

**AN-X-PBSLV  
PROFIBUS  
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.

These warnings help to:

**WARNING!**

- 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-X-PBSLV

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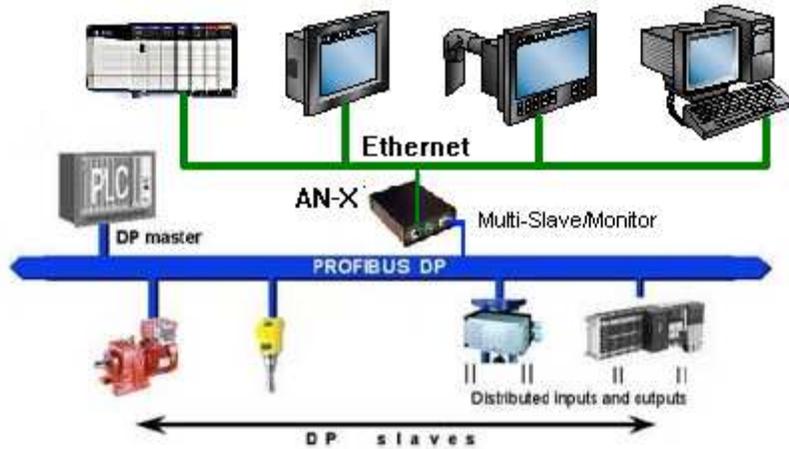
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# AN-X-PBSLV Module Overview



The AN-X-PBSLV communications module connects a computer or other device to a PROFIBUS network, using Ethernet.

The module:

- acts as one or more nodes, up to a total of 125 nodes
- monitors the input and output data on other nodes on the network
- maintains PROFIBUS diagnostic counters
- supports baud rates from 9600 bps to 12 Mbps.

The AN-X-PBSLV module supports exchanging scheduled data over Ethernet with a ControlLogix processor, with RPIs from 5 to 3200 ms. Refer to page 22 for details.

The AN-X-PBSLV also supports unscheduled messaging. The module maps PROFIBUS data to PLC-5 integer files. Use unscheduled messages from a computer or PLC or a DDE or OPC server such as RSLinx to access the PROFIBUS data directly on the AN-X-PBSLV. Refer to page 43 for details.

The module supports Modbus over Ethernet.

The module supports direct AN-X to AN-X communication over Ethernet. Refer to page 34 for details.

The AN-X-PBSLV module has a web interface for configuration of PROFIBUS properties, ControlLogix scheduled communication and AN-X to AN-X communication, and for monitoring operation and data. You can communicate with the module using any standard web browser such as Internet Explorer.

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 module firmware can be updated over Ethernet using the Windows utility supplied. Refer to page 70 for details.

## Hardware Features



The module has:

- LEDs to indicate the status of the connection to the Ethernet, its own internal state, and the connection to the PROFIBUS network
- an Ethernet connector
- a 9-pin D-shell connector to connect to the PROFIBUS network
- a power connector

## Package Contents

- AN-X-PBSLV module
- CD containing software and documentation

## Other Requirements

To exchange scheduled data with a ControlLogix processor over Ethernet requires:

- Version 12 or above of RSLogix 5000
- Version 12 or above of the ControlLogix firmware

- 100 Mbit/second Ethernet network and hardware (ENBT)

## Modes of Operation

There are three AN-X modes of operation:

- Boot mode. The AN-X is running its low level startup firmware.
- Configuration mode. This is the mode when you are updating the firmware in the AN-X.
- Production mode. This is the normal runtime mode of operation.

## Comma Separated Variable (CSV) Files

The files you use to configure AN-X are comma separated variable (CSV) files.

You can create these files using either a spreadsheet, such as Excel, or a text editor.

If you create the file using a spreadsheet, put each field in a separate column in the spreadsheet, then save the file as type CSV (Comma delimited) file.

Example:

BaudRate	12m
----------	-----

If you create the file with a text editor, separate the fields with commas

Example:

BaudRate, 12m

## 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:

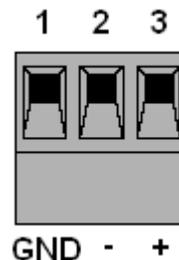
#### **WARNING!**

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

### Power

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

Left to right the pins on the power connector are chassis ground, negative voltage and positive voltage.



The chassis ground should be connected.

Power consumption internally is 300 mA @ 12VDC or 150 mA @ 24VDC.

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

### 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**

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

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

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

## **Software Installation**

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

Insert the CD supplied with the AN-X module and run the program setup.exe on the CD.

## Ethernet Configuration

The AN-X-PBSLV module connects a computer or other device such as a ControlLogix processor on Ethernet to a PROFIBUS network.

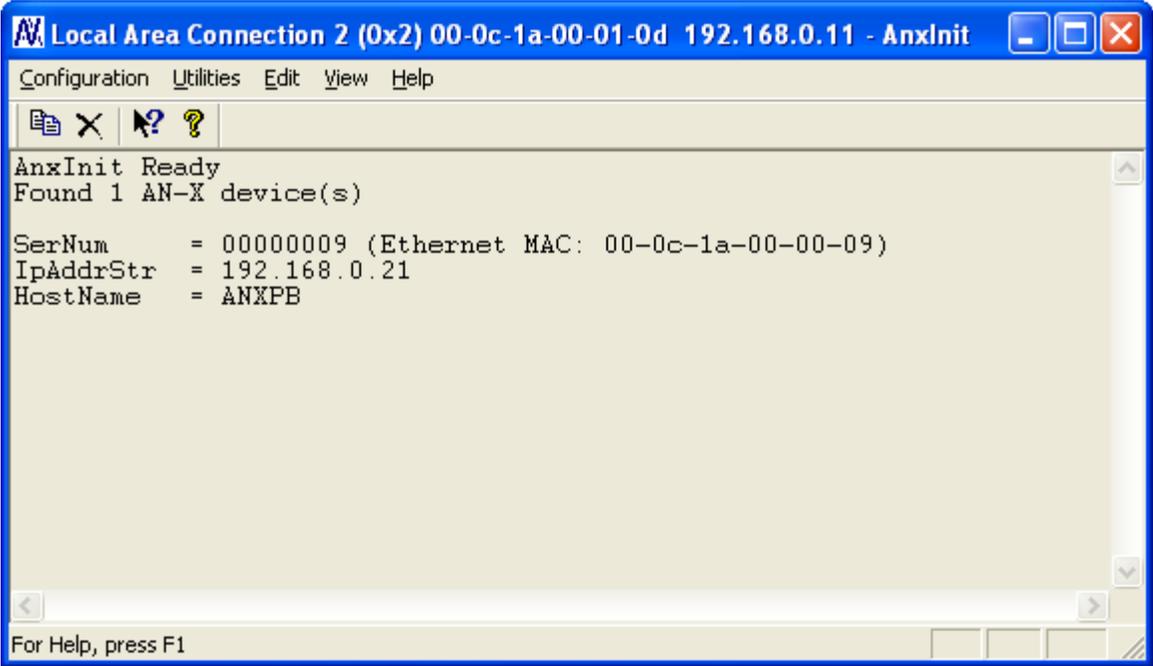
Before you can use the AN-X-PBSLV , you must configure its network properties on Ethernet.

### Ethernet Configuration

AN-X can be configured to use a static (unchanging) IP address or it can be configured to obtain its IP address from a DHCP server.

Unless you have control of the DHCP server, in most applications you will want to configure AN-X to use 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.

AN-X is shipped with DHCP enabled. If it finds a DHCP server on the network, the DHCP server assigns it an IP address. You can use the utility AnxInit to find the IP address that the DHCP server has assigned. Select *Utilities/Locate All AN-X Modules* and AnxInit will locate the AN-X and display its IP address.



```
Local Area Connection 2 (0x2) 00-0c-1a-00-01-0d 192.168.0.11 - AnxInit
Configuration Utilities Edit View Help
AnxInit Ready
Found 1 AN-X device(s)
SerNum      = 00000009 (Ethernet MAC: 00-0c-1a-00-00-09)
IpAddrStr   = 192.168.0.21
HostName    = ANXPB
For Help, press F1
```

If AN-X does not find a DHCP server within about three minutes of starting up, it reverts to a temporary static IP address of 192.168.0.41. If AN-X is using this temporary IP address, it repeatedly flashes the SYS

LED three times followed by a pause. If your computer is on the same subnet, you can use the AN-X web interface to change the IP address.

**IMPORTANT!**

Use this temporary IP address only for initial setup of AN-X. AN-X will not function for its intended purpose at the temporary IP address.

If you are using multiple AN-X modules, configure one at a time, especially if there is no DHCP server on the network, since they will all revert to the same temporary IP address when they fail to find a DHCP server.

**IMPORTANT!**

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

**IMPORTANT!**

The AN-X must be on the local Ethernet (same subnet) when you set its IP address.

You configure the Ethernet properties using the Windows utility AnxInit supplied with AN-X or with the AN-X web interface.

Use the *Configuration/AN-X IP Settings* command to start the AN-X IP configuration wizard, which takes you step by step through the IP configuration process.

**Step 1**

In step 1, you identify the AN-X you are configuring.

**Step 1: AN-X Selection**

Select this computer's Ethernet adapter that's on the same Ethernet subnet as the AN-X module you want to configure (you may only have one Ethernet adapter in your computer)

Local Area Connection 2

Enter the Ethernet MAC Address of the AN-X module you want to configure. You can get this from the label on the AN-X module or by selecting Utilities/Locate All AN-X Modules (if the module's current IP address is on the same subnet).

00-0c-1a-00-00-09

Enter the IP address on the local subnet that you intend the AN-X module to use.

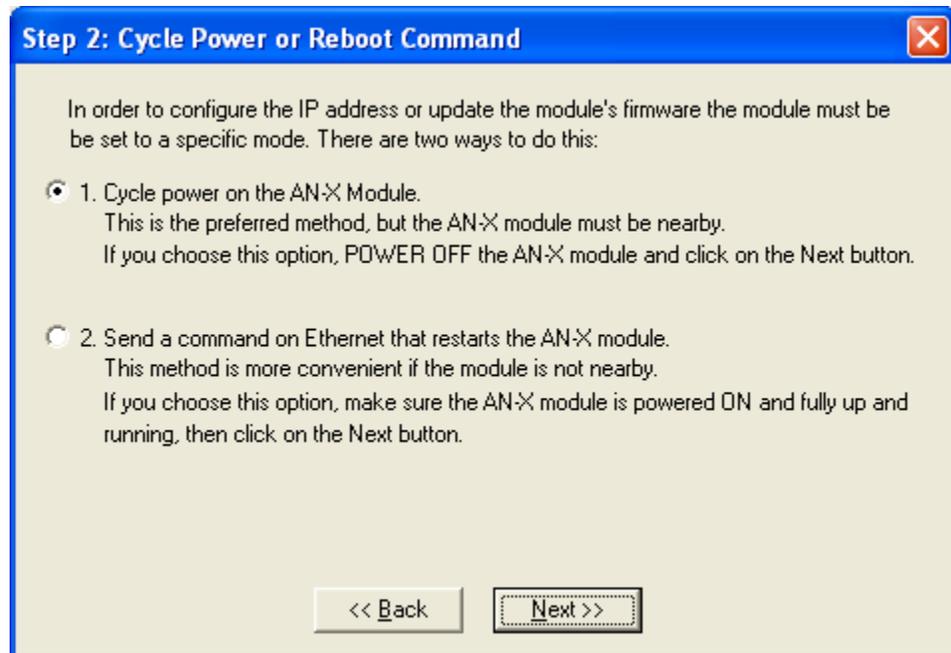
192 . 168 . 0 . 21

Next >> Exit

1. Select the Ethernet adapter that's connected to the AN-X. In most cases there will be just one Ethernet adapter in the computer. The AN-X must be on the same subnet as the computer.
2. Enter the MAC address of the AN-X you are configuring. This is printed on the AN-X label. It consists of six pairs of hexadecimal digits, separated by hyphens. In the example above, it's 00-0c-1a-00-00-09.  
If the AN-X is already online, you can obtain its MAC address using the *Utilities/Locate All AN-X Modules* command.
3. Enter the IP address you intend the AN-X to use.

## Step 2

In step 2, you choose a method of restarting AN-X to put it in boot mode.

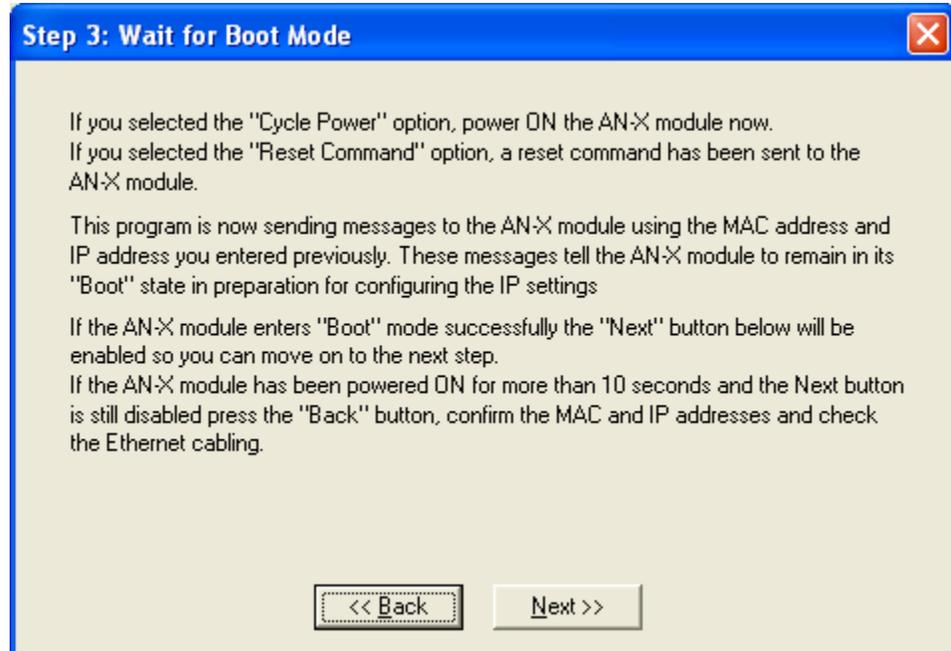


The preferred method is to cycle power on the AN-X. Select the first option on the screen, turn off power to the AN-X and click the *Next >>* button.

The second method, useful if the AN-X is not easily accessible, is to send it a command over Ethernet. The AN-X must be powered on and completely running for this method to work. For example, if this is the first time you are configuring a new AN-X, allow sufficient time for it to acquire an IP address from a DHCP server or to time out and use its default IP address (about 3 minutes). Select the second option on the screen and click the *Next >>* button.

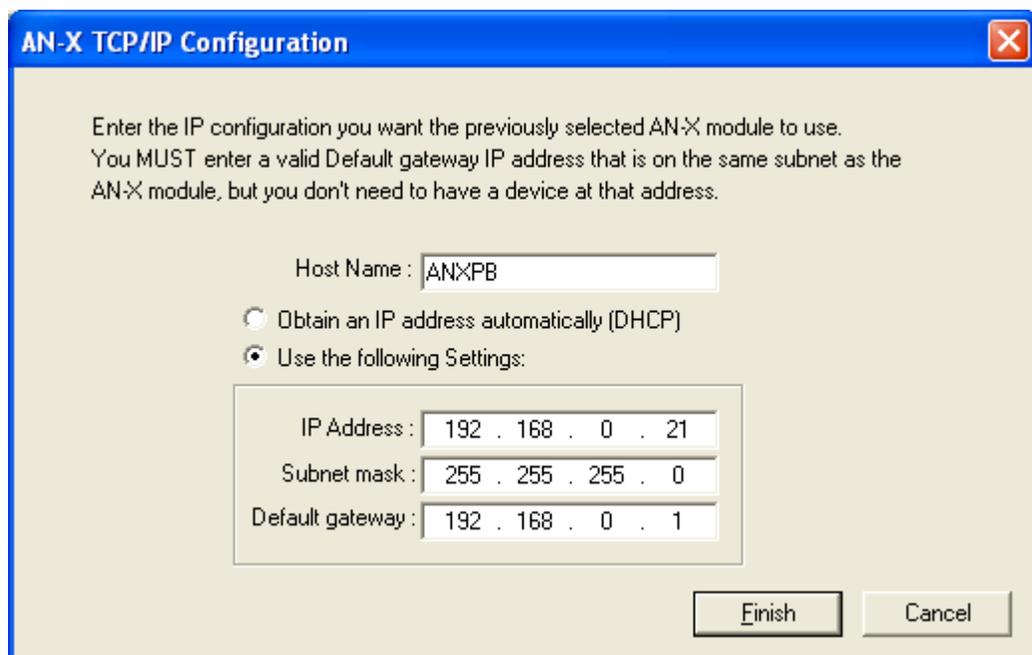
### Step 3:

Wait for AN-X to enter boot mode. While AnxInit is waiting, the *Next>>* button will be disabled. When AN-X is in boot mode, the *Next>>* button will be enabled.



If the AN-X does not enter boot mode within about 10 seconds, return to the previous screens and check the entries.

Click *Next>>* The *AN-X TCP/IP Configuration* dialog appears.



Enter a *Host Name* for the AN-X that is unique on your network. AN-X uses this name internally and it may be used to identify the AN-X if you

have a DNS server on your network. The name can be from 1 to 31 characters long.

To configure the AN-X to obtain its IP address from a DHCP server on the network, select *Obtain an IP address automatically (DHCP)*

To configure the AN-X to use a static IP address, select *Use the following Settings* and enter:

- the desired IP address for the AN-X.
- the Subnet mask 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.

Click OK to complete the configuration.

If you click *Cancel*, AN-X is left running the boot code. Use the *Utilities/Restart AN-X* command to restart the AN-X in production mode.

## Example: Standalone Computer

A typical example is a computer connecting directly to an AN-X.

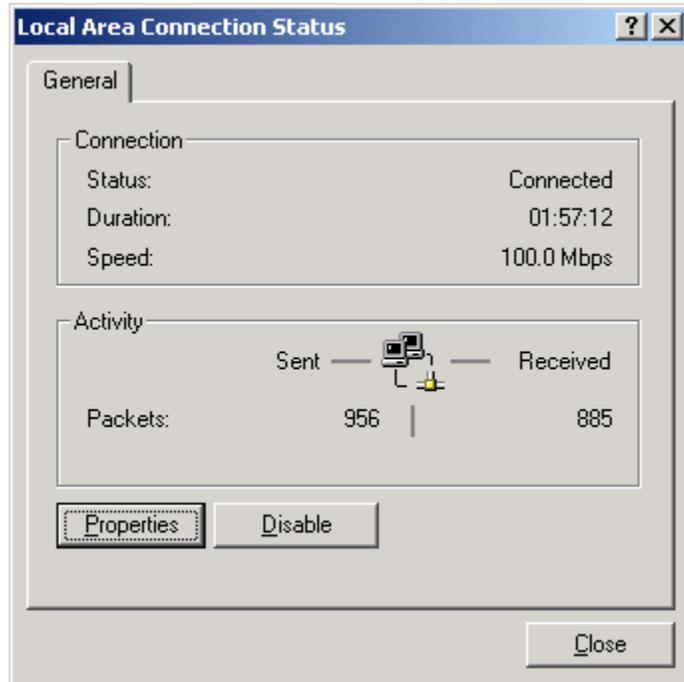
Since you are connecting directly from the computer to AN-X, use a crossover Ethernet cable.

