



Integration Note

Automation/Lighting Panel Manufacturer:	RTI Corp.
Platform:	XP-n Controllers
Model Number(s):	ILC-x00 family of LED lighting controllers IMC-x00 family of Motor controllers (WIP)
Partner Profile/Driver Version:	V1.03 or later Note: x.xx supports bi-directional white
Partner Software Platforms	Integration Designer v 9.4.0.3961 or newer
Driver Developer:	RTI coordinated with Converging Systems
Document Revision Date:	12/17/2016

Integration Note Table of Contents

Please the following table of contents to help you navigate through this Integration Note.

Section	Section/Appendix	Subtopics
Overview and Supported Features		
Supported Commands		
		LED Commands
		Motor Commands
System Architecture and BOM		
		Wiring Diagram IP for use with CS-BUS equipment
		Wiring Diagram RS-232 for use with IBT-100
		Wiring Diagram DMX for use with e-Node/DMX and third-party DMX fixtures
Converging Systems Hardware Setup		
RTI Programming		
	Section 1	Import Communication Device into Project
	Section 2	Set-up Communication Parameters
	Section 3	Add Tasks or Macros
	Section 4	Upload and Test
	Section 5	Create Additional UI Screens
	Section 6	Troubleshooting
RTI User Interfaces	Appendix 1	



Converging Systems Inc. • 32420 Nautilus Drive • Rancho Palos Verdes, CA 90275 USA
Tech support 310.544.2628 x2 • Sales 310.544.2628 x 1 • email: info@convergingsystems.com

© 2016 Converging Systems Inc. All rights reserved. e-Node, IBT-100, ILC-x000 are trademarks of Converging Systems. All other trademarks are the property of their respective owners www.convergingsystems.com

Converging Systems Setup/Configuration	Appendix 2	
Background on Addressing	Appendix 3	
Color Space Issues	Appendix 4	
Reserved	Appendix 5	
Advanced Programming (Group Addressing)	Appendix 6	
DMX Options	Appendix 7	
Reserved	Appendix 8	
Common Mistakes	Appendix 9	
Troubleshooting/System Monitoring	Appendix 10	

OVERVIEW AND SUPPORTED FEATURES

The RTI Integration Designer and associated hardware support the Converging Systems' family of motor and LED lighting control products using either RS-232 serial connection (IBT-100) or Ethernet (e-Node).

Integration with Converging Systems' platforms is enabled from the range of RTI wall pads, touchscreens and other user interfaces. Additionally, status available from a number of Converging Systems' controllers can trigger commands and other events within the above lighting /automation system. For example, a motor movement can trigger a lighting event. Or a lighting command issued can signal back to the touchscreen device as to its current setting (slider movement or level setting).



The harmonized RTI driver can currently support a range of CSI controllers including the

- ILC-100m, monochrome controller,
- ILC-100c RGB controller,
- ILC-400c (RGBW controller) or ILC-400m (4-channel monochrome controller), as well as the
- e-Node/DMX Ethernet/dmx color computer translator
- additional CSI motor controllers using either RAW commands (or native commands to be released-WIP)

THE FOLLOWING OPTIONS ARE SUPPORTED BY THE CONVERGING SYSTEMS CS-BUS (LIGHTING) DRIVER:

- Discrete control of LED states (ON/OFF)
- One-way control of Correlated Color Temperature (CCT) (or sometimes referred to as "Dynamic White") settings with RGB, and RGBW devices using Converging Systems FLLA LED elements. Specific CCT settings can be selected as well as CCT UP/DOWN controls for CCT adjustments
- One-way control of Circadian Rhythm (Sunrise to midday sun to Sunset dynamic settings) using Converging Systems RGBW FLLA devices.

- Support of communication utilizing Telnet with or without authentication (Port 23)
- Two-way control of color settings in the RGB, RGBW, or HSB color space.
- Ability to store and recall specific colors set by a user within ILC-x00 controllers.
- Ability to recall specific Effects stored within specific ILC-x00 controllers.
- Ability to change Dissolve Rates (time it takes to transitions from one state to another) (i) for On and Off states, (ii) for Presets to other Presets (color) settings, and (ii) for state to state transitions within Effects.
- Ability to change Sequence Rates (time after any dissolve that a Preset color is maintained before transitioning to the next color in sequence) in Effects 1 and 4.
- Ability to store a Color Temperature or a Circadian Sun level setting within a Customizable Scene
- Control via all thin client interfaces (PC, Touchscreen)

THE FOLLOWING OPTIONS are not supported by CS-Bus (lighting) driver:

- None

THE FOLLOWING OPTIONS ARE SUPPORTED BY THE CONVERGING SYSTEMS CS-BUS (MOTOR) DRIVER*:

- Motor UP/Down/Stop
- Motor Position Feedback (for CS-BUS motor controllers that provide this level of functionality).
- Store and Recall of presets (for CS-BUS motor controllers that provide this level of functionality)
- Support of communication utilizing Telnet with or without authentication (Port 23)

THE FOLLOWING OPTIONS are not supported by CS-Bus (motor) driver:

- None

*Note: currently native support for motor commands is being engineered. RAW commands can be used to insert appropriate motor commands as specified here.

Tabular Summary of Supported Features

The following commands are supported by the current driver for the various lighting and motor control devices (except those that are grayed out).

LED Lighting Commands

Table 1

General CS-Bus Commands	RTI Naming Convention ¹	ILC-100 m	ILC-100c (sa)	ILC-400 (RGBW mode)	ILC-400 (4 ch Mono)	e-Node DMX
General LED Control Commands						
ON	On	✓	✓	✓	✓	✓
OFF	Off	✓	✓	✓	✓	✓
EFFECT,n	Effect	✓	✓	✓	✓	✓ ¹
STORE,#	Store	✓	✓	✓	✓	✓
RECALL,#	Recall	✓	✓	✓	✓	✓
DISSOLVE.0=xx	Wildcard for all dissolves	✓	✓	✓	✓	✓
DISSOLVE.1=XX	Set LED Dissolve_Rate	** 2	** 2	** 2	** 2	** 2
DISSOLVE.2=XX	Set LED Dissolve_Rate	** 2	** 2	** 2	** 2	** 2
DISSOLVE.3=XX	Set LED Dissolve_Rate	** 2	** 2	** 2	** 2	** 2
DISSOLVE.5=XX	Set LED Dissolve_Rate	** 2	** 2	** 2	** 2	** 2
SEQRATE=XX	Set_LED Sequence_Rate	✓	✓	✓	✓	✓
SUN_UP	Sun_Up			*		
SUN_DOWN	Sun_Down			*		
SUN.S	Set_Circadian_Value			*		
HSB (HSL) Color Space Commands						
FADE_UP	Brightness Up	✓	✓	✓	✓	✓
FADE_DOWN	Brightness Down	✓	✓	✓	✓	✓
SET,L	Brightness	✓	✓	✓	✓	✓
HUE_UP	Hue_Up and Adjust LED -Adjust LED Levels moves by step		✓	✓		✓
HUE_DOWN	Hue_Down and Adjust LED -Adjust LED Levels moves by step		✓	✓		✓
HUE,H	Hue		✓	✓		✓
SAT_UP	Sat_Up		✓	✓		✓
SAT_DOWN	Sat_Down		✓	✓		✓
SAT,S	Set_Saturation_Value		✓	✓		✓
STOP	????	✓	✓	✓	✓	✓
COLOR=H,S,L	Set_Preset_HLS Colorspace	✓	✓	✓	✓	N/A
PRESETH.X=XXX .XXX.XXX	Set LED Presets/HLS Color spacer for preset x	✓	✓	✓	✓	✓
RGB(W) Color Space Commands						

RED,R	RED		✓	✓		✓
GREEN,G	GREEN		✓	✓		✓
BLUE,B	BLUE		✓	✓		✓
VALUE=R,G,B	????		✓	✓		✓
WHITE,W	WHITE(wip)	✓	✓	✓	✓	✓
RGB,R,G,B	Set RGB Value		✓	✓		✓
RGBW,R,G,B	Set RGBW Value			✓		
PRESET.X=XXX.X XX.XXX (3- color)	Set LED Presets/RGB Color spacer for preset x					
PRESET.X=XXX.X XX.XXX (4- color)						
STOP	????	✓	✓	✓	✓	✓
Correlated Color Temperature (CCT) Commands						
CCT,XXXX	SET_Correlated_Color _Temp			*		*
CCT_UP	Color_Temp_Up			*		*
CCT_DOWN	Color_Temp_Down			*		*
Bi-Directional Commands						
COLOR=?	Automatic polling within Driver. Note: Driver achieves same function with Notify ON	✓	✓	✓	✓	✓
VALUE=? (for RGB mode)	Automatic polling within Driver (Note: Driver achieves same function with Notify ON	✓	✓	✓	✓	✓
VALUE=? (for RGBW mode)	Automatic polling within Driver (Note: Driver achieves same function with Notify ON	**	**	**	**	**
PRESETH.X=?		*		*		*
PRESET.X=?		*		*		*
Accessory e-Node Command/Setup Parameters						
Verbose Mode						
UDP Port 4000/5000						
Telnet Login with Authentication (with e-Node		✓	✓	✓	✓	✓
Telnet Login without Authentication						

Notes:

- When needed, these can be implemented using the dealer programmed strings using RAW CMD. See [Step3g](#) for more information.
- ** WIP (by RTI currently)
- ¹ Effect (1) only supported
- ² Easiest to set within the ILC-xxx device using e-Node Pilot, or alternately you can use RAW commands to send over specific dissolve rates directly. See [Step3g](#) for RAW commands. .

Motor Commands (WIP currently)**Table 2**

General Commands	RTI Naming Convention	IMC-100	BRIC ("Bric Mode")	IMC-300 (MKII)
General Motor Control Commands				
UP		✓	✓	✓
DOWN		✓	✓	✓
STOP		✓	✓	✓
RETRACT		✓	✓	✓
STORE,#		✓	✓	✓
RECALL,#		✓	✓	✓
PRESET.X=XX.XX				
Bi-Directional Commands				
STATUS=?				
POSITION=?				✓
Accessory e-Node Command/Setup Parameters				
Verbose Mode		✓	x	✓
UDP Port 4000/5000				
Telnet Login with Authentication (with e-Node)		✓	✓	✓
Telnet Login without Authentication				

Notes:

*When needed, these can be implemented using dealer programmed serial strings user RAW CMD. See [Step 3g](#) for more information.

¹See [Step 3d](#) below for information on how to see supported RTI commands within the Library Browser.

Theory of Operation

A RTI processor along with (i) one or more connected CS-Bus compatible devices (LED or projection screen motors) and a single e-Node (for up to 254 controllers) or (ii) one or more connected CS-Bus compatible devices (LED or projection screen motors) and a single IBT-100 serial interface adapter (for up to 254 controllers or (iii) one to 32 third-party DMX fixtures using a single e-Node/**dmx** is all that is required for system operation and perfect RTI/Converging Systems operation. See [Appendix 7](#) for DMX instructions.

Regardless of which method (Ethernet or RS-232c) is desired to be used to communicate with Converging Systems' controllers, **it is still suggested that initial set-up and commissioning of the controllers' addressing schemes and particular features are made using the e-Node Ethernet device and the e-Node Pilot application.** Settings that can be implemented using this setup are in [Appendix 2](#).

NOTE: Converging Systems LED and most Motor Controllers REQUIRE a communication device (either an e-Node for Ethernet connectivity, an BT-100 for serial connectivity or an e-Node/dmx for DMX connectivity). It is not possible to connect CSI LED or most Motor controllers to a RTI controller in any other way (except if those motor controllers have on-board serial or IP connections).

SYSTEM ARCHITECTURE AND REQUIRED COMPONENTS

1A. WIRING DIAGRAM (for IP connection)

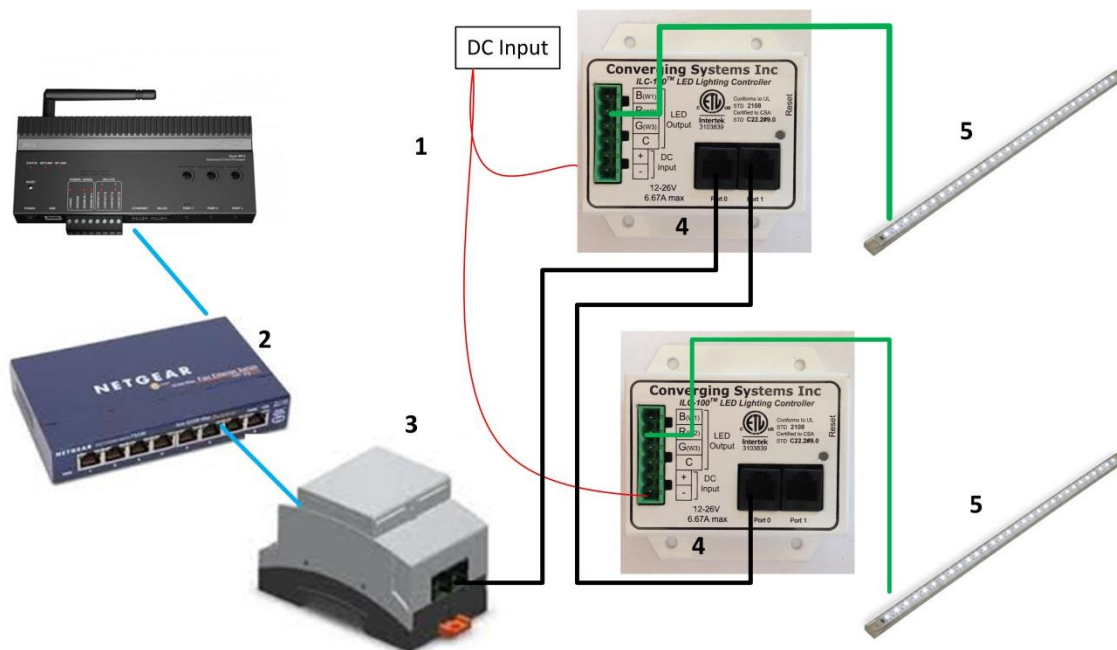


Figure 1

Wiring/Configuration Notes:

1. Maximum length of CS-Bus cabling from e-Node to the last ILC-100 using CAT5e or better cabling (and obeying the 1-1 pin-out requirements for the RJ-25-RJ25 cable) = 4000 feet
2. Maximum number of ILC-100 controllers and Converging Systems' keypads (if provided) that can exist on a single network connected to a single e-Node device = 254
3. Maximum number of e-Nodes that can exist on a RTI system = 254

1B. BILL OF MATERIALS (for IP control)

#	Device	Manufacturer	Part Number	Protocol	Connector Type	Notes
1	RTI XP-n processor	RTI	Various	Ethernet/USB	various	
2	Network Switch	Various	Various	Ethernet	RJ-45	
3	e-Node	Converging Systems	e-Node	Ethernet	RJ-45 (for Ethernet) RJ-25 for local bus	
4	Lighting Controller (or Motor Controller)	Converging Systems	ILC-100 or IMC-100 or (Stewart BRIC)	CS-Bus protocol	RJ-25 for CS-Bus communication	Must terminate beginning and end of bus with 120 ohm resistor on pins 3/4
5	Flexible Linear Lighting (FLLA) RGB or RGBW luminaries	Converging Systems	FLLA-RGB-xxx FLLA-RGBW-xxx		3-color 4 pin 4-color 5 pin 1-color 4 pin	

2A. WIRING DIAGRAM (for RS-232 serial connection)

