AN-X3-PBS-HMI
Profibus DP
Ethernet HMI
Gateway

User Manual

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Cautions

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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-X3-PBS.

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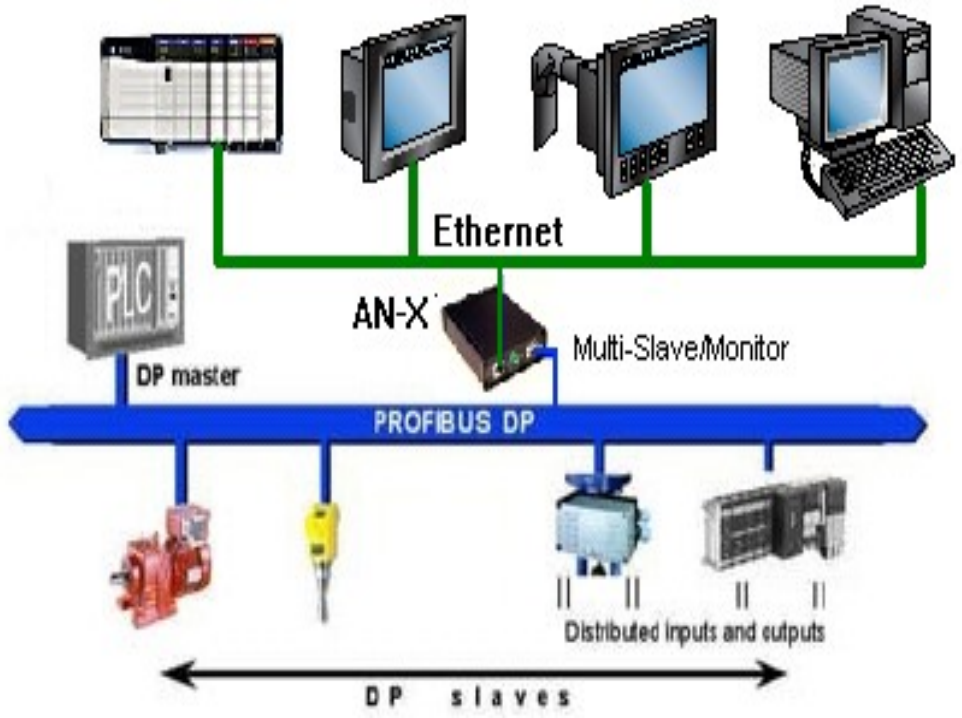
AN-X-PBS Module Overview



The AN-X3-PB module running AN-X3-PBS-HMI firmware (referred to hereafter as AN-X) acts as a gateway between a Profibus DP network and an Ethernet network supporting Ethernet/IP Scheduled Connections, Ethernet/IP PLC-5 File emulation and Modbus TCP.

The AN-X module has a web interface for configuration of Profibus and Ethernet properties.

Profibus DP

The AN-X-PBS communications module connects a computer or other device to a Profibus network using Ethernet.

The module:

- Acts as one or more Active DP Slave Nodes, up to a total of 125
- Monitors the I/O data from all other DP Slave Nodes on the network
- Maintains Profibus DP Slave Node list
- Maintains Profibus Diagnostic Counters
- Supports baud rates from 9600 bps to 12 Mbps (12m 6m 3m 1m5 500k 187k5 93k75 19k2 9k6)

While monitoring other DP Slaves, the AN-X3-PBS is configured with maximum I/O lengths. The AN-X will accept any frame length less than or equal to the maximum length. If a Profibus DP I/O frame is received that is too long, the frame is ignored and the ‘Long Frames’ diagnostic counter is incremented and the ‘Long Node’ value is set to the Node address of Profibus DP Master that sent the frame.

Ethernet/IP Scheduled Connections

INT, DINT and REAL connections are supported.

Each scheduled connection with a ControlLogix contains up to 250 INTs or 125 DINTs or REALs of input data and up to 248 INTs or 124 DINTs or REALs of output data. In order to be able to exchange all Profibus DP I/O data, the AN-X3-PBS-HMI module supports multiple scheduled connections with a ControlLogix processor over Ethernet.

The AN-X3-PBS-HMI module 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 scheduled connections to each of these 16 generic modules.

Each connection can have its own RPI, from 1 to 750 ms.

In general, you should try to use as few connections as possible. There is significant overhead in opening and maintaining each connection.

You can map some or all Profibus DP I/O data to these scheduled connections.

In addition, the AN-X module has diagnostic data that is mapped to ControlLogix slot 15 scheduled input data.

The mapping file can also contain options that apply to the entire configuration.

Ethernet/IP Unscheduled PLC-5 File Emulation

The AN-X3-PB-HMI maps all Profibus DP I/O data to PLC-5 N and F files.

This allows HMI, SCADA and other upstream software to access Profibus DP data on Ethernet as if it is communicating with a PLC-5/20E.

Modbus TCP Server

The AN-X3-PB-HMI maps all Profibus DP I/O data to Modbus TCP Registers.

This allows HMI, SCADA and other upstream Modbus TCP clients to access Profibus DP data on Ethernet.

Hardware Features

The module has:

- LEDs to indicate the status of the connection to the Ethernet, its own internal state, and the state of the Profibus DP Slaves on the network
- An Ethernet RJ45 connector
- A 9-pin D Shell connector to connect to the Profibus network
- A 3-pin Phoenix power connector
- A microSD card for storage of configuration data and firmware

Package Contents

- AN-X3-PB module
- Phoenix Power connector

Using the MicroSD Card

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

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

TIP The most recent firmware for the AN-X is available at qtsusa.com/dist

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), 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.

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).

Installation

Prevent Electrostatic Discharge

The module is sensitive to electrostatic discharge.

WARNING!

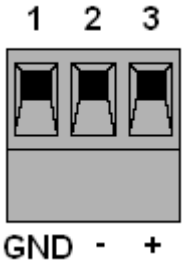
Electrostatic discharge can damage integrated circuits and semiconductors. Follow these guidelines when you handle the module:

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

Power

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

Left to right the pins on the power connector are Chassis Ground, Negative Voltage and Positive Voltage.



Power consumption is 160 mA @ 12VDC or 80 mA @ 24VDC.

The part number for the power connector is:

Phoenix 1757022 (Old part number: MSTB 2.5/3-ST-5.08)

Profibus Cabling and Termination

Use a cable with a standard Profibus 9-pin connector to connect the module to the network.

The network must be terminated at the physical ends of the network. There should be two and only two terminators on the network.

Ethernet Cabling

The AN-X has a standard RJ45 connector for connecting to Ethernet.

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

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

IP Address Configuration

Before you can use the AN-X3, 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

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.

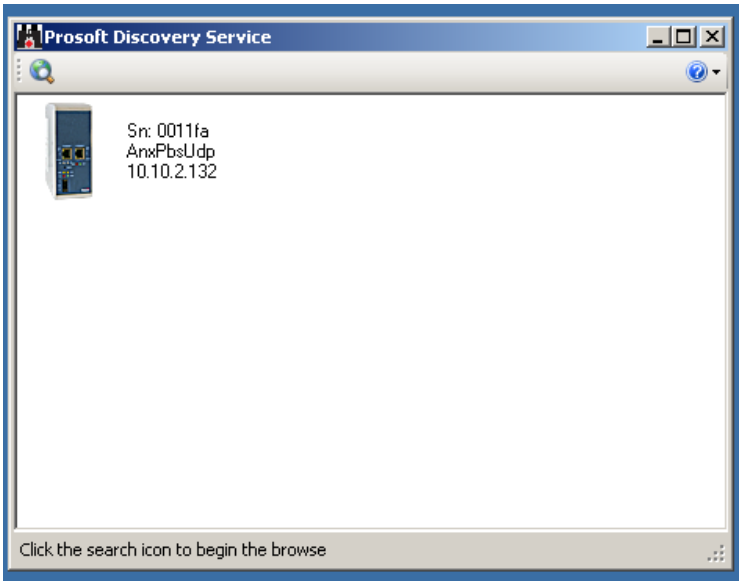
** Since link-local IP addresses are not always accessible, the recommended method to set the initial IP address is with the Prosoft Discovery Service (PDS).

Prosoft Discovery Service

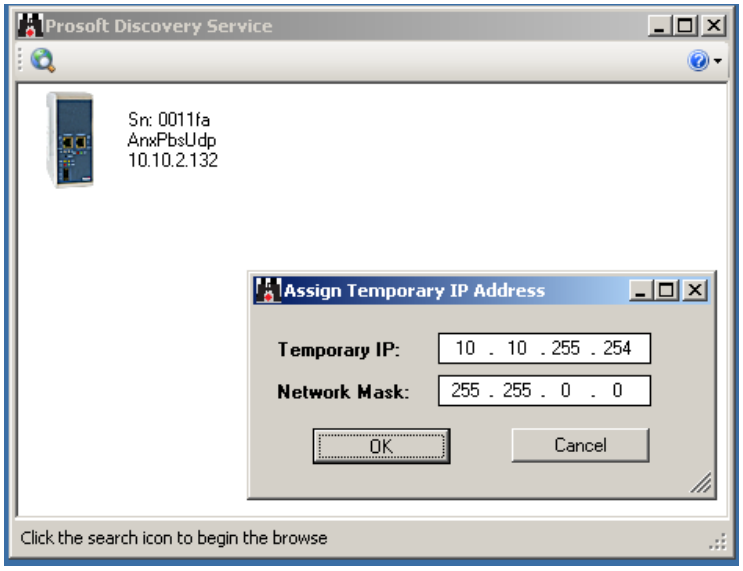
ProSoft Discovery Service (PDS) is a free application available from Prosoft's web page:

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 with the web interface (see page 14).

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 IP/FW Configuration'* command from the web interface, it writes the results to config.txt.

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

IP: 192.168.1.12

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

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

If you edit the file and AN-X3 finds an error during startup, it flashes an error code on the SYS LED, see page 43.

Sample config.txt files

DHCP

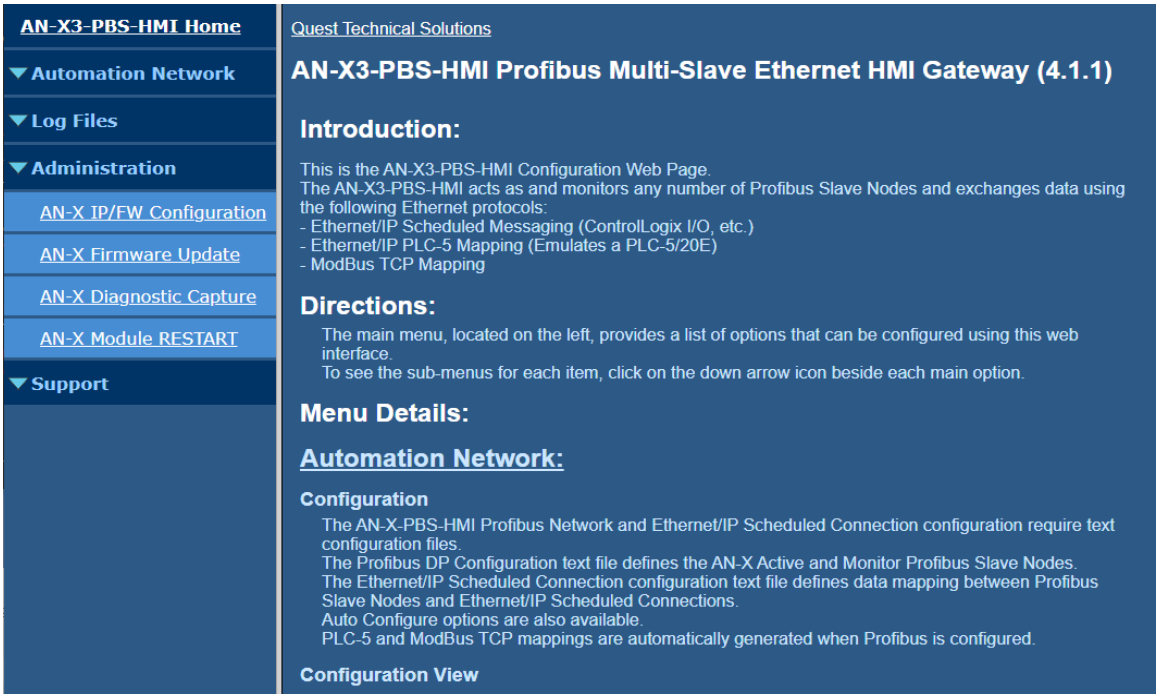
```
IP: DHCP
Hostname: AnxPbsUdp
Firmware: AN-X3-PBS-HMI
```

Static IP Address

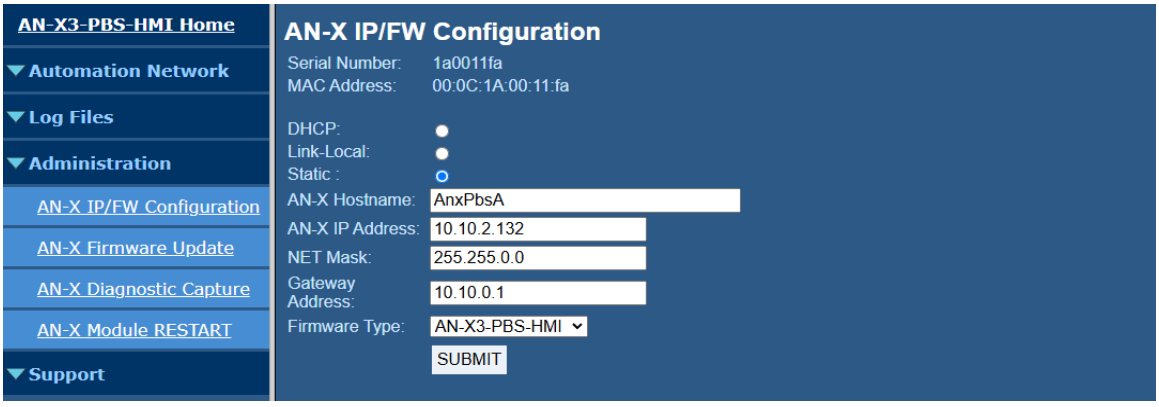
```
IP: 10.10.2.132
NetMask: 255.255.0.0
DefGtwy: 10.10.0.1
HostName: AnxPbsUdp
Firmware: AN-X3-PBS-HMI
```

Web Page IP Configuration

Select ‘Administration/AN-X IP/FW Configuration’.



