CONVERGING SYSTEMS

Integration Note

Automation/Lighting Panel Manufacturer:	Control4
Platforms:	**HC-250 (HC-800) Controller family**
Versions:	2.8.0
Specific Driver/Driver Version:	Composer 2.8.0
Download location for Driver/Driver	Converging Systems dealer portal
Document Revision Date:	February, 25 2016

OVERVIEW AND SUPPORTED FEATURES

The Control4 Composer and associated hardware support the Converging Systems' family of motor and LED lighting control products using either Ethernet (e-Node) or RS-232 serial connection (IBT-100).

Integration with Converging Systems' platforms is enabled from the range of Control4 wall pads, touchscreens, remotes and other user interfaces. Additionally, status available from a number of Converging Systems' controllers can trigger commands and other events within the above lighting /automation system. For example, a motor movement can trigger a lighting event. Or a lighting command issued can signal back to the touchscreen device as to its current setting (slider movement or level setting).

CURRENT PROFILES SUPPORT THE FOLLOWING FEATURES

The following commands are supported by the current driver for the various lighting and motor control devices (except those that are grayed out). The drivers support the standard Control4 proxy commands and extra device specific commands.

LED Lighting Commands

General CS-Bus Commands	Control 4 Device Specific Commands	ILC-100M	ILC-100C	ILC-400	e-Node DMX (MkIII)
General LED Control Commands					
ON	On	✓	✓	✓	✓
OFF	Off	✓	✓	✓	✓
EFFECT,1		✓	✓	✓	✓
EFFECT,n (>1)			✓	✓	N/A
STORE,#	Store	✓	✓	✓	✓
RECALL,#	Recall	✓	✓	✓	✓
DISSOLVE.1=XX	Default Dissolve SET	✓	✓	✓	✓
DISSOLVE.2=XX	Default Dissolve RECALL	✓	✓	✓	✓
DISSOLVE.3=XX	Default Dissolve EFFECT 1	✓	✓	✓	✓
DISSOLVE.4=XX	Default Dissolve EFFECT 3		✓	✓	N/A
SEQRATE=XX	Default Duration EFFECT	✓	✓	✓	✓
SUN_UP				✓	
SUN_DOWN				✓	
SUN.S				✓	
HSB (HSL) Color Space Commands					
FADE_UP	Fade Up	✓	✓	✓	✓
FADE_DOWN	Fade Down	✓	✓	✓	✓
SET,L	Set	✓	✓	✓	✓
HUE_UP	Hue Up		✓	✓	✓
HUE_DOWN	Hue Down		✓	✓	✓
HUE,H	Hue		✓	✓	✓
SAT_UP	Sat Up		✓	✓	✓
SAT_DOWN	Sat Down		✓	✓	✓
SAT_S	Sat		✓	✓	✓
STOP	Stop	✓	✓	✓	✓
RGB Color Space Commands					
RED,R	Red		✓	✓	✓
GREEN,G	Green		✓	✓	✓
BLUE,B	Blue		✓	✓	✓
WHITE,W	White			✓	✓
RGB	RGB		✓	✓	✓

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STOP	Stop		✓	✓	✓
Correlated Color Temperature (CCT) Commands					
CCT,XXXX	CCT		✓	✓	N/A
CCT_UP	CCT Up		✓	✓	N/A
CCT_DOWN	CCT Down		✓	✓	N/A
Bi-Directional Commands					
COLOR=?		✓	✓	✓	✓
VALUE=?		✓	✓	✓	N/A
Accessory Enode Command/Setup Parameters					
Telnet Login with Authentication		✓	✓	✓	✓

Motor Commands (Screen)

General Commands	Control 4 Device Specific Commands	IMC-100	BRIC ("Bric Mode")	
General Motor Control Commands				
UP	Raise	✓	✓	
DOWN	Lower	✓	✓	
STOP		✓	✓	
RETRACT	Raise	✓	✓	
STORE,#			✓	
RECALL,#			✓	
PRESET.X=XX.XX				
Bi-Directional Commands				
STATUS=?				
POSITION=?				

CURRENT PROFILES DO NOT SUPPORT THE FOLLOWING FEATURES

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

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

WIRING DIAGRAM (for IP connection)

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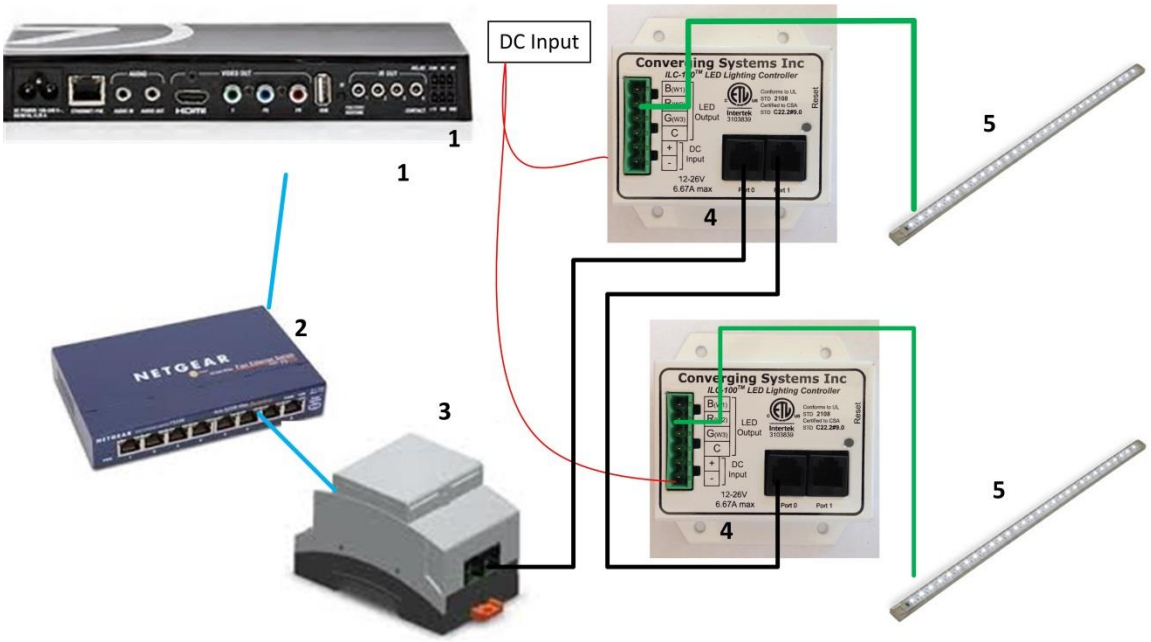

Figure 1

Wiring/Configuration Notes:

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

BILL OF MATERIALS (for IP control)

#	Device	Manufacturer	Part Number	Protocol	Connector Type	Notes
1	HC-300, HC-250/800 family processors	Control4	Various	Ethernet/USB/HDMI	RJ-45	
2	Network Switch	Various	Various	Ethernet	RJ-45	
3	e-Node	Converging Systems	e-Node	Ethernet	RJ-45 (for Ethernet) RJ-25 for local bus	
4	Lighting Controller (or Motor Controller)	Converging Systems	ILC-100 or ILC-400 or IMC-100 or (Stewart BRIC)	CS-Bus protocol	RJ-25 for CS-Bus communication	Must terminate beginning and end of bus with 120 ohm

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

WIRING DIAGRAM (for RS-232 serial connection)

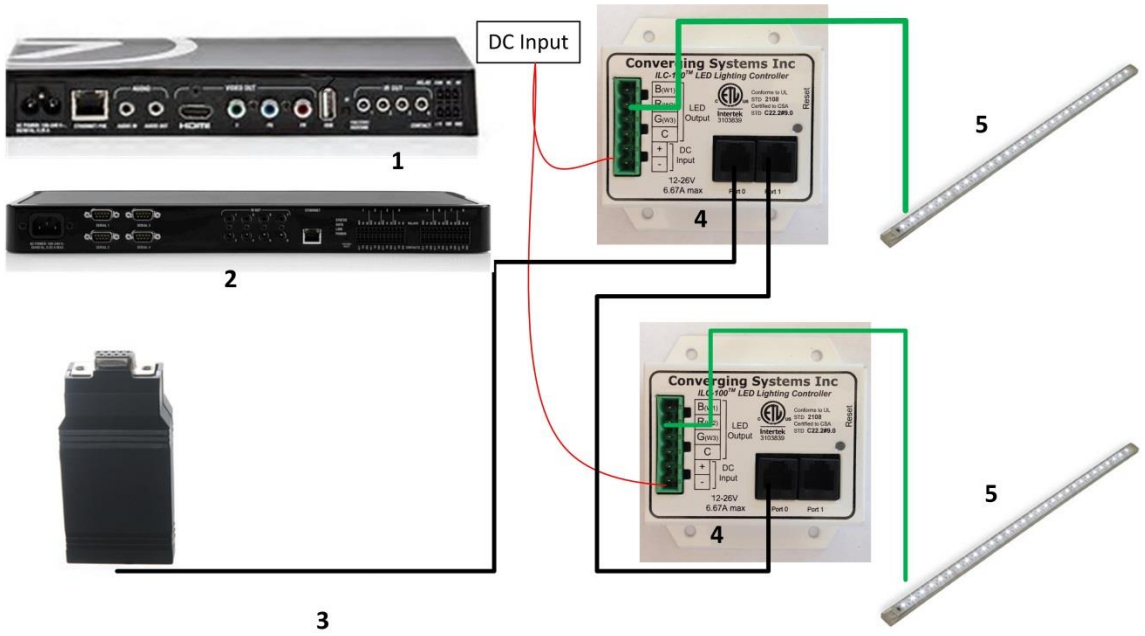

Figure 2

Wiring/Configuration Notes:

1. Maximum length of CS-Bus cabling from e-Node to the last ILC-100 using CAT5e or better cabling (and obeying the 1-1 pin-out requirements for the RJ-25-RJ25 cable) = 4000 feet
2. Maximum number of ILC-100 controllers and Converging Systems' keypads (if provided) that can exist on a single network connected to a single IBT device = 254

BILL OF MATERIALS (for RS-232c connection)

#	Device	Manufacturer	Part Number	Protocol	Connector Type	Notes

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1	HC-300, HC-250/800 family processors	Control4	Various	Ethernet/HDMI/USB	various	
2	HC-250 requires adaptor	Control4	C4-CBL3.5-DB9B	IR to Serial	DB-9 male	
3	IBT-100	Converging Systems	IBT-100	RS-232c	DB-9 (for Serial) RJ-25 for local bus	
4	Lighting Controller (or Motor Controller)	Converging Systems	ILC-100 or ILC-400 or IMC-100 or (Stewart BRIC)	CS-Bus protocol	RJ-25 for CS-Bus communication	Must terminate beginning and end of bus with 120 ohm resister on pins 3/4
5	Flexible Linear Lighting (FLLA) RGB or RGBW luminaries	Converging Systems	FLLA-RGB-xxx FLLA-RGBW-xxx		3-color 4 pin 4-color 5 pin 1-color 4 pin	

System Configuration/Programming

Before proper operation between the Converging Systems' controllers and the Control4 system can begin, it will be first necessary for most applications to configure the Converging Systems' products using the e-Node Pilot (PC-based) application (and the e-Node). In addition, communication parameters within the Control4 Composer software are also required. Refer to the specified instructions below for the particular subsystem for more information.

