LUTRON

Integration Partner

CONVERGING SYSTEMS

Integration Note

(New Web-Pilot Application)

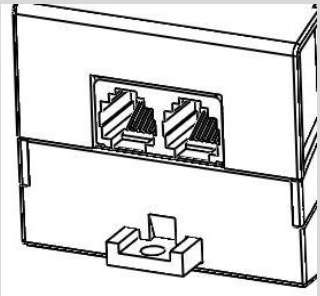
Automation/Lighting Panel Manufacturer:	**Lutron Electronics Co. Inc.**
Platform	**RadioRA2 (RA2)** **HomeworksQS (HWQS)** **Homeworks Illumination (HWI)** **Note: For Grafik Eye GRX and Grafik Eye QS consult e-Node Interfacing Guide**
Model Number(s):	- e-Node with ILC-x00 family of LED lighting controllers, **and/or** - e-Node/DMX (for third-party DMX Fixtures),and/or - e-Node with IMC-x00 family of Motor controllers
Partner Software Platforms	All Lutron setup software (Essentials and Inclusive and Designer)
Specific Profile/Driver Version:	This documentation release is applicable to e-Nodes MKIII devices with the new **Web Pilot** e-Node based commissioning software built in (**V2.10 or later**). If you have an e-Node MKIII with FW versions prior to 2.10, or earlier MKII e-Nodes, please refer to pre 2017 versions of this document. **Reference**. MKIII e-Nodes have two side-by-side RJ-25 (6P6C) ports next **PLUS** one RJ-45 (Port 2) port ***on one side*** of the device. MK-II e-Nodes have a dual RJ-25 set of ports and no adjacent RJ-45 (Port 2) them ***on one side*** of the device.  MKIII e-Node 1  MKII e-Node 2 No driver required from Lutron. **Note**: The existing e-Node Pilot application (V4.11 Build 3 or later) is still required for a few required tasks such as discovering Converging Systems devices connected to any e-Node and for monitoring CS-Bus traffic and for saving Projects off-line.
Partner/Driver Developer:	Converging Systems Inc.
Document Revision Date:	2/5/2017

Table of Contents

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

OVERVIEW AND SUPPORTED FEATURES

The Lutron lighting systems specified on the first page of this Integration Note support the Converging Systems' family of motor and LED lighting control products using the Converging Systems e-Node device.

Integration of the Converging Systems' platforms is enabled from Lutron keypads, and Android and iOS devices both locally and remotely.

THE FOLLOWING OPTIONS ARE SUPPORTED BY THE CONVERGING SYSTEMS LUTRON EMBEDDED SMART INTERFACE (WITHIN E-NODE GATEWAY AND ILC-X00 FAMILY CONTROLLER OR WITHIN E-NODE/DMX GATEWAY)

- 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 (with ILC-400c controller only).
- Support of communication utilizing Telnet with authentication (Port 23)
- One-way control of color settings in the RGB, RGBW (within ILC-400 only), or HSB color space.
- Ability to store and recall specific colors set by a user.
- Ability to recall specific Effects stored (within e-Node/DMX limited to Effect 1).
- 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.
- Control via all thin client interfaces (PC, Home Control + and all Lutron RadioRA2 compatible interfaces

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

- Connectivity using RS-232c interface (IBT-100)

Tabular Summary of Supported Features

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

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LED Lighting Commands

General CS-Bus Commands	Descriptive Naming Convention	ILC-100 m	ILC-100c (sa)	ILC-400 (RGBW mode	ILC-400 (4 ch Mono)	e-Node DMX
General LED Control Commands						
ON	e-Node_On	✓	✓	✓	✓	✓
OFF	e-Node_Off	✓	✓	✓	✓	✓
EFFECT,n	Execute_Effect		✓	✓	✓	✓[1]
STORE,#	Store Preset	✓	✓	✓	✓	✓
RECALL,#	Recall Preset	✓	✓	✓	✓	✓
DISSOLVE.1=XX	Set_Dissolve_Rate	✓	✓	✓	✓	✓
DISSOLVE.2=XX	Set_Dissolve_Rate	✓	✓	✓	✓	✓
DISSOLVE.3=XX	Set_Dissolve_Rate	✓	✓	✓	✓	✓
DISSOLVE.5=XX	Set_Dissolve_Rate	✓	✓	✓	✓	✓
SEQRATE=XX	Set_Sequence_Rate	✓	✓	✓	✓	✓
SUN_UP	Sun_Up			✓		
SUN_DOWN	Sun_Down			✓		
SUN,S	Set_Circadian_Value			✓		
HSB (HSL) Color Space Commands						
FADE_UP	Fade_Up	✓	✓	✓	✓	✓
FADE_DOWN	Fade_Down	✓	✓	✓	✓	✓
SET,L	Set_Brightness	✓	✓	✓	✓	✓
HUE_UP	Hue_Up		✓	✓		✓
HUE_DOWN	Hue_Down		✓	✓		✓
HUE,H	Set_Hue_Value		✓	✓		✓
SAT_UP	Sat_Up		✓	✓		✓
SAT_DOWN	Sat_Down		✓	✓		✓
SAT_S	Set_Saturation_Value		✓	✓		✓
STOP	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	Set_RED_Value		✓	✓		✓[4]
GREEN,G	Set_GREEN_Value		✓	✓		✓[4]
BLUE,B	Set_BLUE_Value		✓	✓		✓[4]
VALUE=R.G.B	???					
WHITE,W	Set_WHITE_Value		✓	✓		✓[3]
RGB,R.G.B	Set RGB Value		✓	✓		✓[4]
RGBW,R.G.B	Set RGBW Value			✓		✓[3]
PRESET.X=XXX.X XX.XXX (3-color)	Set LED Presets/RGB Color spacer for preset x					

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PRESET.X=XXX.XXX.XXX (4-color)						
STOP	Stop adjustment	✓	✓	✓	✓	✓
Correlated Color Temperature (CCT) Commands						
CCT,XXXX	SET_Correlated_Color_Temp		✓	✓		
CCT_UP	Color_Temp_Up		✓	✓		
CCT_DOWN	Color_Temp_Down		✓	✓		
Bi-Directional Commands (not relevant currently)						
COLOR=?	Automatic polling within Driver. **Note**: Driver achieves same function with Notify ON	✓	✓	✓	✓	✓
VALUE=?	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:

- reserved

** reserved

[1] Effect (1) only supported

[2] reserved

[3] Only if QUAD Color is selected in e-Node/dmx for a particular device.

[4] Only if TRI Color is selected in e-Node/dmx for a particular device

[5] Only if TRI Color is selected in e-Node/dmx for a particular device

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Motor Commands

General Commands	Descriptive 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 Enode Command/Setup Parameters				
Verbose Mode		✓	x	✓
UDP Port 4000/5000				
Telnet Login with Authentication (with e-Node		✓	✓	✓
Telnet Login without Authentication		✓	✓	✓

Theory of Operation

A Lutron 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 to 32 third-party DMX fixtures using a single e-Node/**dmx** is all that is required for system operation and perfect Lutron/Converging Systems operation. See Appendix 4 for DMX instructions.

No drivers or changes to Lutron equipment in general are required to establish communication with Converging Systems equipment, although you may wish to fine tune the button logic in your Lutron project to generate the type of output commands which will most effectively control the Converging Systems equipment. For those who wish to understand further the magic of our inter-operability with technology from Lutron, see the following diagram.

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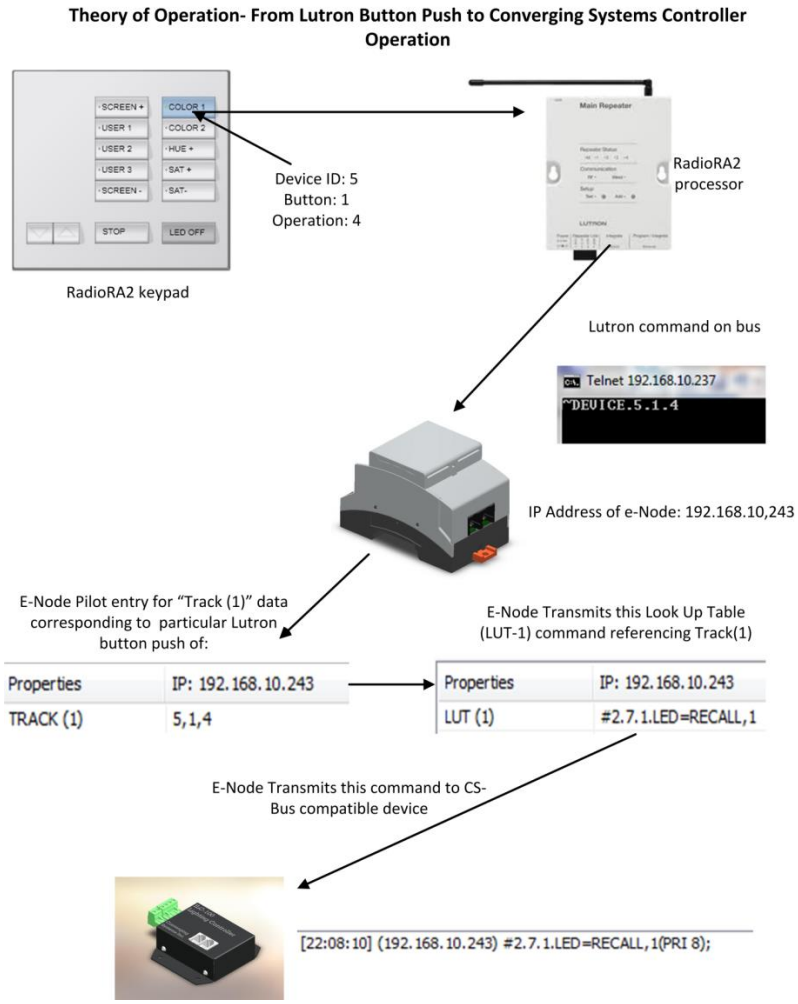

Figure 1

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SYSTEM ARCHITECTURE AND REQUIRED COMPONENTS

1. WIRING DIAGRAM (for RadioRA2) with CS-Bus equipment

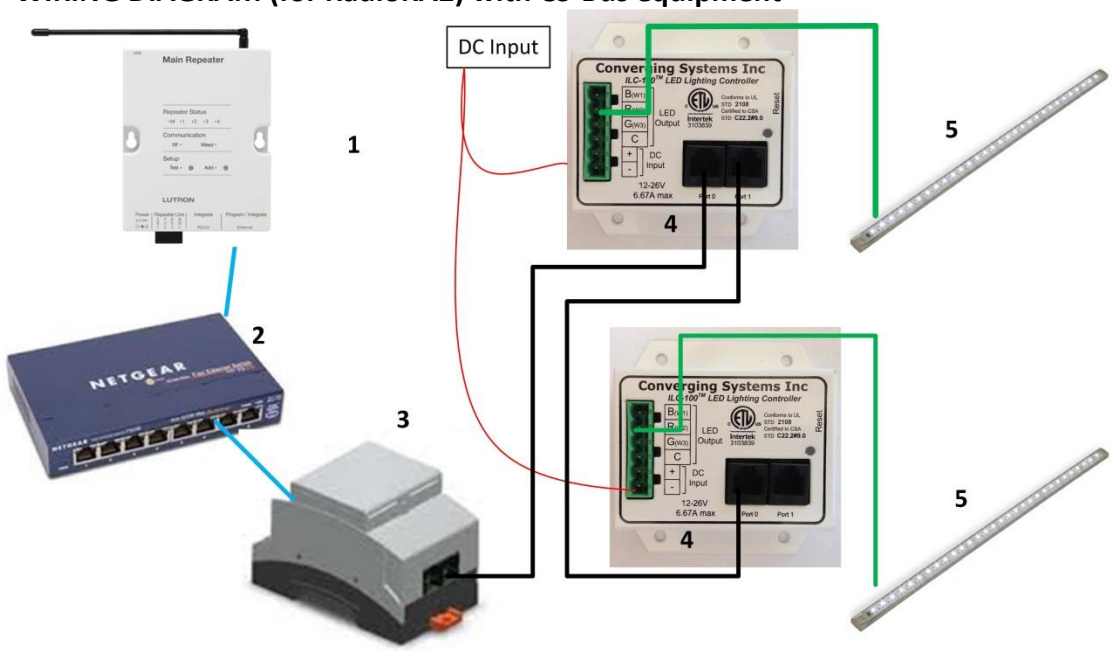

Figure 2

Wiring/Configuration Notes:

1. Maximum length of CS-Bus cabling from e-Node to the last ILC-x00 (or IMC-x00) 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-x00 (or IMC-x00) 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 Lutron RadioRA2 or HomeworksQS system = 254

2. BILL OF MATERIALS (for Lutron)

#	Device	Manufacturer	Part Number	Protocol	Connector Type	Notes
1	Lutron Processor (RR2, HWQS, HWI)	Lutron	Varies	Ethernet	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-x00 or IMC-x00 or (Stewart BRIC)	CS-Bus protocol	RJ-25 for CS-Bus communication	Must terminate beginning and end of bus with 120 ohm resister on

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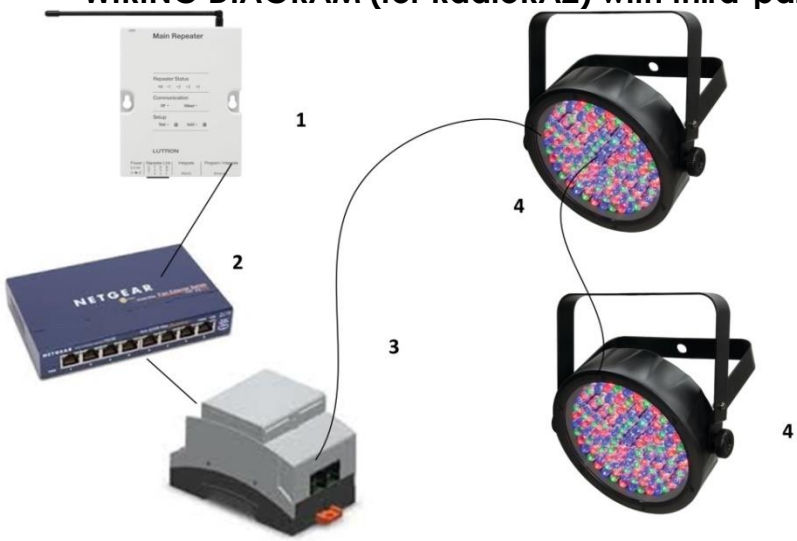
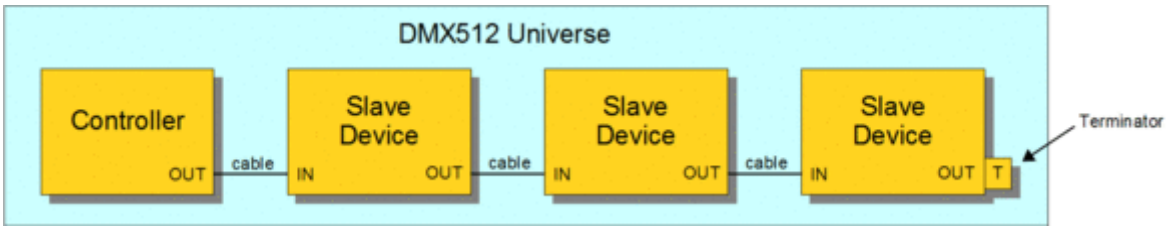
						pins 3/4
5	Flexible Linear Lighting (FLLA) RGB or RGBW luminaries	Converging Systems	FLLA-RGB-xxx FLLA-RGBW-xxx		3-color 4 pin 4-color 5 pin 1-color 4 pin	

3. WIRING DIAGRAM (for RadioRA2) with third-party DMX equipment





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 Lutron system = 254

4. BILL OF MATERIALS (for e-Node/DMX)

#	Device	Manufacturer	Part Number	Protocol	Connector Type	Notes
1	RadioRA2 processor	Lutron	RR-Main-REP-WH	Ethernet	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	

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					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

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 Commissioning Guide (long version)
-ILC-x00 Intelligent Lighting Controller
-IMC-x00 Motor Controller Manual

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

Lutron/Converging Systems Integration Process

1. Lutron Communication Setup

Step	Step	Detail
1a	Establish a **Telnet Username** with **Telnet Password** within Lutron that you can allocate to enable the Converging Systems network connection.	Program into your Lutron processor a ***dedicated*** **Telnet Username** and **Telnet Password** for a Telnet channel that can be dedicated to the Converging Systems' interface. Telnet channels cannot be shared, so if you wish to have the Lutron Home Control + app and the Converging System application running, it is necessary to establish two separate Telnet channels for these two operations to occur.

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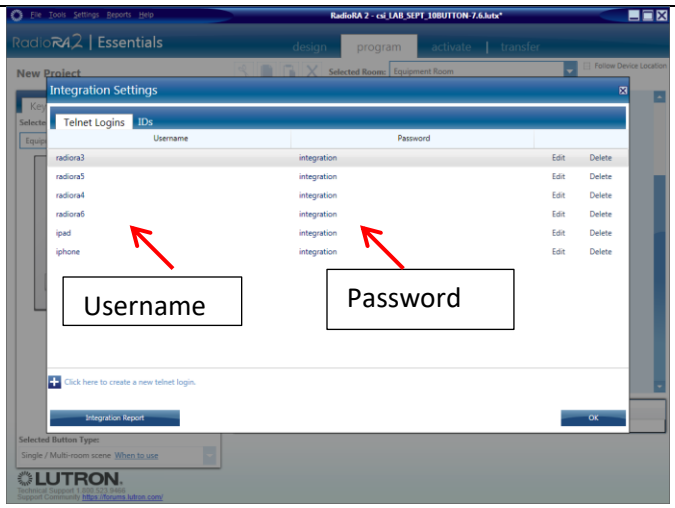
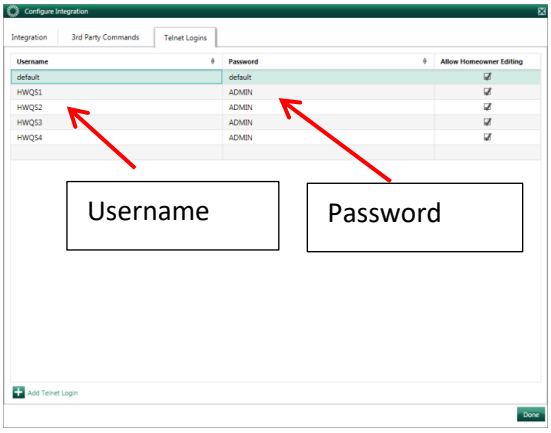
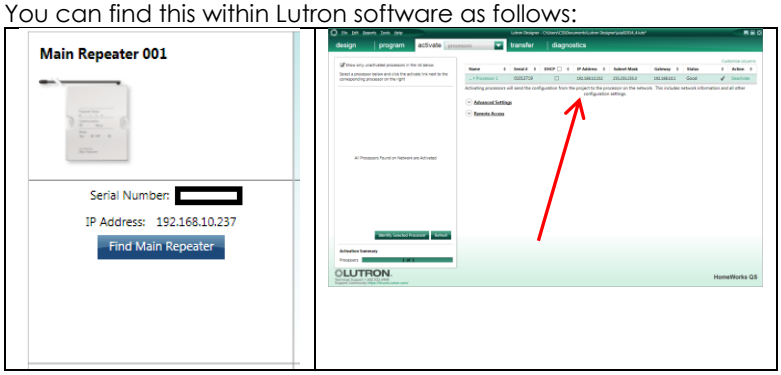
		 RadioRa2 1  HWQS 1 Either write down these credentials or print off the Spreadsheet in Appendix 8 for use later on in these instructions.
1b	Take note of the IP address for the Lutron processor	You can find this within Lutron software as follows:  Either write down this IP address or print off the Spreadsheet in Appendix 8 for use later on in these instructions.

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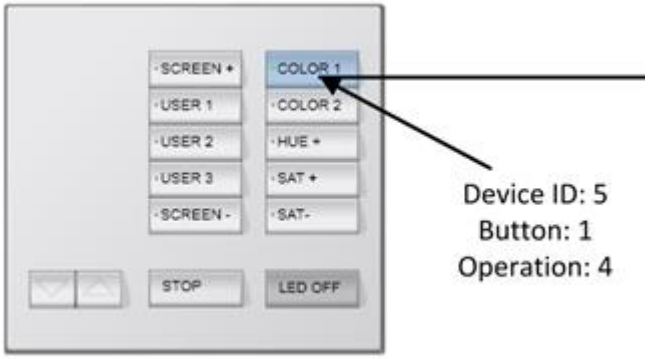
Perform any Necessary Lutron Button Push Tweaks and Gather any Required Data within Essentials or Inclusive

Note: Within the various Lutron platforms, buttons can be created to behave in several discrete manners. Those relevant to our setup instructions are specified below. These button operations are summarized in the table in Appendix 1 and described in further detail after that table. **It is important to understand the discrete operations for how button behave, for the Converging Systems connected devices can only be programmed to respond to those output commands generated by Lutron**. If those buttons do not generate the correct Lutron output codes, Converging Systems' products cannot properly respond--PERIOD.

This is particularly true for the creation of dummy sliders or dummy keypads for display on Home Control+ where each dummy sliders or keypad needs to be linked to some phantom or random load in Lutron software in order to have those controls transmit out signals that we can sense.

Step	Step	Detail
2a	Determine if you have one or more existing buttons on ***already programmed (activated)*** keypads that you wish to program to control Converging Systems controls' specific operations.	If so, Print out or view a Lutron Integration Report to determine these numbers/parameters.  For example, the top button on this keypad has the following data parameters associated with it. <table><tr><th>Integration ID</th><th>Button Number</th><th>Operation Type</th></tr><tr><td>**5**</td><td>**1** (top button)</td><td>**4** (for a release)</td></tr></table> See Appendix 1 as well for the Operation Type (i.e. "3", "4", etc.) available for each button type. Also See Appendix 1 for a cheat sheet of all Lutron Button ID numbers. -Next, either write down this triad of number for each targeted button that you wish to monitor on a sheet of paper or print off the Spreadsheet in Appendix 8 and enter it there for use later.
2b	Determine if you want to generate more interesting customized sliders for the control of these type of features:	If these types of sliders are desired, you can "trick" Lutron and create one or more **non-activated/dummy keypad(s)** to be re-purposed to create non-traditional User Interface controls.

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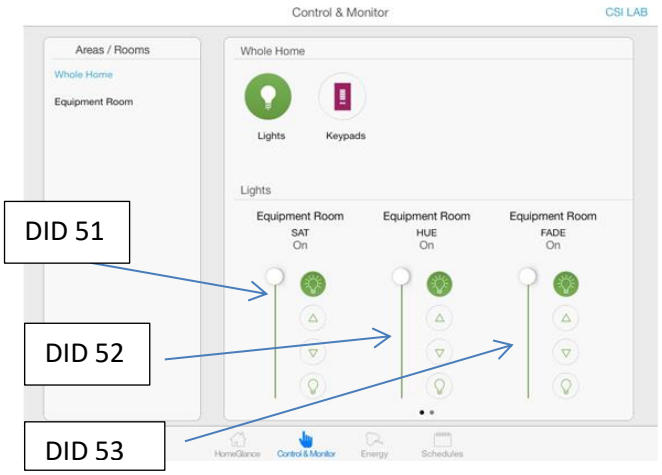
<table>
<tr>
<td></td>
<td>-Hue Slider
-Saturation Slider
-Red Slider
-Green Slider
-Blue Slider
-etc.</td>
<td>An example here would be to create sliders in Home Control + to control variable output for Hue, Saturation, Color Temperature or other variable type output.

Note: This would be a slider that normally would not be considered to be standard Lutron UI control, but in this case will become very practical for enhanced color control.

-In this case, you would create three Dummy dimmer devices and name them Hue, Sat and Fade within Lutron software but simply not ACTIVATE them.

-Next connect them to some load.

-Next, generate an Integration Report and write down the single Device ID for each dummy dimmer device and then either write down this Device ID number on a sheet of paper or print off the Spreadsheet in Appendix 8 and enter it there for use later on in these instructions (i.e. Device ID of 51, 52 and 53 have been created).

