Brainboxes Industrial

Ethernet to Serial Product Manual

Contents

1. Introduction

The Brainboxes Ethernet to Serial industrial product range brings the benefits of fast data access and remote management to asynchronous serial devices by connecting them to the existing local network infrastructure within your industrial environment. Designed and built on-site with close collaboration between the hardware and software teams to deliver a product that is both user-friendly and has plenty of functionality.

The ES industrial product range offers serial devices with support for the RS-232, RS-422 (Full Duplex) and RS-485 (Full & Half Duplex) serial port standards as well as network communication over Raw TCP and Telnet. The supplied Windows drivers allow you to use any existing software that uses COM ports, without modification.

2. Before You Start

IMPORTANT NOTE: ES-511/522: The LEDs on the Magjack are NON-FUNCTIONAL.

Box Contents Check list – ES-511 & ES-522 & ES-551 & ES-571

The following items are included with your product:

- Ethernet to Serial (ES) Industrial device
- Boost.LAN Product CD
- Quick Start Guide

Optional Items:

- Global mains power supply unit - PW-600
- USB port power supply – PW-650 – Ideal for powering your ES-XXX from anywhere using your laptop

If any of the items are missing from your box or damaged in anyway please contact support@Brainboxes.com

Supported Operating Systems

The Ethernet to Serial industrial product range can be used in the following Microsoft Operating Systems with the supplied Boost.LAN drivers:

- Windows Server 2012

- Windows 8 32-bit

- Windows 8 64-bit

- Windows 2008 R2

- Windows 7 32-bit

- Windows 7 64-bit

- Windows Server 2008 32-bit

- Windows Server 2008 64-bit

- Windows Vista 32-bit

- Windows Vista 64-bit

- Windows Server 2003 32-bit

- Windows Server 2003 64-bit

- Windows XP 32-bit

- Windows XP 64-bit

- Windows 2000

Brainboxes Boost.LAN drivers have undergone extensive Microsoft testing with the ES industrial range. Upon passing these tests, the drivers were signed by Microsoft, as an indication of their quality and stability.

It is also possible to use the ES industrial devices with a Linux system. See **Section 10** for full details.

System Requirements

Components: Microsoft .NET Framework 2.0 (installed automatically with Boost.LAN package)
Windows Installer: Windows Installer 3.1 or later (Recommended)
Internet Explorer: If you are running Internet Explorer, then Internet Explorer 6.0 or later is required
Processor: 400 MHz Pentium processor or equivalent (Minimum); 1GHz Pentium processor or equivalent (Recommended)
RAM: 96 MB (Minimum); 256 MB (Recommended)
Hard Disk: Up to 500 MB of available space may be required
CD or DVD Drive: Not required
Display: 800 x 600, 256 colours (Minimum); 1024 x 768 high colour, 32-bit (Recommended)

Network Requirements

Ethernet network connection (wired).

3. Usability Features

The ES industrial range has been designed so that it is as easy as possible to wire up the serial port and power wires to the terminal blocks and to connect the network cable:

- Removable screw terminal blocks make installation easier and quicker.

- Colour coded terminal blocks and ports prevent an incorrect connection.

- Individually numbered pins simplify the wiring and removes confusion.

- Smart Ethernet which automatically detects the polarity of the Ethernet connection so either a straight through or crossover Ethernet cable can be used.

- Dual power supply input, for enhanced reliability.

- Functional ground to DIN rail.

4. Hardware Features

Technical Specifications

Network connection

- 10Base-T or 100Base-TX Ethernet connection
- Standard 8P8C ("RJ45") socket connector
- TCP/IP protocol stack
- DHCP or static IP address
- Automatic transmit/receive crossover detection
- 1500V magnetic isolation

RS-232 Serial Port

- Baud rates up to 1M Baud
- 5, 6, 7 or 8 data bits
- 1, 1.5 or 2 stop bits
- Odd, even, mark, space or no parity bit
- Line-break generation and detection
- RTS/CTS or XON/XOFF flow control option
- ESD protection to 15kV human body model
- Can be connected to as a Windows COM port, as a Raw TCP socket, or using the RFC2217 standard
- Serial cable length: 10m / 30 feet maximum

Port 1 - Yellow	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5
RS232	Sig GND	CTS	RxD	RTS	TxD
RS485 FD	Sig GND	RxD-	RxD+	TxD+	TxD-
RS485 HD	Sig GND			Data+	Data-
Power Input - Black	Power GND	+Vin A	+Vin B	Power GND	Func GND
Input	+5V to +30V DC	60mA@24V 1.4W Typical		120mA@24V 2.9W Max	

RS-422/485 Full Duplex Serial Port

The factory default setting for the ES devices is RS-422 full duplex.

Background Information:
DTR/DSR and CTS/RTS Handshaking is not available.

This mode is generally used between one transmitter / receiver to only one other transmitter / receiver, but it is possible for each output to drive up to 10 receivers.
Generally, in RS-422 systems, all 4 signal lines from the 5 pin terminal block participate in the data transfer sequence. Thus 2 twisted pair cables are used. One twisted pair carries the TXD data outwards, one pair brings the RXD data inward.

- Baud rates up to 1M Baud
- 5, 6, 7 or 8 data bits
- 1, 1.5 or 2 stop bits
- Odd, even, mark, space or no parity bit
- Line-break generation and detection
- XON/XOFF flow control option
- Built-in termination and biasing at receiver inputs
- Can be connected to as a Windows COM port, as a Raw TCP socket, or using the RFC2217 standard
- Serial cable length: 1200 meters / 4000 feet maximum

RS-422/485 Half Duplex Serial Port

- Baud rates up to 1M Baud
- 5, 6, 7 or 8 data bits
- 1, 1.5 or 2 stop bits
- Odd, even, mark, space or no parity bit
- Line-break generation and detection
- Automatic switching between transmit and receive states in half-duplex mode
- 2-wire half-duplex RS-422/485 link mode
- Built-in termination and biasing at receiver inputs
- Can be connected to as a Windows COM port, as a Raw TCP socket, or using the RFC2217 standard
- Serial cable length: 1200 meters / 4000 feet maximum

Power

- Wide-range +5 to +30V DC 60mA@24V 1.4W Typical 120mA@24V 2.9W Max
- Reverse voltage protected
- ESD and surge protected
- Earthing connection point

> **Caution -** Do not attempt to operate this product with any other power supply/rating than that specified.

LED indicators

LED Indicators for the network and serial ports show when a connection is open and when data is being transferred. A two-colour status LED provides additional information on the status of the device.

LED Information		
Status LED	Green Light On	
	Flashing Green	Device Ready
	Flashing Red & Yellow	Changing Settings
	Flashing between Green & Red	Querying IP
	Flashing between Green & Red	IP Problem
	Flashing Green/Red	Performing Hard Reset
	Flashing between Green & Yellow	Problem during initialization (e.g. Firmware Problem)
Serial Port LED	Green light on	Port Open
	Flashing light on	Data RX/TX
Link LED	Green light on	Link established
	Flashing Green	Data RX / TX
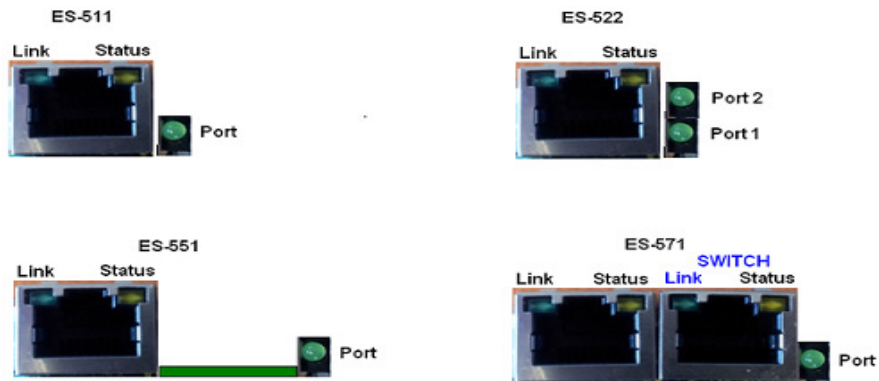
Terminal Block Connector Pin out

A second power supply +VinB can be fitted as a back-up to the main power supply +VinA to prevent down time should one power source fail.

*Func Ground – Functional ground is a connection to the ground from the DIN rail.

	Pin 1	**Pin 2**	**Pin 3**	**Pin 4**	**Pin 5**
RS-232	Sig GND	CTS	RxD	RTS	TxD
RS-485 FD	Sig GND	RxD-	RxD+	TxD+	TxD-
RS-485 HD	Sig GND			Data+	Data-
Power Input	Power GND	+Vin A	+Vin B	Power GND	Func GND*

Reset Button

Manual Reboot

1) Press the reset button once.

2) The status LED will flash and after 5 seconds the device will reboot.

3) When the device is restarted, any connections you have had to the COM ports will need to be re-established.

Manual Hard Restore

1) Press and hold the reset button on the device for 5 seconds.

2) The status LED will flash red/green and the device will be restored to factory default settings. For the factory settings, see **Factory Default Settings** section.

Storage and Operating Environment Guidelines

Operating Temperature: -30°C to +80°C

Storage Temperature: -50°C to +150°C

Humidity: 5% to 95% non-condensing

Housing: IP-30 rated non-conducting polyamide case with integrated DIN rail mount

Factory Default Settings

Network Settings	
Device Network IP Address	DHCP Mode
Web Server Port	80
Port Settings	
Port Mode	RS-422
Baud rate	115200
Databits	8
Stop bits	N
Parity	1
Flow Control	None
Duplex mode	Full Duplex
Protocol Settings	Telnet Mode (Server)

The default settings have been carefully selected and should provide the right settings for the majority of users.

Device Swapping

In the unlikely event of a device failing, it can be easily replaced by swapping it with a device which has the same IP address. This is particularly useful when using a large number of ES industrial devices together which have already been installed and setup and are already communicating with peripherals. The faulty device can be replaced without having to set up and install a new device.

One of the features of Boost.LAN Manager is the ability to export and import device settings. This feature is particularly useful if you are swapping devices. The old device's settings can be exported into a settings file and then imported on the new device. For details on how to use this feature see Exporting and Importing Device Settings.

5. Getting Started

Connecting your ES device

1. Connect the ES device to your local network using an Ethernet cable and plug into the Ethernet port connection on the device. The ES Ethernet port will automatically detect the polarity of the Ethernet connection so either a straight through or crossover Ethernet cables can be used.

2. Connect the power adapter or a DC power line (5-30V) to the ES power terminal block connection.

3. On connecting to the network, the device automatically checks if it is connected to a DHCP Server. If this is the case, the DHCP server will allocate an IP address automatically to the ES device.

4. If no DHCP Server is detected (e.g. you have the ES device plugged directly into the PC), the ES device will default to an IP address of 192.168.127.254 after 60 seconds. If connecting directly to a PC, make sure the PC is on the same 192.168.127.xxx subnet in order to find your device.

5. When the Status LED shows a solid green light the device is ready to use.

Make a note of device MAC address (on the side of the ES device, 00-0A-4F-XX-XX) as you will need it to identify the device on your network later.

Configuring your device settings

There are three methods to view and configure your Ethernet to Serial Device. Which method to use depends on personal preference and convenience.

- ■ **Web Page Interface:** This allows the Ethernet to Serial device to be accessed from any PC within your network as it does not require Boost.LAN Manager. See **Section 6** for more information about the web page interface.

- ■ **Windows Device Manager:** Once Boost.LAN is installed you can use the Windows Device Manager. This is the standard Windows Control Panel that allows users to view and control all hardware attached to a computer. The Ethernet to Serial ports can also be configured from here.

- ■ **Boost.LAN Manager:** This is the Windows application that is installed initially to find the device and install the COM port drivers. Configuring from here is the recommended option for ease and convenience, as it centralises all Ethernet to Serial devices. See **Section 5** for information about Boost.LAN Manager.

6. Configuration Using Boost.LAN Manager

<u>**PLEASE READ CAREFULLY**</u>

- Boost.LAN Manager application is the graphical user interface for locating and configuring all Brainboxes' Ethernet to Serial devices in Windows.

- Boost.LAN Manager is the COM ports device driver that you will use in Windows to access your ES ports as standard Windows COM ports. You need Boost.LAN Manager to install the Boost.LAN COM ports driver.

- Boost.LAN Manager is not required if:

    1. Your application speaks directly to IP addresses. (E.g. using telnet or Win sock communication)

    2. You want to remotely change the settings of the ES device via web page access

Follow the instructions below to start the installation process.
If you have any issues with installation, see Section 9

Windows Installation: Boost.LAN Manager Application (Windows 7)

With the computer turned on, insert the Boost.LAN Driver CD. This should launch the Brainboxes Navigation Page. Note: If the navigation page does not auto load, go to Start → My Computer → Right Click the CD and select Explore. Click "Install" to launch the Boost.LAN Setup.exe program.

