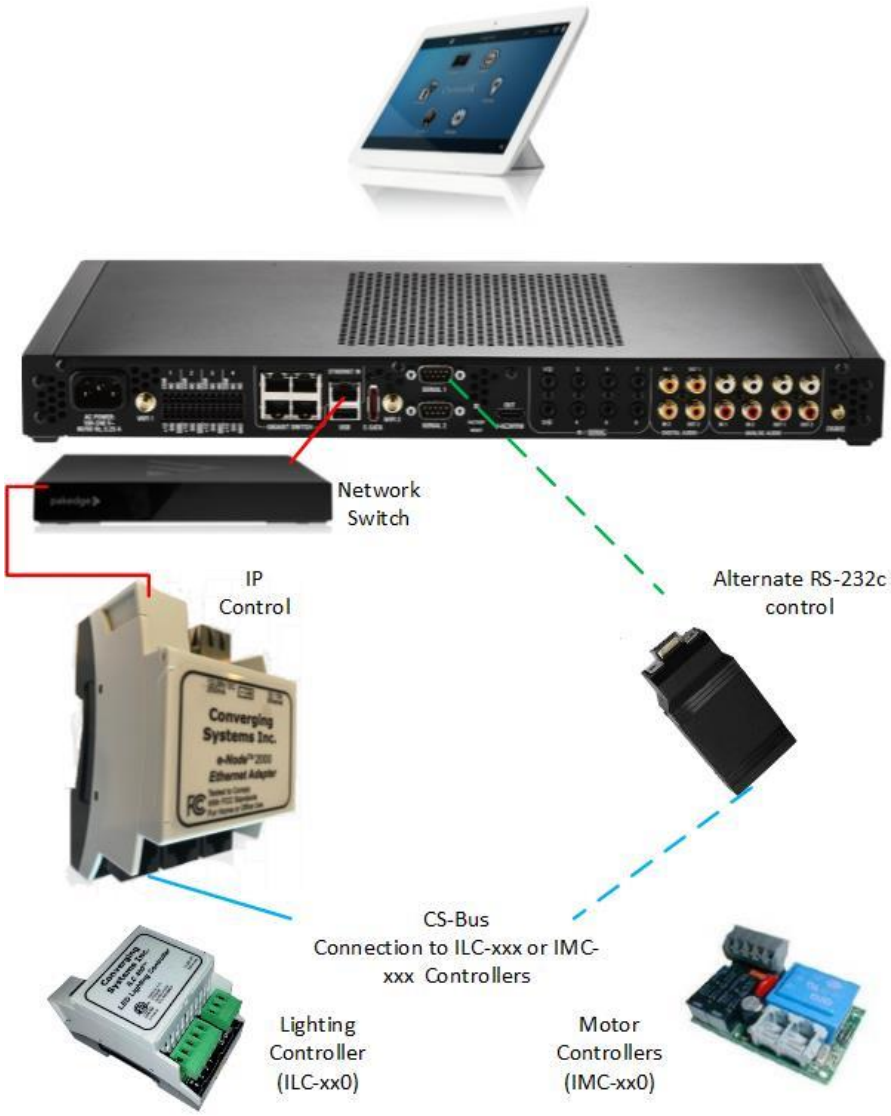
Converging Systems/Control 4 Interface Guide

Control of Converging Systems e-Node and CS-BUS compatible LED and/or Motor controllers through Ethernet (IP) (or optional RS-232c) control



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Control4	Integration Note
Manufacturer:	**Converging Systems, Inc.**
Model Number(s):	**CS-Bus Motor and Lighting Controllers**
Control4 Code Base (OS2)	V2.10.6 and later
Control4 Code Base (OS3)	V3.1.0 and later
Driver Developer:	Converging Systems Inc. (Control4 Certified Developer Partner)
Document Revision Date:	08/07/2021 Rev 5.0

IMPORTANT NOTE-CRITICAL INFORMATION

Converging Systems has advanced its library of Control4 SDDP certified drivers to support Control4's **Advanced Lighting Scenes** as well as Converging Systems new **CSDDP** Protocol (which is an enhanced layer to Control4's SDDP protocol) which currently supports the e-Node™ gateway (but not the e-Node™/dmx* gateway) and which allows for the automatic discovery of connected ILC-xx0 controllers including auto-population of (i) **Z**one/**G**roup/**N**ode address information as well as (ii) Alias name information. C4 certified (Online) drivers (dated 4/16/2021) should be used to obtain this level of functionality.

*Note: Subsequent to the above (Online) C4 certified driver release (4/16/2021), Converging Systems has updated its (i) "**LED lighting controller Multi**" and (ii) "**LED lighting controller generic**" (i.e., **Child Device Drivers**) to be used in conjunction with the currently available 4/16/2021 C4 certified/SDDP supported Online e-Node 2010 **Communication Device Driver** for all e-Node gateways (i.e., e-Node for CS-bus devices and e-Node/dmx for third-party DMX fixtures). Until these two new **Child Device Drivers** become integrated into an updated C4 Online release, these two enhanced CSDDP **Child Device Drivers** can be downloaded from the CSI website https://www.convergingsystems.com/software/local_profiles_library.php#control4 .

Utilization of these two new **Child Device Drivers** allow all DMX (fixtures) supported by the e-Node™/dmx to be auto-discovered within Composer by name along with their pre-programmed **Z**one/**G**roup/**N**ode addresses. This saves the Composer programmer some time in setting up devices but does not take away from any functionality otherwise available with currently available Online Certified drivers.

Revision Update:

CSI Zip Version (Refers to download version from CSI website, otherwise see **Driver Embedded Version #** below)	**V7** (see footnote [V7] by features throughout this document which requires this referenced version of the driver)
Communication and Child Device Versions	

Driver Name	Modification Date	Driver Embedded Version #	Certified
e-Node 2010	4/16/2021	5	-V5 Yes
Led Lighting Controller Multi	6/1/2021 or later	6	-V5 Yes -V6 Submitted
Led Lighting Controller Generic	6/1/2021 or later	8	-V7 Yes -V8 Submitted
IBT-100	3/29/2017	2	Yes
Projection Screen	6/09/2017	2	-V1 Yes -V2 Submitted
Note: Other Certified drivers can be found from Converging Systems available from Composer but these are legacy versions and should not be used any longer for new installations.			

Integration Note	**4.9/4.10**

Topic	Change	Page Number
Enhanced SDDP	A new feature enables SDDP to reveal multiple IP devices by name within System Builder/Properties window	30
Support for CSDDP	Enables connected motor and lighting control devices (CS-Bus and DMX fixtures) to be auto-discovered after SDDP discovers IP devices	32
Support for Direct Control Widget within Composer	Adds previously unsupported Direct Control widgets for lighting	36
Support of Control4's	Add supports for Control4's Advance Lighting Scenes Advanced Lighting Scenes—Lets you change the lighting state, toggle lights,	55

Advanced Lighting	ramp/fade lights, delay on/off, use scene sequencing, flash lights, and so on.	
Support of Execute button for all commands within Scripts	Adds support for Execute button within Scripts 	

CSI Zip Version (refers to download version from CSI website, otherwise see **Driver Embedded Version #** below)	**V6** (see footnote V6 by features throughout this document which requires the referenced version of the driver)

Communication and Child Device Versions

Driver Name	Modification Date	Driver Embedded Version #	Certified
e-Node 2010	4/16/2021	5	Yes
Led Lighting Controller Multi	4/16/2021	5	Yes
Led Lighting Controller Generic	4/16/2021	7	Yes
IBT-100	3/29/2017	2	Yes
Projection Screen	6/20/2015	1	Yes
Note: Other Certified drivers can be found from Converging Systems available from Composer but these are legacy versions and should not be used any longer for new installations			

Integration Note **4.8**

Topic	Change	Page (link)
Enhanced SDDP	A new feature enables SDDP to reveal multiple IP devices by name within System Builder/Properties window	30
Support for CSDDP	Enables connected motor and CS-Bus (but not DMX devices) lighting control devices to be auto-discovered after SDDP discovers IP devices	32
Support for Direct Control Widget	Adds previously unsupported Direct Control widgets for lighting	36

within Composer		
Support of Control4's Advanced Lighting	Add supports for Control4's Advance Lighting Scenes Advanced Lighting Scenes—Lets you change the lighting state, toggle lights, ramp/fade lights, delay on/off, use scene sequencing, flash lights, and so on.	55
Support of Execute button for all commands within Scripts	Adds support for Execute button within Scripts 	

CSI Zip Version (refers to download version from CSI website)	**V5** (see footnote V5 by features throughout this document which requires the most version of the driver)	
Integration Note	4.7a	
Topic	Change	Page (link)
Stores/Recalls for Motor Controllers	A new feature enables stores/recall on Motor Control devices	9

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OVERVIEW AND SUPPORTED FEATURES

The Converging Systems' communication devices (e-Node for IP and IBT-100 for serial) are designed to act as the communication intermediary between a CONTROL4 system and Converging Systems' lighting or motor controllers.

The Converging Systems ILC-x00 family of **LED** lighting controllers are networkable devices which can provide support for Converging Systems' Flexible Linear Lighting Arrays (FLLA) RGB, RGBW, and monochrome LED devices as well as specific third-party surface mount and recessed RGBW fixtures

The Converging Systems IMC-x00 family of **MOTOR** controllers are networkable devices which can provide for third-party motor platforms.

The Converging Systems' e-Node (IP type) Communication Device supports Control4's SDDP protocol allowing for nearly seamless discovery and integration (Certified Driver). All CSI communication modules support normal device commands and in addition support innovative bi-directional communication feedback for LEDs (color status in RGB, RGBW, or HSB color space) as well as feedback for MOTORs (motor position).

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

- Discrete control of LED states (ON/OFF) including feedback of ON/OFF
- Bi-directional control of Hue/Saturation Brightness color settings for RGB, and RGBW devices using Converging Systems FLLA LED elements.
- Bi-directional control of Brightness settings for monochrome devices using Converging Systems FLLA LED elements.
- One-directional control of R, G, B, and W settings with RGB, and RGBW devices using Converging Systems FLLA LED elements.
- Bi-directional 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
- B-directional control of Circadian Rhythm (Sunrise to midday sun to Sunset dynamic settings) using Converging Systems RGBW FLLA devices.
- Ability to set specific RGB value for color through script (for 3-channel color and 3-channel DMX).
- Ability to set specific RGBW value for color through script (for 4-channel color).
- Support of communication utilizing Telnet with or without authentication (Port 23)
- Ability to store and recall specific colors set by a user within ILC-x00 controllers.
- Ability to recall specific Effects stored within specific ILC-x00 controllers.
- Ability to change Dissolve Rates (time it takes to transitions from one state to another) (i) for On and Off states, (ii) for Presets to other Presets (color) settings, and (ii) for state to state transitions within Effects. (Schema 11 and later) (WIP)
- Ability to change Sequence Rates (time after any dissolve that a Preset color is maintained before transitioning to the next color in sequence) in Effects 1 and 4.
- Ability to adjust ramp time for Custom Buttons
- Control via all thin client interfaces (CONTROL4 Touchscreen, keypads)

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

- Circadian Tuning settings on third-party DMX fixtures
- Exact color temperature output on third-party DMX fixtures (although a close approximation might be possible) using RGBW adjustments and then the Store/Recall functions
- Ability to set HSB value for LEDs through custom buttons (although can set manually through slider and then store and recall using custom buttons)

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

- Motor UP/Down
- Stop (using a repeat directional button pressed a 2nd time
- Store and Recall of Presets 1~20 (for CS-BUS motor controllers that provide this level of functionality)*
- Support of communication utilizing Telnet with or without authentication (Port 23)

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

- Motor Position Feedback (for CS-BUS motor controllers that provide this level of functionality).
- Store and Recall of Presets 1~20 (for CS-BUS motor controllers that provide this level of functionality) (with Version 1 of driver)

Note:

*with Version 2 of motor driver

Tabular Summary of Supported Features

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

LED Lighting Commands

Table 1

General CS-Bus Commands	CONTROL4 Device Specific Commands	ILC-100c ILC-300	ILC-400	ILC-450	ILC-100m & ILC-400 in mono mode	e-Node DMX
General LED Control Commands						
ON	On	✓	✓	✓	✓	✓
OFF	Off	✓	✓	✓	✓	✓
EFFECT,n	Effect	✓	✓	✓		✓
STORE,#	Store	✓	✓	✓	✓V5	✓
RECALL,#	Recall	✓	✓	✓	✓V5	✓
DISSOLVE.1=XX	Default Dissolve Set	✓	✓	✓	✓	✓
DISSOLVE.2=XX	Default Dissolve Set	✓	✓	✓	✓	✓
DISSOLVE.3=XX	Default Dissolve Set	✓	✓	✓	✓	✓
DISSOLVE.4=XX	Default Dissolve Set	✓	✓	✓	✓	✓
SEQRATE=XX	Default Dissolve Set	✓	✓	✓	✓	✓
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	Hue	✓	✓	✓		✓
SAT_UP	Sat Up	✓	✓	✓		✓
SAT_DOWN	Sat Down	✓	✓	✓		✓
SAT_S	Sat	✓	✓	✓		✓
STOP	Stop	✓	✓	✓	✓	✓
COLOR=H.S.L						
PRESETH.X=XXX.XXX.XXX	Set LED Presets/HLS Color spacer for preset x	✓	✓	✓		✓
RGB Color Space Commands						
RED,R	Red	✓	✓	✓		✓
GREEN,G	Green	✓	✓	✓		✓
BLUE,B	Blue	✓	✓	✓		✓
VALUE=R.G.B						
WHITE,W	White	✓	✓	✓	✓	✓
RGB,R.G.B	RGB	✓	✓	✓		✓
RGBW,R.G.B	RGBW		✓	✓		
PRESET.X=XXX.XXX.XXX (3-color)	Set LED Presets/RGB Color spacer for preset x					
PRESET.X=XXX.XXX.XXX (4-color)						
STOP	Stop	✓	✓	✓	✓	✓

Correlated Color Temperature (CCT) Commands and SUN (Circadian) Commands						
CCT,XXXX	CCT	✓	✓	✓		✓
CCT_UP	CCT Up	✓	✓	✓		✓
CCT_DOWN	CCT Down	✓	✓	✓		✓
SUN,XXX	SUN		✓	✓		
SUN_UP	SUN Up		✓	✓		
SUN_DOWN	SUN Down		✓	✓		
Bi-Directional Commands						
COLOR=?	Automatic polling within Driver. **Note**: Driver achieves function with Notify ON	✓	✓	✓	✓	✓
VALUE=?	Automatic polling within Driver **Note**: Driver achieves same function with Notify ON					
STATUS=?	Automatic polling within Driver **Note**: Driver achieves same function with Notify ON					
PRESETH.X=?						
PRESET.X=?						
Accessory e-Node Command/Setup Parameters						
Verbose Mode						
UDP Port 4000/5000						
Telnet Login with Authentication (with e-Node***)		✓	✓	✓	✓	✓
Telnet Login without Authentication**		✓	✓	✓	✓	✓

Notes:

* Reserved

** Possible with enhancements to Driver

*** By turning off or on authentication within e-Node through Web-Pilot or Pilot application

Motor Commands

Table 2

General Commands	CONTROL4 Device Specific Commands	IMC-100 (with e-Node)	BRIC ("Bric Mode") (with e-Node	CVM ("IMC-300MKII")
General Motor Control Commands				
GOTO				
UP	Raise	✓	✓	✓
DOWN	Lower	✓	✓	✓
STOP	Stop	**	**	**
MOTOR RIGHT				
MOTOR LEFT				
RETRACT	Raise			
TOGGLE				
STORE,#		✓****	✓	✓****
RECALL,#		✓****	✓	✓****
~~PRESET.X=XX.XX~~				
Bi-Directional Commands				
~~STATUS=?~~				
POSITION=?	Automatic			
Accessory e-Node Command/Setup Parameters				
Verbose Mode		✓	x	✓
UDP Port 4000/5000		✓	✓	✓
Telnet Login with Authentication (with e-Node***)		✓	✓	✓
Telnet Login w/o Authentication***)		✓	✓	✓

Notes:

* Reserved

** By simply hitting the same directional button a 2nd time

*** By turning On or OFF Authentication in Web Pilot or Pilot application

**** With Version 2 of driver will handle stores and recalls from 1 to 20 (update on Converging Systems site at https://www.convergingsystems.com/software/local_profiles_library.php#control4

INTEGRATION REQUIREMENTS-CONVERGING SYSTEMS CONFIGURATION

NOTE: Converging Systems LED and Motor Controllers REQUIRE a communication device (either an e-Node for Ethernet connectivity or the IBT-100 for serial connectivity). It is not possible to connect CSI LED or Motor controllers to an CONTROL4 controller in any other way.

The system will need to be installed and configured according to the Converging Systems documentation, prior to integration with the CONTROL4 system. The Converging Systems e-Node Pilot application (required for setup) is available for download for free from the Converging Systems website (http://www.convergingsystems.com/downloads_library.php

IP configuration using the e-Node is possible using both dynamic and static addressing.

