CONVERGING SYSTEMS

# Integration Note

| | |
|---|---|
| Automation/Lighting Panel Manufacturer: | RTI |
| **Platforms:** | **XP-n Controllers** |
| Versions: | Integration Designer v 9.4.0.3961 or newer |
| Specific Profile/Driver Version: | V1.01 or later (consolidated version for IP and Serial control using UDP).<br>Note: V1.03 or later supports the preferred Telnet Port 23 communication for IP. |
| Download location for Profile/Driver | RTI dealer portal<br>Note: current name is **Converging Systems Intelligent Lighting Controller.rtidriver** |
| Document Revision Date: | June 29, 2015 |

## OVERVIEW AND SUPPORTED FEATURES

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

Integration with Converging Systems' platforms is enabled from the range of RTI wall pads, touchscreens 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 DRIVER 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).

## LED Lighting Commands

| General CS-Bus Commands | RTI Naming Convention[1] | ILC-100 | ILC-400 | e-Node DMX |
|---|---|---|---|---|
| **General LED Control Commands** | | | | |
| | | | | |
| ON | On | ✓ | ✓ | ✓ |
| OFF | Off | ✓ | ✓ | ✓ |
| EFFECT,1 | | ✓ | ✓ | N/A |
| EFFECT,n (>1) | | ✓ | ✓ | N/A |
| STORE,# | Store | ✓ | ✓ | ✓ |
| RECALL,# | Recall | ✓ | ✓ | ✓ |
| DISSOLVE.1=XX | Set LED Dissolve Rate | ✓ | ✓ | N/A |
| DISSOLVE.2=XX | | * | * | * |
| DISSOLVE.3=XX | | * | * | * |
| SEQRATE=XX | Set LED Sequence Rate | ✓ | ✓ | ✓ |
| SUN_UP | | * | * | * |
| SUN_DOWN | | * | * | * |
| SUN.S | | * | * | * |
| | | | | |
| **HSB (HSL) Color Space Commands** | | | | |
| FADE_UP | Brightness Up | ✓ | ✓ | ✓ |
| FADE_DOWN | Brightness Down | ✓ | ✓ | ✓ |
| SET,L | Brightness | ✓ | ✓ | ✓ |
| HUE_UP | -Hue Up and Adjust LED<br>-Adjust LED Levels moves by step. | ✓ | ✓ | ✓ |
| HUE_DOWN | Hue Down | ✓ | ✓ | ✓ |
| HUE,H | Hue | ✓ | ✓ | ✓ |
| SAT_UP | Sat Up | ✓ | ✓ | ✓ |
| SAT_DOWN | Sat Down | ✓ | ✓ | ✓ |
| SAT_S | Sat | ✓ | ✓ | ✓ |
| STOP | ???? | ✓ | ✓ | ✓ |
| COLOR=H.S.L | ???? | ✓ | ✓ | N/A |
| 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 | ??? | ✓ | ✓ | N/A |
| WHITE,W | | * | * | * |
| VALUE=R,G,B,W | | * | * | * |
| PRESET.X=XXX.X | Set LED Presets/RGB | ✓ | ✓ | ✓ |



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| | | | | |
|---|---|---|---|---|
| XX.XXX (3-color) | Color spacer for preset x | | | |
| PRESET.X=XXX.XXX.XXX (4-color) | | * | * | * |
| STOP | ??? | ✓ | ✓ | ✓ |
| **Correlated Color Temperature (CCT) Commands** | | | | |
| CCT,XXXX | | * | * | * |
| CCT_UP | | * | * | * |
| CCT_DOWN | | * | * | * |
| | | | | |
| **Bi-Directional Commands** | | | | |
| COLOR=? | Automatic polling within Driver | ✓ | ✓ | N/A |
| VALUE=? | Automatic polling within Driver | ✓ | ✓ | N/A |
| PRESETH.X=? | | * | * | * |
| PRESET.X=? | | * | * | * |
| | | | | |
| **Accessory Enode Command/Setup Parameters** | | | | |
| Verbose Mode | | | | |
| UDP Port 4000/5000 | | ✓ | ✓ | ✓ |
| Telnet Login with Authentication (with e-Node | | | | |
| Telnet Login without Authentication | | | | |
| | | | | |

**Notes:**

***When needed, these can be implemented using dealer programmed serial strings user RAW CMD. See **Step 3g** for more information.

[1]See **Step 3d** below for information on how to see supported RTI commands within the Library Browser.

## Motor Commands (WIP currently)

| General Commands | RTI Naming Convention | IMC-100 | BRIC ("Bric Mode") | |
|---|---|---|---|---|
| **General Motor Control Commands** | | | | |
| UP | | ✓ | ✓ | |
| DOWN | | ✓ | ✓ | |
| STOP | | ✓ | ✓ | |
| RETRACT | | ✓ | ✓ | |
| STORE,# | | ✓ | ✓ | |



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| | | | | |
|---|---|---|---|---|
| RECALL,# | | ✓ | ✓ | |
| PRESET.X=XX.XX | | | | |
| | | | | |
| **Bi-Directional Commands** | | | | |
| STATUS=? | | | | |
| POSITION=? | | | | |
| | | | | |
| **Accessory Enode Command/Setup Parameters** | | | | |
| Verbose Mode | | ✓ | x | ✓ |
| UDP Port 4000/5000 | | ✓ | ✓ | ✓ |
| Telnet Login with Authentication (with e-Node | | | | |
| Telnet Login without Authentication | | | | |

**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 |
|---|



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# WIRING DIAGRAM (for IP connection)

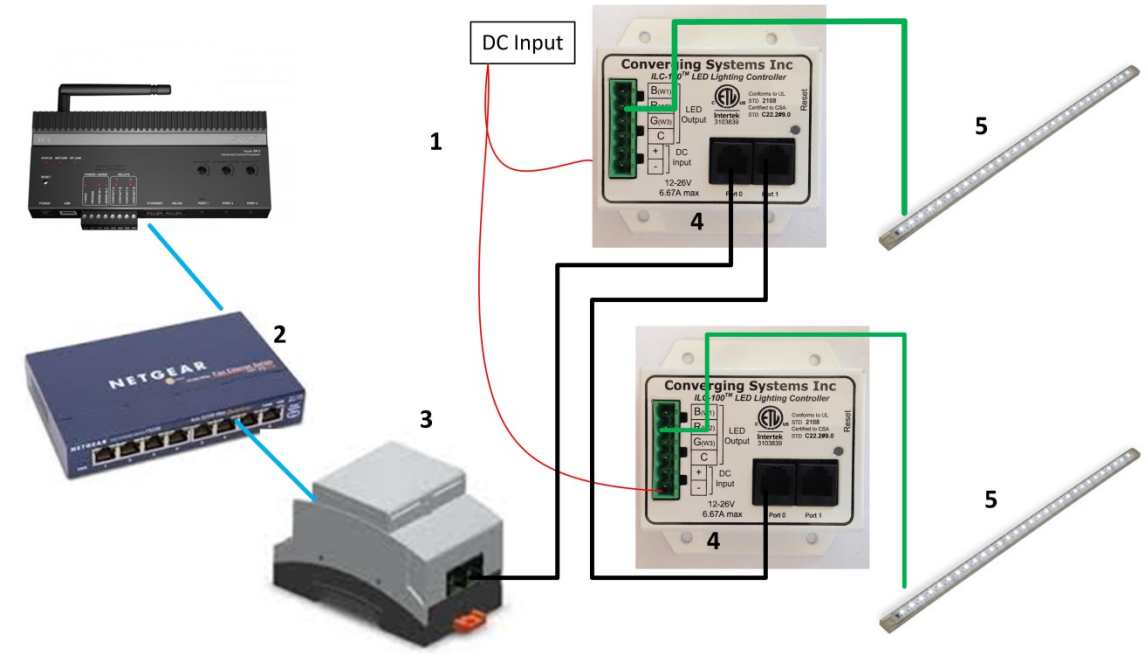


Figure 1

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 e-Node device = 254
3. Maximum number of e-Nodes that can exist on a RTI system = 254

# BILL OF MATERIALS (for IP control)

| # | Device | Manufacturer | Part Number | Protocol | Connector Type | Notes |
|---|---|---|---|---|---|---|
| 1 | RTI XP-n processor | RTI | Various | Ethernet/USB | various | |
| 2 | Network Switch | Various | Various | Ethernet | RJ-45 | |
| 3 | e-Node | Converging Systems | e-Node | Ethernet | RJ-45 (for Ethernet)<br>RJ-25 for local bus | |
| 4 | Lighting Controller (or Motor Controller) | Converging Systems | ILC-100 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)

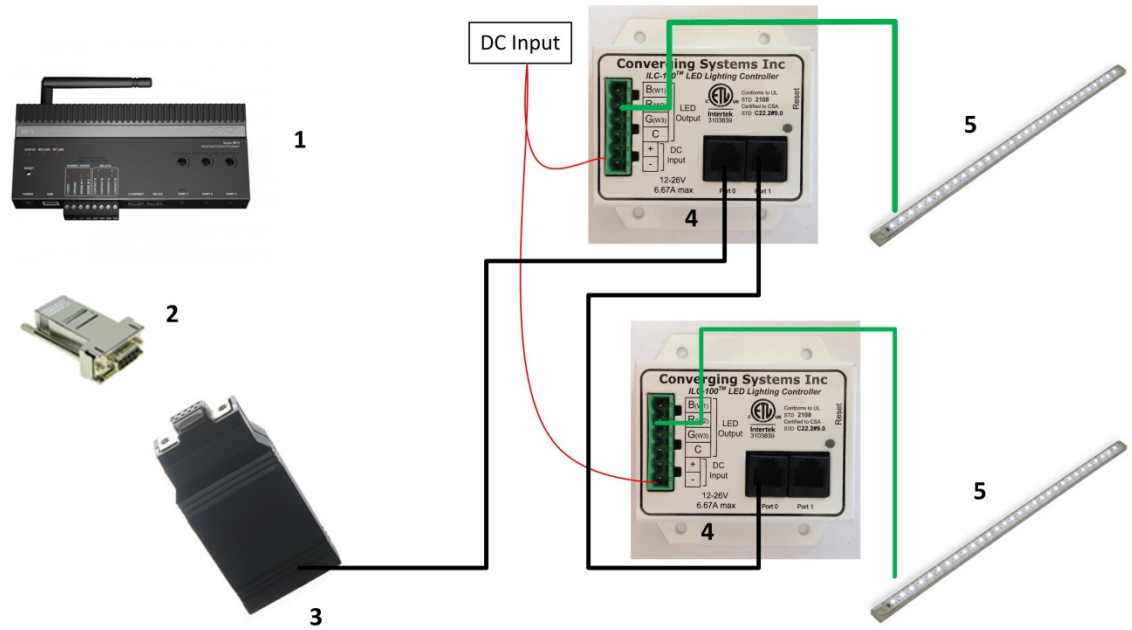


Figure 2

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 e-Node device = 254
3. Maximum number of e-Nodes that can exist on a RTI system = 254

## BILL OF MATERIALS (for RS-232c connection)

| # | Device | Manufacturer | Part Number | Protocol | Connector Type | Notes |
|---|---|---|---|---|---|---|
| 1 | RTI XP-x processor | RTI | Various | Ethernet/Serial/IR | various | |



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| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | RJ-45 to DB-9 male adapter | RTI | RJ-45 to DB-9 male adapter | RS-232c | RJ-45 (for serial)<br>RJ45 / DB9<br>1 / 6<br>2 / 1<br>3 / 5<br>4 / 5<br>5 / 2<br>6 / 3<br>7 / 8<br>8 / 7 | |
| 3 | IBT-100 | Converging Systems | IBT-100 | RS-232c | DB-9 (for Serial)<br>RJ-25 for local bus | |
| 4 | Lighting Controller (or Motor Controller) | Converging Systems | ILC-100 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 terminating resister on pins 3/4 |
| 5 | Flexible Linear Lighting (FLLA) RGB or RGBW luminaries | Converging Systems | FLLA-RGB-xxx<br>FLLA-RGBW-xxx | | 3-color 4 pin<br>4-color 5 pin<br>1-color 4 pin | |

## System Configuration/Programming

Before proper operation between the Converging Systems' controllers and the RTI 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 RTI Integration Designer 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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| | | |
|---|---|---|
| | *communication parameters* | |
| | *Add tasks or macros to specific buttons* | Section 3 |
| | *Upload Project and Test* | Section 4 |
| | *Create Additional UI and Test* | Section 5 |
| Sample User Interfaces | | User Interfaces |
| Common Mistakes | | Appendix 1 |
| Advanced Integration Designer Programming | | Appendix 2 |
| Color Space Issues | | Appendix 3 |
| DMX Programming Support | | Appendix 4 |

## Background

The Converging Systems e-Node is an Ethernet communication device which can be used to connect the RTI Host 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 RTI 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:

## e-Node Programming/Device Programming

Min requirements for this operation

- 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 straight thru (1-1) wiring using a 6-pin RJ-connector (Do not use 568A or 568B wiring and simply chop of the browns because this does not preserve twisted pairs on pins 1 / 2, 3 /4 , and 5/ 6 which is required).