Follow the on screen instructions to install the Boost.LAN Manager application
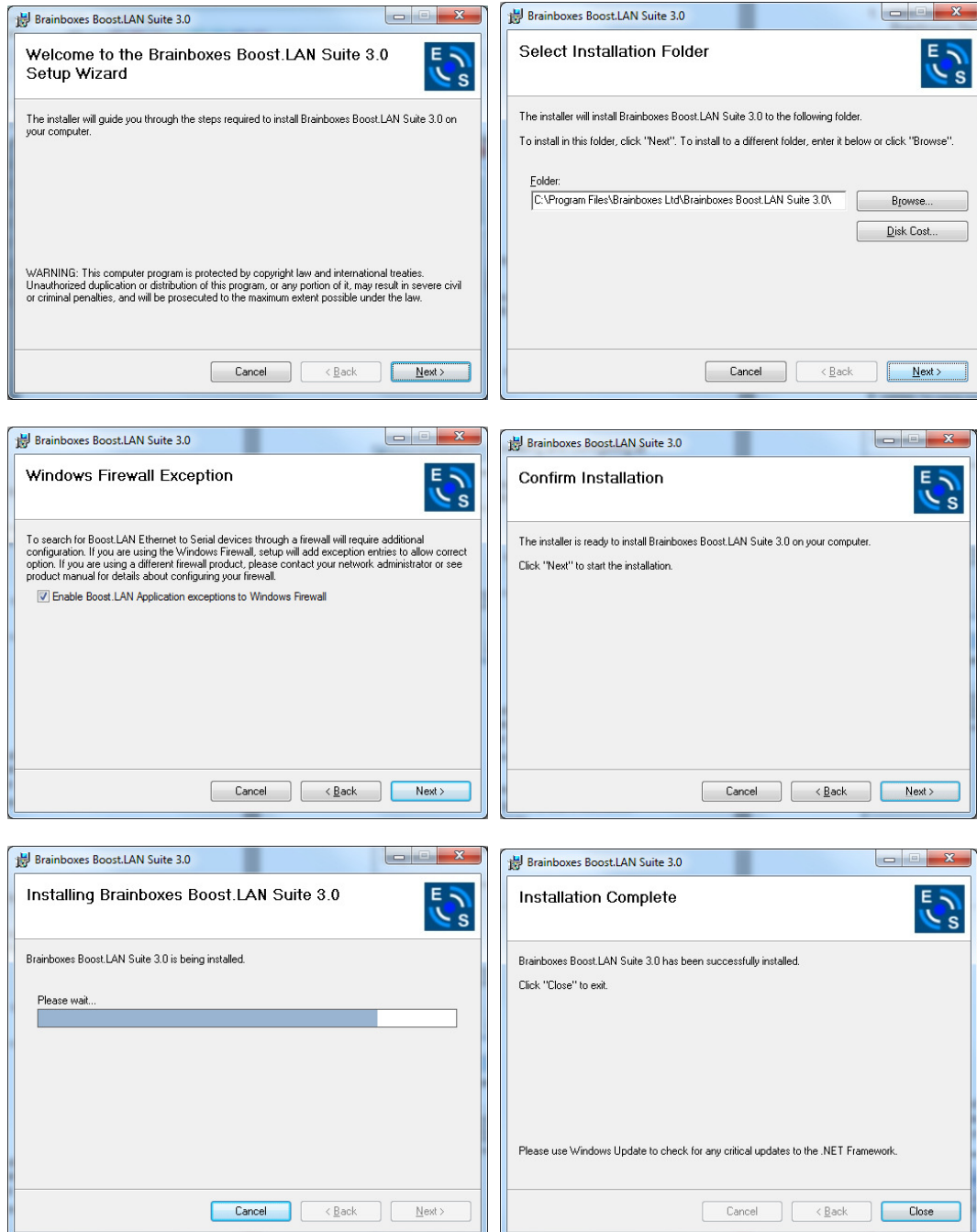
When installation is complete, you should see an icon labelled "Boost.LAN Manager" on the desktop.

## Installing Ethernet to Serial Device Driver (Windows 7)

1. Double click the icon labelled "Boost.LAN Manager" on the desktop to open the application.

2. Click on *"File > Find Devices"* in the top left hand side of the window. This will find any Brainboxes Ethernet to Serial devices connected to your network.
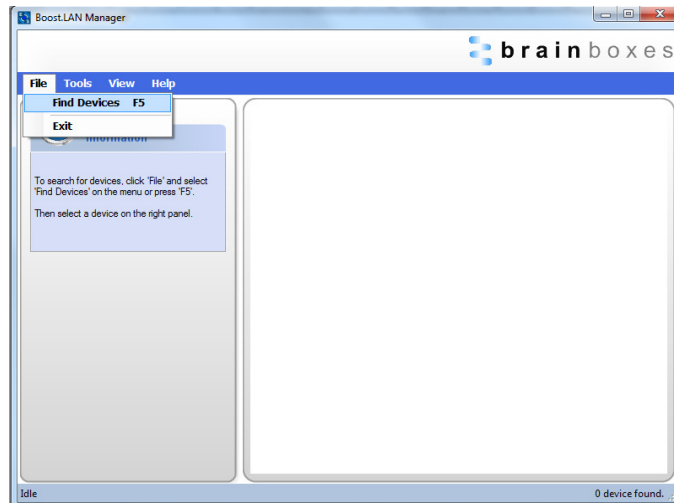

3. You can find your Brainboxes ES device by selecting a device and matching it with the corresponding MAC address available in the left hand panel (see below). The MAC address of your device is located on a sticker on the side of the ES device.
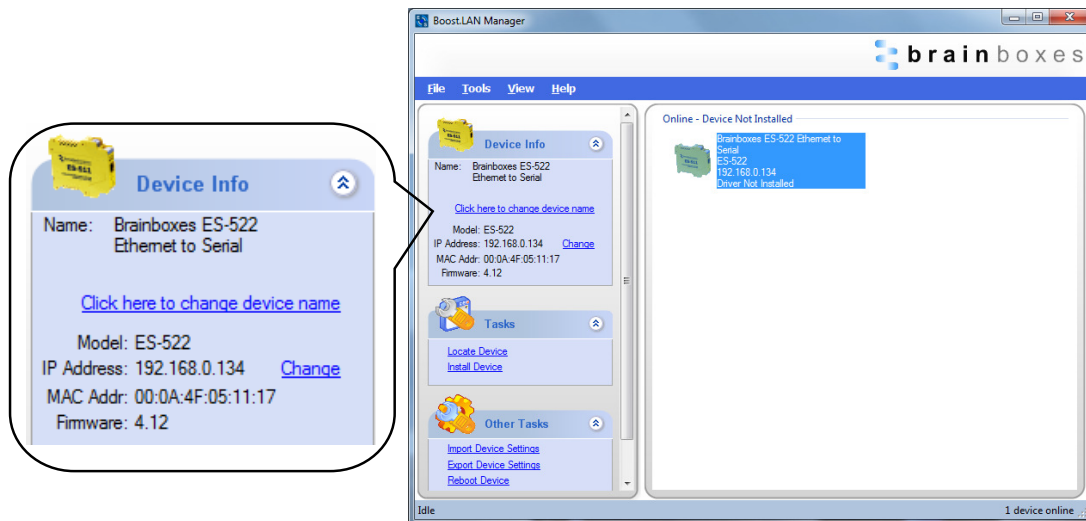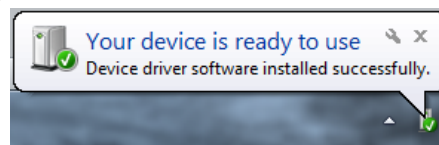

4. Once found, select the device and scroll to the *"Tasks"* section on the left hand panel.

5. Click "*Install Device"*.
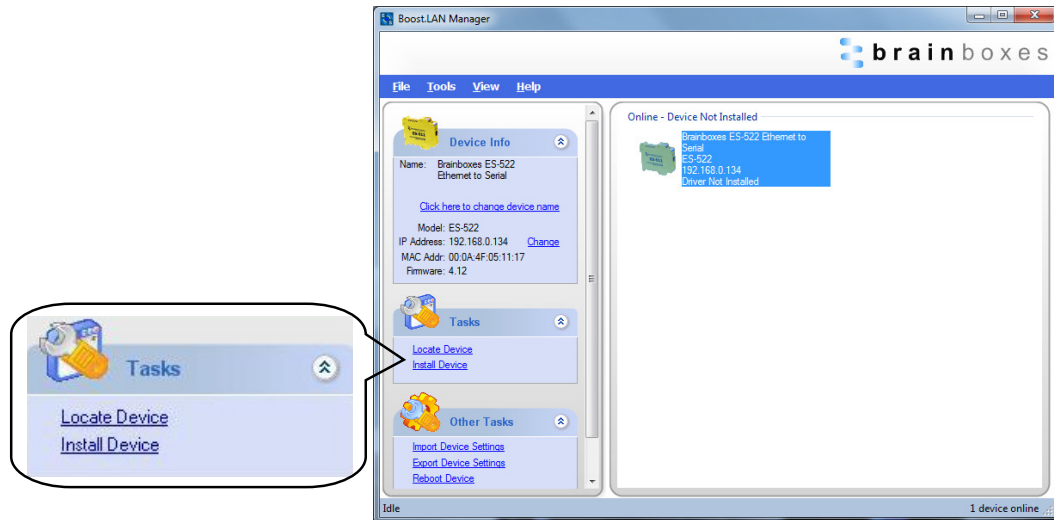
6. During the device installation you will see a timer symbol and the status of the device will be '*Installing driver…*'
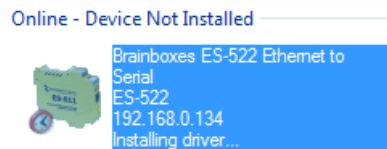
7. Once the device is installed a pop up box will appear saying '*Your new hardware is installed and ready to use.'*

8. In Boost.LAN Manger, the device will display a blue tick symbol showing that it's installed and the status of the device will be 'Ready'. The device will also have moved to the 'Online – Device Installed' section in the main window of Boost.LAN Manager.
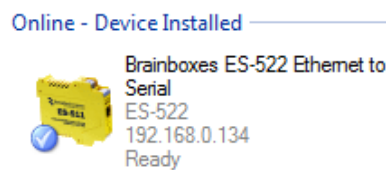
9. You can check the COM Number of the port by following the instructions in the section: Finding your Brainboxes COM port If you need to change the COM port number, see Changing Your COM Label

Windows Installation: Boost.LAN Manager Application (Windows 8)
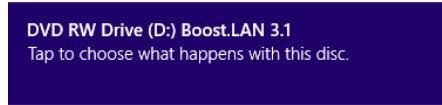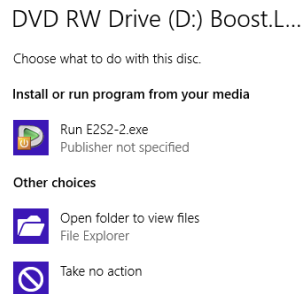
With the computer turned on, insert the Boost.LAN Driver CD.

Note: If the navigation page does not auto load, go to Start → My Computer → Right Click the CD and select Explore. This will open the CD in Windows Explorer for browsing the contents of the CD. Locate the "Setup" program on the CD and double click to launch. Proceed to Step 3.

1. You will now see a purple pop up window as shown below. Click on it.

> **DVD RW Drive (D:) Boost.LAN 3.1**
> Tap to choose what happens with this disc.

2. This will bring up a new menu. Select the 'Open folder to view files' option.

> DVD RW Drive (D:) Boost.L...
>
> Choose what to do with this disc.
>
> **Install or run program from your media**
>
> Run E2S2-2.exe
> Publisher not specified
>
> **Other choices**
>
> Open folder to view files
> File Explorer
>
> Take no action

3. Click on the setup.exe file to begin the installation on the Boost.LAN manager application.

> ▲ Files Currently on the Disc (19)
> 📁 Adobe
> 📁 Bin
> 📁 DotNetFX20
> 📁 Product Information
> 📁 Product Support
> 📁 WindowsInstaller3_1
> 📄 autorun
> 📄 bbnbus
> 📄 BbNBus
> 📄 bbnser
> 📄 BbNSer
> 📄 Boost.LAN Setup (W2K)
> 📄 Boost.LAN Setup
> 📄 BoostLAN
> 📄 E2S2-2
> 📄 E2S2-2
> 📄 LAN2
> 📄 setup
> 📄 SetupW2K
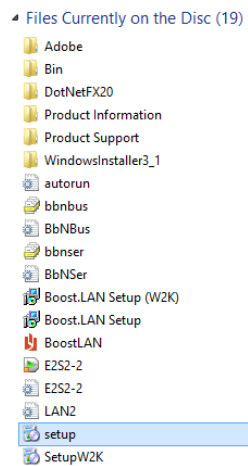
4. When you click on the setup.exe file shown above in step 3, you will then be presented with the below window. Press next.
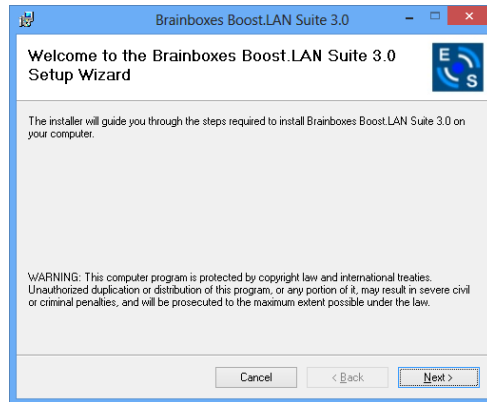
5. After you have clicked next, the setup program will ask you to allow Boost.LAN Ethernet to Serial devices through your firewall. Enable the tick box to continue the installation procedure.
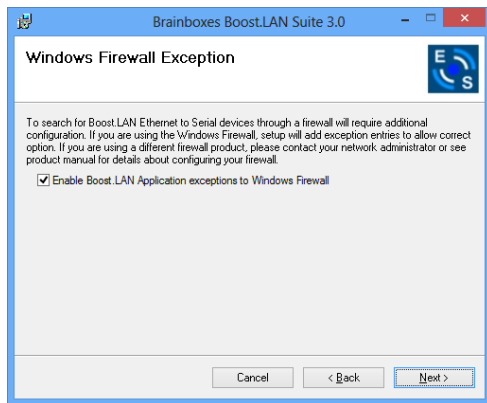
6. You will now be asked to confirm whether or not you wish to carry on installing the software. Click next.
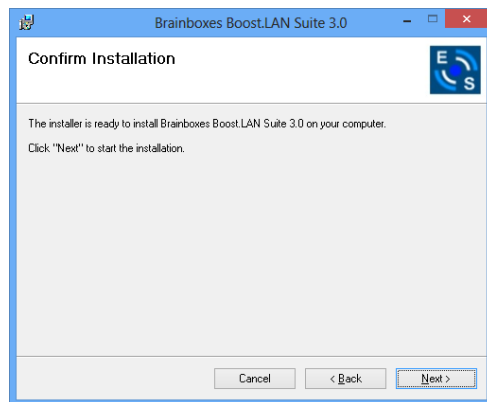
7. The software will now begin to install.
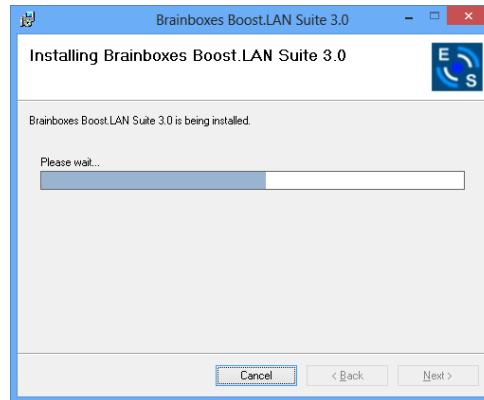
8. After the installation has finished, you will now see the below window. Click close.

