CONVERGING SYSTEMS

Integration Note

Automation/Lighting Panel Manufacturer:	CRESTRON
Platforms:	**2-series** **3-series**
Versions:	VisionTools Pro-E (for GUI). V5.5.11 or later SIMPL Windows for processor programming). V4.02 or later
Specific Profile/Driver Version:	V2.00 or later (consolidated version for IP and Serial control using Telnet-Port 23). Note: UDP communication can be used using Port 4000 and 5000 if desired but not recommended.
Download location for Profile/Driver	Crestron Dealer Portal Note: current name is **Converging Systems eNode & IBT-100 ILC LED Control**
Document Revision Date:	June 1, 2016

OVERVIEW AND SUPPORTED FEATURES

The CRESTRON 2-Series and 3-Series platforms 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 CRESTRON 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[1]	CRESTRON Naming Convention[2]	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		✓	✓	N/A
DISSOLVE.3=XX		✓	✓	N/A
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 -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	Set LED Presets/RGB	✓	✓	✓

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.XXX.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 (TBD)				
Telnet Port 23 (standard)		✓	✓	✓
Telnet Login with Authentication (with e-Node		✓	✓	✓
UDP Port 4000/5000 (optional)		✓	✓	✓
Telnet Login without Authentication				

Notes:

***When needed, these can be implemented using dealer programmed serial strings user RAW CMD. See **Appendix 2** for more information.

1 Note these commands can be verified within SIMPL Windows, under Project Modules/Lighting and by selecting Converging Systems ILC LED Feedback Processor, and selecting Edit User Module

2These names can be selected or user names implemented instead.

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Motor Commands (in S-8:Serial I/O module-future delivery file TBD)

General Commands	CRESTRON Naming Convention	IMC-100	BRIC ("Bric Mode")	
General Motor Control Commands				
UP		✓	✓	
DOWN		✓	✓	
STOP		✓	✓	
RETRACT		✓	✓	
STORE,#		✓	✓	
RECALL,#		✓	✓	
PRESET.X=XX.XX				
Bi-Directional Commands				
STATUS=?				
POSITION=?				
Accessory Enode Command/Setup Parameters				
Verbose Mode		✓	x	✓
Telnet Login with Authentication (with e-Node		✓	✓	✓
UDP Port 4000/5000		✓	✓	✓
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)

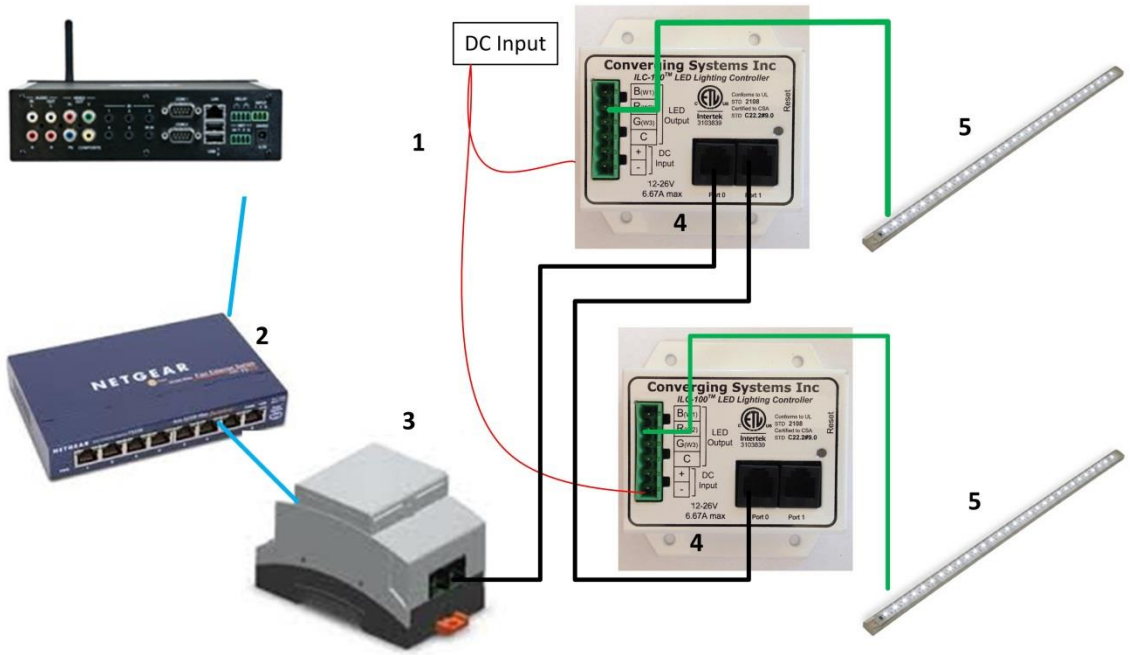

Figure 1

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 CRESTRON system = 254

BILL OF MATERIALS (for IP control)

#	Device	Manufacturer	Part Number	Protocol	Connector Type	Notes
1	CRESTRON 2-Series and 3-Series processors	CRESTRON	Various	Ethernet/USB	various	
2	Network Switch	Various	Various	Ethernet	RJ-45	
3	e-Node	Converging Systems	e-Node	Ethernet	RJ-45 (for Ethernet) RJ-25 for local bus	
4	Lighting Controller (or Motor	Converging Systems	ILC-100 or IMC-100 or (Stewart	CS-Bus protocol	RJ-25 for CS-Bus communication	Must terminate beginning

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	Controller)		BRIC)			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	

WIRING DIAGRAM (for RS-232 serial connection)

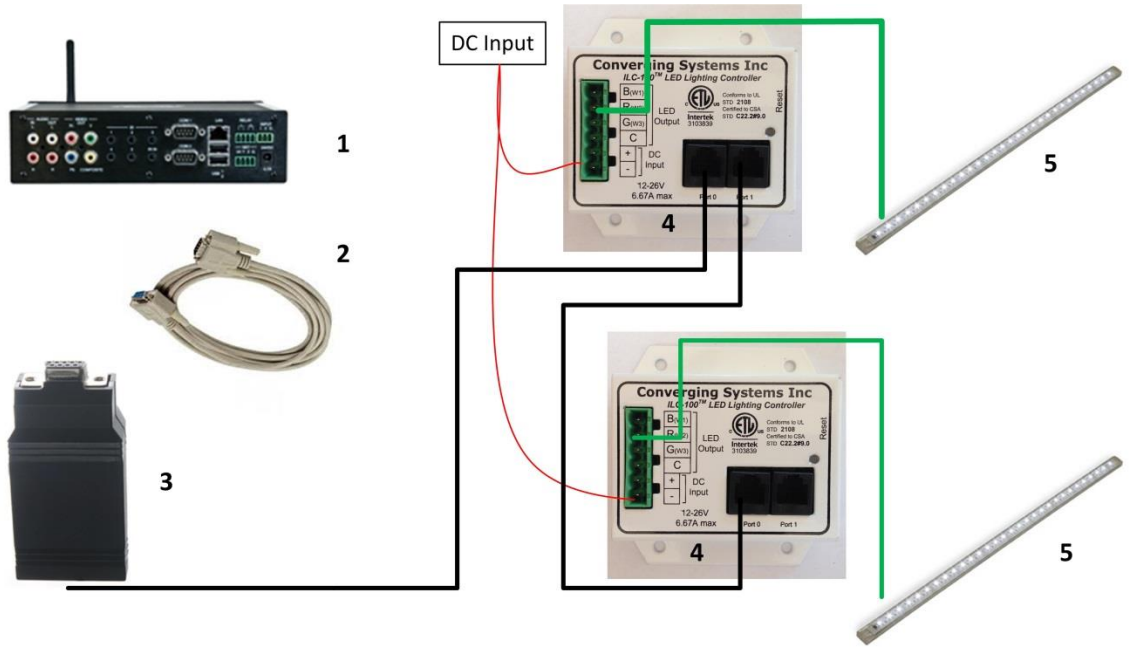

Figure 2

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 CRESTRON system = 254

BILL OF MATERIALS (for RS-232c connection)

#	Device	Manufacturer	Part Number	Protocol	Connector Type	Notes
1	CRESTRON 2-	CRESTRON	Various	Ethernet/Serial/IR	various	

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	series or 3-series processor					
2	DB-9F to DB-9M (CNSP-121) (optional if the IBT-100 is not able to be plugged into the Crestron processor directly)	CRESTRON	CNSP-121	RS-232c	DB-9 (for serial) DB-9F / DB-9M 1 / 2 / 2 Tx 3 / 3 Rx 4 / 5 / 5 G 6 / 7 / 8 / 9 /	
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 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 FLLA-RGBW-xxx		3-color 4 pin 4-color 5 pin 1-color 4 pin	

*Plug directly into processor or use straight DB9M to DB9F cable (item #2) between the Crestron processor and the IBT-100

System Configuration/Programming

Before proper operation between the Converging Systems' controllers and the CRESTRON 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 CRESTRON SIMPL Windows application are also required. Refer to the specified instructions below for the particular Crestron subsystem for more information.

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

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Background

The Converging Systems e-Node is an Ethernet communication device which can be used to connect the Crestron 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 Crestron processor in situations where Ethernet communication is not desired (but where bi-directional feedback is still required).

However, regardless of whether you desire to interface ***more than one*** lighting controller (or motor controller) each with its own controllable operation (i.e. its own **Z**one/**G**roup/**N**ode or **ZGN** address) with either the e-Node (Ethernet) or the IBT-100 (RS-232c communication), and/or you desire ***bi-directional communication/feedback*** between your user interface (UI) and a particular motor or lighting controller, **you must still follow the directions below under (i) e-Node Programming** and **(ii) ILC-100/ILC-400 Programming** in order to establish **unique ZGN address(es) for connected loads** and **turn on the NOTIFY command** which provides for that bi-directional communication.

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

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).

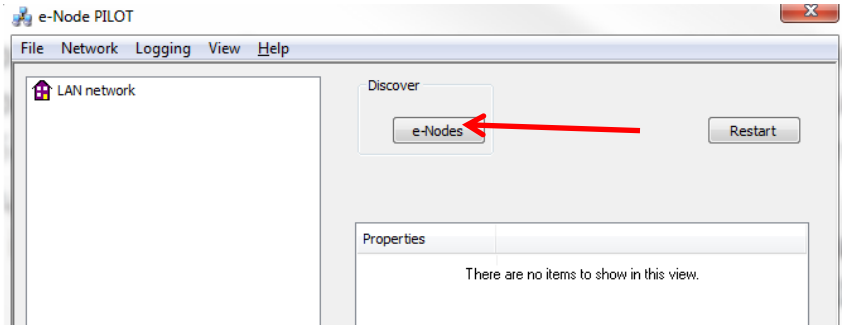
Recommended RJ-25 6P6C connections 6 wires		
e-Node Side	**ILC-x00 side**	**Color of wire**
Pin 1	**Pin 1**	**blue**
Pin 2	**Pin 2**	**Blue/white**
Pin 3	**Pin 3**	**Orange**
Pin 4	**Pin 4**	**Orange/white**
Pin 5	**Pin 5**	**Green**
Pin 6	**Pin 6**	**Green/white**

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 or to set-up specific loads (lighting or motor) with unique, non-zero, **Z**one/**G**roup/**N**ode or **ZGN** addresses.

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.  -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.

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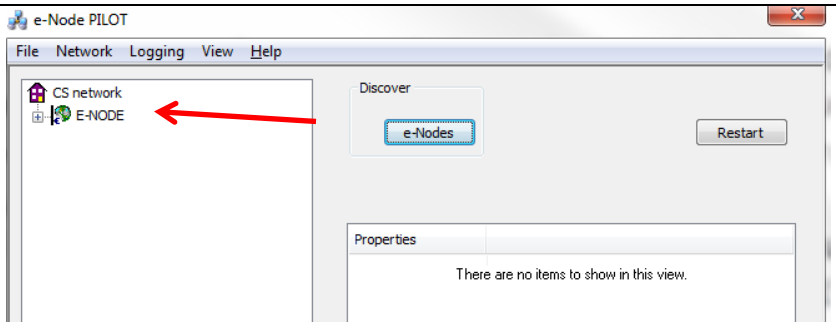
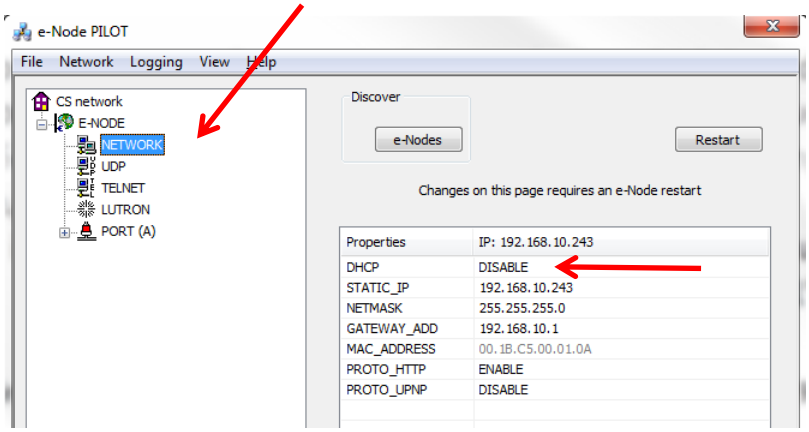
<table>
<tr>
<td></td>
<td></td>
<td>


-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:
<table>
<tr><td>STATIC_IP</td><td>xxx.xxx.xxx.xxx</td><td>Your new static IP 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>

-Note: It is recommended that only STATIC addressing be used with the CRESTRON processors.
</td>
</tr>
<tr>
<td>EN-2</td>
<td>TELNET Port (transmit and receive)

Note: Communication to the e-Node is also possible using UDP (Port xxx for Sending from Crestron and Port xxx for Receiving from Crestron). You may wish to select UDP is</td>
<td>Depending upon the functionality of the CRESTRON driver and the installer's specific settings, the suggested communication protocol between Crestron the e-node is Telnet Port 23 communication (with or 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 CRESTRON driver.

1) Select the View e-Node tab and select the Telnet tab. Set SERVER to ENABLE.

2) Login Settings.</td>
</tr>
</table>

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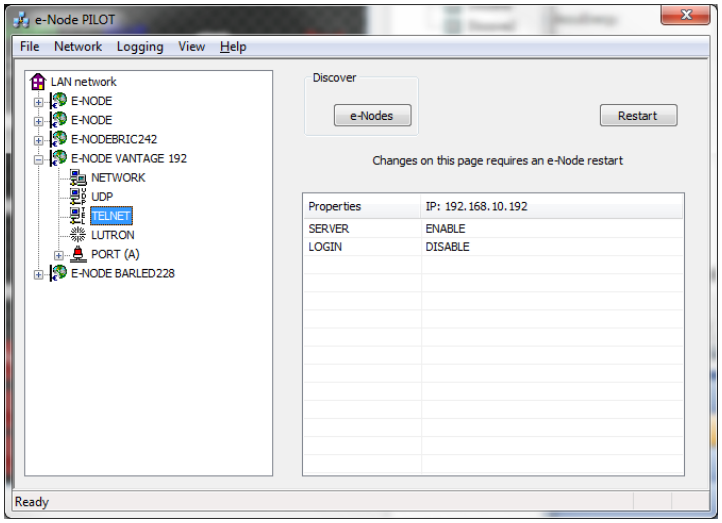
	the single TELNET SERVER port within the e-Node is being used for alternative purposes (another control system).	a) If Telnet communication with Login ***is supported***, set **LOGIN** to **ENABLE** and select the **Restart** button for the particular e-Node that you are utilizing to communicate with the CRESTRON system. b) If Telnet communication with Login is ***unsupported***, set **LOGIN** to **DISABLE** and select the **Restart** button for the particular e-Node that you are utilizing to communicate with the CRESTRON system. 
EN-3	Notify Mode	The CRESTRON software is able to intelligently poll the Converging System's Intelligent Lighting Controllers (either through the e-Node IP device or the IBT-100 serial device). That polling frequency is set within the Crestron driver. Alternatively, Converging Systems' has an auto notify facility which is able to transmit status messages only after a state change, in HSB/HSL mode, RGB mode or both. Depending upon your particular needs, you may wish to silence the e-Node's NOTIFY logic in order to reduce bus traffic. However, by enabling the NOTIFY logic, greater responsiveness is assured to CRESTRON sliders. 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 **OFF.** This will prevent the selected controller from broadcasting its status after every state change therefore reducing CS-Bus traffic.