-For example, the Device ID for the three dummy dimmers is as follows:

<table>
<tr><th>Dummy Button</th><th>Button Number</th></tr>
<tr><td>Hue</td><td>51</td></tr>
<tr><td>Sat</td><td>52</td></tr>
<tr><td>Fade</td><td>53</td></tr>
</table>
</td>
</tr>
<tr>
<td>2d</td>
<td>Complete Lutron programming (only if more sliders are required).</td>
<td></td>
</tr>
</table>

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2. Enter Data Derived in Sections #1 and #2 above into the e-Node through the new e-Node Web-Pilot application.

Introducing e-Node Web Pilot Application

As of January 1, 2017, Converging Systems has developed an alternative technique for setting up parameters and performing programming for Lutron connectivity and Lutron control. The new Converging Systems' tool developed to perform these operations is called the e**-Node Web Pilot** application and ***this is available as a free web-service inside the e-Node***[1]. The e-Node Web Pilot application enables the following functions:

- The selection of the supported Lutron platform that will control Converging Systems lighting or motor controllers. These platforms currently include:
  - RadioRA2
  - HomeworksQS
  - Homeworks Illumination
  - Grafix EyeQS, and
  - Graifix Eye GRX.
- The automatic discovery of the Device ID of any Lutron keypad, timeclock, or other User Interface that can be used to identify that device and subsequently any specified button on that device (whether physical or virtual /dummy) that when selected will trigger any Converging Systems' lighting or motor controller operation[2].

  Note: Previously Lutron Device IDs were only available to the Lutron programmer who had access to the specific Lutron programming tool and was able to connect that tool to the system and generate an Integration Report.
- The setting of all standard e-Node commissioning steps such as setting static IP addresses, setting individual Telnet user names and passwords for up to for concurrent socket connections (with third-party automation systems), turning on the Lutron communication function, customizing I/O communication parameters.

Notes

[1] This new firmware is available for all e-Node MIII hardware platforms that have three (3) side-by-side bus ports on the non-Ethernet/power plug side of the e-Node.

[2] Supported operations include press, release, double-tap and extended hold for any button that can be programmed for such operation with Lutron software.

Step	Step	Detail
3a	Open Web Pilot Application	-Power on e-Node and connect its Ethernet cable to your switch. -Use a Windows computer connected to the same switch and open your **Windows Explorer** and search for the **Network** tab to expand it to see available uPnP devices on your local network. Any connected e-Nodes should appear*

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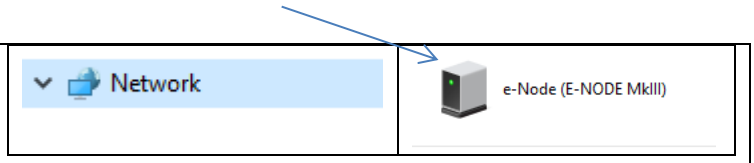
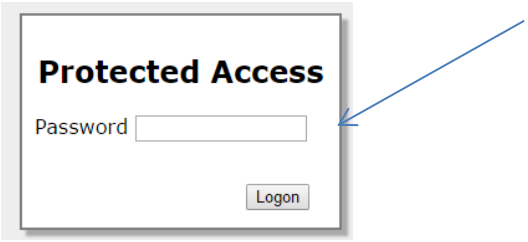
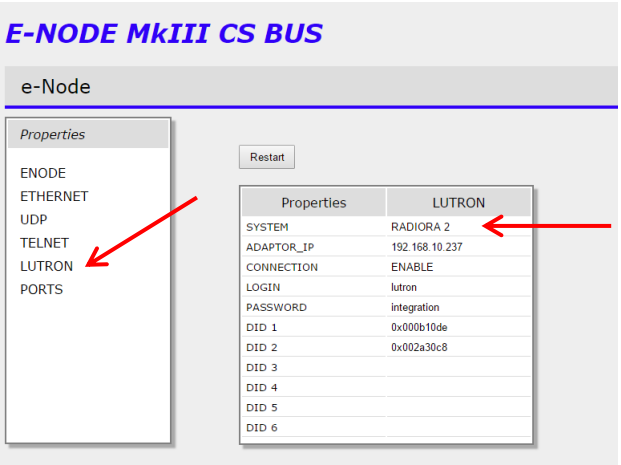
		 -Double click on the icon representing your newly discovered e-Node and the Web Pilot Home Page will appear. -Click on the Converging Systems logo above and you will be asked for a **Password**. Unless this Password has been changed, enter ADMIN and select **Logon**.  ***Note on uPnP Troubleshooting**: You may have to turn on Discovery or load the **uPnP** service on your respective computer depending upon the version or settings of Windows loaded. Make sure that your router or switch has **UPnP** turned on which in some cases is turned OFF by default. Before you waste too much time resolving **uPnP** issues on your computer, you can always load the standalone e-Node Pilot application and follow the steps (EN-x to EN-b) below to find the IP address of your e-Node. After you have found that address, simply type that address into your address bar on your browser and continue onto the next step.
3b	Setup e-Node for your particular Lutron platform. Note: Supplemental directions for Grafik Eye GRX and Grafik Eye QS can be found in a separate manual (see first page of this Integration Note).	-Select the **Lutron** tab. For example, for a RadioRA2 system, select **RADIORA2** 

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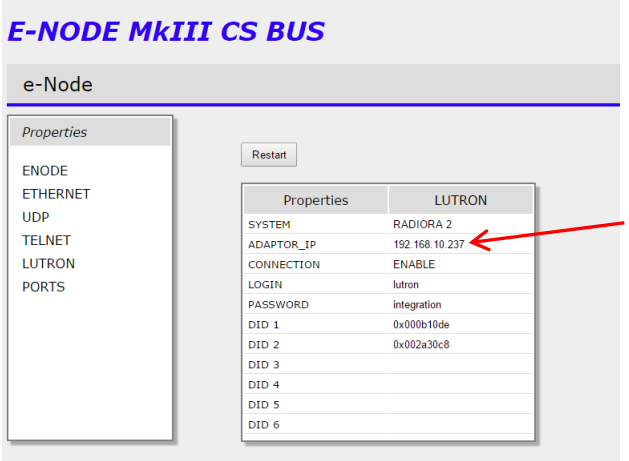
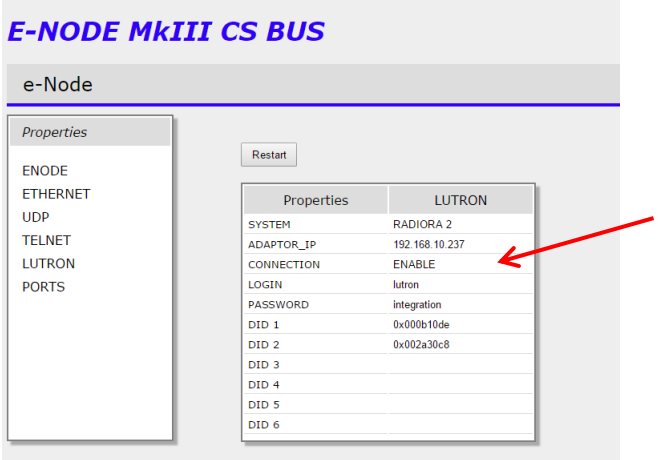
		-Set the **ADAPTOR_IP** address for that of the Lutron processor (which address can be obtained using the Lutron Essentials/Inclusive/Designer software setup utility package).  -Enable the **CONNECTION** tab (representing the Telnet client function) to **ENABLE** to turn on the Telnet Client function within e-Node to enable communication with the Lutron processor.  **Note**: The e-Node supports both Telnet ***Client*** communications (for communication from the Lutron processor) as well as Telnet ***Server*** communications (for communication to other third-party Control systems), both of which can be used concurrently. For this purposes of this Integration Note, we are only dealing with the Telnet Client settings available under the **Lutron tab**.
3c	Enter LOGIN and PASSWORD credentials	-Finally enter an applicable **LOGIN** and **PASSWORD** entry for an available Telnet channel that you previously set-up within the Lutron setup software similar to how you might have set up an iPad® Login/Password field if you were going to run the Lutron Home Control+ application or other Lutron apps.

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		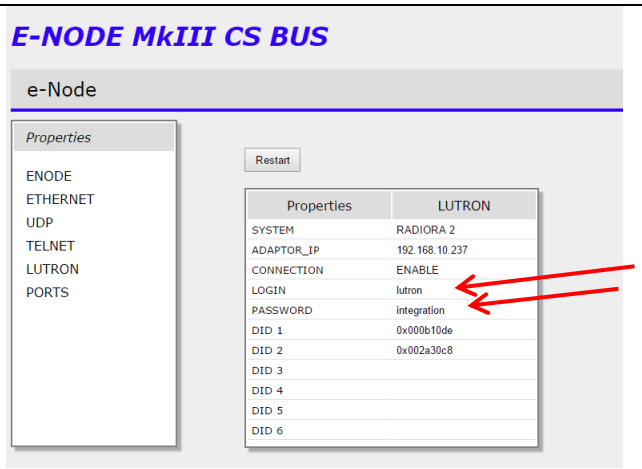
3d	Restart the e-Node if you have made any IP address or login/password changes to the LUTRON tab	Press the **Restart** buttons within Web Pilot to restart the e-Node and to save recently changed programmed values.

3. Enter Connectivity Data to Link Lutron button push(es) to Converging Systems operation

You have 255 data fields within our Smart Lutron Interface Monitor (SLIM) embedded into every e-node (regardless of model) that will enable:

- Any Lutron button push or event to trigger a Converging Systems operation, or
- Any Lutron slider movement to trigger a Converging Systems operation.

Here is how it works:

Backgrounder on Lutron Connectivity. The Flowchart in Figure 1 shows that if a (i) Lutron identified user interface device (i.e. keypad, time clock or other UI with a known **Device ID** ("**DID**"), along with a (ii) known Button Number ("**BN**") on that UI device, and an associated (iii) Mode of Operation ("**MO**") output string (press, release, extended hold, etc. for that button or event is evoked, the Converging Systems' SLIM software logic within the e-Node will **translate** that button action into a compatible CS-Bus command that is directed to all CS-Bus compatible controllers on the CS-Bus (or to a compatible DMX output command within the e-Node/dmx). The steps below will show the necessary programming steps.

"SLIM" Tab Programming

Step	Step	Detail
4a	Gather Device IDs (**DID**)	There are two ways to gather this data. - If you wish to automatically capture the **DID** information using a Converging Systems Spyglass Discovery process, refer to **Step 4a1** below. -If you wish to simply gather all relevant **DID** information from a Lutron

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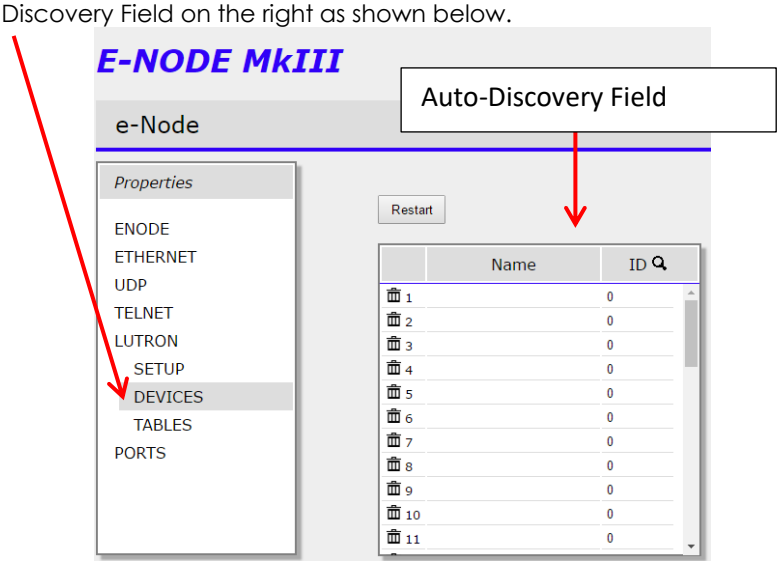
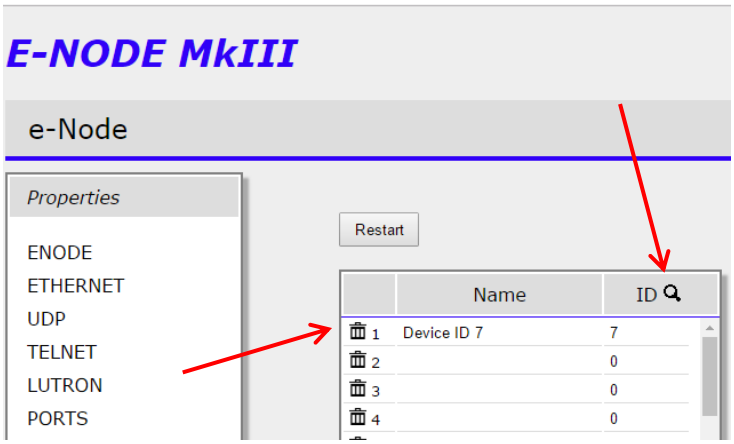
		Integration Report, refer to **Step 4a2** below.
4a1	**Spyglass** Method Note: this method works with RA2 and HWQS. For HWI see [Appendix 11](#)	-Select the **Lutron/Devices** tab. You should see the Lutron Auto-Discovery Field on the right as shown below.  -Provided that (i) you have followed steps in **Steps 3a/3b** above connecting the targeted Lutron processor to your e-Node, and (ii) your Lutron system is powered on and on the same subnet as your e-Node, press any button on your first Lutron UI and then select the **Spyglass** icon. Immediately, a placeholder entry will appear on the first available line, showing both a placeholder name (under "Name") and Device ID number (under "**ID**")  -To assist in further programming, rename the auto-generated entry "Device ID x" with a name that readily identifies the User Interface that has been identified. In this case it has been renamed **Pico Remote**

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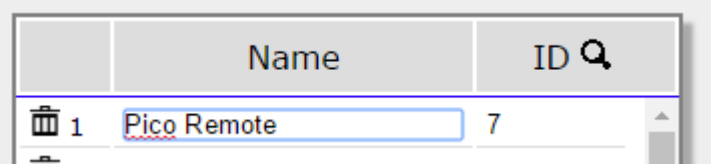
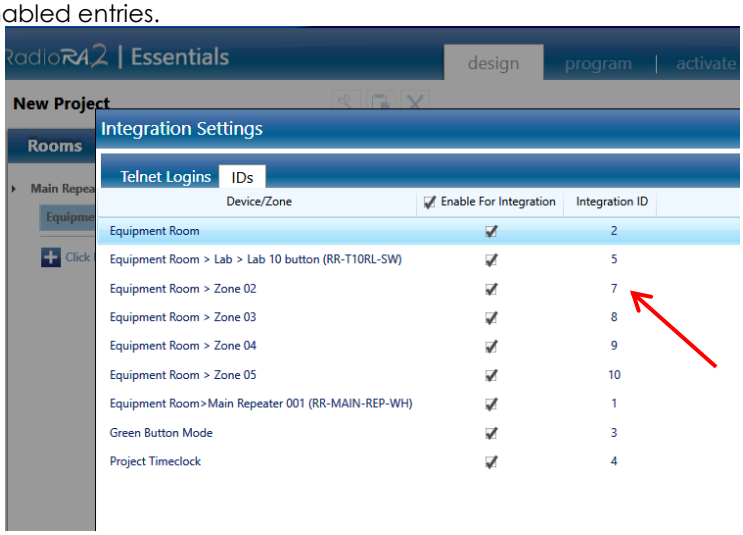
		 -Continue pressing a single button on each subsequent user interface to capture the Device ID Number (**DID**) and the Name entry field where your customized name can be entered for each subsequent device. **Note**: This process is especially useful when the Lutron programmer or the laptop running Lutron software is not available to provide a current Lutron Integration Report. **By using the Spyglass method the e-Node installer on his own can easily capture the Device ID of *any button or time clock event* easily and connect to Lutron without Lutron installer assistance**. In larger installations, it is often more efficient to use the **Integration Report Method** described in **Step 4a2** below, but this **Spyglass Method** is a foolproof method to capture **DIDs** from all targeted interfaces from which you desire to control Converging Systems equipment.
4a2	**Integration Report Method** -Manual Entry	-Open Lutron software -Generate an Integration Settings Report by selecting **Settings/Integration**. Then select the **ID** tab and write down for future reference all the relevant IDs (DID) listed next to checked or enabled entries.  -Select the **Lutron/Devices** tab. You will see the Lutron Auto-

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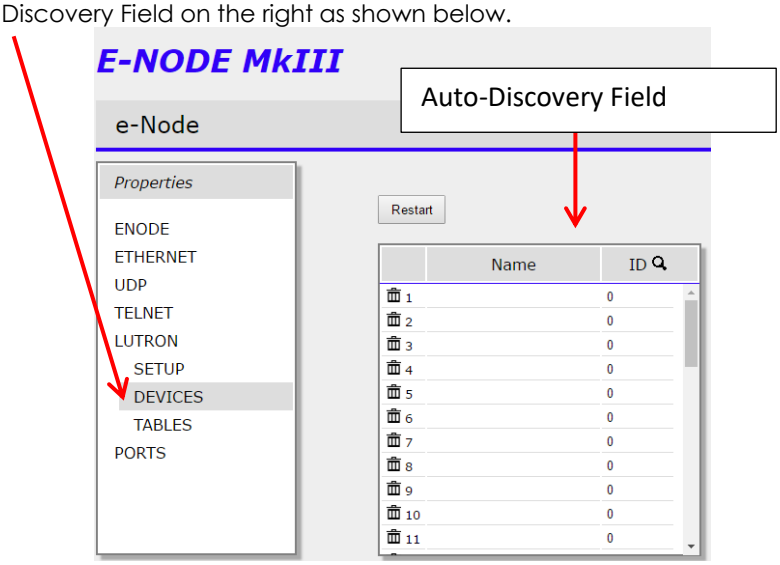
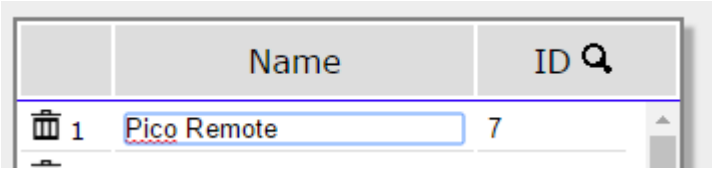
Discovery Field on the right as shown below.



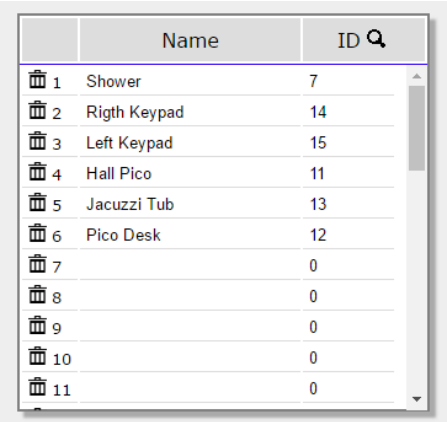
-Next enter on the first available line, a useful Name for the interface under "Name" and the exact numeral of that **DID** under ID.

Example. In this case "Pico Remote" has been entered on Line 1 along with its Device ID of 7 (which has been obtained in **Step 4a2** from the Integration Settings/ID report.



-Continue pressing a single button on each subsequent user interface to capture the Device ID Number (**DID**) and the Name entry field where your customized name can be entered for each subsequent device.

Example. In this case six discrete DID has been entered manually, each it its own alias name and each with a Device ID number



	Name	ID
1	Shower	7
2	Rigth Keypad	14
3	Left Keypad	15
4	Hall Pico	11
5	Jacuzzi Tub	13
6	Pico Desk	12
7		0
8		0
9		0
10		0
11		0

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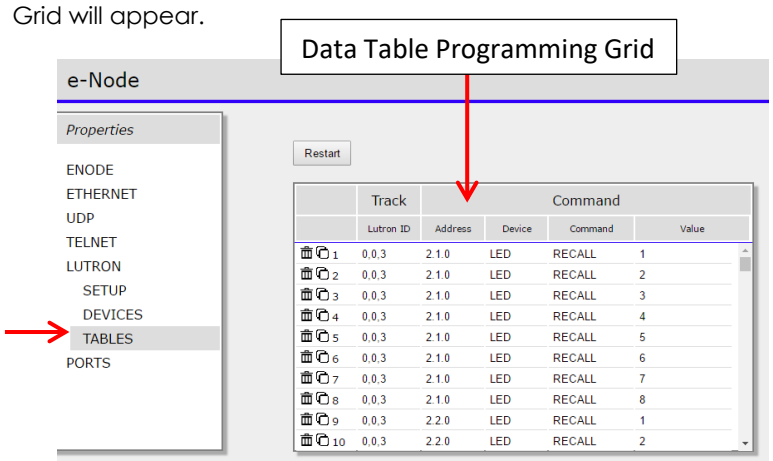
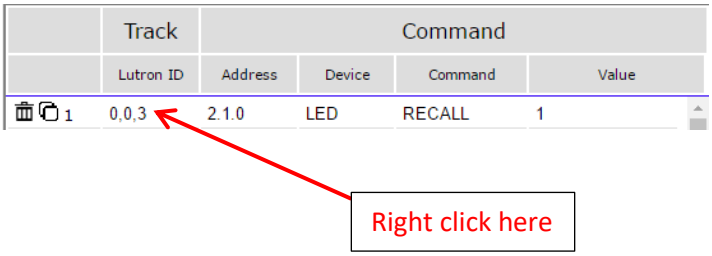
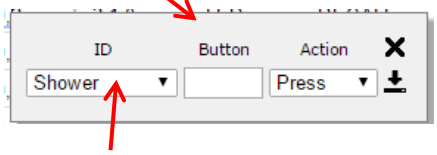
4b	Lookup or remember **Button Number**(s) (**BN**) for any buttons that you desire to trigger an event.	- Determine the **Button Number** on any User Interface that you wish to trigger a Converging Systems motor or lighting event (Refer to Appendix 1 of this document for those **BN** for most User Interfaces.) -Record those numbers separately so that in the next step you can enter them within the Lutron Programming Data Table.
4c	Launch the **Lutron Data Table Programming Grid**	-Select **Lutron/Tables --** Immediately the Data Table Programming Grid will appear. 
4d	Enter Programming Identifiers in the **Lutron Data Table Programming Grid** (on a line-by-line basis) for each operation you wish to program. **Note:** This first section will describe how to enter Lutron button information. **Step4e** below describes how to enter Converging systems resulting Motor or Lighting operations. ***Translation—Here you are programming a particular button or trigger action from Lutron to activate a particular Motor or Lighting operation with Converging Systems products.***	-Right click on the field of the first (or subsequent) **ROW** under Lutron ID. This is the **Lutron ID Data Field**. **Note**: Placeholder values have been entered into each available line for ease in copying the format into valid programming entries. So long as the Lutron ID is set to an invalid value (i.e. 0.0.3 or similar), these line entries will not operate or interfere with proper operation.  - A pop-up will appear  -Provided you have entered alias names in **Step 4a1** or **Step 4a2** above, all of those entered aliases will appear in the scroll down selector box under **ID**. Pick an applicable choice with your mouse, then release the mouse button, and now proceed to the next **Data Field** to enter more data.

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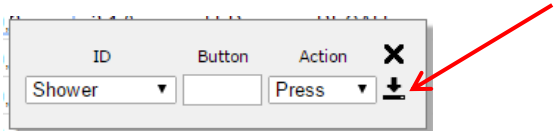
		-Within the **Button Data Field**, enter a Button Number (**BN**) with your keyboard (see Appendix 1 for a listing of all Button Numbers), and now proceed to the next **Date Field** to enter more data. -Within the **Action Data Field**, select from the available choices for type of button or UI action that has been previously programmed within your Lutron system (i.e. Press, Release, etc.) **Note**: Although there are a number of choices available in the Data Table pull down menu, ***only those choices originally programmed within Lutron Essentials or Inclusive software will operate when selected. As an example, if you programmed a Press for a button push within Lutron software, you cannot expect to override that existing functionality with a conflicting selection in the Data Table Programming Grid—you must go back into the Lutron software and change the programming for that button type, if available.*** -After completing one Data Table line entry, hit the "**Download**" icon to download and save programming for that line and advance to the Converging Systems resulting action entry programming instructions in the next Steps to complete the programming for each line.  **SHORTCUT HINTS**. -If you simply wish to skip any entries, select the **X** icon and the popup box will disappear and you can start again or simply move on.