You may wish to go the topic that is most relevant for you (click on link).

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Overview

The Converging Systems e-Node is an Ethernet communication device which can be used to connect the Control4 Host to one or more Converging Systems motor and/or lighting controllers. Alternatively, the Converging Systems' IBT-100 serial interface device can be used to connect the same number of Converging Systems' controllers to a Control4 processor in situations where Ethernet communication is not desired (but where bi-directional feedback is still required).

Regardless of which method (Ethernet or RS-232c) is desired to be used to communicate with Converging Systems' controllers, ***it is still suggested that initial set-up and commissioning of the controllers' addressing schemes and particular features are made using the e-Node Ethernet device and the e-Node Pilot application***. Settings that can be implemented using this setup are as follows:

- Computer running Windows XP or later OS, preferably with a wired Ethernet connection to a local router using CAT5 type cabling
- Converging Systems E-Node Ethernet adapter connected using CAT5 cabling to the above router.
- Download of the latest version of e-Node Pilot application, unzipped and operating on your computer platform
- Powered up and connected ILC-x00 controller using **twisted pair CAT5** cable with straight thru (1-1) wiring and a 6-pin RJ-connector (Do not use 568A or 568B wiring because this does not preserve twisted pairs on pins 1 / 2, 3 /4 , and 5/ 6 which is required). Discard the Brown/white pair.

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

Suboptimal RJ-11 4P4C connection 4 wires		
e-Node Side	**ILC-x00 side**	**Color of wire**
Pin 1	**Pin 1**	**Orange**

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Pin 3	Pin 3	Orange		Pin 2	Pin 2	Blue
Pin 4	Pin 4	Orange/white		Pin 3	Pin 3	Blue/white
Pin 5	Pin 5	Green		Pin 4	Pin 4	Orange/white
Pin 6	Pin 6	Green/white				

Note: For the purposes of commissioning if *you do not have* 6P6C RJ-25 connectors, you can use standard 4-pin RJ11 connectors, but follow the wiring directions above preserving twisted pairs on Pin 2/3 and Pins 1 /4. **This cable will not work for keypad communication or IBT-100 communication**.

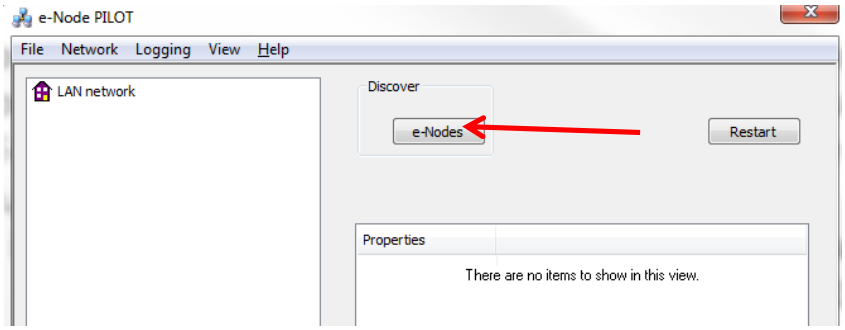
While it may be possible to use flat telephone cable for very short runs, and to prove operation. It should NOT be used is as an installed option. It can be susceptible to interference and will result in unreliable operation.

Please follow the below steps under "**e-Node Programming**" when using the e-Node for Ethernet communication

No special steps need to be followed to commission an IBT-100 for RS-232c communication.

However, in all cases it recommended that you follow the steps under "**ILC-100/ILC-400 Programming**" regardless if you are using the **e-Node** for Ethernet communication or the **IBT-100** for serial communication.

e-Node Programming

Step	Setting	Choices
EN-1	**e-Node IP Address** setting Set up the e-node with an appropriate Static or Dynamic IP address. Refer to the separate "e-Node Quick Start Guide" on how to make such settings.	Static or Dynamic Addressing -Launch the e-Node Pilot application. 

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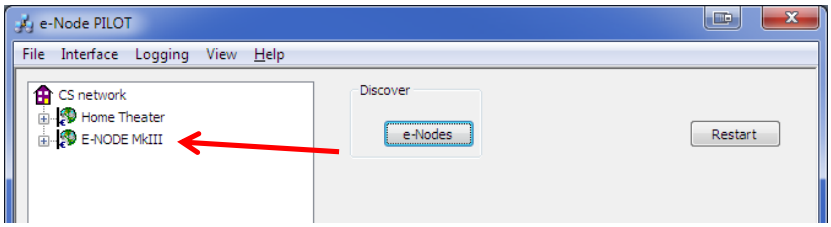
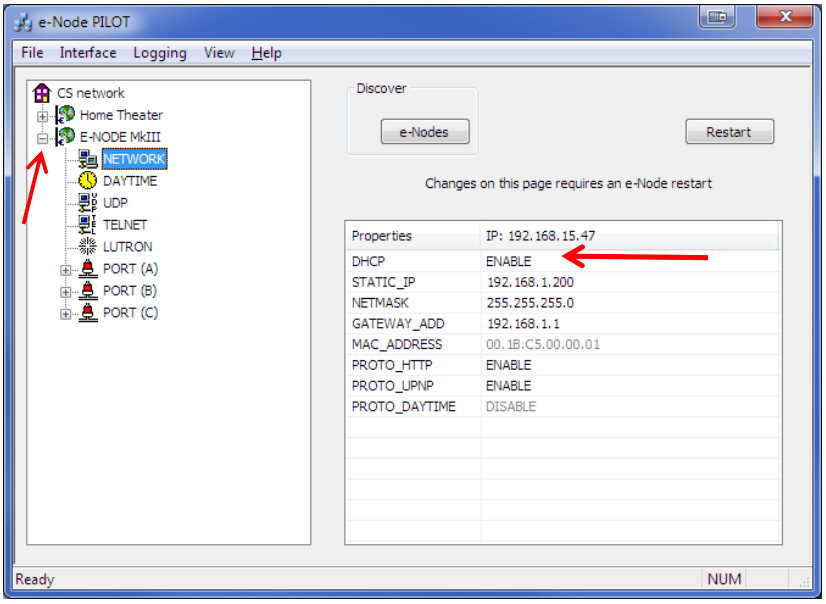
-Select the **View e-Node** tab and select the Discover **e-Node** button**.** Any e-Node(s) connected on the same network will appear as shown.



-Select the **+** mark in front of the e-Node found to expand the menu.



-Review the **DHCP** entry, the factory default is ENABLE which means **DHCP** is activated. DISABLE for **DHCP** refers to static IP addressing. If you wish to set a **STATIC** IP address, enter the following variables ***in the order specified below:***

STATIC_IP	xxx.xxx.xxx.xxx	Your new static IP address
GATEWAY_ADD	xxx.xxx.xxx.xxx	Typically the address of your network's gateway
FINALLY ***and only after you have set the above variables***, select **DHCP**	And Set to **DISABLE**	Now reboot the e-Node for this to take effect.

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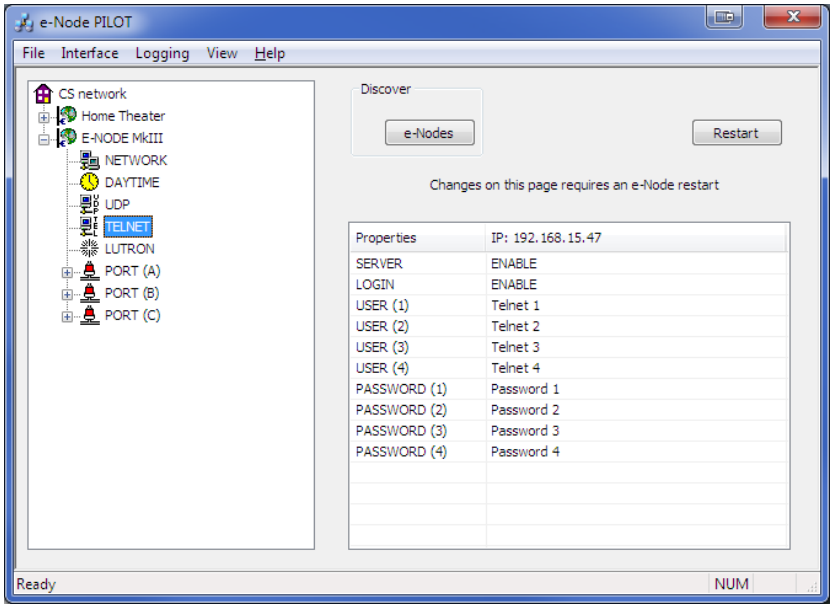
EN-2	**TELNET Port** (transmit and receive)	Depending upon the functionality of the Control4 driver and the installer's specific settings, the suggested communication protocol between Control4 the e-Node is Telnet Port 23 communication (with or without Login). You will need at minimum (i) to turn on **Telnet** within the e-Node, and (ii) to adjust secondarily the setting for **Login** as required by the Control4 driver. 1) Select the **View e-Node tab** and select the **Telnet tab**. Set **SERVER** to **ENABLE**. 2) Login Settings. a) It is highly recommended to use authentication. Set **LOGIN** to **ENABLE** and select the **Restart** button for the particular e-Node that you are utilizing to communicate with the Control4 system.  Version 7 and above of the MkIII e-node can support up to 5 Telnet sessions. Four have user name and passwords as shown above, a fifth has the user name and password of the e-node name (default E-NODE MkIII) and admin password (default ADMIN). This is to maintain backward compatibility.

