CONVERGING SYSTEMS

Integration Note

Automation/Lighting Panel Manufacturer:	RTI
Platforms:	**XP-n Controllers**
Versions:	Integration Designer v 9.4.0.3961 or newer
Specific Profile/Driver Version:	V1.01 or later (consolidated version for IP and Serial control using UDP). Note: newer driver may be available for Telnet Port 23 communication for IP.
Download location for Profile/Driver	RTI dealer portal Note: current name is **Converging Systems Intelligent Lighting Controller.rtidriver**
Document Revision Date:	September 7, 2014

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).

CURRENT DRIVER SUPPORT THE FOLLOWING 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

General CS-Bus Commands	RTI Naming Convention[1]	ILC-100	ILC-400	e-Node DMX
General LED Control Commands				
ON	On	✓	✓	✓
OFF	Off	✓	✓	✓
EFFECT,1		✓	✓	N/A
EFFECT,n (>1)		✓	✓	N/A
STORE,#	Store	✓	✓	✓
RECALL,#	Recall	✓	✓	✓
DISSOLVE.1=XX	Set LED Dissolve Rate	✓	✓	N/A
DISSOLVE.2=XX		*	*	*
DISSOLVE.3=XX		*	*	*
SEQRATE=XX	Set LED Sequence Rate	✓	✓	✓
SUN_UP		*	*	*
SUN_DOWN		*	*	*
SUN.S		*	*	*
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	✓	✓	✓
HUE,H	Hue	✓	✓	✓
SAT_UP	Sat Up	✓	✓	✓
SAT_DOWN	Sat Down	✓	✓	✓
SAT_S	Sat	✓	✓	✓
STOP	????	✓	✓	✓
COLOR=H.S.L	????	✓	✓	N/A
PRESETH.X=XXX.XXX.XXX	Set LED Presets/HLS Color spacer for preset x	✓	✓	✓
RGB Color Space Commands				
RED,R	Red	✓	✓	✓
GREEN,G	Green	✓	✓	✓
BLUE,B	Blue	✓	✓	✓
VALUE=R.G.B	???	✓	✓	N/A
WHITE,W		*	*	*
VALUE=R,G,B,W		*	*	*
PRESET.X=XXX.X	Set LED Presets/RGB	✓	✓	✓

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XX.XXX (3-color)	Color spacer for preset x			
PRESET.X=XXX.XXX.XXX (4-color)		*	*	*
STOP	???	✓	✓	✓
Correlated Color Temperature (CCT) Commands				
CCT,XXXX		*	*	*
CCT_UP		*	*	*
CCT_DOWN		*	*	*
Bi-Directional Commands				
COLOR=?	Automatic polling within Driver	✓	✓	N/A
VALUE=?	Automatic polling within Driver	✓	✓	N/A
PRESETH.X=?		*	*	*
PRESET.X=?		*	*	*
Accessory Enode 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 dealer programmed serial strings user RAW CMD. See **Step 3g** for more information.

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

Motor Commands (WIP currently)

General Commands	RTI Naming Convention	IMC-100	BRIC ("Bric Mode")	
General Motor Control Commands				
UP		✓	✓	
DOWN		✓	✓	
STOP		✓	✓	
RETRACT		✓	✓	
STORE,#		✓	✓	

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RECALL,#		✓	✓	
PRESET.X=XX.XX				
Bi-Directional Commands				
STATUS=?				
POSITION=?				
Accessory Enode Command/Setup Parameters				
Verbose Mode		✓	x	✓
UDP Port 4000/5000		✓	✓	✓
Telnet Login with Authentication (with e-Node				
Telnet Login without Authentication				

CURRENT PROFILES DO NOT SUPPORT THE FOLLOWING FEATURES

Other than any features that are grayed out below, any features specified below are currently unsupported.

Any feature not specifically notes as supported should be assumed to be unsupported

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WIRING DIAGRAM (for IP connection)