Windows Installation: Device Driver (Windows 8)

Double click the icon labelled "Boost.LAN Manager" on the desktop to open the application.

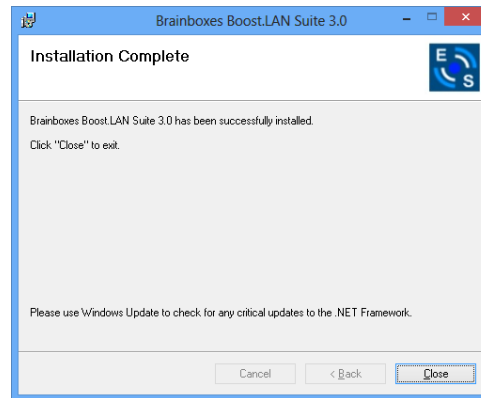1. Click on the *"File > Find Devices"* in the top left hand side of the window. This will find any Brainboxes Ethernet to Serial devices connected to your network.

You can find your Brainboxes ES-device by selecting a device and matching it with the corresponding MAC address available in the left hand panel (see below). The MAC address of your device is located on a sticker on the side of the ES device.

2. Once found, select the device and scroll to the *"Tasks"* section on the left hand panel. Now click Install Device as shown below.

The device will now begin to install. During the device installation you will see a timer symbol and the status of the device will be '*Installing driver…*'
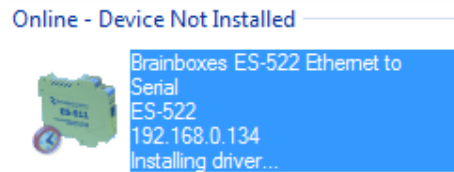
3. In Boost.LAN Manger, the device will display a blue tick symbol showing that it is installed and the status of the device will be 'Ready'. Shown below.
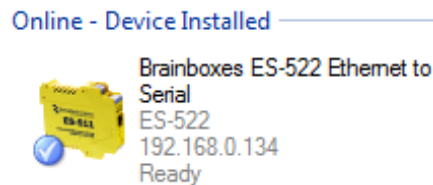
4. You can check the COM Number of the Port, by following the instructions in **Section 0** Finding your Brainboxes COM port If you need to change the COM port number, see **Section** Error! Reference source not found. Changing Your COM Label)

Finding your Brainboxes COM port

1. **Open** Boost.LAN Manager (Found by clicking Start → All Programs → Brainboxes → Boost.LAN → Boost.LAN Manager).

2. Click on your installed ES Device.

3. Find the "COM Ports" section in the left hand pane.

Changing your COM label

1. If you need to change the COM label, find your Brainboxes COM port (using the section Finding your Brainboxes COM port) then double click on the port entry in Boost.LAN Manager.

2. Click on the 'Port Settings' tab and click 'Advanced…'
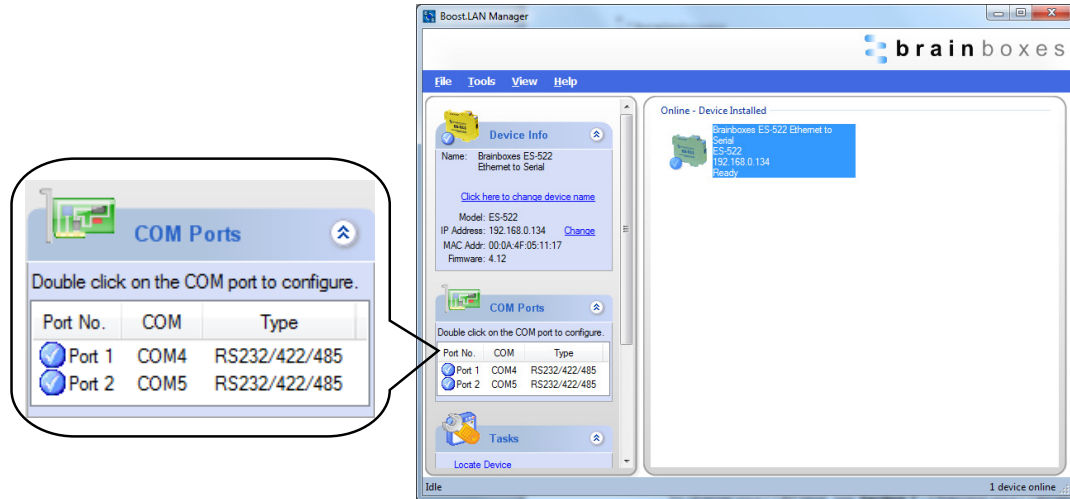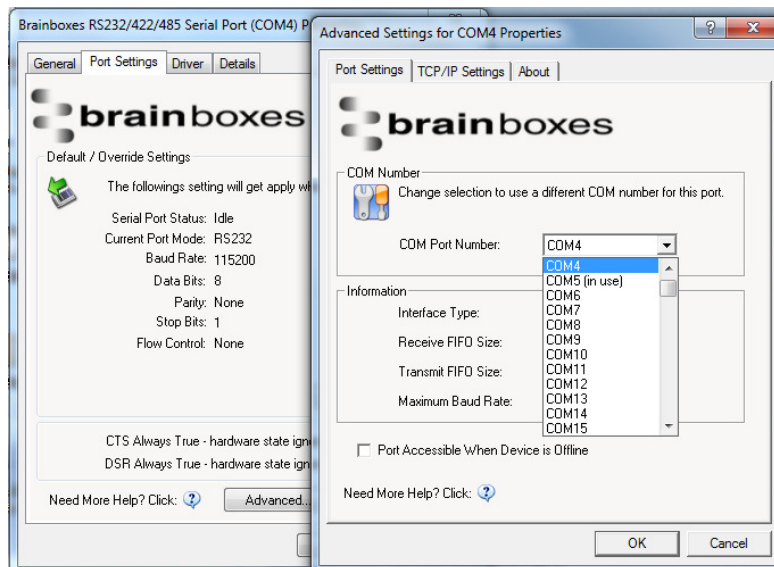
3. A new COM Port label can be selected from the dropdown menu. Click 'OK' to set the new COM Label.

4. If the COM Port number is labelled "in use", it is either currently used by a COM Port present on the system, or is reserved for a device which is not currently present. It is possible to select this COM number and force the change, if you are sure it is not required by any other device.

Changing the IP Address

As mentioned in the "Hardware Features" section of this manual, the ES device is shipped in DHCP Mode. On connecting to the network, the device automatically checks if it is connected to a DHCP Server. If this is the case, the DHCP server will allocate an IP address automatically to the ES device. If no DHCP Server is detected within 60 seconds (e.g. you are using a direct cable connection to the PC), the ES device will default to the static IP address 192.168.127.254.
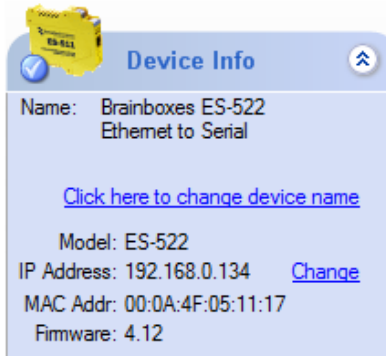If you require a static IP address this can be set manually using Boost.LAN Manager.

■ The IP settings can be easily changed by clicking the "Change" link next to the IP Address available in the "Device Info" section on the left hand panel of Boost.LAN Manager.

■ This will bring up the following dialogue box.
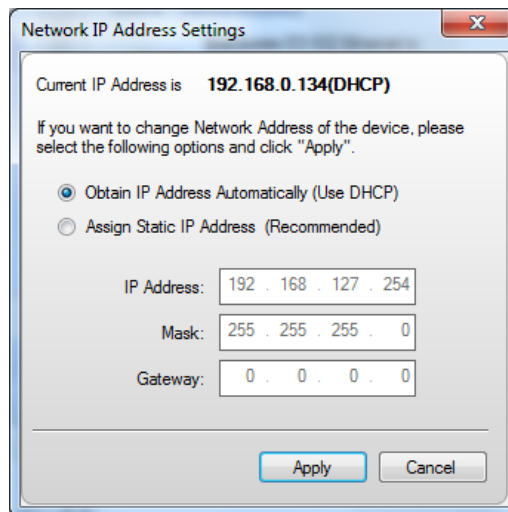
■ Click the "Assign Static IP Address" radio button and enter an IP Address, Subnet Mask and Gateway Address, if applicable. Click "Apply" and the device will reboot and then be set to the static IP address you specified

Changing the Device Name

The device name is the name which the device will use when it is displayed on your network. To change the device name, click on the link in the "Device Info" section in the left hand panel of Boost.LAN Manager.

A box will appear which allows you to enter a new name for the device. Enter the new name for the device and click 'Update'. After a few seconds the device name will be updated in Boost.LAN Manager.
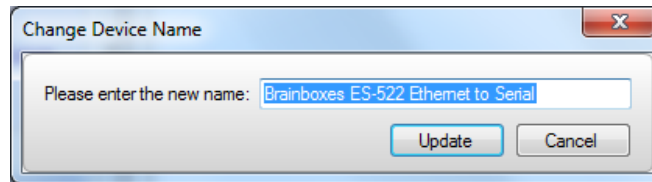
Changing Port Settings

The Port Settings allow you to set Default or Override Settings for the serial communication and set how the device will deal with incoming hardware handshaking events.

- To change the port settings, open Boost.LAN Manager and double click on the Brainboxes COM Port Entry of your installed industrial device. If your device is not installed see **Installing Ethernet to Serial Device Driver**.

- Then Click on the 'Port Settings' tab.
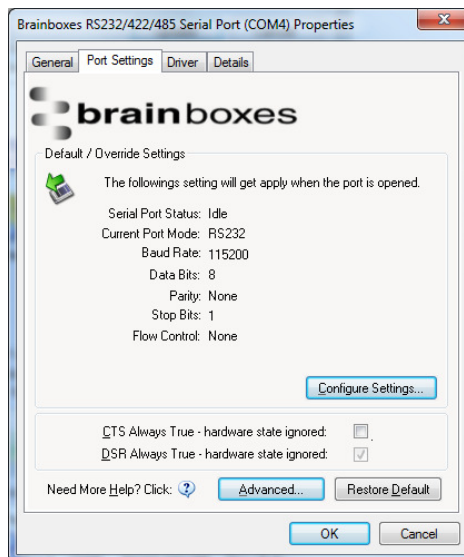
The serial port settings of the ES device are stored in the firmware of the device. As a result of this they have to be configured through the web configuration pages. Click the "Configure Settings" button and you'll be taken to the serial port webpage where the port settings can be configured.

- **Port Status:** Displays current state of the port, that is, whether the port is open (Connected) or closed (Idle). When the port is connected, the IP address and TCP port the device is connected to is displayed.

- **Port Type:** The Port Type drop down box allows you to set the serial port to RS-232 mode or RS-422/485 mode. For information about the pin outs when the port is set to RS-232 or RS-422/485 mode see Section 3, **Hardware Features**. For information about the RS-422/485 configuration see the section below, **RS-422/485 Settings**.

- **Always use these settings:** If this checkbox is ticked, the port will communicate using the baud rate, data bits, parity, stop bits and flow control set in this section regardless of what settings the application is using. For example, this will allow you to force baud rates that your application does not allow you to select. This can be useful for interfacing to equipment which uses higher baud rates or unusual baud rates which your application does not support.

- **Protocol Settings**

  - **Protocol Type – Raw TCP:** Data sent over the network is the same as the data sent over the serial link.

  - **Protocol Type – Telnet:** Data is sent over the Transmission Control Protocol using a virtual terminal connection.

- **Local TCP Port:** Configures which TCP port the ES device will use.

- **Connection Timeout:** This is set to "0" by default. If the Connection Timeout is set to anything other than 0, the connection to the port will be disconnected automatically after being idle (i.e. no data is being received or sent to and from the port) for the specified time. The LED for the port will go off at this point. If the Connection Timeout setting is "0", the port will need to be disconnected manually by the user.

CTS Always True

CTS Always true is only relevant when the ES device is configured to operate in RS-232 mode and when RTS/CTS flow control is enabled.

NB: When the ES device is set to RS-422/485 mode, the RTS/CTS handshaking is not supported. As a result, "CTS Always true" will be enabled by default.

