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Converging Systems Inc.



## **Quick Start Guide**

**e-Node<sup>TM</sup>**

Version 2.1

**Revision History**

<b>Date</b>	<b>Version</b>	<b>Description</b>	<b>Author</b>
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9/13/2012	2.1	Abridged version	AD

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# 1 Overview



The e-Node™ is a gateway device for controlling devices on a CS-Bus™ using internet protocol (IP) messaging. Each device has an associated address, and responds to commands and queries.

The CS-Bus is a bi-directional multi-drop bus using the RS-485 standard. Information transmitted on the bus is in a binary packetized format with sync and checksum bytes to ensure validity of the data. To simplify the programming and control of these devices the e-Node includes a friendly ASCII firewall that allows the user to send and receive simple, friendly text.

## 1.1 Further reading

The following documents are available from the Converging Systems web site.

Commissioning  
Programming  
Upgrading



Pilot Manual  
CSBus messaging  
Technote #1 Firmware upgrading

# 2 Installation

*Initially, make all communication connections to your e-Node while it is unpowered.*

- A. **Connection to CS-Bus Devices.** Connect using CAT5-type twisted pair a 3-pair cable between the e-Node port 0 or 1 and to an available CS-Bus port on any CS-bus or alternative compatible device. (The 4<sup>th</sup> pair on a twisted pair cable can be cut at both ends. Maintain a twisted pair format for pins 1/2, for pins 3/4, as well as for pins 5/6.)

PORT 0

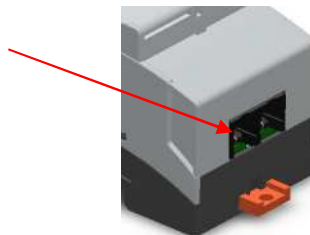


Figure 1

- B. **Connect to an Ethernet Router.** Using a straight-thru CAT5 wire and connect one end to the LAN connection on the e-Node (See Figure 2) and the other end to an available port on an Ethernet router. Make sure that your connection is shorter than 100 meters to your Ethernet router.

**Note:** If you do not have an available router you can connect this CAT5 cable to your PC directly provided the e-Node is in Factory Default DHCP Enabled mode. See directions under AUTOIP in Section 3.5 on how to communicate with the e-Node using AUTOIP

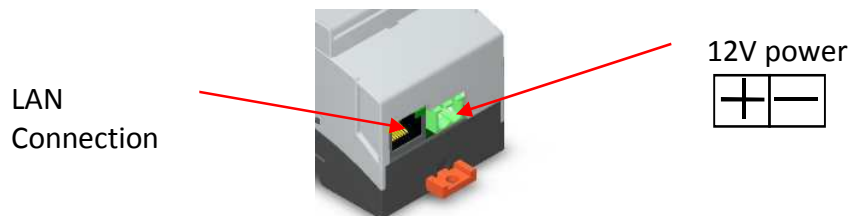


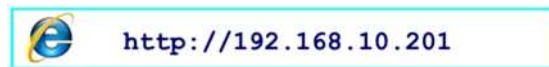
Figure 2

- C. **Connect to a 12v DC Power Supply.** Utilize the provided 12v DC power supply (12v DC @ 100ma min requirement) to provide power to the on-board power connector (see **Figure 2** above). If you are using your own power supply, ensure that proper polarity is maintained.

## 3 Operation

### 3.1 Settings

The e-Node has a factory setting with a DHCP Enabled. When connected to a LAN with an Ethernet router or other DHCP server, the e-Node on power up will request an IP address. This address should be used to communicate with the device. Any example of this IP4 address is as follows:



On power-up, the on-board amber LED on the e-node will initially blink fast. Once the e-Node has obtained its address, that amber LED will confirm proper handshaking by slowing its flash to about 2 seconds per flash. This signifies the e-Node has acquired its IP address.

**Note:** If static IP addressing is required, DHCP can be disabled. This setting can be changed in the web-based application (see **Technical Note #2**) or through the e-Node Pilot Application. If you wish to make this change with the e-Node Pilot Application, consult the e-Node Pilot Application manual.

### 3.2 Communication

Commands sent to the e-Node to control devices are a simple friendly ASCII text. The format is:

Category	Address	.	Device	=	Command	;	CR
----------	---------	---	--------	---	---------	---	----

Where

- Category** is a “#” hash
- Address** is a three part dot delimited number i.e. “1.1.0”
- Device** is the type of device i.e. “LED”

- Command** is an action such as “ON” or “OFF”
- CR** is a carriage return.