The following instructions assume Windows 2000. The procedure for Windows NT and Windows XP is very similar. These instructions also assume that an Ethernet network card has been installed in the computer and that AnxInit has been installed on the computer.

### **TIP**

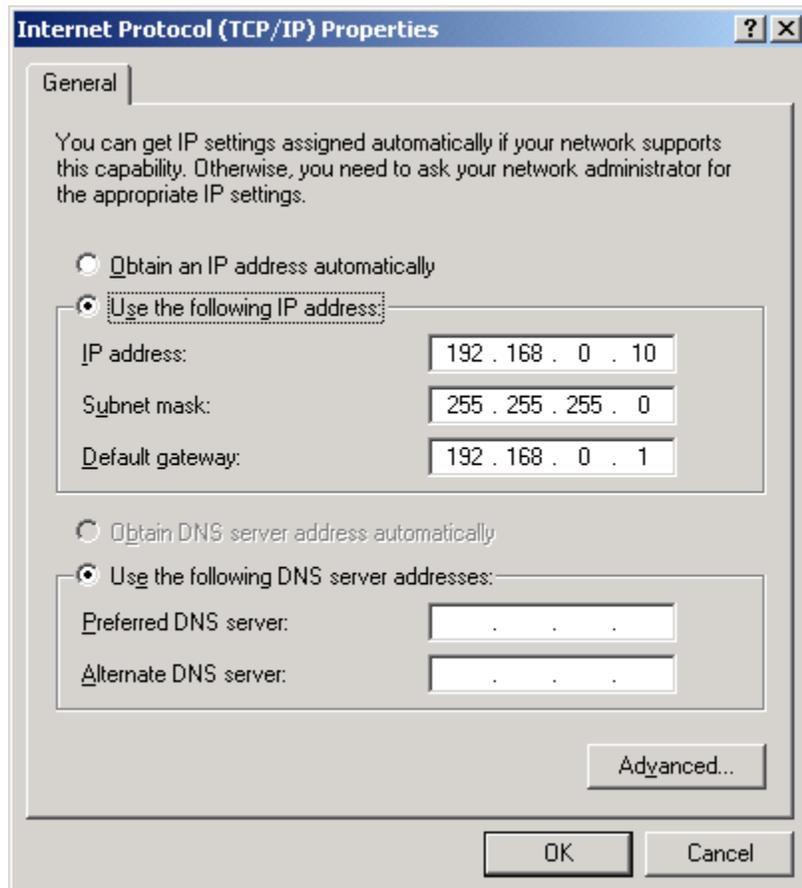
The parameters in this example will work when you set up any standalone computer to work with AN-X.

First configure the computer to use a static IP address. From the Start menu, select *Start/Settings/Network and Dialup Connections*. Double click on *Local Area Connection*.



Click the *Properties* button.

Double click on *Internet Protocol (TCP/IP)*.



In this example, we will assign the computer an IP address of 192.168.0.10

Set the Subnet mask to 255.255.255.0 (standard mask for the Class C network address of 192.168.0.x).

Set the Default gateway to 192.168.0.1 (this address does not exist on the Ethernet network but AN-X requires a valid default gateway entry).

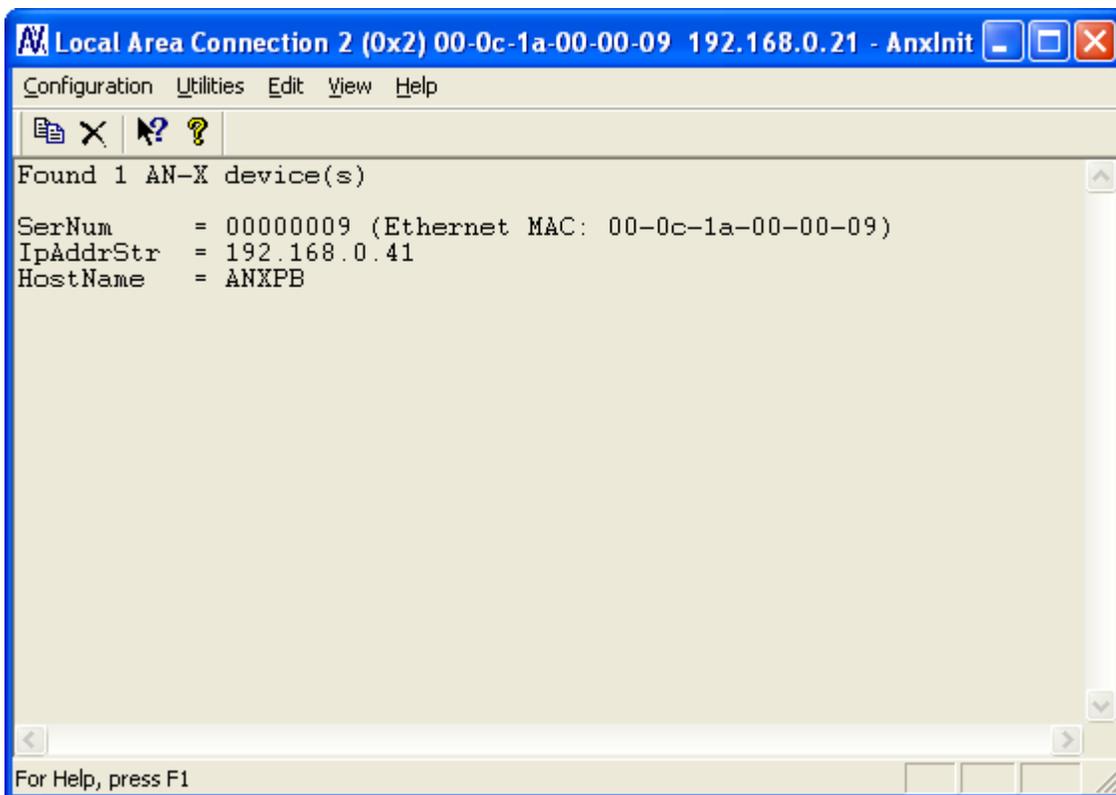
Click OK to accept the settings

Connect the computer to AN-X using the crossover cable.

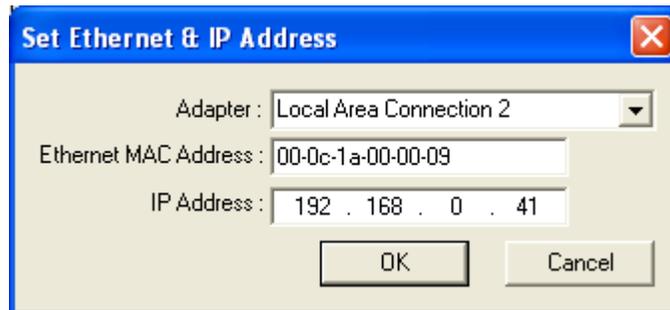
If this is the first time you have used the AN-X module, it will look for a DHCP server on the network. It waits about three minutes, then reverts to a default IP address of 192.168.0.41

Power up the AN-X and wait for the search for a DHCP server to time out. When the search for a DHCP server times out, AN-X will flash the SYS LED red three times followed by a pause repeatedly.

Run AnxInit. Select *Utilities/Locate All AN-X Modules* and confirm that the AN-X is found.



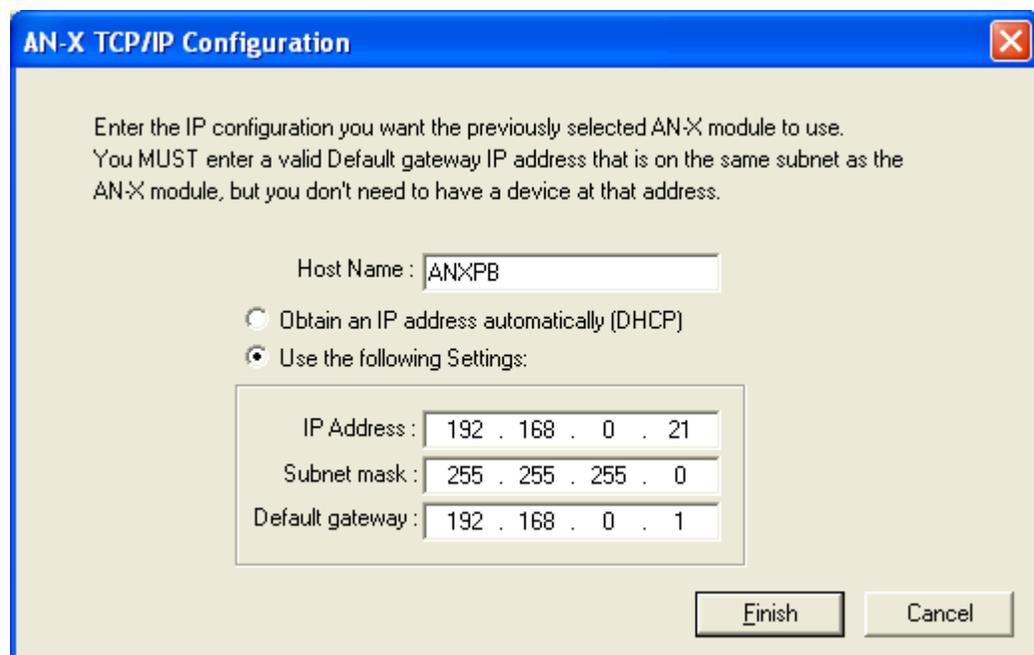
Select *Utilities/Select An AN-X* and enter the MAC Address and IP address.



The dialog box titled "Set Ethernet & IP Address" has a blue title bar with a close button. It contains three input fields: "Adapter" with a dropdown menu showing "Local Area Connection 2", "Ethernet MAC Address" with the value "00-0c-1a-00-00-09", and "IP Address" with the value "192 . 168 . 0 . 41". At the bottom are "OK" and "Cancel" buttons.

Click *OK* to accept the setting.

Select *Utilities/AN-X IP Configuration*.



The dialog box titled "AN-X TCP/IP Configuration" has a blue title bar with a close button. It contains instructional text: "Enter the IP configuration you want the previously selected AN-X module to use. You MUST enter a valid Default gateway IP address that is on the same subnet as the AN-X module, but you don't need to have a device at that address." Below this is a "Host Name" field with "ANXPB". There are two radio buttons: "Obtain an IP address automatically (DHCP)" (unselected) and "Use the following Settings:" (selected). Below the radio buttons is a group box containing three input fields: "IP Address" with "192 . 168 . 0 . 21", "Subnet mask" with "255 . 255 . 255 . 0", and "Default gateway" with "192 . 168 . 0 . 1". At the bottom are "Finish" and "Cancel" buttons.

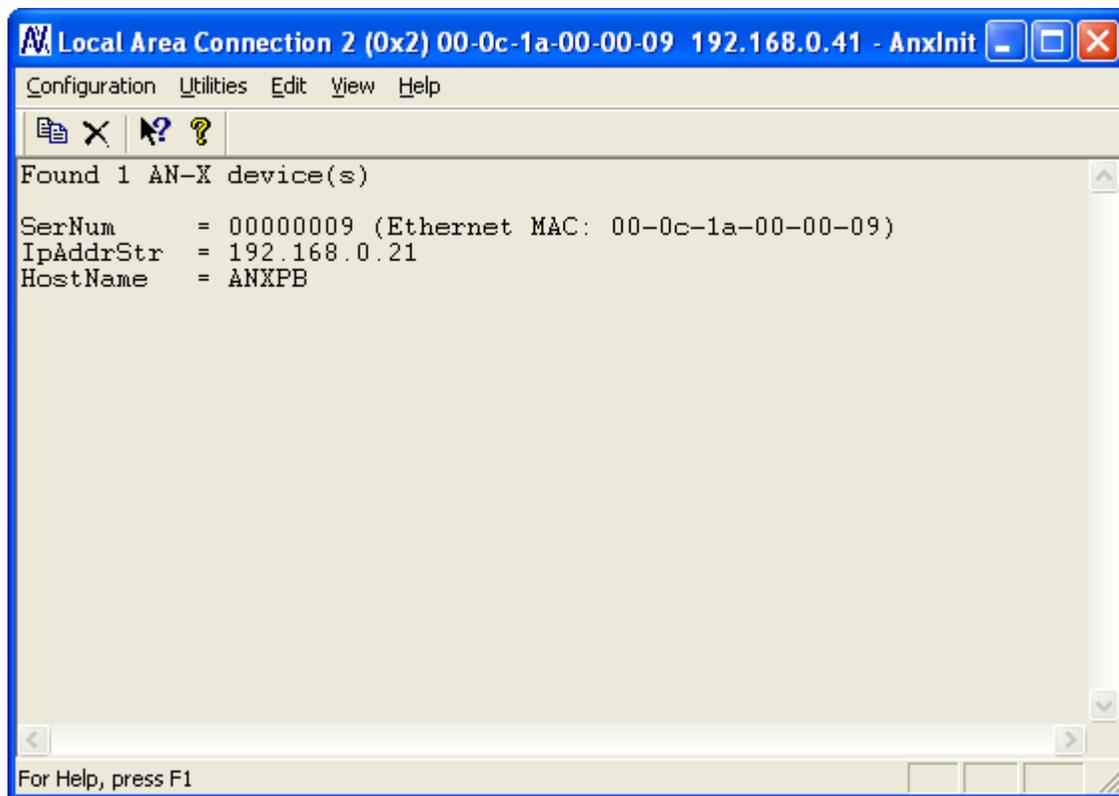
Enter an IP Address. In this case we chose 192.168.0.21

Enter the same Subnet mask and Default gateway that you entered for the computer. The default gateway address does not exist on the network but AN-X requires that the field have a valid entry.

Click *Finish* to accept the settings.

Select *Utilities/Restart AN-X* to restart AN-X with the new parameters.

When the AN-X has restarted (SYS LED is solid green), select *Utilities/Locate All AN-X Modules* and confirm that the AN-X is found with the new parameters.



## 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. To reconfigure it to a known state, run the command *Configuration/AN-X IP Settings* to start the AN-X IP Configuration Wizard and reconfigure AN-X.



## PROFIBUS Configuration

### GSD File

The GSD file for the AN-X-PBSLV is provided on the distribution CD and on the AN-X module itself.

To access the GSD file on the AN-X, run the web interface (see page 58). At the bottom of the home page, there is a link: *AN-X-PBSLV GSD File*. To view the GSD file, click on this link. To save the GSD file to your computer, right click on this link and select *Save Target As...*

### Configuring Slaves on the AN-X-PBSLV

You configure the slaves that the AN-X module is emulating or monitoring on PROFIBUS by creating a comma separated variable (CSV) file using either a text editor or a spreadsheet such as Excel, then sending the configuration to AN-X using the AN-X web interface.

The configuration file defines the network baud rate and the properties of the PROFIBUS slaves the AN-X module is emulating or monitoring.

#### Baud Rate

The baud rate is defined by a line with the keyword `BaudRate` in the first field and an entry that selects the baud rate in the second field.

Possible entries for the baud rate value are:

Baud rate	File entry
12 Mbps	12m
6 Mbps	6m
3 Mbps	3m
1.5 Mbps	1m5
500 Kbps	500k
93750 bps	93k75
19200 bps	19k2
9600 bps	9k6

Examples:

`BaudRate, 12m`

`BaudRate, 9k6`

## PROFIBUS Nodes

Nodes are defined by lines (rows) in the file with the keyword Slave in the first field.

The second field contains the node number, from 1 to 125.

The third field contains the mode. It can be either Active, if the AN-X module is emulating this node, or Monitor, if the AN-X module is monitoring the node on the network.

The fourth and fifth fields are the input length and output length, in bytes, as seen by the PROFIBUS master. For example, an input length of 10 means that the AN-X will send 10 bytes of data to the PROFIBUS master.

The sixth field is the PROFIBUS ID for the module. For monitored nodes, if you know what the ID is, fill it in. Otherwise, set it to 0.

For active nodes, if you are not emulating another device, enter 0x08a5. Otherwise, enter the device ID of the device you are emulating.

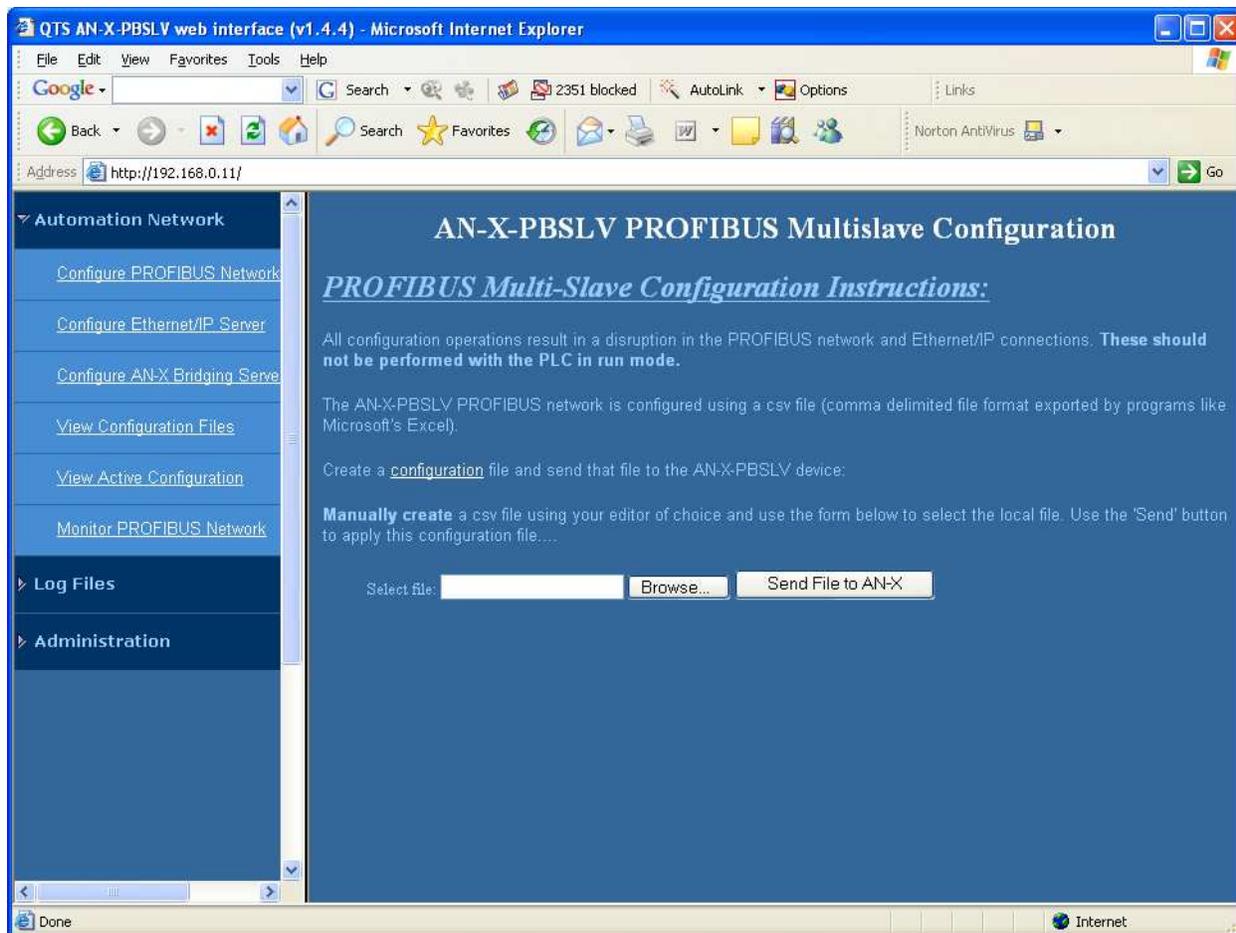
Examples:

Slave, 1, Active, 10, 2, 0x08a5

Slave, 2, Monitor, 5, 2, 0x0000

To send the configuration to the AN-X, start your web browser and enter the AN-X IP address as the address.