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

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

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

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<br><br>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 | Static or Dynamic Addressing<br><br>-Launch the e-Node Pilot application. |



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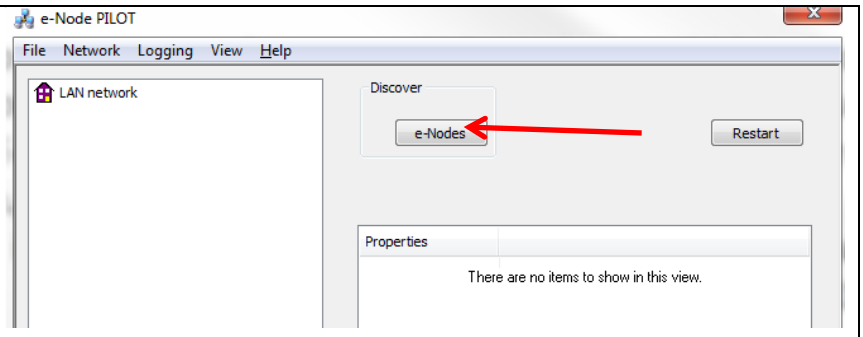
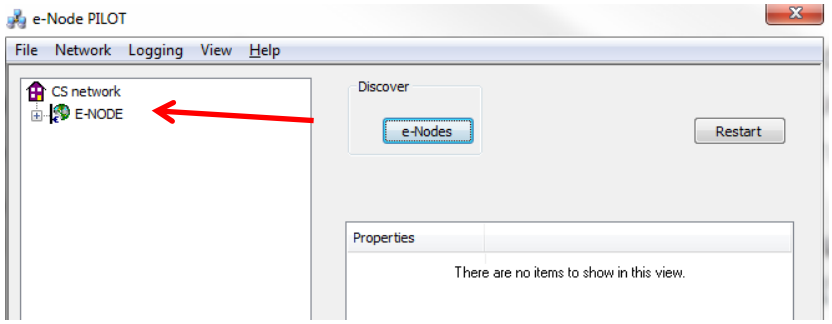
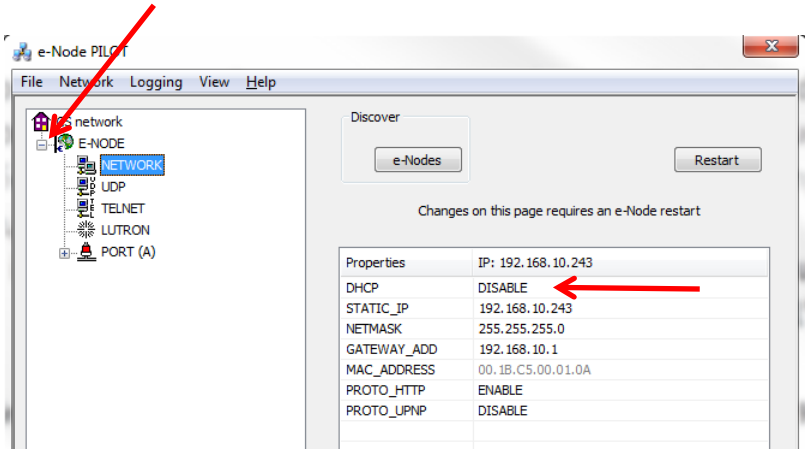
make such settings.




-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 |

<table>
<tr><td></td><td></td><td>
<table>
<tr><td></td><td></td><td>address</td></tr>
<tr><td>GATEWAY_ADD</td><td>xxx.xxx.xxx.xxx</td><td>Typically the address of your network's gateway</td></tr>
<tr><td>FINALLY and only after you have set the above variables, select DHCP</td><td>And Set to DISABLE</td><td>Now reboot the e-Node for this to take effect.</td></tr>
</table>
<br>-Note: It is recommended that only STATIC addressing be used with the RTI processors.
</td></tr>
<tr><td>EN-2</td><td>e-Node Telnet Server and Login setting (only applicable with v1.03 of the Converging Systems driver).</td><td>Newer versions of the RTI driver after V1.01 support Telnet Port 23 communication. This is the recommended setting for communication between RTI and Converging Systems.<br><br>Follow these steps below to enable Telnet communication on the e-Node.<br><br>1) Select the View e-Node tab and select the Telnet tab. Set SERVER to ENABLE.<br><br>2) Login Settings.<br>a) If Telnet communication with Login <u>is supported</u>, set LOGIN to ENABLE and select the Restart button for the particular e-Node that you are utilizing to communicate with the RTI system.<br><br>b) If Telnet communication with Login is <u>unsupported</u>, set LOGIN to DISABLE and select the Restart button for the particular e-Node that you are utilizing to communicate with the RTI system.</td></tr>
</table>



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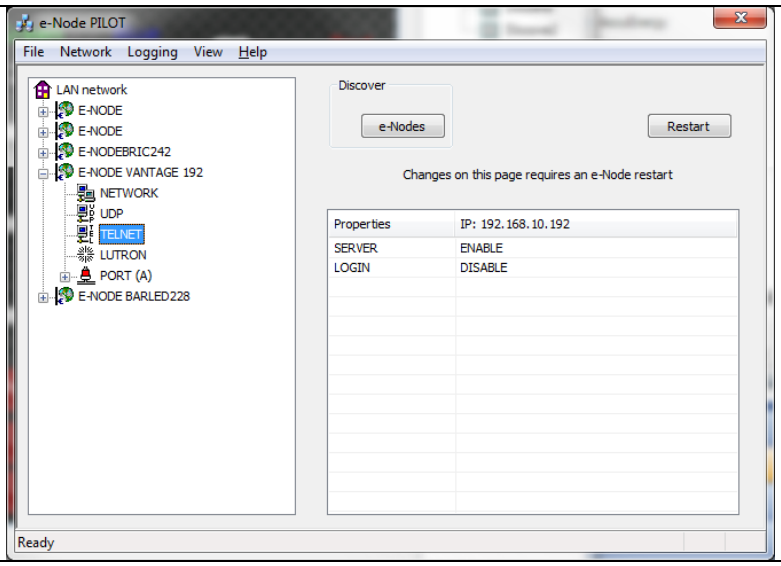
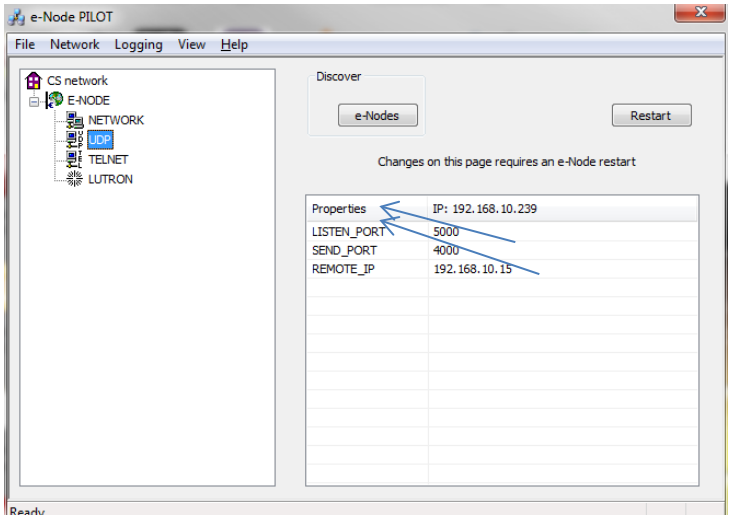
| | | |
|---|---|---|
| | |  |
| EN-2 | **e-Node UDP Port** setting (transmit and receive)<br><br>**Note**: Version 1.01 of the driver or earlier only supports UDP communication. It is recommended that you download a newer version of the driver which support Telnet Port 23 communication. ***In this case, disregard this step.*** | Currently, V 1.01 of the RTI driver utilizes **UDP** communication (Port **5000** for send and Port **4000** for receive from the XP-n processors). These are the factory defaults for the Converging Systems' e-Node. If you are having difficulty establishing communication with the targeted e-Node, launch the **e-Node Pilot application**, verify that under the **View tab/View e-Node tab** the **LISTEN_PORT** for the e-Node is set to 5000 and the **SEND_PORT** is set to 4000. If not, change those settings to these values, and hit **RESTART** to reboot the e-Node. You may need to close and re-open the Pilot application to invoke the change. Here is the applicable page within Pilot where this change is made.<br><br>  |



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| | | |
|---|---|---|
| | | **Note**: Since the e-Node Pilot application also uses **UDP** communication which is a point to point protocol, the RTI system and the Converging Systems' e-Node Pilot cannot be utilized concurrently. So if **UDP** communication is to be used with the XP-n processor, it is important to initially set up the e-Node and all connected lighting and/or motor controllers before turning on the XP-n processor. If you want to subsequently make a change using the Pilot application, just turn off the XP-n processor temporarily and the UDP channel will be available to the e-Node Pilot application. |
| EN-3 | | |

***IBT-100 Programming***

All of the communication parameters to support the IBT-100 are built into the Key Digital driver and therefore no special programming is required of the IBT-100 serial adapter. However, certain features of the ILC-100/ILC-400 with respect to **NOTIFY** (which permits automatic signaling of color status upon color state changes) described above will need to be programmed using the e-Node. But in this case, after the specific lighting controllers are programmed, the e-Node will no longer be required for Key Digital to Converging Systems communication using the IBT-100.

**RS-232C Interfacing Note**: If you plan on simply using the IBT-100 for serial communication and desire to have multiple lighting loads (more than one ILC-100 with a unique **Z**one/**G**roup/**N**ode address you must set up your system using the e-Node as specified above as well as the particular lighting load as specified below. However, if you do not care about bi-directional feedback or support of multiple controllers address, no further set-up is required. However, this is not recommended.

***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. |

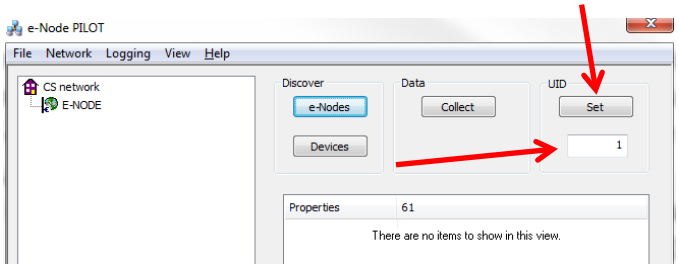
Background. From the factory the **ILC-x00** controllers do not have an assigned UID (unique ID) address. Units come equipped with a factory default address of **Zone**=2, **Group**=1, and **Node**=undefined or a 0. If you set up your RTI system to communicate with an ILC-x00 with an address of **2,1,0** the ILC-x00 will react but it will not provide feedback data which is required for automatic slider updates within the RTI 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 for more information on Zone/Group/Node 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.

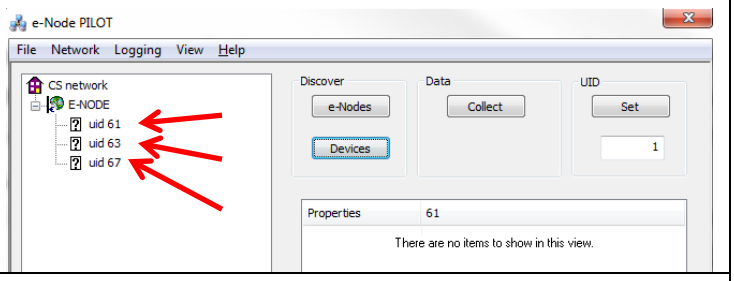
(3) Now, under the **UID** window, select and enter a unique UID number/address (good to start with 1 and work upwards but never use a duplicate number) and select **Set**.




.

