LUTRON Integration Partner

CONVERGING SYSTEMS

Integration Note for QSX/RA3 Platform & e-Node 4000/4100 Gateways

Automation/ Lighting Panel Mfg.	**Lutron Electronics Co. Inc.**
Platform (See Model Numbers below for compatible hardware)	**Type A Platform (this document)** ➢ HomeWorks QSX (HW QSX) (Version 21.3) ➢ RadioRA3 (WIP) **Type B Platform (see separate document)** ➢ RadioRA2 (RA2)(V.12.10) ➢ RadioRA2 Select ➢ HomeWorks QS (HWQS) (Version 21.31) **Type C Platform (see separate doc)** ➢ 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)** 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) – see applicable Lutron platform doc. for specific platform support** 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 DesignerTM Type B platforms use Lutron Essentials™ or Inclusive™
Specific Profile/Driver Ver:	This documentation release is applicable to e-Nodes 4000/4100 platforms only and Lutron LEAP Platforms (QSX and RadioRA3) **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 Info	Converging Systems Inc.
Doc. Rev. Date	**1/22/2022**

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Creating Phantom Loads & Devices	*Appendix 11*	*Phantom Loads* *Phantom Devices*

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).
- Support of communication utilizing Telnet with authentication (Port 23) (with QS and RA2). LEAP protocol with QSX.
- 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)

Lutron Platform support/non-support matrix

Supported Features	**Non-supported/non-tested features**
Single or Dual QSX Systems	Larger systems not tested currently.
	Loads beyond those supported in dual QSX systems
Tracking of real and phantom Button Presses[1]	
Tracking of Loads (real and phantom) in Areas and direct Sub-Areas (Parent and Child Areas)[1]	Childs of Child Areas (Grand-child Areas)

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Tracking of loads (real and phantom) in Areas or Sub-Areas is possible even though they are controlled by keypads or devices in "Grand-Child" areas	Keypads and loads in Areas subordinate to Child Areas cannot be tracked (currently)
SeeTouch, Palladium and Other Hybrid Keypads	
Sensor output can be tracked, if needed, by tracking a real or phantom load (linked to those outputs with Lutron Designer) with SLIM	Sensor output cannot be tracked directly
Timeclock output can be tracked, if needed, by tracking a real or phantom load linked to those triggers (in Lutron Designer) with SLIM	Native Timeclock tracking is not possible
Button presses from Switches and Dimmers (real and phantom) can be tracked, if needed, by tracking a real or phantom load linked to those devices (in Lutron Designer) with SLIM	Tracking of connected loads to switches and dimmers is supported
Fade rate can be entered separately within the SLIM table to match Designer entries	Fade Rate of dimmers[2]
Feature being considered for future updates	Control of Lutron button LED logic
Support of Press/Release/Multi-Tap and Hold features (only if identical/matching programming is made within SLIM)	SLIM cannot create a button type and upload to Lutron Designer for control. Button type has to be programmed with Lutron Designer
CCI can be tracked, if needed, by tracking a phantom load linked to those triggers (in Lutron Designer) with SLIM.	CCI output direct
Not possible with current Lutron LEAP protocol	Ketra Vibrancy control is not monitored.
CCT control of supported LED elements from 1700K to 7000K	If CCT is set to a level outside of the range of any connected LED luminaire, the SLIM module will substitute the closest CCT value.

[1] provided they are not in areas subordinate/below areas or sub-areas

[2] It is possible to enter a matching dissolve rate though within the SLIM data field (WIP)

Tabular Summary of Supported Features

The following commands are supported by the current Smart Interface/driver for the various lighting and motor control devices.

LED Lighting Commands

Table 1

General CS-Bus Commands	Descriptive Naming Convention	ILC-100m	ILC-100c/300	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			✓	NA	NA
HSB (HSL) Color Space Commands						
FADE_UP	Fade_Up	✓	✓	✓	✓	✓
FADE_DOWN	Fade_Down	✓	✓	✓	✓	✓
SET,L	Set_Brightness	✓	✓	✓	✓	✓
HUE_UP	Hue_Up		✓	✓		✓
HUE_DOWN	Hue_Down		✓	✓		✓
HUE,H	Set_Hue_Value		✓	✓		✓
SAT_UP	Sat_Up		✓	✓		✓
SAT_DOWN	Sat_Down		✓	✓		✓
SAT_S	Set_Saturation_Value		✓	✓		✓
STOP	STOP	✓	✓	✓	✓	✓
HSV,h,s,v	Set_Preset_HLS Colorspace	NA	✓	✓	NA	N/A
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			✓		✓
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					
Accessory e-Node Command/Setup Parameters						
TLS Login with Authentication for Lutron Platforms		✓	✓	✓	✓	✓

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Telnet Login with and without Authentication (for non-Lutron platforms)		✓	✓	✓	✓	✓

Notes:

- requires FW upgrade

[1] Effect (1) only supported

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,#		✓	✓	✓
Bi-Directional Commands				
STATUS=?				
POSITION=?				
Accessory Enode Command/Setup Parameters				
UDP Port 4000/5000				
TLS Login with Authentication for Lutron Platforms		✓	✓	✓
Telnet Login with and without Authentication (for non-Lutron platforms)		✓	✓	✓

** 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

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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/supported Lutron platform, the general concept below is representative.

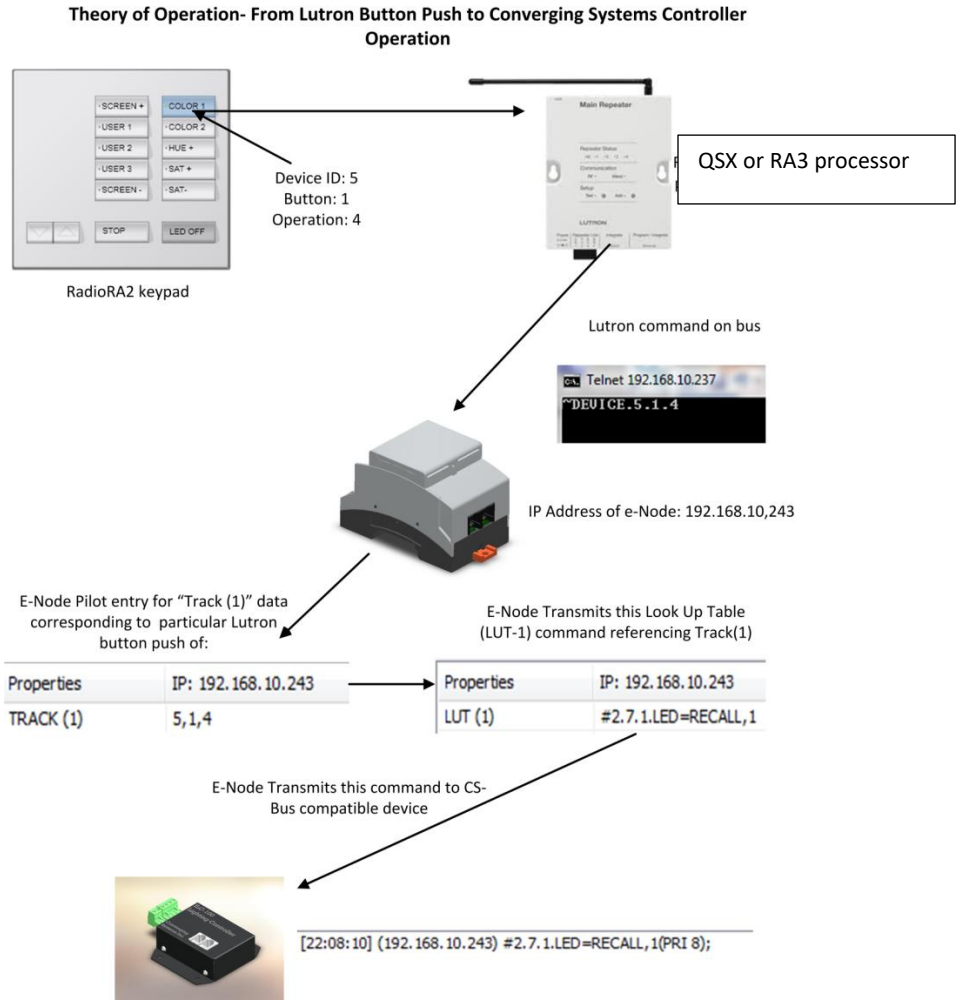

Figure 1

SYSTEM ARCHITECTURE AND REQUIRED COMPONENTS

1. WIRING DIAGRAM (for target Lutron platforms) with CS-Bus equipment

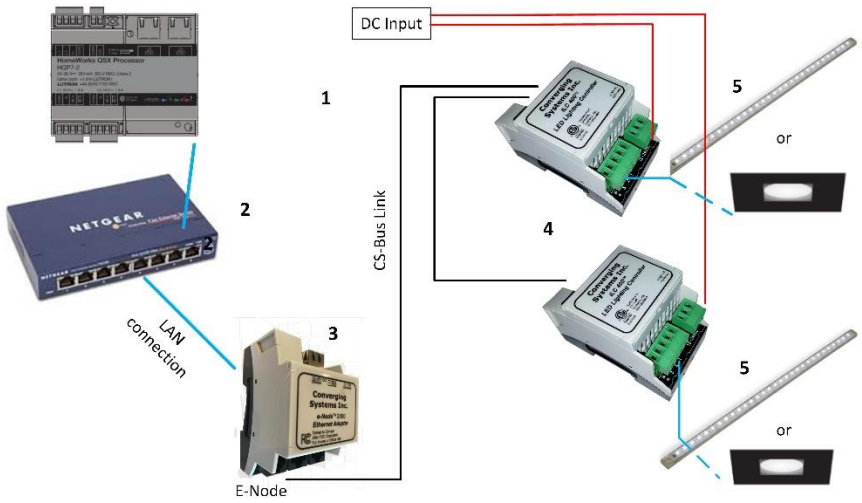

Figure 2

Wiring/Configuration Notes:

1. Maximum length of CS-Bus cabling from e-Node to the last ILC-x00 (or IMC-x00) using CAT5e or better cabling (and obeying the 1-1 pin-out requirements for the RJ-25-RJ25 cable) = 4000 feet
2. Maximum number of ILC-x00 (or IMC-x00) controllers and Converging Systems' keypads (if provided) that can exist on a single network connected to a single e-Node device = 254
3. Maximum number of e-Nodes that can exist on a Lutron system = 254

2. BILL OF MATERIALS (for Lutron)

Table 3

#	Device	Manufacturer	Part Number	Protocol	Connector Type	Notes
1	Lutron Processor (QSX-RA3)	Lutron	Varies	Ethernet	various	
2	Network Switch	Various	Various	Ethernet	RJ-45	
3	e-Node 4000/4100	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 resister on pins 3/4

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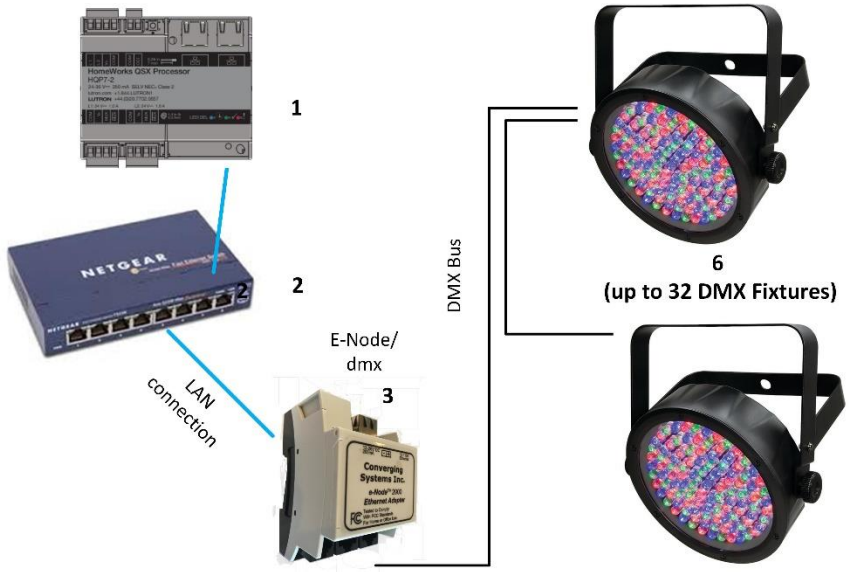
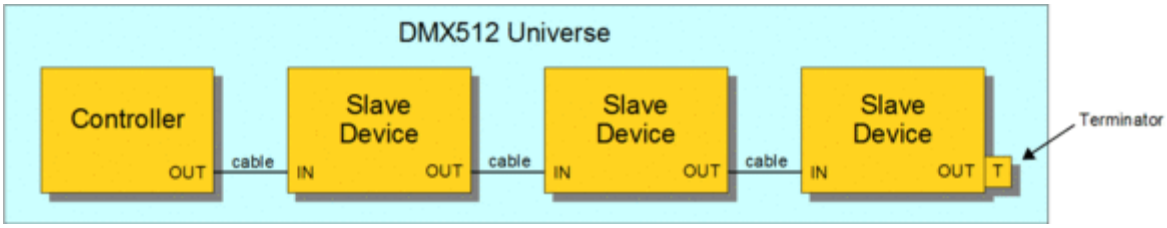
5	Flexible Linear Lighting (FLLA) RGB or RGBW luminaries	Converging Systems	FLLA-RGB-xxx FLLA-RGBW-xxx		3-color 4 pin 4-color 5 pin 1-color 4 pin	