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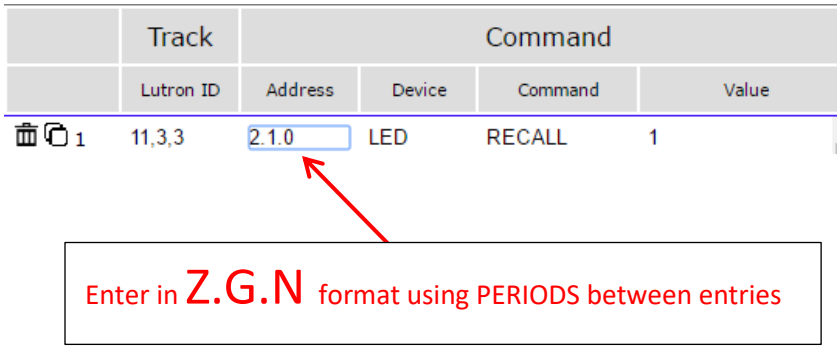
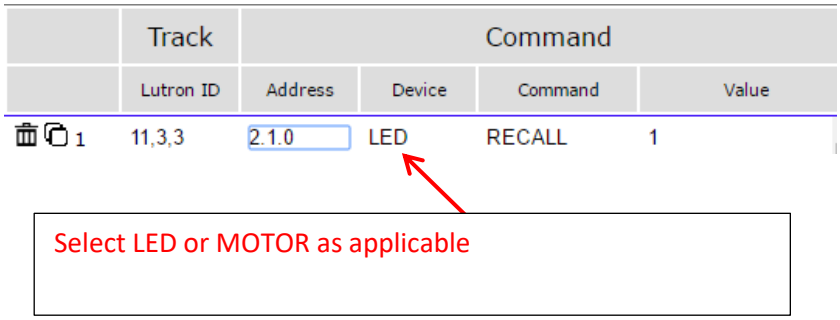
4e	Enter Converging Systems Motor or Lighting Resulting Operations.	-Left click on the field of the first (or subsequent) **ROW** under **Address**. This is the Converging Systems controller **Address Data Field**. **-**Enter the specific Address (**Z.G.N**) for the controller that you wish to link operations with the Lutron previously identified button operation programmed in **Step 4d.** **Note**: It is assumed that you have already assigned **Zone/Group/Node** addresses (**Z.G.N**) to all controllers as further detailed in Appendix 3 herein using the Pilot Application.  -Within the **Device Data Field**, right click in the Data Field and select the class of controller that you wish to control (i.e. **MOTOR** for shading and projection screen control, and **LED** for lighting).  - Within the **Command Data Field**, right click in the Data Field and select the desired command from the pulldown menu. **Note:** For time to time, Converging Systems adds supported commands to its controllers, In the even that an available version of e-Node Web Pilot does not indicate the desired command, simply enter that command using the exact syntax documented in the current Device Driver Toolkit in lieu of an available pulldown choice.

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		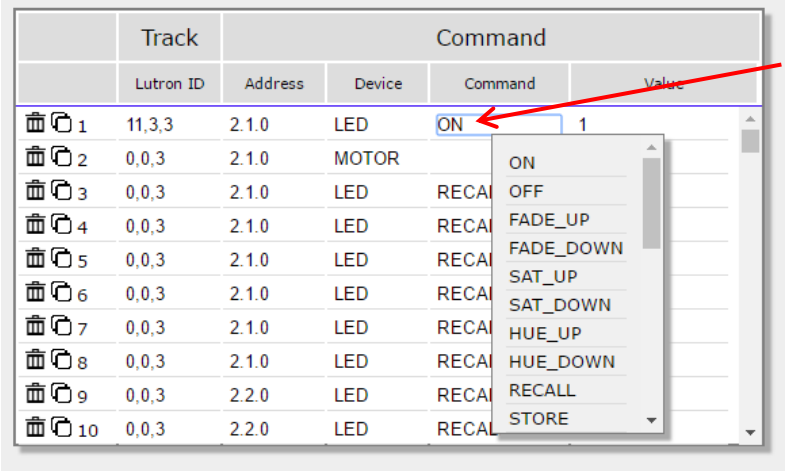 - Finally within the **Value Data Field**, and where supported, enter a numeral for any command entered within the **Command Date Field** that requires such a value, such as a **RECALL** number or a **STORE** number, etc.) -After completing one Data Table line entry, repeat **Step 4d** and **Step 4e** until completed. Refer to the Example Section for more information here. **SHORTCUT HINTS**. -If you simply wish to skip any entries, select the **X** icon and the popup box will disappear and you can start again or simply move on.
4f	Shortcut Hints (and Icon references)	-To **Delete** a Line—Select the icon on any line that you wish to delete. -To **Replicate** a Line—Select the icon on any line to copy that line. That line will be copied immediate below the selected line and all subsequent lines will move down sequentially.
4g	Additional Programming Notes	There is no requirement for the order in which you add commands. There are a total of 255 unique **Date Entry** lines. You can use multiple lines with overlapping or repeating entries for the purpose of creating macros. For instance: -You can have duplicate entries which contain the same **Lutron IDs** but which reference different Converging Systems **Address/ Device/ Command/ Values)**. -Also, you can have duplicate entries which contain the same **Address/ Device/ Command/Values** but which reference different Lutron IDs.

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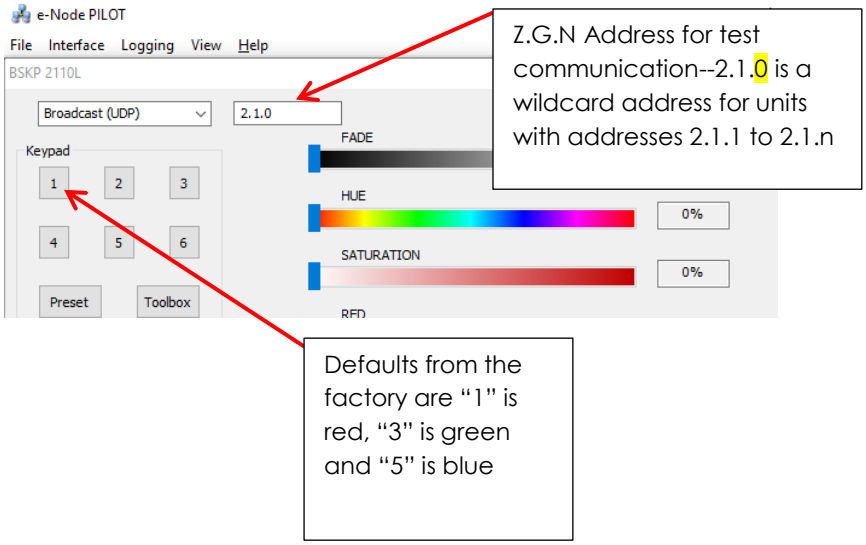
4. Test

Step	Step	Detail
5a	Test with Lutron buttons.	Press various buttons on all Lutron UI devices and see if proper operations are occurring on Converging Systems' devices. If not go to the next Troubleshooting section.

5. Troubleshooting (this requires the e-Node Pilot application rather than the Web Pilot application)

Step	Step	Detail
6a	User the e-Node Virtual Terminal to see if particular functions are working with the Converging Systems' setup prior to testing/ troubleshooting Lutron.	-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  Consult the e-Node documentation or see Appendix 10 for more troubleshooting information.
6b	Use the e-Node Pilot application to monitor traffic received by the e-Node or e-Node/dmx devices to start your troubleshooting process.	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 the **TRACK** and **LUT** entries ***were not properly entered***. 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. As an example, say you wanted to send a **Red** out to a device with address **Z/G/N**=2.1.5

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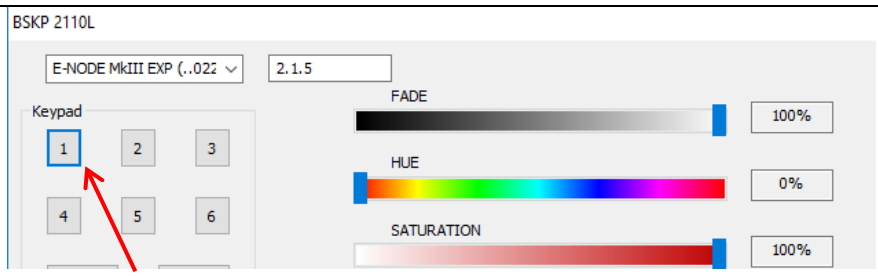
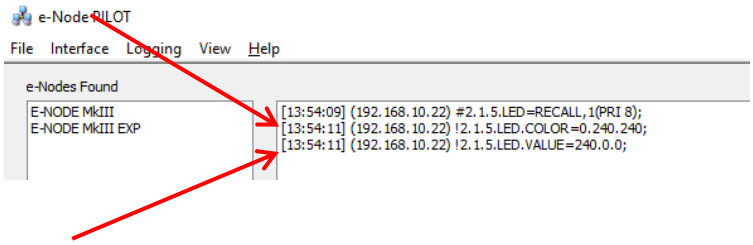
		 Here the Keypad "1" is pressed on the Virtual Keypad which sends out a Recall 1 (which is a red initially from the factory). In effect, by pressing this button, this command is transmitted to our bus: **#2.1.5.LED.VALUE=RECALL,1** In this case, if **NOTIFY** is set to BOTH (that is to say, VALUE data 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. The **LED.COLOR** response shows that the H/S/B specification for red is Hue=240. Sat=240 and Fade=240.  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 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 Lutron command strings are appearing on the IP bus. ***If those commands are NOT appearing on the IP bus, then there is no way the Converging Systems' e-Node can do its work.***

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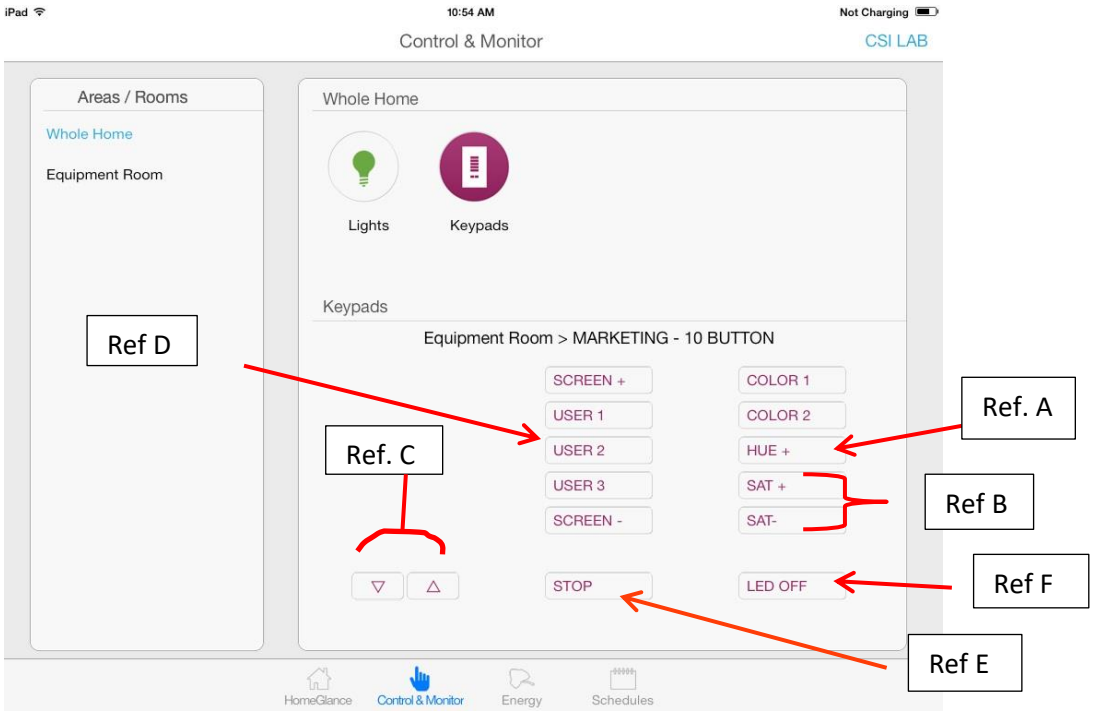
Examples

The following examples are cross platform between various Lutron environments. All examples are relevant for both RadioRA2 (RA2) and HomeworksQS (HWQS) and key functionality overlaps with that available from Homeworks Illumination (HWI). In some cases, additional features available with HomeworksQS are described where applicable ***within the specific example.*** In those cases refer to your particular platform within these examples.

Example 1

Following is a simple example all of the button programming on the specified 10-button RadioRA2 keypad or HomeworksQS seeTouch keypad(***-T10RL). The intent is that we will have buttons from a standard **-T10RL (which just as easily could be 5 button or 15 button keypad) control various lighting and/or motor operations. The layout of the example keypad might be as follows:



The logic or operation of the various buttons can be described as follows:

- [**Ref A**] One button when pressed will trigger colored LEDS to start the process of visiting briefly each color around the color wheel (called Hue). A single HUE+ button goes clockwise, while a HUE- (if present) button would just go counterclockwise.

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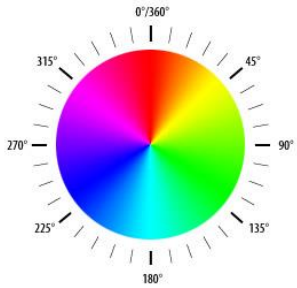
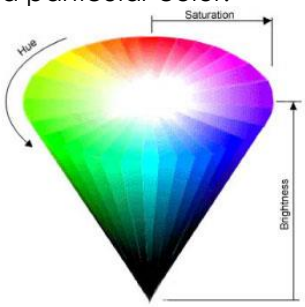


- [**Ref B**] Two buttons would control Saturation+ (UP) and Saturation – (DOWN). Saturation is the absence or presence of white in a particular color.



- [**Ref C**] The normal Lutron fade buttons would control brightness as opposed to shifting the color itself to some unexpected shade.
- [**Ref D**] Additional buttons User 1/User 2/User3 can be thought of a Recall of a scene (previously stored color).
- [**Ref D**] An option exists that if a User(n) button is depressed for an extended period of time it could be multi-purposed as a Store Button if Lutron programming can give us a discrete button operation in this case
- [**Ref E**] Color adjustment STOP button (which would stop any auto sequencing set into motion with the HUE or SAT commands).
- [**Ref F**] Standard OFF button

All of this magic can be quickly programmed within e-Node pilot or the Web-Pilot application. And as you can see, nearly everything to make this work, exists outside of standard Lutron application programming (except if you want to tweak a particular button's operation).Depending upon your specific environment, simply adjust the example below with the following:

- Specific **Device IDs** for your Lutron **devices** (see **Device ID** field below)
- Specific **Button ID** numbers for the ***specific button*** on a device. See **Button ID** field below)
- Specific **Ref #** for the ***button operation*** type
  Note: see Appendix 1 for more information. In general, use a "**3**" for a Press, a "**4**" for a Release, a "**5**" for a Hold and a "**6**" for a Double Tap, as permitted by your Lutron platform)
- Your specific Converging Systems device **Z/G/N** address. See **Z/G/N** field below.

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Here is a Web-Pilot example showing these fields

Lutron Button Identifier

Device ID

Button ID

Ref # for Button

Motor or Lighting Controller Trigger Event

Z.G.N address

Device Class

Device Class/Value

	Track	Command			
	Lutron ID	Address	Device	Command	Value
1	5,1,4	2.7.1	LED	RECALL	1
2	5,2,4	2.7.1	LED	RECALL	2
3	5,3,4	2.7.1	LED	HUE_UP	
4	5,4,4	2.7.1	LED	SAT_UP	
5	5,5,4	2.7.1	LED	SAT_DOWN	
6	5,16,4	2.1.0	LED	OFF	
7	5,6,4	2.1.0	MOTOR	UP	
8	5,7,4	2.7.1	LED	RECALL	10
9	5,7,5	2.7.1	LED	STORE	10
10	5,8,4	2.7.1	LED	RECALL	11
11	5.8.5	2.7.1	LED	STORE	11

	Track	Command			
	Lutron ID	Address	Device	Command	Value
11	5,8,5	2.7.1	LED	STORE	11
12	5,9,4	2.7.1	LED	RECALL	12
13	5,9,5	2.7.1	LED	STORE	12
14	5,10,4	1.1.1	MOTOR	DOWN	
15	5,17,4	2.7.1	LED	STOP	
16	5,17,4	1.1.1	MOTOR	STOP	
17	5,24,3	2.7.1	LED	FADE_DOWN	
18	5,24,4	2.7.1	LED	STOP	
19	5,25,3	2.7.1	LED	FADE_UP	
20	5,25,4	2.7.1	LED	STOP	

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Lutron Platform Programming Detail

For more information on this programming example, refer to the table below for your Lutron platform for specific entries that should be made to complete the programming for each Lutron UI button.

Lutron Platform	Section
RadioRA2	RA2
HomeworksQS	HWQS
Illumination	HWI

RA2

Marked Lutron Button*	Desired Action	Lutron output string	CS Bus resultant command
Color 1	-On button push, causes controller to go to Preset 1 (Recall, 1).	TRACK(**1**)=**5**, 1, 4	LUT(**1**)#2.7.1.LED=RECALL,1
Color 2	-On button push, causes controller to go to Preset 2 (Recall, 2).	TRACK(**2**)=5,2,4	LUT(**2**)#2.7.1.LED=RECALL,2
HUE UP	-On button push, causes controller to go start incrementing the HUE variable. Note: just a button push will start this operation, a release will do nothing in RADIORA2	TRACK(**3**)=5,3,4	LUT(**3**)#2.7.1.LED=HUE_UP
SAT UP	-On button push, causes controller to go start incrementing UP the SAT variable. Note: just a button push will start this operation, a release will do nothing in RADIORA2	TRACK(**4**)=5,4,4	LUT(**4**)#2.7.1.LED=SAT_UP
SAT DOWN	-On button push, causes controller to go start incrementing down the SAT variable. **Note**: just a button push will start this operation, a release will do nothing in RADIORA2	TRACK(**5**)=5,5,4	LUT(**5**)#2.7.1.LED=SAT_DOWN
LED OFF	-On button push, causes controller to turn any already ON LEDS to turn OFF.	TRACK(**6**)=5,16,4	LUT(**6**)#2.7.1.LED=OFF
SCREEN UP	-On button push, causes connected projection screen to MOVE UP. **Note**: With RadioRA2, a button release will not issue a STOP command	TRACK(**7**)=5,6,4	LUT(**7**)#1.1.1.MOTOR=UP
USER 1	-On button push, causes LEDS	TRACK(**8**)=5,7,4	LUT(**8**)#2.7.1.LED=RECALL, 10

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	to go to a USER 1 setting (in this case RECALL location #10) -If the button is held for 10 seconds, the system stores the current color state into memory location #10	TRACK(**9**)=5,7,5	LUT(**9**)#2.7.1.LED=STORE,10
USER 2	-On button push, causes LEDS to go to a USER 1 setting (in this case RECALL location #11) -If the button is held for 10 seconds, the system stores the current color state into memory location #11	TRACK(**10**)=5,8,4 TRACK(**11**)=5,8,5	LUT(**10**)#2.7.1.LED=RECALL,11 LUT(**11**)#2.7.1.LED=STORE,11
USER 3	-On button push, causes LEDS to go to a USER 1 setting (in this case RECALL location #12) -If the button is held for 10 seconds, the system stores the current color state into memory location #12	TRACK(**12**)=5,9,4 TRACK(**13**)=5,9,5	LUT(**12**)#2.7.1.LED=RECALL,12 LUT(**13**)#2.7.1.LED=STORE,12
SCREEN DOWN	-On button push, causes connected projection screen to MOVE DOWN. **Note**: With RadioRA2, a button release will not issue a STOP command	TRACK(**14**)=5,10,4	LUT(**14**)#1.1.1.MOTOR=DOWN
STOP	-On button push, stops all Saturation, HUE, and FADE processes already in motion. -In addition, as an option, if the keypad is also set to control a projection screen, a button push will issue a MOTOR STOP as well.	TRACK(**15**)=5,17,4 TRACK(**16**)=5,17,4	LUT(**15**)#2.7.1.LED=STOP LUT(**16**)#1.1.1.MOTOR=STOP
FADE DOWN	-On button push, FADES LEDS DOWN -On button release, STOPS the fade process	TRACK(**17**)=5,24,3 TRACK(**18**)=5,24,4	LUT(**17**)#2.7.1.LED=FADE_DOWN LUT(**18**)#2.7.1.LED=STOP
FADE UP	-On button push, FADES LEDS UP -On button release, STOPS the fade process	TRACK(**19**)=5,25,3 TRACK(**20**)=5,25,4	LUT(**19**)#2.7.1.LED=FADE_UP LUT(**20**)#2.7.1.LED=STOP

*Note: **(color indicates Type 1, Type 2 or Type 3 button logic—see Appendix 1 RadioRA2 section)**

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HWQS

Marked Lutron Button*	Button Type	LED Logic	Variables	Desired Action	Lutron output string	CS Bus resultant command
Color 1	Type 1A-SA	Scene	y^x Enode (State 1)	-On button push, causes controller to go to Preset 1 (Recall, 1).	TRACK(**1**)=7,1,3	LUT(**1**)#2.1.1.LED=RECALL,1
Color 2	Type 1A-SA	Scene	y^x Enode (State 1)	-On button push, causes controller to go to Preset 2 (Recall, 2).	TRACK(**2**)=7,2,3	LUT(**2**)#2.1.1.LED=RECALL,2
HUE UP	Type 2-DA	**Room** **Note: logic is set to Room**	y^x Enode (un-affected) y^x Enode (un-affected)	-On button push, causes controller to go start incrementing the HUE variable. -With a button release, the incrementing operation will immediately cease.	TRACK(**3**)=7,3,3 TRACK(**4**)=7,3,4	LUT(**3**)#2.1.1.LED=HUE_UP LUT(**4**)#2.1.1.LED=STOP
SAT UP	Type 2-DA	**Room** **Note: logic is set to Room**	y^x Enode (un-affected) y^x Enode (un-affected)	-On button push, causes controller to go start incrementing the SAT variable. -With a button release, the incrementing operation will immediately cease.	TRACK(**5**)=7,4,3 TRACK(**6**)=7,4,4	LUT(**5**)#2.1.1.LED=SAT_UP LUT(**6**)#2.1.1.LED=STOP
SAT DOWN	Type 2-DA	**Room** **Note: logic is set to Room**	y^x Enode (un-affected) y^x Enode (un-affected)	-On button push, causes controller to go start incrementing the SAT variable. -With a button release, the incrementing operation will immediately cease.	TRACK(**7**)=7,5,3 TRACK(**8**)=7,5,4	LUT(**7**)#2.1.1.LED=SAT_DOWN LUT(**8**)#2.1.1.LED=STOP
LED ON/OFF	**Type 1-SADP**	Scene	y^x Enode (on) -Enode (off)	-On button push, causes controller to turn any already OFF LEDS to turn previous ON state. -On double press, causes controller to turn any already ON LEDS to turn OFF.	TRACK(**9**)=7,16,3 TRACK(**10**)=7,16,6	LUT(**9**)#2.1.1.LED=ON LUT(**10**)#2.1.1.LED=OFF
SCREEN UP	Type 1-SA	Scene	y^x Screen (UP)	-On button push, causes connected projection screen to MOVE UP. **Note**: With Type 3	TRACK(**11**)=7,6,3	LUT(**11**)#1.1.1.MOTOR=UP

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				programming, a button release will not issue a STOP command		
USER 1	**Type 1-SAH**	Scene	y^x Enode (on) y^x Enode (User 1)	-On button push, causes LEDS to go to a USER 1 setting (in this case RECALL location #10) -If the button is HELD for a preprogrammed amount of time, a command is sent to the CS-Bus device to STORE the current color setting into its specified memory location (i.e. memory location #10)	TRACK(**12**)=7,7,4 TRACK(**13**)=7,7,5	LUT(**12**)#2.1.1.LED=RECALL, 10 LUT(**13**)#2.1.1.LED=STORE,10
USER 2	**Type 1-SAH**	Scene	y^x Enode (on) y^x Enode (User 2)	-On button push, causes LEDS to go to a USER 1 setting (in this case RECALL location #10) -If the button is HELD for a preprogrammed amount of time, a command is sent to the CS-Bus device to STORE the current color setting into its specified memory location (i.e. memory location #11)	TRACK(**14**)=7,8,4 TRACK(**15**)=7,8,5	LUT(**14**)#2.1.1.LED=RECALL,11 LUT(**15**)#2.1.1.LED=STORE,11
USER 3	**Type 1-SAH**	Scene	y^x Enode (on) y^x Enode (User 3)	-On button push, causes LEDS to go to a USER 1 setting (in this case RECALL location #10) -If the button is HELD for a preprogrammed amount of time, a command is sent to the CS-Bus device to STORE the current color setting into its specified memory location (i.e. memory location #12)	TRACK(**16**)=7,9,4 TRACK(**17**)=7,9,5	LUT(**16**)#2.1.1.LED=RECALL,12 LUT(**17**)#2.1.1.LED=STORE,12
SCREEN DOWN	**Type 1-SA**	Scene	y^x Screen (DOWN)	-On button push, causes connected projection screen to MOVE DOWN. **Note**: With Type 3 programming, a button release will not issue a STOP command	TRACK(**18**)=7,10, 3	LUT(**18**)#1.1.1.MOTOR=DOWN
STOP	**Type 1-SA**	Scene	y^x Screen	-On button push, causes	TRACK(**19**)=7,17,	LUT(**19**)#1.1.1.MOTOR=STOP

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			(STOP)	connected projection screen to STOP, if it is currently moving.	3	
FADE DOWN	**Lower**		N/A	-On button push, FADES LEDS DOWN -On button release, STOPS the fade process	TRACK(**20**)=7,24, 3 TRACK(**21**)=7,24, 4	LUT(**20**)#2.1.1.LED=FADE_DOWN LUT(**21**)#2.1.1.LED=STOP
FADE UP	**Raise**		N/A	-On button push, FADES LEDS UP -On button release, STOPS the fade process	TRACK(**22**)=7,25, 3 TRACK(**23**)=7,25, 4	LUT(**22**)#2.1.1.LED=FADE_UP LUT(**23**)#2.1.1.LED=STOP

*Note: **(color indicates Type 1, Type 2 or Type 3 button logic—see Appendix 1 HomeworksQS section)**

HWI

Additional detail will be provided here in the future.