CTS is an incoming hardware handshaking line used for controlling the flow of data transmitted out of the ES device serial port. Sometimes these signals may want to be ignored. By forcing CTS to True, the Ethernet to Serial device will ignore those signals and always send data.

The CTS input acts like a road traffic light controlled by an output from the external serial peripheral with which the ES device is communicating.

Whenever the external peripheral is ready to receive data it sets CTS input true i.e. the traffic light is green and the ES device is free to transmit data. Whenever the external serial peripheral is not able to receive data it sets CTS input false i.e. the traffic light is red and the ES device will not send any more data. When the ES device has a green light to send data and the external peripheral changes it to CTS false the ES device will stop transmitting within an absolute maximum of 3 characters depending on how much data is in its output buffer.

This setting is especially helpful when CTS is not physically connected (i.e. in a 3 wire setup) and it is not acceptable for the data flow to stop and start due to arbitrary variances on the unconnected signal lines.
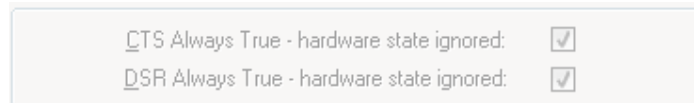
Advanced Settings – TCP/IP Settings & MAC Address

The TCP/IP Settings for the Brainboxes COM Port allow you to view the ES device's TCP/IP settings and MAC.

- To open Advanced Settings open Windows Device Manager, expand the 'Ports (COM & LPT)' section and double click the Brainboxes Serial Port entry.

- In the Serial Port Properties, select the 'Port Settings' tab and then click 'Advanced Settings'

- **Select** the 'TCP/IP Settings' tab.
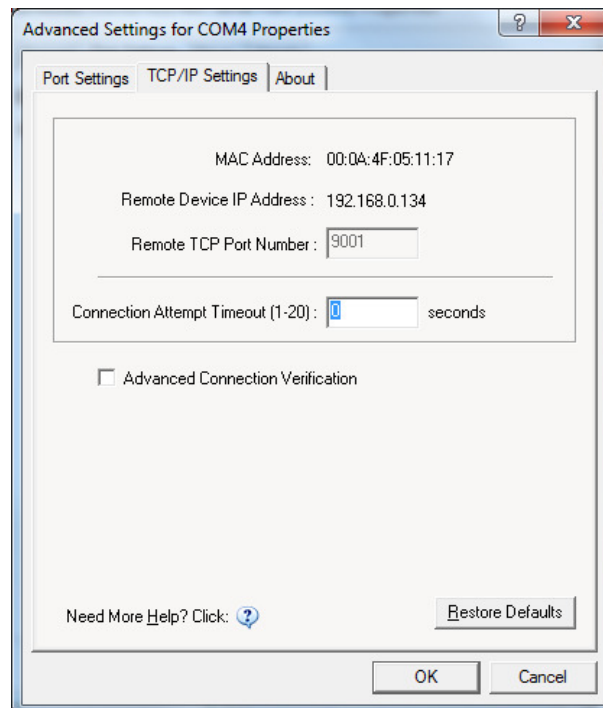
- **Device MAC Address:** This is assigned when the device is manufactured.

- **Remote Device IP Address:** If the device is set to DHCP mode the IP address will be automatically assigned by the DHCP server. If it is set to static, this is set by the user either with the Boost.LAN Manager or using the web configuration page.

- **Remote TCP Port Number:** TCP number used for accessing the port on the ES industrial device. This is set to 9001 by default and can be changed using the web configuration page.

- **Connection Attempt Timeout:** This is set to "0" by default. If "Connection Attempt Timeout" is other than "0", the connection to the port will be disconnected automatically after being idle (i.e. no data is being received or sent to and from the port) for a time ranging from 1 – 20 second/s as specified. If "Connection Attempt Timeout" setting is "0", the port will stay connected until it is manually disconnected by the user.

- **Advanced Connection Verification:** This performs the following checks during the connection opening process.

  - Verifies the port configuration is set correctly (e.g. RS-232 or RS-422/485) on the device.

  - Verifies the device being connected to is the same device model as the device in Boost.LAN Manager

  - Forces the device to use Telnet COM Port control (RFC2217)

  NB: By enabling this setting, it will increase the time it takes to connect to the serial port

Adding a device manually using Boost.LAN Manager

There are two main reasons you may need to add a device manually:

1. UPnP is turned off on your network meaning you are unable to search for devices that are broadcasting.

2. You are accessing the device through one or more routers.

In either of these cases you will need to contact your network administrator to find out the IP address and web server port number for your ES device. Once you have these, follow the steps below to add the device into Boost.LAN Manager.

1. To add a device manually in Boost.LAN Manager, go to Tools and then click 'Add Device Manually'.

2. Enter the IP address of your device into the 'Device IP Address' field, and the web server port number into the 'Device Port Number' field.

3. Click the 'Next' button.
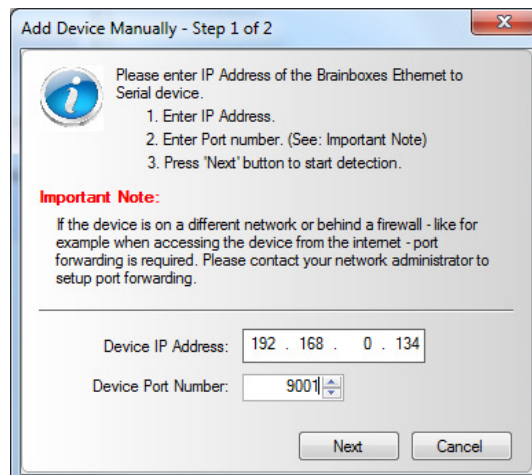
4. Enter the port numbers for Port 1 and Port 2 and then click the 'Add' button. The device will then appear in the Boost.LAN manager window.
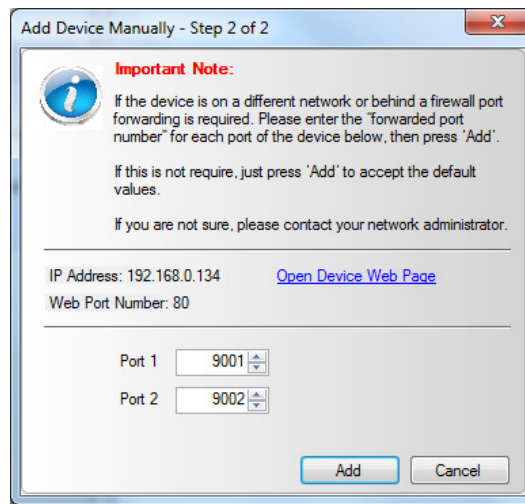
Exporting & Importing Device Settings

It is possible to export the devices current settings to a file, and then import these settings at a later date onto either the same or a different device of the same type. The export feature will export the following settings:

■ All Network Settings.

■ All Serial Port Settings.

Exporting Device Settings

1) Open Boost.LAN Manager

2) Find and select your installed ES Device.

3) On the left hand panel of the window, scroll down to the "Other Tasks" section.
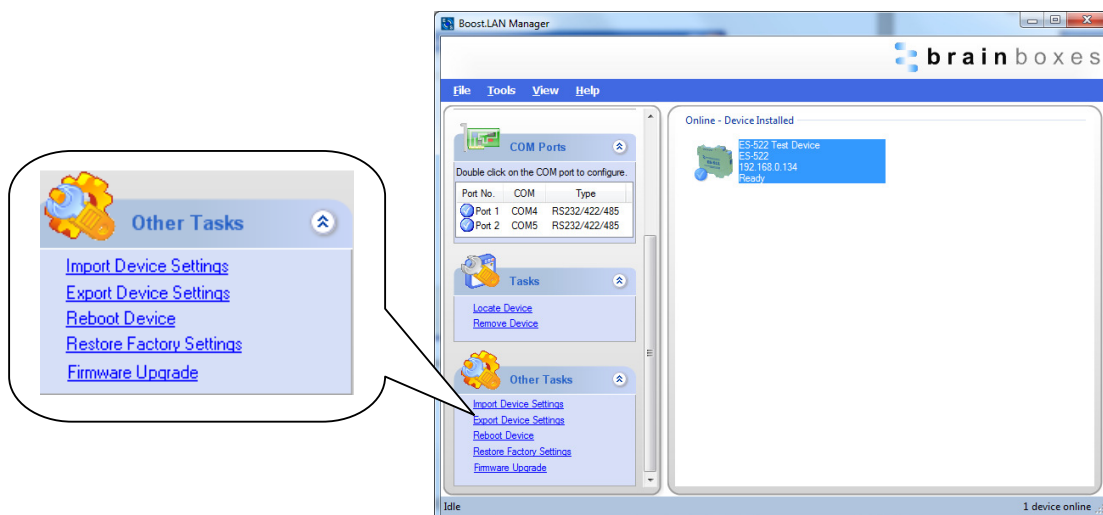
4) Select *"Export Settings"*
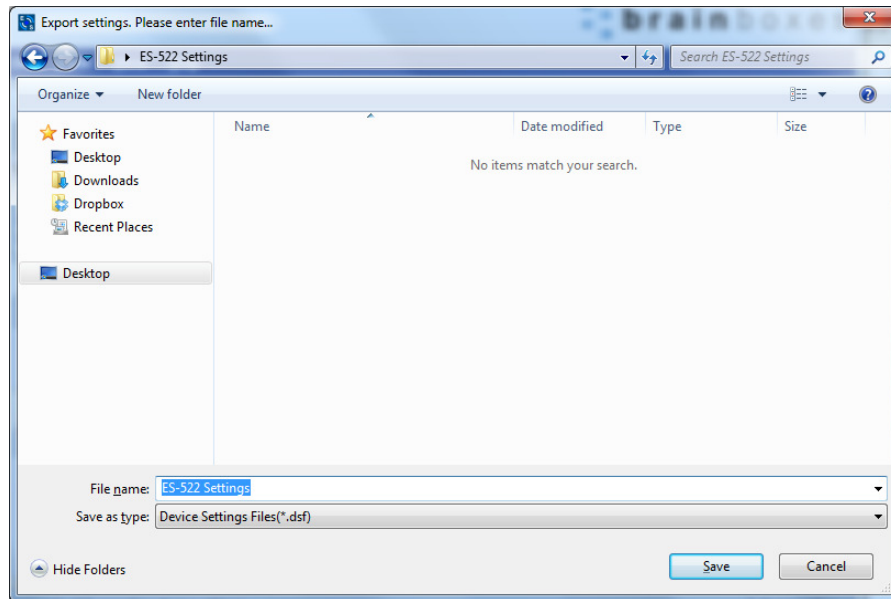
5) Browse to a location where you wish to save the settings file.

6) Enter a file name in the "File name" box. E.g. "ES-522 Settings"

7) Press Save.

Importing Device Settings

1) Open Boost.LAN Manager

2) Find and select your installed ES Device

3) On the left hand panel of the window, scroll down to the "Other Tasks" section

4) Select "Import Settings"

5) Browse to the location of the settings file.
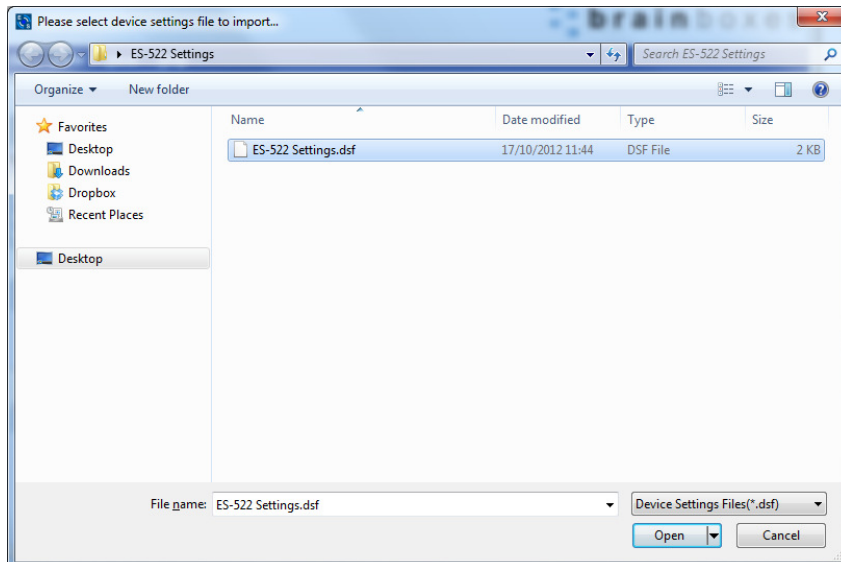
6) Select the file and press Open

7) The settings will then be imported onto the device.

Rebooting Device

We strongly recommend that you check that the device is NOT in operation before doing this to prevent data loss.

If for any reason you wish to reboot your device, whilst still retaining the existing settings:

2) Open Boost.LAN Manager

3) Find and select the ES device you wish to reboot.

4) On the left hand panel of the window, scroll down to the "Other Tasks" section and click "Reboot Device
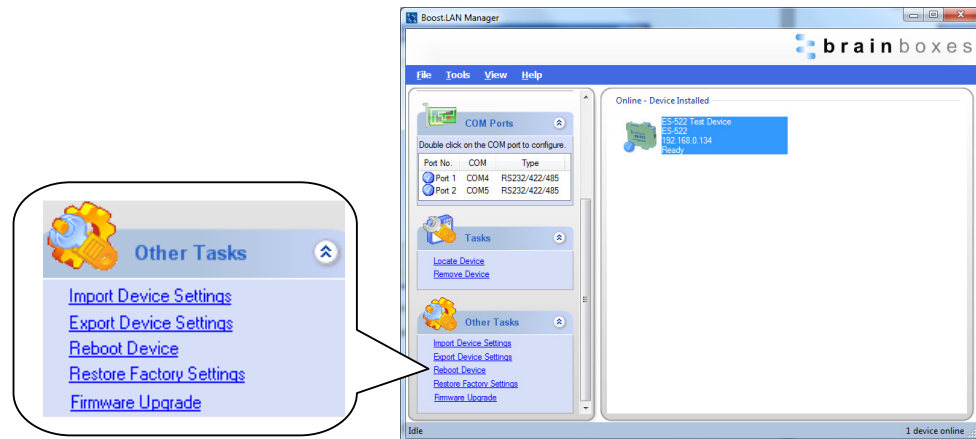
5) Click OK to confirm that you want to reboot your device.