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.<br>• **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.<br>• **ILC-400**. Remove the white plastic protective shroud to the left of the dual RJ-25 connectors with your finger nail or a small flat-headed to expose a push button mounted to the PCB. Depress the pushbutton for ½ second and then release. The existence of the ILC-400 will appear under the e-Node entry within Pilot<br><br>-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.<br><br>  |
| DV-2 | Notify Mode | **Background.** The Converging Systems' lighting controller have a unique new feature called **NOTIFY**, which automatically transmits color state data back to the RTI controller ***only if*** there is a color state change (that is to say, only if the color has changed from its previous state). This feature dramatically reduces bus traffic for color space data is only transmitted onto the bus in those instances when there are color state changes. Three options exist within ILC-100 (fw 3.1 or higher) and all versions of the ILC-400 color controller. These include: **NOTIFY VALUE** (for RGB color space data), **NOTIFY COLOR** (for HSL color space data), and **NOTIFY BOTH** (for both RGB and HSL Color Data). It is |



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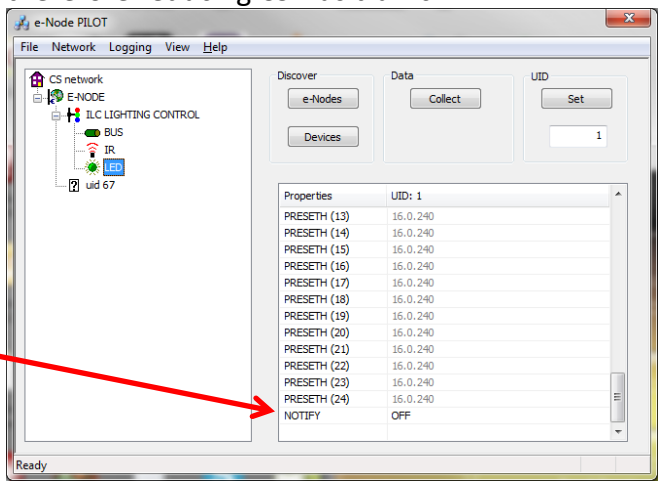
recommended that one of these **NOTIFY** functions is utilized in any integration with RTI's products. After you make any change in this area, reboot by powering off and back on all ILC-x00 controllers reprogrammed.

**Steps.** Within the e-Node Pilot application, select each controller (i.e. ILC Lighting Controller) that you wish to adjust from the **View Map** tab. Then open the **LED** tab. Find the **NOTIFY variable,** and set it to **VALUE (if you are using RGB sliders), COLOR (if you are using HSL sliders), or BOTH (if you are using both RGB and HSL sliders.** This will prevent the selected controller from broadcasting its status after every state change therefore reducing CS-Bus traffic.

Change this to the appropriate type of Notify

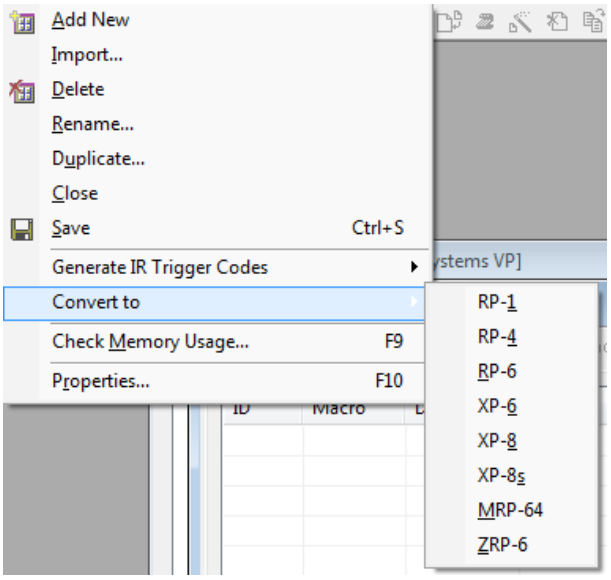
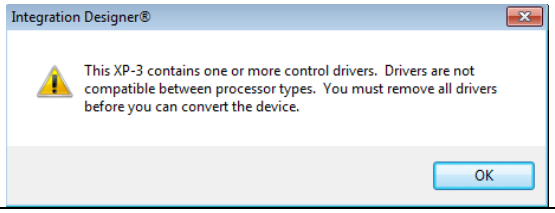



## RTI Programming

Below is a summary of those steps required to import the Converging Systems' e_Node Ethernet adapter/firewall and one or more loads (motors or lighting). Screen shots are provided for additional information. Typically, the following features are set-up within the RTI commissioning software (Integration Designer).

**Note:** If you choose to import the sample RTI project into Integration Designer, proceed to Step #1a, if you wish just to import the Converging Systems hardware into an existing project, proceed to Step #2a.

1. **Import Converging Systems Intelligent Lighting Controller into your project.**

| Step | Step | Detail |
|---|---|---|
| 1a | Import RTI (or CSI) sample .rti project into Integration Designer | Download sample file either from RTI website or from Converging Systems' website.<br><br>Select **Open** and navigate to sample file. |
| 1b | Convert Project file to your particular RTI processor | The sample file may have been created using a RTI processor different from your targeted platform. Within **System Workspace**, left click on project processor icon.<br><br>Then select the **Device tab** and select **Convert To** and from the pulldown and select your target processor.<br><br>  <br><br>Once you see this message, select **OK** to convert.<br><br>  |
| 1c | Import **Converging Systems Intelligent Lighting Controller** into your system file within the RTI Controller (i.e. XP-3 in this case) by using the **Add** feature.<br><br>If you do not have this driver | Within the **System Workspace** window, select your applicable RTI processor. |

| | | |
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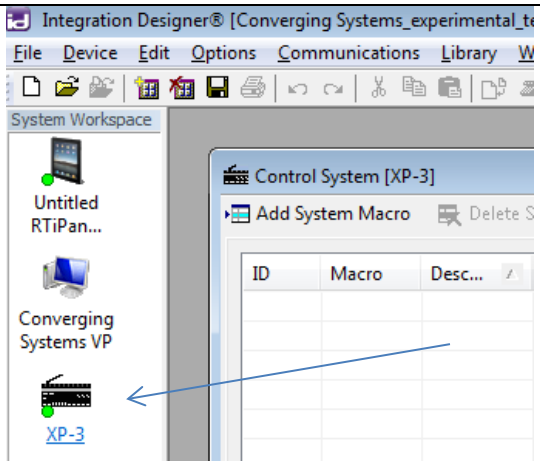
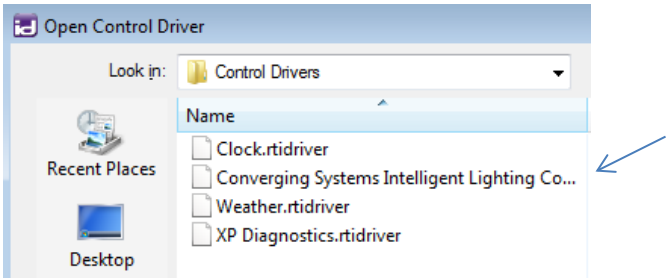
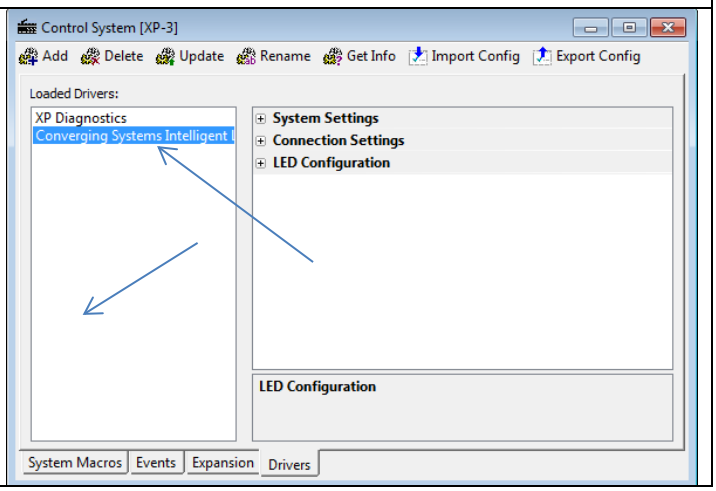
| | in your existing library, go to the RTI Dealer portal and download the latest Converging Systems' driver.<br><br>**Note**: Make sure you download latest version from the RTI library. |  <br><br>Next select the **Drivers** tab at the bottom of the Control System window and select the Add function and navigate to the ***Converging Systems Intelligent Lighting Controller*** entry.<br><br>  |
| 1d | After you have added the **Converging Systems Intelligent Lighting Controller** to your RTI processor's **Driver** library**,** you will see the following entry. |  |



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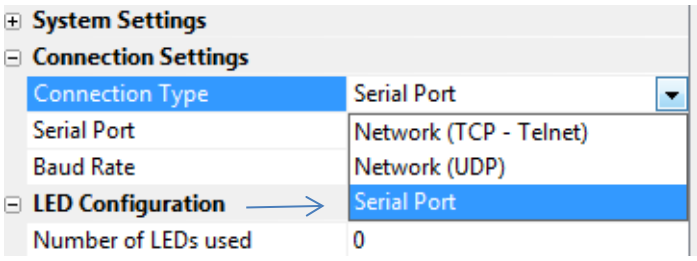
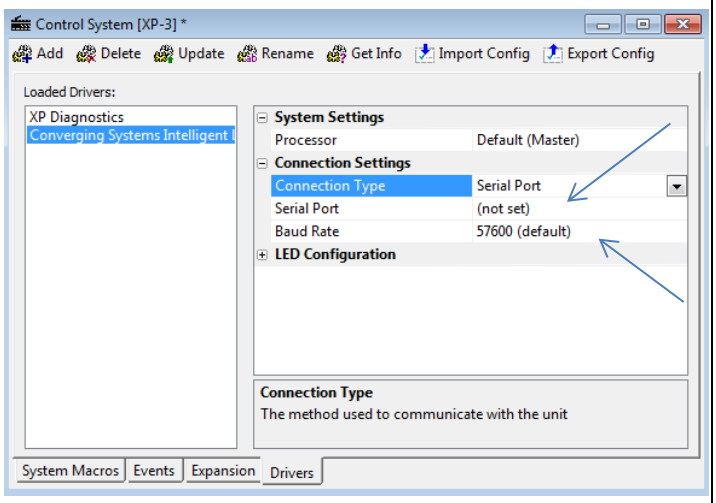
## 2. Set-up communication parameters for the Converging Systems Intelligent Lighting Controller

| Step | Step | Detail |
|---|---|---|
| 2a | Set-up communication parameters for the Converging Systems interface (**IBT-100 serial device** or **e-Node IP device**) that will be used with one or more Intelligent Lighting Controller within **Connection Settings tab** | Determine what will be the communication linkage that you will use to connect to the Converging Systems' device. Refer to the appropriate section below depending upon your choice.<br><br>**Serial Communication**: Left click your RTI processor icon under System Workspace, and select the **Drivers** tab at the bottom. Select the Converging Systems device. Under the **Connection Settings** entry, select the **Connection Type**, pick **Serial Port**.<br><br>  <br><br>Select the applicable **Serial Port** and make sure the **Baud Rate** is set to the 57600 (default setting).<br><br>  <br><br>**IP Communication (Telnet** *Recommended***)**: Left click your RTI processor icon under System Workspace, and select the **Drivers** tab at the bottom. Select the Converging Systems device. Under the **Connection** |

| | | |
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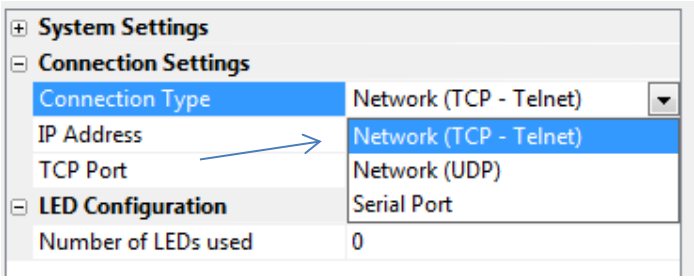
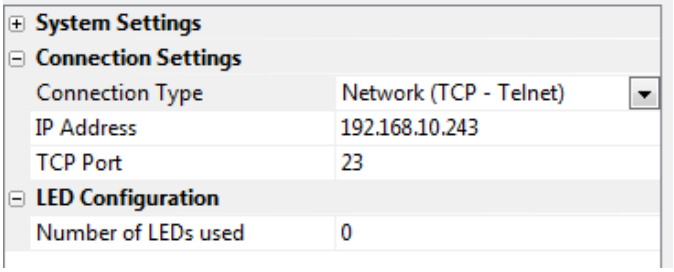
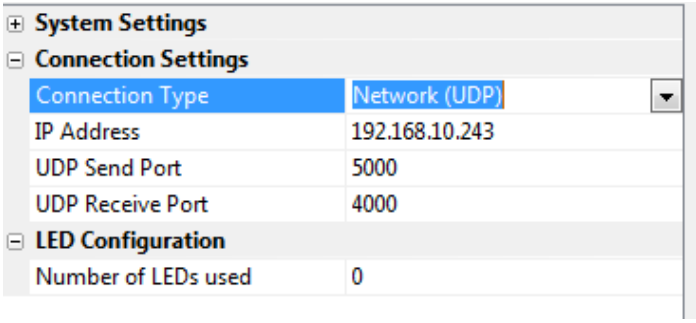
| | | **Settings** entry, select the **Connection Type**, pick **Network (TCP-Telnet).**<br>  <br><br>For **IP Address,** enter the e-Node's previously set up Static IP address (set up initially using e-Node Pilot application).<br>  <br><br>**IP Communication (UDP-not generally recommended)**: Left click your RTI processor icon under System Workspace, and select the **Drivers** tab at the bottom. Select the Converging Systems device. Under the **Connection Settings** entry, select the **Connection Type**, pick **Network (UDP).**<br>  <br><br>For **IP Address,** enter the e-Node's previously set up Static IP address (set up initially using e-Node Pilot application). Select the applicable **UDP Send Port** (5000) and the **UDP Receive Port** (4000). |