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		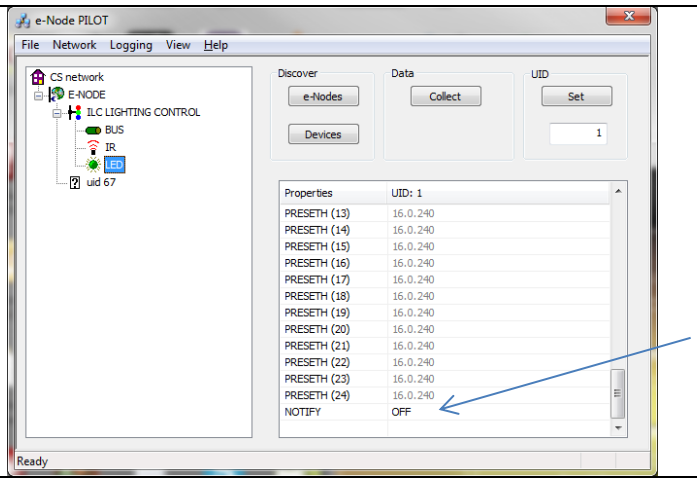

IBT-100 Programming

All of the communication parameters to support the IBT-100 are built into the Crestron IBT-100 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 Crestron 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 CRESTRON 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 CRESTRON systems. ***Therefore, it is advisable to set up a non-zero address for each ILC-x00 controller that is connected to***

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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.)

For newer versions of the e-Node/MKIII, the process to discovery devices has become more streamlined. Refer to the appropriate section below for your specific version of e-Node.

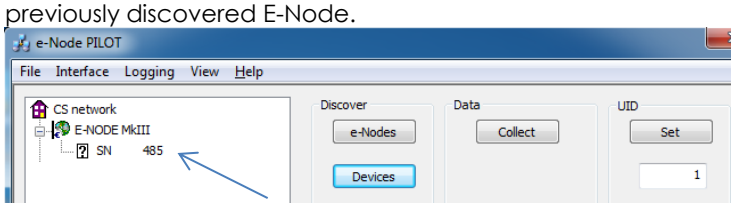
Note: e-Node MKIII has 2 RJ-25 ports and 1 RJ-45 port on the communication side of the controller while the MKII version has just 2 RJ-25 ports

MKIII e-Nodes utilizing new SN discovery

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) Next select the **Devices** button and all compatible ILC-x00 controllers will instantly appear with their SN under the previously discovered E-Node.



(4) Next, (i) assign an unused **UID** (unique ID) to the ILC device to be addressed (generally start with the UID value of "1" and work up sequentially) and enter this number into the UID window, then (ii) **highlight the e-Node** to which the device is connected, then (iii) **select the device with SN** displayed and then (iv) select "**SET**." The initial ILC device with a SN "name" will be updated to a programmed **UID n** entry.

Note: If your device **does not** have SN Addressing, proceed to the standard UID Discovery process detailed under MKII e-Nodes below.

Warning: ***Make sure all control systems are powered off during this process for they may be issuing similar beacons on the bus which will interfere with this process.***

(5) 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.

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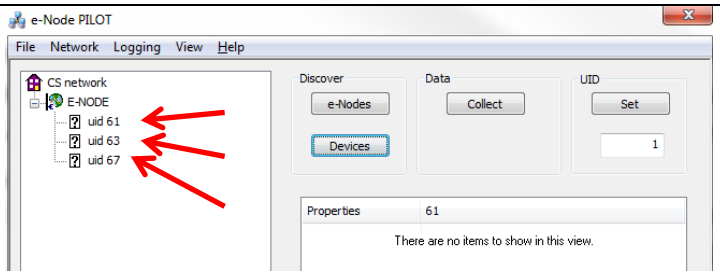
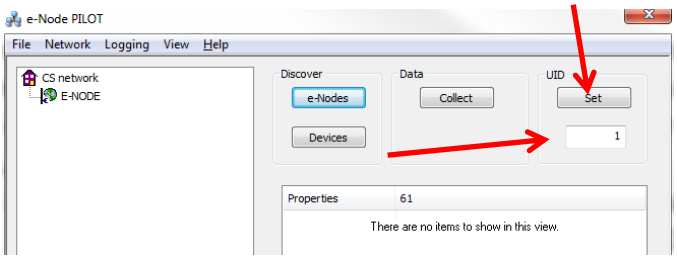


MKII e-Nodes utilizing standard UID/reset button discovery processs.

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.

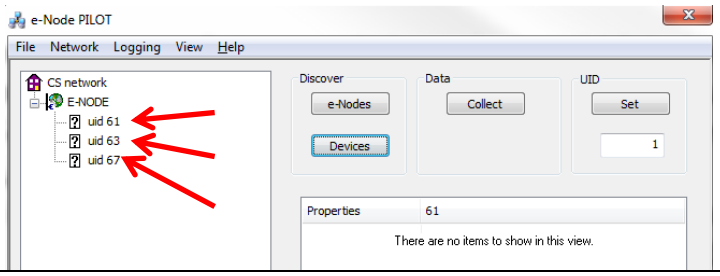
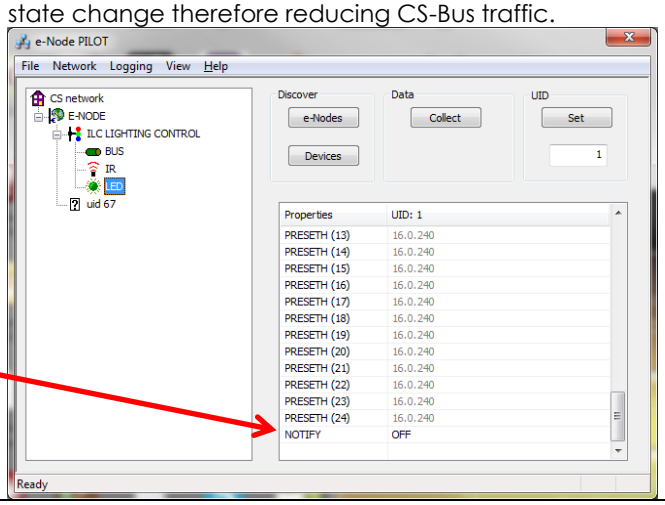
(3) Now, under the **UID** window, select and enter a unique UID number/address (good to start with 1 and work upwards but never use a duplicate number) and select **Set**.



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.

- **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 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

		-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.** The Converging Systems' lighting controller have a unique new feature called **NOTIFY**, which automatically transmits color state data back to the CRESTRON 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 recommended that one of these **NOTIFY** functions is utilized in any integration with CRESTRON'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

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CRESTRON Programming

Below is a summary of those steps required to integrate 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 CRESTRON commissioning software.

1. **Start new SIMPL program in preparation of importing Converging Systems Intelligent Lighting Controller into your project (uses SIMPL Windows app)**

   Note: At this point you may wish to download and review the Converging Systems/Crestron provided sample project available on the Converging Systems website identified as **Sample Project**. This can be found at http://www.convergingsystems.com/inres_crestron.htm

   This Sample Project provides both LED and motor control for the TSW-750 and X-Panel for one ILC-100 controller with Z/G/N address 2.1.1 as well as nominal control of secondary ILC-100 controllers (ZGN of 2.1.2 and 2.1.3) as well as a motor controller (ZGN 1.1.x).

   Converging Systems can make no warranties as to the correctness of the demo program but many dealers have found the sample Project to be very useful as a good start.

Step #	Step Overview	Detail
1a	Open new SIMPL program.	Select **New SIMPL Program** under the **File** Menu in SIMPL
1b	Provide System Name and other Applicable information	Fill in appropriate information

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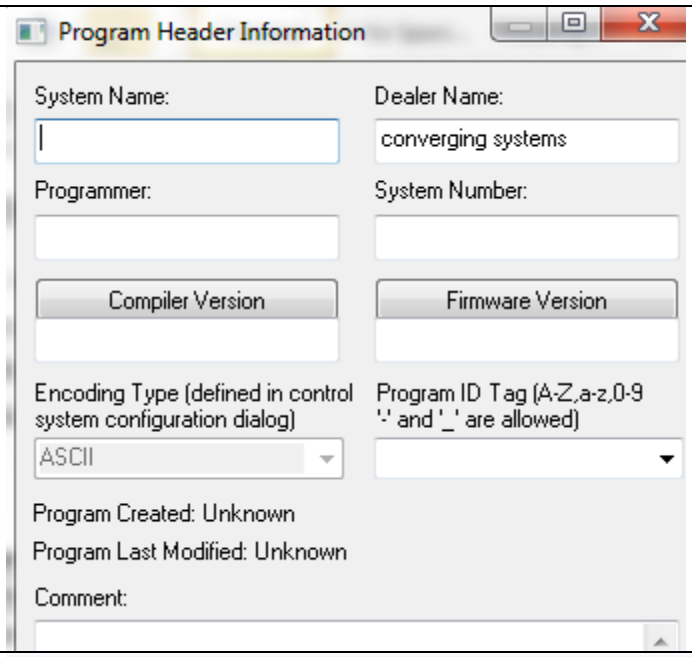
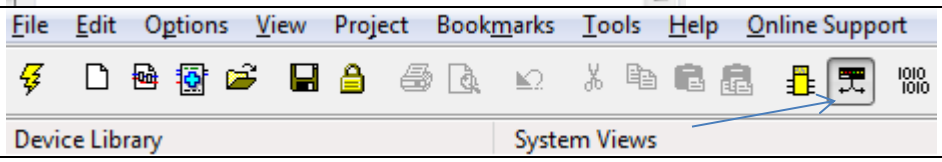
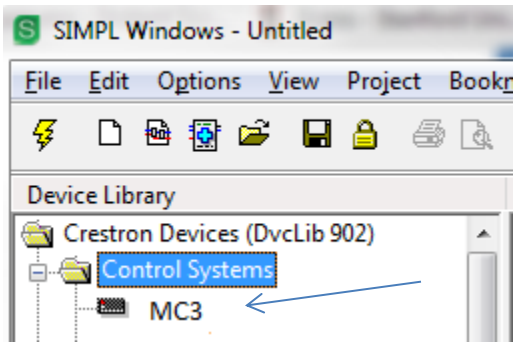
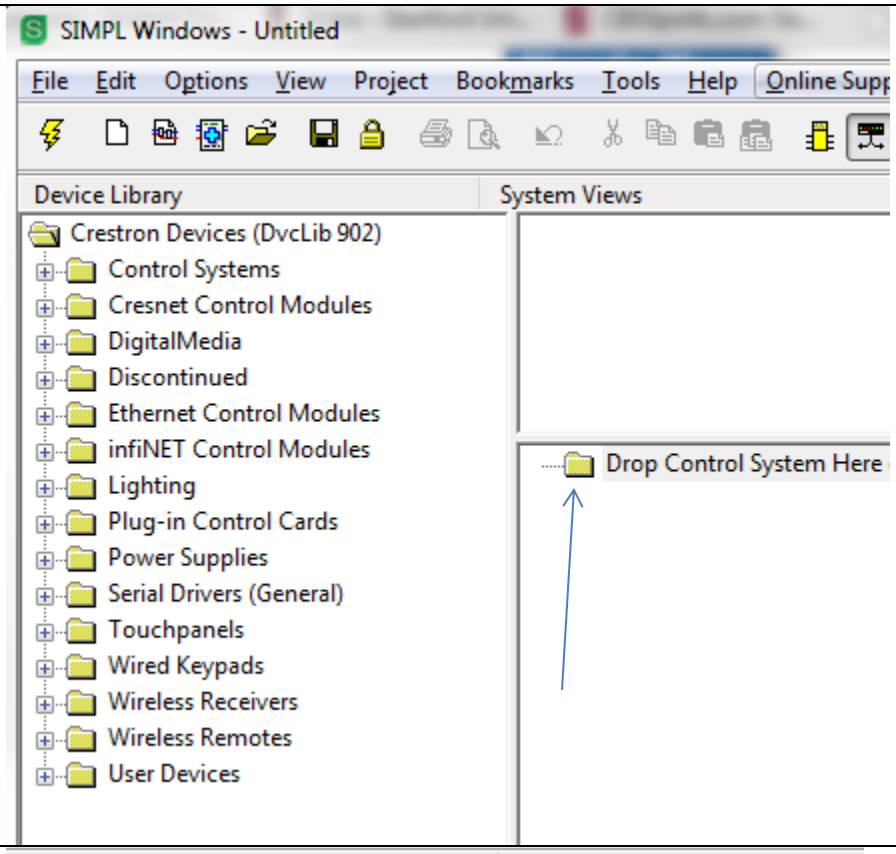
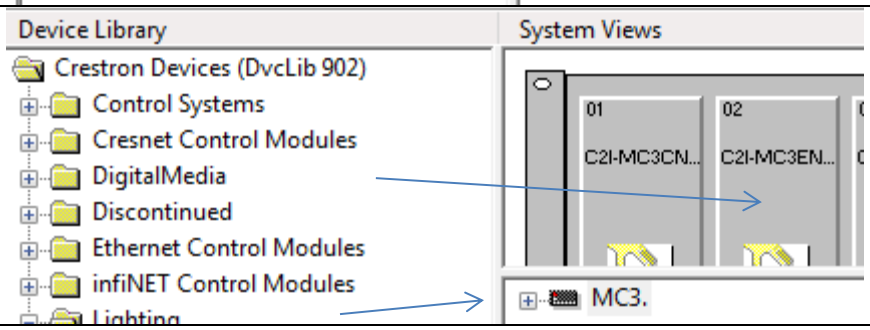
		
1c	Select **Device Library** icon	
1d	Select your **Crestron processor**	In this case the MC3 processor is being selected. Other 2-series or 3-series processors can be selected alternatively for your particular installation. 

1e	Now drag that processor on top of the **icon** to the left of the "Drop Control System" text	
1f	Within **System Views** that processor should appear in the ***bottom window*** as well as a pictorial of various Slots or physical connections available in the ***top window***	
1g	Select the applicable slot where the interfaces will be added	Determine the applicable card slot (in this case **Slot 2**) or network ID in **the Tree View** where your particular hardware devices will be connected. In this example, we are going to add (i) one Ethernet-type touchscreen, (ii) one X-Panel, and (iii) one e-Node (using TCP/IP). **Note**: if we wanted to add the e-Node as a serial device, it would be added to the appropriate Serial slot. See **Appendix 4** for more information.