3. WIRING DIAGRAM (for target Lutron platforms) 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 4100/DMX)

Table 4

#	Device	Manufacturer	Part Number	Protocol	Connector Type	Notes
1	Lutron Processor (QSX, RR3)	Lutron	Various	Ethernet	various	
2	Network Switch	Various	Various	Ethernet	RJ-45	

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3	e-Node/4100 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 TLS 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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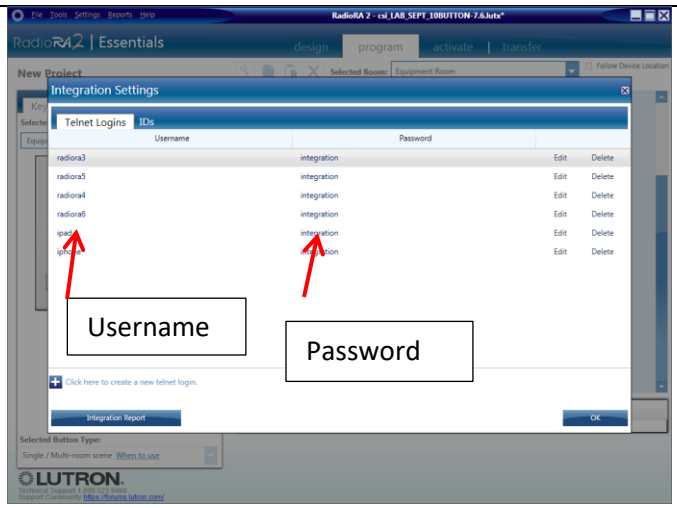
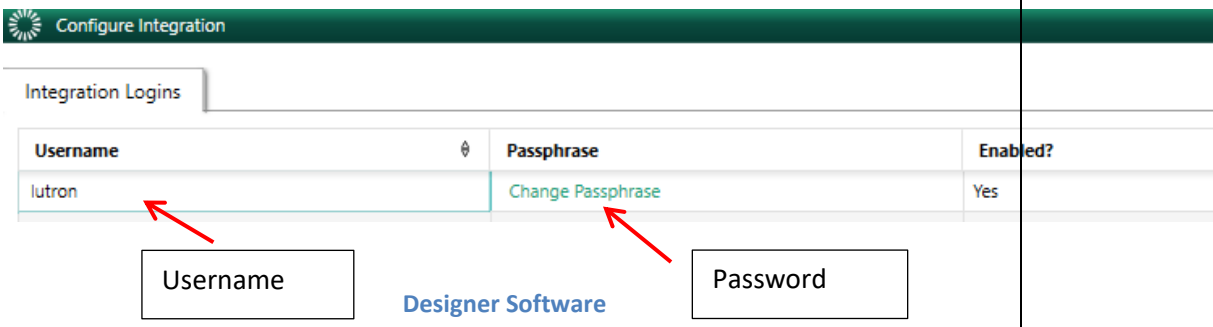
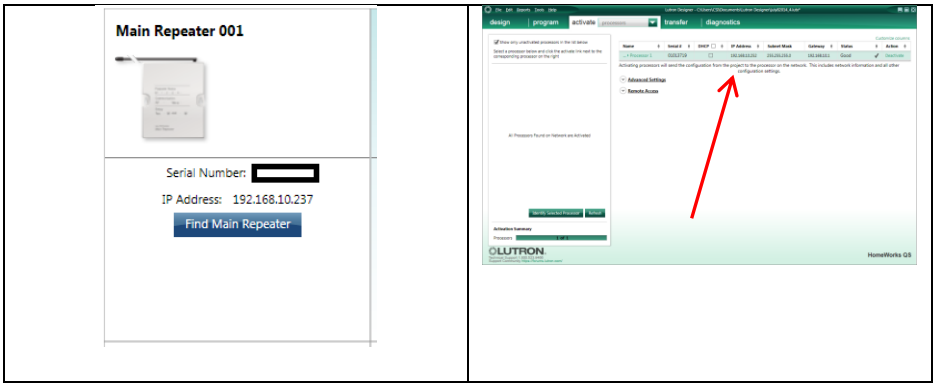
<td>


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.

Note: Within the various Lutron platforms, buttons can be created to behave in several discrete manners. Those relevant to our setup instructions are specified below. These button operations are summarized in the User Interface Reference Table as described in further detail within Appendix 1. **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.

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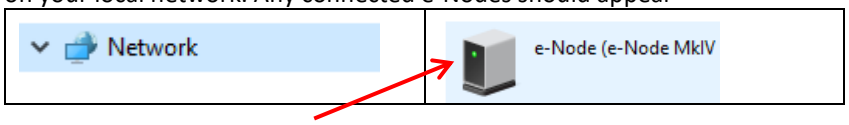
STEP 2. Enter Lutron Connectivity Credentials (from Step #1 above) into the e-Node through the new e-Node Web-Pilot application.

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 are compatible with various Converging Systems e-Node gateways (and associated lighting or motor controllers) is quite extensive. The e-Node 4x00 family is currently compatible with the following platforms. See page 1 for other documentation for other Lutron platforms.
    - Homeworks QSX[R]
    - RadioRA3[R] (WIP)
    - HomeWorks QS (WIP
    - RadioRA2[R] (WIP)
- The automatic discovery of the Device ID of any Lutron keypad, timeclock, occupancy sensor or controlled load.
- 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.

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)

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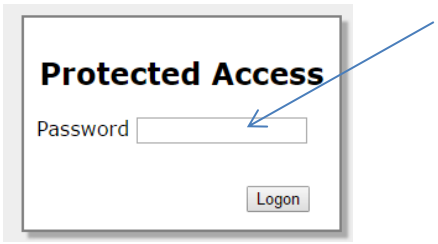
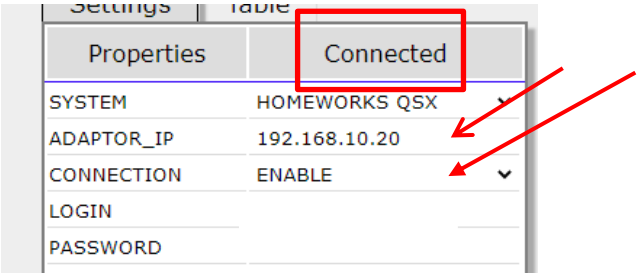
		 -Next you may be asked for a **Password**. Unless this Password has been changed, enter ADMIN and select **Logon**.  ***Note on uPnP Troubleshooting**: You may have to turn on Discovery or load the **uPnP** service on your respective computer depending upon the version or settings of Windows loaded. 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 this Integration Note).	-Select the **Lutron** tab. For example, for a QSX system, select **HOMEWORKS QSX** (or whatever platform you have that is supported). **Note**: If you want to connect Lutron QSX make sure you have a compatible e-Node. See Type A Platform compatible devices.  -Set the **ADAPTOR_IP** address for that of the Lutron processor (which address can be obtained using the Lutron Designer software setup utility package). -Enable the **CONNECTION** tab (representing the TLS or Telnet 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 4x000 supports TLS encrypted communication to Lutron LEAP processors (Type A), as well as Telnet ***Client*** communications (for communication with Lutron Type B and Type C processors) as well as Telnet ***Server*** communications

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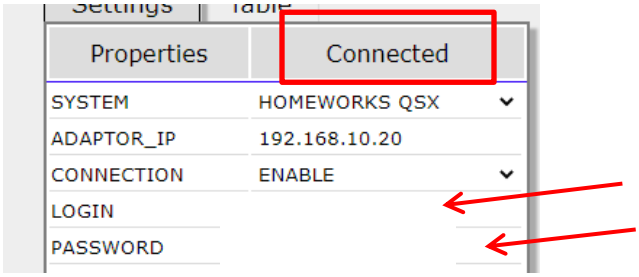
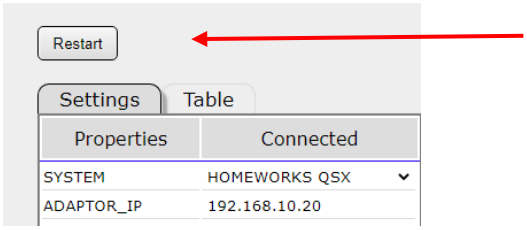
		(for communication to other third-party Control systems). Both the Client and the Service protocols can be used concurrently. The applicable communication protocol is automatically selected once the target Lutron platform is selected here.
2c	Enter LOGIN and PASSWORD credentials	-Finally enter an applicable **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.  -Within the Connection field select Enabled to establish the connection. You must wait until you see the word Connected in order to continue.
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 Modes of Operation

On a macro level, control is possible from Lutron for three distinct modes of operation.

Mode	Description	Description
A	**Lutron only**	Control of Lutron loads ***(only)*** as Lutron has documented within their provided documentation.
B	**CSI only**	Control of Converging Systems' loads ***(only)*** through the Lutron interface (as if the Converging Systems load was a supported Lutron load) as detailed within this document.
C	**Lutron/CSI coordinated output**	Parallel operation of Lutron load(s) **AND** Converging Systems' load(s). Such operations might include: -On for a Lutron device **AND** concurrent On for a CSI device -CCT of 6000K on a Lutron device **AND** concurrent CCT of 6000K for a CSI device -Circadian tracking (i.e., "Natural Show" from Lutron) **AND** CSI's Circadian tracking can both track the sun from sun-rise to sun-set. -Lutron's App "camera function" can pick the same color for output to a Lutron device **AND** to CSI device.

In general, for many operations *no special programming* is required within Lutron Designer to enable the range of support specified above. Unique programming features within the e-Node's SLIM (Lutron) tab typically enable the bulk of Mode B and Mode C operations to be easily programmed with the following exceptions:

- For Mode B operations, an unused Lutron (device) button (real or phantom) needs to be available, and/or a phantom load has to be programmed for utilization of a Ketra UI within the Lutron APP.

-For Mode C operations, where a Lutron load is required to be tracked, the e-Node programmer needs to have knowledge of the load's programmed name (appearing within Designer).

NOTE -- **Only specific button operations (Press/Release/Double tap/Hold) originally programmed within Lutron Designer can be seen by the CSI SLIM interpreter within the e-Node!** Specifically, if a **Double Tap** is desired to control a CSI device, that **Double Tap** would have needed to be programmed within Designer—the e-Node cannot alter the programming parameters within Designer but can only listen to the output strings. Therefore, it is incumbent on the e-Node programmer to fully understand the Lutron Button Type programmed within Lutron Designer in order to program the e-Node to listen to that exact Button identifier Type. ***In other words, if a Press (which we call a "3") is generated by the Lutron processor, and a Release (which we call a "4") is programmed within SLIM Tab, absolutely nothing will occur—either the button type needs to be changed within Designer (to a "4") or the SLIM programming needs to be changed to a "3."***

The next step is to understand the types of Lutron User Interfaces that can be linked to control e-Node connected loads. Now proceed to the next section.

3a. Lutron User Interface (UI) Types of Control

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 directly ***or indirectly*** to control virtually any lighting or motor control action available with any Converging Systems' products. General control of connected loads to the Converging Systems e-Node gateways occurs in two ways from the Lutron Platform:

-**Listening** to Lutron **Button** Presses (real and phantom), and/or

-**Tracking** Existing Lutron **Loads** (real and phantom)

Lutron User Interfaces can be utilized to control CSI loads **IF** they appear on the following User Interface Reference Guide (table). For those interfaces that cannot be directly listened to, their linked or connected real or phantom load can be used alternatively to indirectly monitor the activity of such non-supported User Interfaces.