An example to lower a screen would be

#2.1.0.LED=ON(CR)

The address field is a three-part **Z.G.N** format where **Z** is the zone (or largest universe), **G** is the Group (or next smaller universe), and **N** is the node (smallest descriptor). Each number is separated by a Period (.). Each numeric entry can contain a number from 1 to 255, with the zero (0) reserved for global broadcasts within its respective range. For example an address of #1.1.0 would instruct the system that all units (lighting controllers or motor controllers) within Zone 1 and Group 1 should respond, while an address of #0.0.0 would instruct the system that all units respond (because of the wildcards in each subfield). See the “CS-Bus Messaging Manual” for a complete listing of all commands and more information.

**Note:** With respect to CS-Bus devices, no two devices can have the exact same **Z.G.N** number which permits up to 55,025 units to be bus addressed.

### 3.3 Protocol

Text command messages can be sent to the e-Node using UDP (preferred) or TCP.

Send messages to the IP address of the e-Node using UDP port 5000. Any response message will use port 4000. These port assignments can be changed by configuring the e-Node, see section 6. The e-Node will listen to UDP broadcast messages (IP 255.255.255.255); however, unique IP addresses are recommended.

The e-Node will also respond to a URL format message sent on port 80 (TCP/HTTP). An HTML query format is used with requests in a “&keyword=value” format.

**192.168.1.100/cs\_bus.cgi?zone=1&group=1&node=0&device=LED&command=ON**

This can be used as part of a web page control implementation.

### 3.4 NetBIOS (WINS)

The e-Node can support NetBIOS over TCP (NBT) to provide windows name services (WINS) for Windows-based networks. A 16-character NetBIOS name can be stored in the e-Node and used as a reference for “Name Query (Discovery)” commands sent by a Windows-based PC. The e-Node supports class 0: B node operations as defined in RFC 1001 & 1002. This mode of operation uses UDP broadcasts to discover and resolve name to IP addresses of devices on the network, and does not require the need of NetBIOS Name Servers (NBNS). This scope or range of NetBIOS name discovery is limited to the extent of the broadcast area. If devices are on different subnets, then ensure that any router or gateway is configured to pass broadcasts messages.

If configured, a Windows client will send a NBT Name Query message, on port 137 to all devices requesting acknowledgement of a name. If an e-Node receives this message, and the name matches the NetBIOS name stored, then the e-Node will respond with a name acknowledgement message and include its IP address. The Windows client will maintain and cache this information in a local database. The contents of this cache can be view using “nbtstat -c” at a command prompt.

If broadcast messaging is impractical, an alternative is to configure a name resolution cache by creating an LMHOSTS file.

### 3.5 AutoIP

AUTOIP is a service that enables dynamic IPv4 addresses to be assigned to a device on startup without a DHCP server (such as a router). This is particularly useful where you wish to directly connect the e-Node to your laptop to make changes within the e-Node and where a router may be either unavailable or non-operational. Both your computer and the e-Node must have DHCP Enabled in order to engage AUTOIP.

- Have your PC powered up with NO internet connection. Do not connect the e-Node to the PC.
- Ensure your e-Node has DHCP enabled. If unknown, then reset your e-Node to the Factory Default (see Section 4.3 in the “e-Node Quick Start Guide”). This activates DHCP (Enabled).
- Once the e-Node’s on-board amber LED flashes fast, connect a CAT5 (straight or crossover) cable between the e-Node and PC’s Ethernet port (*yes this can be done provided the computer’s Ethernet Port is set to “Obtain an IP address automatically”*).
- After 30 seconds, the e-Node’s amber LED fast flashing should slow to a slower speed.
- Wait another 30 seconds and you should see a **message balloon** display on your PC, indicating that you have a connection but that it is limited (this is expected and is OK).
- Launch the e-Node Pilot application. You should now be able to communicate with the e-Node.
- You may then use e-Node Pilot to make necessary changes to e-Node. Then, reboot (e-Node) and install the e-Node onto your existing network (which presumably now has an operational DHCP router available).

## 4 Other Features

### 4.1 Web Applications/Wired or Wireless Support

Browser control of many functions available on the e-Node are available by simply typing in the e-Node IPv4 address into your browser’s address window. If you do not know your e-Node’s IPv4 address, refer to **Technical Note #2**. Both standard as well as enhanced web-page support may be offered on your particular version of e-Node.

### 4.2 Firmware Updates

Firmware Updates are possible with the e-Node. You should only perform a firmware update if instructed to do so by Technical Support. Depending upon the version of firmware currently installed with your versions of e-Node, firmware updates may require outside assistance. Refer to **Technical Note #1** for directions on how to perform firmware updates.