6) The status LED will flash red/green and the device will reboot.. Any connections you may have had to the COM port may need to be reopened.

Restoring to Factory Default

We strongly recommend that you check that the device is NOT in operation before doing this to prevent data loss.

If for any reason you wish to restore the ES device back to factory default settings:

1) Open Boost.LAN Manager

2) Find and select the ES device.

3) On the left hand side of the window, scroll down to the "Other Tasks" section

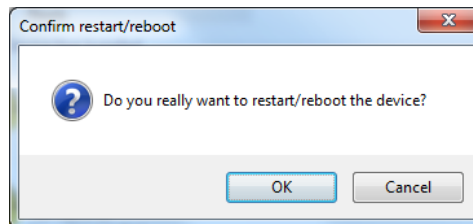4) Select *"Restore Factory Settings"*
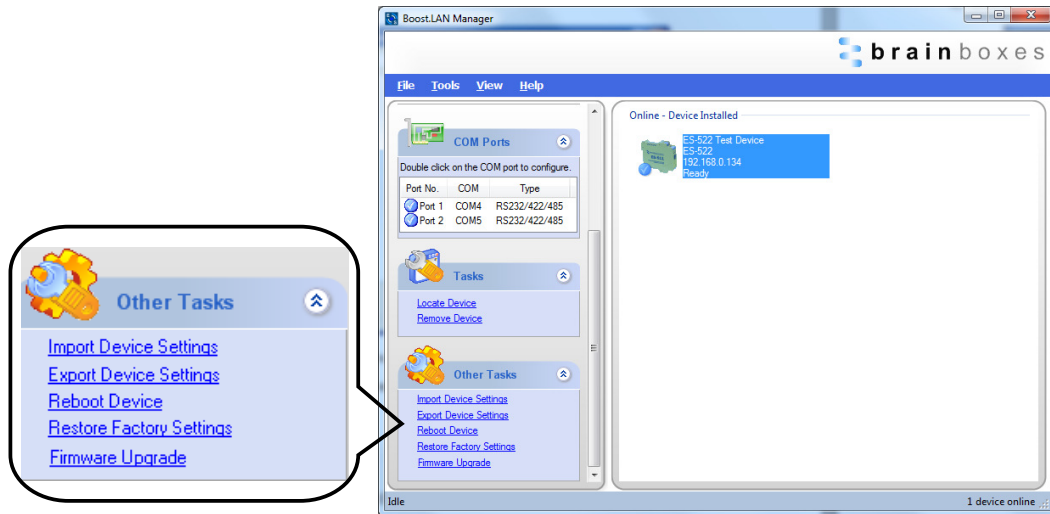
5) A window will appear asking you to confirm that you want to restore the device to factory settings. Click OK.
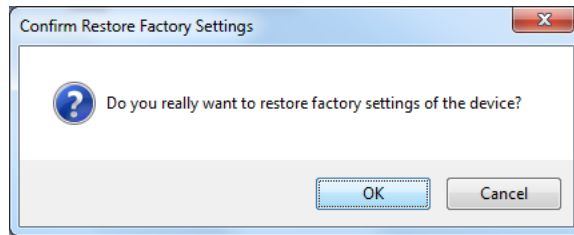
6) The status LED on the device will flash red/green and the ES device will load the factory settings and then reboot.

See **Section 3** for factory default settings.

Firmware Upgrade

To upgrade your firmware to the latest release, follow the instructions below:

NB: We recommend running the firmware upgrade with the ES device connected directly into the PC using an Ethernet cable.

1) Open Boost.LAN Manager and select your device from the Boost.LAN window.

2) Make a note of the current firmware version on the left hand panel.

3) Visit Brainboxes website, http://www.Brainboxes.com/faqs and locate the latest firmware version for your device. Alternatively, contact Brainboxes Technical Support via support@Brainboxes.com and request the latest firmware version be sent to you.

4) If the firmware online or received by Brainboxes Technical Support is a later version, download and save the file to a location you will remember

NB: If the firmware is NOT a later version, do not proceed with the upgrade.

5) In Boost.LAN Manager, go to the left hand panel and select *"Firmware Upgrade"*

6) A message box will appear asking you to confirm you wish to upgrade the firmware.

7) Press "Upgrade"

8) Browse to the directory where you saved the latest firmware.

9) Select the firmware file (*the file extension will be .efw*) and click Open.

10) Do not disconnect the ES Device from the network or power during the upgrade process.

11) Once the upgrade process is complete, select the device and check the firmware version shown in the left hand panel is now the later version.
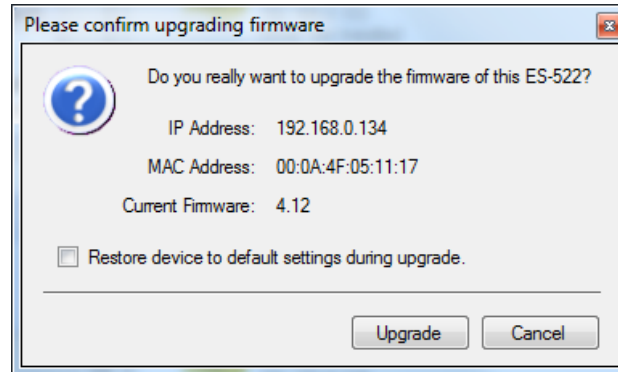
Uninstallation

It is possible to uninstall individual ES industrial devices from your computer or remove the complete Boost.LAN Suite.

Individual Device Uninstallation

This can be done at any time, with or without the device connected. The un-installation steps below are applicable to all devices in the Ethernet to Serial industrial range.

1) Open Boost.LAN Manager.

2) Find and select the ES device you wish to remove.

3) Click "Remove Device" under the Tasks section in the left hand panel.

4) Once the device is removed, it will be listed in the "Online – Device Not Installed" section.

Complete Boost.LAN Suite Uninstallation.

This will remove all Brainboxes Boost.LAN related software, including the Boost.LAN Manager and device drivers.

This can be done at any time, with or without the device connected. The uninstallation steps below are applicable to all devices in the ES Ethernet to Serial range.

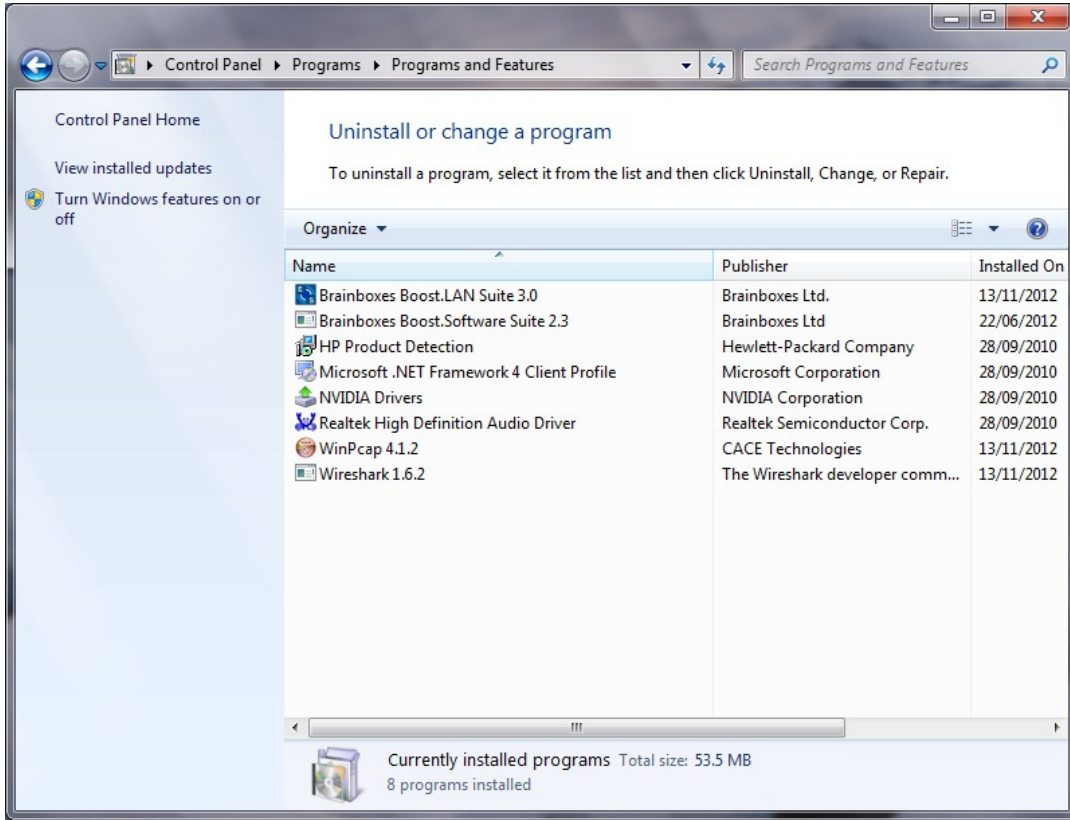1) Open Control Panel, and then open "Add or Remove Programs" or "Uninstall a program", depending on your Operating System.

2) Click on the "Brainboxes Boost.LAN Suite" and then click "Remove" or "Uninstall".

3) The Brainboxes Boost.LAN Suite will then be uninstalled.

7. Configuration Using the Webpage

The ES device can be accessed from any PC, tablet or phone that is connected to your network using any web browser as this does not require Boost.LAN Manager to be installed.
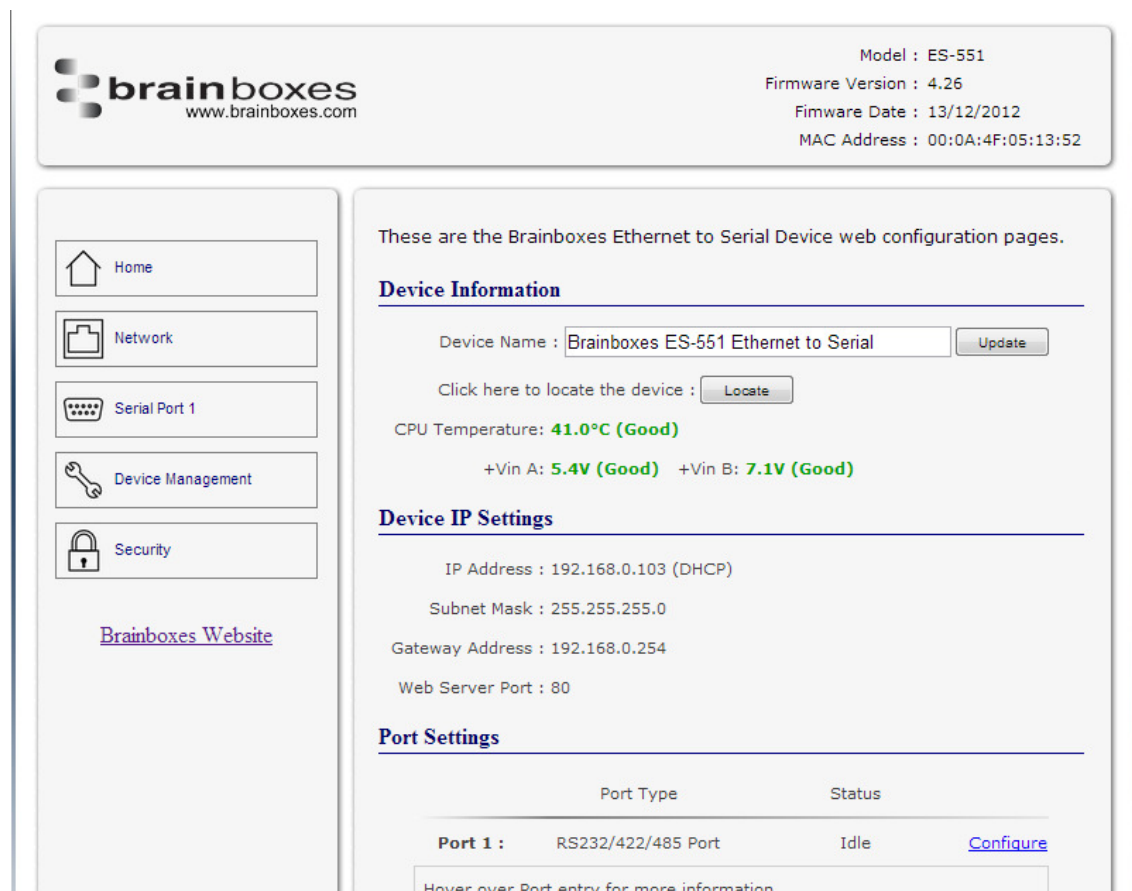
To access the ES device web page:

1. Obtain the IP Address of the ES device.

2. Enter the IP address into the address bar of your Web Browser and press the enter key.

3. The ES device webpage interface should appear allowing you to view and configure the ES device settings.

ES devices store the device settings inside the device. When you access the webpage it gets these settings from the device. When you access the driver it gets the settings from the device too. If you have Boost.LAN closed and change a setting on the webpage, the device driver will not know that the settings have been changed on the webpage until Boost.LAN is opened. When Boost.LAN first opens it will update the settings of any installed devices. Therefore you need to open Boost.LAN manager after changing a setting on the webpage in order for the driver to use this new setting.

