LUTRON Integration Partner

CONVERGING SYSTEMS

Integration Note for non-LEAP-based Lutron platforms & e-Node xx00

Automation/ Lighting Panel Manufacturer:

Lutron Electronics Co. Inc.

Platform
(See Model Numbers below for compatible hardware)

Type A LEAP Platform (see separate doc.)	Type B Platform (see this document)	Type C Platform (see this document)
➢ HomeWorks QSX (HW QSX) (Version 21.3) ➢ RadioRA3 (WIP)	➢ RadioRA2 (RA2)(V.12.10) ➢ RadioRA2 Select ➢ HomeWorks QS (HWQS) (Version 21.31)	➢ HomeWorks Illumination (HWI)

Note: For Grafik Eye GRX and Grafik Eye QS consult e-Node Interfacing Guide

Model Number(s):

For compatibility with Type A Platform (lighting or motor control) (see separate doc.)

Application	e-Node/ 4000	e-Node/ 4100
Support of ILC-xx0 controllers (***and concurrent operation with 3rd party automation platforms***)	✓	
Support of 3rd party DMX fixtures from Lutron QSX (with or without concurrent operation from a third-party platform		✓

For compatibility with Type B and Type C Platforms (lighting or motor control)

Application	e-Node/ 2000	e-Node/ 2100		e-Node/ 4000	e-Node/ 4100
Support of ILC-xx0 controllers (**with or without concurrent support from 3rd *party automation platforms***)	✓		or	✓	
Support of 3rd party DMX fixtures (with or without concurrent operation from a third-party platform		✓	or		✓

Partner Software Platforms

Type A platforms use Lutron Designer™
Type B platforms use Lutron Essentials™ or Inclusive™

Specific Profile/Driver Version:

Note on e-Node/2000 and e-Node/2100.
This documentation release is applicable to e-Nodes MKIII and later 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 2.01.27 (i.e., 2.01.10, or earlier MKII e-Nodes), please refer to pre 2017 versions of this document.

Note on e-Node/4000 and e-Node/4100.
This document release also relates to the support of Type B platforms using the e-Node 4000/4x00 device. These e-Nodes do not provide support for Type C platforms.

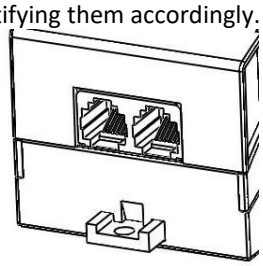
	Reference. MKIII e-Nodes have two side-by-side RJ-25 (6P6C) ports **PLUS** one RJ-45 (Port 2) port ***on one side*** of the device. MK-II e-Nodes have a dual RJ-25 set of ports and no adjacent RJ-45 (Port 2) them ***on one side*** of the device. The e-Node 4000/4100 have markings on their body identifying them accordingly.  Figure 1 e-Node MKIII  Figure 2 e-Node MKII No driver required from Lutron. **Note**: The existing e-Node Pilot application (V4.11 Build 3 or later) is still required for monitoring CS-Bus traffic and for saving Projects off-line.
Partner/Driver Developer:	Converging Systems Inc.
Document Rev. Date:	1/27/2022

Table of Contents

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

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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 SIMPLE LUTRON INTEGRATED MODULE (SLIM) 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). (e-Node 4x00 currently only supports this function).
- Support of communication utilizing Telnet with authentication (Port 23) (with QS and RA2).

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- 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, Lutron Apps and all Lutron 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).

LED Lighting Commands

Table 1

General CS-Bus Commands	Descriptive Naming Convention	ILC-100 m	ILC-100c/ 300 (sa)	ILC-400 (RGBW mode ILC-450	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			✓		
SOLAR,s	Re-Start Circadian Process			*	*	
HSB (HSL) Color Space Commands						
FADE_UP	Fade_Up	✓	✓	✓	✓	✓
FADE_DOWN	Fade_Down	✓	✓	✓	✓	✓
SET,L	Set_Brightness	✓	✓	✓	✓	✓
HUE_UP	Hue_Up		✓	✓		✓

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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		✓	✓		✓
GREEN,G	Set_GREEN_Value		✓	✓		✓
BLUE,B	Set_BLUE_Value		✓	✓		✓
VALUE=R.G.B	???					
WHITE,W	Set_WHITE_Value		✓	✓		✓
RGB,R.G.B	Set RGB Value		✓	✓		✓
RGBW,R.G.B	Set RGBW Value			✓		✓
PRESET.X=XXX.XXX.XXX (3-color)	Set LED Presets/RGB Color spacer for preset x					
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						

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Telnet (or enhanced IP communication) Login with Authentication (with e-Node)		✓**	✓	✓	✓	✓
Telnet (or enhanced IP communication) Login without Authentication (with -Node)		✓**	✓	✓	✓	✓

Notes:

- requires FW upgrade

[1] Effect (1) only supported

[2] reserved

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Motor Commands

Table 2

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

** For e-Node MKIV TLS supported for Type A platforms in addition

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 7 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 (and LED Button logic) in your Lutron project to generate the type of output commands (and responses) 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. (Regardless of connected platform (RR2, RadioRA Select, HW QS, HW QSX, HWI, and other compatible Lutron platforms), the general concept below is representative.

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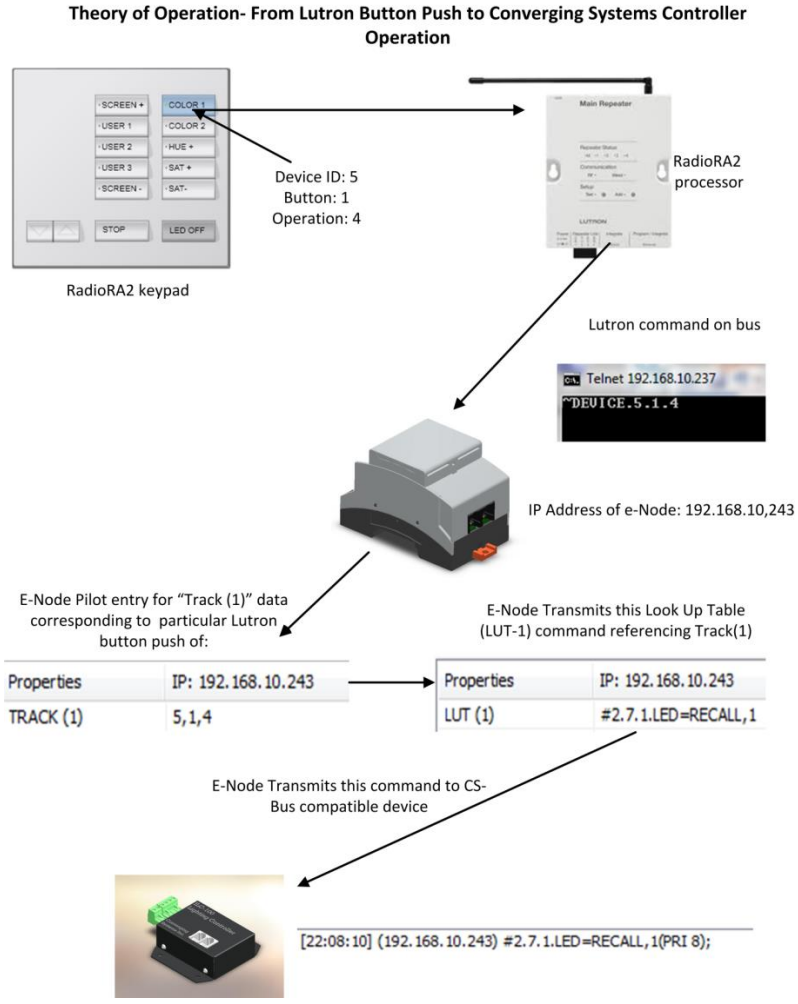

Figure 3

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SYSTEM ARCHITECTURE AND REQUIRED COMPONENTS

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

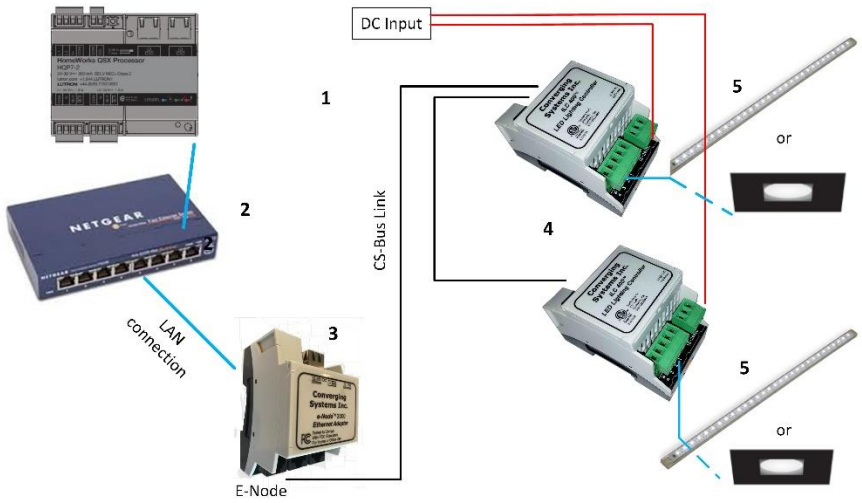

Figure 4

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 system = 254

2. BILL OF MATERIALS (for Lutron)

Table 3

#	Device	Manufacturer	Part Number	Protocol	Connector Type	Notes
1	Lutron Processor (RR2, RRSelect, 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), or CVM	CS-Bus protocol	RJ-25 for CS-Bus communication	Must terminate beginning and end of bus with 120-ohm

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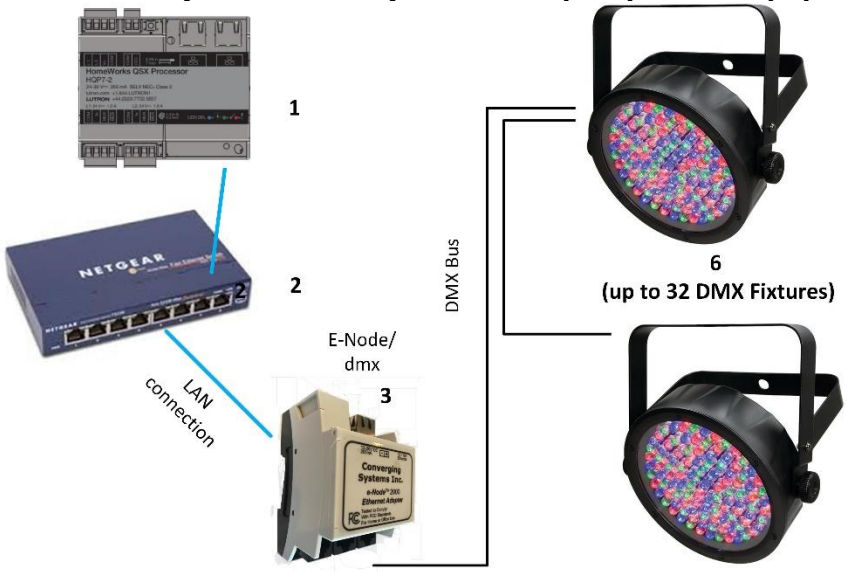
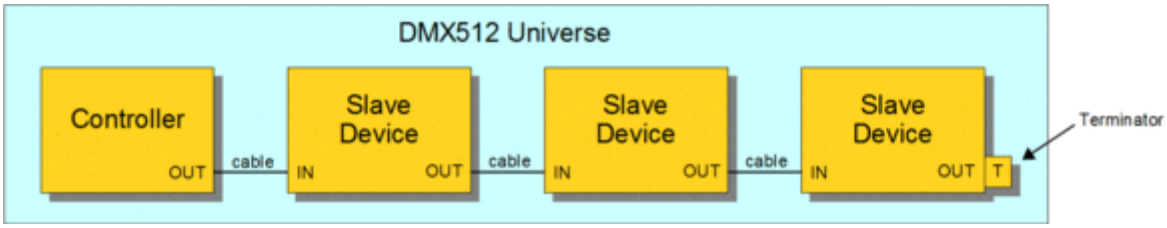
						resister on pins 3/4
5	Flexible Linear Lighting (FLLA) RGB or RGBW luminaries	Converging Systems	FLLA-RGB-xxx FLLA-RGBW-xxx		3-color 4 pin 4-color 5 pin 1-color 4 pin	

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 = 400 meters (1,300feet)
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)

Table 4

#	Device	Manufacturer	Part Number	Protocol	Connector Type	Notes

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1	Lutron Processor (RR2, RRSelect, HWQS, HWI)	Lutron	Various	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

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

STEP 1. Lutron Communication Setup

Step	Overview	Detail
1a	Establish a **Username** with **Password** within Lutron	Program into your Lutron processor a ***dedicated*** **Username** and **Password** for a socket that can be dedicated to the Converging Systems' interface. Ethernet sockets cannot be shared, so if you wish to have a Lutron app and the Converging System application running, it is necessary to establish two separate sockets (with two different username/password pairs) for these two operations to occur.

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<table>
<tr>
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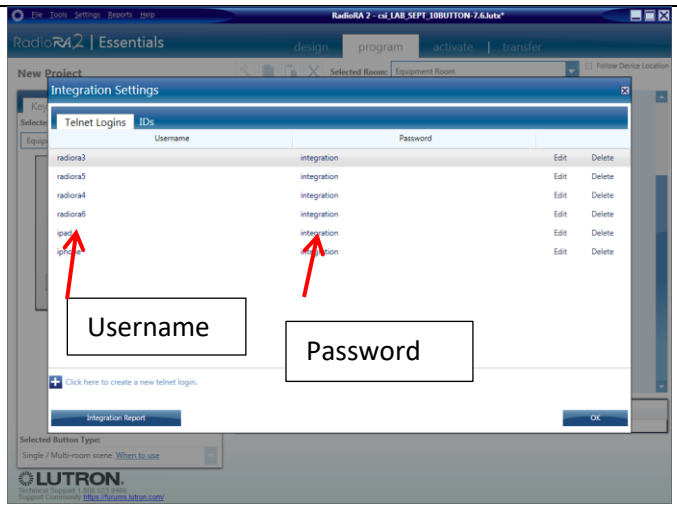
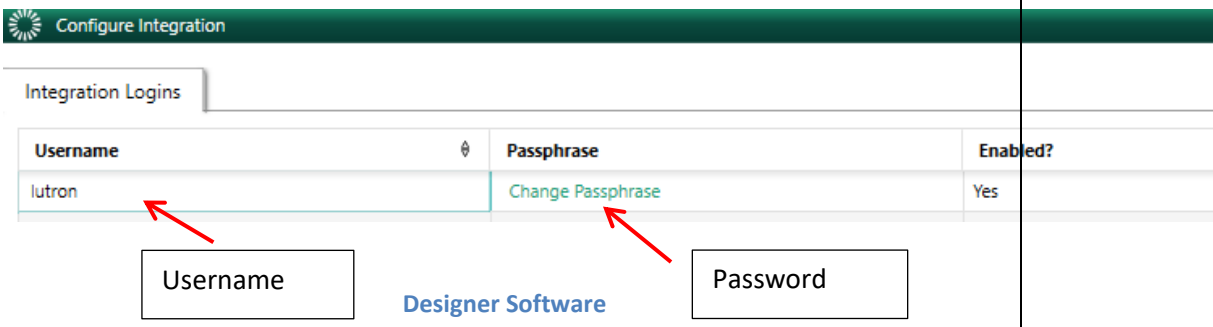
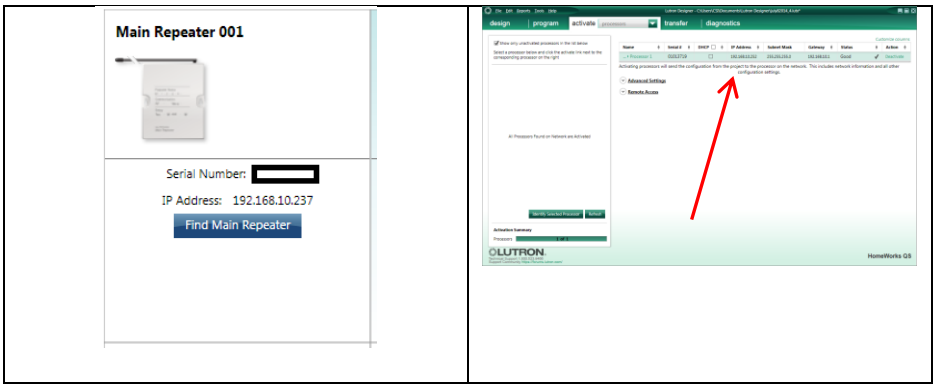
<td>


Essentials or Inclusive Software



Designer Software

Either write down these credentials or print off the Spreadsheet in Appendix 8 for use later on in these instructions.
</td>
</tr>
<tr>
<td>1b</td>
<td>Take note of the IP address for the Lutron processor</td>
<td>
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.
</td>
</tr>
</table>

Perform any necessary Lutron button push tweaks and gather any required data within the Lutron programming software.

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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 various tables in Appendix 1 and described in further detail within that Appendix. **It is important to understand that depending upon the Lutron platform, button operation (i.e., Press, Release, Double Tap and Hold) may behave differently. It is imperative that whatever the button is programmed to generate as an output string within Lutron is precisely matched with the same alias for that operation with the Converging Systems SLIM programming table.**

IMPORTANT

Converging Systems' connected devices can only be programmed to respond to the identical output command(s) generated by Lutron. Specifically, if a Button Press is programmed within Lutron, a similar "Button Press type" alias needs to be programmed within the e-Node's SLIM Table--if a Double Tap is programmed within SLIM, a matching Double Tap has to programmed within 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 Lutron Apps 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.

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STEP 2. Enter Lutron Connectivity Credentials (from Step #1 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®
  - RadioRA3® (only with e-Node 4000/4100)
  - HomeWorks QS
  - HomeWorks QSX (only with e-Node 4000/4100)
  - HomeWorks Illumination (HWI) (only with e-Node 2000/2100)
  - Grafix Eye®QS, and
  - Grafix 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 within that device (whether physical or virtual /dummy) that when selected will trigger any (programmed) Converging Systems' lighting or motor controller operation[2].

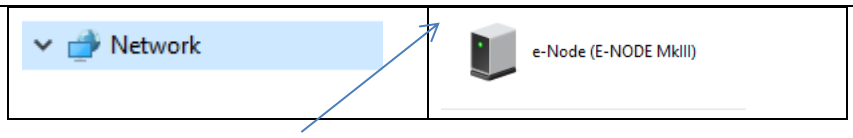
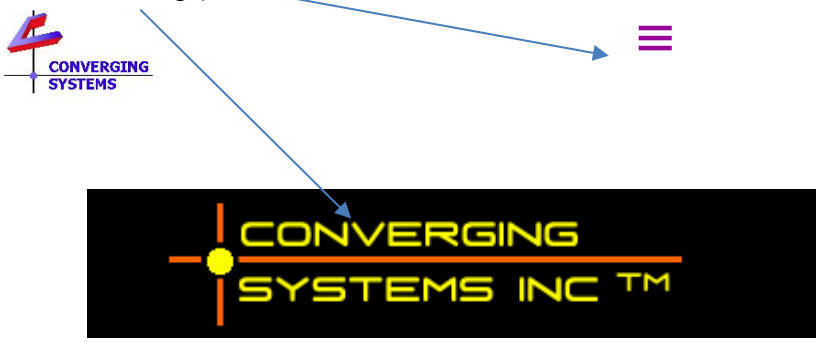
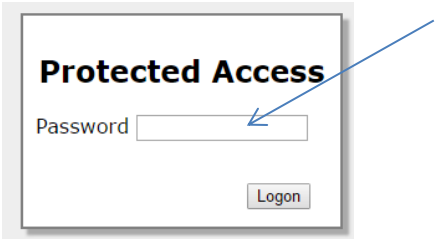
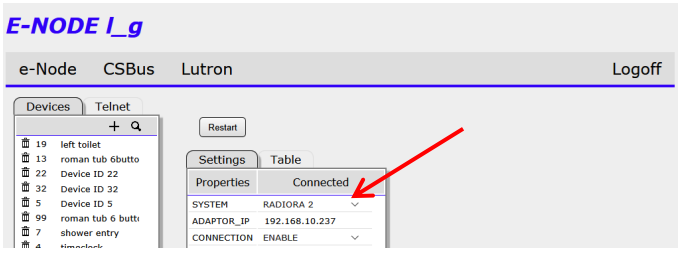
  Note: Previously Lutron Device IDs were only available to the Lutron programmer who had access to the specific Lutron programming tool and was able to connect that tool to the system and generate an Integration Report.
- The setting of all standard e-Node commissioning steps such as setting static IP addresses, setting individual Telnet (or alternative IP communication) 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 MII/MIV 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
2a	Open Web Pilot Application	-Power on e-Node and connect its Ethernet cable to your network 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*

		 -Double click on the icon representing your newly discovered e-Node and the Web Pilot Home Page will appear. Depending upon your version of embedded webpages, click on the menu button or the black and yellow Converging Systems logo (not the RED and BLUE logo)  -Next you may 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 within the e-Node legacy manual 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.
2b	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	-Select the **Lutron** tab. For example, for a RadioRA2 system, select **RADIORA2** (or whatever platform you have that is supported). 