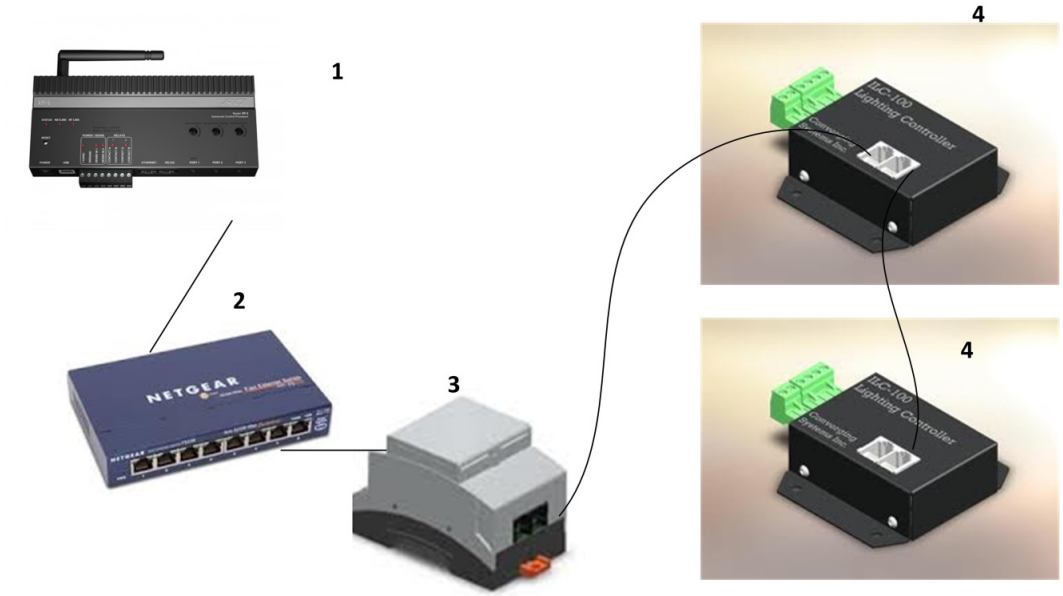

Figure 1

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

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 resister on pins 3/4

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WIRING DIAGRAM (for RS-232 serial connection)

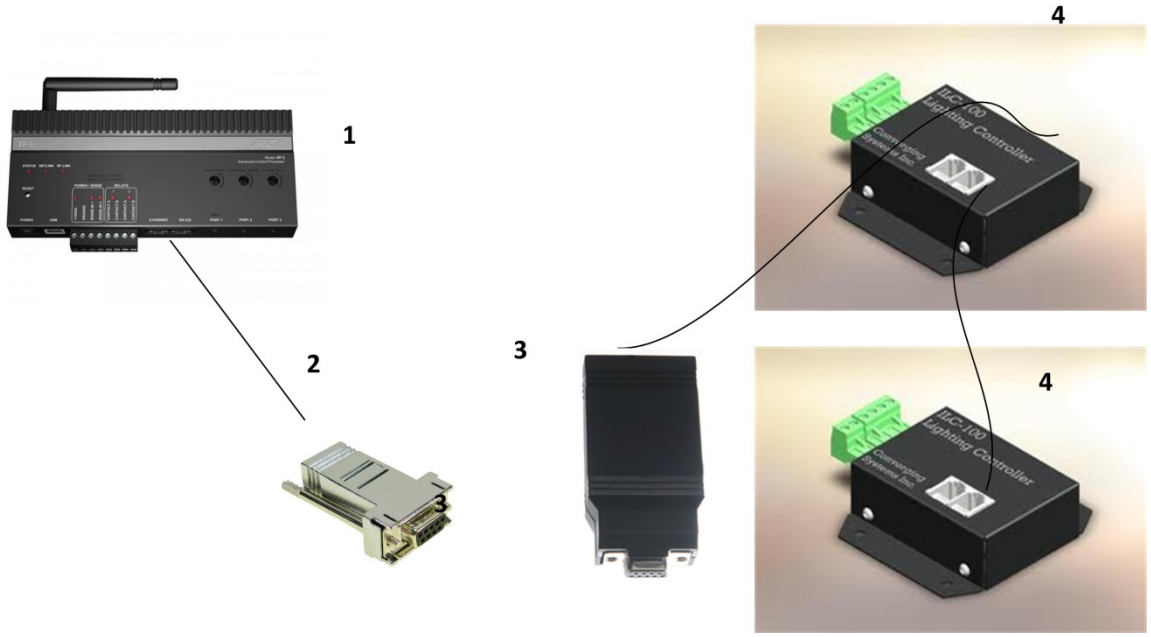

Figure 2

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

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	RJ-45 (for serial) 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	

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					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 resister on pins 3/4

System Configuration/Programming

Before proper operation between the Converging Systems' controllers and the RTI system can begin, it will be first necessary for most applications to configure the Converging Systems' products using the e-Node Pilot (PC-based) application (and the e-Node). In addition, communication parameters within the RTI Integration Designer software are also required. Refer to the specified instructions below for the particular subsystem for more information.

Background

The Converging Systems e-Node is an Ethernet communication device which can be used to connect the RTI Host to one or more Converging Systems motor and/or lighting controllers. Alternatively, the Converging Systems' IBT-100 serial interface device can be used alternatively to connect the same number of Converging Systems' controllers to a RTI processor in situations where Ethernet communication is not desired (but where bi-directional feedback is still required).

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 as follows:

e-Node Programming

Typically, the following features are set-up within the e-Node Pilot application for Ethernet communication.