The AN-X IP/FW 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 LED 3 times red followed by a pause (see page 43).

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-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.

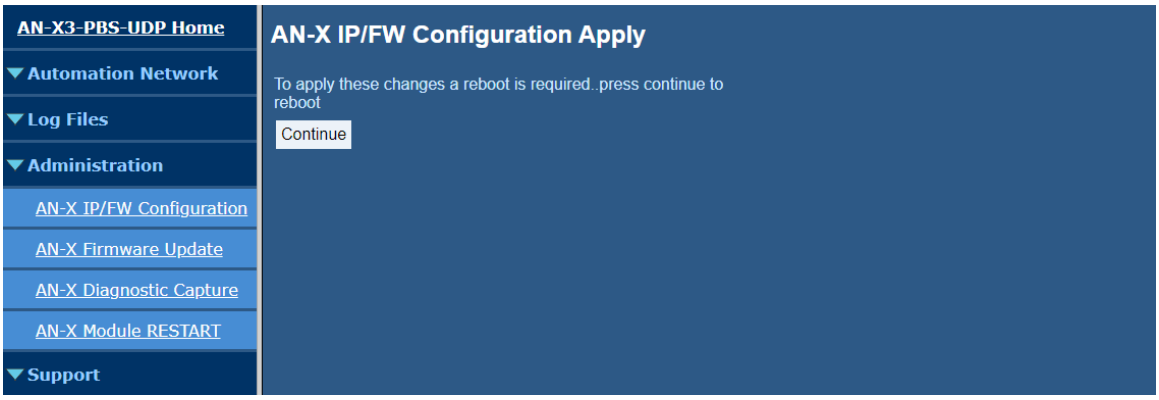
Firmware

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

Submitting the Configuration

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

The following page appears when you click SUBMIT.



Click Continue to restart the AN-X3, then wait until the AN-X has completely restarted before continuing.

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

Reconfiguring an AN-X from an Unknown State

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

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 page 13).

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 website.

  qtsusa.com/dist/AN-X3 (AN-X3-PBS-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

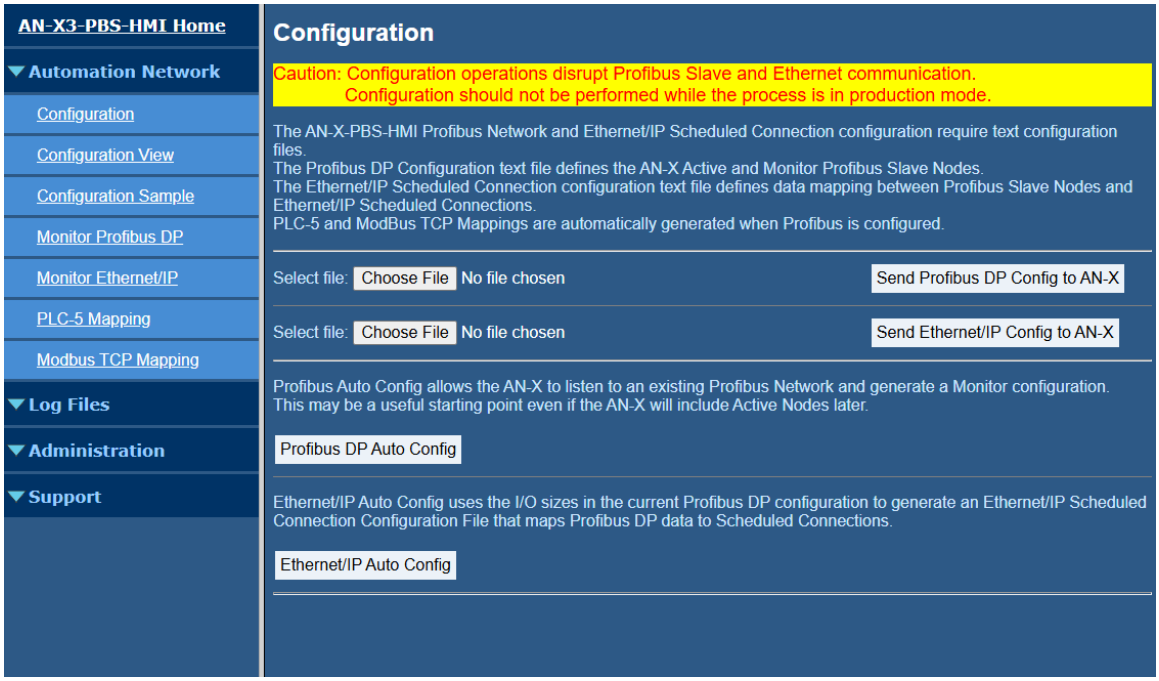
This factory image will have the LOCAL IP address.

The individual microSD files are available on qtsusa.com/dist/AN-X3 in the appropriate uSD_Files directory.

Configuration

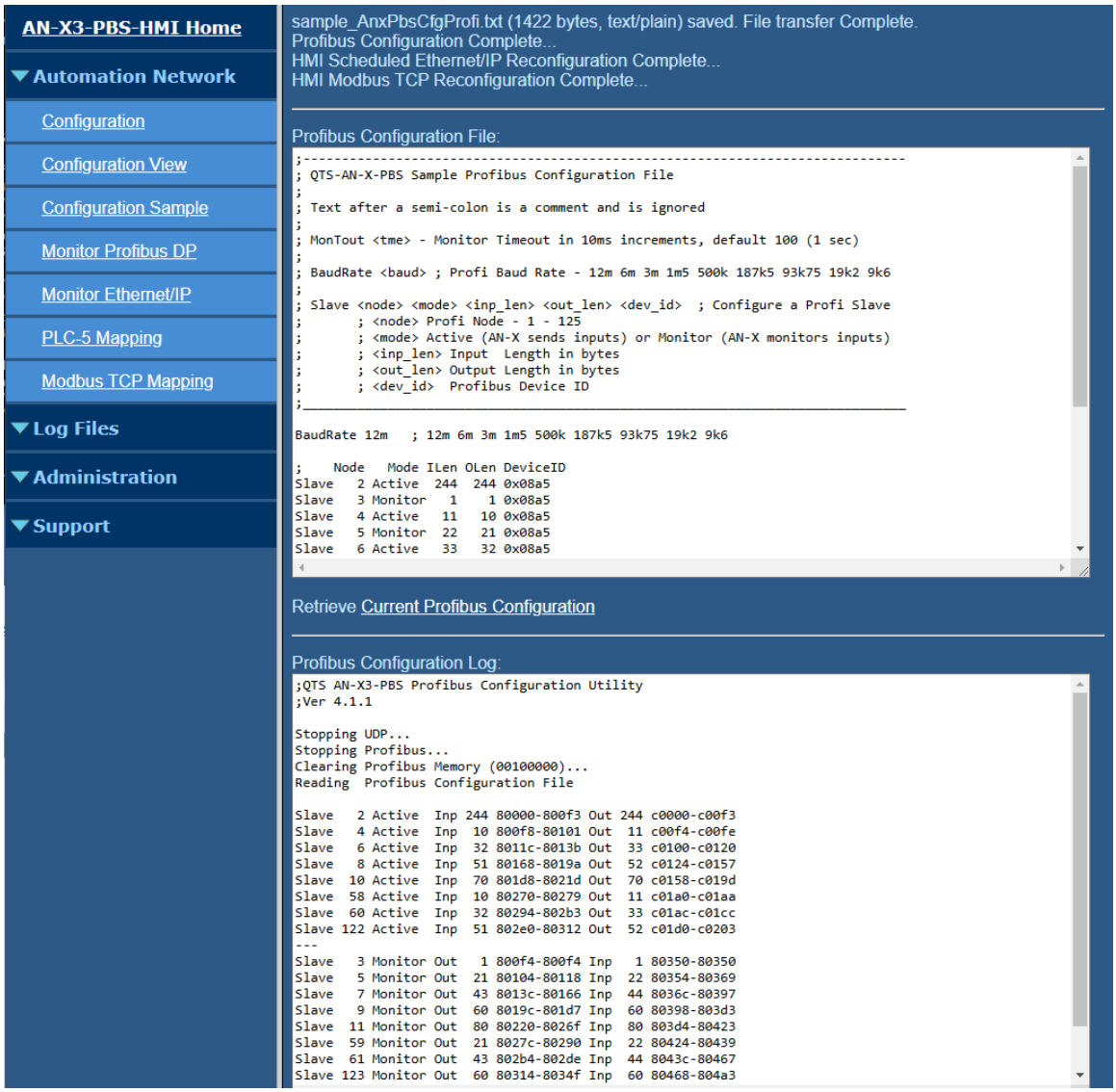
The AN-X3-PBS-HMI Profibus Network and Ethernet/IP Scheduled Connection configuration require text configuration files.
The Profibus DP Configuration text file defines the AN-X Active and Monitor Profibus Slave Nodes.
The Ethernet/IP Scheduled Connection configuration text file defines data mapping between Profibus Slave Nodes and Ethernet/IP Scheduled Connections.
Auto Configure options are also available.
PLC-5 and ModBus TCP mappings are automatically generated when Profibus is configured.

Select '*Automation Network/Configuration*'.



Profibus DP Configuration

Choose your Profibus Configuration text file, then select '*Send Profibus DP Config to AN-X*'.



The Profibus DP Configuration File sent is shown along with the Profibus DP Configuration Log that shows the results of the configuration.

The Ethernet/IP Scheduled Connection Configuration File and Log are also shown. If changes have been made to the Profibus DP configuration, the Ethernet/IP Scheduled Connection configuration may fail.

Changes may need to be made to match the Profibus DP configuration.