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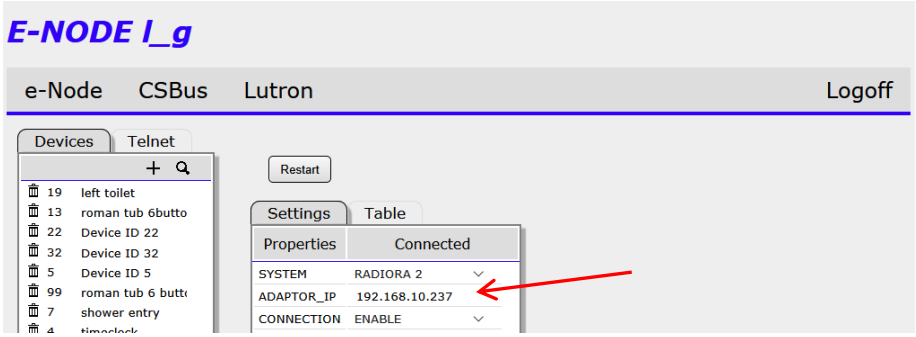
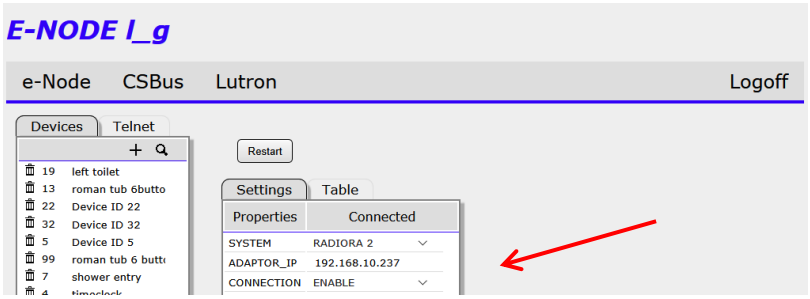
	this Integration Note).	-Set the **ADAPTOR_IP** address for that of the Lutron processor (which address can be obtained using the Lutron Essentials/Inclusive/Designer software setup utility package).  -Enable the **CONNECTION** tab (representing the Telnet or alternative IP client function) to **ENABLE** to turn on the communication Client function within e-Node to enable communication with the Lutron processor.  **Note**: The e-Node 2000/2100 series supports the Telnet ***Client*** communications (for communication with most Lutron processors) only. The e-Node 4000/4100 supports the LEAP protocol (for HWQSX devices) as well as Telnet ***Server*** communications (for communication to other third-party Control systems). Both the Client and the Service protocols can be used concurrently. For the purpose of this Integration Note, we are only dealing with the Telnet Client settings available under the **Lutron tab**.
2c	Enter LOGIN and PASSWORD credentials	-Finally enter an applicable **LOGIN** and **PASSWORD** entry for an available socket 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 App.

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		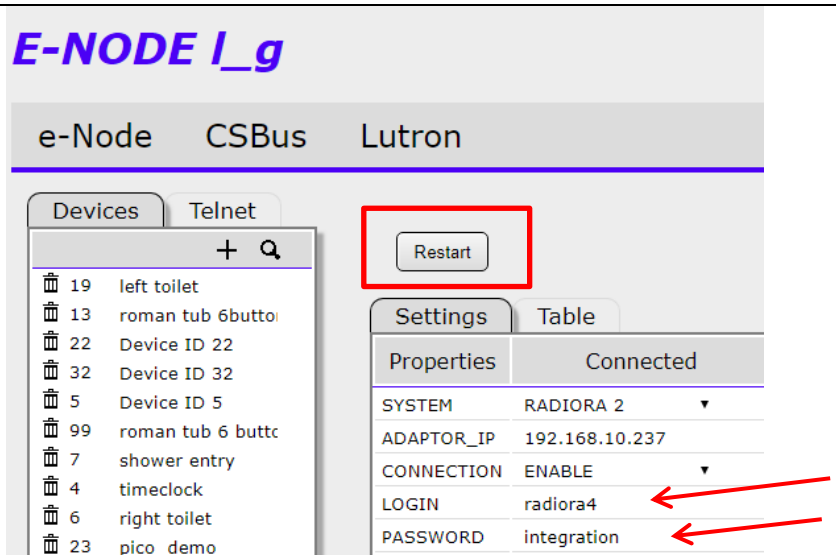
2d	Restart the e-Node **only** if you have made any IP address or login/password changes to the LUTRON tab	Press the **Restart** buttons within Web Pilot to restart the e-Node and to save recently changed programmed values.

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Step 3. Lutron UI Pre-Planning

3a. Typical User Interfaces

The general goal of this section is to describe how various Lutron UI controls (keypads, apps, timeclock events and occupancy sensor triggers) can be programmed to control virtually any lighting or motor control action available within the Converging Systems' family of products. The next section (Step 4) will be where the actual programming into the e-Node/xxx's web application occurs to enable the control. The Examples section will also provide some greater detail for a number of interesting cases.

See the chart below for available Lutron controls and select the type (and hyperlink) for more information.

Table 5

Lutron UI Control	Section
seeTouch and other hardware-oriented keypads and interfaces	Mode 1
Pico and Visor Remotes	Mode 2
Occupancy Sensor Triggers	Mode 3
Timeclock Events	Mode 4
Lutron App control	Mode 5

Mode 1. Connectivity with Keypads

This is the most basic and the easiest method of control of CSI products and is the recommended first step for Lutron connectivity. Control is possible with any physical button on any hardware keypad (except for pure Class 1 dimmer devices). Depending upon the Lutron platform, buttons can be programmed to respond to a **P**ress, **R**elease, **D**ouble **T**ap or Extended **H**old. But these features must be programmed using the Lutron commissioning software in order to be used for control possibilities documented within this Integration Note.

Note: If a specific operation is impossible within the targeted Lutron platform, then that function cannot be made to operate with Converging Systems' products (consult your Lutron instruction manuals for features available within your Lutron commissioning software).

There are three possibilities for how these buttons can be programmed. Once a Type is selected, follow the instructions under "Directions" below for relevant Lutron programming information and/or Converging Systems information

.

Table 6

Type	Target equipment to be controlled	Directions
Type A	Control of only Lutron equipment.	**Lutron Control** -Program as is customary for any Lutron load specified (see Lutron documentation for full instructions here) **Converging Systems Control** -N/A here
Type B	Control **only** of CSI equipment	**Lutron Control** No programming of loads, but check to make sure that (i) Lutron

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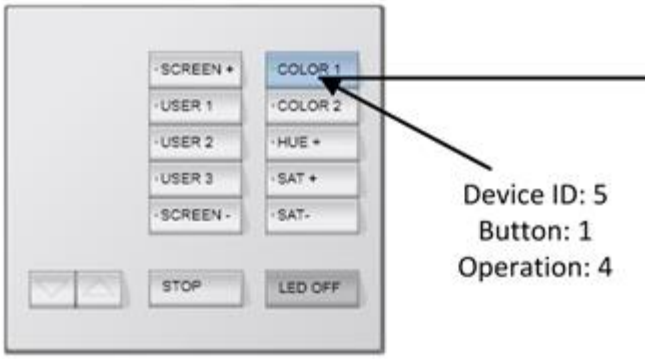
		hardware has been activated, and (ii) the targeted button type is compatible with your needs-- see Appendix 1. **Converging Systems Control** -Follow the steps in sub-step 2a below to prepare for actual programming in Step 4.
Type C	Control of Lutron equipment **and** control of CSI equipment with the same button operation.	**Lutron Control** -Program as is customary for any Lutron load specified (see Lutron documentation for full instructions here). **Converging Systems Control** -Follow the steps in sub-step 2a below to prepare for actual programming in Step 4

For detailed information regarding the preparation required for control of Converging Systems hardware, follow applicable step(s).

Sub-step	Step	Detail (see Example 1 for more detail)
M1a	Determine if you have one or more existing buttons on ***already 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.

	Integ. ID	Button Number	Operation Type
RR2/QS	**5** (or similar smaller #)	**1** (top button)	**4** (for a release)
QSX	**4224** (or similar larger #)	**1** (top button)	**4** (for a release)

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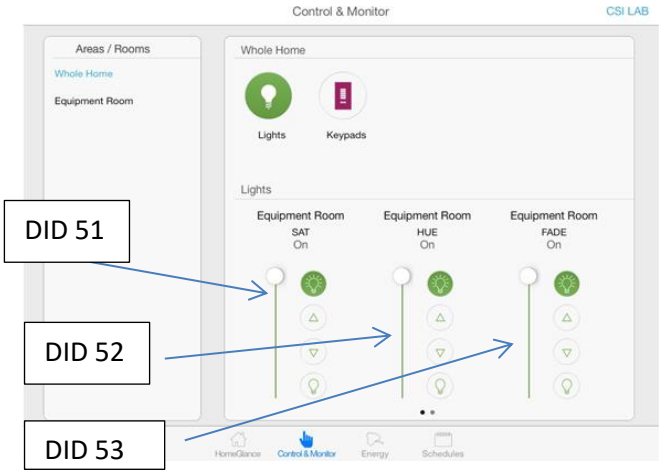
		See Appendix 1, Section 1 for more detailed information on button operations/output (i.e., "3", "4", etc.) generated for each button type. Also See Appendix 1, Section 2 for a cheat sheet of all Lutron Button ID numbers. The latest cheat sheet for Lutron Button ID can be found here http://www.convergingsystems.com/xby.html -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.
M1b	Proceed o Step 4 if no other control devices are required.	
~~M1b~~	~~Complete Lutron programming (only if more sliders are required).~~	~~For examples, see Example 3 See Step 4~~
2b	Determine if you want to generate more interesting customized sliders for the control of these type of features: -Hue Slider -Saturation Slider -Red Slider -Green Slider -Blue Slider -CCT (color temp) -SUN (circadian lighting) -etc.	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. An example here would be to create sliders in the Lutron App 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

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<table>
<tr><td></td><td></td><td>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><td>Dummy Button</td><td>Button Number</td></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>Proceed o Step 4 if no other control devices are required.</td><td>For examples, see Example 3</td></tr>
</table>

Mode 2: Pico and Visor Remote

This is a derivative case to Mode 1 and can be used in the same general manner to control CSI products. Although these UI devices still have buttons that behave identically to the behavior available with Mode 1 controls, there may be reduced functionality with respect to some button types available (again see the Lutron commissioning software for options available). Follow the directions in Mode 1 with special attention to any applicable reduced button functionality (as described above).

Mode 3: Occupancy Sensor Triggers

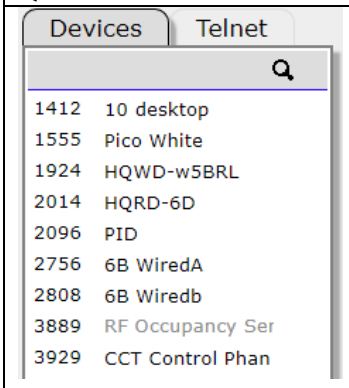
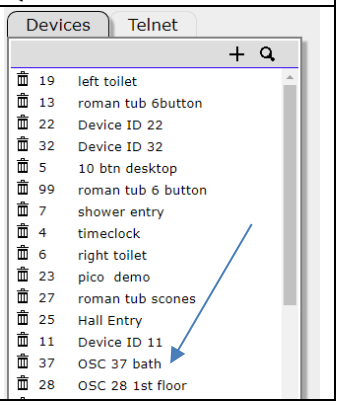
This is a derivative case to Mode 1 and can be used in the same general manner to control CSI products. Although these UI devices do not have buttons, their triggers are similar to a traditional button push. See Table below for details and then see sub-step M3a below for more information on programming preparations to link these types of triggers to Converging Systems' actions.

Table 7

Occupancy Sensor	DID	Button Number	Occupied	Unoccupied
Occupancy Sensor	Available through the e-Node/xxx Lutron/Devices window	"2"	Yields a "3" or a Button press	Yields a "4" or a Button release

For detailed information regarding the preparation required for control of Converging Systems hardware, follow applicable step(s).

Sub-step	Step	Detail

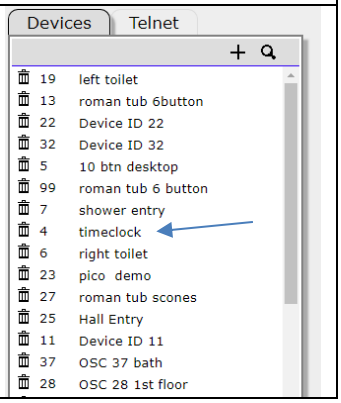
<table>
<tr><td>M3a</td><td>Determine what Occupancy Sensor event(s) that you wish to use to trigger a CSI event.</td><td>Within the e-Node/xxx Lutron/Devices window, the device ID for various pre-programmed Trigger Events will populate. You can use that information to program CSI actions in Step 4.
<table><tr><td>Qsx</td><td>Qs and RadioRA2</td></tr><tr><td> 
</td><td> 
</td></tr></table>
For example, the top button on this keypad has the following data parameters associated with it.
<table><tr><th></th><th>Integ. ID</th><th>Button Number</th><th>Operation Type</th></tr><tr><td>RR2 QS</td><td>37</td><td>2 (default)</td><td>3 (for occupied)</td></tr><tr><td>QSX</td><td>3889</td><td>2 (default)</td><td>3 (for occupied)</td></tr></table>
-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.</td></tr>
<tr><td>M3b</td><td>Proceed o Step 4 if no other control devices are required.</td><td></td></tr>
</table>

Mode 4: Timeclock Triggers

This is a derivative case to Mode 1/Mode 3 and can be used in the same general manner to control CSI products. Although these UI devices do not have buttons, their triggers are similar to a traditional button push. See Table below for details.

Table 8

Occupancy Sensor	DID	Button Number	Trigger
TimeClock Event	Available through the e-Node/xxx Lutron/Devices window	5	1st timeclock event ==1 2nd timeclock event==2, etc.

<table>
<tr><th>SubStep</th><th>Step</th><th>Detail</th></tr>
<tr><td>M4a</td><td>Determine what TimeClock events that you wish to use to trigger a CSI event.</td><td>Within the e-node/xxx Lutron/Devices window, coding for triggered events will appear. You can use that information to program CSI action in Step 4.
<table>
<tr><td>Qsx</td><td>Qs and RadioRA2</td></tr>
<tr><td></td><td> 
</td></tr>
</table>
For example, the top button on this keypad has the following data parameters associated with it.
<table>
<tr><th></th><th>Integ. ID</th><th>Button Number</th><th>Operation Type</th></tr>
<tr><td rowspan="2">RR2 & QS</td><td>4</td><td>5 (default)</td><td>1 (Event 1 triggered</td></tr>
<tr><td>4</td><td>5(default)</td><td>2 (Event 2 triggered)</td></tr>
<tr><td rowspan="2">QSX</td><td>2004</td><td>5 (default)</td><td>1 (Event 1 triggered</td></tr>
<tr><td>2004</td><td>5(default)</td><td>2 (Event 2 triggered)</td></tr>
</table>
-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.</td></tr>
<tr><td>M4b</td><td>Proceed o Step 4 if no other control devices are required.</td><td></td></tr>
</table>

Mode 5. Lutron App Control

Lutron has made available compatible apps for both iOS and Android mobile devices. Depending upon the specific platform, a specific Lutron app can be used to control functions within Converging Systems' platforms.

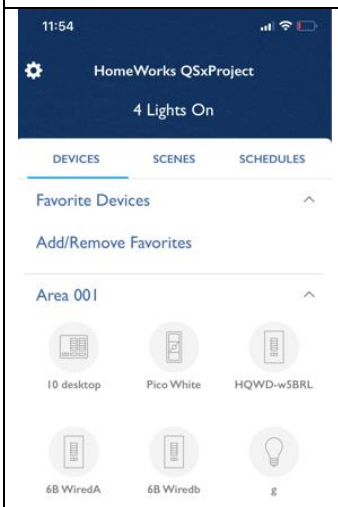
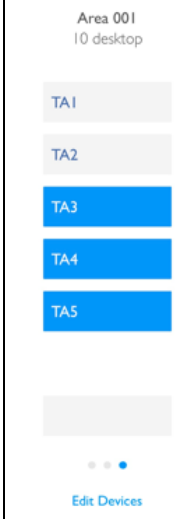
See the list below for applicable app that should be utilized per Lutron platform:

Table 9

Compatible with CSI Platform	Lutron Hardware Platform	Lutron Connect App	Lutron Ap
✗	Caséta		✓
✓	Radio RA Select		✓
✓	RadioRA2	✓	
✓	Homeworks QS	✓	

Within each app are various types of UI controls from can be used to control CSI functions ranging from simple mirrors of existing Lutron hardware devices (i.e., seeTouch and Hybrid keypads but not standard dimmers) as well as dealer created phantom load(s) (and their Lutron auto-generated UI). See the listing below for these various types of UI control.

Table 10

Main User Interface	Control **LKP**	Control **LR**	Control **PL***
Main UI Screen	Desktop Control	Pico Control	Phantom Load
			

- QSX only

As with the above Mode 1-4 (described above), the same three **Types** of control are available

Table 11

Type	Description	Reference/Link
A	control of only Lutron devices	Type A Environment
B	control only of a CSI device	Type B Environment
C	concurrent control from one UI button of (i) a Lutron activity and a (ii) CSI activity.	Type C Environment

The following section details the capabilities that exist for each of these Control Types

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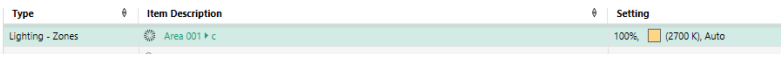
Type 1 Environment - Using a "LKP" control to color pick a Lutron load (Ketra) (See Example 1)

Note for non-QSX environments just pick an Intensity of a load instead.

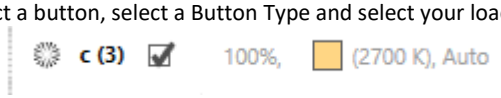
Sub-Step	Step	Detail
M5-T1a	Program in a Ketra load to expose its color picker	-Select a button, select a Button Type and select your load. Select **CCT** and **INT** for that load.  

Type 2a Environment- Using a "LKP" or "LR" control to control a Lutron Device and a CSI Device (w/o color pickers or Ketra "KT" UI screen) (See Example 1)

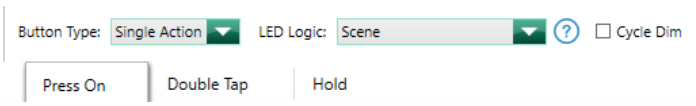
Sub-Step	Step	Detail
M5-T2a1	Program an available button on a Lutron keypad as normal for your supported Lutron load within the Lutron commissioning software.	-Select a button, select a Button Type and select your load.  
M5-T2a2	Wait until Step 4 to link a CSI action to the same button	

	press programmed in sub-step M5-T2a1 above	

Type 2b Environment- Using a "KT" control to color pick a Lutron Device and a "PL" control to color pick a CSI Device (see Phantom Load Insert for more information)

Sub-Step	Step	Detail
M5-T2b1	Program an available button on a Lutron keypad as normal for your supported Lutron load within the Lutron commissioning software.	-Select a button, select a Button Type and select your load. 
5T-2b2	Wait until Step 4 to link a CSI action to the same button press programmed in sub-step 5T2b1 above	

Type 3a Environment- Using any "LKP" or "LR" to control any CSI Device.