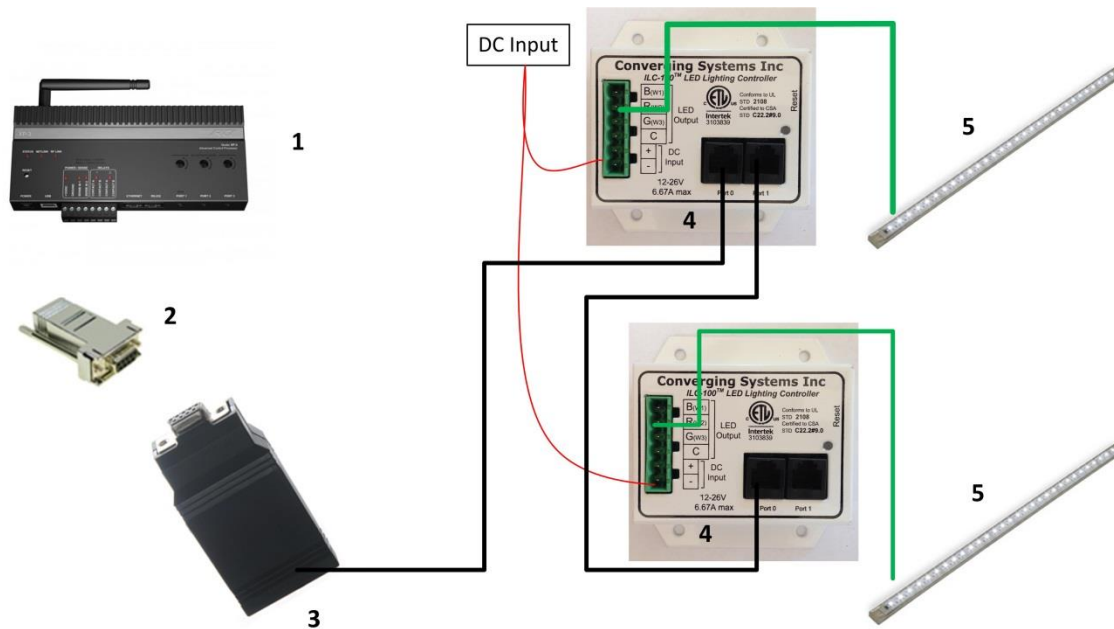


Figure 2

Wiring/Configuration Notes:

1. Maximum length of CS-Bus cabling from e-Node to the last ILC-100 using CAT5e or better cabling (and obeying the 1-1 pin-out requirements for the RJ-25-RJ25 cable) = 4000 feet
2. Maximum number of ILC-100 controllers and Converging Systems' keypads (if provided) that can exist on a single network connected to a single e-Node device = 254
3. Maximum number of e-Nodes that can exist on a RTI system = 254

2B. BILL OF MATERIALS (for RS-232c connection)

#	Device	Manufacturer	Part Number	Protocol	Connector Type	Notes																		
1	RTI XP-x processor	RTI	Various	Ethernet/Serial/IR	various																			
2	RJ-45 to DB-9 male adapter	RTI	RJ-45 to DB-9 male adapter	RS-232c	<div>RJ-45 (for serial)</div> <table><tr><th>RJ45</th><th>DB9</th></tr><tr><td>1</td><td>6</td></tr><tr><td>2</td><td>1</td></tr><tr><td>3</td><td>5</td></tr><tr><td>4</td><td>5</td></tr><tr><td>5</td><td>2</td></tr><tr><td>6</td><td>3</td></tr><tr><td>7</td><td>8</td></tr><tr><td>8</td><td>7</td></tr></table>	RJ45	DB9	1	6	2	1	3	5	4	5	5	2	6	3	7	8	8	7	
RJ45	DB9																							
1	6																							
2	1																							
3	5																							
4	5																							
5	2																							
6	3																							
7	8																							
8	7																							

3	IBT-100	Converging Systems	IBT-100	RS-232c	DB-9 (for Serial) RJ-25 for local bus	
4	Lighting Controller (or Motor Controller)	Converging Systems	ILC-100 or IMC-100 or (Stewart BRIC)	CS-Bus protocol	RJ-25 for CS-Bus communication	Must terminate beginning and end of bus with 120 ohm terminating resistor on pins 3/4
5	Flexible Linear Lighting (FLLA) RGB or RGBW luminaries	Converging Systems	FLLA-RGB-xxx FLLA-RGBW-xxx		3-color 4 pin 4-color 5 pin 1-color 4 pin	

3A. WIRING DIAGRAM (for DMX control using e-Node/dmx and IP) and third-party DMX equipment

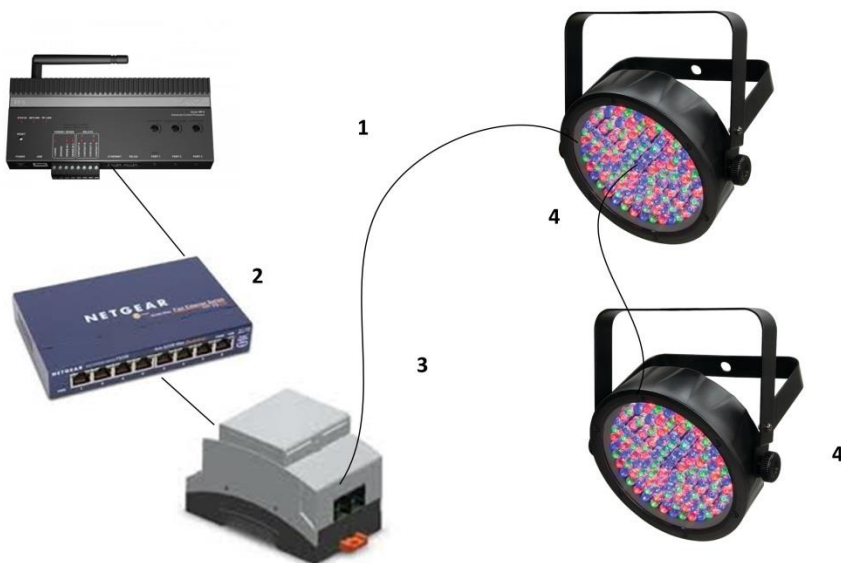


Figure 3

Wiring/Configuration Notes:

1. Maximum length of CS-Bus cabling from e-Node to the last DMX fixture using DMX cabling = 1200 meters (3,900 feet)
2. Maximum number of DMX fixtures connected to a single e-Node/dmx device = 32. If more than 32 fixtures are required, implement additional e-Node/dmx devices.
3. Maximum number of e-Nodes that can exist on a RTI system = 254

3B. BILL OF MATERIALS (for DMX control)

#	Device	Manufacturer	Part Number	Protocol	Connector Type	Notes
1	RTI XP-n processor	RTI	Various	Ethernet/USB	Various	
2	Network Switch	Various	Various	Ethernet	RJ-45	
3	e-Node/dmx	Converging Systems	e-Node/dmx	Ethernet	RJ-45 (for Ethernet) RJ-25 for local DMX bus	
4	Third party DMX fixtures	Various	Various	DMX512	RJ-25 for DMX communication	Must terminate final OUT or THRU connector on last DMX fixture using a 120 ohm resistor
5	Flexible Linear Lighting (FLLA) RGB or RGBW luminaries	Converging Systems	FLLA-RGB-xxx FLLA-RGBW-xxx		3-color 4 pin 4-color 5 pin 1-color 4 pin	

Converging Systems Hardware Setup

NOTE: Converging Systems LED and Motor Controllers REQUIRE a preliminary amount of initial setup/commission which requires the e-Node Ethernet adapter. There are two primary steps that need to be followed:

- Hardware interconnections
- Software setup including device discovery and device addressing.

The core section of this manual assumes that the above two steps have already been performed. In case they have not, please see [Appendix 2](#) and more detailed documentation available on the Converging Systems' [website](#) including

e-Node and Lighting Controller Guides

- ILC Quick Start Guide
- e-Node Commissioning Guide (long version)
- ILC-x00 Intelligent Lighting Controller

Motor Controller Guides

- IMC-x00 Motor Controller Manual

The Converging Systems e-Node Pilot application (required for most installations where bi-directional communication and/or multiple addresses are desired) is available for download for free from the [Converging Systems website](#).

Warning: Only if these above steps have been completed, including device addressing, please proceed to next section.

NOTE: It is recommended that the Converging Systems controllers (ILC-x00 controllers as well as the e-Node Ethernet gateway) are running the latest version of firmware available at the time of installation. Directions for uploading new firmware are contained on the Converging Systems website.

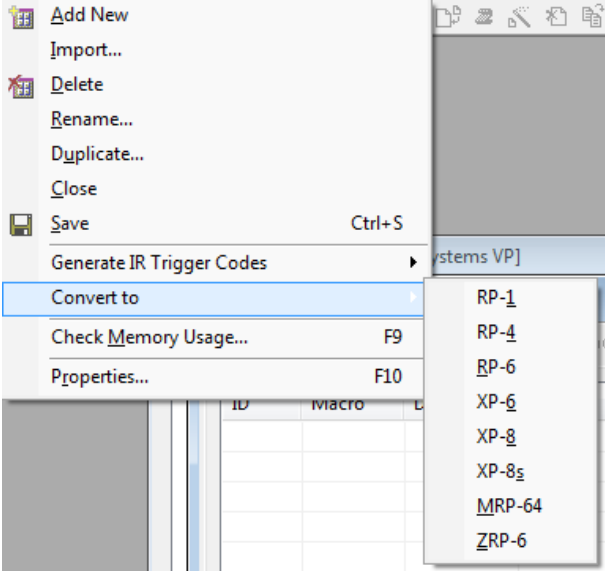
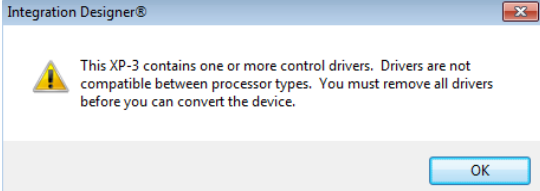
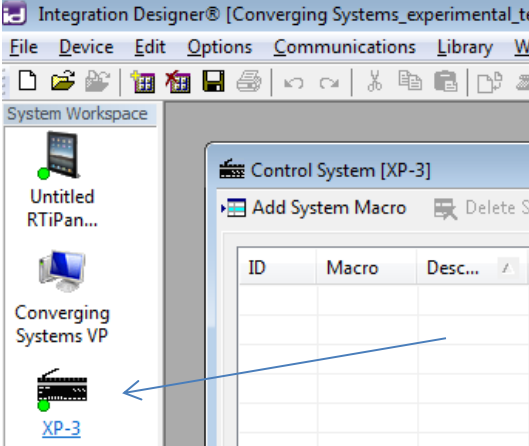
RTI Programming

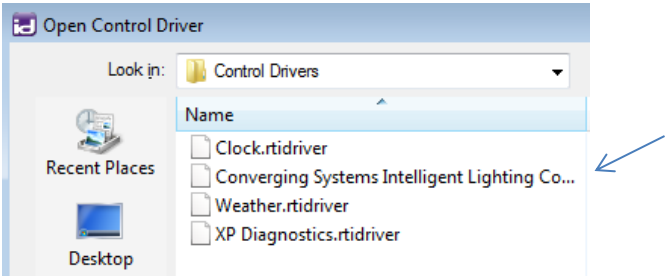
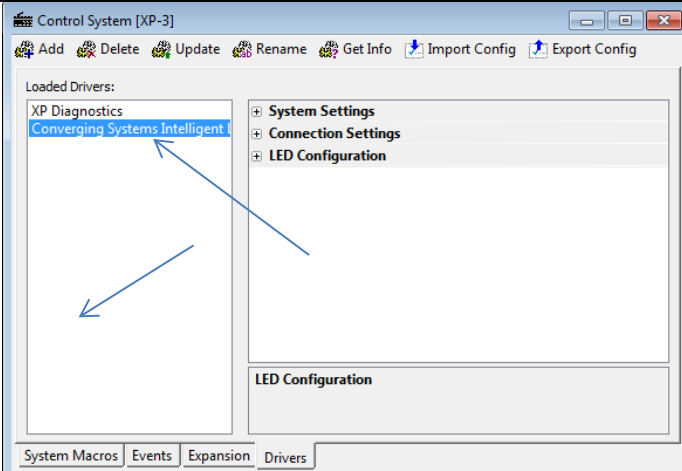
Below is a summary of those steps required to import the Converging Systems' e_Node Ethernet adapter/firewall and one or more loads (motors or lighting). Screen shots are provided for additional information. Typically, the following features are set-up within the RTI commissioning software (Integration Designer).

Note: If you choose to import the sample RTI project into Integration Designer, proceed to Step #1a, if you wish just to import the Converging Systems hardware into an existing project, proceed to Step #2a.

1. Import Converging Systems Intelligent Lighting Controller into your project.

Step	Summary	Detail
1a	Import RTI (or CSI) sample .rti project into Integration Designer	Download sample file either from RTI website or from Converging Systems' website. Select Open and navigate to sample file.

1b	<p>Convert Project file to your particular RTI processor</p>	<p>The sample file may have been created using a RTI processor different from your targeted platform. Within System Workspace, left click on project processor icon.</p> <p>Then select the Device tab and select Convert To and from the pulldown and select your target processor.</p>  <p>Once you see this message, select OK to convert.</p> 
1c	<p>Import Converging Systems Intelligent Lighting Controller into your system file within the RTI Controller (i.e. XP-3 in this case) by using the Add feature.</p> <p>If you do not have this driver in your existing library, go to the RTI Dealer portal and download the latest Converging Systems' driver.</p> <p>Note: Make sure you download latest version from the RTI library.</p>	<p>Within the System Workspace window, select your applicable RTI processor.</p> 

		<p>Next select the Drivers tab at the bottom of the Control System window and select the Add function and navigate to the Converging Systems Intelligent Lighting Controller entry.</p> 
1d	<p>After you have added the Converging Systems Intelligent Lighting Controller to your RTI processor's Driver library, you will see the following entry.</p>	

2. Set-up communication parameters for the Converging Systems Intelligent Lighting Controller

Step	Summary	Detail
2a	<p>Set-up communication parameters for the Converging Systems interface (IBT-100 serial device or e-Node IP device) that will be used with one or more Intelligent Lighting Controller within Connection Settings tab</p>	<p>Determine what will be the communication linkage that you will use to connect to the Converging Systems' device. Refer to the appropriate section below depending upon your choice.</p> <p>Serial Communication: Left click your RTI processor icon under System Workspace, and select the Drivers tab at the bottom. Select the Converging Systems device. Under the Connection Settings entry, select the Connection Type, pick Serial Port.</p>

+ System Settings	
- Connection Settings	
Connection Type	Serial Port
Serial Port	Network (TCP - Telnet)
Baud Rate	Network (UDP)
- LED Configuration	Serial Port
Number of LEDs used	0

Select the applicable **Serial Port** and make sure the **Baud Rate** is set to the 57600 (default setting).

Control System [XP-3] *

Add Delete Update Rename Get Info Import Config Export Config

Loaded Drivers:

- XP Diagnostics
- Converging Systems Intelligent

System Settings

Processor: Default (Master)

Connection Settings

Connection Type: Serial Port

Serial Port: (not set)

Baud Rate: 57600 (default)

LED Configuration

Connection Type

The method used to communicate with the unit

System Macros Events Expansion Drivers

IP Communication (Telnet Recommended): Left click your RTI processor icon under System Workspace, and select the **Drivers** tab at the bottom. Select the Converging Systems device. Under the **Connection Settings** entry, select the **Connection Type**, pick **Network (TCP-Telnet)**.

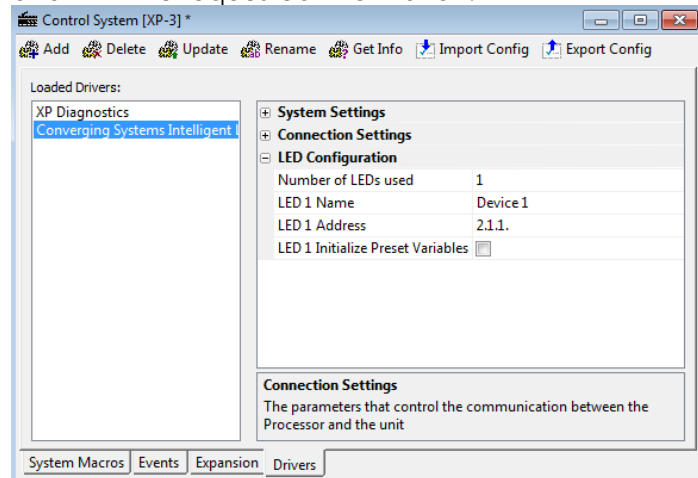
+ System Settings	
- Connection Settings	
Connection Type	Network (TCP - Telnet)
IP Address	Network (TCP - Telnet)
TCP Port	Network (UDP)
- LED Configuration	Serial Port
Number of LEDs used	0

For **IP Address**, enter the e-Node's previously set up Static IP address (set up initially using e-Node Pilot application).

