

OPERATIONS MANUAL

Async2IP

2-Port RS-232 Asynchronous to LAN Adapter

FAST INSTALL: SEE Appendix A – Installation Instructions (Page 11)

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1 Product Introduction

The Async2IP is an interface conversion product that transports serial communications over an Ethernet LAN. It converts a full duplex asynchronous serial data stream to a UDP/IP packet stream. The serial stream consists of transmit and receive data with selected control signals.

Two or more Async2IP units are required to transparently connect serial devices over the LAN. Data conversion is independent of the serial port protocol. The Async2IP units are UDP/IP protocol compatible with the East Coast Data Sync2IP product when such are configured in async mode.

In this asynchronous mode the data is sent on byte boundaries, and when Async flow-control is honored the interconnected Async ports may operate at different speeds. The Async byte format supported is 8 data bits, 1 stop bit, and no parity. Therefore the Async byte frame is 10 bits in length. In Async mode there is guaranteed delivery. Packets will be retransmitted for up to 15 seconds, after which time the "session" will be reset.

The Async2IP presents itself as a DCE device using an 8-pin RJ-45 connector for each of its two async ports.

The Async2IP is configured via a Browser interface.

The diagram of Figure 1-1 illustrates the Async2IP in a basic network configuration. Serial port A of one Async2IP is connected over the LAN to serial port A of the peer Async2IP. Likewise for serial port B.

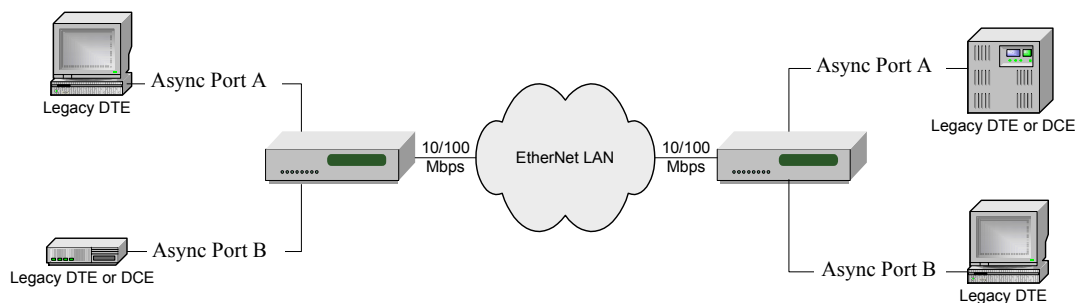


Figure 1-1

1.1 Configuration Flexibility

A peer-to-peer connection may be configured between any two Async2IP ports on the network. Each box is assigned a unique IP address, and a gateway address if operating through a router or server. Although each box has only one address, IP supports a large number of logical port numbers, one of which is assigned to each port present on the Async2IP box and its peer.

With the above addressing in mind, it is possible to configure a network of interconnected devices, not limited to the simple two-box configuration shown above. Figure 1-2 is a diagram illustrating an example of four Async2IP boxes with various ports interconnected as peers.