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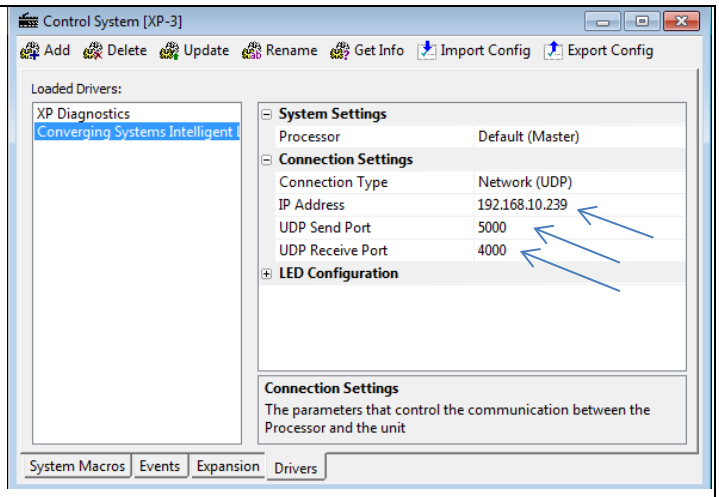
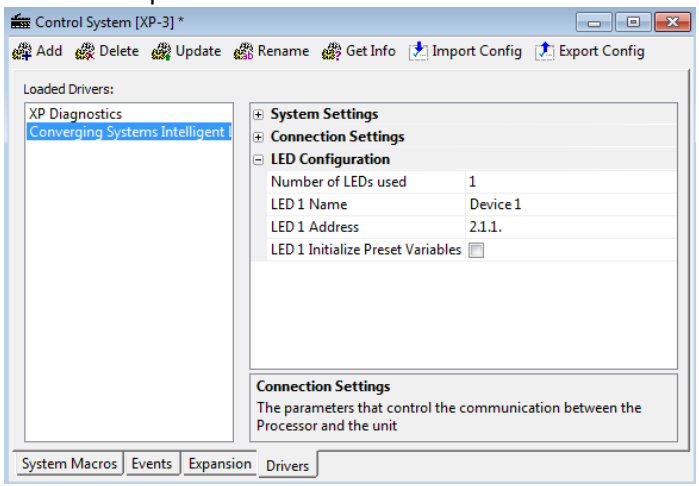
| | |  |
| 2b | Set-up communication parameters for the specific Converging Systems Intelligent Lighting Controller(s) within **Connection Settings Tab** | Determine the universe of controllers that will be connected to the communication linkage that you set up in **Step 2a** above.<br><br>For LED devices, expand the **LED Configuration** tab, and fill in the requested information.<br>  <br><br>**Number of LED's used.** Enter a number between 1 and 254 for the number of controllers that will be supported by your system.<br><br>**LEDn Name.** Enter a name for each controller to be supported. You may leave the default name as is.<br><br>**LEDn Address.** Enter a Zone/Group/Node (**Z.G.N.**) name for each controller to be supported. These Z.G.N. addresses need to be assigned by the e-Node Pilot |

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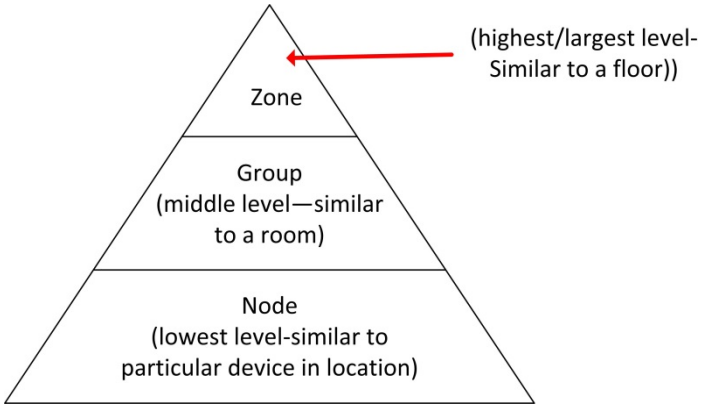
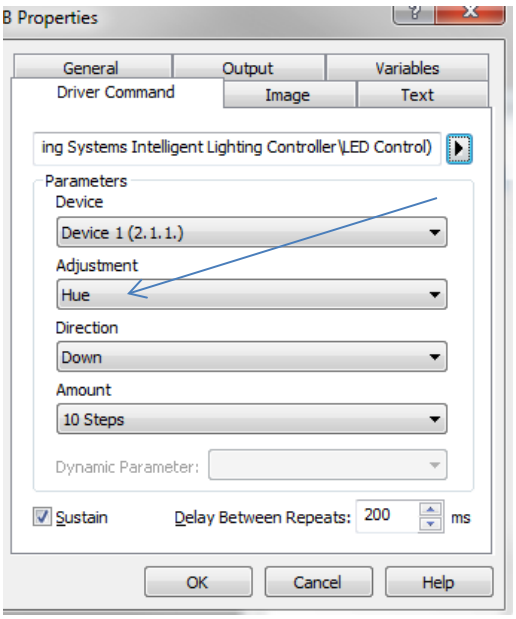
| | | application. **In order for the bi-directional capabilities of the RTI system to operate with respect to Converging Systems' devices, it is imperative that a non-zero entity be selected for each Z.G.N. address.** And please note, no two controllers should be assigned the same Z.G.N. address.<br><br>  <br><br><br>**Example**: If you have a device with a Z.G.N. address of 2.1.1. ,then the RTI 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.<br><br>**LEDn Initialize Preset Variables.** Select if present initialization is required for LED Device(s).<br><br>Note: By enabling Initialize Present Variables, present values are acquired during the driver initialization process. Each preset (1-24) on each enabled ILC Controllers (1-254) must be polled individually. This process can take some time, so it is recommended that the **LEDn Initialize Preset Variables** feature only be enabled on ILC controllers that absolutely need presets initialized during the driver initialization process. If the **LEDn Initialize Preset Variables feature** is not enabled, the preset levels for the respective presets are acquired the first time the preset is recalled or when the preset is stored. |

**3. Now, add Tasks or Macro to a specific button push or action.**

| Step | Step | Detail |
|---|---|---|
| 3a | You can create a user interface (UI) for your system that is suited to your customer's requirements. This **Integration Note** will focus primarily on the integration of the sample project's VP (Virtual Panel). It is up to the dealer to create any additional user interfaces.<br><br>**Note:** However, where appropriate limited information will be provided on how (i) to customize your project with additional sliders and buttons, as well as (ii) to program on a limited basis additional User Intefaces. | Here is a sample of the Sample File provided User Interface.<br>  |
| 3b | You can right click on any button on the sample UI within Integration Designer and select **Edit Properties** to determine the simple steps involved in making the UI operate. Depending upon the type of button selected, varying **Properties** screens will appear.<br><br>Most of the relevant programming for each button is within the **Driver Command** tab. | This **Properties** screen will appear for Sliders and Adjustment buttons.<br>  <br>This **Properties** screen will appear for simple Toggle and normal selection buttons. |



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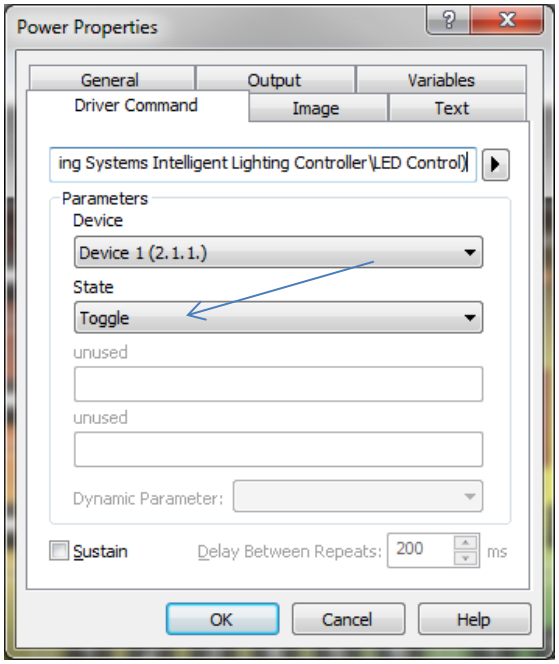
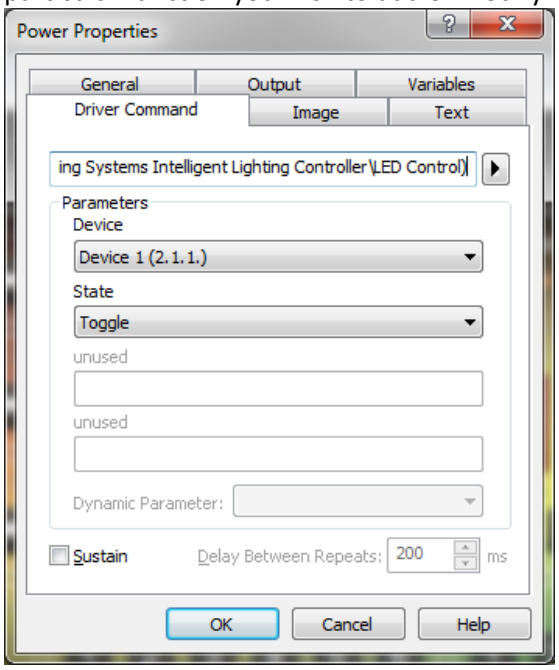
| | |  |
| 3c | Next, you can review specific commands that have been linked to specific buttons throughout the System file. You can mimic the process here with your own UI screens in the future by following the example exactly. | In order to initially review, or customize or change a  button, within the **Properties** window select the Icon and find the specific command that has been programmed within the RTI Certified Driver for the particular function you wish to add or modify.<br>  |



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| | | **Note**: Those commands listed under **LED Control** are those which have been pre-programmed within the RTI Driver. If one or more commands that you wish to support are not currently within the RTI Driver, you may add those within the **RAW Cmd** (see below). |
| 3d | Another way to determine the entire set of commands from which you can make future selections, utilize the **Library Browser** within Integration Designer to review all embedded supported commands. | Select the Library Browser, and open the Converging Systems Intelligent Lighting Controller and review all the Driver Commands supported.<br><br>Again, if one or more commands that you wish to support are not currently within the RTI Driver, you may add those within the **RAW Cmd** (see below).<br><br>**Note**: RAW Cmd typically work well for discrete button pushes but not for additional sliders and bi-directional feedback. Should additional slider functionality be required for new commands available from Converging Systems, contact RTI Technical support for more information. |

| | | |
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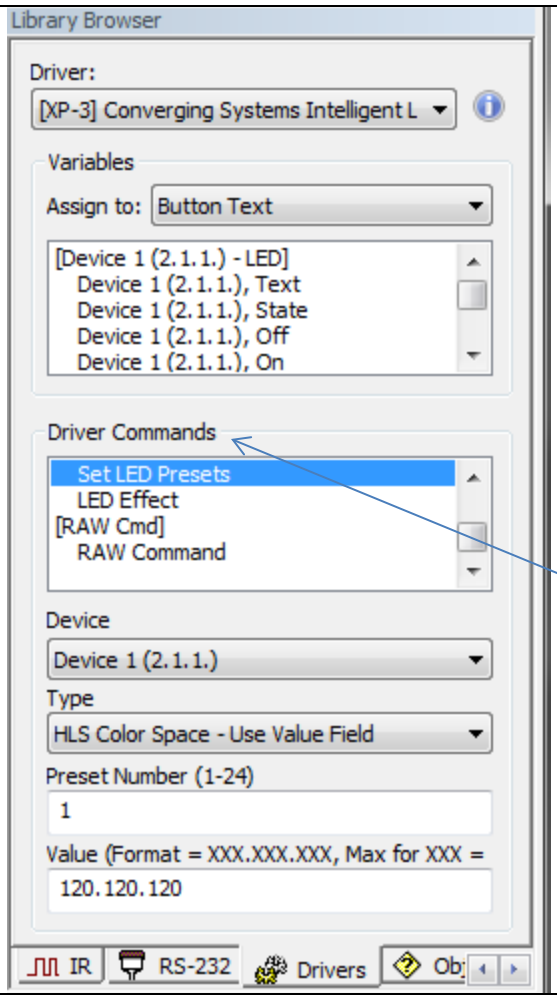
| | |  |
| 3e | Now, that you have selected a targeted command, you must assign that command to specific device. | Assign each command to specific **Parameters/Device by selecting the**  icon and scrolling through available controller names (with addresses). |