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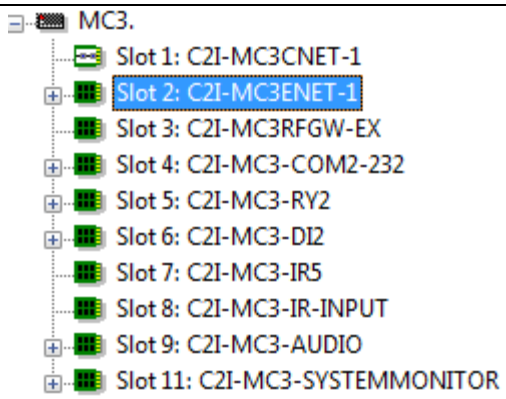
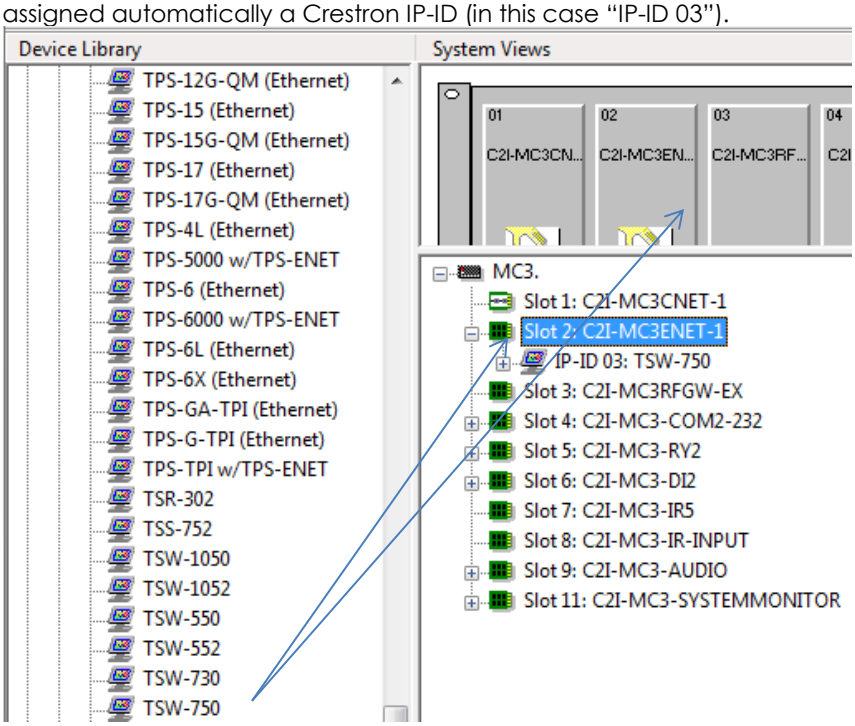
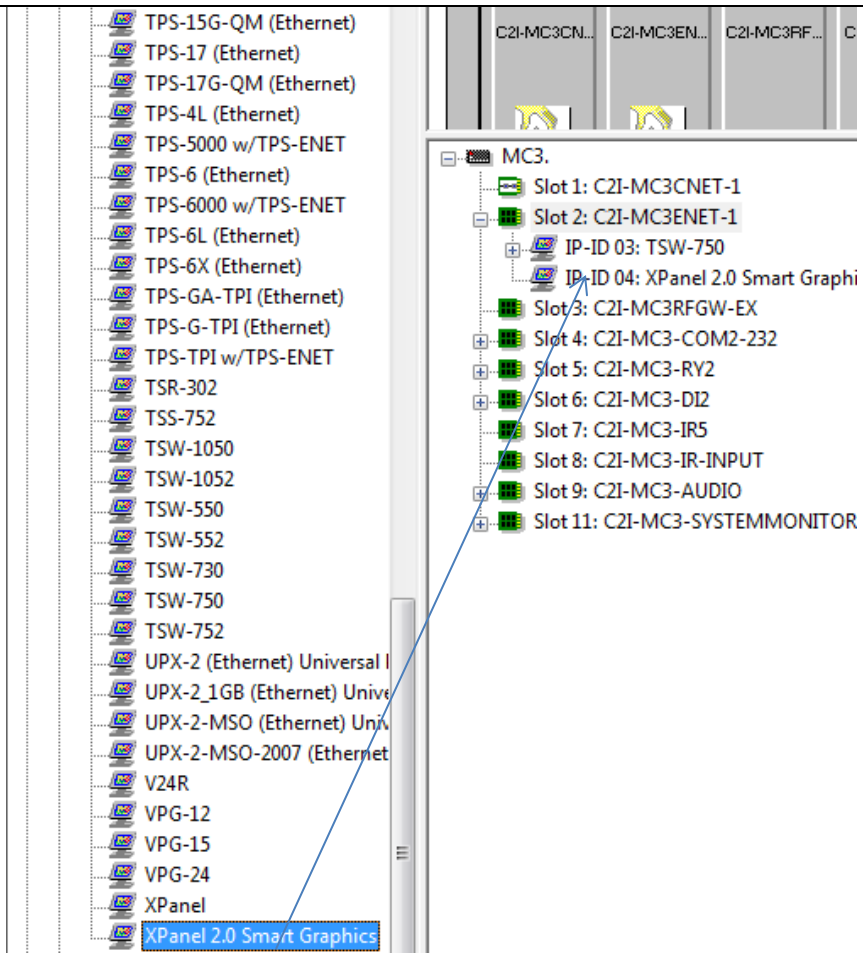
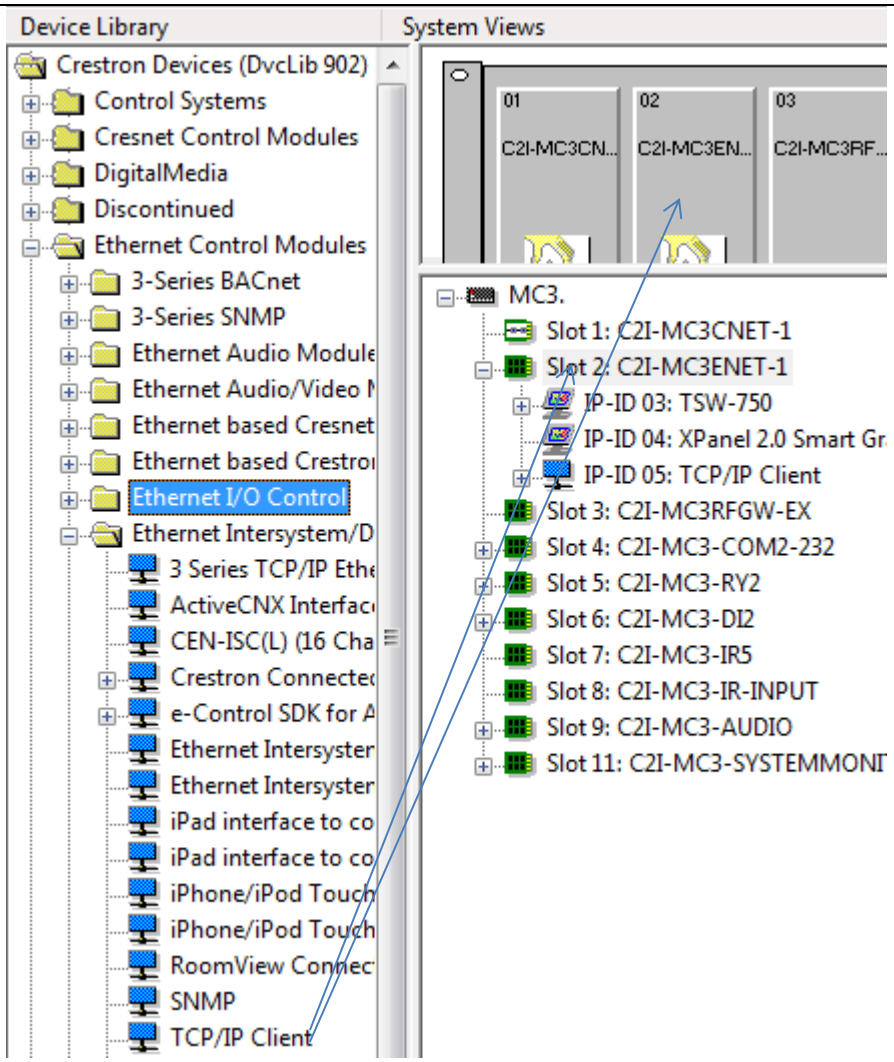
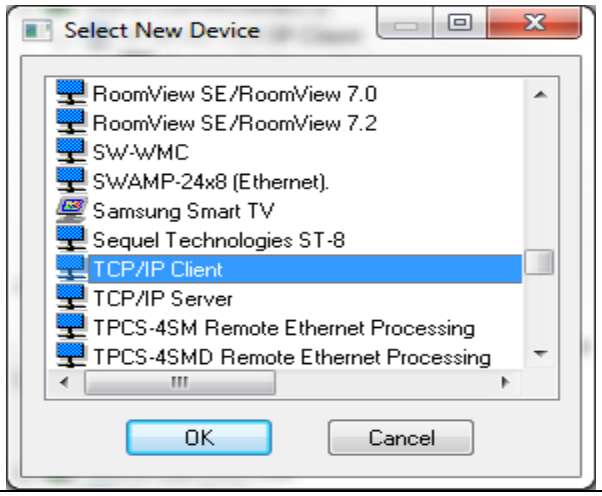
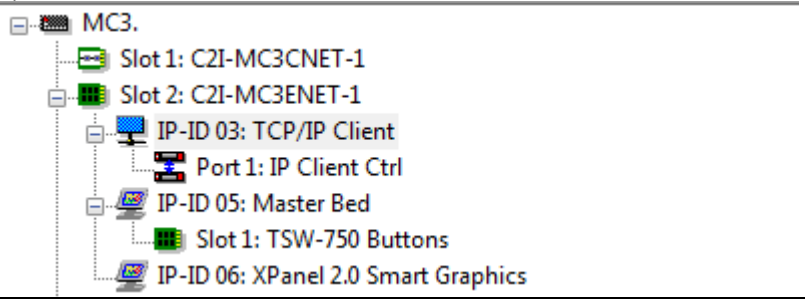
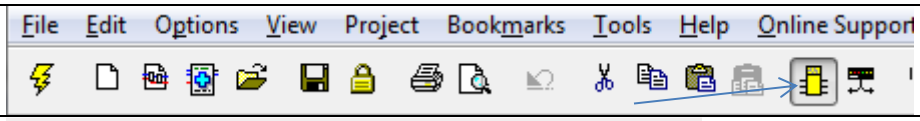
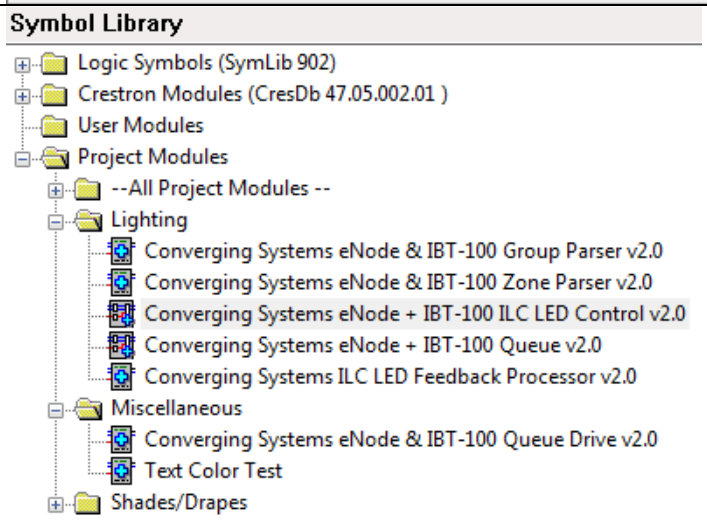
		
1h	First, let us add a touchscreen	Select the TSW-750 from the Device Library, category entitled **Touchpanels/Touchpanels (Ethernet**) and drag that model number (TSW-750) onto of the selected slots (Slot 2), either graphical view or text view. This device will be assigned automatically a Crestron IP-ID (in this case "IP-ID 03"). 
1i	Next, add an X-Panel	Select the XPanel 2.0 Smart Graphics from the Device Library category entitled **Touchpanels/Touchpanels (Ethernet)** and drag that model number onto of the selected slot (**Slot 2**), either graphical view or text view. This device will be assigned automatically a Crestron IP-ID (in this case "IP-ID 04").

		
1j	Finally, since we are adding the e-Node which is an Ethernet Device, we need to add the provision to communicate with that device using a TCP/IP Client	Select the **TCP/IP** client from either (i) the **Ethernet Control Modules/Ethernet Intersystems/Device Communication** library or(ii) a menu pull down which can be exposed by right clicking on the applicable Ethernet slot (in this case Slot #2) and scrolling down until to find that same entry and selecting it. This device will be assigned automatically a Crestron IP-ID (in this case "IP-ID 05"). Note: this IP-ID will be used later when the e-Node is "linked" to the Crestron system (see Section 3).

		 Or 
1k	Final Slot configuration	After the above Ethernet devices have been added to Slot #2, here is what the

	with IP-ID entries	System Views will indicate. 

2. Import Converging Systems Intelligent Lighting Controller into your project

Step #	Step Overview	Detail
2a	Select **Program View**	
2b	Import **Converging Systems Intelligent Lighting Controller** into your system file within the CRESTRON Controller. If you do not have this driver in your existing library, go to the CRESTRON Dealer portal and download the latest Converging Systems' driver. These modules will appear in the **SPIsWork** subdirectory in the sample project. **Note**: Make sure you download latest version from the CRESTRON library.	

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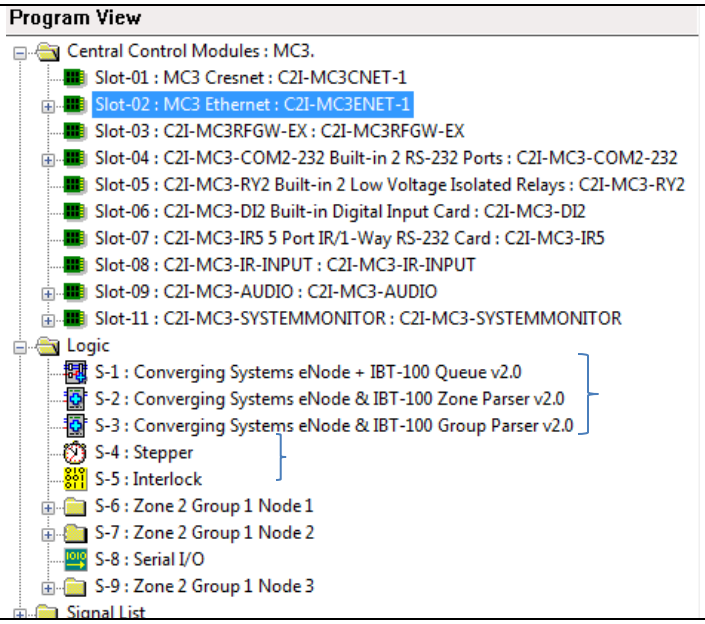
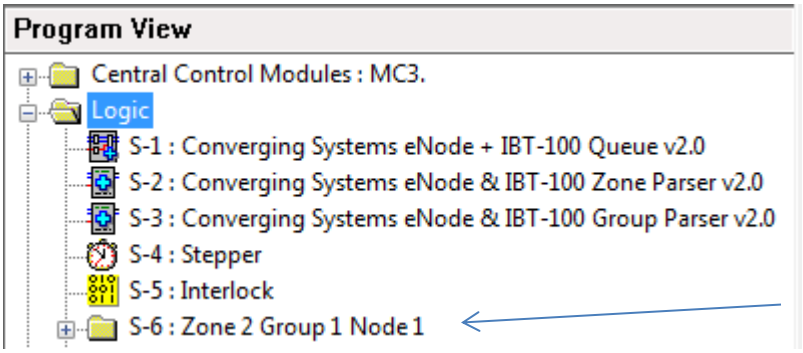
2c	After you have added the **Converging Systems eNode & IBT Driver package** into your project, you should see some of **Logic** entries (Queue, Parser, Stepper, etc.) within **Program View**.	
2d	Add additional symbols for additional ILC-100 controllers.	Determine how many additional loads (other instances of the instance Symbol) that you wish to populate. First, click on the symbol for the first instance of the Converging Systems eNode +IBT ILC LED controller.  Next, select the **Copy** icon  then place your mouse on the **Logic** entry, and select **Paste Special**  . -Within the **Paste Special** pop-up, select how many more loads (Symbols) you want to have duplicated from the pull-down. -Check mark the increment **Signal Names**. -Choose the **Last** Numeric Component to Increment, and **Accep**t all of the Increment settings (**Inputs**, **Outputs**, **Parameters**, and **Symbol Comment** and hit **OK**. -The effect of this procedure is to create the required number of additional loads (Symbols) for your particular project. This automatic procedure works very nicely when you want to preserve the same **Zone** number and the same **Group** Number and just increment the **Node**. Here is an example of four loads (ILC-100) which have been added (Nodes 2,3,4,5) in addition to the initial **Symbo**l populated (Node=1).

