TechNotes-Multi-Channel DMX Control
NEW Profile Selector-Auto DMX Channel Configurator

CONVERGING SYSTEMS

Revision 6/23/2022 FW v1.1.0 and later (e-Node 2100/4100 dmx models)

Table of Contents

Background on Controlling DMX Fixtures from Automation and Lighting Control Systems. DMX fixture typically have many more channels than a typical automation or lighting system is equipped to control natively These automation/control systems in general can control lighting products with RGB color pickers or in some cases Hue/Saturation/Brightness controls. Recently, we have been observing new products from manufacturers that are integrating more advanced features within their fixtures that can be used to control color temperature as well as Circadian Lighting.

Converging Systems' e-Node/dmx is a robust device IP gateway device designed to support 1-32 third-party DMX fixture (which is the industry standard for the number of fixtures supported on one DMX bus without needing additional hardware). Our system allows up to 128 DMX addresses from a total of 512 DMX addresses) per e-Node to be supported. Fixture support traditionally has ranged from monochrome to more sophisticated RGB and RGBW devices. Of late, enhanced models of some DMX fixtures manufactured by WAC Lighting/Aispire, American Lighting, and Chauvet have reached the market that offer bi-white or tri-white tunable white (TW) control and in some cases full CCT (Correlated Color Temperature) support and even a Circadian feature set. The e-Node/dmx is ideally suited to interface with these fixtures in order to provide full compatibility with most popular integration systems in the market today.

This document enables any **Known** or **Unknown** DMX Fixture compliant with the ANSI DMX512-A standard to be able to be controlled from all supported third-party lighting and automation systems with the e-Node/2100 (for all third-party platforms and legacy non Lutron QSX/RadioRA3/Athena installations) or with the e-Node/4100 for all e-Node/2100 installation AND Lutron QSX,RadioRA3 and Athena installations.

YOUR E-NODE MAY REQUIRE A FIRMWARE UPDATE FIRST BEFORE USE FOR SOME FEATURES BELOW—See "How to Update Firmware within e-Node and ILC-xx0 using Cloud Technology" under our Gateway Tech Notes section."

DMX Fixture Channel Information (Mandatory Reading). 99% of the issues that we encounter with our customers revolve around these issues:
- There is limited or no knowledge of **what channels on the DMX fixture do what** (which is Red, which is Green, etc., as well as which DMX channels are required for support vis-à-vis those which are not)
- There is no knowledge of the **starting DMX address for the target DMX fixture**

➢ There is no knowledge of **what each wire on the fixture's incoming DMX (IN) port does** (which is +, which is – and which is com/ground)
➢ There is no knowledge of **what a DMX terminator is** or whether or not it has been installed at all on the DMX Out port on the last DMX fixture on the string
➢ There is no knowledge of whether the **DMX IN port on your fixture has been activated (within the fixture) or whether it actually works**.
➢ There is limited or no knowledge of the **type of wiring specified** by your fixture manufacturer and whether or not the DMX fixture system has even **been tested** in advance of this integration.

It is unfair to ask Converging Systems or our OEMs to troubleshoot your DMX fixture, it setup or configuration. For more information, consult your fixture manufacturer's documentation or in the most basic case, consult the internet for more information on DMX. If you are new to DMX lighting systems, please spend time to familiarize yourself with DMX systems. You may find this article useful as a first step here.

https://www.sweetwater.com/sweetcare/articles/understanding-dmx/

Are we Ready to Proceed. We have summarized the salient issue from the above inventory of information that must be understood before advancing with e-Node/dmx integration. If you can answer all of these questions to the affirmative (i.e., **YES** below) and you can provide all of the other requested information**, then and only then should you proceed with setting up the e-Node.**

<center>DMX Questionnaire</center>

Starting DMX Address ☐	What is the starting DMX address for your fixture (i.e., your fixture may have many DMX channels that are meaningless for this integration process. In this case, pick the first **useful** channel such as Red, or Green, or Blue, or White or Fade channel that is needed to be supported to actually turn on a DMX fixture. Disregard those channels occurring before any of the mandatory channels just referenced *as this only will waste one or more of the possible 128 DMX channels that we can support for all fixtures*)?							
(Fill in all relevant channels names here)	DMX Channel Assignment (channel name like Red, Green, White, etc.) 							
	1st channel	2nd channel	3rd channel	4th channel	5th channel	6th channel	7th channel	6 channel
	Note: you may extend this table if you have more channels that you wish to support							
YES **NO** ☐ ☐	Have you installed a DMX terminator to the last DMX Out on the DMX Fixture on your chain? Your terminator may look like one of the objects below. If **NO**, search for DMX terminator on Amazon and order one for each DMX bus that you wish to support? If you don't believe us, just google it! 							
YES **NO** ☐ ☐	Is your DMX wiring configured that there are no Y's or T's in your DMX wiring (daisy-chain) string. If **NO**, rewire to eliminate all Y's or T's. **Note:** DMX wiring does not allow for any "splices" unless an optical splitter has been secured.							
YES **NO** ☐ ☐	Have you secured proper information from you DMX Fixture's documentation as to the wiring of the DMX In and Out ports and have you read the pin-out information for Ports 1 and Ports 2 on the e-Node/dmx? See this documentation for our pin-outs for more information. https://www.convergingsystems.com/bin/doc/enode/enode_legalsize_SNScheme3_2.pd Remember is you are using Color Kinetics products, their pin-out is different from the rest of the world's pinouts-go figure. If you cannot answer **YES** here, consult manuals available including those from your fixture manufacturer and correct the wiring.							

YES NO	Have you tested your DMX fixtures operation and have assigned their starting DMX addresses either to be unique set of DMX addresses from other DMX fixtures what will be supported on the bus (if you want individual control of each DMX Fixture) or have assigned non-overlapping DMX addresses to each fixture? If **NO**, consult the various manuals available including those from your fixture manufacturer and review/adjust your settings.

Notes on FADE/brightness channels that may be present on a DMX fixture that support tunable white or RGB color spaces. The e-Node/dmx gateways contain some of the most advanced diming technology on the planet. In no case can the diming technology within a DMX fixture that operates in the **Red/Green/Blue or RGBW color space (see Case 5)** or **bi-white or tri-white color space (see Case 11)** rival that available through the e-Node/dmx's internal color computer**. For these above referenced color spaces ONLY, It is imperative that you determine what the DMX channel assignment is for the Fade/Brightness.** For other color spaces see the next section.

➤ If you are using the auto-assign feature of our Profile operator, verify that the fixture's DMX fade channel is set to 100% (by setting that channel to FULL within the e-Node). This insures that the e-Node/dmx will do the heavy lifting and dim the fixture accurately. See Case 5 for an example here. Also see Step 7 for additional information.
➤ If you are manually programming an Unknown DMX fixture, also insure that the fixture's DMX fade channel is set to 100% (by setting that channel to FULL within the e-Node).

Notes on FADE/brightness channels that may be present on a DMX fixture that supports the HSV/HSB color space
In this case, simply assign that DMX channel that controls brightness/intensity to Value as shown in Table 1.
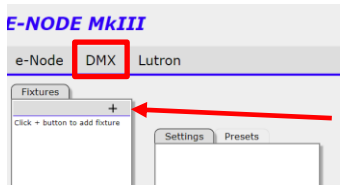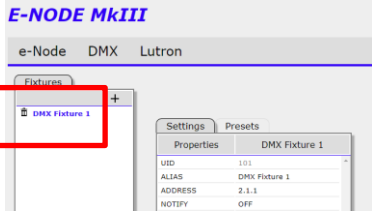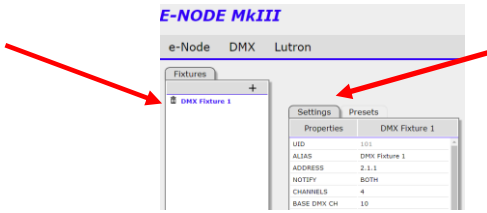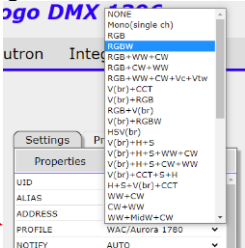
Background on Controlling DMX Fixtures from Automation and Lighting Control Systems. DMX fixture typically have many more channels than a typical automation or lighting system is equipped to control natively These automation/control systems in general can control lighting products with **RGB** color pickers or in some cases **H**ue/**S**aturation/**B**rightness controls. Recently, new products from some automation platform manufacturers are now supporting advanced UI (user interface) controls including the support for correlated color temperature (**CCT**) as well as **Circadian** Lighting (for fixtures which can provide that type of output). The challenge that Converging Systems has answered elegantly here is that it has mapped available UI controls available from third-party automation systems to the widespread range of DMX channel assignments typically available from DXM fixture manufacturers provided some easy steps are taken. These are:

➤ Determine the first useful channel such as **Red**, or **Green**, or **Blue**, or **White** or the **Fade** channel that is needed to be supported to actually turn on a DMX fixture ("Mandatory Channels").
➤ Disregard those channels occurring before any of the Mandatory Channels (that are not necessary to actually turn on a light) in your DMX channel worksheet as this will save scarce DMX channels that otherwise could be allocated for other fixtures later on.

Some DMX fixtures at first blush may present an interesting challenge on how to support them. As an example, CinemaTech has a new fiber optic ceiling fixture that combines RGBW LED emitters with a "speed control" operator (to change the perceived rate at which the stars move). Since no automation system has envisioned a speed operator, we simply map the RGBW operators to one HSB virtual fixture (which is supported by all 3rd party platforms) and the 4th "speed" channel mapped to a 2nd virtual fixture with a single slider UI (such as would be available to control a monochrome light source and which again is supported by all 3rd party platforms). Think about your special needs with creating fixtures within the e-Node/dmx web page.
present

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Adding DMX fixtures to the e-Node

The latest e-Node 2100/4100 devices require that DMX fixtures to be supported need to be added using the **built-in DMX Fixture webpage configurator** available within the e-Node's web pages. This obsoletes the former method of adding DMX fixtures using the standalone e-Node Pilot application). Before adding DMX fixtures, follow the Quick Start Guide for setting up communication with the e-Node. After setting up the e-Node initially, follow the below steps *to add all DMX fixtures* that you wish to support with the e-Node as shown below:

Step 1 **Discover DMX device/DMX Setup**	Step 2 **Set Initial DMX device parameters**
  Add (DMX) Device. Select the DMX tab. **Any DMX fixtures that you wish to support must be added within this section**. Click on the **+** button to add each DMX fixture (up to 32 per e-Node/dmx) that you wish to support here. Initially, just add all fixtures and later (in Step 2), customize those fixtures. 	 **DMX Basic Device Parameters.** For each DMX fixtures added in Step1, you must enter within the **Settings** tab all of the following information. First **highlight** the first fixture and select the **Settings** tab (it is does not auto-appear) and proceed through each step below: -**UID.** This entry is auto appended for each Fixture added. **Note:** no two fixtures can have the same UID address. -**ALIAS**, enter a descriptive name, if desired. -**ADDRESS**, enter a **Z**one/**G**roup/**N**ode (**ZGN**) address, in the format of (**Z.G.N**) with periods between each number. Typically, start with 2.1.1 and assign each new Fixture with a unique **ZGN** number (i.e., 2.1.2, 2.1.3 etc.). See here for more information on advanced topics on **ZGN** assignments. -**BASE DMX CH**, select the starting DMX address (from 1-512) that will be associated with this DMX device (note-if the device is a 3-channel device that uses DMX channels 4 & 5 & 6, just enter "4" here). Now proceed to Step 3 to program the channel assignments for the current DMX fixture being added.
Step 3 **Background On Profile Selections**	Step 4 **Making Selections within Profile**
  Converging Systems has tested hundred DMX fixtures for compatibility with the e-Node 2100/4100 (i.e., "**Known**" DMX Fixture and Fixture Models). We continually add new models to the Profile pulldown for ease of integration by our dealers. -Select the **Profile** tab and scroll down to find pre-programmed **Known** DMX fixture types supported. In addition, at the bottom of the list are a number of specific model names of popular or special DMX fixtures that have been tested and/or for where special calibration/support has been engineered. Now proceed to the next section to learn about **Known** versus **Unknown** DMX fixtures and to begin DMX fixture customization.	**Known DMX Fixtures**. For **Known** DMX fixture types, select from the **Profile** pulldown (red arrow in Step 3) a channel mapping that matches your DMX fixture **exactly** (consult your DMX fixture's documentation for this ordering/mapping), or where listed the model name of your fixture). **Selecting an entry from the list & entering the starting DMX address will automatically populate the DMX channel assignments that otherwise would need to be programmed manually for Unknown DMX devices.** **Note:** If you have an RGB fixture with its 1st ch.-Red/2nd ch.-Green/3rd ch.-Blue, select **RGB**. *Note, the ordering of the inputs in the name must precisely match our auto-assignments*. If your fixture has the **right** names but is configured in a different order (i.e., BRG versus RGB), you would simply pick **None** and proceed to Unknown DMX Fixtures below. If you can accurately find an entry for each of your fixtures, select the **Profile** type for each fixture and proceed to Step 6. -**Unknown DMX Fixtures.** Any DMX Fixture that is not **Known** shall be considered an **Unknown** DMX fixture. For any **Unknown** DMX fixture type or model, select **None** from the Profile pulldown and proceed to Step 5 to make additional (required) entries.

Step 5
Creating a Custom DMX Fixture for Unknown DMX Fixture
(i.e., where the type or name is not available through the Profile pulldown)

-**Channels**, enter the number of channels for the current configuration for the target DMX fixture. A 3-channel RGB fixture would be entered as Channels-**3**, while a RGBWW fixture would be entered as Channels-**5.**

Note: A fixture might have 50 for more channels but we are only concerned with the channels that when set will be controlled by typical automation platforms. If your fixture has some meaningless channels in the front part of its channel assignment listing and those do not need to be controlled, simply skip to its standard type controls (RGB, or HSB, or Brightness) section and use that **first** channel as the starting DMX channel (so as not to waste our limited channel slots) in you design.

-**ASSIGN Ch 1 (n),** enter from the available pulldown choices the appropriate name for the Fixture's channel assignment (as per its manual. See Table 1 for specification for each available choice.

-**ASSIGN Ch xx onwards,** proceed through each sequential channel and select the appropriate name for each.