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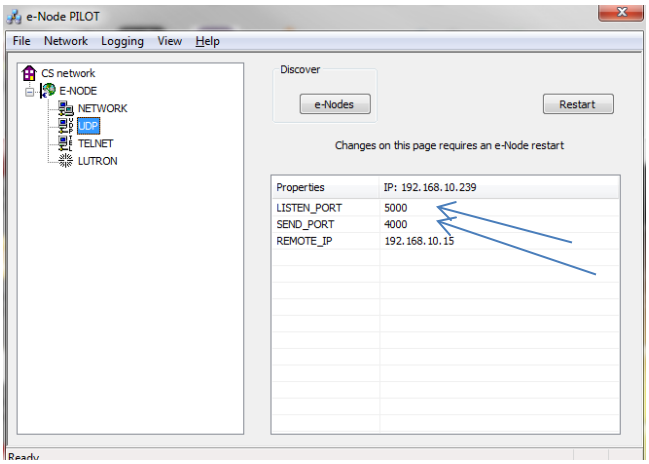
Step	Setting	Choices
1	**IP Address** Set up the e-node with an appropriate Static or Dynamic IP address. Refer to the separate" e-Node Quick Start Guide" on how to make such settings.	Static or Dynamic Addressing **Note**: It is recommended that only Static addressing be used with the RTI processors.
2	**UDP Port** (transmit and receive) **Note**: Converging Systems will be working with RTI in the near future to update the existing RTI Certified driver to utilize **Telnet** (Port 23) communication rather than UDP (Port 4000/5000). When a new RTI driver becomes available utilizing Telnet communication, *<u>this step will not be necessary</u>*. In this proceed to Step #3 below, otherwise go to Step #4	Currently, V 1.01 of the RTI driver utilizes **UDP** communication (Port **5000** for send and Port **4000** for receive from the XP-n processors). These are the factory defaults for the Converging Systems' e-Node. If you are having difficulty establishing communication with the targeted e-Node, launch the e-Node Pilot application, verify that under the **View tab/View e_Node tab** the **LISTEN_PORT** for the e-Node is set to 5000 and the **SEND_PORT** is set to 4000. If not, change those settings to these values, and hit **RESTART** to reboot the e-Node. You may need to close and re-open the Pilot application to invoke the change. Here is the applicable page within Pilot where this change is made.  **Note**: Since the e-Node Pilot application also uses **UDP** communication which is a point to point protocol, the RTI system and the Converging Systems' e-Node Pilot cannot be utilized concurrently. So if **UDP**

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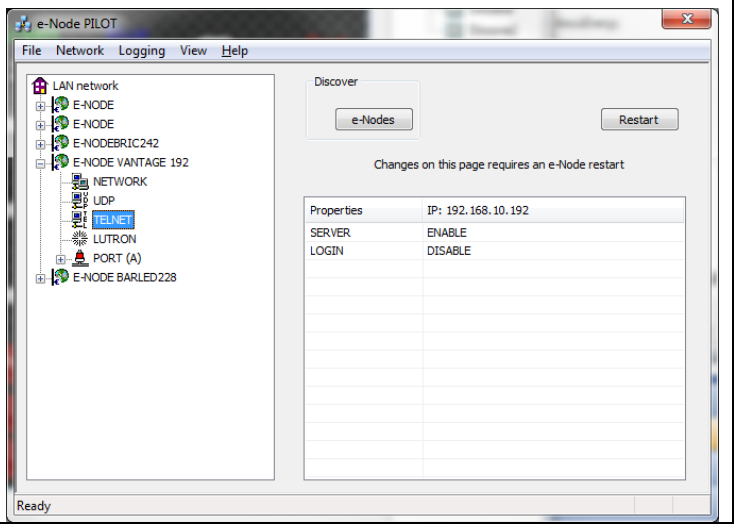
		communication is to be used with the XP-n processor, it is important to initially set up the e-Node and all connected lighting and/or motor controllers before turning on the XP-n processor. If you want to subsequently make a change using the Pilot application, just turn off the XP-n processor temporarily and the UDP channel will be available to the e-Node Pilot application.
3	Telnet Server and Login (**only applicable if the RTI driver becomes available with Telnet support).** **Note**: Currently the RTI driver does not support Telnet with or without Authentication. When that functionality becomes available, follow the directions to the right.	Depending upon the functionality of an RTI driver which might support Telnet (Port 23) communication, you will need at minimum (i)to turn on **Telnet** within the e-Node, and (ii) to adjust secondarily the setting for **Login** as required by the RTI driver. 1) Select the **View e-Node tab** and select the **Telnet tab**. Set **SERVER** to **ENABLE**. 2) Login Settings. a) If Telnet communication with Login ***is supported***, set **LOGIN** to **ENABLE** and select the **Restart** button for the particular e-Node that you are utilizing to communicate with the RTI system. b) If Telnet communication with Login is ***unsupported***, set **LOGIN** to **DISABLE** and select the **Restart** button for the particular e-Node that you are utilizing to communicate with the RTI system. 

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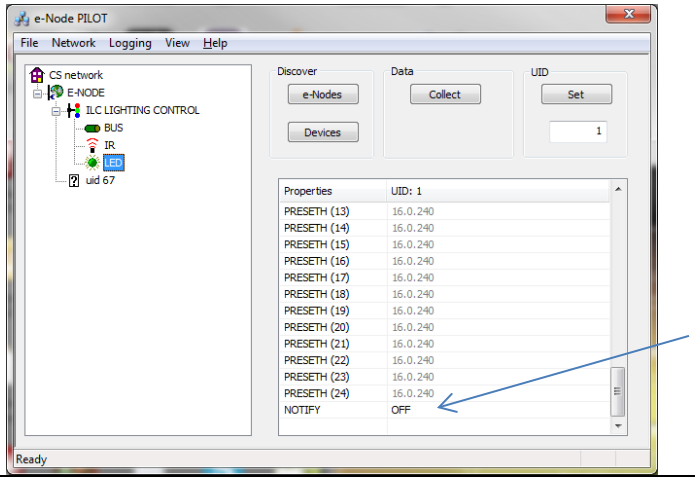
4	Notify Mode	The RTI software is able to intelligently poll the Converging System's Intelligent Lighting Controllers (either through the e-Node IP device or the IBT-100 serial device). In order to reduce the amount of bus traffic, it is possible to disable the Converging Systems' auto notify facility which has been engineered for other automation systems which lack the capability of automatic polling. (Good Job, RTI!) Within the e-Node Piiot application, select each controller (i.e. ILC Lighting Controller) that you wish to adjust from the **View Map** tab. Then open the **LED** tab. Find the **NOTIFY variable,** and set it to **OFF.** This will prevent the selected controller from broadcasting its status after every state change therefore reducing CS-Bus traffic. 