Home page

The Home page of the ES device is mainly for informational purposes whilst the other pages allow you to update various configuration options.

■ **Device Information**

    ○ **Device Name:** Here you can change the name the device will use on the network. To change the name, type the new name in the text box and click "Update"

    ○ **CPU Temperature & Power Supply Voltage**: Here you can see the CPU temperature in green. Below this are the power supply voltages. Vin A (first power supply) and Vin B (second power supply) are also shown in green.

    ○ **Locate:** The Locate button will cause all the LED's on the device to flash green for 5 seconds. This is useful if you have a line of industrial ES devices on a DIN rail and need to locate the physical device.

■ **Device IP Settings**

    ○ **IP Address:** Displays the device's current IP Address

    ○ **Subnet Mask:** Displays the device's current Subnet Mask

    ○ **Gateway Address:** Displays the device's current Gateway Address

    ○ **Web Server Port:** Displays the device's current Web Server Port number

■ **Port Settings:** Under the port settings section is listed the device's ports. Hovering over the port entry will display the ports serial settings. Clicking on the "Configure" link will take you to the serial port configuration pages where you can change the settings for the device.

Port Settings

	Port Type	Status	
Port 1 :	RS232/422/485 Port	Idle	Configure
Port 2 :	RS232/422/485 Port	Idle	Configure

Serial Settings: 115200, 8, n, 1   **Port 1**
Flow Control: No Flow Control
Port Mode: RS232
Protocol: Telnet Mode(Server)
Port: 9001
Tunneling: Off

Network Page

■ **Device Network Address:** Here you can change the device's IP address, subnet mask and gateway address. By default the device is set to obtain an IP address automatically by DHCP. If you need the device to use a static IP address, click on the "Assign Static IP Address" radio button, then enter the IP address, subnet mask and gateway into the text boxes. Click "Apply Changes" to save the network address settings.

■ **Other Settings**

   o **Web Server Port:** To change the web server port number, edit the number in Web Server Port box and click the "Apply Changes" button.

   o **UPnP:** Turning the UPnP of your device off or on can only be done using the web page interface. Turning UPnP off will mean that the ES Device won't be broadcasting on the network. This means you won't be able to find the device using Boost.LAN Manager. You can however **add the device manually** if you know the IP address and web server port number. If you are using Boost.LAN Manager it is recommended that you install the driver before turning off the UPnP. This will ensure that when Boost.LAN is opened, the installed device will be displayed in the Boost.LAN device manager panel.

Serial Port Page

- **Port Status:** Displays current state of the port, that is, whether the port is open (Connected) or closed (Idle). When the port is connected, the IP address and TCP port the device is connected to is displayed.

- **Port Type:** The Port Type drop down box allows you to set the serial port to RS-232 mode or RS-422/485 mode. For information about the pin outs when the port is set to RS-232 or RS-422/485 mode see Section 3, **Hardware Features**. For information about the RS-422/485 configuration see the section below, **RS-422/485 Settings**.

- **Always use these settings:** If this checkbox is ticked, the port will communicate using the baud rate, data bits, parity, stop bits and flow control set in this section regardless of what settings the application is using. For example, this will allow you to force baud rates that your application does not allow you to select. This can be useful for interfacing to equipment which uses higher baud rates or unusual baud rates which your application does not support.

- **Protocol Settings**
  - **Protocol Type – Raw TCP:** Data sent over the network is the same as the data sent over the serial link.

o **Protocol Type – Telnet:** Data is sent over the Transmission Control Protocol using a virtual terminal connection.

■ **Local TCP Port:** Configures which TCP port the ES device will use.

■ **Connection Timeout:** This is set to "0" by default. If the Connection Timeout is set to anything other than 0, the connection to the port will be disconnected automatically after being idle (i.e. no data is being received or sent to and from the port) for the specified time. The LED for the port will go off at this point. If the Connection Timeout setting is "0", the port will need to be disconnected manually by the user.

RS-422/485 Settings

The factory default RS-422/485 setting is full duplex mode.

The RS-485 standard talks about the differential pair as 'Data A' and 'Data B' but line driver chip manufacturers use the labels 'Data+' and 'Data-'.

'Data A' is the inverting pin 'Data-' and 'Data B' is the non-inverting pin 'Data+'

If you can't get the connection to work it may be because you have mistakenly connected the lines the wrong way round.

RS-485 Line Failsafe Biasing

Since RS-485 devices have to take turns to send data on the bus there are times when the bus lines are idle, (not driven by any device) and they float to an indeterminate state generating false data.

To solve this; at each end of the RS-485 bus, add a pull up and a pull down resistor to put the line into a known, good state during idle times. Brainboxes products have factory fitted bias resistors that are jumper enabled.

RS-485 Line Termination

Reflections at the end of the twisted pair cable run can interfere with data on the line and so can cause errors.

Brainboxes products have factory fitted termination resistors that are jumper enabled. Fit the jumper ONLY if this device is at the end of the cable

RS-422 Full Duplex Mode

This mode is generally used between one transmitter / receiver to only one other transmitter / receiver, but it is possible for each output to drive up to 10 receivers.
In RS-422 mode, the ES industrial range of devices have 4 pins, TxD+, TxD-, RxD+ and RxD-. Thus 2 twisted pair cables are used. One twisted pair carries the TxD data outwards, one pair brings the RxD data inward.
This mode is generally used between one transmitter / receiver to only one other transmitter / receiver, but it is possible for each output to drive up to 10 receivers.
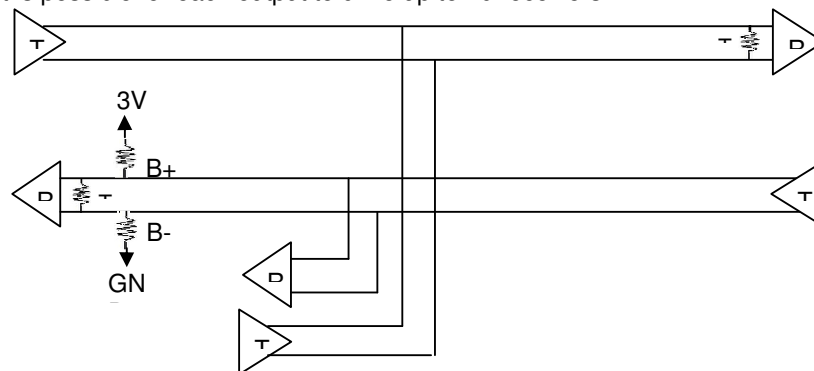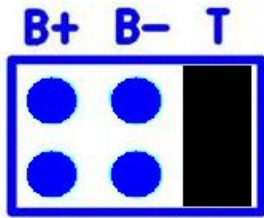
The ES device will have 3 header pins per port which are for electrical jumpers. These jumpers will control the termination resistors and biasing resistors. For optimum signal quality, fit the T jumper but not the B+ and B- jumpers.

The RS-485 standard is similar to the RS-422 standard upon which it is based. The main difference is that up to 32 transmitter / receiver pairs may be present on the line at one time.
Only one pair of twisted wire cable is used in RS-485 Half Duplex communication, Data+ and Data-.
These are the two main wiring schemes:
RS-485 One Talker Many Listeners (Half Duplex)
RS-485 Many Talkers Many Listeners (Half Duplex)

Half-duplex links usually need biasing resistors fitted at some point on the link. These resistors are used to hold the signal lines in a known state when the transmitters are off. If these resistors aren't used it is likely that random data will be received when no transmitter is turned on. This is because of noise which is picked up along the cable which causes the lines to float to unknown states. The B+ resistor pulls the '+' line up to 3V3 and the B- resistor pulls the other '–' line down to ground.
It doesn't matter which device on the link has them, as long as one of them does. Biasing resistors can be connected by fitting the B+ and B- jumpers onto the headers on the ES device PCB.

The T jumper connects in a termination resistor. Termination resistors are used on the end devices in the link to absorb the signal and stop echoes of the data being reflected back onto the transmission line.
For point-to-point links (two devices linked), this should be fitted for both devices. For a multi-drop bus (more than two devices linked on the same cable), the termination should be present at the two end devices but not at any of the devices in between.
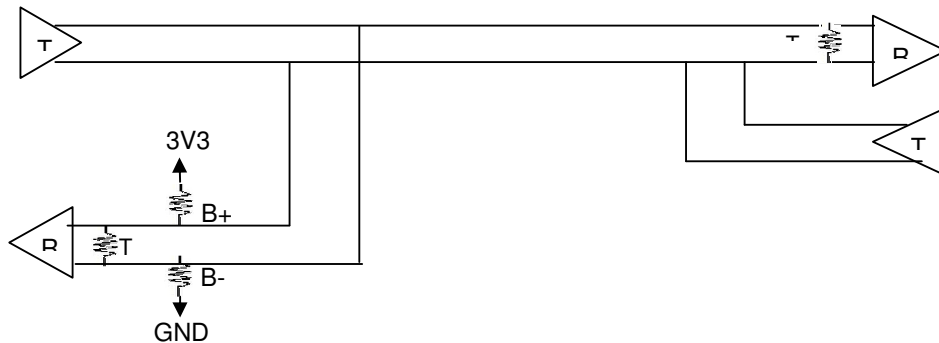
To access the headers, the case of the ES device needs to be opened.
Jumpers can be placed vertically across any of the 3 sets of pins explained as thus below:-

B+ and B- = are bias resistors.
T = Termination resistor

So the possible configurations are:

B+ B− T
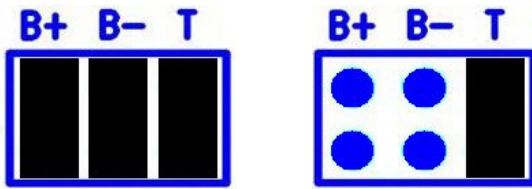
Half-duplex point-to-point link, when no other biasing is present and when biasing is already present somewhere.

For a half-duplex multi-drop bus, if the device is at the end of the bus then use the same jumper configurations as for a half-duplex point-to-point link, above.

B+ B− T
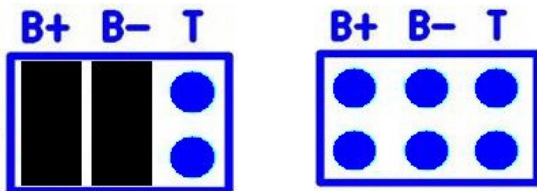
For a half-duplex multi-drop bus, where the device is not at the end of the bus but somewhere in the middle. Or depending on whether biasing is already presented somewhere.

Serial Tunnelling

Brainboxes Ethernet to Serial industrial devices have a feature called serial tunnelling. Serial tunnelling connects two devices together to create a serial tunnel which extends the serial link over an Ethernet connection. When serial data is sent, it is converted to Ethernet packets by one ES industrial device, transmitted over the network, then unpacked and converted back to serial data by the other ES industrial device. An example of tunnelling is shown in the diagram below.

Serial Device   ES Device   Network   ES Device   Serial Device

Serial tunnelling is set up using the webpage interface. In the following instructions there are two devices which are referred to, the local side which is the device that you are connecting from, and the remote side which is the device you are connecting to.

1. Open the web configuration page of the Local ES Device using a web browser.

2. Navigate to the page of the serial port you want to use to tunnel.

3. At the bottom of this web page is the device tunnelling section.

4. To connect tunnelling tick the "Enable" checkbox and select if you want the device to be master or slave. Enter the Remote IP Address and Remote TCP Port number of the ES device you want to connect to and tick the 'Enable' check box.

Serial Tunneling

Enable : ☑

Remote IP Address : 192 . 168 . 0 . 116

Remote TCP Port : 9001
(0-65535)

Note: Serial Tunneling only needs to be configured from one side.

[Apply Changes] [Reset]

5. Click 'Apply Changes' button and you will be taken to a page which will display a success page. You will be redirected to the port page after the countdown timer has finished.

Success

This page will automatically redirect to the Port page. Please wait 8 seconds.
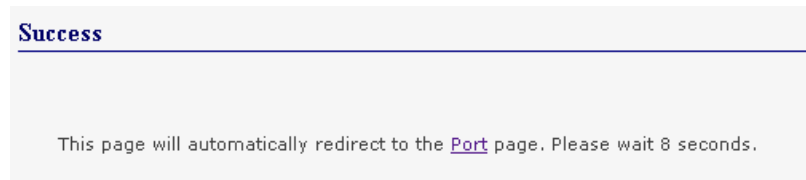
6. The devices will now be in tunnelling mode.

7. On the local device port webpage you will see the device tunnelling section with two buttons, 'Disconnect' and 'Stop Tunnelling'. The 'Stop Tunnelling' button will disconnect the ports on the remote and local side and put both of the devices to an idle state. If the 'Disconnect' button is clicked the remote side port will be disconnected and go into the idle state, but the local side will remain in tunnelling mode.

> **!** This Serial Port is currently connected to the Remote Serial Port in Tunneling Mode.
>
> To temporarily disconnect press 'Disconnect'. This can reduce network traffic.
>
> To permanently disconnect from the remote device press 'Stop Tunneling'.
>
> [Disconnect] [Stop Tunneling]
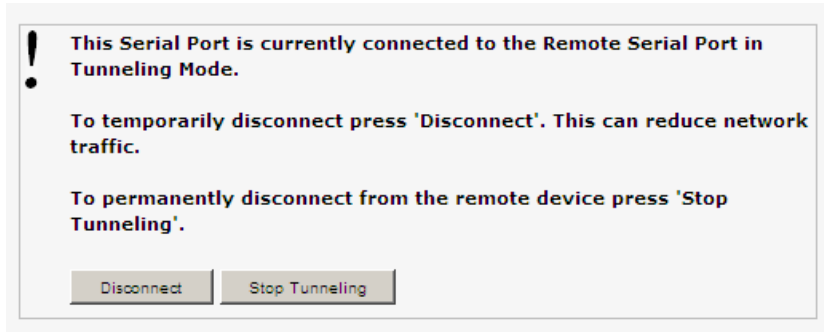
8. On the remote device web configuration page, the Serial port that is tunnelling will show that the port is connected.