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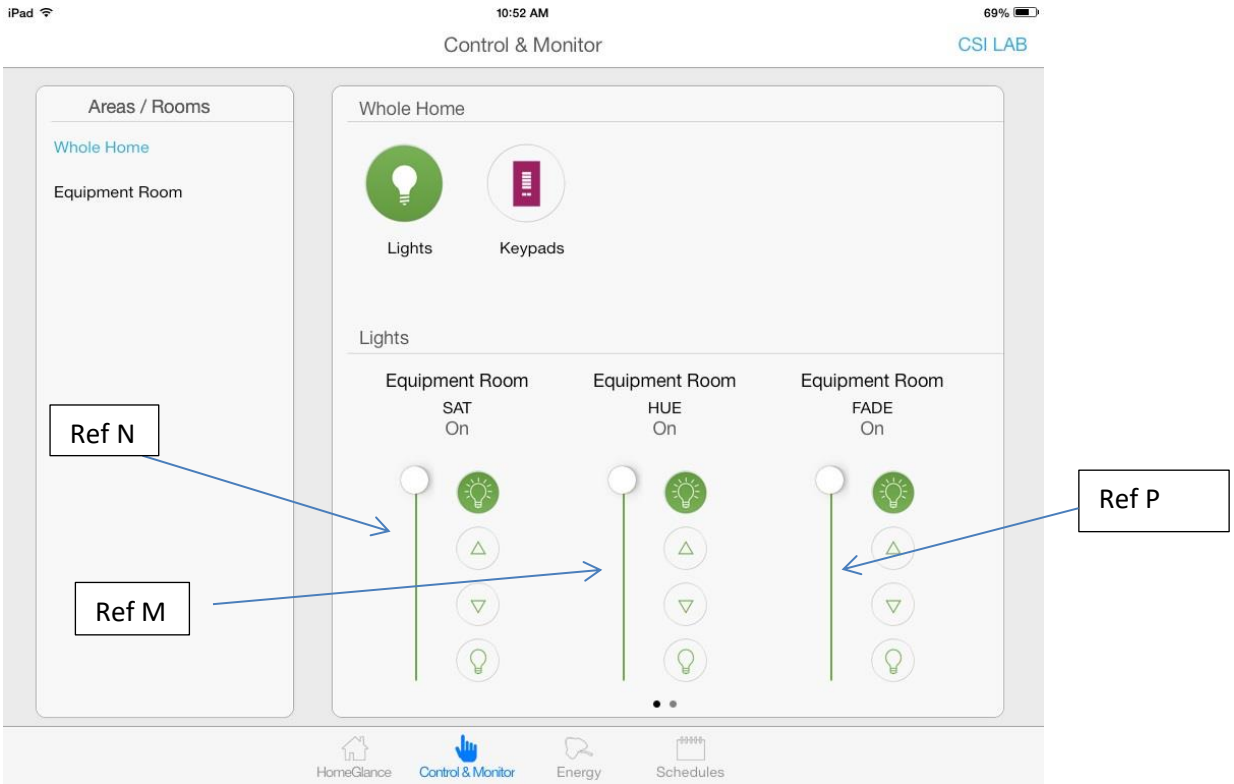
Example 2

Following is a more advanced example of slider control using dummy loads and UI available within Home Control +. The intent is that we will have 3 or more sliders that can control Hue/Sat/Brightness. The layout for this example might be as follows:

Contained within Appendix 5 is more detail on this topic.



The logic or operation of the various buttons can be described as follows:

- [**Ref M**] One slider when adjusted will change the Hue for a selected output device. In reality Hue is best represented by a wheel, but with the Lutron App, a simple slider performs the same function. The bottom 0% represents Red, with Green at 33%, Blue at 66% (and Red again at 100%).

- **[Ref N]** One slider when adjusted will change the Saturation for a selected output device (to and from the white center in this figure.) As saturation increases, colors appear more "pure." As saturation decreases, colors appear more "washed-out."

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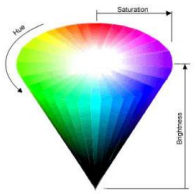
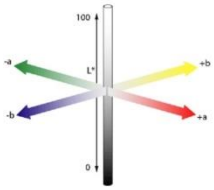


- **[Ref P]** One slider when adjusted will change the Brightness for a selected output device. As brightness increases, the intensity of that color becomes greater (toward the arrow pointer). As brightness decreases, the intensity of that color weakens (toward the center from any location in the space).



All of this magic can be quickly programmed within e-Node pilot or the Web-Pilot application. And as you can see, nearly everything to make this work, exists outside of standard Lutron application programming (except if you want to tweak a particular button's operation).Depending upon your specific environment, simply adjust the example below with the following:

- The specific **Device IDs** for your Lutron devices (see **Device ID** field below)
- The specific **Button ID** for your Lutron devices (see **Device ID** field below).
  Note: In this case, just enter a "**1**" for the Button ID. All sliders are a "1"
- The Button ID number (not needed in this example because it is a slider)
  Note: ***In this case with sliders there is no need to determine the specific Button ID number, for our SLIM software will read the variable output of each slider and map it accordingly***
- The specific Converging Systems device **Z/G/N** address. See **Z/G/N** field below.

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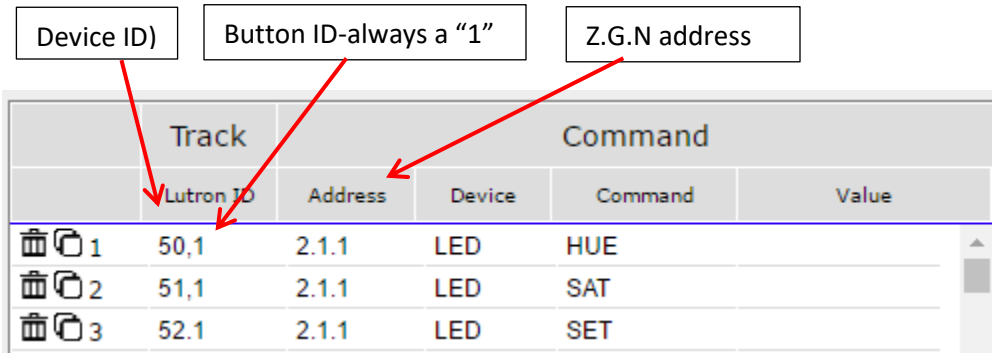
Here is an e-Node Web-Pilot example showing these fields



Note: Please note that the number in parenthesis we refer to as the Index number of which there are 255 discrete pairs. Index 1 on the left column causes Index 1 on the right to operate. Similarly Index 2 on the left column causes Index 2 on the right to operate, and so on.

For more information on this programming example, refer to the table below for specific entries that should be made to complete the programming for each Lutron UI button.

Marked Lutron Button*	Desired Action	Lutron output string entry	CS Bus resultant command
Hue Slider	-On movement of slider from 0% to 100%, Hue commands are transmitted to CS-Bus system. **Note:** HUE of 0 or 100% equates to RED, while a HUE of 80 equates of GREEN, and a HUE of 160 equates to BLUE	TRACK(**50**)=8,1 **Note**: there is no trailing comma and third number in this slider case	LUT(**50**)#2.7.1.LED=HUE **Note**: there is no trailing characters after the HUE command in this slider case
Sat Slider	-On movement of slider from 0% to 100%, SAT commands are transmitted to CS-Bus system. **Note:** SAT of 0 is fully saturated (very white) while a SAT of 100 preserves the HUE of the original selected color	TRACK(**51**)=7,1 **Note**: there is no trailing comma and third number in this slider case	LUT(**51**)#2.7.1.LED=SAT **Note**: there is no trailing characters after the SAT command in this slider case
Brightness Slider	-On movement of slider from 0% to 100%, Brightness (FADE) commands are transmitted to CS-Bus system.	TRACK(**52**)=6,1 **Note**: there is no trailing comma and third	LUT(**52**)#2.7.1.LED=SET **Note**: there is no trailing characters after the SET

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	Note: FADE of 0 is fully OFF (dark) while a FADE of 100 is fully ON	number in this slider case	command in this slider case
CCT Slider (Color Temperature)	-On movement of slider from 0% to 100%, Correlated Color Temperature (CCT) commands are transmitted to CS-Bus system. **Note:** CCT of 0% equates to a CCT of 1800K while CCT of 100% equates to a CCT of 7000K	TRACK(**53**)=10,1 **Note**: there is no trailing comma and third number in this slider case	LUT(**53**)#2.7.1.LED=CCT **Note**: there is no trailing characters after the CCT command in this slider case

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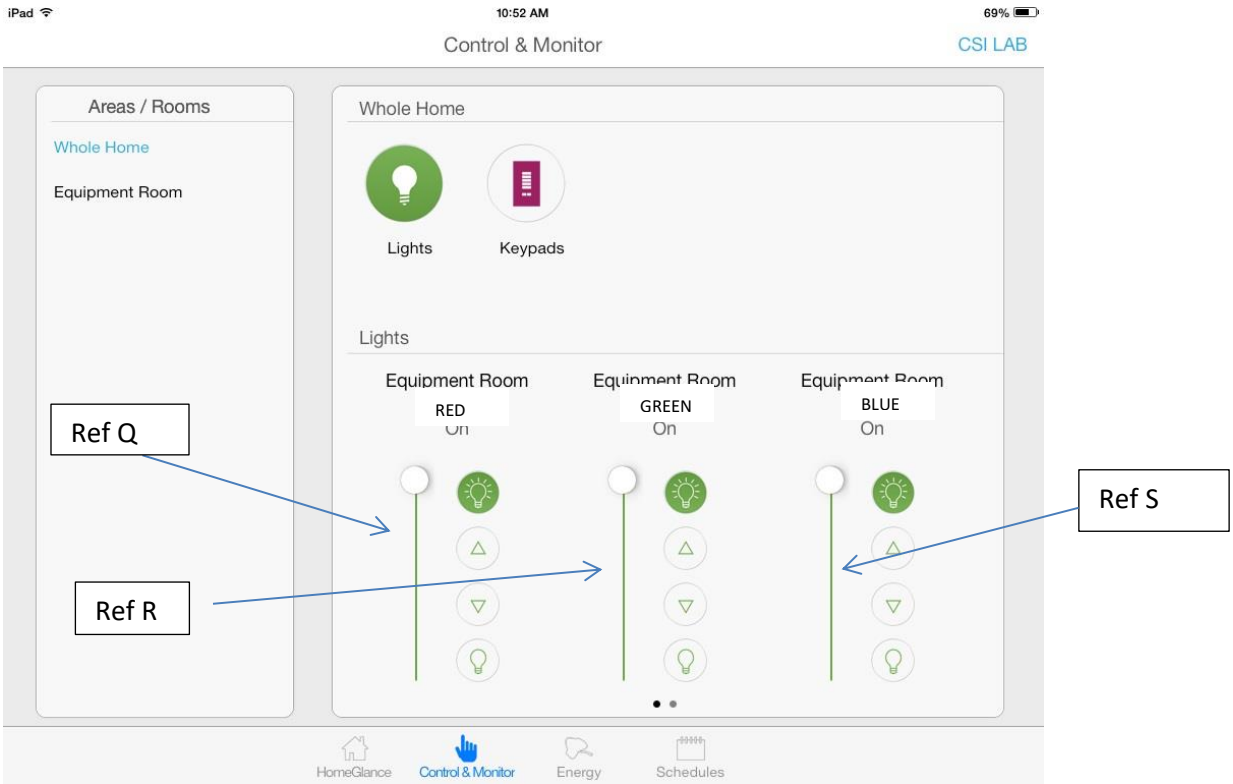
Example 3

Following is a more advanced example of slider control using dummy loads and UI available within Home Control +. The intent is that we will have 3 sliders that can control Red/Green/Blue or 4 sliders to control R/G/B/W or additional sliders to control Color Temperature or Circadian tuning. The layout for this example might be as follows:

Contained within Appendix 5 is more detail on this topic.



The logic or operation of the various buttons can be described as follows:

- [**Ref Q,R, S**] One slider when adjusted will change the **Red** component for a selected output device. Another slider when adjusted will change the **Green** component, while another slider will change the **Blue** component. Optionally for RGBW systems, the 4th slider can change the white component.

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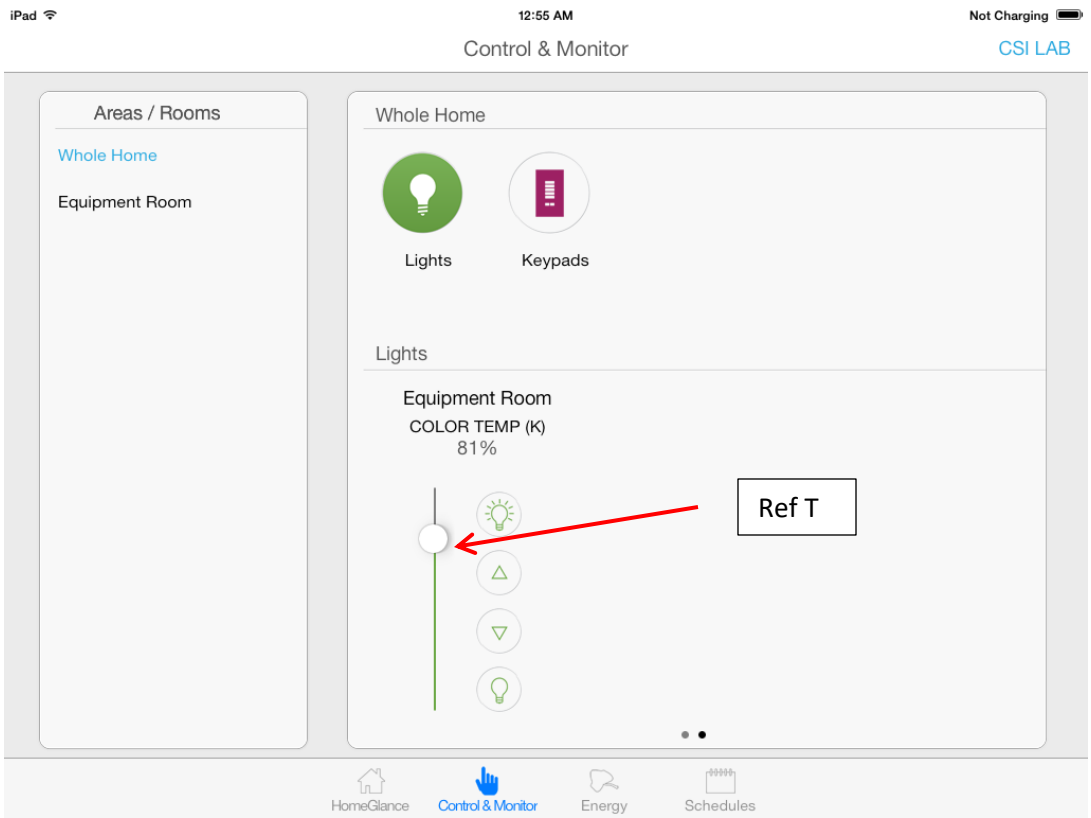
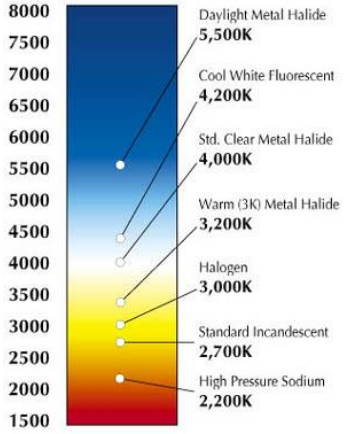


- **[Ref T]** One slider when adjusted will change the Color Temperature for a selected RGB or RGBW supported device (i.e. our own RGB and RGBW FLLA strips). The bottom range is 1700K (for RGBW) and 1800K (for RGB). The top range is 7000K. The Lutron reference of 0 to 100% correlates to the range between the lowest and highest color temperature possible.



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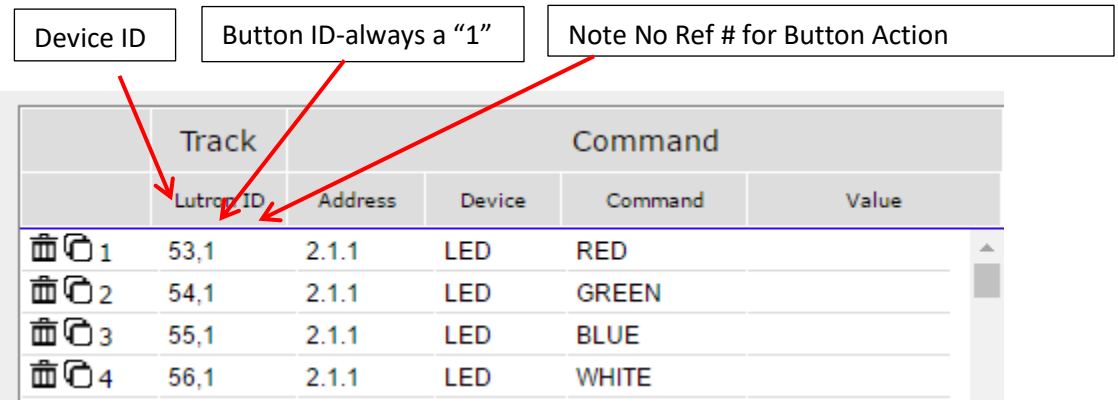
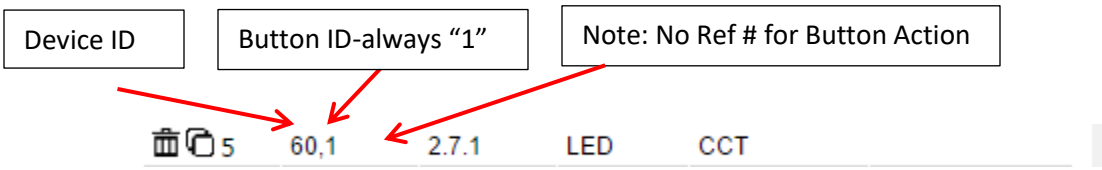
All of this magic can be quickly programmed within e-Node pilot or the Web-Pilot application. And as you can see, nearly everything to make this work, exists outside of standard Lutron application programming (except if you want to tweak a particular button's operation). Depending upon your specific environment, simply adjust the example below with the following:

- The specific **Device IDs** for your Lutron devices (see **Device ID** field below)
- The specific **Button ID** for your Lutron devices (see **Device ID** field below).
  Note: In this case, just enter a "**1**" for the Button ID. All sliders are a "1"
- The Button ID number (not needed in this example because it is a slider)
  Note: ***In this case with sliders there is no need to determine the specific Button ID number, for our SLIM software will read the variable output of each slider and map it accordingly***
- The specific Converging Systems device **Z/G/N** address. See **Z/G/N** field below.

Here is an e-Node Web Pilot example showing these fields for RGB or RGBW (index 4 covers white)



Here is an e-Node Web-Pilot examples showing a simple example for Color Temperature (CCT)



Note: Please note that the number next to the two icons we refer to as the Index number of which there are 255 discrete entries. Index 1 is a unique operation. Each additional index entry

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will be performed by the SIIM software and any irrelevant or faulty entries will be skipped until the entire table of entries is processed.

For more information on this programming example, refer to the table below for specific entries that should be made to complete the programming for each Lutron UI button.

Marked Lutron Button*	Desired Action	Lutron output string entry	CS Bus resultant command
Red Slider	-On movement of slider from 0% to 100%, Red component is transmitted to CS-Bus system.	TRACK(**1**)=53,1 **Note**: there is no trailing comma and third number in this slider case	LUT(**1**)#2.1.1.LED=RED **Note**: there is no trailing characters after the HUE command in this slider case
Green Slider	-On movement of slider from 0% to 100%, Green component is transmitted to CS-Bus system.	TRACK(**2**)=54,1 **Note**: there is no trailing comma and third number in this slider case	LUT(**2**)#2.1.1.LED=GREEN **Note**: there is no trailing characters after the SAT command in this slider case
Blue Slider	-On movement of slider from 0% to 100%, Blue component is transmitted to CS-Bus system.	TRACK(**3**)=55,1 **Note**: there is no trailing comma and third number in this slider case	LUT(**3**)#2.1.1.LED=BLUE **Note**: there is no trailing characters after the SET command in this slider case
White Slider	-On movement of slider from 0% to 100%, White component is transmitted to CS-Bus system (RGBW systems only).	TRACK(**4**)=56,1 **Note**: there is no trailing comma and third number in this slider case	LUT(**4**)#2.1.1.LED=WHITE **Note**: there is no trailing characters after the SET command in this slider case
CCT Slider (Color Temperature)	-On movement of slider from 0% to 100%, Correlated Color Temperature (CCT) commands are transmitted to CS-Bus system. **Note:** CCT of 0% equates to a CCT of 1800K while CCT of 100% equates to a CCT of 7000K	TRACK(**5**)=10,1 **Note**: there is no trailing comma and third number in this slider case	LUT(**5**)#2.7.1.LED=CCT **Note**: there is no trailing characters after the CCT command in this slider case

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Appendix 1

Lutron Button Logic/Lutron Button Types

It is important to understand the codes that are emitted from any Lutron User Interface. This section will identify those codes and alternatives that are available to fine-tune your system. **Section 1** defines the logic available (whether a button can emit a certain output), and **Section 2** identifies Lutron defined **Button Numbers** that will be transmitted upon the selection of that (applicable) button or timeclock operation.

Section 1 Keypad Button Logic

Depending upon the Lutron platform this section describes Lutron keypad logic available. This is important for depending upon the output string transmitted by Lutron, the mirror of that string must be programmed on the e-Node SLIM side. In other words, only if your platform supports a **Double Tap** (HomeworksQS as opposed to RadioRA2), then and only then can you program a **Double Tap** within e-Node SLIM software to operate. Similarly, if you particular button is programmed for a Press (a "3), then you cannot program an e-Node SLIM button to respond to a Release ("4).

Please refer to your specific platform for detailed information.

