SpaceLogic C-Bus Commission Software

C-Bus DALI-2 Gateway – Hue & Saturation

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Aim of this Document

The aim of this document is to help you understand how to configure **Hue & Saturation** for compatible DALI fittings using SpaceLogic C-Bus Commission and the SpaceLogic C-Bus DALI-2 Gateway.

The contents of this document have been developed using:

- C-Bus Toolkit v1.19.0
- SpaceLogic C-Bus Commission v2.10.0
- SpaceLogic C-Bus DALI-2 Gateway 5502CDGP230 firmware

Listed below are the contents of this document:

1. Hue / Saturation
2. Hue / Saturation & C-Bus
3. Hue / Saturation Configuration Example

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Hue / Saturation

DALI Device Type 8 provides commands for DALI devices capable of controlling colour, with there being two main **Colour Types**:

- **Colour Type Tc**, which allows control of the colour temperature of white light, also known as **Correlated Colour Temperature** (**CCT**) or **Tuneable White**.
- **Colour Type RGBWAF**, which allows control of separate Red, Green, Blue, White (and two other channels, Amber & Freecolour, which are not commonly implemented).

This document will focus specifically on **Colour Type RGBWAF***.

Most applications for RGB (W) control uses 3 (Red, Green, and Blue), or 4 (Red, Green, Blue, and White) light sources. These are equivalent when displaying fully saturated colours; however, the addition of the White channel helps to allow better reproduction of unsaturated colours, such as pastel.

Whilst the driver hardware and the DALI control commands deal with Red, Green, Blue, and White levels, it does it provide an intuitive way for the user to select colour; therefore, this concept is often represented as **Hue** and **Saturation**.

- **Hue**, which represents the saturated colour as a value from **0 – 360°**
- **Saturation**, which represents how vibrant the colour is, lower saturation means more white is blended in

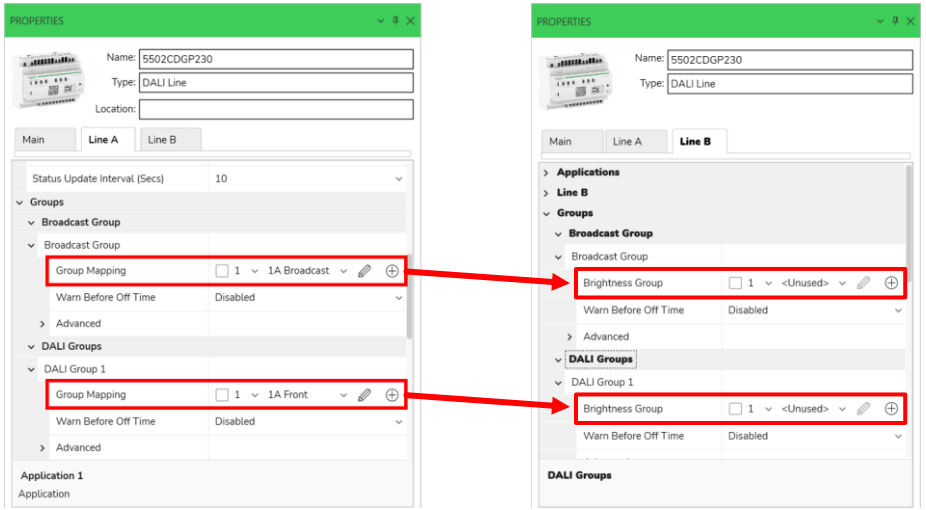
*There is another Colour Type known as **XY**; however, this is not supported by the SpaceLogic C-Bus DALI-2 Gateway

Hue / Saturation & C-Bus

Basic support for controlling CCT & RGB/RGBW DT8 devices have been implemented since:

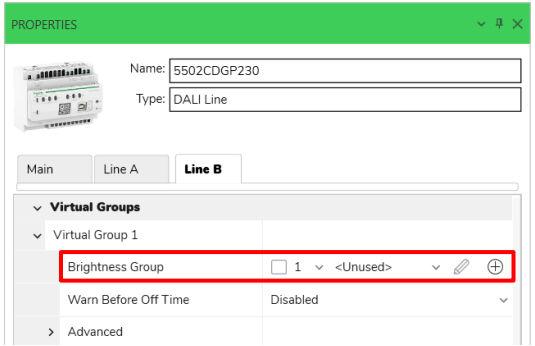
- SpaceLogic C-Bus DALI-2 Gateway 5502CDGP230 firmware v1.9.0
- SpaceLogic C-Bus Commission v2.5.0

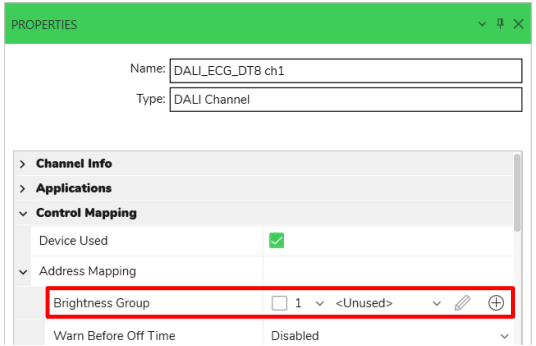
In previous versions of SpaceLogic C-Bus Commission, the parameter to map a **DALI Object** (a DALI device, a DALI Group, Broadcast, or Virtual Group), was named **Group Mapping**; however, it has since been renamed **Brightness Group**:



Hue / Saturation & C-Bus

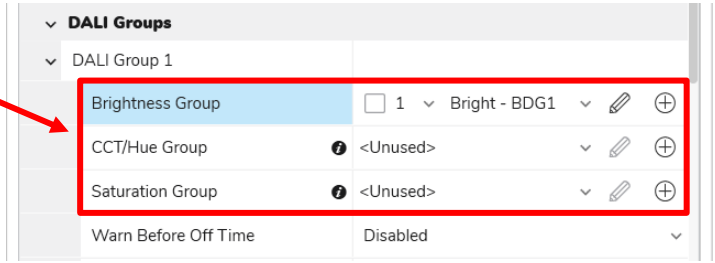
The **Brightness Group** parameter gives you the capability to control the brightness level of the DALI object through a C-Bus group address. As highlighted on the previous page, this parameter is now consistent for all DALI objects:





Assigning a C-Bus group address to the **Brightness Group** parameter will enable two additional parameters:

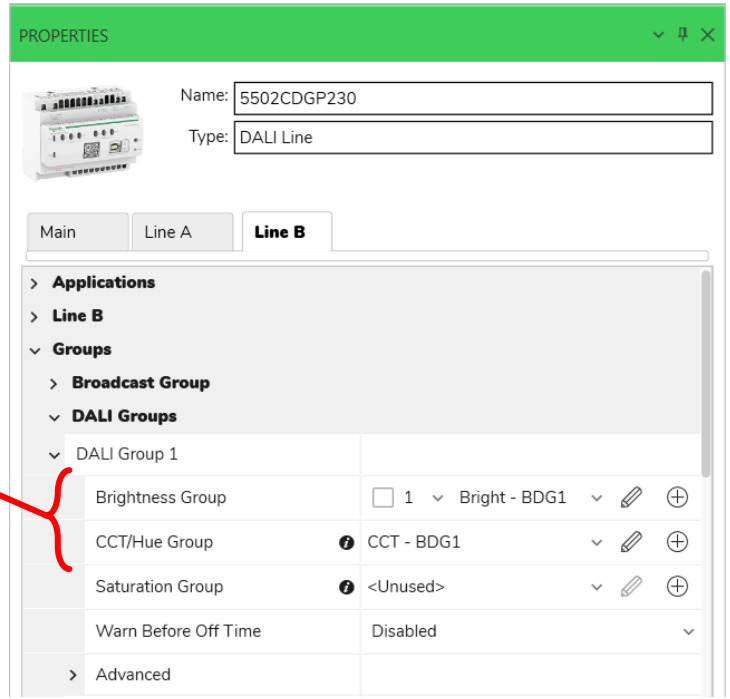
- CCT/Hue Group
- Saturation Group



Hue / Saturation & C-Bus

If a C-Bus group address is **assigned only to** the **CCT/Hue Group parameter** and the **Saturation Group parameter** is left **Unused**, the object will be treated as a **CCT object**. C-Bus Commands to this group will be mapped to control the **Colour Temperature** of this DALI object.

In this example, the **DALI Object**, **DALI Group 1** has a C-Bus group address assigned; additionally, the **CCT/Hue Group** parameter has a different C-Bus group address assigned which means that **DALI Group 1** is now treated as a **CCT object** and that any C-Bus Commands will be mapped to control the **Brightness & Color Temperature**.

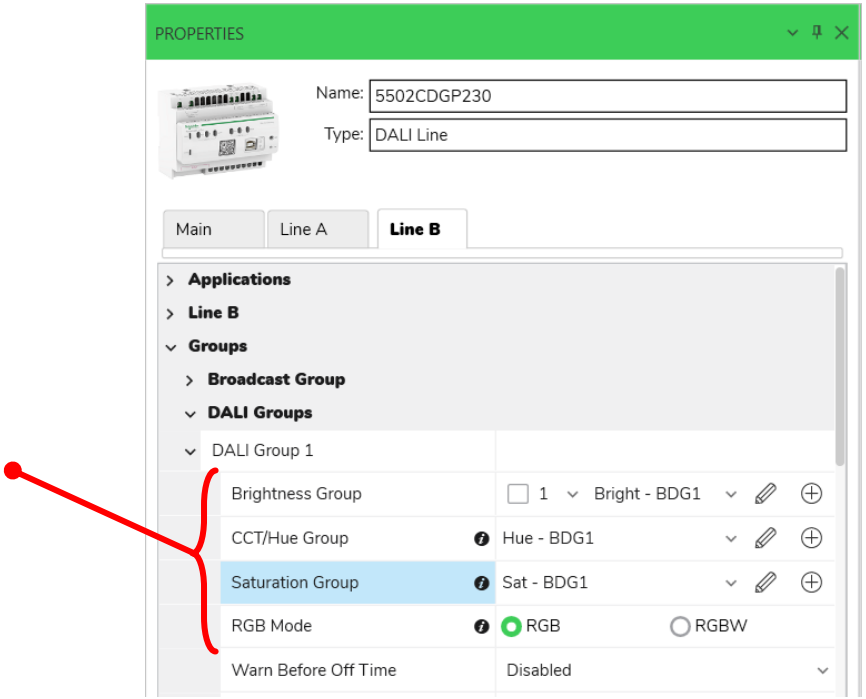


Hue / Saturation & C-Bus

If a C-Bus group address is **assigned only to** the **CCT/Hue Group parameter** and the **Saturation Group parameter** is left **Unused**, the object will be treated as a **CCT object**. C-Bus Commands to this group will be mapped to control the **Colour Temperature** of this DALI object.

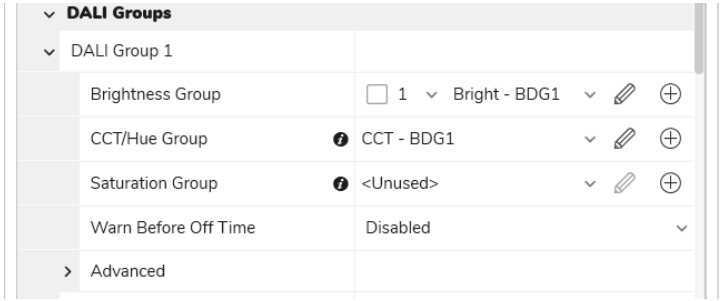
In this example, the **DALI Object**, **DALI Group 1** has a C-Bus group address assigned; additionally, the **CCT/Hue Group** and **Hue/Saturation** parameters each have a different C-Bus group address assigned which means that **DALI Group 1** is now treated as an **RGB/RBGW object** and that any C-Bus Commands will be mapped to control the **Brightness**, **Hue & Saturation**.