		<div data-bbox="737 191 1396 455" data-label="Form"> <div> <div>+</div> <div>System Settings</div> </div> <div> <div>-</div> <div>Connection Settings</div> </div> <div> <div>Connection Type</div> <div>Network (TCP - Telnet)</div> <div>▼</div> </div> <div> <div>IP Address</div> <div>192.168.10.243</div> </div> <div> <div>TCP Port</div> <div>23</div> </div> <div> <div>-</div> <div>LED Configuration</div> </div> <div> <div>Number of LEDs used</div> <div>0</div> </div> </div> <p>IP Communication (UDP-not generally recommended): Left click your RTI processor icon under System Workspace, and select the Drivers tab at the bottom. Select the Converging Systems device. Under the Connection Settings entry, select the Connection Type, pick Network (UDP).</p> <div data-bbox="737 745 1411 1058" data-label="Form"> <div> <div>+</div> <div>System Settings</div> </div> <div> <div>-</div> <div>Connection Settings</div> </div> <div> <div>Connection Type</div> <div>Network (UDP)</div> <div>▼</div> </div> <div> <div>IP Address</div> <div>192.168.10.243</div> </div> <div> <div>UDP Send Port</div> <div>5000</div> </div> <div> <div>UDP Receive Port</div> <div>4000</div> </div> <div> <div>-</div> <div>LED Configuration</div> </div> <div> <div>Number of LEDs used</div> <div>0</div> </div> </div> <p>For IP Address, enter the e-Node's previously set up Static IP address (set up initially using e-Node Pilot application). Select the applicable UDP Send Port (5000) and the UDP Receive Port (4000).</p> <div data-bbox="737 1220 1432 1701" data-label="Form"> <div>Control System [XP-3]</div> <div> <div>Add</div> <div>Delete</div> <div>Update</div> <div>Rename</div> <div>Get Info</div> <div>Import Config</div> <div>Export Config</div> </div> <div> <div>Loaded Drivers:</div> <div> <div>XP Diagnostics</div> <div>Converging Systems Intelligent</div> </div> </div> <div> <div>-</div> <div>System Settings</div> </div> <div> <div>Processor</div> <div>Default (Master)</div> </div> <div> <div>-</div> <div>Connection Settings</div> </div> <div> <div>Connection Type</div> <div>Network (UDP)</div> </div> <div> <div>IP Address</div> <div>192.168.10.239</div> </div> <div> <div>UDP Send Port</div> <div>5000</div> </div> <div> <div>UDP Receive Port</div> <div>4000</div> </div> <div> <div>+</div> <div>LED Configuration</div> </div> <div> <div>Connection Settings</div> <div>The parameters that control the communication between the Processor and the unit</div> </div> <div> <div>System Macros</div> <div>Events</div> <div>Expansion</div> <div>Drivers</div> </div> </div>
2b	Set-up communication parameters for the specific Converging Systems Intelligent Lighting Controller(s) within	Determine the universe of controllers that will be connected to the communication linkage that you set up in Step 2a above.

Connection Settings Tab

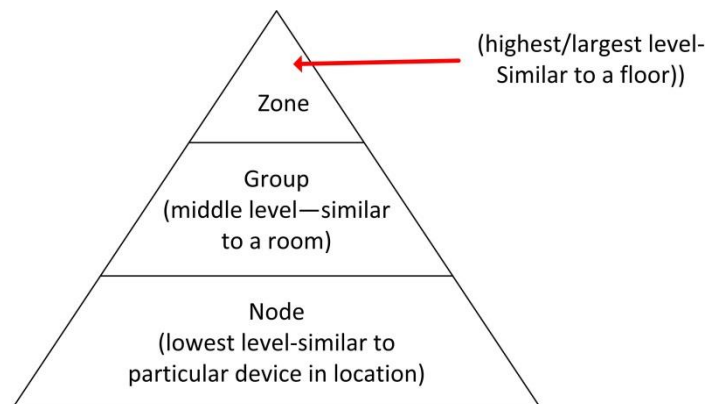
For LED devices, expand the **LED Configuration** tab, and fill in the requested information.



Number of LED's used. Enter a number between 1 and 254 for the number of controllers that will be supported by your system.

LEDn Name. Enter a name for each controller to be supported. You may leave the default name as is.

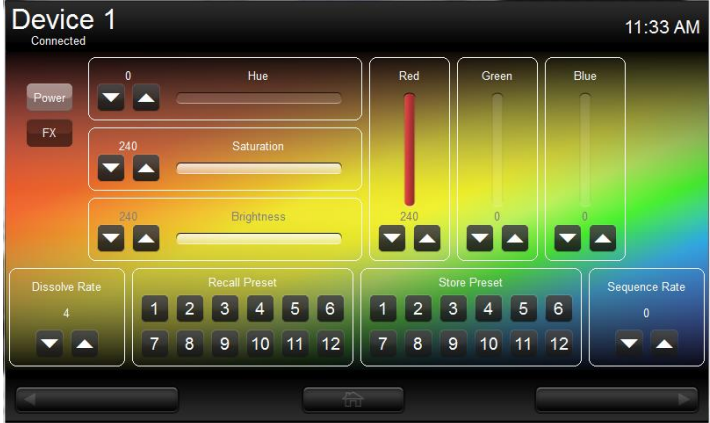
LEDn Address. Enter a Zone/Group/Node (**Z.G.N.**) name for each controller to be supported. These Z.G.N. addresses need to be assigned by the e-Node Pilot application. **In order for the bi-directional capabilities of the RTI system to operate with respect to Converging Systems' devices, it is imperative that a non-zero entity be selected for each Z.G.N. address. And please note, no two controllers should be assigned the same Z.G.N. address.**

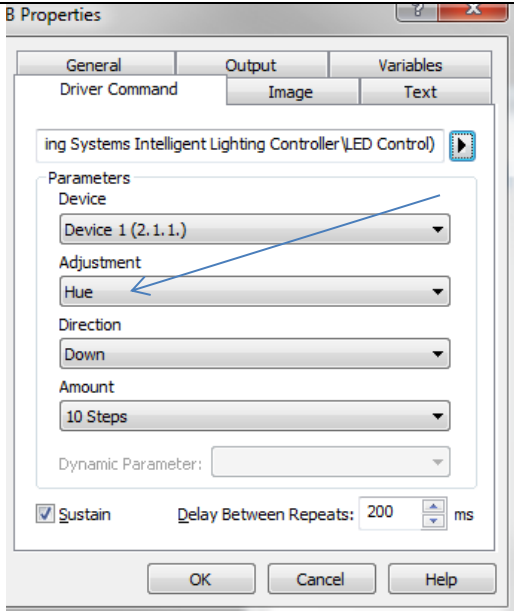
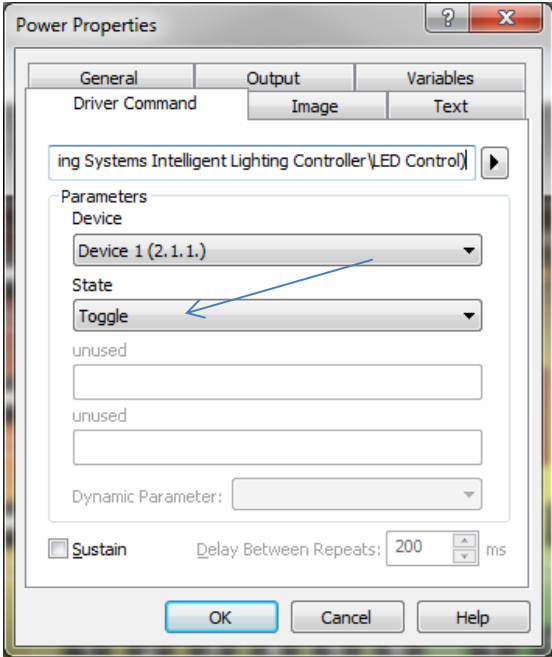



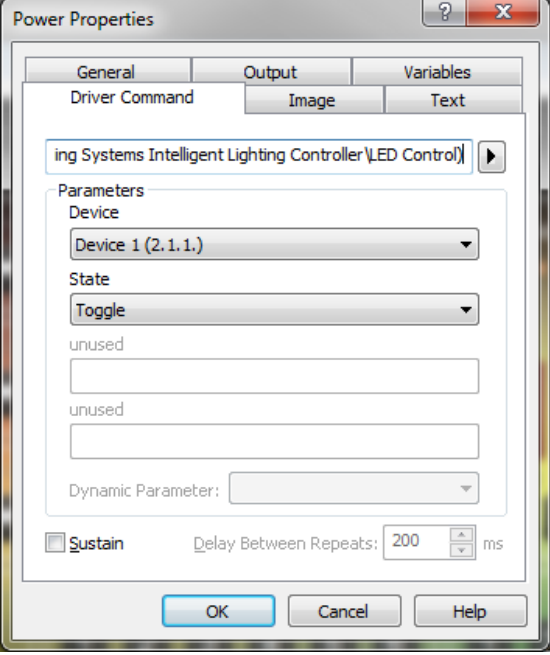
Example: If you have a device with a Z.G.N. address of 2.1.1., then the RTI system can poll that device to determine its current lighting status. If you choose to enter a wildcard address of a 2.1.0. (that is a

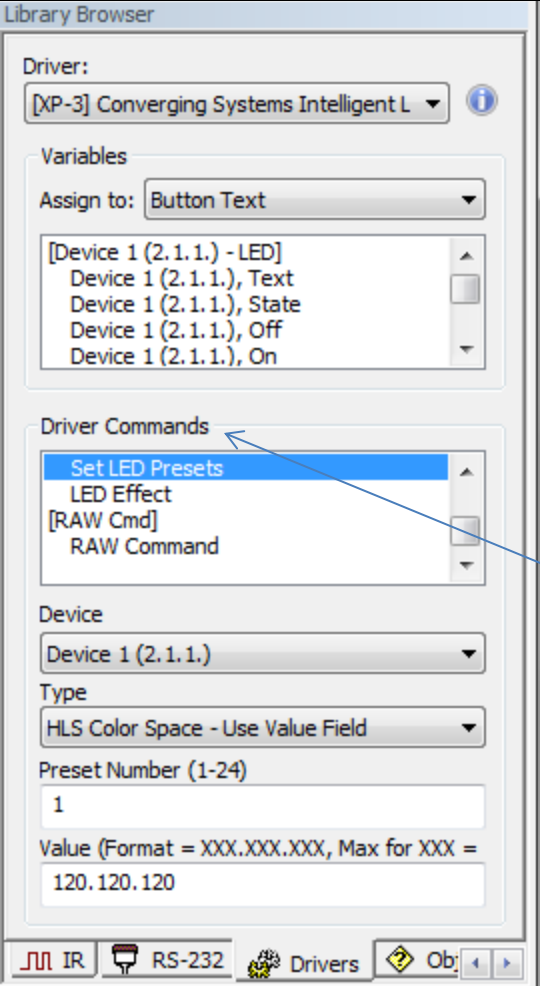

		<p>broadcast to all units with Z.G.N. addresses between 2.1.1. and 2.1.254.), only the unique color settings available from the device with an address of 2.1.1. or the first Z.G.N. unit in the series will be queried.</p> <p>LEDn Initialize Preset Variables. Select if present initialization is required for LED Device(s).</p> <p>Note: By enabling Initialize Present Variables, present values are acquired during the driver initialization process. Each preset (1-24) on each enabled ILC Controllers (1-254) must be polled individually. This process can take some time, so it is recommended that the LEDn Initialize Preset Variables feature only be enabled on ILC controllers that absolutely need presets initialized during the driver initialization process. If the LEDn Initialize Preset Variables feature is not enabled, the preset levels for the respective presets are acquired the first time the preset is recalled or when the preset is stored.</p>
--	--	---

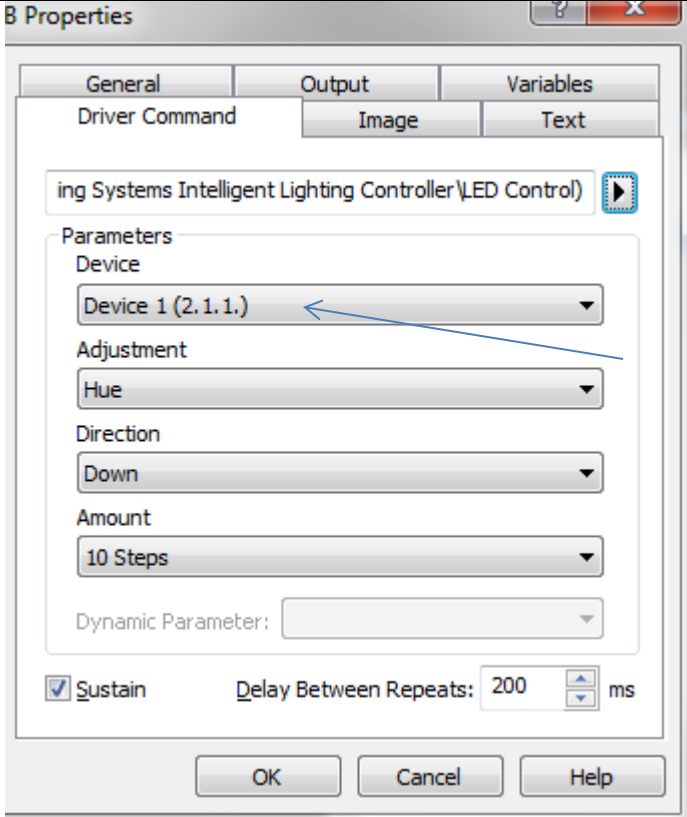

3. Now, add Tasks or Macro to a specific button push or action.

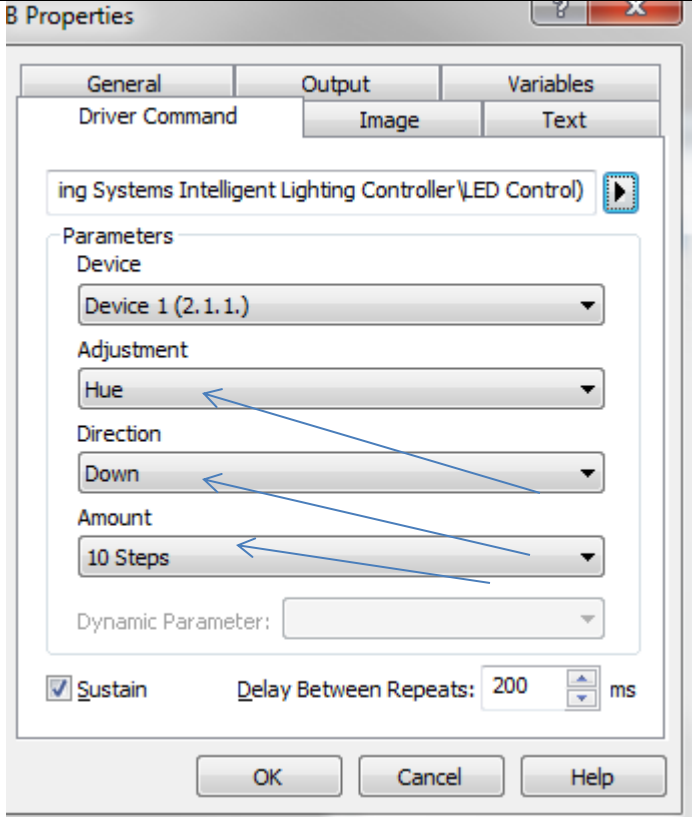

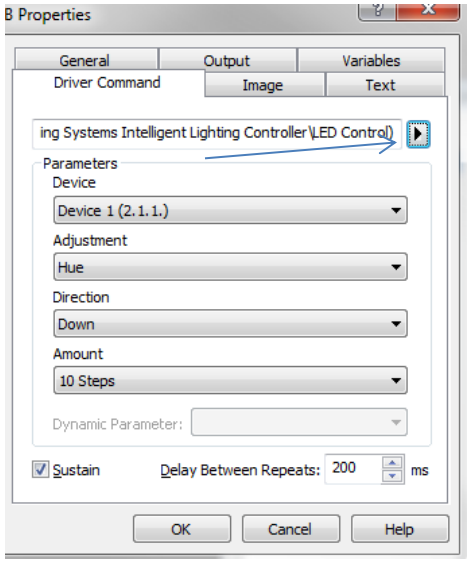
Step	Summary	Detail
3a	<p>You can create a user interface (UI) for your system that is suited to your customer's requirements. This Integration Note will focus primarily on the integration of the sample project's VP (Virtual Panel). It is up to the dealer to create any additional user interfaces.</p> <p>Note: However, where appropriate limited information will be provided on how (i) to customize your project with additional sliders and buttons, as well as (ii) to program on a limited basis additional User Interfaces.</p>	<p>Here is a sample of the Sample File provided User Interface.</p> 
3b	<p>You can right click on any button on the sample UI within Integration Designer and select Edit Properties to determine the simple steps involved in making the UI operate. Depending upon the type of button selected, varying Properties screens will</p>	<p>This Properties screen will appear for Sliders and Adjustment buttons.</p>