The format of the Profibus DP Configuration file is documented in the sample file below.

```
;-------------------------------------------------------------------------------
; QTS-AN-X-PBS Sample Profibus Configuration File
;
; Text after a semicolon is a comment and is ignored
;
; MonTout <tme> - Monitor Timeout in 10ms increments, default 100 (1 sec)
;
; BaudRate <baud> ; Profi Baud Rate - 12m 6m 3m 1m5 500k 187k5 93k75 19k2 9k6
;
; Slave <node> <mode> <inp_len> <out_len> <dev_id>  ; Configure a Profi Slave
;       ; <node> Profi Node - 1 - 125
;       ; <mode> Active (AN-X sends inputs) or Monitor (AN-X monitors inputs)
;       ; <inp_len> Input  Length in bytes
;       ; <out_len> Output Length in bytes
;       ; <dev_id>  Profibus Device ID
;_______________________________________________________________________________

BaudRate 12m   ; 12m 6m 3m 1m5 500k 187k5 93k75 19k2 9k6

;     Node   Mode ILen OLen DeviceID
Slave   2 Active  244  244 0x08a5
Slave   3 Monitor   1    1 0x08a5
Slave   4 Active   11   10 0x08a5
Slave   5 Monitor  22   21 0x08a5
Slave   6 Active   33   32 0x08a5
Slave   7 Monitor  44   43 0x08a5

Slave   8 Active   52   51 0x08a5
Slave   9 Monitor  60   60 0x08a5
Slave  10 Active   70   70 0x08a5
Slave  11 Monitor  80   80 0x08a5

Slave  58 Active   11   10 0x08a5
Slave  59 Monitor  22   21 0x08a5
Slave  60 Active   33   32 0x08a5
Slave  61 Monitor  44   43 0x08a5
Slave 122 Active   52   51 0x08a5
Slave 123 Monitor  60   60 0x08a5
```

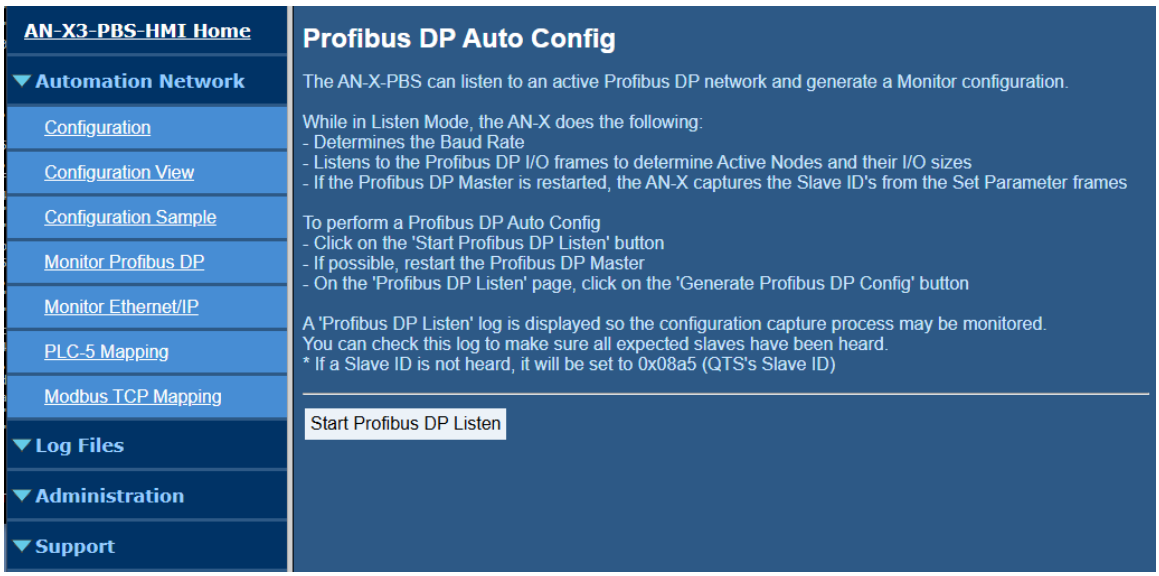
Profibus DP Auto Config

The AN-X-PBS can listen to an active Profibus DP network and generate a Monitor configuration.

While in Listen Mode, the AN-X does the following:

- Determines the Baud Rate
- Listens to the Profibus DP I/O frames to determine DP Slave Nodes and their I/O sizes
- If the Profibus DP Master is restarted, the AN-X captures the Slave IDs from the Set Parameter frames

On the '*Automation Network/Configuration*' page, select the '*Profibus DP Auto Config*' button.

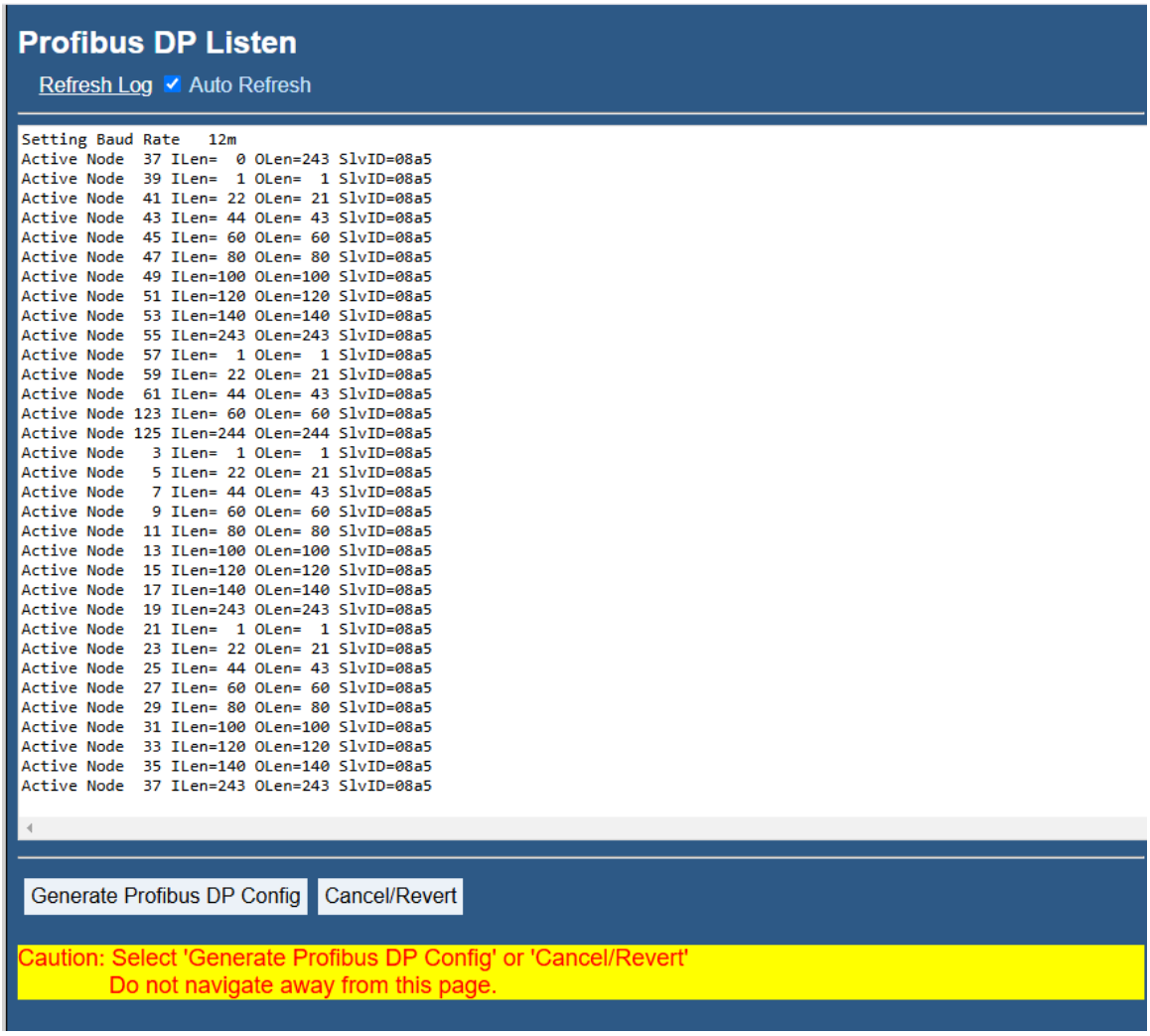


To perform a Profibus DP Auto Config:

- Click on the 'Start Profibus DP Listen' button
- If possible, restart the Profibus DP Master
- On the 'Profibus DP Listen' page, click on the '*Generate Profibus DP Config*' button

A 'Profibus DP Listen' log is displayed so the configuration capture process may be monitored.

You can check this log to make sure all expected slaves have been heard.



* If a Slave ID is not heard, it will be set to 0x08a5 (QTS' Slave ID)

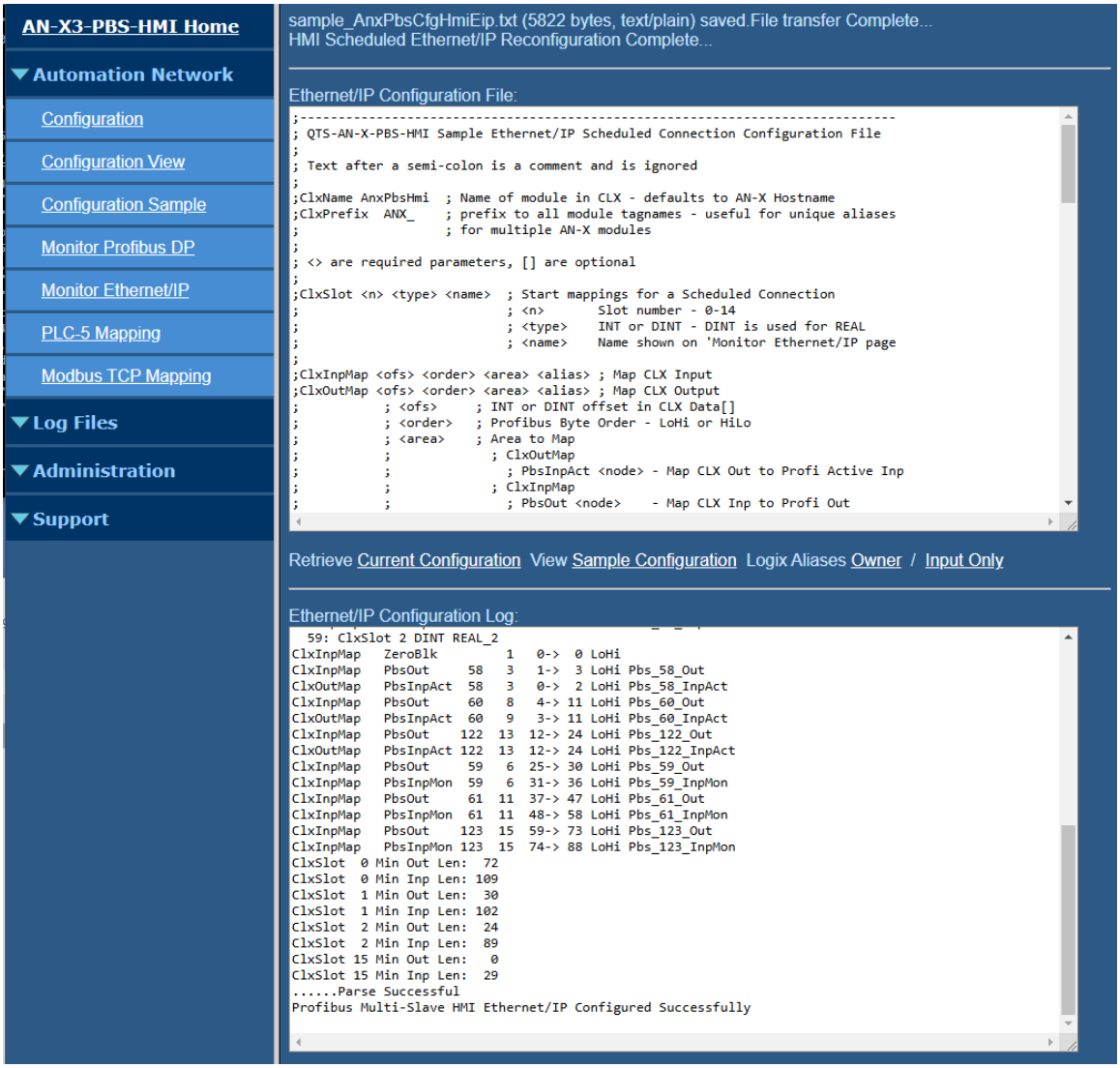
If capturing configurations in a lab to emulate a bigger system, Profibus DP Listen may be left running as DP Slave Node(s) are modified and restarted and added to the AN-X configuration.

The Cancel/Revert button Cancels the 'Profibus DP Auto Config' operation and reverts to the configuration currently loaded.

IMPORTANT! Select '*Generate Profibus DP Config*' or '*Cancel/Revert*'. Do not navigate away from this page.

Ethernet/IP Scheduled Connection Configuration

Choose your Ethernet/IP Connection Configuration text file then, select '*Send Ethernet/IP Config to AN-X*'.



The Ethernet/IP Scheduled Connection Configuration File sent is shown along with the Configuration Log that shows the results.

