDP traffic to and from the module. They are mapped using the keyword `ConnDiag`.

Example:

```
, ConnDiag
```

They consist of:

| Offset | Counter                           |
|--------|-----------------------------------|
| 0      | UDP Tx count                      |
| 1      | UDP Rx count                      |
| 2      | UDP Eth Error, Ctr (lo) Typ (Hi)  |
| 3      | UDP PrtErr, Ctr (Lo) Typ/Slr (Hi) |
| 4      | UDP Tx Busy                       |
| 5      | UDP Rx Busy                       |

## Connection Statistics

The module maintains statistics for each scheduled connection. In the following table, O represents the connection originator (ControlLogix) and T represents the connection target (AN-X).



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The statistics for each connection consists of 10 words of data. Only three words in the ten word block are used.

| Offset | Description  |
|--------|--|
| 0      | Average time for last 32 updates                             |
| 2      | Minimum time since the connection statistics were reset      |
| 4      | Maximum time since the connection statistics were last reset |

The units for the times are 0.1 milliseconds. A value of 87 means 8.7 ms.

To map the statistics for a given connection, include a line with the keyword ConnStatsn, where n is the connection number, from 0 to 15, in the input section of a connection.

Example:

```
,ConnStats2
```

Averages are calculated for the last 32 updates.

## Connection 15 Mappings

When you autoconfigure the AN-X, it maps the following diagnostics to inputs on connection 15.

| Offset | Length | Description                           |
|--------|--------|---------------------------------------|
| 0      | 2      | Block error table                     |
| 2      | 8      | Connection diagnostics                |
| 10     | 10     | Diagnostic counters                   |
| 20     | 10     | Connexion statistics for connection 0 |

We recommend that you use the same mappings and do not change them.

## Resetting Connection Statistics

To reset the connection statistics, set bit 0 of output word 0 of connection 15. AN-X resets the statistics on the transition from 0 to 1.



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## Configuring the AN-X Module in RSLogix 5000

To configure the AN-X3-GENI in RSLogix 5000:

1. Right click on the ControlLogix Ethernet module that will be communicating to the AN-X and select *Add Module*. Add a 1756-ENBT/A module.
2. Set the Major Rev to 1.

The screenshot shows the 'New Module' dialog box with the following configuration:

- General\* Tab:**
  - Type: 1756-ENBT 1756 10/100 Mbps Ethernet Bridge, Twisted-Pair Media
  - Vendor: Allen-Bradley
  - Parent: LocalENBT
  - Name: ANX
  - Description: (empty)
- Ethernet Address:**
  - Private Network: 192.168.1.12
  - IP Address: (empty)
  - Host Name: (empty)
- Slot:** 16
- Module Definition:**
  - Revision: 1.1
  - Electronic Keying: Disable Keying
  - Rack Connection: None
  - Time Sync Connection: None
  - Chassis Size: 17

Status: Creating

Set the *Name* to match the hostname of the AN-X in the Ethernet configuration.

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

Set the revision to 1.1

Set the *Comm Format* or *Rack Connection* to None.

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



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Set *Electronic Keying* to *Disable Keying*.

3. Add Generic modules for each required connection

**New Module**

Type: 1756-MODULE Generic 1756 Module  
Parent: ANX

Name: AnxSlot0

Description:

Comm Format: Data - INT

Slot: 0

**Connection Parameters**

| Input | Assembly Instance | Size         |
|-------|-------------------|--------------|
| 1     | 1                 | 250 (16-bit) |
| 2     | 2                 | 248 (16-bit) |
| 4     | 4                 | 0 (8-bit)    |

Status Input:

Status Output:

Open Module Properties

OK Cancel Help

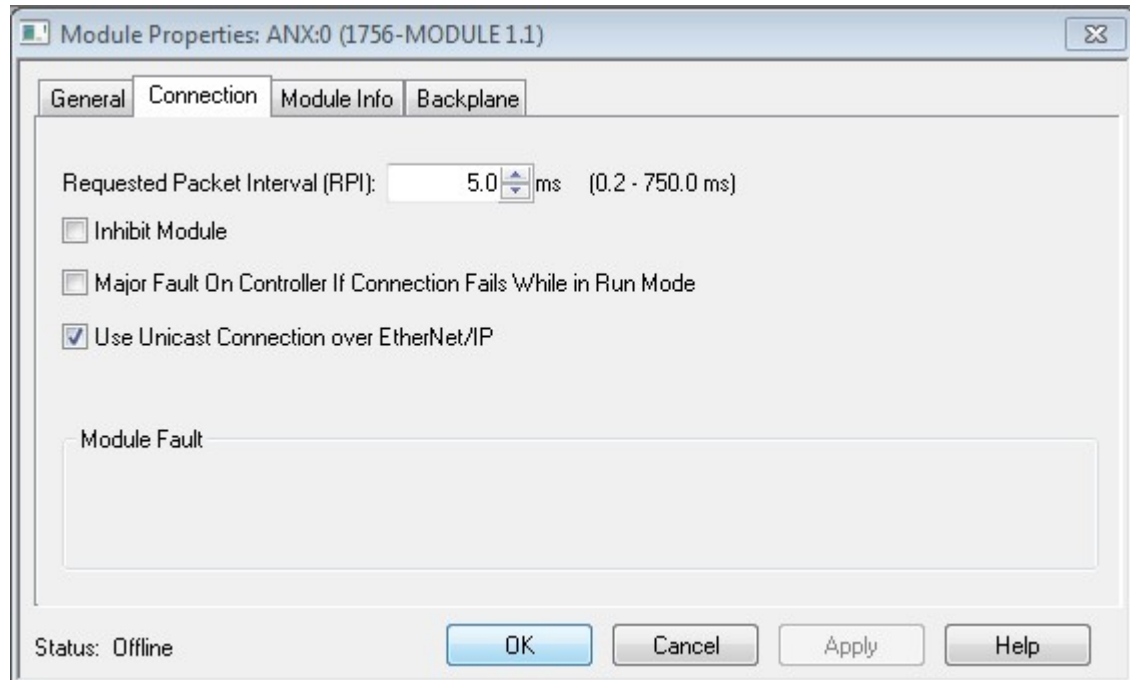
Set the parameters as shown. Set the Slot to 0 for the first connection, 1 for the second connection, and so on.

4. Set the RPI for each connection.



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## ControlLogix Aliases

AN-X uses the Ethernet/IP configuration to create aliases that can be imported into RSLogix 5000. Use these alias tags in your RSLogix 5000 program to access the data on the AN-X.

There are two sets of alias files, one for exclusive owner connections and one for listen only connections.

In the web interface, select *Automation Network/Configuration View*.

Under the Ethernet/IP Configuration File, select *Logix Aliases*, either *Owner* or *ListenOnly*.

```
DataInput ; Inputs to ControlLogix
,BlockErr ; Map BlockErr here since Clx sets to -0xffffffff on Connection Failure
,b1,b01_Inp, ; Of= 2 Len=16 IC660BBD120 High-speed Counter Block
,b2,b02_Inp, ; Of= 18 Len= 1 IC660BBR101 16-Ckt Normally-open Relay Block
,b3,b03_Inp, ; Of= 19 Len= 2 IC660BBD024 12/24VDC 32 Ckt Source I/O Block
,b4,b04_Inp, ; Of= 21 Len= 1 IC660BBD020 24/48VDC 16 Ckt Source I/O Block
,b5,b05_Inp, ; Of= 22 Len= 4 IC660BBA020 24/48VDC 4In/2Out Analog Block
```

Retrieve [Current Ethernet/IP Configuration](#) [Logix Aliases Owner](#) / [ListenOnly](#)



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## Importing Tags in RSLogix 5000

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

## Using the Ethernet/IP Log

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

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

## Using Ghost Mode

In ghost mode, the AN-X3-GENI monitors inputs and outputs on an existing Genius network and passes the monitored data to a ControlLogix via scheduled connections.

Ghost mode is useful when the AN-X3-GENI and a ControlLogix is to replace an existing control system and you want to verify the data and timing on the existing system before replacing it.

### **WARNING!**

You must be careful in setting up ghost mode that you do not disrupt the existing system when you connect and configure the AN-X3-GENI

Configuration is best performed when the existing system is connected but is not running.

The AN-X3-GENI requires an available serial bus address on the Genius network.

You can use the autoconfiguration feature of the AN-X3-GENI to locate all the devices on the network and generate a starting Genius configuration file.

### **Genius Configuration File**

You must configure the Genius I/O on the network being monitored. The configuration file format is the same as described earlier (see page 25). Ensure that the Scan field is removed from all Genius devices so that the AN-X3-GENI doesn't write outputs to the network.

### **ControlLogix Configuration File**

The output data on the Genius network is mapped to ControlLogix scheduled inputs.

Data definitions for the monitored outputs consist of lines that define the mapping of the Genius output data into the ControlLogix data table.

They consist of lines of the form

```
CLX_offset (optional), Genius_Location, tagname
```



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The CLX\_offset is the offset into the data for the connection. You can select the offset where the data is located or you can leave it blank and AN-X will automatically assign the offset.

The Genius\_location consists of an address in the form

```
msourceSBA>destSBA[length]
```

where

sourceSBA is the serial bus address (SBA) of the module on the Genius bus that is sending the data

destSBA is the serial bus address of the destination

length is the length of data in words

Genius bus input data is mapped as before.

