



MeshTek® 4 PWM Smart Lighting Controller (SLC)

Human Centric Lighting Control

User Manual

Revision 2.0

TABLE OF CONTENTS

CHAPTER 1	INTRODUCTION.....	4
CHAPTER 2	OVERVIEW	5
2.1	DEVICE OVERVIEW	5
2.2	PACKAGE CONTENTS.....	5
2.3	PWM SLC BOARD.....	5
2.4	PWM SLC CONNECTORS	6
2.5	BENEFITS.....	6
2.6	CONTROL OPTIONS	7
2.7	ELECTRICAL SPECIFICATIONS	7
2.8	ABSOLUTE MAXIMUM RATINGS.....	7
CHAPTER 3	HARDWARE	8
3.1	CONNECTOR PINOUT	8
CHAPTER 4	GETTING STARTED	10
4.1	CONNECTING THE MESHTEK® 4 CHANNEL PWM SLC TO LED DRIVER.....	10
CHAPTER 5	USING THE MESHTEK® SMART LIGHTING CONTROLLER APP	11
5.1	LAUNCH MOBILE APP	11
5.2	CONTROL THROUGH THE MOBILE APP.....	15
5.3	SETTING DEFAULT AND CREATING SCENES	18
5.4	CREATING SCHEDULES THROUGH APP	20
5.5	ADDING AND EDITING A NETWORK.....	24
5.6	SHARING ACCESS TO YOUR MESHTEK DEVICES	25
5.7	RESET SLC.....	25
CHAPTER 6	PACKAGING AND LABELING.....	27
CHAPTER 7	REVISION HISTORY	28

TO OUR VALUED CUSTOMERS

It is our intention to provide you, our valued customer, with the best possible documentation to ensure successful use of your MeshTek products. To this end, we will continue to update our publications to better suit your needs. Our publications will be refined and enhanced as new volumes and updates are introduced.

Please note: images used in the manual are for reference purposes and may be different than the actual product.

If you have any questions or comments regarding this publication, please contact the Marketing Communications Department via Email at sales@ilumisolutions.com. We welcome your feedback.

Errata

An errata sheet, describing minor operational differences from the data sheet and recommended workarounds, may exist for current devices. As device/documentation issues become known to us, we will publish an errata sheet. The errata will specify the revision of silicon and revision of the document to which it applies.

To determine if an errata sheet exists for a particular device, please check with one of the following:

- Contact the MeshTek team
- Contact your local MeshTek sales representative

When contacting a sales office, please specify which device, revision of MeshTek® 4 Channel PWM Smart Lighting Controller (SLC), user manual and data sheet (include literature number) you are using.

Chapter 1 Introduction

The MeshTek® 4 Channel PWM Smart Lighting Controller (SLC) is a plug & play controller, providing an interface between a standard non-dimmable LED driver(s) and LED load(s) thereby making an LED fixture/luminaire smart. It can be configured to have four PWM controlled output channels for connection with LED load or four PWM control signals from the MeshTek® module to interface with your external LED driver and then control them remotely through ilumi iOS and Android apps over a simple Bluetooth Low Energy (BLE) protocol. Multiple lighting fixtures can be controlled individually or together as a group.

All PWM SLCs generate and form a reliable, secured and dynamic mesh network, extending the range as well. Each SLC has a PA/SLA built in for high signal strength and sensitivity that can communicate to other SLCs up to 200m range, requiring no external antenna, thereby saving costs in terms of material and assembly. The patented PWM SLC technology also has a Real-Time Clock for time stamping and scheduling purposes.

The simplicity of a BLE local mesh network, with easy scheduling, takes out the need of any wiring, installations and requirement of a pre-existing wireless network. This makes the MeshTek® SLC most suitable for horticultural, white tunable lighting control and scheduling.