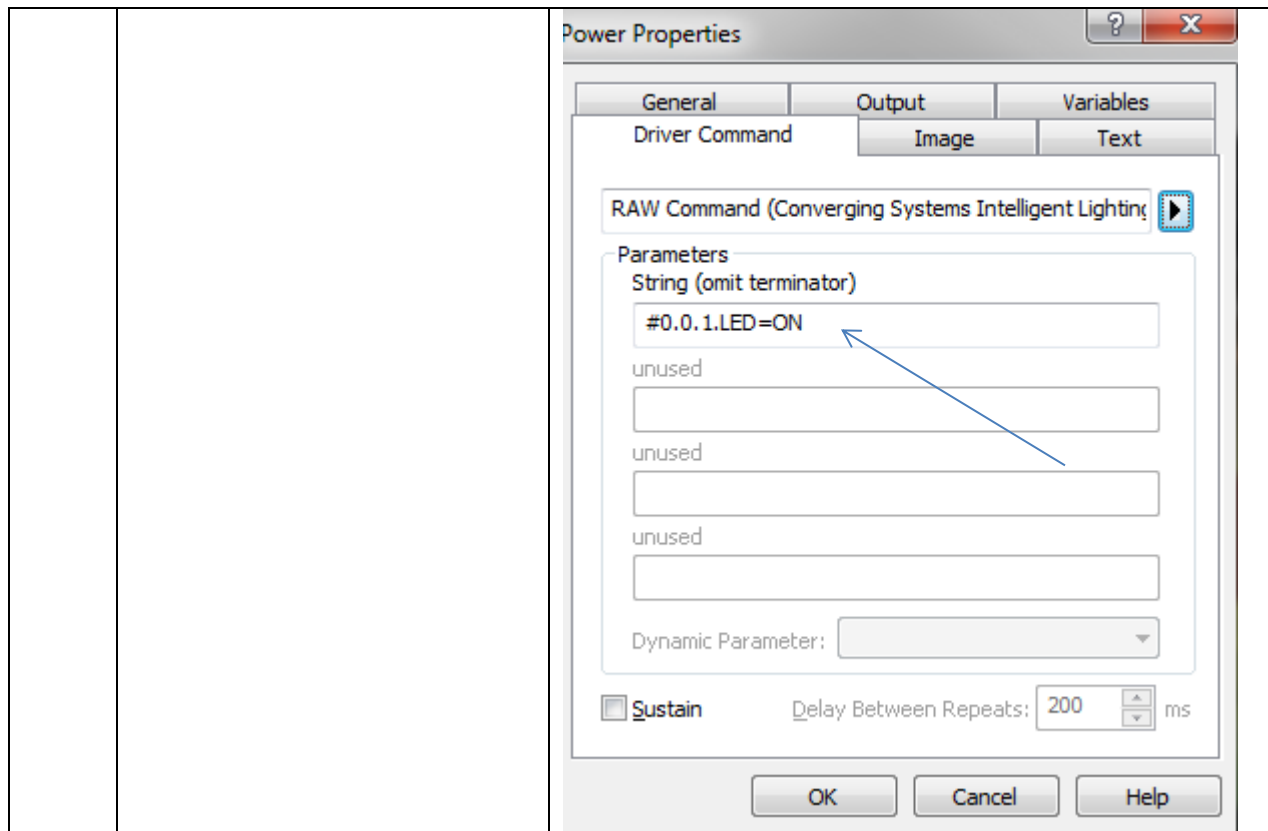
	<p>appear.</p> <p>Most of the relevant programming for each button is within the Driver Command tab.</p>	 <p>This Properties screen will appear for simple Toggle and normal selection buttons.</p> 
3c	<p>Next, you can review specific commands that have been linked to specific buttons throughout the System file. You can mimic the process here with your own UI screens in the future by following the example exactly.</p>	<p>In order to initially review, or customize or change a button, within the Properties window select the  and find the specific command that has been programmed within the RTI Certified Driver for the particular function you wish to add or modify.</p>

		 <p>Note: Those commands listed under LED Control are those which have been pre-programmed within the RTI Driver. If one or more commands that you wish to support are not currently within the RTI Driver, you may add those within the RAW Cmd (see below).</p>
3d	<p>Another way to determine the entire set of commands from which you can make future selections, utilize the Library Browser within Integration Designer to review all embedded supported commands.</p>	<p>Select the Library Browser, and open the Converging Systems Intelligent Lighting Controller and review all the Driver Commands supported.</p> <p>Again, if one or more commands that you wish to support are not currently within the RTI Driver, you may add those within the RAW Cmd (see below).</p> <p>Note: RAW Cmd typically work well for discrete button pushes but not for additional sliders and bi-directional feedback. Should additional slider functionality be required for new commands available from Converging Systems, contact RTI Technical support for more information.</p>

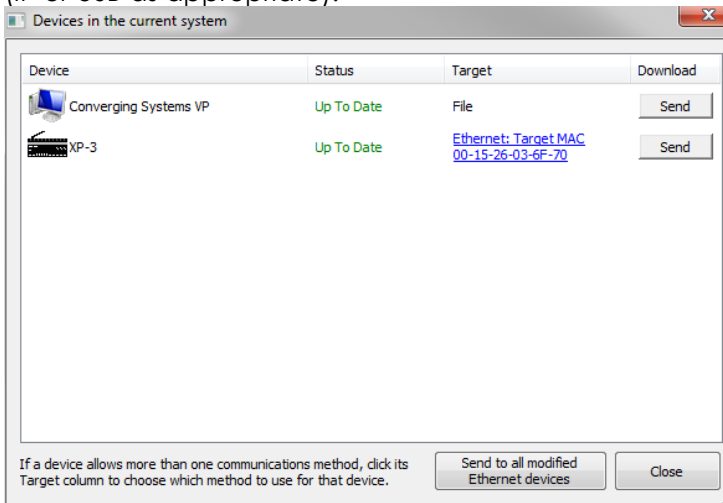






		
3e	<p>Now, that you have selected a targeted command, you must assign that command to specific device.</p>	<p>Assign each command to specific Parameters/Device by selecting the  icon and scrolling through available controller names (with addresses).</p>

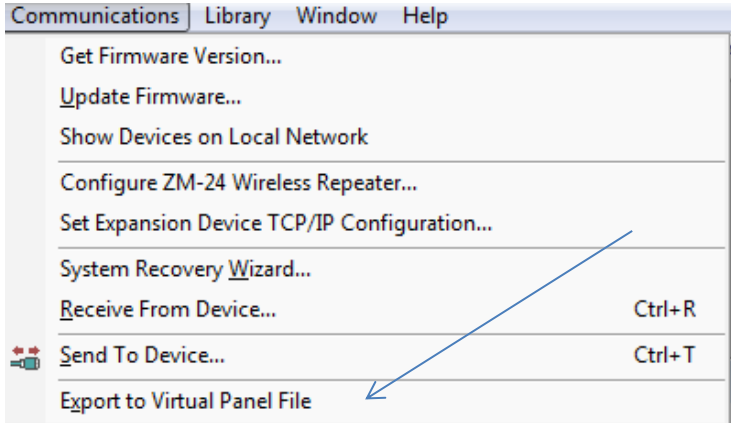
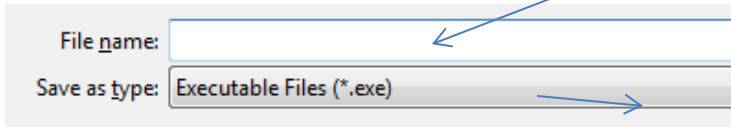

		
3f	Continue providing any required data for the Adjustment section for each command being programmed. If presented, also input any requested data for additional fields such as Direction and Steps .	<p>Assign Adjustment entries for Sliders and Adjustment icons by selecting the  icon and scrolling through available commands.</p> <p>Assign Direction entries and Steps entries if requested.</p>

		
3g	<p>Continue this process until you have all your buttons, sliders programmed. Should you encounter a specific Converging Systems' command that is not supported by the RTI Driver, download the Converging Systems' <i>Third Party CS-Bus Device Driver Toolkit-Programmer's Guide</i> and program those commands directly using the RAW Cmd feature within Integration Designer.</p> <p>Note: the above referenced toolkit can be downloaded from http://www.convergingsystems.com/software/inres_programmingdesignkit.php</p>	<p>From the Edit Properties pop-up window, select the  icon and selecting Converging Systems Intelligent Lighting Controller/ RAW Cmd selection.</p>  <p>Then enter your new command within String block</p>



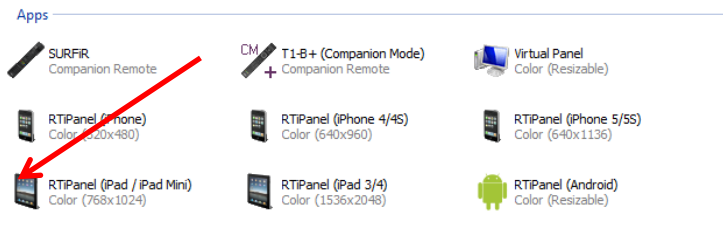
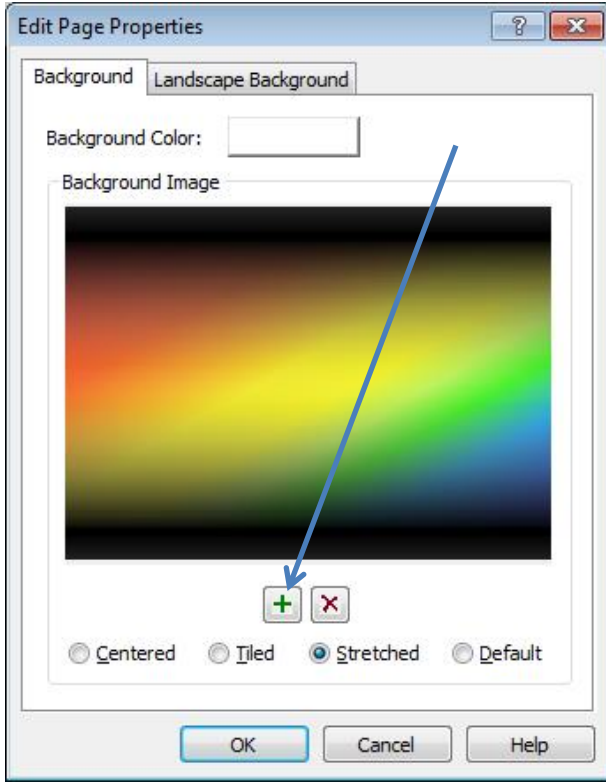
4. Upload System file (*.rti) and Test

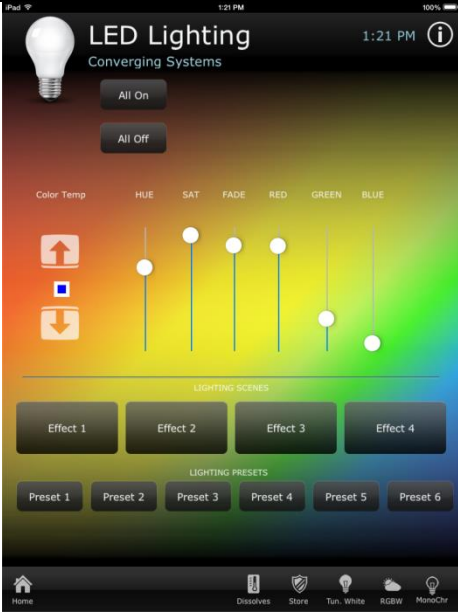
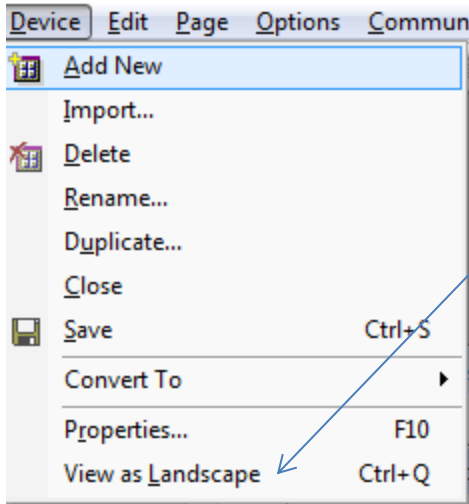
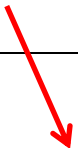
Step	Summary	Detail												
4a	Upload System file	<p>Make sure you are connected to your RTI processor and upload your System file. Select Communications/Send To Device and upload your System File using the applicable upload communication channel available (IP or USB as appropriate).</p>  <p>The screenshot shows the "Devices in the current system" dialog box. It contains a table with the following data:</p> <table><thead><tr><th>Device</th><th>Status</th><th>Target</th><th>Download</th></tr></thead><tbody><tr><td> Converging Systems VP</td><td>Up To Date</td><td>File</td><td><input type="button" value="Send"/></td></tr><tr><td> XP-3</td><td>Up To Date</td><td>Ethernet: Target MAC 00-15-26-03-6F-70</td><td><input type="button" value="Send"/></td></tr></tbody></table> <p>At the bottom of the dialog, there is a note: "If a device allows more than one communications method, click its Target column to choose which method to use for that device." Below this note are two buttons: "Send to all modified Ethernet devices" and "Close".</p>	Device	Status	Target	Download	 Converging Systems VP	Up To Date	File	<input type="button" value="Send"/>	 XP-3	Up To Date	Ethernet: Target MAC 00-15-26-03-6F-70	<input type="button" value="Send"/>
Device	Status	Target	Download											
 Converging Systems VP	Up To Date	File	<input type="button" value="Send"/>											
 XP-3	Up To Date	Ethernet: Target MAC 00-15-26-03-6F-70	<input type="button" value="Send"/>											
4b	If you have developed a Virtual Terminal (such as has	Under the Communications tab, select to Export to Virtual Panel File												

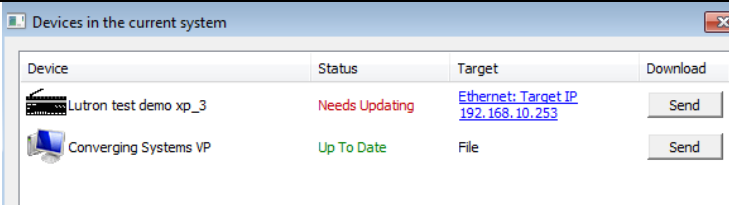
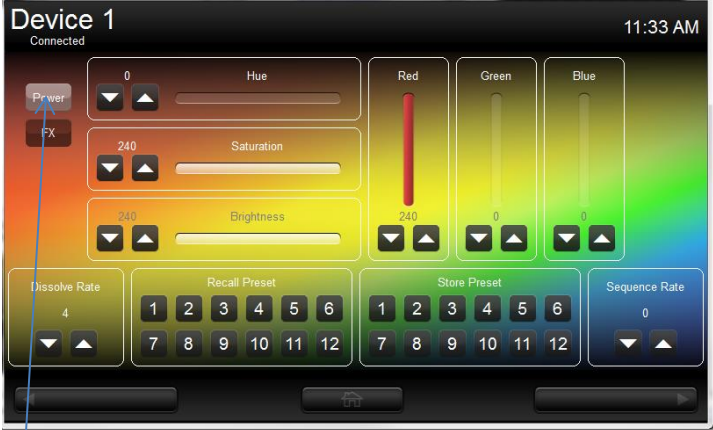
	<p>been included within the RTI sample project), create a Virtual Terminal.exe</p>	 <p>And then enter an appropriate name for the file.</p> 
4c	<p>Test using the Virtual Terminal.</p>	<p>Launch the Virtual Terminal exe. Press various buttons on the Virtual Terminal and verify that the corresponding action on all the Converging Systems's devices are operating properly.</p>  <p>Example: The Power Button should toggle the LEDs ON or OFF with each subsequent press of the Power button.</p>