The format of the Ethernet/IP Scheduled Connection Configuration file is documented in the sample file below.

```
;--------------------------------------------------------------------------------
; QTS-AN-X-PBS-HMI Sample Ethernet/IP Scheduled Connection Configuration File
;
; Text after a semicolon is a comment and is ignored
;
;ClxName AnxPbsHmi  ; Name of module in CLX - defaults to AN-X Hostname
;ClxPrefix  ANX_    ; prefix to all module tagnames - useful for unique aliases
;                   ; for multiple AN-X modules
;
; <> are required parameters, [] are optional
;
;ClxSlot <n> <type> <name>  ; Start mappings for a Scheduled Connection
;                           ; <n>       Slot number - 0-14
;                           ; <type>    INT or DINT - DINT is used for REAL
;                           ; <name>    Name shown on 'Monitor Ethernet/IP page
;
;ClxInpMap <ofs> <order> <area> <alias> ; Map CLX Input
;ClxOutMap <ofs> <order> <area> <alias> ; Map CLX Output
;           ; <ofs>     ; INT or DINT offset in CLX Data[]
;           ; <order>   ; Profibus Byte Order - LoHi or HiLo
;           ; <area>    ; Area to Map
;           ;             ; ClxOutMap
;           ;               ; PbsInpAct <node> - Map CLX Out to Profi Active Inp
;           ;             ; ClxInpMap
;           ;               ; PbsOut <node>    - Map CLX Inp to Profi Out
;           ;               ; PbsInpMon <node> - Map CLX Inp to Profi Monitor Inp
;           ;               ; GlbCtl           - Map CLX Inp to Profi Global Control
;           ;               ; 7 6 5 4 3 2 1 0  Profibus Global Control
;           ;               ; 0 0           0  Reserved
;           ;               ;             x    Clear Data, 1=Stop 0=Run
;           ;               ;           x      UNFREEZE
;           ;               ;         x        FREEZE
;           ;               ;       x          UNSYNC
;           ;               ;     x            SYNC;           ;               ; ZeroBlk <len>
- Zero CLX Inp <len> INTs or DINTs
;           ; [alias]   ; Generate CLX Alias with this name - Must be
unique;_____________________________________________________________________________
; The layout of the Slot 15 connection is shown at the end of this file

ClxSlot  0 INT INT_0
ClxInpMap    0 LoHi GlbCtl        PbsGlbCtl       ;   2
ClxInpMap Auto LoHi PbsOut      2                 ; 122
ClxOutMap Auto LoHi PbsInpAct   2                 ; 122
ClxInpMap Auto LoHi PbsOut      4                 ;   6
ClxOutMap Auto LoHi PbsInpAct   4                 ;   6
ClxInpMap Auto LoHi PbsOut      6                 ;  16
ClxOutMap Auto LoHi PbsInpAct   6                 ;  18
ClxInpMap Auto LoHi PbsOut      3                 ;   2
ClxInpMap Auto LoHi PbsInpMon   3                 ;   2
ClxInpMap Auto LoHi PbsOut      5                 ;  12
ClxInpMap Auto LoHi PbsInpMon   5                 ;  12
ClxInpMap Auto LoHi PbsOut      7                 ;  22
ClxInpMap Auto LoHi PbsInpMon   7                 ;  22

ClxSlot  1 DINT DINT_1
ClxInpMap    0 LoHi ZeroBlk     1                 ;   1
ClxInpMap Auto LoHi PbsOut      8 Pbs_8_Out       ;  13
ClxOutMap Auto LoHi PbsInpAct   8 Pbs_8_InpAct    ;  13
ClxInpMap Auto LoHi PbsOut     10 Pbs_10_Out      ;  18
ClxOutMap Auto LoHi PbsInpAct  10 Pbs_10_InpAct   ;  18
ClxInpMap Auto LoHi PbsOut      9 Pbs_9_Out       ;  15
ClxInpMap Auto LoHi PbsInpMon   9 Pbs_9_InpMon    ;  15
ClxInpMap Auto LoHi PbsOut     11 Pbs_11_Out      ;  20
ClxInpMap Auto LoHi PbsInpMon  11 Pbs_11_InpMon   ;  20
```

```
ClxSlot  2 DINT REAL_2
ClxInpMap    0 LoHi ZeroBlk     1                 ;   1
ClxInpMap Auto LoHi PbsOut     58 Pbs_58_Out      ;   3
ClxOutMap Auto LoHi PbsInpAct  58 Pbs_58_InpAct   ;   3
ClxInpMap Auto LoHi PbsOut     60 Pbs_60_Out      ;   8
ClxOutMap Auto LoHi PbsInpAct  60 Pbs_60_InpAct   ;   9
ClxInpMap Auto LoHi PbsOut    122 Pbs_122_Out     ;  13
ClxOutMap Auto LoHi PbsInpAct 122 Pbs_122_InpAct  ;  13
ClxInpMap Auto LoHi PbsOut     59 Pbs_59_Out      ;   6
ClxInpMap Auto LoHi PbsInpMon  59 Pbs_59_InpMon   ;   6
ClxInpMap Auto LoHi PbsOut     61 Pbs_61_Out      ;  11
ClxInpMap Auto LoHi PbsInpMon  61 Pbs_61_InpMon   ;  11
ClxInpMap Auto LoHi PbsOut    123 Pbs_123_Out     ;  15
ClxInpMap Auto LoHi PbsInpMon 123 Pbs_123_InpMon  ;  15


;-------------------------------------------------------------------------------
; Slot 15 Diagnostics Connection Data Layout
; DataOutput
;   0"AnxAmxDcs Zero Diagnostic Counters on bit 0 transition to 1"
; DataInput
;   0 Profi Tx Frames                   N9:0
;   1 Profi Rx Frames Good              N9:1
;   2 Profi Rx Lo=StpErrs Hi=ParErrs    N9:2
;   3 Profi Rx Lo=SD_Errs Hi=RptErrs    N9:3
;   4 Profi Rx Lo=UndErrs Hi=FcsErrs    N9:4
;   5 Profi Rx Lo=ED_Errs Hi=OvrErrs    N9:5
;   6 Profi Rx Lo=LngErrs Hi=LngNode    N9:6
;   7 Profi Rx Lo=DupFrm  Hi=TnsOvr     N9:7

;   8 Profi Good Node List   0- 15      N9:8
;   9 Profi Good Node List  16- 31      N9:9
;  10 Profi Good Node List  32- 47      N9:10
;  11 Profi Good Node List  48- 63      N9:11

;  12 Profi Good Node List  64- 79      N9:12
;  13 Profi Good Node List  80- 95      N9:13
;  14 Profi Good Node List  96-111      N9:14
;  15 Profi Good Node List 112-125      N9:15

;  16 "AnxAmxDcs UDP TX Count"
;  17 "AnxAmxDcs UDP RX Count"
;  18 "AnxAmxDcs UDP EthErr Ctr(Lo) Typ(Hi)"
;  19 "AnxAmxDcs UDP PrtErr Ctr(Lo) Typ/Slt(Hi)"
;
;  20 "AnxAmxDcs CLX -> AN-X Slot  0 Upd Time (*100us, Avg)"
;  22 "AnxAmxDcs CLX -> AN-X Slot  0 Upd Time (*100us, Min)"
;  24 "AnxAmxDcs CLX -> AN-X Slot  0 Upd Time (*100us, Max)"
;
;  30 "AnxAmxDcs CLX -> AN-X Slot  1 Upd Time (*100us, Avg)"
;  32 "AnxAmxDcs CLX -> AN-X Slot  1 Upd Time (*100us, Min)"
;  34 "AnxAmxDcs CLX -> AN-X Slot  1 Upd Time (*100us, Max)"
;
;  40 "AnxAmxDcs CLX -> AN-X Slot  2 Upd Time (*100us, Avg)"
;  42 "AnxAmxDcs CLX -> AN-X Slot  2 Upd Time (*100us, Min)"
;  44 "AnxAmxDcs CLX -> AN-X Slot  2 Upd Time (*100us, Max)"
;
;  50 "AnxAmxDcs CLX -> AN-X Slot 15 Upd Time (*100us, Avg)"
;  52 "AnxAmxDcs CLX -> AN-X Slot 15 Upd Time (*100us, Min)"
;  54 "AnxAmxDcs CLX -> AN-X Slot 15 Upd Time (*100us, Max)"
;-------------------------------------------------------------------------------
```

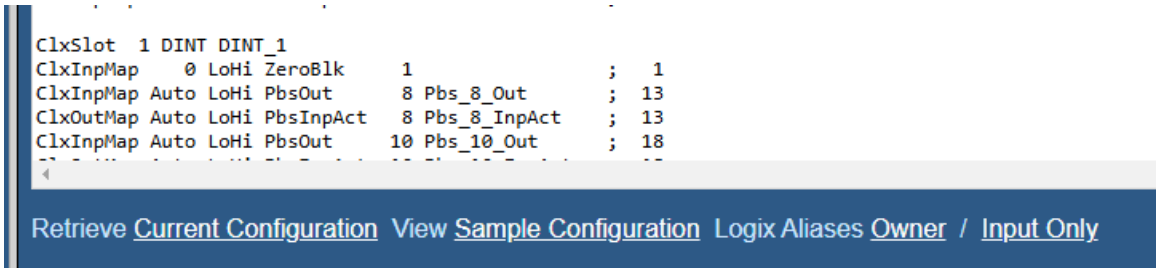
ControlLogix Aliases

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 'Input Only' connections.

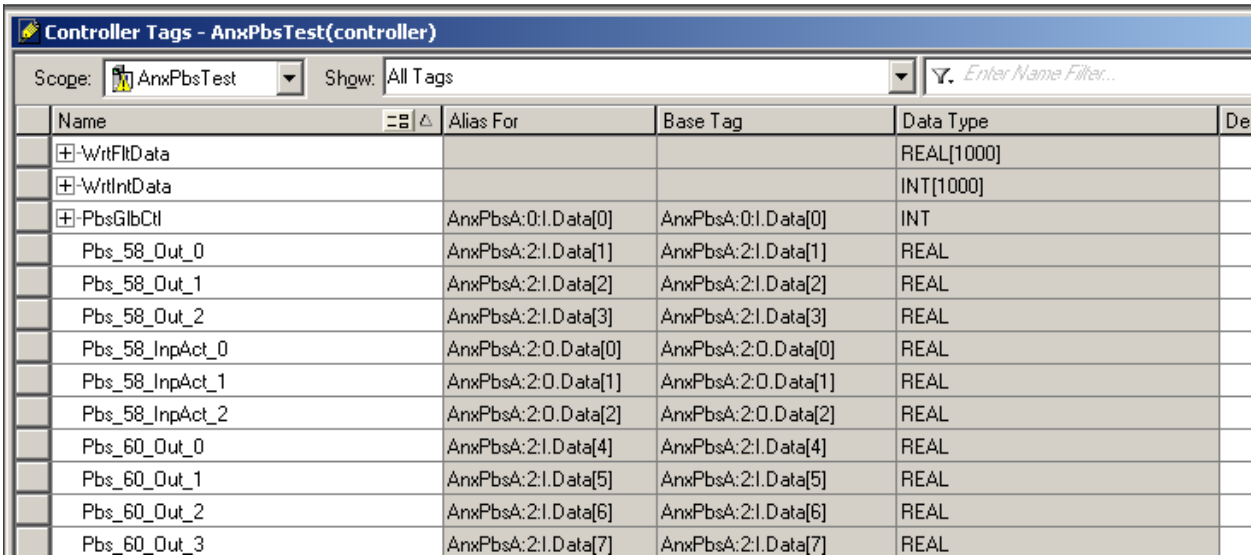
In the web interface, select *Automation Network/Configuration View*.