Chapter 2 Overview

2.1 Device Overview

The MeshTek® 4 Channel PWM SLC integrates:

- MeshTek-H52 - Bluetooth 5.0 ready module
- Four PWM control with Common Anode configuration or Four PWM control signals from the MeshTek-H52 module
- 3 General Purpose Input Outputs with I2C and 3-Wire SPI communication capabilities to connect to external peripheral such as sensors
- Real time clock for scheduling task
- Market-leading LED driver utilization with ilumi's built-in HyperLux technology,
HyperLux®: <https://www.ilumisolutions.com/pages/hyperlux-minimize-led-drivers-costs>

2.2 Package Contents

Package contains the following:

- Plug & Play ilumi MeshTek® 4 Channel PWM SLC

2.3 PWM SLC Board

- Representation of end user interface and connectors present on MeshTek® 4 Channel PWM SLC is shown below

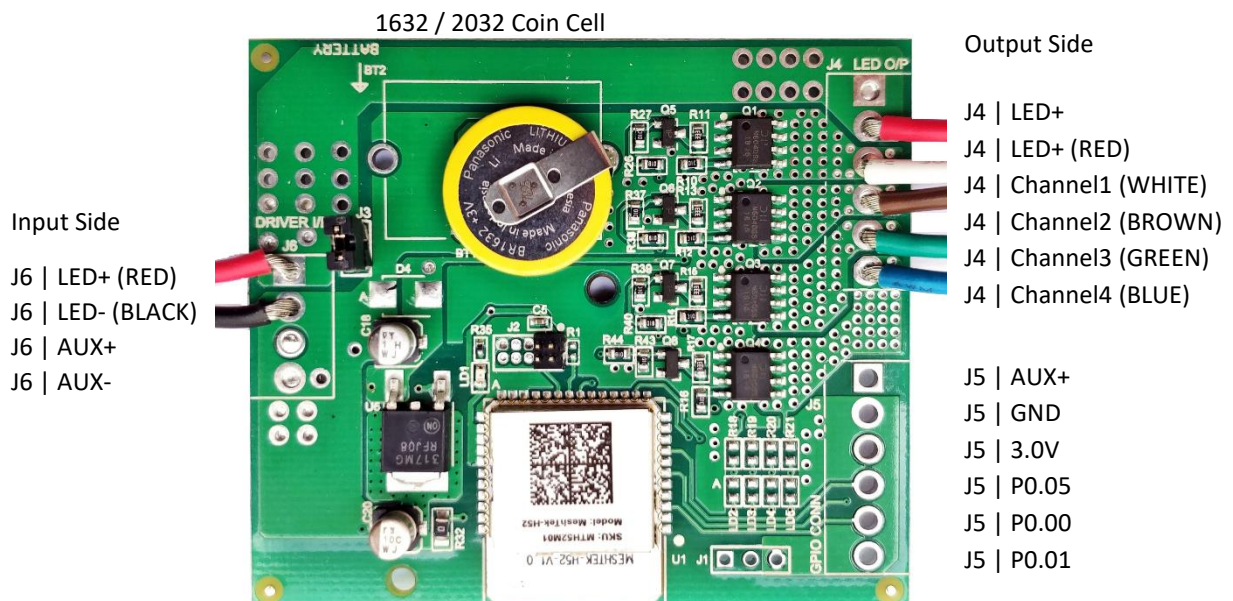


Figure 2-1 MeshTek® 4 Channel PWM SLC (65mm X 56mm)

2.4 PWM SLC Connectors

J6 - LED DRIVER; INPUT CONNECTOR	J4 - LED LOAD; OUTPUT CONNECTOR
J2 - PROGRAMMING CONNECTOR	J5 - GPIO; OUTPUT CONNECTOR
J3 - JUMPER	