Now, from the below table, click on the applicable hyperlink (i) under the particular Mode of Operation (Lutron, CSI, or combined) and (ii) under the specific Lutron User Interface Type desired.

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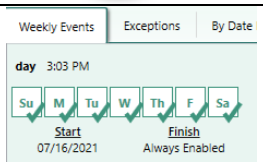
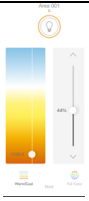
Table 5

User Interface Reference Guide

Type	Description	Image	Mode A (LUTRON)	Mode B (CSI)	Mode C (HYBRID)
LISTENING TO LUTRON BUTTON PRESSES (real and/or phantom)					
UI-1	Keypads (SeeTouch, Palladium and Hybrid) but not Dimmers or Switches		M-A	M-B1	M-C1
UI-2	Pico and Visor Remotes		M-A	M-B1	M-C1
UI-6a	Lutron APP mirroring visual representations of the above UI-1 and UI-2 devices (for Ketra UI see T-6b below)		M-A	M-B1	M-C1
TRACKING EXISTING Lutron Loads (real or phantom)					
UI-3	Dimmers and Switches		M-A	M-B2	M-C2
UI-4	Occupancy triggers		M-A	M-B2	M-C2
UI-5	Timeclock events		M-A	M-B2	M-C2
UI-6b	Lutron App/ Ketra UI		M-A	M-B2	M-C2

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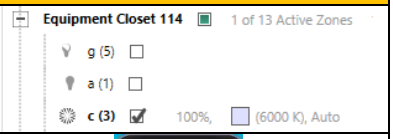
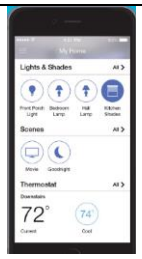
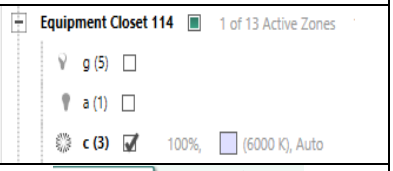
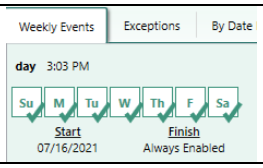
Now, review the applicable section below for system design and actual programming examples for all supported interface options.

Step 3. Mode A/B/C Documentation and Basic Examples

MODE A Documentation		
Background: For this basic **MODE A** case, user interfaces should be linked and programmed according to Lutron documentation. For completeness, all user interfaces tested and supported and referenced within this manual are listed below. Refer to applicable User Interface Types below.		
Mode	Overview	Detail
UI-1/ UI-2/ UI-3	Within **Lutron Designer/Program/Devices**, link and program button(s) to real or phantom load(s) with applicable settings	
UI-6a/ UI-6b	In general, no programming is needed here. **Note: Lutron App** auto-populates **T-1** & **T-2** devices as **T-6a** devices. In addition, the **Lutron App** populate **T-6b** devices. **T-5** devices are populated under Schedule. Dimmers and Switches are not auto-populated per se, but their connected loads are auto-populated. Note: you may expose or hide devices within the **Lutron App** itself	
UI-4	Within **Lutron Designer/Program/Occupancy,** program available states to trigger real (or phantom load(s)) with applicable settings.	
UI-5	Within **Lutron Designer/Program/Timeclocks,** program available event(s) to trigger real (or phantom load(s)) with applicable settings.	

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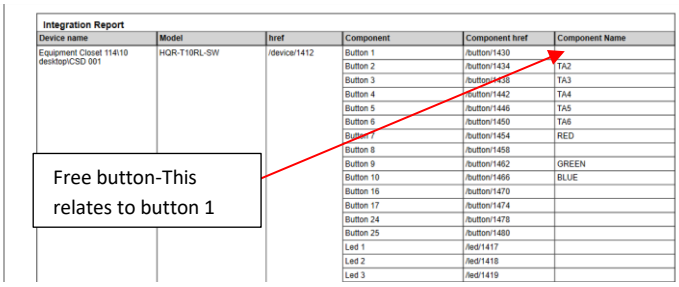
MODE B1 Documentation

Background: For this basic **MODE B1** case, a **BUTTON** on specific real and phantom devices will be used to trigger an e-Node/4x00's connected load (LED or Motor).

These directions are only appliable for UI-1, UI-2,and UI-6a user interfaces. If you have another UI Type, refer back to Table for additional guidance/hyperlinks.

Step	Overview	Detail
B1-1	Determine if you have one or more existing buttons on *already activated* keypads that could be utilized to program and control Converging Systems loads.	If so, print out or view a Lutron Integration Report to determine these numbers/parameters.  Integration Report Device name / Model / href / Component / Component href / Component Name Equipment Closet 114\10 desktop\CSD 001 / HQR-T10RL-SW / /device/1412 Button 1 /button/1430 Button 2 /button/1434 TA2 Button 3 /button/1438 TA3 Button 4 /button/1442 TA4 Button 5 /button/1446 TA5 Button 6 /button/1450 TA6 Button 7 /button/1454 RED Button 8 /button/1458 Button 9 /button/1462 GREEN Button 10 /button/1466 BLUE Button 16 /button/1470 Button 17 /button/1474 Button 24 /button/1478 Button 25 /button/1480 Led 1 /led/1417 Led 2 /led/1418 Led 3 /led/1419 Free button-This relates to button 1 The above indicates several buttons on the targeted keypad that are free to use for this type of Mode B programming. If, however, you do not find any free buttons, see if you could free up one or more buttons for use here (and reprogram with Designer). - Finally, if no buttons are available, is would be necessary to create one or more phantom devices from which to control Converging Systems' operations (**if you wish to actually have a keypad type interface**). See Appendix 11 for more information on Phantom Devices.  Tabletop Keypad *Or use our on-line look-up reference to determine button numbers for a wide variety of Lutron devices. For example, the top button (Button 1) on this keypad has the following data parameters associated with it (with our sample

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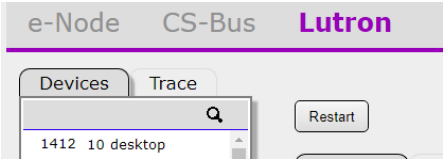
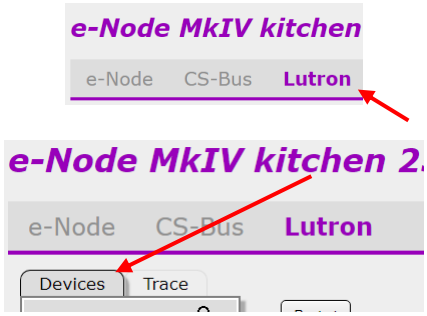
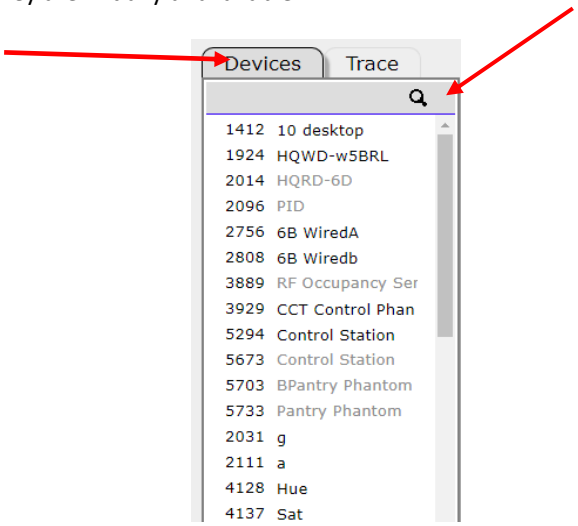
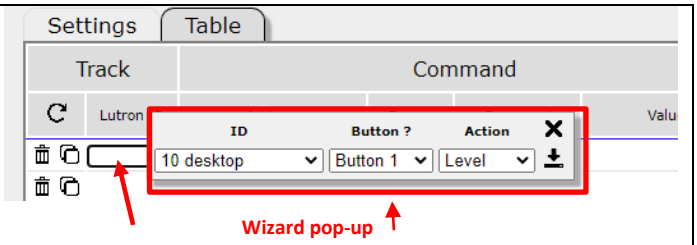
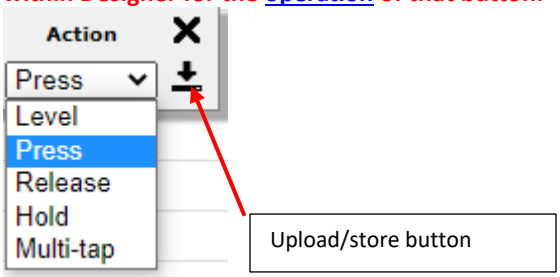
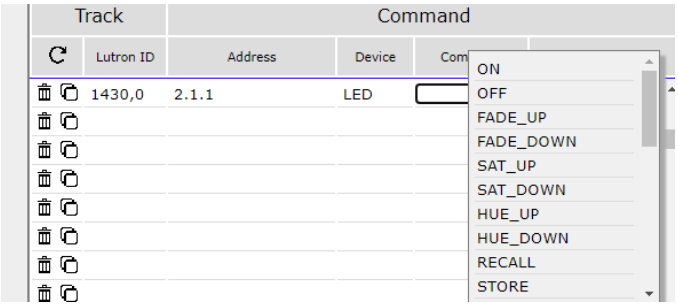
<table>
<tr>
<td></td>
<td></td>
<td>project—your assigned number for integration ID may vary). This number can also be found on the Lutron Integration report for this particular activated keypad.
Using our on-line look-up, you can easily select button number when programming in Step B1-3
 

<table>
<tr><th>Integration ID</th><th>Button #</th><th>Operation*</th></tr>
<tr><td>1412 (or similar larger #)</td><td>1 (top button)</td><td>3 for press
4 for release
5 for Multi-Tap
6 for Hold</td></tr>
</table>
*Only if programmed within Lutron Designer</td>
</tr>
<tr>
<td>B1-2</td>
<td>Proceed to the Lutron Tab within the e-Node Webpage and select “Devices”
 
</td>
<td>Wait for a few seconds or more for all available entries to auto-appear (for larger projects this might take up to 60 seconds). This list will contain devices and loads. You only have to concern yourself here with DEVICES where their names appearing will mirror their assigned names within Designer (and viewable within the Lutron Integration Report). You may have to select the spyglass to re-discover devices if they are initially unavailable.
 
</td>
</tr>
<tr>
<td>B1-3</td>
<td>After discovering Lutron DEVICES, select the “Table”</td>
<td>Find an unused programming line, and right click under Lutron ID to expose the Lutron Button Wizard (pop-up).</td>
</tr>
</table>

		 -**ID**. Select the applicable pre-populated ID (device) name to start your device programming (here "10 desktop"). -**Button**. Next select the Button that you wish to program from the pulldown (you can select the ? for a full listing of button numbers). (Here select 1) -**Action**. Select from one of the available choices (but not Level). **Note: These choices must match what was programmed within Designer for the operation of that button.**  -Finally, hit the upload button when finished to proceed.
B1-4	You are now ready to select the (i) **Address** of the lighting or motor controller connected to the e-Node in ZGN format ("ZGN Address"), and its (ii) desired Action ("**Command**") and "**Value"** (if applicable for that Command) which will trigger when the Lutron ID is sensed.	Fill in required entries to define what this (Lutron) button will do. Here, under **Address** you will find the **Z**one, **G**roup, **N**ode address (in this example 2.1.1), the CSI Device Type (in this case LED) and from the pulldown any supported Command selected.  **Address** -Enter your specific Zone, Group, Node address (here for our example we have entered 2.1.1) **Device** - Select **LED** or **Motor** as applicable from the pulldown

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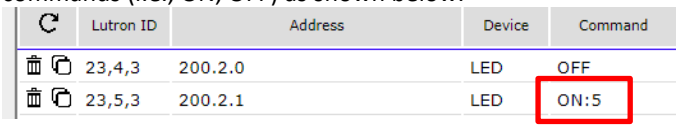
Command - For the selection in the above step, select the applicable command that you wish this button to trigger (i.e., if you wanted the button to turn on the LEDS pick **ON**).
VALUE- For specific commands such as STORE, RECALL, CCT, HSV, HUE, SAT, SET, R*, G*, B*, W*, RGB*, RGBW*, you should enter the value as appropriate. Here is an example of possible values:

Command	Description of possible values	Example
STORE, RECALL	Value from 1~24	1 (is the 1st storage location)
CCT	Values from 1700K ~ 7000K	2700 is for a CCT of 2700K (no K to be entered in value)
HSV	h.s.v (value for each from 0 ~240)	0.240.240 Is Red, full SAT, and full brightness (also 240.240.240 is identical too)
HUE	H (values from 0~240)	80 is green 160 is blue 0 or 240 is red
SAT	S (values from 0 ~240)	240 is full saturation-that means no white 0 is no saturation which means the color has been tempered with White
SET	V (value from 0 ~240) "Set" is our word for brightness	0 is off 120 is half brightness 240 is full on
R*	R (values from 0 ~240)	0 is off 240 is full Red
G*	G (values from 0~240)	0 is off 240 is full Green
B*	B (values from 0~240)	0 is off 240 is full Blue
RGB*	r.g.b (values for each from 0 to 240)	240.0.0 Is full red
RGBW	r.g.b.w (values for each from 0 to 240)	240.0.240.0 Is magenta (red and blue combined)

*We recommend against using these options except in special circumstances—HSV is a much better color model which permits accurate dimming.