TABLE 1
Selections will dictate if e-Node (i) **CPU** (internal) processing, or (ii) or **P**ass**T**hrough operation, or (iii) **I**ntelligent **V**ariable **S**etting occurs

Selection	Mode	Function
RED(V)	**CPU**	Std for DMX devices which provide Red as input
GREEN(V)	**CPU**	Std for DMX devices which provide Green as input
BLUE(V)	**CPU**	Std for DMX devices which Blue as input
WHITE(V)	**CPU or PT**	Use this to support a single White (in a RGBW system) or a Mid white in a 3-white (W1/W2/W3) system
MONO(V)	**PT**	Std for **Monochrome** (1-channel) devices (***don't use White here***)
FULL(B)	**IVS**	Use this to set to full **ON** (if device has diming channel)
HUE(V)	**PT**	Use this to support a native HUE channel
SAT(V)	**PT**	Use this to support a native SAT channel
VALUE(V)	**PT**	Use this to support a native Brightness channel
CCT(V)	**PT**	Use this to support a native CCT channel
PAN(V)	**PT**	Use this to support a native PAN channel
TILT(V)	**PT**	Use this to support a native TILT channel
WARM(V)	**CPU**	Use this to support a native WARM White ch. with CCT
COOL(V)	**CPU**	Use this to support a native COOL White ch. with CCT
RGB ENABLE	**IVS**	Use this to turn on channel to full ON whenever there is call for RGB output (see Case 11)
SUN(V)		Not implemented currently
OFF(B)	**IVS**	Use this to set channel to full **OFF** (use for channels bypassed)

Step 6
Final Entries (for all DMX fixtures)

-**NOTIFY, set to** Auto for Control4, and Elan, **or select** Both for all other platforms
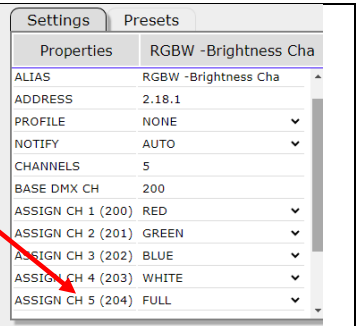
-**ADDRESS,** enter a **Z**one/**G**roup/**N**ode (**ZGN**) address, in the format of (**Z.G.N**) with periods between each number. Typically, start with 2.1.1 and assign each new Fixture with a unique **ZGN** number (i.e., 2.1.2, 2.1.3 etc. See section for more information on advanced topics on ZGN assignments.

The next two Steps are for information purposes only that document some unique operators

Step 7
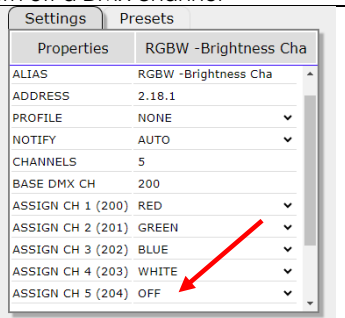### Use of FULL to Turn on a DMX channel so that the e-Node can control it

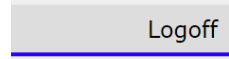If DMX fixture has Fade channel and has RGB or RGBW operators

Settings	Presets	
Properties	RGBW -Brightness Cha	
ALIAS	RGBW -Brightness Cha	
ADDRESS	2.18.1	
PROFILE	NONE	⌄
NOTIFY	AUTO	⌄
CHANNELS	5	
BASE DMX CH	200	
ASSIGN CH 1 (200)	RED	⌄
ASSIGN CH 2 (201)	GREEN	⌄
ASSIGN CH 3 (202)	BLUE	⌄
ASSIGN CH 4 (203)	WHITE	⌄
ASSIGN CH 5 (204)	FULL	⌄

Step 8
Use of OFF to Turn off a DMX channel

If DMX fixture has a channel that you wish to turn OFF

Settings	Presets	
Properties	RGBW -Brightness Cha	
ALIAS	RGBW -Brightness Cha	
ADDRESS	2.18.1	
PROFILE	NONE	⌄
NOTIFY	AUTO	⌄
CHANNELS	5	
BASE DMX CH	200	
ASSIGN CH 1 (200)	RED	⌄
ASSIGN CH 2 (201)	GREEN	⌄
ASSIGN CH 3 (202)	BLUE	⌄
ASSIGN CH 4 (203)	WHITE	⌄
ASSIGN CH 5 (204)	OFF	⌄

Step 9
Testing

Once you are finished adding all the DMX fixture that you wish to support, exit the **Settings** section by hitting Logout tab

Logoff

-Next you will see up to 24 UI screens labeled with your names that you can adjust the **H**ue/**S**aturation/**B**rightness and control the fixtures' ON/OFF state. Use this as a troubleshooter before integrating with third-party automation systems.

-There also is a Troubleshooting tab within the **Settings** tab that can individually control each of the 512 DMX channels. This is a good tool should you have some channel assignments entered incorrectly or problems with your fixtures.

Step 10
Start Integrating with Your Selected Automation System

Refer to the Table of Contents at the beginning of this document for supported Automation Platform Quick-Start guides. More information can be found here.

APPENDIX 1

EXAMPLES OF DMX FIXTURE CHANNEL MAPPINGS FOR UNKNOWN FIXTURES

This section shows the auto-assignments that are automatically made using the Profile pulldown describe in Steps 3/4 above. It is important to remember that only in cases of Unknown DMX fixtures do these entries below need to be manually entered. In other words, if the Profile pulldown can identify your fixture, **DO NOT WASTE TIME ENTERING ANY CHANNEL INFORMATION**. However, if you are entering information for an UNKNOWN device, then this section will help you understand more details on those entries.

DMX Fixture Type	Case (click on link)		DMX Fixture Type (continued)	Case (click on link)		DMX Fixture Type (continued	Case (click on link)
Case Examples for Popular DMX Fixtures							
Monochrome (single ch. output)	.1a		V+H+S	6a		V + CCT + S + H	9
Pan or Tilt-type Device	.1b		H+S+V	6b		W1+W2+W3	10
R+G+B	1		V+ H+S+W1+W2	7a		W1+W2+W3 +V^{TW}	11
R+G+B+W	2		H+S+V+W1+W2	7b		R+G+B+W1+W2+V^C+V^{TW}	12
R+G+B+W1+W2	3		V+CCT+S+H	8a		V + CCT	13
V^C +R+G+B	4		V+H+S+CCT	8b		Cinematech RGBW+speed	14
V+R+G+B+W	5		H+S+V+CCT	8c			

Profile

Case .1a   **Single Channel (Monochrome) Dimmable DMX Device**

DMX channel	Assignment (as per DMX fixture's manual) within e-Node/dmx
1	**Mono**

ALIAS	Case .1
ADDRESS	2.16.1
NOTIFY	BOTH
CHANNELS	1
BASE DMX CH	160
ASSIGN CH 1 (160)	MONO

Notes: On single output devices (and on devices that have too many channels to be included in any of the cases below), create a single channel DMX device with the appropriate starting DMX address. Use **Mono** for dimming. **Only use MONO for single channel devices.**

Recommended Controls to be used from 3rd Party lighting and automation platforms[1]

✓ **Brightness**

[1]See Appendices TOC for specific UI control per platform.

Case .1b   **Motorized (Pan or Tilt) DMX Device**

DMX channel	Assignment (as per DMX fixture's manual) within e-Node/dmx
1	**Pan**

ALIAS	Case .1a
ADDRESS	2.16.1
NOTIFY	BOTH
CHANNELS	1
BASE DMX CH	160
ASSIGN CH 1 (160)	PAN

Notes: Some DMX fixtures may have a PAN/TILT feature. These can be intelligently mapped to any type of variable slider in an automation system (i.e., **Pan** could be controlled by a Value (Brightness control)). In this case, use Pan or Tilt as appropriate.

✓ Renamed Slider or Dimmer to **Pan (or Tilt)**

[1]See Appendices TOC for specific UI control per platform.

Case 1   Red/Green/Blue DMX Device (using our color computer-HSB color space)

DMX channel	Assignment (as per DMX fixture's manual) within e-Node/dmx
1	**Red**
2	Green
3	**Blue**

ALIAS	Case 1
ADDRESS	2.5.1
NOTIFY	BOTH
CHANNELS	3
BASE DMX CH	50
ASSIGN CH 1 (50)	RED
ASSIGN CH 2 (51)	GREEN
ASSIGN CH 3 (52)	BLUE

Recommended Controls to be used from 3ʳᵈ Party lighting and automation platforms[1]

✓ **Hue**
✓ **Saturation**
✓ **Brightness**

Theory of Operation-Standard Operation Procedures for this Case

How To Set a Color (in HSB color space)	How To Set a TW-Kelvin Value (Workaround)
-**First**. Set Brightness level to a value > 0 (w/o brightness level there is no light output) -**Second**. Set Hue for color selection -**Third.** Set Saturation to vary the amount of white in color	Not possible

Notes:
[1]See Appendices TOC for specific UI control per platform.

Case 2   Red/Green/Blue/White DMX Device (using our color computer-HSB color space)

DMX channel	Assignment (as per DMX fixture's manual) within e-Node/dmx
1	**Red**
2	**Green**
3	**Blue**
4	**White**

ALIAS	Case 2
ADDRESS	2.6.1
NOTIFY	BOTH
CHANNELS	4
BASE DMX CH	60
ASSIGN CH 1 (60)	RED
ASSIGN CH 2 (61)	GREEN
ASSIGN CH 3 (62)	BLUE
ASSIGN CH 4 (63)	WHITE

Recommended Controls to be used from 3ʳᵈ Party lighting and automation platforms[1]

- ✓ **Hue**
- ✓ **Saturation**
- ✓ **Brightness**, plus
- ✓ Separate single slider channel for **White** (for mixing White with other colors)

Theory of Operation-Standard Operation Procedures for this Case

How To Set a Color (in HSB color space)	How To Set a TW-Kelvin Value (Workaround)
-**First.** Set Brightness level to a value >0 (w/o brightness level there is no light output) -**Second.** Set Hue for color selection -**Third.** Set Saturation to vary the amount of white in color	-**First.** Set Brightness (Fade) to a value > 0 -**Exception.** CCT selection is **not** a native function supported by this fixture. In order to generate a reasonable rendition of a tunable white setting, adjust the **H, S, B & W** levels individually to match a known Kelvin fixture and use the **STORE** and **RECALL** functions to access these-user created surrogate settings[2].

Notes:

[1] See Appendices TOC for specific UI control per platform.

[2] Since there is no native CCT support with this fixture type, use the **Store** and **Recall** functions (supported by **all** integration party platforms) to save or recall a compound CCT settings (CCT and Brightness all in one setting).

Case 3   **Red/Green/Blue + W(warm) + W(cool) DMX Device**
(using our color computer for HSB color space and TW control)

DMX channel	Assignment (as per DMX fixture's manual) within e-Node/dmx
1	**Red**
2	**Green**
3	**Blue**
4	**Warm White[1]**
5	**Cool White[2]**

CHANNELS	5
BASE DMX CH	30
ASSIGN CH 1 (30)	RED
ASSIGN CH 2 (31)	GREEN
ASSIGN CH 3 (32)	BLUE
ASSIGN CH 4 (33)	WARM
ASSIGN CH 5 (34)	COOL

Notes:

-On RGB+WW, models, an intelligent mapping is done between the first Warm LED channel (regardless of its real color) and an available dynamic variable (i.e., **WARM in this case**). The second intelligent mapping is done between the second White LED (again regardless of its real color temperature) and another available e-Node dynamic variable (i.e., **COOL in this case**).

Recommended Controls to be used from 3rd Party lighting and automation platforms[1]

- ✓ **Hue** (slider or dimmer)
- ✓ **Saturation** (slider or dimmer)
- ✓ **Brightness** (slider or dimmer)
- ✓ **CCT** (slider or dimmers to mix the two whites seamlessly)

Theory of Operation-Standard Operation Procedures for this Case

How To Set a Color (in HSB color space)	How To Set a TW-Kelvin Value
-**First.** Set Brightness level to a value >0 (w/o brightness level there is no light output)	-**First.** **Set Saturation to "0"** (which tells color computer the device is in TW color space)

| -**Second**. Set Hue for color selection
-**Third**. Set Saturation to vary the amount of white in color
(must be at a value >0 or else reverts to TW mode.) | -**Second.** Set Brightness (Fade) to a value > 0
-**Third.** Set Color Temp (K) with CCT slider[2] |

Notes:

[1]See [Appendices TOC](#) for specific UI control per platform.

[2][1]In order to store a combined CCT + Intensity ("V" or Fade level) value to describe a Color Temperature/Brightness level displayed, use the **STORE** function to save the hybrid value and the **RECALL** function to retrieve the hybrid value.

Case 4 **Brightness (Value) + RGB Device** (using our color computer for HSB color space)

DMX channel	Assignment (as per DMX fixture's manual) within e-Node/dmx
1	**Brightness (Value)**
2	**Red**
3	**Green**
4	**Blue**

ALIAS	Case 4
ADDRESS	2.8.1
NOTIFY	BOTH
CHANNELS	4
BASE DMX CH	80
ASSIGN CH 1 (80)	FULL
ASSIGN CH 2 (81)	RED
ASSIGN CH 3 (82)	GREEN
ASSIGN CH 4 (83)	BLUE

Notes: On RGB DMX fixtures, typically dimming is done without a color computer (i.e., there is simply a percentage applied to all of the illuminated colors that tries to dim accurately). The e-Node has a very sophisticated color computer built-in which typically in these cases will outperform the embedded simple multiplier function in those fixtures. In this case, select **FULL (see above)** which enables the e-Node's built-in color computer to perform the processing in Hue/Saturation/Brightness color space which is much more accurate.

Recommended Controls to be used from 3rd Party lighting and automation platforms[1]

- ✓ **Hue** (slider or dimmer)
- ✓ **Saturation** (slider or dimmer)
- ✓ **Brightness** (slider or dimmer)

Theory of Operation-Standard Operation Procedures for this Case

How To Set a Color (in HSB color space)	How To Set a TW-Kelvin Value (Workaround)
-**First**. Set Brightness level to a value >0 (w/o brightness level there is no light output) -**Second**. Set Hue for color selection -**Third**. Set Saturation to vary the amount of white in color.	Not possible

Notes:

[1]See [Appendices TOC](#) for specific UI control per platform.

Case 5   **Brightness (Value) + RGBW Device** (using our color computer for HSB color space)

DMX channel	Assignment (as per DMX fixture's manual) within e-Node/dmx
1	**Brightness (Value)**
2	**Red**
3	**Green**
4	**Blue**
5	**White**

ALIAS	Case 5
ADDRESS	2.9.1
NOTIFY	BOTH
CHANNELS	5
BASE DMX CH	90
ASSIGN CH 1 (90)	FULL
ASSIGN CH 2 (91)	RED
ASSIGN CH 3 (92)	GREEN
ASSIGN CH 4 (93)	BLUE
ASSIGN CH 5 (94)	WHITE

Notes: On RGB DMX fixtures, typically dimming is done without a color computer (i.e., there is simply a percentage applied to all of the illuminated colors that tries to dim accurately). The e-Node has a very sophisticated color computer built-in which typically in these cases will outperform the embedded simple multiplier function in those fixtures. In this case, select **FULL (see above)** which enables the e-Node's built-in color computer to perform the processing in Hue/Saturation/Brightness color space which is much more accurate.