2.5 Benefits

- A 4 Channel PWM control is suitable for horticultural and adjustable white fixtures/luminaires
- Maximized LED driver utilization <https://www.ilumisolutions.com/pages/hyperlux-minimize-led-drivers-costs>
- Support of common anode configuration for LED load
- Plug & Play integration between an LED driver and the LED load
- Proven BLE Mesh Technology with over 150,000+ MeshTek® end devices installed worldwide
- Ready state-of-the-art iOS and Android apps
- The only BLE solution with auto Firmware Over the Air Update (FOTA) in a meshed network
- The only self-healing BLE mesh for high data transfer and reliable communications
- Built-in antenna with up to 200-meter range with reliable and secured meshing
- Input supply current 100mA in Transmit mode at +18.9dBm output power and less than 1mA in ideal mode
- Reverse polarity protection
- Built-In Real Time Clock with battery for automation and scheduling
- 3 GPIOs for sensor and other peripheral integration (I2C, SPI 3-wire, UART configurable)
- Available only in open frame form (no enclosure or sleeve option available)

2.6 Control Options

- Four PWM Channels to control LEDs or Four 3V PWM Control Signal (1KHz Frequency)
- Three GPIOs available on J5 can be configured as UART lines or I2C lines for interfacing the MeshTek® BLE module with external peripherals and sensors

2.7 Electrical specifications

ELECTRICAL SPECIFICATIONS				
Description	Min	Nom	Max	Notes
LED Driving Voltage (LED+)	6V	-	60V	AUX+/- needs to be powered separately. Common Anode Topology
LED Driving Voltage (LED+)	6V	-	24V	AUX+/- powered with the same LED+/- supply. Common Anode Topology.
LED Driving Current Channel-1	0	-	4A	
LED Driving Current Channel-2	0	-	4A	
LED Driving Current Channel-3	0	-	4A	
LED Driving Current Channel-4	0	-	4A	
Input Supply Voltage (AUX+)	6V	-	24V	
Input Supply Current (AUX)	10mA		100mA	With ilumi mesh stack running
GPIO Output drive current		20mA		
Radio Operating Frequencies	2.360 GHz		2.500 GHz	
Radio On-Air Data Rate		1 Mbps	2 Mbps	
Radio Output Power		-	+18.9 dBm	RF output power configured to +18.9dBm using external PA
Receiver Sensitivity @ BLE		-96 dBm		Ideal transmitter

2.8 Absolute Maximum Ratings

- LED driving voltage supported by the board: 26V* (suitable for LED panels, strips, down lights, fixtures, etc.); 60V with AUX+/- powered separately.
- Input Supply Input (AUX+): 26V**
- General Purpose I/O voltage: 3.6V
- Temperature range: -20°C to 50°C

**If load consists of multiple LED chains (colored or non-colored) and individual LED chain control is required, then the LED chains should be connected in a common anode topology for proper operation. Refer to application setup shown in [Figure 4-1](#)*

**For proper functioning, the total LED forward voltage for each channel should be in close range when compared with each other and it shouldn't exceed the LED driving voltage.*

**Refer to the LED driver system voltage range before making the connection; no load voltage for the LED driver shouldn't exceed absolute maximum rating defined above.*

*Remove Jumper J3 to increase the LED+ range to 60V.

**If J3 is removed, then external power needs to be applied to AUX+ and AUX- to power the board.

Stresses beyond those listed under Absolute Maximum Ratings may cause permanent or partial damage to the device. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

Chapter 3 Hardware

3.1 Connector Pinout

3.1.1 LED DRIVER INPUT CONNECTOR (J6)

J6 is available for connecting the LED driver and supplying input supply to the SLC. J6 pinout with wire color for reference is as noted below:

Pin No.1 (Red Wire)	Pin No.2 (Black Wire)	Pin No.3	Pin No.4
LED+	*LED-	AUX+	*AUX-

*Note: 1. LED- and AUX- are internally shorted on the board

Note2: Wires are not loaded at AUX+ and AUX-. Board is powered via LED+ with jumper J3 shorting LED+ and AUX+; Contact support@ilumisolutions.com in case of any questions regarding this.