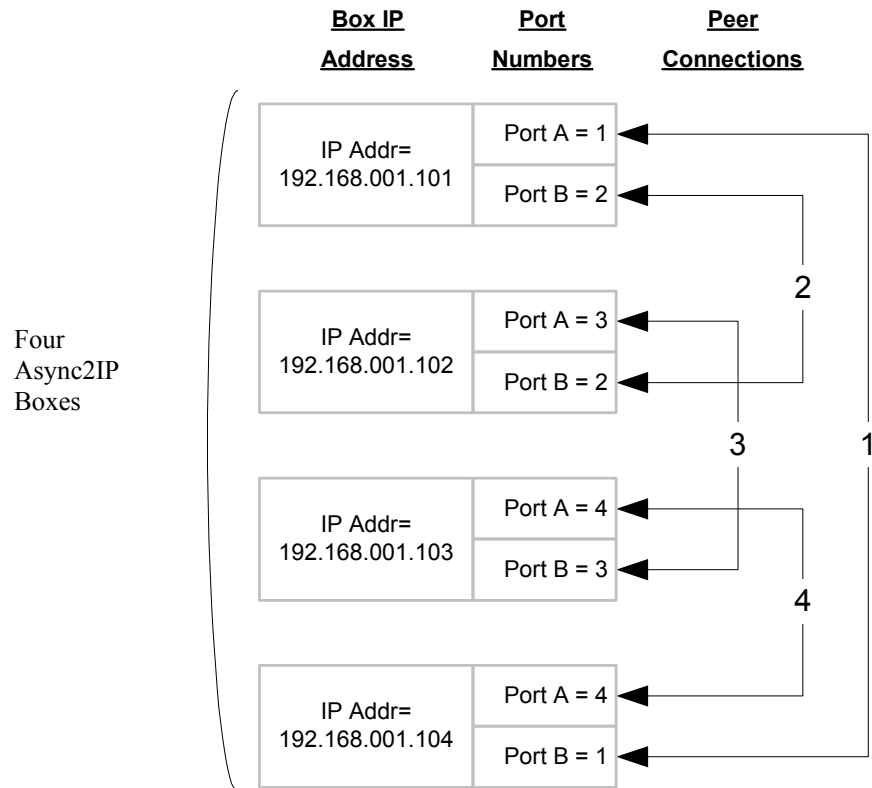


Figure 1-2

In this example the linked ports are given unique number pairs for simplicity, i.e., four links numbered one through four and corresponding to the IP port number. However, two peers in the network can have the same IP port numbers as long as the port numbers match and that the port numbers are unique for each IP address.

2 Principles of Operation

2.1 Data Flow

The Async2IP processes LAN bound serial data and packetizes the data for transport over the LAN connection. On the opposite end of the link, the packets are disassembled and the data is sent serially to the device in the same way it was received. All serial data is sent in this manner from one port to the other.

The LAN segment of the path has a much higher capacity for data transport than each individual link of the Async2IP. However, since it is a medium shared with other traffic, loading will vary over time. This has the effect of altering the latency of packets from one port to its peer while the connection is maintained.

In order to minimize the chance of serial output data being disrupted by either too many or too few packets in a period of time, the packet data must be buffered at both Async2IP source and destination units. The buffers allow the data to make a smooth transition between the constant flow of data bits on the serial interface and the bursty flow of packets on the LAN.

Packet size is determined by data rate. A new packet of serial data is assembled and sent on average every 20mS. So for low data rates, packets are small, whereas for higher data rates, packets are proportionally larger.

2.2 Port Data Rates

The Async2IP supports the following Async data rates:

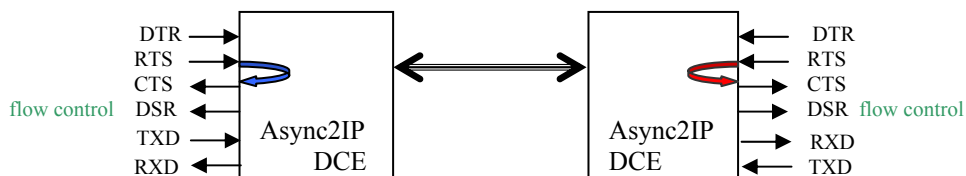
1200, 1800, 2400, 3600, 4800, 7200, 9600,
14400, 19200, 28800, 38400, 57600, 115200 bps.

2.3 ASYNC Flow Control

The two Async ports are decoupled by the LAN link. Therefore the Async speeds at each end do not have to match. This of course can lead to under and over-flow. This is dealt with by using hardware flow control. DSR (since the Async2IP is a DCE) is used for this purpose. The Async2IP will drop DSR when it can take no more data. For this to work, the user device must have a pin (perhaps CTS) that it is monitoring for permission to transmit. A special cable will have to be used that connects the Async2IP DSR to the pin being monitored by the user device.

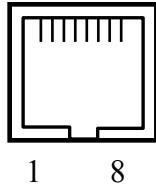
The same flow control mentioned above is used if packet traffic on the LAN becomes slow (no matter what the Async speeds are).