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ILC-100/ILC-400 Programming

Step	Setting	Choices
DV-1	**ILC-x00 Discovery** and **Address Setup**	More thorough documentation of this step can be found in the *e-Node Commissioning Guide* referenced in Step EN-1 above. However for document completeness, an abridge version of this guide is summarized below. Background. From the factory the **ILC-x00** controllers do not have an assigned UID (unique ID) address. Units come equipped with a factory default address of **Zone**=2, **Group**=1, and **Node**=undefined or a 0. If you set up your Control4 system to communicate with an ILC-x00 with an address of **2.1.0** the ILC-x00 will react but it will not provide feedback data which is required for automatic slider updates within the Control4 systems. ***Therefore, it is advisable to set up a non-zero address for each ILC-x00 controller that is connected to either an IBT-100 or an e-Node.*** The directions below indicated how to perform this operation. (See **Step 2b** below as well as **Appendix 2** for more information on **Z**one/**G**roup/**N**ode addressing.) Process. (1) Power on the e-Node and any connected ILC-x00 controllers. (2) Launch the Pilot application and select the Discover **e-Node** within the **View Map** tab. (3) Now, under the **UID** window, select and enter a unique UID number/address (good to start with 1 and work upwards but never use a duplicate number) and select **Set**.

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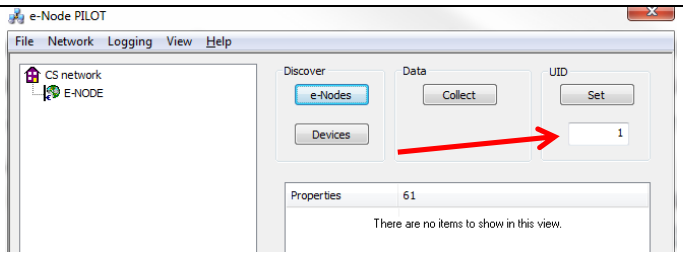


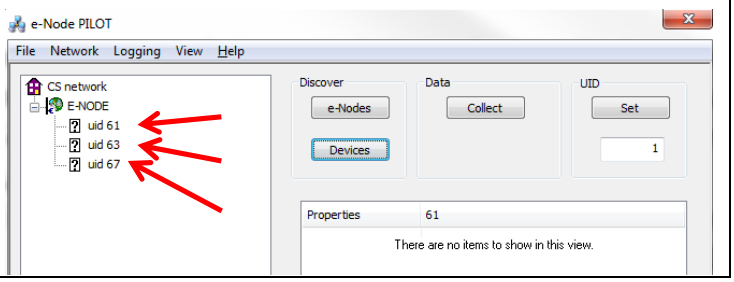
.

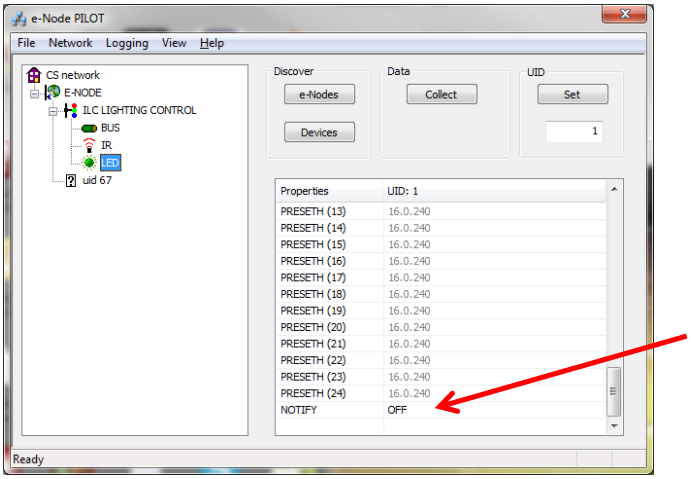
4) You will now need to hit the discovery button on your respective controller. Now close down the pop-up menu.

5) Now you will need to depress for approximately ½ second the "Discovery/Reset" button on an ILC-x00 controller for the unit to become programmed with the selected UID address. See the appropriate section for your particular device.

- **ILC-100.** Take a larger type paper clip or similar device and **gently** insert it into the reset/discovery hole on the side of the chassis and press the momentary button that you will feel for ½ second and then release. The existence of the ILC-100 will appear under the e-Node entry within Pilot.
- **ILC-400**. Remove the white plastic protective shroud to expose a push button mounted to the PCB. Depress the pushbutton for ½ second and then release. The existence of the ILC-400 will appear under the e-Node entry within Pilot

-If you have more than one connected controller (ILC-100 or ILC-400) continue this process until you have **Discovered** all devices. In the example below, three ILC-100 devices have been Discovered or found.



DV-2	Notify Mode	**Background.** Should you be implementing Color and Dimmer sliders within your project, the Control4 system needs to receive color data back from the Converging Systems' controllers in order to update Control4's resources to automatically move the slider. Converging Systems' lighting controllers can automatically notify the Control4 system whenever there is a color/lighting state change (recommended). In order to activate this NOTIFY feature within Converging System's controllers, ***it is necessary to first turn on the appropriate NOTIFY function within*** the targeted controller (under the LED entry). By default from the factory, **NOTIFY** is set to **OFF** to reduce the amount of bus traffic. To operate with Control4 set the **NOTIFY** to **COLOR.**  **Note:** Prior to V 3.15 of the ILC-100 firmware, it is necessary to reboot the ILC-100 for this new setting to become active after it is changed. For versions 3.15 or later, simply changing this value within Pilot is sufficient. **Legacy Firmware Note**: Earlier version of Converging Systems' color controllers did not support the **NOTIFY** function. Consult factory for possible upgrade.

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Control4 COMPOSER PROGRAMMING

Below is a summary of those steps required to import the Converging Systems' drivers into the Control4 Composer application. There are separate drivers for the two communication devices.

Type of Device	Model Name	Filename	Purpose
Communication Devices			
	e-Node	Ip_CSI_e-Node_2000.c4i	
	IBT	Serial_CSI_IBT100.c4i	
Lighting Load Devices			
	ILC-100 3 color RGB controller	LEDLight_CSI_ILC100C.c4i	One instance required for every ILC device.
	ILC-400 4-color RGBW controller (RGBW configuration)	LEDLight_CSI_ILC400C.c4i	One instance required for every ILC device.
	ILC-400 4-channel monochrome controller (configuration)	LEDLight_CSI_ILC400M.c4i	One instance required for every channel (up to 4 instances for everyILC-400M device).
	ILC Generic	LED_Light_CSI_GENERIC.c4i	Optional driver to add additional features, e.g. CCT, SUN
	DMX 3-channel processor within e-Node/dmx	DMXLight_CSI_2100.c4i	One instance required for every DMX fixture
Motor Load Devices			
	IMC-100 single channel motor controller	Screen_Stewart_IMC100.c4i	
	IMC-300 triple channel motor controller		

1. Import Relevant Drivers into your project

Step #	Step Overview	Detail
1a	Copy the applicable **Communication Device** (*.c4i) driver to your drive. **Note**: see above Table for appropriate *.c4i driver for your particular requirements	Copy the applicable *.c4i file to **\My Documents\Control4\Drivers

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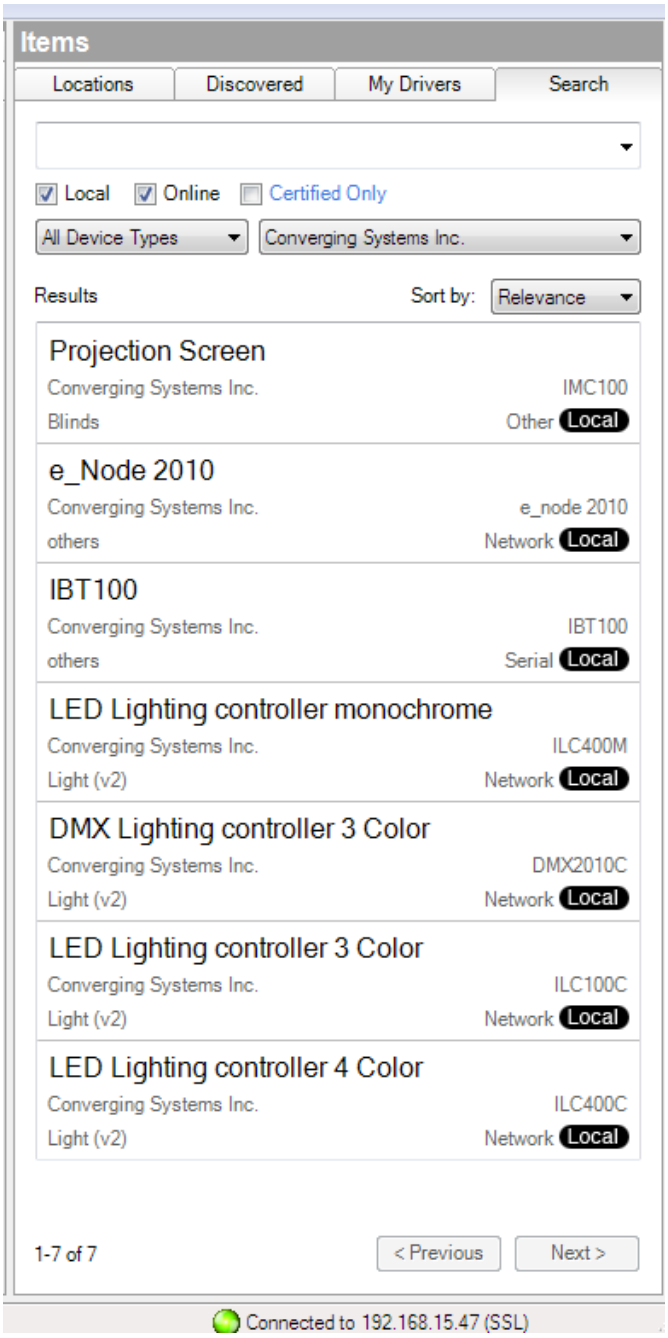
1b	Copy the applicable **Lighting Load Device** and/or **Motor Load Device** (*.c4i) driver to your drive. **Note**: see above Table for appropriate *.c4i driver for your particular requirements	Copy the applicable *.c4i file to **\My Documents\Control4\Drivers

Drivers can be added to the Composer application using the tools available. They can be searched under “Converging Systems Inc.” as the manufacturer. A right click will allow you to copy to your project.