Example:

A Genius bus controller at serial bus address 31 is sending 2 words of output data to a Genius block at serial bus address 17. To map this data to a offset 27 in a ControlLogix scheduled connection, and assign it tagname Block17Outputs, add the following line to the DataInput section of the connection

```
27, m31>17[2], Block17Outputs
```

### ControlLogix Tags

As before, AN-X can create tags that can be imported into RSLogix 5000 to access the data.



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## Quick Start

Use the following steps to run the AN-X3-GENI in ghost mode.

1. Use the web interface to set the baud rate and serial bus address
2. Connect AN-X3-GENI to the Genius network.
3. Use the web interface to perform an autoconfiguration and automatically generate a ControlLogix configuration.
4. Save and edit the Genius configuration file. Remove Scan from all network devices.
5. Save and download the modified Genius configuration file to the AN-X3-GENI.
6. Save and edit the ControlLogix configuration file the AN-X3-GENI created when you performed the autoconfiguration. Comment out all the DataOutput sections. Uncomment the ghost mode entries it created and modify them to suit your application.
7. Save and download the modified ControlLogix configuration file.
8. Use the web interface to view the active configuration and locate the data.
9. Use the web interface to export the aliases for the ControlLogix configuration and import them into RSLogix 5000.

Use the aliases to access the data from RSLogix 5000



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## Ethernet PLC-5 File Emulation

You can use a DDE or OPC server, such as RSLinx, or an Allen-Bradley PLC etc. to access Genius Inputs and Global data registers directly on the AN-X3-DCSNet. The module "emulates" PLC-5 integer files N100 to N131. Each file corresponds to a Genius node. For example, if you access N102:1, this corresponds to node 2 word 1.

The AN-X3-GENI supports Word Range read/write, Typed read/write, Read/Modify/Write, and PLC-3 Bit Write messages, with both logical ASCII and logical binary addressing.

To configure a topic in RSLinx to access data on the AN-X3-GENI:

1. Create a new topic. From the main menu select *DDE/OPC/Topic Configuration*. Click *New* and give the topic a name.
2. For the Data source, browse the path to the AN-X3 module and click *Apply*.
3. On the *Data Collection* tab, set the *Processor Type* to *PLC-5*. Check *Polled Messages* and select an appropriate update rate. Leave everything else unchecked. Click *Apply*
4. You do not need to set anything on the *Advanced Communication* tab.
5. Click *Done* to complete the topic configuration.

You can now access data using any DDE or OPC client capable of communicating with RSLinx.