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



Importing Tags in RSLogix 5000

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

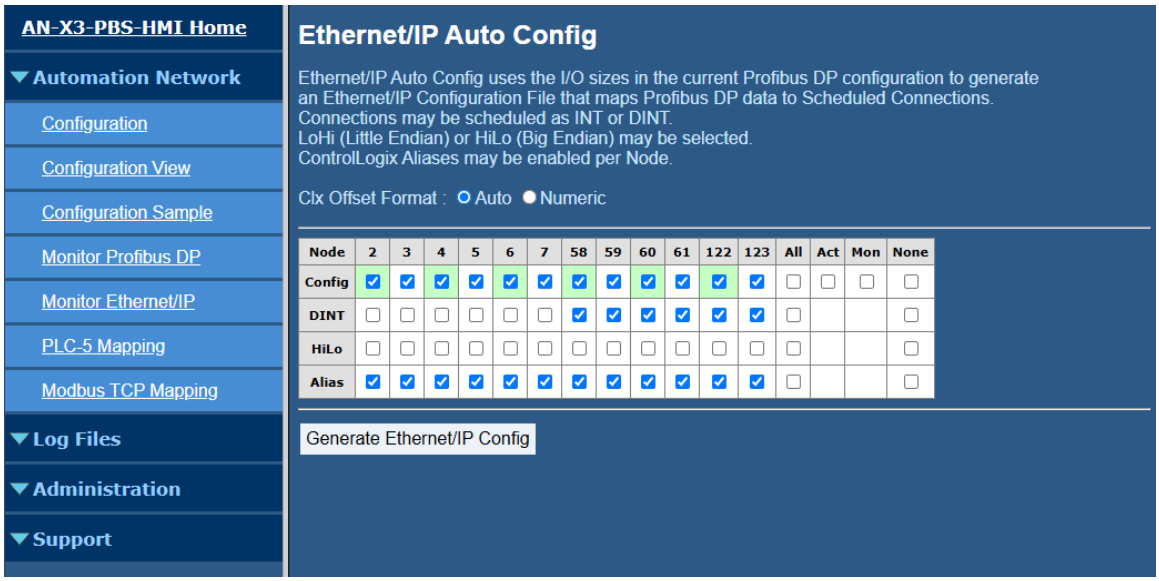


Name	Alias For	Base Tag	Data Type	De
WrtFltData			REAL[1000]	
WrtIntData			INT[1000]	
PbsGlbCtl	AnxPbsA:0:I.Data[0]	AnxPbsA:0:I.Data[0]	INT	
Pbs_58_Out_0	AnxPbsA:2:I.Data[1]	AnxPbsA:2:I.Data[1]	REAL	
Pbs_58_Out_1	AnxPbsA:2:I.Data[2]	AnxPbsA:2:I.Data[2]	REAL	
Pbs_58_Out_2	AnxPbsA:2:I.Data[3]	AnxPbsA:2:I.Data[3]	REAL	
Pbs_58_InpAct_0	AnxPbsA:2:O.Data[0]	AnxPbsA:2:O.Data[0]	REAL	
Pbs_58_InpAct_1	AnxPbsA:2:O.Data[1]	AnxPbsA:2:O.Data[1]	REAL	
Pbs_58_InpAct_2	AnxPbsA:2:O.Data[2]	AnxPbsA:2:O.Data[2]	REAL	
Pbs_60_Out_0	AnxPbsA:2:I.Data[4]	AnxPbsA:2:I.Data[4]	REAL	
Pbs_60_Out_1	AnxPbsA:2:I.Data[5]	AnxPbsA:2:I.Data[5]	REAL	
Pbs_60_Out_2	AnxPbsA:2:I.Data[6]	AnxPbsA:2:I.Data[6]	REAL	
Pbs_60_Out_3	AnxPbsA:2:I.Data[7]	AnxPbsA:2:I.Data[7]	REAL	

Ethernet/IP Scheduled Connection Auto Config

Ethernet/IP Scheduled Connection Auto Config uses the I/O sizes in the current Profibus DP configuration to generate an Ethernet/IP Scheduled Connection Configuration File that maps all Profibus DP data to Scheduled Connections.

On the '*Automation Network/Configuration*' page, select the '*Ethernet/IP Auto Config*' button.



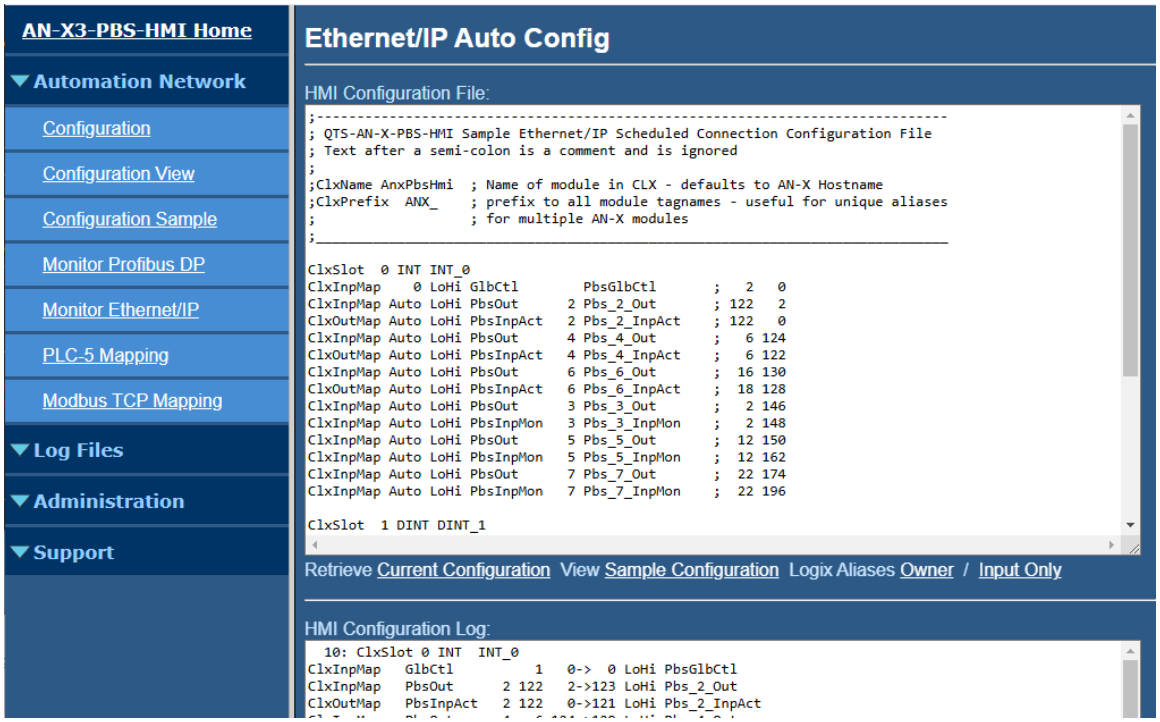
Choose which Profibus Nodes you want mapped to Scheduled connections.

For DINT or REAL connections, select the 'DINT' checkbox.

If the Profibus data is in Hi/Lo Byte format, select the 'HiLo' checkbox.

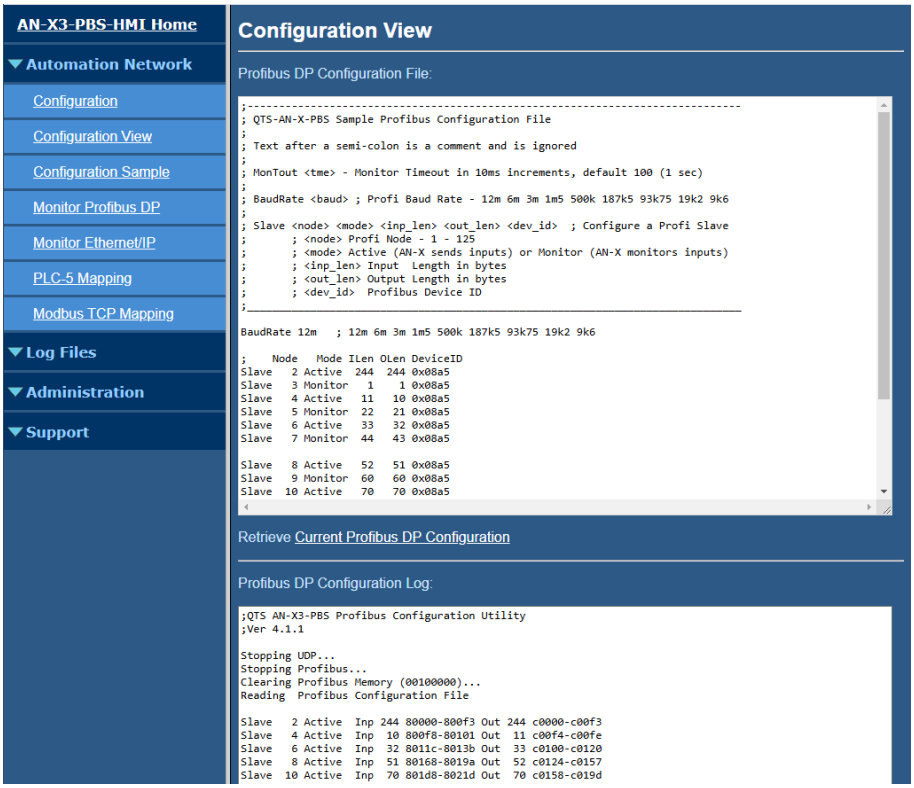
Select the 'Alias' checkbox to generate ControlLogix aliases for the corresponding Profibus Node.

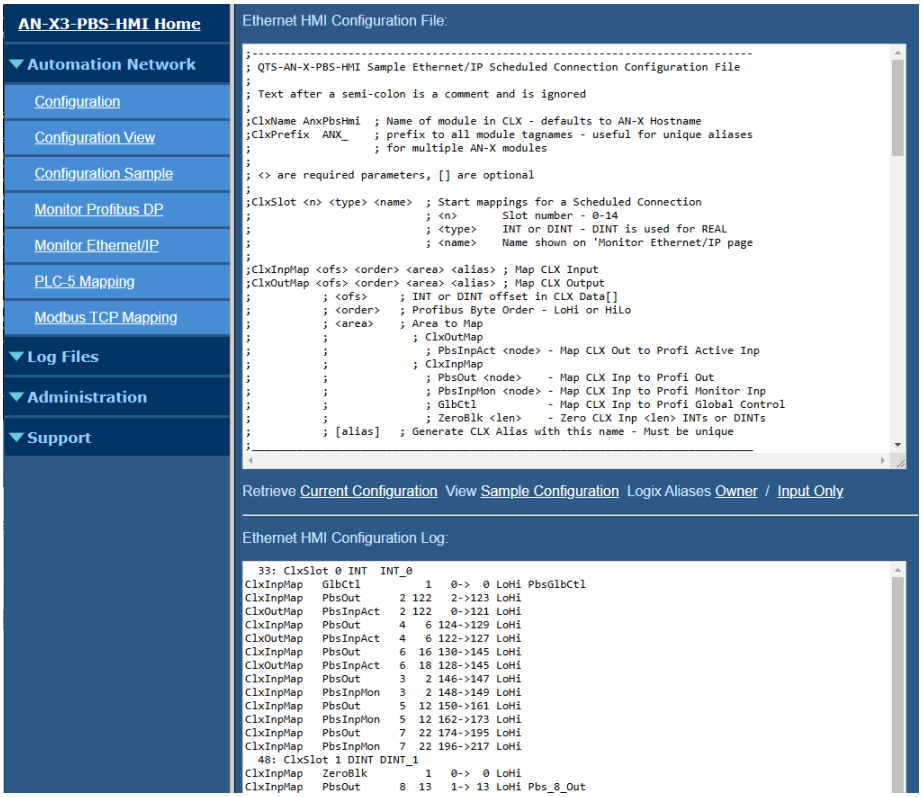
Select the *'Generate Ethernet/IP Config'* button.