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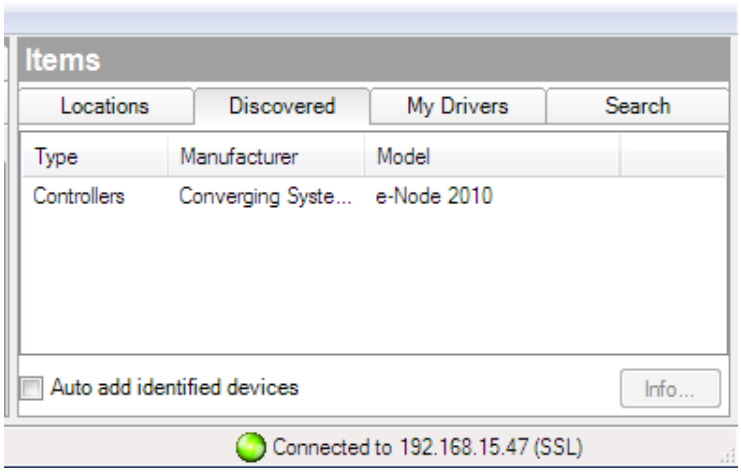
2. Adding a Communication Device (e-Node or IBT-100) in Control4 Composer

<table>
<tr><th>Step #</th><th>Step Overview</th><th>Detail</th></tr>
<tr><td>2a</td><td>Add 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 Controller and/or Motor Controllers</td><td>-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 2b below.

-If using Serial (IBT-100) control (RS-232 Client communication from Control4) to the IBT-100, proceed to Step 2e below.</td></tr>
<tr><td colspan="3">Directions Relating Specifically to IP Control for the e-Node</td></tr>
<tr><td>2b</td><td>Adding an e-Node for Device Communication</td><td>Adding an e-Node is simple, due to the support of Control4 SDDP protocol. If an e-Node is on the network it will automatically be displayed in the "Discovered" view.

Double clicking the discovered device will automatically add it to your project. Alternatively by allowing "Auto add identified devices," you can simple add the e-Node to you project by depressing the discovery button on the e-Node.</td></tr>
<tr><td>2c</td><td>Set up Telnet User Name and Telnet Password</td><td>Within the Properties window, change the User and Password to match those set in the e-Node using the e-Node Pilot application. The factory defaults for these fields is as below:

<table>
<tr><td>User</td><td>E-NODE MkIII</td></tr>
<tr><td>Password</td><td>ADMIN</td></tr>
</table>
</td></tr>
</table>

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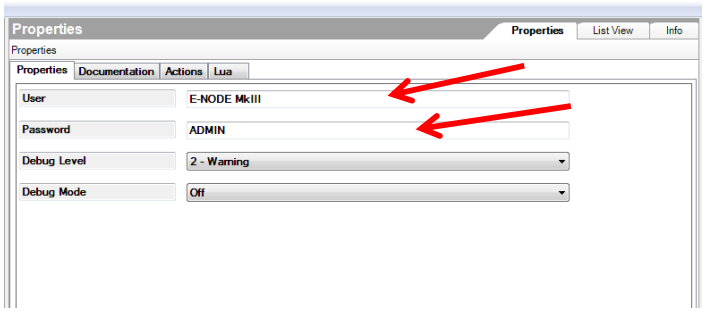
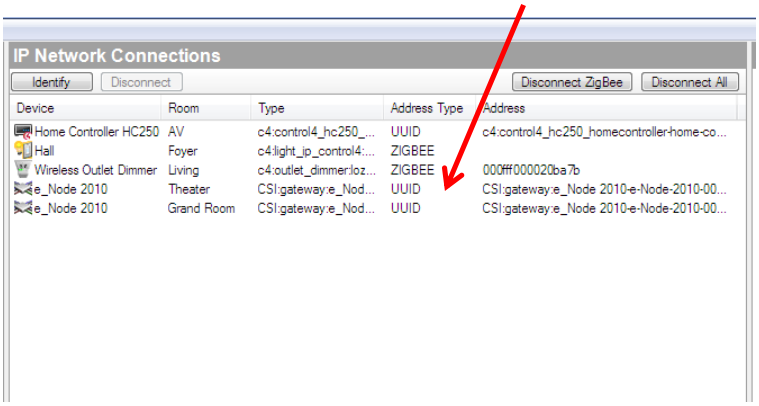
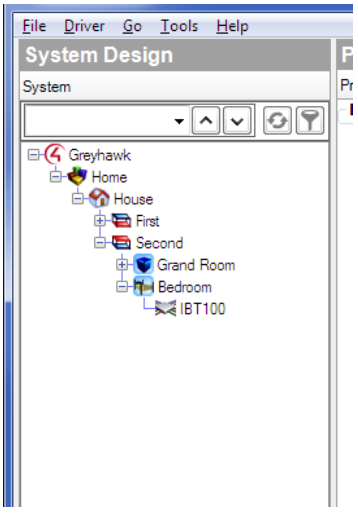
		Alternatively use one of the user / password combinations defined under the “TELNET” view in Pilot. 
2d	Set up the appropriate IP address for the e-Node	With SDDP the IP address is identified automatically 
Directions Relating Specifically to RS-232c Control using the IBT-100		
2e	Adding an IBT-100 for Device Communication	- Using the **System Design** view, add a **Driver** to a desired room by dragging it into that appropriate room. 

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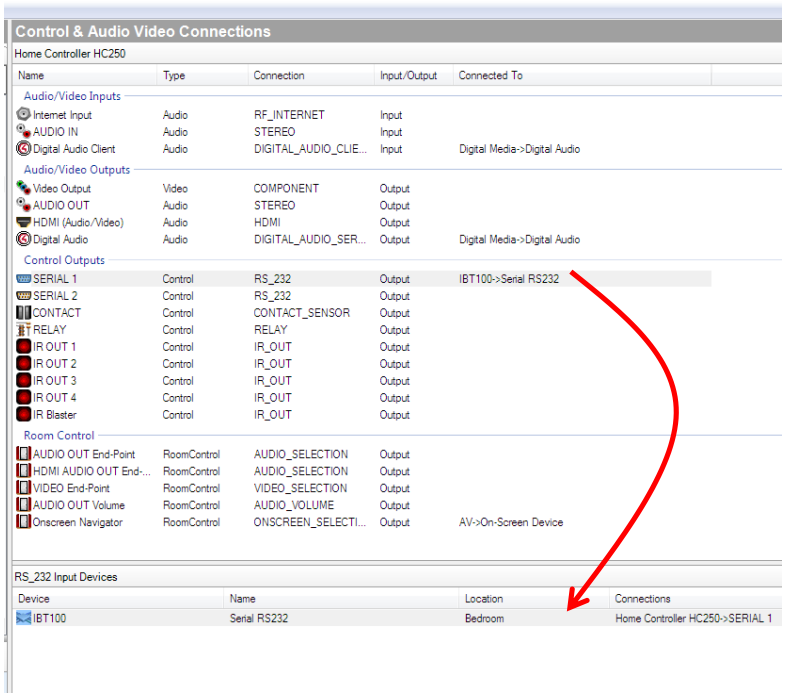
2f	Setting up the Serial port.	Within the **Connections** view, assign the IBT-100 to a serial port.  By dragging and drop. The baud rate and other setting is automatic.

3. Adding an ILC Lighting Load (ILC-100/ILC-400 or other load) into Control4 Composer

Step #	Step Overview	Detail
3a	Add Lighting Load Drivers	-Using the **System Design** view, add a ILC-xxx driver for every instance of an ILC-100, ILC-400 or monochrome channels for the ILC-400. **Note**: The applicable driver will add driver will approriate entires for the type of device added. See the table below for the entries added for specific type of devices. If you wish you can add additional controls for CCT or SUN

	ILC-100	ILC-400 RGBW	ILC-400 M	DMX
Intensity	✓	✓	✓ (one per instance)	✓
Hue	✓	✓		✓
Purity	✓	✓		✓

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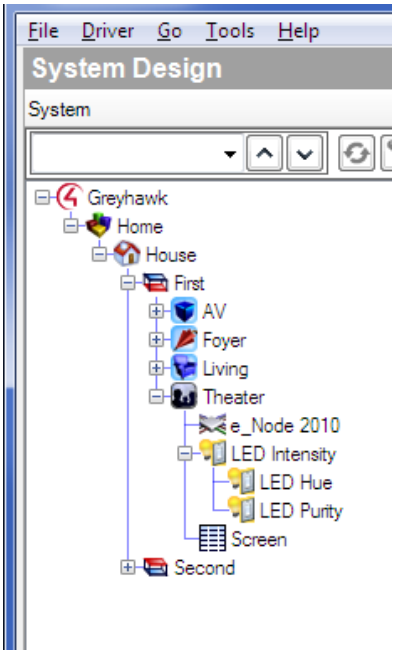
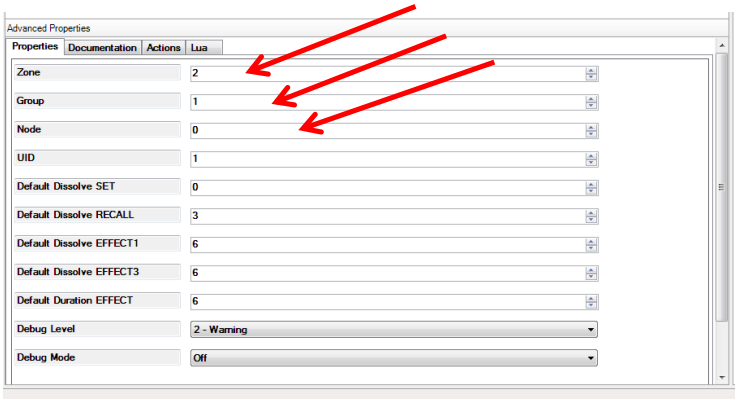
		<table><tr><td></td><td>ILC-100</td><td>ILC-400 RGBW</td><td>ILC-400 M</td><td>DMX</td></tr><tr><td>CCT</td><td></td><td></td><td>✓</td><td></td></tr><tr><td>SUN</td><td></td><td></td><td>✓</td><td></td></tr></table> Add the driver for ILC-400M and rename for CCT or SUN. This will work with either ILC-100 (CCT) or ILC-400 (CCT & SUN). 
3b	Add **Z**one/**G**roup/**N**ode address to match the load to be controlled.	-Within the Properties view, enter the appropriate Z/G/N addresses and UID.  The default dissolves can also be set.