Sub-Step	Step	Detail
M5-T2a1	Program an available button on a Lutron keypad for (i) Button Operation and (ii) if appliable LED Logic.	-Since you are not connecting the CSI load within the Lutron commissioning software, you only have to make sure the Button Type (as appropriate) and the LED Logic if available with your platform) is set properly.   The load connection of a specific button will only be programmed outside of Lutron commissioning software (see next step).
M5-T3a2	Wait until Step 4 to link a CSI action to the **same button** press programmed in sub-step M5-T2a 1 above	

Type 3b Environment- Using a "PL" control to color pick a CSI Device (see Phantom Loads insert below). (See Example 2)

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Sub-Step	Step	Detail
M5-T3b1	Program an available button on a Lutron keypad as normal for your supported Lutron load within the Lutron commissioning software.	-With phantom loads, there is no programming whatsoever required other than the establishment of the relevant Phantom Loads below.
M5-T3b2	Wait until Step 4 to link a CSI action to the **same button** press programmed in sub-step M5-T3b1 above	

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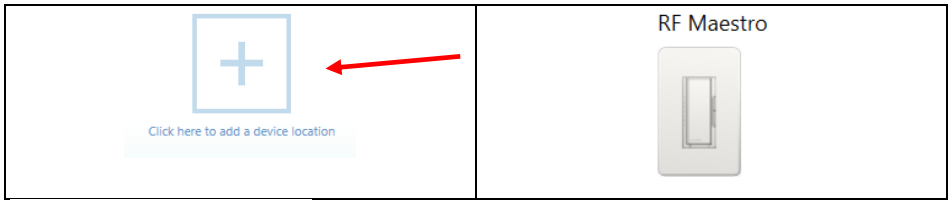
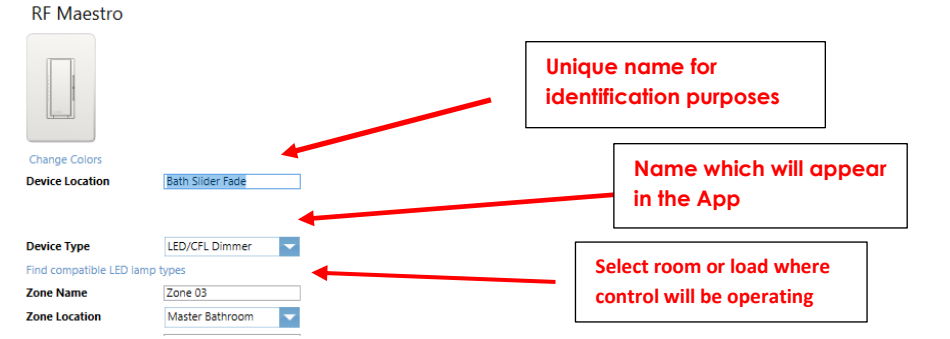
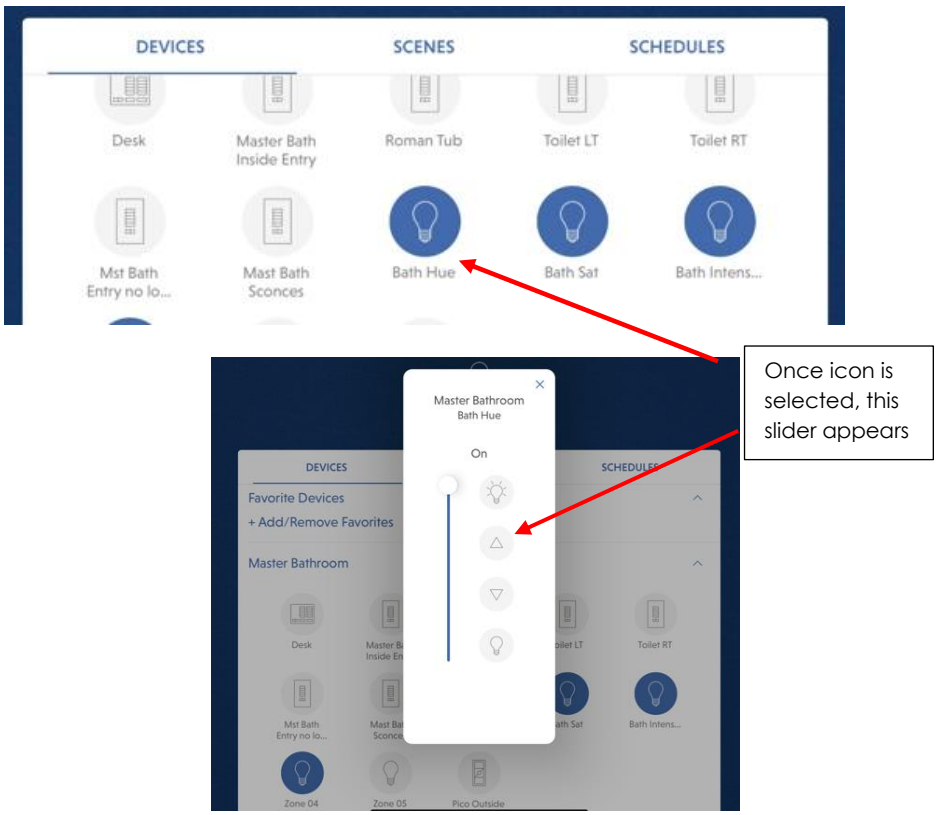
3b. Information on how to create a Phantom Load within Lutron Commissioning software.

There are occasions where the control of variable controls (dimmers/sliders for Color Temperature/CCT, Intensity/INT, Hue, Saturation, Circadian levels) on CSI equipment is required but an applicable Lutron UI populated within the Lutron iOS or Android Apps does not properly support these Converging Systems' features (or at least presently). Accordingly, the use of Phantom loads (linked to one or more devices) can be used to accomplish this goal. Please refer to the applicable section below for your particular platform.

(i) Lutron Essentials/Inclusive and RadioRA 2

Table 12
Phantom Loads with Essentials/Inclusive (for RadioRa2)

Step	Overview	Detail
3b(i)1	Create new Phantom Loads (new phantom Zone Names)	 -Open **design** and add one (new) **device location** for each Phantom Load desired. A useful load to add would be a **RF Maestro** although a number of other (phantom) devices could be used as well.   a. If you want to add 3 sliders for a **Hue/Saturation/Brightness** set of GUI Sliders, you would create **3** phantom loads (one for Hue/one for Saturation/and one for Brightness) which will be named and programmed in step "c" below. b. If you want to add a **Color Temperature** & **Intensity** set of GUI Sliders, you would create **2** phantom loads (one for CCT/and one for Brightness) which will be named and programmed in step "c" below. c. After you have added required loads as described above, assign -a unique name within the **Device Location** field, and -an identifiable/useful name for **Zone Name** (that will subsequently appear within the Lutron app). -the **Device Type** to "LED/CFL Dimmer"

		Note: Other entries are generally irrelevant here.
3b(i)2	Assign those Phantom Loads to a newly created Phantom Fixture	No additional programming here is required for this platform for the connection between then new Phantom Loads and various Converging Systems controllers will be set up **entirely** within the e-Node's SLIM application (see Step 4).
3b(i)3	Test that these phantom loads (**Zone Names**) appear within the applicable Lutron app.	These new loads can now be used to control the variable type controls (i.e., Hue, Saturation, Brightness, Color Temperature (CCT), Circadian Levels (SUN) as well as standard type controls such are Red, Green, Blue, White).  **Note**: they will not actually do anything other than appear and change colors until linked to CSI actions in Step 4.
3b(i)4	Transfer Log	Please note: Phantom loads will generate error messages but that is OK 9:43:00 PM: Unable to transfer to Master Bathroom > Bath Slider Hue. The device is not activated. 9:43:00 PM: Unable to transfer to Master Bathroom > Bath Slider Sat. The device is not activated. 9:43:00 PM: Unable to transfer to Master Bathroom > Bath Slider Fade. The device is not activated.

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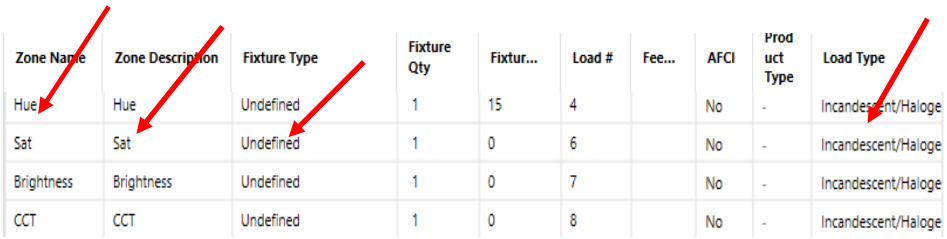
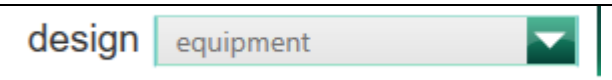
(ii) Lutron Designer (for QS)

Table 13 Phantom Loads with Designer (for QS/QSX)

Step	Overview	Detail
3b(ii)1	Create new Phantom Loads (new phantom Zone Names)	 - -Open **design/loads** and add one new **Zone Name** for each Phantom Load desired. a. If you wanted to add 3 sliders for a **Hue/Saturation/Brightness** set of GUI Sliders, you would create **3** phantom loads (one for Hue, one for Saturation/and one for Brightness), and name then with a useful name (under **Zone Name**) that could be used to control them within the Lutron app, and/or. b. If you wanted to add a **Color Temperature** & **Intensity set** of GUI Sliders, you would create **2** phantom loads (one for CCT/and one for Brightness or Intensity), and again name them with a useful name (under **Zone Name**) that could be used to control them within the Lutron app. -Typically, when adding loads (i.e., **Zone Names),** add a useful name here (i.e., "Hue") for identification within the Lutron app, leave the **Fixture Type** "Undefined" and for **Load Type** pick "Incandescent/Halogen." And finally, the **Zone Description** is just for added information if desired.  Zone Name / Zone Description / Fixture Type / Fixture Qty / Fixtur... / Load # / Fee... / AFCI / Product Type / Load Type Hue / Hue / Undefined / 1 / 15 / 4 / / No / - / Incandescent/Haloge Sat / Sat / Undefined / 1 / 0 / 6 / / No / - / Incandescent/Haloge Brightness / Brightness / Undefined / 1 / 0 / 7 / / No / - / Incandescent/Haloge CCT / CCT / Undefined / 1 / 0 / 8 / / No / - / Incandescent/Haloge
3b(ii)2	Assign those Phantom Loads to a newly created Phantom Fixture	 -Open **design/ equipment** and add a DPM Adaptive, for example. Many other "phantom loads" can be used but this is a good example of a load that accommodate multiple phantom loads.  -Expand the **+** mark in front of the phantom load and assign **Zone Names** above to each available (not-yet Assigned) entry.

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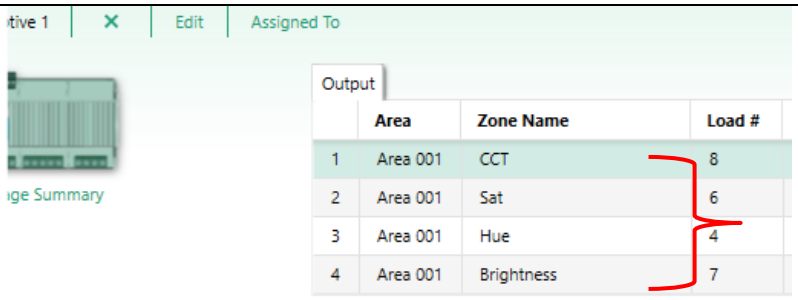
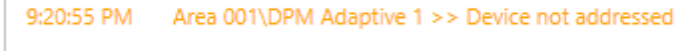
		
3b(ii)3	Test that these phantom loads (Zone Names) appear within the applicable Lutron app.	These new loads can now be used to control the variable type controls (i.e., Hue, Saturation, Brightness, Color Temperature (CCT), Circadian Levels (SUN) as well as standard type controls such are Red, Green, Blue, White).  **Note**: they will not actually do anything other than appear and change colors until linked to CSI actions in Step 4.
3b(ii)4	Transfer Log	 Please note: Phantom devices to which phantom loads are connected will generate error messages but that is OK

STEP 4. Enter Connectivity Data to Link Lutron button operations to Converging Systems operation

You have 255 data fields within our **S**mart **L**utron **I**nterface **M**onitor (**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, Double Tap, 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	Obtain Device IDs (**DID**)	**If you have a Type A Platform (QSX), proceed to Type A below, otherwise go to the Type B Platform Controller section below in this same step.** For Type B Platform Controllers (QS and RR2) 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 4b1** below. -If you wish to simply gather all relevant **DID** information from a Lutron Integration Report, refer to **Step 4b2** below.
4b1	**Spyglass** Method (For Type B Platform Controllers only) Note: this method works with RA2, Select, HWQS. For	-Make sure that (i) you have followed steps in **Steps 3a/3b/3c** above connecting the targeted Lutron processor to your e-Node/xxx, and (ii) your Lutron system is powered on and on the same subnet as your e-Node/xxx, and (iii) you have supplied the correct username and password. -Provided these steps are followed the first feedback available will be the entry "**Connected**." -Provided these steps are followed, then all available devices seen by a Type B Platform processor can now be discovered. Once discovered, the Device ID ("**ID**") number for the specific device along with its Lutron alias name will appear. -Select the **Lutron/Device** tab. You should see the Lutron Auto-Discovery Field on the left as shown below.

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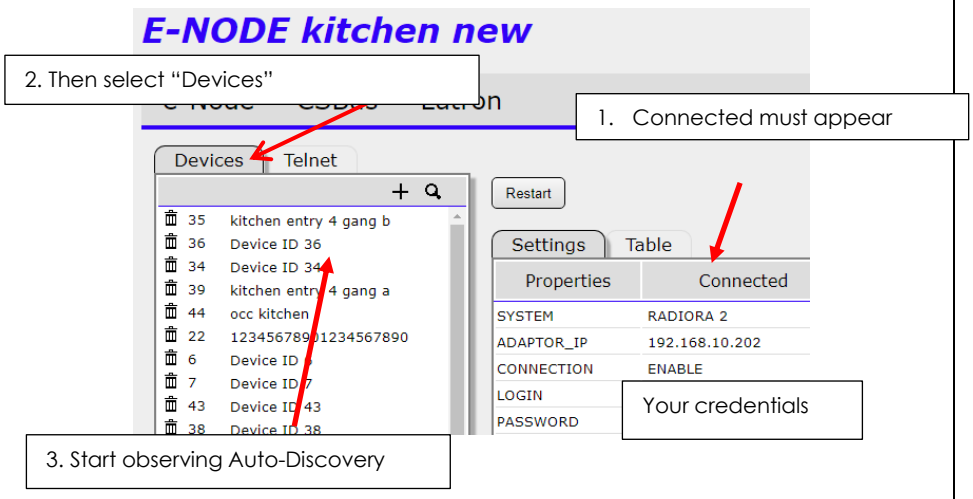
	HWI see Appendix 11	 -Now after pressing a single button on any Lutron connected UI device (that has already been activated within the Lutron commissioning software) its **DID** number and alias name will auto-populate. Continue this process for all activated UI devices (i.e., including triggering Occupancy Sensors and all timeclock events). Once your Auto-Discovery window is populated with all devices, proceed to the next step. **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 a*ny button or time clock event eas*ily 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 4b2** 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.
4b2	**Integration Report Method** - Manual Entry (For Type B Platform controllers only)	-Open Lutron software -Generate an Integration Settings Report by selecting **Settings/Integration** (in Essentials or Inclusive) or **Tools/Configure Integration** (in Designer). Then select the **ID** tab and write down for future reference all the relevant IDs (DID) listed next to checked or enabled entries.

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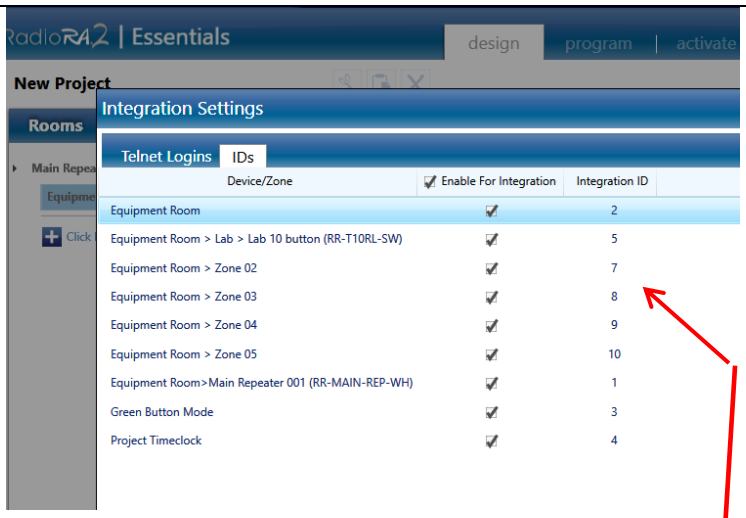
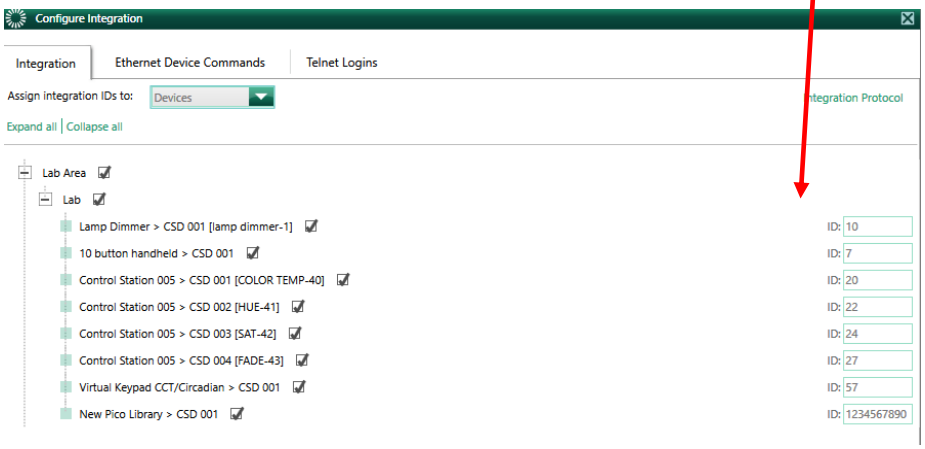
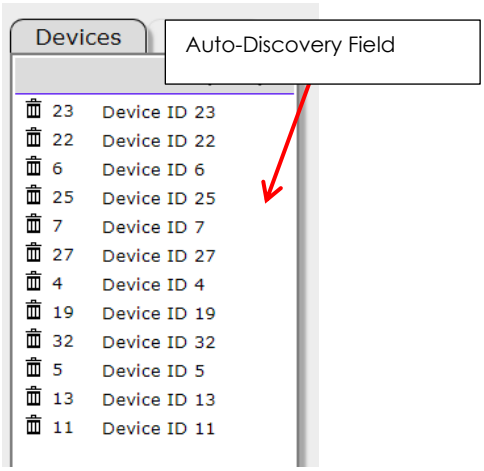




-Select the **Lutron/Devices** tab. You will see the Lutron Auto-Discovery Field as shown below.



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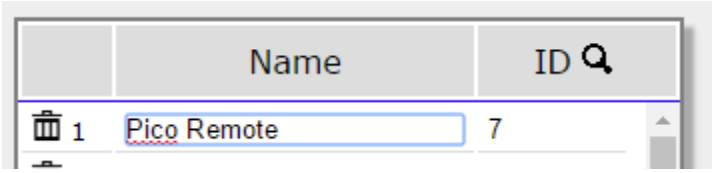
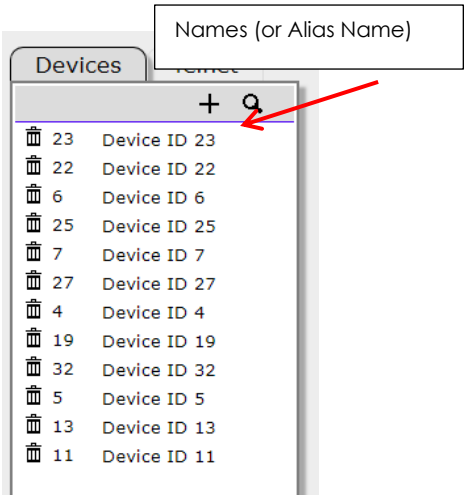
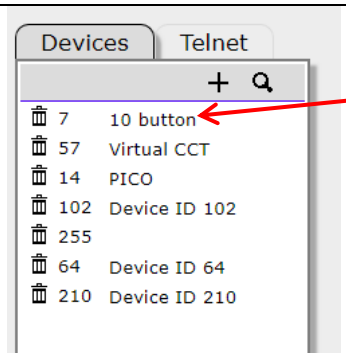
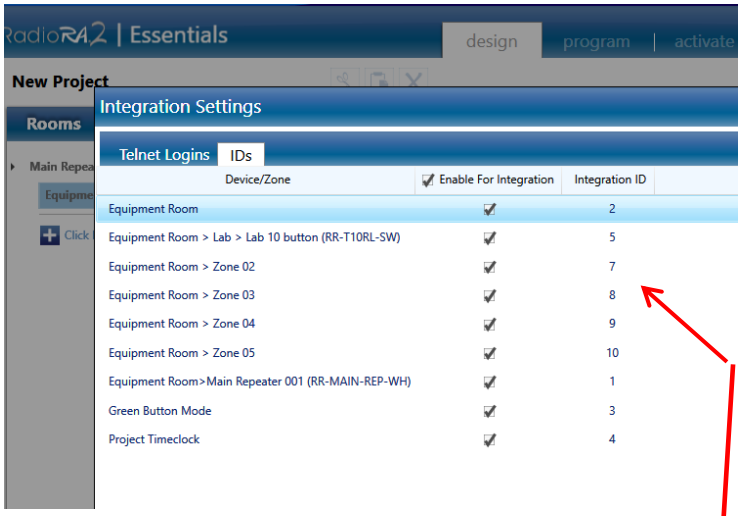
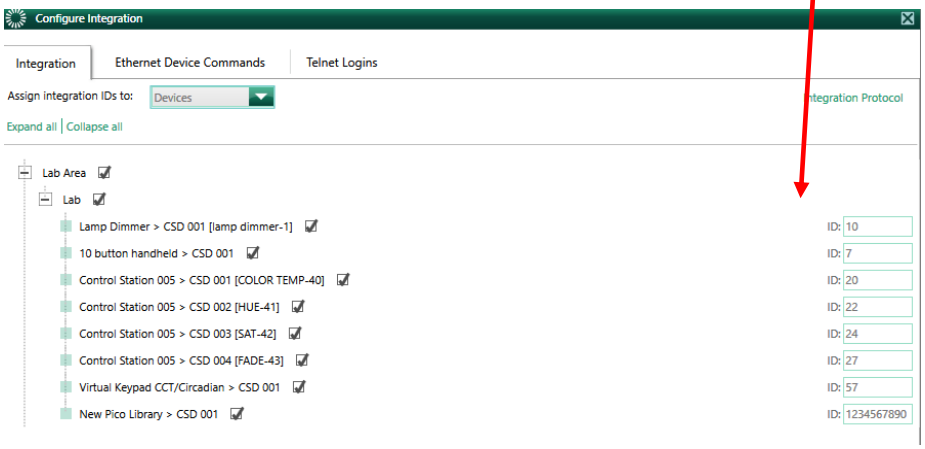
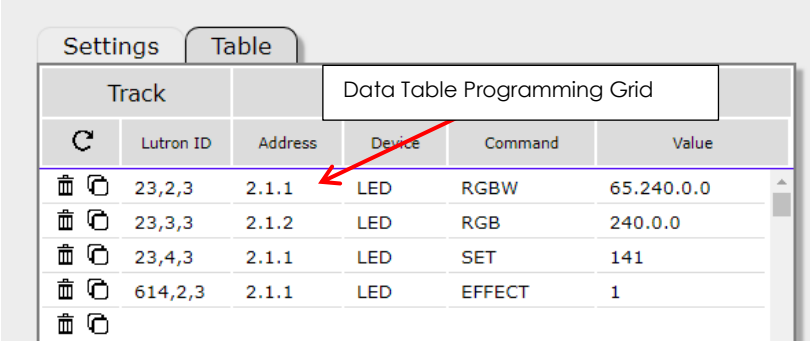
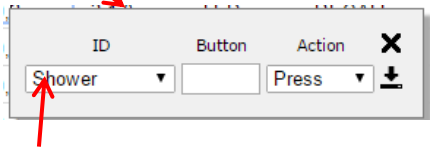
		-Next, enter on the first available line, a useful Name for the interface under "Name" and the exact numeral of that **DID** under ID. **Example**. In this case "Pico Remote" has been entered and its corresponding Device ID of 7 appears (which was either auto-discovered or manually entered from the Integration Settings/ID report). 
4c	Customizing Alias Names	-Select the **Lutron/Devices** tab. You will see the Lutron Auto-Discovery Field as shown below.  -Next, in order to assist in programming within the SLIM Table, rename any generic or poorly defined entry above to an applicable name (with 20 or fewer alpha or numeric character with no special characters in the new name). Example. In the example below the imported device entitled "Device ID 7" has been renamed to **10 Button.**