Select *Automation Network/Configure PROFIBUS Network*.



Type or browse the configuration file name into the *Select file:* area and click *Send File to AN-X*.

If the AN-X is successfully configured, the web interface displays a summary of the downloaded network.

If there has been an error, it displays an error message. To see the cause of the error, select *Log Files/System Error Log*.

## Configuring AN-X-PBSLV in a PROFIBUS Master

First, install or register the GSD file for the AN-X-PBSLV in the program that configures the PROFIBUS master you are using.

If you are simply using the AN-X-PBSLV to pass data to the PROFIBUS master, configure it using this GSD file. Select modules to define the data you want to pass, then set the input and output lengths in the CSV file you use to configure the AN-X-PBSLV to match the total lengths in the master.

If you are using the AN-X-PBSLV to emulate or monitor other devices, configure those devices in the master's PROFIBUS configuration, and

---

then set the input and output lengths and the device IDs in the CSV file you use to configure the AN-X-PBSLV to match the total lengths and Ids of the devices in the master.

## ***Scheduled Data with a ControlLogix***

AN-X-PBSLV can exchange scheduled data with a ControlLogix processor.

It supports:

- up to 248 registers of output data
- up to 250 registers of input data
- up to 250 registers of status input data
- RPIs from 5.0 to 3200.0 ms

The terms input and output are from the point of view of the ControlLogix processor.

### **Mapping PROFIBUS Data**

You select which PROFIBUS data is mapped to each of the ControlLogix data areas.

The ControlLogix sends output data to the AN-X-PBSLV and the AN-X sends it out on the PROFIBUS network, as PROFIBUS input data to a PROFIBUS master.

The AN-X sends input data and status input data to the ControlLogix.

### **Connections**

There are two possible types of scheduled connections from the ControlLogix processor to the AN-X-PBSLV:

- Exclusive owner connections, which contain input, output and possibly status input data
- Input-only connections, which contain input and possibly status input data

Only the exclusive owner connection can write data to AN-X and to PROFIBUS.

There can be only one exclusive owner connection to an AN-X module, but there can be more than one input only connection to an AN-X.

You can have an input only connection even if there is no exclusive owner connection. For example, you can use AN-X to monitor a PROFIBUS network. If there are no active nodes, there is no need for an exclusive owner connection, since there is no data to write.

### **Configuration**

Configuring the scheduled data exchange consists of:

1. Configuring AN-X in RSLogix 5000

2. Creating a spreadsheet to select which PROFIBUS data is mapped to the scheduled data and saving it as a comma separated variable (CSV) file
3. Sending the configuration to AN-X

## Requirements

- RSLogix 5000 version 12 or above
- ControlLogix processor with version 12 or above firmware
- 100 Mbit Ethernet network and ENBT modules. We strongly recommend using switches rather than hubs

### **WARNING!**

Do not use the web interface to monitor data on the AN-X-PBSLV while the AN-X is exchanging scheduled data with a ControlLogix processor in a production environment.

## Reference

Allen-Bradley publication *EtherNet/IP Media Planning and Installation Manual*, publication ENET-IN001A-EN-P

## Configuring AN-X in RSLogix 5000

You configure the module in RSLogix 5000 to set the module type, how much scheduled data to transfer and how often to transfer it.

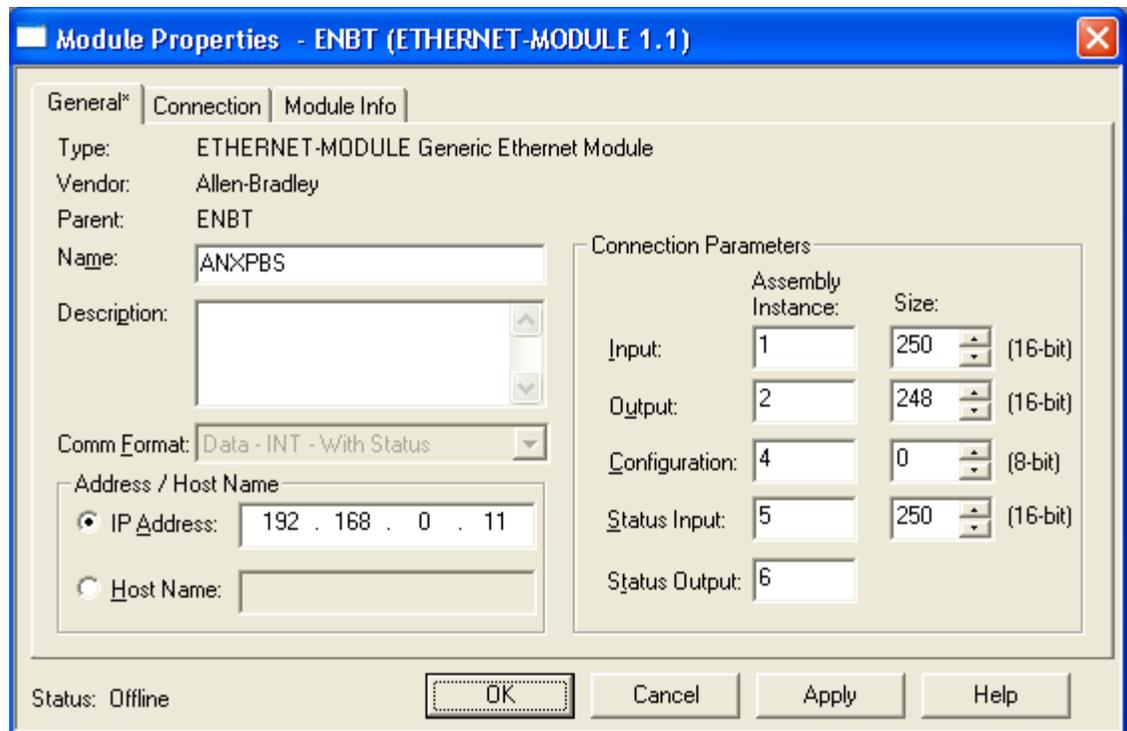
There can be a maximum of 248 words of output data and 250 words each of input and status input data.

### **TIP**

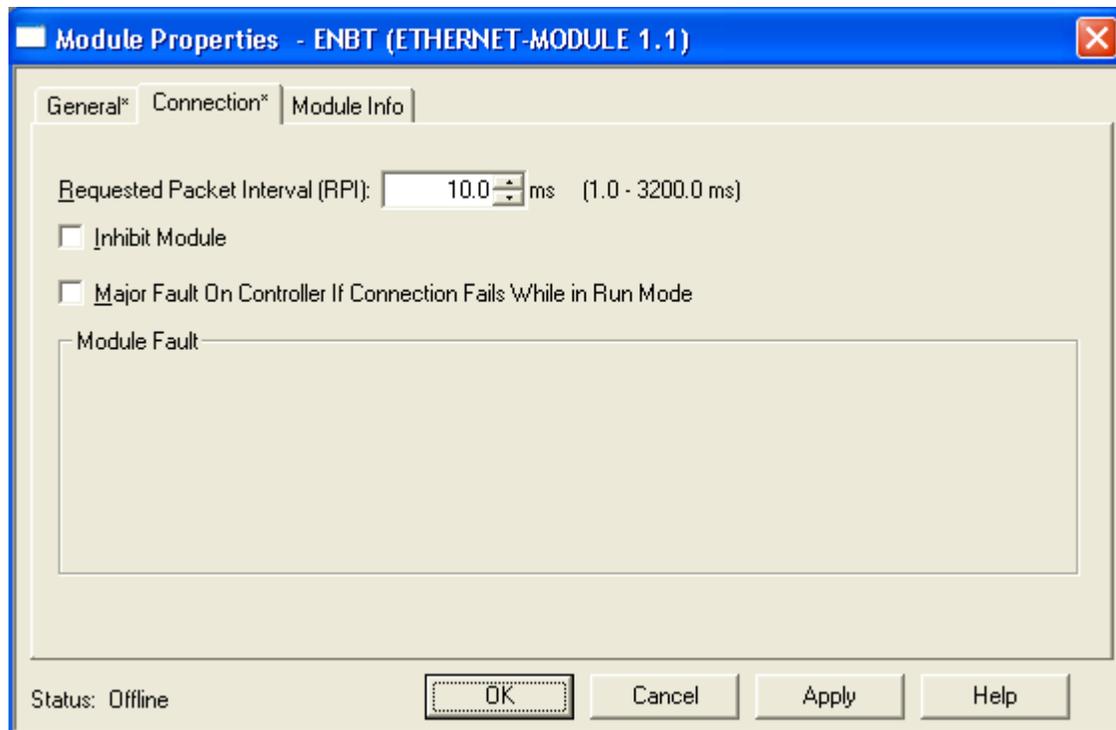
If the total amount of input data you wish to pass from PROFIBUS is 250 or fewer words, you can map all the data to the input data and do not need to create the status input data. This will use less Ethernet bandwidth. In the following, to create input and status input data, select Data –INT – with Status as the Data Format. To create just input data, select Data – INT.

To configure the module in RSLogix 5000, you must be offline.

1. If you are creating a new project, select *File/New* to create a new project. Give the processor a name and enter the slot it occupies in the ControlLogix rack.
2. Right click on *I/O configuration* and select *New Module...*
3. Select a module of Type ETHERNET-MODULE, Description Generic Ethernet Module from the list and click OK. RSLogix 5000 displays the *Module Properties* dialog box.



4. Assign the module a *Name* and optionally a *Description*.
5. Set the *Comm Format* to Data – INT – with Status (or Data – INT).
6. Set the *IP Address* to match the address of the AN-X module.
7. Set the *Input Assembly Instance* to 1. Normally you set the size to the maximum allowed, 250 words. You can set it to a smaller value but it should be large enough to transfer all the mapped data.
8. Set the *Output Assembly Instance* to 2. Normally you set the size to the maximum allowed, 248 words. You can set it to a smaller value but it should be large enough to to transfer all the mapped data.
9. Set the *Configuration Assembly Instance* to 4. Set the size to 0.
10. Set the *Status Input Assembly Instance* to 5. Normally you set the size to the maximum allowed, 250 words. You can set it to a smaller value but it should be large enough to to transfer all the mapped data. If the *Comm Format* is Data – INT, the status input and status output are grayed out.
11. Set the *Status Output Assembly Instance* to 6. You cannot set the size.
12. Click *Next >* to display the second Module Properties dialog box



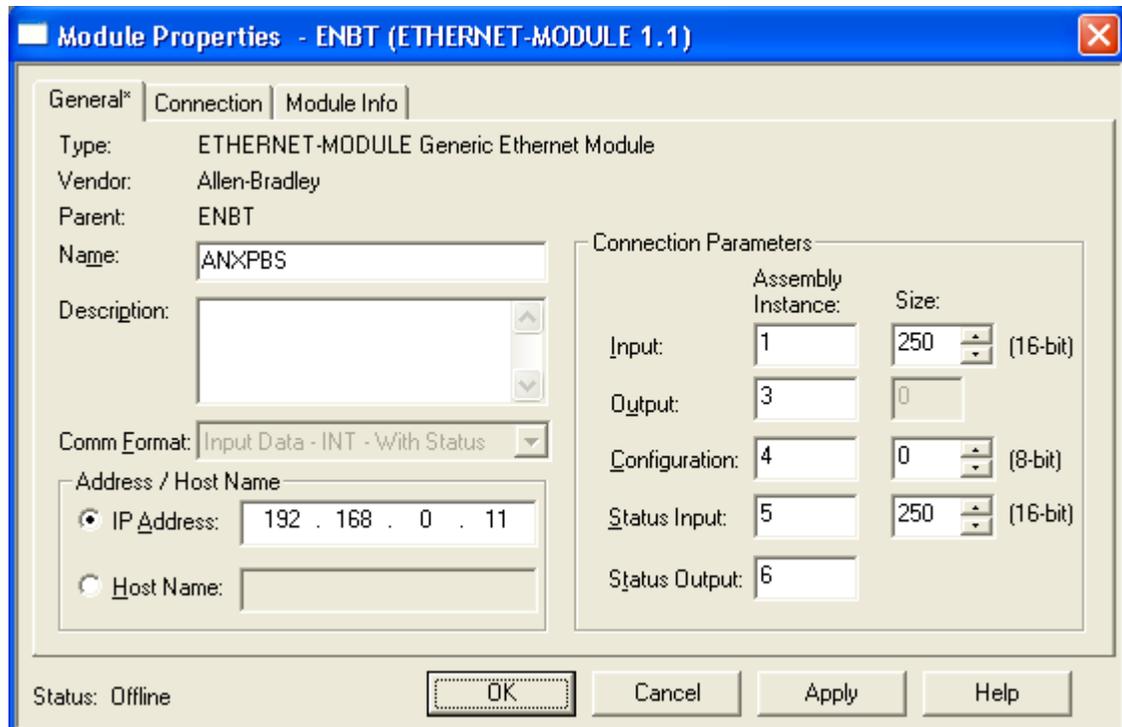
### Connection Parameters

13. Set the module's *Requested Packet Interval (RPI)*. This is how often the module's scheduled data is updated in the processor. The value can range from 5.0 to 3200.0 ms.
14. Click *Finish >>* to complete the module configuration.

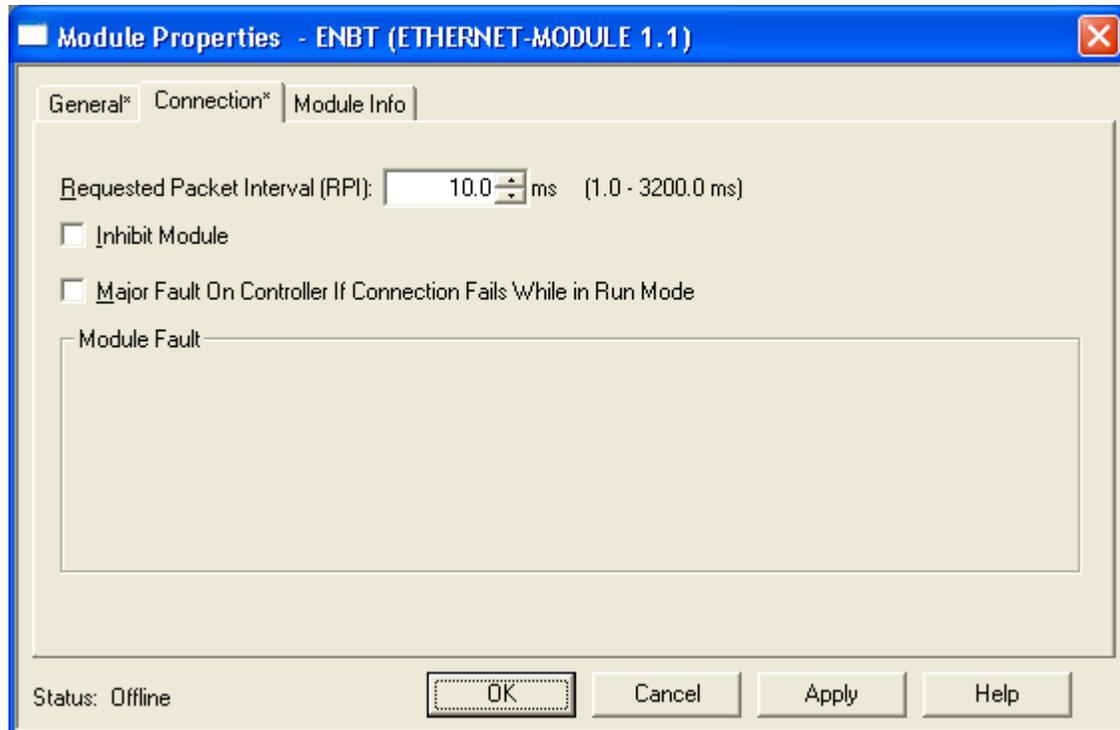
## Configuring Input-Only Connections

In a ControlLogix system, multiple processors can receive inputs from a module. Only one processor can control the outputs. To configure an input-only connection to the AN-X module:

1. Right click on *I/O configuration* and select *New Module...*
2. Select a module of Type 1756-ETHERNET, Description Generic Ethernet Module from the list and click OK. RSLogix 5000 displays the *Module Properties* dialog box.



3. Assign the module a *Name* and optionally a *Description*.
4. Set the *Comm Format* to Input Data – INT – With Status (or Input Data – INT).
5. Set the *IP Address* to match the IP address of the AN-X module.
6. Set the *Input Assembly Instance* to 1. Normally you set the size to the maximum allowed, 250 words. You can set it to a smaller value but it should be large enough to transfer all the mapped data. If there is also an exclusive owner connection, then the size should match the exclusive owner size.
7. Set the *Output Assembly Instance* to be 3. You cannot set the size.
8. Set the *Configuration Assembly Instance* to 4. Set the size to 0.
9. Set the *Status Input Assembly Instance* to 5. Normally you set the size to the maximum allowed, 250 words. You can set it to a smaller value but it should be large enough to transfer all the mapped data. If there is also an exclusive owner connection, then the size should match the exclusive owner size.
10. Set the *Status Output Assembly Instance* to 6. You cannot set the size.
11. Click *Next >* to display the second *Module Properties* dialog box.



## Connection Parameters

12. Set the module's *Requested Packet Interval (RPI)*. This is how often the module's scheduled data is updated in the processor. The value can range from 5.0 to 3200.0 ms.
13. Click *Finish >>* to complete the module configuration.

All connections to the module must have the same lengths and RPIs.

## Selecting the RPI

When you create an exclusive owner or input only connection to the AN-X-PBSLV, you must enter a requested packet interval (RPI), the period at which the data updates.

Consider the PROFIBUS network update rate when selecting a value. There's no point in setting the RPI to be much faster than the PROFIBUS network update time. AN-X will just resend the same data and add to the Ethernet traffic.

## Mapping the PROFIBUS Data

You define the PROFIBUS data that is exchanged between the AN-X and the ControlLogix processor in a comma-delimited text file, which can be created using a spreadsheet such as Excel or with a text editor.

## Module Name

The first line in the file is the module name, used to create tags that can be imported into RSLogix 5000.

The first field contains the keyword ClxExp. The second field contains the name you gave the module when you configured in in RSLogix 5000.

Example:

ClxExp, ANX

## I/O Data

The file has three data definition sections, one for ControlLogix output data, one for input data, and one for status input data. The sections are identified by a line that consists of a keyword, either “DataOutput”, “DataInput” or “StatusInput”.

Each section can contain up to 64 data definition entries.

Each definition consists of the offset into the data section, the PROFIBUS node number, the PROFIBUS data area and offset, the item count, the data type, and a ControlLogix tag name.

The first field in each row or line is the offset into the data section and is optional. If you do not want to manually assign data offsets, leave the offset blank.

The PROFIBUS node number can range from 1 to 125.

The PROFIBUS data area consists of an I or an O for PROFIBUS input or output data, a slash, and a byte offset into the PROFIBUS input or output data for that node. Offsets are always byte offsets, independent of the data type.

The count is the number of consecutive data items to be mapped for that node. The units are determined by the data type.