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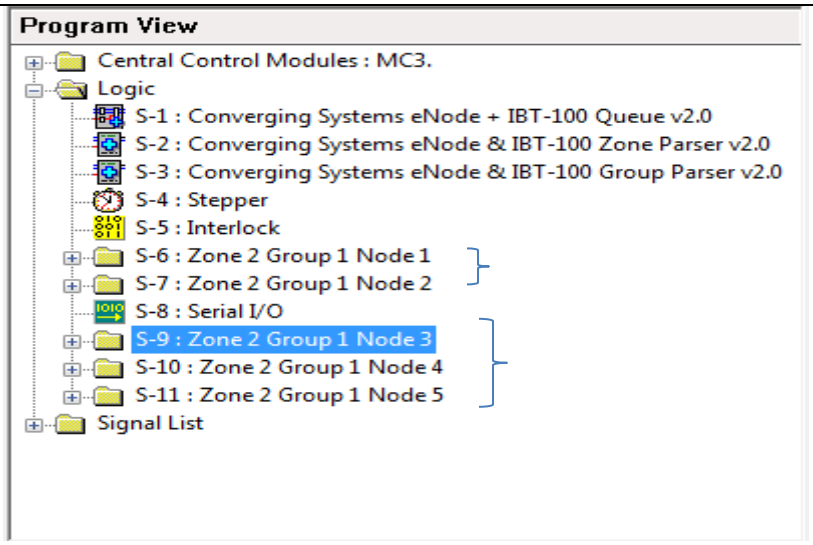
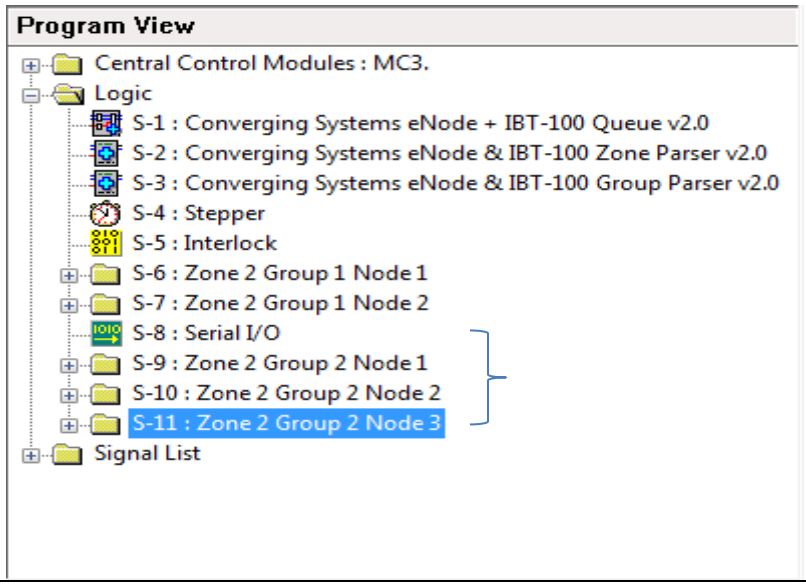
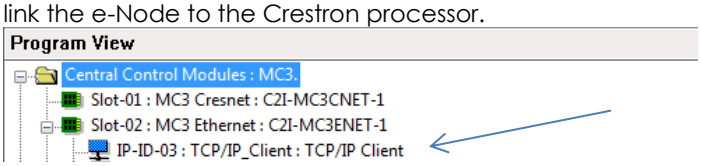
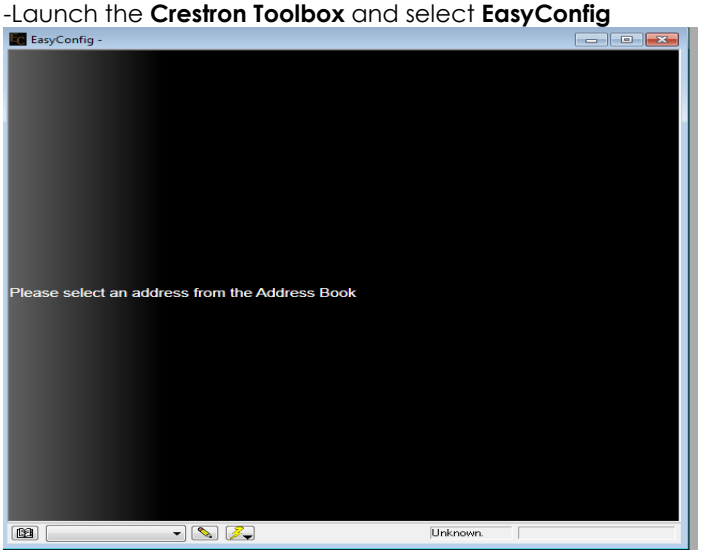
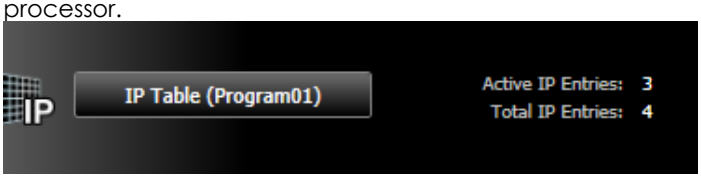


-In some situations you may want a new set of **Group** or **Zone** numbers, rather than just increment the **Node** numbers. The easiest way to faciliate this type of auto increment is to use the **Search and Replace** (**F9**) function which allows you to copy the signals from one area of a panel to another area. Then use the **Search and Replace** function to set whatever **Zone** or **Group** numbers you desire. Here is an example of three loads (ILC-100) which have been added as **Group 2** devices (**Nodes** 1,2,3).



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

Step #	Step Overview	Detail
3a	Set-up communication parameters for the Converging Systems interface (**IBT-100 serial**	Determine what will be the communication linkage that you will use to connect to the Converging Systems' device.

	device or **e-Node IP device**) that will be used with one or more Intelligent Lighting Controller within **Connection Settings tab**	-If using IP/ Ethernet control (**TCP/IP** Client communication from Crestron) to the e-Node, proceed to **Step 3b** below. -If using Serial (IBT-100) control (**RS-232** Client communication from Crestron) to the IBT-100, proceed to **Step 3f** below.
Directions Relating Specifically to IP Control for the e-Node		
3b	Link the targeted e-Node to the appropriate Crestron **IP-ID.**	It is preferable to set up the e-Node with a Static Address which is on the same subnet as the Crestron processor. -Within Program View, verify the **IP-ID** assigned to the TCP/IP Client. You will need to remember this number when you link the e-Node to the Crestron processor.  -Launch the **Crestron Toolbox** and select **EasyConfig**  **Note:** If the **EasyConfig** asks you for the "address from the Address book" open the blank window at the bottom of this screen and select your Crestron processor's address. -Next, select the **IP Table** tab in order to make the device connection between the e-Node and the Crestron processor.  -Once the **IP Table Setup** launches, select the **Add Entry**

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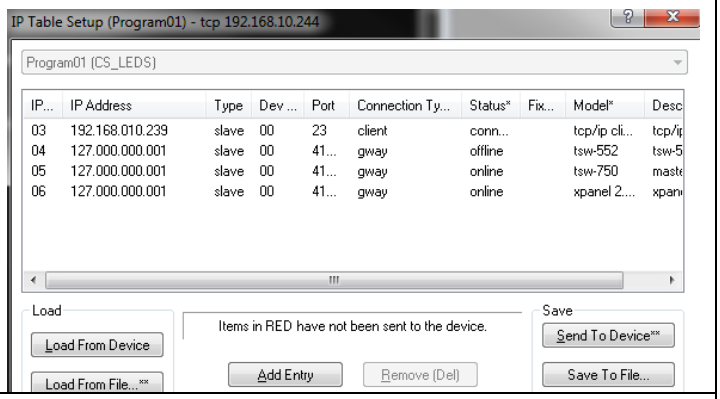
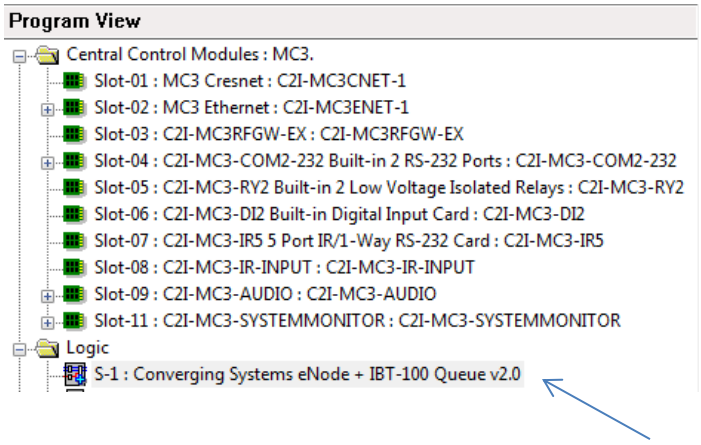
		button and enter the **IP address** for the targeted e-Node and select the appropriate **IP ID** and click OK (note in our example the IP-ID address is IP-ID 03. 
3c	Set up Telnet User Name and Telnet Password	Open the Converging Systems eNode + IBT-100 **Queue** component, and set the **Telnet User name** and **Telnet Password** within the **Detail tab**  Within the **Detail View**, set the applicable user names and password for your-eNode as established through the e-Node Pilot application. The default names from Converging Systems are Username **E-NODE** Password **ADMIN** (these are case sensitive)

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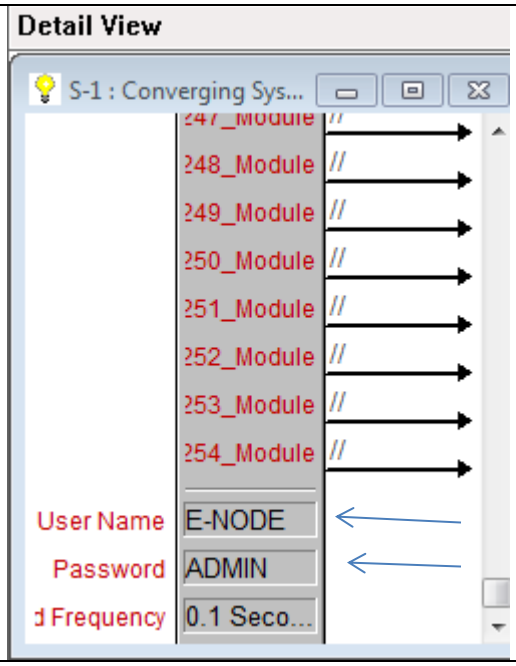
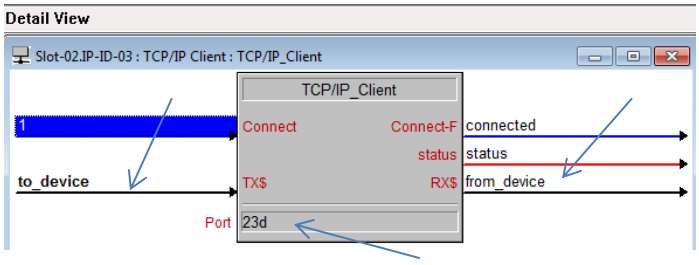
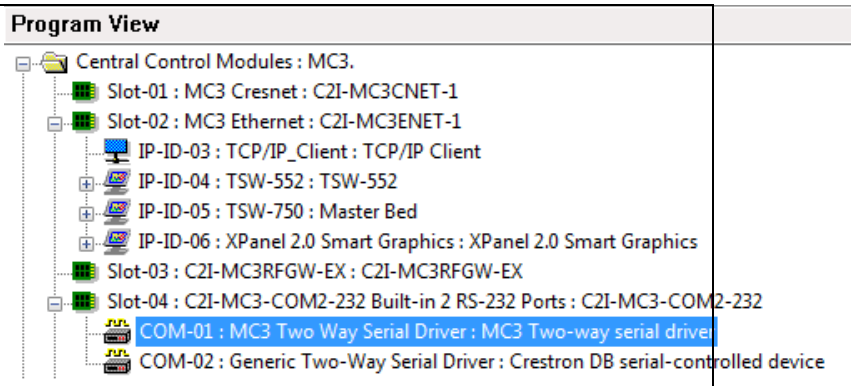
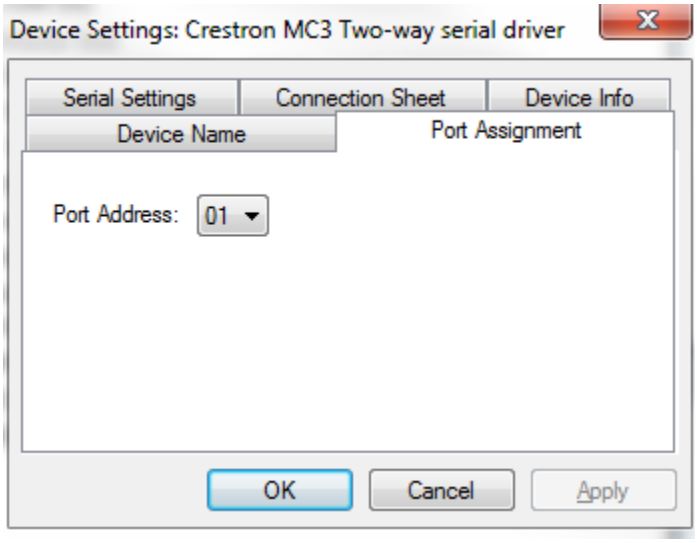
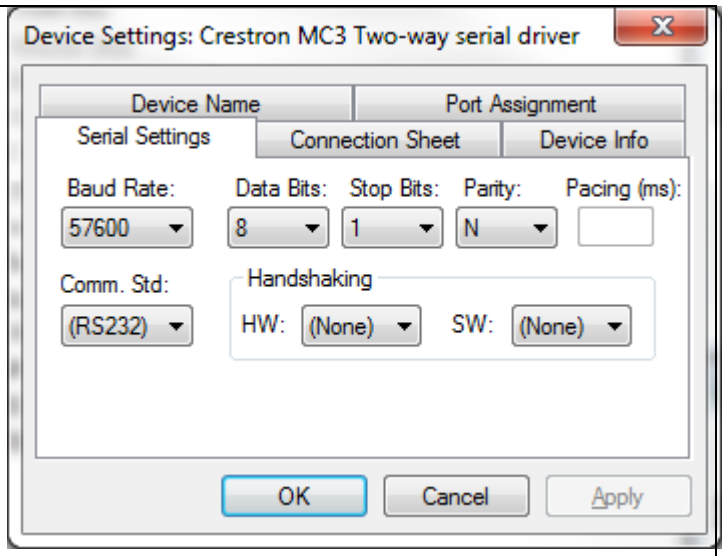
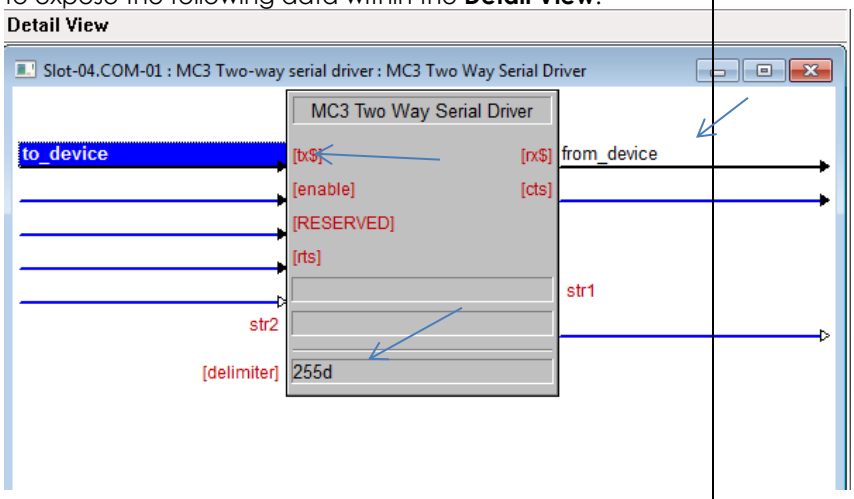
<table>
<tr><td></td><td></td><td> 
</td></tr>
<tr><td>3d</td><td>Connect the Signals from the Crestron Processor to the Converging Systems e-Node Ethernet interface adapter.</td><td>Double click on the IP-ID entry under the applicable Ethernet Slot for the TCP_Client that will be used to communicate with the e-Node to expose the following data within the Detail View.
 

Program the signals as follows:
<table><tr><td>TX$</td><td>to_device</td></tr><tr><td>RX$</td><td>from_device</td></tr><tr><td>Port</td><td>23</td></tr></table></td></tr>
<tr><td>3e</td><td></td><td>Now, proceed to Step 3i below</td></tr>
<tr><td colspan="3">Directions Relating Specifically to RS-232c Control using the IBT-100</td></tr>
<tr><td>3f</td><td>Link the targeted IBT-100 (which provides the RS-232c connectivity between the Crestron processor and the Converging Systems controllers (lighting or motor).</td><td>In Program View, select an unused Crestron “Built-in RS-232 Port” to be purposed to communicate with the IBT-100.

In our case, pick the Two-Way Serial Driver:</td></tr>
</table>

		
3g	Configure the Crestron Serial Port to communicate with the IBT-100 interface.	Right click on the above Serial Port (COM-01 in this case), and select **Configure Device**. The following pop-up should appear. If not, select the **Port Assignment** tab to reveal this pop-up.  Confirm that the Port Address is set the serial port to which you will have the IBT-100 connected. If you need to change the default, make that change and select **Apply** and the **OK.** Next, select the **Serial Settings** Tab to expose this window:

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


Set the communication parameters by selecting Serial Settings and fill in the data fields with the following information:
<table>
<tr><td>Baud Rate</td><td>57600</td></tr>
<tr><td>Data Bits</td><td>8</td></tr>
<tr><td>Stop Bits</td><td>1</td></tr>
<tr><td>Parity</td><td>N</td></tr>
<tr><td>Comm. Std.</td><td>RS232</td></tr>
<tr><td>Handshaking</td><td>(None)</td></tr>
<tr><td>SW</td><td>(None)</td></tr>
</table>
Select Apply and the OK.
</td>
</tr>
<tr>
<td>3g</td>
<td>Connect the Signals from the Crestron Processor to the Converging Systems IBT-100 serial interface adapter.</td>
<td>
Double clock on the Com Port customized above in Step 3f, to expose the following data within the Detail View.