NOTE: It is recommended that the Converging Systems' controller(s) as well as the e-Node Ethernet gateway (communication device) are running the latest version of firmware available at the time of installation

WIRING DIAGRAM (for IP connection)

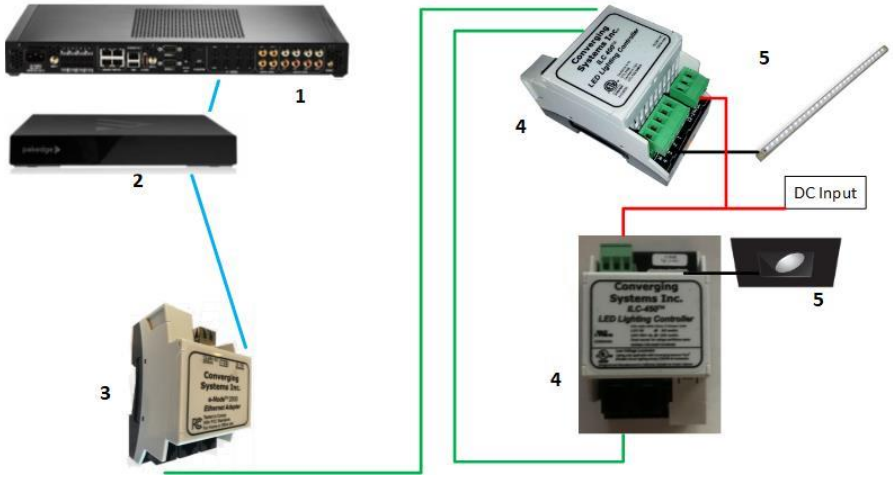


Figure 1

Wiring/Configuration Notes:

1. Maximum length of CS-Bus cabling from e-Node to the last ILC-xxx/IMC-x00 controller using CAT5e or better cabling (and obeying the 1-1 pin-out requirements for the RJ-25-RJ25 cable and a twisted pair of the same color carrying the signals on pins 3 and 4 of an 6P6C cable) = 4000 feet
2. Maximum number of ILC-xxx/IMC-xxx 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 CONTROL4 system = 254

BILL OF MATERIALS (for IP control)

Table 3

#	Device	Mfg.	Part Number	Protocol	Connector Type	Notes
1	Control4 Processor	CONTROL4	Various	Ethernet/Serial/IR	RJ-45	
2	Network Switch	Various	Various	Ethernet	RJ-45	
3	e-Node	Converging Systems	e-Node (or CVM)	Ethernet	RJ-45 (for Ethernet)	
4	Lighting Controller (or Motor Controller)	Converging Systems	ILC-x00 or IMC-x00	CS-Bus protocol	RJ-25 for CS-Bus communication	Must terminate beginning and end of bus with 120 ohm resister on pins 3/4
5	Flexible Linear Lighting (FLLA) luminaries	Converging Systems	FLLA-Monochrome/Bi-White/RGB or RGBW type		1-color 2 pin 2-color 3 pin 3-color 4 pin 4-color 5 pin	
5 alt.	Alternate RGBW Fixture	Various	Various	Requires ILC-450	8 pin Phoenix type	

WIRING DIAGRAM (for RS-232 serial connection)

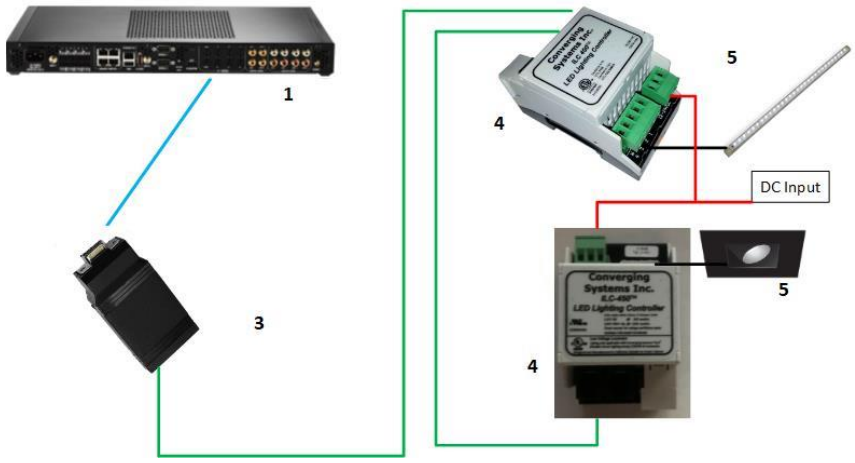


Figure 2

Wiring/Configuration Notes:

1. Maximum length of CS-Bus cabling from e-Node to the last ILC-xxx/IMC-xxx using CAT5e or better cabling (and obeying the 1-1 pin-out requirements for the RJ-25-RJ25 cable and a twisted pair of the same color carrying the signals on pins 3 and 4 of an 6P6C cable) = 4000 feet
2. Maximum number of ILC-xxx/IMC-xxx 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 Control4 system = 254

BILL OF MATERIALS (for RS-232c connection)

Table 4

#	Device	Manufacturer	Part Number	Protocol	Connector Type	Notes
1	Control4 processor	Control4	Various	Ethernet/Serial/IR	various	
2	Reserved					
3	IBT-100	Converging Systems	IBT-100	RS-232c	Control4 custom serial cable to DB-9 (for Serial)	
4	Lighting Controller (or Motor Controller)	Converging Systems	ILC-x00 or IMC-xxx)	CS-Bus protocol	RJ-25 for CS-Bus communication	Must terminate end of bus with 120 ohm terminating resister on pins 3/4
5	Flexible Linear Lighting (FLLA) luminaries	Converging Systems	FLLA-Monochrome/Bi-White/RGB or RGBW type		1-color 2 pin 2-color 3 pin 3-color 4 pin 4-color 5 pin	
5 alt.	Third-party RGBW fixture	Various	Various	Requires ILC-450	8 pin Phoenix type	

COMPONENT HARDWARE SETUP

NOTE: Please refer to Appendix 1 for a reference document for general hardware instructions for Converging Systems devices. You may also find the Quick Start Guides that accompanied your hardware useful. In addition, these documents provide additional detail as to Best Practices for wiring and setup.

-Once completed with this work, proceed to the next section-Component Software Setup.

Other relevant and more detailed information can also be found as follows:

Lighting Control
https://www.convergingsystems.com/lighting_install_library.php
Motor Control
https://www.convergingsystems.com/motor_install_library.php

There are also a number of short Quick Start Guides for various products that can be downloaded from the above links as well.

Best Practice-Setup Hardware before proceeding to the next section

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

NOTE: Please refer to Appendix 1 for a reference document for complete software commissioning for Converging Systems devices. This includes information on software commissioning including Activation/ Addressing and Turning on Bi-Directional Communication (NOTIFY). You may also refer to Quick Start Guides that accompany your hardware. In addition, these documents provide additional detail as to Best Practices for programming. ‘

-Once completed with this work, proceed to the next section-Composer Setup and Programming.

Other relevant and more detailed information can also be found as follows:

Lighting Control
https://www.convergingsystems.com/lighting_install_library.php
Motor Control
https://www.convergingsystems.com/motor_install_library.php

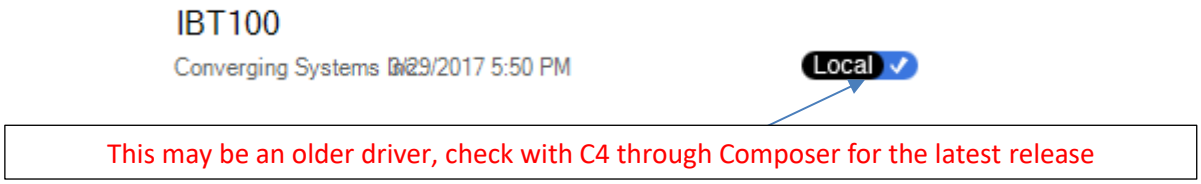
There are also a number of short Quick Start Guides for various products that can be downloaded from the above links as well.

Best Practice-Active/Address and Customize Software (within Hardware) before proceeding to the next section

Driver Details

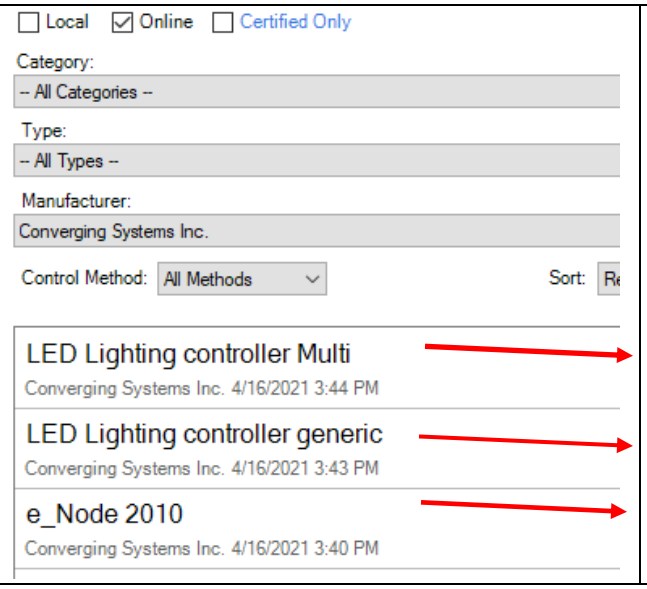
Drivers can be found within Composer for Converging Systems (see table below for specific driver nomenclature). Search on ***Converging Systems*** as shown below. Since there are a number of available drivers make sure that you use the ***Next*** option to review all drivers.

Note: Make sure you have loaded in the latest Control4 drivers for Converging Systems. Drivers stored on your computer may be older versions. Simply, check for new drivers from Control4's website within Composer before proceeding.



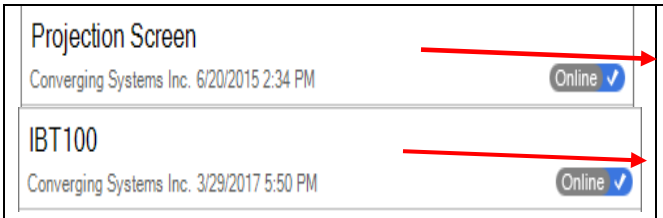
Note on latest Drivers--In some special cases, the latest driver may only be available on the Converging Systems website. See https://www.convergingsystems.com/software/local_profiles_library.php#control4 for the latest drivers. If you are downloading driver(s) from the Converging Systems' website, make sure you unzip the driver package and place in the same subdirectory where Composer knows where to find such drivers.

Table 5 Certified Device Driver Reference Table



Driver type, Use and Reference Information
(see table below for more information)

Comm	CS-Bus Device		DMX Device		Motor
IP or Serial Comm	Single chn. Or special feature (CCT slider)	RGB or HSB device	Single chn. Or special feature (CCT)	RGB Or HSB Device	(one per channel)
		LM		LM	
	LG		LG		
C-IP					



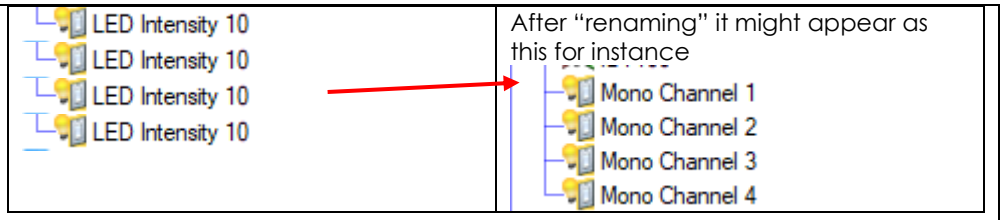
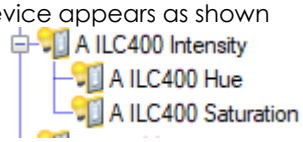
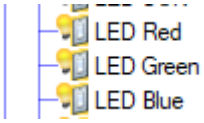
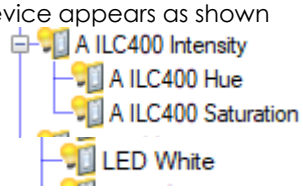
					M1
C-RS					

***Latest Driver maybe located on Converging Systems website.**

Driver Application/Best Practices Summary

Table 6

Type	Type of Device to be supported	Use
C-IP	Communication Device/e-NODE (for either e-Node CS-Bus type (standard) or e-Node/dmx)	SDDP Discovery Type IP interface. **One (1)** instance required for 1-254 (typical) **Motor** or **Lighting** Controllers (which do not have the communication device built in). Within System Builder, this device appears as follows: e_Node 2010 **Note**: the BRIC II (CVM/alias IMC-300 MKII) requires this Communication Device even though there is no external e-Node.
C-RS	Communication Device (RS-232C)	RS-232c gateway device. **One (1)** instance required for 1-254 (typical) **Motor** or **Lighting** Controllers. Note: e-Node still required for initial discovery and assignment of addresses. Within System Builder, this device appears as follows: IBT100
LG	Monochrome Load Device	**ILC-100M** **One (1) LG** child-type device instance is required for each single channel monochrome ILC-100 controller. Within System Builder, this device might appear as follows: LED Intensity 10 → After "renaming" it might appear as this for instance: LED Recall 1 **ILC-400 (in 4 channel monochrome mode)** **Four** (4) **LG** child-type device instances are required for ILC-400 configured for 4-ch monochrome mode. Within System Builder, this device appears as follows:

		
LM	Lighting Load Device for **RGB** or **RGB** components within a RGBW device	**<u>ILC-100sa/ILC-300 and e-Node/dmx supporting a fixture with RGB components</u>** **One (1) LM** child-type device instance is required for each triple-channel (RGB) ILC-100/ILC-300 controller (or 3 channel DMX controller) or quad-channel (RGBW) ILC-400 or ILC-450 controller (at minimum). This provides full control of 3 channels for these devices with a **H**ue/**S**aturation and **B**rightness component (automatically populated). This is the preferred method of controlling Color Output-rather than **R,G,B** which we consider "old school." Within System Design, this device appears as shown  **Note**: This driver will not individually control the **R**, **G**, or **B** components. See **LG** driver for more information here should you wish to control these components separately. **ALTERNATIVE CONFIGURATION-with RGB controls** If you were interested in tuning the **R, G, B** components separately--we don't know why--you would need to add three (3) instances of the **LG** driver (see below). Within System Design, three **LG** instances would appear as follows (after renaming) 
LM **+** **LG**	Lighting Load Device (for RGBW)	**<u>ILC-400/ILC-450 and e-Node/dmx supporting a fixture with RGBW components</u>** **One (1) LM** child-type device instance is required for each four -channel ILC-400/ILC-450 controller (to control via its color computer the HSB parameters). A separate **LG** child type device instance would be required to control the white component (separately). This provides full control of **H**ue/**S**aturation and **B**rightness plus a separate control for **White**. This is the preferred method of controlling RGBW devices with a separate control for the White component. Within System Design, this device appears as shown 

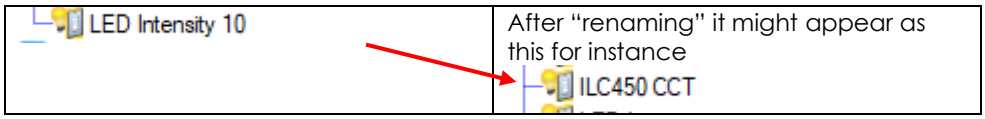
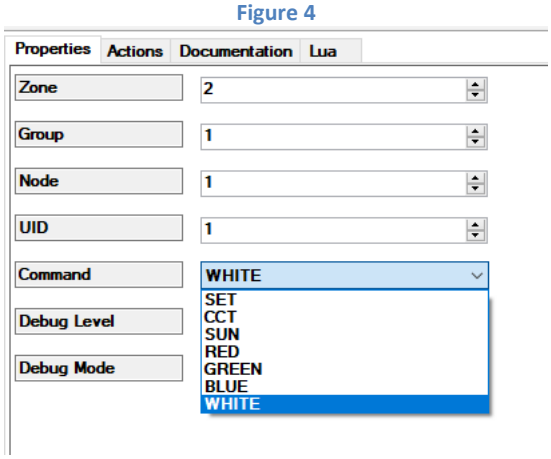
		Note: this driver will not individually control the **R, G, B, and W** components. See **LG** driver for more information here. **ALTERNATIVE CONFIGURATION-with RGB controls** If you were interested in tuning the **R, G, B, W** components separately (such as if you were to want to match a fixture manufactured by another vendor), you would need to add four (4) instances of the LG driver (see below) in addition to the one instance of the L3 driver shown above. Within **System Design**, four **LG** instances would appear as follows (after renaming) 
LG	Lighting Device with CCT control (color temperature as a parameter)	**ILC-400/ILC-450 and e-Node/dmx supporting a fixture with built-in CCT** In addition to any other controls desired (i.e., HSB or RGBW -- see above), additional control of CCT can be achieved with **one (1) LG** child-type device instance. Within System Builder, this device might appear as follows: 
LG	"Swiss Army Knife" Options Device	**ILC-400/ILC-450 and e-Node/dmx supporting a fixture with built-in CCT, Circadian, R, G, B or White controls that are not otherwise supported with above examples.** **One (1**) LG child-type device instance is required for ***each*** optional control specified from the below list in the Figure below that is desired to be controlled (***in addition to*** those already provided standard controls generated above). **Important**: Multiple instances of these LG Devices can be added to provide nearly unlimited control any of the features in the pull-down below through UI sliders. Control of these features through buttons or scheduled events (i.e., such as the command to set CCT to 2700K does not require an additional LG device). -Once added, these addition sliders/features can be programmed to act as a child/dependency to another parent driver created as long as you set the **Z**one/**G**roup/**N**ode address to be same as the parent.

Figure 4



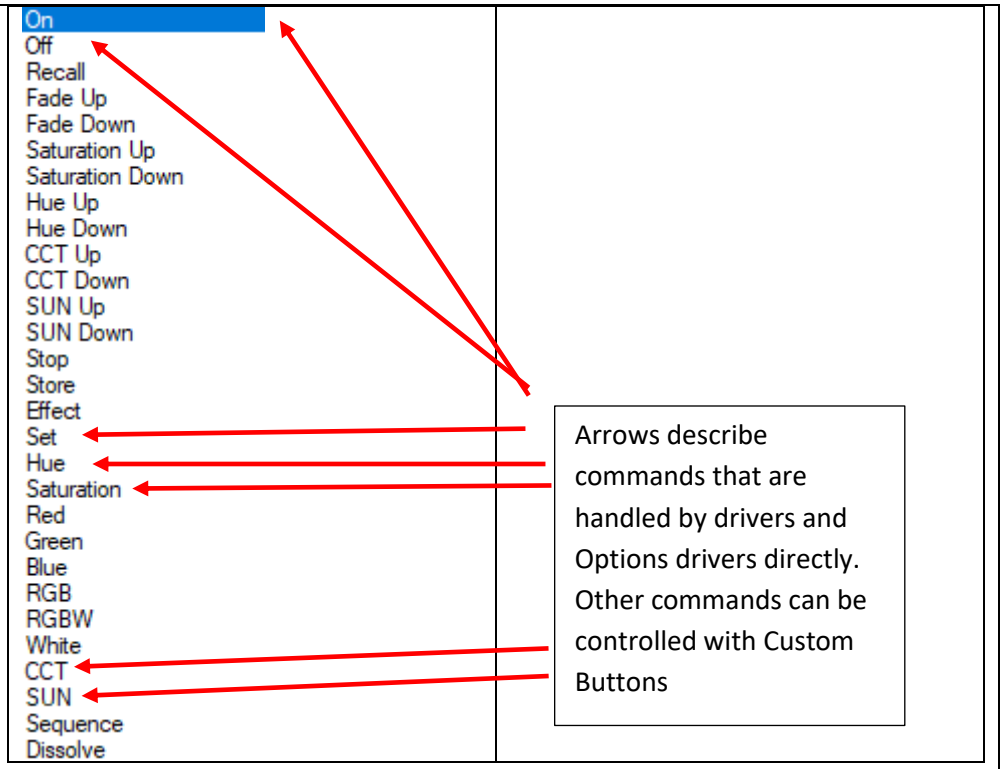
Example: If you used the standard LM to exposer H/S/B controls, you could add one LG Driver to impact CCT control. Or you could add another **LG** Driver to add Sun (Circadian). The directions below show how a separate CCT (color temp) and SUN (Circadian)driver component could be added.