Note on using Dissolve Rates

You can also adjust the fade/dissolve rate for specific commands (i.e., ON, OFF) as shown below.



	Lutron ID	Address	Device	Command
	23,4,3	200.2.0	LED	OFF
	23,5,3	200.2.1	LED	ON:5

Sample commands which support dissolves	Syntax	Legend
ON with dissolve rate	ON: x Manually enter as shown above with colon	X is seconds
OFF with dissolve rate	OFF:x Manually enter as shown above with colon	X is seconds

That is, it, after you have selected the Command (and Value if required with Command), your programming for this button is complete. Now just continue onto an unused line for your next **DEVICE** programming step entry.

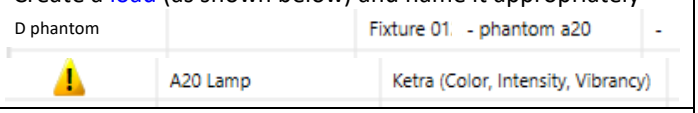
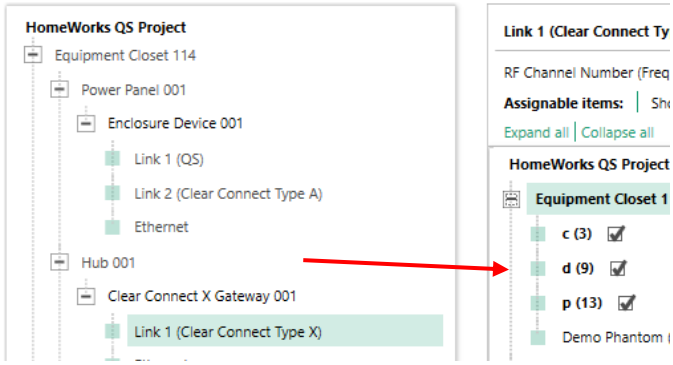
MODE B2 Documentation

Background: For this more advanced **Mode B2** case, a **load** (real or phantom) linked to a real or phantom button press, sensor trigger, or Ketra UI panel selection (***but programmed within Lutron Designer for that linkage***) will be used to monitor and derive status from that load in order to mimic that load's output (where applicable) on an e-Node/4x00's connected load (LED or Motor).

-These directions (B2-G1 onwards) are only applicable for UI-3, UI-4, UI-5 user interfaces.
-In you desire to have a UI-6b user interfaces control an e-Node load, you will need to create a phantom Ketra load (see below).
-If you have another type of UI, refer back to Table for additional guidance.

Type 6b- Phantom Load Note: In order for Mode B2/UI-6b User Interface (i) to be displayed on the Lutron APP and subsequently (ii) to be able to control a CSI lighting load, **a phantom Ketra load needs to be created within Lutron Designer**. This becomes the "load" that the UI-6b user interfaces will track. Proceed to Step B2-P1 below first before proceeding to the general directions provided thereafter (Step B2-G1). For more on Phantom Loads, see Appendix 11.

NOTE: If you have no need to control a CSI load similarly to how a Ketra load is controlled on the Lutron App, simply skip Steps B2-P1/P3, and proceed to Step B2-G1

Step	Overview	Detail
	Creating a Phantom Ketra Load (for Type 6b operation)	
B2-P1	Within **Lutron Designer/Design/loads** create a phantom Ketra Load	-Create a load (as shown below) and name it appropriately 
B2-P2	Within **Lutron Designer/Link assignment** assign that phantom Ketra Load to an applicable Clear Connect Type X gateway	 -Click on check box to assign our newly created Ketra phantom load "d"(9) above. -To verify it has been assigned properly (and eliminate warning seen in Step B2-P1), go back to **Design/Loads** and make sure the warning triangle has disappeared 

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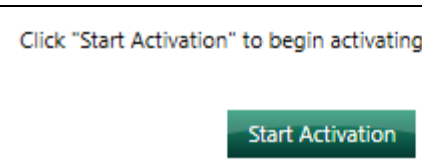
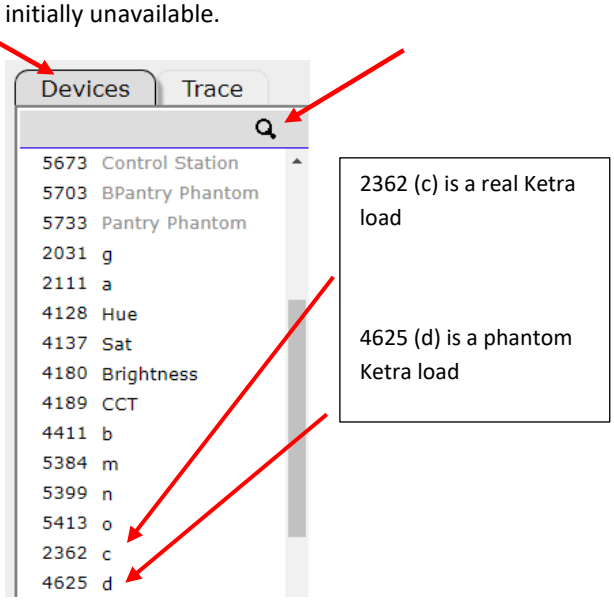
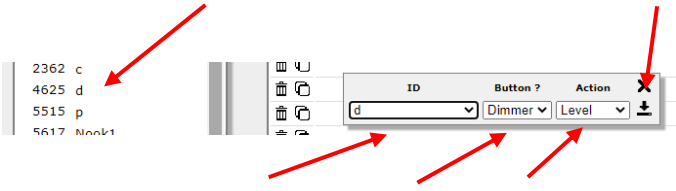
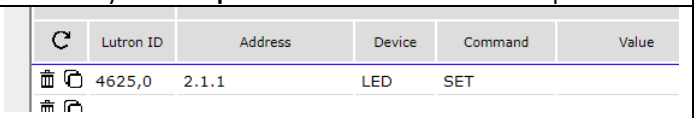
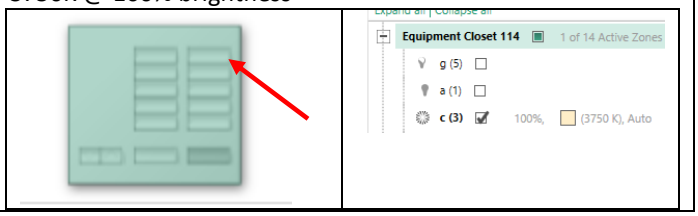
B2-P3	Upload change to Lutron processor through the **Activate** screen	
Directions for Linking Loads (real or phantom) with a Converging Systems load		
B2-G1	Proceed to the Lutron Tab within the e-Node Webpage and select "Devices"	-Wait for a few seconds or more until all available entries auto-appear (including any new Phantom loads created above). -This list will contain devices and loads (real and phantom). You only have to concern yourself here with **LOADS** where their names appearing will mirror their assigned names within Designer. Wait until all available entries appear. You may have to select the spyglass to re-discover devices if any are initially unavailable. 
B2-G2	Select Table and an unused row to perform your programming to monitor a **Load.** 	In this case since we are controlling only a CSI device (and not a Lutron Mode 1 fixture), we can use the phantom load created in Steps B2-P1/3 above. Here the phantom Ketra load appears as "d."  -**ID**. Select the applicable pre-populated ID name for your targeted **LOAD** to start your LOAD programming. -**Button**. Next select for the Button type **DIMMER** to monitor the variable output generated by Lutron for this load. -**Action**. Once **DIMMER** is selected, select **LEVEL** which is applicable choice here to complete this step.

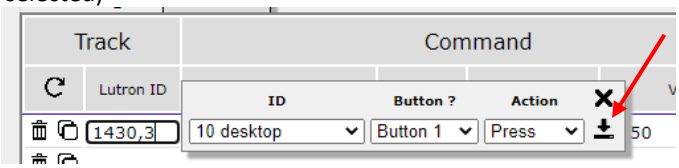
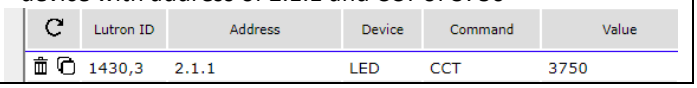
		And finally hit the **upload** button when finished to proceed.
B2-G3	You are now ready to select the (i) **Address** of the e-Node connected controller ("ZGN Address"), and its (ii) desired Action ("**Command**") and "**Value"** (if applicable for that Command) which will trigger when the Lutron ID is sensed.	 Fill in required entries to define how this load monitoring will operate. **Address** -Enter your specific **Z**one, **Group**, **Node** address (here for our example we have entered 2.1.1) **Device**- Select **LED** or **Motor** as applicable from the pulldown **Command**-For the selection in the above step, enter **SET** (don't be confused with all of the other choices—**SET is the wildcard here that monitors everything that you will need**). **Address – No Value** is needed here since the "0" entered under Lutron will be tracking a variable string. That is, it, after you have completed the above for a single line, your programming for this LOAD is complete. Now just continue on an unused line for your next **LOAD** programming entry.

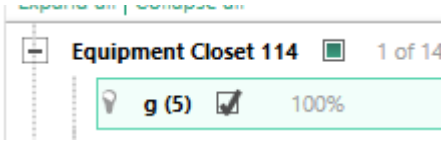
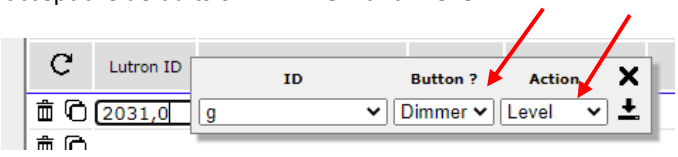
MODE C1 Documentation

Background: For this hybrid **MODE C1** case, a **BUTTON** on specific real and/or phantom devices will be used to trigger an e-Node/4x00's connected load (LED or Motor). For more on how to create a Phantom Device, see Appendix 11.

These directions are only appliable for UI-1, UI-2,and UI-6a user interfaces. If you have another type refer back to Table for additional guidance.

Step	Overview	Detail
C1-1	-Make sure that Lutron linkages have been made as per Mode A and -CSI linkages have been made as per Mode B1	Refer to the following steps for relevant examples.
C1 Ex 1	**Example 1**. Here, Button 1 on a 10-button desktop will control a Ketra bulb at 3750K @ 100% brightness as well as CSI load to the same CCT and brightness	-Set Lutron programming within Designer for "c" load to 3750K @ 100% brightness 

		-Set SLIM Table programming (button 1 on 10 button keypad selected)  -Set SLIM Table programming for above button to control CSI device with address of 2.1.1 and CCT of 3750 

MODE C2 Documentation		
Background: For this more advanced **Mode C2** case, a **load** linked to ***a real or phantom*** button press, sensor trigger, or Ketra UI panel selection (***but programmed within Lutron Designer for that linkage***) will be used to monitor and derive status from that load in order to mimic that output (where applicable) on an e-Node/4x00's connected load (LED or Motor). For more on how to create a Phantom Device, see Appendix 11. These directions are only applicable for UI-3, UI-4, UI-5, and UI-6b user interfaces. If you have another type refer back to Table for additional guidance.		
Step	Overview	Detail
C2-1	-Make sure that Lutron loads have been established and programmed as per Mode 1 and -CSI linkages (to those loads) have been made as per Mode 2b	Refer to the following steps for relevant examples.
C2 Ex.1	**Example 1**. Create a scenario where an Lutron occupancy sensor will control a standard incandescent bulb (controlled by Lutron) to 100% (for occupied state) as well as a monochrome CSI load to the same 100% brightness.	- Set Lutron programming within Designer for "g" load to 100% brightness  - Set SLIM Table programming for "g" load to track load and accept the defaults of "**Dimmer**" and "**Level**." 