<p align="center">Recommended Controls to be used from 3rd Party lighting and automation platforms*</p>

- ✓ **Hue** (slider or dimmer)
- ✓ **Saturation** (slider or dimmer)
- ✓ **Brightness** (slider or dimmer)
- ✓ Separate single slider channel for **White** (for mixing White with other colors)

<p align="center">Theory of Operation-Standard Operation Procedures for this Case</p>

How To Set a Color (in HSB color space)	How To Set a TW-Kelvin Value (Workaround)
-**First**. Set Brightness level to a value >0 (w/o brightness level there is no light output) -**Second**. Set Hue for color selection -**Third**. Set Saturation to vary the amount of white in color (must be at a value >0 or else reverts to TW mode.)	-**First**. Set Brightness (Fade) to a value > 0 -**Exception**. CCT selection is not a native function supported by this fixture. In order to generate a reasonable rendition of a tunable white setting, adjust the **H, S, B, W** levels individually to match a known Kelvin fixture and use the **STORE** and **RECALL** functions to access these user-created surrogate settings[2].

Notes:

[1]See Appendices TOC for specific UI control per platform.

[2] Since there is no native CCT support with this fixture type, use the **STORE** and **RECALL** functions (supported by **all** integration partner platforms) to save or recall a compound CCT settings (CCT and Brightness all in one setting).

Case 6a   **Brightness (Value) + Hue+ Saturation DMX Device** (using our pass-through mode)

DMX channel	Assignment (as per DMX fixture's manual) within e-Node/dmx
1	**Brightness (Value)**
2	**Hue**
3	**Saturation**

ALIAS	Case 6a
ADDRESS	2.10.1
NOTIFY	BOTH
CHANNELS	3
BASE DMX CH	100
ASSIGN CH 1 (100)	VALUE
ASSIGN CH 2 (101)	HUE
ASSIGN CH 3 (102)	SAT

Notes: This is an interesting case, where our drivers can seamlessly control HSB devices

Recommended Controls to be used from 3rd Party lighting and automation platforms[1]

✓ **Hue** (slider or dimmer)
✓ **Saturation** (slider or dimmer)
✓ **Brightness** (slider or dimmer)

Theory of Operation-Standard Operation Procedures for this Case

How To Set a Color (in HSB color space)	How To Set a TW-Kelvin Value
-**First**. Set Brightness level to a value >0 (w/o brightness level there is no light output) -**Second**. Set Hue for color selection -**Third.** Set Saturation to vary the amount of white in color	Not Possible

Notes:
[1]See Appendices TOC for specific UI control per platform.

Case 6b   **Hue+ Saturation+ Brightness (Value) DMX Device** (using our pass-through mode)

DMX channel	Assignment (as per DMX fixture's manual) within e-Node/dmx
1	**Hue**
2	**Saturation**
3	**Brightness (Value)**

ALIAS	Case 6b
ADDRESS	2.11.1
NOTIFY	BOTH
CHANNELS	3
BASE DMX CH	110
ASSIGN CH 1 (110)	HUE
ASSIGN CH 2 (111)	SAT
ASSIGN CH 3 (112)	VALUE

Notes: This just shows that the ordering of the functions within the DMX fixture really does not matter, as long as they are mapped carefully within the e-Node/dmx.

Recommended Controls to be used from 3rd Party lighting and automation platforms[1]

✓ **Hue** (slider or dimmer)
✓ **Saturation** (slider or dimmer)
✓ **Brightness** (slider or dimmer)

Theory of Operation-Standard Operation Procedures for this Case

How To Set a Color (in HSB color space)	How To Set a TW-Kelvin Value
-**First**. Set Brightness level to a value >0 (w/o brightness level there is no light output) -**Second**. Set Hue for color selection -**Third.** Set Saturation to vary the amount of white in color (	Not Possible

Notes:
[1]See Appendices TOC for specific UI control per platform.

Case 7a   Brightness (Value) + Hue/Saturation + W(warm)/W(cool) DMX Device
(using our color computer for HSB color space & Tunable White)

DMX channel	Assignment (as per DMX fixture's manual) within e-Node/dmx
1	**Brightness (Value)**
2	**Hue**
3	**Saturation**
4	**Warm White[1]**
5	**Cool White[2]**

CHANNELS	5	
BASE DMX CH	60	
ASSIGN CH 1 (60)	VALUE	⌄
ASSIGN CH 2 (61)	HUE	⌄
ASSIGN CH 3 (62)	SAT	⌄
ASSIGN CH 4 (63)	WARM	⌄
ASSIGN CH 5 (64)	COOL	⌄

Notes: On HSB + WW models, an intelligent mapping is done between the first Warm LED channel (regardless of its real color) and an available dynamic variable (i.e., **WARM in this case**). The second intelligent mapping is done between the second White LED (again regardless of its real color temperature) and another available e-Node dynamic variable (i.e., **COOL in this case**).

Recommended Controls to be used from 3rd Party lighting and automation platforms[1]

- ✓ **Hue** (slider or dimmer)
- ✓ **Saturation** (slider or dimmer)
- ✓ **Brightness** (slider or dimmer)
- ✓ **CCT** (slider or dimmers to mix the two whites seamlessly)

Theory of Operation-Standard Operation Procedures for this Case

How To Set a Color (in HSB color space)	How To Set a TW-Kelvin Value
-**First**. Set Brightness level to a value > 0 (w/o brightness level there is no light output) -**Second**. Set Hue for color selection -**Third**. Set Saturation to vary the amount of white in color (must be at a value >0 or else reverts to TW mode.)	-**First. Set Saturation to "0"** (which tells color computer the device is in TW color space) -**Second.** Set Brightness (Fade) to a value > 0 -**Third.** Set Color Temp (K) with CCT slider[2]

Notes:
[1]See Appendices TOC for specific UI control per platform.
[2]In order to store a combined CCT + Intensity ("V" or Fade level) value to describe a Color Temperature/Brightness level displayed, use the **STORE** function to save the hybrid value and the **RECALL** function to retrieve the hybrid value.

Case 7b — Hue/Saturation + Brightness + W(cool)/W(warm) DMX Device
(using our color computer for Tunable White control

DMX channel	Assignment (as per DMX fixture's manual) within e-Node/dmx
1	**Hue**
2	**Saturation**
3	**Brightness (Value)**
4	**Cool White[2]**
5	**Warm White[1]**

CHANNELS	5	
BASE DMX CH	60	
ASSIGN CH 1 (60)	HUE	⌄
ASSIGN CH 2 (61)	SAT	⌄
ASSIGN CH 3 (62)	VALUE	⌄
ASSIGN CH 4 (63)	COOL	⌄
ASSIGN CH 5 (64)	WARM	⌄

Notes: On HSB + WW models, an intelligent mapping is done between the first Warm LED channel (regardless of its real color) and an available dynamic variable (i.e., **COOL in this case**). The second intelligent mapping is done between the second White LED (again regardless of its real color temperature) and another available e-Node dynamic variable (i.e., **WARM in this case**).

Recommended Controls to be used from 3rd Party lighting and automation platforms[1]

- ✓ **Hue** (slider or dimmer)
- ✓ **Saturation** (slider or dimmer)
- ✓ **Brightness** (slider or dimmer)
- ✓ **CCT** (slider or dimmers to mix the two whites seamlessly)

Theory of Operation-Standard Operation Procedures for this Case

How To Set a Color (in HSB color space)	How To Set a TW-Kelvin Value
-**First**. Set Brightness level to a value >0 (w/o brightness level there is no light output) -**Second**. Set Hue for color selection -**Third**. Set Saturation to vary the amount of white in color (must be at a value >0 or else reverts to TW mode.)	-**First. Set Saturation to "0"** (which tells color computer the device is in TW color space -**Second.** Set Brightness (Fade) to a value >0 -**Third.** Set Color Temp (K) with CCT slider[2]

Notes:
[1]See Appendices TOC for specific UI control per platform.
[2]In order to store a combined CCT + Intensity ("V" or Fade level) value to describe a Color Temperature/Brightness level displayed, use the **STORE** function to save the hybrid value and the **RECALL** function to retrieve the hybrid value.

Case 8a — Brightness (Value) + CCT + Saturation + Hue DMX Device (using our pass-through mode)

DMX channel	Assignment (as per DMX fixture's manual) within e-Node/dmx
1	**Brightness (Value)**
2	**CCT**
3	**Saturation**
4	**Hue**

ALIAS	Case 8a
ADDRESS	2.18.1
NOTIFY	BOTH
CHANNELS	4
BASE DMX CH	180
ASSIGN CH 1 (180)	VALUE
ASSIGN CH 2 (181)	CCT
ASSIGN CH 3 (182)	SAT
ASSIGN CH 4 (183)	HUE

Notes: This just shows that the ordering of the functions within the DMX fixture really does not matter, as long as they are mapped carefully within the e-Node/dmx.

Theory of Operation-Standard Operation Procedures for this Case

How To Set a Color (in HSB color space)	How To Set a TW-Kelvin Value
-**First**. Set Brightness level to a value >0 (w/o brightness level there is no light output) -**Second**. Set Hue for color selection -**Third**. Set Saturation to vary the amount of white in color (must be at a value >0 or else reverts to TW mode.)	-**First.** **Set Saturation to "0"** (which tells color computer the device is in TW color space -**Second.** Set Brightness (Fade) to a value >0 -**Third.** Set Color Temp (K) with CCT slider[2]

Notes:

[1]See Appendices TOC for specific UI control per platform.

[2]In order to store a combined CCT + Intensity ("V" or Fade level) value to describe a Color Temperature/Brightness level displayed, use the **STORE** function to save the hybrid value and the **RECALL** function to retrieve the hybrid value.

Case 8b   **Brightness (Value) + Hue + Saturation + CCT DMX Device** (using our pass-through mode)

DMX channel	Assignment (as per DMX fixture's manual) within e-Node/dmx
1	**Brightness (Value)**
2	**Hue**
3	**Saturation**
4	**CCT**

ALIAS	Case 8b
ADDRESS	2.14.1
NOTIFY	BOTH
CHANNELS	4
BASE DMX CH	140
ASSIGN CH 1 (140)	VALUE
ASSIGN CH 2 (141)	HUE
ASSIGN CH 3 (142)	SAT
ASSIGN CH 4 (143)	CCT

Notes: This just shows that the ordering of the functions within the DMX fixture really does not matter, as long as they are mapped carefully within the e-Node/dmx.

Recommended Controls to be used from 3rd Party lighting and automation platforms*

- ✓ **Hue** (slider or dimmer)
- ✓ **Saturation** (slider or dimmer)
- ✓ **Brightness** (slider or dimmer)
- ✓ **CCT** (slider or dimmers to mix the two whites seamlessly)

Note: see Appendices TOC for specific UI control per platform.

Case 8c   **Hue + Saturation + Brightness (Value) + CCT DMX Device** (using our pass-through mode)

DMX channel	Assignment (as per DMX fixture's manual) within e-Node/dmx
1	**Hue**
2	**Saturation**
3	**Brightness (Value)**
4	**CCT**

ALIAS	Case 8c
ADDRESS	2.15.1
NOTIFY	BOTH
CHANNELS	4
BASE DMX CH	150
ASSIGN CH 1 (150)	HUE
ASSIGN CH 2 (151)	SAT
ASSIGN CH 3 (152)	VALUE
ASSIGN CH 4 (153)	CCT

Notes: This just shows that the ordering of the functions within the DMX fixture really does not matter, as long as they are mapped carefully within the e-Node/dmx.

Recommended Controls to be used from 3rd Party lighting and automation platforms[1]

- ✓ **Hue** (slider or dimmer)
- ✓ **Saturation** (slider or dimmer)
- ✓ **Brightness** (slider or dimmer)
- ✓ **CCT** (slider or dimmers to mix the two whites seamlessly)

Theory of Operation-Standard Operation Procedures for this Case

How To Set a Color (in HSB color space)	How To Set a TW-Kelvin Value
-**First**. Set Brightness level to a value >0 (w/o brightness level there is no light output) -**Second**. Set Hue for color selection -**Third**. Set Saturation to vary the amount of white in color (must be at a value >0 or else reverts to TW mode.)	-**First.** **Set Saturation to "0"** (which tells color computer the device is in TW color space -**Second.** Set Brightness (Fade) to a value > 0 -**Third.** Set Color Temp (K) with CCT slider[2]

Notes:

[1]See Appendices TOC for specific UI control per platform.

[2]1In order to store a combined CCT + Intensity ("V" or Fade level) value to describe a Color Temperature/Brightness level displayed, use the **STORE** function to save the hybrid value and the **RECALL** function to retrieve the hybrid value.

Case 9　　　　**Brightness (Value) + CCT Hue + Saturation + Hue DMX Device** (using our pass-through mode)

DMX channel	Assignment (as per DMX fixture's manual) within e-Node/dmx
1	**Brightness (Value)**
2	**CCT**
3	**Saturation**
4	**Hue**

ALIAS	Case 9	
ADDRESS	2.4.1	
NOTIFY	BOTH	⌄
CHANNELS	4	
BASE DMX CH	1	
ASSIGN CH 1 (1)	VALUE	⌄
ASSIGN CH 2 (2)	CCT	⌄
ASSIGN CH 3 (3)	SAT	⌄
ASSIGN CH 4 (4)	HUE	⌄

Notes: This just shows that the ordering of the functions within the DMX fixture really does not matter, as long as they are mapped carefully within the e-Node/dmx.

Recommended Controls to be used from 3rd Party lighting and automation platforms[1]

- ✓ **Hue** (slider or dimmer)
- ✓ **Saturation** (slider or dimmer)
- ✓ **Brightness** (slider or dimmer)
- ✓ **CCT** (slider or dimmers to mix the two whites seamlessly)

Theory of Operation-Standard Operation Procedures for this Case

| How To Set a Color (in HSB color space)	How To Set a TW-Kelvin Value
-**First**. Set Brightness level to a value >0 (w/o brightness level there is no light output) -**Second**. Set Hue for color selection -**Third**. Set Saturation to vary the amount of white in color (must be at a value > 0 or else reverts to TW mode.)	-**First**. **Set Saturation to "0"** (which tells color computer the device is in TW color space -**Second**. Set Brightness (Fade) to a value >0 -**Third**. Set Color Temp (K) with CCT slider[2]

Notes:
[1]See Appendices TOC for specific UI control per platform.
[2]In order to store a combined CCT + Intensity ("V" or Fade level) value to describe a Color Temperature/Brightness level displayed, use the **STORE** function to save the hybrid value and the **RECALL** function to retrieve the hybrid value.

Case 10　　　　**Warm/W + Mid/W +Cool/W DMX Device** (using our color computer for Tunable White control)

DMX channel	Assignment (as per DMX fixture's manual) within e-Node/dmx
1	**W1 (Warm White)**
2	**W2 (Mid White)**
3	**W3 (Cool White)**

ADDRESS	2.5.1	
NOTIFY	BOTH	⌄
CHANNELS	3	
BASE DMX CH	50	
ASSIGN CH 1 (50)	WARM	⌄
ASSIGN CH 2 (51)	WHITE	⌄
ASSIGN CH 3 (52)	COOL	⌄

Notes: This just shows that the ordering of the functions within the DMX fixture really does not matter, as long as they are mapped carefully within the e-Node/dmx.