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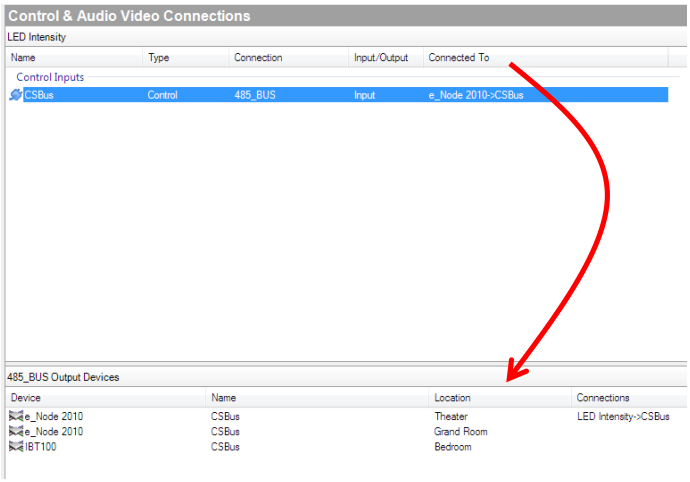
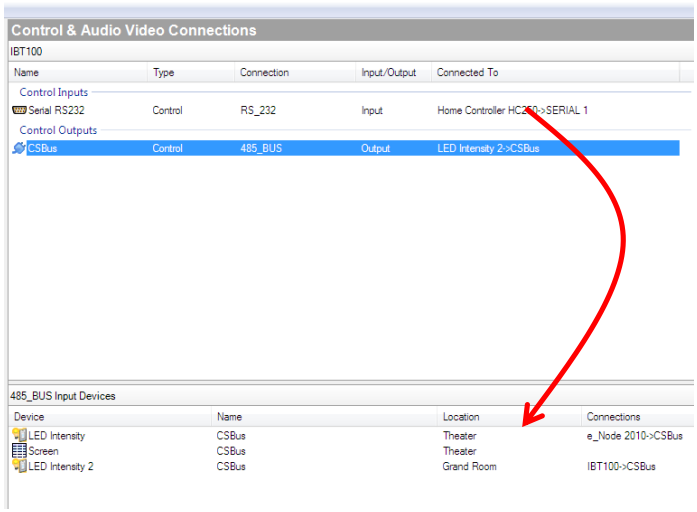
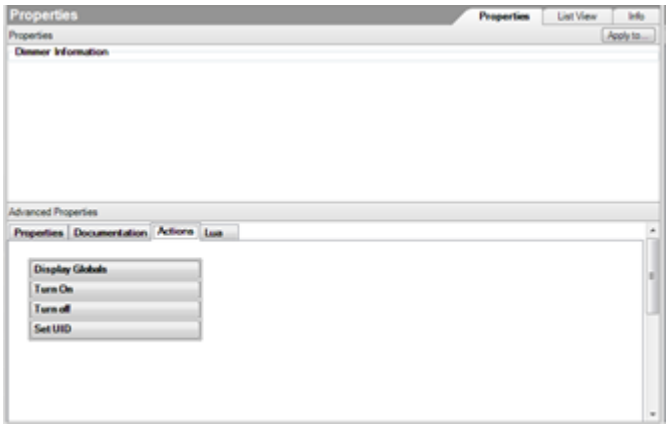
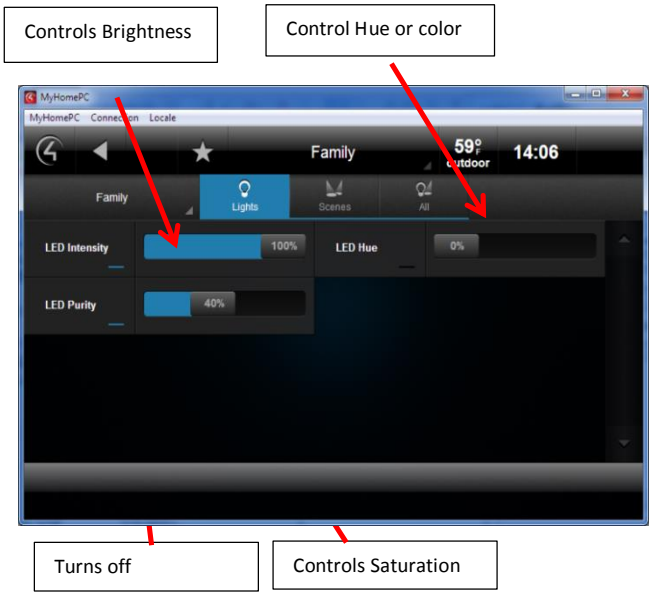
3d	Set a connection for each new Lighting Load controller to the appropriate **Communication Device**.	-Within **Connection** view, Set the connection to the appropriate **Communication Device**. IP Connectivity (using e-Node). For IP connection using an e-Node here is an example of the connection made between one ILC-100 and an e-Node  RS-232c Connectivity (using IBT-100). For connection using an IBT-100, here is an example of the connection made between one ILC-100 and an IBT-100 

4. Test Project

Step #	Step Overview	Detail
4a	Test Project.	- You can now test the setup using the **Action Properties** in System Design **Note**: Make sure you are connected to your Control4 processor and it is on-line before continuing. 
4b	Test with Navigator.	With either a "MyHome" app or a touch screen, verify operation 
4c	Test with SR250 remote.	-You should also be able to control the LED using various SR250 buttons.

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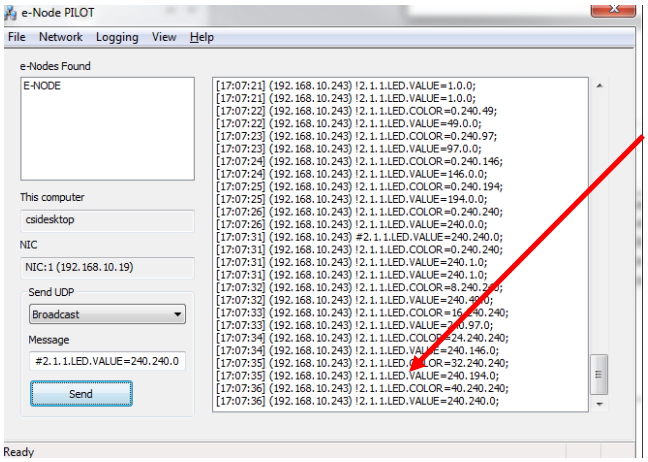
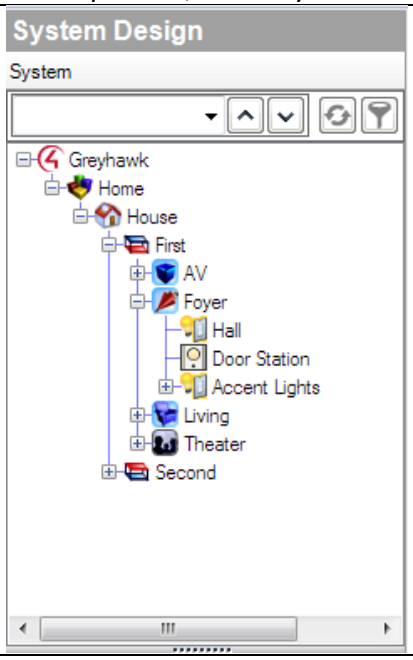
		 -Proceed through each button and slider to verify proper operation. If certain functions are not operational proceed to the next step.
4d	There are tools available to proceed with troubleshooting. Utilize one or both of these tools to determine your error.	<u>e-Node Pilot Application</u> Launch the e-node Pilot application and select **View Traffic** and discover e-nodes by right click in "e-Nodes Found" box. You can observe CS-Bus traffic. You can see the actual valid commands that are being received on the CS-Bus from the Control4 system. If you do not see a command that implies that the Control4 System is not properly sending out a command to the Converging Systems bus.  Alternatively, you can debug, and check operations by enable the debug mode in the Properties Window, and switch to the LUA view to see trace messages.

Control4 Programming

All the device specific commands available in the ILC-100/400's can be used when programming with Composer. The opportunities are limitless, and can be best highlighted in the following example.

<table>
<tr><td colspan="2">LED Lighting in the Foyer.</td></tr>
<tr><td colspan="2">Activate the lights if the front door bell button is pushed, but only if it is nighttime.</td></tr>
<tr><td>Create an instance of a door button, and a LED light</td><td> 
</td></tr>
</table>

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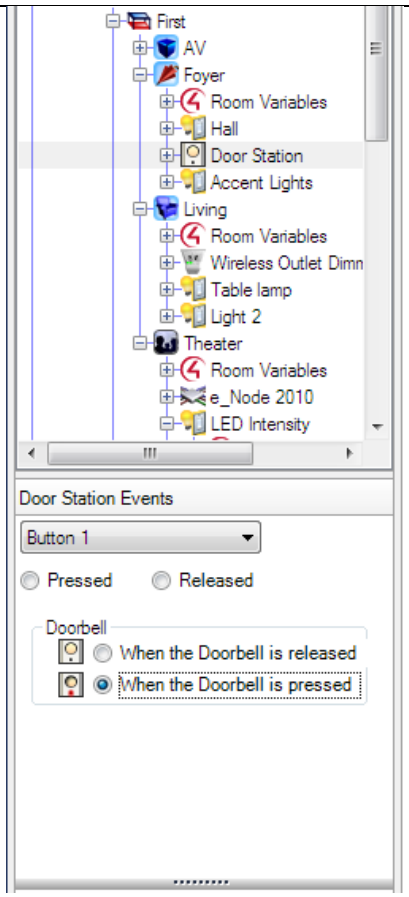
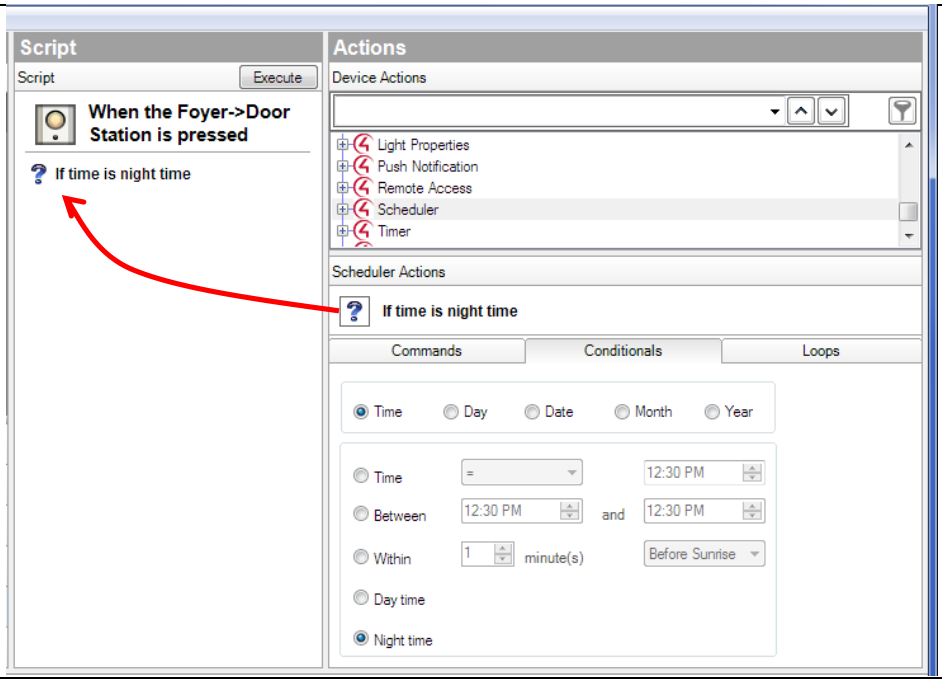
In Program view, click on Door Station and select button pushed	
In the Actions Pane, select “Scheduler” and click “Night time”. Then drag the “?” into the script window.	