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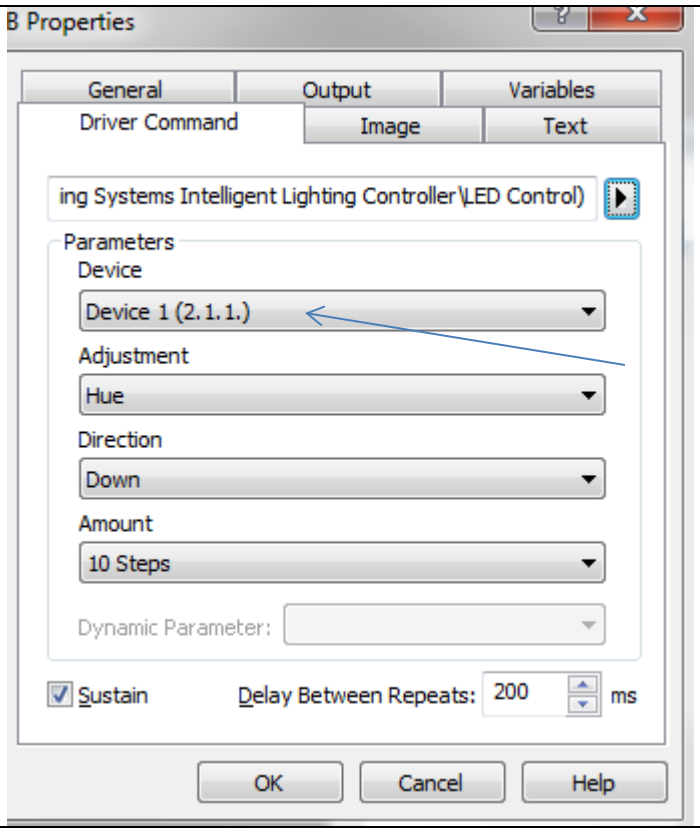
| | |  |
| 3f | Continue providing any required data for the **Adjustment** section for each command being programmed. If presented, also input any requested data for additional fields such as **Direction** and **Steps**. | Assign **Adjustment** entries for Sliders and Adjustment icons by selecting the  icon and scrolling through available commands.<br><br>Assign **Direction** entries and **Steps** entries if requested. |



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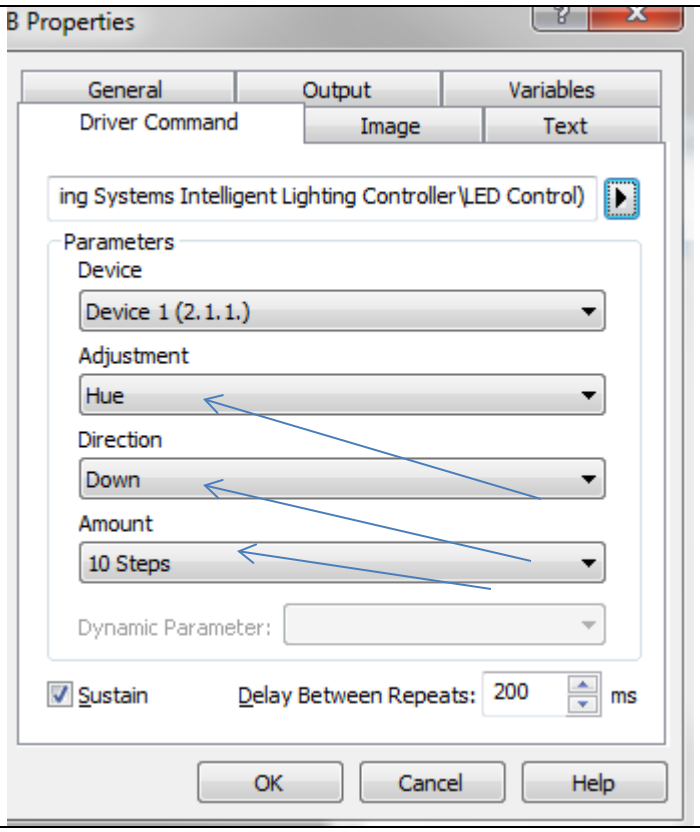
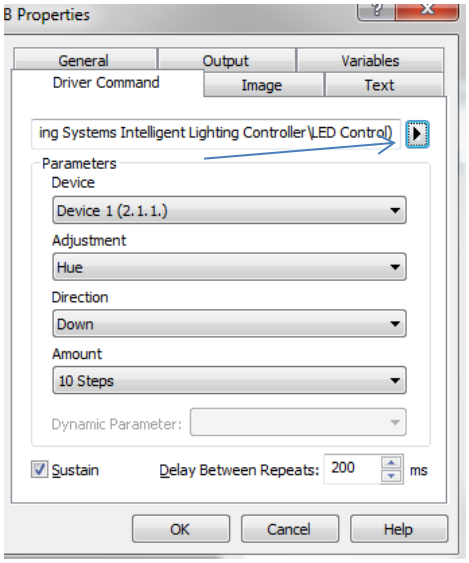
| | |  |
| 3g | Continue this process until you have all your buttons, sliders programmed. Should you encounter a specific Converging Systems' command that is not supported by the RTI Driver, download the Converging Systems' *Third Party CS-Bus Device Driver Toolkit-Programmer's Guide* and program those commands directly using the **RAW Cmd** feature within Integration Designer.<br><br>**Note**: the above referenced toolkit can be downloaded from http://convergingsystems.com/inres_programmingdesignkit.htm | From the Edit Properties pop-up window, select the  icon and selecting Converging **Systems Intelligent Lighting Controller/ RAW Cmd selection**.<br><br>  |



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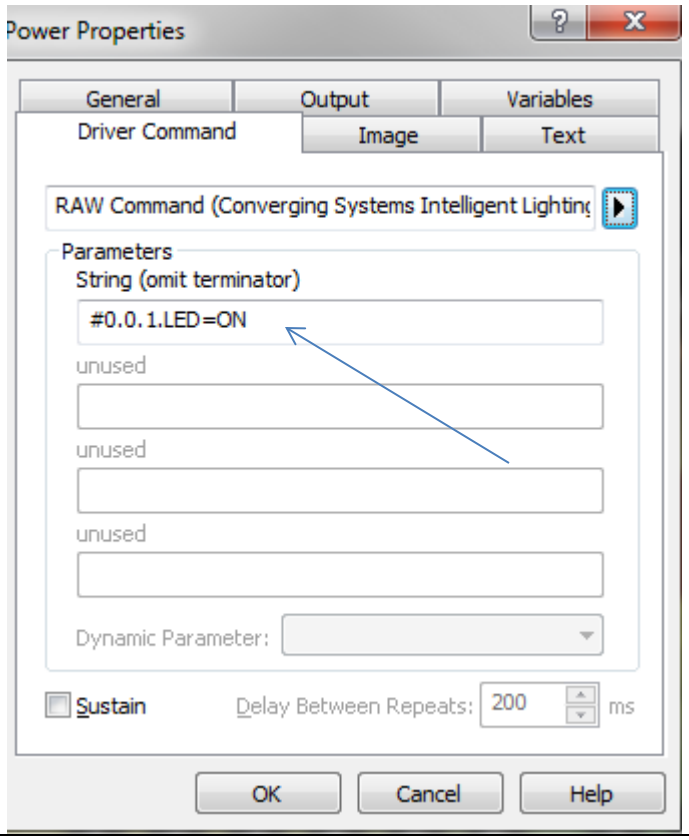
| | | Then enter your new command within **String block**<br>  |

## 4. Upload System file (*.rti) and Test

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| 4a | Upload System file | Make sure you are connected to your RTI processor and upload your System file. Select **Communications/Send To Device** and upload your System File using the applicable upload communication channel available (IP or USB as appropriate). |

| | | |
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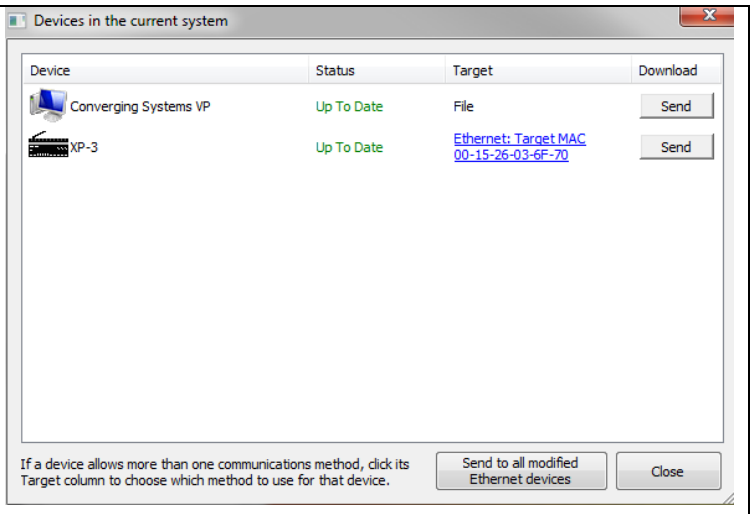
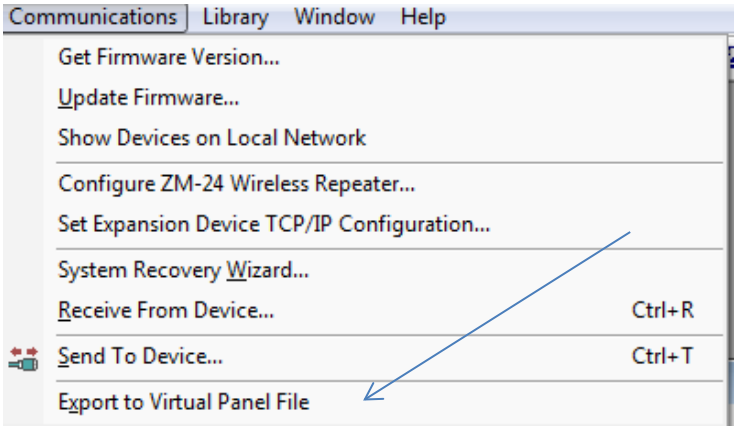
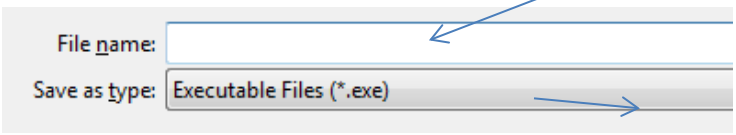
| | |  |
| 4b | If you have developed a **Virtual Terminal** (such as has been included within the RTI sample project), create a **Virtual Terminal.exe** | Under the Communications tab, select to Export to Virtual Panel File.<br>  <br>And then enter an appropriate name for the file.<br>  |
| 4c | Test using the Virtual Terminal. | Launch the Virtual Terminal exe. Pess various buttons on the Virtual Terminal and verify that the corresponding action on all the Converging Systems's devices are operating properly. |

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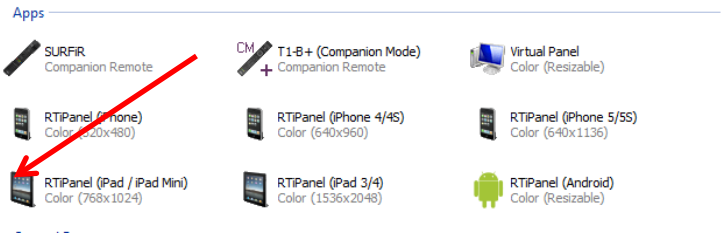
| | |  <br>Example: The **Power** Button should toggle the LEDs ON or OFF with each subsequent press of the **Power** button. |

## 5. Create Additional UI Screen (iPad in this case) and Test

| | | |
|---|---|---|
| 5a | Create New User Interface | Within System Workspace left click to Add New User Interface.<br>Select applicable interface. In this example, we are going to add an **iPad interface** (non-retina display).<br>  |

| | | |
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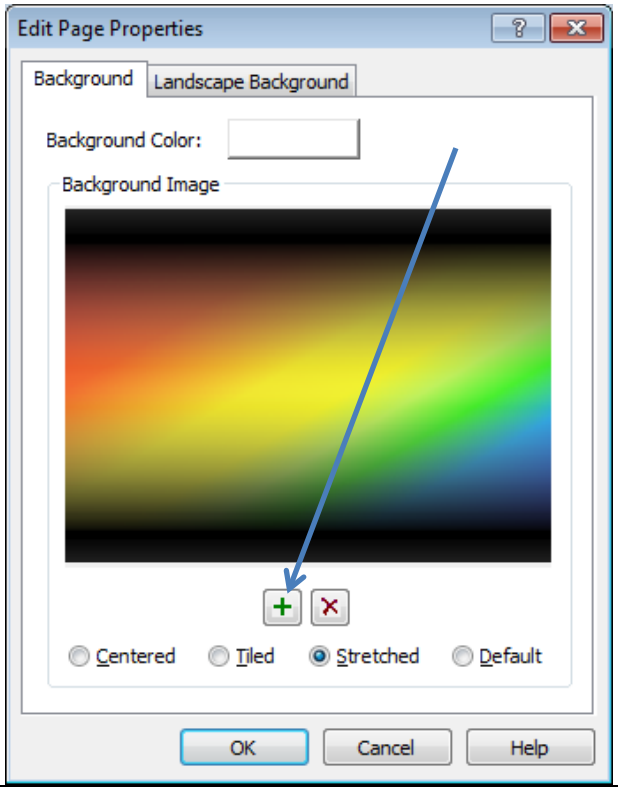
| 5b | Import selected background | Right click on blank UI screen and select **Page Properties**.<br><br>Select the "+" mark and navigate to selected background. (You may choose a different background for landscape with the **Landscape tab**.)<br><br>  |
| 5c | Add buttons and sliders as desired | You may choose to cut and paste standard buttons from the **VP panel** provided as an example to the sample project. For sliders you may need to create new sliders as appropriate. |