		
4d	Determining ID number (for future use with SLIM programming)	-Open Lutron software -Generate an Integration Settings Report by selecting **Settings/Integration** (in Essentials or Inclusive) or **Tools/Configure Integration** (in Designer). Then select the **ID** tab and write down for future reference all the relevant IDs (DID) listed next to checked or enabled entries.   -

4e	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.
4f	Launch the **Lutron Data Table Programming Grid**	-Select **Lutron/Table** -- Immediately the Data Table Programming Grid will appear. 
4f	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. **Step4g** below describes how to enter Converging systems resulting Motor or	-Right click on the field of the first (or subsequent unused) **ROW** under Lutron ID. This is the **Lutron ID Data Field**.  - A pop-up will appear  -Any newly programmed alias names (referenced in Step4c) or default imported name 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. -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.

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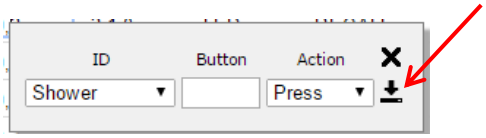
	Lighting operations. ***Translation—Here you are programming a particular button or trigger action from Lutron to activate a particular Motor or Lighting operation with Converging Systems products.***	-Within the **Action Data Field**, select from the available choices for type of button or UI action 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 setup 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 (above) and the popup box will disappear and you can start again or simply move on.

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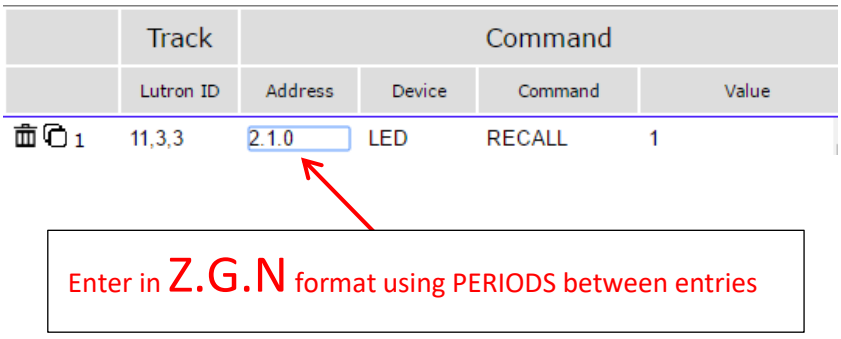
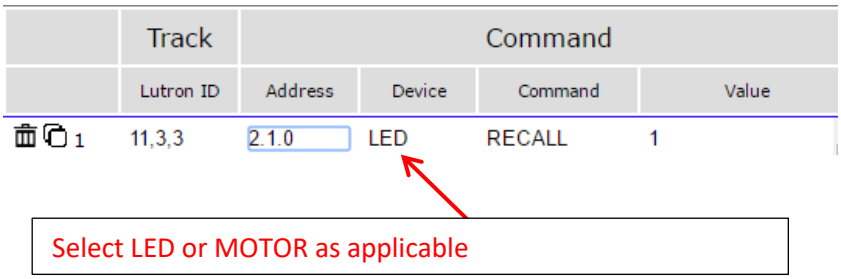
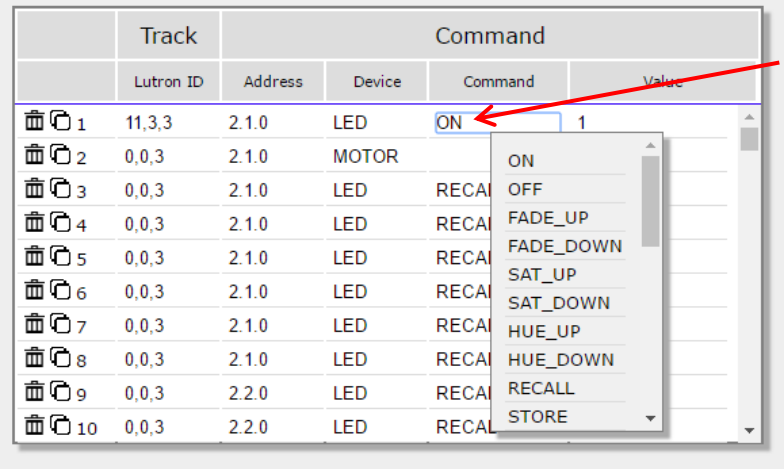
4g	Enter Converging Systems Motor or Lighting Resulting Operations.	-Left click on the field of the first (or subsequent) **ROW** under **Address**. This is the Converging Systems controller **Address Data Field**. **-**Enter the specific Address (**Z.G.N**) for the controller that you wish to link operations 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 event 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.

		 - 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 4f** and **Step 4g** until completed. Refer to the Example Section for more information here.
4h	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. -To Sort the data table numerically—Select the icon within the data table and the entire table will automatically sort. **Note**: Depending upon which e-Node platform you are using, some or all of these features specified within this step **may not** be available
4i	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.

STEP 5. 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.

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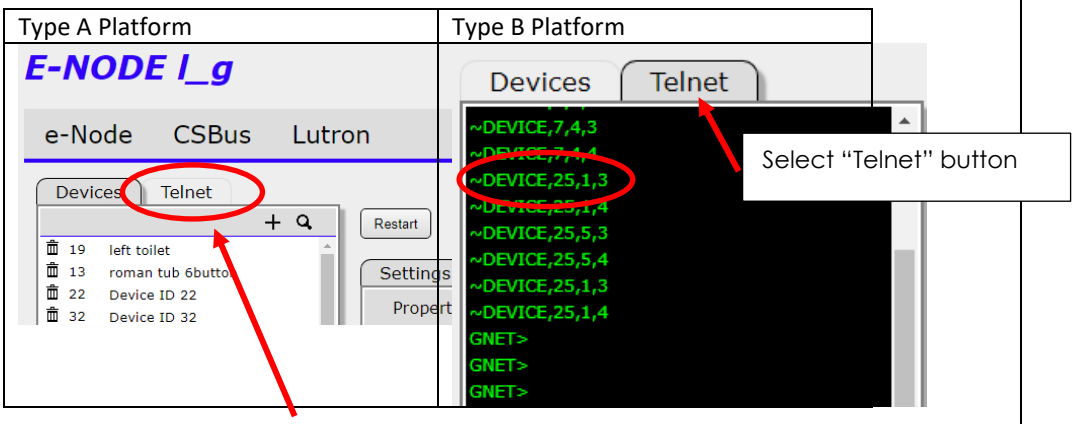
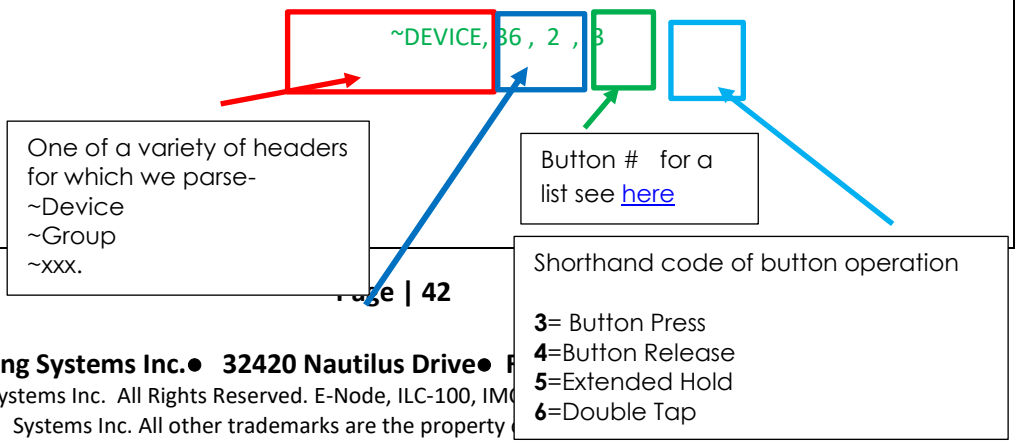
STEP 6. Troubleshooting Level A--using the built-in "Telnet" or "Trace" within the web-application with the e-Node/xxx

Step	Overview	Detail
6a	Use the built-in diag. window within the **e-Node/ Lutron tab** webpage to monitor Lutron button presses For Type A Platforms click here. For Type B Platforms click here.	For Type B Platform Within the Lutron tab, select the button circled below to launch the e-Node's Lutron diagnostic tool to monitor Lutron's internal communication which occurs each time an activated device is triggered (button is Presses or Released or Double Tapped or Held, or occupancy sensor is activated or deactivated, etc. -Example. The right window below provides an example when the top right button of test 10 button desktop keypad is pressed (and which was programmed for a Press within Designer in advance). **Note**: Standard dimmers will not generate any output and will be grayed out in the list and therefore will not generate a code that we can parse.



Important Note

The output string that appears above presents two types of information. This information is as follows:



Device ID of User Interface (keypad, occupancy sensor or timeclock event)

Note A. == This reference can be seen within **Reports/Integration** within Essentials or Inclusive.

TBD

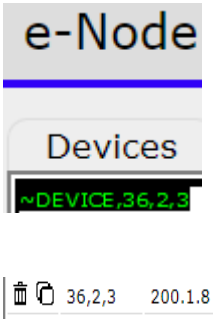
REMEMBER

If you can see the output string then our Lutron parser can see those strings and things will work, otherwise, you've got the picture…

-TROUBLESHOOTING TABLE

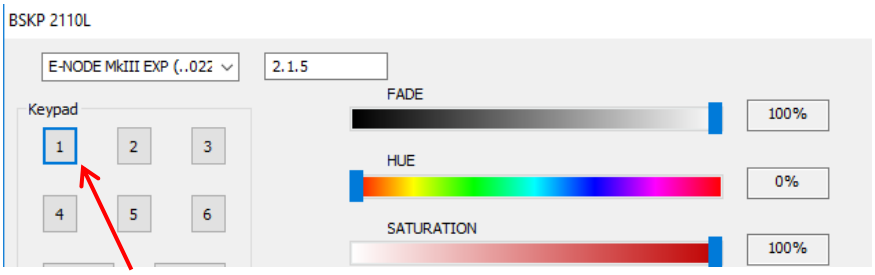
If things are not working as expected, search for your issue below under **Observation** and verify the **Cause** is applicable and then take corrective action shown under **Remedy**.

Observation	Cause	Remedy
Output string from a button operation does not appear AT ALL within diagnostic window 		
	E-Node may not be Connected to Type B Platforms	See Step 3 above and make sure e-Node shows "**Connected**"
	Exact button operation is not programmed within SLIM	See Step 4 and make you have programmed that button operation within SLIM
Output string appears but has button operation that differs from what is programmed within SLIM		

<table>
<tr><td></td><td></td><td>
<table>
<tr><td>A “3 is seen from Lutron but a “4” is programmed within SLIM
 
</td><td></td><td></td></tr>
<tr><td></td><td>A different button operation is programmed within SLIM from that which is programed within Lutron (i.e., a “3” is seen from Lutron while a “4” is programmed within SLIM</td><td>Either change within Designer the operation of the button to match what was programmed within SLIM. Or change the programming within SLIM to match what was programmed within Lutron.</td></tr>
</table>

Consult the e-Node documentation or see Appendix 10 for more troubleshooting information.</td></tr>
<tr><td>6b</td><td>Use the e-Node Pilot app.to monitor traffic received by the e-Node/xxx to start your trouble-shooting process.</td><td>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 Lutron SLIM 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
 

Here the Keypad “1” is pressed on the Virtual Keypad which sends out a Recall 1 (which is a red initially from the factory).</td></tr>
</table>

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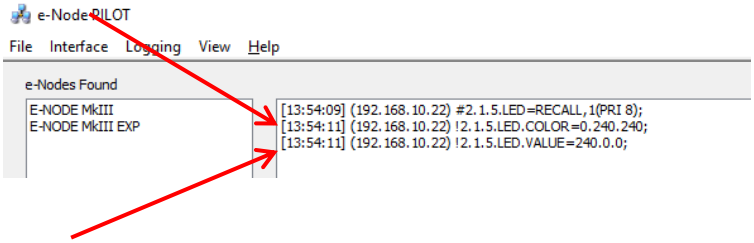
		In effect, by pressing this button, this command is transmitted to our bus: **#2.1.5.LED.VALUE=RECALL,1** In this case, if **NOTIFY** is set to BOTH (that is to say, VALUE data and COLOR data are both turned on), a response comes back on the bus (starting with a "**!**" mark) from that unit with an address 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.

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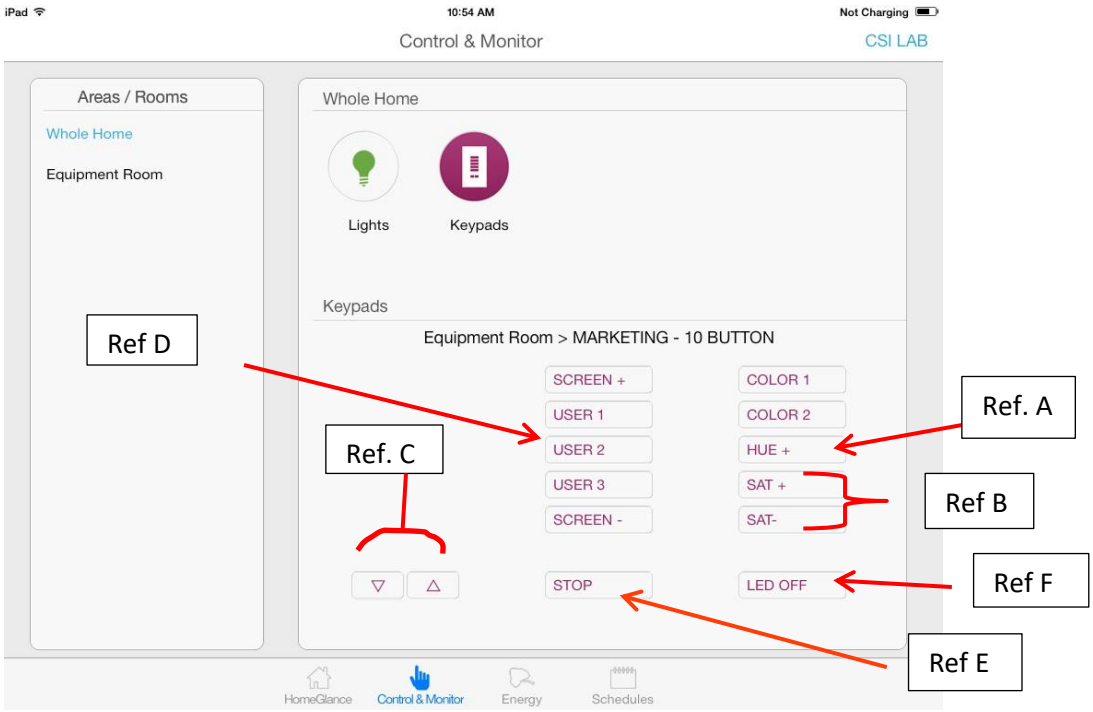
Examples

The following examples apply to all supported Lutron platform. All examples are relevant for RadioRA2 (RA2), HomeWorks QS (HWQS), HomeWorks QSX (HWQSX) with some overlay with functionality available with HomeWorks Illumination (HWI). In some cases, additional features available with HomeWorks platforms 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 HomeWorks'/QS or QSX seeTouch keypad(***-T10RL. 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.

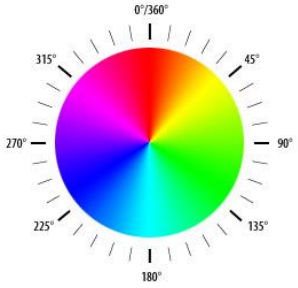


Figure 5

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

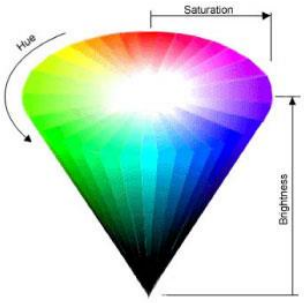


Figure 6

- [**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.

Here is a Web-Pilot example showing these fields

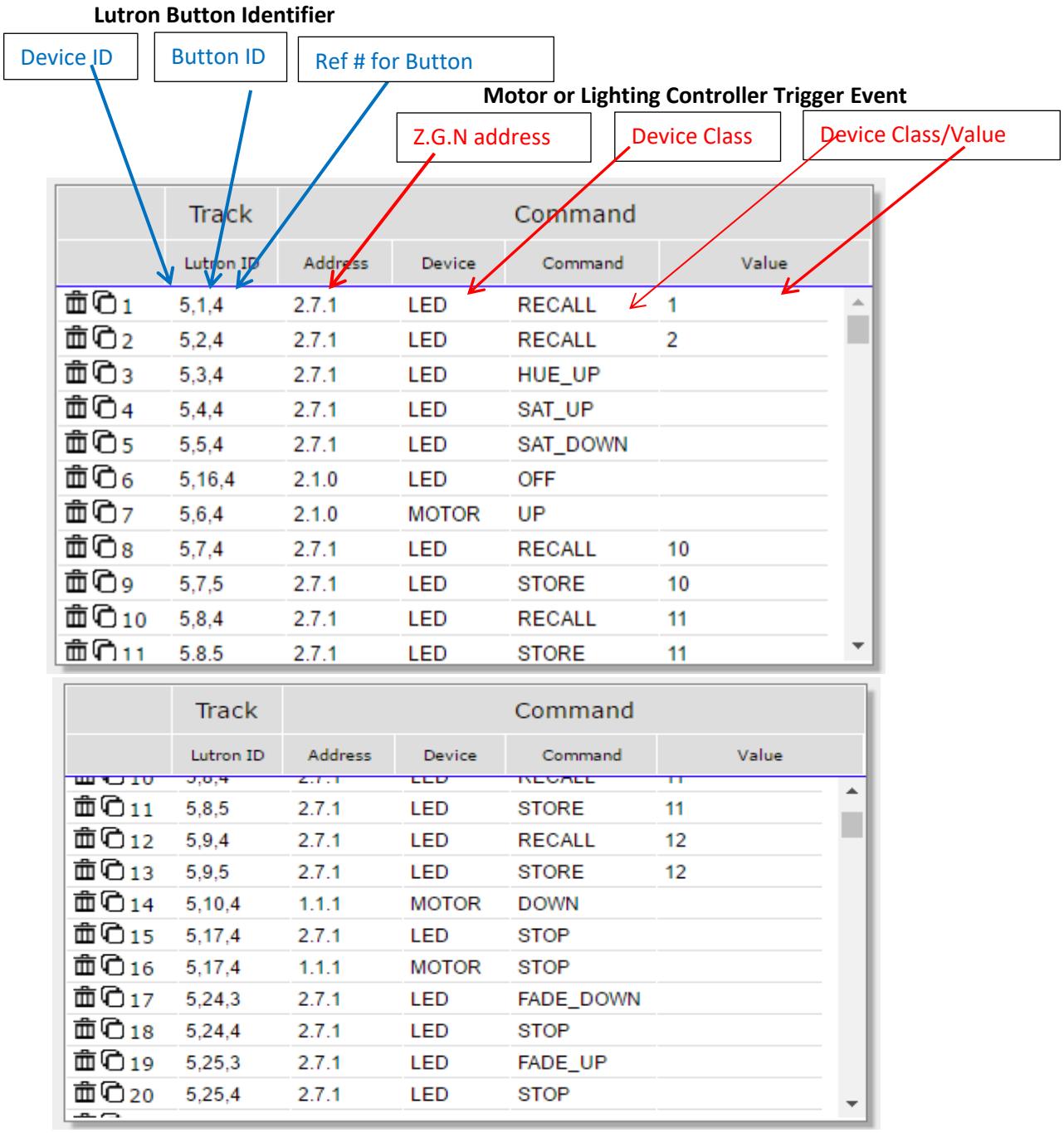


Figure 7

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/HWQS/HWQSX	Section 1
Illumination	Section 2

Section 1 RA2/HomeWorks QS (where difference exist-see notes)

Background on HomeWorks QS/ QSX

Additional functionality exists within HW QS/ QSX (over RadioRA2) which impacts the features available with the Converging Systems/Lutron interface. These areas fall into the following categories

-Ability to program Double Tap and Hold features.