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).

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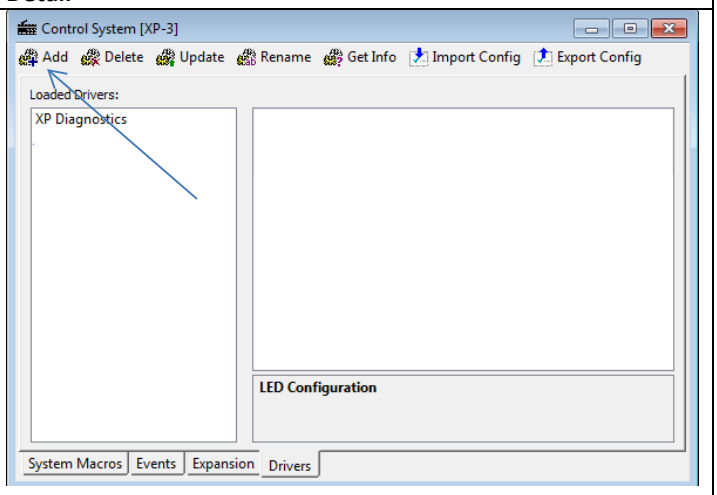
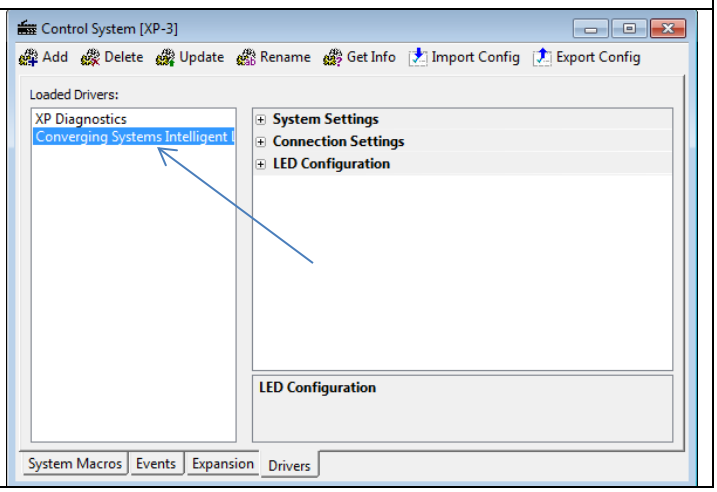
1. Import Converging Systems Intelligent Lighting Controller into your project.

Step	Step	Detail
1a	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. If you do not have this driver in your existing library, go to the RTI Dealer portal and download the latest Converging Systems' driver. **Note**: Make sure you download latest version from the RTI library.	
1b	After you have added the **Converging Systems Intelligent Lighting Controller** to your RTI processor's **Driver** library**,** you will see the following entry.	

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

Step	Step	Detail
2a	Set-up communication parameters for the Converging Systems interface (**IBT-100 serial device** or **e-Node IP device**) that will be used with	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. **Serial Communication**: Under the **Connection Settings**