5. Create Additional UI Screen (iPad in this case) and Test

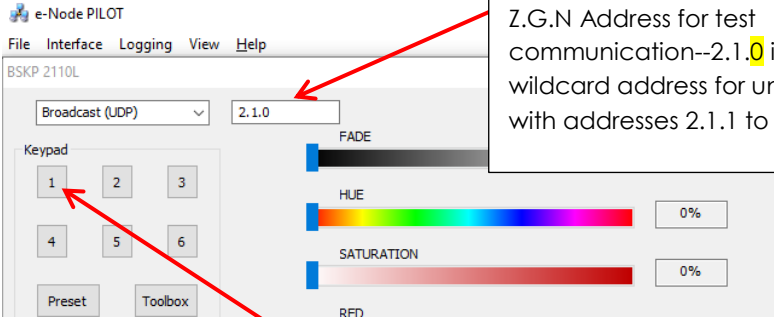
Step	Summary	Detail
5a	Create New User Interface	<p>Within System Workspace left click to Add New User Interface.</p> <p>Select applicable interface. In this example, we are going to add an iPad interface (non-retina display).</p>

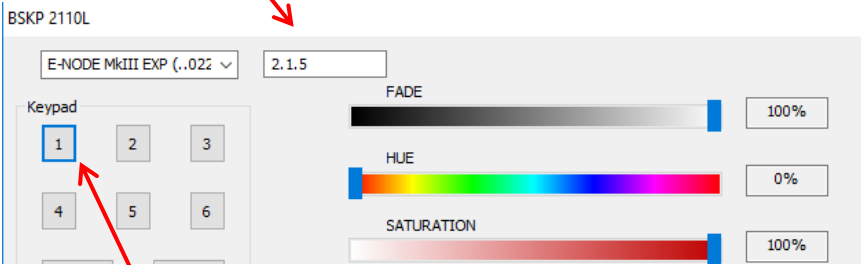
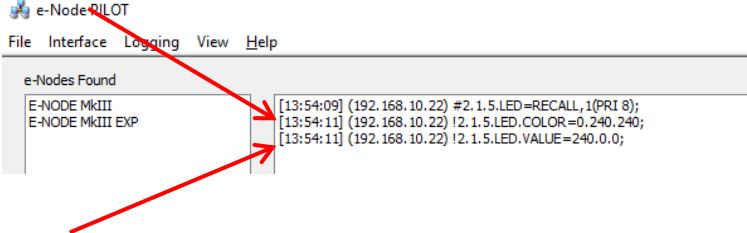
		 <p>The 'Apps' panel displays several device templates for selection. A red arrow points to the 'RTIPanel (iPad / iPad Mini)' template, which has a resolution of 768x1024. Other templates include SURFIR, T1-B+, Virtual Panel, and various RTIPanel models for iPhone and Android.</p>
5b	Import selected background	<p>Right click on blank UI screen and select Page Properties.</p> <p>Select the "+" mark and navigate to selected background.</p> <p>(You may choose a different background for landscape with the Landscape tab.)</p>  <p>The 'Edit Page Properties' dialog box is shown with the 'Landscape Background' tab selected. It features a 'Background Color' field and a 'Background Image' preview area. A blue arrow points to the '+' button below the preview area, which is used to add a new background image. Below the preview area are radio buttons for 'Centered', 'Tiled', 'Stretched' (selected), and 'Default'. At the bottom are 'OK', 'Cancel', and 'Help' buttons.</p>
5c	Add buttons and sliders as desired	<p>You may choose to cut and paste standard buttons from the VP panel provided as an example to the sample project. For sliders you may need to create new sliders as appropriate.</p>

		
5d	Assign tasks to each button	See Section 3 above for more information.
5e	Customize for landscape mode as well (if desired).	<p>If you desire your User Interface to automatically adapt to the built-in gyro within your device, customize you UI screen for landscape mode.</p> <p>After highlighting your new UI within the System Workspace, Select Device, and View as Landscape.</p> 
5f	Perform any additional UI customizations as appropriate.	<p>In this case, we have created a new UI for an Apple iPad. Make sure you have secured necessary licenses from RTI to enable the download. Provided the iPad is authenticated with the license key, you will see the new UI update on the iPad after you Update your RTI platform through the Communications, Send to Device Tab.</p> 

		
5g	Test using the new UI.	<p>Launch the new UI. Press various buttons on the UI and verify that the corresponding action on all the Converging Systems's devices are operating properly.</p>  <p>Example: The Power Button should toggle the LEDs ON or OFF with each subsequent press of the Power button.</p>

6 Troubleshooting

Step	Summary	Detail
6a	User the e-Node Virtual Terminal to see if particular functions are working with the Converging Systems' setup prior to testing/troubleshooting RTI.	<p>-Test to see if system is working with the e-Node Virtual Terminal feature within e-Node pilot. Use the sliders or presets buttons send commands to a particular Z/G/N address</p>  <p>Z.G.N Address for test communication--2.1.0 is a wildcard address for units with addresses 2.1.1 to 2.1.n</p> <p>Defaults from the factory are "1" is red, "3" is green and "5" is blue</p> <p>Consult the e-Node documentation or see Appendix 10 for more troubleshooting information.</p>

6b	<p>Use the e-Node Pilot application to monitor traffic received by the e-Node or e-Node/dmx devices to start your troubleshooting process.</p>	<p>We highly recommend launching the e-Node Pilot application and selecting the VIEW TRAFFIC window to make sure the proper commands that have been programmed can be seen on the CS-BUS. We can almost guarantee that if there are no appropriate CS-BUS commands appearing in the VIEW TRAFFIC window, then any integration with a third-party platform will not perform.</p> <p>In order to remotely monitor actual commands flowing to a particular controller, within the e-Node Pilot standalone application, select the View Traffic Tab, and select the Discover e-Node button. Monitor the traffic in the right window to troubleshoot the system.</p> <p>As an example, say you wanted to send a Red out to a device with address Z/G/N=2.1.5</p>  <p>Here the Keypad "1" is pressed on the Virtual Keypad which sends out a Recall 1 (which is a red initially from the factory).</p> <p>In effect, by pressing this button, this command is transmitted to our bus:</p> <p>#2.1.5.LED.VALUE=RECALL,1</p> <p>In this case, if NOTIFY is set to BOTH (that is to say, VALUE data and COLOR data are both turned on), a response comes back on the bus (starting with a "!" mark) from that unit with an address of 2.1.5.</p> <p>The LED.COLOR response shows that the H/S/B specification for red is Hue=240. Sat=240 and Fade=240.</p>  <p>Alternatively, the LED.VALUE response shows the R/G/B specification for red is Red=240, Green=0, and Blue=0). Depending upon your configuration your addresses will vary as</p>
----	--	--

		well as the specification for a selected color.)
6c	Additional Telnet troubleshooting	You can also launch your computer's TELNET application, to verify the expected third-party integration platform's command strings are appearing on the IP bus. <i>If those commands are NOT appearing on the IP bus, then there is no way the Converging Systems' e-Node can do its work.</i>

Appendix 1

RTI Programming User Interfaces

The individual installer typically designs the User Interface (UI) for the particular needs of the end-user. Converging Systems may add from time-to-time new UIs with advanced functionality. Sample UI screens are pictured below.

LED CONTROL ENVIRONMENTS

The following illustrations provide some sample UI for LED control interfaces. Some or all of these GUI screens are available for use if you download our RTI sample project found at http://www.convergingsystems.com/inres_rti.php

Figure	UI
1 General GUI Screen	

2
Alterative GUI
Screen



3
VP Panel Screen



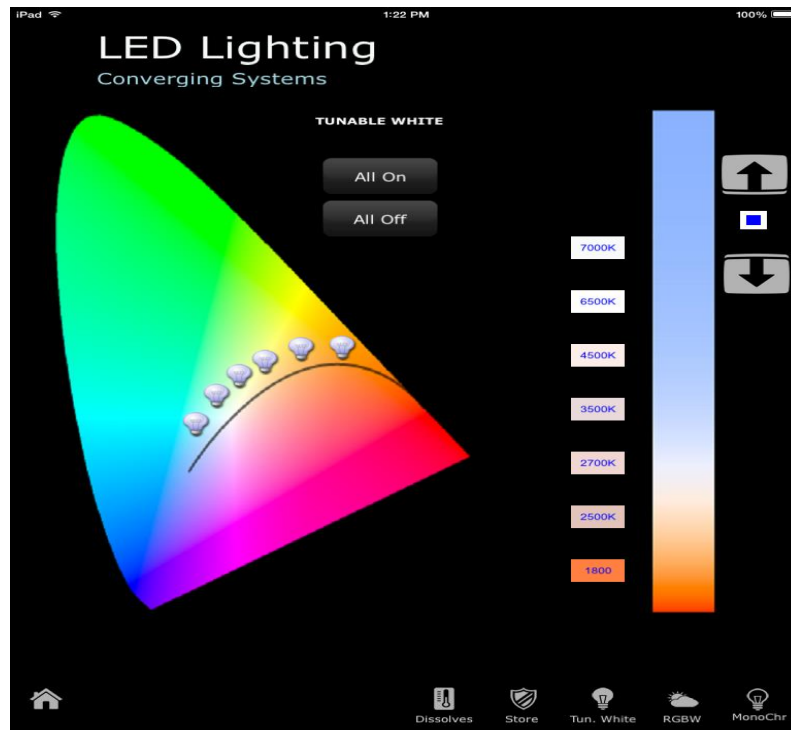
4
Presets GUI
Screen



5
RGBW Control GUI



6
Color Temp GUI



7
Monochrome GUI



Appendix 2

Converging Systems System Setup/Configuration

Before proper operation between the Converging Systems' controllers and the Integration Partner's platform can begin, it will be first necessary for most installations to configure the Converging Systems' products using the e-Node Pilot (PC-based) application and an e-Node or e-Node/dmx (Ethernet communication device).

In case you have not previously configured a Converging Systems controller product, please refer to the extended instructions in this Appendix.

Background

The Converging Systems e-Node is an Ethernet communication device which can be used to connect the Integration Partner's host to one or more Converging Systems motor and/or lighting controllers. (The e-Node/dmx is a similar gateway product that enables the Integration Partner's Host to be connected to 1 to 32 third-party DMX fixtures.)

However, regardless of whether you desire to interface **more than one** lighting controller (or motor controller) each with its own controllable operation (i.e. its own **Zone/Group/Node** or **Z/G/N** address) with either the e-Node (Ethernet) or e-Node/dmx, **you must still follow the directions below under (i) e-Node Programming and (ii) ILC-100/ILC-400 Programming** in order to establish **unique ZGN address(es) for connected loads**.

Settings that can be implemented using this setup are as follows:

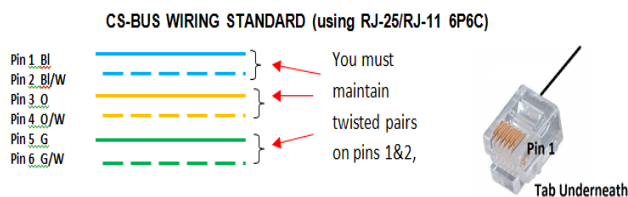
Setup Table of Contents

Topic	Section	Subtopics
Component Hardware Setup		
		Cabling Instructions
		Interconnect Instructions
Component Software Setup		
		e-Node Programming
		IBT-100 Programming
		Lighting/Motor Controller Programming

COMPONENT HARDWARE SETUP-For CS-Bus Equipment (for DMX see Appendix 7)

NOTE: The CS-BUS uses standard RJ-25 (RJ-11 6P6C) connectors available at [Home Depot](http://HomeDepot.com), and all electrical distributors). The mandatory pinout is 1-1, 2-2, 3-3, 4-4, 5-5, and 6-6 with twisted pairs on 1&2, 3&4 and 5&6). **You cannot use standard flat telephony cable for telephony cable does not use twisted pairs and the wiring topology is swapped (1-6, 2-5, 3-4, etc.). Failure to follow the CS-BUS wiring standard will void your warranty.** If you return a unit to Converging Systems with its communication chip destroyed this is a telltale sign that you used Telephone cabling. **REPEAT--DO NOT USE TELEPHONY CABLE.** Also, do **not** attempt to use standard Ethernet cabling (568B or 568A) and simply chop off the browns for this will leave the twisted pairs inconsistent with our CS-BUS Wiring Standard (the middle two lines will not be a twisted pair and data integrity will be lost). If you do not have 6P6C RJ11 RJ-25 modular connectors and wish to proceed, refer to the diagram below for a workaround.

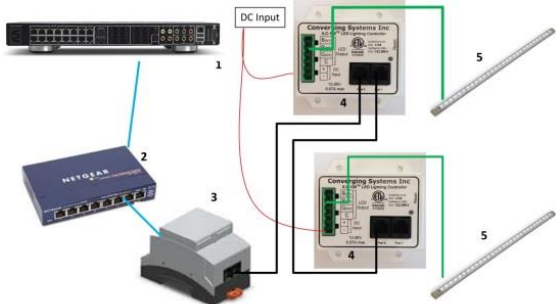
Cabling Detail

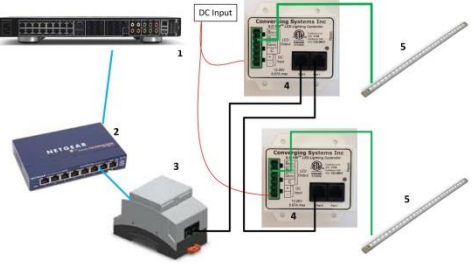
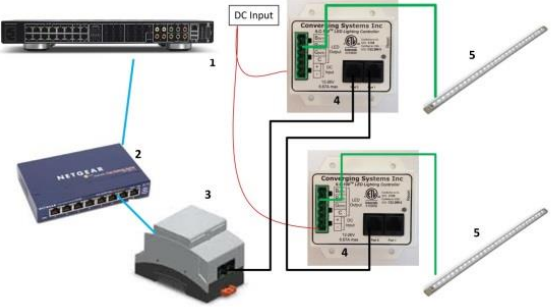


Recommended RJ-25 6P6C connections 6 wires			Suboptimal RJ-11 4P4C connection 4 wires		
e-Node Side	ILC-x00 side	Color of wire	e-Node Side	ILC-x00 side	Color of wire
Pin 1	Pin 1	blue			
Pin 2	Pin 2	Blue/white	Pin 1	Pin 1	Orange
Pin 3	Pin 3	Orange	Pin 2	Pin 2	Blue
Pin 4	Pin 4	Orange/white	Pin 3	Pin 3	Blue/white
Pin 5	Pin 5	Green	Pin 4	Pin 4	Orange/white
Pin 6	Pin 6	Green/white			

Note: For the purposes of commissioning if you do not have 6P6C RJ-25 connectors, you can use standard 4-pin RJ11 connectors, but follow the wiring directions above preserving twisted pairs on Pin 2/3 and Pins 1 /4. **This cable will not work for keypad communication or IBT-100 communication.**

Interconnect Instructions

Step	Setting	Choices
HW-1	Connect IMC-x00 and ILC-000 controllers to each other	<p>Interconnect controllers sequentially in a daisy-chain fashion (without "Y"s or "T"s) by connecting Port 1 of one device to Port 0 of the next sequential device. Utilize standard CAT5 (or better) wiring and maintain 1/1 pinouts between ends (see CS-Bus Wiring Standard above). Also maintain twisted pairs as shown above (1&2, 3&4, 5&6).</p> <p>See termination footnote below ¹</p> <p>Note: Failure to follow the CS-BUS wiring standard will void your warranty. If you return a unit to Converging Systems with its communication chip destroyed this is a telltale sign that you used Telephone cabling. REPEAT--DO NOT USE TELEPHONY CABLE for either they are swapped in configuration or they do not have twisted pairs.</p> <p>Also, do not attempt to use standard Ethernet cabling (568B or 568A) and simply chop off the browns for this will leave the twisted pairs inconsistent with our CS-BUS Wiring Standard (the middle two lines will not be a twisted pair and data integrity will be lost). If you do not have 6P6C RJ11/RJ-25 modular connectors and still wish to proceed, refer to the ILC-x00 family controller Instruction manual for more information.</p>
HW-2	Connect controllers to Gateway	 <p>e-Node connections. Interconnect either CS-Bus (RJ-25 not RJ-45) port on the e-Node to an available/unused CS-Bus on the first or last ILC-x00 controller using a fabricated CAT 5(or better) cable wired as per the CS-Bus Wiring Standard. Connect the supplied 12vdc power adapter to the mating 2-pin connector on the e-Node. Connect a standard Ethernet wire from your network switch to the RJ-45 connector on the e-Node. (In case you wish to share power supplies, the e-Node can operate from 24vdc as well.)</p> <p>-IBT-100 connections. If you are using serial connectivity, connect a CS-BUS Standard cable from Port 0 on the first ILC-x00 controller to the single RJ-25 port on the IBT-100. Plug the IBT-100's DB-9 connector directly onto your computer or controller's serial port or to a USB/Serial adapter connected to your system (57,600,n.8,1,n).</p>