Lutron Platform	Section
RadioRA2	RA2 Keypad Button Logic
HomeworksQS	HWQS Keypad Button Logic
Illumination	HWI Keypad Button Logic

RA2 Keypad Button Logic

Button Type	Operation	Lutron system software output				Cases where this type of button is desirable
		Push	Release	Double Push	Extended hold	
Type 1	Standard type	"**3**"	N/A	N/A	N/A	ON, OFF, HUE UP, MOTOR DOWN, STOP
Type 2	Adv. Setting type	N/A	"**4**"	N/A	"**5**"	All of the above commands PLUS User Recall button which you want to double as a Store button when

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						held for 10 seconds. **Note**: **If you don't care about doubling up on the functionality of buttons, disregard Type 2 buttons.**
Type 3	Special FADE UP/DOWN	"**3**"	"**4**"	N/A	N/A	FADE UP, or FADE DOWN (or MOTOR UP, or MOTOR DOWN)

Type 1- Standard operation. This is standard and most common operation that can be used for the bulk of Converging Systems' operations such as *ON, OFF, RECALL n, MOTOR UP, STOP* and to initiate a *HUE UP, SATURATION UP* or similar type operation. In this case the Lutron system generates a "**3**" from the Lutron processor, and no other output strings are possible.

Note: within RadioRa2, all buttons except the ***FADE DOWN and FADE UP*** buttons generate a "**3**" from the Lutron processor when these buttons are first depressed (except if they are programmed as a Type 2 button—see below). There is no separate output command stream generated by Lutron in this case for a button release.

Type 2-Advanced Settings. As an option, the Lutron programming software allows a hardware button to be pressed and held for ten seconds to generate a different output sequence. In this case, if the button is depressed and then released quickly, the Lutron system generates a "**4**" as a button operation. If the button is held for 10 seconds and then released, the Lutron system generates a "**5**" instead (note in this case there is never a "**3**" generated by ANY Button from the entire keypad that is being programmed). **This is the recommended option where you (i) want to establish a dual mode of operation of a button (like to Recall a previously saved color and then to SAVE that color state for future recall). You can right click on the non-button areas of the keypad being programmed within the Lutron software and pick the Advanced Settings tab as seen in Figure 5 below.**

Note: As long as there **no** other buttons on the keypad that you are programming that would be impacted by such a SAVE operation, Converging Systems recommends that this **Type 2 Advanced Setting** button type be used on all keypads that are dedicated to Converging Systems operation because separate button operations can be leveraged (together) saving money for the customer.

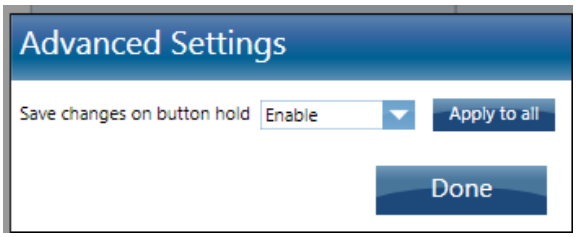

Figure 3

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Type 3- Special FADE (up and down) BUTTONS. Within RadioRA2, these are the only two buttons that have a different operation. These buttons are reserved for FADE type operations. When these buttons are pressed, the Lutron system generates a "**3**" but when these buttons are released, there is the special case of a "**4**" being generated. This logic is particular good only for our FADE UP and FADE DOWN LED commands which would provide a STOP command when the button is released.

Required Action (Potentially). Now with this information in mind, update any of your Lutron Essentials or Inclusive programming for each button programmed that you wish to trigger a Converging Systems' event in a unique way, if required. Also, take note within the **Lutron Integration Report** seen in Figure 6 can be found the **Integration IDs** that will be used later in this Integration Note to link Lutron button pushes with Converging Systems' invoked CS-Bus commands.

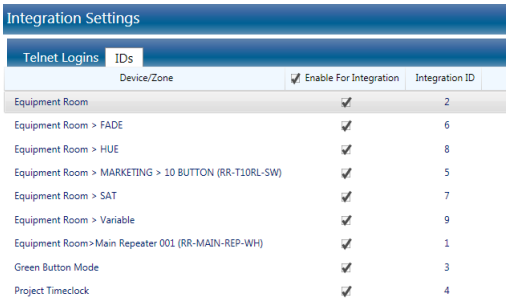

Figure 4

HWQS Keypad Button Logic

Button Type	Operation	Lutron system software output				Cases where this type of button is desirable
		Press On	Release	Double Tap	Hold	
Type 1A	Single Action ("SA)	"3"	N/A	N/A	N/A	ALL OFF, RECALL (n), MOTOR STOP
Type 1B	Single **with Hold ("SAH")**	N/A	"4"	N/A	"5"	USER 1 (Recall and Store with Hold)
Type 1C	Single with Double Press option ("SADP")	"3"		"6"		LED ON/OFF (On with a single press, OFF with a double press)
Type 2	Dual Action	"3"	"4"	N/A	N/A	SAT+/-, HUE+/-, CCT+/-, MOTOR JOG

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	("DA")					UP, MOTOR JOG DOWN
Type 3	Toggle ("TG")	"**3**"	N/A	N/A	N/A	RECALL PRESET (Lighting or Motor), SCREEN UP/DOWN (Activate motion upon Button Press-motor will travel to end point until separate Stop is received) **Note**: this is in lieu of holding the button until you desire it to stop (which is an alternative) at which point you would release the button—see Type 2)
Type 4	RAISE/ LOWER ("RAISE") ("LOWER")	"**3**"	"**4**"	N/A	N/A	FADE UP, or FADE DOWN (or MOTOR UP, or MOTOR DOWN)

Type 1A- Single Action ("SA"). This is standard and most common operation that can be used for discrete operations such as ALL OFF, ALL ON, MOTOR STOP In this case the Lutron system generates a "**3**" from its processor, and no other output strings are generated.

Type 1B- Single Action with Hold ("SAH"). This is a useful derivative case from the standard Single Action operation. This is most useful where you desire a single button to both select a previously stored Color or Motor position, but with the additional functionality, that an extended hold will transmit a separate software string that can be utilized by CS-BUS to invoke a STORE command. In this case the Lutron system generates a "**4**" from its processor upon a Button Press/Release, a "**5**" upon a Hold.

Type 1C- Single Action with Double Press Option ("SADP"). This is a useful derivative case from the standard Single Action operation. This is most useful where you desire a single button to turn ON lighting elements with a single press, as well as turn OFF lighting elements with a double press. In this case the Lutron system generates a "**3**" from its processor upon a single Button Press, a "**6**" upon a double Button Press.

Type 2-Dual Action ("DA"). This is a useful selection for selections such as Hue UP, Hue DOWN, Saturation UP, Saturation DOWN, Color Temperature UP, and Color Temperature DOWN. This is also useful for MOTOR JOG operations where you actually wish to hold the button until you want the motor to stop, at which point you would release the button. In this case the Lutron system generates a "**3**" from its processor upon a Button Press, a "**4**" upon a quick Button Release.

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Type 3-Toggle ("TG"). This is a useful selection for selections such as RECALL PRESET (for lighting or motor positioning) as well as other simple operations such as MOTOR UP and MOTOR DOWN (which directs Motor for instance to move to its fully UP or DOWN position without the necessity of holding the button for the entire length of the motor's travel. In this case the Lutron system generates a "**3**" from its processor upon a Button Press only.

Type 4- Special FADE ("RAISE" , "LOWER"). Within HomeWorks QS, these are the only two buttons that have a different operation. These buttons are reserved for FADE type operations. When these buttons are pressed, the Lutron system generates a "**3**" but when these buttons are released, there is the special case of a "**4**" being generated. This logic is particular good only for our FADE UP and FADE DOWN LED commands which would provide a STOP command when the button is released. Alternatively, these buttons could also be used similarly to Type 3 button for Motor operation.

Required Action (Potentially). Now with this information in mind, update any of your Lutron Designer programming for each button programmed that you wish to trigger a Converging Systems' event in a unique way, if required. Also, take note under **Tools/ Configure Integration/Integration** seen in Figure 6 can be found the **Integration IDs** that will be used later in this Integration Note to link Lutron button pushes with Converging Systems' invoked CS-Bus commands.

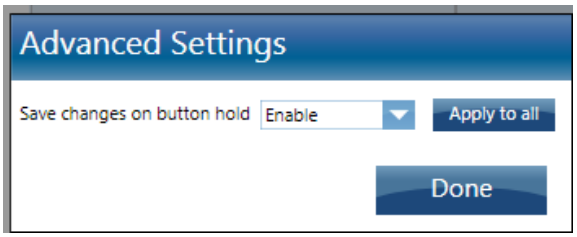

Figure 5

Type 3- Special FADE (up and down) BUTTONS. Within Homeworks QS, these are the only two buttons that have a different operation. These buttons are reserved for FADE type operations. When these buttons are pressed, the Lutron system generates a "**3**" but when these buttons are released, there is the special case of a "**4**" being generated. This logic is particular good only for our FADE UP and FADE DOWN LED commands which would provide a STOP command when the button is released.

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Required Action (Potentially). Now with this information in mind, update any of your Lutron Designer programming for each button programmed that you wish to trigger a Converging Systems' event in a unique way, if required. Also, take note within the **Lutron Designer Configure Integration tab** seen in Figure 4 can be found the **Integration IDs** that will be used to link Lutron button pushes with Converging Systems' invoked CS-Bus commands.

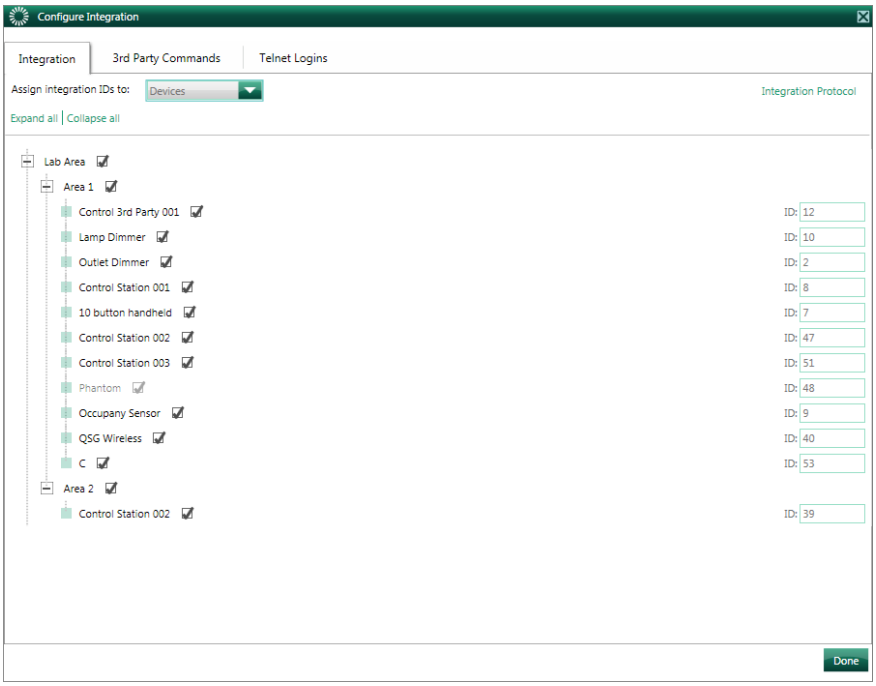

Figure 6

HWI Keypad Button Logic

Reserved-WIP

Button Type	Operation	Lutron system software output				Cases where this type of button is desirable
		Push	Release	Double Push	Extended hold	
Type 1	Standard type	"KBP"	"KBR"	N/A	N/A	ON, OFF, HUE UP, MOTOR DOWN, STOP
Type 2	Adv. Setting type	N/A	"KBR"	"KBDT"	"KBH"	All of the above commands PLUS User Recall button which you want to double as a Store button when held for 10 seconds. **Note**: **If you don't care about doubling up on the functionality of**

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						buttons, disregard Type 2 buttons.
Type 3	Special FADE UP/DOWN	“KBP”	“KBR”	N/A	N/A	FADE UP, or FADE DOWN (or MOTOR UP, or MOTOR DOWN)

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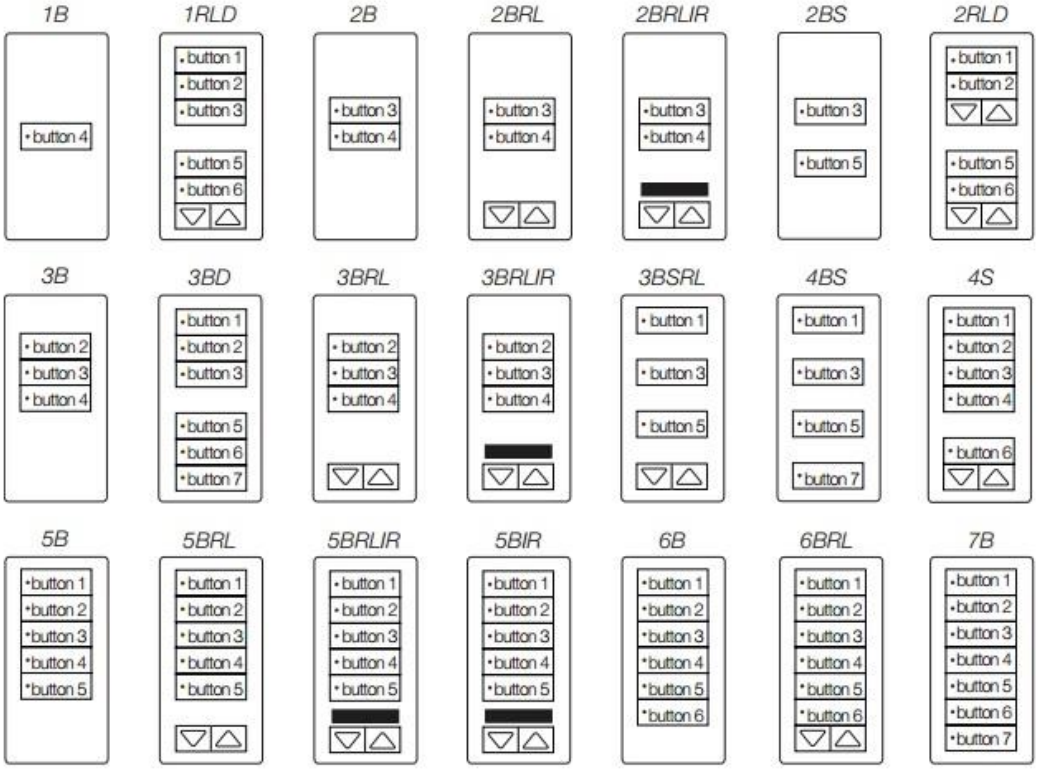
Section 2-- Keypad Button IDs

Use these Button IDs for various Lutron keypads

seeTouch® Keypad

QS Models (QSWS2-): 1B, 1RLD, 2B, 2BRL, 2BRLIR, 2RLD, 3B, 3BD, 3BRL, 3BRLIR, 5B, 5BRL, 5BRLIR, 7B
RadioRA® 2 Models (RRD-W): 1RLD, 2RLD, 3BD, 3BRL, 3BSRL, 4S, 5BRL, 5BRLIR, 6BRL, 7B
HomeWorks® QS/myRoom™ Models (HQRD-W, HQWD-W, HQWA-W, HQRA-W, HQWAS-W):
1B, 1RLD, 2BS, 2RLD, 3BS, 3BD, 3BSRL, 4BS, 4S, 5B, 5BRL, 5BIR, 6B, 6BRL, 7B
Clear Connect® Device Models (CCD-W): 6BRL



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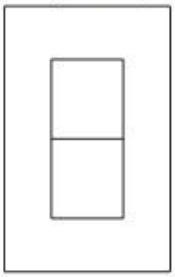
Palladiom® Keypad

QS Models (QWP-): U-2W, U-3W, U-4W, U-RW,
S-2W, S-3W, S-4W, S-RW, S-22W, S-24W, S-42W, S-44W, S-2RW, S-4RW, S-RRW,
B-2W, B-3W, B-4W, B-RW, B-22W, B-24W, B-42W, B-44W, B-2RW, B-4RW, B-RRW.

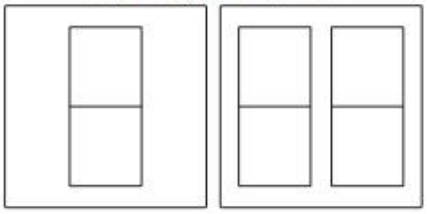
HomeWorks® QS Models (HQWT-): U-P2W, U-P3W, U-P4W, U-PRW,
S-P2W, S-P3W, S-P4W, S-PRW, S-P22W, S-P24W, S-P42W, S-P44W, S-P2RW, S-P4RW, S-PRRW,
B-P2W, B-P3W, B-P4W, B-PRW, B-P22W, B-P24W, B-P42W, B-P44W, B-P2RW, B-P4RW, B-PRRW.

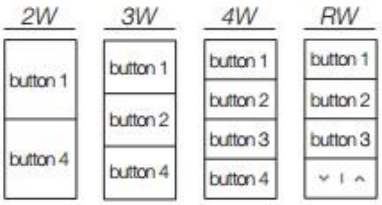
myRoom™ Models (MWP-): U-2W, U-3W, U-4W, U-RW,
S-2W, S-3W, S-4W, S-RW, S-22W, S-24W, S-42W, S-44W, S-2RW, S-4RW, S-RRW,
B-2W, B-3W, B-4W, B-RW, B-22W, B-24W, B-42W, B-44W, B-2RW, B-4RW, B-RRW.

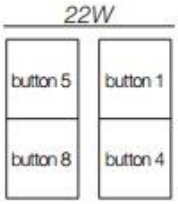
U.S. Style Faceplate

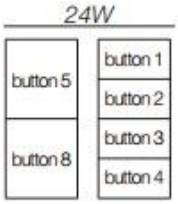


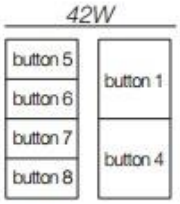
Square Style Faceplates

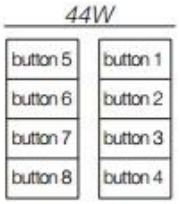


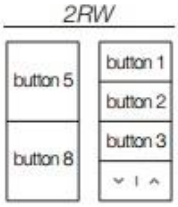


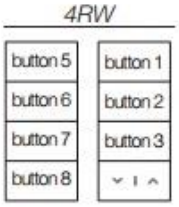


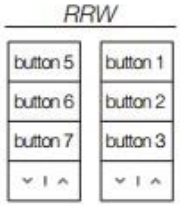












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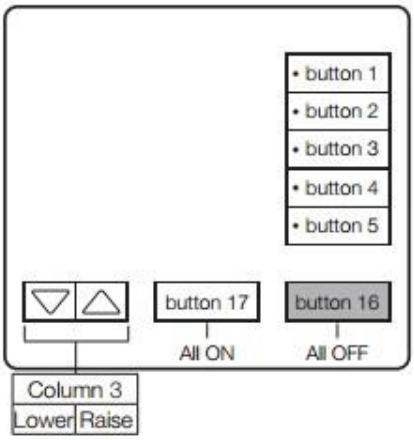
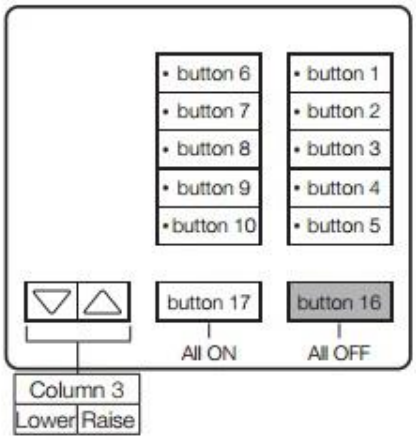
Tabletop seeTouch® Keypad

RadioRA® 2 Models (RR-): T5RL, T10RL, T15RL
HomeWorks® QS Models (HQR-, HQK-, HQQ-, HQM-, HQN-):
T5RL, T10RL, T15RL, T5CRL, T10CRL, T15CRL

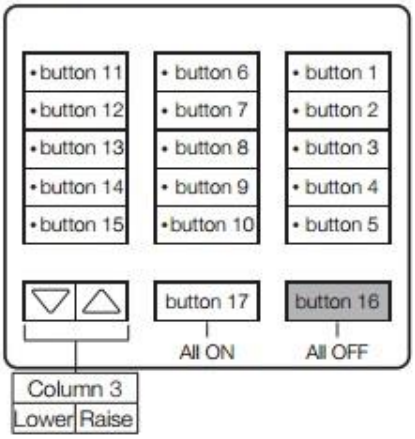
T5-RL



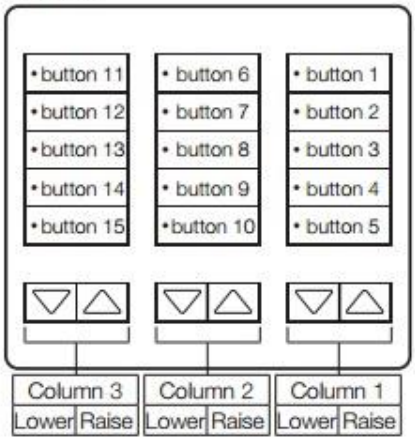
T10-RL



T15-RL



T15-CRL



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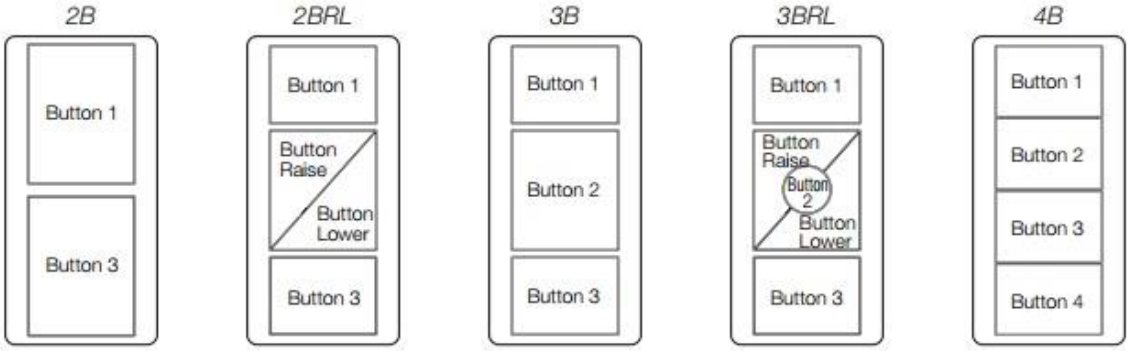
Pico® Wireless Control

CURRENT Models: PJ-2B, PJ-2BRL, PJ-3B, PJ-3BRL, PJ2-2B, PJ2-2BRL, PJ2-3B, PJ2-3BRL, PJ2-4B
LEGACY Models:
QS Models (QSR4P-, QSR8P-, QSRKP-, QSRMP-): 2, 2R, 3B
RadioRA® 2 Models (RRD- P): 3BRL-L, 3BRL-S



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Appendix 2

Converging Systems System Setup/Configuration

Before proper operation between the Converging Systems' controllers and the Lutron system 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 Lutron Host to one or more Converging Systems motor and/or lighting controllers. (The e-Node/dmx is a similar gateway product that enables a Lutron 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 **Z**one/**G**roup/**N**ode 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

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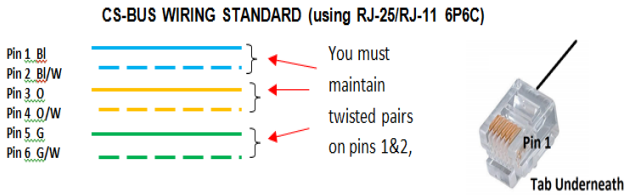
COMPONENT HARDWARE SETUP-For CS-Bus Equipment (for DMX see Appendix 3)

NOTE: The CS-BUS uses standard RJ-25 (RJ-11 6P6C) connectors available at Home Depot, 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 RJ11RJ-25 modular connectors and wish to proceed, refer to the next section for a workaround.

Cabling Detail



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

Suboptimal RJ-11 4P4C connection 4 wires		
e-Node Side	**ILC-x00 side**	**Color of wire**
Pin 1	**Pin 1**	**Orange**
Pin 2	**Pin 2**	**Blue**
Pin 3	**Pin 3**	**Blue/white**
Pin 4	**Pin 4**	**Orange/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**.