When the **Saturation Group** parameter has a group address assigned an additional parameter, **RGB Mode** is made available, giving you the capability to set whether the DALI Object is treated as an RGB or RGBW object

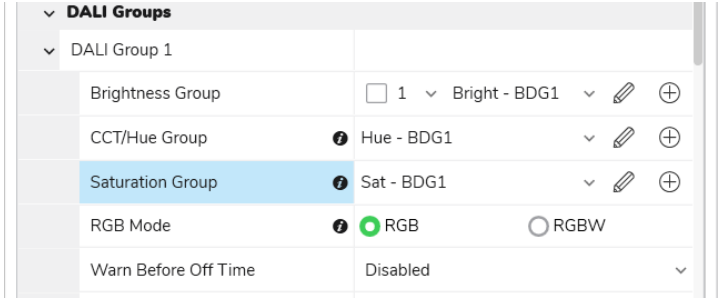


Hue / Saturation & C-Bus

To help summarise the principles covered in the previous slides:



- DALI Group → treated as CCT Object
- C-Bus Group Bright – BDG1 controls Brightness
- C-Bus Group CCT – BDG1 controls CCT



- DALI Group → treated as RBG/RGBW Object

  Since RBG Mode is set to RGB
- C-Bus Group Bright – BDG1 controls Brightness
- C-Bus Group Hue – BDG1 controls Hue
- C-Bus Group Sat – BDG1 controls Saturation

Hue / Saturation & C-Bus

Ramping and pushbutton is supported by the **Brightness Group parameter**; however, ramping on the **CCT/Hue Group** and **Saturation parameters Group** will be ignored.

Based on this, pushbutton dimming operations **should not be used** on the **CCT/Hue Group** or **Saturation Group**. It is recommended that changes to the level of the CCT Group should be made using **Presets** or **Scenes**, without ramping.

If changes to the CCT/Hue Group and Saturation Group parameters are made whilst the Brightness Group is not ramping, the colour change will be activated with a fixed one-second fade time. If the Brightness Group is already ramping when the CCT/Hue Group or Saturation Group parameters are changed, the fade time is dynamically re-calculated and a new fade issued with the new colour (without stopping the existing fade).

Scenes that change both the colour and the brightness should put the colour groups before the brightness group.

Hue / Saturation & C-Bus

For RGB/RGBW DALI objects, the level of the C-Bus group controlling Hue is mapped to a Hue value of 0-360° using the equation:

$$Hue = 360 \times \left(\frac{C\text{-}Bus\ Group\ Address\ Level}{255}\right)$$

Some Hue values for common colours and their correspond C-Bus levels and nearest C-Bus % values are shown in the table below:

Colour	Hue	C-Bus Level	Nearest C-Bus %
Red	**0**	0	0
Yellow	**60**	42	17
Green	**120**	84	33
Cyan	**180**	128	50
Blue	**240**	170	67
Magenta	**300**	212	83

The level of the Saturation group maps to the Saturation level as per the normal C-Bus level to percentage mapping where 255 = 100%. Setting the Saturation level to zero will result in white, regardless of the Hue value. The DALI-2 compliant DT8 driver is responsible for keeping the colour constant as the level is dimmed, so brightness changes via the Brightness group should not affect the colour.

Hue / Saturation & C-Bus

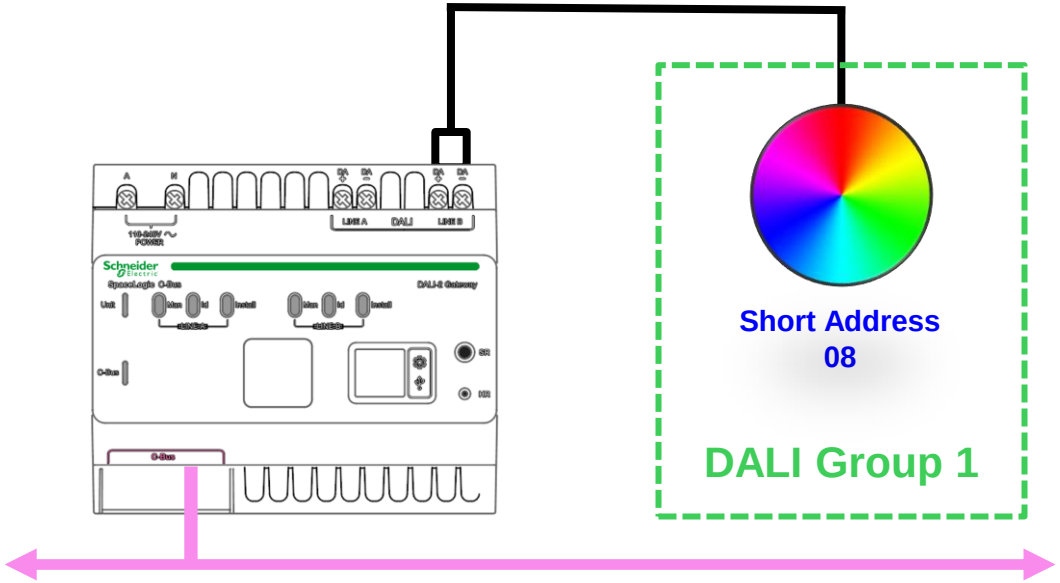
The following are recommended practices & limitations to help reinforce your understanding of Hue / Saturation behaviour with C-Bus:

- Use **Scenes** or **Presets** for setting colours
- When controlling RGB/RGBW colours, always send the Hue & Saturation values together
- If changing both the colour and level in a scene, put the colour groups first
- For pushbutton dimming or multiple devices, use a DALI group
  - If required, use DALI groups first for dimming, and then use Virtual groups for changing colour
- Do not mix DALI devices of different colour types in the same DALI group
- The C-Bus DALI-2 Gateway uses the **Normalised Control** method for RGBWAF control, this requires that the RGBWAF Control configuration option is set to **0x80 (Normalised)** in the DALI devices for correct operation. This is set by default in the devices, and is also set by the gateway when setting the normal DALI parameters such as DALI group assigning in the C-Bus Commission software (This will be explored in greater detail in the following pages).