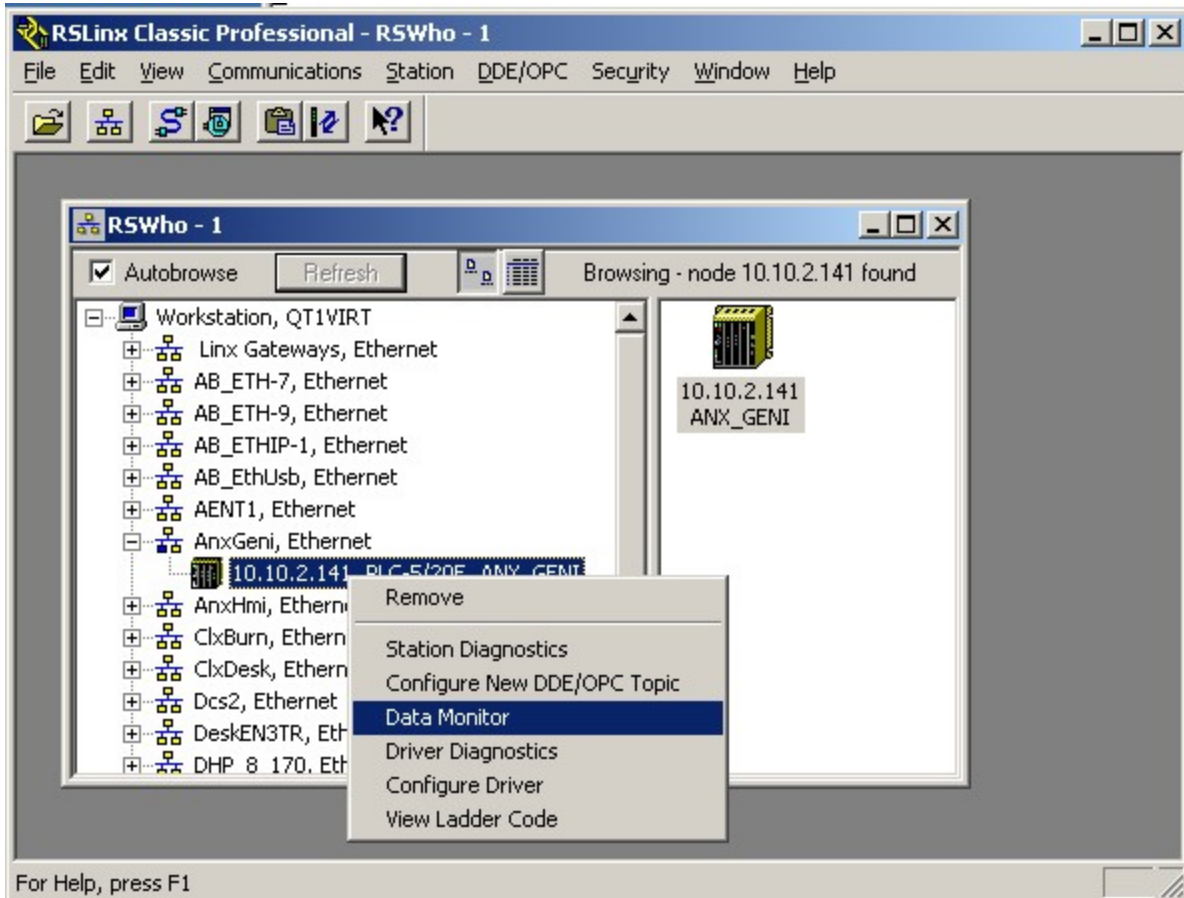


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## Using RSLinx to View Data

AN-X3 appears to RSLinx to be an Ethernet PLC-5, specifically a PLC-5/20E.



First create an Ethernet driver to communicate with the AN-X3.

If you right click on the AN-X3 module in RSLinx and select Data Monitor, a list of files appears.



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| File | Type    | Elements | Length |
|------|---------|----------|--------|
| N100 | Integer | 64       | 128    |
| N101 | Integer | 64       | 128    |
| N102 | Integer | 64       | 128    |
| N103 | Integer | 64       | 128    |
| N104 | Integer | 64       | 128    |
| N105 | Integer | 64       | 128    |
| N106 | Integer | 64       | 128    |
| N107 | Integer | 64       | 128    |
| N108 | Integer | 64       | 128    |
| N109 | Integer | 64       | 128    |
| N110 | Integer | 64       | 128    |
| N111 | Integer | 64       | 128    |
| N112 | Integer | 64       | 128    |
| N113 | Integer | 64       | 128    |
| N114 | Integer | 64       | 128    |
| N115 | Integer | 64       | 128    |
| N116 | Integer | 64       | 128    |
| N117 | Integer | 64       | 128    |
| N118 | Integer | 64       | 128    |
| N119 | Integer | 64       | 128    |
| N120 | Integer | 64       | 128    |
| N121 | Integer | 64       | 128    |
| N122 | Integer | 64       | 128    |
| N123 | Integer | 64       | 128    |

Found 156 of 156

Each file corresponds to the data for one DCS drop. File N100 corresponds to drop 0, N101 corresponds to drop 1 and so on.

To view the drop data, double click on the appropriate file.

|         | 0    | 1  | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---------|------|----|---|---|---|---|---|---|---|---|
| N102:0  | 55AA | 9B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| N102:10 | 0    | 0  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| N102:20 | 0    | 0  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| N102:30 | 0    | 0  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| N102:40 | 0    | 0  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| N102:50 | 0    | 0  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| N102:60 | 0    | 0  | 0 | 0 |   |   |   |   |   |   |

Status: Active

To change the display format, right click on the data display and select *Properties*, then select the format you want.



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## Accessing Global Data from HMIs

To read the global data for any node, create the connection to the AN-X as you would for a PLC-5, and read the data from the appropriate integer file.

You can also use an HMI to write to the global data that the AN-X3-GENI is transmitting, that is, the file that corresponds to the AN-X3-GENI serial bus address. Of course, if the AN-X3-GENI global data is mapped to a ControlLogix connection, the global data you write using the HMI will be overwritten by the data from the scheduled data.



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## Using the Web Interface

The AN-X module contains a webserver capable of communicating with standard web browsers such as Chrome or Firefox.

Use the web interface to:

- set the baud rate and serial bus address for the AN-X3-GENI
- set the Genius bus I/O network configuration
- set the Ethernet/IP scheduled data configuration
- view the current configuration
- view AN-X logs
- view and clear faults from Genius blocks

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.