3.1.2 LED LOAD OUTPUT CONNECTOR (J4)

J4 is available for connecting LED load. J4 pinout with wire color for reference is as noted below:

Pin No.1	Pin No.2 (RED Wire)	Pin No.3 (White Wire)
LED+	LED+	*Channel-1 (or P0.29)
Pin No.4 (Brown Wire)	Pin No.5 (Green Wire)	Pin No.6 (Blue Wire)
*Channel-2 (or P0.02)	*Channel-3 (or P0.04)	*Channel-4 (or P0.30)

*Note: Contact support@ilumisolutions.com if Pin no. 3, 4, 5, 6 needs to be configured as 3V PWM signals to drive external switching circuit or driver.

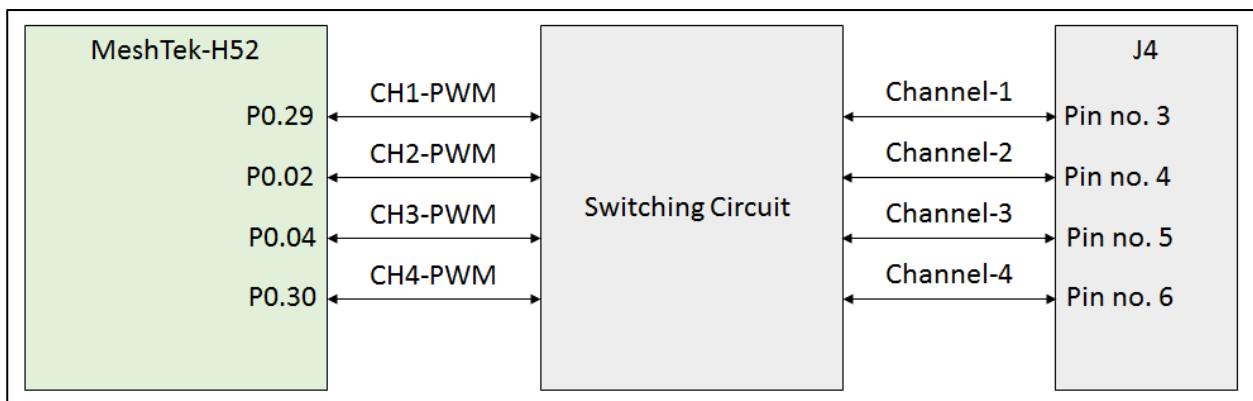


Figure 3-1 MeshTek® 4 Channel PWM SLC - J4 Connector

3.1.3 LED GPIO OUTPUT CONNECTOR (J5)

J5 is available for interfacing with a MeshTek® BLE module with external peripherals and sensors. J5 pinout is as noted below:

Pin No.1	Pin No.2	Pin No.3
AUX+	GND	3.0V
Pin No.4	Pin No.5	Pin No.6
P0.05	P0.00	P0.01

Note1: Wires on J5 aren't loaded; Contact support@ilumisolutions.com if the board is required with wires loaded on J5.

3.1.4 PROGRAMMING CONNECTOR (J2)

J2 is 5X2 1.27mm pitch programming connector

Pin No.1	Pin No.2	Pin No.3	Pin no.4	Pin No.5
3.0V	SWDIO	GND	SWDCLK	GND
Pin No.6	Pin No.7	Pin No.8	Pin No.9	Pin no.10
NC	NC	NC	GND	*P0.21/RESET

3.1.5 JUMPER (J3)

- Jumper on J3 is present on the board by default.
- Jumper on J3 shorts LED+ and AUX+ to make it a single input board instead of dual
- If the Jumper is removed, then the board won't get powered unless the Jumper is put back or external power is applied to AUX+ / AUX-.

Note1: The Jumper should be removed if the user intends to provide separate power to LED+/LED- and AUX+/AUX-.