Recommended Controls to be used from 3rd Party lighting and automation platforms[1]

- ✓ **Brightness** (slider or dimmer)

✓ **CCT** (slider or dimmers to mix the two whites seamlessly)

Theory of Operation-Standard Operation Procedures for this Case

How To Set a Color (in HSB color space)	How To Set a TW-Kelvin Value
Not Possible	-**First.** Set Brightness (Fade) to a value > 0 -**Second.** Set Color Temp (K) with CCT slider[2]

Notes:

[1]See Appendices TOC for specific UI control per platform.

[2]In order to store a combined CCT + Intensity ("V" or Fade level) value to describe a Color Temperature/Brightness level displayed, use the **STORE** function to save the hybrid value and the **RECALL** function to retrieve the hybrid value.

Case 11   **Warm/W + Mid/W +Cool/W + Brightness (Value^{TW}) DMX Device**
(using our Color Computer for Tunable White control)

DMX channel	Assignment (as per DMX fixture's manual) within e-Node/dmx
1	**W1 (Warm White)**
2	**W2 (Mid White)**
3	**W3 (Cool White)**
4	**Brightness (Value^{TW})**

ADDRESS	2.1.1
NOTIFY	BOTH
CHANNELS	4
BASE DMX CH	1
ASSIGN CH 1 (1)	WARM
ASSIGN CH 2 (2)	WHITE
ASSIGN CH 3 (3)	COOL
ASSIGN CH 4 (4)	FULL

Notes: This shows mapping of a full spectrum of three Whites within the fixture controlled by a single CCT control

Recommended Controls to be used from 3rd Party lighting and automation platforms[1]

✓ **Brightness** (slider or dimmer) ✓ **CCT** (slider or dimmers to mix the two whites seamlessly)	✓

Note:

[1] see Appendices TOC for specific UI control per platform.

Case 12 **Red/Green/Blue + W1(warm) + W2(cool) + Brightness(Value^{C}) + Brightness(Value^{TW}) DMX Device**
(using our color computer for HSB control and for Tunable White control)

DMX channel	Assignment (as per DMX fixture's manual) within e-Node/dmx
1	**Red**
2	**Green**
3	**Blue**
4	**Warm White**
5	**Cool White**
6	**Brightness (Value^{C})**
7	**Brightness (Value^{TW})**

ADDRESS	2.1.2
NOTIFY	BOTH
CHANNELS	7
BASE DMX CH	10
ASSIGN CH 1 (10)	RED
ASSIGN CH 2 (11)	GREEN
ASSIGN CH 3 (12)	BLUE
ASSIGN CH 4 (13)	WARM
ASSIGN CH 5 (14)	COOL
ASSIGN CH 6 (15)	RGB ENABLE
ASSIGN CH 7 (16)	FULL

Notes:

-On RGB+WW, models, an intelligent mapping is done between the first Warm LED channel (regardless of its real color) and an available dynamic variable (i.e., **WARM in this case**). The second intelligent mapping is done between the second White LED (again regardless of its real color temperature) and another available e-Node dynamic variable (i.e., **COOL in this case**).
-**RGB Enable** is a special function that turns on the channel selectively whenever a Hue value is set, otherwise Color Temperature (CCT) output is generated.
- White/Cool/Warm can be used for virtually any type of White in a multi-DMX channel fixture (regardless of color temperature) **but NOT for a monochrome (white) single-channel fixture**

Recommended Controls to be used from 3rd Party lighting and automation platforms[1]

- ✓ **Hue** (slider or dimmer)
- ✓ **Saturation** (slider or dimmer)
- ✓ **Brightness** (slider or dimmer)
- ✓ **CCT** (slider or dimmers to mix the two whites seamlessly)

Theory of Operation-Standard Operation Procedures for this Case

How To Set a Color (in HSB color space)	How To Set a TW-Kelvin Value
-**First**. Set Brightness level to a value >0 (w/o brightness level there is no light output) -**Second**. Set Hue for color selection -**Third**. Set Saturation to vary the amount of white in color (must be at a value > 0 or else reverts to TW mode.)	-**First.** Set Brightness (Fade) to a value >0 -**Second.** Set Color Temp (K) with CCT slider[2]

Notes:
[1]See Appendices TOC for specific UI control per platform.
[2]In order to store a combined CCT + Intensity ("V" or Fade level) value to describe a Color Temperature/Brightness level displayed, use the **STORE** function to save the hybrid value and the **RECALL** function to retrieve the hybrid value.

Case 13   **Brightness (Value) + CCT** (using our control computer and pass-through mode)

DMX channel	Assignment (as per DMX fixture's manual) within e-Node/dmx
1	**Brightness (Value)**
2	**CCT**

CHANNELS	2	
BASE DMX CH	1	
ASSIGN CH 1 (1)	VALUE	⌄
ASSIGN CH 2 (2)	CCT	⌄

Notes: The DMX fixture's built-in CCT control is controlled directly through this "CCT" pass-through function.

Recommended Controls to be used from 3rd Party lighting and automation platforms[1]

- ✓ **Brightness** (slider or dimmer)
- ✓ **CCT** (slider or dimmers to mix the two whites seamlessly)

Theory of Operation-Standard Operation Procedures for this Case

How To Set a Color (in HSB color space)	How To Set a TW-Kelvin Value
Not Possible	-**First.** Set Brightness (Fade) to a value > 0 -**Second.** Set Color Temp (K) with CCT slider[2]

Notes:
[1]See Appendices TOC for specific UI control per platform.

[2]In order to store a combined CCT + Intensity ("V" or Fade level) value to describe a Color Temperature/Brightness level displayed, use the **STORE** function to save the hybrid value and the **RECALL** function to retrieve the hybrid value.

Case 14 Red/Green/Blue/White + Speed Control CinemaTech Fiber Optic DMX Device
(using our color computer for RGBW color space) and our color computer for Speed Control)
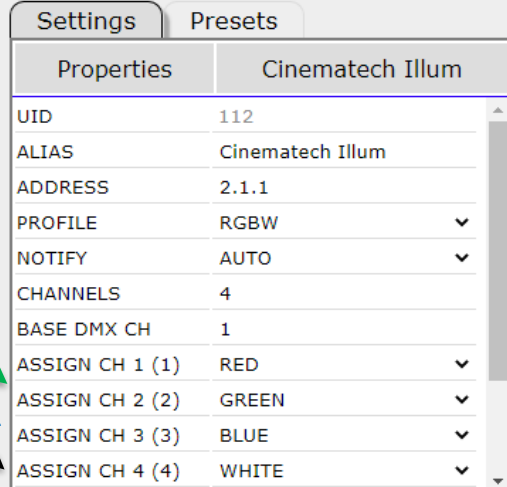
(Two fixtures created as shown below to handle unique circumstance of this configuration)

	DMX Fixture 11	CHANNELS	4
	Cinematech Illum	BASE DMX CH	1
	Cinematech Speed Con	ASSIGN CH 1 (1)	VALUE
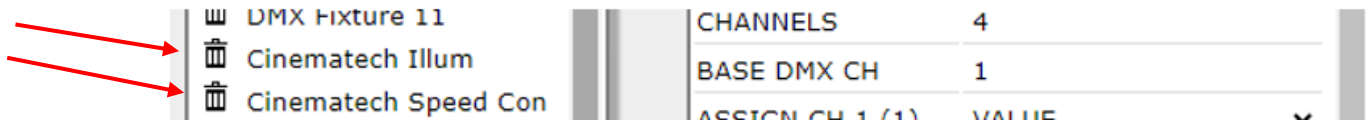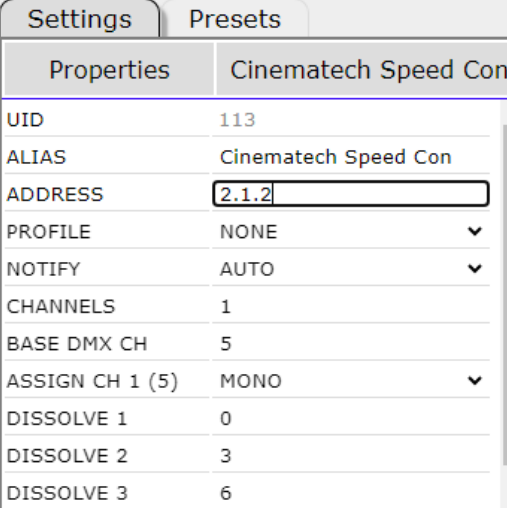
(First Fixture of Two Required here)

DMX channel	Assignment (as per DMX fixture's manual) within e-Node/dmx
1	Red
2	Green
3	Blue
4	White

Settings | Presets

Properties	Cinematech Illum
UID	112
ALIAS	Cinematech Illum
ADDRESS	2.1.1
PROFILE	RGBW
NOTIFY	AUTO
CHANNELS	4
BASE DMX CH	1
ASSIGN CH 1 (1)	RED
ASSIGN CH 2 (2)	GREEN
ASSIGN CH 3 (3)	BLUE
ASSIGN CH 4 (4)	WHITE

DMX channel	Assignment (as per DMX fixture's manual) within e-Node/dmx
1	Mono

Settings | Presets

Properties	Cinematech Speed Con
UID	113
ALIAS	Cinematech Speed Con
ADDRESS	2.1.2
PROFILE	NONE
NOTIFY	AUTO
CHANNELS	1
BASE DMX CH	5
ASSIGN CH 1 (5)	MONO
DISSOLVE 1	0
DISSOLVE 2	3
DISSOLVE 3	6

Recommended Controls to be used from 3rd Party lighting and automation platforms[1]

- ✓ **Hue** (slider or dimmer)
- ✓ **Saturation** (slider or dimmer)
- ✓ **Brightness** (slider or dimmer)
- ✓ **Monochrome Slider** slider or dimmers to control the speed from Slow to Fast)

Theory of Operation-Standard Operation Procedures for this Case

How To Set a Color (in HSB color space)	How To Set Speed Control
-**First**. Set Brightness level to a value >0 (w/o brightness level there is no light output) -**Second**. Set Hue for color selection -**Third.** Set Saturation to vary the amount of white in color	-**First.** Set Brightness (Fade) to a value >0

Notes:

[1]See Appendices TOC for specific UI control per platform.

[2][1]In order to store a combined HSV + speed setting ("V" or Fade level) set desired state, use the **STORE** function to save the hybrid value and the **RECALL** function to retrieve the hybrid value.

Appendix 2
Control4 Setup for DMX and Examples

Control4 User Interface for Converging Systems' Drivers. The desired method of control for color lighting is in the **H**ue/**S**aturation/**B**rightness color space. If a DMX fixture has only RGB inputs, the e-Node controls those inputs using the preferred HSB color space (i.e., a slider for Hue, a slider for Saturation and a slider for Brightness "Value"). By using HSB sliders/dimmers, a full range of color control and dimming is possible *often beyond the scope of a native DMX fixture*. In addition, interesting add-ons such as Tunable White (**TW**), and Correlated Color Temperature Control (**CCT**) as well as add-ons for individual tweaking of R, G, B values are possible. We have prepared a simple logic diagram found below under "Recommended Control4/CSI Driver Assistant" tool to aid in your system design and programming.

Summary of Various C4 drivers. Below are various drivers available. Within each driver are settings such as:
- **Notify** (for bidirectional feedback-set to **BOTH** we recommend for getting HSB and RGBW and CCT feedback), and
- **Zone, Group, Node** address. Fill in all those as appropriate.
- Within the Generic Driver (only) there is a pulldown for setting custom passthrough **Functions**.
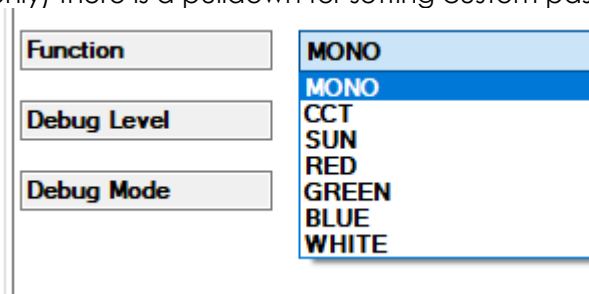
Driver Names (besides the single communication device for e-Node/dmx to which all units are connected) are listed below and should be installed within your project (1 or more) depending upon the directions within the Driver Selection Tools documentation below.

Name
• "**LED Lighting Controller Multi**" (see elsewhere for instructions here)
• "**LED Lighting Controller Generic**" for pass through control of a number of functions (see elsewhere for instructions here)
• "**Projection Screen**" (one per motor)

Recommended Control4/CSI Driver Assistant Tool. There are currently several drivers for Control4 which enable the above DMX fixtures to be supported. Provided the command HUE does not appear as a supported DMX input channel, the sophisticated e-Node color computer is selectively added automatically through this driver selection process. If the command HUE does appear, an alternative pass-through technology is selected that intelligently passes through a variable string from 0 ~ 255 for each variable function selected, all ***without interfering with the DMX's fixture built-in color management technology.***
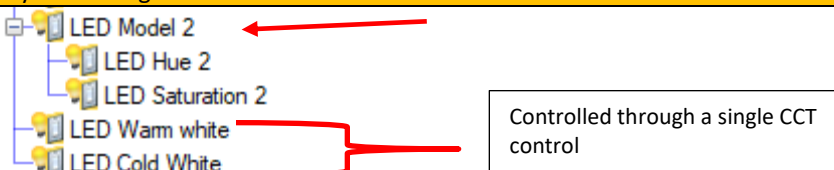
Use this decision tree to determine the proper driver(s) to be loaded.

Fixture Input Type
1-channel
2-channel
3 or more channels

If "1",
-Select One "LED Lighting Controller Generic" driver and assign Function ... (MONO only here)

If "2",
-Select one "LED Lighting Controller Generic" for Chn1 and assign Function
- Select one "LED Lighting Controller Generic" for Chn2 and assign Function

Do **any of the three** of the channels include HUE?
        NO   YES

Select one "Led Lighting Controller Multi" and assign Function for each of the three channels as documented within DMX fixture's manual.