### 4.3 Reset Device

It is possible to perform a reset to Factory Default on your e-Node. All user settings, aliases, programmed tasks, triggers, embedded addresses, Static IP address settings will be returned to Factory Defaults. It is recommended that you document all settings by using e-Node Pilot before resetting the device. More information on e-Node Pilot can be found in the e-Node Pilot application manual.

**Process.** Remove the plastic shroud that surrounds the LAN-connection on the e-Node using your fingernail to separate the shroud from the rest of the e-Node case. On the printed circuit board **behind** the Power Jack can be found a small pushbutton. While the e-Node is powered, depress and hold this pushbutton and note that the small amber LED to the **left** of the Power Jack will flash. After the third flash, release the button and the on-board amber LED will begin to flash fast. Then after a few second and if the e-Node is attached to a network DHCP router, the amber LED will begin flashing much slower (indicating that it has obtained an IP address). At this point, the e-Node has been reset and has been “discovered” by the network. If you wish to reset the device without resetting to the Factory Defaults, hold the button down for just one flash before releasing.

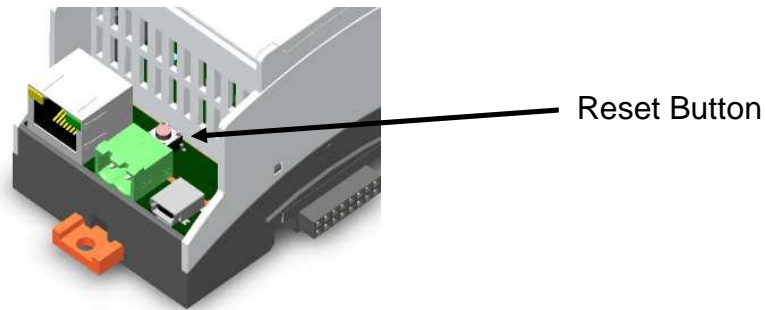
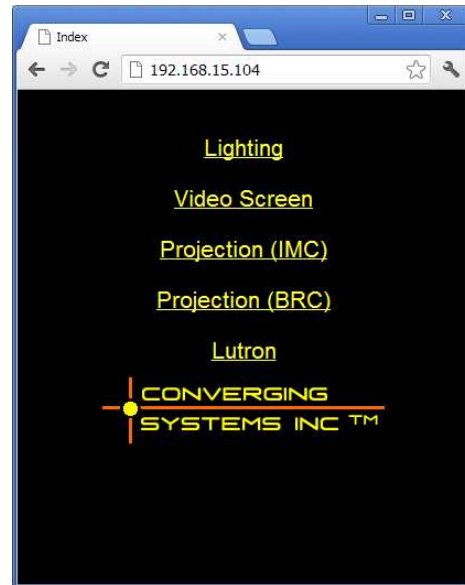


Figure 3

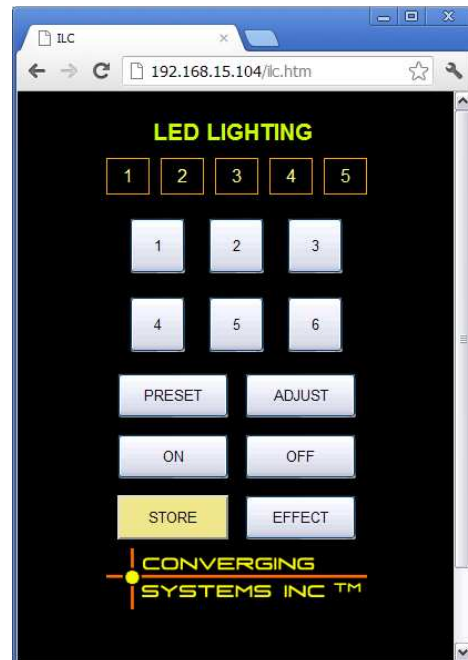


## 5 How to Launch and Operate Standard Web Applications

Type in the e-Node's IP address or NetBIOS address into your browser. You should see a web-page splash screen appear within your browser. This webpage should auto adjust in size depending upon your browsing device (i.e. iPad<sup>R</sup>, iTouch<sup>R</sup>, Android<sup>R</sup> phone, etc.). Below is an example of a sample splash screen:



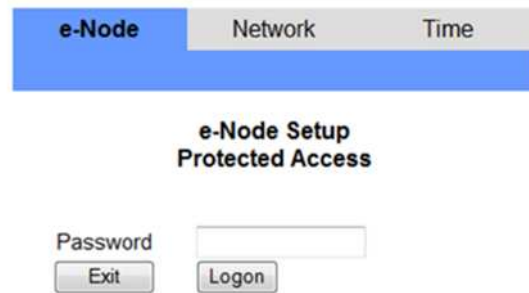
Go to the lighting page by clicking on the "Lighting" link. The following page should display, allowing the control of an ILC100 lighting controller from a web page. Clicking on the logo, will link back to the home page.