Configuration View

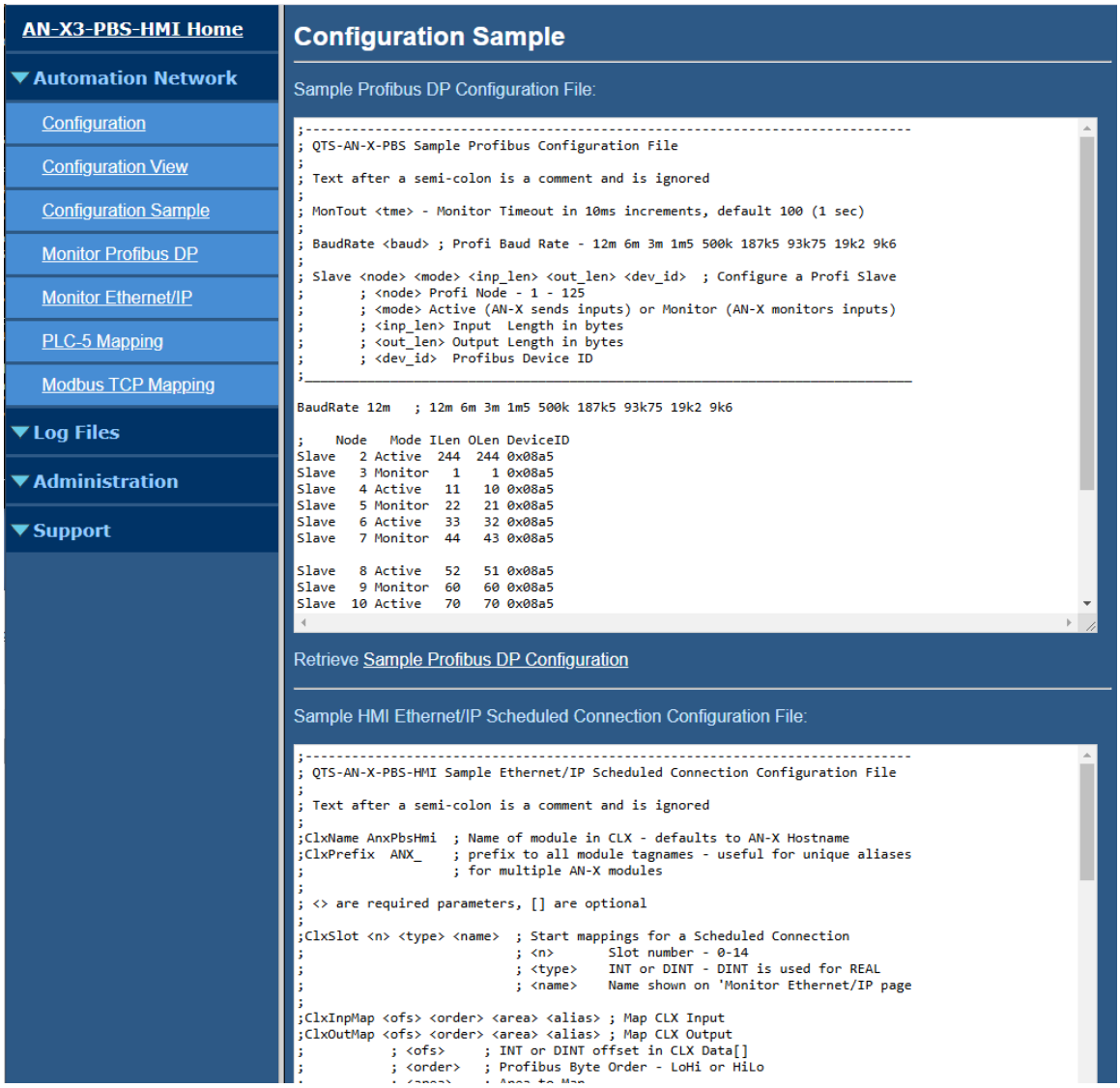
Select '*Automation Network/Configuration View*' to view or retrieve the current Profibus DP and Ethernet/IP Scheduled Configuration Files and view their corresponding Configuration Logs.





Configuration Sample

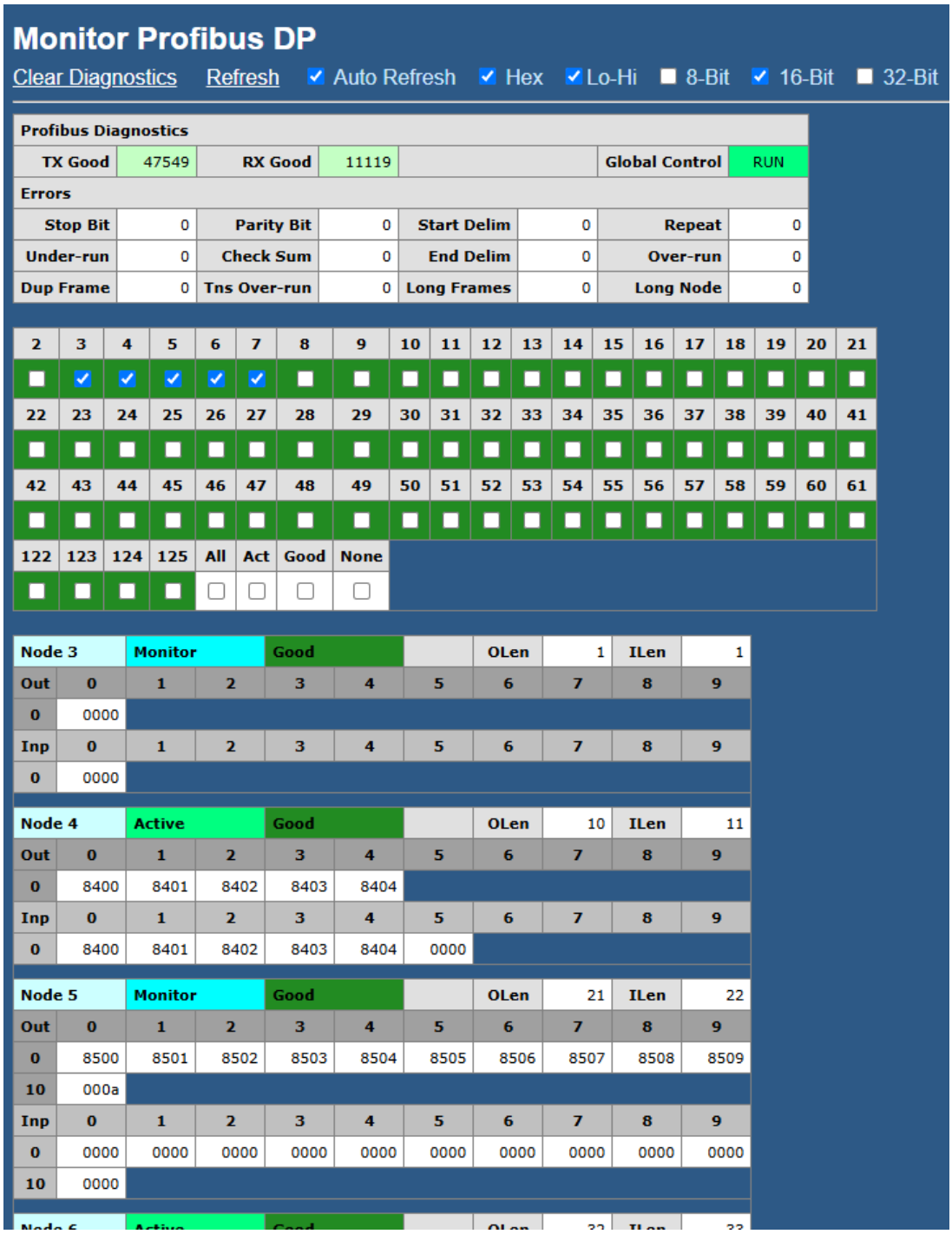
Select '*Automation Network/Configuration Sample*' to view and retrieve Sample Profibus DP and Ethernet/IP Scheduled Connection Configuration Files.



The format and layout of the configuration files are documented in these sample files (see page 19 and page 23).

Monitor Profibus DP

To monitor Profibus Diagnostic Counters, Active Node List and Profibus DP I/O data, select '*Automation Network/Monitor Profibus DP'*.



Standard Profibus Diagnostic Counters are shown as well as some specific to the AN-X.

If Error Counters are incrementing, this may indicate wiring, grounding or electrical noise problems.

A list of Active DP Slave Nodes is shown as well as check boxes to select DP Slave Nodes to monitor.

Data from any or all Active or Monitored Profibus DP slaves may be displayed.

The Mode (Active or Monitor) and State (Good or Timeout) is also shown for displayed Nodes.

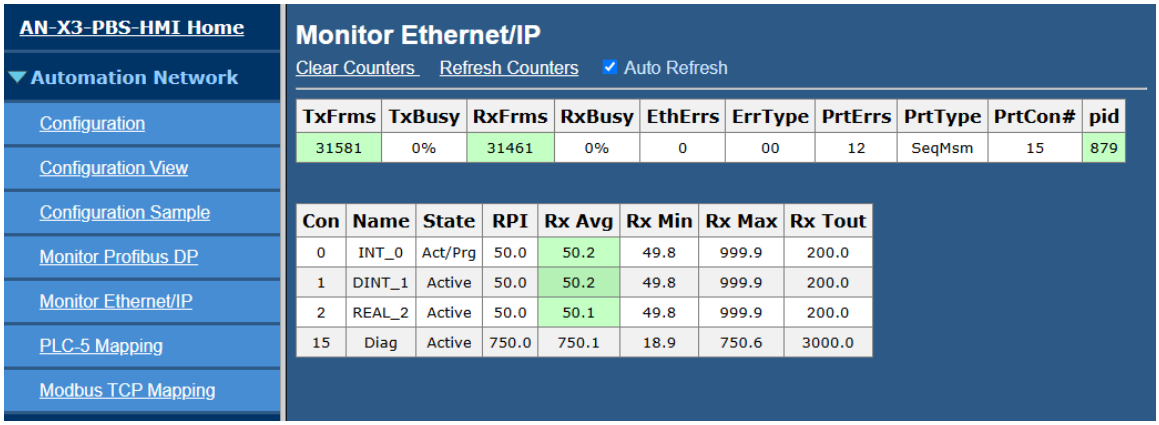
Data can be displayed in Hexadecimal or Signed Integer.

Data display size can be 8, 16 or 32 bit.

For 16 and 32 bit, byte ordering can be low to high (Lo-Hi, Little Endian) or high to low (Big Endian).

Monitor Ethernet/IP

To monitor Ethernet/IP Scheduled Connections, select '*Automation Network/Monitor Ethernet/IP'*.



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.

The Connection Statistics consist of:

Counter	Description
Connection number	0 to 15
Name	Name of Connection
State	Active or Idle
RPI	Requested Packet Interval
Rx Avg	The average of the last 32 update times, in ms.
Rx Min	The minimum update time since the last counter

Counter	Description
	reset, in ms.
Rx Max	The maximum update time since the last counter reset, in ms
Rx Tout	The receive timeout, calculated from the RPI

PLC-5 Mappings

The AN-X3-PB-HMI maps all Profibus DP I/O data to PLC-5 N and F files.

Outputs are mapped first, then Monitored Inputs, from N10 to N16 and F50 to F56, as many files as are needed.

These files are typically Read-Only.

Active Inputs are mapped from N17 to N19 and F57 to F59 as needed.

These files are Read/Write.

If the Profibus I/O data is INTs, use the N files. If FLOAT, use the F files.

Byte Order

Accessing N10 to N19 uses Lo/Hi byte order for Profibus DP I/O data.

Accessing N20 to N29 uses Hi/Lo byte order for Profibus DP I/O data.

Accessing F50 to F59 uses Lo/Hi byte order for Profibus DP I/O data.

Accessing F60 to F69 uses Hi/Lo byte order for Profibus DP I/O data.

IMPORTANT! Adding or removing Profibus Nodes changes PLC-5 File mapping.

IMPORTANT! Profibus Active Inputs can be overwritten by Scheduled Data or Modbus TCP Register write.

Profibus Global Control

The Profibus Global Control value is mapped to N8:0.

This is used to determine whether the Profibus Master is in Run or Stop mode.

```
7 6 5 4 3 2 1 0  Profibus Global Control
0 0           0  Reserved
            x    Clear Data, 1=Stop 0=Run
          x      UNFREEZE
        x        FREEZE
      x          UNSYNC
    x            SYNC
```

Profibus Diagnostic Counters and Good Node List

The AN-X Profibus Diagnostic Counters are mapped to N9 as follows:

```
; Profi Diagnostics   N9:0-15
; Profi Tx Frames                   N9:0
; Profi Rx Frames Good              N9:1
; Profi Rx Lo=StpErrs Hi=ParErrs    N9:2
; Profi Rx Lo=SD_Errs Hi=RptErrs    N9:3
; Profi Rx Lo=UndErrs Hi=FcsErrs    N9:4
; Profi Rx Lo=ED_Errs Hi=OvrErrs    N9:5
; Profi Rx Lo=LngErrs Hi=LngNode    N9:6
; Profi Rx Lo=DupFrm  Hi=TnsOvr     N9:7

; Profi Good Node List   0- 15      N9:8
; Profi Good Node List  16- 31      N9:9
; Profi Good Node List  32- 47      N9:10
; Profi Good Node List  48- 63      N9:11
```

```
; Profi Good Node List  64- 79       N9:12
; Profi Good Node List  80- 95       N9:13
; Profi Good Node List  96-111       N9:14
; Profi Good Node List 112-125       N9:15
```

Modbus TCP Mappings

The AN-X3-PB-HMI maps all Profibus DP I/O data to Modbus TCP Registers.

Outputs are mapped first, then Monitored Inputs, to Modbus Input Registers from 300001 to 310000 as needed.

Active Inputs are mapped to Modbus Holding Registers 400000 to 410000 as needed.

Byte Order

Accessing 300001 to 310000 or 400001 to 410000 uses Lo/Hi byte order for Profibus DP I/O data.

Accessing 310001 to 320000 or 410001 to 420000 uses Hi/Lo byte order for Profibus DP I/O data.

Accessing 320001 to 330000 or 420001 to 430000 uses Lo/Hi byte order, swapped words for Profibus DP I/O data.

Accessing 330001 to 340000 or 430001 to 440000 uses Hi/Lo byte order, swapped words for Profibus DP I/O data.