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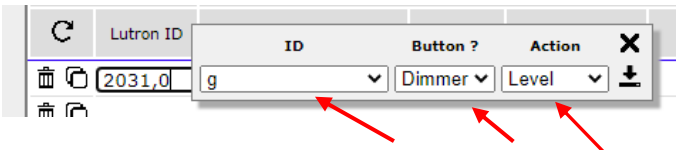
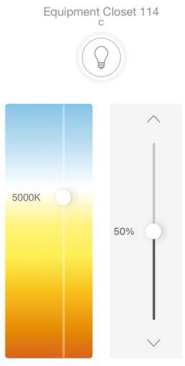
		- Set SLIM Table programming for above button to control CSI device with a **ZGN** address of 2.1.1 and brightness tracking the "master" Lutron load by setting it to SET (see below) **without a value.** 
C2 Ex.2	**Example 2**. Create a scenario where an Lutron occupancy sensor will control a standard incandescent bulb (controlled by Lutron) to 50% (for occupied state) as well as a monochrome CSI load to the same 50% brightness. **Note**: In this load tracking scenario, the CSI load can only track the same brightness level of the "master" (Lutron-load). It is impossible for the CSI load to be set to a different brightness level.	- Set Lutron programming within Designer for "g" load to 50% brightness  - Set SLIM Table programming for "g" load to track load and accept the defaults of "**Dimmer**" and "**Level**."  -Set SLIM Table programming for above button to control CSI device with address of 2.1.1 and brightness tracking the "master" Lutron load by setting it to SET (see below) **without a value**. 
C2-Ex.3	**Example 3**. Create a scenario where a Ketra UI will control a Ketra bulb at 5000K @50% brightness as well a CSI full color load to 5000K but at 60% brightness.	-Ketra User Interface on Lutron App will auto-appear without any additional programming  **Note**: Simple move CCT to 5000K on the Lutron APP and set brightness to 50%

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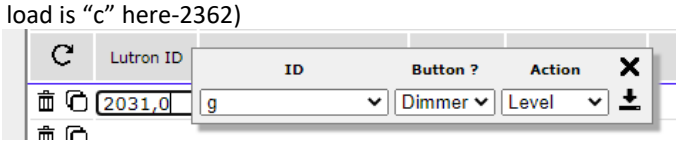
		-Set SLIM Table programming to track for Ketra bulb (Ketra load is “c” here-2362)  -Set SLIM Table programming for above button to control CSI device with address of 2.1.1 and CCT of 3750 

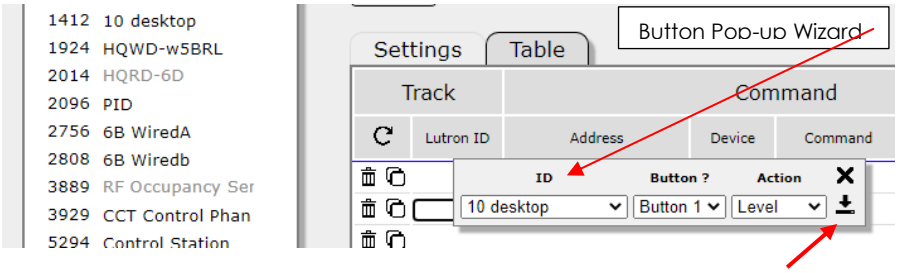
STEP 4. Extended Detail/Examples for SLIM Programming

There are 512 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 monitored load to trigger a Converging Systems operation, or
- Any Lutron phantom slider movement to trigger a Converging Systems operation, or
- The Lutron Ketra UI to control a supported full color/Tunable white Converging Systems' load

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.

Step	Step	Detail
4a	Example 4S-1	**Challenge:** Program the top button on a 10-button keypad to invoke a Recall,1 (to recall a color or CCT level stored in Preset 1).  -Find an available unused programming line and right click to expose **Pop-up Wizard** -Select the **10 desktop** and select from the pulldown the Button # -Select the **Action** (typically a press or a release or whatever was programmed within Designer. -Hit **upload** icon. -Next finish the programming by entering the Z/G/N **Address** (with periods) under Address. -Select the **Device** type (LED, MOTOR, or Key). -Select from the pulldown the applicable command (find **Recall** here). -And finally, if that command needs a modifier (VALUE) enter that. In this case since we want **Recall #1** so enter 1 here.

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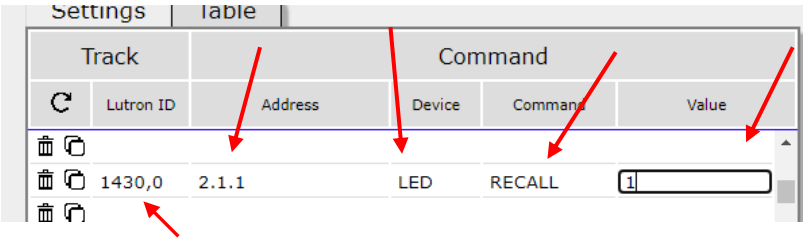
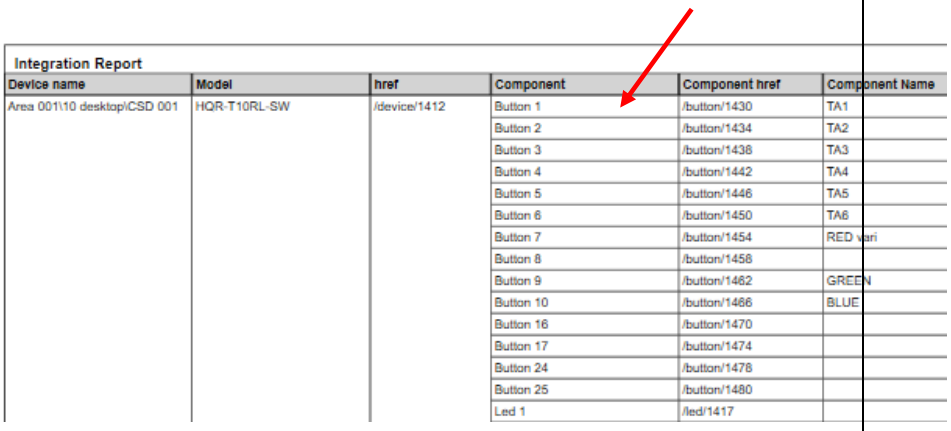


PRO TIP You will see the Lutron ID above matches the same number that appears on the Lutron Integration Report



Integration Report

Device name	Model	href	Component	Component href	Component Name
Area 001\10 desktop\CSD 001	HQR-T10RL-SW	/device/1412	Button 1	/button/1430	TA1
			Button 2	/button/1434	TA2
			Button 3	/button/1438	TA3
			Button 4	/button/1442	TA4
			Button 5	/button/1446	TA5
			Button 6	/button/1450	TA6
			Button 7	/button/1454	RED vari
			Button 8	/button/1458	
			Button 9	/button/1462	GREEN
			Button 10	/button/1466	BLUE
			Button 16	/button/1470	
			Button 17	/button/1474	
			Button 24	/button/1478	
			Button 25	/button/1480	
			Led 1	/led/1417	

Note On DID for User Interfaces. The starting **DID** number each UI device along with its Lutron alias name will appear within the **Auto-Discovery** field (see “1412” above). If you were to look at **Designer/Reports/Integration** for each UI device, you would see the identical (starting or seed) DID number (i.e., 1412 here) as well as a neighboring DID for each button/and related button LED on that device. Here button 1 and LED 1 have the address of “1412” and “1417” respectively.

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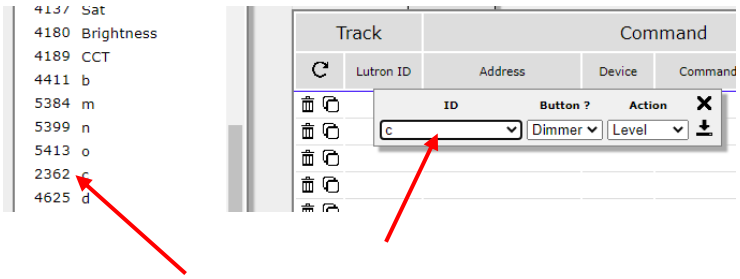
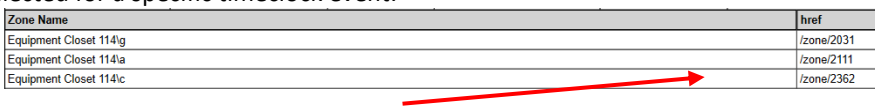
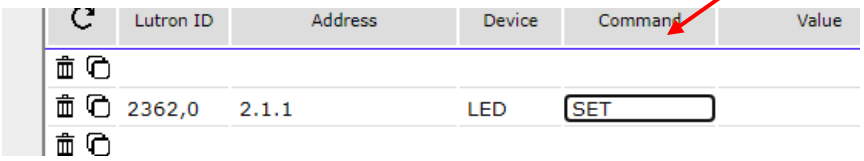
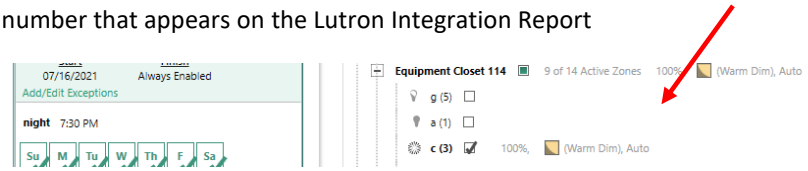
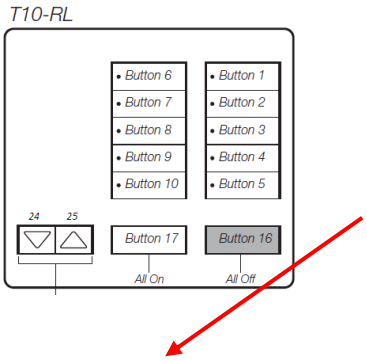
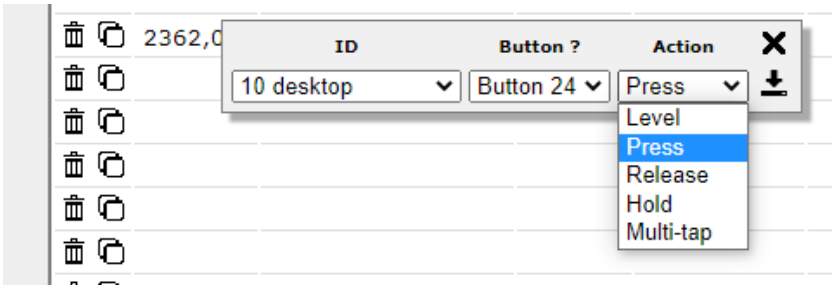
4b	Example 4S-2	**Challenge:** Monitor a **load** that a timeclock event is triggering. **Note**: A timeclock event might just be turning on a monochrome light to a certain brightness or a Ketra bulb to a specific color temp/brightness. For this example, let's monitor the Ketra bulb's CCT and brightness.  You can always open the Lutron Integration Report to confirm you have the correct load selected for a specific timeclock event.  -Find an available unused programming line and right click to expose **Pop-up Wizard** -Select the **Ketra "c" load** and since this is a load that you will be tracking, select **DIMMER** for **Button Type** and, -Select **LEVEL** for **Action** (as shown above). -Hit **upload** icon. -Next finish the programming by entering the Z/G/N **Address** (with periods) under Address. -Select the **Device** type (LED, MOTOR, or Key). Enter LED here. -Select from the pulldown the command entitled **SET** (which must be used to track variable loads). -DO NOT ENTER ANY MODIFIERS here, for SET is programmed to monitor everything rather than just one parameter. 