The type can be one of:

Type	Description
U8	8-bit unsigned integer, 0 to 255
S8	8-bit signed integer, -128 to 127
U16	16-bit unsigned integer, 0 to 65535
S16	16-bit signed integer, -32767 to 32767

Each element of type S8 or U8 is mapped to an INT in the ControlLogix. Bytes are not packed into the high byte and low byte of integers.

The ControlLogix tag name is used to create tags that can be imported into RSLogix 5000. If the size is greater than 1, separate tags are created for each, with the base name appended with `_1`, `_2`, etc. See page 30 for details and examples.

The maximum size for each section is 250 input registers, 248 output registers and 250 status input registers.

Anything after a semicolon on a line is treated as a comment and is ignored. You can use this to document the file by adding comments to the ends of lines or as separate lines.

## Input Data

The input data section begins with a line that starts with the keyword `DataInput`.

This is followed by up to 64 mappings, of the form  
offset (optional), PROFIBUS node number, PROFIBUS data area and offset, item count, data type, ControlLogix tag name

Example:

```
DataInput
, 1, O/0, 1, U8, Node1Output
```

is a mapping that takes 1 byte of the PROFIBUS output data for node 1, starting from offset 0. The data type is U8. It is assigned tag name `Node1Output` in the ControlLogix.

Rules for entries:

- can't be an input on an active slave
- can be an output on an active slave
- can be an input or an output on a monitored slave

## Output Data

The output data section begins with a line that starts with the keyword `DataOutput`.

This is followed by up to 64 mappings, of the form  
offset (optional), PROFIBUS node number, PROFIBUS data area and offset, item count, data type, ControlLogix tag name

For example,

```
, 1, I1, 1, U8, Node1Input
```

is a mapping that takes 1 ControlLogix INT register and maps it to 1 byte of PROFIBUS input data for node 1, starting from offset 0. The data type is U8. It is assigned tag name `Node1Input` in the ControlLogix.

The only valid mappings for ControlLogix outputs are to PROFIBUS inputs on active nodes.

Rules for entries:

- can be an input on an active slave
- can't be an output on an active slave
- can't be an input or an output on a monitored slave

The ControlLogix connection run/idle header can also be mapped to an output register. The mapping has the keyword Run in the offset field.

The value is 1 if the ControlLogix is in run mode and 0 if it is in program mode.

## Status Input Data

The status input data section begins with a line that starts with the keyword StatusInput.

This is followed by up to 64 mappings, of the form

offset (optional), PROFIBUS node number, PROFIBUS data area and offset, item count, data type, ControlLogix tag name

For example,

```
, 2, O/7, 1, U8, Node2Output
```

is a mapping that takes 1 byte of the PROFIBUS output data for node 2, starting from byte offset 7. The data type is U8. It is assigned tag name Node2Output in the ControlLogix.

Rules for entries:

- can't be an input on an active slave
- can be an output on an active slave
- can be an input or an output on a monitored slave

## Sample File

The following sample file shows how data could be mapped for an AN-X configured with PROFIBUS nodes 1 and 2 as active nodes and node 3 as a monitored node on the same network.

```
ClxExp,ANX
```

```
DataInput
```

```
,1, O/0, 2, U8, Node1Outputs
```

```
,2, O/0, 4, U8, Node2Outputs
```

```
DataOutput
```

---

,1, I/O, 8, U8, Node1Inputs  
,2, I/O, 4, U8, Node2Inputs  
StatusInput  
,3, O/O, 8, U8, Node3Outputs  
,3, I/O, 12, U8, Node3Inputs

## Sending the Configuration to AN-X

When the configuration is complete, save it to a file. If you are using a spreadsheet to create the configuration, save it as a file of type comma separated variable (CSV).

To send the configuration to AN-X:

1. Start your web browser
2. Enter the AN-X IP address as the address, for example, 192.168.0.4
3. Select *Automation Network/Configure Ethernet/IP Server*
4. Browse or type in the configuration file name
5. Click *Send File to AN-X*

The web interface displays the result of the upload, either success or an error message. To see further details, select *Log Files/Ethernet/IP Log* (see page 64) and check for error messages.

## Viewing the Current Configuration

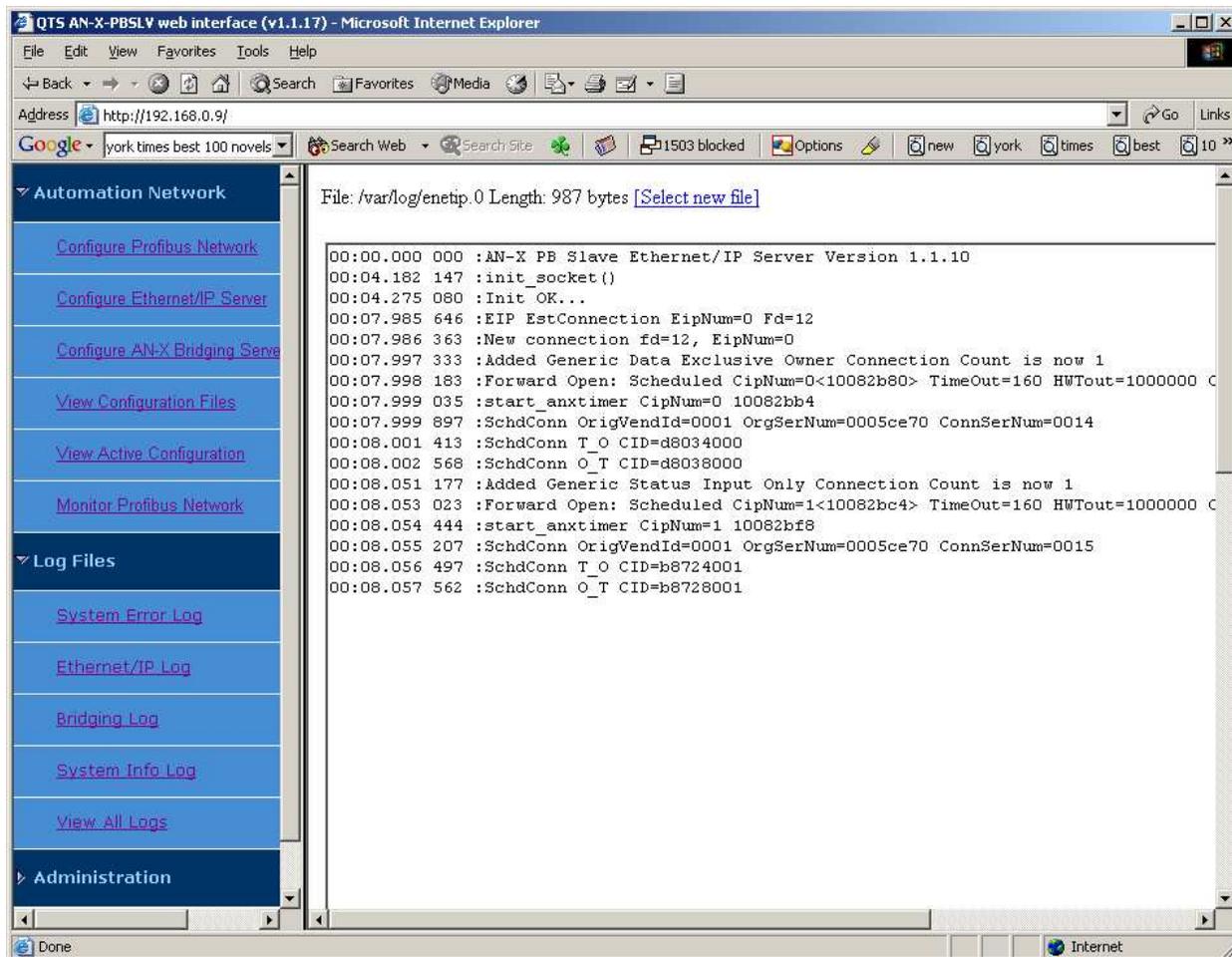
To view the configuration in an AN-X module, access the AN-X using the web interface, and select *Automation Network/View Configuration Files*. Click on the link *AN-X-PBSLV Ethernet/IP Configuration File*.

To save the configuration to a file on your computer, right click on the link and save the target to a file.

## Error Log

Errors that occur during configuration of scheduled data or during operation of scheduled data or unscheduled messaging are logged in the AN-X.

You can view the log using the AN-X web interface. Select *Log Files/Ethernet/IP Log* to view the log.



If the log overflows, AN-X closes the log file (enetip.0) and opens a second log file (enetip.1) and continues to alternate between the two log files as each one fills up. Use View All Logs to view both log files.

## Exporting Tags from AN-X

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

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

There are two sets of tag files, one for exclusive owner connections and one for input only connections.

To view the files, click on either *AN-X-PBSLV Ethernet/IP ControlLogix Exclusive Owner Data Tags* or *AN-X-PBSLV Ethernet/IP ControlLogix Input Only Data Tags*. To save the file to your computer, right click on the link and select *Save Target As...*

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

For items in the Ethernet/IP configuration with a count greater than 1, AN-X appends \_1, \_2, etc. to the tag name you supply in the configuration file.

For example, if the configuration contains

```
,,Node1Outputs,U8,2,1,O/0
```

with a count of 2, AN-X creates the tags

```
ALIAS,"","Node1Outputs_0","","ANX:I.Data[0]"
```

```
ALIAS,"","Node1Outputs_1","","ANX:I.Data[1]"
```

## Using RSLogix 5000 to Diagnose Problems

To display the Module Properties dialog, right click on the module while online with RSLogix 5000. This may help diagnosing some problems, especially connection errors.

The following information is based on version 12.00 of RSLogix 5000.

### General Tab

The *Type* should be ETHERNET MODULE Generic Ethernet Module

The *Vendor* should be Allen-Bradley (since it's configured as a generic module)

The name and description are whatever you set when you configured the module.

*Comm Format*, *IP Address* and *Connection Parameters* should match what you set when you configured the module.

### Connection Tab

The *Inhibit Module* checkbox inhibits the module. It should not be checked for normal operation.

The *Major Fault on Controller if Connection Fails While in Run Mode* checkbox causes the module to fault the processor if the connection between the ControlLogix processor and the module fails.

If there are any problems connecting to the AN-X-PBSLV module, there will be an error message in the module fault area.

## ***AN-X to AN-X Communication***

An AN-X module can be configured to exchange data with other AN-X modules over Ethernet.

Each AN-X can produce from 1 to 10 blocks of data. Each block can contain up to 1400 bytes of data. You map PROFIBUS data to the produced blocks in a spreadsheet or comma-separated variable (CSV) text file, then send the configuration to the AN-X using the web interface.

Produced data blocks update at timed intervals, from 5 to 16383 ms. The actual update rate may be limited by the available bandwidth of your Ethernet network.

For each AN-X, you can define up to 10 blocks of data to be consumed from the data produced by other AN-X modules. The consumed data is then written to the PROFIBUS input data for slaves on the consuming AN-X.

Each consume block has an associated timeout which can range from 5 to 16383 ms. If the consume block is not updated within the timeout period, AN-X logs a timeout event in the bridging log.

You configure all AN-X modules on the Ethernet network with a single configuration file, since consume blocks on each AN-X must resolve tag name references to extract data produced by the other AN-X modules.

AN-X to AN-X communication can be used to pass data from one PROFIBUS network to another using two AN-X-PBSLV modules or to pass data from a PROFIBUS network to a dissimilar network using an AN-X module for the other network.

There is no limit on the number of AN-X modules that can consume the data that an AN-X produces.

### **Configuration File Format**

The configuration file consists of several sections

- configuration ID
- module\_ip, identified each AN-X being configured
  - produce, defines produced data for that AN-X
    - up to 10 produce blocks
  - consume, defines consumed data for that AN-X
    - up to 10 consume blocks

---

## Configuration ID

The `configuration_id` line defines a 32 bit signed integer configuration ID and specifies whether the AN-X to which the configuration is uploaded should enable or disable execution of the configuration.

The purpose of the configuration ID is to ensure that all AN-X devices are using the same configuration. When an AN-X produces a block of data, it includes the configuration ID with the data. If an AN-X consuming the data does not have a matching configuration ID, it ignores the data and logs an error in the bridging log. Select *Log Files/Bridging Log* to view the log.

The second parameter in the `configuration_id` line determines whether AN-X to AN-X communication is enabled or disabled. Possible values are “enable” or “disable”.

Examples:

```
configuration_id, 1, enable
```

```
configuration_id, 2047, disable
```

## Module Definition

The `module_ip` line begins the definition of the produced and consumed data for an AN-X. It consists of the keyword “`module_ip`”, followed by a comma and then the AN-X IP address.

Example:

```
module_ip, 192.168.0.9
```

The `module_ip` line is followed by a produce section and a consume section for the AN-X.

## Produce Section

The produce line marks the start of the produced data for an AN-X. It consists of a comma, followed by the keyword “`produce`”

Example:

```
, produce
```

## Produce Blocks

Each AN-X can have up to 10 blocks of produced data. The produce block can be up to 1400 bytes long.

The `block_id` line marks the beginning of the definition of a block of produced data. The format of the `block_id` line is

```
, , block_id, blocknumber, update_type, update_time
```

The blocknumber can range from 1 to 10.

The update type must be Timed, the block updates at regular time intervals. The type is followed by an update time in milliseconds, from 5 to 16383 ms.

Some examples:

```
, , block_id, 1, timed, 100
```

```
, , block_id, 1, timed, 5000
```

The block\_id line is followed by from 1 to 64 data definition lines that specify the contents of the produce block. The format is

```
, , offset (optional), tagname, data operation, count, node, area/offset
```

The offset is the byte offset in the produce block. It can range from 0 to 1399, but the upper limit also depends on the data type. For example, the maximum offset for data type U16 (see below) is 1398.

The offset is optional but if it is included it defines the location of the item in the produce block. Subsequent items with no offset in the definition are allocated after the item with the offset. For example, if you assign an offset of 1320 to an item with type U8, count 1, the next item (with no explicit offset) is automatically assigned offset 1321.

### TIP

Don't use offsets unless necessary. AN-X will assign all data locations automatically. If you add data later, you won't have to change any offsets.

The tagname can have from 1 to 47 alphanumeric characters. It has to start with a letter or an \_ (underscore). It cannot include spaces or punctuation (especially commas). Consume blocks use the tagname to identify the start of a specific piece of data.

Tagnames must be unique within a produced block.

The data operation describes how the item is processed when it is transferred to the produced block. The data operation can be one of the following:

Operation	Description
U8	Copy one byte to one byte
U16	Copy two bytes to two bytes
U16_SW	Copy and swap and two bytes to two bytes
U32	Copy four bytes to four bytes
U32_SW	Copy and swap four bytes to four bytes (first byte is

Operation	Description
	copied to fourth byte, second byte is copied to third byte, etc)
U8_TO_U16	Copy one byte to two bytes, unsigned. The high byte of the destination is set to 0.
S8_TO_S16	Copy one byte to two bytes, signed. If the high bit in the source byte is set, the byte with the higher offset in the produce block is 0xff. Otherwise it is 0.
U16_TO_U8	Copy two bytes to one byte, unsigned, ignore the contents of the upper byte of the source.
U16_TO_U8_OV	Copy two bytes to one byte, unsigned. If the upper byte of the source is non-zero, clamp the destination at 255. For example if the first byte contains 00 and the second byte contains 01, the destination is set to 0xFF = 255 decimal.
S16_TO_S8	Copy two bytes to one byte, signed. If the source value is outside the range of an 8-bit signed integer (-128 to 127), the value is clamped at -128 or 127.

The count defines how many items of the data type are to be transferred to the produce block. The maximum value of the count is determined by the combination of the amount of data defined for the node and the data operation.

The node can be any valid node number from 1 to 125. The node must exist in the PROFIBUS configuration for the AN-X.

The area/offset identifies the starting piece of PROFIBUS data for the node. The area can be I or O. The offset is a byte offset and does not depend on the data operation. The offset must be a valid offset into the PROFIBUS data for the node. The area and node must be separated by a “/” character.

Some examples of area and offset:

I/0

O/243

### Consume Section

The consume line marks the start of the consume definitions for an AN-X. It consists of a comma, followed by the keyword “consume”.

Example:

, consume

## Consume Blocks

Each AN-X can have up to 10 consume definition blocks. A consume block tells the consuming AN-X the source of the data (IP address and produce block number), the location of the data within the produced block and the amount of data to consume, how to process that data, and where to write the consumed data.

The destination PROFIBUS node data must be writable by the AN-X that consumes the data. For example, if an AN-X has active PROFIBUS slaves at nodes 1, 2 and 3, it can write the consumed data only to PROFIBUS input data on nodes 1, 2 and 3.

The producer\_ip line identifies the AN-X that is producing the data. The format is

```
, , producer_ip, IP address
```

Example:

```
, , producer_ip, 192.168.0.9
```

The block\_id marks the beginning of the definition of a block of produced data. The format of the block\_id line is

```
, , block_id, blocknumber, timeout
```

The blocknumber is the block number on the producing AN-X and can range from 1 to 10.

The timeout can range from 5 to 16383 ms. If the produced block does not update within the timeout period, AN-X logs an error in the bridging log. Select *Log Files/Bridging Log* to view the log.

The block\_id line is followed by from 1 to 64 data definition lines that specify the contents of the consume block. The format is:

```
, , offset (optional), tagname, data operation, count, node, area/offset
```

The offset is the byte offset in the produce block. The minimum offset is 0. The maximum offset is 1399 but also depends on the data operation.

NOTE: If the offset is included, it takes precedence over the tagname.

As an example of where an offset is sometimes useful, if a produce block produces a 16 bit value with a tag name, most consumers use the entire 16 bit value via the tag name, but one of the consumers that is interested in just the upper byte can obtain the upper byte using the offset.

The tagname can have from 1 to 47 alphanumeric characters. It has to start with a letter or an \_ (underscore). It cannot include spaces or punctuation (especially commas).

AN-X uses the tagname to locate the produced data. The combination of producer IP address, block number and tagname (or offset) specifies the start of the data to be consumed.

The data operation can be one of the following

Operation	Description
U8	Copy one byte to one byte
U16	Copy two bytes to two bytes
U16_SW	Copy and swap two bytes to two bytes
U32	Copy four bytes to four bytes
U32_SW	Copy and swap four bytes to four bytes (first byte is copied to fourth byte, second byte is copied to third byte, etc)
U8_TO_U16	Copy one byte to two bytes, unsigned. The high byte of the destination is set to 0.
S8_TO_S16	Copy one byte to two bytes, signed. If the high bit in the source byte is set, the byte with the higher offset in the produce block is 0xff. Otherwise it is 0.
U16_TO_U8	Copy two bytes to one byte, unsigned, ignore the contents of the upper byte of the source.
U16_TO_U8_OV	Copy two bytes to one byte, unsigned. If the upper byte of the source is non-zero, clamp the destination at 255. For example if the first byte contains 00 and the second byte contains 01, the destination is set to 0xFF = 255 decimal.
S16_TO_S8	Copy two bytes to one byte, signed. If the source value is outside the range of an 8-bit signed integer (-128 to 127), the value is clamped at -128 or 127.

**TIP**

To obtain a data operation that isn't supported, use a combination of data operations, one in the produce and one in the consume. For example, to copy a single byte to the high byte of a 16-bit word, use a U8\_TO\_U16 to copy the byte to a word in the produce block, then use a U16\_SW in the consume to extract the data.