IMPORTANT! Adding or removing Profibus Nodes changes Modbus TCP Register Mapping.

IMPORTANT! Profibus Active Inputs can be overwritten by Scheduled Data or PLC-5 File write.

Profibus Global Control

The Profibus Global Control value is mapped to 340001.

This is used to determine whether the Profibus Master is in Run or Stop mode.

```
7 6 5 4 3 2 1 0  Profibus Global Control
0 0           0  Reserved
            x    Clear Data, 1=Stop 0=Run
          x      UNFREEZE
        x        FREEZE
      x          UNSYNC
    x            SYNC
```

Profibus Diagnostic Counters and Good Node List

The AN-X Profibus Diagnostic Counters are mapped as follows:

```
; Profi Diagnostics                 340201-340216
; Profi Tx Frames                   340201
; Profi Rx Frames Good              340202
; Profi Rx Lo=StpErrs Hi=ParErrs    340203
; Profi Rx Lo=SD_Errs Hi=RptErrs    340204
; Profi Rx Lo=UndErrs Hi=FcsErrs    340205
; Profi Rx Lo=ED_Errs Hi=OvrErrs    340206
; Profi Rx Lo=LngErrs Hi=LngNode    340207
; Profi Rx Lo=DupFrm  Hi=TnsOvr     340208
```

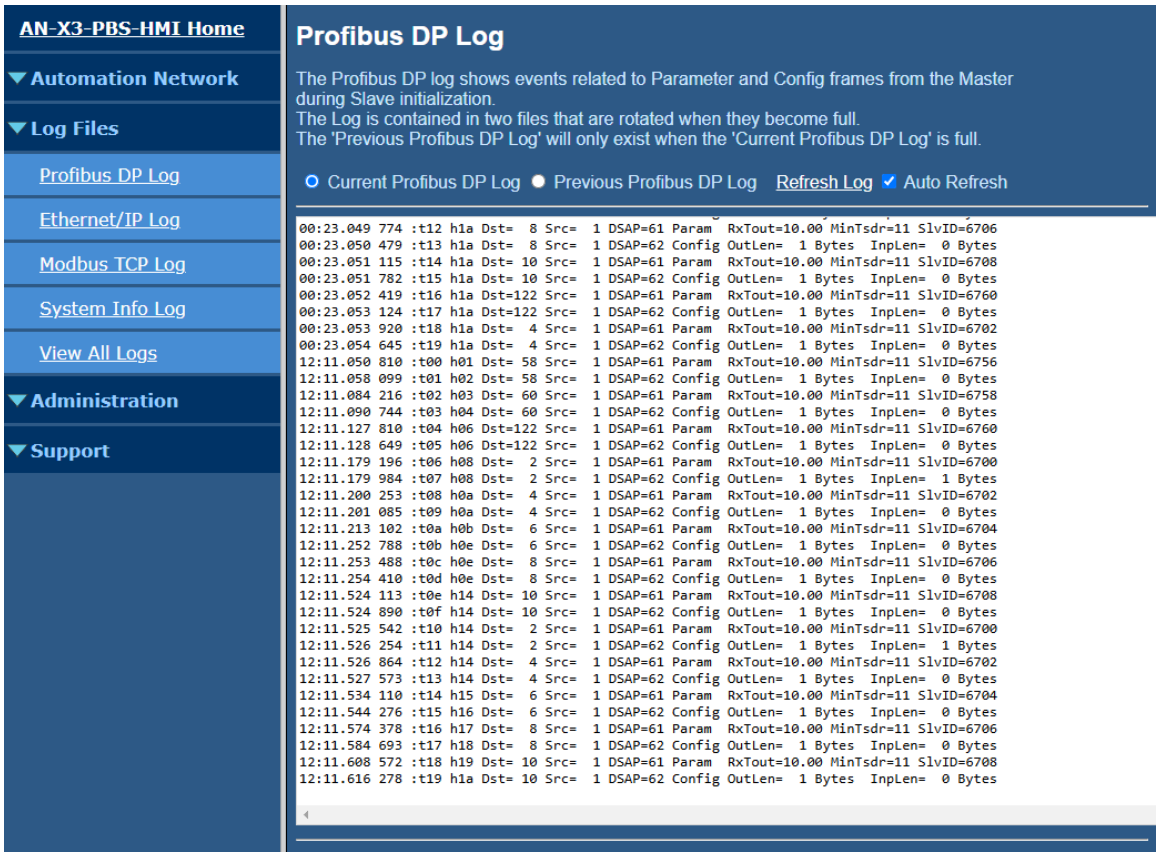
```
; Profi Good Node List   0- 15       340209
; Profi Good Node List  16- 31       340210
; Profi Good Node List  32- 47       340211
; Profi Good Node List  48- 63       340212

; Profi Good Node List  64- 79       340213
; Profi Good Node List  80- 95       340214
; Profi Good Node List  96-111       340215
; Profi Good Node List 112-125       340216
```

Log Files

Profibus DP Log

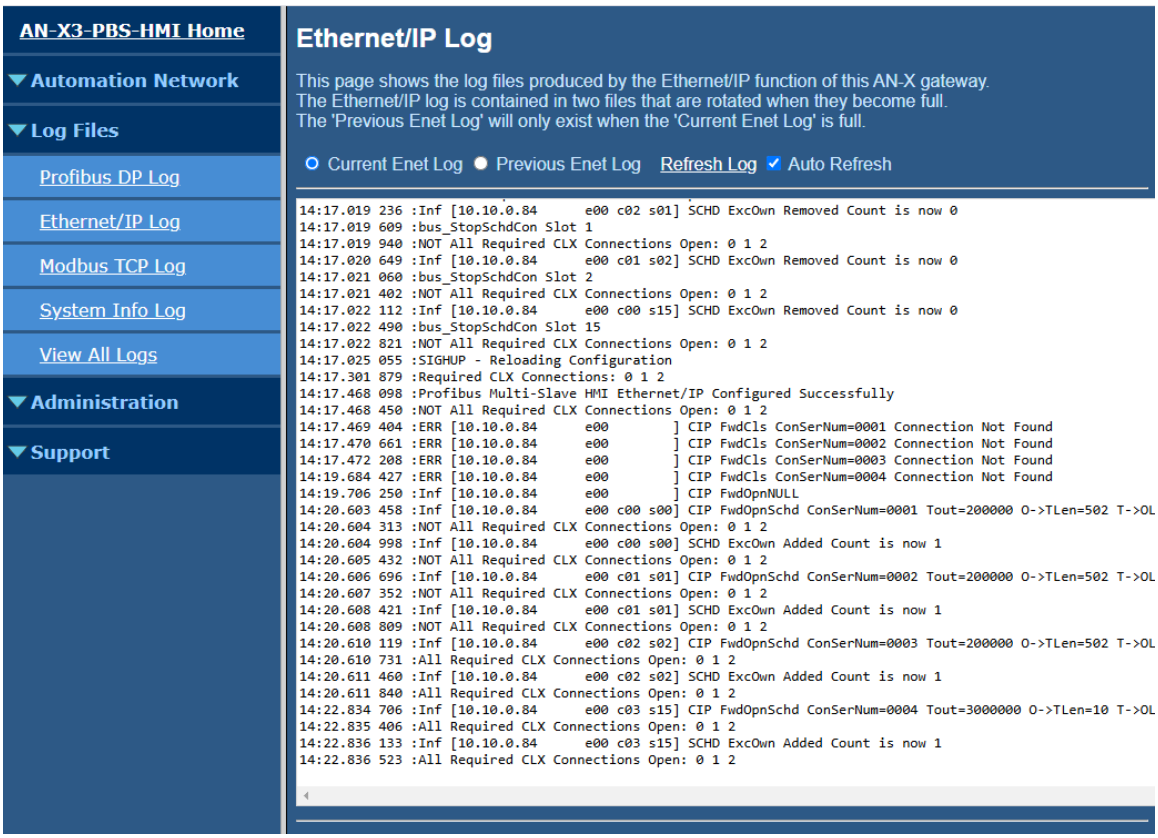
The Profibus DP log shows events related to Parameter and Config frames from the Master during Slave initialization.

The Log is contained in two files that are rotated when they become full.



Ethernet/IP Log

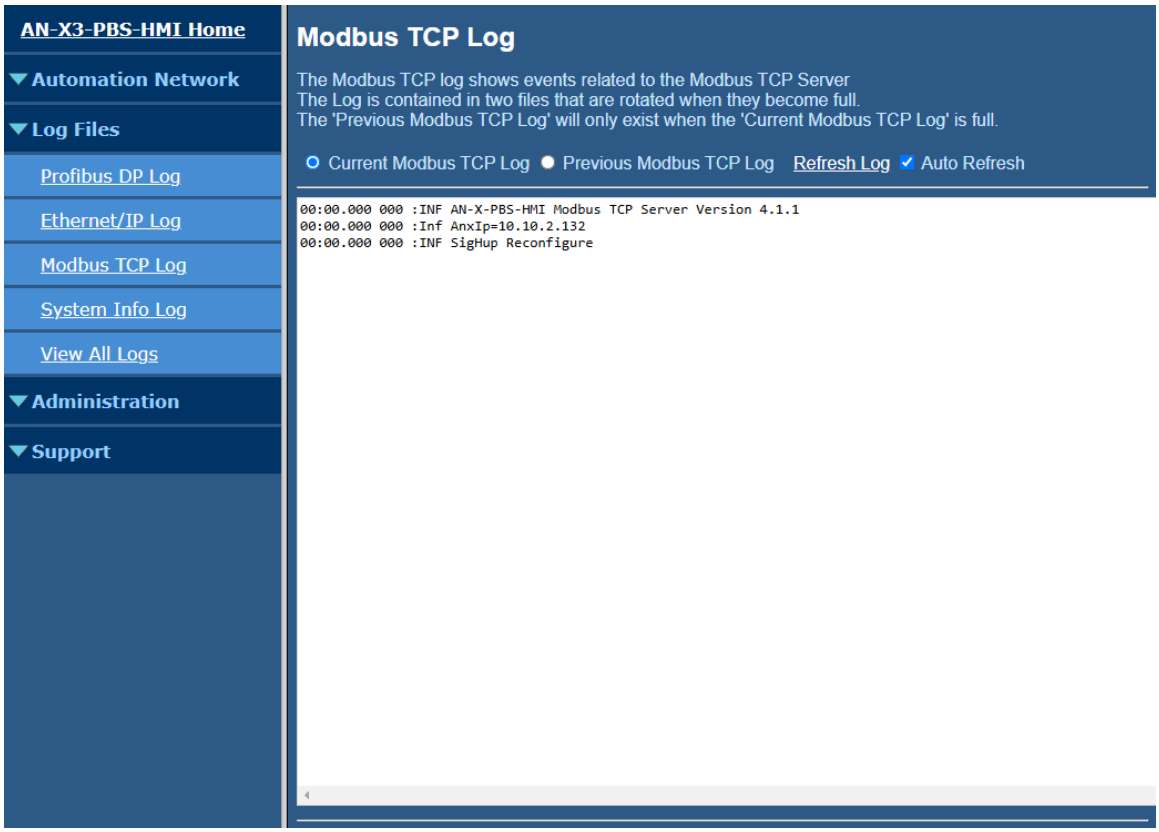
The Ethernet/IP log shows messages and errors associated with Ethernet/IP communication, both scheduled and unscheduled.



This may be useful for troubleshooting Scheduled Connection issues and PLC-5 file access issues.

Modbus TCP Log

The Modbus TCP log shows messages and errors associated with Modbus TCP communication.



This may be useful for troubleshooting Modbus TCP Register access issues.

System Info Log

The *System Info Log* records informational messages during AN-X startup and normal operation. This is mostly used by technical support and does not contain information useful to the end user.

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

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

AN-X IP/FW Configuration

See page 14 for details on setting the IP address.