Hue / Saturation Configuration Example

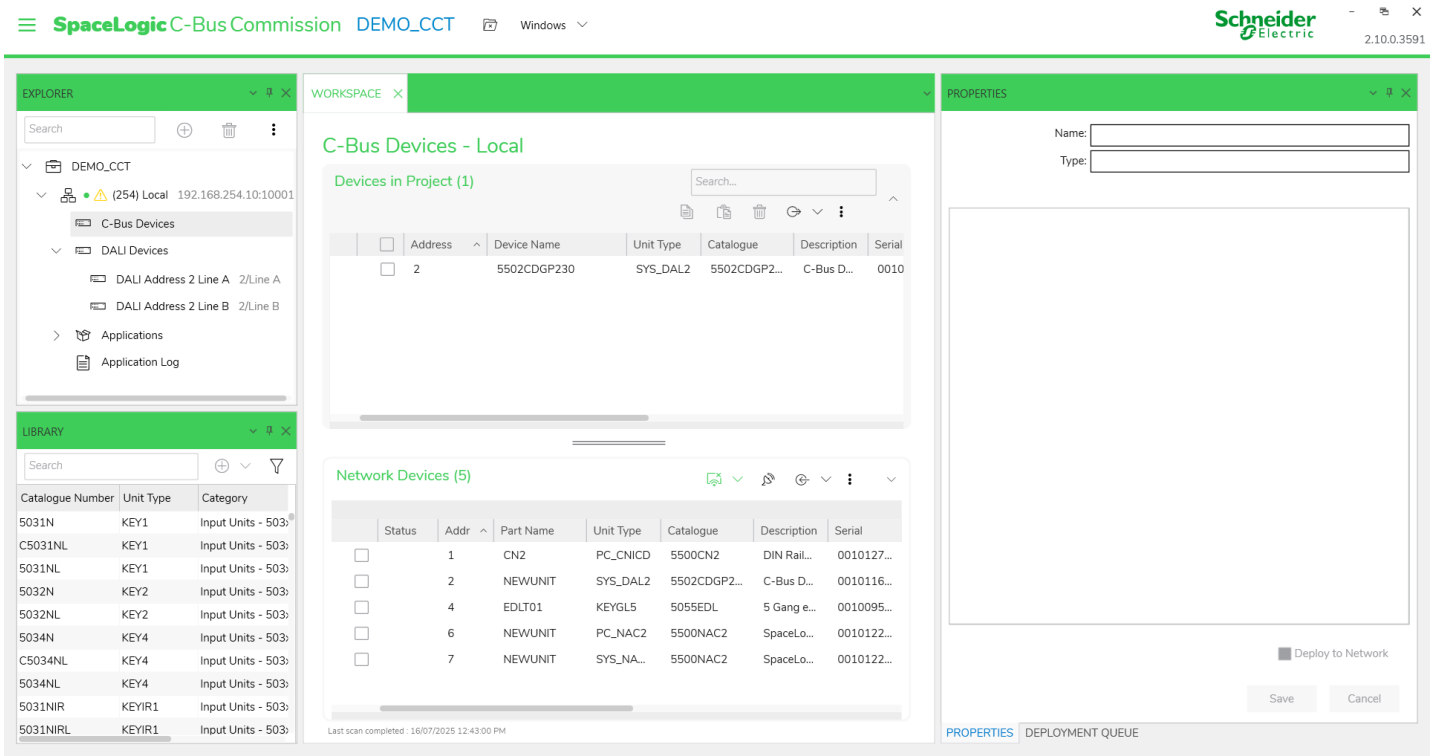
An example of creating a custom profile and performing dimming range testing will now be demonstrated using:

- SpaceLogic C-Bus DALI-2 Gateway (5502CDGP230)
- 1 × DALI DT8 Device (RGBW Supported)



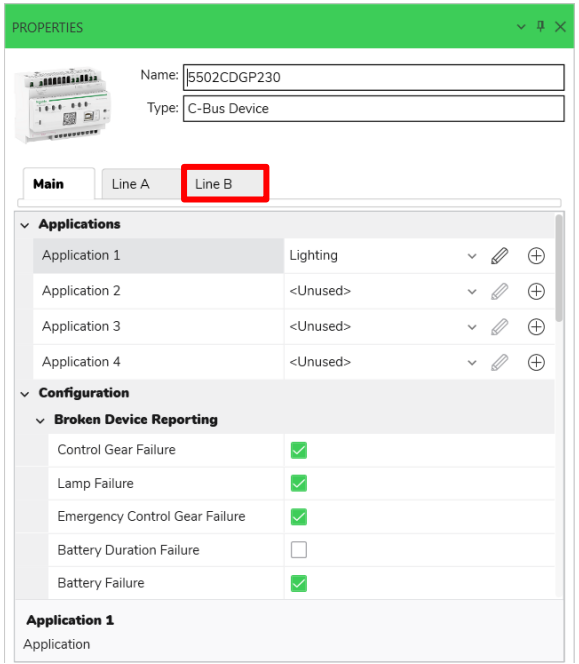
Hue / Saturation Configuration Example

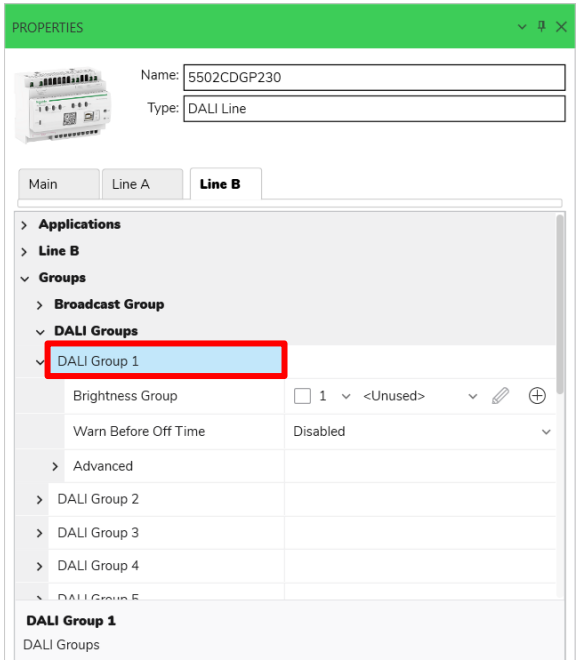
1. To begin this example, the C-Bus Network that contains the C-Bus DALI-2 gateway has already been opened & scanned:

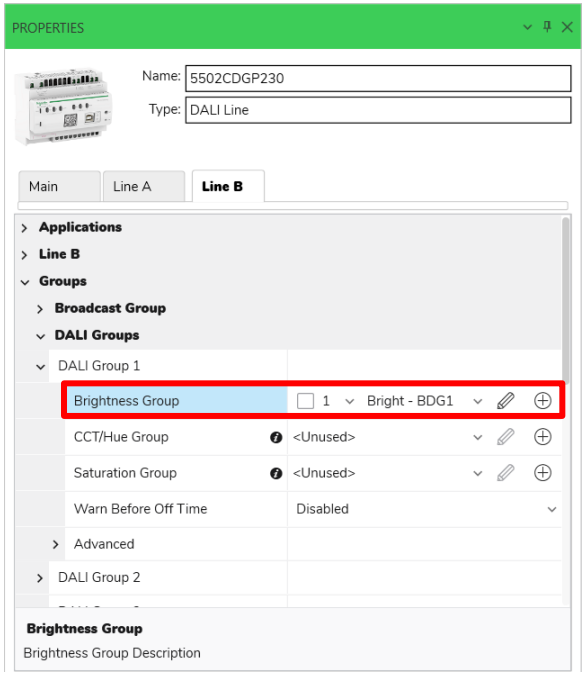


Hue / Saturation Configuration Example

2. For this example, the Project Gateway is loaded into the Properties Editor window.
3. **Line B** is selected followed by the **DALI Groups category** and **DALI Group 1**.
4. A C-Bus group address, **Bright – BDG1** is assigned to the **Brightness Group parameter**.





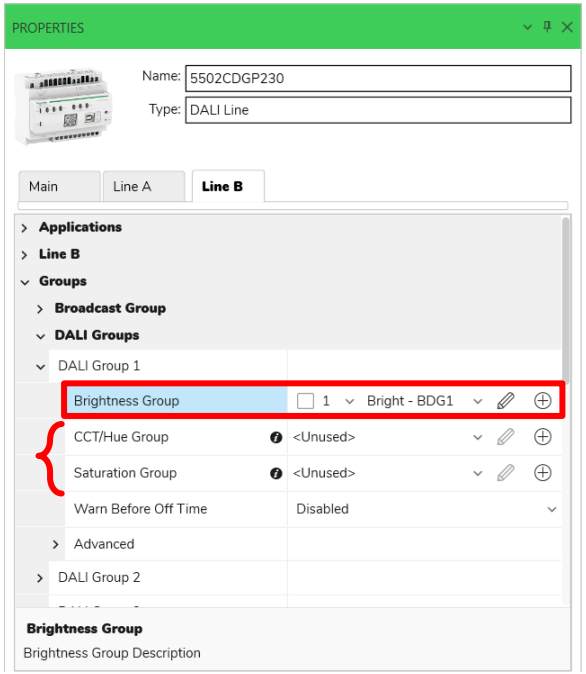


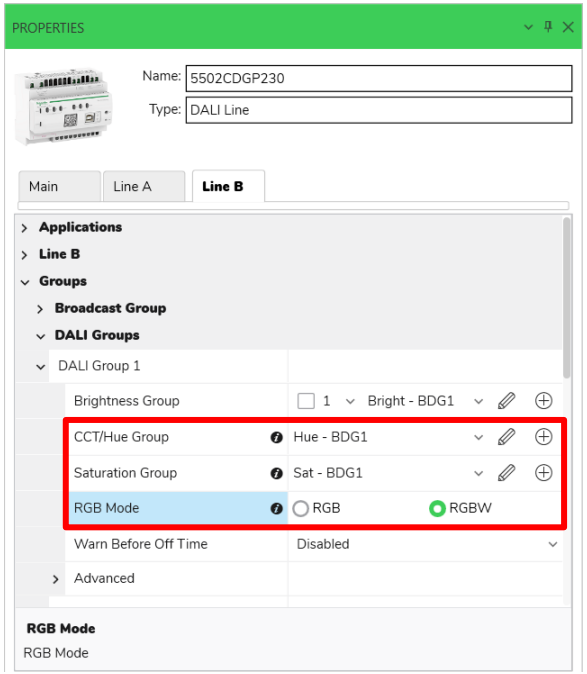
Hue / Saturation Configuration Example

5. As a C-Bus group address has been assigned to the **Brightness Group**, the **CCT/Hue Group** & **Saturation Group** parameters are now enabled.
6. C-Bus group addresses, **Hue – BDG1** & **Sat – BDG1** will be assigned to the **CCT/Hue Group & Saturation Group** parameters.