The count defines how many items of the data type are extracted from the produce block.

The maximum value of the count is determined by the length of node input data to which the consumed data is being written.

The node can be any valid node number from 1 to 125. The node must exist in the PROFIBUS configuration for the AN-X and must be one of the active nodes on the AN-X-PBSLV.

The area/offset identifies the starting piece of PROFIBUS data for the node. The area must be I. The offset must be a valid offset into the PROFIBUS data for the node. The range of valid offsets is determined

by the amount of input data defined for the node. The area and node must be separated by a “/” character.

Some examples:

I/O

I/243

### Comments

AN-X ignores anything after a semicolon on a line in the configuration file. You can add comments to the file by preceding a comment with a semicolon, either at the end of a line or on a separate line.

## Sample Configuration File

In the following configuration, there are two AN-X modules.

- the AN-X at IP address 192.168.0.9 is producing a block of data every 100 ms. It is also consuming data from the AN-X module at IP address 192.168.0.10 and writing it to inputs on node 1
- the AN-X at IP address 192.168.0.10 is producing one block of data every 500 ms and consuming data from the AN-X at IP address 192.168.0.9 and writing it to inputs on node 7

```
configuration_id,107,enable
```

```
module_ip,192.168.0.9
```

```
,produce
```

```
.,block_id,1,Timed,100
```

```
,,,Node1Outputs,U8,2,1,O/O
```

```
,,,Node2Outputs,U8,4,2,O/O
```

```
,,,Node3Outputs,U8,8,3,O/O
```

```
,,,Node3Inputs,U8,12,3,I/O
```

```
,consume
```

```
.,producer_ip,192.168.0.10
```

```
.,block_id,1,5000
```

```
,,,Node7Outputs,U8,2,1,I/O
```

```
module_ip,192.168.0.10
```

```
,produce
```

```
.,block_id,1,Timed,1000
```

```
,,,Node7Outputs,U8,10,7,O/O
```

```
,consume  
,,producer_ip,192.168.0.9  
,,block_id,1,5000  
,,,Node1Outputs,U8,2,7,I/O
```

## Sending the Configuration to AN-X

When the configuration is complete, save it to a file. If you are using a spreadsheet to create the configuration, save it as a file of type comma separated variable (CSV).

To upload the configuration:

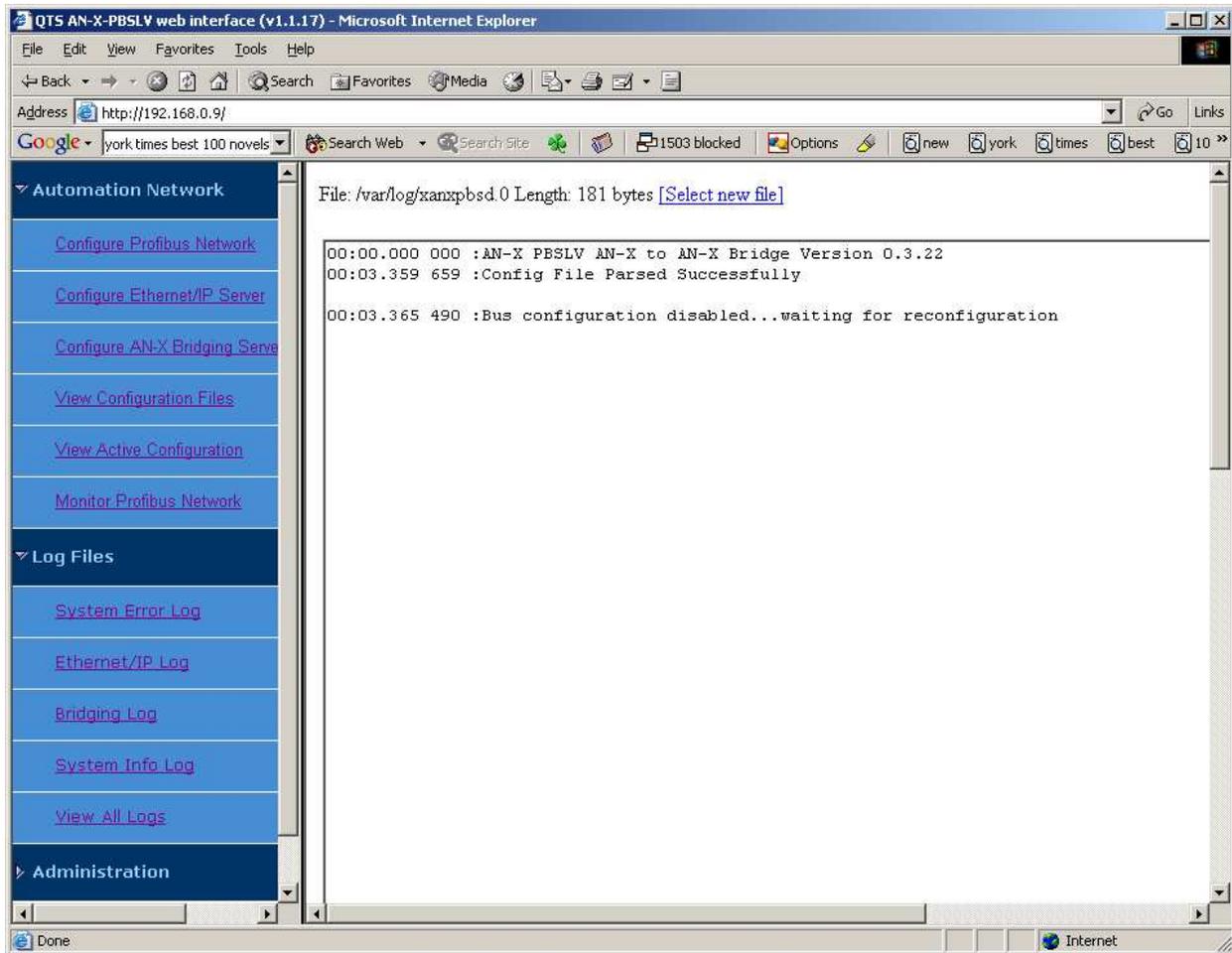
1. Start your web browser
2. Enter the AN-X IP address as the address, for example, 192.168.0.9
3. Select *Automation Network/Configure AN-X Bridging Server*
4. Browse or type in the configuration file name
5. Click *Send File to AN-X*

If the file is processed successfully, the web interface shows the configuration. If an error occurs, the web interface gives an error message. To see further details, select *Log Files/Bridging Log* (see page 64) and check for error messages at the end of the log.

## Error Log

Errors that occur during configuration of AN-X to AN-X communication or during operation are logged in the Bridging Log.

You can view the log using the AN-X web interface. Select *Log Files/Bridging Log* to view the log.



If the log overflows, AN-X closes the log file (xanxpbsd.0) and opens a second log file (xanxpbsd.1) and continues to alternate between the two log files as each one fills up. Use *Log Files/View All Logs* to view both log files.

## Unscheduled Messages

You can use unscheduled messages to access the PROFIBUS data directly on the AN-X-PBSLV:

- directly, from a computer or PLC, by sending messages
- from a DDE or OPC server, such as RSLinx
- from an HMI such as RSVIEW or Wonderware InTouch, using the appropriate driver

## PCCC/PLC-5 Files

The module "emulates" PLC-5 integer files.

The AN-X-PBSLV 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.

Data is mapped in two different ways – on a node-by-node basis and packed into blocks.

### Node-by-node Mapping

The node-by-node mapping is more convenient for obtaining data for a given node but is less efficient. It requires a separate read to obtain data for each node.

PLC-5 Files	Description
N200-N325	Node 0-125 Outputs from PROFIBUS master
N400-N525	Node 0-125 Inputs to PROFIBUS master (active nodes only)
N600-N725	Node 0-125 Inputs to PROFIBUS master (monitored nodes only)

### Packed Mapping

The packed mapping is more efficient – the data is packed into a small number of files, but processing is required to extract the data for any specific node. Also, if the configuration changes, the addresses for the data for each node will change.

PLC-5 Files	Description
N20-N39	Node 0-125 Outputs from PROFIBUS master
N40-N59	Node 0-125 Inputs to PROFIBUS master (active nodes)

	only)
N60-N79	Node 0-125 Inputs to PROFIBUS master (monitored nodes only)

Use the web interface to obtain the location of the data for a specific node. Select *Automation Network/View Configuration Files* and click on the link *AN-X-PBSLV Ethernet/IP PLC-5 Register Map*.

### Using RSLinx

To configure a topic in RSLinx to access data on the AN-X-PBSLV:

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-X 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 should now be able to access data using any DDE or OPC client capable of communicating with RSLinx.

### Other OPC Servers

Details for configuring other OPC servers are found in technical notes on the QTS website, [www.qtsusa.com](http://www.qtsusa.com).

## Modbus over Ethernet

AN-X-PBSLV supports Modbus over Ethernet. OPC/DDE servers that support Modbus over Ethernet can communicate with AN-X-PBSLV to read and write PROFIBUS node data.

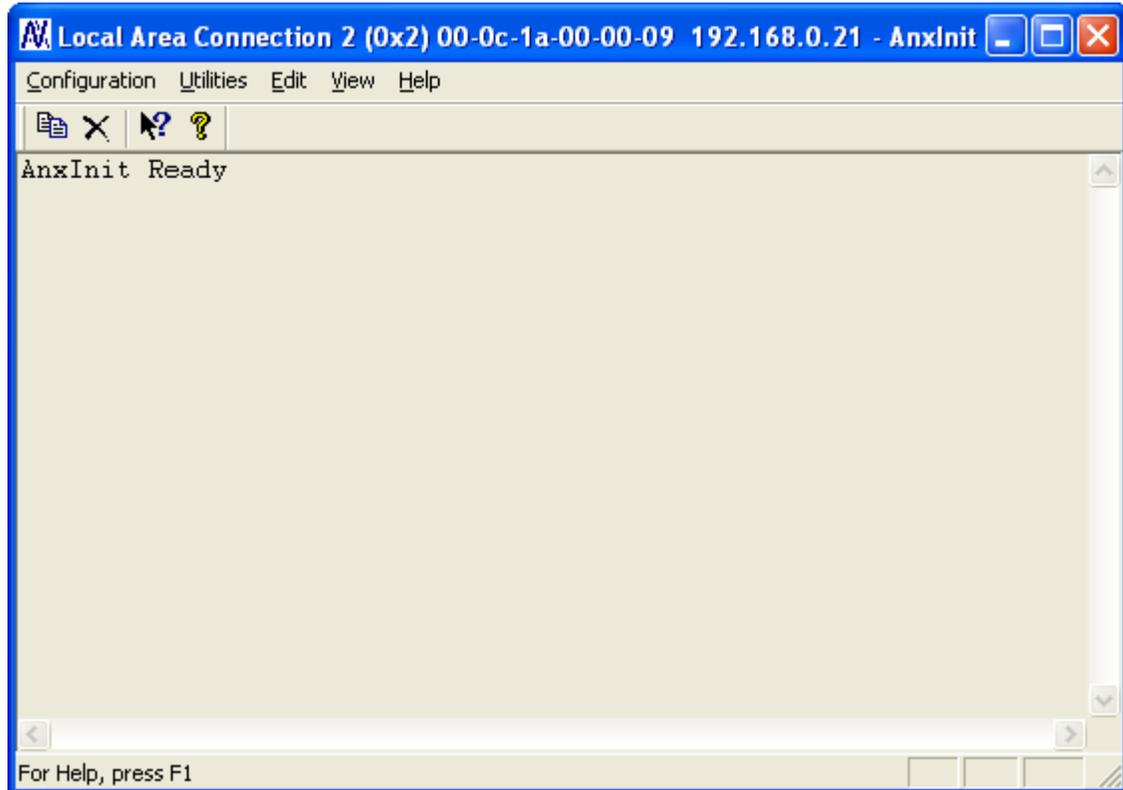
The data for each node is accessed by setting the Unit ID to the PROFIBUS node number.

For each node, PROFIBUS data is mapped to 0xxxxx, 1xxxxx, 3xxxxx, and 4xxxxx registers. To view the mapping, use the web interface and select *Automation Network/View Active Configuration*.

Details for configuring specific OPC servers are found in technical notes on the QTS website, [www.qtsusa.com](http://www.qtsusa.com).



## Using AnxInit



AnxInit is a 32-bit Windows application supplied with AN-X to perform the following functions:

- Locate and identify AN-X modules on the Ethernet network
- Select a specific AN-X for configuration
- Set the IP address and other network parameters for an AN-X
- Restart the selected AN-X
- Display information about the selected AN-X
- Read the kernel parameters for the selected AN-X
- Update the flash (low level firmware) on the selected AN-X
- Update the firmware on the selected AN-X
- Patch the firmware on the selected AN-X

In addition, it can be used to:

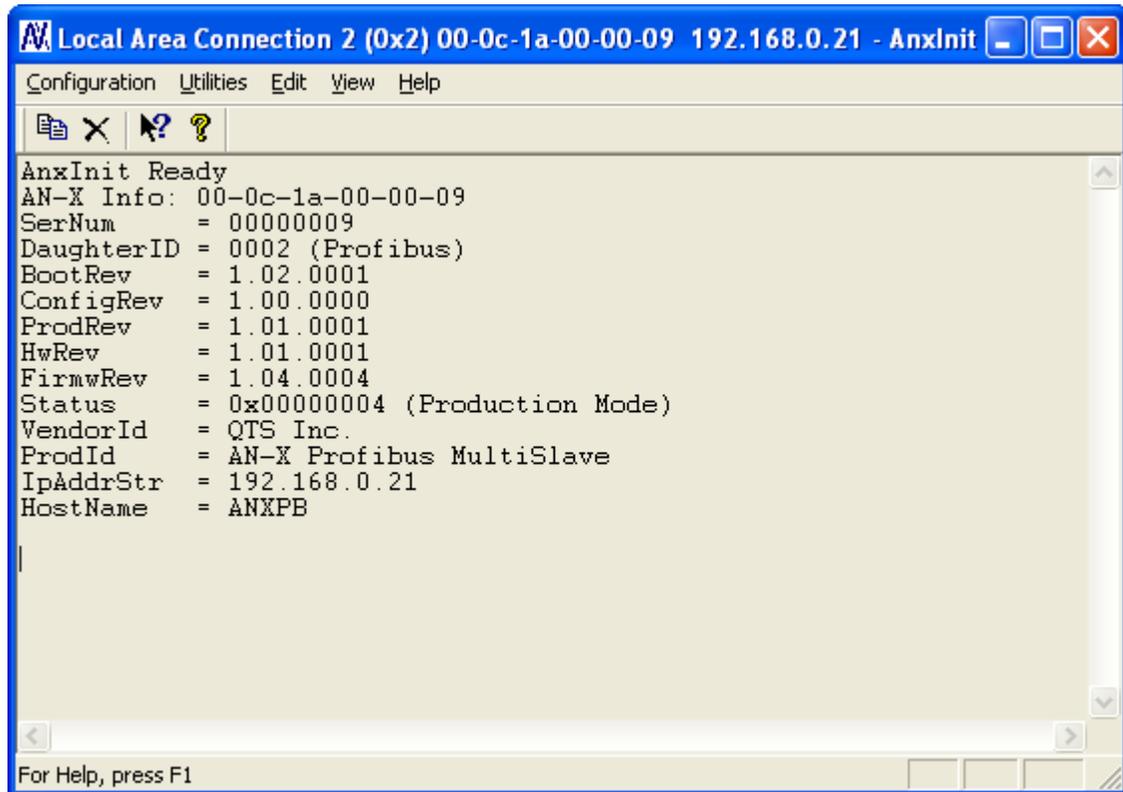
- clear the AnxInit log
- copy the contents of the log to the clipboard for use by another application. This is often useful for technical support

## AnxInit Log

AnxInit logs messages in its main window. These messages are often useful for determining the cause of errors or for technical support.

To clear the log, select *Edit/ClearLog*.

To copy the contents of the Log to the Windows clipboard so that they can be pasted into another application, select *Edit/Copy*.



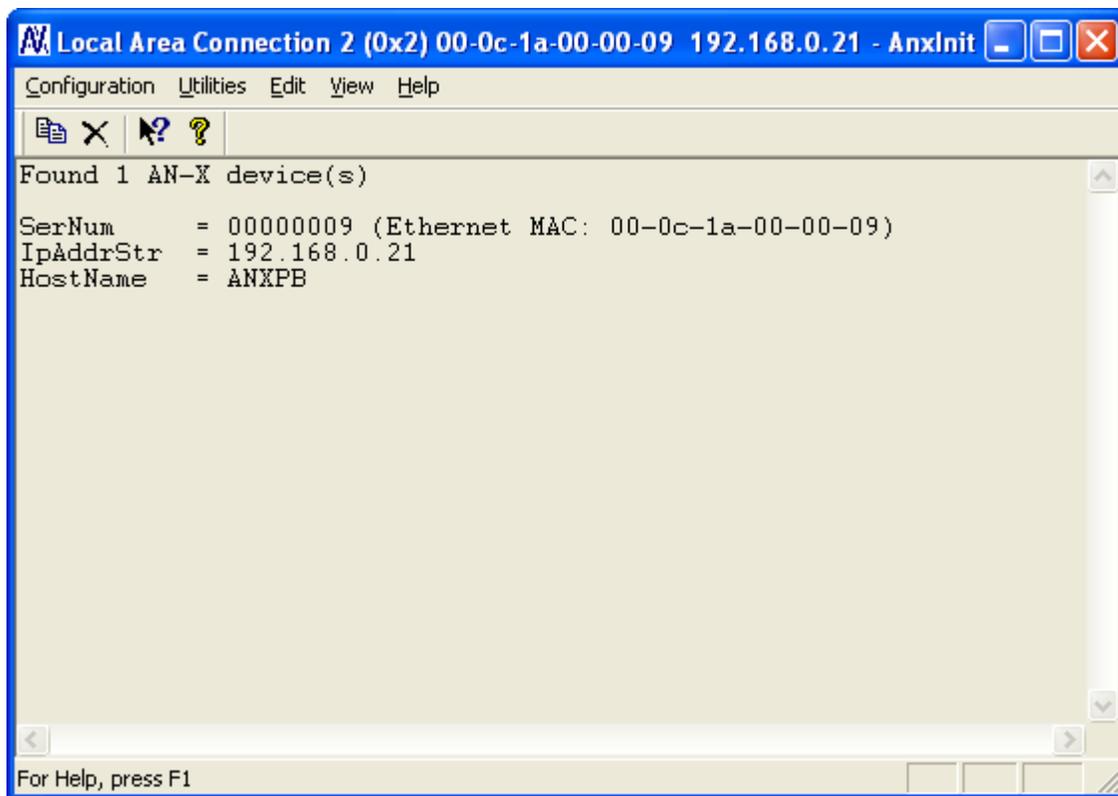
### AN-X Log

## Locating Available AN-X Modules

To locate all accessible AN-X modules on the Ethernet network, select *Utilities/Locate All AN-X Modules*.

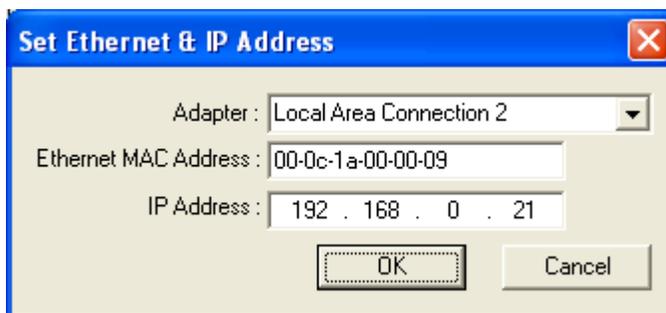
AnxInit displays a list of the AN-X modules it finds, showing their MAC IDs, IP addresses and host names.