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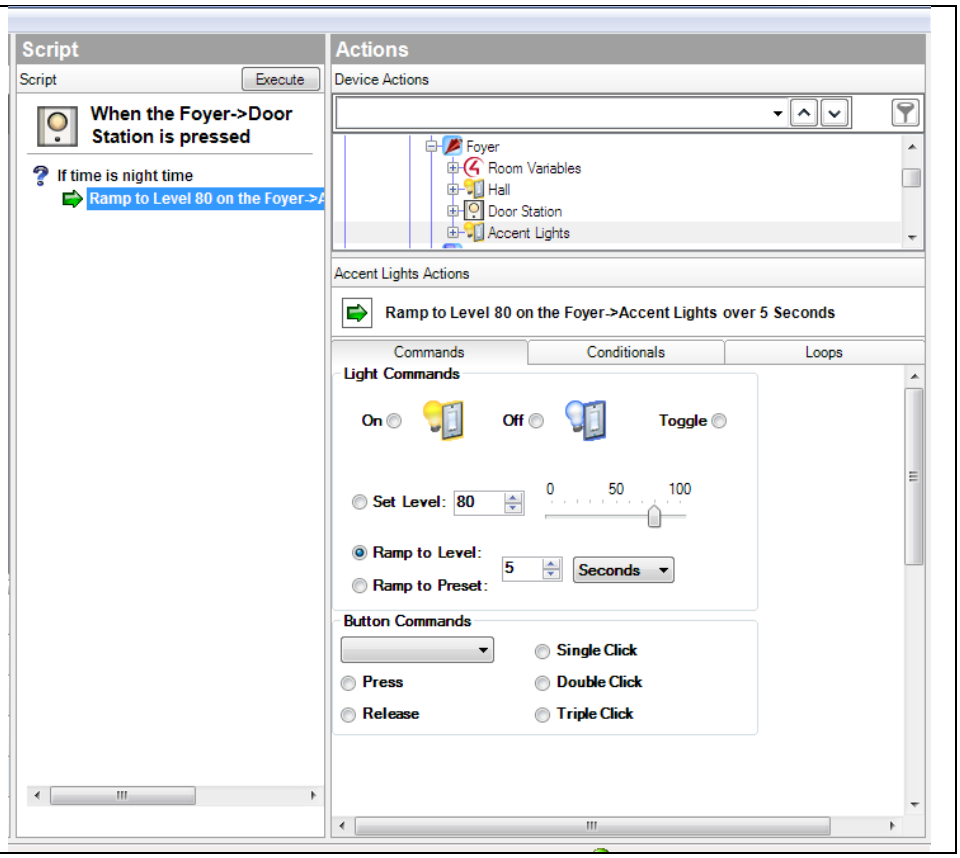
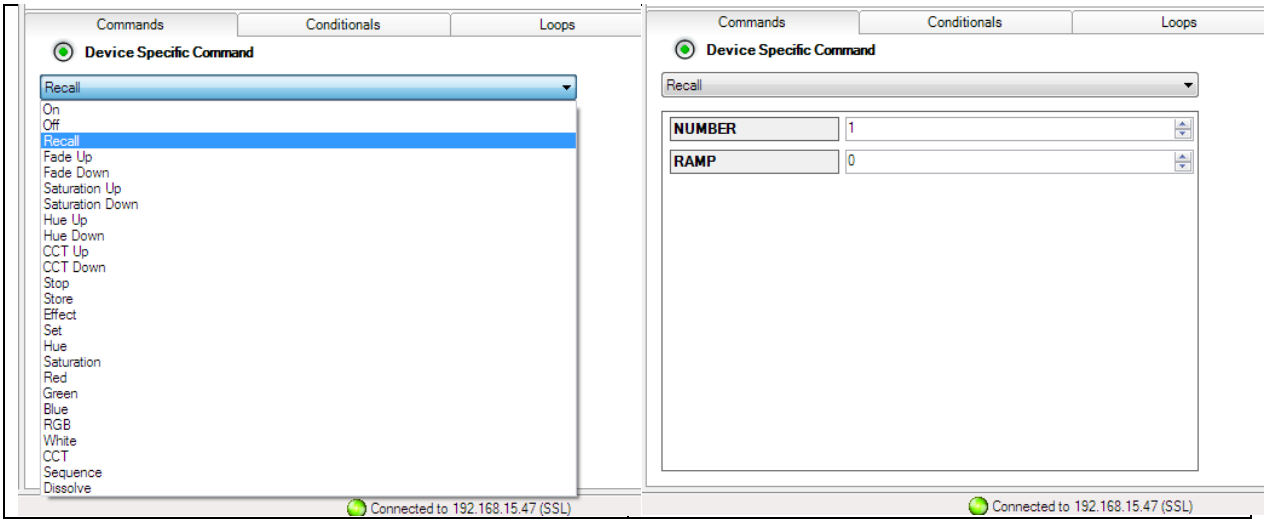
In the Actions Pane, select the ILC-x00 and click “Ramp to Level” Set the level to 80, and the time to 5 seconds. Then drag the arrow to the script window.



Further device specific actions can be invoked in the action window. Scroll down, and click “Device Specific Command.” The drop down will indicate all the commands available. 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.



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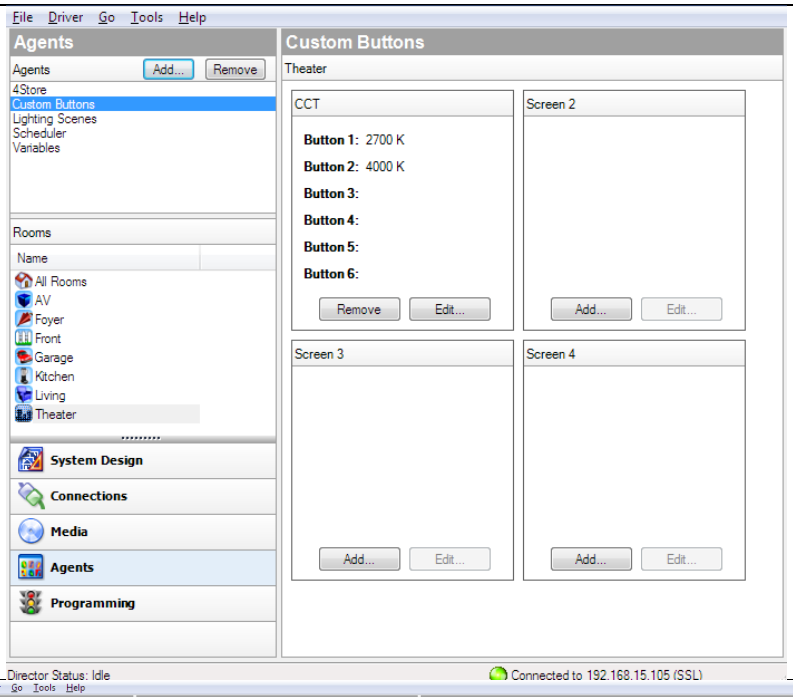
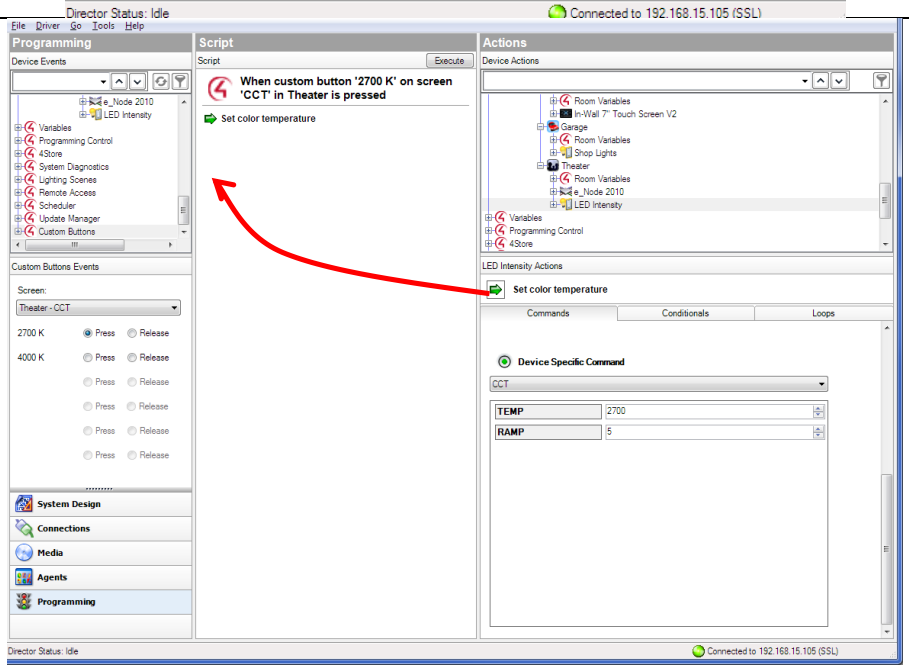
Adding Custom Buttons	
Provide color temperature control buttons	
In “Agents” add custom buttons. Select which room, and give the buttons a title.	
In Program view, select the button press as the device event, and then the ILC as the action. Select Device Specific Command, and enter color temperature, and ramp time. Then drag the arrow into the script window.	