		PRO TIP Background Information. It may be difficult sometimes to properly identify the load that is connected to the triggering event such as an occupancy sensor or timeclock event. For assistance, simply go into Designer and find the triggering event and note the connected load's alias. Here you can see that the Lutron ID above matches the same number that appears on the Lutron Integration Report 

4c	Example 4S-3	**Challenge:** Program a Lutron UI with raise and lower buttons to raise and lower CSI connected lighting loads until such time as the button is release (when a STOP will be issued). -Select a Lutron UI with applicable raise/lower buttons. You can always determine the button number for any targeted operation by clicking on the **?** in the Button Pop-up Wizard  -Within the Pop-Up Wizard, pick the **10 desktop** -Pick **Button 24** (for fade down) -You will program this first button in two manners. One for when it is <u>pressed</u> and another for when it is <u>released</u>.  -Select Press and hit upload.

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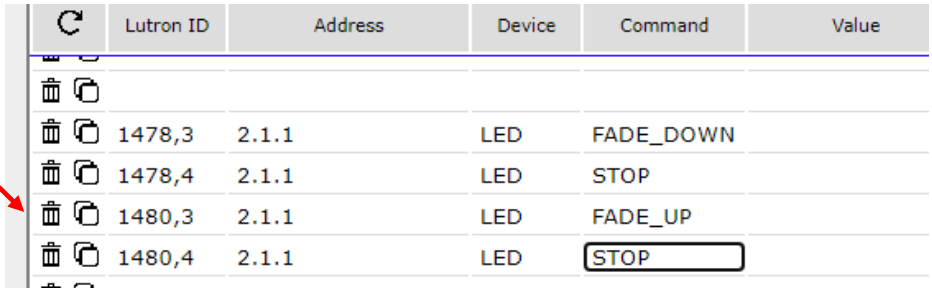
-Then enter the **Z.G.N Address** (as appropriate), The Device Type (**LED**), and the command. Within Lutron UIs the left button is always Fade Down, while the right button is Fade UP.
-Then you will make a new entry for the "release" condition and tie that to STOP
-Then continue for Button 25 for FADE_UP and STOP



	Lutron ID	Address	Device	Command	Value
	1478,3	2.1.1	LED	FADE_DOWN	
	1478,4	2.1.1	LED	STOP	
	1480,3	2.1.1	LED	FADE_UP	
	1480,4	2.1.1	LED	STOP	

PRO TIP

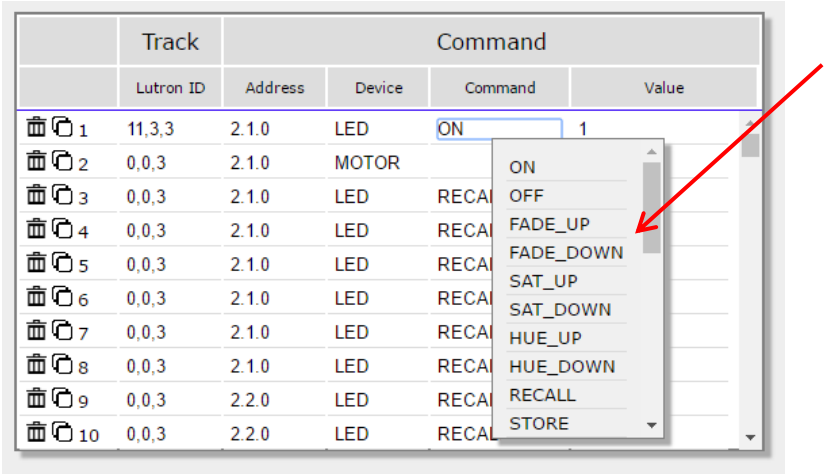
Shorthand Tricks.

-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: 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.



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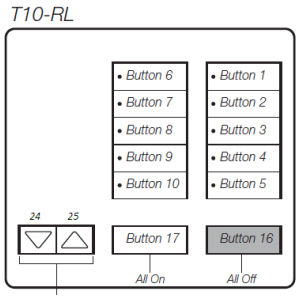
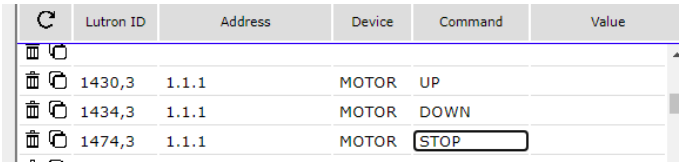
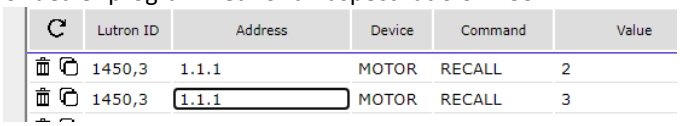
4d	Example 4S-4	**Motor Control Challenge:** Program a Lutron UI with raise and lower buttons to raise and lower a projection screen. -Select a UI that is applicable for the control of motors.  -With the background of the above examples, program Button 1 for a Raise and Button 2 for a lower and Button 17 for a Stop.  Lutron ID / Address / Device / Command / Value 1430,3 — 1.1.1 — MOTOR — UP 1434,3 — 1.1.1 — MOTOR — DOWN 1474,3 — 1.1.1 — MOTOR — STOP PRO TIP Projection Screens with Presets. Converging Systems motor controllers for masking screens have the concept of Store Presets and Recall Presets for different aspect ratios. Here is an example where **Button 6** above will go to **Preset 2** which might be factory or dealer programmed for an aspect ratio of 16:9. **Button 7** will be programmed to go to **Preset 3** which might be factory or dealer programmed for an aspect ratio of 2.35:12  Lutron ID / Address / Device / Command / Value 1450,3 — 1.1.1 — MOTOR — RECALL — 2 1450,3 — 1.1.1 — MOTOR — RECALL — 3
4e	Example 4S-5	**Tracking Lutron's Natural Show.** Please refer to separate document "Circadian Tracking Tech Note-Homeworks QSX for more information here.
4f	Additional Programming Info	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 Troubleshooting section.

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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**, 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
HomeWorks QSX	HWQSX
RadioRA3	RA3 Keypad Button Logic

1A. HWQSX 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 HWQSX 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

User Interface Output
Table 6

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

Detail

BL-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.

BL-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.

BL-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.

BL-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.

BL-5 - 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.

BL-4 - Special FADE ("RAISE", "LOWER"). Within HomeWorks QSX, 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 7

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**		
BL-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
BL-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
BL-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.	
BL-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**		

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BL-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
BL-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**		
BL-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.	
BL-3B	Toggle with Hold ("TGH")				"**5**"	 **Application**: Not generally recommended	Room
BL-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.	
BL-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**		
BL-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 BL-x) 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 BL-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 BL-3A situation, but until as a new release is made, if a toggle-type operation is required, simply substitute a Type BL-1C format instead.

1B. Keypad Button Logic

(WIP)

Section 2-- Keypad Button IDs

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 TRACE window to press a button to see its Button ID.

Section 3—Lutron Button LED Logic (HWQSX 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 RadioRA3).

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.

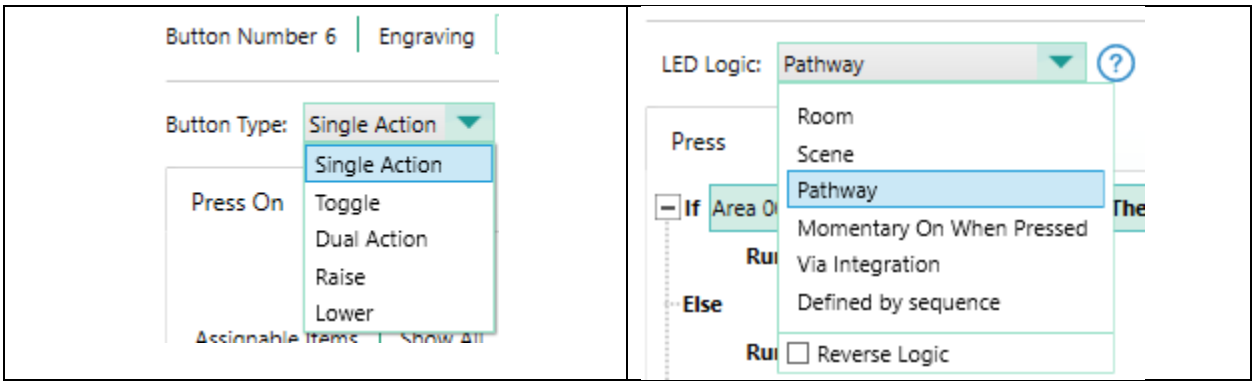

Figure 3

Table 8

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		✓		✓	
Scene	LED will be on if all Zones on at specific level			✓		✓
Pathway	LED will be on if all Zones on any level			✓	✓	
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.

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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.

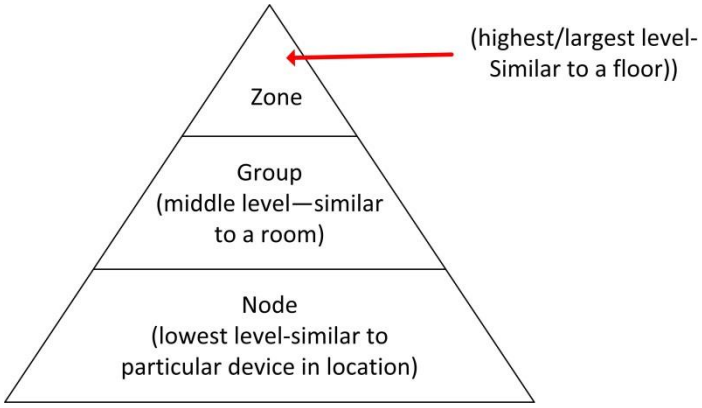

Figure 4

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

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

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

Table 9

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.**

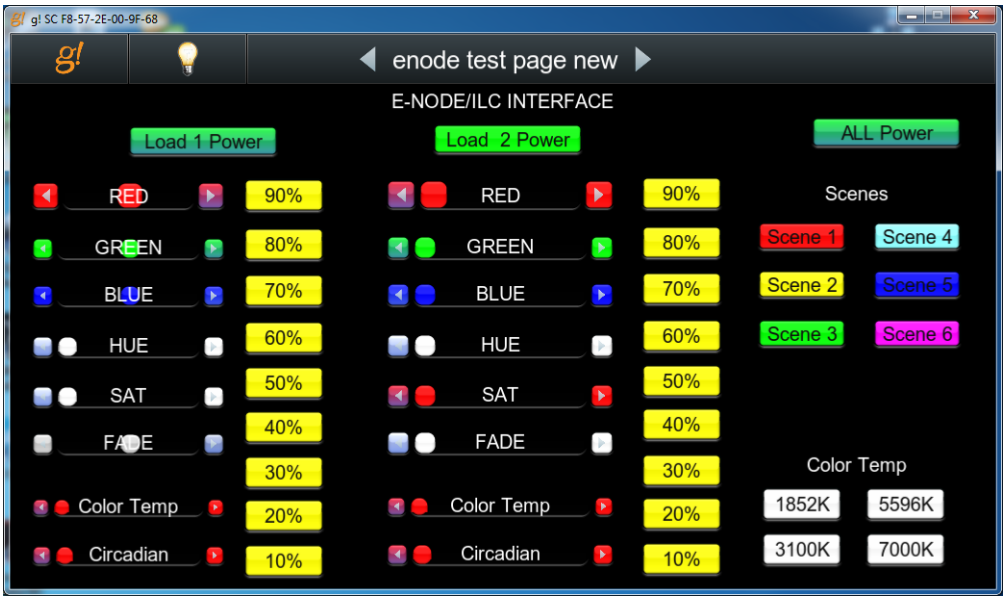

Figure 5

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

(WIP)

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Appendix 6

ADVANCED Lutron PROGRAMMING

AP Topic 1

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

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

Table 10

	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 11

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.