This command is useful for determining IP addresses when they have been set by a DHCP server or for confirming that an AN-X is accessible.



## Selecting an AN-X

Before you can perform an operation on an AN-X, you must select it. Choose *Utilities/Select An AN-X* to select a specific AN-X.



From the Adapter list, select the network adapter that connects to the Ethernet network that contains the AN-X.

In the *Ethernet MAC Address* field, enter the MAC Address of the AN-X you wish to select. It can be found on the AN-X label or using the *Locate All AN-X Modules* command. The format is as shown above, six pairs of hexadecimal digits separated by hyphens.

In the *IP Address* field, enter the Ethernet IP address of the AN-X you wish to select. It can be found using the *Locate All AN-X Modules* command. The format is as shown above, four decimal numbers each in the range 0 to 255.

Both MAC address and IP address must match the settings on the AN-X in order for communication to occur.

Click OK to select the AN-X.

The title bar of AnxInit shows the MAC Address and IP Address of the currently selected AN-X.

## Set AN-X IP Configuration

*Utilities/AN-X IP Configuration* sets the AN-X IP address and hostname.

The AN-X must be on the local Ethernet to set its IP address.

First select the AN-X using the *Utilities/Select An AN-X command*.

Next select *Utilities/AN-X IP Configuration*. The *AN-X TCP/IP Configuration* dialog appears.

Enter a *Host Name* for the AN-X. 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 31 characters long.

To configure the AN-X to obtain its IP address from a DHCP server on the network, select *Obtain an IP address automatically (DHCP)*

To configure the AN-X to use a static IP address, select *Use the following Settings* and enter the following:

- the desired *IP Address* for the AN-X.
- the *Subnet mask* 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.

Click OK to complete the configuration.

*Utilities/AN-X IP Configuration* resets the selected AN-X. Use the *Utilities/Restart AN-X* to restart the AN-X in production mode.

If you Cancel the *Utilities/AN-X IP Configuration* command, AN-X is left running the boot code. Use the *Utilities/Restart AN-X* command to restart the AN-X.

## Restart an AN-X

Use the *Utilities/Restart AN-X* command to restart the currently selected AN-X.

## AN-X Info

The *Utilities/AN-X Info* command provides information about the currently selected AN-X in the log window.

The information shown:

AN-X Info	Ethernet MAC address
SerNum	Serial number
DaughterID	Daughterboard ID, 2 for AN-X-PBSLV
BootRev	Boot code version
ConfigRev	Configuration kernel version
ProdRev	Production kernel version
HwRev	Hardware version
FirmwRev	Firmware release version (depends on current operating mode)
Status	see below
VendorId	Vendor ID
ProdId	Product ID
IpAddrStr	IP address assigned using <i>Utilities/AN-X IP Configuration</i>
HostName	name assigned using <i>Utilities/AN-X IP Configuration</i>

In boot mode, FirmwRev, Vendor ID and Product ID and not valid, and IpAddrStr and HostName are not shown.

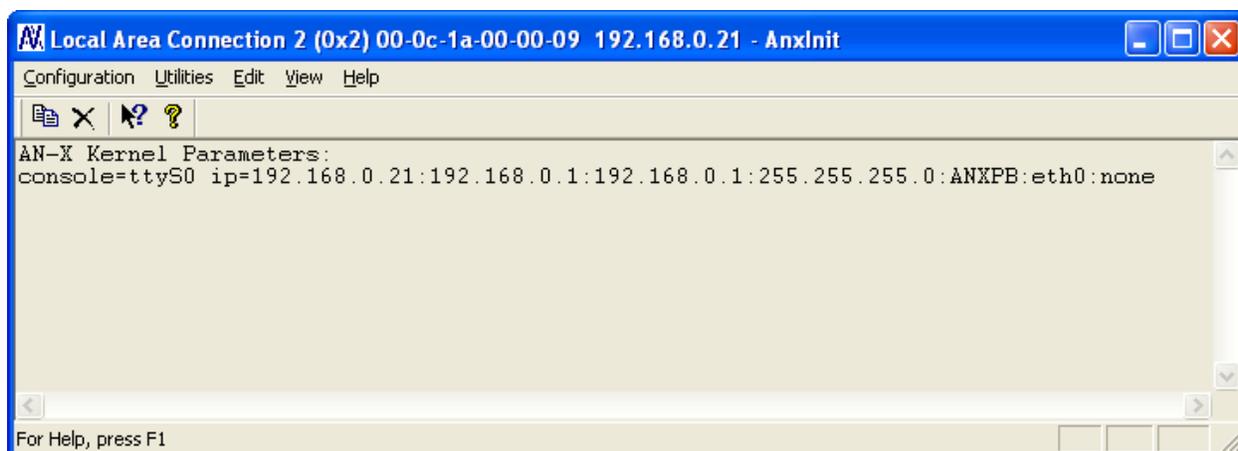
Possible status values are:

Value	Meaning
1	Boot mode
2	Configuration mode
4	Production mode

## Read Kernel Parameters

The *Utilities/Read Kernel Parameters* command displays various communications parameters for the currently selected AN-X

This command resets the AN-X. You will be warned and given the opportunity to cancel the command.



The *Utilities/Read Kernel Parameters* command leaves the AN-X running the boot code. Use the *Utilities/Restart AN-X* command to restart the AN-X in production mode.

## Run Config Mode

The *Utilities/Run Config Mode* command is used to restart the currently selected AN-X in configuration mode (normally used internally for updating firmware).

This command is not used in normal operation but may be required for technical support.

The AN-X is in configuration mode when the SYS LED flashes red twice, followed by a pause.

To exit configuration mode, use the *Utilities/Restart AN-X* command to restart AN-X in production mode.

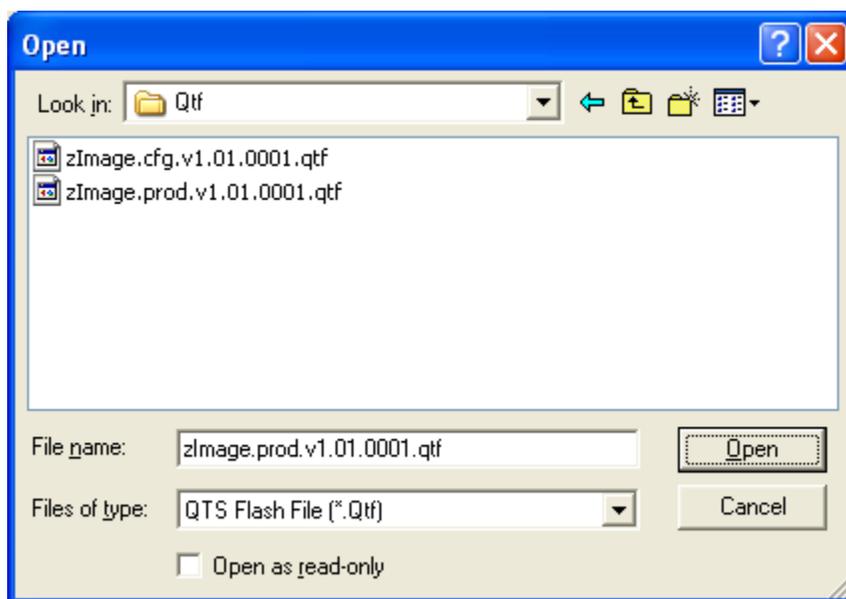
## Update AN-X Flash

The *Utilities/Update AN-X Flash* command updates the low-level firmware (configuration and production kernels).

Files have extension qtf.

This command resets the AN-X. You will receive a warning and be given the opportunity to Cancel the command.

If you cancel at the filename dialog, the AN-X has already been reset and is in boot mode. Use the *Utilities/Restart AN-X* command to restart it in production mode.



## Update Firmware

There are two ways to update all the firmware in an AN-X module.

1. The *Configuration/Firmware Update* command starts the firmware update wizard, which takes you step by step through the firmware update process.
2. The *Utilities/Update Firmware* command updates all the firmware on an AN-X you have selected using the *Utilities/Select An AN-X* command.

Firmware files have extension *bin*.

### Firmware Update Wizard

Select the *Configuration/Firmware Update* command to start the firmware update wizard.

#### Step 1:

In step 1, you identify the AN-X you are configuring.

**Step 1: AN-X Selection**

Select this computer's Ethernet adapter that's on the same Ethernet subnet as the AN-X module you want to configure (you may only have one Ethernet adapter in your computer)

Local Area Connection 2

Enter the Ethernet MAC Address of the AN-X module you want to configure. You can get this from the label on the AN-X module or by selecting Utilities/Locate All AN-X Modules (if the module's current IP address is on the same subnet).

00-0c-1a-00-00-09

Enter the IP address on the local subnet that you intend the AN-X module to use.

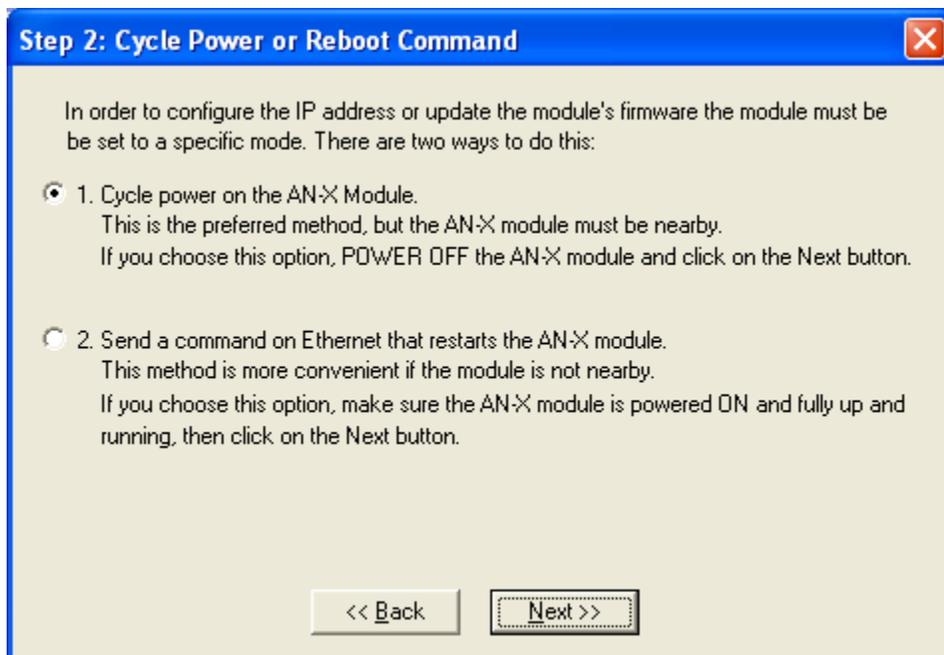
192 . 168 . 0 . 21

Next >> Exit

1. Select the Ethernet adapter that's connected to the AN-X. In most cases there will be just one Ethernet adapter in the computer. The AN-X must be on the same subnet as the computer.
2. Enter the MAC address of the AN-X you are updating. This is printed on the AN-X label. It consists of six pairs of hexadecimal digits, separated by hyphens. In the example above, it's 00-0c-1a-00-00-09. If the AN-X is already online, you can obtain its MAC address using the *Utilities/Locate All AN-X Modules* command.
3. Enter the IP address of the AN-X you want to update

## Step 2

In step 2, you choose a method of restarting AN-X to put it in config mode.

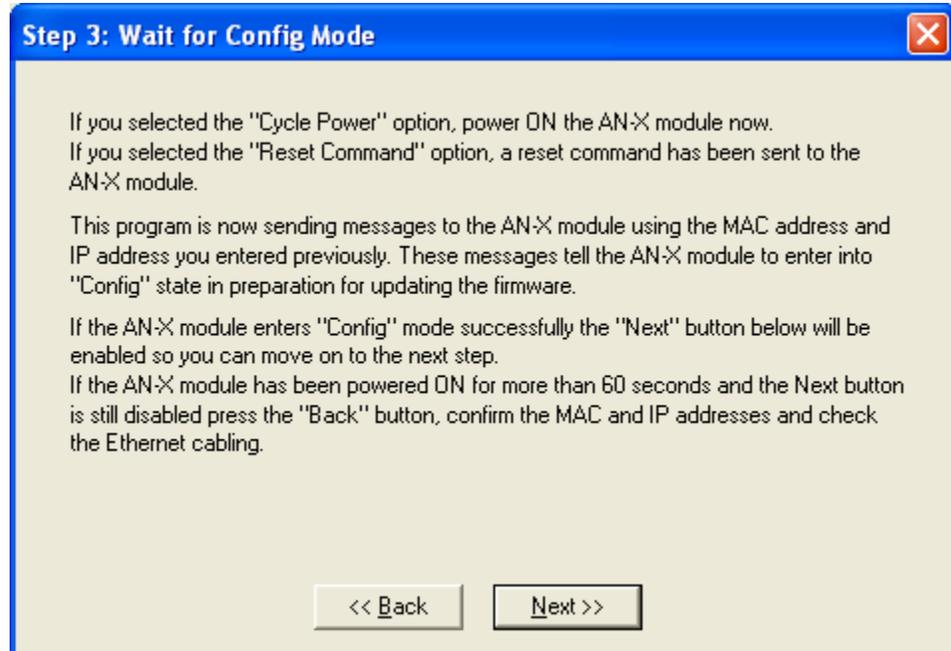


The preferred method is to cycle power on the AN-X. Select the first option on the screen and click the *Next >>* button.

The second method, useful if the AN-X is not easily accessible, is to send it a command over Ethernet. The AN-X must be powered on and completely running for this method to work. For example, if this is the first time you are configuring a new AN-X, allow sufficient time for it to acquire an IP address from a DHCP server or to time out and use its default IP address (about 3 minutes). Select the second option on the screen and click the *Next >>* button.

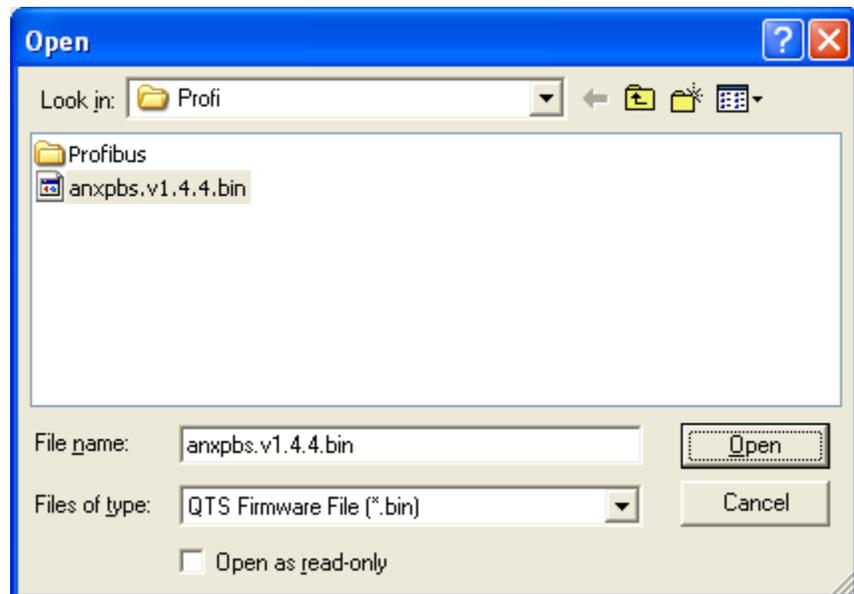
### Step 3:

Wait for AN-X to enter config mode. While AnxInit is waiting, the *Next>>* button will be disabled. When AN-X is in boot mode, the *Next>>* button will be enabled.



If the AN-X does not enter config mode within about 60 seconds, return to the previous screens and check the entries.

Click the *Next>>* button, and select the firmware file you want to download and click *Open*.



AnxInit transfers the firmware file and restarts the AN-X.

After you run update the firmware, you must reconfigure the AN-X and restore:

- PROFIBUS configuration

- Ethernet/IP configuration
- AN-X to AN-X configuration

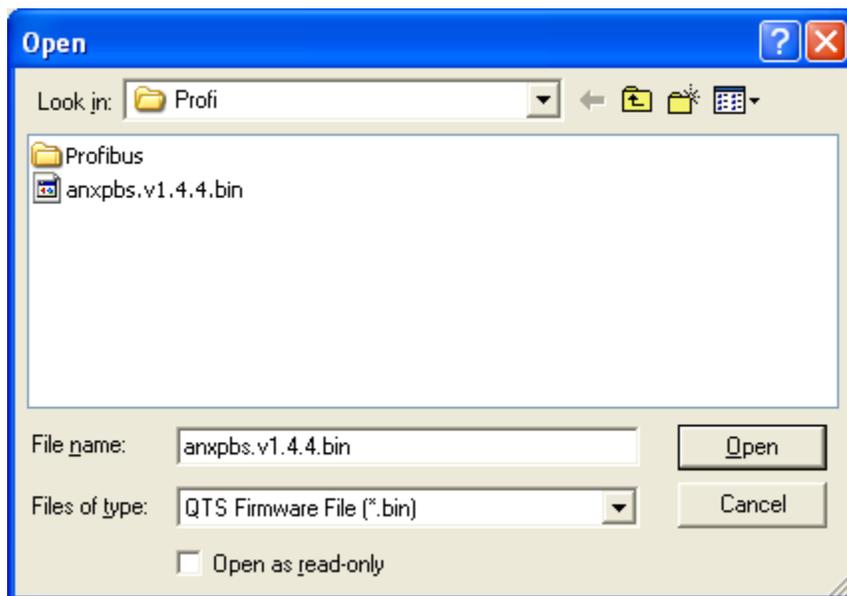
## Update Firmware Command

The *Utilities/Update Firmware* command updates all the firmware on an AN-X you have previously selected using the *Utilities/Select An AN-X* command.

This command resets the AN-X. You will receive a warning and be given the opportunity to Cancel the command.

If you cancel at the filename dialog, the AN-X has already been reset and is in configuration mode. Use the *Utilities/Restart AN-X* command to restart it in production mode.

Click the *Next>>* button, and select the firmware file you want to download and click *Open*.



AnxInit transfers the firmware file and restarts the AN-X.

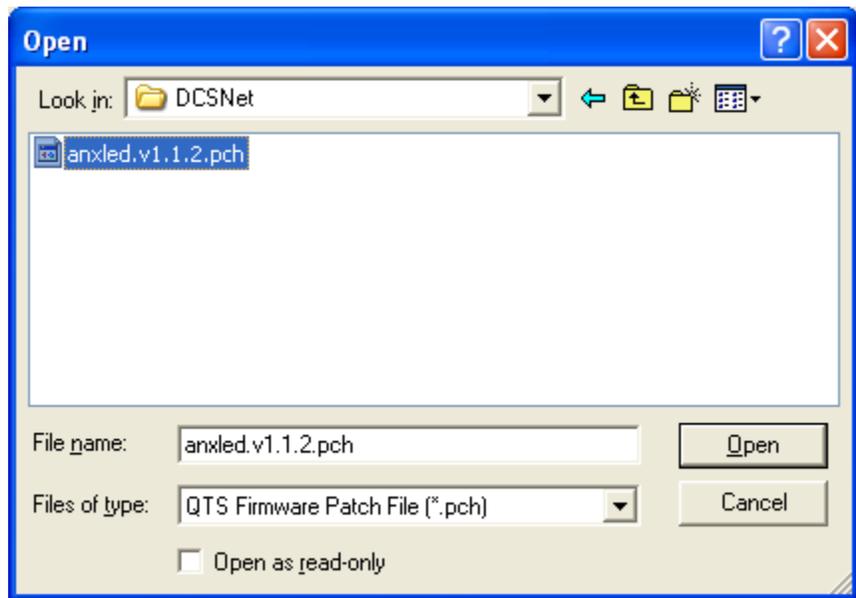
After you run update the firmware, you must reconfigure the AN-X and restore:

- PROFIBUS configuration
- Ethernet/IP configuration
- AN-X to AN-X configuration

## Patch Firmware

The *Utilities/Patch Firmware* command applies small patches to the firmware running on the AN-X.