LED Intensity 10	→	After "renaming" it will appear as this for instance LED CCT If you were to add two instances of this **LG** Devices, after renaming these features would appear as follows: LED CCT LED SUN

SPECIAL NOTE ON OTHER OPERATORS NOT AVAILABLE WITHIN THE OPTIONS DEVICE DRIVER

Custom Buttons Other than the items below ***identified with an arrow***, depending upon the specific parent driver loaded, some or all of the below operators can be individually controlled through the Control4 GUI interface using . See the Custom Buttons section for more information.

Table 7



Note for a full list of what these commands do, see the **D**evice **D**river Tool**k**it (DDK) available on the Converging Systems dealer site.
https://www.convergingsystems.com/software/inres_programmingdesignkit.php

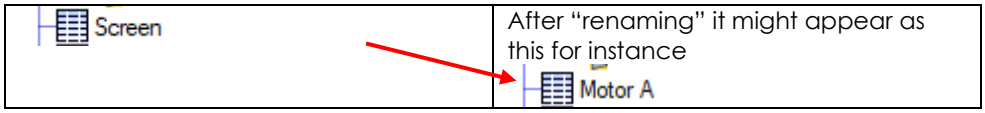
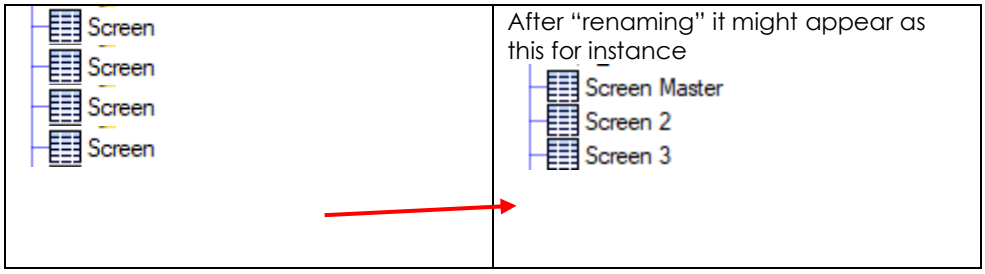
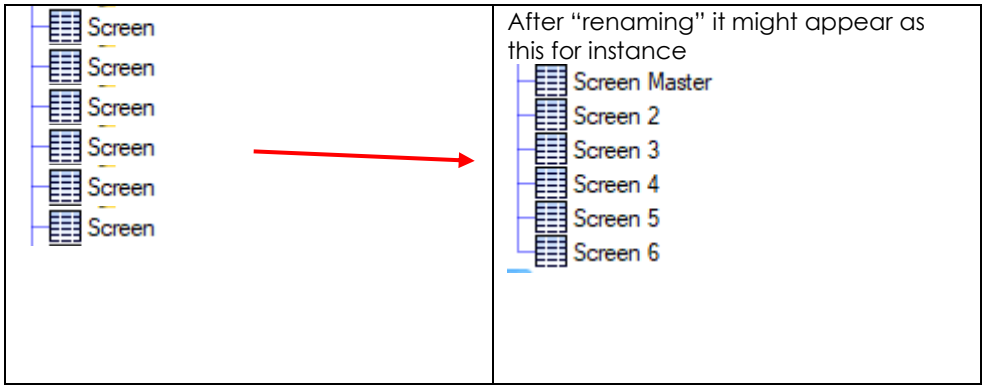
M1		**IMC-100/IMC-170/BRIC** **One (1)** child-type device instance is required for each single channel IMC-100 controller. Within System Builder, this device might appear as follows:  **CVM (BRIC II) (triple-channel controller)** **One** (1) child-type device instance is required for each channel of an IMC-300 (BRIC) or CVM controller. If all three channels of the triple motor controller are desired to be supported, then three instances of this driver need to be installed. **IMPORTANT**: ***The CVM includes a build in communication device which provides both Internet Protocol (IP) as well as RS-232c (RS) support. Therefore, as with all other motor and lighting type devices, a single Communication Driver (C-IR, or C-RS) needs to be loaded as well (and connected with individual loads).*** Within System Builder, this device appears as follows:  **Note**: In dual CVM configurations (which could support up to six motors), then one driver needs to be installed for each motor required to be supported). Within **System Builder**, this device appears as follows: 

Table 8

Required number of Child drivers for Lighting control (in addition to a single required Communication Device)

Desired number of sliders	Type	Child Driver Name	
		LED Lighting Multi (LM)	LED Lighting Generic (LG)
1	Brightness Only	0	1
3	Hue/Sat/Brightness (HSB) recommended	1	0
3	Red, Green, Blue (not really recommended)	0	3
4	Red, Breen, Blue, White	0	4
4	Hue, Saturation, Brightness (HSB) + Color Temperature (CCT)	1	1
6	HSB + RGB	1	3
7	HSB+ RGBW	1	4
8	HSB+RGBW+ CCT	1	5
9	HSB+RGBW+CCT + Circadian	1	6
10	CCT + Brightness	0	2

Table 9

Required number of Child drivers for Motor control (in addition to a single required Communication Device)

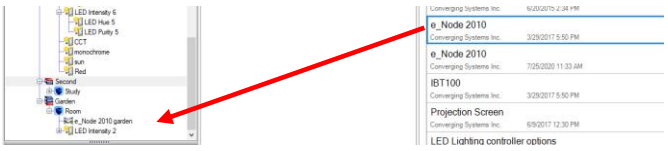
Desired number of sliders	Type	Child M1 driver
1	Single- Motor Channel	1
3	Two-Channel Motor Control	2
3	Three-Channel Motor Control	3
4	Four-Channel Motor Control	4
4	Five-Channel Motor Control	5
6	Six-Channel Motor Control	6

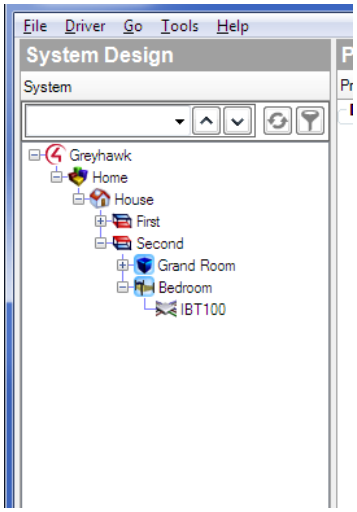
Programming Details

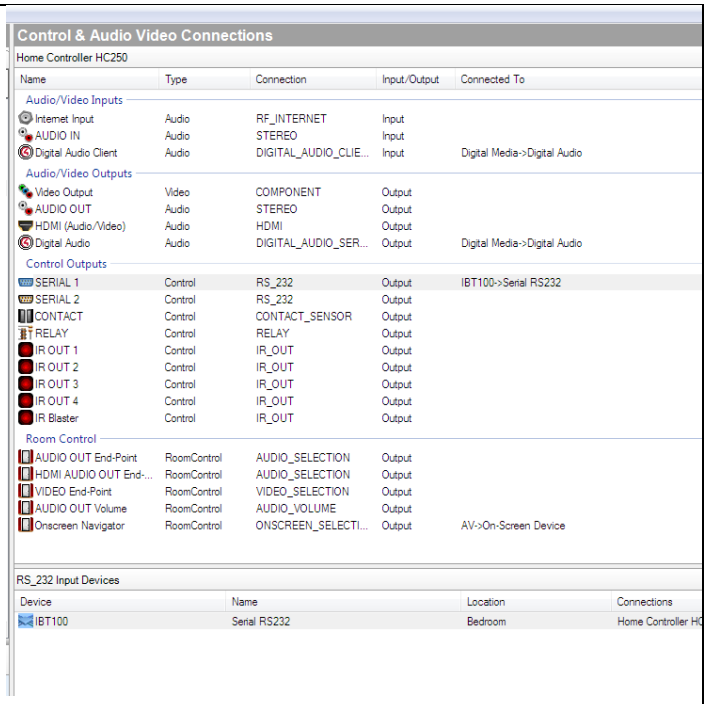
Below is a summary of those steps required to import the Converging Systems' drivers into the Control4 Composer application. See next section (section 2) for the programming of those devices

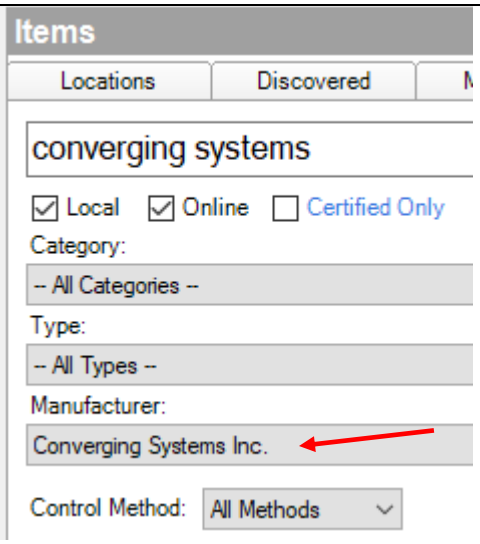
1. Import Latest (relevant) Converging Systems' Drivers into your project:

Step #	Step Overview	Detail
Communication Device Driver Installation		

1a	Select a Communication Device for the Converging Systems interface (**e-Node IP device or IBT-100 serial device)** that will be used with one or more Lighting Controllers and/or Motor Controllers	-Determine what will be the Communication Device that you will use to communicate with an applicable Converging Systems' Lighting Load or Motor Load. Refer to the appropriate section below depending upon your choice. -If using IP/ Ethernet control (**TCP/IP** Client communication from Control4) to the e-Node, proceed to **Step 1a1** below. -If using Serial (IBT-100) control (**RS-232** Client communication from Control4) to the IBT-100, proceed to **Step 1b1** below.
Directions Relating Specifically to IP Control for the e-Node (SDDP-Equipped)		
1a1	Background on SDDP IP-type devices—Converging Systems SDDP Equipped Communication Device	-The following devices support Control4's **SDDP** protocol. • e-Node, or • e-Node DMX, or • CVM (three-channel motor controller), or • Other Converging Systems SDDP compatible ("**Hybrid Comm/Load Devices**") -Refer to the Reference Table above for the applicable name of the applicable name of the Communication Device driver that will be loaded within this section.
1a2	Drag Communication Device into your project	-Within Control4's **Composer/System Design/Items/Search** View, select the applicable Communication Device (i.e., e-Node 2010) and drag it into the room or zone where you wish to establish initial control with this Communication Device. 
1a3	Note on Multiple Instances of the Communication Device	**Note**: If you will be implementing ***multiple*** Converging Systems' Communication devices within your project, you must drag one copy of the Communication Device driver for **each separate IP address that will be addressed (**i.e. two e-Nodes will require two instances of the Communication Device to be dragged into the appropriate zone or room**).**

		Now proceed to Step 2 below
Directions Relating Specifically to RS-232c Control using the IBT-100 (*not SDDP Equipped*)		
1b1	Adding an IBT-100 for Device Communication	In some cases, the Converging Systems e-Node may be available for a Control4 installation. In this case the SDDP functionality will not be available. Refer to Reference Table above for the applicable name of the Communication Device driver that will be loaded within this section. - Using the **System Design** view, add a **Driver** to a desired room or zone by dragging it into that appropriate location. 
1b2	Setting up the Serial port.	Within the **Connections** view, assign the IBT-100 to a serial port.

		 By dragging and dropping the IBT Driver, the baud rate and other setting are automatically set.
1b3	Note on Multiple Instances of the Communication Device	**Note**: If you will be implementing ***multiple*** Converging Systems' Communication devices within your project, you must drag one copy of the Communication Device driver for **each separate serial address that will be addressed (**i.e. two IBT-100 devices will require two instances of the Communication Device to be dragged into the appropriate zone or room**).** **Now proceed to Step 1c1 below**
Lighting Load and/or Motor Load Device Installation		
1c1	Verify if all drivers necessary to support your project are either available under Items/Search. **Note**: see Certified Driver Table (above) Table for appropriate drivers for your particular requirements	-Within Control4's **Composer/System Design/Items/Search** View, check the Online check box and search for the latest Converging Systems Certified Communication Device drivers.

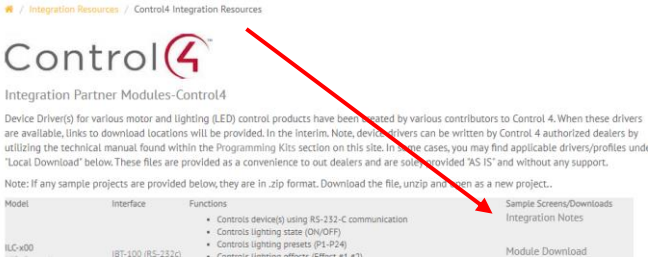
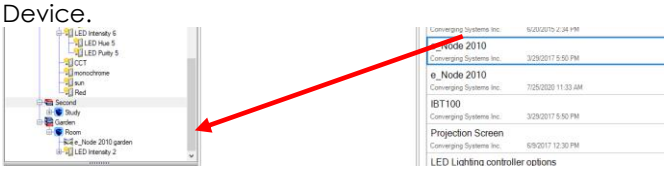


-Drag the applicable driver Lighting or Motor Load Driver(s) ***into your project (room or location). For smaller systems this may be where the above Communication Device is located***. However, for larger systems, these controllers may be scattered throughout the project. Regardless of where the controllers are located, they need to be linked (see Device Connection instructions). See Driver Table for all relevant Communication drivers for your project.

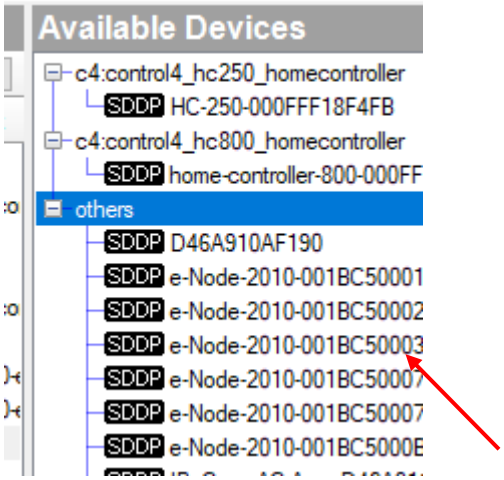
Note: See Note on downloading latest drivers from Converging Systems' site for the latest drivers in case new versions are available. It is best to download the target driver(s) into a separate directly (for field installation in case you do not have internet connection) and then make a copy within your main Control4 driver library on your local computer for later implementation.

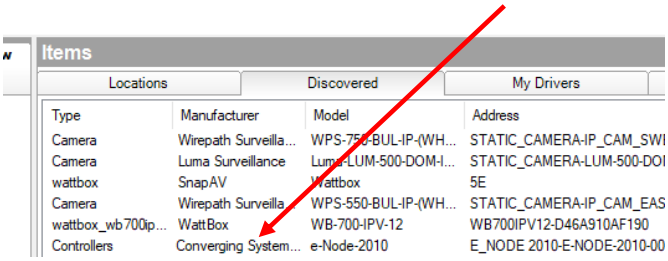
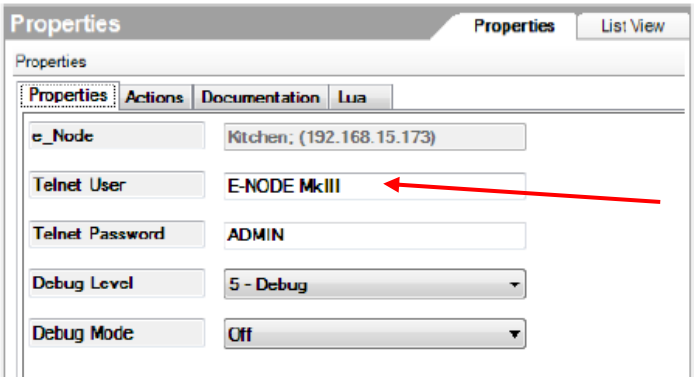
-If you are manually adding a device driver that is not otherwise available as an Online Certified device, copy the applicable **Lighting Load Device** and/or **Motor Load Device** (*.c4i or *.c4z) driver to your local drive (where Composer can find them-typically within the **Published Driver** directory). After those drivers are available, then drag them into your project where applicable as above

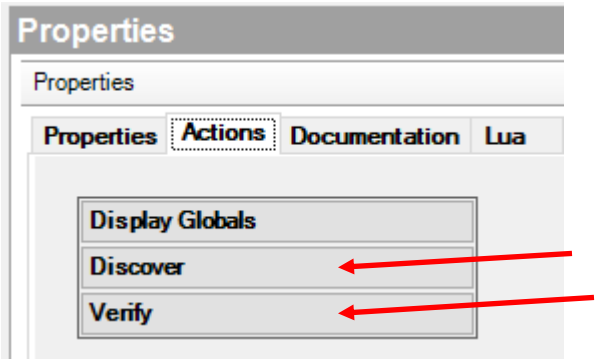
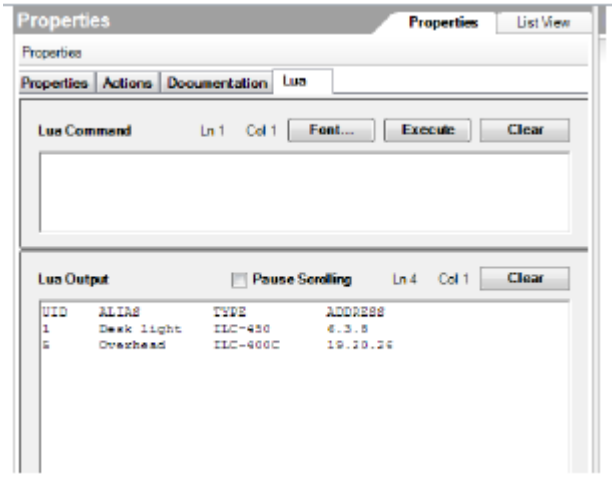
If you are downloading from the Converging Systems' website, your download location will appear as follows:

		Converging Systems website 
1c2	Drag drivers into specific rooms or zones.	- Within Control4's **Composer/System Design/Items** view, select the applicable **type** and **quantity** of Child Device Drivers (as described Driver Application/Best Practices Summary) and drag those into the room or zone where you wish to establish control with the Communication Device.  The applicable driver will add functionality with the approriate entires for the type of device added. See the **Tables** below for the entries added for specific type of devices. **Note on Hybrid Comm/Load Devices**, For these devices, it is required that Child Devices (drivers) are still added even though the Communication Component of that hybrid device has already been added.
1c3	Note on Multiple Instances of the IP Communication Device	**Note**: If you will be implementing ***multiple*** Converging Systems' load (motor or lighting) devices within your project (which are connected to their own Communication Device), you must drag **one or more copies** of the applicable Load device driver for the number of channels of output/control **(**i.e. a 3 color RGB device would require one LED Lighting Controller 3 color driver, while a full color RGBW that wanted a Hue, Saturation, and Brightness Control + a Color Temperature (CCT) control would need two drivers—a 3-color driver and a single option driver). See the Example Table for more information. **Now proceed to the next Step.**

2. Assigning Available Devices to System Design entries/Setting Parameters

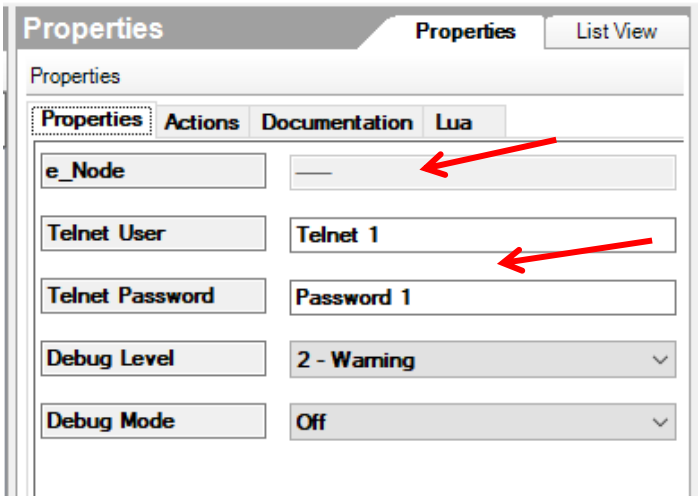
Step #	Step Overview	Detail
	Assigning Devices	
2a1	Discover (Communication) Devices	-All Converging Systems' SDDP-equipped communication devices (**hereinafter referred to for convenience as the "e-Node"**) if properly powered on with the SDDP feature ENABLED (see Pilot or Web Pilot to confirm its setting), will appear automatically within the **Composer/Connections/Network/Available Devices** view.  Note: Should you have multiple devices with the same name (i.e. e-Node-2020), review the trailing digits after e-Node2010-**xxxxxxxxxx** which refer to the units MAC address. Should your unit **NOT** be discoverable with SDDP or you wish to disable this level of functionality, proceed to step 2a2 to proceed.
2a2	Assign Devices	**For SDDP Discovered Devices** -Within the **Composer/Connections/Network** view, highlight the Communication Device under the **Available Devices** column and drag it over to the previously programmed Converging Systems' Communication Device (found under **IP Network Connections)** already programed within Systems Design. One the linkage has been made, proper assignment of a specific IP device with a discovered IP address is programmed. 

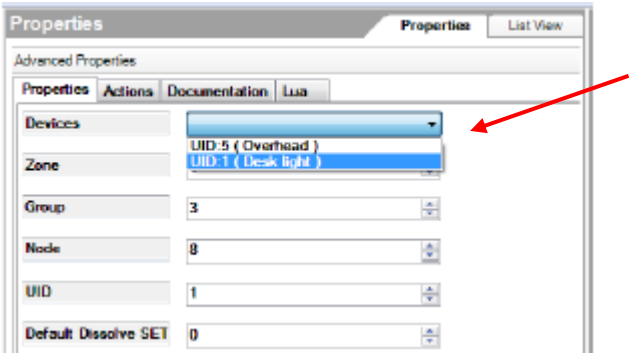
		<u>For non-SDDP devices</u> -For devices with SDDP set to DISABLED or for non-SDDP devices, you will need to manual program the units IP address within the **Composer/Connections/IP Network Connections** field by highlighting the target Communication Device (within IP Network Connections) and entering its address. Once the address appears under "Address," the assignment has been made.
2a3	Review Assignments	-Within the **Composer/System Design. Items/Discovered** view, you can quickly check for all (Converging Systems) Controllers, model names and address. It is wise to check this before proceeding to make sure all the steps to this point have been followed properly. 
Setting Parameters (and Reading read-only fields)		
For e-Node Communication Device		
2b1	Enhanced SDDP. Selecting specific e-Node by name (and a selection of e-Nodes with individual names if multiple e-Nodes exist)[V6]	-Within the **Composer/System Design/Properties field**, a new field has been added indicating the name and IP address of the connected e-Node/xxx once a Telnet connection has been successfully authenticated and is active. This read-only field will automatically update information received from the e-Node, and is a way to verify connection. If the "alias" or name of e-Node is changed within the Converging Systems' commissioning tools, this feature should automatically update provided there is a Telnet connection.  **<u>Actions</u>**

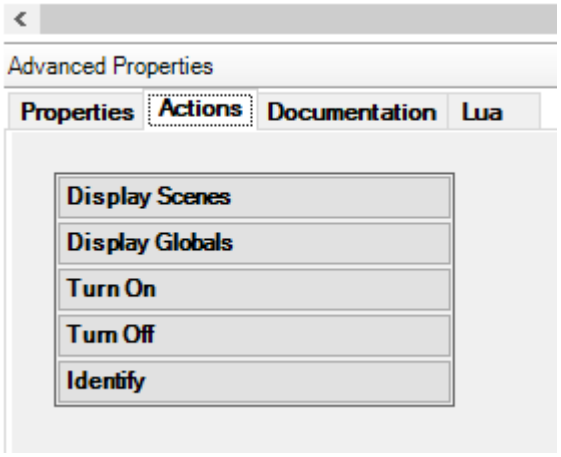
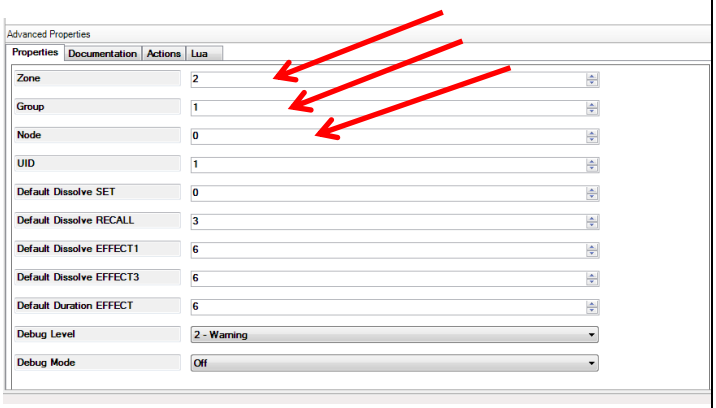
		Two new buttons have been added to **Composer/System Design/Properties** field under the **Action** tab.  -**Discover**. The **Discover** button will communicate with all the devices attached to the e-Node/xxx, and collect necessary information for the easy commissioning of the individual lighting or motor devices. The driver automatically tracks any changes made to devices using the Pilot or Web Pilot tools, and will update this information accordingly, and then pass it on to the individual drivers. If the Converging Systems lighting or motor devices are setup using the embedded Web Server Pilot app (or the freestanding Pilot application) first while this driver is active, then all of the information should be current. However, if you need to refresh the data, the **Discover** button can be used. -**Verify***. The Verify Devices will show the **UID**, **Alias**, **Type**, and **ZGN** address of all the found ILC-xxx devices connected to the targeted e-Node. This list is viewable on the **LUA** tab. The **LUA** Debug does not need to be on.  ***Note: VERIFY is supported on the e-Node/std for the support of connected ILC-xx0 controllers as of the 4/16/2021 C4 release. Support for VERIFY has been added as of 6/1/2021 for DMX devices connected to an e-Node/dmx, In order to gain support for this new feature,**

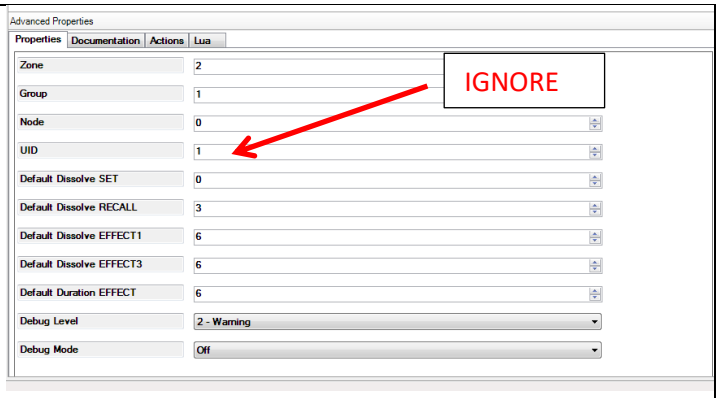
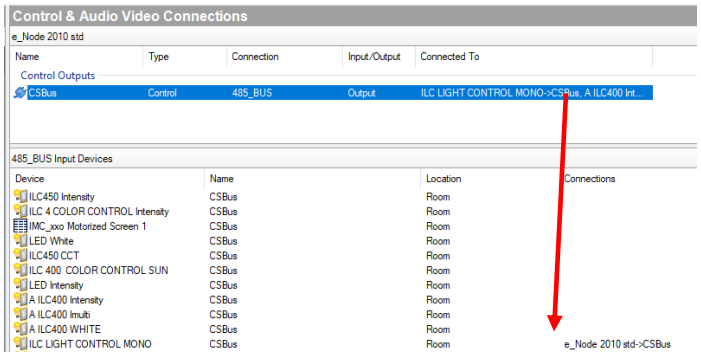
<table>
<tr><td></td><td></td><td>download new Child Device Drivers from the CSI website until available from Control4 within Composer as updated Certified devices. See Revision table (V7) for applicable driver versions required.</td></tr>
<tr><td>2b2</td><td>Set up Telnet User Name and Telnet Password</td><td>Within the Composer/System Design/Properties window, change the User Name and Password to match those set in the e-Node using the e-Node Pilot application (or Web Pilot application). The factory defaults for these fields is as below:

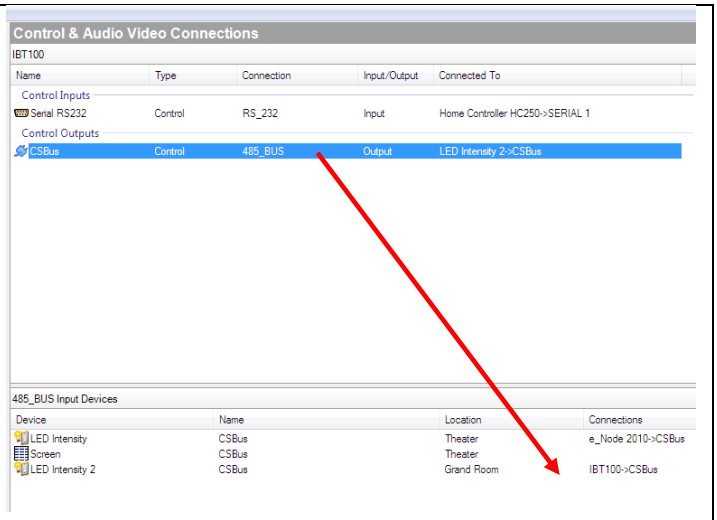
<table><tr><th>User Name</th><th>Password</th></tr><tr><td>Telnet 1</td><td>Password 1</td></tr></table>
Alternatively, use one of the user / password combinations defined under the “TELNET” view in Pilot (or Web Pilot application). Unless those have been changed, use the defaults shown below:

<table><tr><th>User Name</th><th>Password</th></tr><tr><td>Telnet 1</td><td>Password 1</td></tr><tr><td>Telnet 2</td><td>Password 2</td></tr><tr><td>Telnet 3</td><td>Password 3</td></tr><tr><td>Telnet 4</td><td>Password 4</td></tr></table>
 
</td></tr>
<tr><td colspan="3">For Lighting and Motor Control Devices (connected to above Communication Device)</td></tr>
<tr><td>2c1</td><td>CSDDP. Selecting specific Lighting Control or Motor Control Device (if you have more than one)[10]</td><td>Background. A new feature exists within the latest driver that indicates the name and UID (see step 2c2) of all connected ILC-xx0 (lighting) controllers. (Latest versions of the two Child drivers support similar functionality with connected DMX fixtures). The driver will automatically track any changes to the device using the Converging Systems’ commissioning tools.</td></tr>
</table>

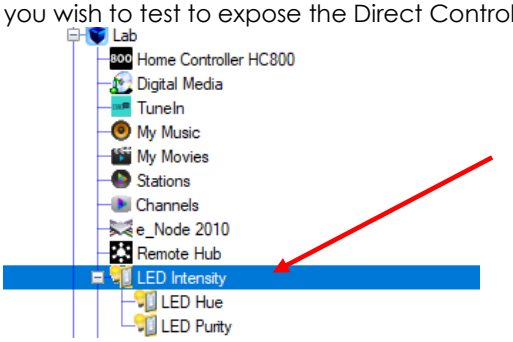
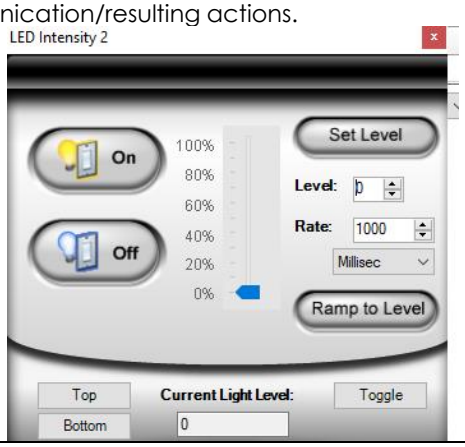
		This feature facilitates the situation where multiple ILC-xx0 controllers may be connected to the same e-Node and where multiple drivers need to be brought into to Composer for the desired level of control. (With a driver update, connected DMX fixtures can similarly be automatically be brought into Composer as well.) -Within the **Composer/System Design/Properties** field select the **Device**'s name from the pull down*  -Once the device is chosen, hit the **Set** button to accept. **Note**: If the information within the pulldown is not present or not correct, the e-Node Communication driver may need to be refreshed by using the **Discover** command (see Step 2b1 above). **Example**. If you had two ILC-400 and you wanted HSB sliders + CCT sliders for each, you would need 1 **LM** and one **LG** Child driver for each ILC-400. You could use the **Devices** name field to pick the parent LED controller for which the set of sliders available within that driver would control. **Actions** Several new buttons have been added to **Composer/System Design/Properties** field under the **Actions** tab for Child Device Drivers.

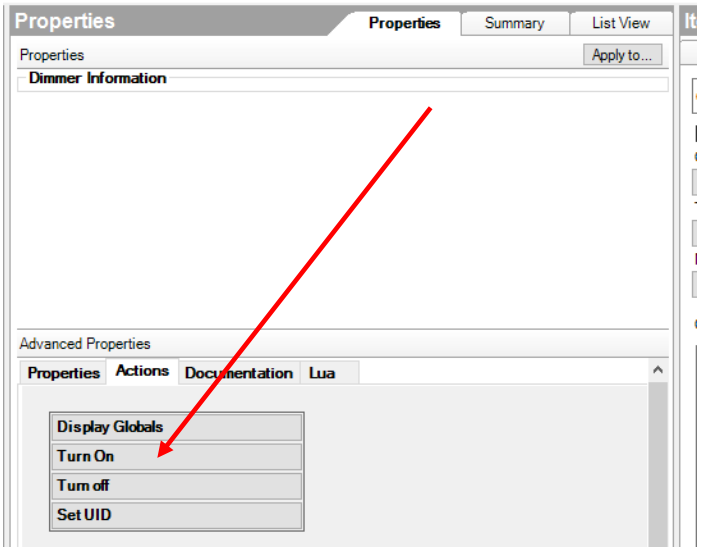
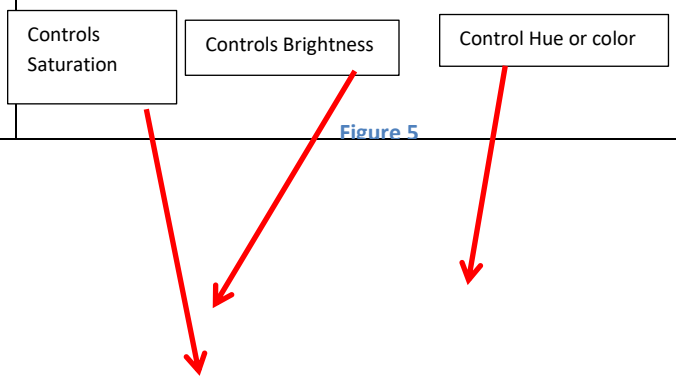
		 **Identify**. The Identify button forces the controller unit's on-board LED (and connected LEDs if it is a lighting controller) to flash. This can be a useful tool to quickly identify a connected load. **Display Scenes.** The **Display Scenes** button will show on the LUA page all the scenes currently active on this driver.
2c2	Add **Z**one/**G**roup/**N**ode address to match the load to be controlled.	-Within the **Composer/System Design/Properties** view, enter the appropriate Z/G/N addresses (if not automatically added). V6Note: with the latest version of the driver, the UID will auto-populate (for informational purposes only).  The default dissolves can also be set.
2c2	Skip the UID Section .	- Even though this driver exposes this control, current releases of the driver ignores this entry. -V6The newest driver version auto-popluates the UID value previously set with Pilot or the Web Pilot application.