Note: if those functions are R, G, B for instance—the C4 system will auto-generate Hue/Saturation/Brightness UI controls for the first three channels to be supported (which is our recommended technology position over old-school R/G/B controls)

Select one "LED Lighting Controller Multi" and assign Function for specific Hue channel to "Hue" plus other channels as appropriate

Note: The assignment of "Hue" leverages off of the fixture's built-in color computer

Are there additional channels beyond the first 3 that need supporting?
NO
YES

You are done with loading drivers

If "Yes," for **each** additional channel add one "LED Lighting Controller Generic" and assign Function

Control4 Examples

Example C4.1- Case for the control of Red/Green/Blue + W/W (using our color computer)
- Program as per Case 3 within e-Node
- Add Multi-Driver and name if accordingly
- Add Generic Driver and name it accordingly for CCT (color temperature)

Details of System Design-Two drivers loaded	
	Controlled through a single CCT control
Details of multi driver	**Details of Generic driver (1) settings (for control of two different Whites using a calculated CCT)**
Zone 2	Zone 2
Group 1	Group 1
Node 1	Node 1
UID 0	UID 0
Fade to Warm 0	Function CCT

Example C4.2- Case for the control of Brightness/CCT/Saturation and Hue (features built-into DMX fixture) using pass through mode
- Program as per Case 8a within e-Node
- Add Multi-Driver and name if accordingly
- Add Generic Driver and name it accordingly

Details of System Design-Two drivers loaded	
Details of multi driver	**Details of Generic driver settings**
Zone 2	Zone 2
Group 1	Group 1
Node 1	Node 1
UID 0	UID 0
Fade to Warm 0	Function CCT

Example C4.3- Case for the control of W1+W2+W3 (features built-into DMX fixture) using our color computer mode

- Program as per Case 10 within e-Node
- Add Multi-Driver and name if accordingly
- Add Generic Driver and name it CCT (whereby we will be controlling two separate whites with a unified CCT control

Details of System Design-Two drivers loaded

Details of multi driver	Details of Generic driver settings

Zone	2	Zone	2
Group	1	Group	1
Node	1	Node	1
UID	0	UID	0
Fade to Warm	0	Function	CCT

Appendix 3
Crestron Setup for DMX and Examples (SIMPL)

Crestron User Interface for Converging Systems' Drivers. The desired method of control for color lighting is in the **H**ue/**S**aturation/**B**rightness color space. If a DMX fixture has only RGB inputs, the e-Node controls those inputs using the preferred HSB color space (i.e., a slider for **H**ue, a slider for **S**aturation and a slider for **B**rightness "Value".) By using HSB sliders/dimmers, a full range of color control and dimming is possible *often beyond the scope of a native DMX fixture*. In addition, interesting add-ons such as Tunable White (**TW**), and Correlated Color Temperature Control (**CCT**) as well as add-ons for individual tweaking of R, G, B values are possible.

Summary of Crestron/Converging Systems drivers. The latest Crestron created drivers for Converging Systems available from Crestron) dramatically simplifies the support of basically any type of Converging Systems' supported lighting fixture. That includes, single element (monochrome), Tunable White (2 or more whites), RGB (3 color), RGBW (4-color) as well as variety of more sophisticated DMX offerings including **H**ue/**S**aturation/**B**rightness channels as well as hybrid Tunable White (TW) and Correlated Color Temperature (CCT) channels.

Consult **Integration Note** for more information.

Background on various UI types.

Keypads	App buttons and sliders	Widgets	Color Picker
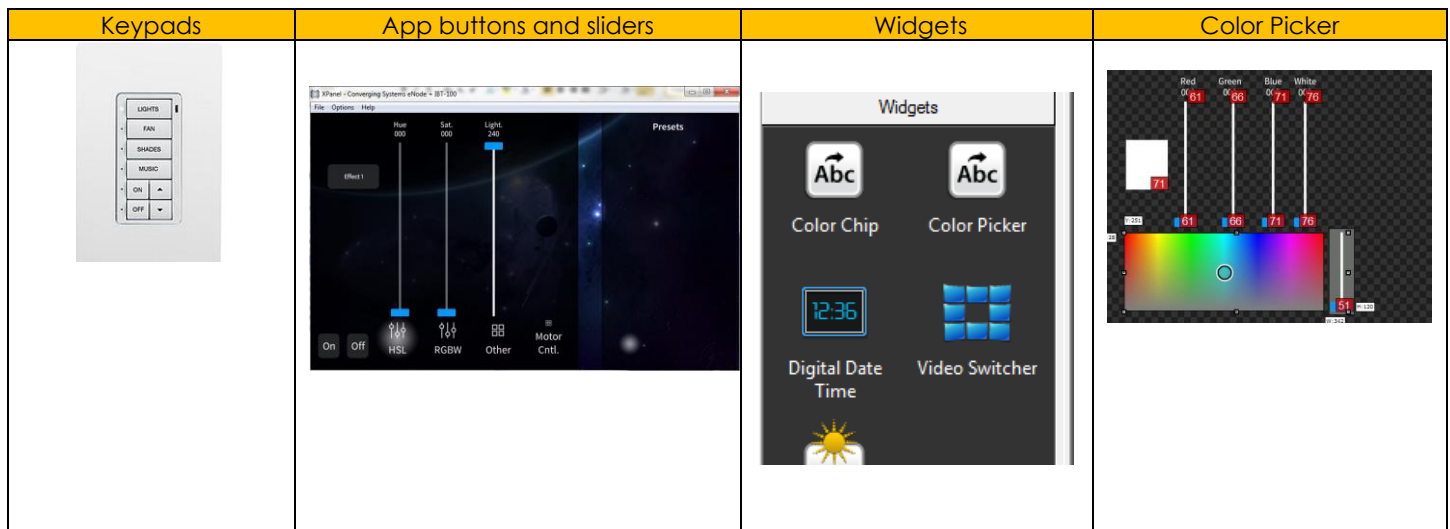
Crestron Examples
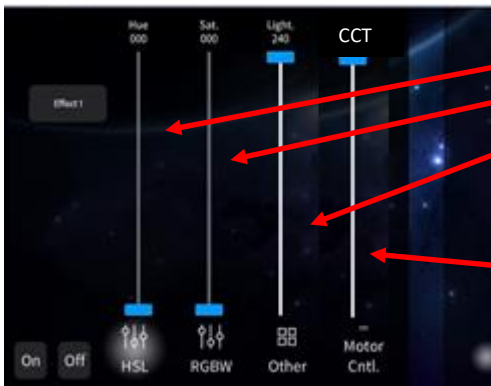
Example CS.1- Case for the control of Red/Green/Blue DMX fixture (using our color computer)
- Program as per Case 1 within e-Node
- Add device(s) and select UI controls

Details of System Design/UI Programming		
UI Control to be added	**Actual UI auto-generated**	**Theory of Operation**
-In VisionTools Pro-E, select a Slider and drag it over to the page where you wish it be located -Create three sliders/dimmers for: a. Hue b. Saturation c. Brightness -Attach them to a device with the same **Z**one/**G**roup/**N**ode address as programmed during the commissioning process		Full color control is supported through these sliders -Hue -Saturation -Brightness

Example CS.2- Example E.3- Case for the control of RBW + W/W + V^{RGB}+V^{TW} Fixture (using our color computer)
- Program as per Case 12 within e-Node
- Add device(s) and select UI controls

Details of System Design/UI Programming		
UI Control to be added	**Actual UI auto-generated**	**Theory of Operation**
-In VisionTools Pro-E, select a Slider and drag it over to the page where you wish it be located -Create three sliders/dimmers for: a. Hue b. Saturation c. Brightness d. Color Temperature (CCT) -Attach them to a device with the same **Z**one/**G**roup/**N**ode address as programmed during the commissioning process		Full color control is supported through these sliders -Hue -Saturation -Brightness And -Color Temperature (CCT)

Appendix 4
Elan Setup for DMX and Examples

Elan User Interface for Converging Systems' Drivers. The desired method of control for color lighting is in the **H**ue/**S**aturation/**B**rightness color space. If a DMX fixture has only RGB inputs, the e-Node controls those inputs using the preferred HSB color space (i.e., a slider for **H**ue, a slider for **S**aturation and a slider for **B**rightness "Value".) By using HSB sliders/dimmers, a full range of color control and dimming is possible *often beyond the scope of a native DMX fixture*. In addition, interesting add-ons such as Tunable White (**TW**), and Correlated Color Temperature Control (**CCT**) as well as add-ons for individual tweaking of R, G, B values are possible.
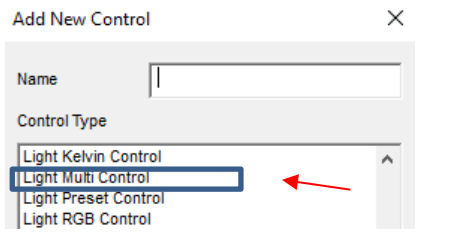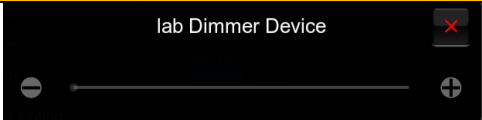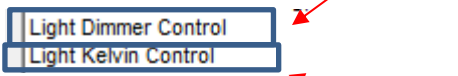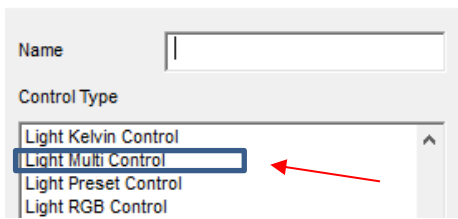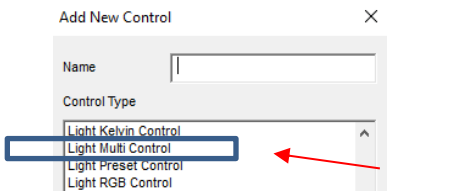
Summary of Elan/Converging Systems drivers. The latest Elan Core release v.8.6 dramatically simplifies the support of basically any type of Converging Systems' supported lighting fixture. That includes, single element (monochrome), RGB (3 color), RGBW (4-color) as well as variety of more sophisticated DMX offerings including **H**ue/**S**aturation/**B**rightness channels as well as Tunable White (TW) and Correlated Color Temperature (CCT) channels. By simply selecting the "**Discover Device**" magic button within Elan Configurator for a discovered e-Node/dmx, all of these relevant features (where applicable) are auto-discovered as "devices" within the Lighting Tab. Typically, there is no reason to do anything else but create a specified supported UI type and fill in the supported device within the "**Connect to..**" entry. All of this is contained within a single unified Elan hosted/approved driver!!!

Within each discovered device are:
- **Zone, Group, Node** address. Unless you want to create your own custom broadcast device (for controlling multiple devices using a wildcard indicator), previously commissioned devices will all have their address pre-filled in.
- **Command.** Unless you want to create your own custom control device (for controls that be in addition to those auto-discovered), all previously commissioned devices will all have their commands pre-filled in.
- **Level.** Unless you want to create your own custom control device (for Recalls and Stores beyond those now supported natively within Elan), you will not need to enter any values here either.
- **Dissolve/Ramp (sec).** This entry might be useful in more advance cases where you wish to alter the dissolve rates from ON to OFF, from once color to another, and rates at which Effect transitions (consult CSI documentation for Elan for more).
- Within the Generic Driver (only) there is a pulldown for setting custom passthrough **Functions**.

Lighting Device: 400M LG_A_SW	
Name	400M LG_A_SW
Location	1st floor: office
System #	118900
Device Type	On/Off Device
Device Classification	Light
Hide Device from Scheduler	No
Address (Z.G.N)	200.1.1
Command	ON/OFF
Level	
Dissolve/Ramp (sec)	
Device Testing	
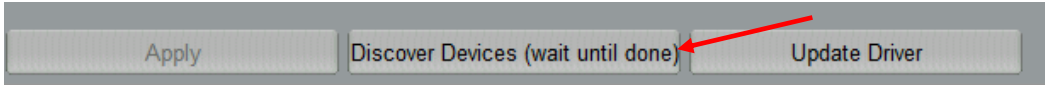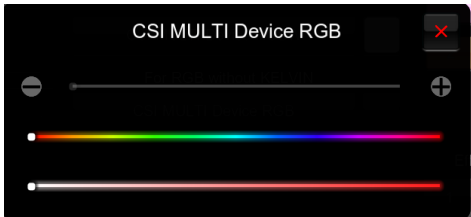
Background on various UI types.

For fixture types	"New Control" required to be added within Custom Page to generate UI shown under "UI Example" column	Is device type necessary to support this UI auto-discovered with driver setup?	UI example
Monochrome	Add "Lighting Multi Control" Add New Control ✕ Name Control Type Light Kelvin Control Light Multi Control Light Preset Control Light RGB Control	**Yes- no action required** **Note:** a Dimmer is autogenerated during a DMX device discovery where a single channel is encountered within the device	lab Dimmer Device Note: this is an Elan "Lighting Multi Control" UI that provides only one slider.
CCT Device with Dimming	Add two UI controls -one "Light Dimmer Control" for Intensity (connect to MCH device) Light Dimmer Control Light Kelvin Control -one "Light Kelvin Control" for CCT (connect o MCH device)	**Yes- no action required** **Note:** a Dimmer_MCH is autogenerated during a DMX device discovery where a "DMX-Multi-Channel" type device is is encountered	www + v mch 211 WAC RGB (w w w) TI 212 Note: Currently, there is **not** an Elan "Lighting Multi Control" that just provides Dimming and CCT so the alternative is two create two individual controls here (i.e., one Light Dimmer and one Light Kelvin)
RGB devices without CCT or TW	Add "Lighting Multi Control" Add New Control ✕ Name Control Type Light Kelvin Control Light Multi Control Light Preset Control Light RGB Control	**Yes-no action required** **Note:** a Dimmer_Multi is autogenerated during a DMX device discovery where a "DMX-Multi-Channel" type device (where DMX channels >2) is is encountered	CSI MULTI Device RGB Note: this is an Elan "Lighting Multi Control" UI that provides a HSB (triple-set) of sliders.
RGB devices with CCT or TW	Add "Lighting Multi Control" Add New Control ✕ Name Control Type Light Kelvin Control Light Multi Control Light Preset Control Light RGB Control	**No- Therefore action required.** **Note:** Add a new device called a Dimmer (Spectrum Mulit-Ch) and enter an applicable **Z**one/**G**roup/**N**ode address.	CSI MULTI Device RGBW 3500k CSI MULTI Device RGB Note: this is an Elan "Lighting Multi Control" UI that provides a HSB (triple-set) of sliders + CCT slider (which results from manually adding the Dimmer (Spectrum Multi-Ch).