## 6 Changing the IP Address and Ports

Access the e-Nodes home page, and click on the logo.

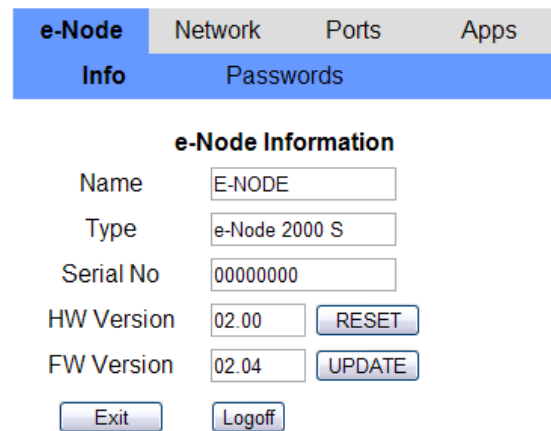
Enter the default factory password ADMIN (upper case) and select Logon. If you have changed this password either in the e-Node web page set-up pages or through the e-Node Pilot application, type in that customized password instead. You should see the following screen appear.



The screenshot shows the 'e-Node Setup Protected Access' screen. At the top, there are three tabs: 'e-Node' (selected), 'Network', and 'Time'. Below the tabs, the title 'e-Node Setup Protected Access' is centered. There is a 'Password' input field, an 'Exit' button, and a 'Logon' button.

This page will display the current information about the e-Node, its hardware and firmware versions.

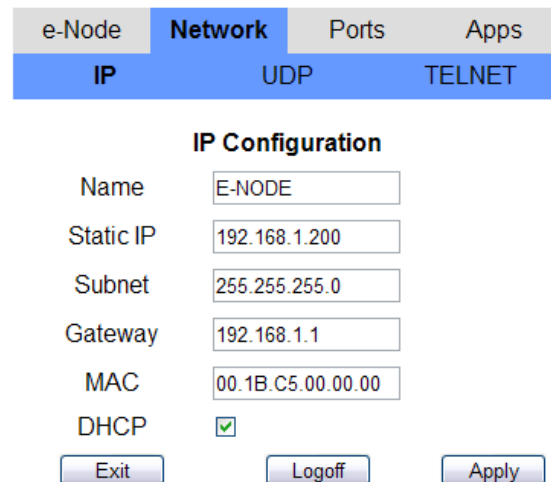
Click on the "Network" tab to go to the setup page.



The screenshot shows the 'e-Node Information' screen. At the top, there are four tabs: 'e-Node' (selected), 'Network', 'Ports', and 'Apps'. Below the tabs, there are two sub-tabs: 'Info' and 'Passwords'. The title 'e-Node Information' is centered. The form contains the following fields and buttons:

- Name: E-NODE
- Type: e-Node 2000 S
- Serial No: 00000000
- HW Version: 02.00 (with a 'RESET' button)
- FW Version: 02.04 (with an 'UPDATE' button)
- Buttons: 'Exit' and 'Logoff' at the bottom.

On the Network page, you can change to static IP by un-clicking the DHCP box, and set a static address. The correct subnet and gateway address should be set accordingly. Click apply when finished.



The screenshot shows the 'IP Configuration' screen. At the top, there are four tabs: 'e-Node', 'Network' (selected), 'Ports', and 'Apps'. Below the tabs, there are three sub-tabs: 'IP' (selected), 'UDP', and 'TELNET'. The title 'IP Configuration' is centered. The form contains the following fields and buttons:

- Name: E-NODE
- Static IP: 192.168.1.200
- Subnet: 255.255.255.0
- Gateway: 192.168.1.1
- MAC: 00.1B.C5.00.00.00
- DHCP: ☒
- Buttons: 'Exit', 'Logoff', and 'Apply' at the bottom.

If you need to change the UDP ports for sending and receiving UDP messages, this can be done on the UDP page. Click Apply to set the new values.

You should either power cycle the e-Node or reset if the addressing has been changed. The web pages will no longer work, and you will need to re-connect the browser.

e-Node	Network	Ports	Apps
IP	UDP	TELNET	

**UDP Configuration**

Listen Port

Send Port

Remote IP