|  |   |
|--|---|
| <b>Home Page</b>                       | <a href="#">Quest Technical Solutions</a>   |
| <b>▼ Automation Network</b>            | <b>AN-X3-GENI Genius I/O Ethernet/IP Gateway (4.4.4)</b>  |
| <a href="#">Genius Node/Baud</a>       | <b>Introduction:</b>  |
| <a href="#">Configuration</a>          | This is the main configuration screen for the AN-X-GENI module.   |
| <a href="#">Configuration View</a>     | <b>Directions:</b>  |
| <a href="#">Configuration Sample</a>   | 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. |
| <a href="#">Monitor Genius Network</a> | <b>Menu Details:</b>  |
| <a href="#">Monitor Ethernet/IP</a>    | <b><u>Automation Network:</u></b>   |
| <b>▼ Log Files</b>                     | Contains all the option pages that pertain to the GE Genius network.  |
| <b>▼ Administration</b>                | <b>Genius Baud/Node Settings:</b>   |
| <b>▼ Support</b>                       | Use this screen to configure the BAUD rate and Serial Bus Address of this GE Genius network gateway.  |
|  | <b>Genius Network Configuration:</b>  |
|  | Use this screen to configure the Genius network devices that are connected to this AN-X-GENI gateway.   |
|  | <b>Configure ControlLogix Support:</b>  |
|  | The AN-X-GENI device has the ability to talk to ControlLogix family PLCs. The communication connections between the PLC and the AN-X-GENI device use the Ethernet/IP protocol.                            |
|  | <b>View Configuration Files:</b>  |
|  | Use this option to retrieve the current ControlLogix (Ethernet/IP) and GE Genius network configuration files.   |

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



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

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

**TIP**

Run the browser in a mode where it doesn't cache data (incognito in Chrome, Private browsing in Firefox and Safari, etc.)

In addition, in most browsers you can reload a page while overriding the cache. For example, you can use Ctrl-F5 in Firefox or Internet Explorer, or Shift-F5 in Google Chrome.



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## Automation Network

The Automation Network Configuration functions are described previously in this document.

## Monitor Genius Network

Select *Automation Network/Monitor Genius Network* to display I/O scanner status, diagnostic counters and I/O data.

### Genius Network Diagnostics and I/O Data Monitor

[Clear Diagnostics](#)  
 [Refresh](#)  
  Auto Refresh  
  Hex

| Genius Network Diagnostic Counters |        |            |          |            |          |          |          |            |      |
|------------------------------------|--------|------------|----------|------------|----------|----------|----------|------------|------|
| Tx Frms                            | 20098  | Tx Msgs    | 31       | Rx Frms    | 9674     | Rx Msgs  | 31       | No Token   | 0    |
| Rx Dup                             | 0      | Rx CRC Err | 0        | Rx Stp Err | 1        | Rx Abort | 0        | Rx Overrun | 0    |
| ScanState                          | Active | NodeExp    | 00000c3e | NodeErr    | 00000000 | NodeAct  | 20000c3e | cgi-pid    | 1183 |

| 0                        | 1                                   | 2                                   | 3                                   | 4                                   | 5                                   | 6                        | 7                        | 8                        | 9                        | 10                                  | 11                                  | 12                       | 13                                  | 14                       | 15                       |
|--------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|--------------------------|-------------------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| 16                       | 17                                  | 18                                  | 19                                  | 20                                  | 21                                  | 22                       | 23                       | 24                       | 25                       | 26                                  | 27                                  | 28                       | 29                                  | 30                       | 31                       |
| <input type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| Node 1       | IC660BBD120 | High-speed Counter Block         |      |      |      |      |      |      |      |      |      |      |  |
|--------------|-------------|----------------------------------|------|------|------|------|------|------|------|------|------|------|--|
| 0:O.Data[0]  | Out         | 0                                | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    |      |  |
|              |             | 0                                | 0000 |      |      |      |      |      |      |      |      |      |  |
| 0:I.Data[2]  | Inp         | 0                                | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    |      |  |
|              |             | 0                                | 0000 | 0000 | 0000 | 0000 | 0000 | 0000 | 0000 | 0000 | 0000 | 0000 |  |
|              |             | 10                               | 0000 | 0000 | 0000 | 0000 | 0000 | 0000 | 1000 |      |      |      |  |
| Node 2       | IC660BBR101 | 16-Ckt Normally-open Relay Block |      |      |      |      |      |      |      |      |      |      |  |
| 0:O.Data[1]  | Out         | 0                                | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    |      |  |
|              |             | 0                                | 0000 |      |      |      |      |      |      |      |      |      |  |
| 0:I.Data[18] | Inp         | 0                                | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    |      |  |
|              |             | 0                                | 0000 |      |      |      |      |      |      |      |      |      |  |
| Node 3       | IC660BBD024 | 12/24VDC 32 Ckt Source I/O Block |      |      |      |      |      |      |      |      |      |      |  |
| 0:O.Data[2]  | Out         | 0                                | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    |      |  |
|              |             | 0                                | 0000 | 0000 |      |      |      |      |      |      |      |      |  |
| 0:I.Data[19] | Inp         | 0                                | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    |      |  |
|              |             | 0                                | 0000 | 0000 |      |      |      |      |      |      |      |      |  |
| Node 4       | IC660BBD020 | 24/48VDC 16 Ckt Source I/O Block |      |      |      |      |      |      |      |      |      |      |  |

Checkboxes may be used to choose which nodes to display.