Elan Examples
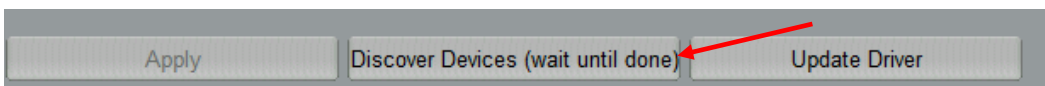
Example E.1- Case for the control of Red/Green/Blue (using our color computer)

- Program as per Case 1 within e-Node
- Have Converging Systems driver auto-discovery DMX fixture as a DMX-Multi-Channel" device

Details of System Design/UI Programming		
UI Control to be added	Actual UI auto-generated	Theory of Operation
-Insert (single) "Lighting Multi Control" object -For control within Properties/ "**Connect to..** – Scroll down and find auto-generated Multi Device (for this DMX fixture) and select Enter		Dimmer control Hue control (color selection) Saturation control (absence or presence of color)
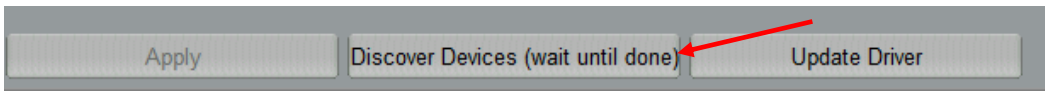
Example E.2- Case for the control of Triple W Tunable White + Built in Intensity Fixture (using our color computer)

- Program as per Case 11 within e-Node
- Have Converging Systems driver auto-discovery DMX fixture as a DMX-Multi-Channel" device

Details of System Design/UI Programming		
UI Control to be added	Actual UI auto-generated	Theory of Operation
-Insert "Light Dimmer Control" **+** -Insert "Light Kelvin Control" -For **each** control within Properties/**Connect To…** Scroll down and find auto-generated Multi Device (for this DMX fixture) and select Enter		Dimmer control Intelligent CCT control

Example E.3- Case for the control of RBW + W/W + V^{RGB}+V^{TW} Fixture (using our color computer)

- Program as per Case 12 within e-Node
- Have Converging Systems driver auto-discovery DMX fixture as a DMX-Multi-Channel" device

Details of System Design/UI Programming		

UI Control to be added	Actual UI auto-generated	Theory of Operation
IMPORTANT FIRST STEP **Under the Device Tree in Configuration add a new device** Dimmer (Spectrum Mulit-Ch) (enter **Z**one/**G**roup/**N**ode for device) -Insert (single) "Lighting Multi Control" object -For control within Properties/ "**Connect to..** – Scroll down and find auto-generated Multi Device (for this DMX fixture) and select Enter		Dimmer control[1] CCT control Hue control (color selection) Saturation control (absence or presence of color) **[1]The Dimmer Controls whatever is active at the moment.**

Example E.4- Case for the control of Lumenetix RBW + W/W + V^{RGB}+V^{TW} Fixture (using our color computer)

- Program as per Case 9 within e-Node
- Have Converging Systems driver auto-discovery DMX fixture as a DMX-Multi-Channel" device

Details of System Design/UI Programming

Apply	Discover Devices (wait until done)	Update Driver

UI Control to be added	Actual UI auto-generated	Theory of Operation
IMPORTANT FIRST STEP **Under the Device Tree in** **Configuration add a new device** Dimmer (Spectrum Mulit-Ch) (enter **Z**one/**G**roup/**N**ode for device) -Insert (single) "Lighting Multi Control" object -For control within Properties/ "**Connect to..** – Scroll down and find auto-generated Multi Device (for this DMX fixture) and select Enter		Dimmer control[2] CCT control[1] Hue control[1] (color selection) Saturation control[1] (absence or presence of color) [1]Note: This DMX fixture has some built-in logic within its DMX decoder which requires that you set Saturation to 0 before adjusting color temperature. Specifically, -if Saturation >0 then colors can be selected. -if Saturation =0 then CCT can be selected. **[2]The Dimmer Controls whatever is active at the moment.**

Appendix 5
Lutron Setup for DMX and Examples

Lutron User Interface for Converging Systems' Drivers. The desired method of control for color lighting is in the **H**ue/**S**aturation/**B**rightness color space. If a DMX fixture has only RGB inputs, the e-Node controls those inputs using the preferred HSB color space (i.e., a slider for Hue, a slider for Saturation and a slider for Brightness "Value".) By using HSB sliders/dimmers, a full range of color control and dimming is possible *often beyond the scope of a native DMX fixture*. In addition, interesting add-ons such as Tunable White (**TW**), and Correlated Color Temperature Control (**CCT**) as well as add-ons for individual tweaking of R, G, B values are possible.

Summary of Lutron/Converging Systems platforms and theory of operation. The proprietary embedded Lutron interface within the e-Node/dmx dramatically simplifies the support of basically **any type** of third-party DMX fixture from Lutron. That includes, single element (monochrome), RGB (3 color), RGBW (4-color) as well as variety of more sophisticated DMX offerings including **H**ue/**S**aturation/**B**rightness channels as well as Tunable White (TW) and Correlated Color Temperature (CCT) channels (or even devices offering more theatrical controls such as Pan and Tilt).

Depending upon the Lutron platform (**HWQSX™** where discovery of all IDs occurs automatically) or all other supported Lutron platforms (**RRSelect™**, **RR2™**, **HWQS™**, **MyRoomPrime™**, **Quantum™** where semi-automated discovery occurs by selecting the spyglass (see Figure 1 below)), it is easy to map any (i) Lutron keypad button press, (ii) timeclock event, (iii) or occupancy sensor event with any DMX function (i.e., DMX channel or derived channel such as color temperature). When the Lutron apps are desired to operate such DMX features, besides standard buttons which can be mapped to any DMX function, additional "phantom buttons/sliders" can be created by the Lutron programmer (within Designer, Inclusive, etc.) and associations can be made with any or all of the above DMX functions! For more information, consult the Lutron Integration note

The key to support here is the embedded **S**mart **L**utron **I**nteface **M**odule (**SLIM**) Data Table within the e-Node/dmx embedded web server where all simple associations/programming occurs.
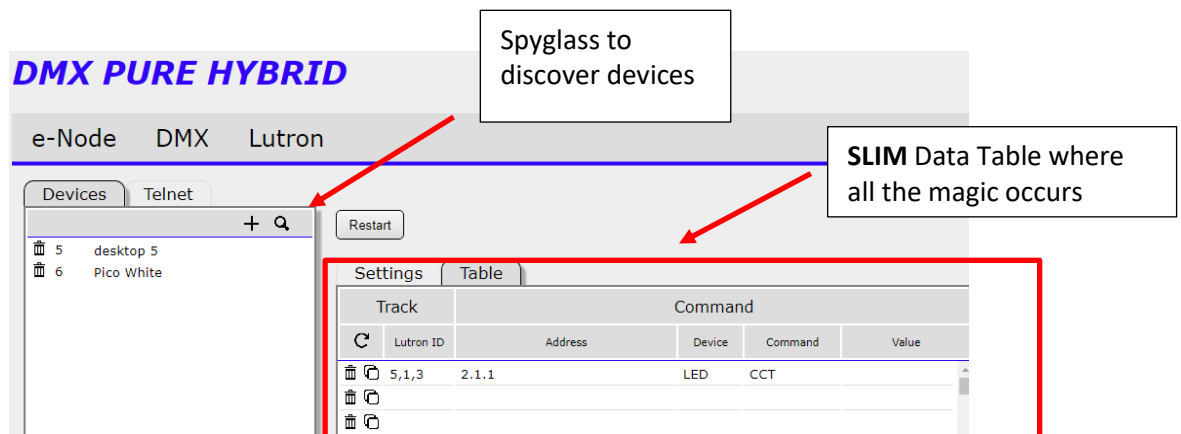
Figure 1 -Lutron

Within the **SLIM** Data Table, the following entries make integration a snap
- **Lutron ID** address. This is the Lutron assigned Device ID for all user interfaces, occupancy sensors and timeclock events.
- **Address (Zone, Group, Node)** address. This is the dealer assigned Zone/Group/Node address for the DMX fixture desired to be controlled.

- **Device.** This is for the class/category of Converging Systems controller desired to be address (LED, Motor,...). Select **LED** here.
- **Command.** Here pick the function that you wish to control but **NOT** the literal DMX channel that was assigned in Step 3 above. The reason is that within the e-Node/dmx there is a sophisticated color computer that calculates the appropriate (often times a multi-channel) output stream that **drives multiple DMX channels concurrently** rather than in most cases acting as a simple pass-through agent.

    -Example 1: If you had a DMX fixture with separate Kelvin temperatures for White but you wanted to just pick a relative Color temperature for the fixture with just one slider (color temperature), the selection within the SLIM Data Table would be **CCT.**

    -Example 2: If you had a DMX fixture with **Red**, **Green** and **Blue** standard LEDS and you wanted to dim those LEDS without just dividing each channel output by a factor (which often times give inaccurate color output at lower brightness levels), the selection within the SLIM Data Table would be **HUE** to adjust the color and **SET** to adjust intensity (all within the HSB color space which we like).

- **Value.** For certain functions, a value can be installed to select Store and Recalls, or to changed dissolve rates. Consult the Lutron Integration note for more information.

Lutron Examples

Example L.1- Case for the control of Red/Green/Blue (using our color computer)

- Program as per Case 1 within e-Node
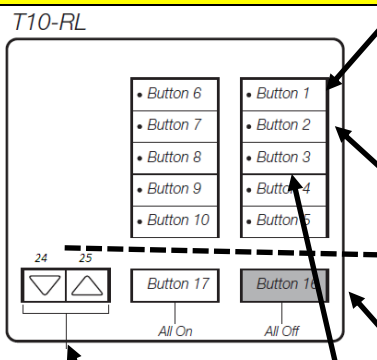- Within the e-Node/dmx "Lutron" tab, perform the following steps

Details of System Design/UI Programming
We are going to program a Lutron 10- button desktop to control Hue/Sat/Brightness for the above specified DMX fixture

Devices | Telnet

+ 🔍

🗑 5   desktop 10
🗑 6   Pico White

UI Control to be added	UI (Button) reference	SLIM Data Table Entries (for each button targeted)
T10-RL • Button 6 • Button 1 • Button 7 • Button 2 • Button 8 • Button 3 • Button 9 • Button 4 • Button 10 • Button 5 24 25 ▽ △ Button 17 Button 16 All On All Off	-To support Hue function with Button 1 (line 1 here) -To support Sat function with Button 2 (line 2 here) -To support Fade function with Lutron Fade buttons 24/25 (lines 3-6 here) -To support Off function with button 16 (line 17)	Enter Z.G.N directly with periods Settings | Table Track | Command

SLIM Data Table (Table tab):

	Lutron ID	Address	Device	Command
🗑 📋	5.1.3	2.1.1	LED	HUE
🗑 📋	5.2.3	2.1.1	LED	SAT
🗑 📋	5.24.3	2.1.1	LED	FADE_DOWN
🗑 📋	5.24.4	2.1.1	LED	STOP
🗑 📋	5.25.3	2.1.1	LED	FADE_UP
🗑 📋	5.25.4	2.1.1	LED	STOP
🗑 📋	5.16.3	2.1.1	LED	OFF
🗑 📋				

Command pulldown options:
ON
OFF
FADE_UP
FADE_DOWN
SAT_UP
SAT_DOWN
HUE_UP
HUE_DOWN
RECALL
STORE

Select from pulldown

*Note: within the three octet **Lutron ID** (see above), the first entry is the Lutron assigned Device ID, the second is the Lutron assigned Button Number and the third is the Lutron installer button **programmed** function (press-**3**, release-**4**, and **5** and **6** where supported advanced holds/multi-taps). Those functions need to be understood/programmed within Lutron programming software—the e-Node/dmx will only listen to what is generated. If you want to change the function, first

update the Lutron platform through its programming software, then update the entry here. Unless you do this, the e-Node/dmx will not monitor correctly.

Example L.2- Case for the control of Red/Green/Blue + W1+W2 + V^{RGB} + V^{TW} (using our color computer)

- Program as per Case 12 within e-Node
- Within the e-Node/dmx "Lutron" tab, perform the following steps

Details of System Design/UI Programming
We are going to program a Lutron 10-button desktop to control Hue + Sat + CCT + Brightness control for the above specified DMX fixture (with a single brightness control for all outputs)

Devices | Telnet

+ 🔍

🗑 5   desktop 10
🗑 6   Pico White

UI Control to be added	UI (Button) reference	SLIM Data Table Entries (for each button targeted)
T10-RL Button 6, Button 1 Button 7, Button 2 Button 8, Button 3 Button 9, Button 4 Button 10, Button 5 24, 25 Button 17, Button 16 All On, All Off	-To support Hue function with Button 1 (line 1 here) -To support Sat function with Button 2 (line 2 here) -To support Fade functions with Lutron Fade buttons 24/25 (lines 3-6 here) -To support Off function with button 16 (line 7) -To support CCT _up/ CCT_down function with Buttons 3/4 (line 6/9) -To support a STOP function (for adjustment of CCT) with button 17 (line 10)	Enter Z.G.N directly with periods

Track | Command

	Lutron ID	Address	Device	Command
🗑 📋	5.1.3	2.1.1	LED	OFF
🗑 📋	5.2.3	2.1.1	LED	SAT
🗑 📋	5.24.3	2.1.1	LED	FADE_DOWN
🗑 📋	5.24.4	2.1.1	LED	STOP
🗑 📋	5.25.3	2.1.1	LED	FADE_UP
🗑 📋	5.25.4	2.1.1	LED	STOP
🗑 📋	5.16.3	2.1.1	LED	OFF
🗑 📋	5.3.3	2.1.1	LED	CCT_UP
🗑 📋	5.4.3	2.1.1	LED	CCT_DOWN
🗑 📋	5.17.3	2.1.1	LED	STOP

Select from pulldown

*Note: within the three octet **Lutron ID** (see above), the first entry is the Lutron assigned Device ID, the second is the Lutron assigned Button Number and the third is the Lutron installer button **programmed** function (press-**3**, release-**4**, and **5** and **6** where supported advanced holds/multi-taps). Those functions need to be understood/programmed within Lutron programming software—the e-Node/dmx will only listen to what is generated. If you want to change the function, first update the Lutron platform through its programming software, then update the entry here. Unless you do this, the e-Node/dmx will not monitor correctly.
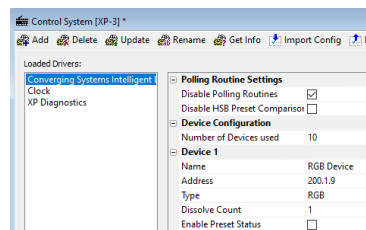
Appendix 6
RTI Setup for DMX and Examples

RTI User Interface for Converging Systems' Drivers. The desired method of control for color lighting is in the **H**ue/**S**aturation/**B**rightness color space. If a DMX fixture has only RGB inputs, the e-Node controls those inputs using the preferred HSB color space (i.e., a slider for Hue, a slider for Saturation and a slider for Brightness "Value".) By using HSB sliders/dimmers, a full range of color control and dimming is possible ***often beyond the scope of a native DMX fixture***. In addition, interesting add-ons such as Tunable White (**TW**), and Correlated Color Temperature Control (**CCT**) as well as add-ons for individual tweaking of R, G, B values are possible.

Summary of RTI/Converging Systems drivers. The latest RTI drivers for Converging Systems (v1.3) dramatically simplifies the support of basically any type of Converging Systems' supported lighting fixture. That includes, single element (monochrome), Tunable White (2 or more whites), RGB (3 color), RGBW (4-color) as well as variety of more sophisticated DMX offerings including **H**ue/**S**aturation/**B**rightness channels as well as hybrid Tunable White (TW) and Correlated Color Temperature (CCT) channels.