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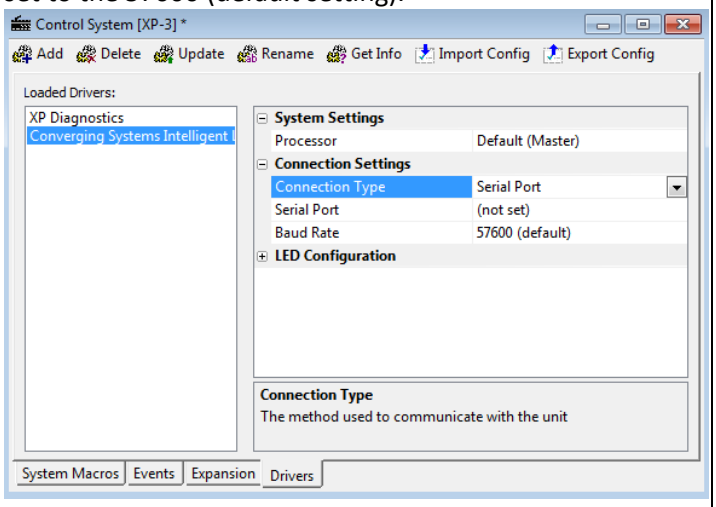
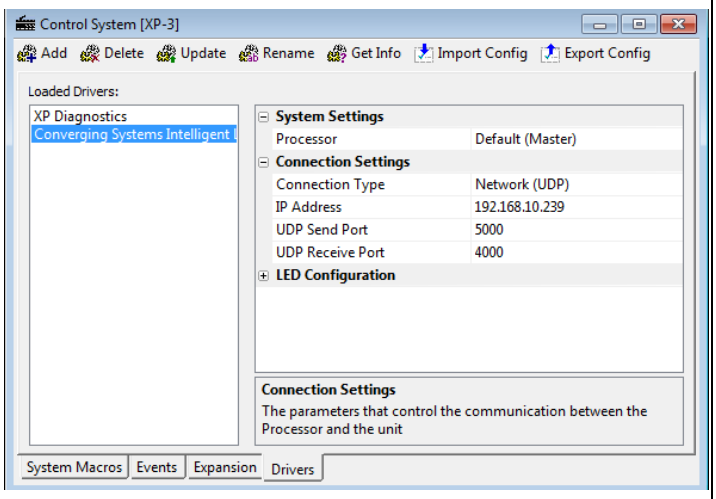
	one or more Intelligent Lighting Controller within **Connection Settings tab**	**tab**, select the **Connection Type**, pick **Serial Port**. Select the applicable **Serial Port** and make sure the **Baud Rate** is set to the 57600 (default setting).  **IP Communication (UDP)**: Under the **Connection Settings tab**, select the **Connection Type**, pick **Network (UDP).** 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).  Note: When **Telnet (Port 23)** communication becomes available, under the **Connection Settings tab**, select the **Connection Type**, pick **Network (Telnet).**Select the applicable Port (23). For **IP Address,** enter the e-Node's previously set up Static IP address (set up initially using e-Node Pilot application).

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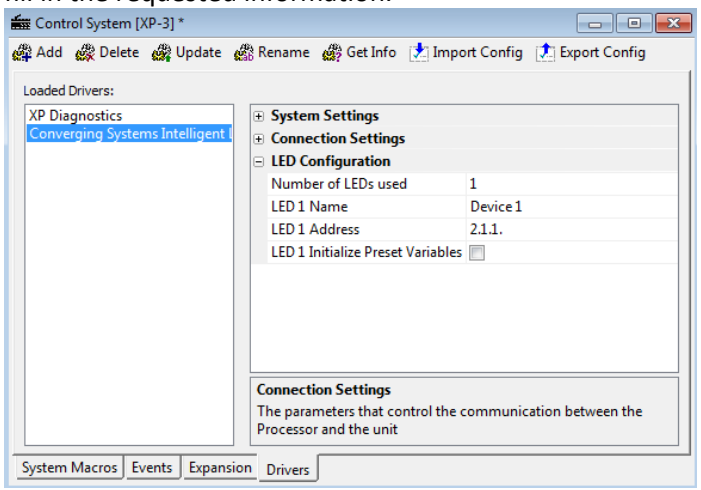
2b	Set-up communication parameters for the specific Converging Systems Intelligent Lighting Controller(s) within **Connection Settings Tab**	Determine the universe of controllers that will be connected to the communication linkage that you set up in **Step 2a** above. For LED devices, expand the **LED 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 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.

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		LEDn Initialize Preset Variables. Select if present initialization is required for LED Device(s). 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.

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

Step	Step	Detail
3a	You can create a user interface (UI) for your system that is suited to your customer's requirements. This **Integration Note** will not focus on the creation of unique pages for your particular project, but as a resource, a sample project with professionally created UI pages is available from the RTI website and accompanies the RTI Certified Driver for Converging Systems. It is suggested that you open this RTI developed system at this point.	
3b	You can right click on any button on the sample UI within Integration Designer and select **Edit Procedure** to determine the simple steps involved in making the UI operate. Depending upon the	This **Properties** screen will appear for Sliders and Adjustment buttons.

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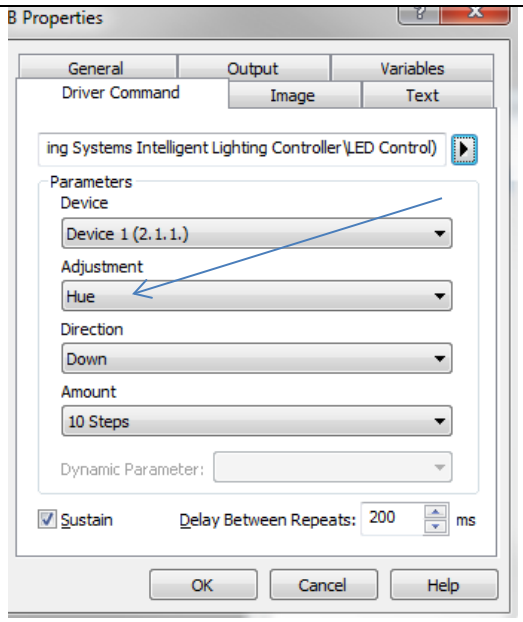
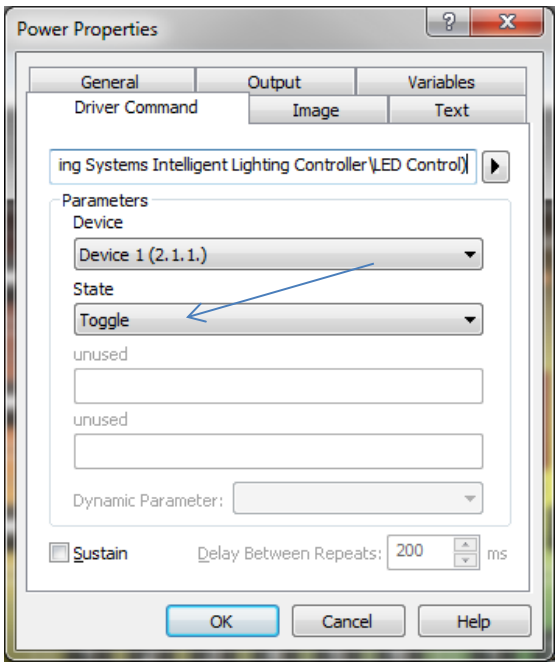
	type of button selected, varying **Properties** screens will appear. Most of the relevant programming for each button is within the **Driver Command** tab.	 This **Properties** screen will appear for simple Toggle and normal selection buttons. 
3c	Next, you can review specific commands that have been linked to specific buttons throughout the System file.	In order to initially review, or customize or change a button, within the **Properties** window select the  Icon and find the specific command that has been