See page 32 for diagnostic counter descriptions.



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## Monitor Ethernet/IP

Select *Automation Network/Monitor Ethernet/IP* to display Ethernet/IP status and diagnostic counters.

### Scheduled Ethernet Diagnostic Monitor

[Clear Counters](#)  
 [Refresh Counters](#)  
  Auto Refresh

| TxFrms | TxBusy | RxFrms | RxBusy | EthErrs | ErrType | PrtErrs | PrtType | PrtCon# |
|--------|--------|--------|--------|---------|---------|---------|---------|---------|
| 54539  | 0%     | 47194  | 3%     | 0       | 00      | 0       | SeqMsm  | 15      |

| Con# | Name       | State  | RPI   | Rx Avg | Rx Min | Rx Max | Rx Tout |
|------|------------|--------|-------|--------|--------|--------|---------|
| 0    | ClxSlot 0  | Active | 1.0   | 1.0    | 0.7    | 999.9  | 128.0   |
| 15   | ClxSlot 15 | Active | 100.0 | 100.2  | 13.5   | 999.9  | 400.0   |

### Ethernet/IP UDP Statistics

The Ethernet/IP Statistics consist of two portions:

- Global counters
- Statistics for each connection

The Global Counters consist of:

| Counter | Description                                    |
|---------|--|
| TxFrms  | Count of transmitted frames                    |
| TxBusy  | Percentage of time the transmitter is not idle |
| RxFrms  | Count of received frames                       |
| RxBusy  | Percentage of time the receiver is not idle    |
| EthErrs | Count of Ethernet errors                       |
| EthType | Type of last error                             |
| PrtErrs | Count of Ethernet protocol errors              |
| PrtType | Type of last protocol error                    |
| PrtCon# | Connection number of last protocol error       |

The global counters cannot be cleared.



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The Connection Statistics consist of:

| Counter           | Description  |
|-------------------|--|
| Connection number | 0 to 15  |
| Status            | Active or Idle   |
| Rx Tout           | The receive timeout, calculated from the RPI                 |
| Rx Avg            | The average of the last 32 update times, in ms.              |
| Rx Min            | The minimum update time since the last counter reset, in ms. |
| Rx Max            | The maximum update time since the last counter reset, in ms  |



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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.

### Genius I/O Fault Log

Genius bus modules can return fault information. If a module that is being controlled by the AN-X-GENI returns a fault, you can use the web interface to view and clear the fault.

Select *Log Files/Genius IO Fault Log*.

### AN-X Genius Fault Monitor

This page shows the Genius Device Fault Log and provides functions to clear faults and the log. The Genius Fault log is contained in two files that are rotated when they become full. The 'Previous Fault Log' will only exist when the 'Current Fault Log' is full.

Node Number:

Current Fault Log
 Previous Fault Log

 Auto Refresh

```

00:23.759 719 :AN-X Fault Server Startup
36:35.467 503 :All Faults Cleared on Node 1
36:35.469 082 :All Faults Cleared on Node 2
36:35.470 210 :All Faults Cleared on Node 3
36:35.471 331 :All Faults Cleared on Node 4
36:35.472 623 :All Faults Cleared on Node 5
36:35.473 758 :All Faults Cleared on Node 10
36:35.474 885 :All Faults Cleared on Node 11
36:35.642 894 :**Fault #11: Unknown Device Fault: 03 00 11 01 00 82 00
36:35.701 633 :**Fault #11: Unknown Device Fault: 13 00 11 01 00 81 00
36:35.729 188 :**Fault #11: Unknown Device Fault: 03 00 11 01 00 81 02
36:37.055 343 :All Faults Cleared on Node 1
36:37.056 845 :All Faults Cleared on Node 2
36:37.057 998 :All Faults Cleared on Node 3
36:37.059 143 :All Faults Cleared on Node 4
36:37.060 245 :All Faults Cleared on Node 5
36:37.061 354 :All Faults Cleared on Node 10
36:37.062 806 :All Faults Cleared on Node 11
36:37.229 445 :**Fault #11: Unknown Device Fault: 03 00 11 01 00 82 00
36:37.288 725 :**Fault #11: Unknown Device Fault: 13 00 11 01 00 81 00
36:37.316 273 :**Fault #11: Unknown Device Fault: 03 00 11 01 00 81 02

```

The web interface displays the faults in the Genius IO Fault Log area of the screen. To clear faults for a specific Genius block, select the serial bus address of the module from the *Station Number* list, then click the *Clear Station Faults* button.

To clear the faults on all modules, click the *Clear All Faults* button.

If there is a problem clearing faults, an error message will be displayed in the Fault Log area.

To clear the fault log, click the *Clear Fault Log* button.

See also page 33 for information on how you can monitor faults in your ControlLogix program.