-Ability to program on-button LED logic to simulate status of Converging Systems controllers (both Motor and LED controllers)

Table 14

Marked Lutron Button*	Button Type	LED Logic*	Variables*	Desired Action**	CS-Bus Address (ZGN)	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**)	2.7.1	DID: 7,1,3 / Device: LED / Cmd: **RECALL** / Value: 1
Color 2	Type 1A-SA	Scene	y^x Enode (State 1)	-On button push, causes controller to go to Preset 2 (**Recall, 2**)	2.7.1	DID: 7,2,3 / Device: LED / Cmd: **RECALL** / Value: 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 **STOP**	2.7.1 2.7.1	DID: 7,3,3 / Device: LED / Cmd: **HUE_UP** / Value: DID: 7,3,4 / Device: LED / Cmd: **STOP** / Value:
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	2.7.1 2.7.1	DID: 7,4,3 / Device: LED / Cmd: **SAT_UP** / Value: DID: 7,4,4 / Device: LED / Cmd: **STOP** / Value:

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<table>
<tr><td></td><td></td><td></td><td></td><td>operation will immediately STOP</td><td></td><td></td></tr>
<tr><td>SAT DOWN</td><td>Type 2-DA</td><td>Room

Note: logic is set to Room</td><td>y^x Enode (un-affected)

y^x Enode (un-affected)</td><td>-On button push, causes controller to go start incrementing the SAT variable.

-With a button release, the incrementing operation will immediately cease.</td><td>2.7.1

2.7.1</td><td><table><tr><td>DID</td><td>Device</td><td>Cmd</td><td>Value</td></tr><tr><td>7,5,3</td><td>LED</td><td>SAT_DOWN</td><td></td></tr></table>
<table><tr><td>DID</td><td>Device</td><td>Cmd</td><td>Value</td></tr><tr><td>7,5,4</td><td>LED</td><td>STOP</td><td></td></tr></table></td></tr>
<tr><td>LED ON/OFF</td><td>Type 1-SADP</td><td>Scene</td><td>y^x Enode (on)

-Enode (off)</td><td>-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</td><td>2.1.0

2.1.0</td><td><table><tr><td>DID</td><td>Device</td><td>Cmd</td><td>Value</td></tr><tr><td>7,16,3</td><td>LED</td><td>ON</td><td></td></tr></table>
<table><tr><td>DID</td><td>Device</td><td>Cmd</td><td>Value</td></tr><tr><td>7,16,3</td><td>LED</td><td>OFF</td><td></td></tr></table></td></tr>
<tr><td>SCREEN UP</td><td>Type 1-SA</td><td>Scene</td><td>y^x Screen (UP)</td><td>-On button push, causes connected projection screen to MOVE UP
Note: With Type 3 programming, a button release will not issue a STOP command</td><td>2,1,1</td><td><table><tr><td>DID ID</td><td>Device</td><td>Cmd</td><td>Value</td></tr><tr><td>7,6,3</td><td>MOTOR</td><td>UP</td><td></td></tr></table>
<table><tr><td>DID</td><td>Device</td><td>Cmd</td><td>Value</td></tr><tr><td>7,6,4</td><td>MOTOR</td><td>STOP</td><td></td></tr></table></td></tr>
<tr><td>USER 1</td><td>Type 1-SAH</td><td>Scene</td><td>y^x Enode (on)

y^x Enode (User 1)</td><td>-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)</td><td>2.7.1

2.7.1</td><td><table><tr><td>DID</td><td>Device</td><td>Cmd</td><td>Value</td></tr><tr><td>7,7,3</td><td>LED</td><td>RECALL</td><td>10</td></tr></table>
<table><tr><td>DID</td><td>Device</td><td>Cmd</td><td>Value</td></tr><tr><td>7,7,4</td><td>LED</td><td>STORE</td><td>10</td></tr></table></td></tr>
<tr><td>USER 2</td><td>Type 1-SAH</td><td>Scene</td><td>y^x Enode (on)

y^x Enode (User 2)</td><td>-On button push, causes LEDS to go to a USER 1 setting (in this case RECALL location #11)
-If the button is HELD for a preprogrammed amount of time, a command is sent to the CS-Bus device to STORE</td><td>2.7.1

2.7.1</td><td><table><tr><td>DID</td><td>Device</td><td>Cmd</td><td>Value</td></tr><tr><td>7,8,3</td><td>MOTOR</td><td>RECALL</td><td>11</td></tr></table>
<table><tr><td>DID</td><td>Device</td><td>Cmd</td><td>Value</td></tr><tr><td>7,8,4</td><td>MOTOR</td><td>STORE</td><td>11</td></tr></table></td></tr>
</table>

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				the current color setting into its specified memory location (i.e. memory location #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 #12) -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)	2.7.1 2.7.1	DID: 7,9,3 / Device: MOTOR / Cmd: RECALL / Value: 12 Lut. ID: 7,9,4 / Device: MOTOR / Cmd: STORE / Value: 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	1.1.1	DID: 7,10,3 / Device: MOTOR / Cmd: DOWN / Value:
STOP	**Type 1-SA**	Scene	y^x Screen (STOP)	-On button push, causes connected projection screen to STOP, if it is currently moving.	1.1.1	DID: 7,10,4 / Device: MOTOR / Cmd: STOP / Value:
FADE DOWN	**Lower**		N/A	-On button push, FADES LEDS DOWN -On button release, STOPS the fade process	2.7.1 2.7.1	DID: 7,24,3 / Device: LED / Cmd: FADE_DOWN / Value: DID: 7,24,4 / Device: LED / Cmd: STOP / Value:
FADE UP	**Raise**		N/A	-On button push, FADES LEDS UP -On button release, STOPS the fade process	2.7.1 2.7.1	DID: 7,25,3 / Device: LED / Cmd: FADE_UP / Value: DID: 7,25,4 / Device: LED / Cmd: STOP / Value:

Note: (color indicates Single Action, Dual Action or Raise Lower button logic—see Appendix 1)

* Only relevant for HW platforms.
**With RadioRA2 other than dimming buttons, buttons if individual buttons are targeted to take on a certain personality, then all buttons on that device need to follow-suit. Therefore, additional buttons in some cases may need to be dedicated to perform dual functions.

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HWI

Additional detail will be provided here in the future. See Appendix 11 for more information.

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Example 2

Following is a more advanced example of slider control using phantom (dummy) loads and UI available within the relevant Lutron app. 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.

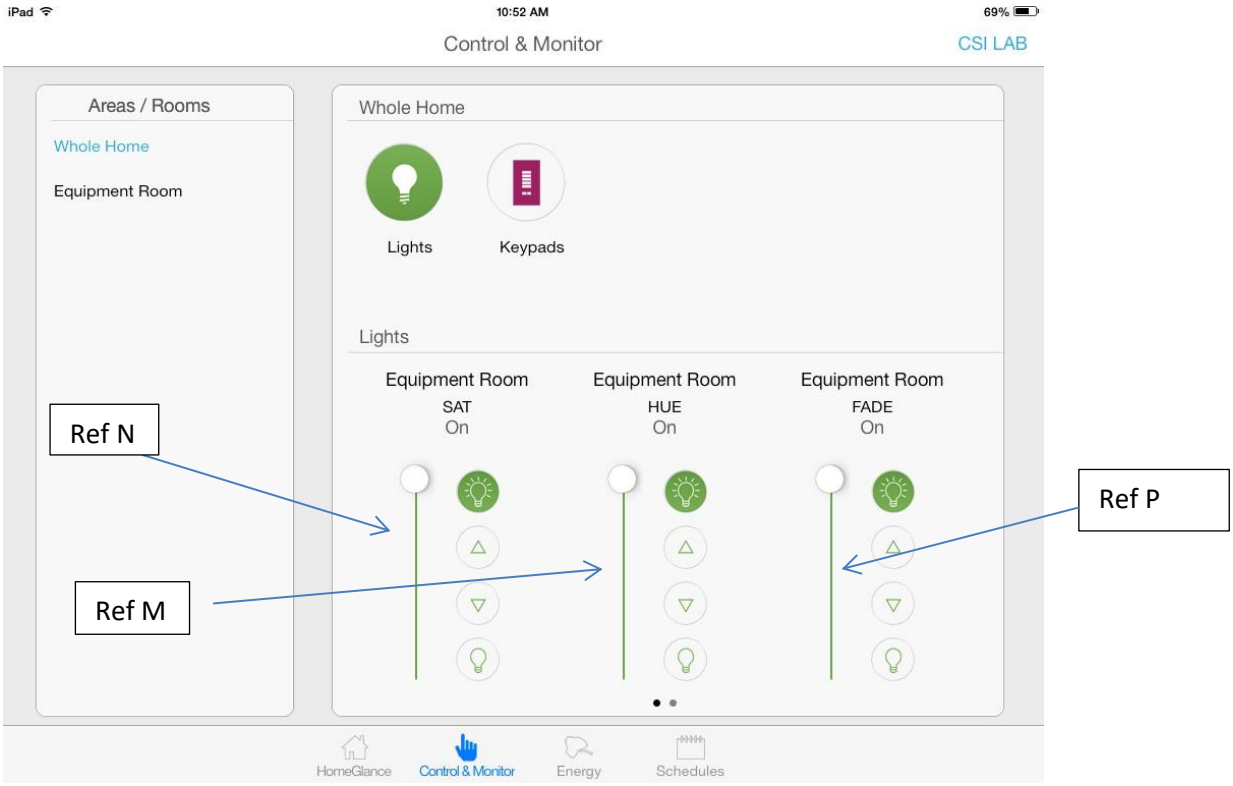

Figure 8

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%).

Figure 9

- **[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."

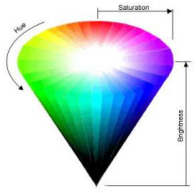

Figure 10

- **[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).

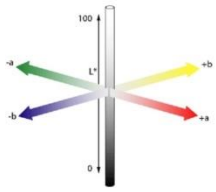

Figure 11

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

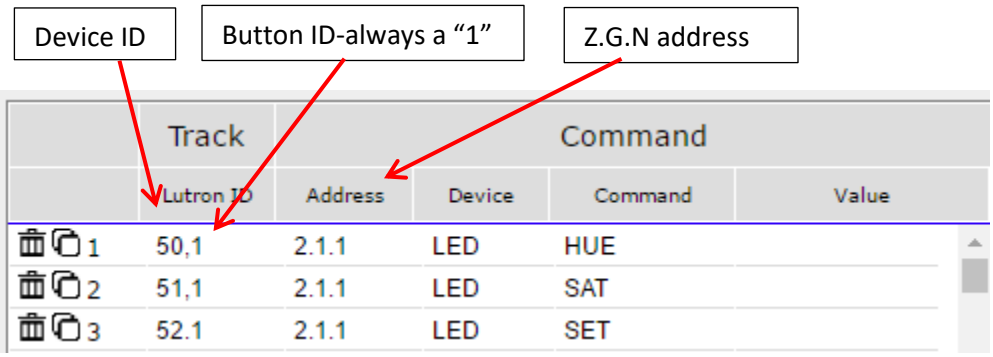

Figure 12

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.

Table 15

Marked Lutron Button*	Desired Action	CS-Bus Address (ZGN)	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	2.7.1	DID: 8,1 | Device: LED | Cmd: **HUE** | Value: **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	2.7.1	DID: 7,1 | Device: LED | Cmd: **SAT** | Value: **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.	2.7.1	DID: 6,1 | Device: LED | Cmd: **SET** | Value:

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<table>
<tr><td></td><td>Note: FADE of 0 is fully OFF (dark) while a FADE of 100 is fully ON</td><td></td><td>Note: there is no trailing characters after the SET command in this slider case</td></tr>
<tr><td>CCT Slider (Color Temperature)</td><td>-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</td><td>2.7.1</td><td><table><tr><th>DID</th><th>Device</th><th>Cmd</th><th>Value</th></tr><tr><td>10,1</td><td>LED</td><td>CCT</td><td></td></tr></table>
Note: there is no trailing characters after the CCT command in this slider case</td></tr>
</table>

Example 3

Following is a more advanced example of slider control using dummy loads and UI available within any Lutron app. 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.

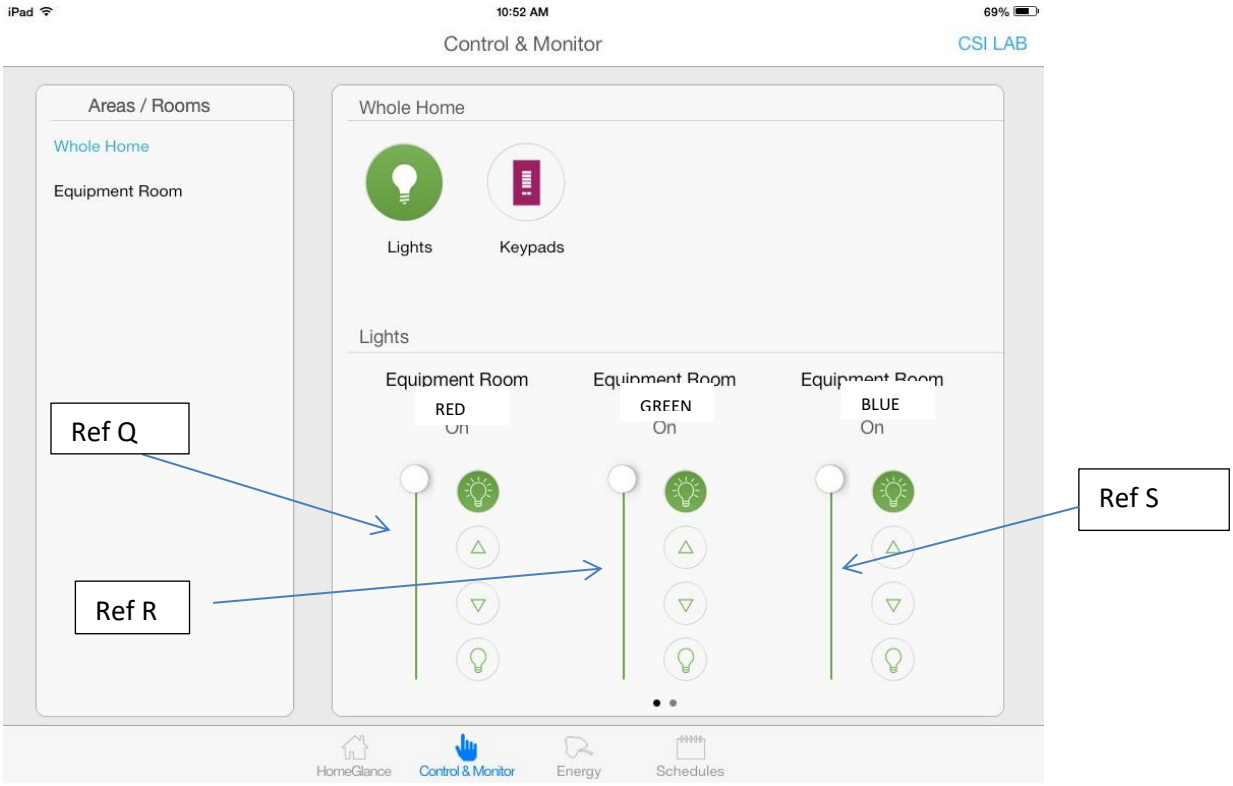


Figure 13

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.

Figure 14

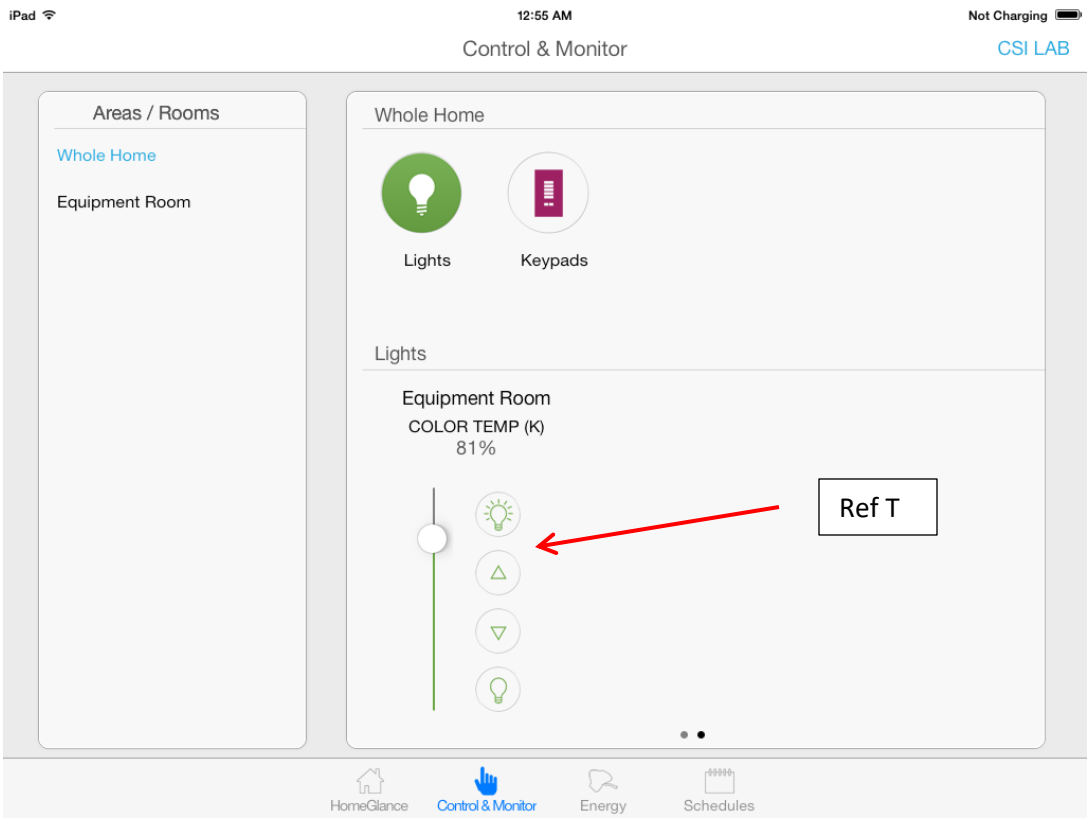


Figure 15

- **[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.