> **!** This Serial Port is currently open.
> Please disconnect it and refresh this page to change the settings.
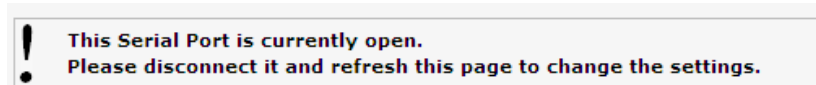
9. In Boost.LAN Manager, the symbol in the image below will be displayed when a device in is connected in tunnelling mode.

Brainboxes ES-522 Ethernet to Serial
ES-522
192.168.0.134
Ready

Device Management

Restart Device

Click to restart the device : [Restart Device]

Restore Factory Default Settings

Click to restore the factory settings : [Restore Factory Default]

Home
Network
Serial Port 1
Serial Port 2
Device Management
Security
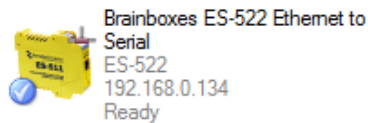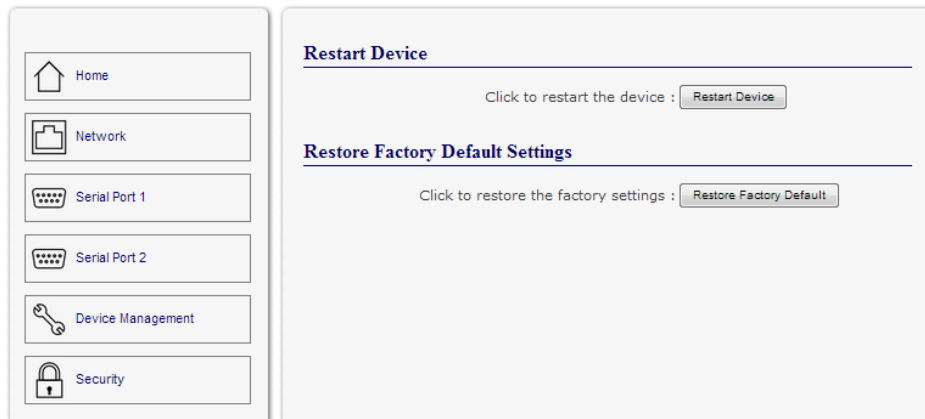
On the device management page there are two options. The first to restart the device and the second to restore the device to factory settings. Before clicking either of the buttons make sure that the device is not in use.
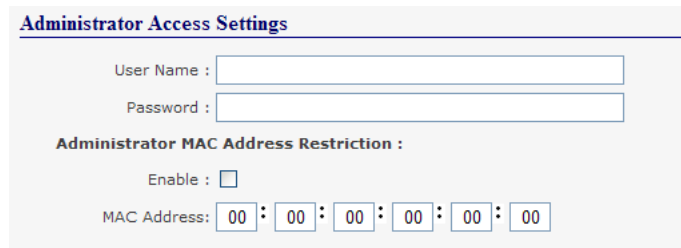
- **Restart Device:** Clicking this button will reboot the device while keeping all the devices settings.

- **Restore Factory Default:** Restoring the factory default will revert all the settings of the device back to the factory defaults and then reboot the device.

Security

Anyone with access to the network can access the webpage of your ES device and change its settings. To prevent this from occurring, there are security features available on the device that can restrict access to certain web pages to account holders only.

Administrator Access Settings

- Creating an Administrator account restricts access to the Security Page to the Administrator account holder. All other pages are still accessible to other users.

- To create an Administrator account:

    1. Open the device's Webpage by typing the device's IP address into a browser

    2. On the left hand menu, click Security. This will open the device's Security Settings page.

Administrator Access Settings

User Name :

Password :

Administrator MAC Address Restriction :

Enable : ☐

MAC Address: 00 : 00 : 00 : 00 : 00 : 00
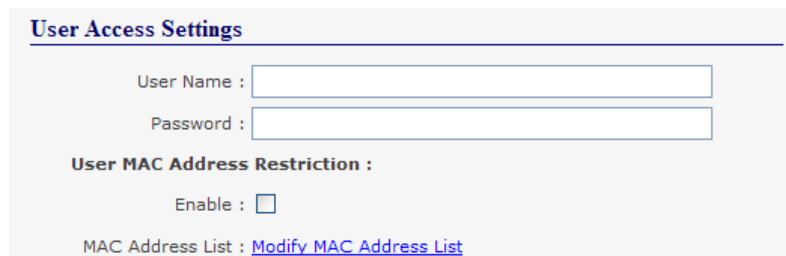
4. Enter a username and password in the "Administrator Access Settings" section

5. Click "Apply Changes" at the bottom of the page.

6. To access the security page of the device via the webpage again, you will be prompted with a log in prompt. Only the administrator will have access to this page.

User Access Settings

- Creating a User Access account restricts complete access to the web page interface of your device to a User Account or Administrator account holder. No configuration page can be accessed without logging in using the user or administrator log on credentials.

- A User account may be created without an Administrator account.

- Both an Administrator and User Account can be set up on the same device. If both are setup, the Security Page will be restricted to the Administrator account holder only. If just a User is setup, then the User has access to all areas.

- To create a User account:

    1. Open the device's Webpage by typing the device's IP address into a browser.

    2. On the left hand panel, click Security. This will open the device's Security Settings page.

    3. Enter a username and password in the "User Access Settings" section.

User Access Settings

User Name :

Password :

User MAC Address Restriction :

Enable : ☐
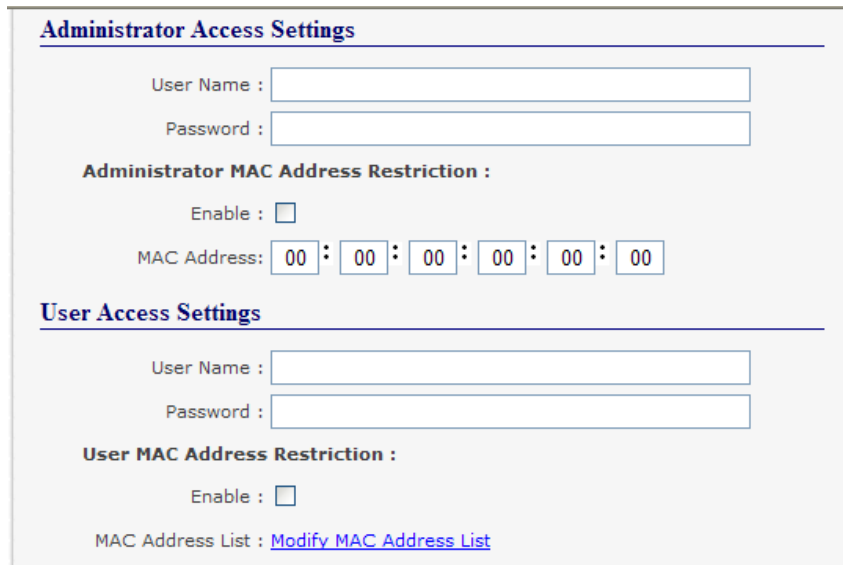
MAC Address List : Modify MAC Address List

4. Click "Apply Changes" at the bottom of the page.

5. To access the web interface of the device again, you will be prompted with a log in prompt. Only an administrator or user will be able to log in.

MAC Address restriction

In addition to Administrator and User accounts to restrict access to users with the correct log on credentials, there is a feature called "MAC address restriction"

- MAC address restriction is available under both Administrator and User settings.

Administrator Access Settings

User Name :

Password :

Administrator MAC Address Restriction :

Enable : ☐

MAC Address: 00 : 00 : 00 : 00 : 00 : 00

User Access Settings

User Name :

Password :

User MAC Address Restriction :

Enable : ☐

MAC Address List : Modify MAC Address List
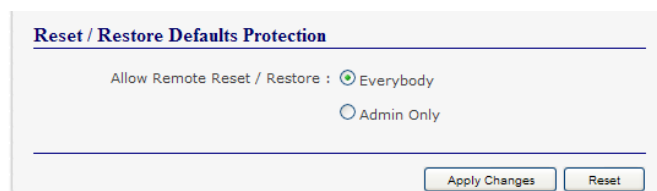
- Enabling MAC address restriction means access that the device will be limited to Administrators or Users with the MAC addresses specified in the MAC Address list. For example
  - The Administrator/User is expected to always log in from the same MAC address. Even if the correct username and password are entered, access will be refused if the MAC address is different.
- **WinSock and UPnP communications are also restricted to specified MAC addresses.**
- Administrators are automatically Users, so there is no need to add the Administrator MAC address to the User MAC address list.
- With MAC address restriction enabled, the device will only appear visible on specified MAC addresses.

Restricting "Reset/Restore Default"

Once an Administrator account is set up, access to the "Device Management" page to "Reset or Restore Default settings" is still available to all users. Alternatively, if both an Administrator and User are set up, both the Administrator and User can access the page.

To avoid any unauthorised "Resetting or Restoring to Default", the following features are available.

- **Everybody:** This will restrict the ability to reset or restore to those with an administrator or user account
- **Admin only**: This will restrict the ability to reset or restore to the administrator only.

Reset / Restore Defaults Protection

Allow Remote Reset / Restore : ⦿ Everybody

◯ Admin Only

[Apply Changes] [Reset]

- NB: You must set up an Administrator account or a User account (or both depending on requirements) for "Reset/Restore Defaults Protection" to take effect.

Authentication Method

There are two authentication methods:

Authentication Method

Basic Authentication Challenge ⦿
Digest Authentication Challenge ○
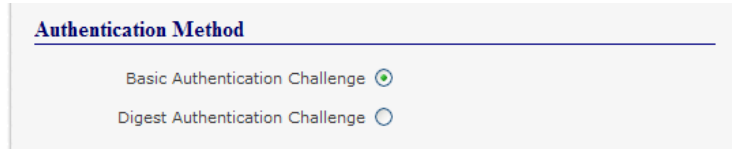
- **Basic Authentication Challenge**: Log on credentials are passed as plaintext over the network.
- **Digest Authentication Challenge:** Log on credentials are encrypted when sending over the network and as such, more secure than Basic Authentication Challenge.

8. Testing your ES Device

In order to prove that your Brainboxes Ethernet to Serial industrial device is functioning correctly, you can perform a loopback test to check the Transmit and Receive lines are working **and** that you can access the device over the network.

A loopback test will verify that your ES device is able to Transmit and Receive Data. The Transmit and Receive lines will need to be connected so that any data sent out of the ES device is then received back on the same Port. Please see the following FAQ from our website for instructions on how to test your Serial port.

> http://www.Brainboxes.com/faq/items/how-do-i-test-my-Brainboxes-card-to-make-sure-its-working

If you are still experiencing problems, see the Troubleshooting Section in this manual.

Using the ES industrial device with your equipment

If you are using a COM port based application

1) Ensure the ES device is powered up and connected to the network (Ethernet and Status LED should be ON)

2) Ensure the ES device is set to the correct port type for communication to your equipment. (i.e. RS-232 mode if using an RS-232 device, or RS-422/485 mode if using an RS-422/485 device) For information on setting the port type, see **serial port page** section.

3) Ensure the ES device is installed on the PC you wish to control the communications to the equipment with.

4) Open your application on the PC which talks to your equipment.

5) Select the COM port associated with your device.

6) Click "Open" or "OK" to start communications as you would usually when communicating to the equipment using your existing direct serial cable connection.

7) Check the Port LED on the ES device is now ON. This indicates the port is open and is receiving data to and from your equipment.

8) Continue to use your application as normal. If you have problems with your application communicating to the equipment, see troubleshooting guide.

If you are using a socket based application

1) Ensure the ES device is powered up and connected to the network (Ethernet and Status LED should be ON)

2) Ensure the ES device is set to the correct port type for communication to your equipment. (i.e. RS-232 mode if using an RS-232 device, or RS-422/485 mode if using an RS-422/485 device) For information on setting the port type, see **serial port page** section.

3) Determine the IP address and port number for each serial port you'll be communicating to. Use Boost.LAN Manager to find your IP address as detailed in **Installing ES Industrial Device**. Use the web configuration page to find the number number(s) for each serial port.

4) Open your application and enter the IP address of the ES device and port number for each serial port you'll be communicating to.

5) Click "Open" or "OK" to start communications as you would usually when communicating to the equipment using your existing direct serial cable connection.

6) Check the Port LED on the ES device is now ON. This indicates the port is open and is receiving data to and from your equipment.

7) Continue to use your application as normal. If you have problems with your application communicating to the equipment, see troubleshooting guide.

9. Advanced Network Configuration

Proxy Server Settings

If you have a proxy server enabled on your PC this will restrict access to the web page interface. You may need to add the ES device to the Proxy Server's exceptions list. If you need help doing this contact your network administrator.

Remote Access

The Remote access feature of the ES devices allows access to the device over the internet or through one or more routers. The device can be accessed remotely through either the webpage interface, or through Boost.LAN Manager. To access the ES device remotely, you will need the IP address of the router and have port forwarding set up on your router for the device and the ports on your device. If you need assistance setting up port forwarding on your network, contact your network administrator.