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## Ethernet AB/CSP Log

The AN-X module maps Genius nodes 0 to 31 to PLC-5 files N100 to N131.

The Ethernet AB/CSP log shows messages and errors associated with this PLC-5 Emulation.

## Ethernet/IP Log

The Ethernet/IP log shows messages and errors associated with the Ethernet/IP communication, both scheduled and unscheduled.

## System Info Log

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

## View All Logs

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

## Administration Menu

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

## AN-X IP/FW Configuration

See page 18 for details.



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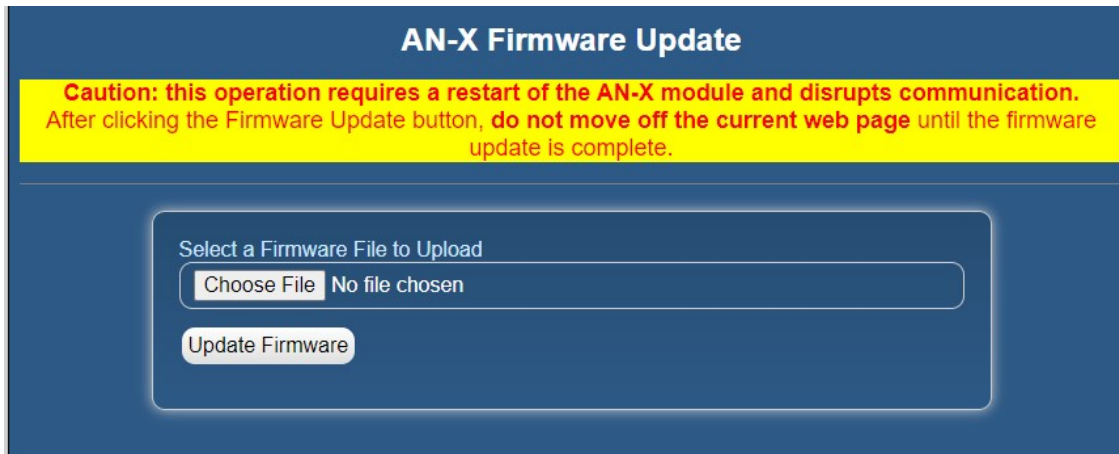


## AN-X Firmware Update

Use *AN-X Firmware Update* to transfer a firmware file to the microSD card on the AN-X. Firmware files for the AN-X3 have names that begin with AN-X3 and have extension \*.qtf.

### **WARNING!**

Do not update firmware in the AN-X while applications that use the AN-X are running.



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

### **WARNING!**

It is essential that you do not disrupt power while updating firmware, especially maintenance firmware, to the AN-X3 or while the AN-X3 is restarting following a firmware update.

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



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AN-X displays progress and status information as the firmware is updated.

### AN-X Firmware Update

**Caution: this operation requires a restart of the AN-X module and disrupts communication.**  
After clicking the Firmware Update button, **do not move off the current web page** until the firmware update is complete.

Select a Firmware File to Upload

Choose File AN-X3-MOD-MAS.v4.3.3.qtf

Update Firmware

**Sending firmware file, please wait....18% complete**

### AN-X Firmware Update

**Caution: this operation requires a restart of the AN-X module and disrupts communication.**  
After clicking the Firmware Update button, **do not move off the current web page** until the firmware update is complete.

Select a Firmware File to Upload

Choose File AN-X3-MOD-MAS.v4.3.3.qtf

Update Firmware

**Firmware sent ... waiting for validation and copy processes to finish (about a minute)...**



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

### AN-X Firmware Update

**Caution: this operation requires a restart of the AN-X module and disrupts communication.**  
After clicking the Firmware Update button, **do not move off the current web page** until the firmware update is complete.

Select a Firmware File to Upload

No file chosen

Firmware update to AN-X3-MOD-MAS.v4.3.3.qtf was successful.

Click this [RESTART](#) link to restart the AN-X and run the new firmware version

If you have other files to transfer, return to the main page and continue. Otherwise, restart the AN-X in order to run the updated firmware.

## Diagnostic Capture

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

Select *Administration/Archive Configuration*.

### AN-X Diagnostic Capture

**Instructions:**

Use the link provided below to retrieve the newly created diagnostic capture file. This file contains all the current configuration information, logs etc.

The archive file is a standard tar file.

This file contains the current configuration, logs and other diagnostic information which is useful for troubleshooting by technical support staff.

[Archive File](#)

Click the *Archive File* link. There may be a slight delay while AN-X builds the archive file. Select the destination where the file will be stored and save the file.



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## AN-X Module Restart

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

### AN-X Module Restart

To restart the AN-X module hit the 'Restart Now' link.

[Restart Now](#)

**Warning: Hitting the 'Restart Now' link will cause the AN-X module to restart. All communication with Ethernet/IP and automation networks will be disrupted.**

## Support Menu

The Support menu contains Contact Information.