		<p>Note: The IBT-100 requires power to operate which is only available from Port 0 of the ILC-x00 controllers. Should Port 0 be unavailable on a convenient ILC-x00 device, unplug the existing wire plugged into Port 0 and swap it into Port 1 of the target ILC-x00 controller and in a sequential fashion reverse the connections of all other connections from Port 1/Port 0 to Port 0/ Port 1 across the lighting CS-Bus network.</p>									
HW-3a	(For Lighting devices only) Connect Lighting Elements to Controllers	 <p>FLLA connections. Connect the flying leads from the header end of the FLLA device to the ILC-x00 controller using recommended cabling (typically 16 awg or 18 awg). See Voltage Drop table for more info.</p> <table border="1"> <tbody> <tr> <td>RGB (4 pin)</td><td>ILC-100c (C, G, R, B) ILC-400m (C, G, R, B, W)</td><td>Note: C is positive common</td></tr> <tr> <td>RGBW (5 pin)</td><td>ILC-400 (C,G,R,B, W)</td><td>Note: C is positive common</td></tr> <tr> <td>Mono (2 pin)</td><td>ILC-400 (C,1) &/or (C,2) &/or (C,3) &/or (C,4) ILC-100m (C,W)</td><td>Note: C is positive common</td></tr> </tbody> </table>	RGB (4 pin)	ILC-100c (C, G, R, B) ILC-400m (C, G, R, B, W)	Note: C is positive common	RGBW (5 pin)	ILC-400 (C,G,R,B, W)	Note: C is positive common	Mono (2 pin)	ILC-400 (C,1) &/or (C,2) &/or (C,3) &/or (C,4) ILC-100m (C,W)	Note: C is positive common
RGB (4 pin)	ILC-100c (C, G, R, B) ILC-400m (C, G, R, B, W)	Note: C is positive common									
RGBW (5 pin)	ILC-400 (C,G,R,B, W)	Note: C is positive common									
Mono (2 pin)	ILC-400 (C,1) &/or (C,2) &/or (C,3) &/or (C,4) ILC-100m (C,W)	Note: C is positive common									
HW-3b	(For Motor devices only) Connect Motor(s) to Controllers	Connect as per separate Motor Control instructions.									
HW-4a	(For Lighting Devices) Connect Power	 <p>DC Constant Voltage Power Supply Connection. Connect power supply which provides the same voltage as the FLLA LED rating (typically 24vdc). Obey the polarity printed on the ILC-x00 case. If your controller has a 3-pin power connection (+, - and GND), you should connect a separate GND lead from a solid earth ground to the ILC-x00 Ground connection after connecting the + and - terminals (this is for low-end dimming without flicker).</p> <p>IMPORTANT: Failure to plug in the power connector into the marked + and - power input port on the case but rather into the LED output connectors on the ILC-x00 controller will destroy the unit which is not a covered warranty repair—Be careful here.</p>									
HW-4b	(For Motor Devices) Connect Power	Connect as per separate Motor Control instructions.									

Notes:

- ¹ : The CS-BUS by design is a modified IEEE-485 bus which requires termination on the beginning and the end of the CS-Bus. Please be advised that in most cases, termination is not required but if you do experience communication issues, it would be wise to turn on termination (in software using the Pilot software) on the first unit of the chain. If the e-Node is used as the last item in the chain, those units have built-in termination. It is important, however, not to turn on any other termination features on any other unit.

COMPONENT SOFTWARE SETUP (using e-Node and e-Node Pilot app)

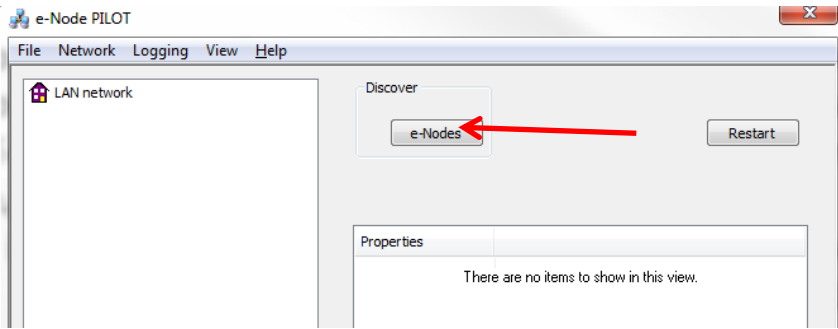
NOTE: Converging Systems LED and Motor Controllers REQUIRE a preliminary amount of initial setup/commission which requires the e-Node Ethernet adapter. This is required to set **Zone/Group/Node** addressing. This section is an abridged version of necessary steps which need to be followed. For more information, consult the more detailed documentation available on the Converging Systems' [website](#) including

- [ILC Quick Start Guide.](#)
- [e-Node Commissioning Guide \(long version\)](#)
- [ILC-x00 Intelligent Lighting Controller](#)
- [IMC-x00 Motor Controller Manual](#)

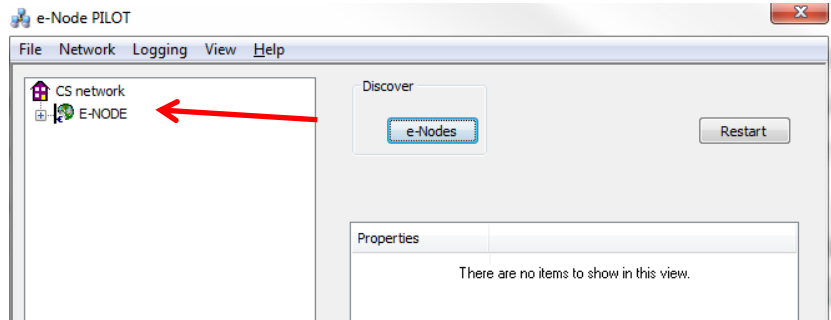
e-Node Programming/Device Programming

Min. requirements for this operation

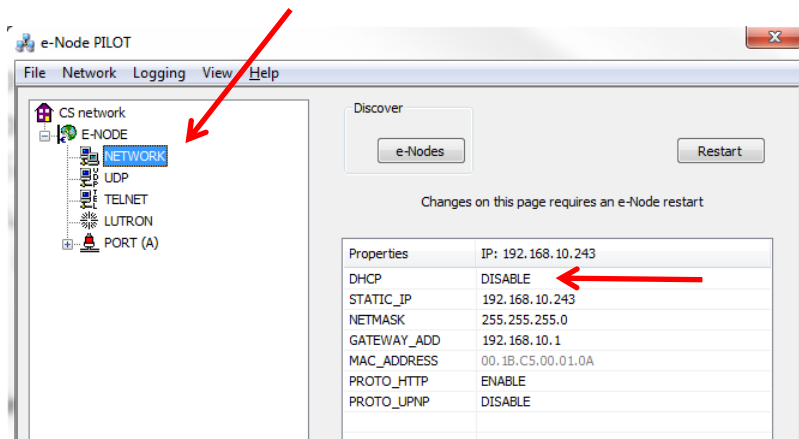
- Computer running Windows XP or later OS, preferably with a wired Ethernet connection to a local router using CAT5 type cabling
- Converging Systems E-Node Ethernet adapter, connected using CAT5 cabling to the above router.
- Download of the latest version of [e-Node Pilot application](#), unzipped and operating on your computer platform

Step	Setting	Choices
EN-1	e-Node IP Address setting Set up the e-node with an appropriate Static or Dynamic IP address. Refer to the separate " e-Node Quick Start Guide " on how to make such settings.	Static or Dynamic Addressing -Launch the e-Node Pilot application. 

-Select the **View e-Node** tab and select the Discover **e-Node** button. Any e-Node(s) connected on the same network will appear as shown.



-Select the + mark in front of the e-Node found to expand the menu.



-Review the **DHCP** entry, the factory default is **ENABLE** which means **DHCP** is activated. **DISABLE** for **DHCP** refers to static IP addressing. If you wish to set a **STATIC** IP address, enter the following variables **in the order specified below**:

STATIC_IP	xxx.xxx.xxx.xxx	Your new static IP address
GATEWAY_ADD	xxx.xxx.xxx.xxx	Typically the address of your network's gateway
FINALLY and only after you have set the above variables, select DHCP	And Set to DISABLE	Now reboot the e-Node for this to take effect.

-Note: It is recommended that only **STATIC** addressing be used with the RTI processors.

EN-2 Reserved

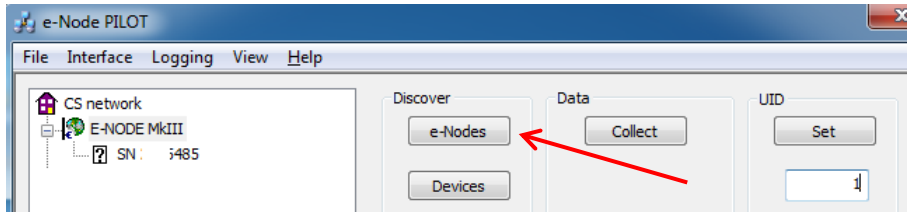
IBT-100 Programming

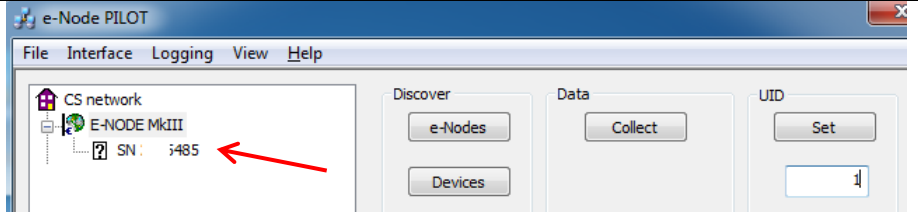
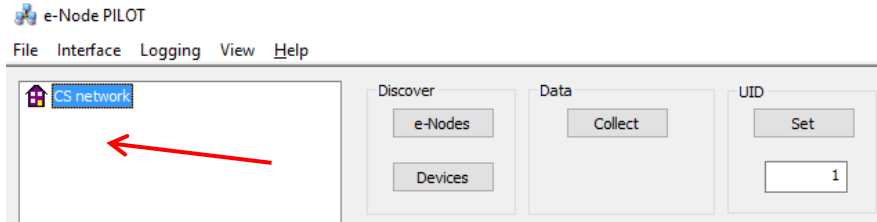
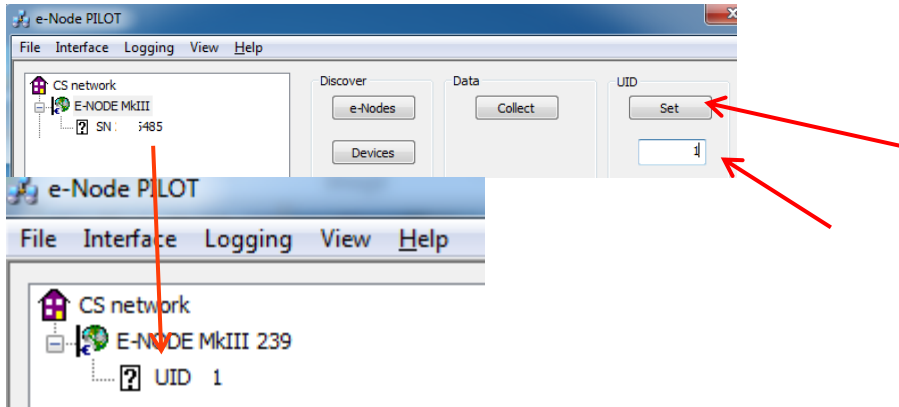
- Computer running Windows XP or later OS, with an available RS-232c serial port.
- Converging Systems IBT-100 serial interface adapter.

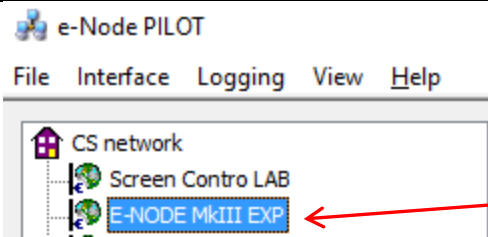
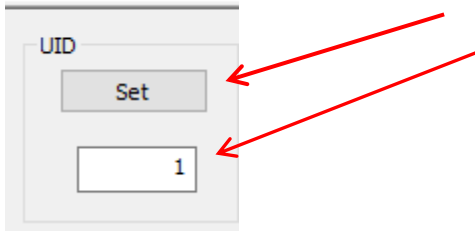
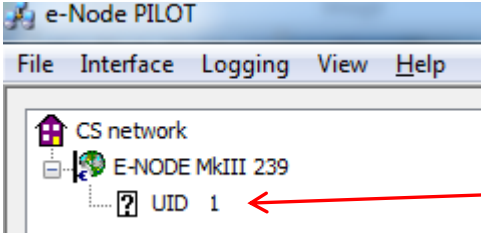
All of the communication parameters to support the IBT-100 are built into the RTI driver and therefore no special programming is required of the IBT-100 serial adapter. However, certain features of the ILC-100/ILC-400 with respect to **NOTIFY** (which permits automatic signaling of color status upon color state changes) described above will need to be programmed using the e-Node. But in this case, after the specific lighting controllers are programmed, the e-Node will no longer be required for RTI to Converging Systems communication using the IBT-100.

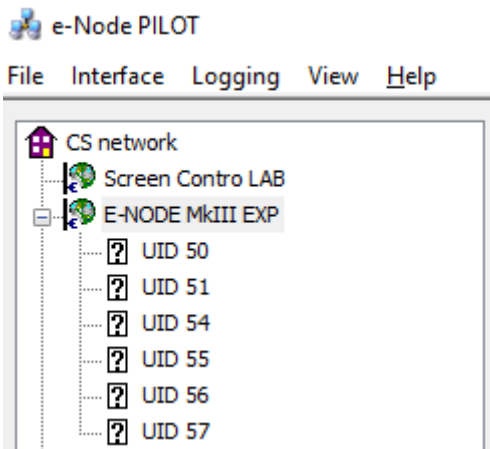
RS-232C Interfacing Note: If you plan on simply using the IBT-100 for serial communication and desire to have multiple lighting loads (more than one ILC-100 with a unique **Zone/Group/Node** address you must set up your system using the e-Node as specified above as well as the particular lighting load as specified below. However, if you do not care about bi-directional feedback or support of multiple controllers address, no further set-up is required. However, this is not recommended.