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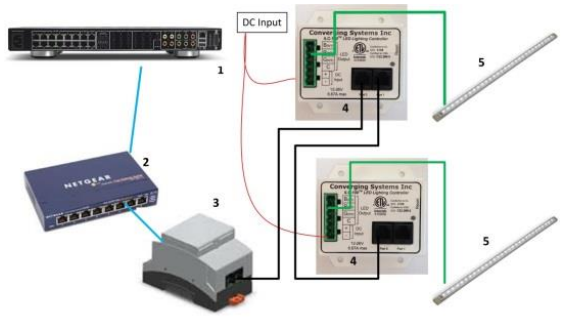
Step	Setting	Choices
HW-1	Connect IMC-x00 and ILC-000 controllers to each other	Interconnect controllers sequentially in a daisy-chain fashion (without "Y"s or "T"s) by connecting Port **1** of one device to Port **0** of the next sequential device. Utilize standard CAT5 (or better) wiring and maintain 1/1 pinouts between ends (see **CS-Bus Wiring Standard** above). Also maintain twisted pairs as shown above (1&2, 3&4, 5&6). See termination footnote below [1] **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**. 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.
HW-2	Connect controllers to Gateway	 **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.) -**IBT-100 connections (not applicable for Lutron)**. 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

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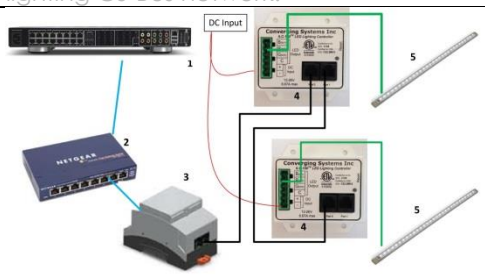
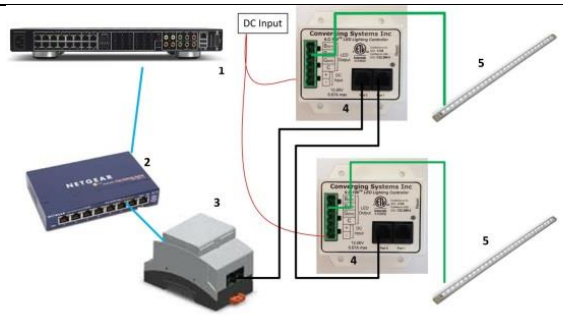
<table>
<tr><td></td><td></td><td>serial port or to a USB/Serial adapter connected to your system (57,600,n.8,1,n).
Note: The IBT-100 requires power to operate which is only available from **Port 0** of the ILC-x00 controllers. Should **Port 0** be unavailable on a convenient ILC-x00 device, unplug the 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.</td></tr>
<tr><td>HW-3a</td><td>(For Lighting devices only)
Connect Lighting Elements to Controllers</td><td> 

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.
<table>
<tr><td>RGB
(4 pin)</td><td>ILC-100c (**C, G, R, B**) Note: **C** is positive common
ILC-400m (**C, G, R, B, W**)</td></tr>
<tr><td>RGBW
(5 pin)</td><td>ILC-400 (**C,G,R,B, W**) 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**) Note: **C** is positive common</td></tr>
</table></td></tr>
<tr><td>HW-3b</td><td>(For Motor devices only)
Connect Motor(s) to Controllers</td><td>Connect as per separate Motor Control instructions.</td></tr>
<tr><td>HW-4a</td><td>(For Lighting Devices)
Connect Power</td><td> 

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 and fail-safe communication).</td></tr>
<tr><td>HW-4b</td><td>(For Motor Devices)
Connect Power</td><td>Connect as per separate Motor Control instructions.</td></tr>
</table>

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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.

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COMPONENT SOFTWARE SETUP (using e-Node and e-Node Web-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 **Z**one/**G**roup/**N**ode 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

-e-Node Commissioning Guide (long version)
-ILC-x00 Intelligent Lighting Controller
-IMC-x00 Motor Controller Manual

e-Node Programming/Device Programming

Introducing e-Node Web Pilot Application

As of January 1, 2017, Converging Systems has developed an alternative technique for setting up parameters and performing programming for Lutron connectivity and Lutron control. The new Converging Systems' tool developed to perform these operations is called the e**-Node Web Pilot** application and ***this is available as a free web-service inside the e-Node***[1]. The e-Node Web Pilot application enables the following functions:

- The selection of the supported Lutron platform that will control Converging Systems lighting or motor controllers. These platforms currently include:
  - RadioRA2
  - HomeworksQS
  - Homeworks Illumination
  - Grafix EyeQS, and
  - Graifix Eye GRX.
- The automatic discovery of the Device ID of any Lutron keypad, timeclock, or other User Interface that can be used to identify that device and subsequently any specified button on that device (whether physical or virtual /dummy) that when selected will trigger any Converging Systems' lighting or motor controller operation[2].
  Note: Previously Lutron Device IDs were only available to the Lutron programmer who had access to the specific Lutron programming tool and was able to connect that tool to the system and generate an Integration Report.
- The setting of all standard e-Node commissioning steps such as setting static IP addresses, setting individual Telnet user names and passwords for up to four concurrent socket connections (with third-party automation systems), turning on the Lutron communication function, customizing I/O communication parameters.

Notes

[1] This new firmware is available for all e-Node MIII hardware platforms that have three (3) side-by-side bus ports on the non-Ethernet/power-plug side of the e-Node.

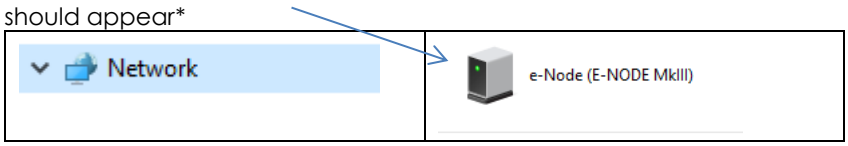
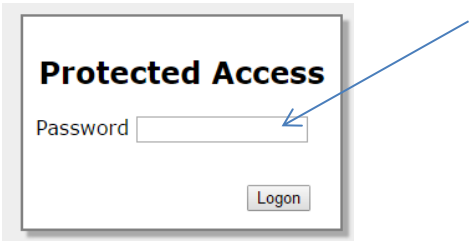
[2] Supported operations include press, release, double-tap and extended hold for any button that can be programmed for such operation with Lutron software.

After reviewing the Minimum Requirements, please proceed to the commissioning steps below.

Minimum Requirements

- 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.
- Version 2.0 or later of e–Node for Web-Pilot Commissioning.
- Download of the latest version of e-Node Pilot application, unzipped and operating on your computer platform. **This version should be used if you do not have the appropriate e-Node or if you wish to use some of the extended facilities of the e-Node Pilot application which includes (i) network monitoring/traffic, (ii) discovery of connected devices to a specific e-Node, (iii) saving/recalling of projects containing all variables programmed inside e-Node(s) or connected devices.**

Web Pilot Commissioning

Step	Overview	Details
WP-1	Open **Web Pilot Application**	-Power on e-Node and connect its Ethernet cable to your switch. -Use a Windows computer connected to the same switch, open your **Windows Explorer** and search for the **Network** tab to expand it to see available **uPnP** devices on your local network. Any connected e-Nodes should appear*  -Double click on the icon above representing your newly discovered e-Node and the Web Pilot Home Page will appear. -Click on the Converging Systems logo on that page and you will be asked for a **Password**. Unless this Password has been changed, enter ADMIN and select **Logon**.  ***Note on uPnP Troubleshooting**: You may have to turn on Discovery or load the uPnP service on your respective computer depending upon the version or settings of Windows loaded. Make sure that your router or switch has **UPnP** turned on which in some cases is turned OFF by default.

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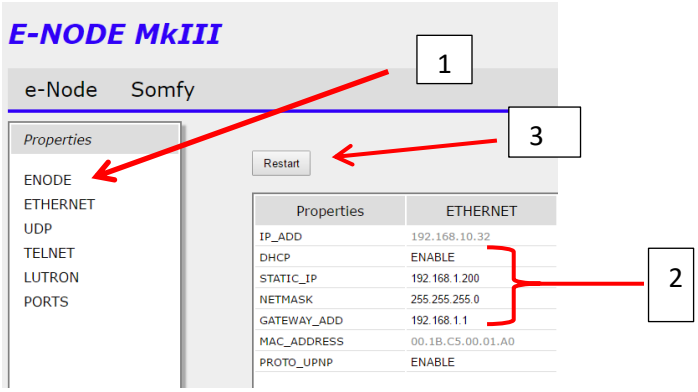
<table>
<tr><td></td><td></td><td>Before you waste too much time resolving uPnP issues on your computer, you can always load the standalone e-Node Pilot application (available from our website), and select View/eNode page and select Discover e-Nodes. Expand the + mark in front of the e-node and its IP address will populate under the Properties window. After you have found that address, simply type that address into your address bar on your browser and continue onto the next step.</td></tr>
<tr><td>WP-2</td><td>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.</td><td>Static or Dynamic Addressing

-Select the ENODE tab on the left (1) and the Ethernet Properties box will appear on the right.

-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:
<table>
<tr><td>STATIC_IP</td><td>xxx.xxx.xxx.xxx</td><td>Your new static IP address</td></tr>
<tr><td>GATEWAY_ADD</td><td>xxx.xxx.xxx.xxx</td><td>Typically the address of your network's gateway</td></tr>
<tr><td>FINALLY select DHCP</td><td>And Set to DISABLE</td><td>Now select the Restart button reboot the e-Node for this to take effect.</td></tr>
</table>
-Note: It is recommended that only STATIC addressing be used in general.</td></tr>
<tr><td>WP-3</td><td>Reserved</td><td></td></tr>
</table>

IBT-100 Programming

The IBT-100 is not compatible with the Lutron Radiora2, Homeworks QS or Homeworks Illumination

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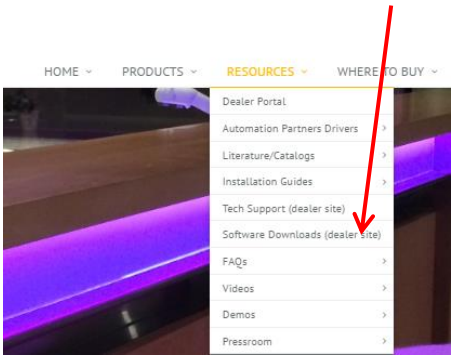
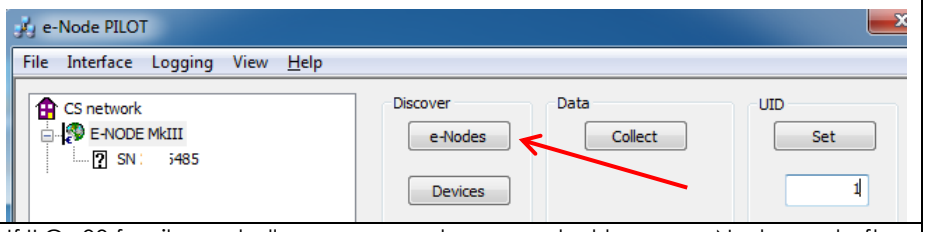
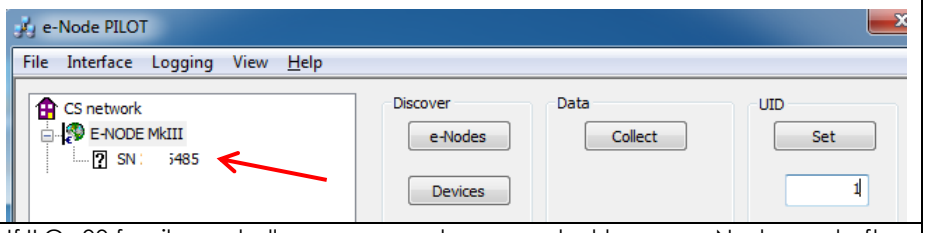
Currently this step requires the e-Node standalone Pilot application (which is available from the Converging Systems website under Software Downloads).



Step	Setting	Choices
DV-1	Discover Devices	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. It is necessary that all devices (led and motor controllers) are (i) discovered and then (ii) assigned a unique UID (**UID**). 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. 
DV-2a	Initial Procedure	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. 
DV-2b	Initial Procedure	If ILC-x00 family controllers are properly connected to your e-Node, and after the **Discover e-node** button has been selected, and if ***no entries appear*** 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

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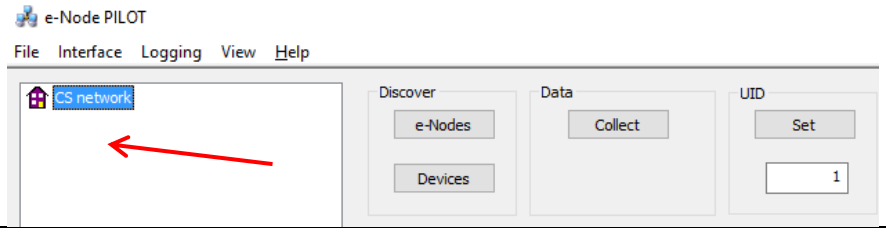
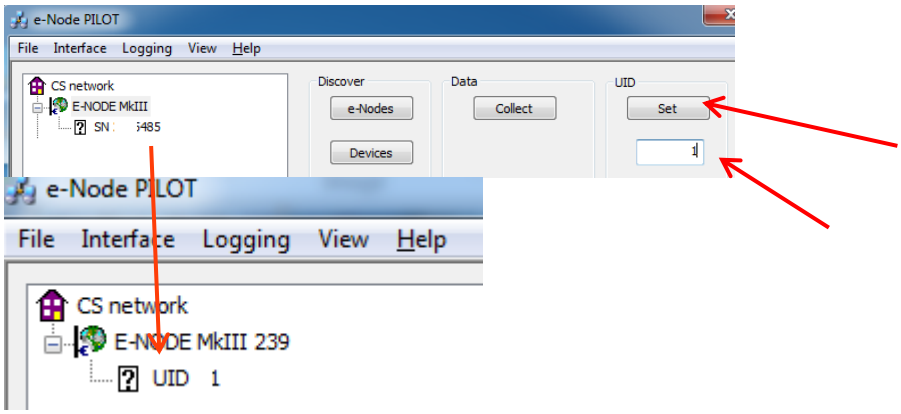
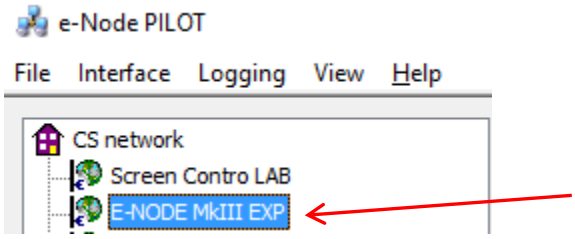
		no entries populate, you have devices with **pre-SN addressing and an alternative process is required to discover these (earlier) firmware units**. Proceed to **Step DV-3b** below. 
DV-3a	Assign UID to Device (for SN Addressing)	First select the **SN entry** for the device that you wish to assign a unique 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.  -Proceed through all lighting and motor controllers connected to each e-Node until completed. Proceed to **Step DV-4**.
DV-3b	Assign UID to Device (for pre-SN Addressing	-First highlight the e-Node to which the target device Is connected.  - 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[1] on the ILC-xx device using a larger type paper clip (small paperclips have a hard time finding the internally positioned reset button).

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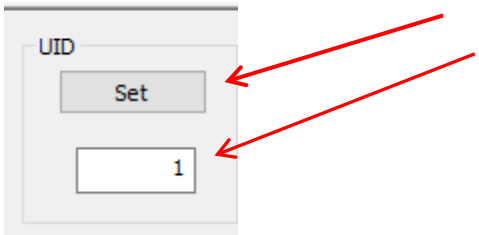
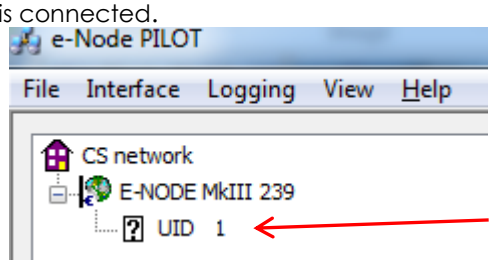
		 -If successful, the device's on-board PCB LED will blink off for a moment then re-light AND the newly assigned UID entry will auto-populate under the e-Node to which it is connected.  - Proceed through all lighting and motor controllers connected to each e-Node until completed. Note for Discovery Button. 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: • **ILC-100c.** 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-100c 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. • **ILC-100m.** Take a smaller type paper clip or similar device and **gently** insert it into the reset/discovery hole on the side of the chassis in front of the two RJ-025 connected and to the right of printing that says "**DS**" and move the paperclip inwards toward the center of the product (**not downwards**) and you will feel a momentary button. Perform a ½ second press and then release the button. The existence of the ILC-100m will appear under the e-Node entry within Pilot. -Now proceed to **Step DV-4**
DV-4	Note on Duplicate UID Addresses	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 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).
DV-5	Enter **Z/G/N**	From the factory the **ILC-x00** controllers have wildcard **Z**one/**G**roup/**N**ode

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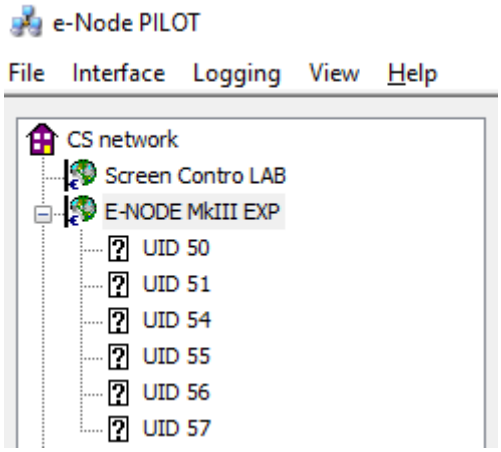
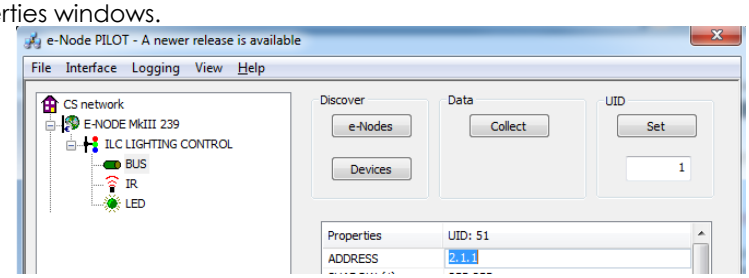
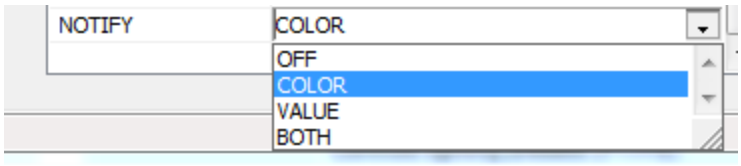
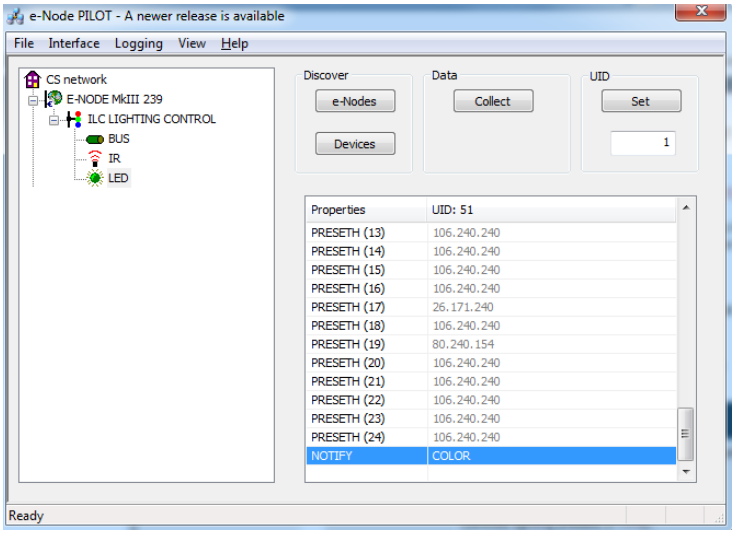
	Addresses	addresses of **Zone**=2, **Group**=1, and **Node**=undefined or a 0. Motor controllers have a similar wildcard address of **Zone**=1, **Group**=1, and **Node**=undefined or a 0. The concept is that they will respond to broadcasts but need a real non-zero address in order to operate properly. The following procedure demonstrates this process. Currently if you leave the system unmodified, the Lutron system 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 (which Lutron does not listen to currently). ***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**. -Enter a discrete **Z**one/**G**roup/**N**ode 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. The directions below indicated how to perform this operation. (See **Appendix 3** for more information on **Z**one/**G**roup/**N**ode addressing.)  - 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.  - 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.

DV-6 ***(not req'd for Lutron)***	Set Notify Mode (not relevant here for there is no programmed bi-directional communication back to the Lutron system from the Converging Systems' controllers)	In order to invoke bi-directional communication for the ability for many automation systems' 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—***old school because there is no dimmer in this color space***). 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**.  Here is an example of NOTIFY set to COLOR in enable Hue/Saturation/Brightness sliders to operate.  The system will need to be installed and configured according to the Converging Systems documentation prior to integration with the target automation 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. **NOTE**: It is recommended that the Converging Systems LED 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.

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Appendix 3

Background on Addressing

This information is only relevant for when you ***start*** adding buttons and sliders within the GUI section of your Lutron. 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 **Z**one/**G**roup/**N**ode 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 **Z**one numbers, **G**roup numbers, and **N**ode numbers.

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

Background on Bi-Directional Feedback (bi-direction feedback is currently not supported with Lutron-WIP): 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.

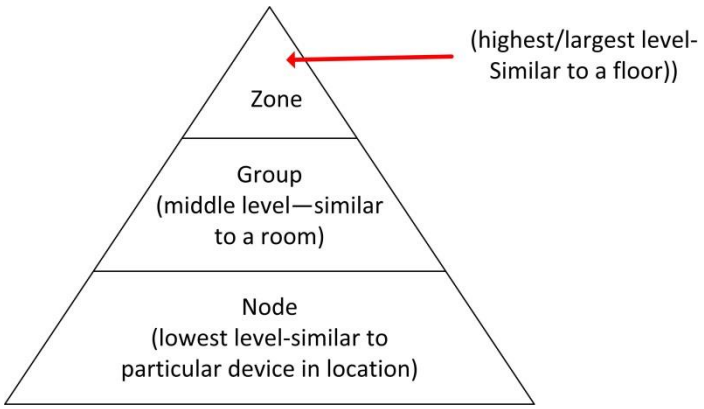

Figure 7

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YOU MUST HAVE PRE-ASSIGNED Z/G/N ADDRESSES TO ALL LOADS BEFORE PROCEEDING WITH Lutron interfacing. 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 the Lutron Tab.

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 1

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

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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 **Figure 8** 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.**

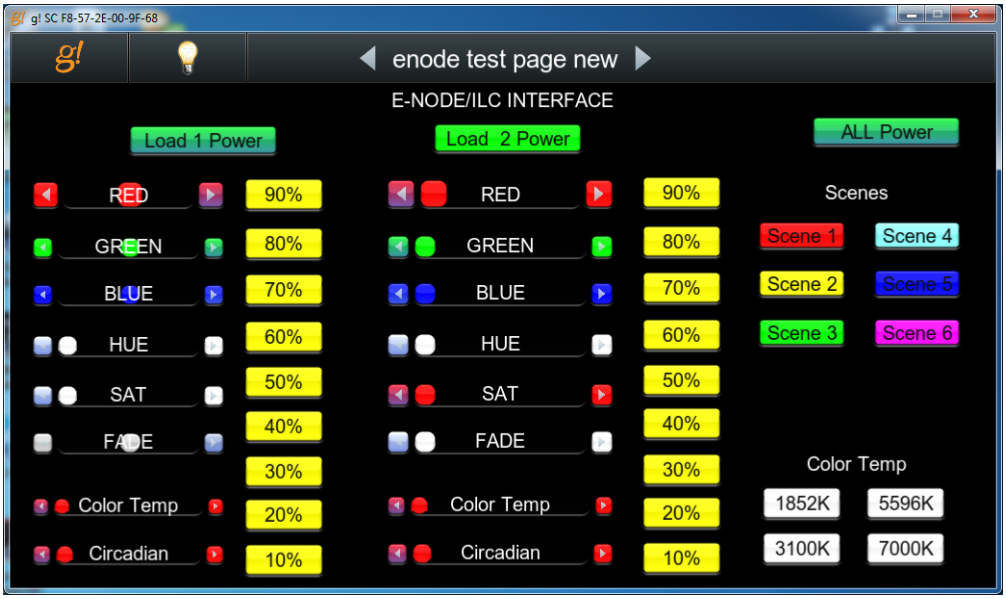

Figure 8

Note: this UI is not currently available from within Lutron but the concept is still valid with respect to the type of sliders shown—**we recommend showing Hue/Saturation and Brightness sliders for accurate color control.**

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Appendix 5

Home Control+ Slider Application Notes

This section details Level 2 more sophisticated programming techniques. Two important topics will be covered:

-Lutron LED Button Logic handling
-Slider utilization within the Home Control+ application.