These patch files files have extension *pch*.



This command resets the AN-X. You will receive a warning and be given the opportunity to Cancel the command.

You do not have to reconfigure the AN-X after applying a patch. All configuration information will be left intact.

When the patch has been applied, AnxInit restarts the AN-X in production mode.

If you cancel at the filename dialog, the AN-X has already been reset and is in configuration mode. Use the *Utilities/Restart AN-X* command to restart it in production mode.

## Using the Web Interface

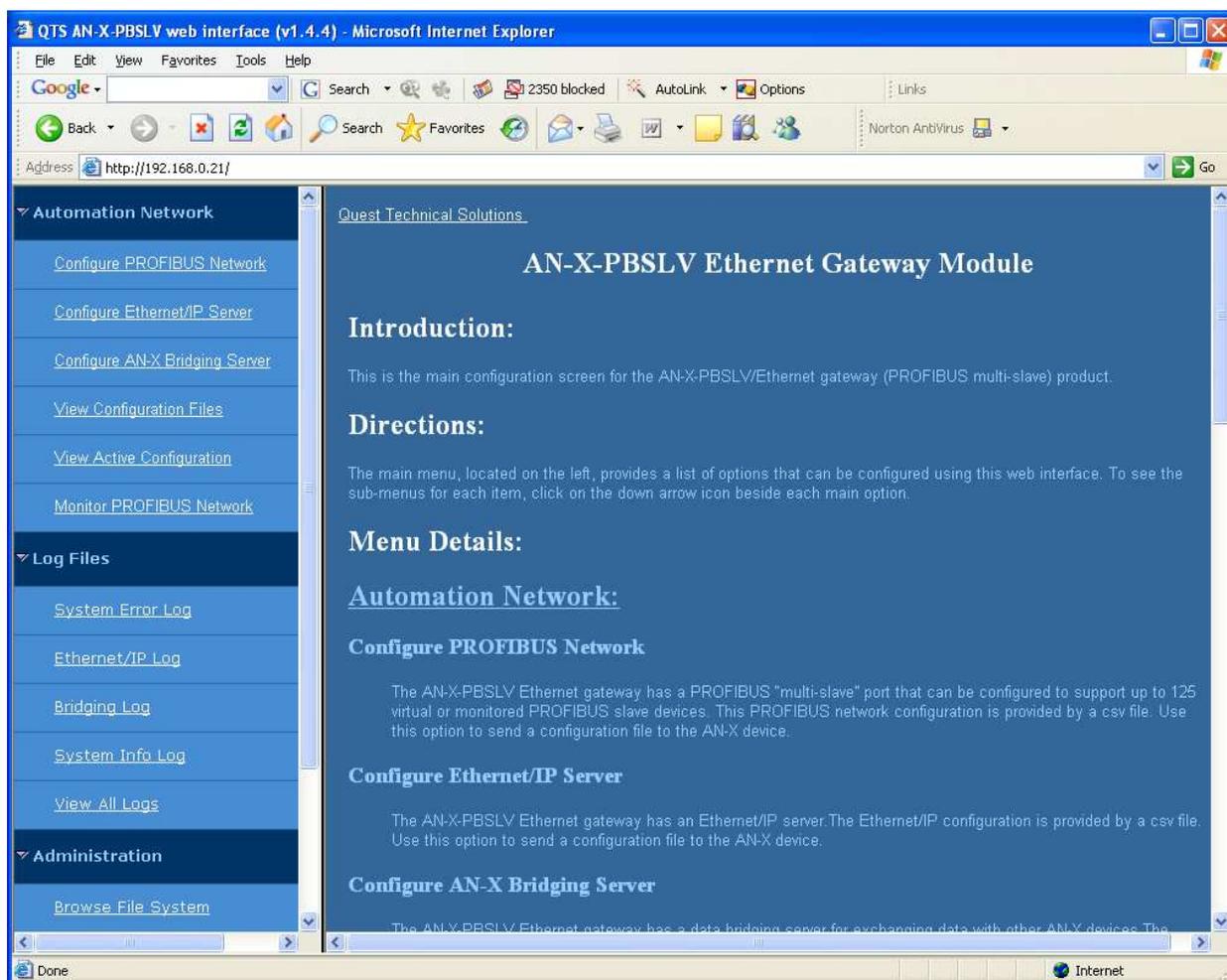
The AN-X module contains a webserver capable of communicating with standard web browsers such as Internet Explorer.

The web interface is used for:

- setting the PROFIBUS configuration
- uploading Ethernet/IP and AN-X to AN-X configuration files
- monitoring PROFIBUS data
- viewing AN-X logs

To use the web interface, you need to know the IP address of the AN-X. Use the *Utilities/Locate All AN-X Modules* command in AnxInit to find all AN-X modules on the Ethernet network.

To access the web interface, start your web browser and type the AN-X IP address where you normally enter web addresses in the browser.

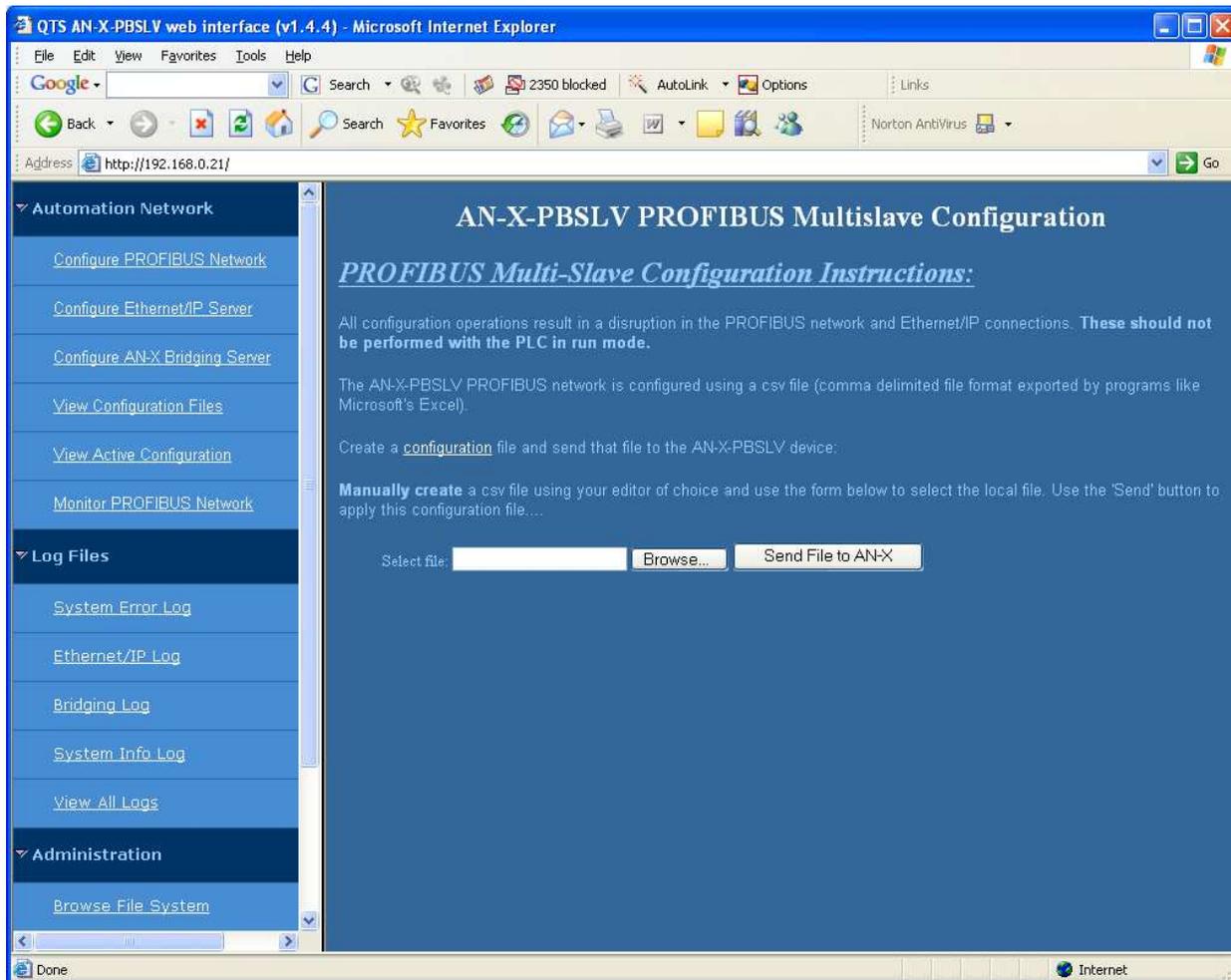


The left pane contains commands. Click on the arrows at the left of the main headings to expand or contract the sections.

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

## PROFIBUS Configuration

Select *Automation Network/Configure PROFIBUS Network* to load the PROFIBUS configuration.



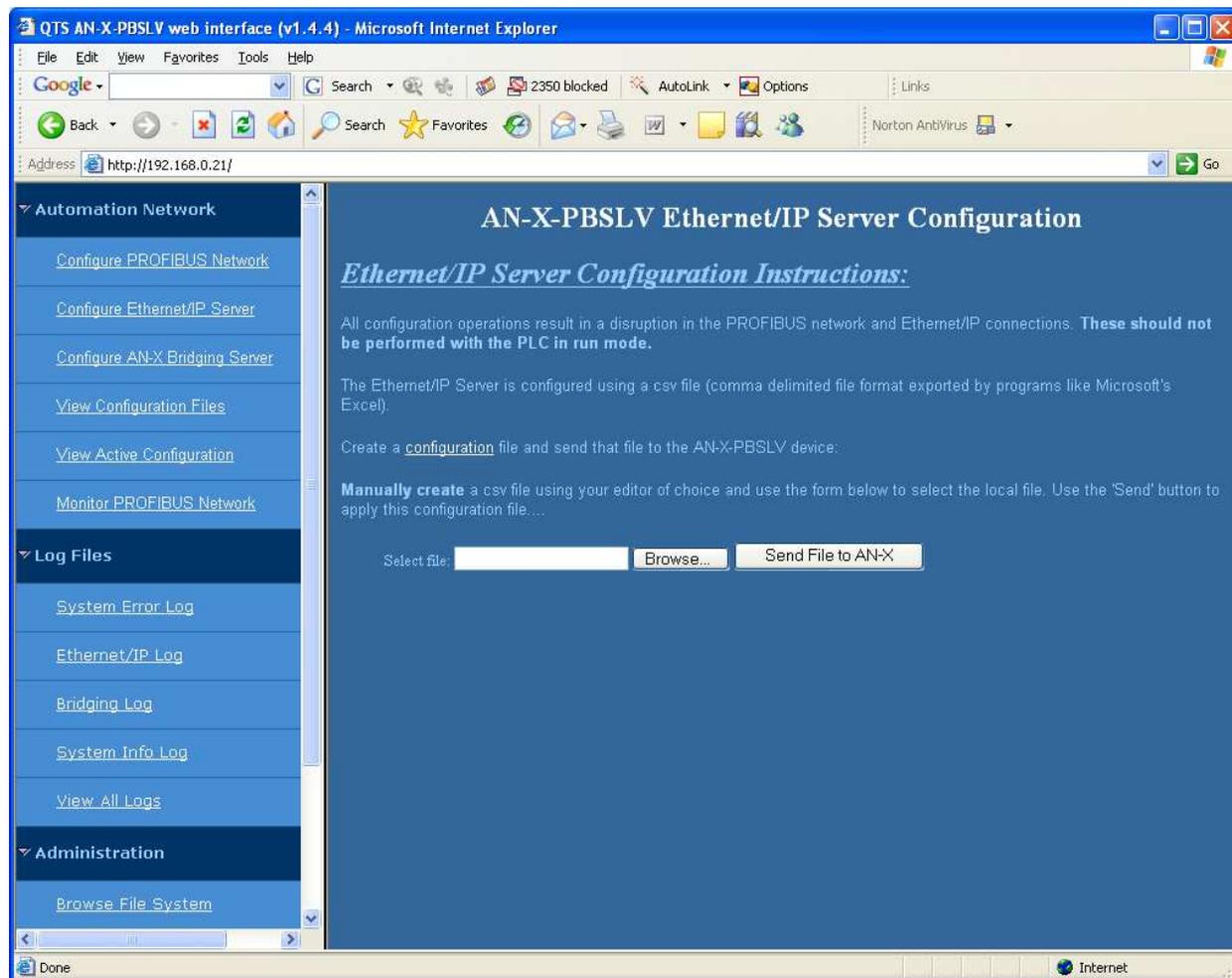
Click the *Send File to AN-X* button.

If you are using Ethernet/IP scheduled connections or AN-X to AN-X communication, check the logs for these applications since the new PROFIBUS configuration may cause the current configurations for those applications to be in error.

## Configure Ethernet/IP Support

AN-X can exchange scheduled data with a ControlLogix processor over Ethernet. Refer to section *Scheduled Data with a ControlLogix* on page 22 for information of configuring scheduled data exchange.

Select *Automation Network/Configure Ethernet/IP Server* in the web interface to upload the configuration.



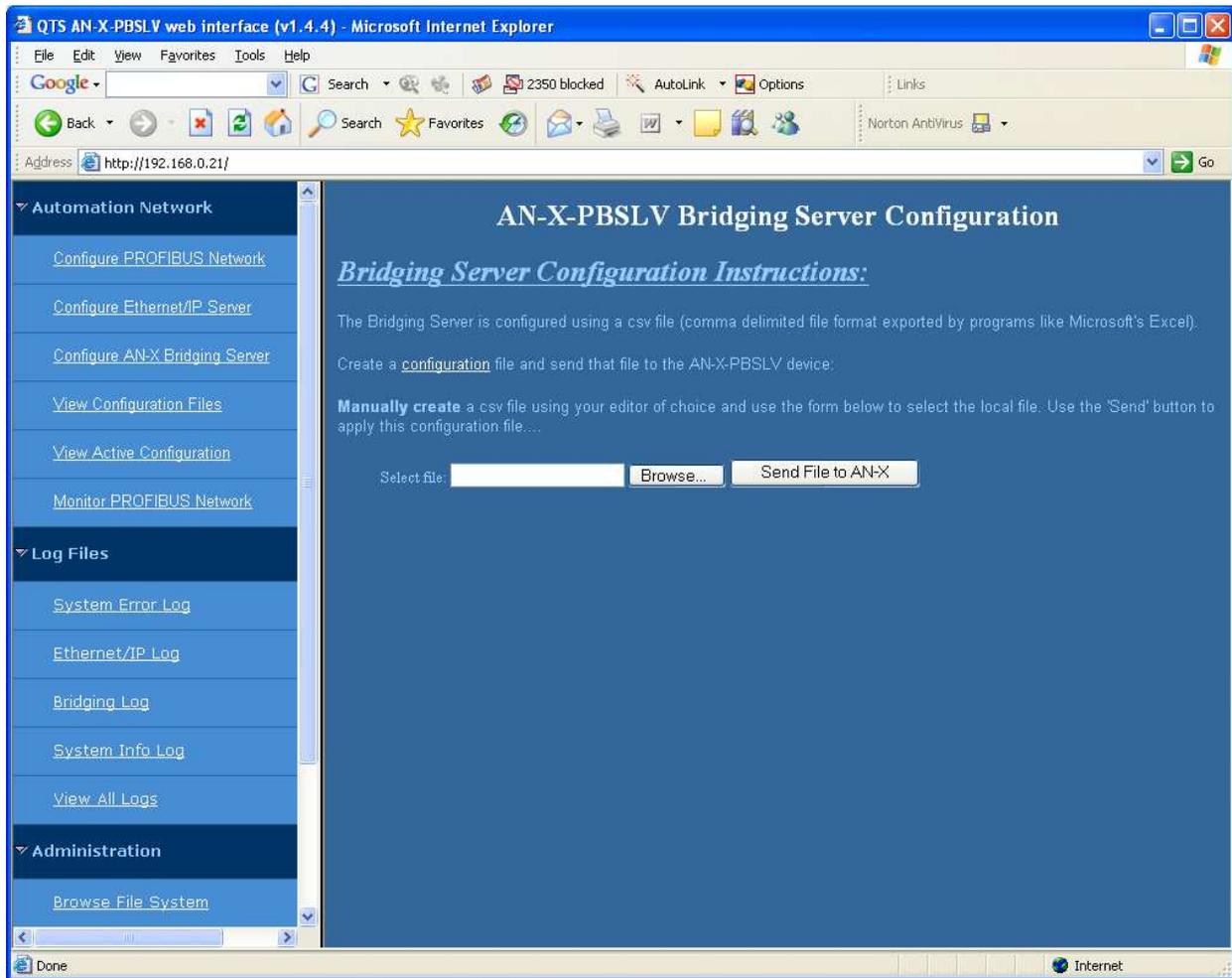
Type or browse the configuration file name into the *Select file:* area. Then click the *Send File to AN-X* button to send the file to AN-X.

Check the Ethernet/IP Log to determine if there have been any errors with the upload.

## Define AN-X to AN-X Communication

AN-X modules can share data with each other over Ethernet. Refer to section *AN-X to AN-X Communication* on page 34 for information on how to create a configuration file.

Select *Automation Network/Configure AN-X Bridging Server* in the web interface to upload the configuration.



Type or browse the configuration file name into the *Select file:* area and click *Send File to AN-X*.

If the AN-X is successfully configured, the web interface displays a summary of the configuration.