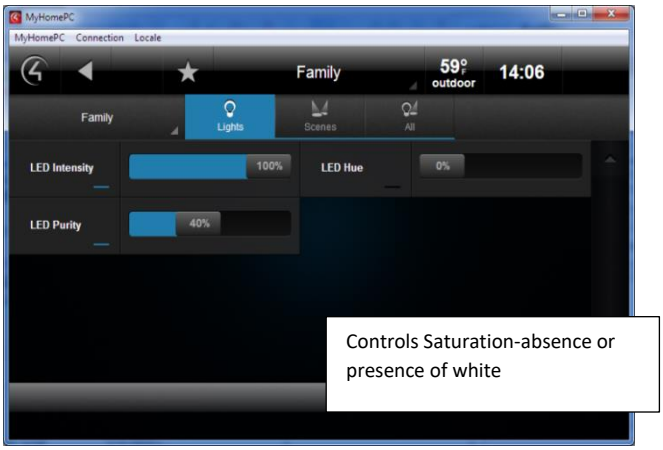
		
2c3	Set a connection for each new Lighting Load controller to the appropriate **Communication Device**. THIS STEP IS OFTEN NEGLECTED – DO NOT NEGLECT	-Within **Composer/Connection/ControlAV** view, set the connection from the Lighting Load or Motor Load device to the appropriate **Communication Device**. Select the **Control Outputs** device and drag to the appropriate device in the **485_Bus Input Device**s window to "connect" the device. **IF NO CONNECTION HERE--- NOTHING WILL WORK, PERIOD** <u>IP Connectivity (using e-Node/xxx)</u>. For IP connection using an e-Node/xxx, here is an example of the connection made between one ILC-100 and an e-Node.  <u>RS-232c Connectivity (using IBT-100)</u>. For connection using an IBT-100, here is an example of the connection made between one ILC-100 and an IBT-100

3. Test Project.

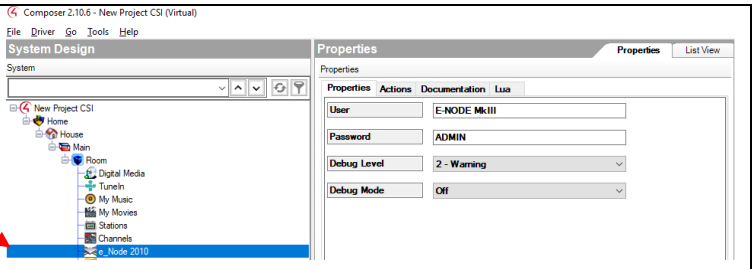
Step #	Step Overview	Detail
3a	Test Project.	- Within **System Design**, double click on the device that you wish to test to expose the Direct Control window.  -Utilize the GUI and see if the connected devices behaves approrpriately.ce to expose the Direct Control window. Refer to Troubleshooting Section below, if you do not see commmunication/resulting actions. 

		-Alternatively, open the **Actions** window. Select the various listed commands, and verify I the command is making its way to a powered-on/configured Converging Systems layout. Refer to Troubleshooting Section below, if you do not see commmunication/resulting actions.  **Note**: Make sure you are connected to your Control4 processor and it is on-line before continuing. **Note**: Disregard the "Set UID" entry as this is a depreciated feature. (Now this entry is eliminated in latest drivers[V6].
3b	Test with User Interface.	With either a Control4 app (OS2 or OS3 as appropriate) or a touch screen, verify operation.  Figure 5

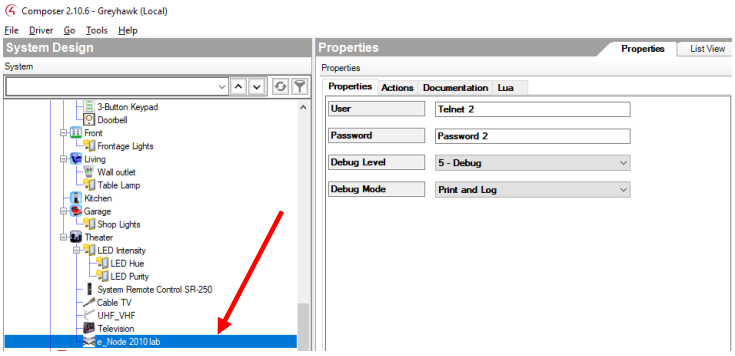
		
3c	Test with Actions/Execute	-Create an Action within the Scripts window and select Execute 
3d	Test with Control4 remote	-You should also be able to control the LED using various supported Control4 remotes (and other keypads).  -Proceed through each button and interface to verify proper operation. If certain functions are not operational, check your programming within Composer.

4. Troubleshooting

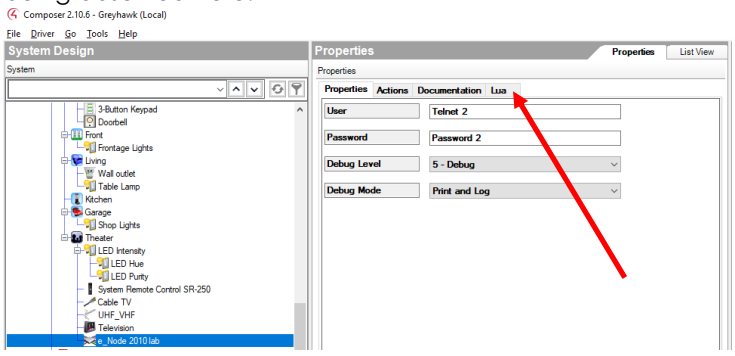
Step #	Step Overview	Detail
4a	Test communication to -Communication Device, and -LED and/or Motor Load Device(s)	-Within Composer, select the **System Design** tab and select the Communication Device to which the suspect ILC-xxx/IMC-xxx is connected.



-Set the Debug Level to "5-Debug" and set the Debug Mode to "Print and Log."

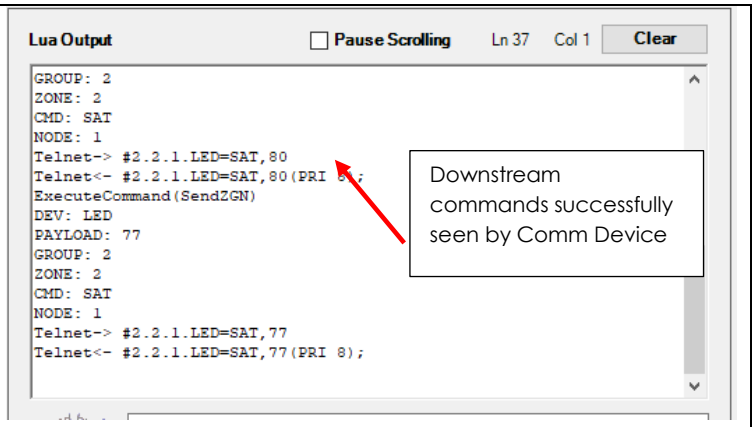
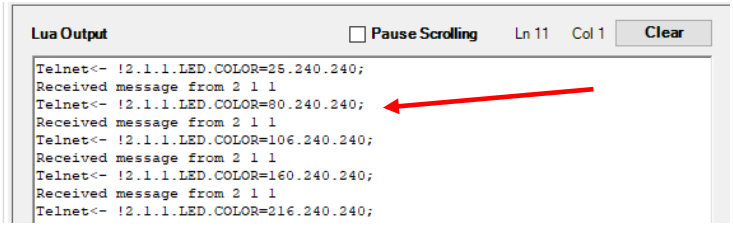


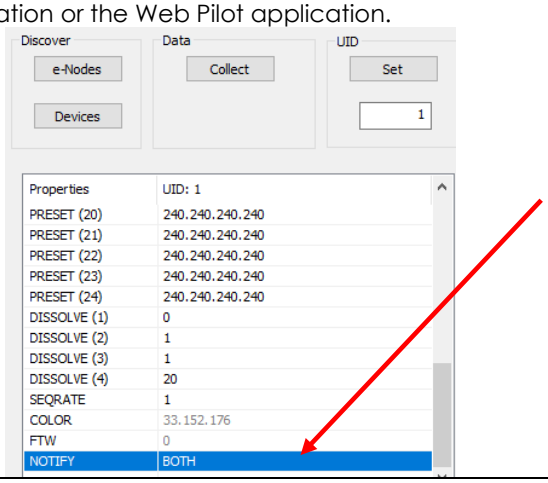
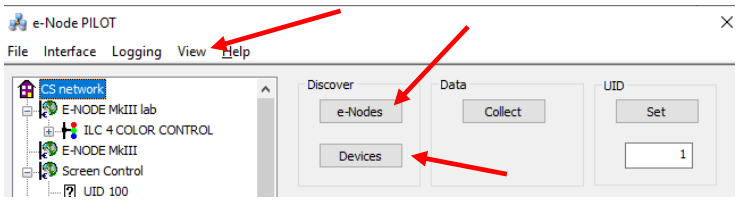
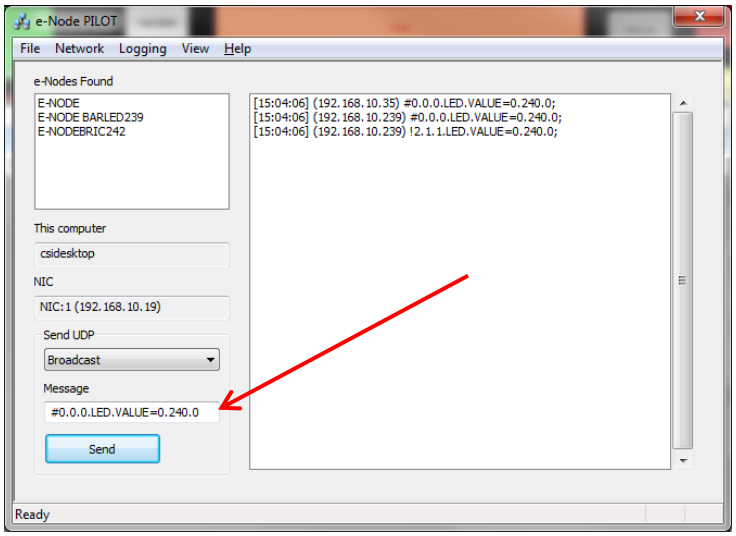
-Open up the **Lua Window** for the Communication Device being observed here.



-Invoke a button push or slider operation on a known good Control4 user interface and see if LUA code appears in the LUA window (shown below). You must see commands such as **#Z.G.N.TYPE=Command**, level going over on Telnet (see **#2.2.1.LED=SAT, 80** below).

If you see the same command followed by a "**PRI 8**" as the next line in the sequence, you know data is getting to and being received by the target communication device for this is a mirroring/acknowledgement being broadcast back to the Control4 system from the communication device (in this case the e-Node).

		 Provided you see the above type commands, you now know that (1) You have good communication from C4 to the Converging Systems' Communication Device (e-Node) (2) You have appropriate communication of Device specific commands flowing to ILC-100/IMC-100 devices (ON, OFF, etc.)
4b	Test backchannel communication from -LED and/or Motor Load Device(s)	-Follow the steps specified in Step 5a above and open the LUA output window for the **Communication Device** (i.e. e-Node) -Press any button on a C4 User Interface Device that will change the state of the ILC-xxx/IMC-xxx device such as an ON (if the LEDs are off) or an UP (if the Motor is down). -Monitor the LUA window (for the target Communication Device and see if you see backchannel data in the form of a "!" prior to a command that indicates -Color (for Hue, Saturation, and Brightness data) -Value (for RGB, or RGBW data) -Position (for Motor Position data)  -Provided you see this type of bi-directional data (which you will only see if there is a state change (i.e. On to OFF, UP to DOWN, but not one OFF after a previous OFF), you now know that (i) Bi-directional data is traveling from a Converging Systems Load device (ILC-xxx/IMC-xxx) and is being received/monitor by a Director.

		Note: Typically, if downstream commands are working (see Step 5a) and upstream ! commands are **not** seen (Step 5b), you have not set **NOTIFY** to the appropriate setting within the Pilot application or the Web Pilot application. 
4c	Launch the Converging Systems' **Pilot** application which communicates with the Converging Systems' e-Node Ethernet bridge.	 -Within the Pilot application, select the **View Map** Tab and discover **e-Nodes** and **Devices**. Then go to the **Traffic** Tab, and enter the following command in the **Message** window to see if your e-Node and connected LED controllers are properly functioning. **#0.0.0.LED.VALUE=0.240.0** 

		The connected LEDS should turn GREEN Consult the e-Node documentation or see Appendix 7 for more troubleshooting information.

Control4 Advanced Programming

All the device specific commands available in the ILC-xxx/IMC-xxx devices (as well as the supported DMX fixtures) can be used when programming with Composer. The opportunities are limitless. Following are some examples of commonly performed tasks.

Section 1	Adding Custom Buttons
	Examples
Section 2	Trigger Events
	Examples
Section 3	Copntrol4 Advanced Lighting Scenes

Sec 1. Adding Custom buttons

In addition to standard UI controls (on/off and sliders), custom buttons can be programmed to handle particular lighting and motor requirements (given the type of device selected) as follows:

Table 10

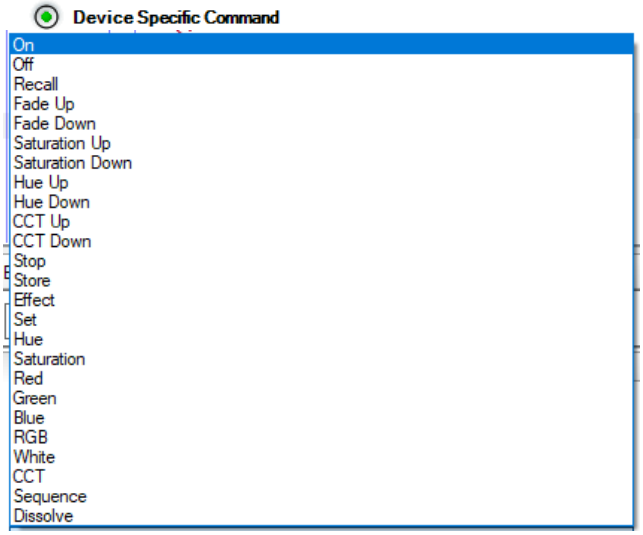
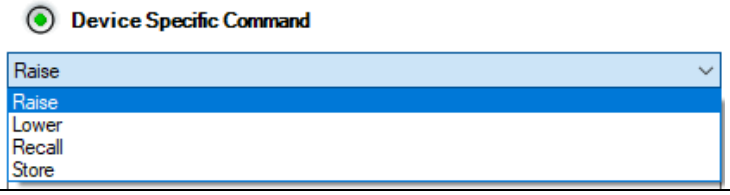
Lighting Functions (certain functions are reserved for specific lighting devices)	Motor Functions
• On • Off • Recall • Fade Up/Down • Sat Up/Down • Hue Up/Down • CCT Up/Down • Color Temperature Settings • Stop • Store • Effect (for dynamic motion) • Set (for Brightness level) • Hue • Saturation • Red • Green • Blue • SUN • RGB (to set a specific RGB Level) • RGBW (set a specific RGBW Level) • White • Color Temp (CCT) • Sequence (for period of time Effect 1 and 3 illumination is ON) • Dissolve (for Dissolve .1 and Dissolve.2 and Dissolve.3 and Dissolve.4 each with a Type (number of seconds) • SUN Up/Down	• Motor Up/Down • Recall Position • Store Position • Stop**

Notes:

* Reserved
**same effect can be achieved by hitting the same directional button a second time which autogenerates a STOP command

Depending upon the type of Device loaded, specific commands are available from which a custom button can be created. See table below for those choices.

Table 11

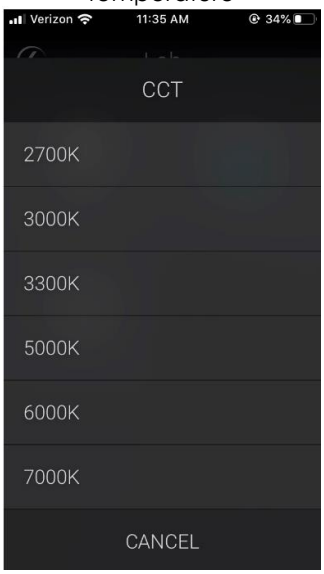
Device Type	Device Specific Commands (available for use with Customer Buttons and Triggers)
LM and LG Devices (Note: depending upon the actual device being supported some of these entires may not be relevant)	
M	

Section 1 Lighting Examples

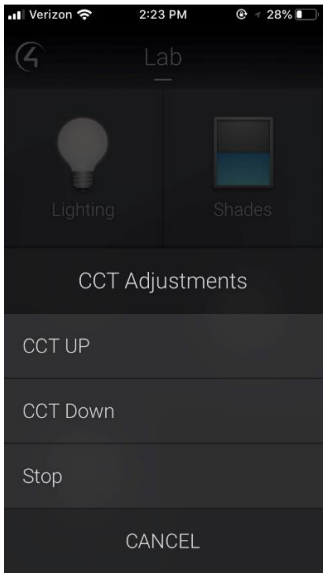
Following are directions to perform several types of custom buttons.