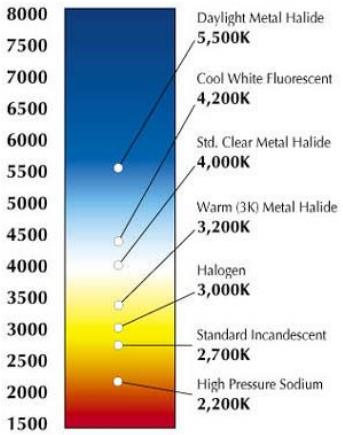


Figure 16

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)

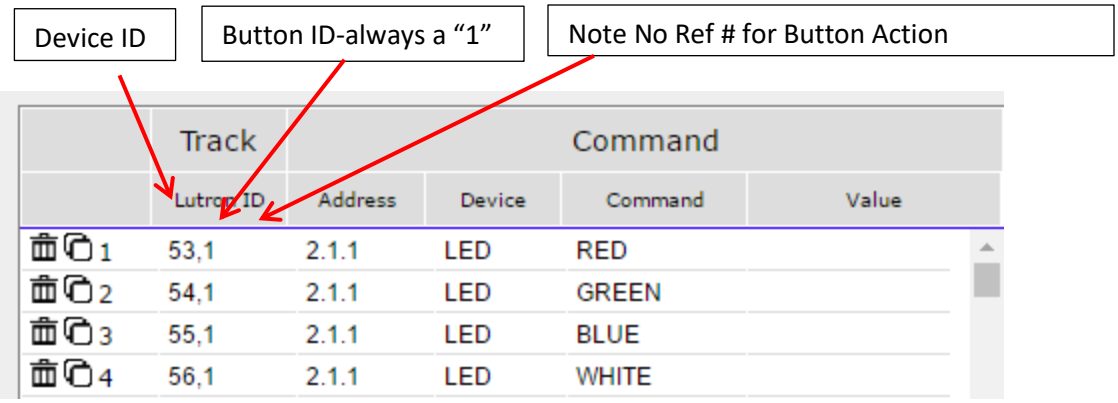
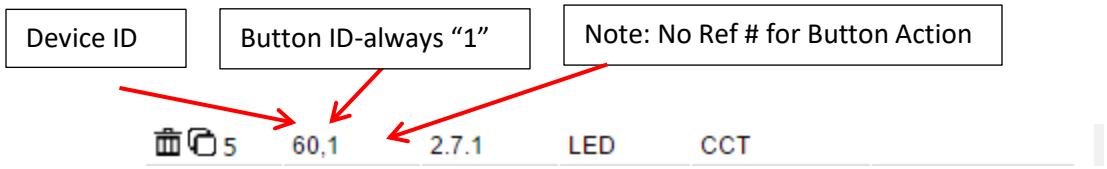


Figure 17

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 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.

Table 16

Marked Lutron Button*	Desired Action	CS-Bus Address (ZGN)	CS Bus resultant command
Red Slider	-On movement of slider from 0% to 100%, Red component is transmitted to CS-Bus system.	2.1.1	DID: 53,1 | Device: LED | Cmd: **RED** | Value: **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.	2.1.1	DID: 54,1 | Device: LED | Cmd: **GREEN** | Value: **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.	2.1.1	DID: 55,1 | Device: LED | Cmd: **BLUE** | Value:

<table>
<tr><td></td><td></td><td></td><td>Note: there is no trailing characters after the SET command in this slider case</td></tr>
<tr><td>White Slider</td><td>-On movement of slider from 0% to 100%, White component is transmitted to CS-Bus system (RGBW systems only).</td><td>2.1.1</td><td><table><tr><th>DID</th><th>Device</th><th>Cmd</th><th>Value</th></tr><tr><td>6,1</td><td>LED</td><td>WHITE</td><td></td></tr></table>
Note: there is no trailing characters after the WHITE command in this slider case</td></tr>
<tr><td>CCT Slider (Color Temperature)</td><td>-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</td><td>2.7.1</td><td><table><tr><th>DID</th><th>Device</th><th>Cmd</th><th>Value</th></tr><tr><td>10,1</td><td>LED</td><td>CCT</td><td></td></tr></table>
Note: there is no trailing characters after the CCT command in this slider case</td></tr>
</table>

Additional Examples

Example 4

Following is a more advanced example of concurrent (or nearly concurrent) support of a Ketra fixture (using a KT control) and matching set of Covnerging Systems FLLA llinear strips (using a PL control). At the current time, the Lutron APP Ketra popup can only control Ketra bulbs but similar control is still pssible of FLLA devices to select CCT and INT (intensity). In this case two user interfaces

slider control using dummy loads and UI available within any Lutron app. 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.

Case 2a control: This case involves using a single button on a Lutron hardware UI to control Lutron loads and Converging Systems load to a specified color temperature (CCT), for instance.

Type 1 or Type 2 Control. Program using Lutron software as usual to control a Lutron platform on its own. U

<table>
<tr><td>Programming Steps</td><td>Within Designer</td><td>Within e-Node/xxx Lutron tab (web server)—Table subtag</td></tr>
<tr><td></td><td>-Within Program devices, link a particular button press or operation to a Ketra setting of CCT=2700 and INT=100% (for a button which is identified within Designer as Lutron Device ID of 4220,1)</td><td>-Using the DID for the 1st phantom load (i.e., 4440 bellow), program it to control CCT as below
<table>
<tr><td>DID</td><td>ZGN</td><td>Cmd</td><td>Val</td></tr>
<tr><td>4440,1</td><td>2.1.1</td><td>CCT</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>
-Using the DID for the 2nd phantom load (i.e., 4460 below), program it to control Intensity as below

Program TA1 to control a specific load with the command CCT=2700
<table>
<tr><td>DID</td><td>ZGN</td><td>Cmd</td><td>Val</td></tr>
<tr><td>4460,1</td><td>2.1.1</td><td>SET</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td></td><td></td><td></td></tr>
</table>

-Type 3 Control. Given we are trying to program both platforms to simply go to 2700K, this (advanced) user interface is not necessary. Here 2700K can be programmed as a static value within Lutron (for a control) and similarly 2700K can be programmed as a static value as well within CSI's SLIM programmer (see above).

Type 4 Control. Typically not necessary for the control of Lutron devices

Case 2b control: This case involves using the Lutron Ketra popup UI to control Ketra to a specific advanced level (CCT + INT) and a separate set of UI controls to mimic the output on a Converging Systems support output device (CCT +INT here as well.

Type 1 or Type 2 Control. This case focuses on a Type 3 control

Type 3 Control. Set the Lutron Ketra bulb using the existing feature set of the Type 3 control. Then

<table>
<tr><td>Programming Steps</td><td>Within Designer</td><td>Within e-Node/xxx Lutron tab (web server)—Table subtag</td></tr>
<tr><td></td><td>-Type Type 3 control will autopopulate for the Ketra bulb.

-Create two phantom loads for sliders that will be used for the e-Node
a. Create one phatom load and name it CCT
b. Create a second phantom load and name if Intensity</td><td>-Using the DID for the 1st phantom load (i.e., 4440 bellow), program it to control CCT as below
<table><tr><td>DID</td><td>ZGN</td><td>Cmd</td><td>Val</td></tr><tr><td>4440,1</td><td>2.1.1</td><td>CCT</td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr></table>
-Using the DID for the 2nd phantom load (i.e., 4460 below), program it to control Intensity as below

Program TA1 to control a specific load with the command CCT=2700
<table><tr><td>DID</td><td>ZGN</td><td>Cmd</td><td>Val</td></tr><tr><td>4460,1</td><td>2.1.1</td><td>SET</td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr></table></td></tr>
<tr><td></td><td></td><td></td></tr>
</table>

Type 4 Control. Typically not necessary for the control of Lutron devices

Type 3 Control. Program using Lutron software as usual to control a Lutron Ketra platform on its own. Currently, this interface does not control variable features witin Converging Sytems controls such as Hue, Saturation, Color Temperature or Circadian so a separate set of controls need to be adopted to yield the same results on Converging Sytems products as Ketra products (see Type 4 below)

Program using Lutron software as usual to control a Lutron platform on its own.

The most common method of interfacing \Lutron to CSI controls is through mapping a discrete keypad button (see Case 2/3 above) to a CSI function This is handled in section x to xx. I

Example 1: If the Lutron user wanted to set a Ketra bulb to 2700K concurrently with setting a CSI linear strip to the same value, a button within a Type 2 control above could be used to activate this setting. Here is how that button would be programmed on both platforms (Lutron and CSI)

Programming Steps	Within Designer	Within e-Node/xxx Lutron tab (web server)

<table>
<tr>
<td></td>
<td>Program TA1 to active Ketra to 2700K

(The TA1 button might have a device ID of 3440 which could be found within the Integration Report)</td>
<td>Using the Table subtab, program) program TA1 to control a specific load with the command CCT=2700
<table>
<tr><td>DID</td><td>ZGN</td><td>Cmd</td><td>Val</td></tr>
<tr><td>34401,1</td><td>2.1.1</td><td>CCT</td><td>2700</td></tr>
</table>
</td>
</tr>
<tr><td></td><td></td><td></td></tr>
</table>

with a button (i.e., TA1 above) progfthe respective button programmed within Designer to activate the Ketra fixture and within the e-Node/xxx controller And Lutron tab

Within some Lutron installations will be Ketra fixtures that are associated with their own UI (see in Case 4 above)

to arious Lutron platforms have varying degrees of intelligence built into their button LED logic to indicate status of loads, scenes and other system information. This section is focused on HomeWorks QSX (although much of the information is also relevant to QS).

Within Designer, after a button type is selected (see the Figure below-left entry), an applicable LED Logic option should be selected (see the Figure below-right entry). An applicable LED Logic option should be selected based upon the requirements of the project. See the Table below to see the conditions that must be met in order for the LED Logic to turn on or off its LED indicator.

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Appendix 1

Lutron (LED) 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/occupancy sensor state, or timeclock operation. Section 3 reviews key parameters of Lutron LED button logic.

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** (HomeWorks QS/QSX as opposed to RadioRA2 in general cases), then and only then can you program a **Double Tap** within e-Node SLIM software to operate. Similarly, if your 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
HomeWorks QS	HWQS Keypad Button Logic
Illumination	HWI Keypad Button Logic

RA2 Keypad Button Logic

Table 17

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 held for 10 seconds. **Note**: **If you don't care about doubling up on the functionality**

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						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.

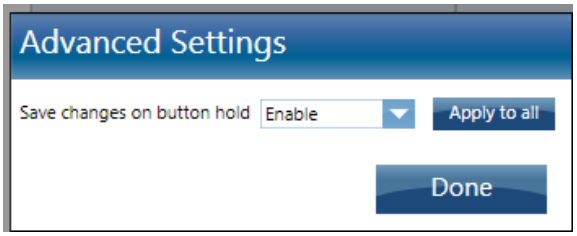

Figure 18

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 below in the Figure 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.

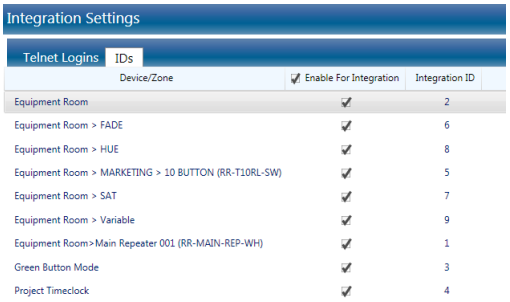

Figure 19

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Type 3B	Toggle with Hold ("TGH")	N/A	"**4**"	N/A	"**5**"	LED ON/OFF (**ON** with a single press, **OFF** with a Hold)	Room
Type 4	RAISE/ LOWER ("RAISE") ("LOWER")	"**3**"	"**4**"	N/A	N/A	FADE UP, or FADE DOWN (or MOTOR UP, or MOTOR DOWN)	

HWQS Keypad Button Logic

There are many ways within Lutron Designer that buttons can be programmed to control specific loads. Although, the Converging Systems **SLIM** programming tool can be used in nearly all cases to accurately map a Luton button operation (Press, Release, Hold and Double Tap) to a desired Converging Systems lighting or motor operation, a few recommended Lutron button programming Cases will usually suffice for most user demands.

Please review a comprehensive HWQS Table for a detailed summary of **nearly all** possible button/programming combinations to determine their applicability for use with Converging Systems' motor and lighting control products. Creative dealers will find nearly unlimited programming potentials exist and will be limited only by their own creativity,

Desired Operation and Applicable Button Type Programming within Designer and CSI's SLIM Programmer

Table 18

Case	Application	Generated Output
Type 1A	ALL OFF, ALL ON, MOTOR STOP, Select Recall, Select Color Temperature (only).	"3"
Type 1B	Recall (for press) and Store (for a Hold)- two functions for one button.	"4" and "5"
Type 1C	On with first press, Off with Double Tap	"3" and "6"
Type 2A	Ramp UP (motor or LED) while pressed, and Stop when released	"3" and "4"
Type 4	Raise or Lower (any programmed) LED Level (or jog Motor Up Down) until released using Lutron dedicated Fade buttons	"3" and "4"

Detail

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, and 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 2A-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.

Type 3A-Toggle ("TG"). This is not particularly useful for either LED or MOTOR control applications. For ON/OFF toggle, see Type 1C.

Type 3C-Toggle with Double Tap ("TC"). This is an alternative choice to Type 1C for an ON/OFF toggle. The initial button press would turn on the light while a HOLD would turn the LED off. In this case the Lutron system generates a "**3**" from its processor upon a Button Press and a "6" on the Double Tap.

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.

Legend (color code below)

Table 19

Option not available for programming within Designer with this Button Type
Programmed within Designer (for the specific case described)
Not programmed within Designer (for the specific case described)

Button Type	Operation	Lutron system software output ("#" below represents signal that occurs upon a True for specific operations programmed below)				Cases where this type of button is desirable	Suggested Programming for LED Logic
HWQSX SINGLE ACTION BUTTON TYPES							
		Press On	**Release**	**Double Tap**	**Hold**		
Type 1A	Single Action ("SA)	"3"				ALL OFF, RECALL (n), MOTOR STOP, CCT UP, CCT DOWN, MOTOR UP, MOTOR DOWN ***Application**: this is a single action type operation. If a MOTOR or LED ramp is invoked, another SA button must be programmed to stop the ramp (STOP).	Scene OK
Type 1B	Single **with Hold ("SAH")**	"4*			"**5**"	**Application**: A ***Recall Preset*** is invoked when the button is pressed (or released) and separate operation (a **Store**) is triggered when the button is held.	Scene OK
Type 1C	Single with Double Press option ("SADP")	"**3**"		"**6**" (3/6)		LED ON/OFF (On with a single press, OFF with a double press) **Application**: An alternative for a single button that turns lights ON with a press and turns lights OFF with a double tap.	

Type 1BC	Single with Double Press option and Hold option ("SADPH")	"4"		"6" (4/6)	"5"	**Application**: Available for usual applications—generally not recommended	
HWQSX DUAL ACTION BUTTON TYPES							
		Press On	**Release**	**Double Tap**	**Hold**		
Type 2A	Dual Action ("DA")	"**3**"	"**4**"		N/A	SAT+/-, HUE+/-, CCT+/-, MOTOR JOG UP, MOTOR JOG DOWN **Application:** Ideal to invoke a ramp (on press) and to invoke a **STOP** (on release)	Scene OK
Type 2D	Dual Action with Press, Double Press & Hold Option ("DADPH")	"3"	"4"	"6" (3/4/6)		**Application**: Available for usual applications—generally not recommended	
HWQSX TOGGLE ACTION BUTTONS							
		Press On	**Release**	**Double Tap**	**Hold**		
Type 3A	Toggle ("TG")	"**3**"	"3"			(Similar to Type 2, but ***not*** for a lighting ON/OFF toggle) **Application:** Although intuition would suggest that this is applicable for an ON/OFF toggle (for lighting), it is not effective because once you release your finger an OFF is issued. See Type 3B below.	
Type 3B	Toggle with Hold ("TGH")				"**5**"	**Application**: Not generally recommended	Room
Type 3C	Toggle with Double Tap (and Release) ("TDP")	"3"		"6" (3/6)		(Similar to Type 1C, but ***not*** for a lighting ON/OFF toggle) **Application**: An alternative for a single button that turns lights ON with a press and turns lights OFF with a double tap.	
Type 3BC	Toggle with Double Tap and Hold ("TDPH")			"6"	"5"	**Application**: Available for usual applications—generally not recommended	
HWQSX RAISE/LOWER BUTTONS							
		Press On	**Release**	**Double Tap**	**Hold**		

Type 4	RAISE/ LOWER (“RAISE”) (“LOWER”)	“**3**”	“**4**”			FADE UP, or FADE DOWN (or MOTOR UP, or MOTOR DOWN)	

Next Steps. Now with this information in mind, update any of your Lutron Designer programming for any button programmed that you wish to trigger a Converging Systems' event in a unique way, if required.

Important Technical Note

In some cases, a button type (i.e., Toggle/Case 3A) may control a Lutron load in a different manner than is currently possible with a non-Lutron supported device. Specifically, one will see that the output from the Case 3A toggle is "3" and also "3" (regardless of the button toggle state), but a Lutron Ketra load may very well cycle on and off as expected. This is particularly true if the **Program Type** for that Toggle Button within Designer is set **to Conditional** and an **if/then/else condition** has been set that reads the button's LED state. In this case, A TRUE condition for the button LED (illuminated), enables a subsequent button press to turn off a Lutron load and a FALSE condition (non- illuminated button LED) enables a subsequent button press to tun on a Lutron load. From the point of view of a Lutron approved Integration Partner, currently we only see identical outputs regardless of the state of the toggle sequence. This difference relates not to a failure of design by Converging Systems but rather than architecture of the internal operations of the HWQSX system. Currently, we are exploring with Lutron an alternative approach for this Toggle Case 3A situation, but until as a new release is made, if a toggle-type operation is required, simply substitute a Type 1C format instead.

HWI Keypad Button Logic

Table 20

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 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)

Section 2-- Keypad Button IDs

Use these Button IDs for various Lutron keypads

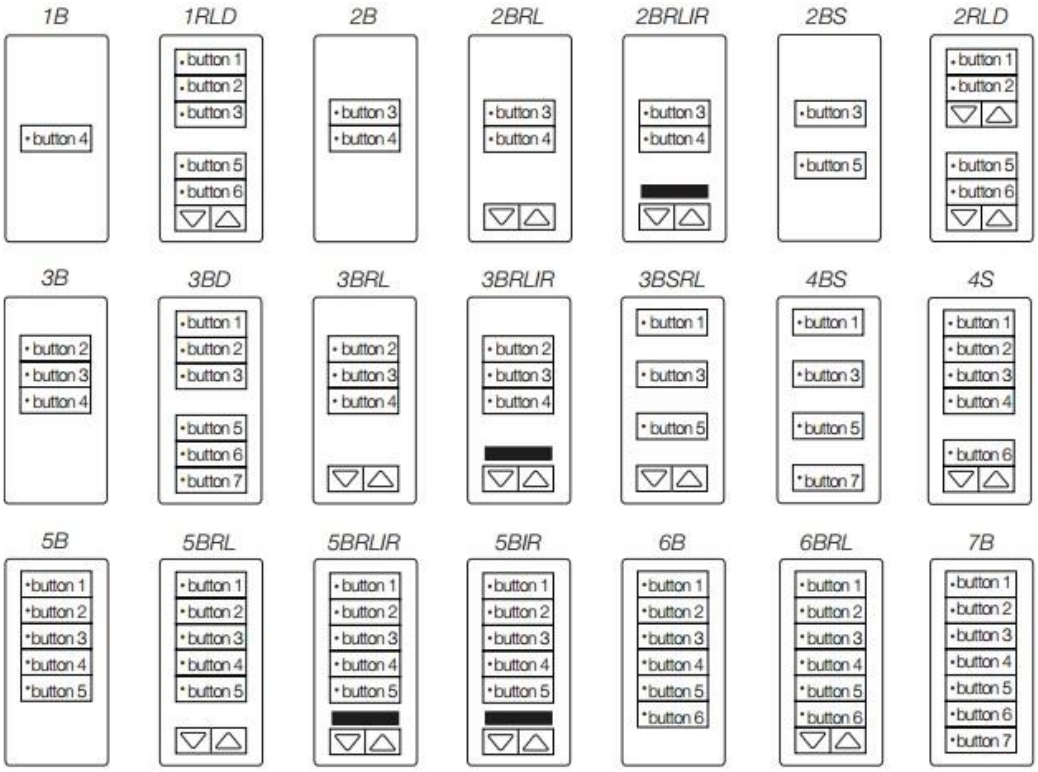
Since Lutron often releases new keypads and other user interfaces, please refer to this link for the most update list available in order to determine Lutron auto-assigned button numbers.

http://www.convergingsystems.com/xby.html

If you cannot find a button number from either of these resources, you can use the Telnet or DIAG window to press a button to see its Button ID. For more information see, xxxx

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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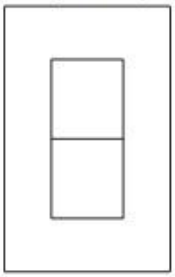
Palladiom® Keypad

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.

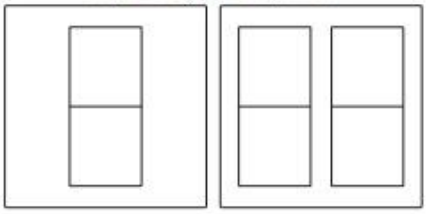
HomeWorks® QS Models (HQWT-): U-P2W, U-P3W, U-P4W, U-PRW,
S-P2W, S-P3W, S-P4W, S-PRW, S-P22W, S-P24W, S-P42W, S-P44W, S-P2RW, S-P4RW, S-PRRW,
B-P2W, B-P3W, B-P4W, B-PRW, B-P22W, B-P24W, B-P42W, B-P44W, B-P2RW, B-P4RW, B-PRRW.