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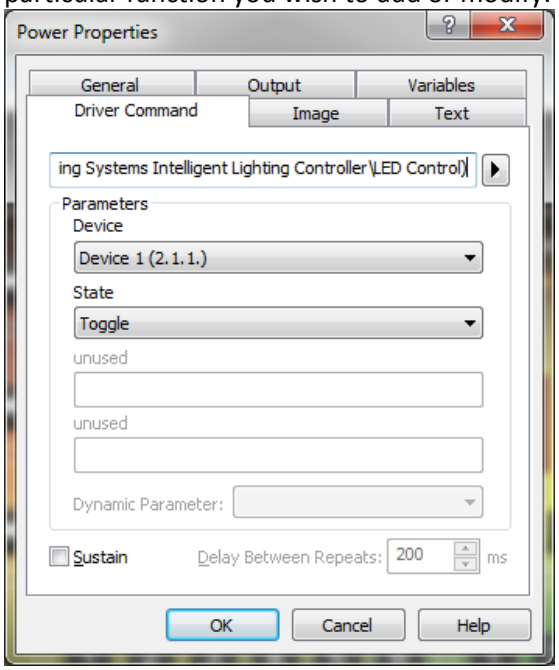
	You can mimic the process here with your own UI screens in the future by following the example exactly.	programmed within the RTI Certified Driver for the particular function you wish to add or modify.  **Note**: Those commands listed under **LED Control** are those which have been pre-programmed within 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).
3d	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.	Select the Library Browser, and open the Converging Systems Intelligent Lighting Controller and review all the Driver Commands supported. 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).

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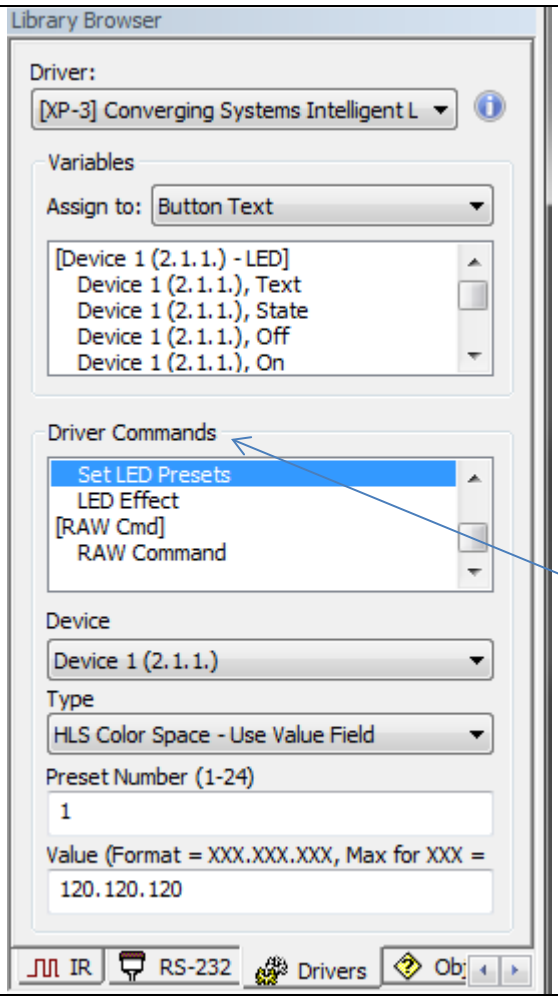
3e	Now, that you have selected a targeted command, you must assign that command to specific device.	Assign each command to specific **Parameters/Device by selecting the** icon and scrolling through available controller names (with addresses).