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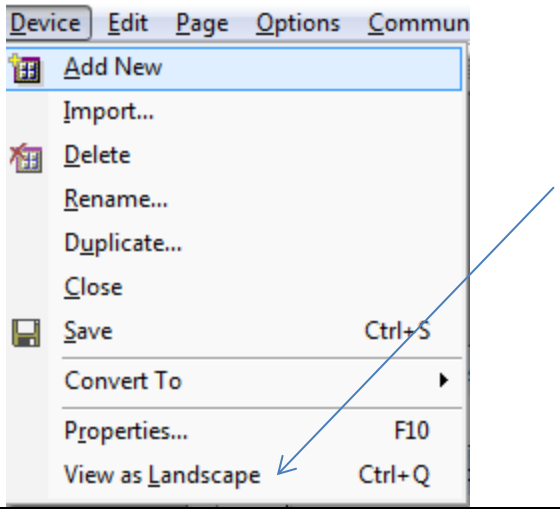
| | |  |
| 5d | Assign tasks to each button | See Section 3 above for more information. |
| 5e | Customize for landscape mode as well (if desired). | If you desire your User Interface to automatically adapt to the built-in gyro within your device, customize you UI screen for landscape mode.<br><br>After highlighting your new UI within the **System Workspace**, Select **Device**, and **View as Landscape**.<br><br>  |
| 5f | Perform any additional UI customizations as appropriate. | In this case, we have created a new UI for an Apple iPAD. Make sure you have secured necessary licenses from RTI to enable the download. Provided the iPAD is authenticated with the license key, you will see the new UI update on the iPad after you Update your RTI |

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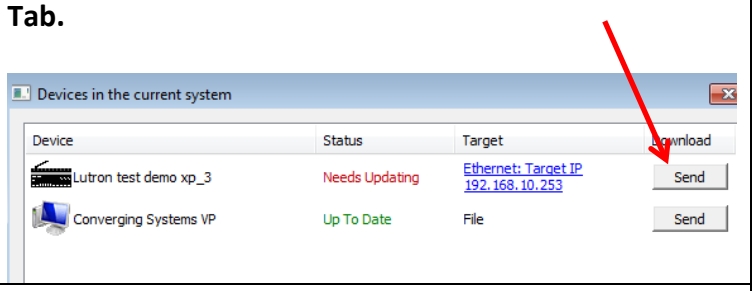
| | | platform through the **Communications, Send to Device Tab.**<br>  |
| 5g | Test using the new UI. | Launch the new UI. Press various buttons on the UI and verify that the corresponding action on all the Converging Systems's devices are operating properly.<br>  <br>Example: The **Power** Button should toggle the LEDs ON or OFF with each subsequent press of the **Power** button. |

## RTI 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

The following illustrations provide some sample UI for LED control interfaces.


Figure 3 VP Panel Screen



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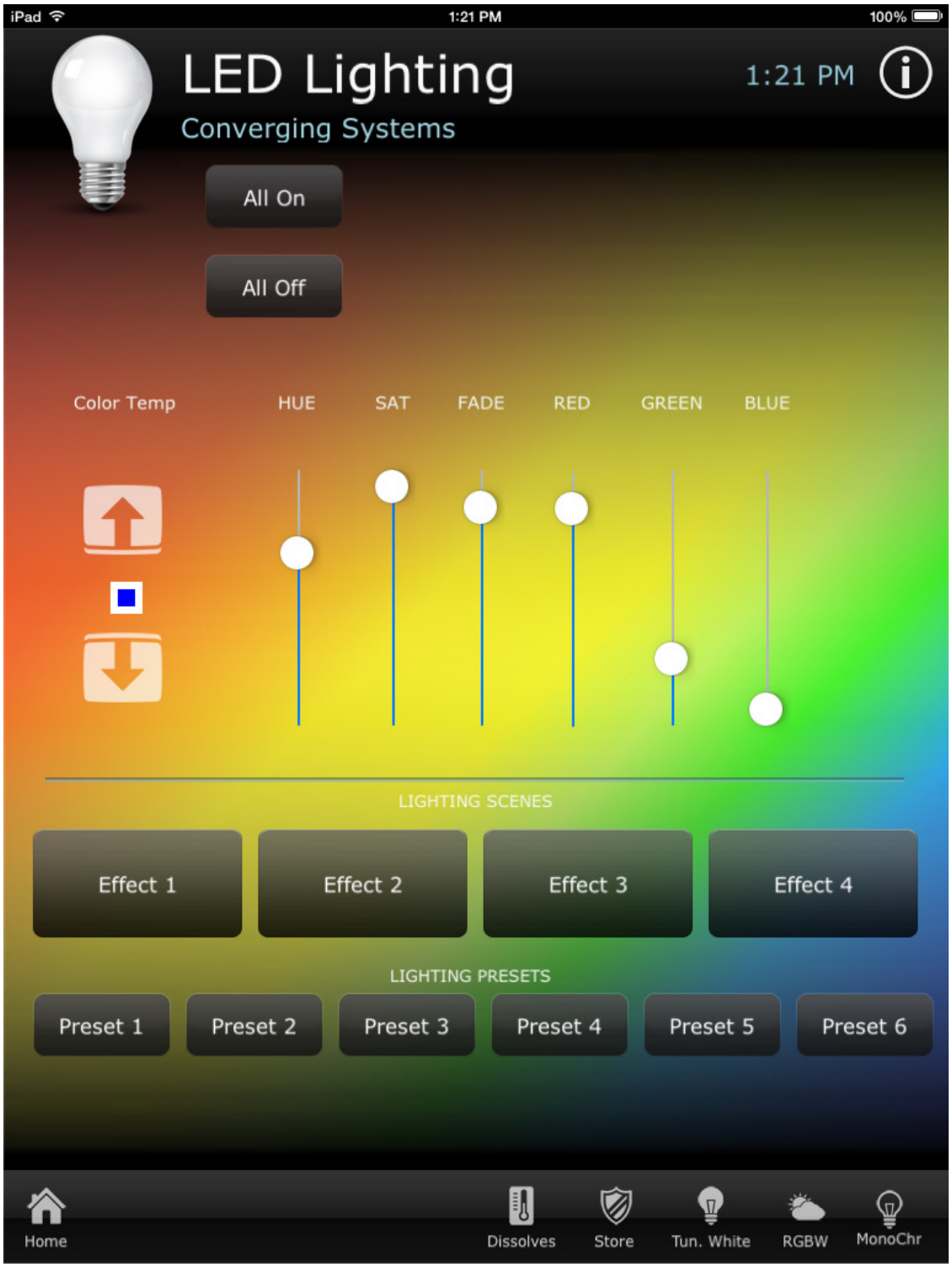


Figure 4 iPAD Screen



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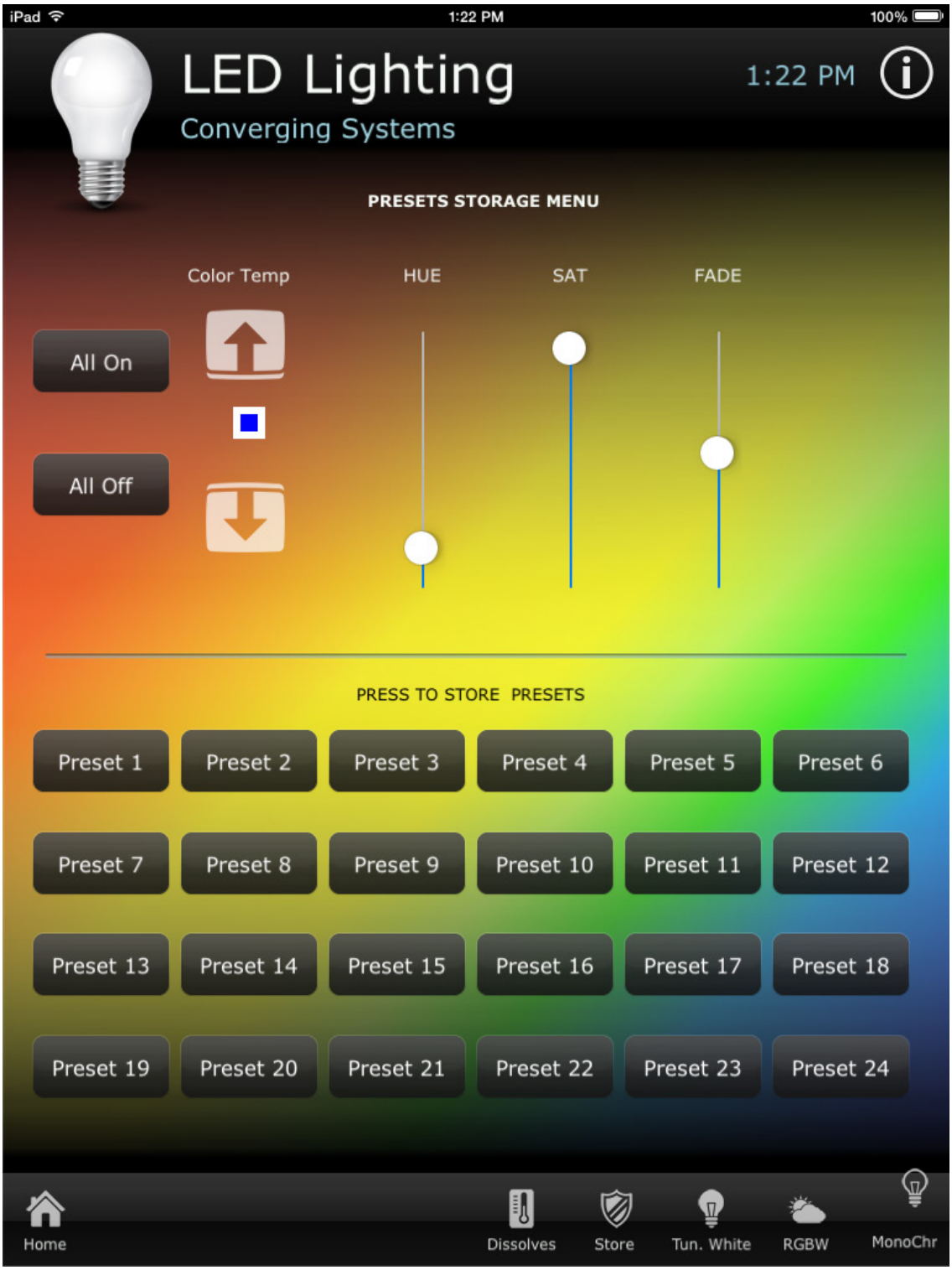