The following illustrations provide some sample user interfaces (UI) where sliders are integrated for the Home Control+ application. In addition, detailed examples showing programming steps that can be followed to insure that the Lutron indicator LED logic implemented on Lutron hardware dimmers and Lutron touchscreen buttons operate predictably. A sample project with all of these steps embedded is also available as a download from Converging Systems' website.

A. Standard Keypad Control—Standard Buttons with Operational Lutron Button LED indicators

Below can be seen a screen that reveals standard and actual hardware Lutron keypad previously programmed. Some of these buttons refer to the control of Converging System's LED lighting control products, while other buttons refer to the control of Converging Systems' motor (projection screen) control products. Your specific application may vary.

Programming Steps. Actual programming steps are detailed on pages 11-13 above. No changes are required to generate this specific screen within the Home Control + application.

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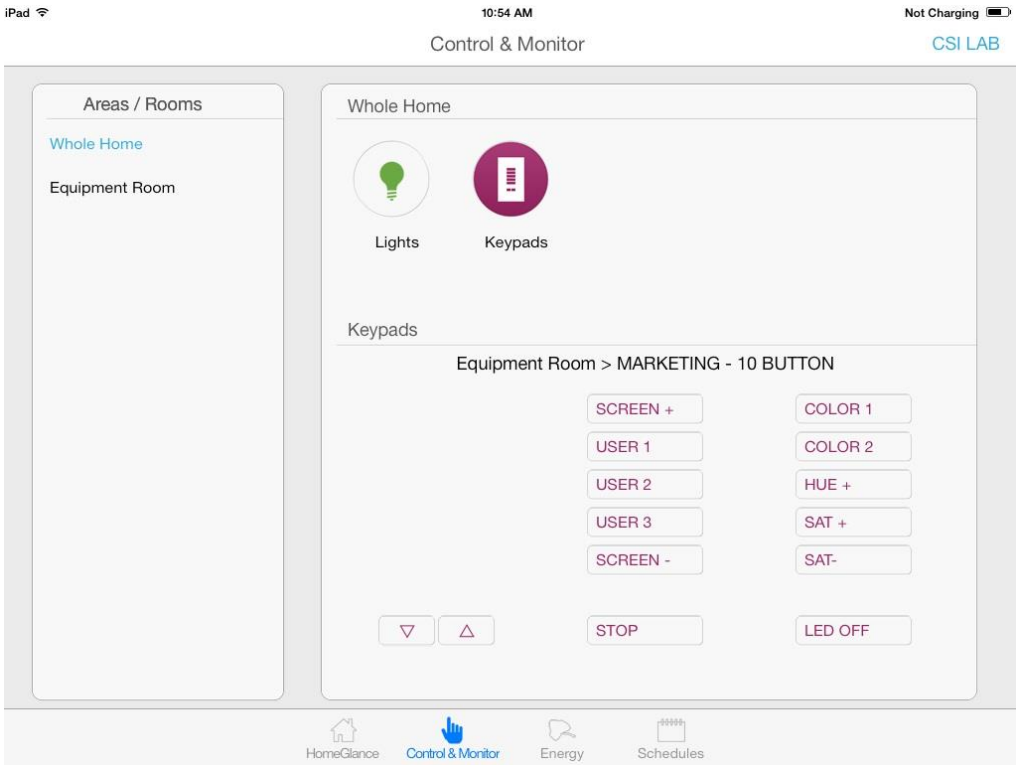

Figure 9

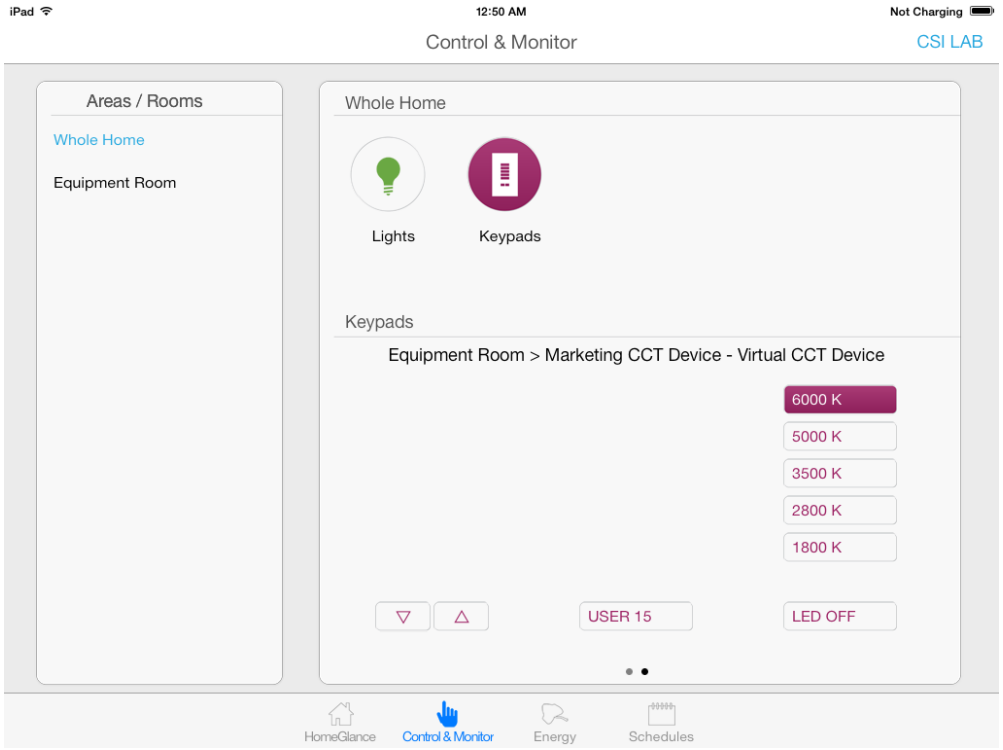

Figure 10

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B. Slider Control (Full color Hue, Saturation, Brightness as well as Correlated Color Temperature Control--CCT)

Below can be seen two screens that reveal (i)standard **Hue**, **Saturation**, and **Brightness** control as well (ii) **Correlated Color Temperature** (CCT) control. All of these controls are derived from the creation of set of Lutron phantom keypads with the Lutron Essentials or Inclusive applications but which utilize a derivative of the standard CS-Bus command set to interrelate with sliders only.

Programming Steps. Actual programming sets for the e-Node Pilot application are provided after the screens.

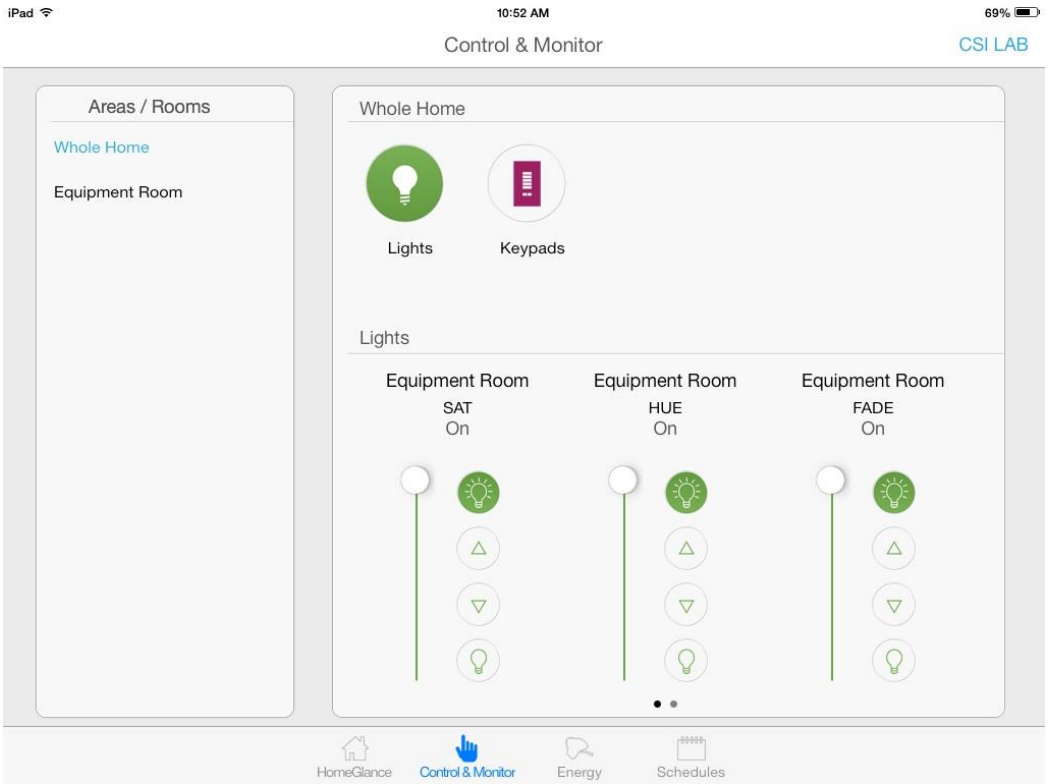

Figure 11

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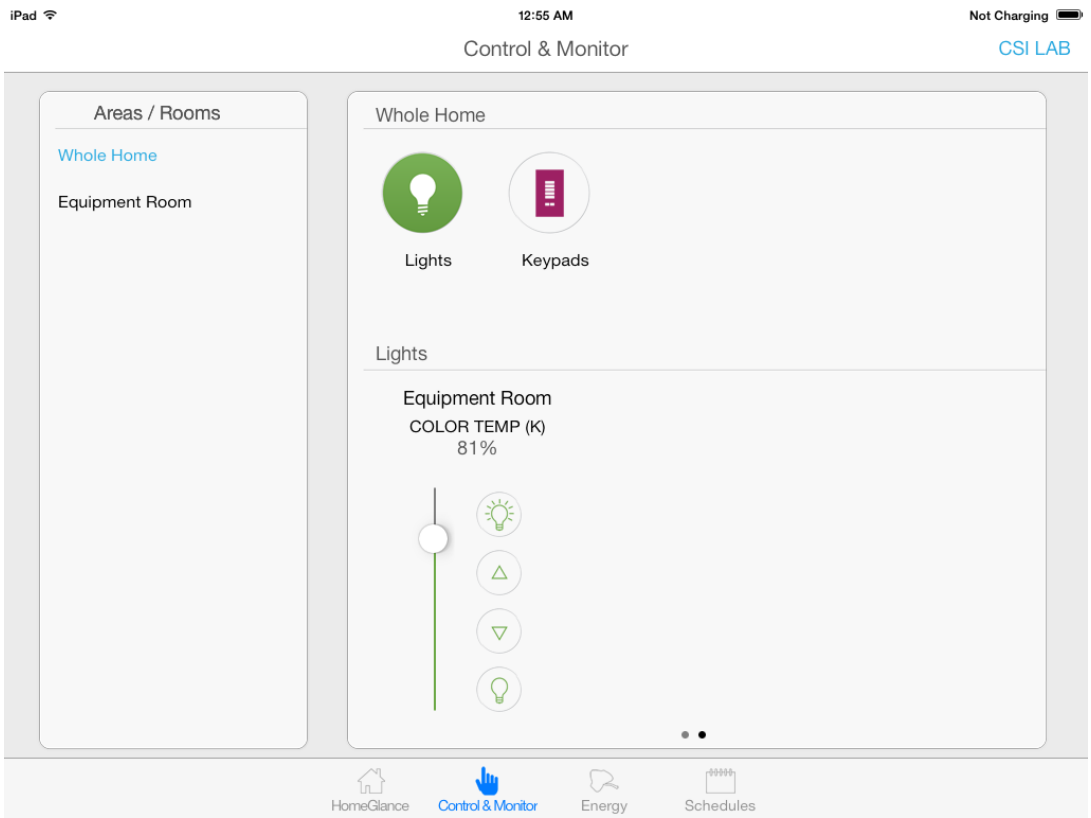

Figure 12

Programming Steps

The above Slider can be easily integrated into the above project with the insertion of the following steps:

Marked Lutron Button*	Desired Action	Lutron output string entry	CS Bus resultant command
Hue Slider	-On movement of slider from 0% to 100%, Hue commands are transmitted to CS-Bus system. **Note:** HUE of 0 or 100% equates to RED, while a HUE of 80 equates of GREEN, and a HUE of 160 equates to BLUE	TRACK(**50**)=8,1 **Note**: there is no trailing comma and third number in this slider case	LUT(**50**)#2.7.1.LED=HUE **Note**: there is no trailing characters after the HUE command in this slider case
Sat Slider	-On movement of slider from 0% to 100%, SAT commands are transmitted to CS-Bus system. **Note:** SAT of 0 is fully saturated (very white) while a SAT of 100 preserves the HUE	TRACK(**51**)=7,1 **Note**: there is no trailing comma and third number in this slider case	LUT(**51**)#2.7.1.LED=SAT **Note**: there is no trailing characters after the SAT command in this slider case

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	of the original selected color		
Brightness Slider	-On movement of slider from 0% to 100%, Brightness (FADE) commands are transmitted to CS-Bus system. **Note:** FADE of 0 is fully OFF (dark) while a FADE of 100 is fully ON	TRACK(**52**)=6,1 **Note**: there is no trailing comma and third number in this slider case	LUT(**52**)#2.7.1.LED=SET **Note**: there is no trailing characters after the SET command in this slider case
CCT Slider (Color Temperature)	-On movement of slider from 0% to 100%, Correlated Color Temperature (CCT) commands are transmitted to CS-Bus system. **Note:** CCT of 0% equates to a CCT of 1800K while CCT of 100% equates to a CCT of 7000K	TRACK(**53**)=10,1 **Note**: there is no trailing comma and third number in this slider case	LUT(**53**)#2.7.1.LED=CCT **Note**: there is no trailing characters after the CCT command in this slider case

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Appendix 6

ADVANCED Lutron 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 **Z**one/**G**roup/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.

Table 2

	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.

Table 3

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

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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 **Z**one/**G**roup/**N**ode (**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.

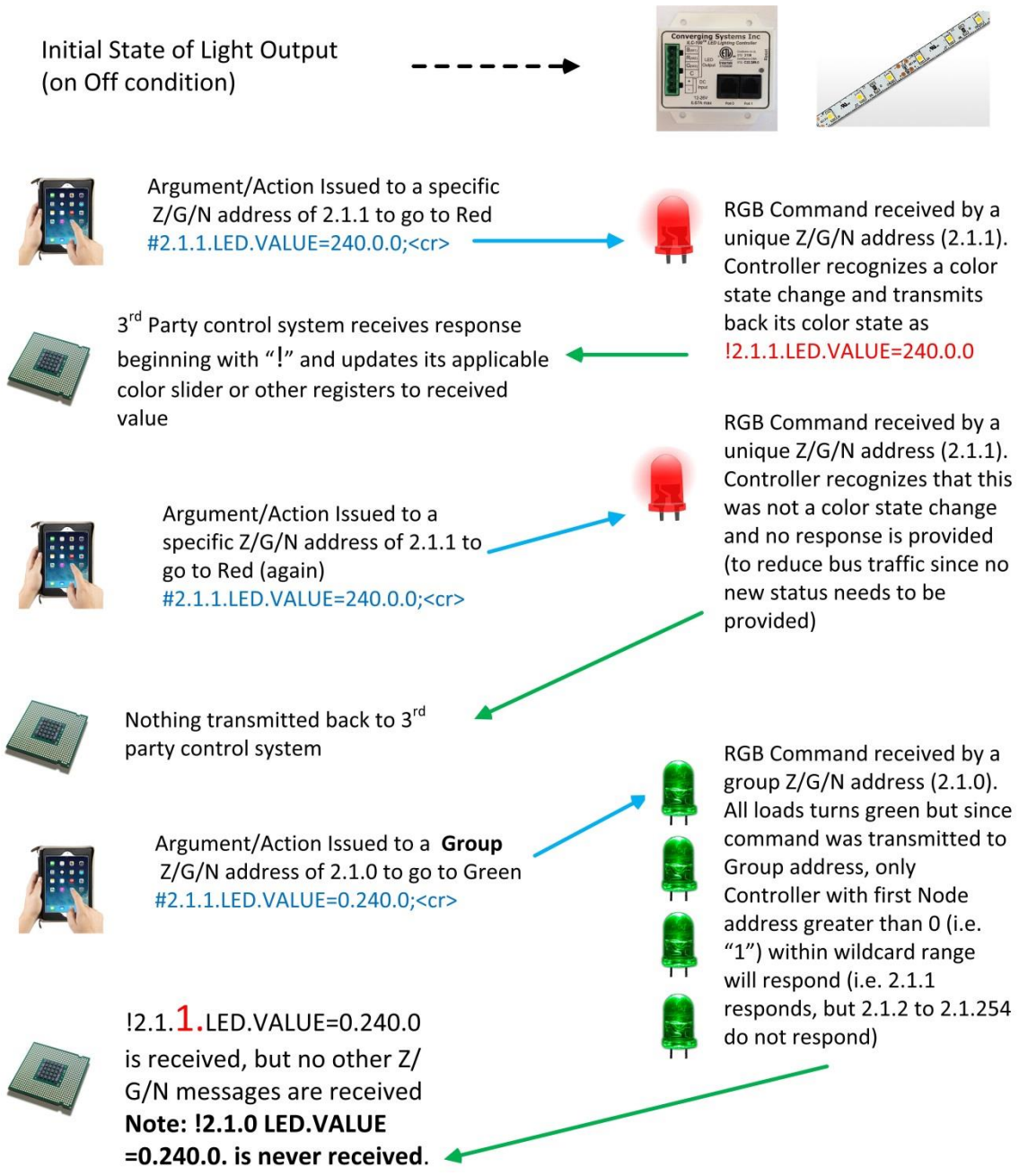

Figure 13

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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 e-Node/Lutron 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 **SLIM** software already in existence within Converging Systems' products. (See the listing of commands that are supported with the e-Node/dmx device see LED Commands in this document.)

Please follow the directions which follow to drive DMX fixtures from a LUTRON System

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

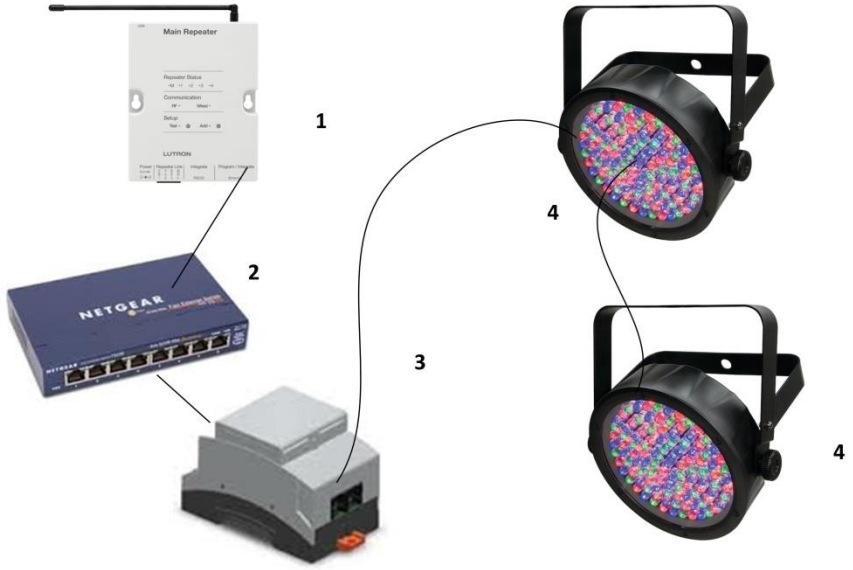

Figure 14

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 Lutron system = 254

BILL OF MATERIALS (for IP control)

#	Device	Manufacturer	Part Number	Protocol	Connector Type	Notes
1	RadioRA2 processor	Lutron	RR-Main-REP-WH	Ethernet	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

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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 (Step EN-1 and EN-2).

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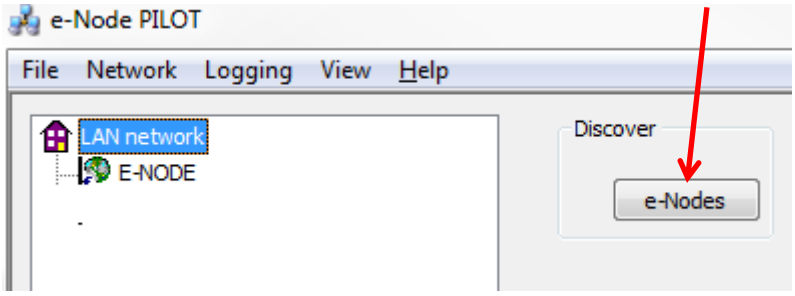
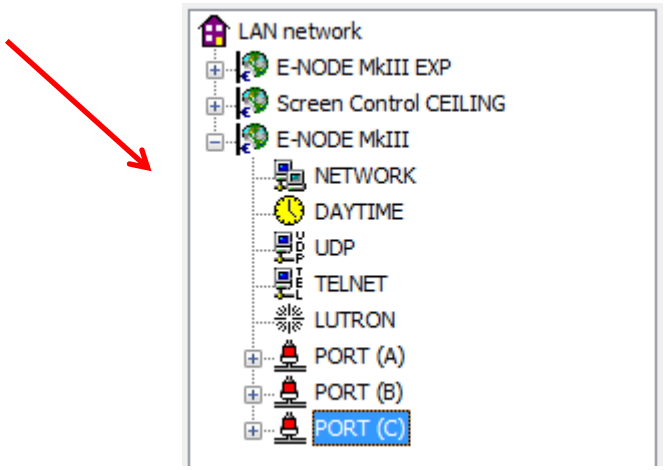
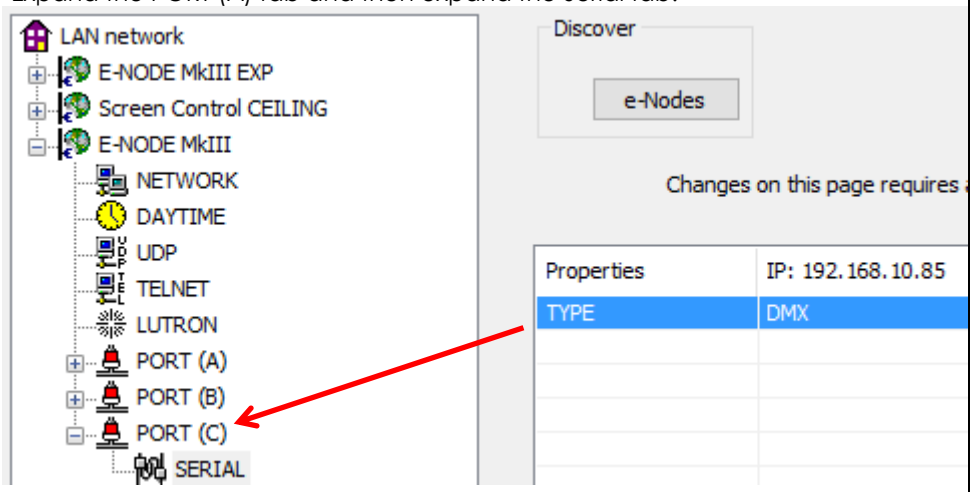
DMX-2	Verify the e-Node DMX is set to communicate to DMX fixtures	-Select the **View e-Node** tab and select the **Discover e-Node** button. Any e-Node(s) connected on the same network will appear as shown.  -Select the **+** mark in front of the e-Node/dmx that you wish to program to expose the sub-tabs.  -Expand the PORT (A) tab and then expand the Serial tab. 