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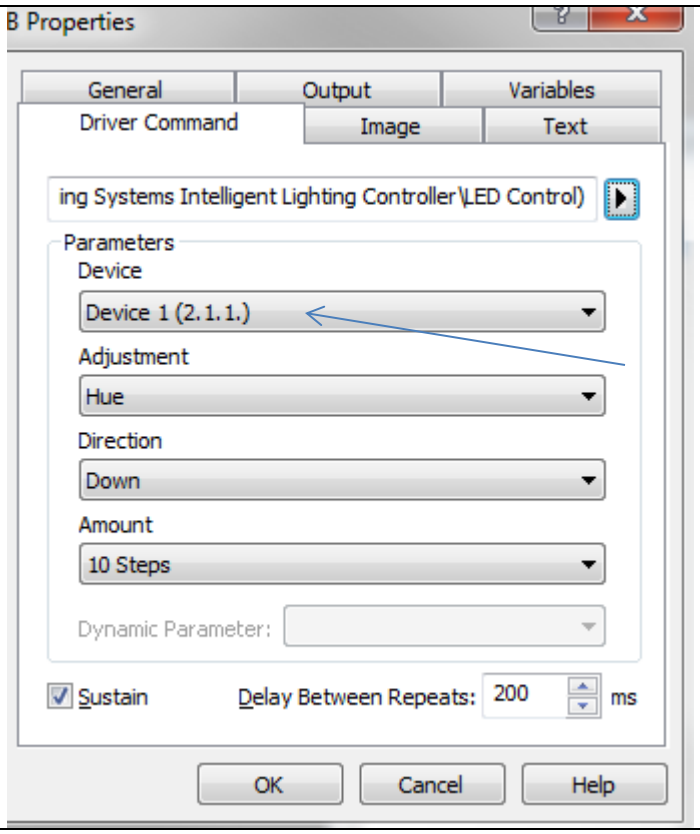
3f	Continue providing any required data for the **Adjustment** section for each command being programmed. If presented, also input any requested data for additional fields such as **Direction** and **Steps**.	Assign **Adjustment** entries for Sliders and Adjustment icons by selecting the icon and scrolling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

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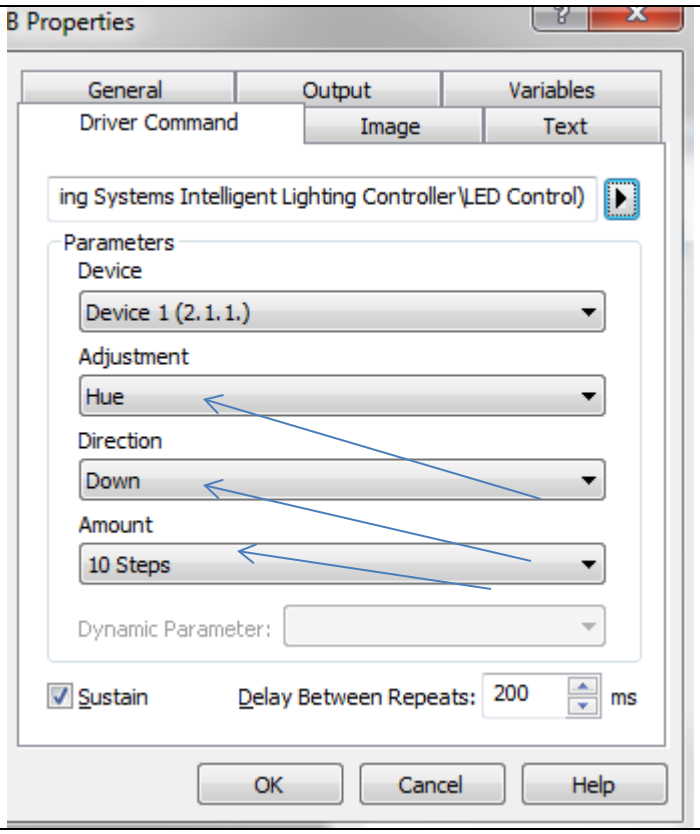
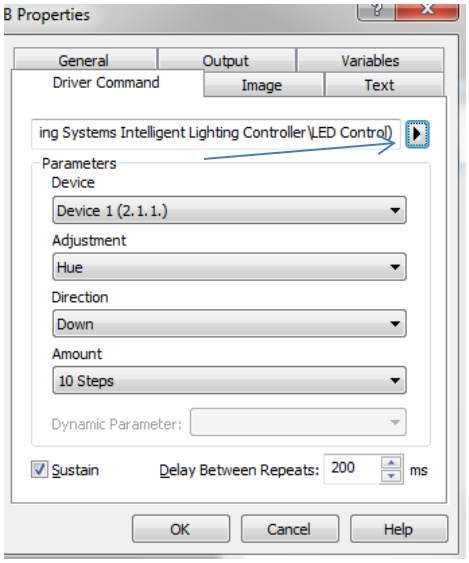
		
3g	Continue this process until you have all your buttons, sliders programmed. Should you encounter a specific Converging Systems' command that is not supported by the RTI Driver, download the Converging Systems' *Third Party CS-Bus Device Driver Toolkit-Programmer's Guide* and program those commands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