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



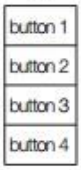
Square Style Faceplates



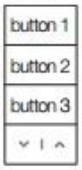
2W

3W

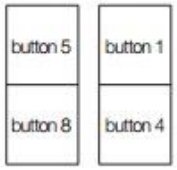
4W



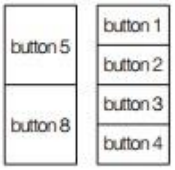
RW



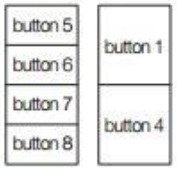
22W



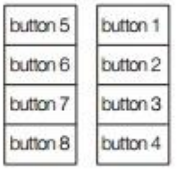
24W



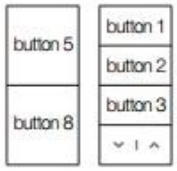
42W



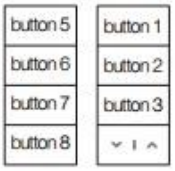
44W



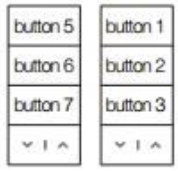
2RW



4RW



RRW



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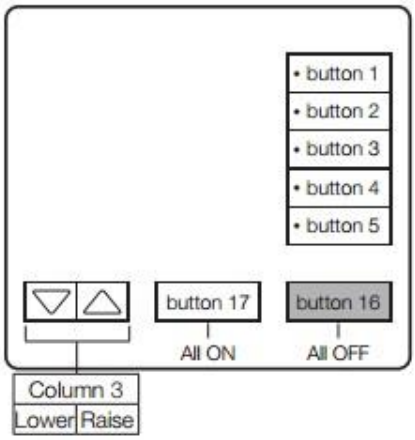
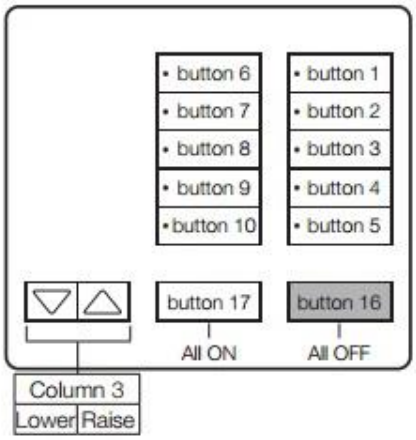
Tabletop seeTouch® Keypad

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

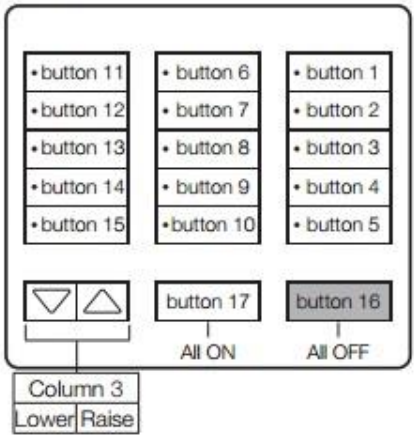
T5-RL



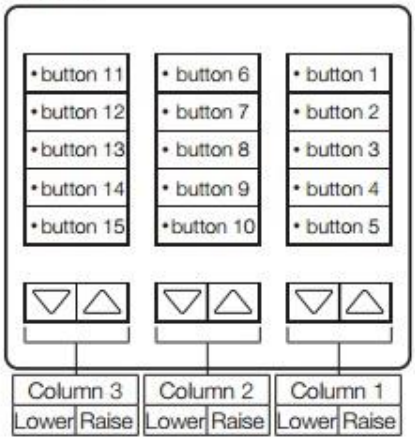
T10-RL



T15-RL

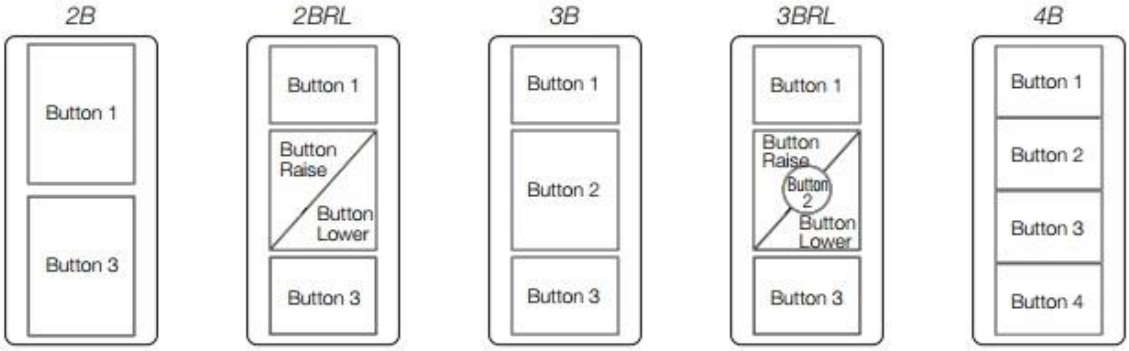


T15-CRL



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, 3R
RadioRA® 2 Models (RRD- P): 3BRL-L, 3BRL-S



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Section 4—Lutron Button LED Logic (primarily HWQSX and HWQS focused)

Various Lutron platforms have varying degrees of intelligence built into their button LED logic to indicate status of loads, scenes and other system information. This section is focused on HomeWorks QSX (although much of the information is also relevant to QS).

Within Designer, after a button type is selected (see the Figure below-left entry), an applicable LED Logic option should be selected (see the Figure below-right entry). An applicable LED Logic option should be selected based upon the requirements of the project. See the Table below to see the conditions that must be met in order for the LED Logic to turn on or off its LED indicator.

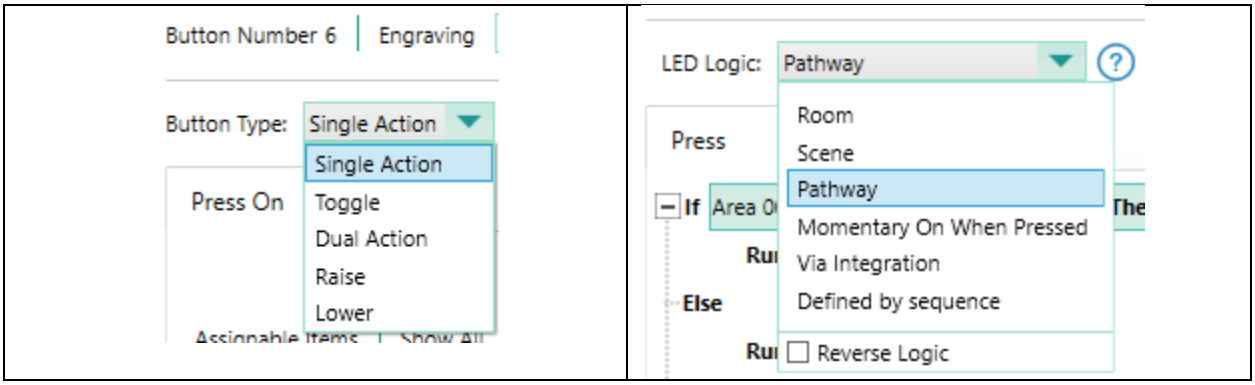

Figure 20

Table 21

LED Logic	LED Behavior	Button LED status	**Any** Zone	**All** Zones	Output on at **any** level	Output on at a **specific** level
Room	LED will be on if any Zone on at any level	ON	✓		✓	
Scene	LED will be on if all Zones on at specific level	ON		✓		✓
Pathway	LED will be on if all Zones on any level	ON		✓	✓	
Momentary on when pressed	LED will come on momentarily when pressed (typically for Single Action button)					

Via Integration	LED will be on only with integration commands		Status under the control of a connected external platform
Defined by Sequence	LED is controlled by the first sequence programmed on the button		As programmed

Currently, the Converging Systems integration with QSX listens to, but does not currently control, the Button's LED status (either On or Off). In order to deliver a fully operational systems to the end-user customer, it is incumbent on the Lutron installer to properly understand Lutron LED logic and how to program it for particular needs.

It is understood that the general design goal is that if a button's LED ("BLED") behaves in a certain fashion with one load, it should behave the same way with alternative loads. Accordingly, we can consider three cases that are of interest here:

Mode	Description
A	Lutron button presses will **only** control Lutron loads
B	Lutron button presses will **only** control Converging Systems loads
C	Lutron button presses will control **both** Lutron loads and Converging Systems' loads

Mode A: Where Lutron will only control Lutron loads

This is the most basic case, where the Lutron button LED logic will perform as programmed. If properly programmed, it will provide an accurate feedback through the **BLED** of whether the loads are on, or on to a specific level, and in what areas. With this case, there are no implications for third-party devices since they are not part of the system.

Mode B: Where Lutron will only control Converging Systems loads TBD

Currently, since the HQ QSX is not monitoring Converging Systems' load status, the button LED logic can be programmed to simulate (responsive) control. Here are some alternatives that will work

Table 22

Tactic	Methodology	For type of Button Operation	LED Logic selection	Outcome
1 (rec)	**Phantom Loads**	No programming of devices is necessary (and	Within the App, the icon turns "on" or if the Slider is	

		therefore no button logic needs to be selected). Load auto appears in app.	up from "0". For Hue and CCT this not particularly relevant but OK.	
2	**Momentary Button Logic**	**Type 1A**- Single Option Button (like an On button or a separate Off button)	Select "Momentary when pressed"	In this case the BLED will turn on momentarily (but not long term) when the button is pressed for ON
3		Single Action	With conditional If LED is off, then Run ON Action If LED is on, then Run Off Action Note: Still gives out all "3" so does not work	Led only stays on if set to a real Lutron load, otherwise if goes off in 3 seconds
4	Integration Control of LED Logic (WIP)	All	Provided the LED Logic is set to "Via Integration" the LED state will reflect the setting of the light (most relevant for Brightness))	

Mode C: Where Lutron will control (i) Lutron Loads concurrently with (ii) Converging Systems loads

This is a more advanced case where a third-party device (not known to Lutron in a specific installation), is being controlled alongside a similar Lutron-known load. The Lutron button logic described in Case 1 above will continue to work as programmed and since Lutron's core is reacting to known loads, the LED logic will continue to work with the assumption that any Converging Systems load is mirroring a parallel controlled Lutron load. In this case, given the parallel operation, even though Lutron is not monitoring the Converging Systems' load, the **BLED** will continue to operate as programmed.

Appendix 2

Converging Systems System Setup/Configuration

Before proper operation between the Converging Systems' controllers and a third-party control system can begin, it will be first necessary for most applications to configure the Converging Systems' products using the e-Node Pilot (PC-based) application or the Web-Pilot application. Subsequently, matching communication parameters within the third-party control system are required-see specific directions for each system at

https://www.convergingsystems.com/inres_atoz.php.

In case you have not previously configured a Converging Systems controller product, please refer to the following directions.

Background

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

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) and/or you desire ***bi-directional communication/feedback*** between your user interface (UI) and a particular motor or lighting controller, **you must still follow the directions below under (i) e-Node Programming** and **(ii) ILC-xxx Programming** in order to establish **unique ZGN address(es) for connected loads** and **turn on the NOTIFY command** which provides for that bi-directional communication.

Note: The IBT referenced in these following documents is not compatible with Lutron interfaces since the support requirements of the Lutron platforms requires IP (Internet Protocol) platforms.

Please download Hardware and Software Setup Guide from the Converging Systems website which can be navigated to at www.convergingsystems.com under

For LED Lighting	Resources/Installation Guides/LED Lighting/General/Installation Guides/Hardware and Software Initial Setup/Commissioning Guide or find it here https://www.convergingsystems.com/lighting_install_library.php
For Motors	Resources/Installation Guides/Motor Control/General/Installation Guides/Hardware and Software Initial Setup/Commissioning Guide or find it here https://www.convergingsystems.com/motor_install_library.php

-Complete all the setup steps in the referenced document and then AND ONLY THEN proceed to the remainder of the instructions within this Integration Note.

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. If you want multiple controllers to behave in parallel use the Shadow address concept and assign any secondary units to the same Shadow address as the target Controller.

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.

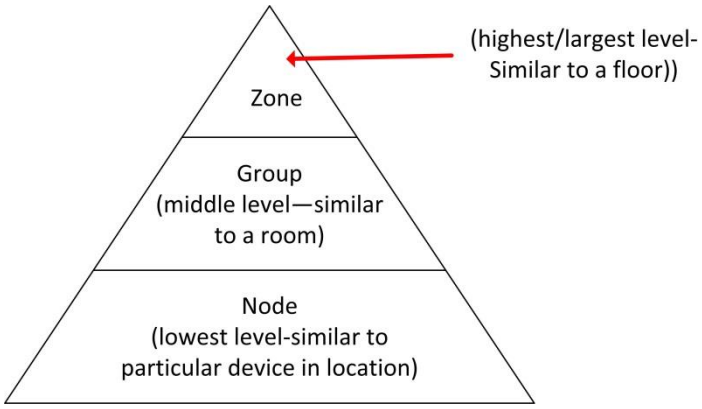

Figure 21

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 23

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.**

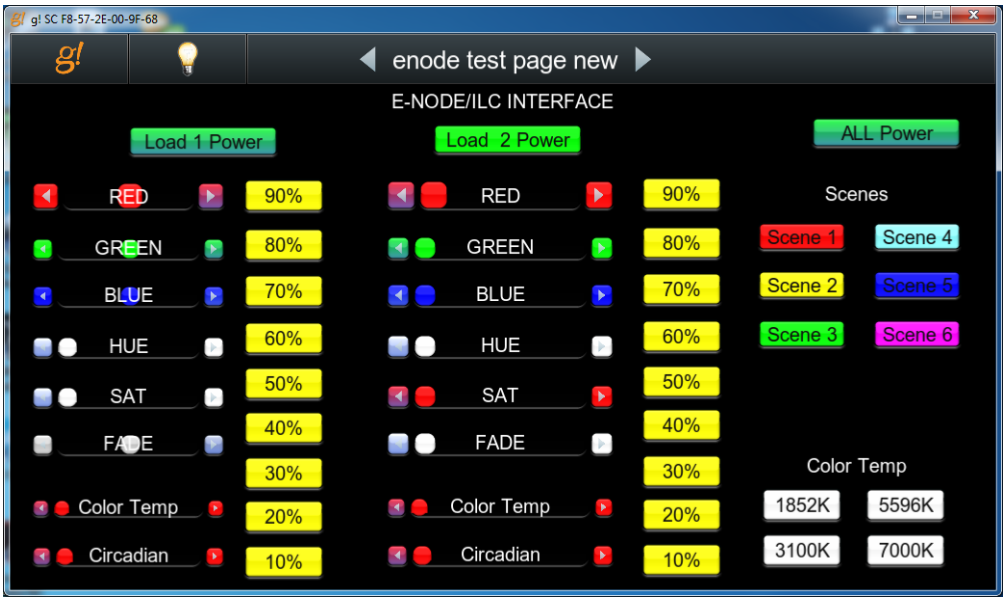

Figure 22

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

Lutron App 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 ensure 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.

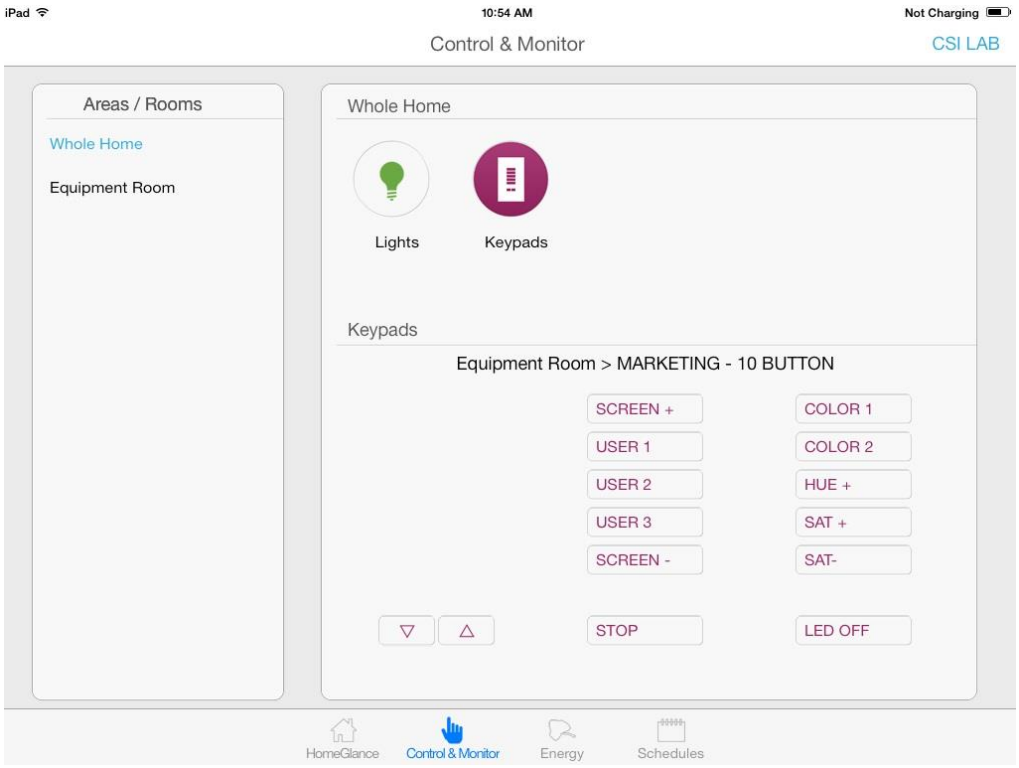

Figure 23

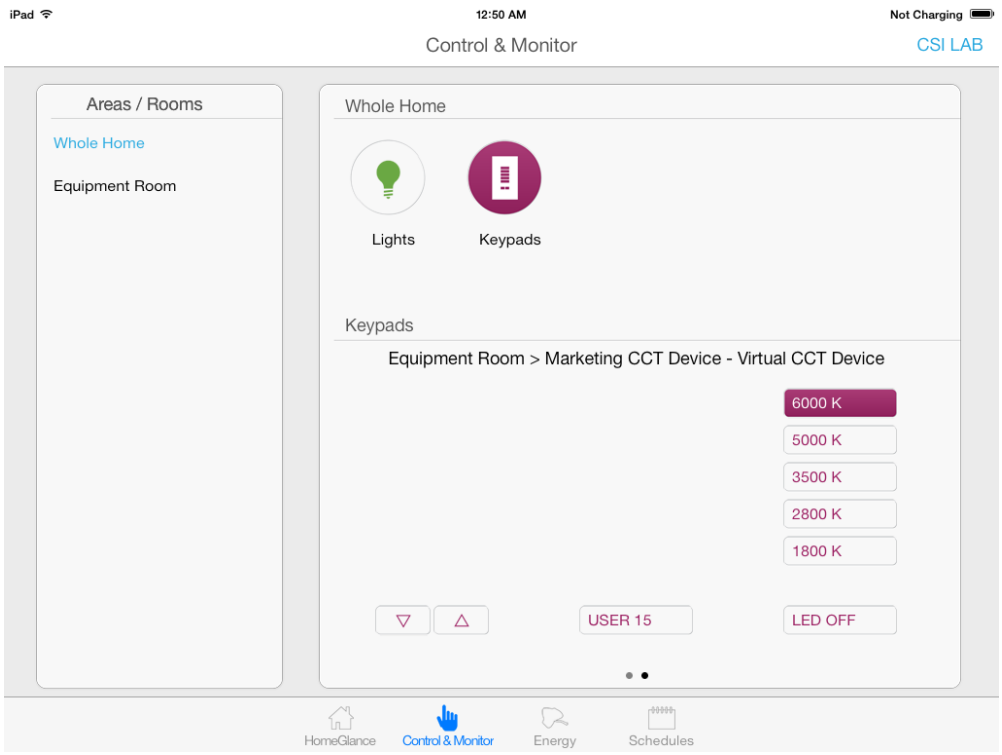

Figure 24

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. Please refer to Example xx for more information here.