Program the signals as follows:
</td>
</tr>
</table>

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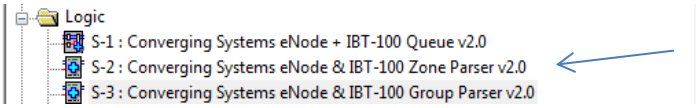
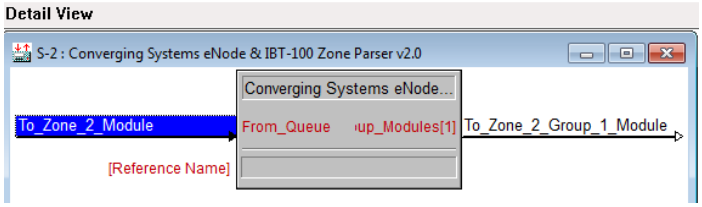
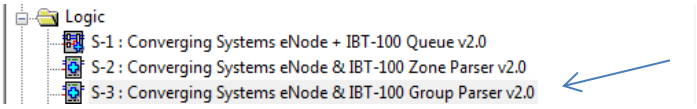
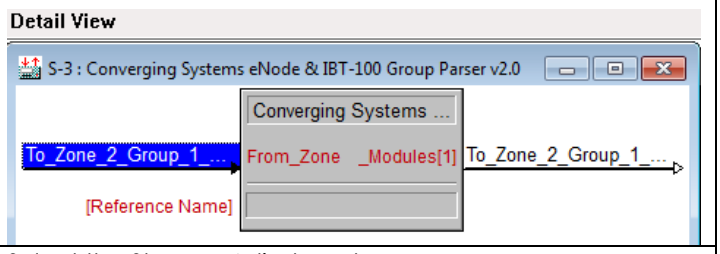
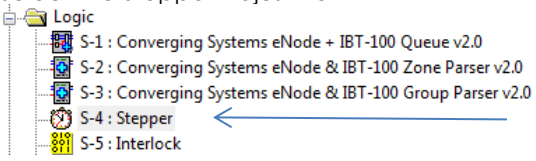
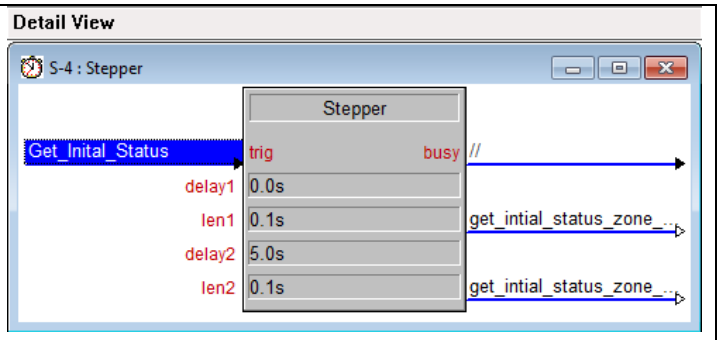
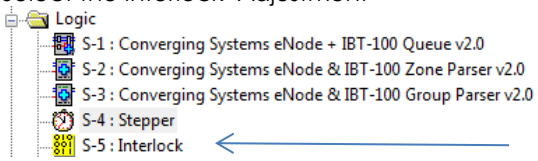
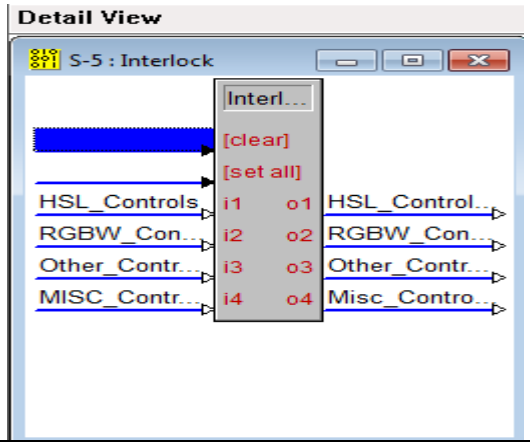
			[tx$]	**to_device**
			[rx$]	**from_device**
			[delimeter]	**255d**
3h	Proceed to next Section	Now proceed to the next section (**3i**) "***General Directions after Communication is wet with applicable interface (e-Node or IBT-100***)"		

General Directions after Communication is Set with Applicable Interface (e-Node or IBT-100)		
3i	Depending upon how many Zones of ILC-100 controllers you anticipate, expand the universe in the Zone Parser (TBD)	Select the Zone Parser  And expand it to alter the number of Zones to be searched. 
3j	Depending upon how many Groups of ILC-100 controllers you anticipate, expand the universe in the **Group Parser** (TBD)	Select the Group Parser  And expand it to alter the number of Groups to be searched. 
3k	Stepper Adjustment (TBD)	Select the Stepper Adjustment  And expand it to make the appropriate adjustment.

		
3l	Interlock Adjustment (TBD)	Select the Interlock Adjustment  And expand it to make the appropriate adjustment. 

4. Now, add Tasks or Macro to a specific button push or action (uses VisionTools Pro-e app)

Step #	Step Overview	Detail

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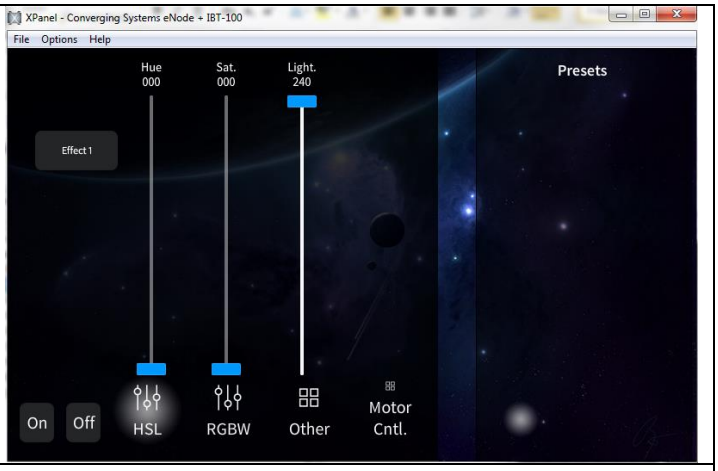
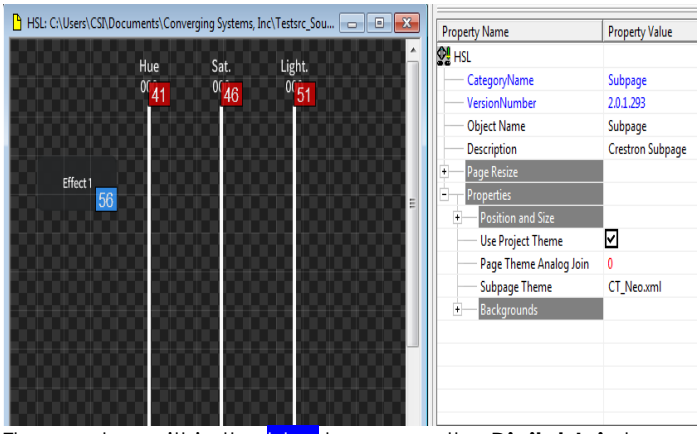
4a	You can create a user interface (UI) for your system that is suited to your customer's requirements. This **Integration Note** will not focus on the creation of unique pages for your particular project, but as a resource, a sample project with professionally created UI pages is available from the CRESTRON website and accompanies the CRESTRON customized Driver for Converging Systems. ***It is suggested that you open this CRESTRON developed system at this point.***	
4b	You can right click on any page on the sample UI within the **VisionTools Pro-e** project and review the programming behind any integrated button or slider.	 The number within the blue boxes are the **Digital Join** keys and the number within the red boxes are **Touch Feedback Analog Join** keys. **Digital Join** keys related to particular actions that are trigger upon the selection of a specific button, while the **Touch Feedback Analog Join** keys are special bi-directional feedback operators.
4c	It is important that for new buttons that you may wish to add that there is an existing **Digital Join** operation already programmed within **SIMPL Windows** for that particular operation. Note: ***If such an operation is not already programmed, then it must be programmed and downloaded into your Crestron processor in order for the operation to work from a button push on a user interface.***	To see exactly what action is related to any **Digital Join** key, follow the directions within this step: -open SIMPL Windows project -Select Program View  -Under the **Program View**, double click on the applicable user interface programming for the screen that you are reviewing (in this case it is the **X-Panel 2.0 Smart Graphics)** and find the following information under **Detail View**.

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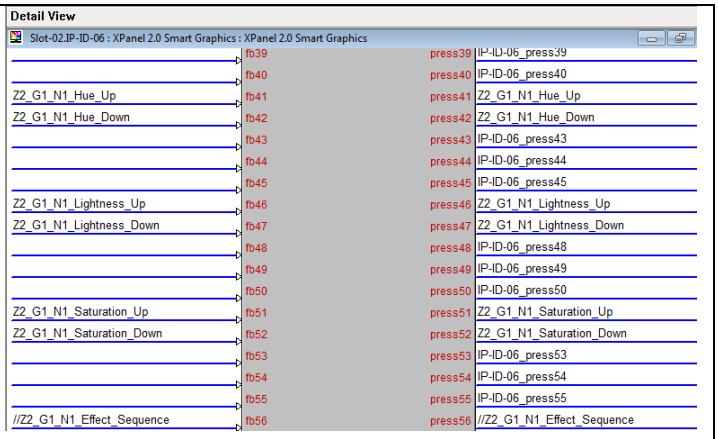
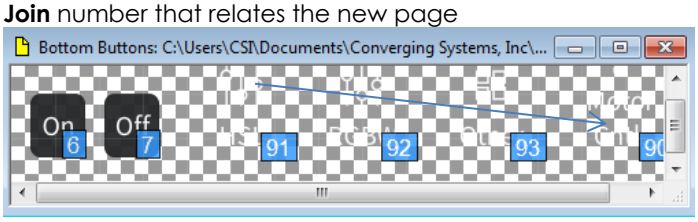
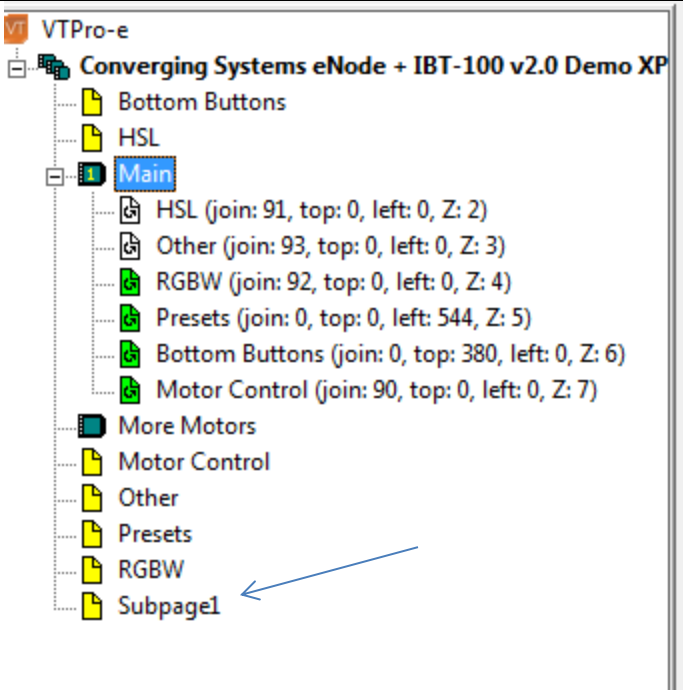
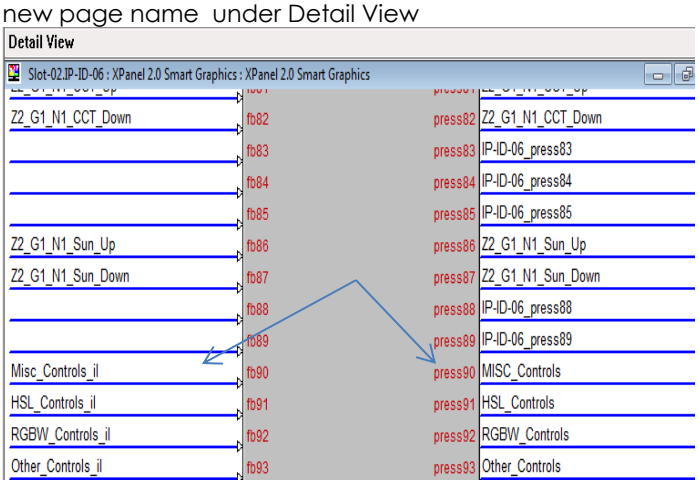
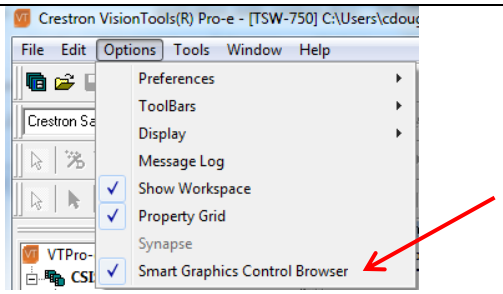
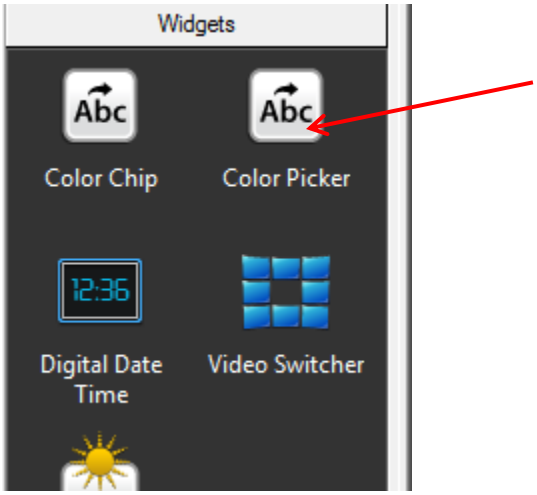
		 Note: In the above example in Step xx, the **Digital Join** key of 56 for Effect 1, relates to the logic shown above.
4d	Now let us add a new button for a command that already appears in the **Detail View** shown above.	In **VisionTools Pro-E**, open up the **Buttons library** and select a **Button** and drag it over the HSL page where you wish it to be located.
4e	Now let us customize that button	Click on the new button location which will launch the **Property** window. At minimum, add a **Label** and enter a **Press Digital Join number relating to those programmed operations in 4c above.**
4f	Add a new page if desired	-In the **Project View** window, go to the **Bottom Buttons** or similar screen and add a new button with a **Press Digital Join** number that relates the new page  -In the **Project View** window, add a new **Subpage** as applicable, populating that page with new buttons.

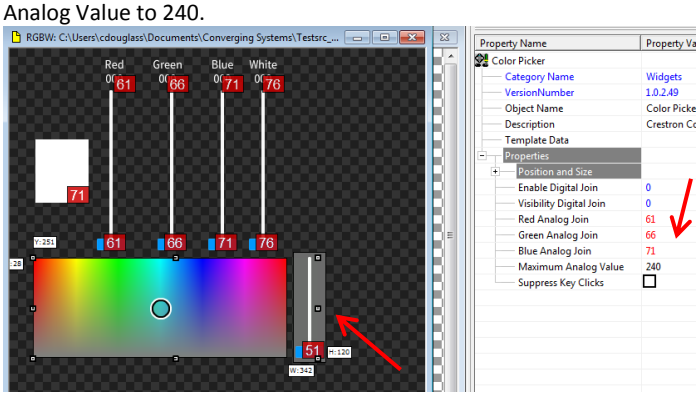
		 **-**In the SIMP Windows program, you may need to entera a new page name under Detail View  -In the **VisionTools Project View** window, under the Main tab, click on the new **Subpage** and provide it with a **Visibility Digital Join** key that matches the recently added entry in the Detail View above (i.e. 90 in this case).
4g	Implement a Crestron Smart Graphic Object (like a cool color picker)	-From the **VisonTools Options** window, checkmark the **Smart Graphics Object Browser**



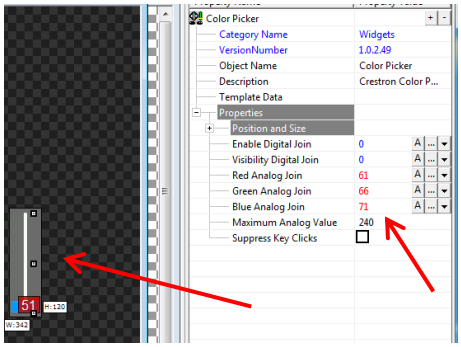
-From the widget category, select the Color Picker and drag it onto a new or existing page.