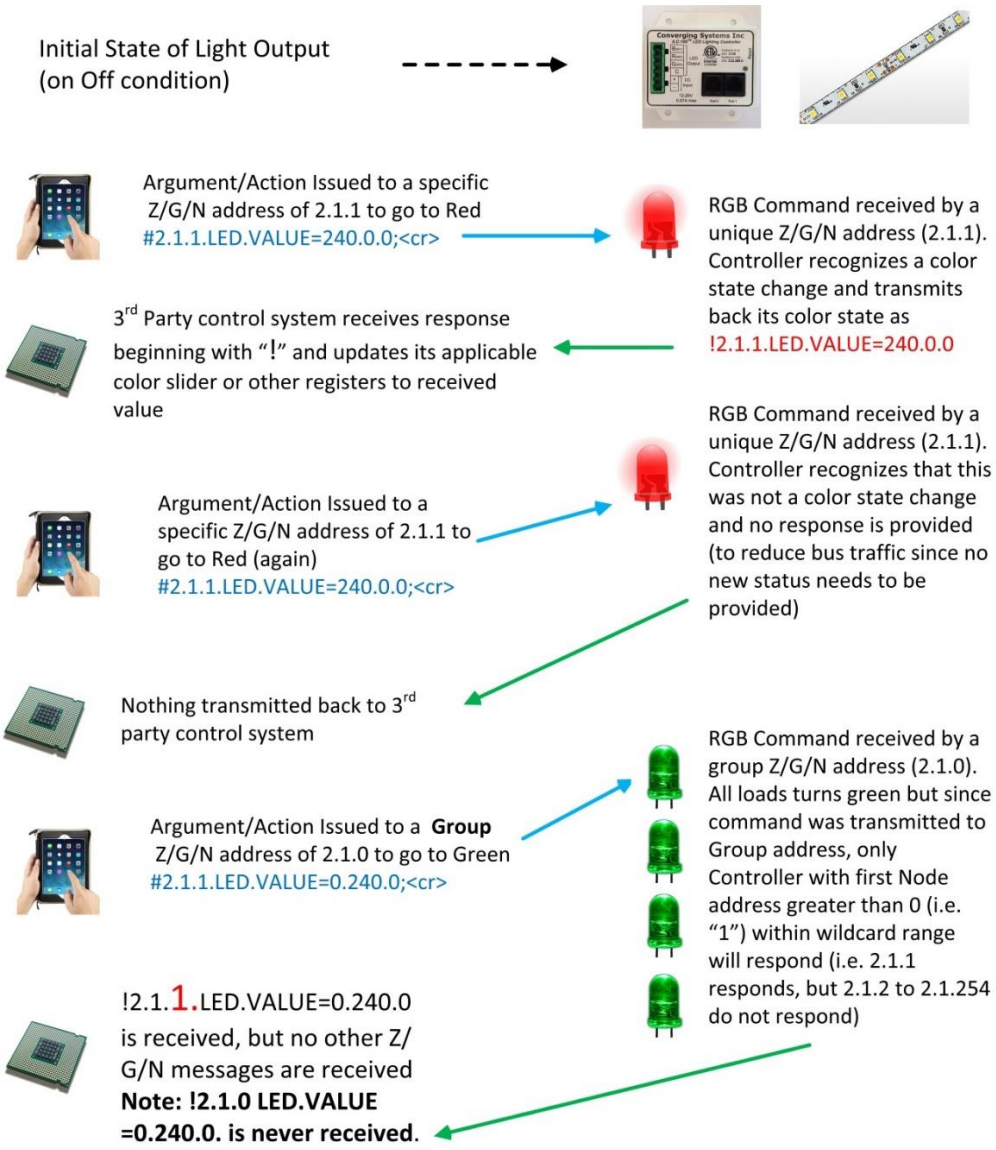

Figure 6

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

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	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 12

Lutron button targeted for connection to Converging Systems LED or Motor operation							**Desired outcome when Lutron button is pushed**	**Command that needs to be entered into e-Node Pilot application[1]**
Index		Button Alias[1]	**Integration ID**	**Button Number**	**Button Logic**		Descriptive Summary[2]	**Actual programming string[3]**
		Recall 1	(e.g.) 5.	(e.g.) 1.	(e.g.) 3.		(e.g.) Color goes to Recall 1	(e.g.) #2.1.1.LED=RECALL,1
(1)								
(2)								
(3)								
(4)								
(5)								
(6)								
(7)								
(8)								
(9)								
(10)								
(11)								
(12)								
(13)								
(14)								
(15)								
(16)								
(17)								
(18)								
(19)								
(20)								
(21)								
(22)								
(23)								
(24)								

(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.

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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.

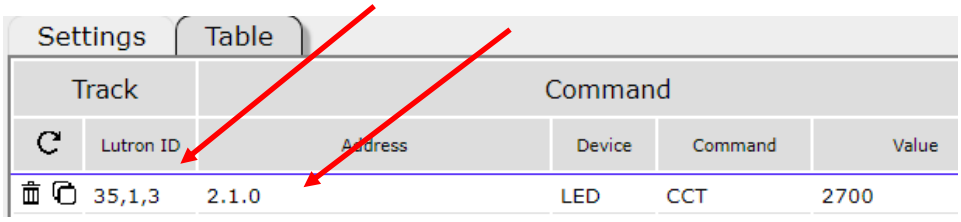
2. Forgetting to input accurate **Z**one/**G**roup/**N**odes addresses within the LUTRON tab. The factory defaults will work with some systems but certainly, if your particular lighting or motor controllers do not function, check these addresses.

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

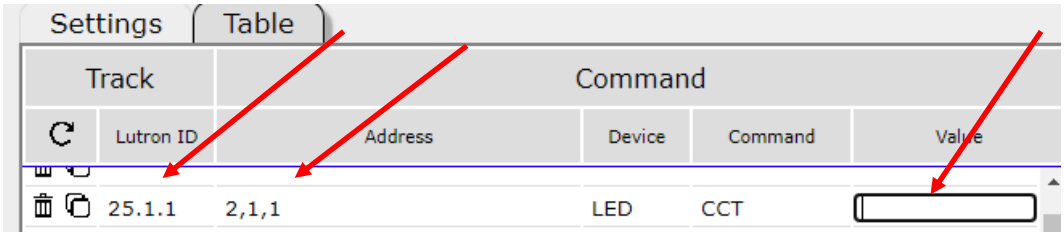
4. Forgetting to match a valid LUT for each related TRACK within e-Node Pilot or the web application.

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)



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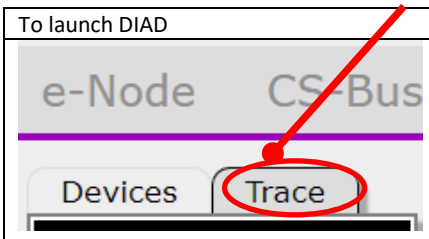
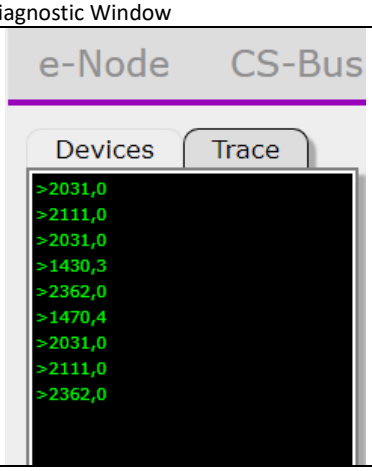
Appendix 10

Troubleshooting/System Monitoring

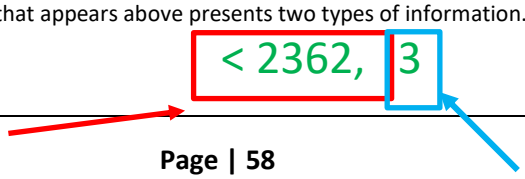
STEP 6. Troubleshooting Level A--using the built-in "Trace" window within the web-application with the e-Node/4x000

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 A 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 Pressed or Released or Double Tapped or Held, occupancy sensor is activated or deactivated, time clock event is triggered, 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 Lutron commissioning software in advance). **Note**: Standard Lutron dimmers will not generate any output and will be grayed out in the list and therefore will not generate a code that the e-Node can (currently) parse.

To launch DIAD	Diagnostic Window
	

Important Note

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



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Device ID of button—this is the DID of the **button** rather than the starting range of the parent keypad device (see in the upper left window) --see **Note On DID for User Interfaces**.

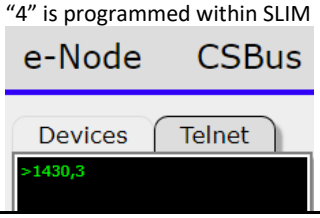
Shorthand code of button operation

3=Button Press
3=Button Press
4=Button Release
5=Extended Hold
6=Double Tap

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 QSX processor	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 A "3 is seen from Lutron but a "4" is programmed within SLIM 		

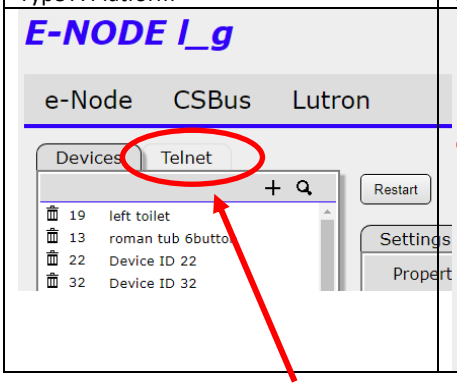
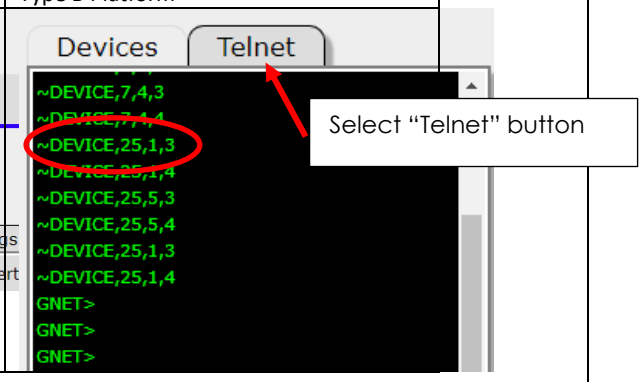
1430,4 2.1.1	LED RECALL 4	
	A different button operation is programmed within SLIM from that which is programed within Lutron (i.e., a "3 is seen from Lutron while a "4" is programmed within SLIM	Either change within Designer the operation of the button to match what was programmed within SLIM. Or change the programming within SLIM to match what was programmed within Lutron.

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.

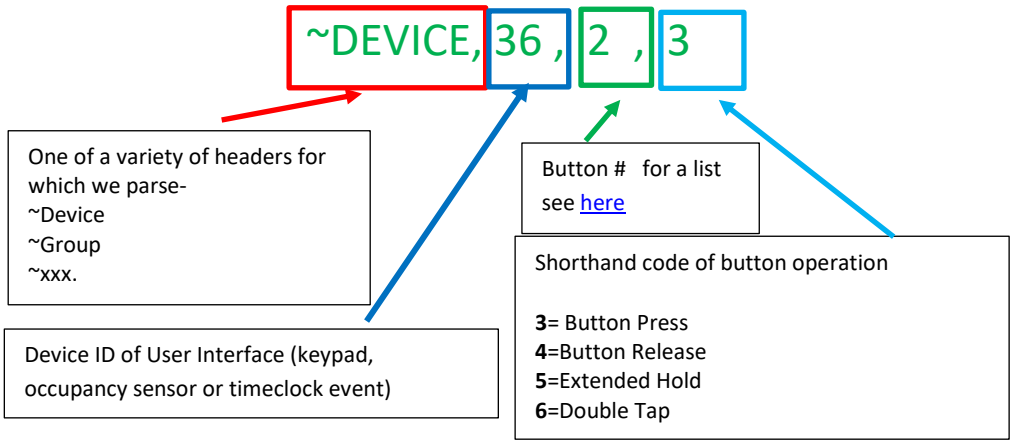
-Example. The right window below provides an example when the top right button of test 10 button desktop keypad is pressed (and which was programmed for a Press within Designer in advance).

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.

Type A Platform	Type B Platform
	

Important Note

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



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**.

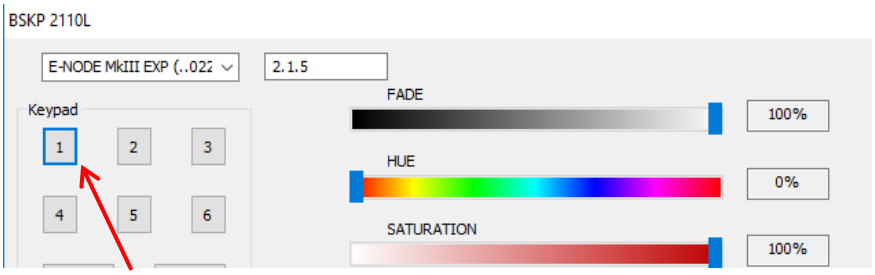
Observation	Cause	Remedy
Output string from a button operation does not appear AT ALL within diagnostic window 		
	E-Node may not be Connected to Type B Platforms	See Step 3 above and make sure e-Node shows "**Connected**"
	Exact button operation is not programmed within SLIM	See Step 4 and make you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

<table>
<tr><td></td><td></td><td>
<table>
<tr><td>from what is programmed within SLIM

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.