Lighting/Motor Control Programming

Step	Setting	Choices
DV-1	Discover Devices	<p>Units from the factory do not have a pre-programmed UID address and therefore it is impossible to perform any additional programming to these devices including address changes until the UID is assigned. The following steps illustrate this process.</p> <p>It is necessary that all devices (led and motor controllers) are (i) discovered and then (ii) assigned a unique UID (Unique ID). The procedure to do so varies if you have earlier versions of ILC-x00 controllers or more current ones. To determine which version of firmware you have, start by selecting the Discover Devices button as shown below.</p> 
DV-2a	Initial Procedure	<p>If ILC-x00 family controllers are properly connected to your e-Node, and after the Discover e-Node button has been selected, any ILC-x00 devices connected to that e-Node will auto-populate under that e-Node as a "SN XXXXX" entry. If this occurs, you have devices with SN addressing. Proceed to Step DV-3a below.</p>

		
DV-2b	Initial Procedure	<p>If ILC-x00 family controllers are properly connected to your e-Node, and after the Discover e-node button has been selected, and if <u>no entries appear</u> under the previously discovered e-Node then you have pre-SN Addressing firmware. (Before you determine that this is the case, make sure the ILC-x00 devices are properly powered on and the interconnect cables with proper pinouts are connected between the e-Node and the ILC-x00 controllers.) If no entries populate, you have devices with pre-SN addressing and an alternative process is required to discover these (earlier) firmware units. Proceed to Step DV-3b below.</p> 
DV-3a	Assign UID to Device (for SN Addressing)	<p>First select the SN entry for the device that you wish to assign a unique UID by highlighting that entry within Pilot. Next (i) assign an unused UID (unique ID) to the lighting or motor controller to be addressed (generally start with the UID value of "1" and work up sequentially) by entering each subsequent number under the UID set box. To finalize the UID selection, select the Set box and the "SN" entry will automatically change to the entered UID number.</p>  <p>-Proceed through all lighting and motor controllers connected to each e-Node until completed. Proceed to DV-4.</p>
DV-3b	Assign UID to Device (for pre-SN Addressing)	<p>-First highlight the e-Node to which the target device is connected.</p>

		<div data-bbox="535 191 1019 426"></div> <p data-bbox="535 457 1417 632">- Next (i) assign an unused UID (unique ID) to the lighting or motor controller to be addressed (generally start with the UID value of "1" and work up sequentially) by entering that number under the UID set box, then (ii) press the Set button and finally (ii) carefully press for ½ second the discovery/reset button! on the ILC-xx device using a larger type paper clip (small paperclips have a hard time finding the internally positioned reset button).</p> <div data-bbox="865 659 1336 888"></div> <p data-bbox="535 892 1417 982">-If successful, the device's on-board PCB LED will blink off for a moment then re-light AND the newly assigned UID entry will auto-populate under the e-Node to which it is connected.</p> <div data-bbox="743 980 1221 1211"></div> <p data-bbox="535 1243 1393 1299">- Proceed through all lighting and motor controllers connected to each e-Node until completed.</p> <p data-bbox="535 1331 1417 1417">Note for Discovery Button. Depending upon the device, the discovery/reset button may be in a different location. Consult the product's manual for the exact location. Here is some detail for two popular controllers:</p> <ul data-bbox="576 1446 1417 1738" style="list-style-type: none">• ILC-100. Take a larger type paper clip or similar device and gently insert it into the reset/discovery hole on the side of the chassis and press the momentary button that you will feel for ½ second and then release. The existence of the ILC-100 will appear under the e-Node entry within Pilot.• ILC-400. Remove the white plastic protective shroud to the left of the dual RJ-25 connectors with your finger nail or a small flat-headed to expose a push button mounted to the PCB. Depress the pushbutton for ½ second and then release. The existence of the ILC-400 will appear under the e-Node entry within Pilot <p data-bbox="535 1799 799 1827">-Now proceed to DV-4</p>
DV-4	Note on Duplicate UID	If you by chance enter duplicate UIDs for two controllers, the system will fail to work. In this case since you may not know which unit was the original and

	Addresses	<p>which was the duplicate, you must reset both units according to documentation found for the respective controller on the Converging Systems website and then assign unique UIDs to each one again (i.e. "Unique" IDs).</p>
DV-5	Enter Z/G/N Addresses	<p>From the factory the ILC-x00 controllers have wildcard Zone/Group/Node address of Zone=2, Group=1, and Node=undefined or a 0. Motor controllers have a similar wildcard address of Zone=1, Group=1, and Node=undefined or a 0. The concept is that they will respond to broadcasts but need a real non-zero address in order to operate properly. The following procedure demonstrates this process.</p> <p>Currently if you leave the system unmodified, the Integration Partner's host will communicate with a device with a factory address of 2.1.0 but no backchannel information will be provided back to the host system. However, it is often the case that our systems are additionally connected to third-party automation systems such as those manufactured by Control4, Crestron, Elan, Savant, etc. which do support back-channel data for this reason, we recommended that you change all Node addresses to non-zero values during initial installation.</p> <p>-Enter a discrete Zone/Group/Node address for each Lighting or Motor Controller identified within step #3 above. To do so, click on the "?" mark and/or the "+" mark in front of the targeted controller to expand its data fields. For more information on Zone/Group/Node address, review the detailed explanation of Zone/Group/Node addressing within the Background on Addressing section of this document.</p> <p>The directions below indicated how to perform this operation. (See Step 2b below as well as Appendix 3 for more information on Zone/Group/Node addressing.)</p>  <p>- After the selected motor or lighting controller is expanded, a number of data fields with icons will appear. Select the BUS tab, to expose the BUS properties windows.</p>

		<div data-bbox="621 191 1347 436" data-label="Image"></div> <p>- Enter the Zone/Group/Node address separated by PERIODs and hit ENTER. When the field turns BLUE you know the data has been successfully entered.</p>
DV-6	Set Notify Mode	<p>In order to invoke bi-directional communication for the ability for the control system's dimmer sliders to automatically respond to changes in color states (a really cool feature), set the NOTIFY Flag to either COLOR (for the HSV or Hue, Saturation, Value color space) or to VALUE (for the old school Red, Green, Blue color space—<i>old school because there is no dimmer in this color space</i>). If you want to have both sets of sliders (not really recommended in larger systems where bus traffic may become excessive), set the flag to BOTH.</p> <div data-bbox="535 821 1266 972" data-label="Image"></div> <p>Here is an example of NOTIFY set to COLOR in enable Hue/Saturation/Brightness sliders to operate.</p> <div data-bbox="535 1071 1260 1593" data-label="Image"></div> <p>The system will need to be installed and configured according to the Converging Systems documentation prior to integration with the gl system. The Converging Systems e-Node Pilot application (required for setup) is available for download for free from the Converging Systems website under Resources/Software Downloads/Software (http://www.convergingsystems.com/downloads_library.php). IP configuration using the e-Node is possible using both dynamic and static addressing.</p> <p>NOTE: It is recommended that the Converging Systems LED controllers (ILC-</p>

		x00 controllers as well as the e-Node Ethernet gateway) are running the latest version of firmware available at the time of installation.
--	--	---

Appendix 3

Background on Addressing

This information is only relevant for when you **start** adding buttons and sliders within the GUI section of your Integration Platform. All Converging Systems' devices (loads or controllers as opposed to communication devices) that are connected to a communication device (e-Node ore-Node/dmx) will be addressed using a unique **Zone/Group/Node** addressing scheme (**Z/G/N**). Those addresses are referred to within g! Tools as **Zone, Group and Node Addresses**.

Background on ZGN Addresses: The largest group is referred to as the **Zone**, which might be associated with a floor of a building. The next smaller group is referred to as the **Group**, which might be associated with a room on that floor of a building. Finally, the smallest entity is referred to as the **Node**, or the particular unit in that Room or Group, and within that Floor of Zone. From the factory, all lighting devices have a default address of **Zone=2, Group=1, Node=0** ("0" refers to an undefined unit).

Range of Z/G/N Addresses: Enter a number between 1 and 254 for **Zone** numbers, **Group** numbers, and **Node** numbers.

Please note -- no two controllers should be assigned the same Z/G/N address.

Background on Bi-Directional Feedback: Once a load device (CS-Bus controllers) is programmed using the e-Node Pilot application to a non-zero value, then **AND ONLY THEN** can those devices can be queried or monitored for state data (color or motor position) which is quite useful in auto-updating sliders and numerical readouts.

The figure below describes this hierarchy.

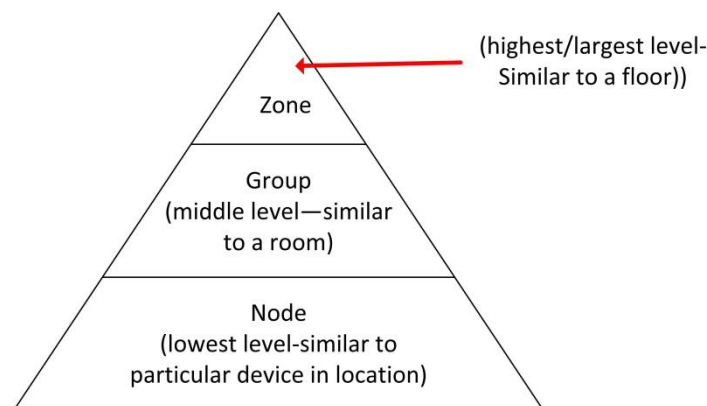


Figure 4

YOU MUST HAVE PRE-ASSIGNED Z/G/N ADDRESSES TO ALL LOADS BEFORE PROCEEDING WITH Integration software programming. See the Converging Systems' documentation on the e-Node Pilot application for more information here.

At this point after you assigned **Z/G/N** address to all loads (ILC-100 or ILC-400 controllers as well as DMX channel), it would be useful to write down a “map” of all interconnected loads and their re-assigned **Z/G/N Addresses** for use when programming within third-party software.

Specifically, if you had more than one ILC-100/ILC-400 controllers (or DMX device), you could give them (through the e-Node Pilot application) addresses as follows:

Table 3

ILC unit	Zone/Group/Node Address
First Unit	2.1. 1
2 nd unit	2.1. 2
nth unit	2.1. 3 or some other number up to 254

Appendix 4

COLOR SPACE ISSUES

Note on Color Space. Converging Systems recommends that only the HSB (Hue, Saturation and Brightness) color space is used for it is infinitely more accurately and user friendly to control color. Although the figure below shows both HSB and RGB on the same UI, this is probably more confusing for the typical user than the simple subset of HSB (hue, saturation, brightness) controls. **Since there is no concept of dimming within the RGB color space, having RGB sliders only frustrates the user who may just want to dim an existing colored output. However, if the User is intent on having RGB sliders, we would recommend leaving the Brightness slider to get accurate dimming.**



Figure 5

APPENDIX 5

(reserved)

APPENDIX 6

ADVANCED INTEGRATION DESIGNER PROGRAMMING

AP Topic 1

1.0 How to set up group control of loads using sliders with feedback available to sliders.

Addressing Background CS-Bus controllers can be address with a unique **Zone/Group/Node** (ZGN) address. Up to 254 entries can be used for each field. The first field is the **Zone** (or largest range), the middle field is the **Group**, and the last field is the **Node**. No two loads can share the same **Z/G/N** address. As an example, if you will be populating a pair of two controllers within each of two rooms on two floors of a building here would be the suggested addressing that could be used.

	Floor One	Floor Two
Room 1	2.1.1 for first controller in room. 2.1.2 for second controller in this room	
Room 2	2.2.1 for first controller in room. 2.2.2 for second controller in this room	
Room 3		3.1.1 for first controller in room. 3.1.2 for second controller in this room
Room 4		3.2.1 for first controller in room. 3.2.2 for second controller in this room

Group Addressing. In certain cases it is desirable is simply send a wildcard address for a group of controllers to all respond in unison rather than programming each individually to respond through macros. There are two problems with macros in general. One is that often they are executed serially which means that if you had two hundred loads referenced within a macro, the timing of the execution of the last command sent out might be delayed from the first command sent out. In this case, not all LEDs would turn on or OFF at the same time, potentially. The second issue involves the actual programming time required to program scores or even hundreds of commands for a simple ALL OFF button.

Within the CS-Bus software protocol is the concept of utilizing a "0" within any address field as a surrogate for defined numbers ranging from 1 to 254 within that same field. Thus, if you issued a command of #2.1.0.LED=ON:<cr> , all units with addresses of 2.1.1 to 2.1.254 would immediately respond. Please see the table below for an example of how various wildcards could be used.

Specific controller address	Specific command that will trigger targeted controller
2.1.1	2.1.0 or 2.0.0 or 0.0.0
2.1.2	2.1.0 or 2.0.0 or 0.0.0
2.1.3	2.1.0 or 2.0.0 or 0.0.0

2.2.1	2.2.0 or 2.0.0 or 0.0.0
2.2.2	2.2.0 or 2.0.0 or 0.0.0
2.2.254	2.2.0 or 2.0.0 or 0.0.0
5.254.4	5.254.0 or 5.0.0 or 0.0.0

NOTIFY Command Background Converging Systems has a **NOTIFY** function which automatically provides color state feedback (from the targeted controller) provided a unique **Zone/Group/Node (Z/G/N)** address is provided with an action/argument payload to that specific controller. Specifically, if a command to invoke a color change is directed to a controller that has a **Z/G/N** address of 2.1.1, that specific controller with that address will respond back to the automation system as to its specific color state if and only if there is a color state change impacted on that specific controller.

In some cases as has been discussed above, there might be a requirement to send a group command or all hail command to more than one controller. In this case, the group command would be directed not to a single controller or load but to a series of controllers. To reduce bus traffic when a series of controllers is given the same command, **only the first controller whose node number is 1 greater than the wildcard command of "0" will respond** (which reduces bus traffic by up to 243 messages). The logic here is that if 254 controllers are all told to turn **Red**, only the surrogate for that group of controllers will respond and within the CS-Bus messaging logic that surrogate is the controller with a node of "1." So for example, if a

#2.1.0.LED.VALUE=240.0.0:<cr> command is transmitted to 254 controllers, they will all turn to **Red**, but only the controller with an address of **2.1.1** will respond with its new color status. In this case, a command on the bus from that surrogate controller would come back as follows:

!2.1.1.LED.VALUE=240.0.0 (the exclamation mark indicates that it is a message from CS-Bus device rather from an automation controller). Please see the diagram on the next page for the theory of operation here.

Initial State of Light Output
(on Off condition)



Argument/Action Issued to a specific
Z/G/N address of 2.1.1 to go to Red
`#2.1.1.LED.VALUE=240.0.0;<cr>`



RGB Command received by a
unique Z/G/N address (2.1.1).
Controller recognizes a color
state change and transmits
back its color state as
!2.1.1.LED.VALUE=240.0.0



3rd Party control system receives response
beginning with “!” and updates its applicable
color slider or other registers to received
value



Argument/Action Issued to a
specific Z/G/N address of 2.1.1 to
go to Red (again)
`#2.1.1.LED.VALUE=240.0.0;<cr>`



RGB Command received by a
unique Z/G/N address (2.1.1).
Controller recognizes that this
was not a color state change
and no response is provided
(to reduce bus traffic since no
new status needs to be
provided)



Nothing transmitted back to 3rd
party control system



Argument/Action Issued to a **Group**
Z/G/N address of 2.1.0 to go to Green
`#2.1.1.LED.VALUE=0.240.0;<cr>`



RGB Command received by a
group Z/G/N address (2.1.0).
All loads turns green but since
command was transmitted to
Group address, only
Controller with first Node
address greater than 0 (i.e.
“1”) within wildcard range
will respond (i.e. 2.1.1
responds, but 2.1.2 to 2.1.254
do not respond)



!2.1.1.LED.VALUE=0.240.0
is received, but no other Z/
G/N messages are received

Note: !2.1.0 LED.VALUE
=0.240.0. is never received.

Appendix 7

DMX Options

Note on DMX Lighting Devices. There are many third-party lighting devices available in the marketplace that support the DMX512 lighting standard ("standard for digital communication"). DMX devices were originally utilized for theatrical interior and architectural lighting application only, but recently their adoption rate has grown in other areas where colored lighting is desired. DMX 3-color lighting fixtures utilize the Red, Green, Blue (RGB) color space which although practical for theatrical uses and the trained lighting designer is quite limited for traditional dimming application **for the technology inherently lacks the most basic dimming slider** which would preserve a specific hue while lowering the brightness to full off. But that has all changed now...

Converging Systems' e-Node/dmx. Converging Systems has developed an adaptation of its lighting/dimming technology currently available within its ILC-x00 line of LED controllers and has re-purposed that technology into a separate product known as the e-Node/dmx. The existing RTI drivers compatible with the ILC-x00 LED controllers can also drive directly the e-Node/dmx (color engine/dmx translator), and the e-Node/dmx makes the necessary color adjustments within its own processor to translate incoming commands to outgoing DMX commands **and transmits those directly onto a DMX bus**. What is unique about this implementation is that the Converging Systems' hue-accurate dimming technology (with a built-in dimmer slider) can now drive DMX fixtures by using RTI device drivers already in existence for other Converging Systems' products. (See the listing of commands that are supported with the e-Node/dmx device which are listed in the front of this Integration Note.)