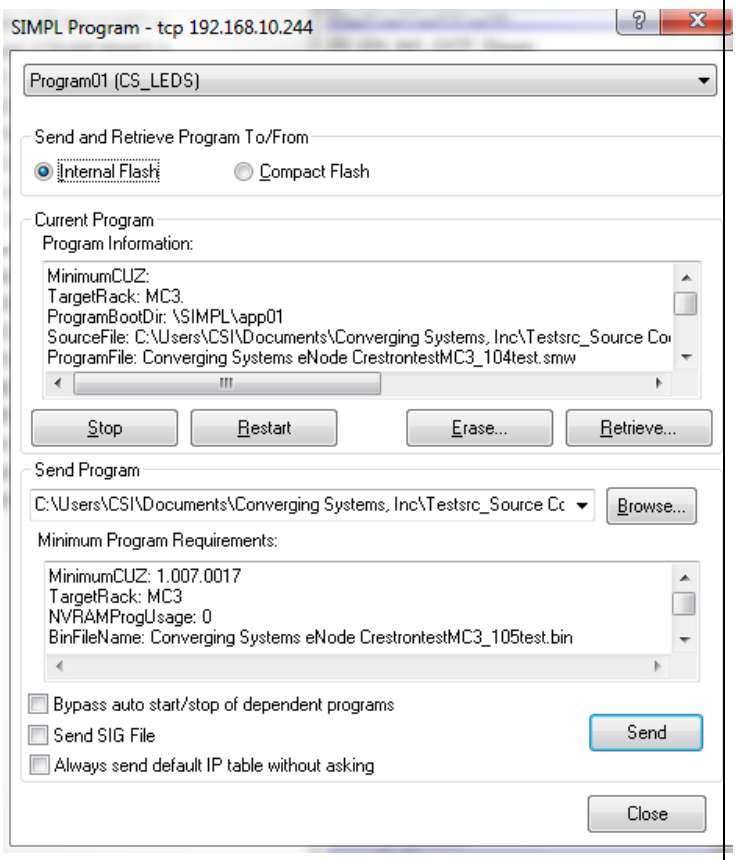
-Assign the **Red**, **Green** and **Blue** digital joins to the appropriate value selected above when you created R/G/B sliders. Set the Maximum Analog Value to 240.

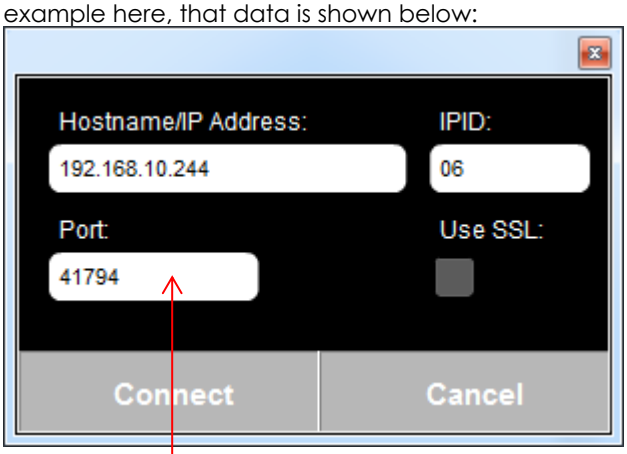
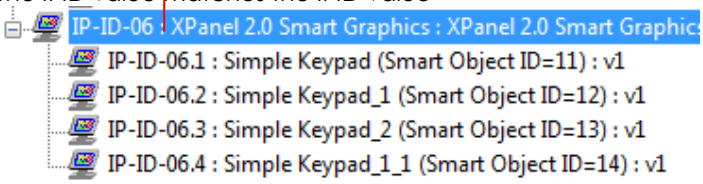
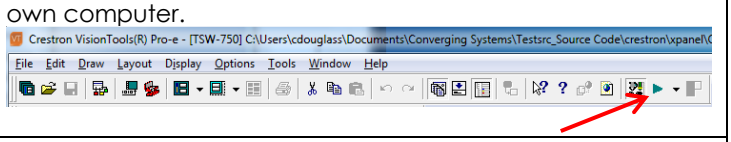


-You will notice that to the right of the color picker is a Crestron slider that was initially developed for an alternative piece of technology that lacks advanced color science functionality present in the Converging Systems ILC-x00 controller family. That default vertical slider only has the capability of sending our FADE levels as a percentage of R/G/B values which is an inaccurate method of Fading a color to black without hue shifts. (Simply lowering **RGB** values will guarantee hue shifts from a hybrid color to OFF but utilizing the CSI **Fade** slider will

		provide Hue accurate dimming to OFF.) As a workaround for this GUI example, simply (i) insert a rectangle of the same color as the background on top of the default object and (ii) add a Converging Systems Fade slider (which operates in the Hue/Saturation/Brightness color space. Connect that new slider to the appropriate **Digital Join** as the Fade slider previously created Step 4B above and set the Maximum Analog Value to 240 as before.  -You can also download the Color Swatch from the Widget menu to display the specific color on your UI that you have picked from your Color Picket. Again, connect the R/G/B Digital joins as appropriate and set the Maximum Analog Value to 240.

5. Upload Compiled Code to Crestron Processor and any Touchscreen (hardwired or XPanel) and Test

Step #	Step Overview	Detail
5a	Compile file for Crestron processor and Upload (using **SIMPL Windows**).	-Make sure you are connected to your CRESTRON processor and upload your System file. Within **SIMPL Windows**, select the **Project** tab, then select Convert/Compile and follow the prompts to upload the file the Crestron processor. -Alternatively, you can hit the Compile icon  which performs the same function. -When the Address Book is revealed, make sure the address for the Crestron processor is correctly identified and hit **Send**. 
5b	Compile file for Crestron Touchscreen (wired) and Upload using **VisionTools**	Open the **VisionTools** project targeted toward your specific Touch Panel (in this case the TSW-750) and make sure that the Touch Panel is turned on and physically connected to the same subnet as your Crestron processor. Within **VisionTools Pro-e**, select the **File** tab, then select **Compile Project and then Upload Project.** **Note:** When the Address Book is revealed, make sure the

		address for the Crestron Touch Panel is correctly identified and hit **Send**.
5c	Compile file for Crestron X-Panel using VisionTools Pro-e and Open with X-Panel application.	Open the **VisionTools** project targeted toward **the XPanel 2.0 Smart Graphics**. Select the **File** tab, and then select **Compile Project. DO NOT HIT THE UPLOAD tab.** But instead, launch the customized **XPanel** file by clicking on the **.c3p** file just created. Once launched, you may need to enter the **IP address, Port** number and **IPID** value for your Crestron processor to properly connect the XPanel program. For our example here, that data is shown below:  The IPID value matches the IPID value  **Note:** with newer Crestron releases of VisionTools you can simply simulate your VisionTools GUI by selecting the Play Button and the X-Panel will nearly instantly display on your own computer. 
5d	Test using the Touchpanel or XPanel.	Make sure all the Converging Systems's devices are operating properly.

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CRESTRON 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.

Hue /Saturation/Brightness Adjustments

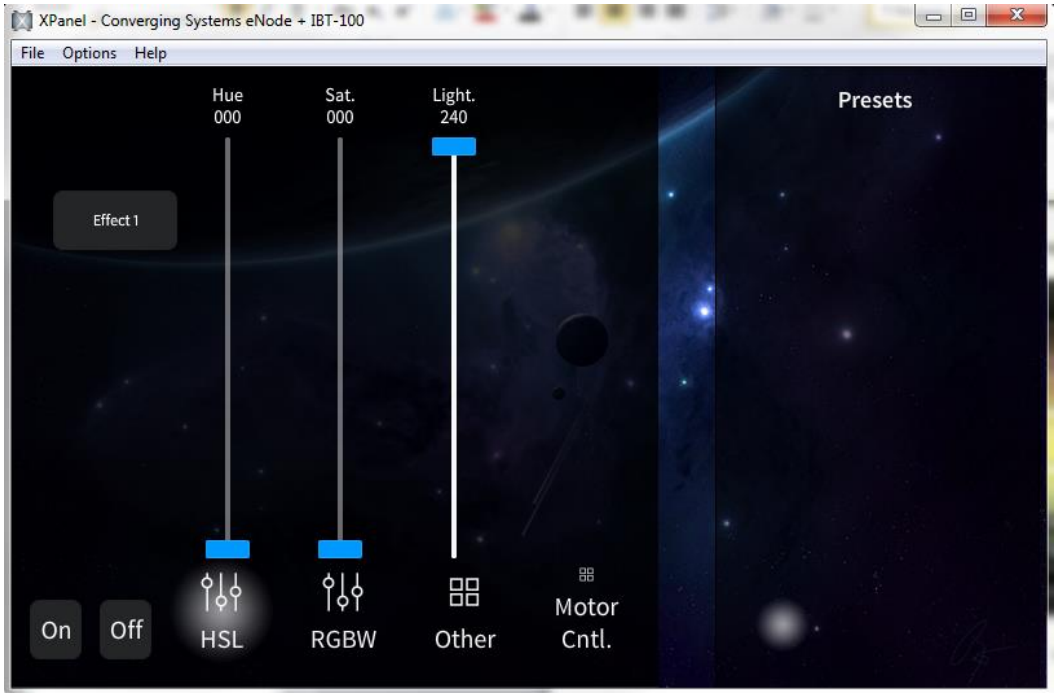

Figure 3

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Red/Green/Blue Adjustments

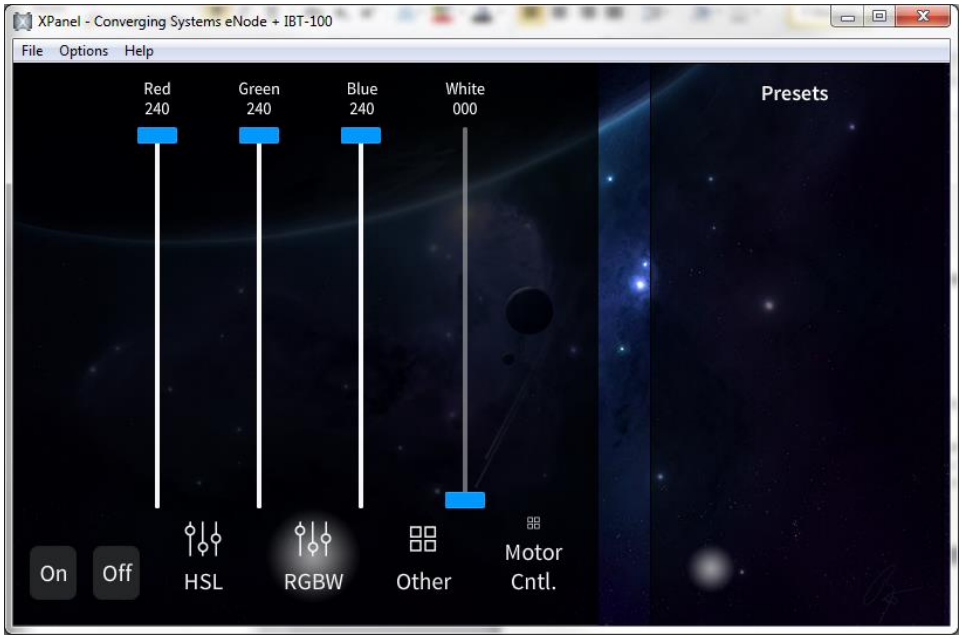


Figure 4

DISSOLVE AND SEQRATE ADJUSTMENTS

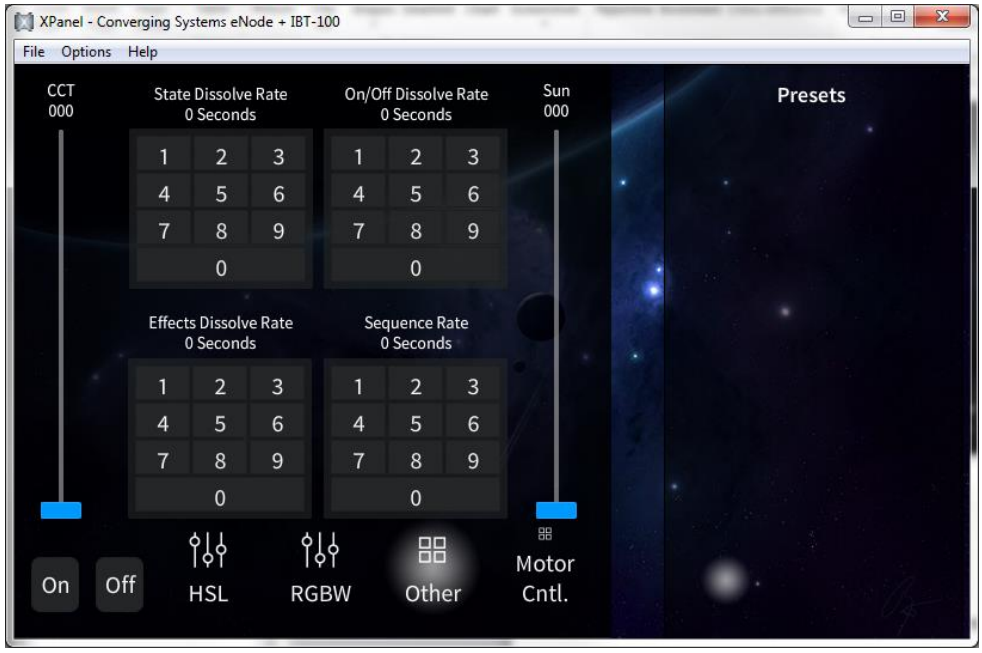


Figure 5

MOTOR CONTROL ENVIRONMENTS

BRIC CONTROL (Using CS-BUS commands)

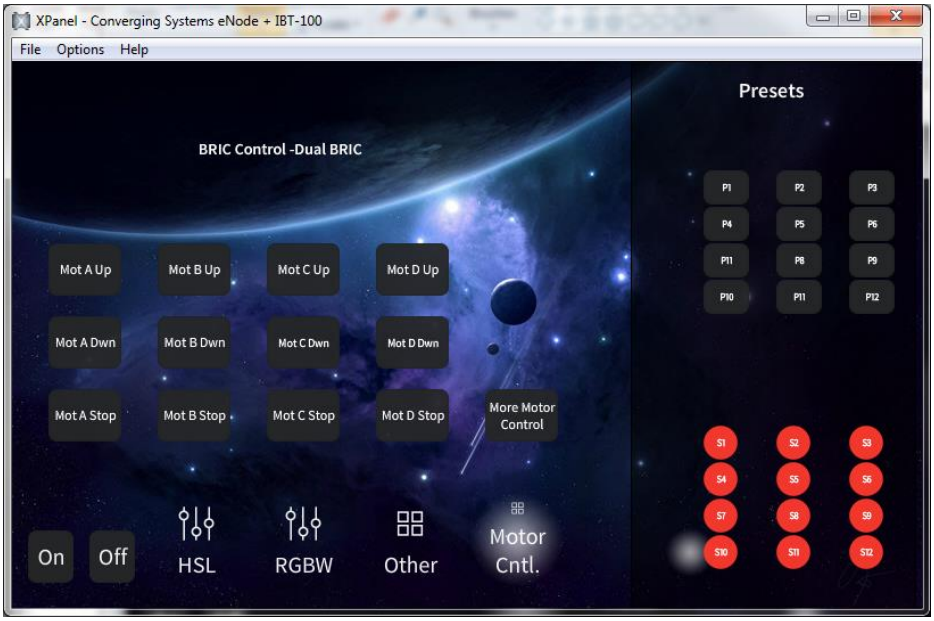


Figure 6

Cinecurve/Single Motor

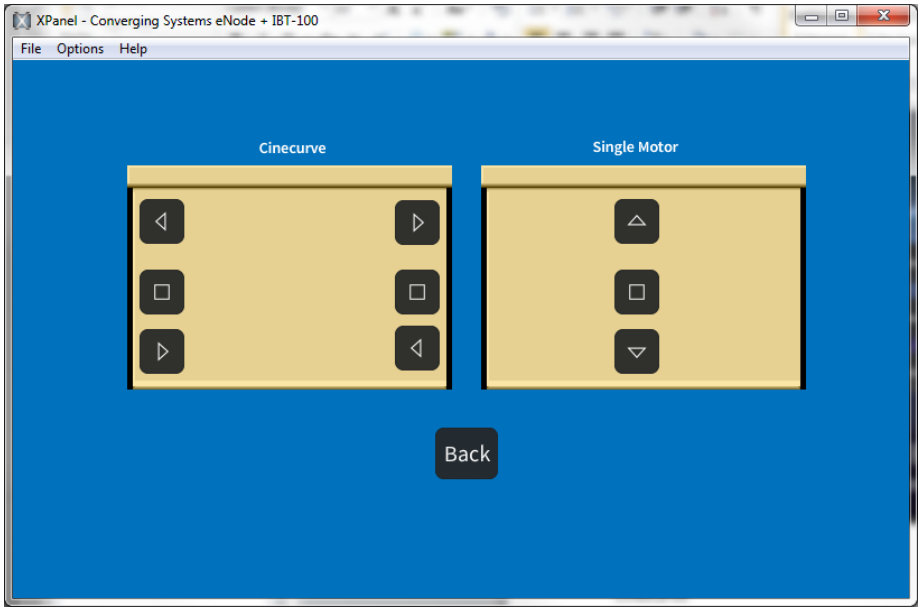


Figure 7

(reserved)

Appendix 1

Common Mistakes

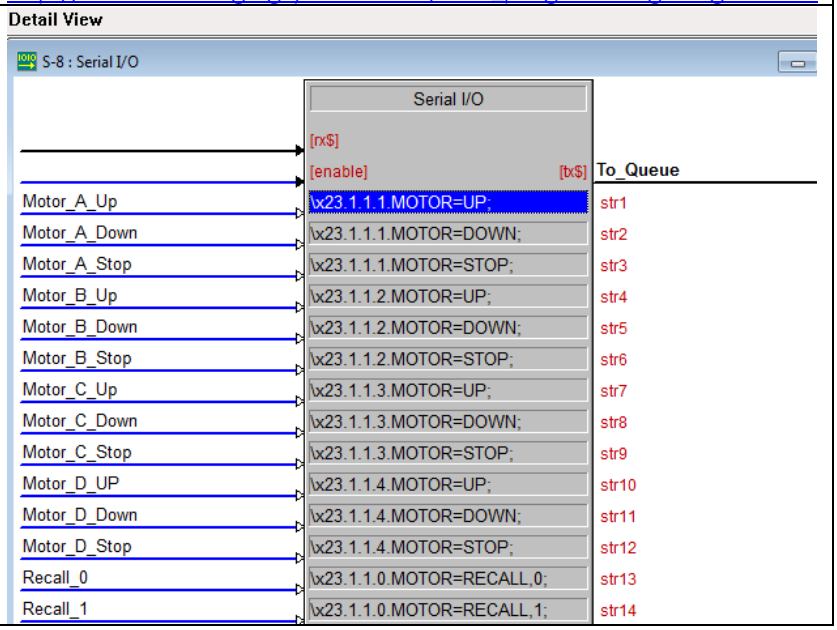
1. Forgetting to set the addresses for controllers (motor or lighting) from within Integration Designer.