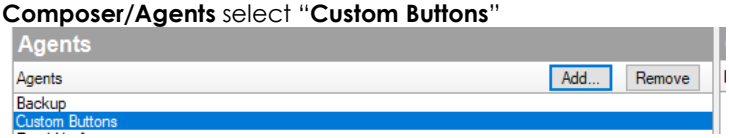
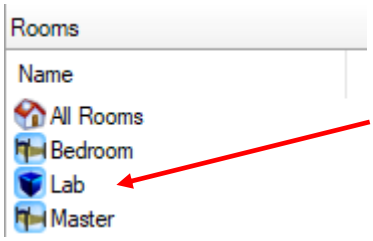
Objective

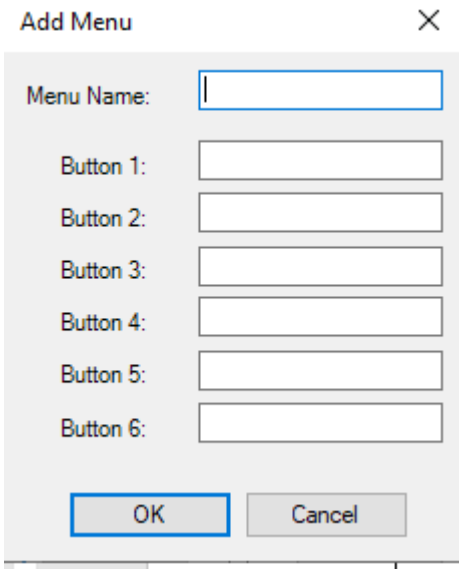
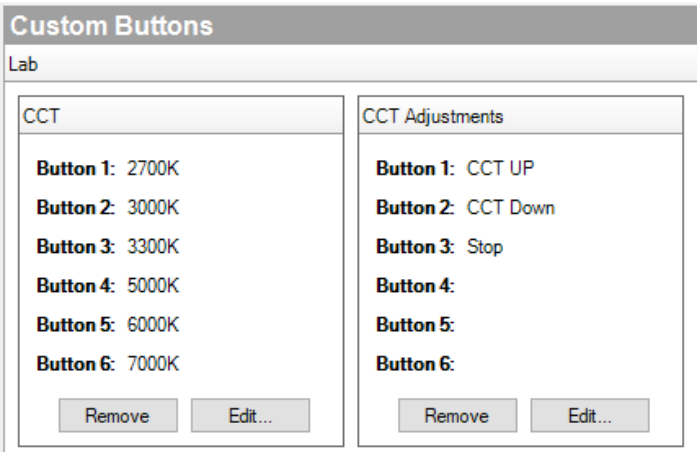
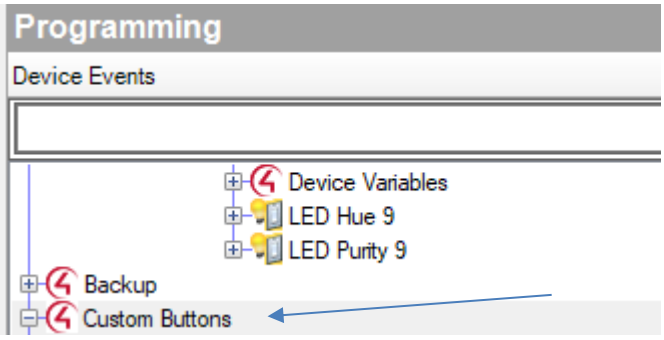
Make available custom buttons to set color temperature

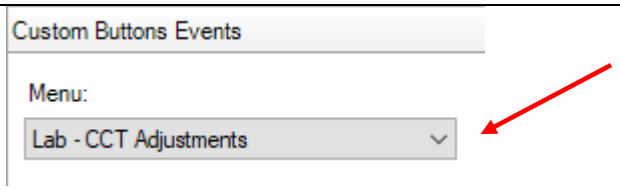
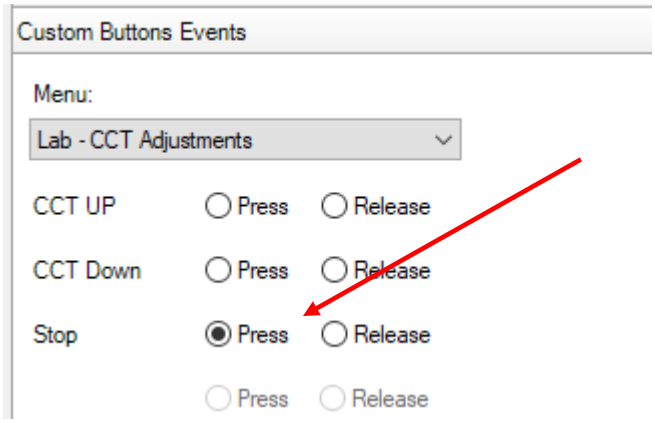
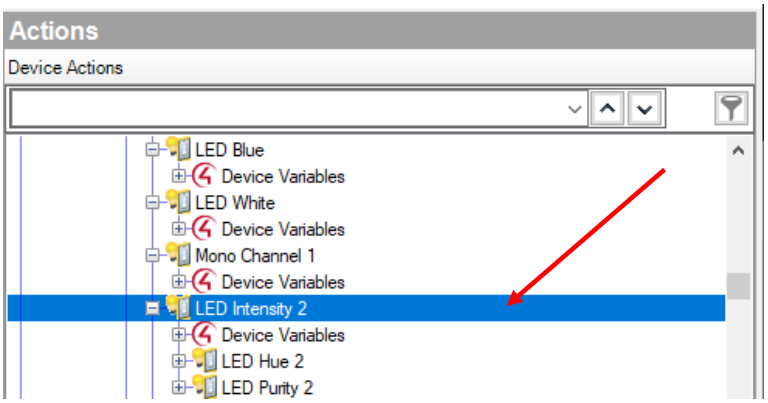


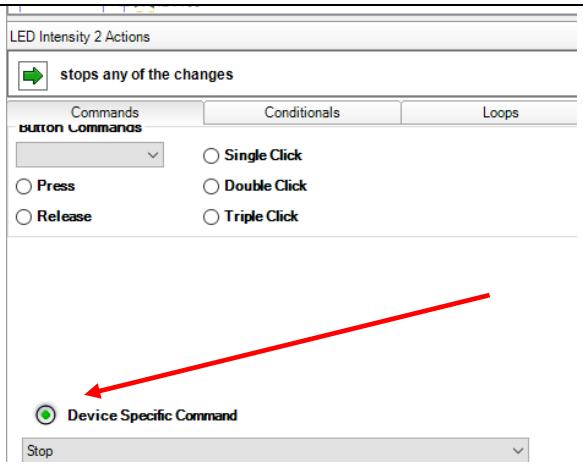
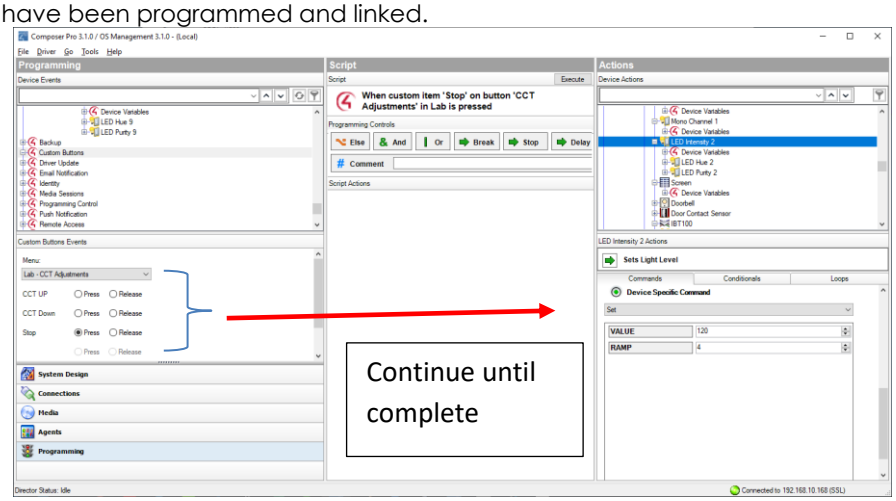
Make custom button to select Color Temp. Adjustments



Step #	Directions	Notes
1	Add custom Buttons.	-Within **Composer/Agents** select "**Custom Buttons**"  -Within **Rooms** window, select where the new **Custom Button** (menu) will appear. 
2	Fill In menu items	-Four **Menu** templates will open, select available template and hit "**Add**" to reveal the "**Add Menu**." Fill out table with appropriate names/text, and hit **OK**.

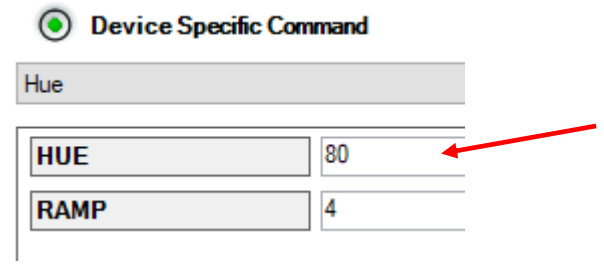
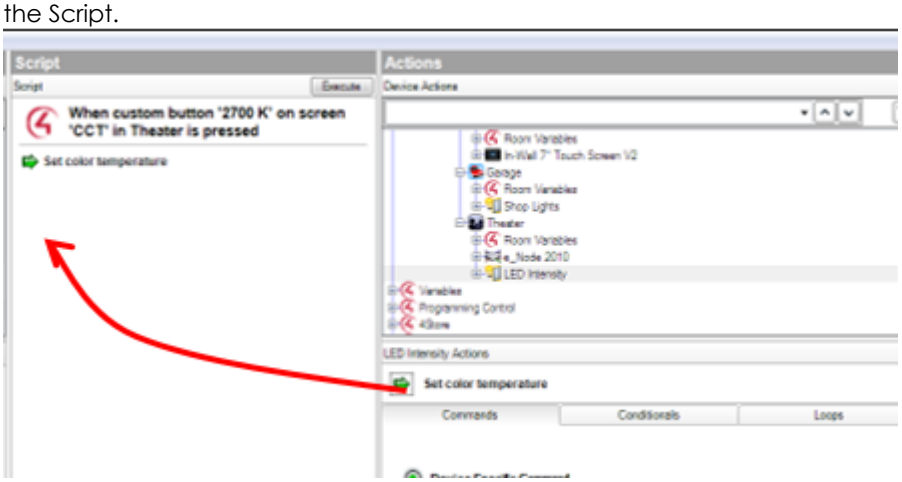
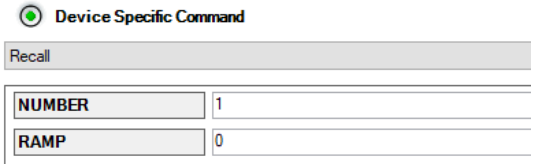
		 Fill out above menu and click OK, proceed to fill out all **Custom Menus** that you wish to populate. In this example, two custom menus have been created. 
3	Configured Custom Button Action	-Within **Composer/Programming**, select **Custom Buttons**.  -Within **Custom Buttons Events** window, select a Menu item for programming

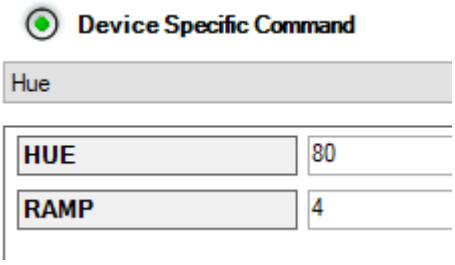
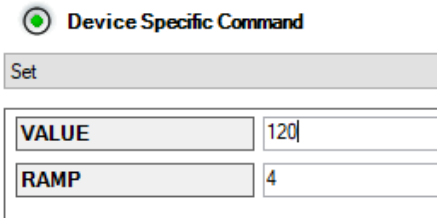
		 And then when the previously programmed menu choices appear in that same **Custom Button s Events** window, select for each entry a **Press** or **Release** as appropriate. 
4	Program Device Actions	-Next, within the **Device Actions** window select the Converging System Driver ***that will respond*** when the above Button event (in a particular room) is triggered  -In the window **below the Device Actions window,** scroll down to the **Device Specific Command radio selector**, and select it to expose all possible commands supported with the driver. **Note**: Depending upon the driver selector, various scroll boxes will appear. See the Device Specific Command Table above for all possible choices.

		
5		-Finally, select the desired **action**, and fill in the appropriate levels (typically 0 to 240 for color settings), and Ramp Time (in seconds).
6		-Continue moving between the **Custom Buttons Event** window and the **Device Actions** window until all items within the **Custom Buttons Event** page have been programmed and linked. 
7		For more information on all available commands, refer to our Device Driver Toolkit available at https://www.convergingsystems.com/software/inres_programmingdesignkit.php

Section 1 Additional Lighting Examples

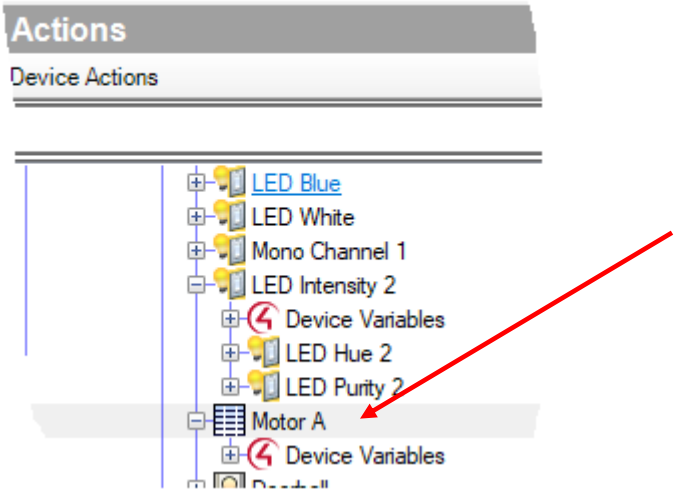
1	Primary color selection	Here, a Hue setting of 80 (which relates to GREEN) is selected.

		 **Note**: Here are numbers that can be used (range is 0 to 240 for HSB (which is in effect a color wheel which has no start and no end). Red 0 or 240 Yellow 40 Green 80 Cyan 120 Blue 160 Magenta 200 Red 240 **-Drag**  after above programming to middle Script window to complete the Script. 
2	Preset value Recalled	Here, a Recall #1 is selected with a 0 second ramp or dissolve rate.  **Note**: Here are default Presets (1-6 out of the 24 available) which can be Stored (using the Store command) or accessed (using the Recall command). Preset 1 Red Preset 2 Yellow Preset 3 Green Preset 4 Cyan

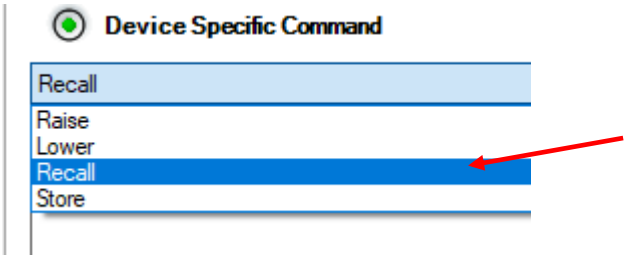
		<table><tr><td>Preset 5</td><td>Blue</td></tr><tr><td>Preset 6</td><td>Magenta</td></tr></table>  **-Drag**  after above programming to middle Script window to complete the Script.
3	Brightness Level set	Here, a brightness level of 50% is selected with a 4 second ramp time. The SET command (brightness) is set to 120 which is 50% between 0 and 240. **Note**: Our scale is 0 to 240 for most devices with non-timed ranged with 0 being OFF and 240 being full on.  **-Drag**  after above programming to middle Script window to complete the Script.

Section 2 Motor Examples

1	Preset value Recalled	Here, Converging Systems motor controller which permit the storage and subsequently recall of exact motor positions can be supported with Version 2 or later of the Converging Systems motor drivers* *note. Version 2 is currently on the Converging Systems website and will be transferred shortly to C4 on-line database. -First clock on the applicable motor device. **IMPORTANT:** The **Recall** command can only be run successfully if a previously **STORED** value (either through Converging Systems setup software or through a separate Store command) was invoked—you cannot recall anything if you have not learned or stored it.

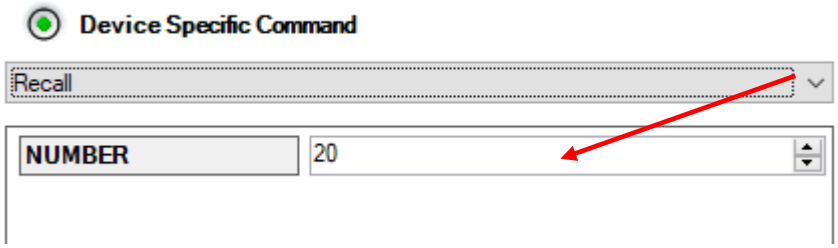


-Next scroll down to the Device Specific Command section and expand the available choices (to **Recall i**n this example).

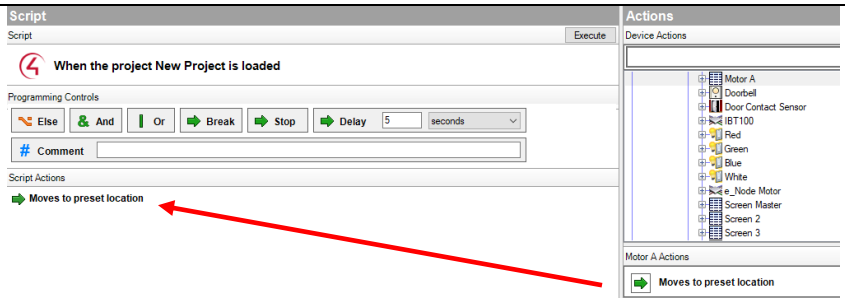
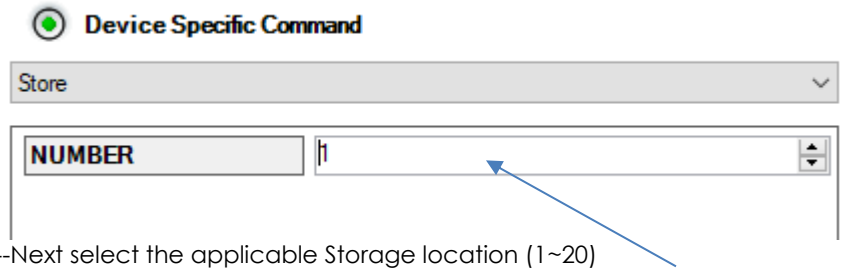
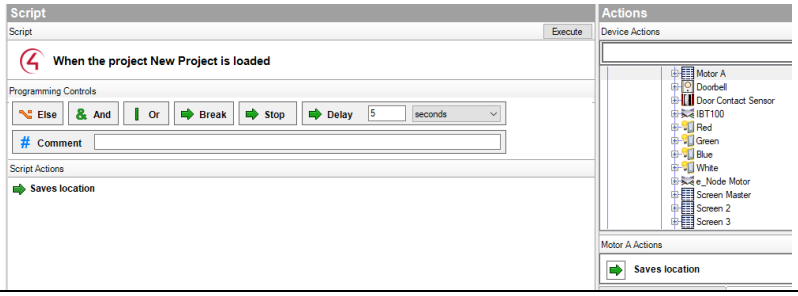


Note: Preset locations 1~20 can be recalled (and stored). This is applicable for devices that provide this feature set only.