Following are the RS-232 flow control lead mappings:



2.4 ASYNC RS-232 Leads

Each of the async ports are available on the back panel via 8-pin RJ-45 connectors. The pinouts and for these connectors are:



Pin	RS232 Use
1	RTS, Request to Send
2	DTR, <u>Not Used</u>
3	TXD, Transmit Data
4	GND
5	GND
6	RXD, Receive Data
7	DSR, Flow Control
8	CTS, Clear to Send

2.5 DHCP and Fixed IP Addressing

Each Async2IP box must be assigned a unique network IP address in order to send and receive data between two linked ports. When Async2IP boxes are configured, the operator will choose the method by which this is done, either by manually assigned addresses, or by automatically assigned addresses using DHCP. Most routers and servers support DHCP, but if DHCP is not in use, then IP addresses must be manually assigned. It is recommended that addresses be manually assigned, even if DHCP is available.

NOTE: If DHCP is used, it is important to be familiar with how the IP addresses are assigned. This is because the Async2IP port-to-port connection depends on each box knowing the IP address of the peer to which it is connected. Should a box on the network experience a power cycle, for example, the DHCP server may assign it a different IP address in which case, the connection(s) to its peer will be lost.

In some cases, the DHCP server may be programmed to “remember” the association between the Ethernet MAC address and the last assigned IP address, and thereby re-assign the same IP address each time the Async2IP comes online. This would alleviate the above problem.

Whether IP addresses for a Async2IP box are fixed or assigned via DHCP, the operator will need to know the working IP addresses of each box in order to set up port-to-port connections.

2.6 Peer Port Number

Each Async2IP box has two physical ports. An IP address, of which there is one assigned per box, can have 4096 logical port numbers. The operator may assign any one of the logical port numbers, 1 – 4096 to each physical port. The only requirement is that the logical port numbers assigned to each peer of a two-port connection be the same.

For simple paired-box configurations, it is recommended to assign the logical port number identical to the physical port to avoid confusion. In configurations involving three or more Async2IP boxes, it may become necessary to use other logical port numbers that do not match the physical port number. As long as the logical port number assigned to both peers on the connection is the same, the link will work.

3 Operator Interface

3.1 Front and Back Panels



Figure 3-1



Figure 3-2

3.1.1 Front Panel LED Indicators

The following table describes the purpose of the LED indicators and their meaning by color:

<u>LABEL</u>	<u>WHEN OFF</u>	<u>WHEN YELLOW</u>	<u>WHEN GREEN</u>
SYS	POWER is Off	System Initializing	Normal Operation
LINK	LAN not connected	Establishing Connection	Normal Connection
PORT 1	Port peer not found	Out of Sync	Port is Connected
PORT 2	Port peer not found	Out of Sync	Port is Connected

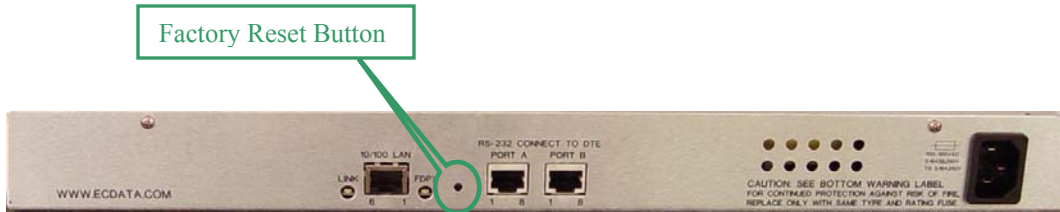
3.1.2 Rear Panel LED Indicators

There are two LAN LED indicators on the back panel. These are:

<u>LABEL</u>	<u>WHEN OFF</u>	<u>WHEN GREEN</u>
LINK	No LAN detected	LAN is active
FDPX	In Half Duplex Operation	In Full Duplex Operation

3.1.3 Rear Panel Push Button

There is one push button recessed into the back panel. It can only be activated via a small screwdriver or paperclip. This is the “**set factory defaults**” button. If it is pushed on and held on **during an initial power on sequence** (approximately 15 seconds) the Async2IP box will set all of its configuration parameters to the following factory defaults:



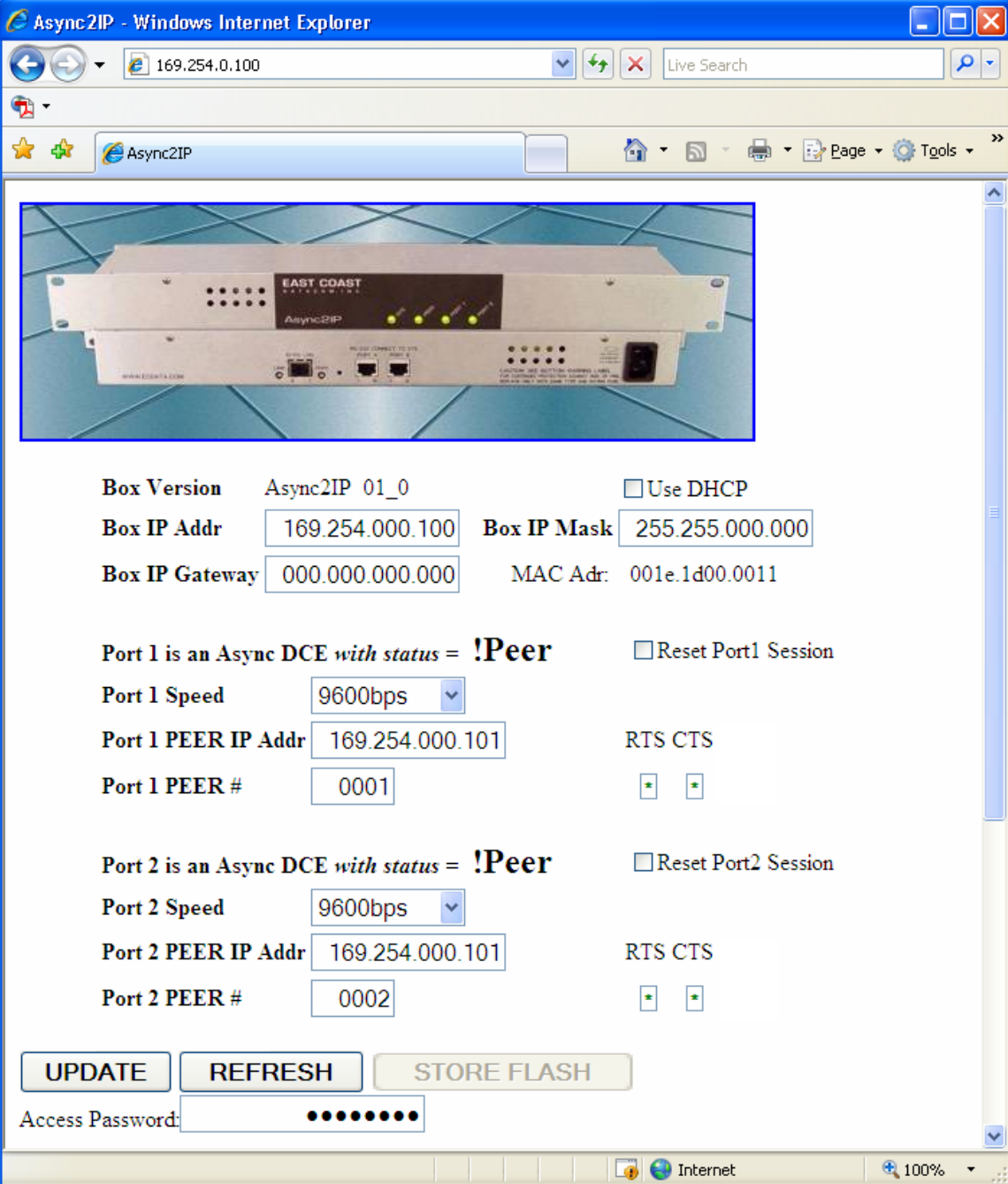
Box IP Address	169.254.0.100
Box IP Mask	255.255.0.0
Box Gateway Address	0.0.0.0
Port 1 Peer IP Address	169.254.0.101
Port 1 Peer Number	0001
Port 1 Async Speed	9600
Port 2 Peer IP Address	169.254.0.101
Port 2 Peer Number	0001
Port 2 Async Speed	9600
Web Page Password	12345678

3.2 Web Browser Interface

3.2.1 Configuration Page

An HTML Browser is used to configure the Async2IP settings and monitor the running status. Each Async2IP box has an internal html server program that can be accessed providing the means to perform the configuration operations.