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 CRESTRON driver. If you want to change those alias names and passwords for the e-NODE make sure you change them within the CRESTRON profile.

Appendix 2

Programming New Serial Strings

Converging Systems may release from time-to-time new commands that may not be supported by available Crestron drivers. Crestron software makes it very easy to add such commands. Below is a quick summary of the method by which these commands can be added.

Step #	Step Overview	Detail
A2-1	Within **SIMPL Windows**, enter new commands within the **Serial I/O tab** available under **Logic.**	Enter serial strings under **Serial I/O** and provide their alias command name on the right-hand column. The syntax should be entered precisely as shown: \x23.Z.G.N.MOTOR=UP; Enter the specific Zone, Group and Node numbers in place of the "Z" "G" and "N"entries above. Enter appropriate commands (in lieu of MOTOR) where appropriate, as well as any information required after the "=" sign, all of which can be found in the Converging Systems Device Driver Toolkit which can be found at http://www.convergingsystems.com/inres_programmingdesignkit.htm
A2-2	Here is an example of motor commands for the ILC-100 added in this way.	

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Appendix 3

ADVANCED CRESTRON PROGRAMMING

AP Topic 1

1.0 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.**

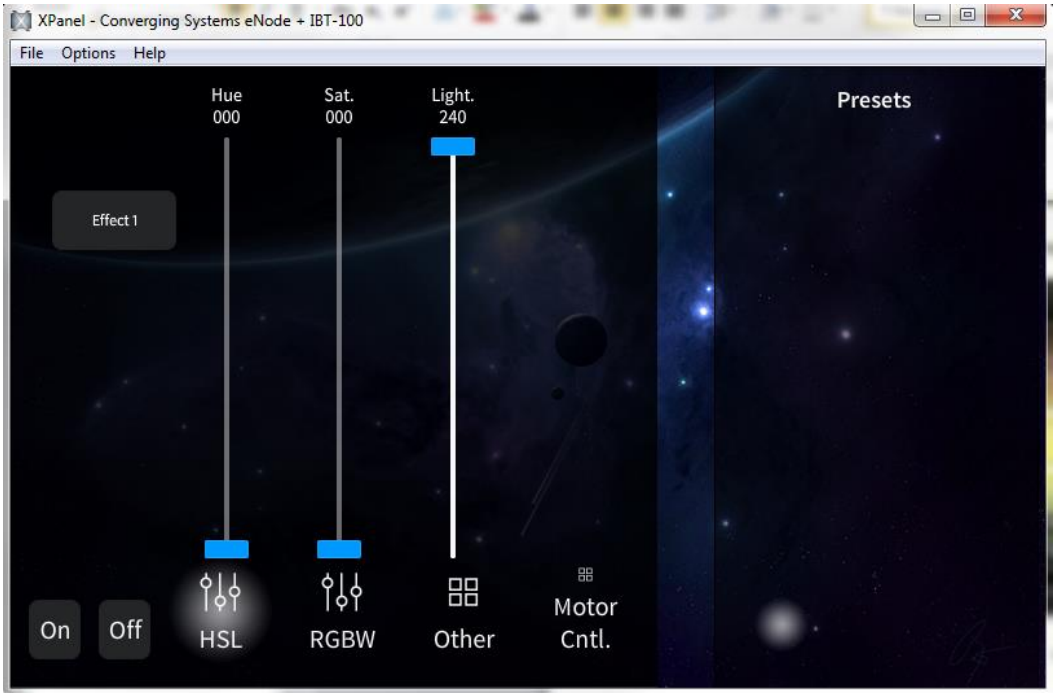

Figure 8

AP Topic 2

2.0 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 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 and 4-color lighting fixtures utilize the Red, Green, Blue (RGB) or RGBW illuminants 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 Crestron 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 the host controllers 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 the host controller.

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

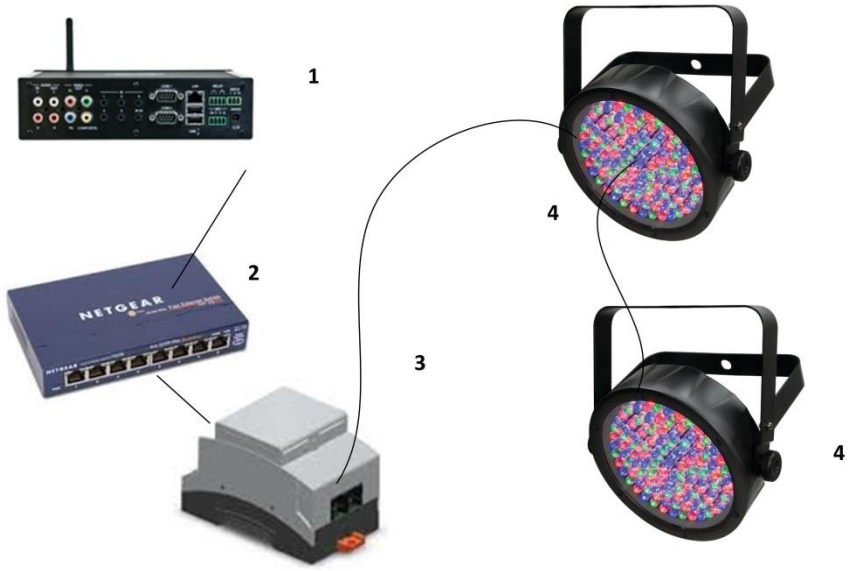


Figure 9

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 Crestron system = 254

BILL OF MATERIALS (for IP control)

#	Device	Manufacturer	Part Number	Protocol	Connector Type	Notes
1	CRESTRON 2-Series and 3-Series processors	CRESTRON	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) 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 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	

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:

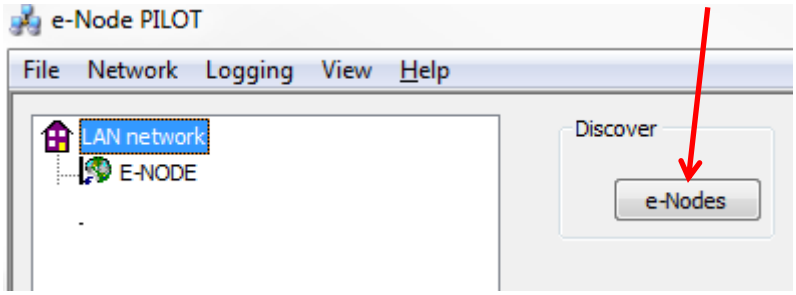
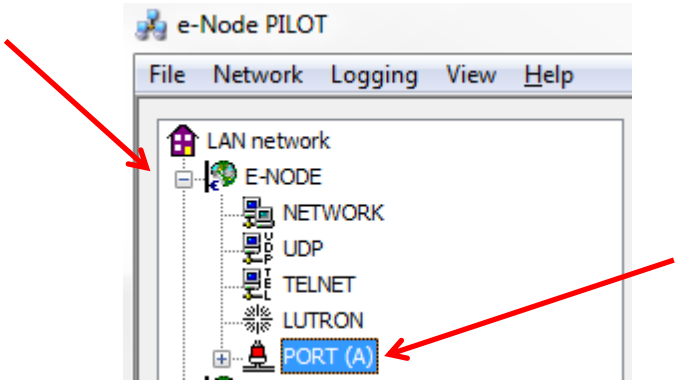
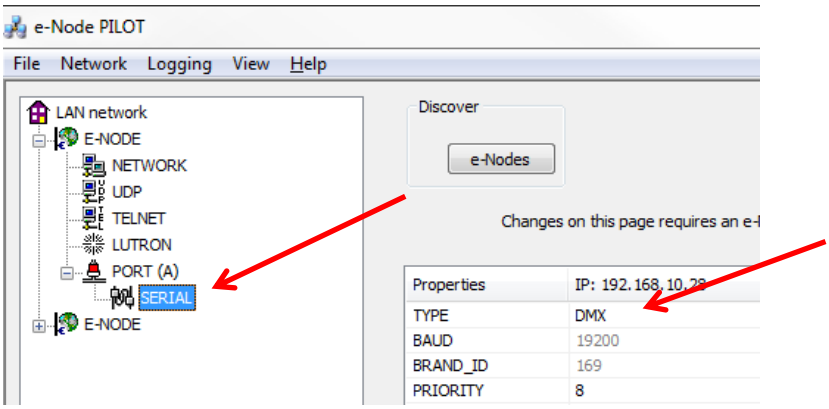
e-Node/dmx (MkIII) PORT 2 RJ-45 connector

Pin	Signal
1	Data +
2	Data -
3	Do not connect
4	Do not connect
5	Do not connect
6	Do not connect
7	Ground
8	Do not connect

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 (Step EN-1 and EN-2).

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.  -Select the **+** mark in front of the e-Node/dmx that you wish to program to expose the sub-tabs.  -Expand the PORT(A) 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 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

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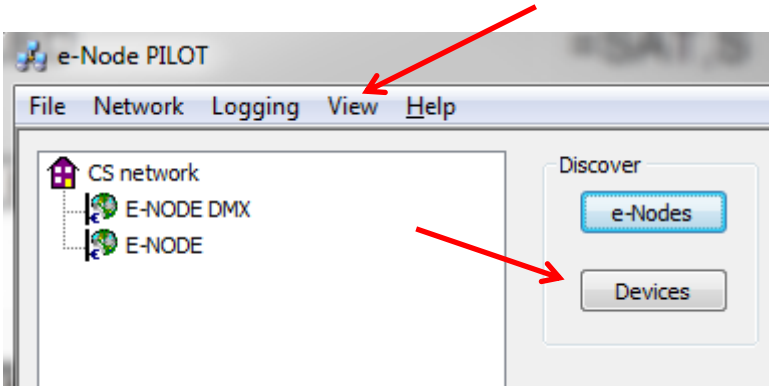
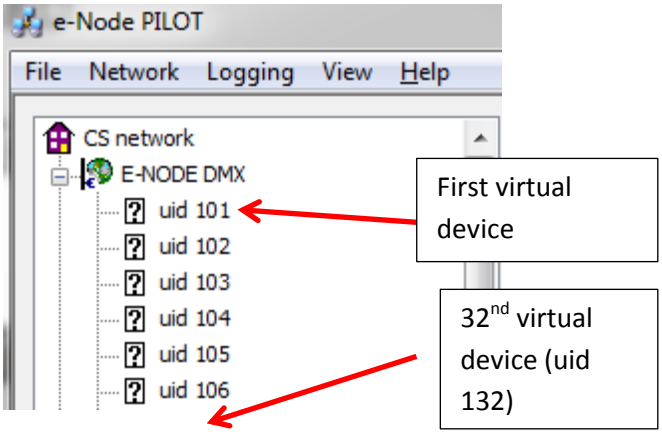
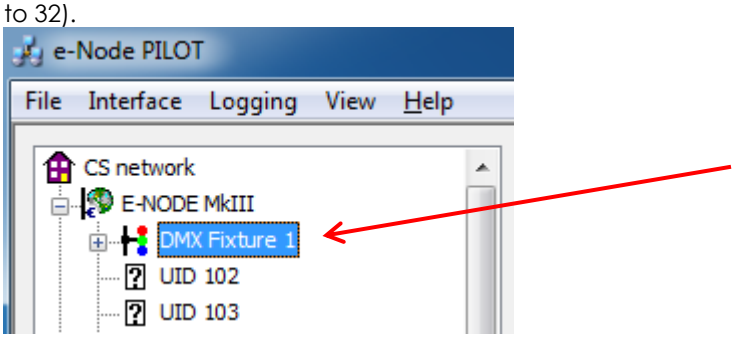
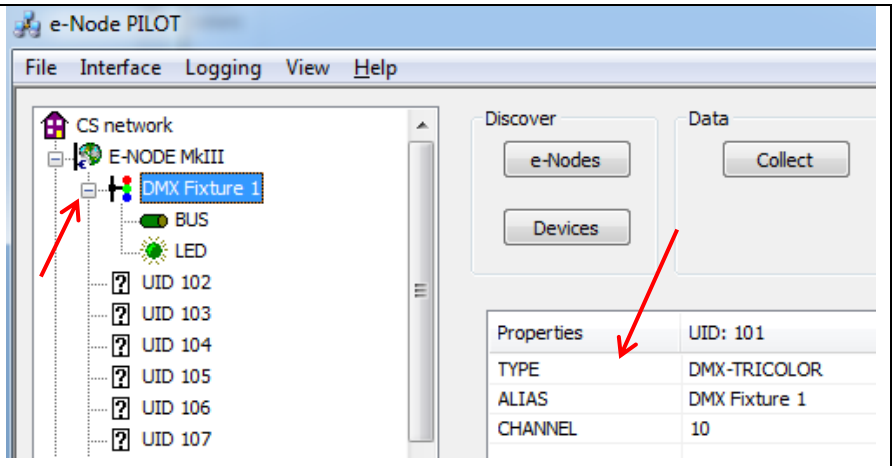
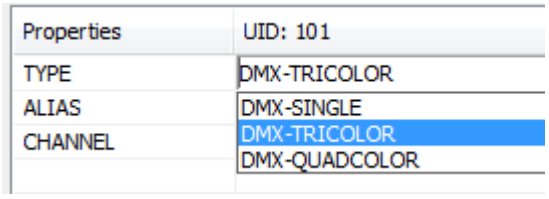
		fixtures.
DMX-3	Device Discovery	-Select the **View Map** tab and select the **Discover e-Node** button. Any e-Node(s) connected on the same network will appear as shown. -Select the Discover Devices button.  -Immediately 32 virtual "DMX Devices" will appear as follows:  Note: this picture shows the first 6 devices discovered. In a real example, all 32 virtual devices will appear.
DMX-4	DMX Fixture Type	- Select the **View Map** tab and select a specific **uid entry** (101-132) such that the entry is highlighted and then switches to a specific **DMX Fixture** (1 to 32).  -Expand the + mark in front of the selected entry to expand its menu.



-Within the **Properties** select the appropriate type of DMX fixture that you wish to support. For example, a 3-color DMX device (typically RGB colorants) is referred to as **DMX-TRICOLOR**, while a 4-color DMX device (regardless of those four colors) would be referred to as a **DMX-QUADCOLOR** and a 1-color DMX device would be referred to as a **DMX-SINGLE.**

Note: For each **UIDn/DMX** Fixture it is important to select the appropriate type in order for the embedded software to be able to properly adapt itself for the target output device.



Note: The MKIII hardware release of e-Node/dmx is required for this level of functionality operating with firmware versions 1.02 or later.