Please follow the directions which follow to drive DMX fixtures from an RTI System

WIRING DIAGRAM (for DMX control using e-Node/dmx and IP)

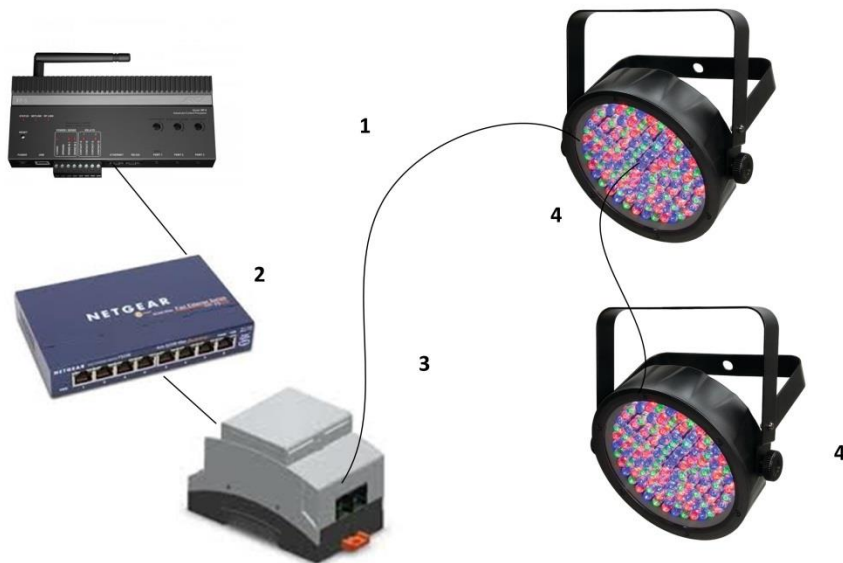


Figure 6

Wiring/Configuration Notes:

- Maximum length of CS-Bus cabling from e-Node to the last DMX fixture using DMX cabling = 1200 meters (3,900 feet)
- Maximum number of DMX fixtures connected to a single e-Node/dmx device = 32. If more than 32 fixtures are required, implement additional e-Node/dmx devices.
- Maximum number of e-Nodes that can exist on a RTI system = 254

BILL OF MATERIALS (for IP control)

#	Device	Manufacturer	Part Number	Protocol	Connector Type	Notes
1	RTI XP-n processor	RTI	Various	Ethernet/USB	Various	
2	Network Switch	Various	Various	Ethernet	RJ-45	
3	e-Node/dmx	Converging Systems	e-Node/dmx	Ethernet	RJ-45 (for Ethernet) RJ-25 for local DMX bus	
4	Third party DMX fixtures	Various	Various	DMX512	RJ-25 for DMX communication	Must terminate final OUT or THRU connector on last DMX fixture using a 120 ohm resistor
5	Flexible Linear Lighting (FLLA)	Converging Systems	FLLA-RGB-xxx		3-color 4 pin 4-color 5 pin	

	RGB or RGBW luminaries		FLLA-RGBW-xxx		1-color 4 pin	
--	------------------------	--	---------------	--	---------------	--

e-Node Programming/Device Programming

Minimum requirements for this operation.

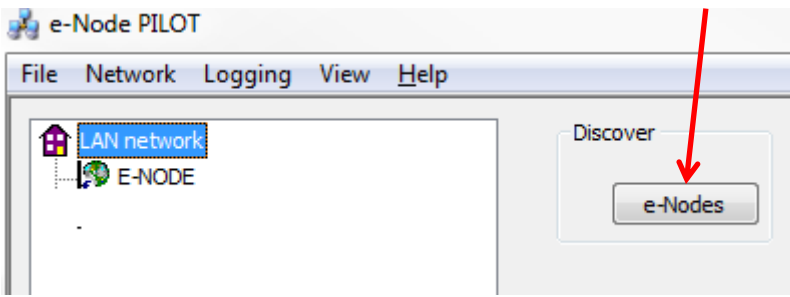
-e-Node/dmx with power supply
 -Necessary cabling to connect e-Node/dmx to first DMX fixture (see "e-Node Interfacing with DMX Guide"). For reference the pin-outs on the e-Node/dmx are as follows:

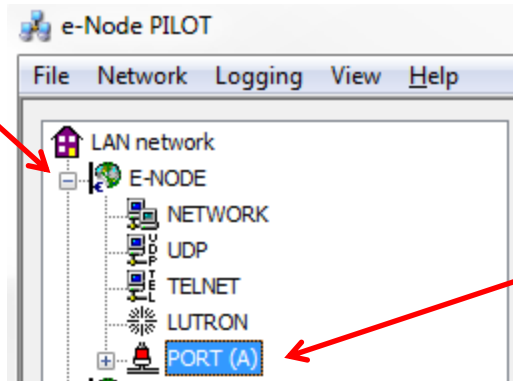
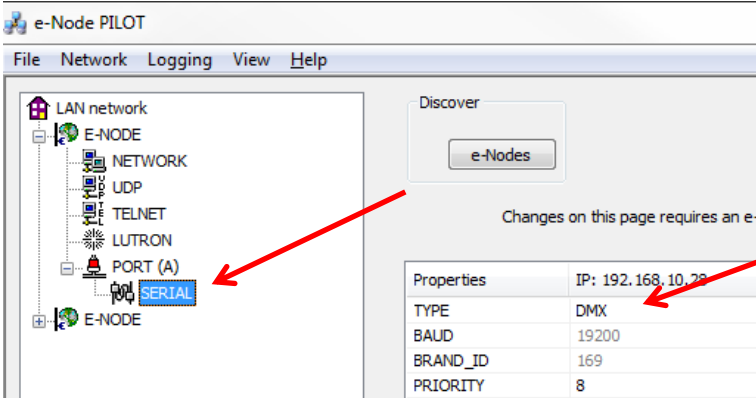
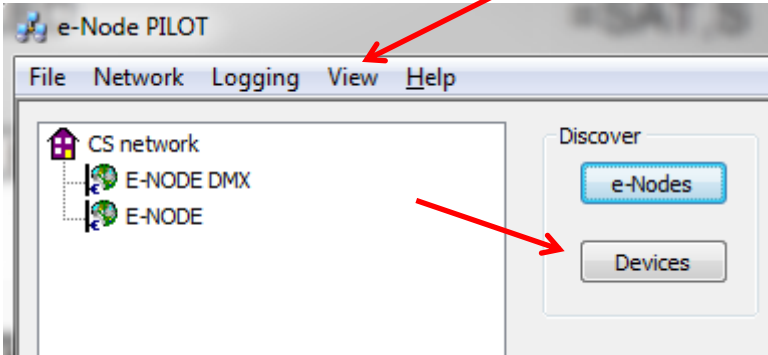
e-Node/dmx (MkIII) PORT 2 RJ-45 connector

Pin	Signal
1	Data +
2	Data -
3	Do not connect
4	Do not connect
5	Do not connect
6	Do not connect
7	Ground
8	Do not connect

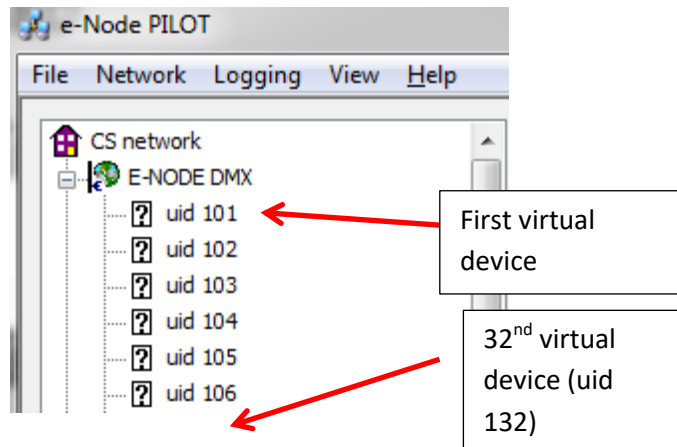
Note: Even though Converging Systems recommends that RJ-25 6P6C plugs should be used for most CS-Bus wiring, the DMX wiring can utilize a 4P4C RJ11 plug.

e-Node/dmx Programming

Step	Setting	Choices
DMX-1	e-Node/dmx setup	Follow the directions under e-Node Programming in Appendix 2 of this Integration Note Step EN-1 and EN-2 .
DMX-2	Verify the e-Node DMX is set to communicate to DMX fixtures	<p>-Select the View e-Node tab and select the Discover e-Node button. Any e-Node(s) connected on the same network will appear as shown.</p>  <p>-Select the + mark in front of the e-Node/dmx that you wish to program to expose the sub-tabs.</p>

		<div></div> <p>-Expand the PORT(A) tab and then expand the Serial tab.</p> <div><table><tr><th>Properties</th><th>IP: 192.168.10.28</th></tr><tr><td>TYPE</td><td>DMX</td></tr><tr><td>BAUD</td><td>19200</td></tr><tr><td>BRAND_ID</td><td>169</td></tr><tr><td>PRIORITY</td><td>8</td></tr></table></div> <p>-Verify that after the TYPE entry, the data field indicates DMX. If it does not indicate DMX, select DMX from the pull down menu and reboot the e-Node/dmx in order to make this setting active.</p> <p>Note: the e-Node/dmx can also be configured to communicate with standard CS-Bus devices (ILC-100, ILC-400) and therefore only when this entry is set to DMX, will the e-Node/dmx properly communicate to DMX fixtures.</p>	Properties	IP: 192.168.10.28	TYPE	DMX	BAUD	19200	BRAND_ID	169	PRIORITY	8
Properties	IP: 192.168.10.28											
TYPE	DMX											
BAUD	19200											
BRAND_ID	169											
PRIORITY	8											
DMX-3	Device Discovery	<p>-Select the View Map tab and select the Discover e-Node button. Any e-Node(s) connected on the same network will appear as shown.</p> <p>-Select the Discover Devices button.</p> <div></div>										

-Immediately 32 virtual "DMX Devices" will appear as follows:



Note: this picture shows the first 6 devices discovered. In a real example, all 32 virtual devices will appear.

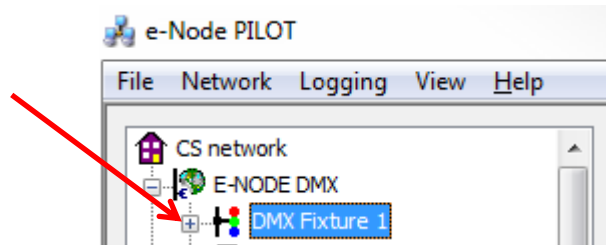
DMX-4 Set up Device Addressing

The DMX data packet is mapped to CS messages by assigning a unique Zone. Group. Node number to three successive DMX channels. These are mapped as shown in the following table:

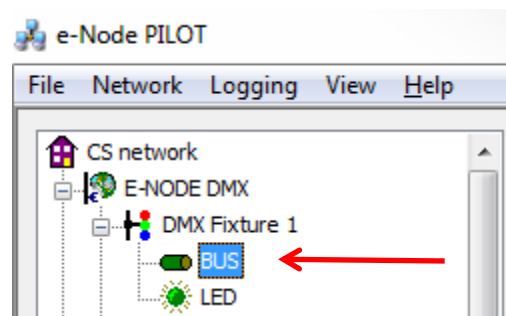
Fixture	DMX Channel Allocation	CS-Zone.Group. Node
1	1-3	2.1.1
2	4-6	2.2.1
3	7-9	2.3.1
4	10-12	2.4.1
5	13-15	2.5.1
6	16-18	2.6.1
7	19-21	2.7.1
8	22-24	2.8.1
9	25-37	3.1.1
10	28-30	3.2.1
11	31-33	3.3.1
12	34-36	3.4.1
13	37-39	3.5.1
14	40-42	3.6.1
15	43-45	3.7.1
16	46-48	3.8.1
17	49-51	4.1.1
18	52-54	4.2.1
19	55-57	4.3.1
20	58-60	4.4.1
21	61-63	4.5.1
22	64-66	4.6.1
23	67-69	4.7.1
24	70-72	4.8.1
25	73-75	5.1.1
26	76-78	5.2.1
27	79-81	5.3.1
28	82-84	5.4.1

29	85-87	5.5.1
30	88-90	5.6.1
31	91-93	5.7.1
32	94-96	5.8.1

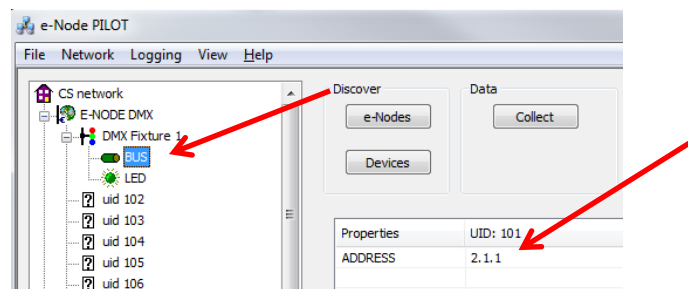
-To see these entries, click on the **?** in front of any particular **uid** listing which will expand its directory.



-After the directory is expanded, you will see these entries:



-If you desire to change any Zone/Group/Node address, click on the **BUS** entry, and change the address as appropriate.



DMX-4	Proceed through standard RTI Programming.	<p>In this case, you will not be programming ILC-100 or ILC-400 devices, so you can skip the Appendix 2 steps relating to ILC-100/400 programming (Steps DV-1 and DV-2).</p> <p>-Proceed to standard RTI Programming (Steps 1 onwards above in the main body of this Integration Note).</p> <p>Note: the e-Node/dmx takes care of everything else!!!</p>
-------	---	--

Appendix 9

Common Mistakes

1. **No Communication to the e-Node.**

(.1) Forgetting to IP address of the e-Node within Integration Designer. Make sure you have selected a static IP address for the e-Node using the e-Node pilot application and then use that same address within Integration Designer.

(.2) (FUTURE) Forgetting to make sure that the alias name for the e-Node is E-NODE and the password for e-NODE is ADMIN. These are set within the Converging Systems driver within Integration Designer.

2. **Individual Lighting or Motor Controllers do not respond, although data is passing to e-Node or IBT-100.**

(.1) Forgetting to set the addresses for controllers (motor or lighting) from within Integration Designer.

3. **Sliders do not seem to work.**

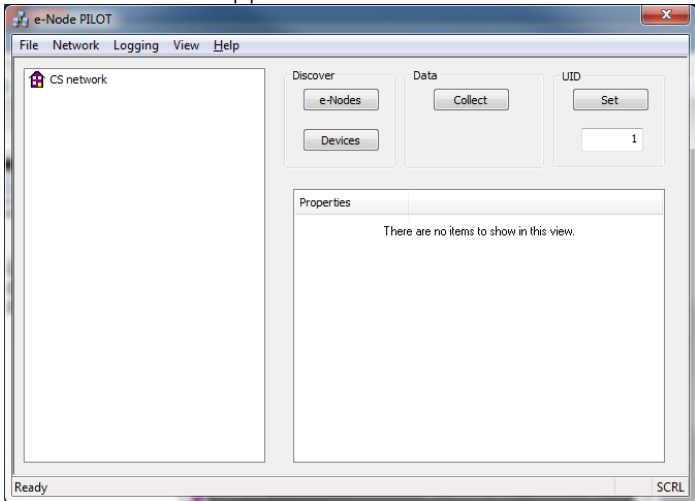
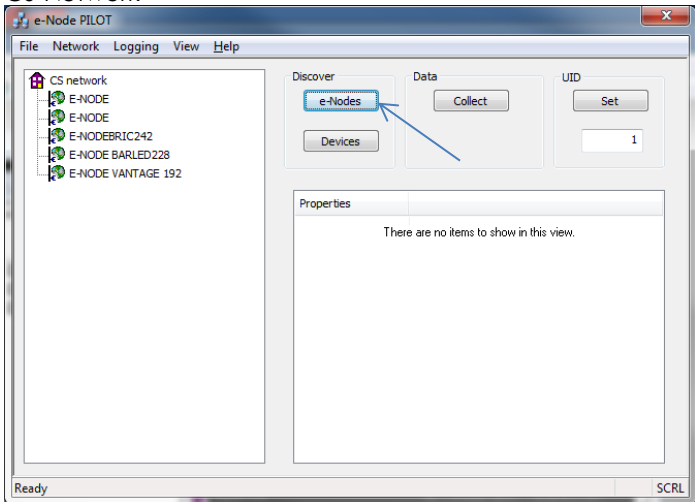
(.1) Make sure the sliders have been set to the appropriate **SET LED** argument (Red, Green, Blue, Hue,Sat, Brightness, etc.).

(.2) Make sure that within **Variables**, the **Bar Graph Object** is set to the appropriate Level command argument (Red, Green, Blue, Hue,Sat, Brightness, etc.).

Appendix 10

Troubleshooting/System Monitoring

Using Converging Systems' Tools

Step #	Step Overview	Detail
A5.2.1	Launch e-Node Pilot application	<p>This screen should appear</p> 
A5.2.2	Discover e-Node devices(s)	<p>Select View Map and press the Discover e-Node button. If your e-Node can be seen, you should see it appear under CS-Network</p> 
A5.2.3	Discover Devices	<p>Next press the Discover Device button. Any connected loads (i.e. ILC-100 or motor controllers) should appear</p>