-Next select the applicable Preset (1~20)



-Drag  after above programming to middle Script window to complete the Script.

		
2	Current Location Stored	-As above (in the Recall case), select the applicable Device Specific Command (i.e. **Store** in this case)  --Next select the applicable Storage location (1~20) - Drag  after above programming to middle Script window to complete the Script. 

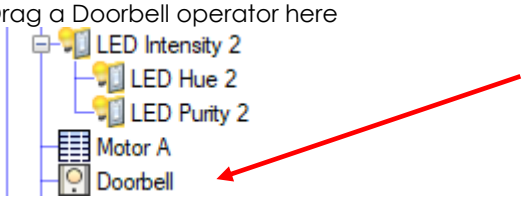
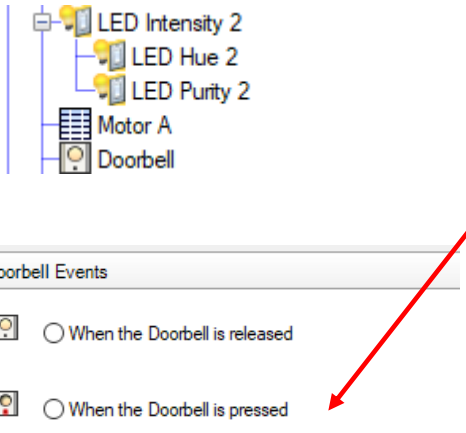
2. Trigger Events

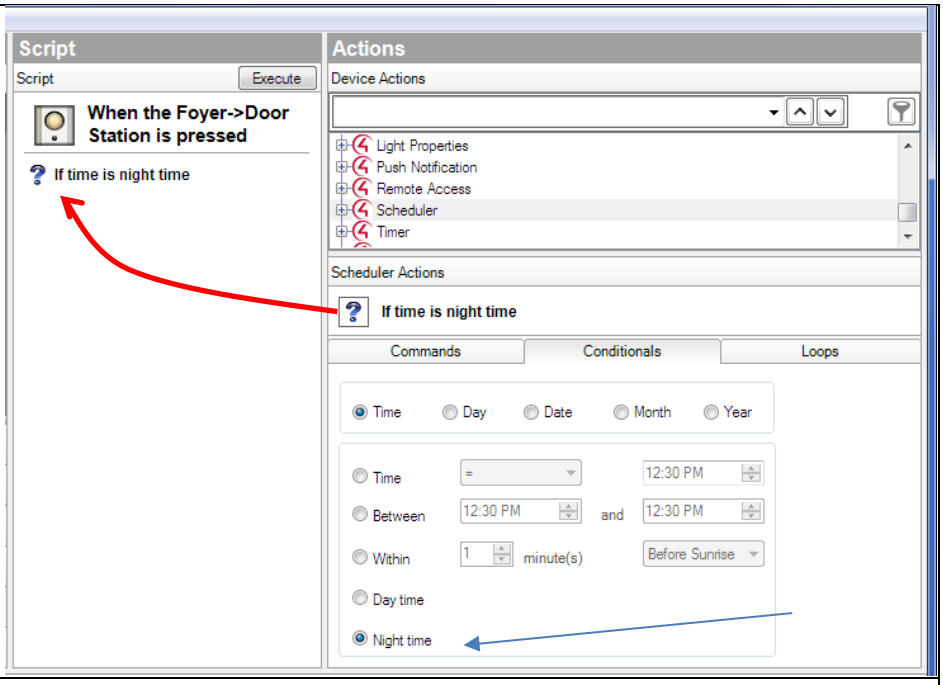
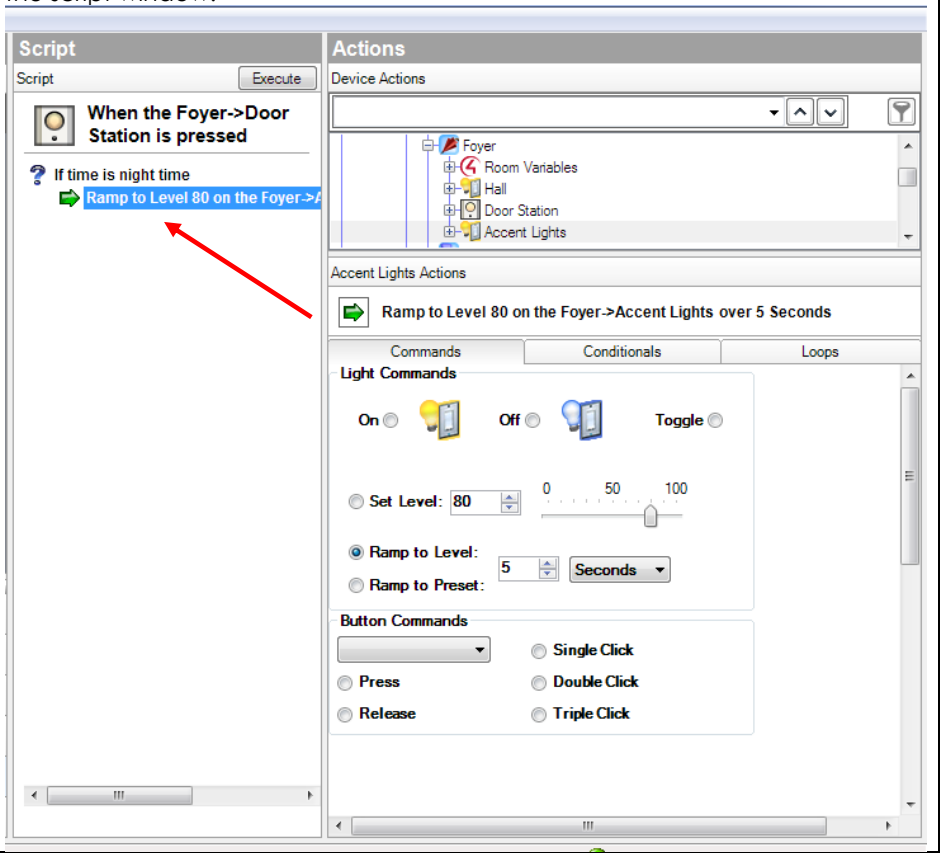
A powerful feature of Control4 platforms is the ability to program triggering events. Lighting and Motors are often connected to outside events (occupancy for lighting) or (projector on for projection screens).

Section 2 Example

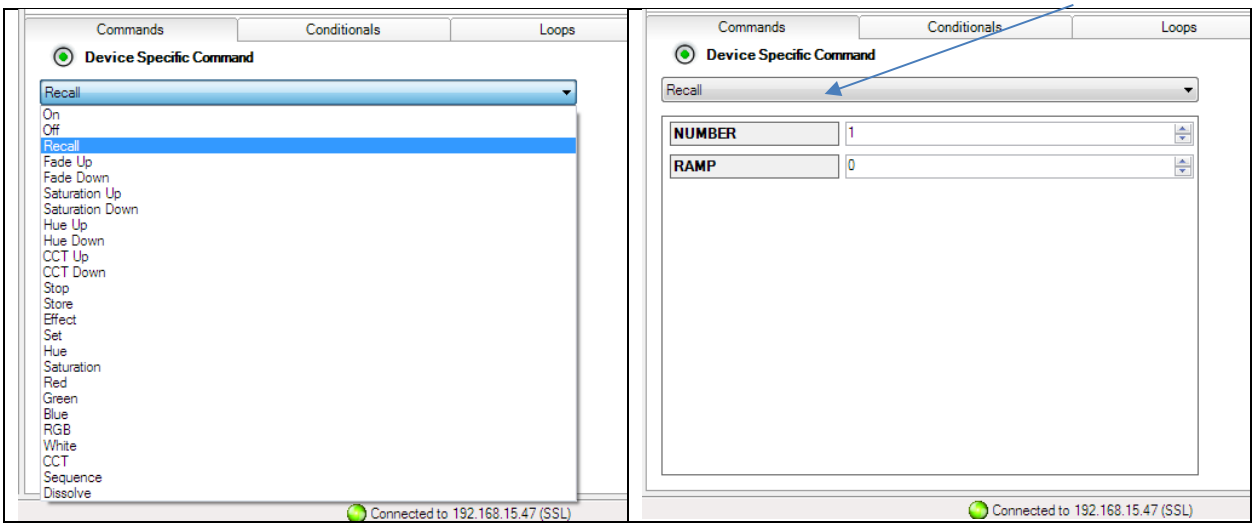
Following are directions to perform a suggested objective.

Objective
Activate the lights (or Motor) if the front door bell button is pushed, but only if it is nighttime.

Step #	Directions	Notes
1	Create an instance of a Door Bell, and a LED light (or Motor)	-Drag a Doorbell operator here  -Your Lights and Motors (if programmed) are already here
2	Program Doorbell	-In **Programming** view, click on Doorbell and select button pushed 
3	Program a Schedule	In the **Actions** Pane, select "**Schedule**r" and click "Night time". Then drag the "?" into the script window.

		
3	Program Levels	-In the **Actions Pane**, select the targeted Light (or motor) and click "Ramp to Level" Set the level to 80, and the time to 5 seconds. Then drag the arrow to the script window. 

Further device specific actions can be invoked in the **Action** window. Scroll **WAY DOWN**, and click "**Device Specific Command**." The drop down will indicate all the commands available (these vary depending upon the device selected—See Device Specific Commands Table for choice. Clicking a command will then show the parameters that can be specified for that command. For example, to transition to a preset color, select "Recall" and enter the preset number and ramp time in seconds.



3. Control Advanced Lighting Scenes

Control4's Advanced Lighting agent provides these features:

- LED trading for lighting scenes
- Toggle lighting scenes
- Ramp and fade lighting scenes
- Set delays within lighting scenes
- Scene sequencing
- Flash lights in lighting scenes

To use Advanced Lighting agent:

	Directions	Notes

Section 3 Example

(reserved)

Have fun, and enjoy completing your project.

COMMON MISTAKES

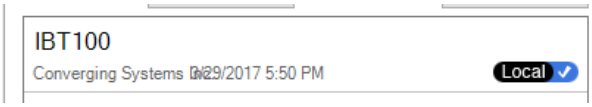
1. Forgetting to set TELNET credentials for Converging Systems e-Node device within the Lighting Interface page. Typically, Telnet sessions require a LOGIN ID. Currently within the Control4 driver, the user name is by default set to E-NODE MKIII and the password is ADMIN. More recent versions of the e-Node now have new usernames and passwords available (up to four different Telnet sockets can be maintained concurrently). Telnet 1/Password 1 are used for credentials. Unless you are using the system with older Converging Systems devices, use the new default username of Telnet 1 and password of Password 1.

   Note: Make sure that the settings within the e-Node match the setting within your MOTOR or LED module.

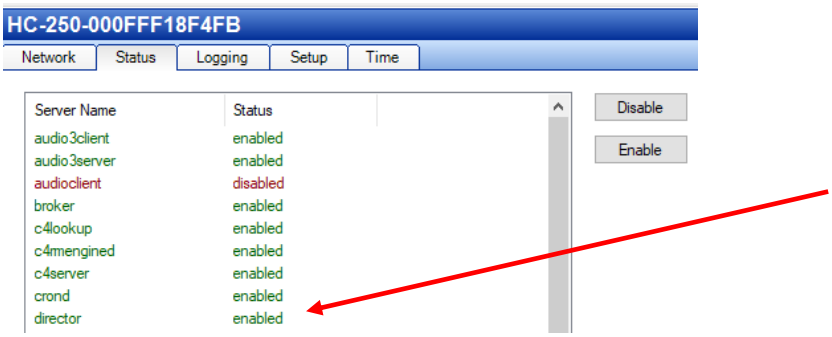
2. Forgetting to update **Z**one/**G**roup/**N**odes addresses within the default serial or IP driver for specific controllers. The default driver from Converging Systems is set to **2.1.0** for lighting devices, and **1.1.0** for motor devices. The "0" in the last location refers to a wildcard setting which causes all devices with a Node address from 1 to 254 to respond. If you have a setup with uses specific addresses other than **2.1.1** for instance (i.e. **2.1.2** for the second controller, **2.1.3** for the third controller, etc.) you must update the serial or IP driver accordingly.

3. Using commas between the Zone/**G**roup/**N**ode entries instead of periods (within the Address Tag)

4. Forgetting to check to make sure you have the latest Converging Systems drivers loaded you're your system. When you see the Local indicator within a loaded driver, it may be an older driver that has subsequently been replaced.

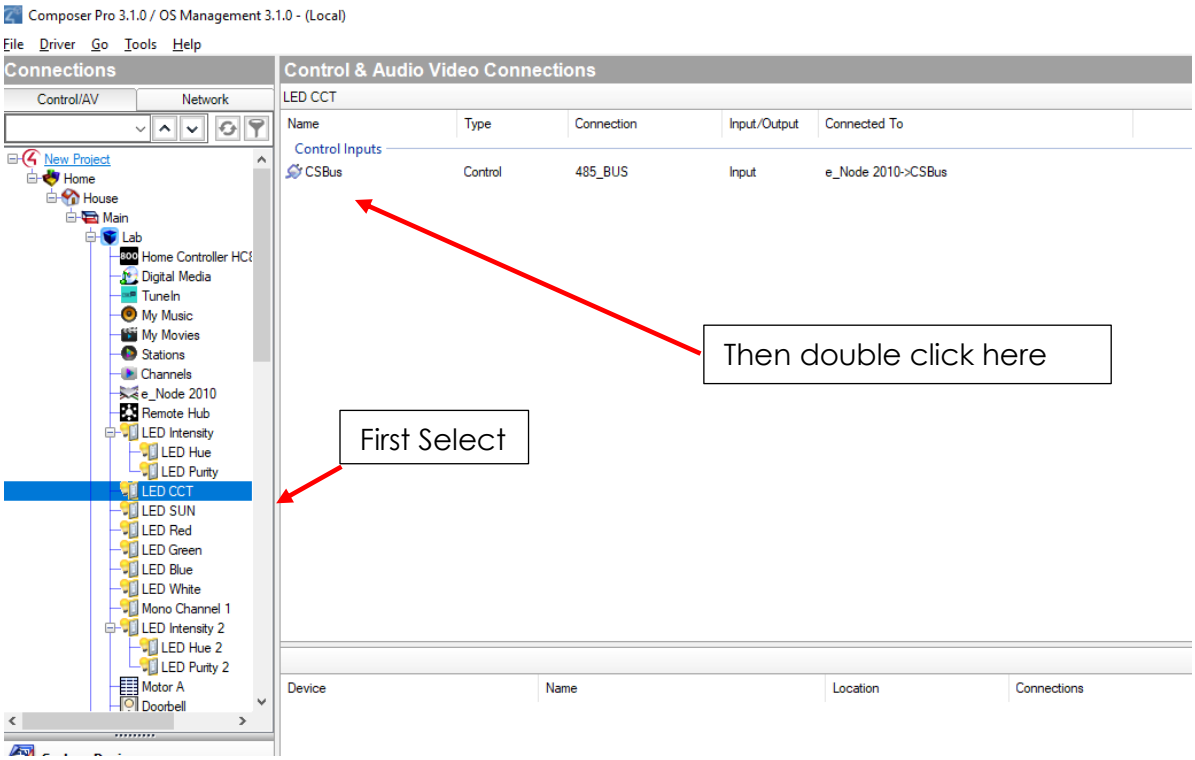


5. When attempting to connect to a Control4 processor, the **Local System** cannot see your processor while **System Manager** can see the device. You intended device may not have **Director (and other relevant services)** invoked. Within **System Manger, s**elect on your intended controller. In the Detail box on the right, make sure Director (and other relevant services) are turned to **Enabled**. After toggling this status entry, proceed to System Design and your processor should be evident. Proceed as you would normally.

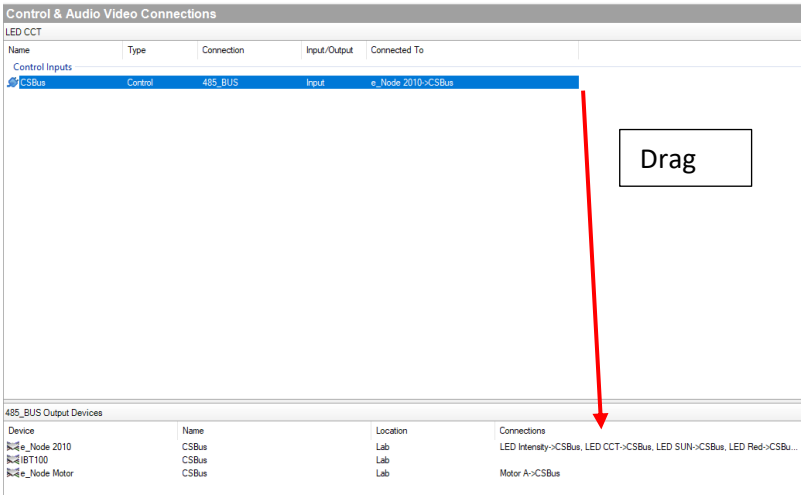


6. Forgetting to make a connection between the **Load** device (Motor or LED device) and the applicable **Communication** device (e-Node or IBT). See Section 2c3

   -Select the targeted Load Device (i.e. LED CCT device in this case), double click on it when it appears in the top window



-Drag that entry into the applicable Communication Device in the bottom window.



Note: without this step, nothing will work.

Appendix 1

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) or the IBT-100 (RS-232c communication), 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-100/ILC-400 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: If you plan on utilizing the IBT-100 for serial communication and (i) ***you will not need*** more than one address other than the factory default **ZGN** address of 2.1.0 for lighting controllers or 1.1.0 for motor controllers, and (ii) ***you do not need bi-directional communication*** between the lighting load or the motor load and your User Interface, then you can proceed to the IBT-100 Set up Section and you may skip the (i) e-Node Programming section as well as (ii) the ILC-100/ILC-400 Programming sections below.