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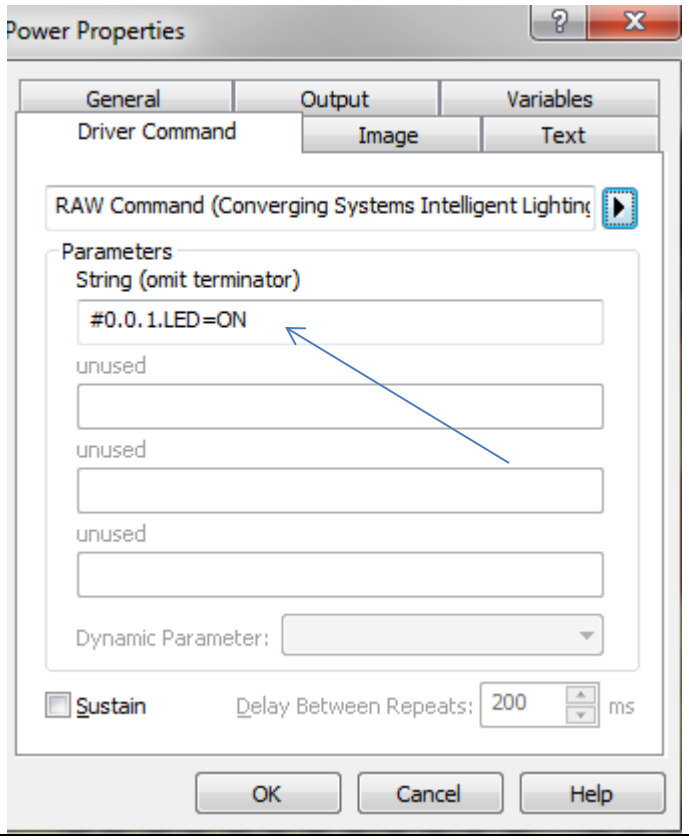
		Then enter your new command within **String block** 

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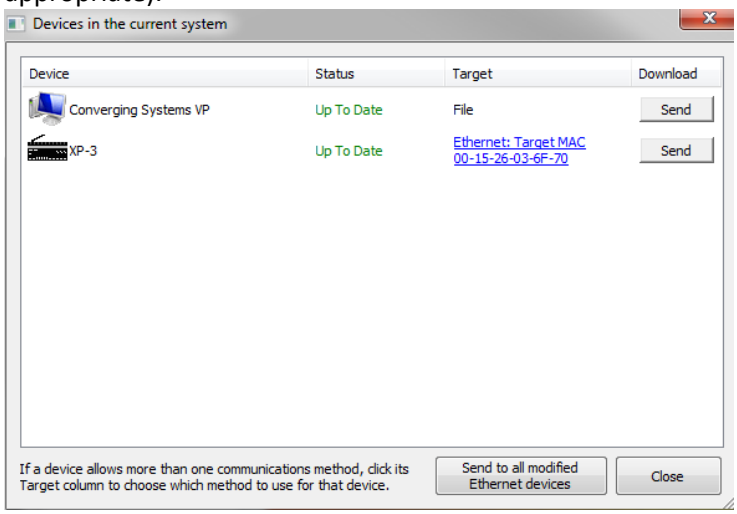
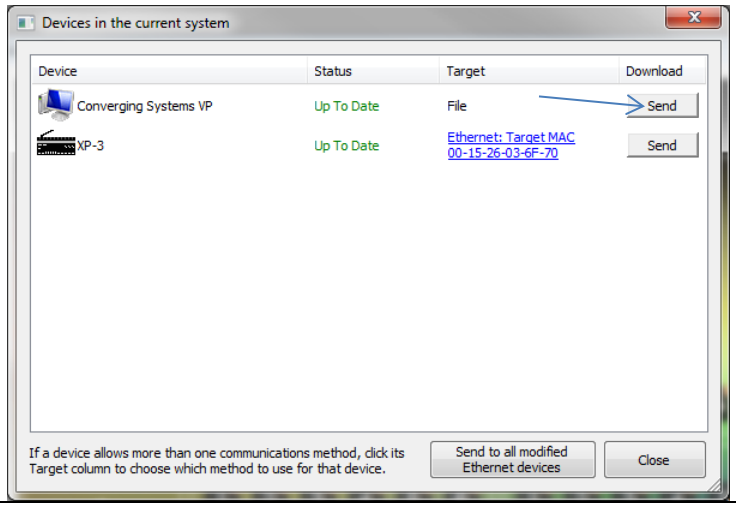
4. Upload System file (*.rti) and Test

4a	Upload System file	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). 
4b	If you have developed a **Virtual Terminal** (such as has been included within the RTI sample project), create a **Virtual Terminal.exe**	Select the Virtual Terminal page and select Send 
4c	Test using the Virtual Terminal.	Launch the Virtual Terminal exe. File and press various buttons on the Virtual Terminal and verify that the corresponding action on all the Converging Systems's devices are operating properly.

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		 Example: The **Power** Button should toggle the LEDs ON or OFF with each subsequent press of the **Power** button.

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.

Figure 3

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Appendix 1

Common Mistakes

1. Forgetting to set the addresses for controllers (motor or lighting) from 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 RTI driver. If you want to change those alias names and passwords for the e-NODE make sure you change them within the RTI profile.

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APPENDIX 2

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Appendix 3

ADVANCED RTI PROGRAMMING

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 **Figure 4** 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 4

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Appendix 4

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Appendix 5

DMX Options

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