Within each discovered device are:
- **Name**. An alias name that can used to identify device.
- **Address (Zone, Group, Node)**. Unless you want to create your own custom broadcast device (for controlling multiple devices using a wildcard indicator), previously commissioned devices will all have their address pre-filled in.
- **Type**. A complete range of supported device types.
- **Dissolve Count.** Consult **Integration Note** for more information**.**
- **Enable Preset Status.** Consult **Integration Note** for more information**.**
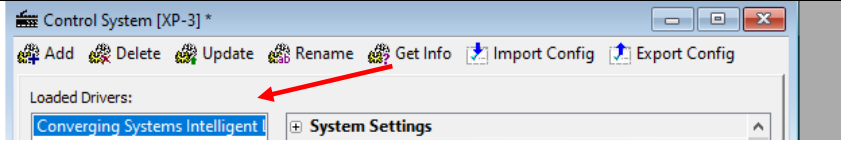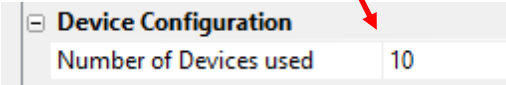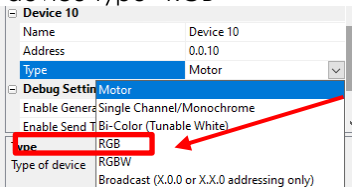
Background on various UI types.

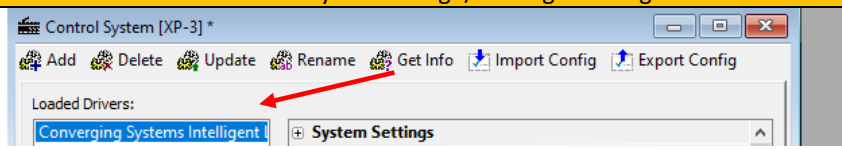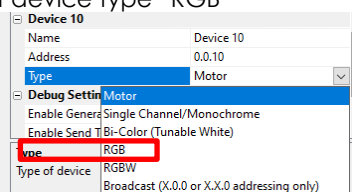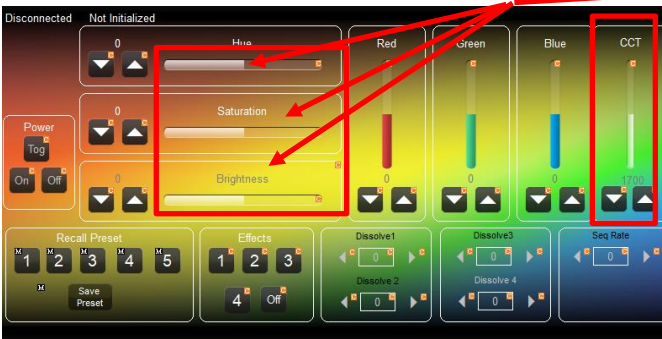| Keypads	UI example buttons-touchscreens and apps	UI example sliders-touchscreens and apps

RTI Examples

Example R.1- Case for the control of Red/Green/Blue (using our color computer)

- Program as per Case 1 within e-Node
- Add device(s) and select UI controls

Details of System Design/UI Programming

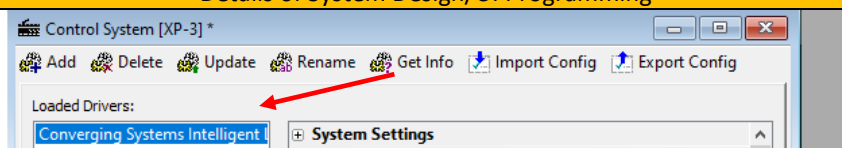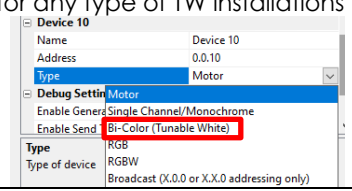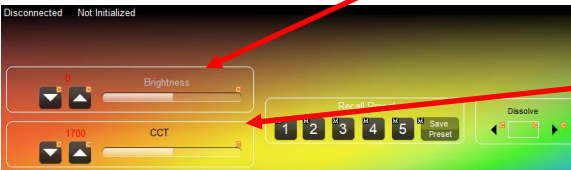| Adding Device and Type	Sample UI	Controls Implemented/Theory of Operation
-Within Loaded Drivers (Converging Systems Intelligent) add a device under "Device Configuration" for each separate DMX fixture to be controlled (here we are going to have 10 different fixtures added) -Select device type "RGB" 	Here is a sample UI for the control fo Hue/Saturation and Brightness (recommeded over RGB sliders) 	For HSB brigtness sliders (to control RGB output) Select -Hue -Saturation -Brightness (fade)

Example R.2- Case for the control of Brightness + CCT + Saturation + Hue (using our color computer)

- Program as per Case 9 within e-Node
- Add device(s) and select UI controls

Details of System Design/UI Programming

Adding Device and Type	Sample UI	Theory of Operation
-Within Loaded Drivers (Converging Systems Intelligent) add a device under "Device Configuration" for each separate DMX fixture to be controlled (here we are going to have 1fixture added) **Device Configuration** Number of Devices used — 1 -Select device type "RGB" 	Here is a sample UI for the control fo Hue/Saturation and Brightness + CCT (recommeded over RGB sliders) 	For HSB brigtness sliders (to control RGB output) Select -Hue -Saturation -Brightness (fade) -and another slider to contrrol CCT

Example R.3- Case for the control of three White channels with a single CCT control (using our color computer)

- Program as per Case 10 within e-Node
- Add device(s) and select UI controls

Details of System Design/UI Programming

Adding Device and Type	Sample UI	Theory of Operation
-Within Loaded Drivers (Converging Systems Intelligent) add a device under "Device Configuration" for each separate DMX fixture to be controlled (here we are going to have 1fixture added) **Device Configuration** Number of Devices used — 1 -Select device type "Bi-Color (TW)" which works for any type of TW installations 	Here is a sample UI for the control fo Hue/Saturation and Brightness + CCT (recommeded over RGB sliders) 	For Tunable White brigtness slider -For CCT control

Appendix 7
Savant Setup for DMX and Examples

Savant User Interface for Converging Systems' Drivers. The desired method of control for color lighting is in the **H**ue/**S**aturation/**B**rightness color space. If a DMX fixture has only RGB inputs, the e-Node controls those inputs using the preferred HSB color space (i.e., a slider for Hue, a slider for Saturation and a slider for Brightness "Value".) By using HSB sliders/dimmers, a full range of color control and dimming is possible ***often beyond the scope of a native DMX fixture***. In addition, interesting add-ons such as Tunable White (**TW**), and Correlated Color Temperature Control (**CCT**) as well as add-ons for individual tweaking of R, G, B values are possible.
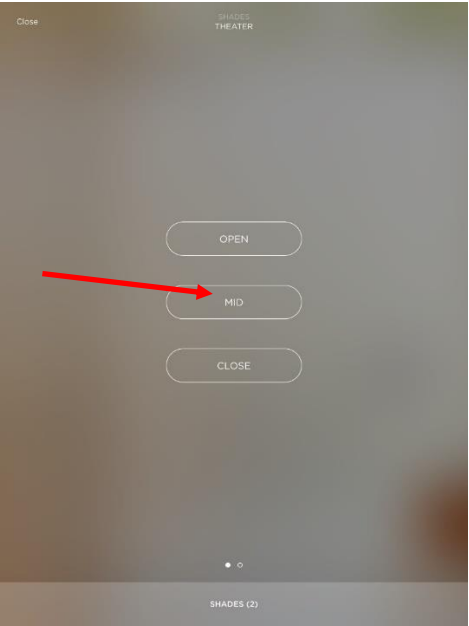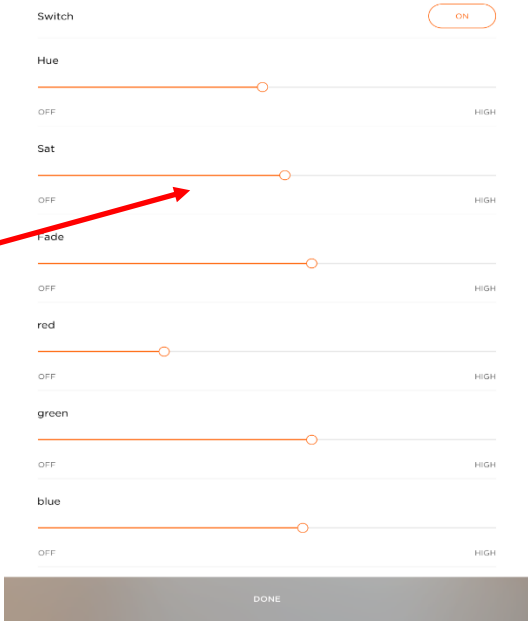
Summary of Savant/Converging Systems drivers. The latest RTI drivers for Converging Systems (v1.3) dramatically simplifies the support of basically any type of Converging Systems' supported lighting fixture. That includes, single element (monochrome), Tunable White (2 or more whites), RGB (3 color), RGBW (4-color) as well as variety of more sophisticated DMX offerings including **H**ue/**S**aturation/**B**rightness channels as well as hybrid Tunable White (TW) and Correlated Color Temperature (CCT) channels.

Within each discovered device are:
- **Name**. An alias name that can used to identify device.
- **Address (Zone, Group, Node)**. Unless you want to create your own custom broadcast device (for controlling multiple devices using a wildcard indicator), previously commissioned devices will all have their address pre-filled in.
- **Type**. A complete range of supported device types.
- **Dissolve Count.** Consult **Integration Note** for more information**.**
- **Enable Preset Status.** Consult **Integration Note** for more information**.**

Enabled	Identifier	Location	Entity	Label	Address [1]	Address [2]	Address [3]	Address [4]	Add...	Addre...	Lights Are On	Controller	Button Label	Toggle Label	Savant Keypad	UI Type	Command Type	Command	Sa
▶✓	9	Cabaret	Switch	Toggle Switch	200	1	5	2			✓	Lighting Controller ILC	Toggle Switch	Toggle Swi...		Toggle	Release Com...	SwitchOn	
▶✓	64	Cabaret	Switch	Switch	200	1	5	1			✓	Lighting Controller ILC	Switch	Switch		Toggle	Release Com...	SwitchOn	
✓	11	Cabaret	Hue	Hue	200	1	5				✓	Lighting Controller ILC	Hue			Slider	Push Command	RFDimmerSet	
✓	12	Cabaret	Saturation	Sat	200	1	5				✓	Lighting Controller ILC	Sat			Slider	Push Command	LowVoltageDim...	
✓	13	Cabaret	Brightness	Fade	200	1	5				✓	Lighting Controller ILC	Fade			Slider	Push Command	DimmerSet	
▶✓	48	Cabaret	Discrete Power Off	OFF	200	1	5				✓	Lighting Controller ILC	OFF			Push	Push Command	SwitchOff	
▶✓	50	Cabaret	Discrete Power On	ON	200	1	5				✓	Lighting Controller ILC	ON			Push	Push Command	SwitchOn	
✓	51	Cabaret	SceneSaver Button	Recall 10	200	1	5	10			✓	Lighting Controller ILC	Recall 10			Push	Push Command	SceneRestore	
✓	52	Cabaret	SceneSaver Button	Store 10	200	1	5	10			✓	Lighting Controller ILC	Store 10			Push	Push Command	SceneSave	
▶✓	55	Cabaret	SceneSaver Button	recall 10:1	200	1	5	10	1		✓	Lighting Controller ILC	recall 10:1			Push	Push Command	SceneRestore	
✓	58	Cabaret	RGB	red	200	1	5	0			✓	Lighting Controller ILC	red			Slider	Push Command	DimmerSet	
✓	59	Cabaret	RGB	green	200	1	5	1			✓	Lighting Controller ILC	green			Slider	Push Command	DimmerSet	
✓	60	Cabaret	RGB	blue	200	1	5	2			✓	Lighting Controller ILC	blue			Slider	Push Command	DimmerSet	
✓	68	Cabaret	WhiteColorChannel	White Dimmer	200	2	1				✓	Lighting Controller ILC	White Dimmer			Slider	Push Command	RFDimmerDecrease	
▶✓	62	Cabaret	ColorTempSlider	CCT Slider	200	2	1				✓	Lighting Controller ILC	CCT Slider	CCT Slider		Slider	Push Command	RFDimmerSet	
✓	66	Cabaret	Device Identify	id	200	2	1				✓	Lighting Controller ILC	id			Push	Push Command	DimmerFlash	
✓	72	Cabaret	SelectEffect	effect 1	200	2	1	1	1		✓	Lighting Controller ILC	effect 1			Push	Push Command	RFDimmerIncrease	
✓	74	Cabaret	CCTPick	cct4190	200	2	1	4190	3		✓	Lighting Controller ILC	cct4190			Push	Push Command	RFDimmerButto...	