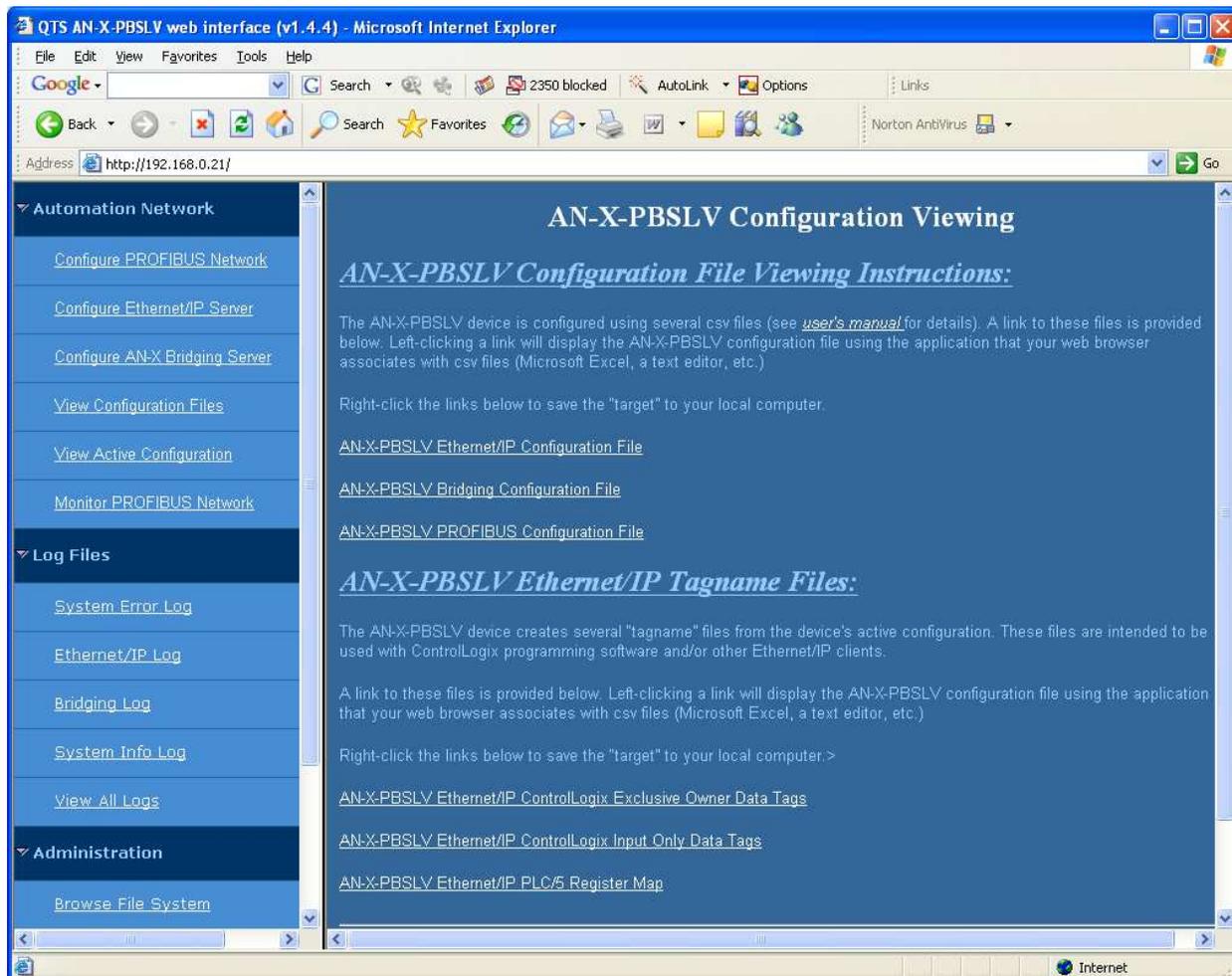
If there has been an error, it displays an error message. To see the cause of the error, select *Log Files/Bridging Log*.

## View Configuration Files

Select *View Configuration Files* to view:

- the ControlLogix configuration
- the AN-X to AN-X configuration
- the PROFIBUS configuration
- the ControlLogix tags

- the PLC-5 register map



Click on the links to view the files.

Right click on the links to retrieve the active files from AN-X and store them on your computer.

## View Active Configuration

Select *View Active Configuration* to view:

- the PROFIBUS configuration
- the Modbus mappings
- the Ethernet/IP configuration
- the bridging configuration

## Monitor PROFIBUS Data

To use the web interface to view the current PROFIBUS network data on the AN-X, select Automation Network/Monitor PROFIBUS Network.

The screenshot shows the AN-X-PBSLV web interface in Microsoft Internet Explorer. The browser address bar shows <http://192.168.0.21/>. The page title is "AN-X-PBSLV Profibus Monitor".

On the left sidebar, the "Automation Network" menu is expanded, and "Monitor PROFIBUS Network" is selected. Other menu items include "Configure PROFIBUS Network", "Configure Ethernet/IP Server", "Configure AN-X Bridging Server", "View Configuration Files", "View Active Configuration", "Log Files", and "Administration".

The main content area displays the following information:

- Slave Number:
- [Refresh Display](#)
- Current Slave Number: 1 Status: Ok
- Input Data Area (024 bytes):
 

```
000: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
016: 00 00 00 00 00 00 00 00
```
- Output Data Area (024 bytes):
 

```
000: 00 01 02 03 04 05 06 07 08 09 0a 0b 0c 0d 0e 0f
016: 10 11 12 13 14 15 16 17
```
- Diagnostic Information:
 

```
Master's Address: 00 Slave ID: 08a5 Watchdog Active
```
- Device Parameters:
 

```
Group ID: 00 Watch Dog Period: 60 ms Watch Dog Requested
```
- Profibus Interface Error Counters:
 

Counter	Counter Value
Tx Good	52322
Rx Good	08662
Rx Stop Bit Errors	61
Rx Parity Bit Errors	32
Rx Start Delimiter Errors	28

At the bottom left of the sidebar, there is a [Home Page](#) link. The browser status bar at the bottom shows "Done" and "Internet".

To select the node to be displayed, type the number in the *Slave Number* field and click Submit.

To update the display, click the *Refresh Display* link or use the browser's refresh button.

Scroll the browser window to view all the data. The values are shown in hexadecimal.

Beneath the data display is a summary of the PROFIBUS diagnostic counters (see page 68).

## 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.

### System Error Log

The System Error log records errors that occur during AN-X operation. This log is normally empty.

### System Info Log

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

### AN-X-PBSLV Bridging Log

The AN-X-PBSLV Bridging Log records messages from the application that is responsible for direct AN-X to AN-X communication.

These messages include normal startup messages, messages about problems with the configuration file, and runtime errors such as timeouts.

If the log overflows, AN-X closes the log file (xanxpbsd.0) and opens a second log file (xanxpbsd.1) and continues to alternate between the two log files as each one fills up. Use View All Logs to view both log files.

### Ethernet/IP Log

The Ethernet/IP Log records messages from the application that is responsible for scheduled communication with a ControlLogix processor and unscheduled communication with DDE and OPC servers.

These messages include normal startup messages, messages about problems with the configuration file, and runtime errors such as timeouts.

If there are problems with scheduled connections to the AN-X or with unscheduled messages to the AN-X, this log may provide further information on the cause of the problem.

If the log overflows, AN-X closes the log file (enetip.0) and opens a second log file (enetip.1.1) and continues to alternate between the two log files as each one fills up. Use View All Logs to view both log files.

### View All Logs

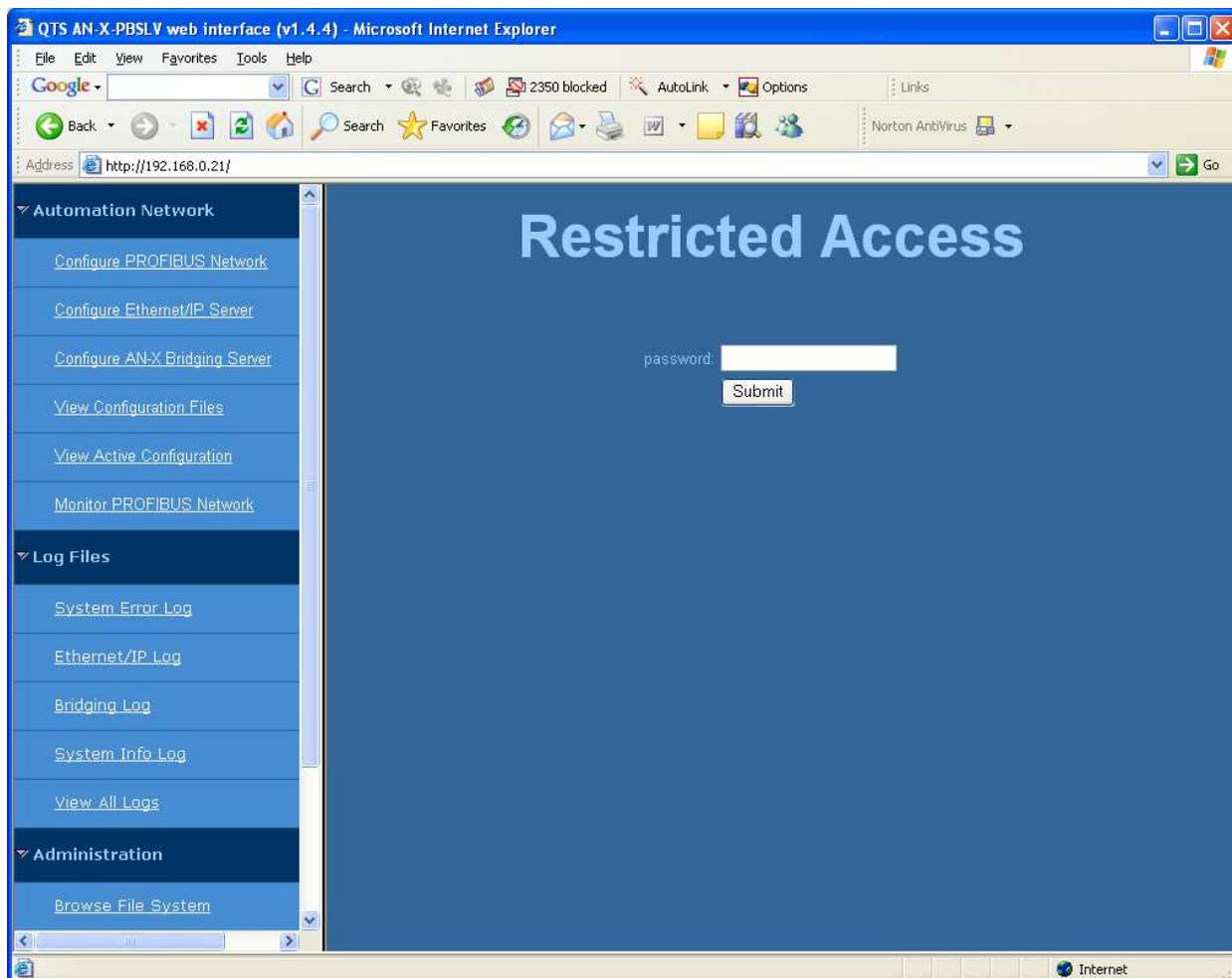
Use View All Logs to list and view all the AN-X logs. To view a log file, double click on the file name.

## Administration Menu

The Administration Menu is used to set the AN-X IP address and to view and edit files on AN-X. The file edit function is password protected and is used only for AN-X technical support.

## Browse File System

If you are required by QTS technical support to examine files on the AN-X, select Administration/Browse File System.

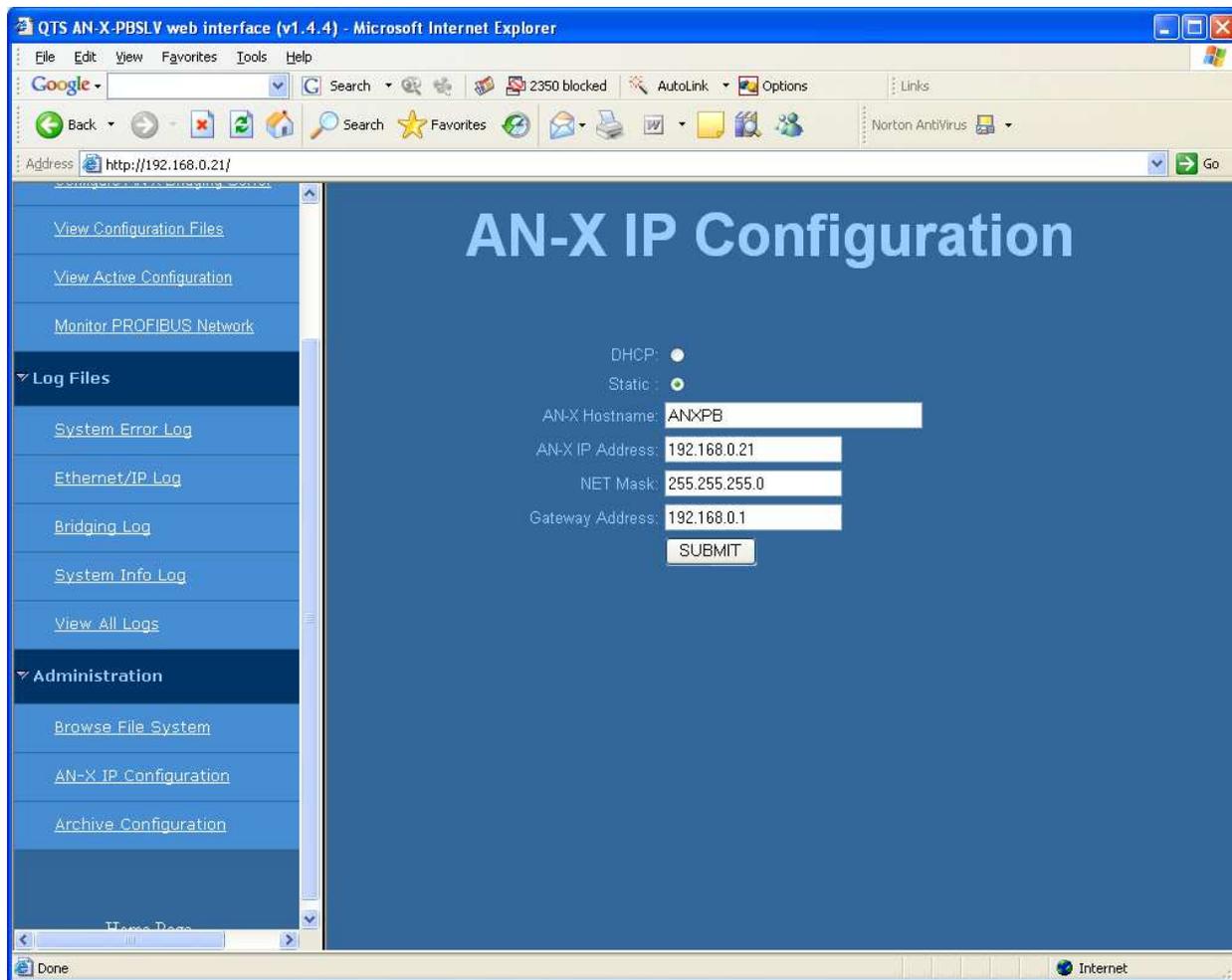


Technical support will provide the password and supply detailed information on any further steps.

## AN-X IP Configuration

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

Select *Administration/AN-X IP Configuration*.



You can configure the AN-X to use DHCP or to use a static IP address.

Click SUBMIT to set the parameters.

When prompted, click CONTINUE to reboot the AN-X with the new parameters.

## Archive Configuration

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

Select *Administration/Archive configuration*.

Click on the Archive File link and save the file. Select the destination where the file will be stored.

## Troubleshooting

### LEDs

The AN-X-PBSLV has LEDs that indicate the state of the Ethernet connection, the connection to the PROFIBUS network processor, and the overall module state.

### Ethernet LEDs

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

The orange LED, labelled 100, is on if the link is running at 100 Mb/s and is off otherwise.

The 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.

### SYS LED

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

Use it 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 LED State	Possible cause
Red 2	AN-X is in config mode
Red 3	DHCP configuration failed
Red 4	Fatal application error, check logs for cause
Red 5	Application memory access violation, check logs
Red 6	Application failed, illegal instruction, check logs
Red 7	Application crashed, unknown cause, check logs
Fast red flash	PROFIBUS configuration failed Configuration of ControlLogix support failed Configuration of AN-X to AN-X communication failed
Single red flash	AN-X to AN-X communication problem, error on producer or timeout on consumer ControlLogix scheduled data or unscheduled messaging, addressing or connection problem

SYS LED State	Possible cause
Red 2	AN-X is in config mode
Slow red flash	script or application problem during startup

At startup, the SYS LED sequence is:

- boot code starts – fast flashing red
- boot code loads a kernel – solid red
- if the configuration kernel is loaded, 2 red flashes followed by a pause
- if the production kernel loads with no errors, solid green

## NET LED – PROFIBUS Network Status

The NET LED indicates the status of the PROFIBUS network connection.

Off	not configured
Solid green	all monitored and active nodes have good status
Flashes red	one or more active or monitored nodes has bad status

## Diagnostic Counters

AN-X maintains standard PROFIBUS diagnostic counters. Use *Automation Network/Monitor PROFIBUS* in the web interface to view the diagnostic counters.

The counters are:

Counter	Description
Tx Good	Count of transmitted frames
Rx Good	Count of received frames
Rx Stop Bit Errors	Stop bit error on received frame
Rx Parity Errors	Parity bit error on received frame
Rx Start Delimiter Errors	Start delimiter error on received frame
Rx FDL Header Errors	FDL length error. Frame has SD SD Length

Counter	Description
	Length, problem with one of the SDs or lengths
Rx Packet Underrun Errors	Underrun error, received frame didn't finish or frame too small
Rx Checksum Errors	Frame checksum error on received frame
Rx End Delimiter Errors	End delimiter missing or bad on received frame
RX Frame Overrun Errors	Overrun error, received frame too long
Data Overflow on Node	Node number of frame which is sending too much data
Data Overflow on SAP	SAP of node which is sending too much data
RX Duplicate Frames	Duplicate frame received. Master is retrying frame, indicates communication problems
Transaction Buffer Overruns	Software on AN-X isn't servicing hardware fast enough. Transaction buffer overrun

## Updating the Firmware

The AN-X operating software consists of several parts:

- boot code, runs at startup
- configuration kernel, runs when you update firmware
- production kernel, runs in normal operation
- application software, for PROFIBUS communication, scheduled communication with ControlLogix and unscheduled messaging, and AN-X to AN-X communication

The kernels are supplied on the AN-X CD in files with extension *qtf* and are updated using the AnxInit utility. Run the command *Utilities/Update AN-X Flash* and select the file you wish to download. Refer to page 52 for details.

Firmware files contain the application programs for AN-X and have extension *bin*. They are downloaded using the command *Configuration/Firmware Update* or *Utilities/Update Firmware* in AnxInit. Refer to page 52 for details.

Occasionally individual patch files are released. They have extension *pch* and are downloaded using the *Utilities/Patch Firmware* command in AnxInit. Refer to page 56 for details.

## Reading Version Numbers

To read the version numbers of the various software components:

Boot code	AnxInit – AN-X Info
Configuration kernel	AnxInit – AN-X Info
Production kernel	AnxInit – AN-X Info
Firmware	AnxInit – AN-X Info (version depends on current mode, boot, configuration or production)
Individual applications	
AN-X to AN-X communication	Web interface, AN-X-PBSLV Bridging log
ControlLogix scheduled communication and unscheduled messaging	Web interface, ControlLogix Log

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## Obtaining the Latest Software

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

## Specifications

Parameter	Specification
Function	Bridge between Ethernet and PROFIBUS network
Description	Processor: 100MHz IDT MIPS FLASH memory: 64M RAM: 64M
Typical Power Consumption	300 mA @ 12 VDC or 150 mA @ 24 VDC
Maximum Power dissipation	3.6W
Environmental Conditions:	
Operational Temperature	0-50°C (32-122°F)
Storage Temperature	-40 to 85°C (-40 to 185°F)
Relative Humidity	5-95% without condensation

## **Support**

Technical support is available from Quest Technical Solutions.

Quest Technical Solutions

4110 Mourning Dove Court

Melbourne FL 32934

321 757-8483

website: [qtsusa.com](http://qtsusa.com)

email: [support@qtsusa.com](mailto:support@qtsusa.com)

If you need to make a return, contact QTS to obtain a return authorization number.