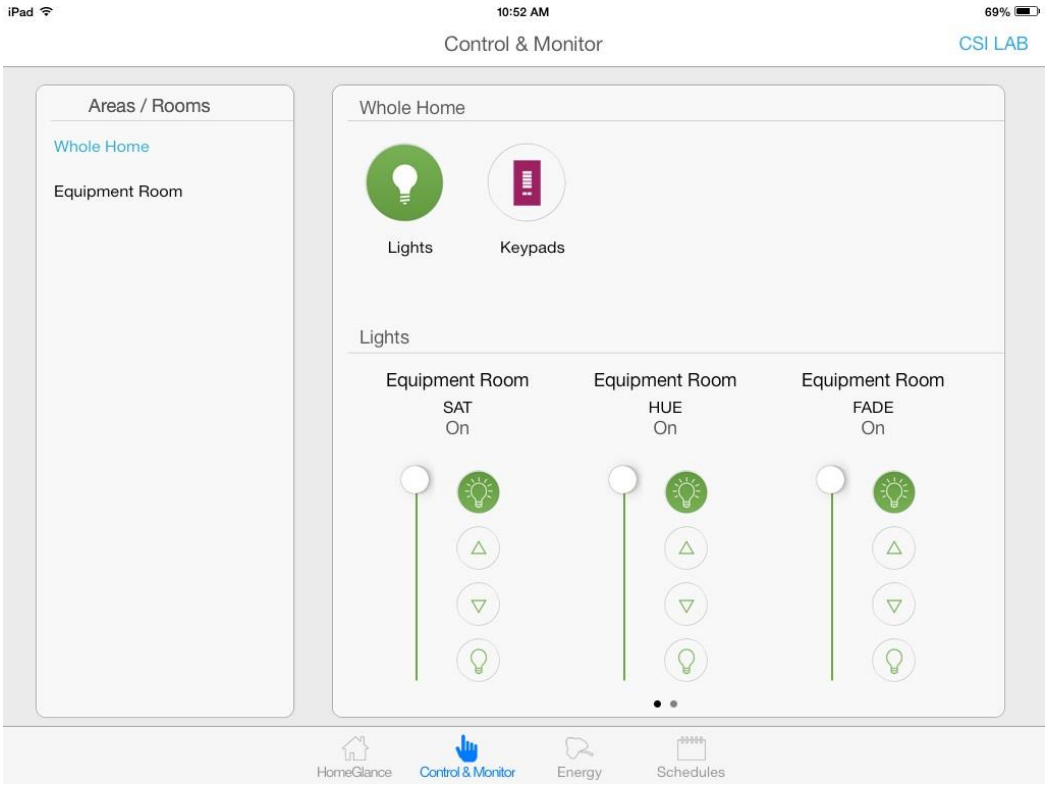

Figure 25

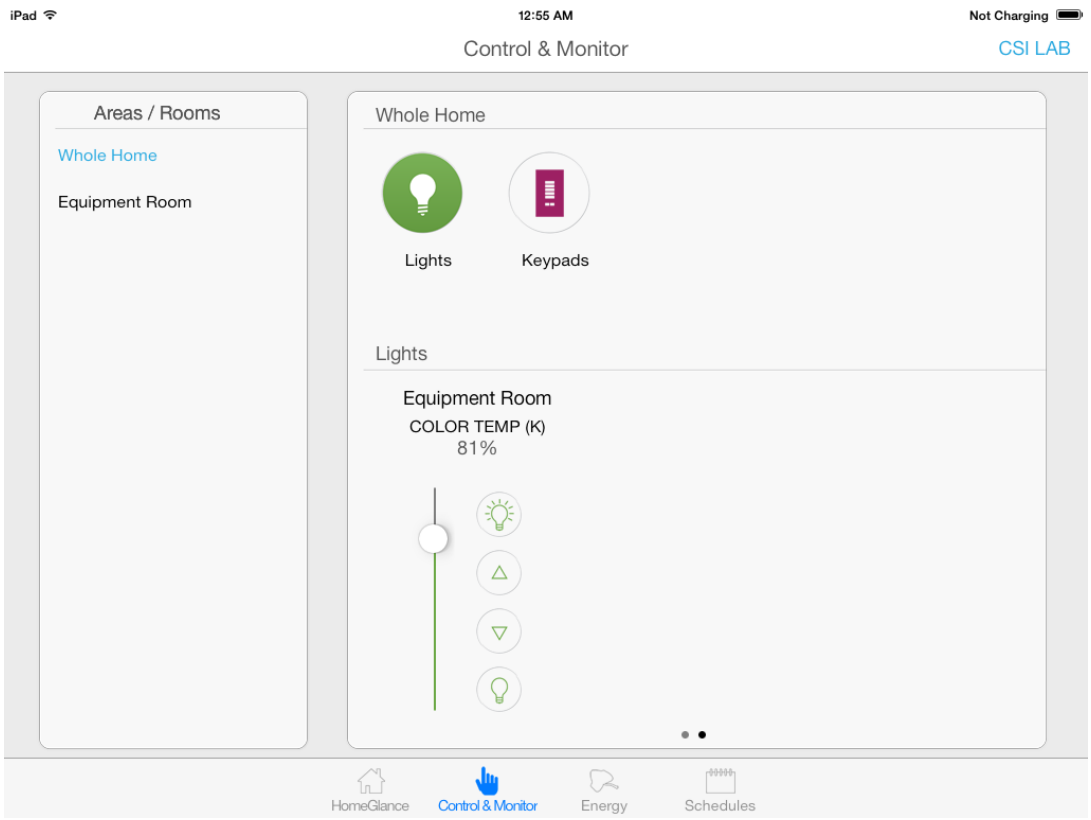

Figure 26

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 24

	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 25

Specific controller address	**Specific command that will trigger targeted controller**
2.1.1	2.1.0 or 2.0.0 or 0.0.0
2.1.2	2.1.0 or 2.0.0 or 0.0.0
2.1.3	2.1.0 or 2.0.0 or 0.0.0
2.2.1	2.2.0 or 2.0.0 or 0.0.0
2.2.2	2.2.0 or 2.0.0 or 0.0.0

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

NOTIFY Command Background Converging Systems has a **NOTIFY** function which automatically provides color state feedback (from the targeted controller) provided a unique **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.

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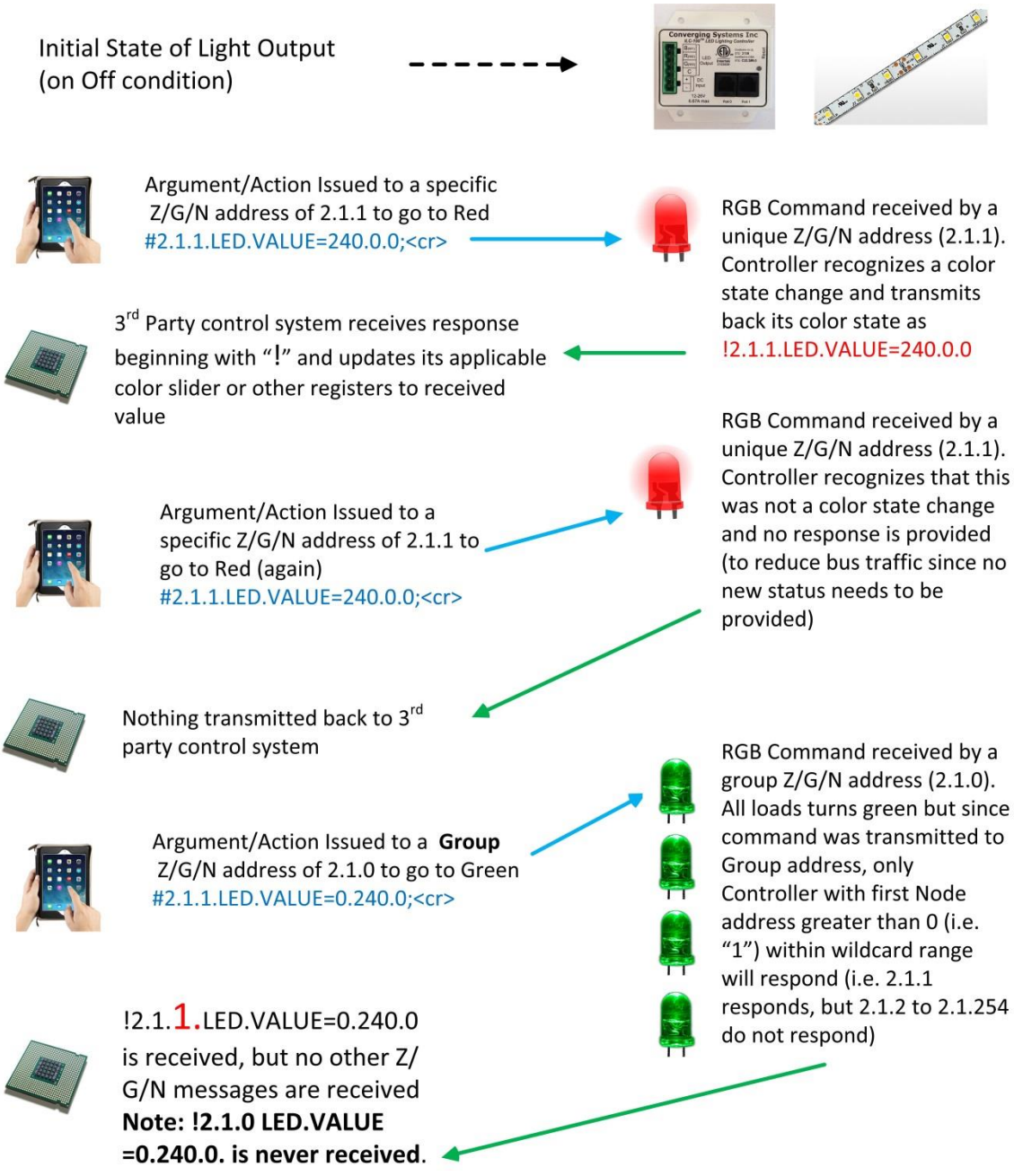

Figure 27

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Appendix 7

DMX Setup/Programming

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.)

Converging Systems e-Node/dmx Hardware/Software Setup
There are two steps required to complete the process of Integrating 3rd party DMX fixtures with many of the User Interface controls available through Lutron. These Steps have to be created in the proper sequence, first complete Step1, then complete Step 2. These steps are as follows:

Step 1	Connect the e-Node/dmx to existing 3rd DMX fixtures and discover them and assigned Zone/Group/Node addresses to fixtures using the color computer wizard native to the e-Node dmx which **Example1:** Why would you want to control a DMX fixtures with WW or WWW luminaries with two or three sliders when a single-Color Temperature Slider could suffice? **Example2:** Why would you opt for a Red, Green and Blue set of sliders to mix colors when color science can provide you with a single color control widget to select your color seamlessly?
Step 2	Link using the e-Node/dmx's innovative SLIM technology to map any button, slider, occupancy sensor or timeclock event to any LED parameter (i.e., Hue, Saturation, Brightness, Color Temperature, Circadian level, Recall, Stores, plus many more)

Now let's get started with Step 1.

Step	Action
1	Please download the "**Converging Systems Hardware/Software Setup Guide for e-Node/dmx**" from the Converging Systems website which can be navigated to at www.convergingsystems.com under

	Resources/Installation Guides/LED Lighting/Installation Guides/**Gateway (e-Node/xxx & IBT-100**) and search under "Installation Guide" for the following document "e-Node Installation, Programming and Interface Guide" Or alternatively within this page navigate the above location: https://www.convergingsystems.com/lighting_install_library.php Within this document is a link to a Quick Start Guide that will enable you to blast through Step1 in just minutes. It contains hyperlinks to most of the industry's DMX fixture types and quick instructions on how to set up the e-Node/dmx to match those fixture(s)' features and settings. In case you wish to jump directly to this invaluable document, it can be found here: www.convergingsystems.com go to Resources/Installation Guides/LED Lighting/General/Installation Guides/Gateway (e-Node/xxx & IBT-100) and search under Programming Manuals for "**e-Node/dmx Multi-Channel DMX Control**." Should you desire to learn more of the numerous options available for more sophisticated needs, feel free to peruse the full document.
2	**Warning:** Only after you have completed Step 1 above, proceed through the remainder of the instructions set forth in this Integration Note starting with the section entitled Lutron/Converging Systems Integration Process in order to enable Lutron connectivity to any function available through the e-Node/dmx using the e-Node's sophisticated color computer and SLIM technology to make Lutron connectivity seamless.

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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)

Table 26

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)								
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(24)								

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

[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.

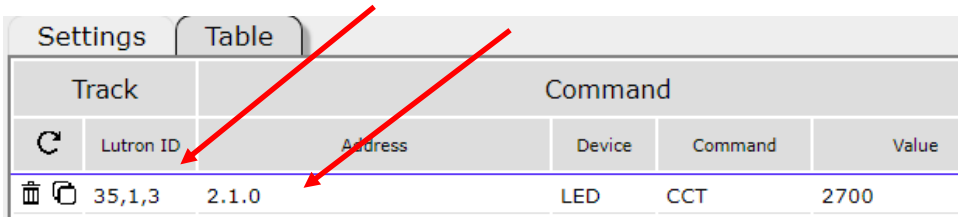
2. Forgetting to input accurate **Z**one/**G**roup/**N**odes addresses within the LUTRON tab. The factory defaults will work with some systems but certainly, if your particular lighting or motor controllers do not function, check these addresses.

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

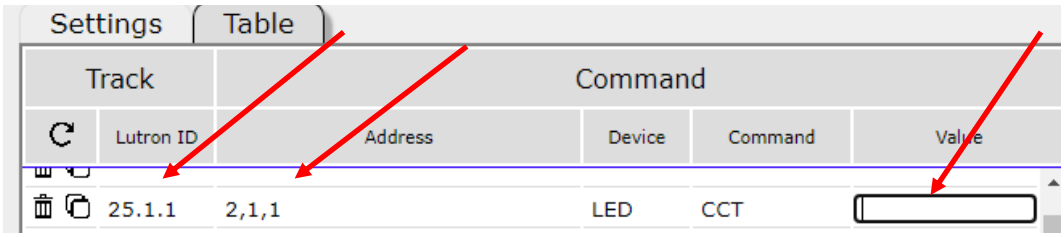
4. Forgetting to match a valid LUT for each related TRACK within e-Node Pilot or the web application.

5. Forgetting to properly use COMMAS within the Track/Lutron ID column or failure to properly use PERIODS within the Command/Address section of the e-Node Lutron Setup area.

Here is an example that works (commas with Lutron ID and periods with Address):



Here is an example THAT WILL NOT WORK (periods with Lutron ID, commas with Address) and in the Case of selecting a command that requires a value—failure to enter a value)



Appendix 10

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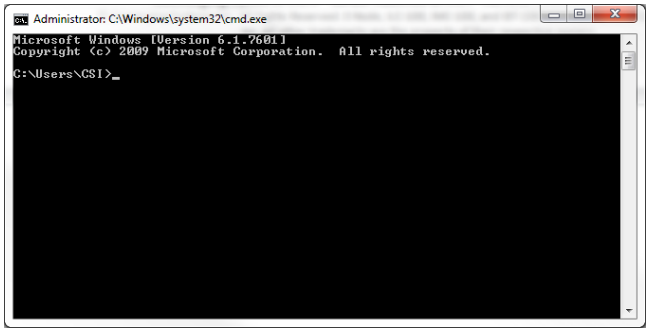
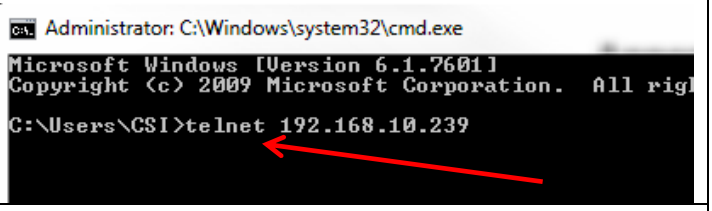
Using Telnet Tools

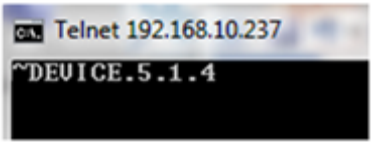
<table>
<tr><th>Step #</th><th>Step Overview</th><th>Detail</th></tr>
<tr><td>A10.1.1</td><td>Launch MS-DOS Telnet application.

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.</td><td>-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.

 
</td></tr>
<tr><td>A10.1.2</td><td>Monitor Lutron button pushes to verify if the Device ID, Button Push, and Button operation are being accurately transmitted through Telnet.</td><td>Here is representative Telnet output stream indicating that a button from the following device has been pushed.

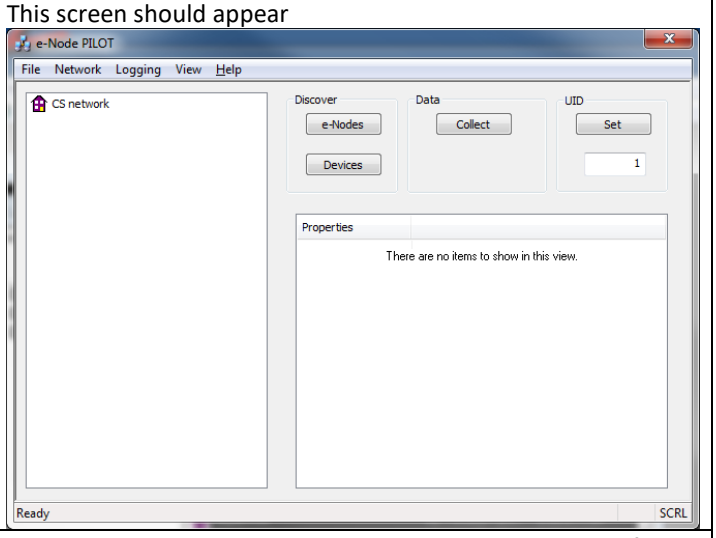
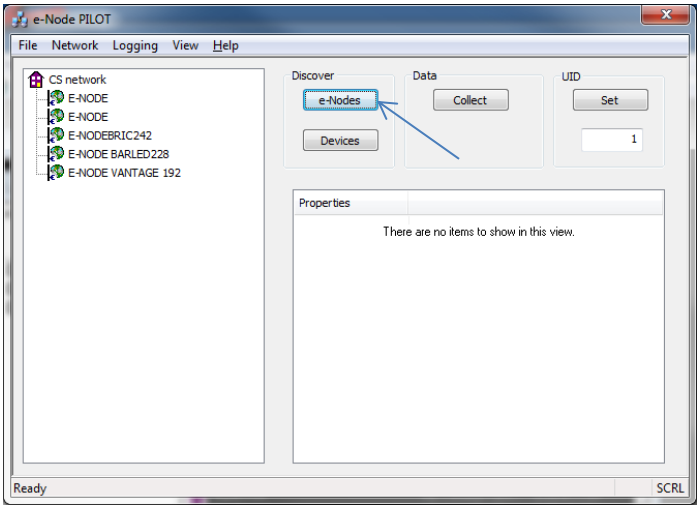
 

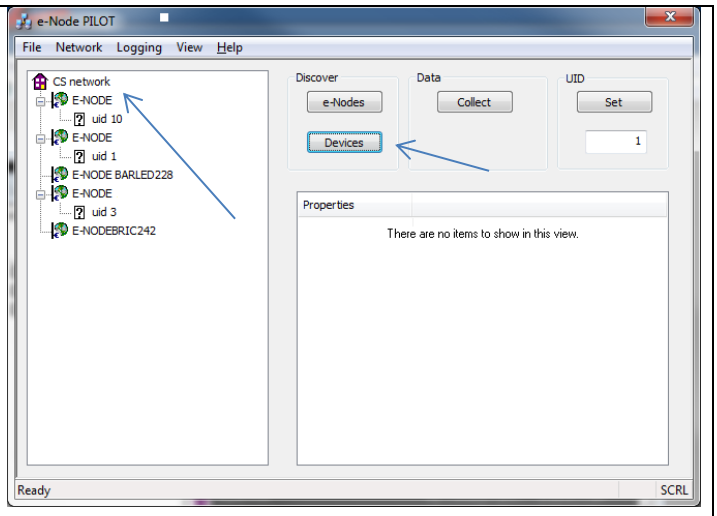
In this case, the parameters represented by this Telnet output stream represent the following:

<table>
<tr><td>Device ID</td><td>5</td></tr>
<tr><td>Button Number</td><td>1</td></tr>
<tr><td>Button Operation</td><td>4</td></tr>
</table>

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.</td></tr>
</table>

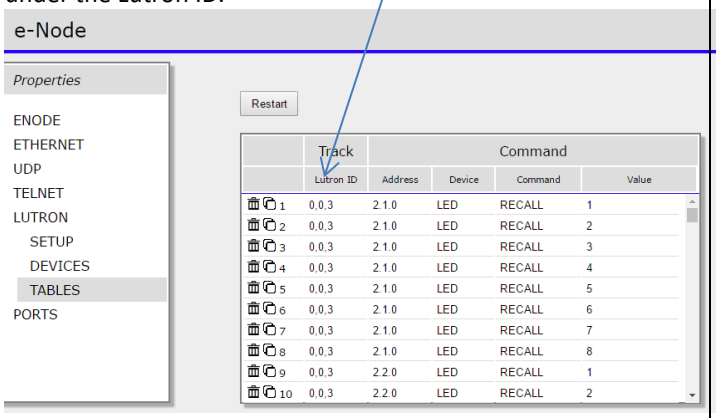
Using Converging Systems’ Tools

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

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 Keypad Device	**01**=unit #1 of 32 assignable keypad devices	**02**=unit #2 of 32 assignable keypad devices	.....	**32**=unit #32 of 32 assignable keypad devices

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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.	