The internal server provides a single page access to the Async2IP status and configuration, an example of which is shown in Figure 3-3.



The screenshot shows a Windows Internet Explorer browser window titled "Async2IP - Windows Internet Explorer". The address bar contains "169.254.0.100". The browser's address bar shows "Async2IP". The main content area displays a photograph of the Async2IP hardware device, which is a white, rack-mountable unit with "EAST COAST NETWORKS" and "Async2IP" printed on it. Below the photograph, the configuration page is displayed. It includes the following fields and options:

- Box Version:** Async2IP_01_0
- Box IP Addr:** 169.254.000.100
- Box IP Mask:** 255.255.000.000
- Box IP Gateway:** 000.000.000.000
- MAC Addr:** 001e.1d00.0011
- Use DHCP

Port 1 is an Async DCE with status = **!Peer** Reset Port1 Session

- Port 1 Speed:** 9600bps
- Port 1 PEER IP Addr:** 169.254.000.101
- Port 1 PEER #:** 0001
- RTS CTS:

Port 2 is an Async DCE with status = **!Peer** Reset Port2 Session

- Port 2 Speed:** 9600bps
- Port 2 PEER IP Addr:** 169.254.000.101
- Port 2 PEER #:** 0002
- RTS CTS:

At the bottom of the page, there are three buttons: **UPDATE**, **REFRESH**, and **STORE FLASH**. Below these buttons is an "Access Password:" field with a masked password of ten dots.

Figure 3-3

The web page does not auto-update, therefore the operator will have to REFRESH the page to acquire the most current status.

The web page is accessed via a web browser like Internet Explorer. The IP address of the desired Async2IP box is entered into the Address field of the browser. This is the numeric IP address only since no aliases are assigned.

Configuration parameters are available on the web page as either edit boxes, drop-down lists, or a check box. Changing these items on the page does not update the Async2IP unit until the UPDATE button is used. Likewise the new parameters, so updated, are not stored to Flash in the Async2IP unit until the STORE FLASH button is used. The STORE FLASH button will remain disabled until some change has been sent to the Async2IP unit via the UPDATE button. When the STORE FLASH button is active it is a reminder that the unit has new parameters but FLASH is out of date.

The "Reset Portx Session" check boxes are used to reset the associated async session after a configuration change (like a new peer IP address) has been made. Such port session configuration changes do not take effect until the session is reset.

The possible session status indications are:

- ~Peer** - There is no session peer.
- !Peer** - Peer IP address does not resolve.
- Active** - Peer session is connected and active.
- O!sync** - Session data Overflow condition.
- U!sync** - Session data Underflow condition.

The REFRESH button does just that. It requests the most current settings and status from the Async2IP unit.

There is a required Access Password, which is always 8 numeric digits. This password is needed for the UPDATE, STORE FLASH, and Port session RESETs. The REFRESH button does not need the Password. This Access Password is only available for modification via the front panel of the Async2IP unit.

3.2.2 Firmware Upgrade Page

An HTML Browser is used to upgrade the firmware in the Async2IP. This is a separate webpage accessed via a hidden button field on the main Async2IP webpage. The hidden button is located within the product picture at the top of the main page. The “Async2IP” product name on the product front panel in the picture is the location of the hidden button. By placing the mouse over the “Async2IP” name and left clicking, the separate firmware upgrade page will appear, as shown in Figure 3-4.

The RESET Async2IP LINK button is used to restart the LAN connection at the Async2IP unit. This is used to activate any changed LAN IP setting that may have been updated. Of course if the Box IP Addr is changed then that new IP address will need to be used to re-connect to the Async2IP unit.



Figure 3-4

It is a two-step process to upload a new firmware upgrade to a Async2IP unit. The first step is to upload the new firmware into RAM in the unit. The second step is to store this new firmware into Flash and reboot the unit. The correct Access Password is needed for both steps.

Until the Async2IP unit has received a valid firmware upload the STORE FIRMWARE button will remain disabled.

To upload a new firmware image the operator needs to enter the correct Access Password, select the file to upload via the Browse... button, and then single left click on the UPLOAD FILE button. A status message at the completion of the upload will appear to the right of the Access Password field.