Chapter 4 Getting started

It is recommended that you use a wrist band or anti-electrostatic glove when handling the SLC.

4.1 Connecting the MeshTek® 4 Channel PWM SLC to LED driver

Application setup for common anode topology LED driver PWM control is in [Figure 4-1](#).

For Human Centric Lighting Application, only Channel 1 and Channel 2 are to be used.

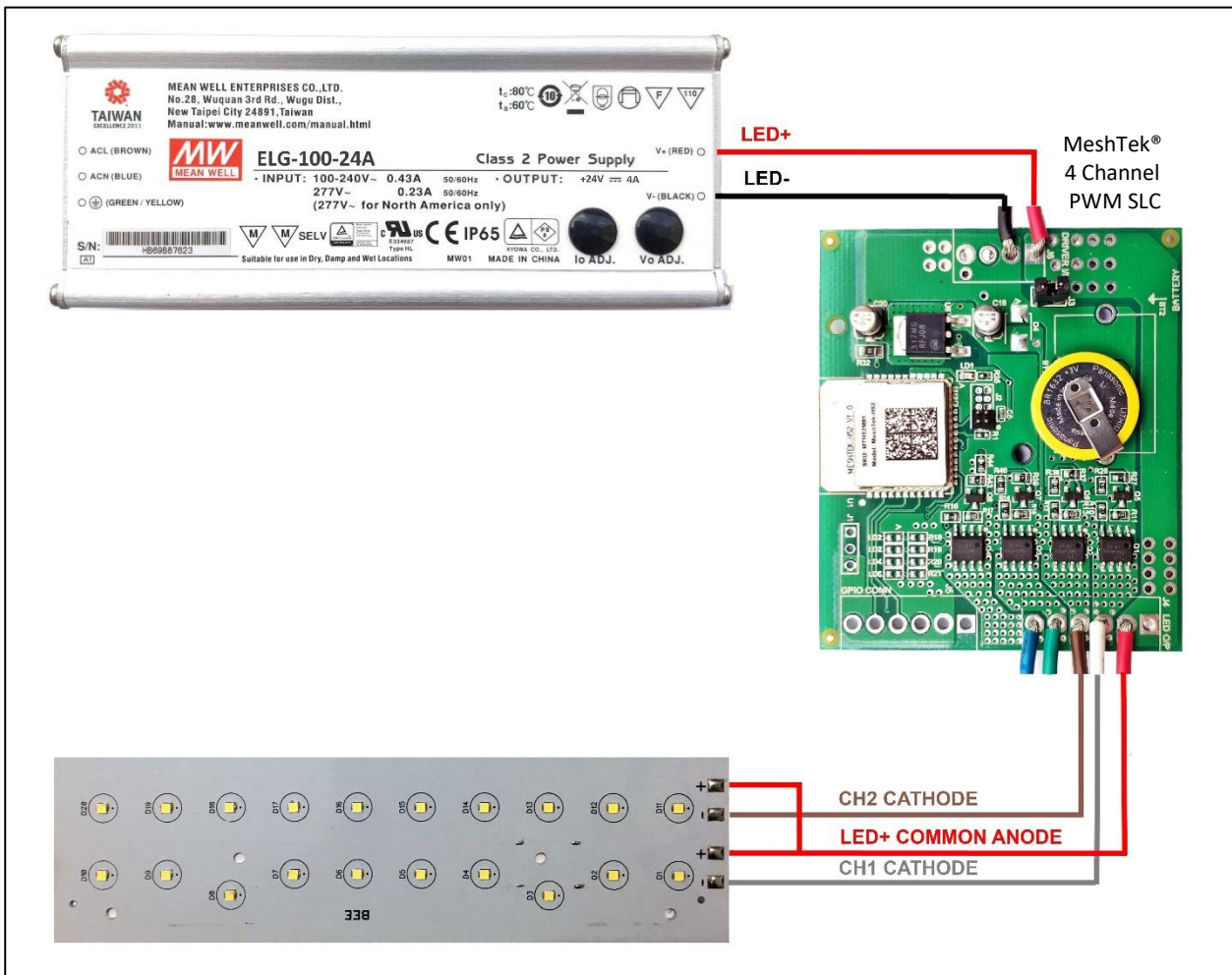


Figure 4-1 Application Setup

Note:

1. If the load consists of multiple LED chains (colored or non-colored) and individual LED chain control is required, then the LED chains should be connected in a common anode topology for proper operation. Refer to application setup shown in [Figure 4-1](#)
2. For proper functioning, total LED forward voltage for each chain (channel) should be in close range when compared with each chain (channel) and it shouldn't exceed LED driving voltage.

Chapter 5 Using The MeshTek® Smart Lighting Controller App

5.1 Launch Mobile App

[DOWNLOAD MeshTek® iOS APPLICATION BY CLICKING HERE.](#)

PLEASE FOLLOW BELOW INSTRUCTIONS TO INSTALL AND USE THE APP:

Trust Enterprise apps on iPhone/iPad after download.

1. Launch Settings from your Home Screen.
2. Tap on General.
3. Tap on Device Management.
4. Tap the name of the distributor under the Enterprise App section. (ilumi Solutions, Inc.)
5. Tap to trust.
6. Tap to confirm and now open Human Centric.

You can use the QR Code below to download iOS app as well.



Once registered on the HockeyApp, you will see the Human Centric Lighting App that you can download on your mobile device. Ensure to follow the 6 steps listed on the page to be able to run the app on the phone. Registering on HockeyApp will also help the user in getting a notifications of new app availability.

This app is designed for Human Centric related features only. Please contact sales@ilumisolutions.com for white labelling the app and enhancements with additional features and functionality.

When the MeshTek® App is launched, click on “I have MeshTek” button (we assume you have purchased a MeshTek Lighting Controller). A new screen will pop up asking you to Create Account and Login. If you are a first time user then click on “Don’t have an account?” button, enter your email ID and password as shown in [Figure 5-2](#). If you are a registered user then enter the credentials and click on the “Sign In” button as shown in [Figure 5-2](#).



Figure 5-1 MeshTek® Human Centric Lighting App

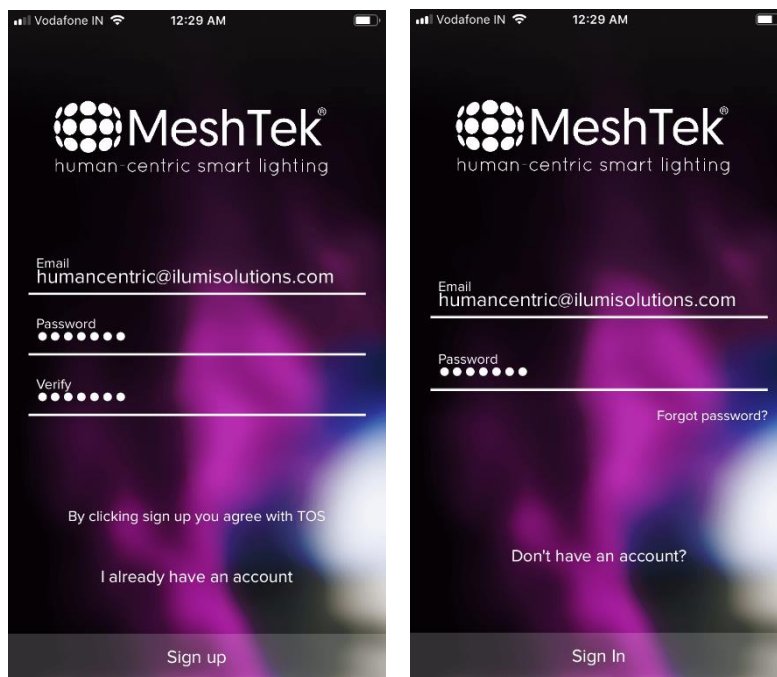


Figure 5-2 Create Account and Sign In

Once logged in, user would see the Networks screen which has a default “Main” network present as shown in the below image.