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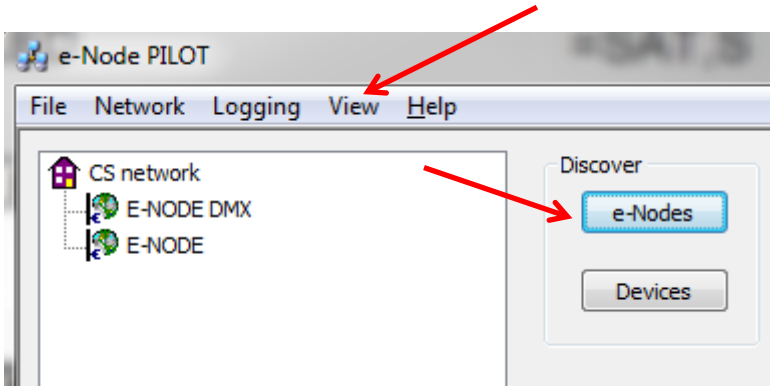
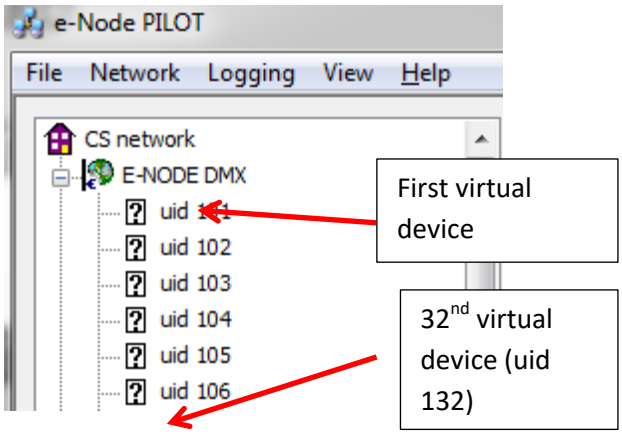
		-Verify that after the **TYPE** entry, the data field indicates **DMX**. If it does not indicate **DMX**, select **DMX** from the pull down menu and reboot the e-Node/dmx in order to make this setting active. Note: the e-Node/dmx can also be configured to communicate with standard CS-Bus devices (ILC-100, ILC-400) and therefore only when this entry is set to **DMX**, will the e-Node/dmx properly communicate to DMX fixtures.
DMX-3	Device Discovery	-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. -Select the Discover Devices button.  -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	DMX Fixture Type	- Select the **View Map** tab and select a specific **UID entry** (101-132) such that the entry is highlighted and then switches to a specific **DMX Fixture** (1 to 32).

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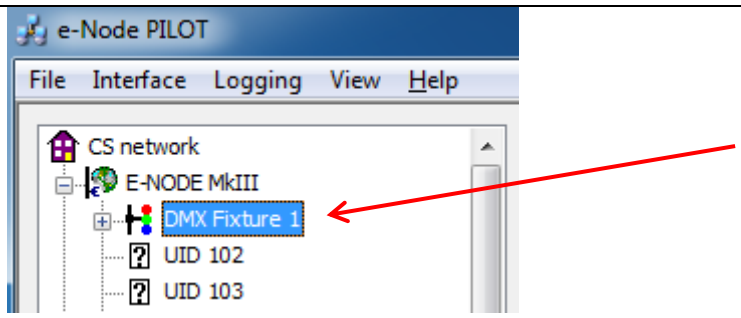
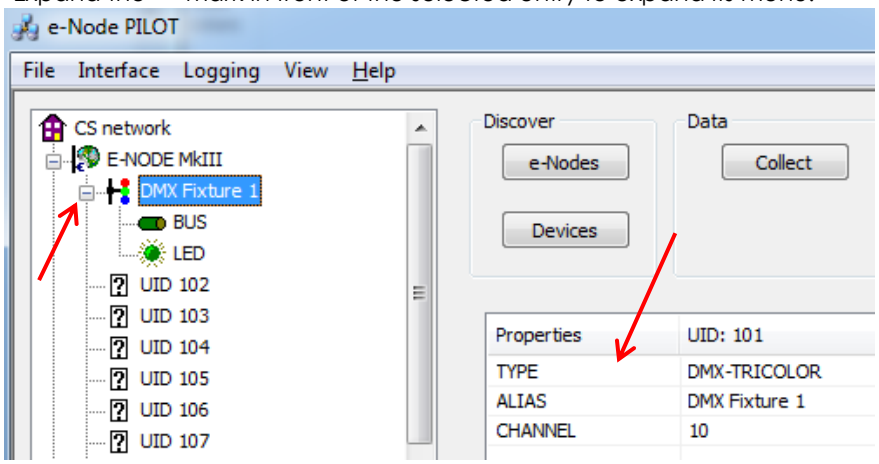
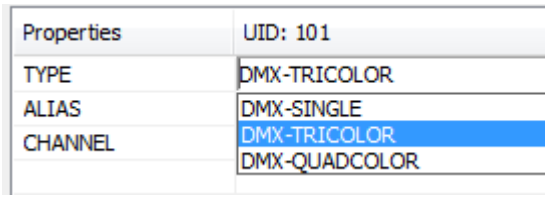


-Expand the **+** mark in front of the selected entry to expand its menu.



-Within the **Properties** select the appropriate type of DMX fixture that you wish to support. For example, a 3-color DMX device (typically RGB colorants) is referred to as **DMX-TRICOLOR**, while a 4-color DMX device (regardless of those four colors) would be referred to as a **DMX-QUADCOLOR** and a 1-color DMX device would be referred to as a **DMX-SINGLE.**

Note: For each **UIDn/DMX** Fixture it is important to select the appropriate type in order for the embedded software to be able to properly adapt itself for the target output device.



Note: The MKIII hardware release of e-Node/dmx is required for this level of functionality operating with firmware versions 1.02 or later.

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DMX-5	Set up Device Addressing	The DMX data packet is mapped to CS messages by assigning a unique **Z**one/ **G**roup/ **N**ode number to a particular **UIDn/DMX Fixture** (regardless of the number for channels which are associated with that DMX Fixture). Specifically in the example below, the start DMX address for DMX Fixture 1 is **10** and the required number of successive DMX addresses is automatically internally assigned within the e-Node/dmx to those discrete channels within that fixture. For example, for a 4-channel DMX fixture which will be addressed with a default **Z/G/N** address of 2.1.1, the default start DMX channel would be 10 and the e-Node/dmx firmware automatically allocates 4 sequential channels for the 4 colors of that fixture (e.g. 10/11/12/13). Typically (unless the defaults are changed by the installer), Red would be assigned to DMX Channel 10, Green would be assigned to DMX Channel 11, Blue would be assigned to DMX Channel 12 and White would be assigned to DMX Channel 13. All DMX ***Start*** addresses and associated **Z/G/N** addresses can be changed by the installer. DMX start default channels, Z/G/N default addresses are mapped as shown in the following table:

DMX Fixture	Default UID	DMX Channel Allocation	CS-Zone/Group/ Node
1	101	10-19	2.1.1
2	102	20-29	2.2.1
3	103	30-39	2.3.1
4	104	40-49	2.4.1
5	105	50-59	2.5.1
6	106	60-69	2.6.1
7	107	70-79	2.7.1
8	108	80-89	2.8.1
9	109	90-99	3.1.1
10	110	100-109	3.2.1
11	111	110-119	3.3.1
12	112	120-129	3.4.1
13	113	130-139	3.5.1
14	114	140-149	3.6.1
15	115	150-159	3.7.1
16	116	160-169	3.8.1
17	117	170-179	4.1.1
18	118	180-189	4.2.1
19	119	190-199	4.3.1
20	120	200-209	4.4.1
21	121	210-219	4.5.1
22	122	220-229	4.6.1
23	123	230-239	4.7.1
24	124	240-249	4.8.1
25	125	250-259	5.1.1

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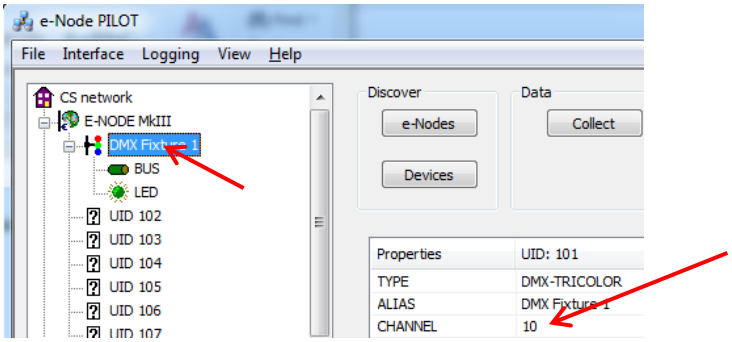
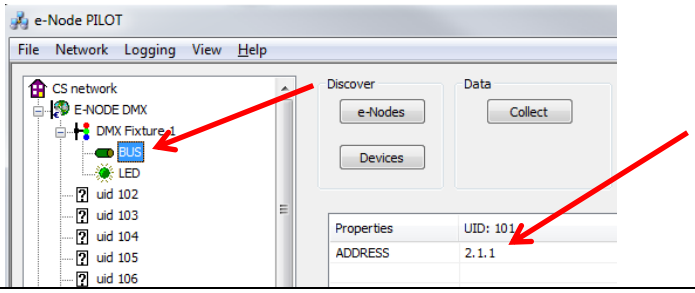
26	126	260-269	5.2.1	
27	127	270-279	5.3.1	
28	128	280-289	5.4.1	
29	129	290-299	5.5.1	
30	130	300-309	5.6.1	
31	131	310-319	5.7.1	
32	132	320-329	5.8.1	

-If you desire to change any default DMX start address, click on the DMX Fixture entry and change the address as appropriate.



-If you desire to change any **Z**one/**G**roup/**N**ode address, click on the BUS entry, and change the address as appropriate.



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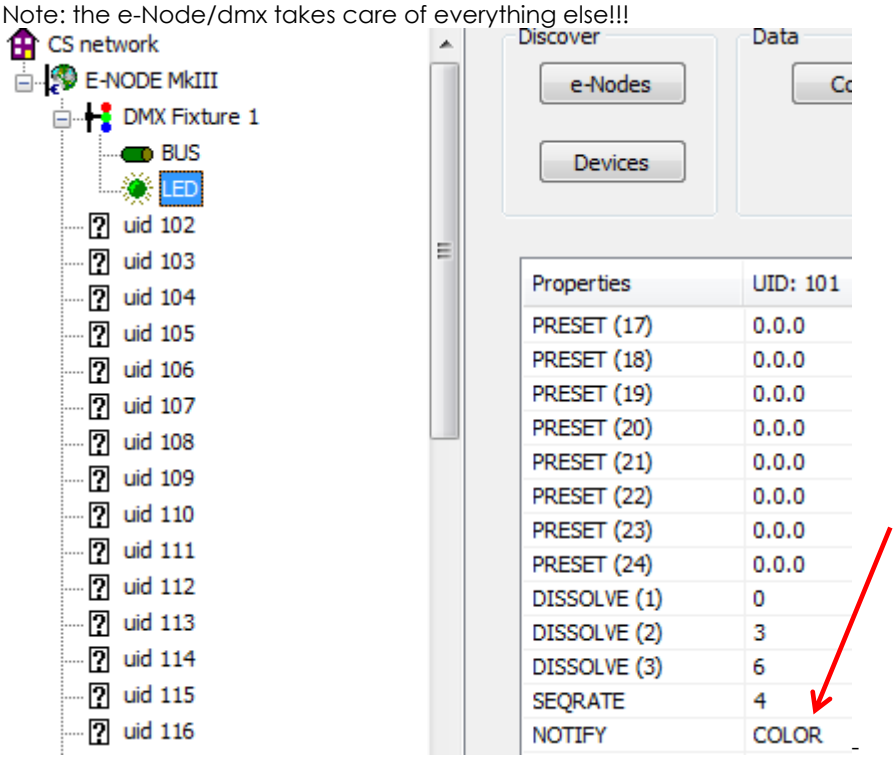
DMX-6	Turn on NOTIFY as applicable for your project (**not required for Lutron operation since bi-directional feedback is not utilized**)	-Program the Device **Notify** parameter for the e-Node/dmx. Change the parameter for the specific device (UID-DMX Fixture) for which you which to invoke the NOTIFY function. **Note**: See section DV-2 in Appendix 2 for explanation of the NOTIFY function. Also understand In this case, you will not be programming ILC-100 or ILC-400 devices, so you can skip the ILC-100/400 section (Steps DV-1 and DV-2) in Appendix 2. -Proceed to standard Lutron Programming (Steps 1 onwards above in the main body of this Integration Note). Note: the e-Node/dmx takes care of everything else!!!  Note: the e-Node/dmx takes care of everything else!!!

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Appendix 8

Lutron Programming Spreadsheet

Telnet Username	
Telnet Password	
IP address of the Lutron primary processor	___ ___ ___, ___ ___ ___, ___ ___ ___, ___ ___ ___

(note **RED BOLD Column Entries** below are required for Programming)

Lutron button targeted for connection to Converging Systems LED or Motor operation							**Desired outcome when Lutron button is pushed**	**Command that needs to be entered into e-Node Pilot application[1]**
Index		Button Alias[1]	**Integration ID**	**Button Number**	**Button Logic**		Descriptive Summary[2]	**Actual programming string[3]**
		Recall 1	(e.g.) 5.	(e.g.) 1.	(e.g.) 3.		(e.g.)Color goes to Recall 1	(e.g.) #2.1.1.LED=RECALL,1
(1)								
(2)								
(3)								
(4)								
(5)								
(6)								
(7)								
(8)								
(9)								
(10)								
(11)								
(12)								
(13)								
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(21)								
(22)								
(23)								
(24)								

(Up to 256 indexes are available, please make additional copies of this table as needed.)

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[1]Note: CS-Bus commands that can be utilized are described in a separate document entitled "Third-Party CS-Bus Device Driver Toolkit-Programmers Guide (DDK) which can be downloaded from http://www.convergingsystems.com/inres_programmingdesignkit.php

[2]These entries are not required for programming but are only provided to assist in the programmer's ease of project documentation.

[1]These programming strings assume a pre-programmed CS-Bus device with a Zone address of 2, a Group address of 1, and Node address of 1. The factory default for lighting controllers is Z.G.N= 2.1.0 while the defaults for motor controllers is Z.G.N=1.1.0. The e-Node Pilot application is required to change the factory default address to a unique address. The device address shown above as #2.1.1 can be any address from 1-254 per field. This address would need to have been programmed for the specific device being controlled using the e-Node Pilot application also available from Converging Systems under Downloads.

Appendix 9

Common Mistakes

Common Mistakes

1. Forgetting to set turn on the Telnet Login under the **TELNET** page (to ENABLE). The Lutron processor does require a valid username and password, If **TELNET** is set to no login, the e-Node and the Lutron processors will fail to communicate.

2. Forgetting to input accurate **Z**one/**G**roup/**N**odes addresses within the LUTRON tab. The factory defaults will work with some systems but certainly, if your particular lighting or motor controllers do not function, check these addresses.

3. Forgetting to press the **RESTART** button within e-Node Pilot application after changes on the **NETWORK**, **TELNET**, or **LUTRON** pages are made.

4. Forgetting to match a valid LUT for each related TRACK within e-Node Pilot or the web application.

5. Forgetting to properly use COMMAS within the TRACK section or failure to properly use PERIODS within the LUT section of the e-Node Pilot application.

Here is an example that works (commas with TRACK and periods with LUT):

TRACK(1) 5,1,4	LUT(1) #2.7.1.LED=FADE_UP

Here is an example THAT WILL NOT WORK (periods with TRACK and commas with LUT)

TRACK(1) 5.1.4	LUT(1) #2,7,1,LED=FADE_UP

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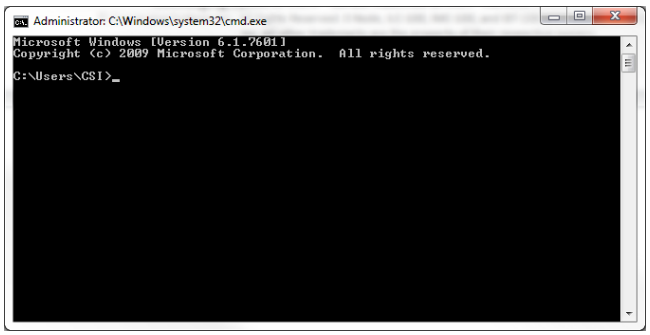
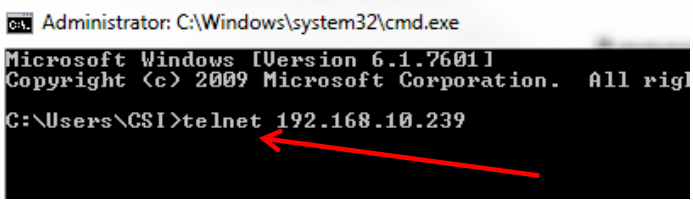
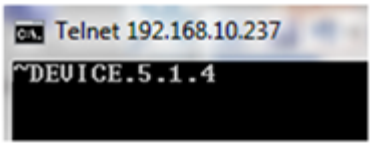
Appendix 10

Troubleshooting/System Monitoring

Using Telnet Tools

Step #	Step Overview	Detail
A10.1.1	Launch MS-DOS Telnet application. **Note**: If the Telnet utility is not immediately available on your PC, you will need to add it under Add Programs—it is a Windows utility available but not always installed.	-Enter the command prompt but typing in "CMD" in the search box within your PC.  -Launch the Telnet application by typing in the following command followed by the IP address for your Lutron processor. 
A10.1.2	Monitor Lutron button pushes to verify if the Device ID, Button Push, and Button operation are being accurately transmitted through Telnet.	Here is representative Telnet output stream indicating that a button from the following device has been pushed.  In this case, the parameters represented by this Telnet output stream represent the following: Device ID: 5 Button Number: 1 Button Operation: 4 Thus if you are seeing a 5,1,4 from Lutron but you have entered a TRACK(n) of **5**,**2**,**4** into the e-Node, and nothing is happening, you have just discovered why. Change the TRACK(n) entry, and try once again.

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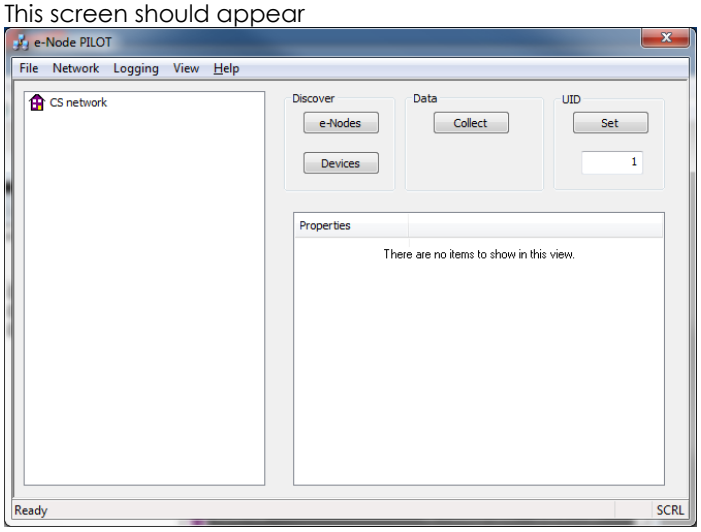
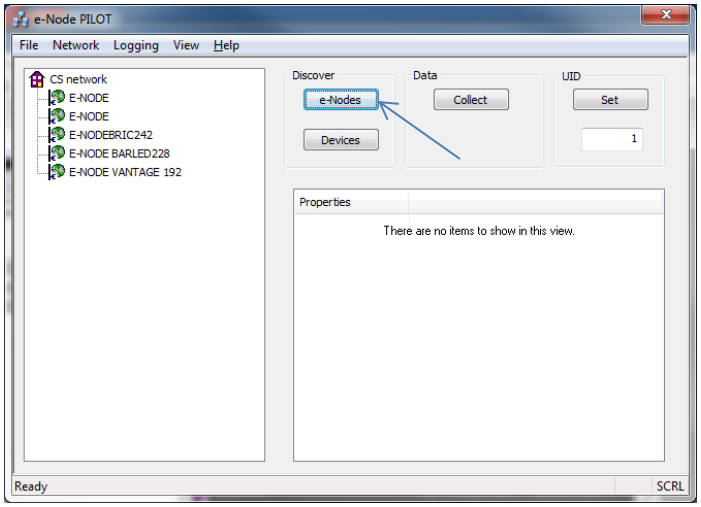
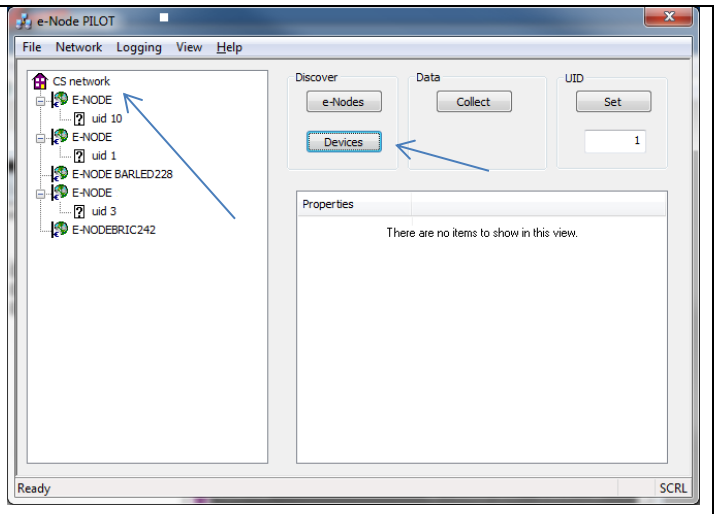
Using Converging Systems' Tools

Step #	Step Overview	Detail
A10.2.1	Launch **e-Node Pilot** application	This screen should appear 
A10.2.2	Discover e-Node devices(s)	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 
A10.2.3	Discover Devices	Next press the **Discover Device** button. Any connected loads (i.e. ILC-100 or motor controllers) should appear

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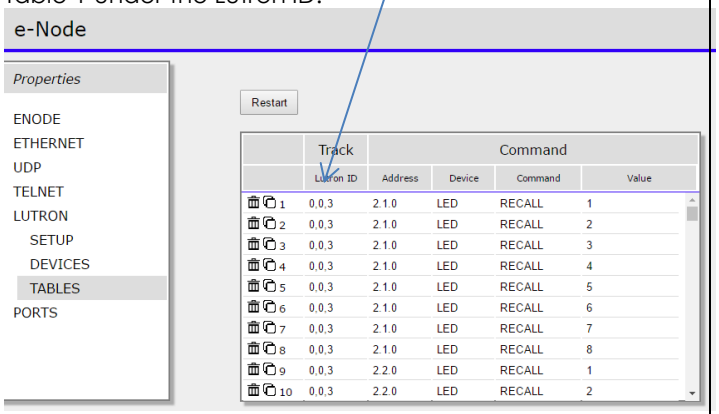
Appendix 11

Special Instructions for Homeworks Illumination

Step #	Step Overview	Detail
A11.1.1	Enter HWI keypad codes under Lutron ID	-For Lutron ID data entry, enter the **HWI Special Entry** from **Table 1** below which matches the Lutron output codes for the particular button operation and address that the CSI SLIM interpreter will "listen to." Note: It is important to input those entries exactly from Table 1 under the Lutron ID. 
A5.2.2	Enter remaining fields on each Index line as specified Discover e-Node devices(s)	Follow directions for the entry of Address, Device, Command, etc. from Step 4e in main body of this Integration Note.

Structure of Special Entry

Button Mode	,	[	Processor #	:	Link #	:	Assignable Key Device	]	,	Button Number

Allowable entries within each of the above field

Category	Available Choices for each Data Field			
Button Mode	KBR (for Keypad Press)	**KBR** (for Keypad Release)	**KBDT** (for Keypad Double Tap)	**KBH** (for Keypad Hold)
Processor #	**01**=processor 1.	**02**=processor 2	Etc.	Etc.
Link #	**06**=Link6 configured as keypad link	Etc.	Etc.	Etc.
Assignable	**01**=unit #1 of 32	**02**=unit #2 of 32	…..	**32**=unit #32 of 32

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Keypad Device	assignable keypad devices	assignable keypad devices		assignable keypad devices
Button Number	**1**=Button #1 from top operated as per Button Mode selected	**2**=Button #2 from top operated as per Button Mode selected	Etc.	

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