To store and reboot the new firmware the operator needs to enter the correct Access Password, and then single left click on the STORE FIRMWARE button (there is no need for the file name field to contain any entry). There will be no status message on this web page. Instead a new very concise page will be displayed to remind the operator that since the unit has rebooted the connection will need to be re-established. After approximately one minute the connection should be re-established. The Async2IP unit will have maintained the same IP address and configuration as was in Flash before the STORE FIRMWARE button was activated.

The "Change the password" checkbox will prompt the operator with a series of data entry and confirmation dialog boxes.

Appendix A – Initial Configuration

From the factory (or after the factory-default button has been used) the Async2IP box has the following IP addressing configuration:

IP address:	169.254.0.100
IP mask:	255.255.0.0
Password:	12345678

The 169.254.x.x address range is reserved for local default networking. The **Windows Operating System** defaults to this address range after a timeout where no IP address is assigned to the workstation (as in a DHCP request timeout). Therefore if the Async2IP is direct cabled to a workstation (no routers involved) it can be initially configured via its configuration web page interface.

Following are the initial configuration steps to follow:

- 1) Directly attach the Async2IP unit to a PC workstation with either a standard LAN cable or a crossover LAN cable (the Async2IP unit will auto-detect which cable is being used).
- 2) Power up both the workstation and the Async2IP.
- 3) Wait for the workstation operating system to completely boot.
- 4) Insure that the workstation operating system has activated the LAN port to which the Async2IP box is attached. [**NOTE:** This requires a DHCP IP address request timeout which may take some time.] On the Windows XP operating system the LAN port status can be checked by double clicking the network icon located in the system tool bar.
- 5) At this time the workstation will have an IP address of 169.254.x.x and the Async2IP box will be 169.254.0.100. (These two addresses must be different)
- 6) Bring up a web browser (like Internet Explorer) and enter 169.254.0.100 into the desired Address bar and then hit Enter. This will request the Async2IP configuration web page.
- 7) Use the Async2IP web page to assign the desired IP and async settings.
- 8) Insure the access password of 12345678 is entered into the password box and then **click on UPDATE**.
- 9) After the update has completed, click on the **STORE FLASH** button.
- 10) **Power down** and disconnect the Async2IP box from the workstation.
- 11) Install and power up the Async2IP into the desired network.

Appendix B - Specifications

Application

Serial to TCP/IP protocol adapter, to send a full duplex serial data stream over a UDP/IP stream

Capacity

Two Async Ports converted to one 10/100 Base-T LAN Port

Interface

ASYNC: RS-232 DCE on a RJ-45
LAN: 10/100 Base-T, RJ-45

Data Format

Data transparent at all data rates

Data Rates

RS-232: 1.2k to 115.2Kbps
LAN: 10/100 Auto

Serial Buffer

2048 bytes

Buttons

One: Factory Reset on back of Unit

Indicators

System: Green or Yellow
Peer: Green or Yellow
Port 1: Green or Yellow
Port 2: Green or Yellow
Link: Green

FDPX: Yellow

Configuration

Via Browser interface

User Configuration

Stored in Flash memory

Power Source

90-120VAC @10%, 50Hz, or 90-240VAC 50/60Hz 0.16/0.08A, IEC Power Inlet, (2) 5mm Fuses located internally

Environmental

Operating Temp: 32° to 122° F (0° to 50° C)
Relative Humidity: 5 to 95%Non-Condensing
Altitude: 0 to 10,000 feet

Dimensions

Length 3.22inches (8.18 cm)
Width 19.00 inches (48.26 cm)
Height 1.75 inches (4.44 cm)

Weight

2 pounds (0.907 Kg)

Warranty

Three Years, Return To Factory

Ordering Information:

PT# 180055
Model: Async2IP_2
Desc: 2-Port Async to LAN Adapter

Power Supply Options
PT# 180062
Model: AC 110VAC

PT# 180070
Model: AC 110/220VAC

PT# 180074
Model: DC 36-72VDC

Included with each unit:

1) Installation Guide

For further detailed technical information on this product, contact East Coast Datacom Technical Assistance toll free at (800) 240-7948.