Once you have the IP address and port forwarding numbers of the device and ports, you can either access the device through the webpage or through Boost.LAN.

Remote Access Using Web Browser

To access the ES device through the webpage you will need the IP address of your router and the ES device's port forwarding number. Type this address into the navigation bar with a colon then the port forwarding number. For example *http://82.68.120.56:20050/* See the example in the screen shot below.
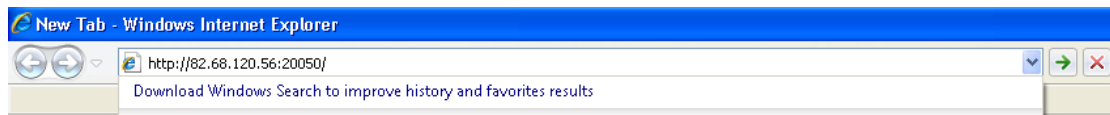
Firewall Exceptions and Port Numbers

When using the ES devices with a firewall you may need to manually add the exception entries and port numbers to the firewall list. Listed below are the default port numbers and the firewall exceptions.

Program Name	Default port number
Device Web Server	80
Serial Port 1	9001
Serial Port 2	9002
Firmware Upgrade	67 (BOOTP Server) 68 (BOOTP Client) 69 (TFTP Port)

Default Windows Firewall Exception entries:

- Brainboxes Boost.LAN Suite
- Brainboxes Boost.LAN Suite (Device discovery) (except Windows XP 32 & 64 bits)
- UPnP Framework (Windows XP 32 & 64 bits)
- Network Discovery (Windows 7 or later)

10.   Troubleshooting and Testing

Common problems

One of the most common problems that users find is that the serial interface standards do not match. A simple way around this problem is to use an ES-511 or ES-522 which have interchangeable standards so that the user can use either RS-232/422/485, half or full duplex.

Another problem which users can often encounter is that their old equipment or hardware has demanding time and flow requirements and may have no buffers. There is an easy solution for this; use a Brainboxes 16C950+ UART as it meets the most stringent demands. It has very tight timing characteristics implemented in the hardware. It supports between 60 baud and 1,000,000 baud (1Mb). Also supports any custom baud rate as standard. It has a 2 kilobyte FIFO on Rx and Tx.

Grounding the device; though the twisted pair carries the data, a ground connection is also required to provide a return path for induced common mode noise and receiver current. Otherwise radiated emissions occur. To fix this, Brainboxes products have a Signal Ground connection on each serial port. Connect the Ground wire to this; optionally add a 120Ω 1Watt resistor in series at one end of the bus.

The most common problems and frequently asked questions for the ES range of devices is listed in the table below along with descriptions and suggestions for corrective actions.

Question	Description	Solution
Problems installing Boost.LAN Device Manager	Boost.LAN installation wizard has not completed or shows an error	Restart the PC and try installing Boost.LAN again. Check if there is an updated driver package online at http://www.Brainboxes.com
Can't find ES device in Boost.LAN Device Manager	When the 'Find Devices' button is clicked the device isn't displayed in Boost.LAN manager.	Check that the device is correctly powered up and plugged into the network. Check the Ethernet and status LED behaviour (see Section 3 Hardware Features) Ensure Brainboxes Boost.LAN Suite is set as an exception in Windows Firewall if it is enabled, and any other custom firewall that you have installed. If you have a proxy server installed check Boost.LAN is on the exceptions list. If you are connecting through a router check that port forwarding is enabled on the router.
Problems installing Boost.LAN COM port driver	Can't install the ES device COM ports.	If device manager shows error messages for the Ethernet to serial device and ports (errors are indicated by a yellow exclamation mark), it is recommended to uninstall and re-install. If the problem is still present after trying the above, try another computer to narrow down the problem.
Code 10 Error in	Device Manager reports "This	In the device Properties dialog box, click the Driver tab, and then click Update

Device Manager	device cannot start. (Code 10)"	Driver to start the Hardware Update Wizard. Follow the instructions to update the driver.
		Install the latest drivers found on our website.
		Try installing the COM port on a different PC.
Cannot open COM port	There is an error when trying to open the COM port.	Check the Ethernet cable is plugged in to the device.
		Check the ES device is correctly installed, and the ports appear in Device Manager without any errors (Errors are indicated by a yellow exclamation mark.)
		Make sure that the port you are trying to open is not being blocked by a firewall that may be installed.
		If you are using a hub/switch or another device between the network server and ES device, check that it's powered and working correctly.
		If you are using the ES device in Static IP mode, check that its IP address is in the same sub-net as the server.
		Check that there are no IP address conflicts on the network.
		If you are using the RS-422/485 in half duplex mode, make sure it is set for half duplex communication in the software.
		Check if there is an updated firmware or software driver package for your ES device by contacting Brainboxes Technical Support with your existing software version.
		Check the status LED behaviour. (See Section 3. Hardware Features)
		If the status LED is showing a problem perform a power cycle, and if there is still a problem restore the factory settings. (See Section 13)
		Make sure that you have access to the device which you are trying to open the COM port of.
		If the problem is still present after trying the above, try a different network card if possible.
Communication Problems	Problems transmitting or receiving data through the port.	Check the status LED behaviour. (See Section 3. Hardware Features)
		If the status LED is showing a problem perform a power cycle, and if there is

		still a problem restore the factory settings. (See Section 13)
		Perform a loopback: The loopback test will verify that your ES device is able to Transmit and Receive data. The transmit and receive lines are connected together so any data sent is received on the same port. Details of loopback tests can be found on our website. http://www.Brainboxes.com/
Can't access ES configuration webpage	When you try to access the webpage by typing the IP address into the address bar of your web browser, the page cannot be displayed.	Check the status and Ethernet lights on the device show that the device is connected to the network and ready. (See section 3 Hardware Features)
		Check that the IP address is the correct one. If you are on a private network the default IP address is 192.168.127.254.
		If you have a proxy server installed check IP address of the device is on the exceptions list.
Error page loads when trying to load web Configuration page	When loading the web configuration page, the Brainboxes web page loads with an error.	Check that you have user or admin access to the device that you are trying to load. If the security settings are on you will need your MAC address added to the access list.
		To clear the security settings you will need to hard reset the device by holding the reset button on the device for 10 seconds, until the device beeps twice. You will then have access to all the web configuration pages.
Problem Upgrading Firmware	The upgrade process does not start or continues to restart without completing successfully	We recommend using a direct Ethernet to PC connection when upgrading the firmware of your ES device. Using this private network means the upgrade will run smoother and quicker because there is no other traffic on the network.

■ Should the problem still persist with your ES device please contact support@Brainboxes.com with:

- o Your Loopback test result
- o IP address
- o Static or DHCP setting
- o COM Setting required (baud rate, data bits, parity, stop bits and handshaking)
- o Firmware and Driver version.

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11.   Linux support for ES devices

It is possible to communicate with the ES range of devices from Linux for both configuration and communicating with attached devices using standard serial port applications. This is achieved by using the Cyclades Serial Client application.

NB The Cyclades Serial Client application is open source software, which is not owned or distributed by Brainboxes. Brainboxes cannot be held responsible for any loss or damage incurred from using this software.

Configuring the ES device from Linux

- To configure the device, you will need to know the device's IP address. You should be able to get this information from your network administrator. If this is not possible, you can search for the ES device from a Linux machine using **upnp_search.pl**. This can be found on the CD in the directory **Product Support/Utilities/Linux Tools** and requires Perl to be installed along with the **Net::UPnP** Perl module.

- Configuration of all the options on the device can be done using the Web page interface. This can be done from any OS, using any modern browser (e.g Mozilla Firefox, Konqueror, Opera, etc) See **Section** Error! Reference source not found.**.**

- **Note:** The Cyclades Serial Client will not be able to track changes in the IP address of an ES product on the network. It is for this reason that we recommend setting the device to a static IP address on the ES device when used with Linux.

Using Cyclades Serial Client to communicate with ES device ports

- The Cyclades serial client can be downloaded as an rpm, or can be installed from the standard package repositories of many popular flavours of Linux, including Debian and Ubuntu.

- After installation, the correct details for the Brainboxes ES ports will need to be added to the /etc/cyclades-devices file. You will require one configuration line for each port, which contains the following details in a colon separated format;

  - o   devname → the device node in /dev, e.g. */dev/ttyS0*
  - o   rastype → this is just set to *Brainboxes*
  - o   rasname → the IP address of the ES device on your network
  - o   physport → port number on the device
  - o   type → communications protocol. Set to *rfc2217*
  - o   options → further device specific options *–p 9000 –d 0*

Example lines for and ES-357 device are given below;

```
/dev/ttyS8:Brainboxes:192.168.0.223:1:rfc2217:-p 9000 -d 0
/dev/ttyS9:Brainboxes:192.168.0.223:2:rfc2217:-p 9000 -d 0
```

See *man cyclades-devices* and also text within */etc/cyclades-devices* for more information.

- After the ES product port information has been added to the */etc/cyclades-devices* file, the cyclades device server should be started and stopped using the commands (as root);

  - o   *cyclades-serial-client start*
  - o   *cyclades-serial-client stop*

These should be integrated into your rc.d scripts so that the ES devices are initiated and stopped on your system startup and halt.

12. Lifetime Warranty and Support

To receive the lifetime Warranty, you need to register your product with us using our online form.

NB: this must be done within 28 days of Purchase.

Lifetime Warranty Sign up

* Terms and Conditions are available online. Standard warranty period is 3 years if a product is not registered.

Since 1983, Brainboxes have designed, tested and manufactured our products all under one Roof. One of our greatest strengths is in after sales service. Technical Support is provided by members of our Test Team, who know our products inside out and have direct access to the chip and board designers as well as the technicians who built and tested your product.

If you have any issues, questions or suggestions about our Products and Services, then please contact us.

Technical Support is free*. As long as you have a Brainboxes Product we will be happy to help, even if it's discontinued or out of warranty. Excellent Customer Service, just as it should be.

For the quickest solution to your issue, if you email us, please include as much detail of your setup and the fault you are experiencing.

* Standard rate call charges for phone support apply.

Email

Technical Support: support@Brainboxes.com

Sales Enquiries: sales@Brainboxes.com

Telephone

You can speak to Brainboxes Support or Sales teams direct,

Monday – Friday, 9am to 5pm (UK time)

Tel: +44 (0)151 220 2500

13.   Regulatory Approvals / Compliance

For up to date details of global certifications, please check the product datasheet on the Brainboxes website: www.brainboxes.com

Company Accreditation

Brainboxes is accredited to internationally recognised standards for our Quality and Environmental Management Systems. Our ISO9001 Quality System was first accredited in 1994, followed by our ISO14001 Environmental System in 2008. These standards help ensure we can demonstrate effective management of all our quality systems and our environmental impacts, together with a process of continuous improvement.

All our Quality systems are subject to internal and external assessment on a regular basis. Copies of Certificates are available for download from our website: www.brainboxes.com

Linked with our Lean and Six Sigma techniques, we believe we have the most reliable products on the market, and to back this up we are offering a Lifetime Warranty* on all our Serial Products.

Europe – EU Declaration of Conformity

Brainboxes products are designed to conform to the protection requirements of European Council Directive 2004/108/EC and its subsequent revisions.

A Declaration of Conformity and supporting Technical Construction File is available by request from Brainboxes, and will identify any updated legislation that may have been introduced since the publication of this Manual.

Warning: This is a Class A Product. In a domestic environment this product may cause interference in which case the user may be required to take adequate measures to address this.

WEEE Directive (Waste Electrical and Electronic Equipment)

The Waste Electric and Electronic Equipment (WEEE) Regulations 2013 became law in the UK on the 1st of January 2014 and replaced the 2006 Regulations. Brainboxes is fully compliant with this legislation.

Customer Responsibilities

You are encouraged to dispose of WEEE in an environment friendly way.

This can be done through your local civic amenities site, an approved treatment facility or alternatively through a relevant compliance scheme.

Brainboxes' Responsibilities

Brainboxes has a legal responsibility, as producer, to provide a free of charge collection service to our customers for our obligated WEEE.

Brainboxes is defined as a producer under the WEEE regulations because we sell own brand Electrical & Electronic Equipment (EEE) in the UK. Our WEEE Producer Registration Number is WEE/AH0004XR.

For details of our WEEE recovery service options, please see our Website, or email us at:

weeerecovery@Brainboxes.com

RoHS Compliance

All Brainboxes Serial and Bluetooth products are fully RoHS compliant.

Brainboxes identified at an early stage the importance of rapid compliance to RoHS guidelines and established a project team to actively manage the transition. The initial step in the process was to use our close relationships with suppliers to ensure early access to RoHS compliant components for all of our Bluetooth and Serial Products. In addition, the project team worked to ensure that our manufacturing processes meet all RoHS requirements well in advance of the deadline.

To verify supplier declarations on RoHS compliancy, we have also sent fully built products to an external test house for X-Ray system XDAL. This technique is capable of determining percentages of different elements and is accurate to 0.1% Wt.

RoHS Compliant Brainboxes products have been available since January 2005.

<u>What is the RoHS Directive?</u>

The Restriction of the Use of Certain Hazardous Substances (RoHS) in Electrical and Electronic Equipment (EEE) Directive (2011/65/EU) was transposed into UK law on 2 January 2013.

This legislation bans the placing on the EU market of new EEE containing more than the agreed levels of:

- lead (Pb)
- cadmium (Cd)
- mercury (Hg)
- hexavalent chromium (Cr6+)
- polybrominated biphenyls (PBB)
- polybrominated diphenyl ethers (PBDE)

Any future revisions to this legislation will be complied with, and identified in a Declaration of Conformity, available on request.

14.   Copyright

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