Figure 5 iPAD UI Screen Store Menu



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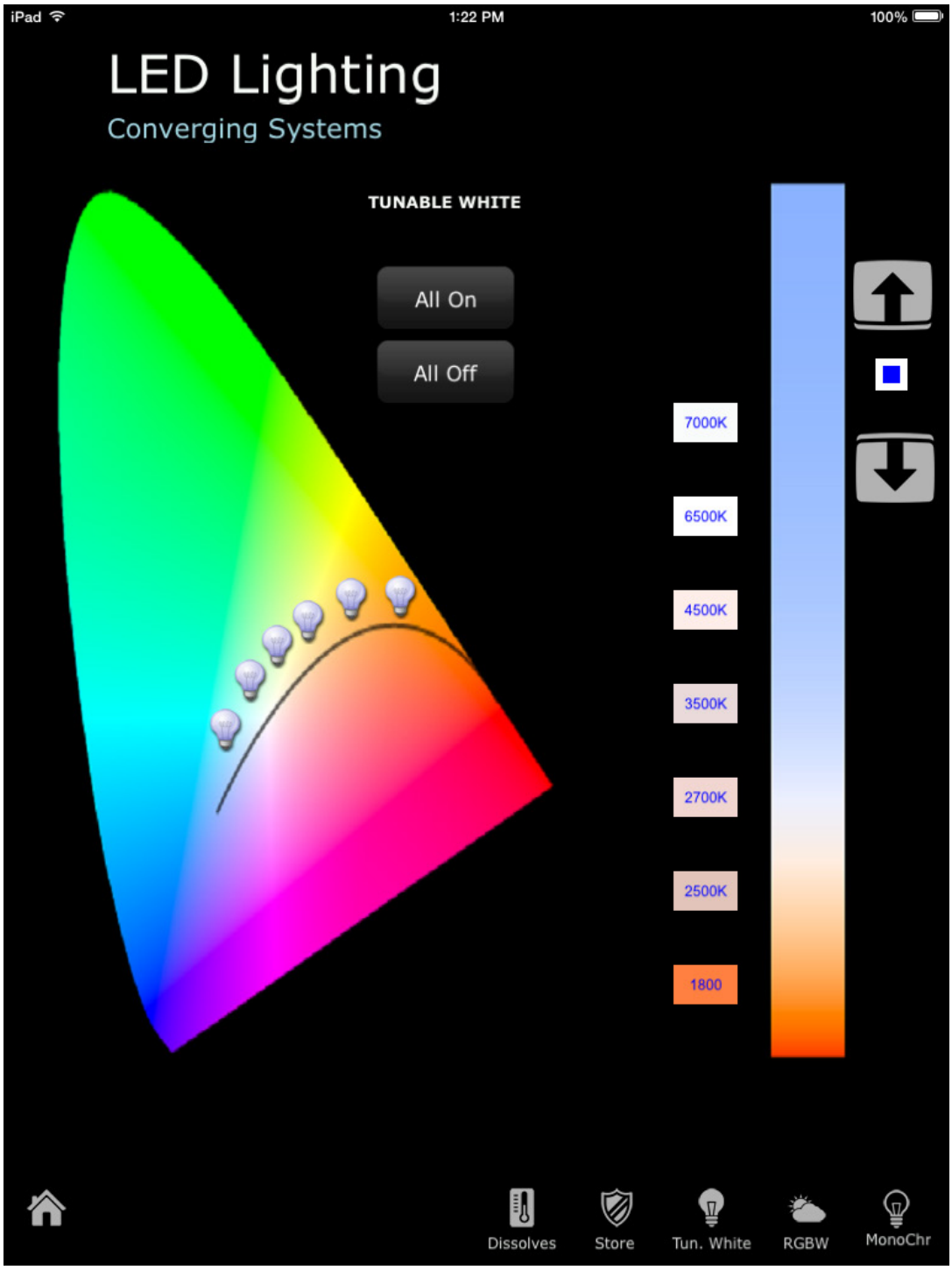


Figure 6 iPAD UI Screen Tunable White CIE Chart

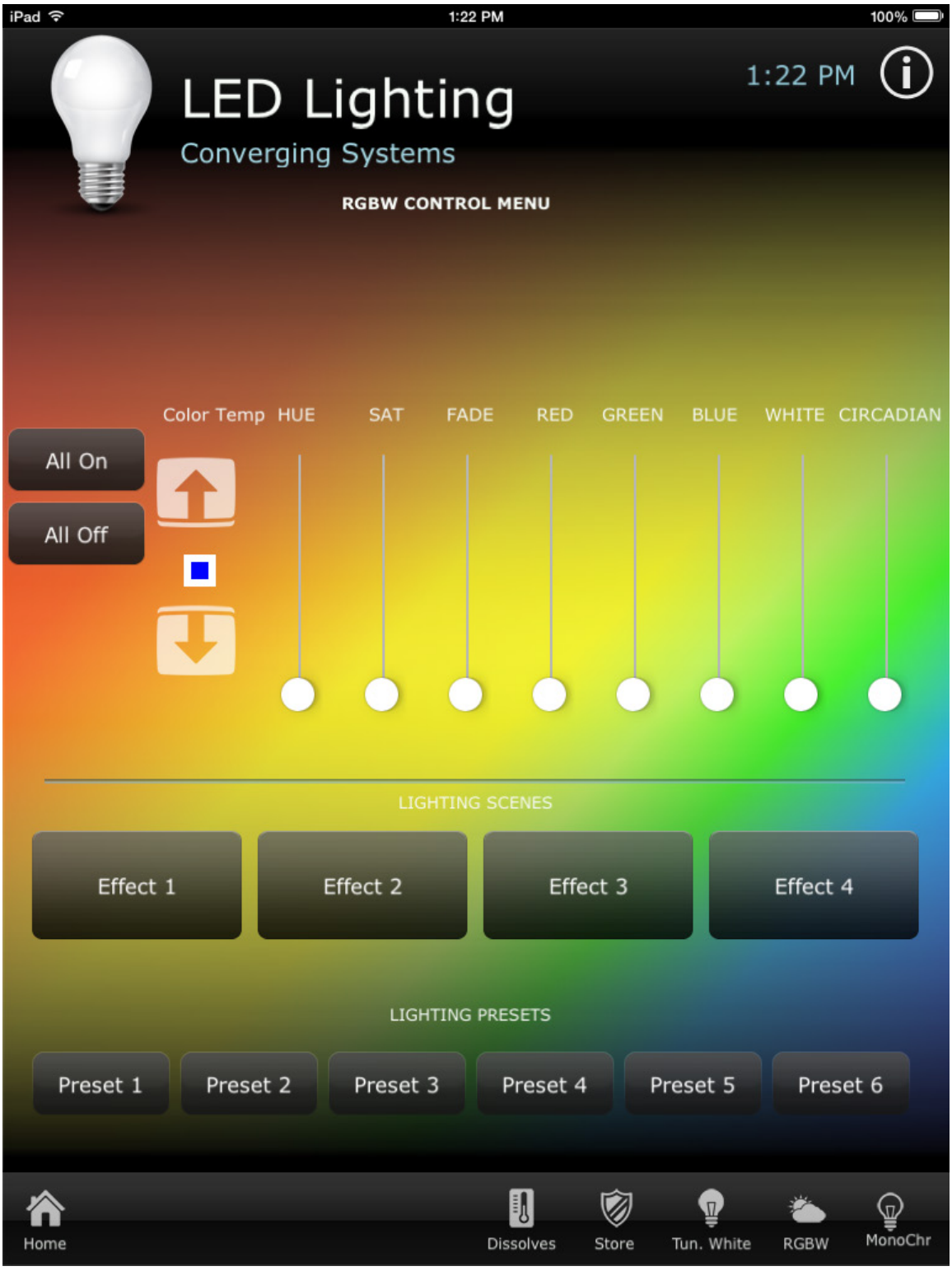


Figure 7 iPAD UI Screen RGBW



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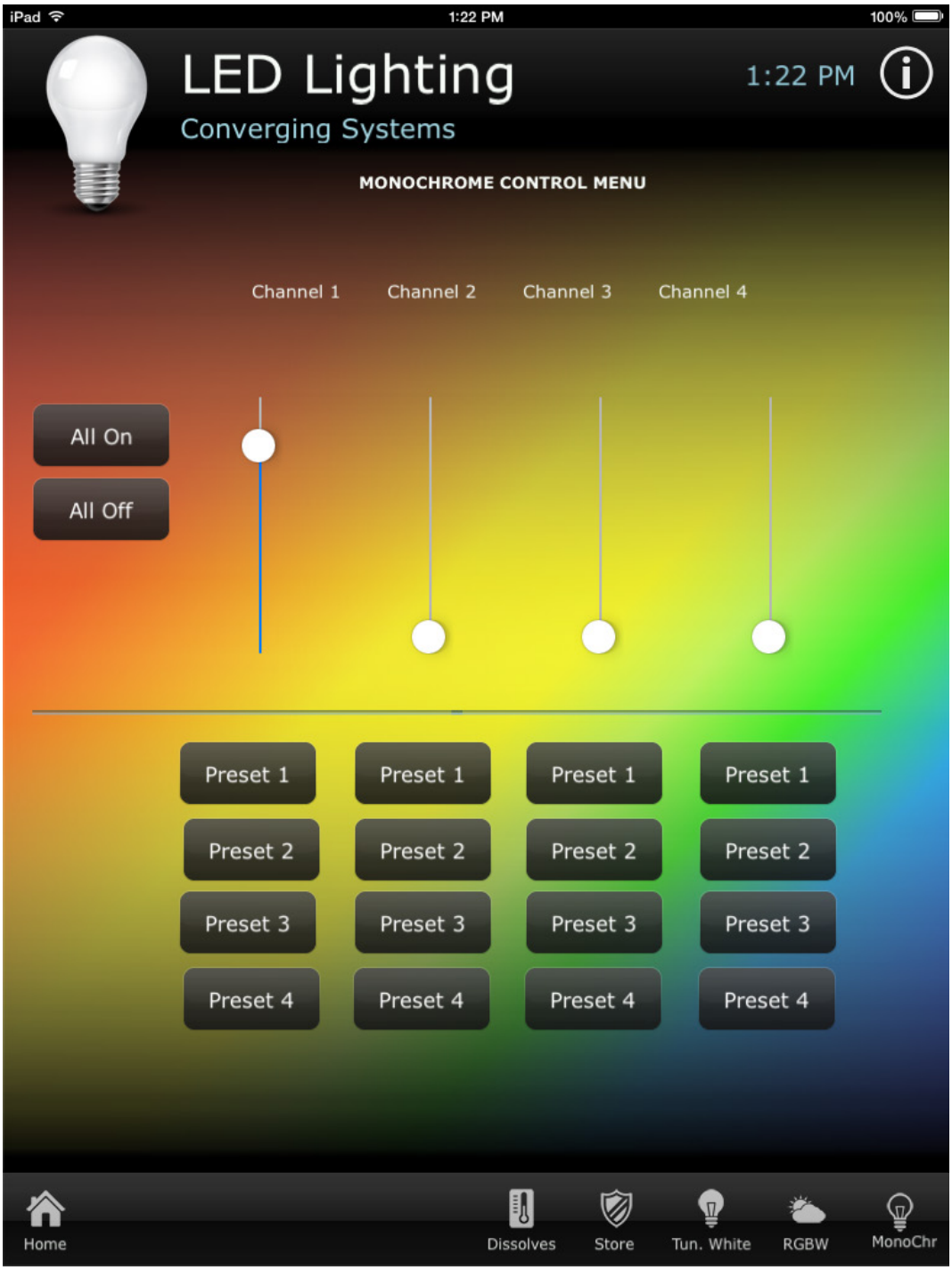


Figure 8 iPAD UI Screen Monochrome



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# Appendix 1

# Common Mistakes

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

(.1) Forgetting to IP address of the e-Node within Integration Designer. Make sure you have selected a static IP address for the e-Node using the e-Node pilot application and then use that same address within Integration Designer.

(.2) (FUTURE) Forgetting to make sure that the alias name for the e-Node is E-NODE and the password for e-NODE is ADMIN. These are set within the Converging Systems driver within Integration Designer.

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 Integration Designer.

3. **Sliders do not seem to work.**

(.1) Make sure the sliders have been set to the appropriate **SET LED** argument (Red, Green, Blue, Hue,Sat, Brightness, etc. )**.**

(.2) Make sure that within **Variables**, the **Bar Graph Object** is set to the appropriate Level command argument (Red, Green, Blue, Hue,Sat, Brightness, etc. ).

# APPENDIX 2

# ADVANCED INTEGRATION DESIGNER 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). Please see the diagram on the next page for the theory of operation here.



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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 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 **Figure 4** below shows both HSB and RGB on the same UI, this is probably more confusing for the typical user than the simple subset of HSB (hue, saturation, brightness) controls**. Since there is no concept of dimming within the RGB color space, having RGB sliders only frustrates the user who may just want to dim an existing colored output. However, if the User is intent on having RGB sliders, we would recommend leaving the Brightness slider to get accurate dimming.**


Figure 9

# Appendix 4

# DMX Options

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

**Converging Systems' e-Node/dmx.** Converging Systems has developed an adaptation of its lighting/dimming technology currently available within its ILC-x00 line of LED controllers and has re-purposed that technology into a separate product known as the e-Node/dmx. The existing RTI 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 RTI device drivers already in existence for other Converging Systems' products. (See the listing of commands that are supported with the e-Node/dmx device which are listed in the front of this Integration Note.)