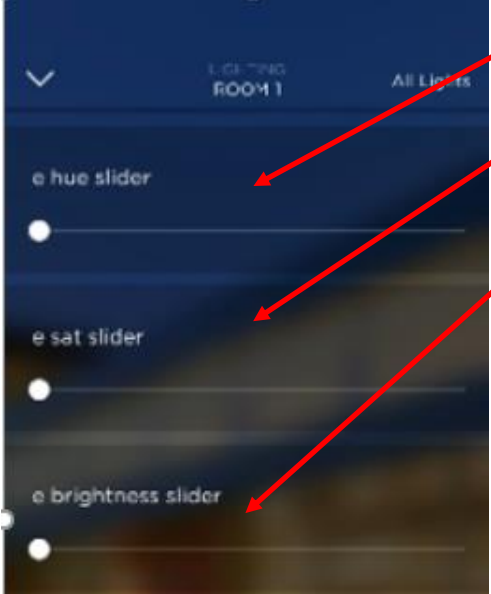**Background on various UI types.**

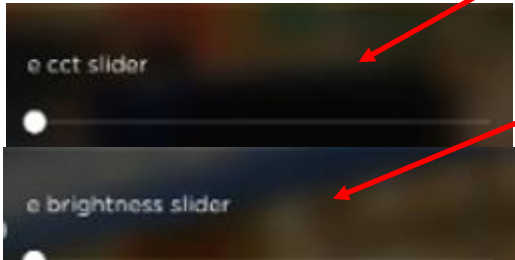| Keypads	UI example buttons-touchscreens and apps	UI example sliders-touchscreens and apps

CONVERGING SYSTEMS

Savant Examples

Example S.1- Case for the control of Red/Green/Blue (using our color computer)

- Program as per Case 1 within e-Node
- Add device(s) and enter Data Table entries for each highlighted Entity below

Details of System Design/UI Programming			
These entities highlighted are useful here			
Popular Lighting Entities			
Switch	**Brightness (slider)**	Blue (slider)[2]	ColorTempSlider
Hue (slider)	Red (slider)[2]	White (slider) -for White in RGBW	RecallPreset Button
Saturation (slider)	Green (slider)[2]	CircadianSlider	StorePreset Button
Popular Lighting Entities			
Shade (Up/Down/Stop)	ShadeDown		
MotorSlider (variable)	ShadeAdjStop		
ShadeUp			

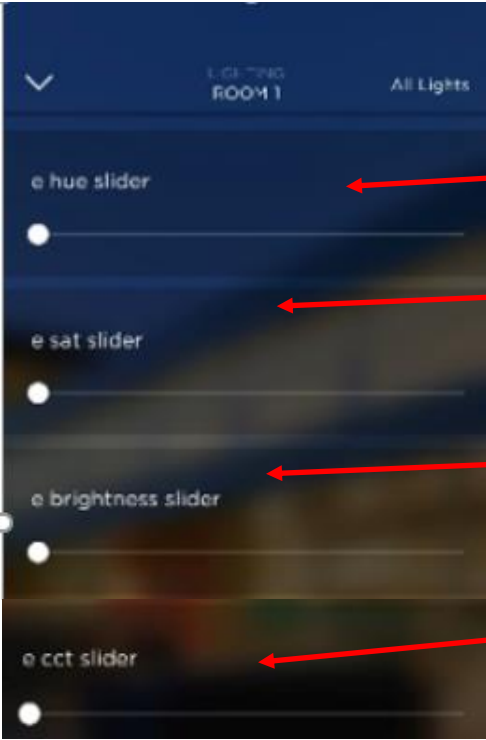| Data Table Entity Selection/Programming	Sample UI	Controls Implemented/Theory of Operation
To create new Lighting slider/toggle or switch proceed here: -Select the **+** icon to create new entry -Select **Controller** name (e-Node) -Select **Location** -Select **Entity** -Enter **Z/G/N** address for **Add.(1**)-Zone#, **Add(2)**-Group #, **Add(3)**-Node #, -Hit Done, **Generate Services**, Reenter Data Table -Enter **Label** -Enter any required entries in **Address(4**) (i.e., **#** for Preset/Stores/Effect or "**0**" for Switch -Optional-Enter any **Dissolve rate** (seconds for most entries in **Address(5)** or minutes for Circadian/ramps)	Here is a sample UI for the control fo Hue/Saturation and Brightness (recommeded over RGB sliders) 	For HSB brigtness sliders (to control RGB output) Select -Select **Hue** entity for Hue slider -Selecti **Saturation** entity for Saturation Slider -Select **Brightness** entity for Brightness (fade) slider

**Example S.2- Case for the control of W1 + W2 + W3 + Brightness Channel DMX Fixture (using our color computer)**

- Program as per Case 11 within e-Node
- Add device(s) and enter Data Table entries for each highlighted Entity below

Details of System Design/UI Programming			
These entities highlighted are useful here			
Popular Lighting Entities			
Switch	**Brightness (slider)**	Blue (slider)[2]	**ColorTempSlider**
Hue (slider)	Red (slider)[2]	White (slider) -for White in RGBW	RecallPreset Button
Saturation (slider)	Green (slider)[2]	CircadianSlider	StorePreset Button

Popular Lighting Entities	
Shade (Up/Down/Stop)	ShadeDown
MotorSlider (variable)	ShadeAdjStop
ShadeUp	

Data Table Entity Selection/Programming	Sample UI	Controls Implemented/Theory of Operation
To create new Lighting slider/toggle or switch proceed here: -Select the **+** icon to create new entry -Select **Controller** name (e-Node) -Select **Location** -Select **Entity** -Enter **Z/G/N** address for **Add.(1)**-Zone#, **Add(2)**-Group #, **Add(3)**-Node #, -Hit Done, **Generate Services**, Reenter Data Table -Enter **Label** -Enter any required entries in **Address(4)** (i.e, **#** for Preset/Stores/Effect or "**0**" for Switch -Optional-Enter any **Dissolve rate** (seconds for most entries in **Address(5)** or minutes for Circadian/ramps)	Here is a sample UI for the control fo Hue/Saturation and Brightness (recommeded over RGB sliders) e cct slider e brightness slider	For HSB brigtness sliders (to control RGB output) Select -Select **CCT** entity for (Intelliigent TW) slider -Selectt **Brightness** entity for Brightness (fade) slider

Example S.3- Case for the control of R + G + B + W1 + W2 + V^{RGB} + V^{TW} + Brightness Channel DMX Fixture (using our color computer)

- Program as per Case 12 within e-Node
- Add device(s) and enter Data Table entries for each highlighted Entity below

Details of System Design/UI Programming			
These entities highlighted are useful here			
Popular Lighting Entities			
Switch	**Brightness (slider)**	Blue (slider)[2]	**ColorTempSlider**
Hue (slider)	Red (slider)[2]	White (slider) -for White in RGBW	RecallPreset Button
Saturation (slider)	Green (slider)[2]	CircadianSlider	StorePreset Button
Popular Lighting Entities			
Shade (Up/Down/Stop)	ShadeDown		
MotorSlider (variable)	ShadeAdjStop		
ShadeUp			

Data Table Entity Selection/Programming	Sample UI	Controls Implemented/Theory of Operation
To create new Lighting slider/toggle or switch proceed here: -Select the **+** icon to create new entry -Select **Controller** name (e-Node) -Select **Location** -Select **Entity** -Enter **Z/G/N** address for **Add.(1**)-Zone#, **Add(2)**-Group #, **Add(3)**-Node #, -Hit Done, **Generate Services**, Reenter Data Table -Enter **Label** -Enter any required entries in **Address(4)** (i.e., **#** for Preset/Stores/Effect or "**0**" for Switch -Optional-Enter any **Dissolve rate** (seconds for most entries in **Address(5)** or minutes for Circadian/ramps)	Here is a sample UI for the control fo Hue/Saturation and Brightness (recommed over RGB sliders) 	For HSB brigtness sliders (to control RGB output) Select Select **Hue** entity for Hue slider -Select **Saturation** entity for Saturation Slider -Select **Brightness** entity for Brightness (fade) slider -Select **CCT** entity for (Intelliigent TW) slider
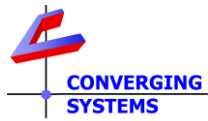
Appendix 8
URC Setup for DMX and Examples

In early 2023, URC released an excellent driver for the e-Node gateway. This section will beu pdated shortly.
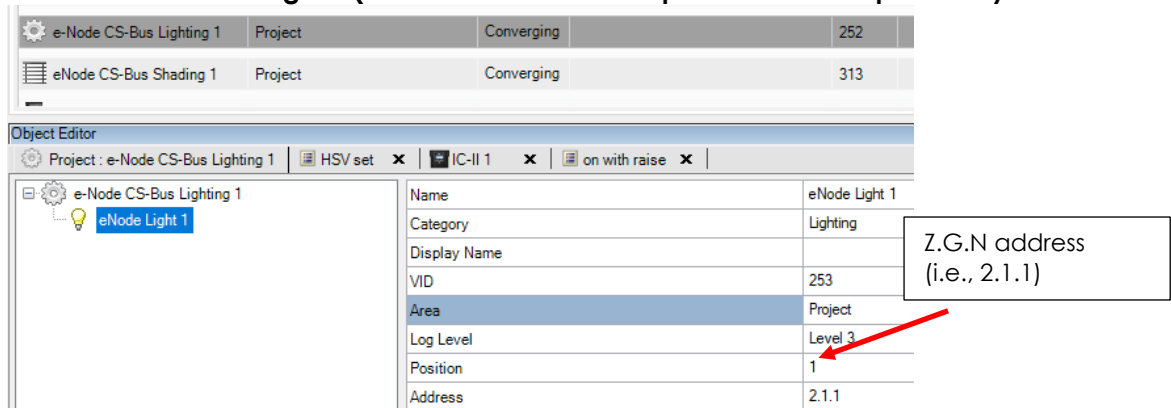
Appendix 9
Vantage Setup for DMX and Examples

Vantage User Interface for Converging Systems' Drivers. The desired method of control for color lighting is in the **H**ue/**S**aturation/**B**rightness color space. If a DMX fixture has only RGB inputs, the e-Node controls those inputs using the preferred HSB color space (i.e., a slider for Hue, a slider for Saturation and a slider for Brightness "Value".) By using HSB sliders/dimmers, a full range of color control and dimming is possible *often beyond the scope of a native DMX fixture*. In addition, interesting add-ons such as Tunable White (**TW**), and Correlated Color Temperature Control (**CCT**) as well as add-ons for individual tweaking of R, G, B values are possible.

Summary of Vantage/Converging Systems drivers. The latest Vantage drivers for Converging Systems ("eNode CS-Bus Lighting" v16 (for 4.1 and later) - available from Vantage within Design Center) dramatically simplifies the support of basically any type of Converging Systems' supported lighting fixture. That includes, single element (monochrome), Tunable White (2 or more whites), RGB (3 color), RGBW (4-color) as well as variety of more sophisticated DMX offerings including **H**ue/**S**aturation/**B**rightness channels as well as hybrid Tunable White (TW) and Correlated Color Temperature (CCT) channels.
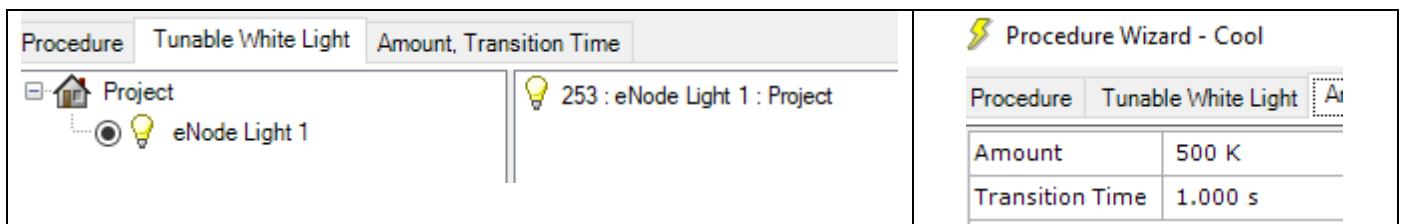
Tasks should be added under Programming View for the combination (e-Node/dmx "**parent device**" + individual "eNode Light x" (children devices) within Design Center's Object Editor. For each task linkages are made to the targeted load device (above referenced). In is important to fil out the pop-up table for all relevant data. Typical data required for each entry include

- **Object** (command) **name.**
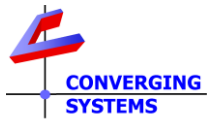- **Reference to particular load eNode Light x (which has a Zone Group Node address previously entered.**
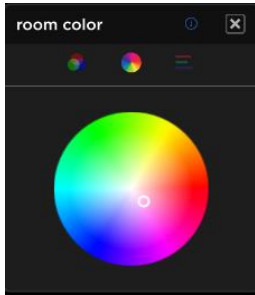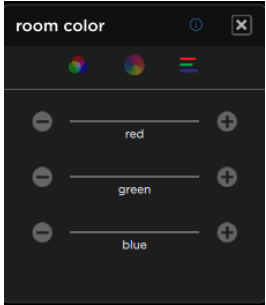

- **Address (Zone, Group, Node).** Unless you want to create your own custom broadcast device (for controlling multiple devices using a wildcard indicator), previously commissioned devices will all have their address pre-filled in.
- **Value.** Often a value (i.e., color temperature, or RGB or HSB value. A complete range of supported device types.
- **Dissolve Rate.** Similarly a dissolve or transition time. Consult **Integration Note** for more information**.**
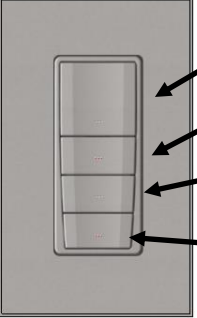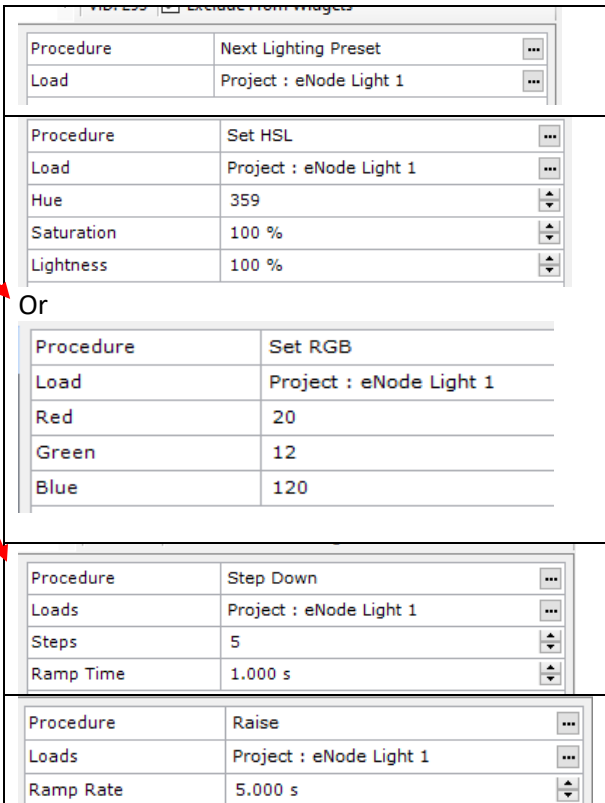
Background on various UI types.

Keypads	App buttons and sliders	Other Widgets	Keypad buttons

Vantage Examples

Example V.1- Case for the control of Red/Green/Blue DMX fixture (using our color computer)

- Program as per Case 1 within e-Node
- Add device(s) and select UI controls

Details of System Design/UI Programming

Adding Device and Type	Sample UI	Controls Implemented/Theory of Operation
	-To support Recall,x (and subsequent next recall) with Button 1 -To support setting of special RGB or HSB value with Button 2 -To invoke Fade_Down (by a decrement value) with Button 3 -To invoke Fade_UP with button 4	

Appendix 12

Specific Tested DMX Models (and Applicable Case References)

Vendor	Standalone DMX Controller	Build-in DMX Functionality	Model	Applicable Case
American Lighting	REC-DMX-RJ45A-5CH (DMS decoder)		-HTL 1800K to 6000K (linear) -RGBTW 2700 – 6000K (linear)	3 ch-Case 10 5 ch-Case 3
AspectLED	AL-CTLR-DMXDEC4-XLR AL-CTLR-DMXDEC4		W-Series RGBW	4-ch-Case 2
Chauvet		Freedom ParTri-6		3 ch-Case 1
		Slim Par 38		3 ch-Case 1
Cinematech	Cinematch Fiber Optix Kit			4 ch & 1 ch Case 14
Diode Led	DI-1810		Dazzle 24 24 RGBW	4-ch-Case 2
Jesco		WW516-12PP30RGB		3 ch-Case 1
WAC Lighting	Aispire A2C10-3 DMX Decoder		-RGBWW (linear) -CCT Tunable White (linear)	7 ch-Case 12 4 ch-Case 11
		WAC Illumenight Color Changing 2.0 (Lumenetix engine)		4 ch-Case 9
		WAC Atmosphere	-Bi White A1RB-3662	**2 ch-Case 13**