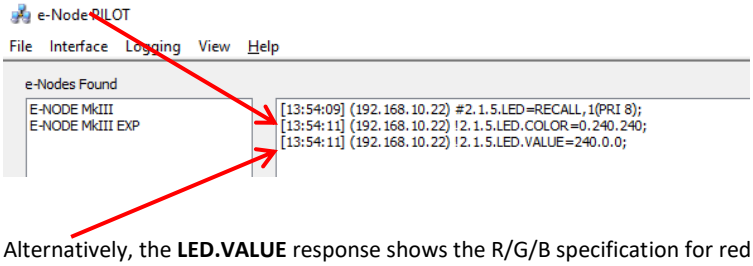
In order to remotely monitor actual commands flowing to a particular controller, within the e-Node Pilot standalone application, select the View Traffic Tab, and select the Discover e-Node button. Monitor the traffic in the right window to troubleshoot the system.

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).

In effect, by pressing this button, this command is transmitted to our bus:

#2.1.5.LED.VALUE=RECALL,1</td></tr>
</table>

		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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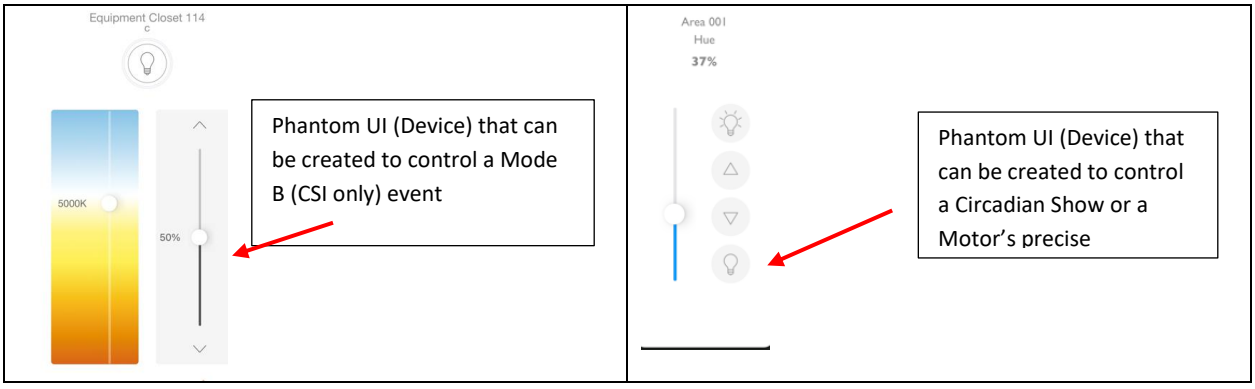
Appendix 11

Creating Phantom Loads and Devices

Background. Creating Phantom Devices and Loads are valuable tools within the Lutron Environment to add additional functionality. This section describes their use and how to create them where necessary.

Phantom Device. In the Mode B environment (i.e., control of CSI equipment along), there are occasions where it may be desirable to utilize Lutron designed user-friendly user-interfaces (i.e., the Ketra UI) to control Converging Systems full color tunable white linear strips or similar devices. In addition, it may be also desirable to utilize dimmer type sliders to control other Converging Systems operations (like selection of a Circadian Point in time output, or the precise movement/location of a projection screen). In this case, creating a **Phantom Device** is required.

Note: **In Mode C environments (CSI and Lutron linked), phantom devices are not generally necessited for CSI can track the Lutron load (controlled by the above user interfaces) directly.**



Phantom Loads. In certain Mode B and Mode C environments where either

-a **Lutron trigger event** (i.e., occupancy sensor, timeclock event, PID device actuation), and/or
-a **Lutron standard switch or dimmer device** (Class 1 AC type)

……are controlling Lutron Loads, it is necessary to create one or more **Phantom Load(s)** (linked to those same devices above) **to track and to enable a CSI load to respond in parallel**.

Please refer to the applicable section below on instructions on how to create both types of phantom operations.

Operation	Applicability		Link
	Mode B	Mode C	
Creation of a Phantom Load	✓		Section 1
Creation of a Phantom Device	✓	✓	Section 2

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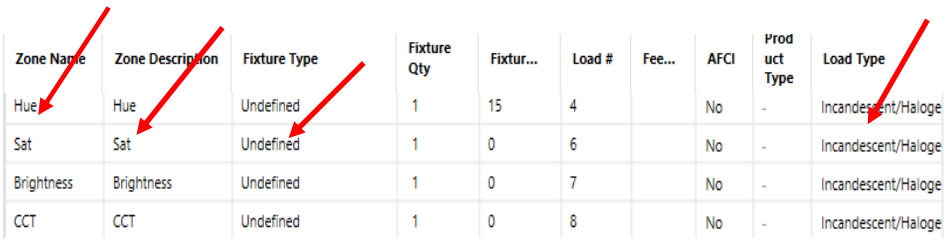
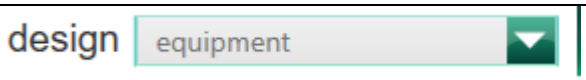
1. Information on how to create a Phantom Load within Lutron Commissioning software.

A. Lutron Designer (for QS/QSX)

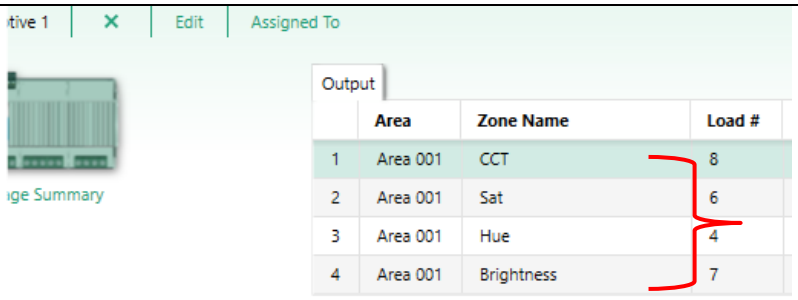
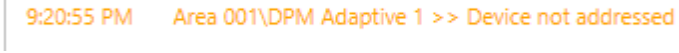
<table>
<tr><th>Step</th><th>Overview</th><th>Detail</th></tr>
<tr><td>PL-1</td><td>Create new Phantom Loads (new phantom Zone Names)</td><td>- Open design/loads and add one new Zone Name for each Phantom Load desired.
 

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.
 
</td></tr>
<tr><td>PL-2</td><td>Assign those Phantom Loads to a newly created Phantom Fixture</td><td> 

-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.
 

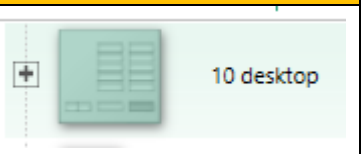
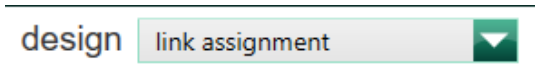
-Expand the + mark in front of the phantom load and assign Zone Names above to each available (not-yet Assigned) entry.</td></tr>
</table>

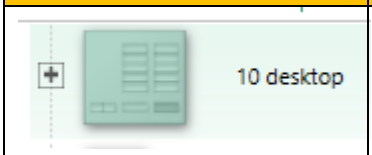
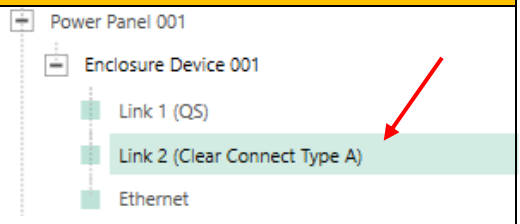
		
PL-3	Test that these phantom loads (Zone Names) appear within the applicable Lutron app.	These new loads can now be used to control the variable type controls (i.e., Hue, Saturation, Brightness, Color Temperature (CCT), Circadian Levels (SUN) as well as standard type controls such are Red, Green, Blue,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

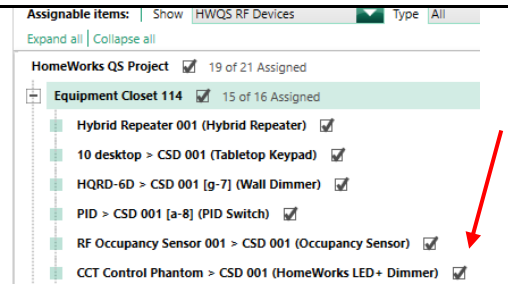
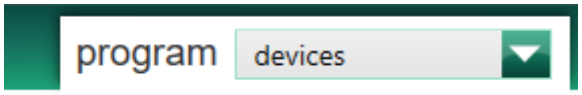
2. Information on how to create a Phantom Device within Lutron Commissioning software.

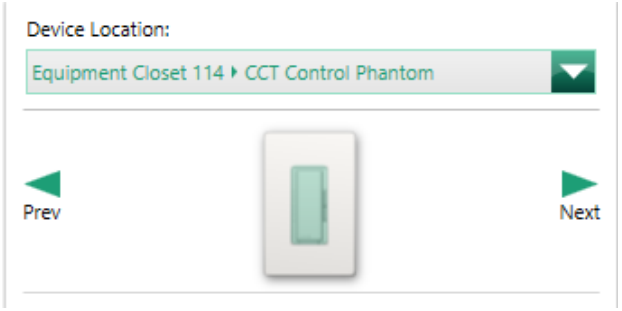
A. Lutron Designer (for QS/QSX)

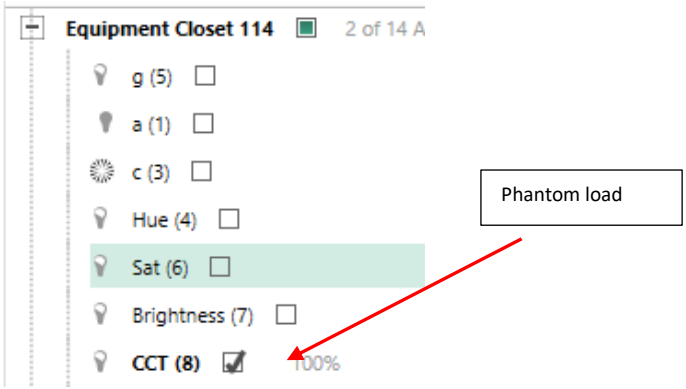
<table>
<tr><th>Step</th><th>Overview</th><th>Detail</th></tr>
<tr><td>PD-1</td><td>Create new Phantom Device</td><td>- Open design/controls and add a Dimmer or keypad depending upon your desire for a user interface.
 

<table>
<tr><th>Requirement</th><th>Type of UI to select</th></tr>
<tr><td>If you wanted 10 unique buttons to control specific operation (CCT of 2700 for button 1, CCT of 3000 for button 2, etc.)</td><td> 
</td></tr>
<tr><td>If you wanted a single slider to control Circadian levels or motor position</td><td> 
</td></tr>
</table></td></tr>
<tr><td>PD-2</td><td>Assign Phantom Device to applicable HW</td><td>-Open design/link assignment and make applicable assignment of newly created Phantom Device.
 

Note: For the Devices shown above, they should be assigned as follows
-Within the applicable HW device assign as shown below and select the radial checkbox to complete
<table>
<tr><th>Requirement</th><th>Assignment Location</th></tr>
<tr><td> 
</td><td> 
</td></tr>
</table></td></tr>
</table>

<table>
<tr><td></td><td></td><td>
<table>
<tr><td></td><td> 
</td></tr>
<tr><td>  Dimmer</td><td>(same as above)</td></tr>
</table>
</td></tr>
<tr><td>PD-3</td><td>Link loads</td><td>Go to program/device, and make applicable linkage between the new Phantom Device (created in this section) and an applicable Phantom Load created in section 1
 

For the specific triggering device, scroll through available device to find the newly created phantom device and program it to the phantom load (created in Section 1).
 

-
 
</td></tr>
</table>

		.
PD-4	Transfer Log	This procedure will expose the Phantom Device on the Lutron APP such that it will control a Phantom Load that the Converging Systems SLIM app will track.