Please follow the directions which follow to drive DMX fixtures from an RTI System



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

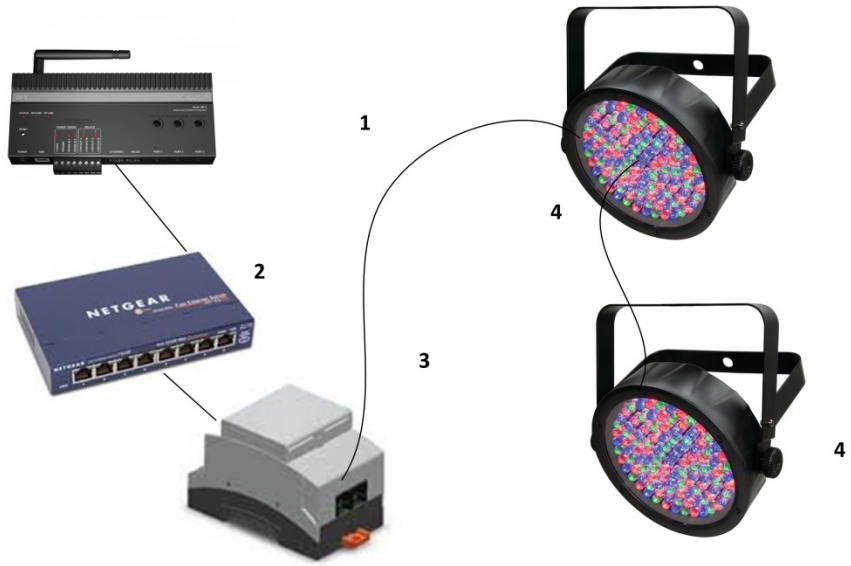


Figure 10

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 RTI system = 254

# BILL OF MATERIALS (for IP control)

| # | Device | Manufacturer | Part Number | Protocol | Connector Type | Notes |
|---|---|---|---|---|---|---|
| 1 | RTI XP-n processor | RTI | Various | Ethernet/USB | Various | |
| 2 | Network Switch | Various | Various | Ethernet | RJ-45 | |
| 3 | e-Node/dmx | Converging Systems | e-Node/dmx | Ethernet | RJ-45 (for Ethernet)<br>RJ-25 for local DMX bus | |
| 4 | Third party DMX fixtures | Various | Various | DMX512 | RJ-25 for DMX communication | Must terminate final OUT or THRU connector on last DMX fixture using a 120 ohm resistor |
| 5 | Flexible Linear | Converging Systems | FLLA-RGB-xxx | | 3-color 4 pin | |



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| | | | | | | |
|---|---|---|---|---|---|---|
| | Lighting (FLLA) RGB or RGBW luminaries | | FLLA-RGBW-xxx | | 4-color 5 pin<br>1-color 4 pin | |

**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:

| Pin | Signal |
|---|---|
| **1** | Not Used |
| **2** | DMX Ground |
| **3** | RS485 - |
| **4** | RS485 + |
| **5** | Not Used |
| **6** | Not Used |

**Note**: Even though Converging Systems recommends that RJ-25 6P6C plugs should be used for most CS-Bus wiring, the DMX wiring can utilize a 4P4C RJ11 plug.

***e-Node/dmx Programming***

| Step | Setting | Choices |
|---|---|---|
| DMX-1 | e-Node/dmx setup | Follow the directions under e-node Programming at the beginning of this Integration Note **Step EN-1** and **EN-2**. |



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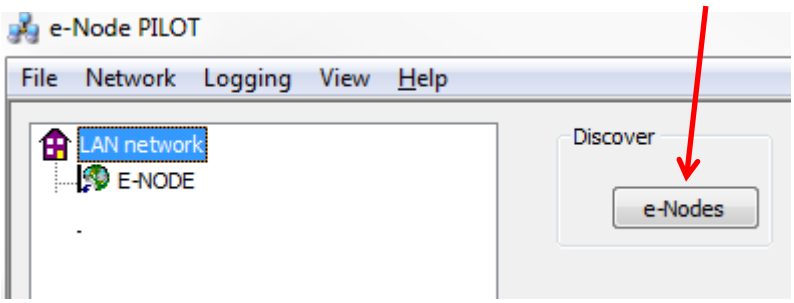
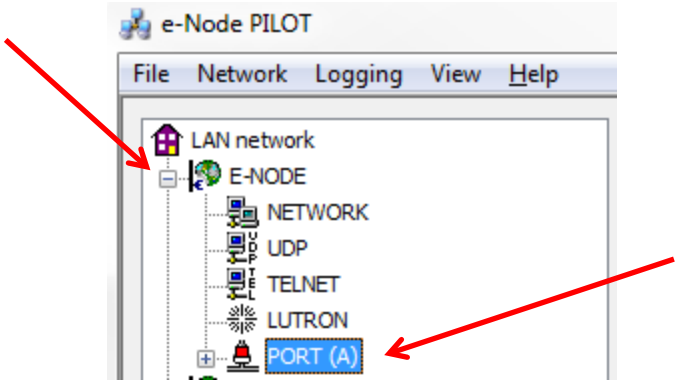
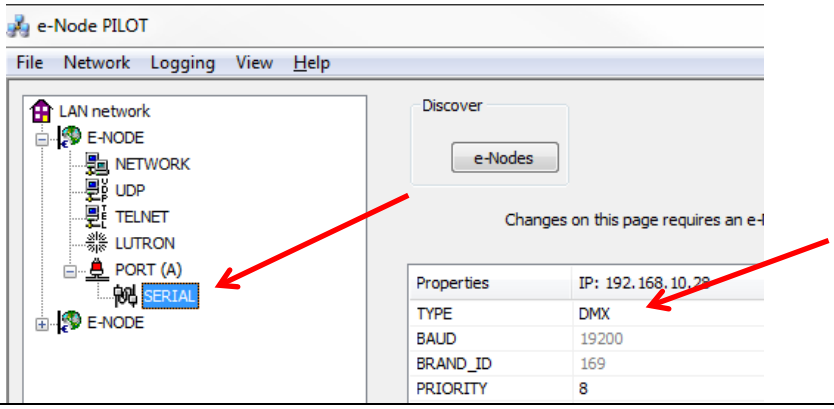
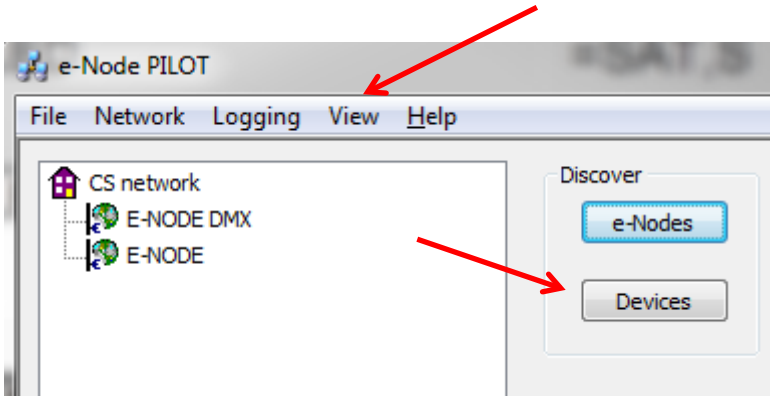
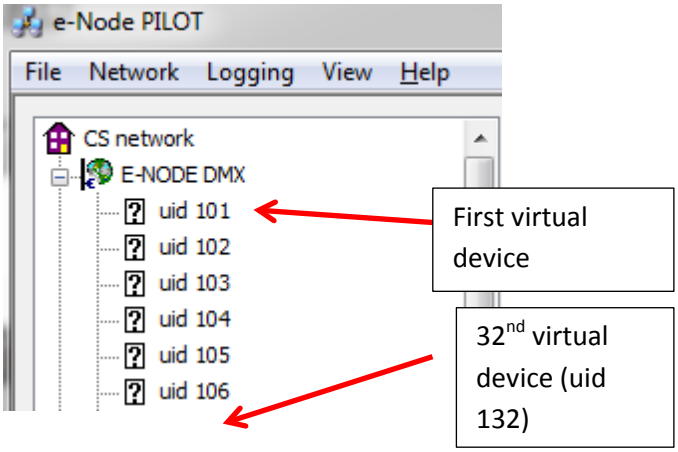
| | | |
|---|---|---|
| DMX-2 | Verify the e-Node DMX is set to communicate to DMX fixtures | -Select the **View e-Node** tab and select the Discover **e-Node** button**.** Any e-Node(s) connected on the same network will appear as shown.<br>  <br><br>-Select the + mark in front of the **e-Node/dmx**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

| | | |
|---|---|---|
| | | -Verify that after the **TYPE** entry, the data field indicates **DMX**. If it does not indicate **DMX**, select **DMX** from the pull down menu and reboot the e-Node/dmx in order to make this setting active.<br><br>**Note**: the e-Node/dmx can also be configured to communicate with standard CS-Bus devices (ILC-100, ILC-400) and therefore only when this entry is set to DMX, will the e-Node/dmx properly communicate to DMX fixtures. |
| DMX-3 | Device Discovery | -Select the **View Map** tab and select the Discover **e-Node** button**.** Any e-Node(s) connected on the same network will appear as shown.<br><br>-Select the Discover **Devices** button.<br><br>  <br><br>-Immediately 32 virtual "DMX Devices" will appear as follows:<br><br>  <br><br>**Note**: this picture shows the first 6 devices discovered. In a real example, all 32 virtual devices will appear. |



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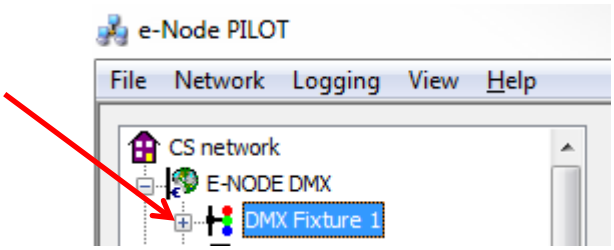
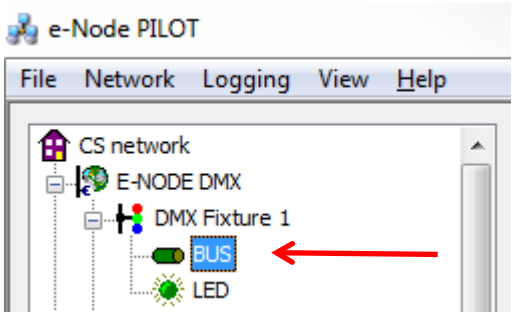
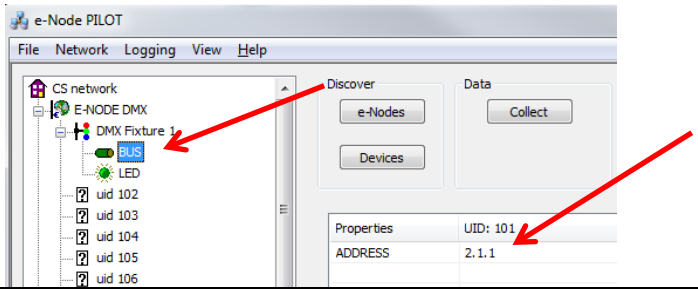
| | | |
|---|---|---|
| DMX-4 | Set up Device Addressing | The DMX data packet is mapped to CS messages by assigning a unique Zone. Group. Node number to three successive DMX channels. These are mapped as shown in the following table: |

| Fixture | DMX Channel Allocation | CS-Zone.Group. Node |
|---|---|---|
| **1** | 1-3 | 2.1.1 |
| **2** | 4-6 | 2.2.1 |
| **3** | 7-9 | 2.3.1 |
| **4** | 10-12 | 2.4.1 |
| **5** | 13-15 | 2.5.1 |
| **6** | 16-18 | 2.6.1 |
| **7** | 19-21 | 2.7.1 |
| **8** | 22-24 | 2.8.1 |
| **9** | 25-37 | 3.1.1 |
| **10** | 28-30 | 3.2.1 |
| **11** | 31-33 | 3.3.1 |
| **12** | 34-36 | 3.4.1 |
| **13** | 37-39 | 3.5.1 |
| **14** | 40-42 | 3.6.1 |
| **15** | 43-45 | 3.7.1 |
| **16** | 46-48 | 3.8.1 |
| **17** | 49-51 | 4.1.1 |
| **18** | 52-54 | 4.2.1 |
| **19** | 55-57 | 4.3.1 |
| **20** | 58-60 | 4.4.1 |
| **21** | 61-63 | 4.5.1 |
| **22** | 64-66 | 4.6.1 |
| **23** | 67-69 | 4.7.1 |
| **24** | 70-72 | 4.8.1 |
| **25** | 73-75 | 5.1.1 |
| **26** | 76-78 | 5.2.1 |
| **27** | 79-81 | 5.3.1 |
| **28** | 82-84 | 5.4.1 |
| **29** | 85-87 | 5.5.1 |
| **30** | 88-90 | 5.6.1 |
| **31** | 91-93 | 5.7.1 |
| **32** | 94-96 | 5.8.1 |

| | | |
|---|---|---|
| | | -To see these entries, click on the **?** in front of any particular **uid** listing which will expand its directory.<br>  <br>-After the directory is expanded, you will see these entries:<br>  <br>-If you desire to change any Zone/Group/Node address, click on the **BUS** entry, and change the address as appropriate.<br>  |
| DMX-4 | Proceed through standard RTI Programming. | In this case, you will not be programming ILC-100 or ILC-400 devices, so you can skip the ILC-100/400 section (**Steps DV-1 and DV-2**).<br><br>-Proceed to standard RTI Programming (**Steps 1** onwards above in the main body of this Integration Note).<br><br>Note: the e-Node/dmx takes care of everything else!!! |

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