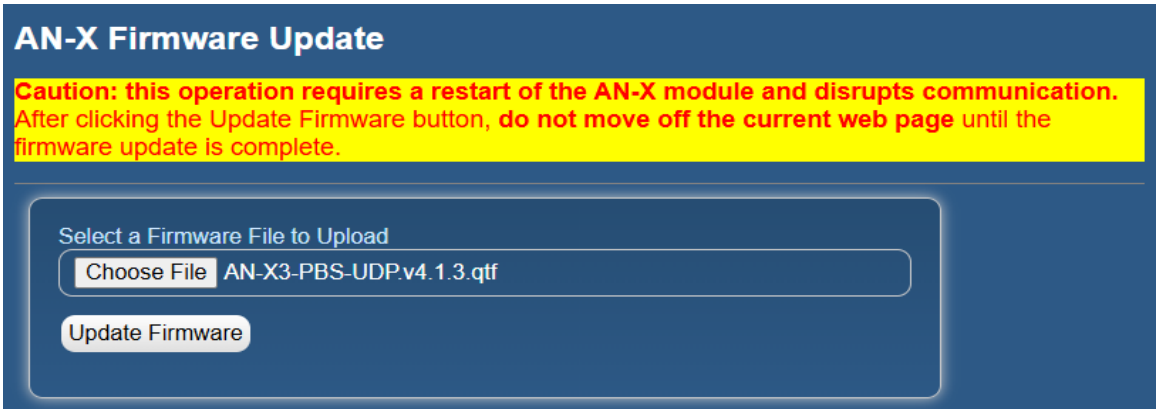
If other firmware images are available and on the microSD card, you can select this firmware with the '*Firmware Type*' Drop Down box.

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.

TIP The most recent firmware for the AN-X is available at qtsusa.com/dist

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



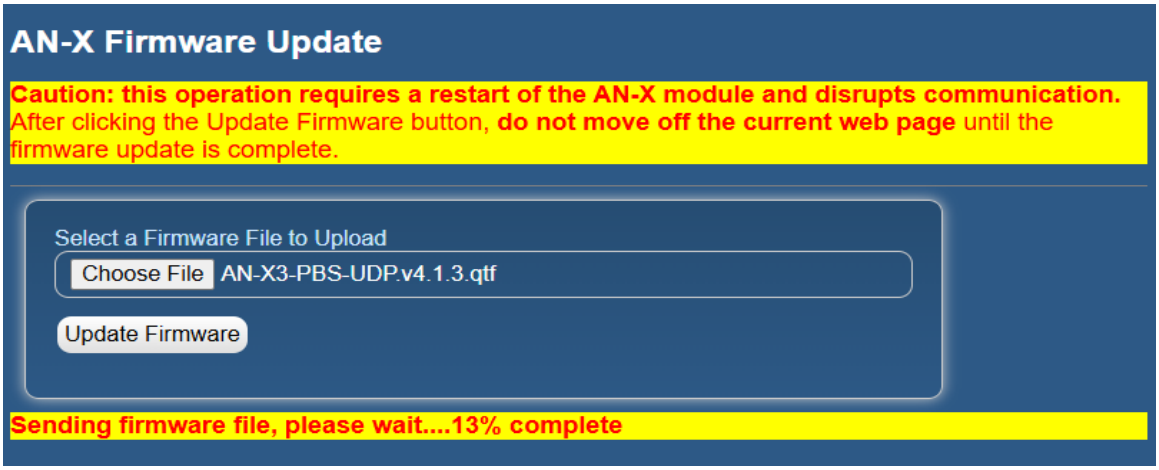
Browse to select the file, then click the '*Update Firmware*' button to transfer the file.

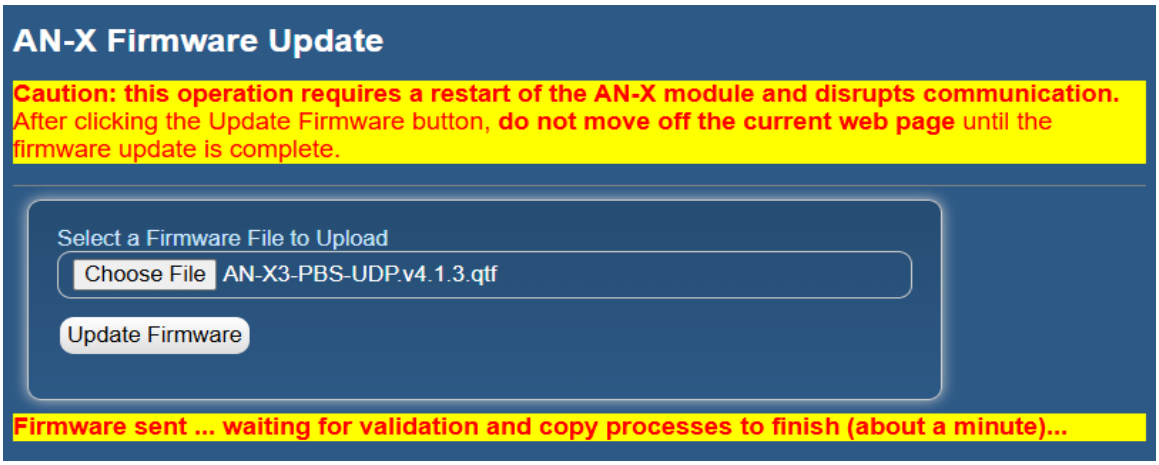
WARNING!

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.

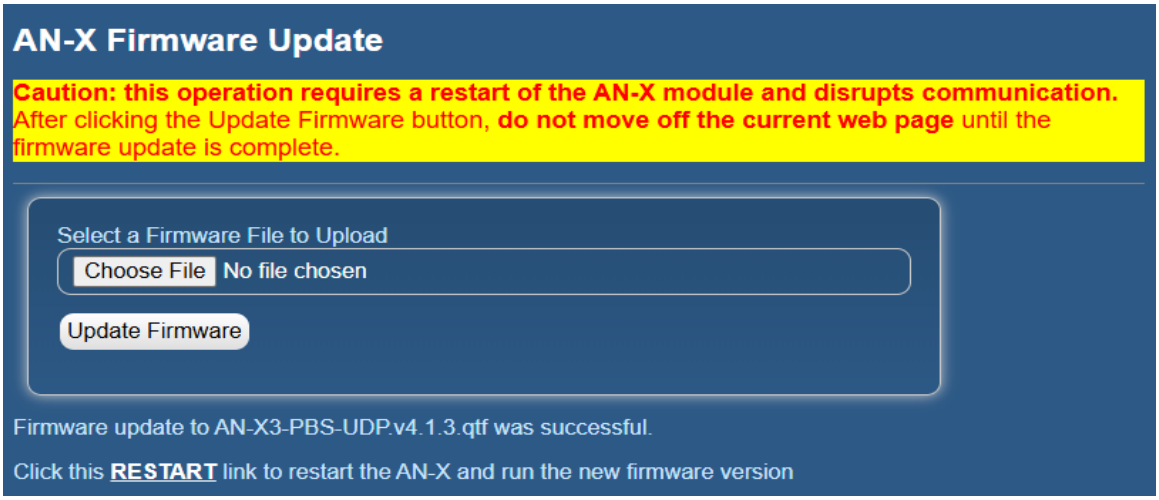
Interrupting power at some points in the update process could render the AN-X inoperative and it will have to be returned to the factory for re-initialization.

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





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



Manual Firmware Update

AN-X Firmware qtf files can be copied and updated on the microSD manually.

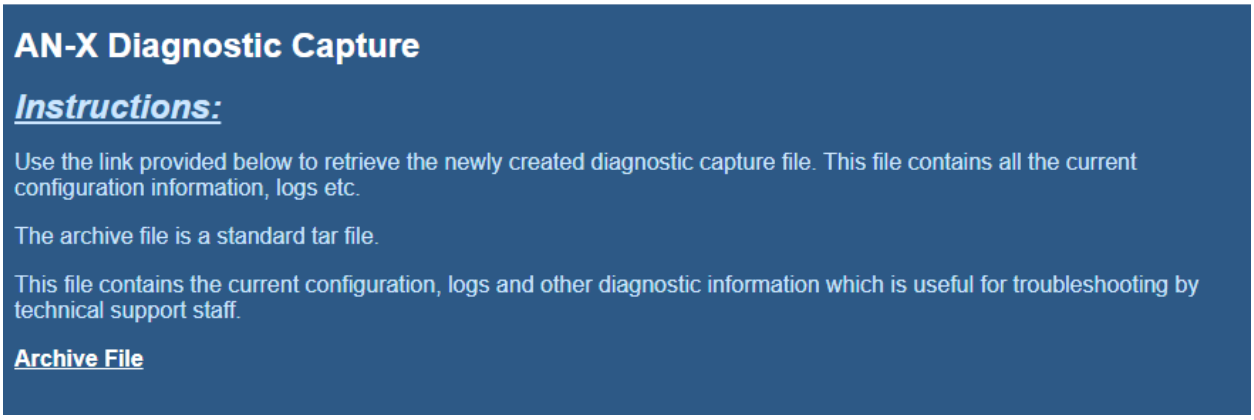
- Remove the microSD and insert it into your computer. You should see the current qtf file (AN-X3-PBS-HMI.v4.1.1.qtf for example).
- Delete or change the name of the current qtf file (zzAN-X3-PBS-HMI.v4.1.1.qtf for example). Renaming may be useful in case we need to revert back to the previous version.
- Copy the new qtf file to the microSD.
- Remove the microSD from your computer and insert it back into the AN-X. Be careful not to insert it above the connector (see page 8).

TIP The most recent firmware for the AN-X is available at qtsusa.com/dist

IMPORTANT! Make sure there is only one qtf filename that starts with the '*Firmware Type:*' specified. If not, the AN-X may use the wrong one.

Diagnostic Capture

Use '*Administration/AN-X Diagnostic Capture*' to create an archive tar file that contains the current AN-X configuration and logs for use by technical support. There may be a slight delay while AN-X builds the archive file.

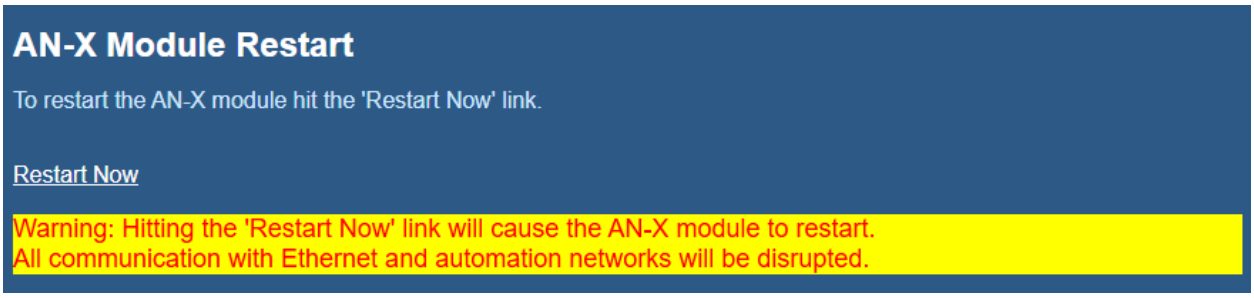


Click the Archive File link.

Select the destination where the file will be stored and save the file.

AN-X Module RESTART

Use the '*AN-X Module RESTART*' page to restart the AN-X module.



Support Menu

Contact Information

The Support contains contact information and links if you need help with the AN-X.

Troubleshooting

LEDs

The AN-X3-PB has LEDs that indicate the state of the Ethernet connection, the overall module state and the connection to the Profibus network.

Ethernet LEDs

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

The upper, yellow LED, labeled 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 300 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.

SYS LED

The SYS 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 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.

Powerup/Reboot

SYS LED	Meaning
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
Yellow 9	Error processing option file or file not found
Yellow 10	Option file mismatch

'Railroading' – SYS and NET LEDs

AN-X3 alternates (railroads) flashing the SYS and NET LEDs to indicate its state.

It railroads the LEDs red while it is copying new maintenance firmware files from the microSD card to flash memory. * Make sure power is not removed while railroading red.

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

It railroads the LEDs green for 15 to 20 seconds as it starts normal production mode.

SYS and NET LEDs: Runtime

SYS – AN-X Status

The SYS is used by the AN-X operating system and software to indicate the state of configuration and Ethernet communication.

SYS LED	Meaning
Flashing green/off	One or more configured Scheduled Connection is not active
Flashing green/red	Unscheduled messaging, addressing or connection problem
Flashing red/off	Configuration file problem

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

NET LED – Network Status

The NET LED indicates the status of the Profibus DP Network.

NET LED	Meaning
Red	One or more Active or Monitored DP Slaves has not been updated from the Profibus DP master within the Timeout period
Green	All Active and Monitored DP Slaves are being updated successfully

Specifications

Parameter	Specification
Function	Gateway between Ethernet and Profibus
Maximum Power Consumption	160 mA at 12 VDC, 80 mA at 24 VDC
Maximum Power Dissipation	2 Watts
Operational Temperature	0-50°C (32-122°F)
Storage Temperature	–40 to 85°C (–40 to 185°F)
Relative Humidity	5-85% 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 that have been modified or repaired without Quest Technical Solutions approval or that 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.

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Revisions

Version	Date	Changes
1.1	Apr 16/25	Initial Release