Appendix 1

Common Mistakes

1. **No Communication to the e-Node**.

(.1) Forgetting to make sure that the alias name for the e-Node is E-NODE MkIII and the password for e-NODE is ADMIN. These are set within the Control4 profile. If you want to change those alias names and passwords for the e-NODE make sure you change them within the Control4 profile.

2. **Individual Lighting or Motor Controllers do not respond, although data is passing to e-Node or IBT-100.**

(.1) Forgetting to set the addresses for controllers (motor or lighting) from within Composer.

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Appendix 2

COLOR SPACE ISSES

Note on Color Space. Converging Systems uses the HSB (Hue, Saturation and Brightness color space for its Control4 drivers. This makes it easier to dim (only one control) and to change color. It is more intuitive, and easier to change colors that the RGB model. It also makes it fit easier with the existing Control4 proxies.

Appendix 3

ADVANCED Control4 PROGRAMMING

AP Topic 1

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

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

	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, ***only the first controller whose node number is 1 greater than the wildcard command of "0" will respond*** (which reduces bus traffic by up to 243 messages). The logic here is that if 254 controllers are all told to turn **Red**, only the surrogate for that group of controllers will respond and within the CS-Bus messaging logic that surrogate is the controller with a node of "1." So for example, if a **#2.1.0.LED.VALUE=240.0.0:<cr>** command is transmitted to 254 controllers, they will all turn to **Red** , but only the controller with an address of **2.1.1** will respond with its new color status. In this case, a command on the bus from that surrogate controller would come back as follows: **!2.1.1.LED.VALUE=240.0.0** (the exclamation mark indicates that it is a message from CS-Bus device rather from an automation controller). The Control4 drivers are designed so that all instances of a driver will respond if the zone and group match, and it ignores the node number. So, for example, it is possible to have 4 instances of a driver with ZGN of 2.1.1, 2.1.2, 2.1.3, 2.1.4, and then have a fifth instance as a "master" to control all four with a ZGN of 2.1.0. Moving the master control will change all four lights, and all four navigation sliders and the master will update.

Initial State of Light Output
(on Off condition)

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.

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Appendix 4

DMX Options

Note: These directions related to the e-Node/dmx *MkIII* device. The MkIII device has an on-board RJ-45 connector (marked as Port 2) to be used with remote DMX fixtures

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 Control4 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 Control4 device drivers already in existence for other Converging Systems' products. (See the listing of commands that are supported with the e-Node/dmx device see LED Commands in this document.)

Please follow the directions which follow to drive DMX fixtures from a Control4 System

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

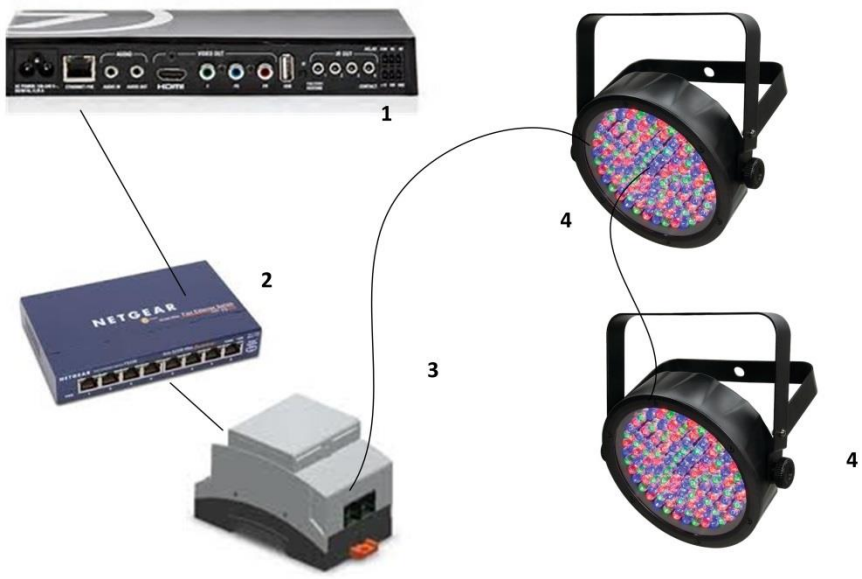

Figure 3

Wiring/Configuration Notes:

1. Maximum length of CS-Bus cabling from e-Node to the last DMX fixture using DMX cabling = 1200 meters (3,900 feet)
2. Maximum number of DMX fixtures connected to a single e-Node/dmx device = 32. If more than 32 fixtures are required, implement additional e-Node/dmx devices.
3. Maximum number of e-Nodes that can exist on a Control4 system = 254

BILL OF MATERIALS (for IP control)

#	Device	Manufacturer	Part Number	Protocol	Connector Type	Notes
1	Control4 HC-300 HC-250/800 family processors	Control4	Various	Ethernet/USB/HDMI	various	
2	Network Switch	Various	Various	Ethernet	RJ-45	
3	e-Node/dmx	Converging Systems	e-Node/dmx	Ethernet	RJ-45 (for Ethernet) RJ-25 for local DMX bus	
4	Third party DMX fixtures	Various	Various	DMX512	RJ-25 for DMX communication	Must terminate final OUT or THRU connector on last DMX

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						fixture using a 120 ohm resistor

e-Node Programming/Device Programming

Minimum requirements for this operation.

-e-Node/dmx with power supply
-Necessary cabling to connect e-Node/dmx to first DMX fixture (see "e-Node Interfacing with DMX Guide"). For reference the pin-outs on the e-Node/dmx are as follows.

e-Node/dmx (MkIII) PORT 2 RJ-45 connector

Pin	Signal
1	Data +
2	Data -
3	No not connect
4	No not connect
5	No not connect
6	No not connect
7	Ground
8	

Note: For connection to various DMX fixtures, see the wiring diagram in the applicable e-Node/dmx (MkIII) manual.

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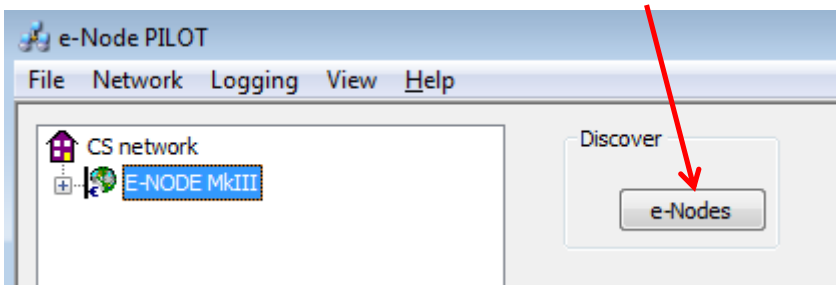
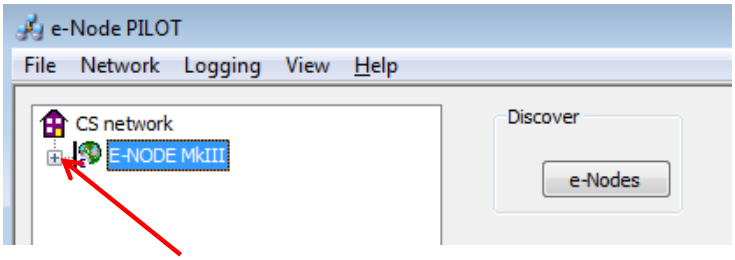
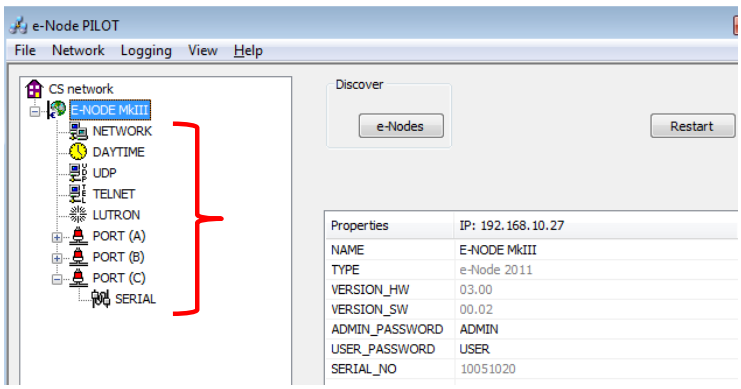
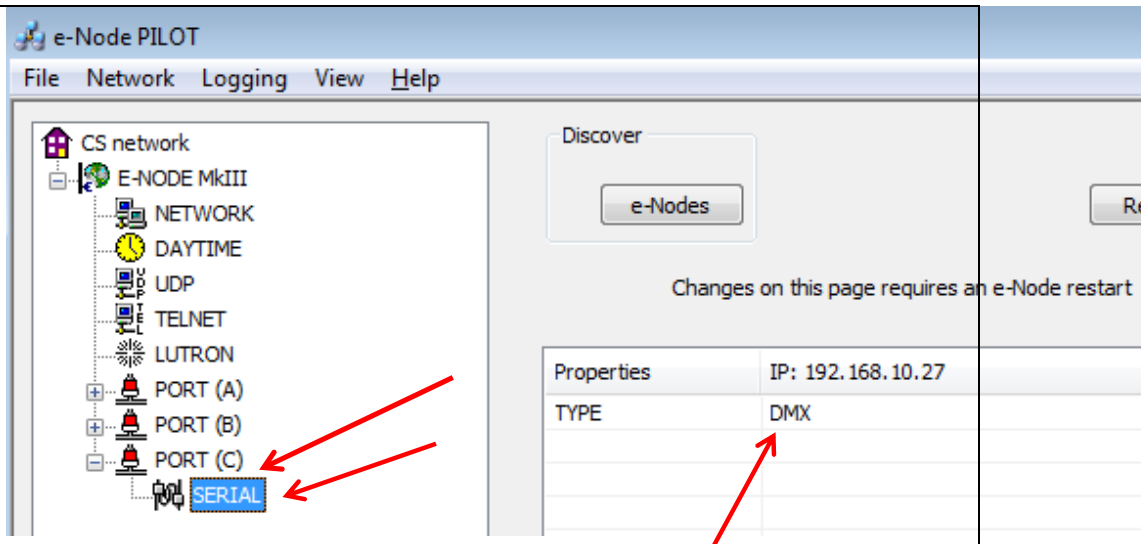
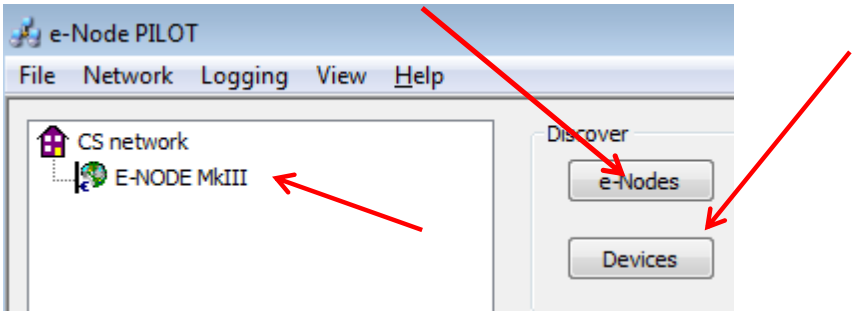
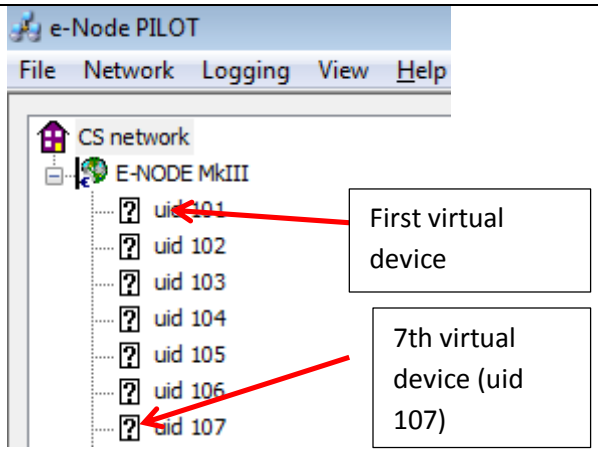
e-Node/dmx Programming