Please download Hardware and Software Setup Guide from the Converging Systems website which can also be found **Resources/Installation Guides/System/Installation Guides or by going to these links below**

Type of Setup	**Link (look for Systems/Installation Guides)**
Led Lighting Control	https://www.convergingsystems.com/lighting_install_library.php
Motor Lighting Control	https://www.convergingsystems.com/motor_install_library.php

-Complete all the setup steps in the referenced document and then AND ONLY THEN proceed to Control4 Composer instructions above.

Appendix 2

Background on Addressing

This information is only relevant for when you ***start*** adding buttons and sliders within the GUI section of your Elan project. All Converging Systems' devices (loads or controllers as opposed to communication devices) that are connected to a communication device (e-Node or IBT-100) will be addressed using a unique **Z**one/**G**roup/**N**ode addressing scheme (**Z**/**G**/**N**). Those addresses are referred to within Elan Configurator 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 desire individual control. You can assign multiple controllers identical Z/G/N addresses after you have commissioned units and have verified that all units are operational.

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

The figure below describes this hierarchy.

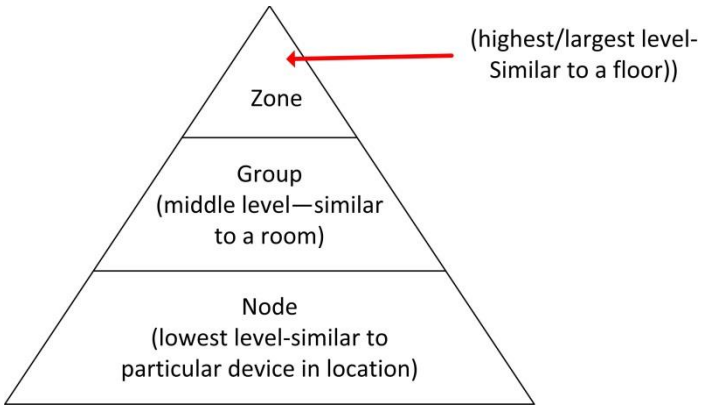


Figure 6

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

At this point after you assigned **Z/G/N** address to all loads (ILC-100 or ILC-400 controllers) 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 Elan Configurator.

Example: If you have a device with a Z/G/N address of **2.1.1**, then the Elan system can monitor that device to determine its current lighting status. If you choose to enter a wildcard address of a 2.1.**0** (that is a broadcast to all units with Z/G/N addresses between **2.1.1** and **2.1.254**), only the unique color settings available from the device with an address of **2.1.1** or the first Z/G/N unit in the series will be queried. See **Appendix 5** for more information.

Example: If you have a device with a Zone/Group/Node ("**Z/G/N**") address of **2.1.1**, then the Elan system can poll that device to determine its current lighting status. If you choose to enter a wildcard address of a 2.1.**0** (that is a broadcast to all units with Z/G/N addresses between 2.1.1. and **2.1.254**), only the unique color settings available from the device with an address of **2.1.1** or the first Z/G/N unit in the series will be queried.

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

Table 12

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**

Appendix 3

COLOR SPACE ISSUES

Note on Color Space.

Converging Systems recommends that only the HSB (Hue, Saturation and Brightness color space is used for it is infinitely more accurately and user friendly to control color. Although the Figure below shows both HSV and RGB on the same UI, this is probably more confusing for the typical user than the simple subset of HSV (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.**

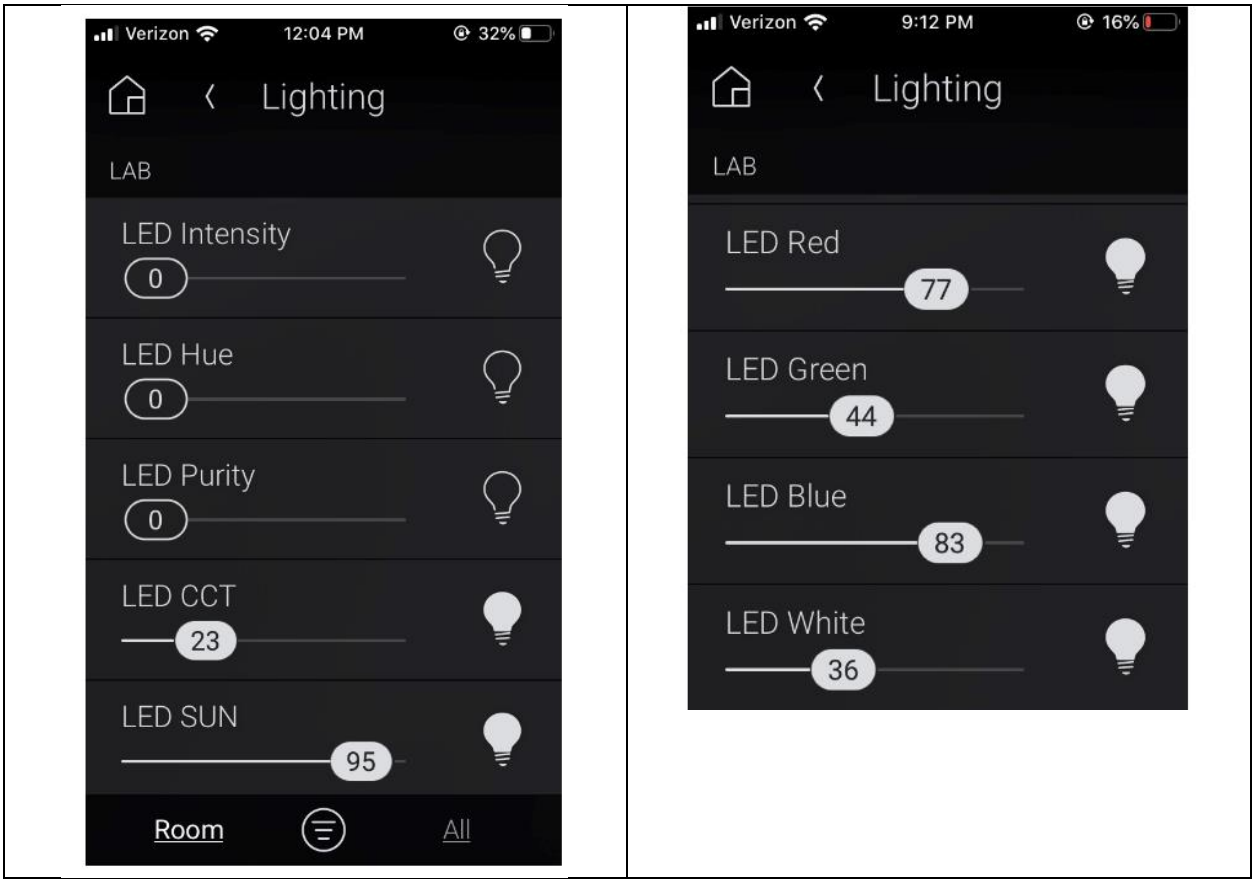


Figure 7

Appendix 4

ADVANCED CONTROL4 PROGRAMMING

Topic	Section
How to Set up group control	Section 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.

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

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

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

Specific controller address	Specific command that will trigger targeted controller
2.1.1	2.1.0 or 2.0.0 or 0.0.0
2.1.2	2.1.0 or 2.0.0 or 0.0.0
2.1.3	2.1.0 or 2.0.0 or 0.0.0
2.2.1	2.2.0 or 2.0.0 or 0.0.0
2.2.2	2.2.0 or 2.0.0 or 0.0.0
2.2.254	2.2.0 or 2.0.0 or 0.0.0
5.254.4	5.254.0 or 5.0.0 or 0.0.0

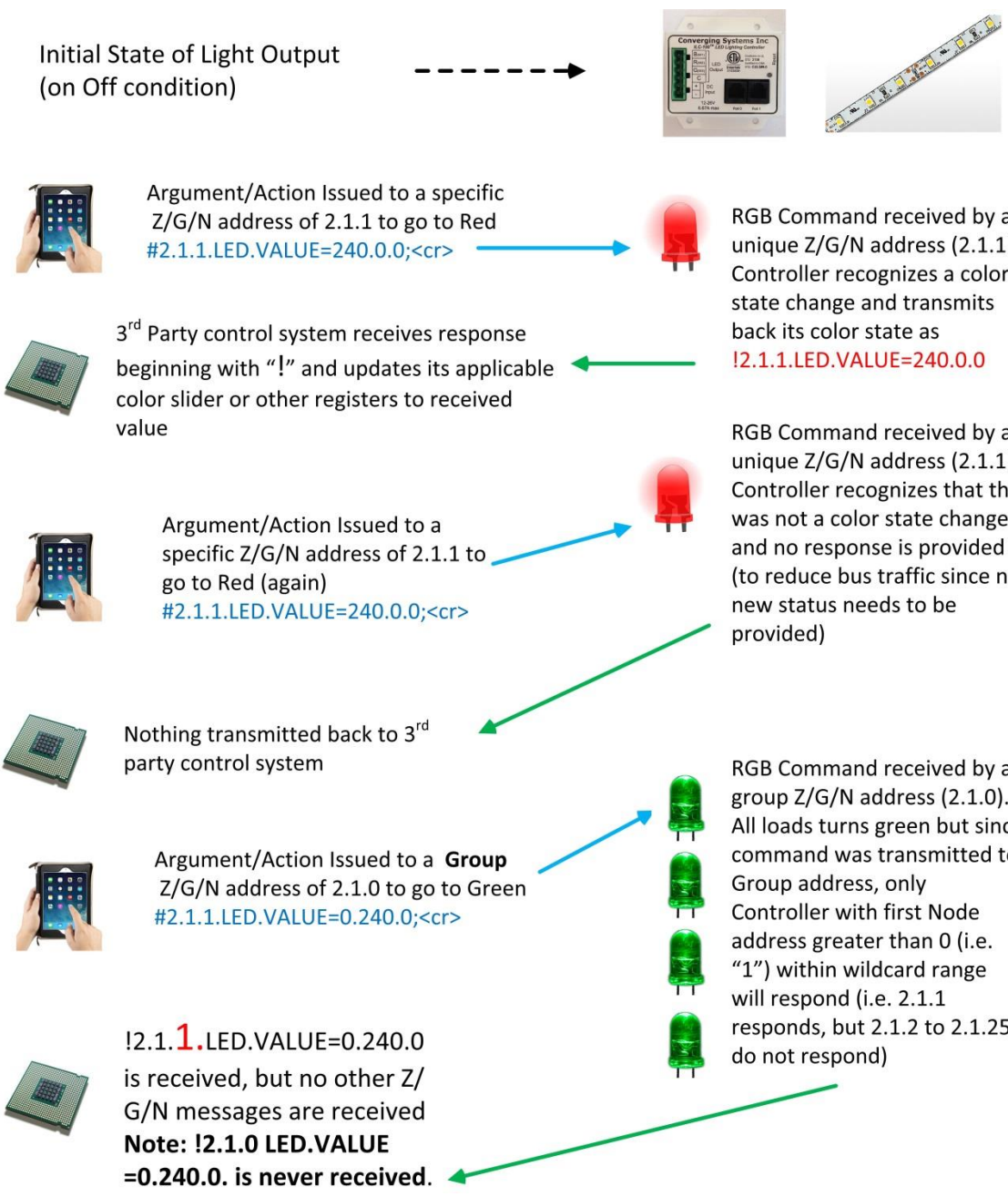
NOTIFY Command Background Converging Systems has a **NOTIFY** function which automatically provides color state feedback (from the targeted controller) provided a unique **Z**one/**G**roup/**N**ode (**Z/G/N**) address is provided with an action/argument payload to that specific controller. Specifically, 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, ***the status of the first controller whose node number is 1 greater than the wildcard command of "0" will respond and will be automatically remapped to the wildcard address of "0" from which the command emanated**** (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.

*Note: this is in 2018 updates to our ILC-400 firmware initially

2.0 Reserved.

Figure 8


Initial State of Light Output
(on Off condition)
Converging Systems Inc
Argument/Action Issued to a specific Z/G/N address of 2.1.1 to go to Red
#2.1.1.LED.VALUE=240.0.0;<cr>
RGB Command received by a unique Z/G/N address (2.1.1). Controller recognizes a color state change and transmits back its color state as
!2.1.1.LED.VALUE=240.0.0
3rd Party control system receives response beginning with "!" and updates its applicable color slider or other registers to received value
RGB Command received by a unique Z/G/N address (2.1.1). Controller recognizes that this was not a color state change and no response is provided (to reduce bus traffic since no new status needs to be provided)
Argument/Action Issued to a specific Z/G/N address of 2.1.1 to go to Red (again)
#2.1.1.LED.VALUE=240.0.0;<cr>
Nothing transmitted back to 3rd party control system
RGB Command received by a group Z/G/N address (2.1.0). All loads turns green but since command was transmitted to Group address, only Controller with first Node address greater than 0 (i.e. "1") within wildcard range will respond (i.e. 2.1.1 responds, but 2.1.2 to 2.1.254 do not respond)
Argument/Action Issued to a Group Z/G/N address of 2.1.0 to go to Green
#2.1.1.LED.VALUE=0.240.0;<cr>
!2.1.1.LED.VALUE=0.240.0 is received, but no other Z/G/N messages are received
Note: !2.1.0 LED.VALUE =0.240.0. is never received.

Appendix 5

DMX Setup/Programming

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

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

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

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

Now let's get started with Step 1.

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

Appendix 6

Sample User Interfaces

CONTROL4 Programming-User Interfaces

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

LED CONTROL ENVIRONMENTS (Standard Sliders and Light ON indicators)

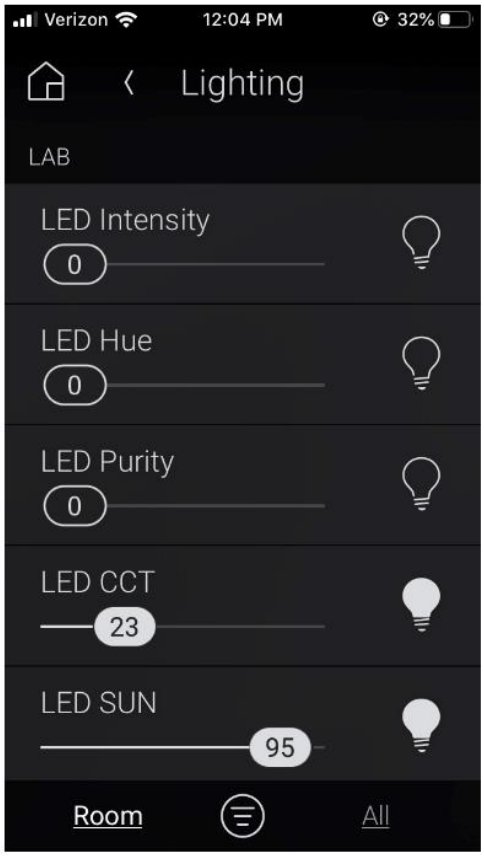


Figure 9

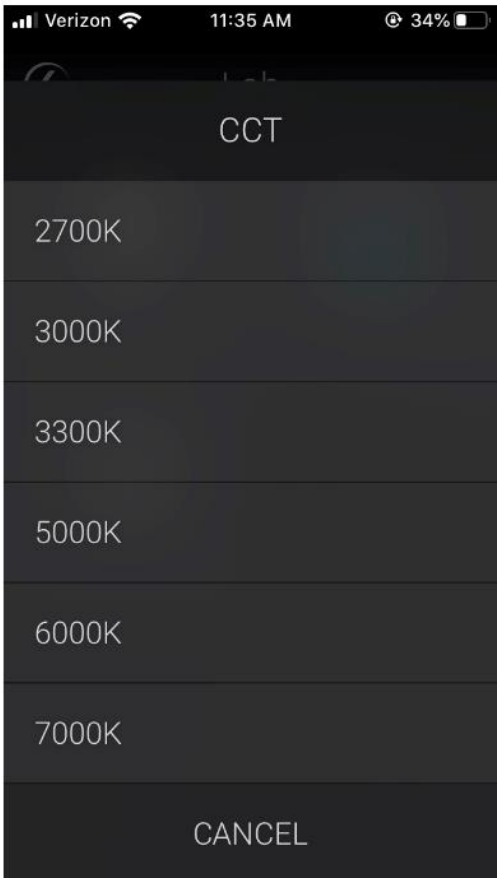
Notes:

-Hue/Saturation/Brightness control.
-Color Temperature-CCT (from 1700 to 8000 Kelvin with 0 matching 1700 Kelvin and 100 matching 8000 degrees Kelvin.)
-Circadian Tuning (SUN) (from sunrise to midday sun --with 0 matching sunrise or sunset and 100 matching midday sun.)

LED CONTROL ENVIRONMENTS (Custom Buttons)

Custom Button UI

Figure 10



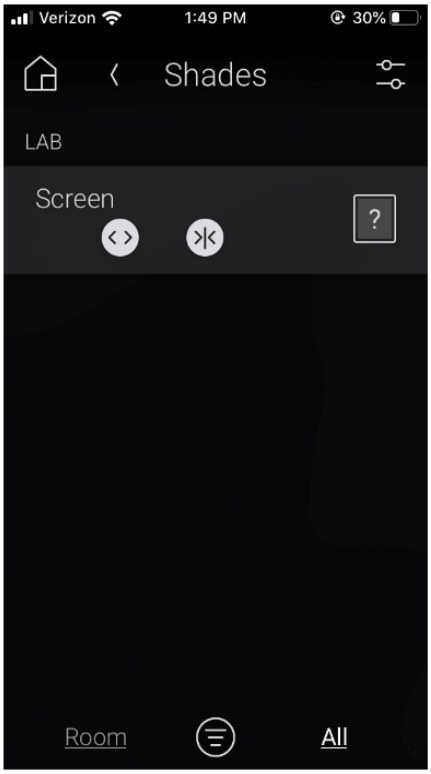
Note:

-Color Temperature Specific Buttons

MOTOR CONTROL ENVIRONMENTS

The following illustrations provide some sample UI for motor control interfaces. Future updates to the CONTROL4/CSI drivers will be made available supporting these screens.

Figure 11



Note:

-Sliders can control motors from open to close.

Appendix 7

Troubleshooting/System Monitoring

(See Troubleshooting within Document)