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## Troubleshooting

### LEDs

The AN-X3-GENI has LEDs that indicate the state of the Ethernet connection, the overall module state and the connection to the Genius 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-X3 is not connected to Ethernet, the 10/100 LED is on.

#### MS and NS LEDs: Startup

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

The SYS or MS LED should be used in conjunction with the logs to locate the cause of problems.

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

| SYS (or MS) LED State | Possible cause  |
|-----------------------|---|
| Red 3                 | DHCP configuration failed                                       |
| Yellow 2              | microSD card not present  |
| Yellow 3              | AN-X3 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-X3 production firmware file not found on microSD card        |
| Yellow 7              | Production firmware file invalid or error programming to flash  |
| Yellow 8              | Daughterboard mismatch  |
| Flashing red/green    | Unscheduled messaging, addressing or connection problem         |
| Flashing red/off      | Configuration file problem                                      |

#### “Railroading” – SYS (or MS) and NET (or NS) LEDs

AN-X alternates (railroads) flashing the SYS (or MS) and NET (or NS) LEDs to indicate its state.



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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.

## MS and NS LEDs: Runtime

There are two possible runtime LED modes.

Standard mode is the new default mode and is compliant with the Ethernet/IP specification.

### **IMPORTANT!**

Debug mode provides more information about the state of the Genius network.

Debug mode was the mode used in earlier versions of the firmware.

To set debug mode, enter a line with the keyword LedModeDebug in the ControlLogix configuration file.

When you autoconfigure the AN-X, it sets debug mode in the file it creates.

## Standard Mode

The MS and NS LEDs are used by the AN-X operating system and software to indicate the state of operations and errors.

In standard mode, the MS and NS LEDs should be used in conjunction with the logs to locate the cause of problems.

| Condition           | LEDs                              |
|---------------------|-----------------------------------|
| All OK              | MS Solid Green, NS Solid Green    |
| Missing connections | MS Solid Green, NS Flashing Green |
| Error event         | MS Solid Green, NS Pulses Red     |
| Bad Config          | MS Flash Red, NS Flash Green      |

Error Events:

- Connection Timeout
- Returned error to connection request



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## Debug Mode

### SYS or MS LED

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

The SYS or MS LED should be used in conjunction with the logs to locate the cause of problems.

| SYS (or MS) LED State | Possible cause  |
|-----------------------|---|
| Flashing red/green    | Unscheduled messaging, addressing or connection problem |
| Flashing red/off      | Configuration file problem                              |

### NET or NS LED – Network Status

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

| Color                 | Meaning   |
|-----------------------|---|
| Flashing or solid red | One or more configured Genius blocks is not active on the network<br>Network error (CRC, stop, abort, etc.)<br>Baud rate mismatch |
| Yellow                | No configured Genius I/O, and no Genius network activity  |
| Green                 | All configured blocks are active on the Genius bus<br>Some blocks may be in error   |

## Fatal Errors

AN-X3 monitors its operation for “impossible” conditions and generates a fatal error if it detects one. It generates a fatal error code on the SYS (or MS) LED by flashing 8 bits followed by a pause. The least significant bit is first, with green for 1 and red for 0.

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



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## Updating the Firmware

The AN-X3 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-X3 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-X3 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-X3 or while the AN-X3 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-X3 is running on the home page and 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, the one you want AN-X to use.

## Obtaining the Latest Software

Version numbers and software for the most recent AN-X3 releases are available from the QTS website, [qtsusa.com/dist](http://qtsusa.com/dist)



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## *Specifications*

| Parameter                 | Specification                              |
|---------------------------|--|
| Function                  | Bridge between Ethernet and Genius network |
| Typical 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                 |



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## **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](tel:+603.7724.2080), [support.AP@prosoft-technology.com](mailto:support.AP@prosoft-technology.com)

#### **Europe – Middle East – Africa**

Languages Spoken: French, English

[+33 \(0\) 5.34.36.87.20](tel:+33.0.5.34.36.87.20), [support.EMEA@prosoft-technology.com](mailto:support.EMEA@prosoft-technology.com)

#### **North America**

Languages Spoken: English, Spanish

[+1.661.716.5100](tel:+1.661.716.5100), [support@prosoft-technology.com](mailto:support@prosoft-technology.com)

#### **Latin America ( Brasil)**

Languages Spoken: Portuguese, English

[+55.11.5083.3776](tel:+55.11.5083.3776), [support.brazil@prosoft-technology.com](mailto:support.brazil@prosoft-technology.com)

#### **Latin America ( Spanish Speaking Countries)**

Languages Spoken: Spanish, English

[+52.222.399.6565](tel:+52.222.399.6565), [latinam@prosoft-technology.com](mailto:latinam@prosoft-technology.com)



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## Warranty

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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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