Brightness Group has a C-Bus group address assigned; therefore, CCT/Hue and Saturation Group parameters are now enabled

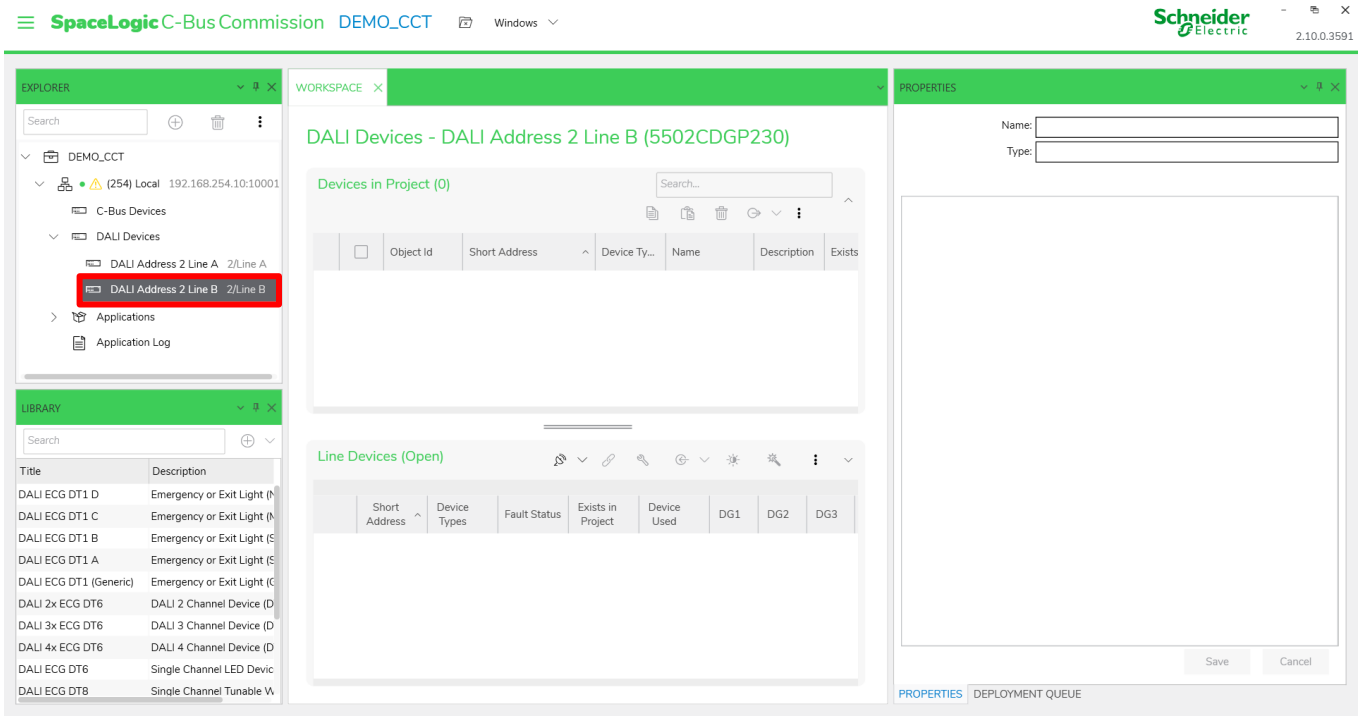
CCT/Hue Group and Saturation Group have C-Bus group addresses assigned; therefore, all devices in DALI Group 1 will be treated as RGBW objects (as RBGW has been selected)





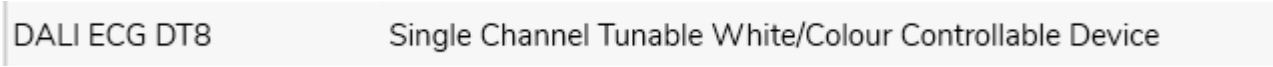
Hue / Saturation Configuration Example

7. The changes will be saved to the project device and deployed to the network device.
8. Once deployment is complete, project DALI devices will need to be added to **Line B** under **DALI Devices**.

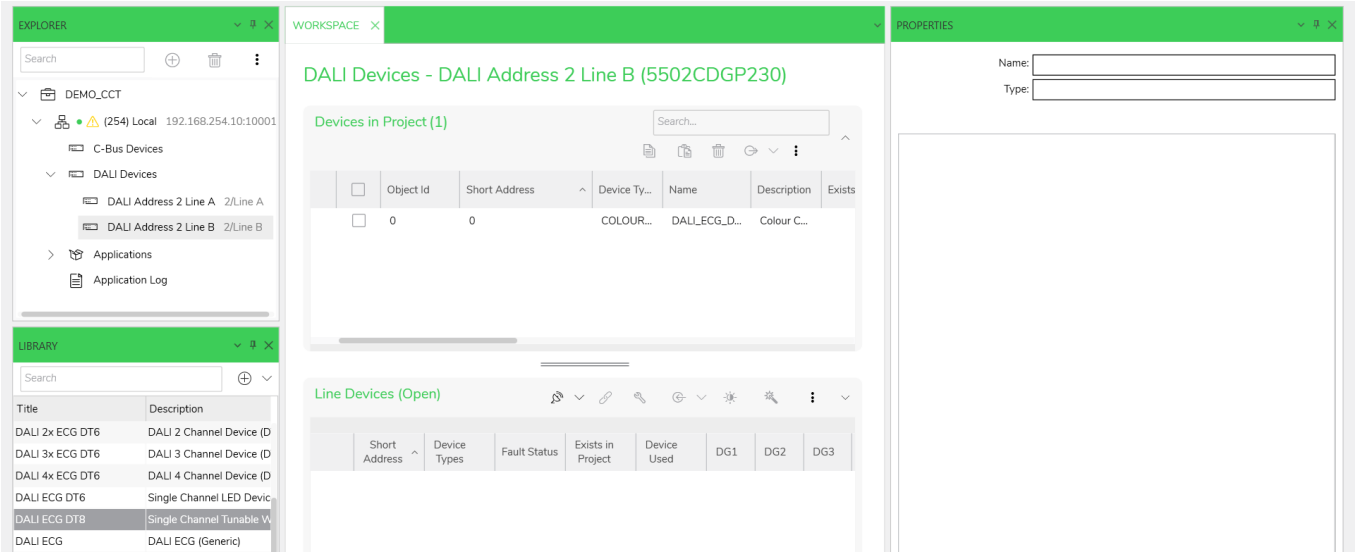


Hue / Saturation Configuration Example

9. 1 × DALI ECG DT8 Single Channel Tunable White/Colour Controllable Device will be added from the **Library**:

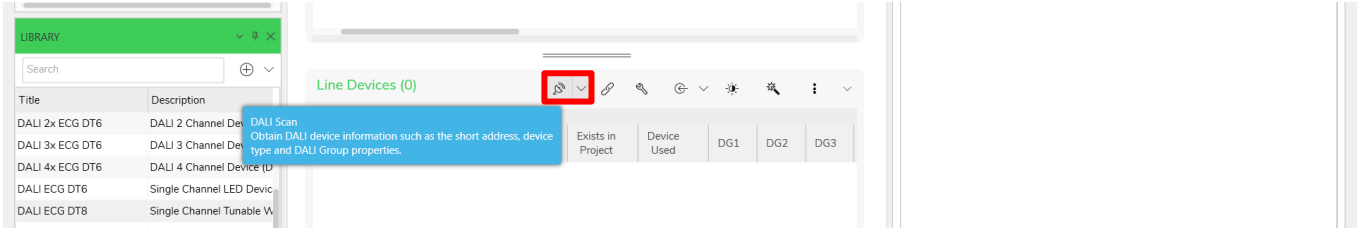


10. Once added the **Devices in Project** section resembles the following:

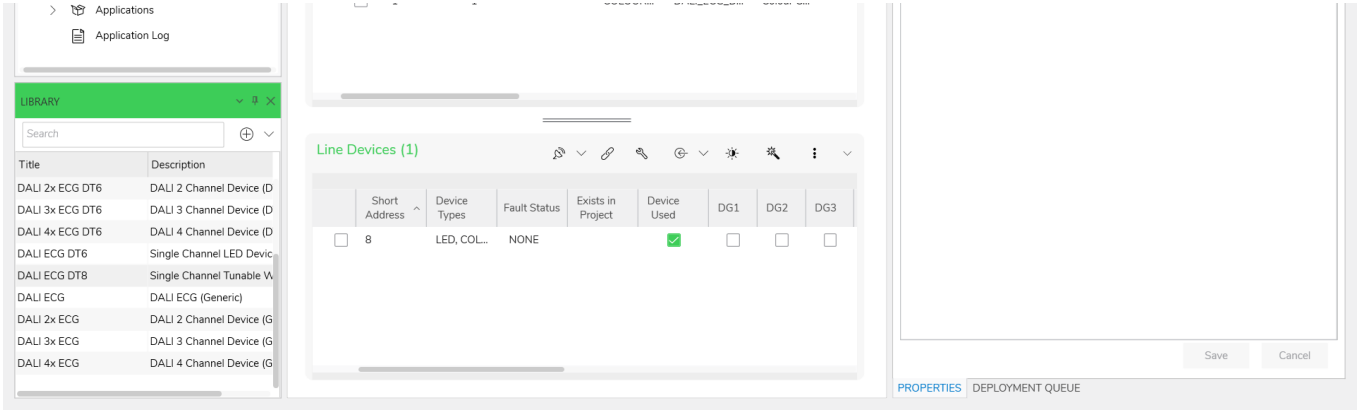


Hue / Saturation Configuration Example

11. DALI Line B will now be scanned:

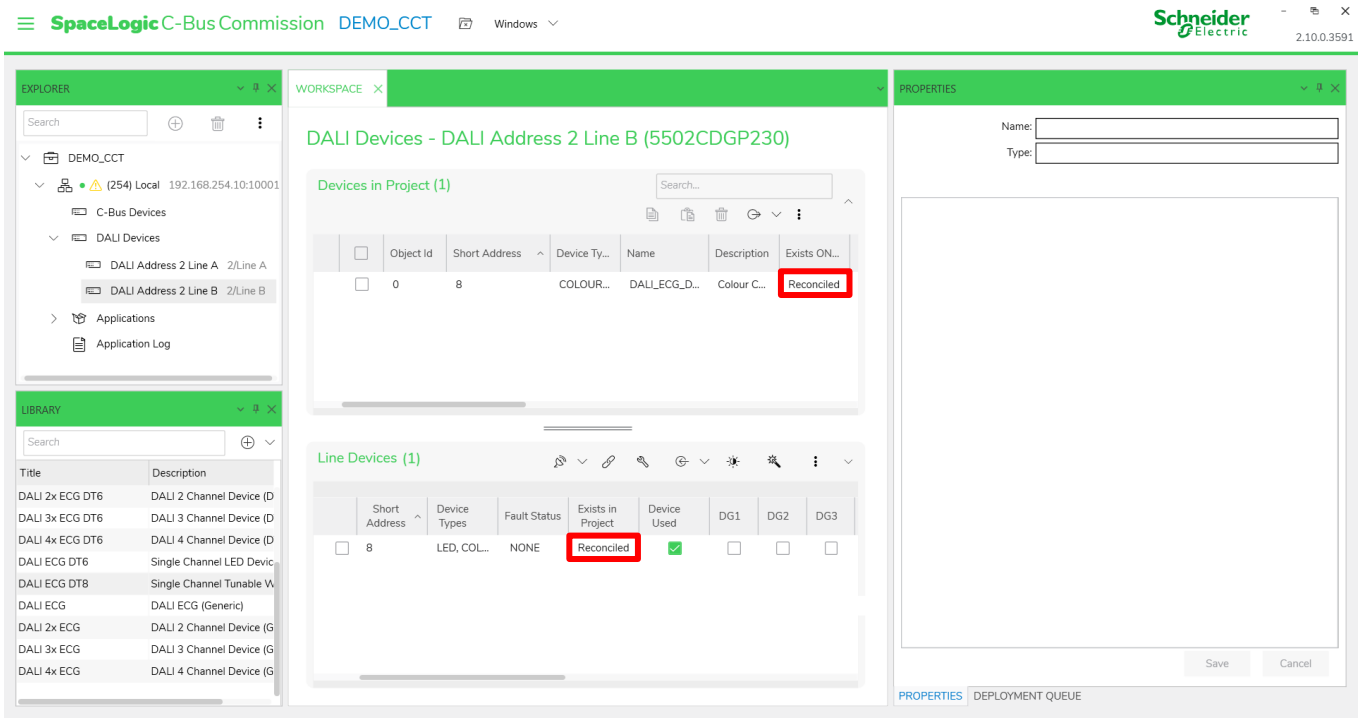


12. Once scanned the **Line Devices** section will resemble the following:



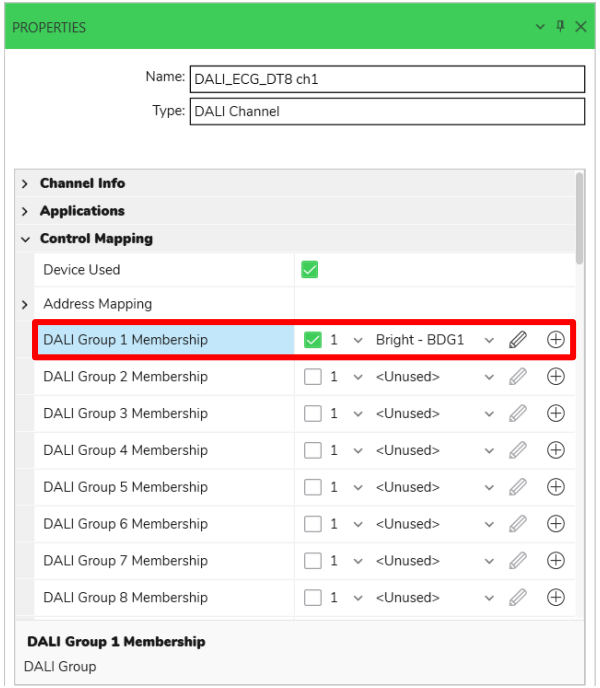
Hue / Saturation Configuration Example

13. The project DALI device will be **readdressed and reconciled** with the network device:



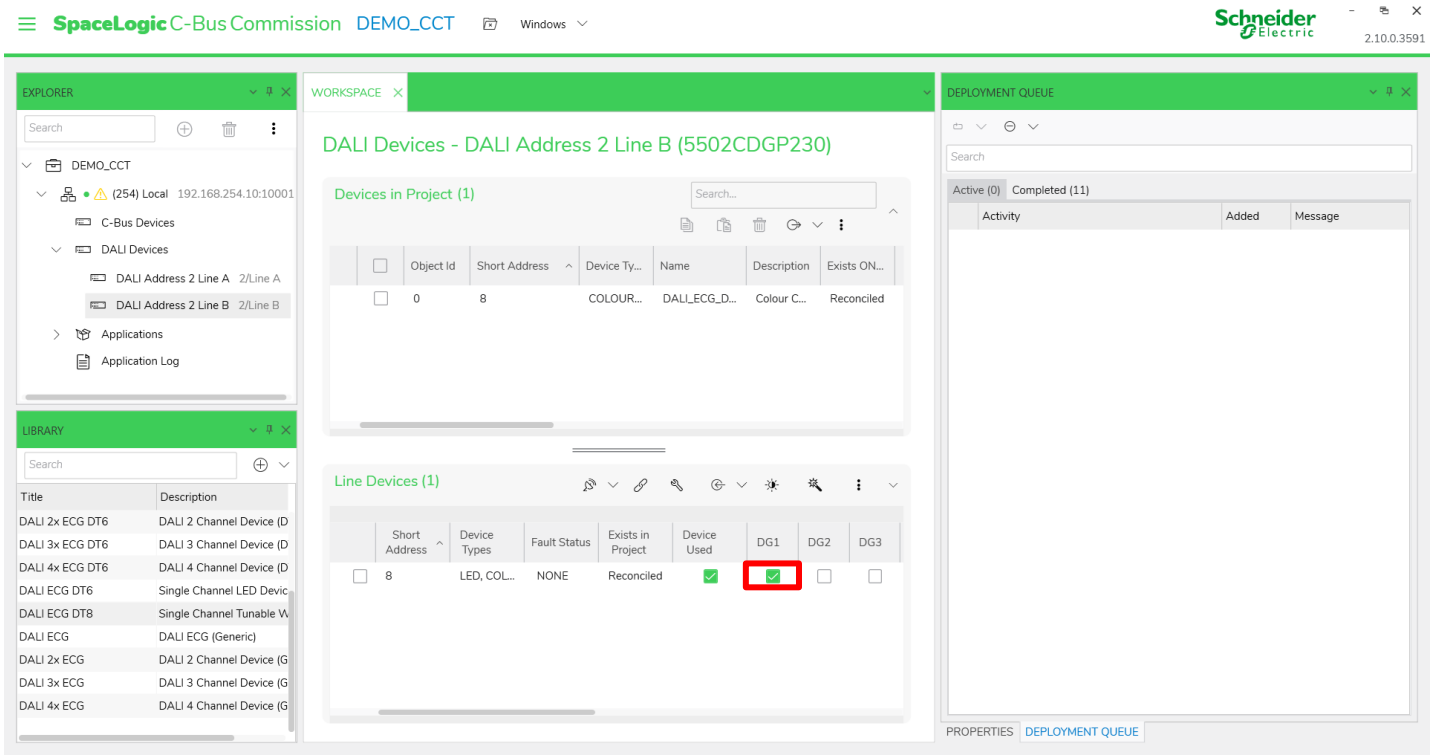
Hue / Saturation Configuration Example

14. The project device will be imported into the **Properties** window and made a member of **DALI Group 1**, changes will be saved to the project device and deploy to the network device accordingly.



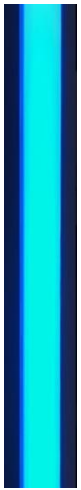
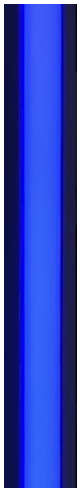
Hue / Saturation Configuration Example

15. The **Line Devices** section will resemble the following once all changes have been successfully deployed:



Hue / Saturation Configuration Example

16. The Hue functionality of the configured DALI device is presented below, completing this example.

Hue	N/A	0	120	180	240
Brightness Group (Bright - BDG1)	0	255 (100%)			
CCT/Hue Group (Hue - BDG1)	0	0	84	128	170
Saturation Group (Sat – BDG1)	0	255 (100%)			
Physical Output of DALI device					

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