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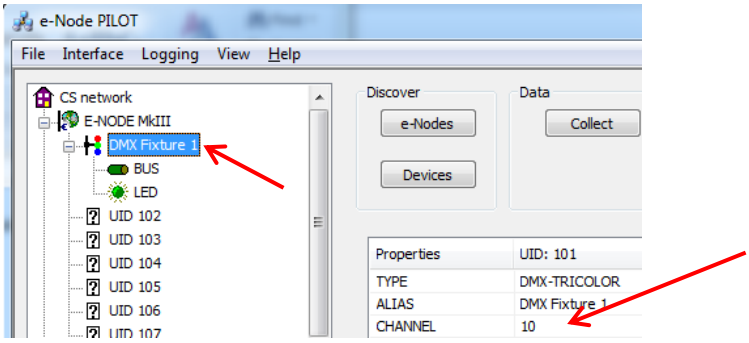
DMX-5	Set up Device Addressing	The DMX data packet is mapped to CS messages by assigning a unique **Z**one/ **G**roup/ **N**ode number to a particular **UIDn/DMX Fixture** (regardless of the number for channels which are associated with that DMX Fixture). Specifically in the example below, the start DMX address for DMX Fixture 1 is **10** and the required number of successive DMX addresses is automatically internally assigned within the e-Node/dmx to those discrete channels within that fixture. For example, for a 4-channel DMX fixture which will be addressed with a default **Z/G/N** address of 2.1.1, the default start DMX channel would be 10 and the e-Node/dmx firmware automatically allocates 4 sequential channels for the 4 colors of that fixture (e.g. 10/11/12/13). Typically (unless the defaults are changed by the installer), Red would be assigned to DMX Channel 10, Green would be assigned to DMX Channel 11, Blue would be assigned to DMX Channel 12 and White would be assigned to DMX Channel 13. All DMX ***Start*** addresses and associated **Z/G/N** addresses can be changed by the installer. DMX start default channels, Z/G/N default addresses are mapped as shown in the following table:

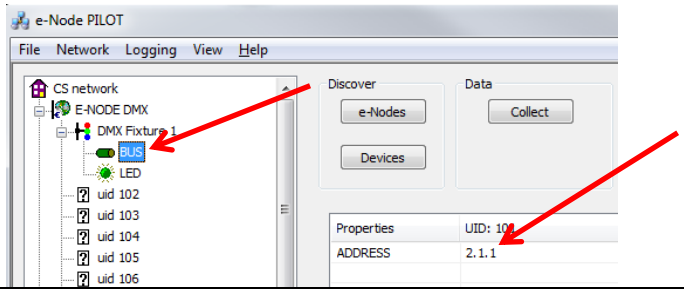
DMX Fixture	Default UID	DMX Channel Allocation	CS-Zone/Group/ Node
1	101	10-19	2.1.1
2	102	20-29	2.2.1
3	103	30-39	2.3.1
4	104	40-49	2.4.1
5	105	50-59	2.5.1
6	106	60-69	2.6.1
7	107	70-79	2.7.1
8	108	80-89	2.8.1
9	109	90-99	3.1.1
10	110	100-109	3.2.1
11	111	110-119	3.3.1
12	112	120-129	3.4.1
13	113	130-139	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

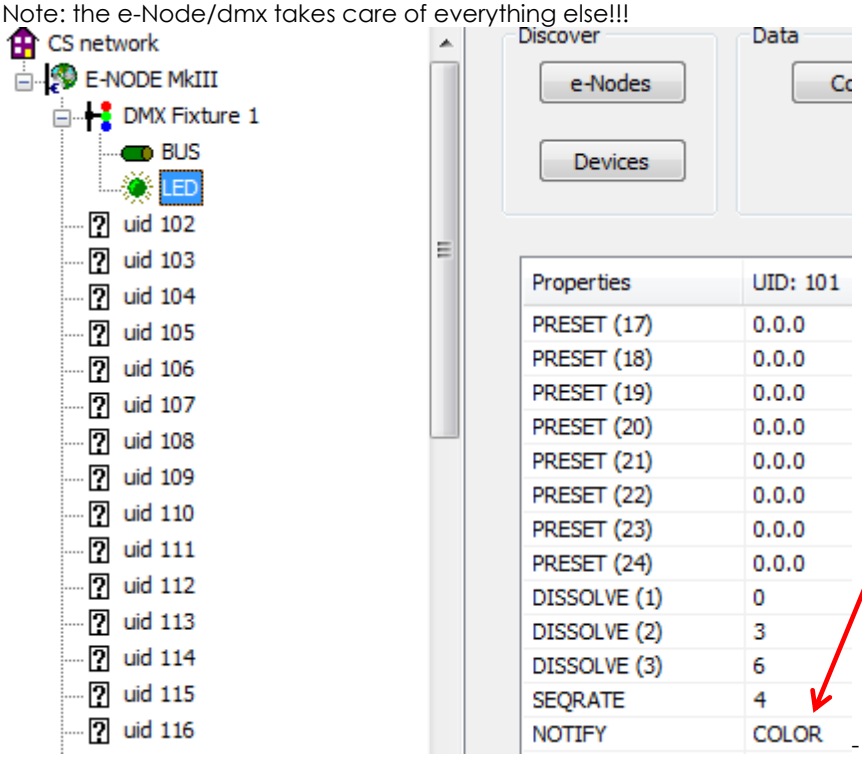
24	124	240-249	4.8.1	
25	125	250-259	5.1.1	
26	126	260-269	5.2.1	
27	127	270-279	5.3.1	
28	128	280-289	5.4.1	
29	129	290-299	5.5.1	
30	130	300-309	5.6.1	
31	131	310-319	5.7.1	
32	132	320-329	5.8.1	

-If you desire to change any default DMX start address, click on the DMX Fixture entry and change the address as appropriate.



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



DMX-6	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 in the the ILC-100/400 section for explanation of the NOTIFY function. Also understand 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). -Proceed to standard Crestron Programming (Steps 1 onwards above in the main body of this Integration Note). Note: the e-Node/dmx takes care of everything else!!!  Proceed to standard Vantage Programming (Steps 1 onwards above in the main body of this Integration Note). Note: the e-Node/dmx takes care of everything else!!!

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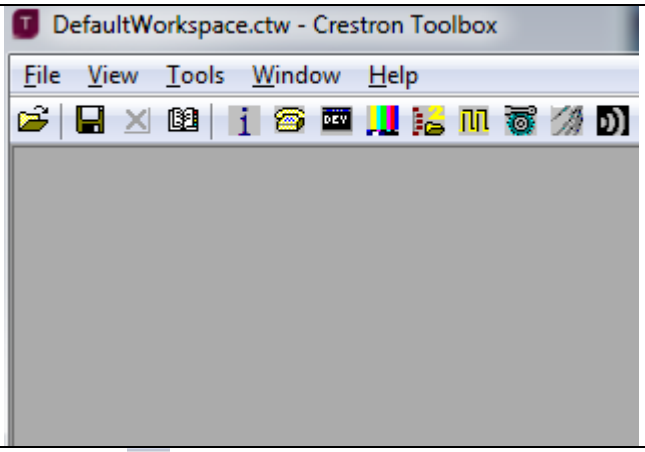
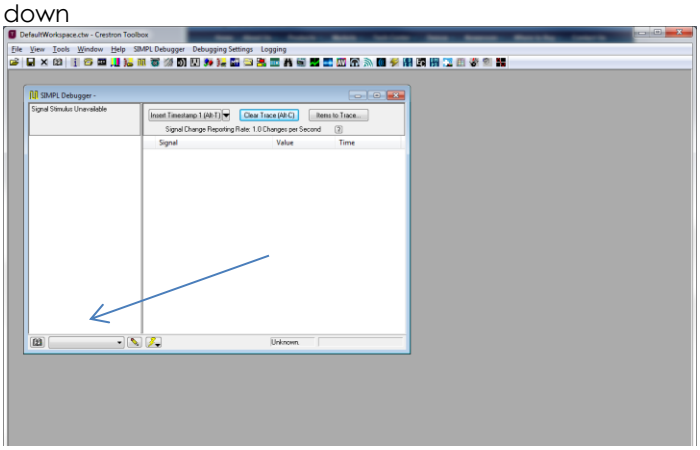
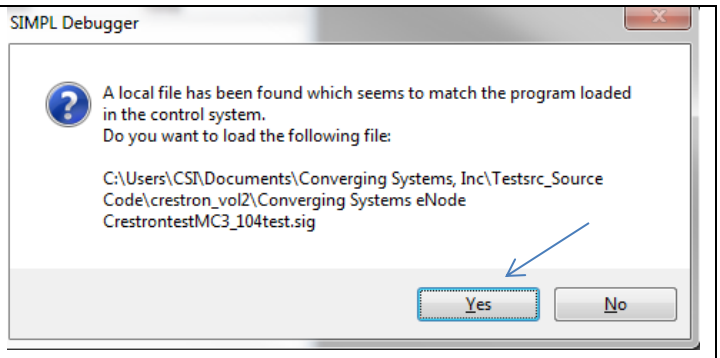
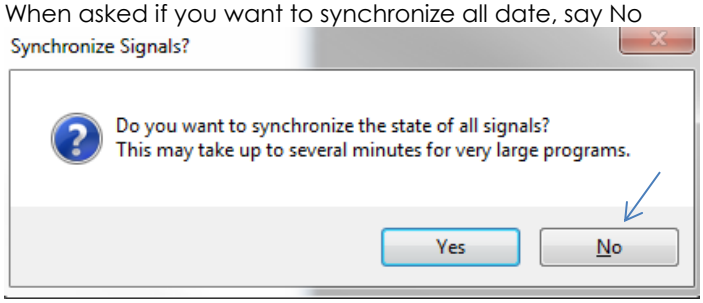
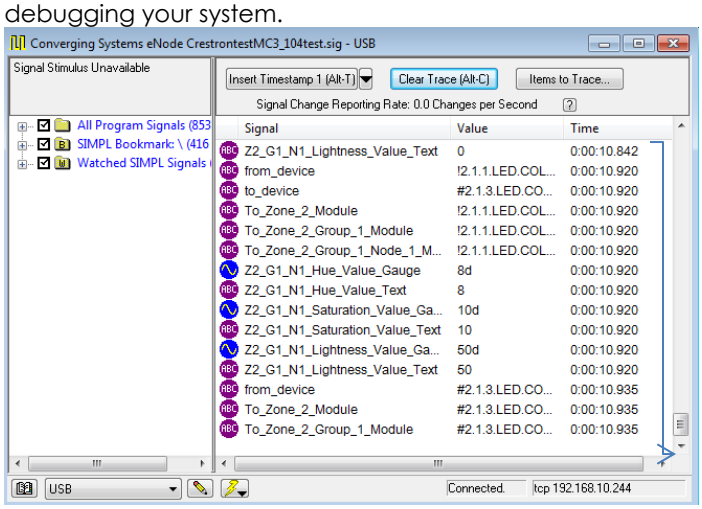
Appendix 5

Troubleshooting/System Monitoring

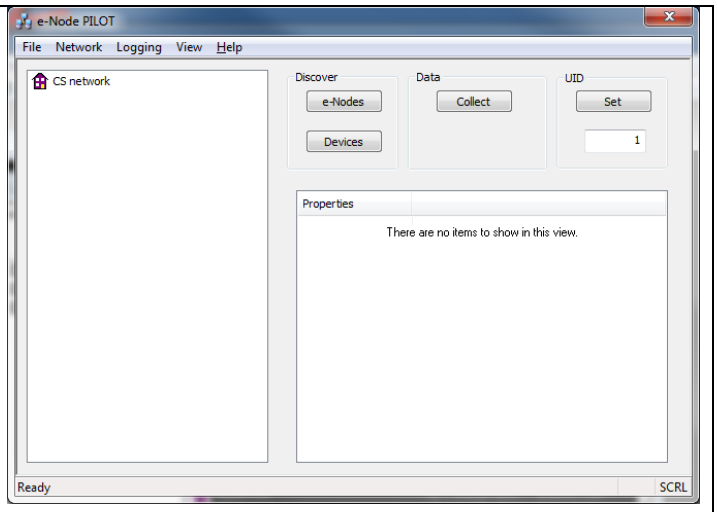
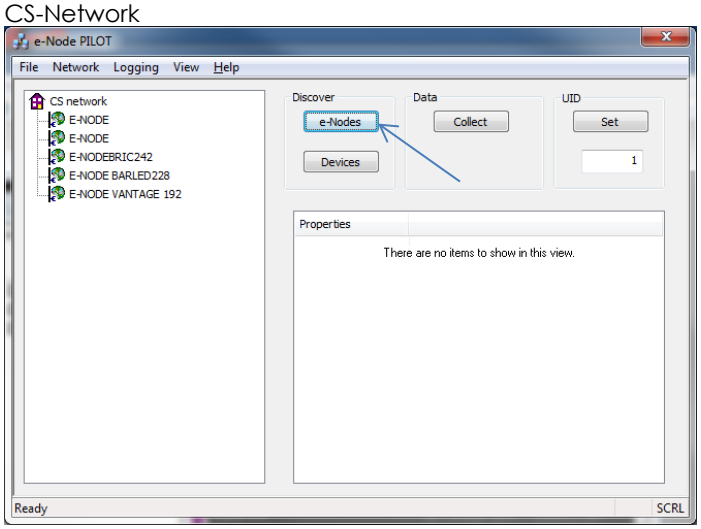
Using Crestron Tools

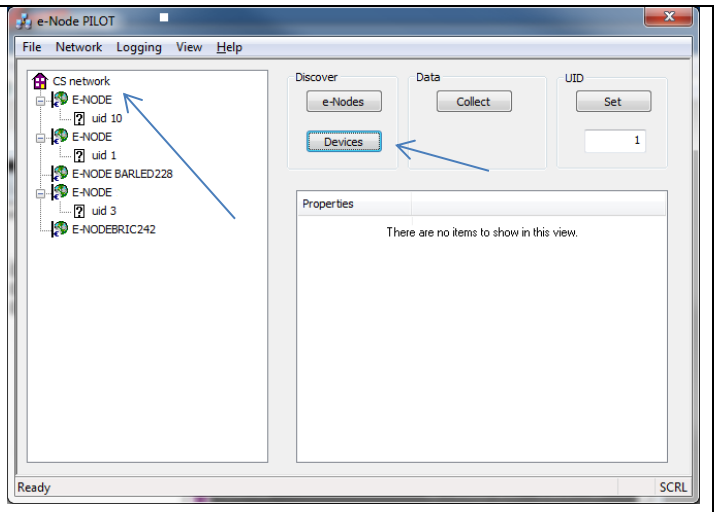
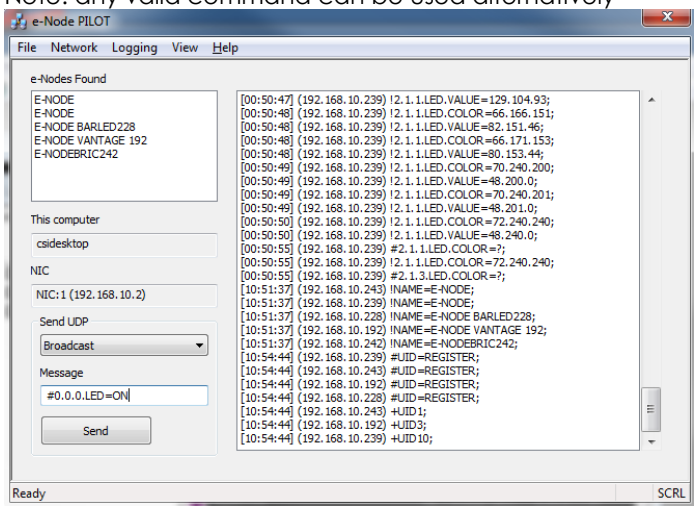
Step #	Step Overview	Detail
A6.1.1	Launch **Crestron Toolbox**	
A6.1.2	Select the **SIMPL Debugger**	Select the  icon
A6.1.3	Enter the **Processor** that you wish to monitor	Select your Crestron processor from the Address book pull-down  You will be prompted to load a *.sig file, select **Yes** and proceed

		 When asked if you want to synchronize all date, say No 
A6.1.4	Monitor Bus Traffic	The Crestron SIMPL debugger is now available for use and should show all traffic relevant to the e-Node to start debugging your system. 

Using Converging Systems' Tools

Step #	Step Overview	Detail
A6.2.1	Launch **e-Node Pilot** application	This screen should appear

		
A6.2.2	Discover e-Node devices(s)	Select **View Map** and press the **Discover e-Node** button. If your e-Node can be seen, you should see it appear under CS-Network 
A6.2.3	Discover Devices	Next press the **Discover Device** button. Any connected loads (i.e. ILC-100 or motor controllers) should appear

		
A6.2.4	Next enable Pilot to start receiving bus traffic. **Note:** By default, Pilot only receives traffic after traffic is initiated from its IP location.	To do this go to the Traffic window, and enter this command in the Message window: **#0.0.0.LED=ON** Note: any valid command can be used alternatively 
A6.2.5	Monitor Bus Traffic from and to the e-node.	Here is what you will start seeing when bus traffic is being monitored.