Step	Setting	Choices
DMX-1	e-Node/dmx setup	Follow the directions under e-Node Programming at the beginning of this Integration Note Step EN-1 and EN-2.
DMX-2	Verify the e-Node DMX is set to commun-icate to DMX fixtures	-Select the **View e-Node** tab and select the **Discover** e-Nodes button. Any e-Node(s) connected on the same network will appear as shown.  -Select the + mark in front of the e-Node/dmx that you wish to program to expose the sub-tabs.   -Expand the **PORT(C)** tab and then expand the **Serial** tab.

		 -Verify that after the **TYPE** entry, the data field indicates DMX. If it does not indicate DMX, select DMX from the pull down menu and reboot the e-Node/dmx by selecting the **Restart** button in order to make this setting active. Note: the e-Node/dmx can also be configured to communicate with standard CS-Bus devices (ILC-100, ILC-400) and therefore only when this entry is set to DMX, will the e-Node/dmx properly communicate to DMX fixtures. To program the e-Node/dmx to be able to communicate with standard CS-Bus devices, within **Port (C)** under Type, select the **CS-Bus** option and reboot the e-Node/dmx device by selecting the **Restart** button within Pilot.
DMX-3	Device Discovery	-Select the **View Map** tab and select the **Discover e-Nodes** button. Any e-Node(s) connected on the same network will appear as shown. -Next highlight the e-Node Discovered and this hit the **Discover Devices** button.  -Immediately 32 virtual “DMX Devices” will appear as follows:



Note: this picture shows the first 7 devices discovered. In a real example, all 32 virtual devices will appear.

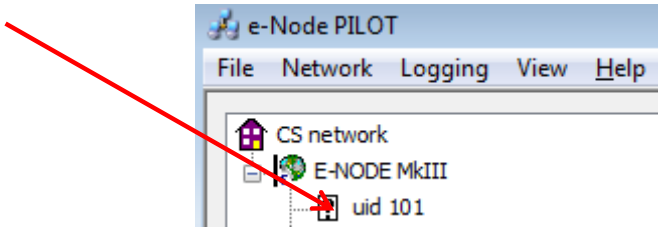
DMX-4 | Set up Device Address-ing

The DMX data packet is mapped to CS-Bus messages by assigning a unique **Z**one/**G**roup/**N**ode number to three successive DMX channels. These are mapped as shown in the following table:

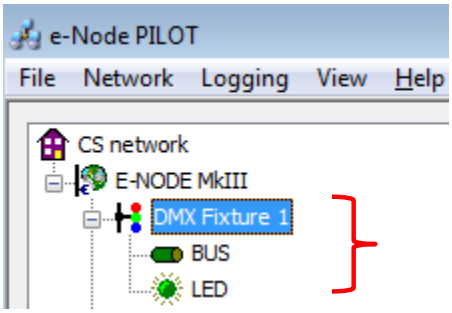
DMX Fixture	Default UID	DMX Channel Allocation	CS-Zone/Group/ Node
1	101	10-19	2.1.1
2	102	20-29	2.2.1
3	103	30-39	2.3.1
4	104	40-49	2.4.1
5	105	50-59	2.5.1
6	106	60-69	2.6.1
7	107	70-79	2.7.1
8	108	80-89	2.8.1
9	109	90-99	3.1.1
10	110	100-109	3.2.1
11	111	110-119	3.3.1
12	112	120-129	3.4.1
13	113	130-139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

22	122	220-229	4.6.1
23	123	230-239	4.7.1
24	124	240-249	4.8.1
25	125	250-259	5.1.1
26	126	260-269	5.2.1
27	127	270-279	5.3.1
28	128	280-289	5.4.1
29	129	290-299	5.5.1
30	130	300-309	5.6.1
31	131	310-319	5.7.1
32	132	320-329	5.8.1

-To see these entries, click on the **?** in front of any particular **uid** listing which will expand its directory.



-After the directory is expanded, you will see these entries:



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

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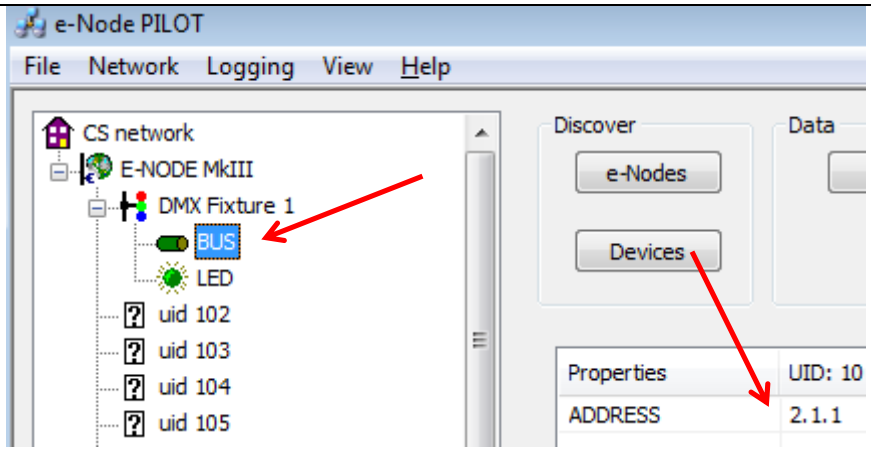
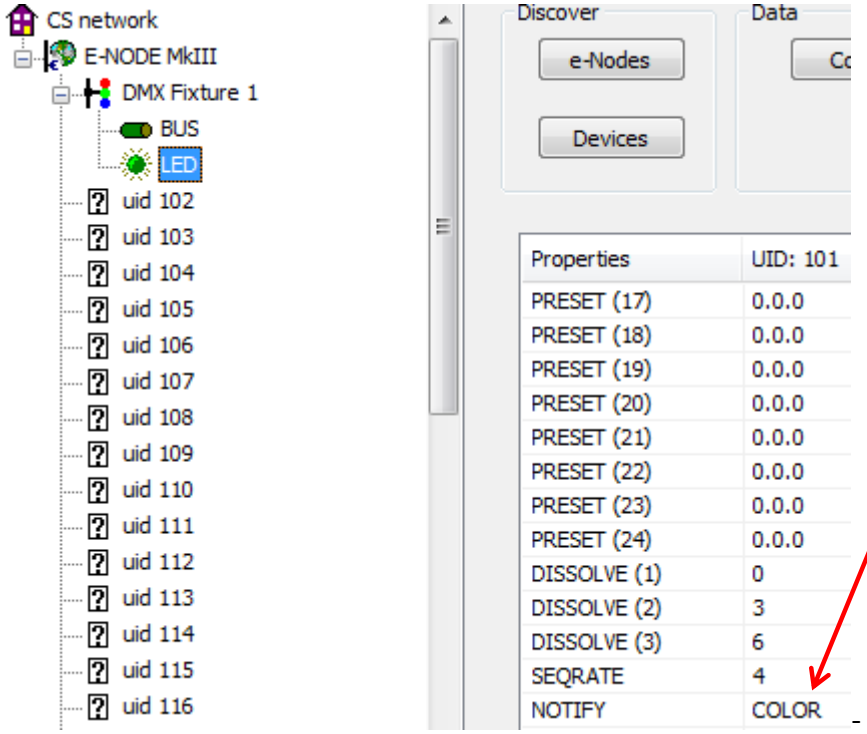
		
DMX-4	Turn on NOTIFY as applicable for your project	-Program the Device **Notify** parameter for the e-Node/dmx. Change the parameter for the specific device (UID-DMX Fixture) for which you which to invoke the NOTIFY function. **Note**: See section DV-2 above for explanation of the NOTIFY function.  Proceed to standard Control4 Programming (Steps 1 onwards above in the main body of this Integration Note).

		Note: the e-Node/dmx takes care of everything else!!!
DMX-5	Proceed through standard Control4 Programming.	In this case, you will not be programming ILC-100 or ILC-400 devices, so you can skip to the Control4 Composer programming section (Sections 1-5 above).

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Appendix 5

Troubleshooting/System Monitoring

(reserved)

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