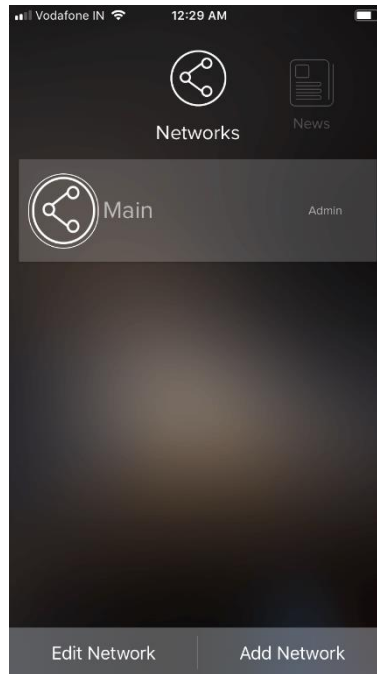


Figure 5-3 Networks

User can create multiple networks incase required, refer to [Section 5.5](#) on how to Add and Edit a Network.

Click on the default network “Main” to go to the Dashboard of the Main network. Once in Dashboard, the app would automatically search for the SLC. If the app doesn’t search for SLC or by mistake you have clicked on the “Later” tab, then scroll to “More” section present on the right side of the Dashboard icons and click on “Search for MeshTek Devices” button.

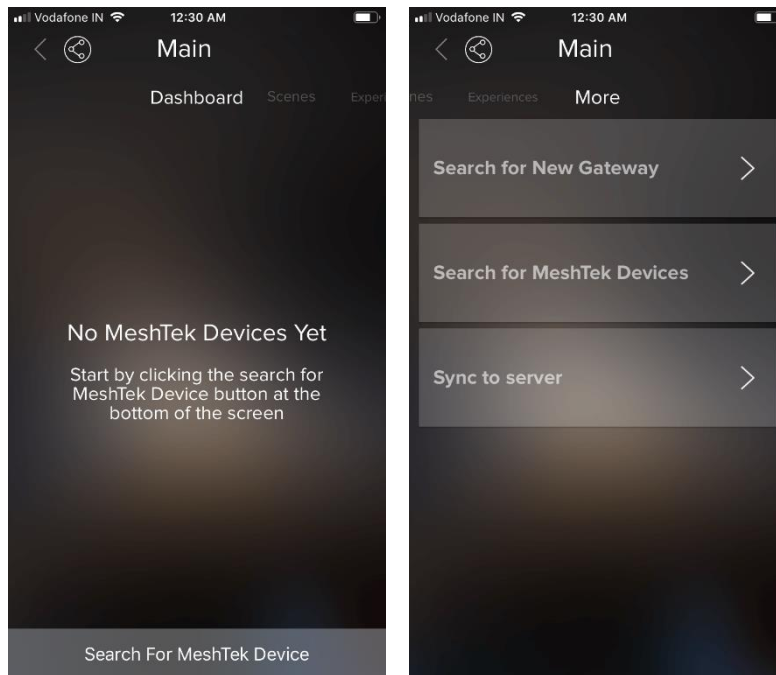


Figure 5-4 Search for MeshTek Devices

Prior to all this, please make sure that all the SLCs are powered up. The app scans for the powered SLCs and initiates the commissioning/pairing process, refer to [Figure 5-5](#). The maximum number of mesh SLCs that can directly connect with an iOS/Android device is configurable.

5.2 Control through the Mobile App

5.2.1 **Select** and **drag** a SLC to the “New Group” item. It will bring up a screen and prompt you to enter a Group name. Provide this Group a name and click on “Next” to select the Group icon, user can choose to skip the process and finish the commission process.

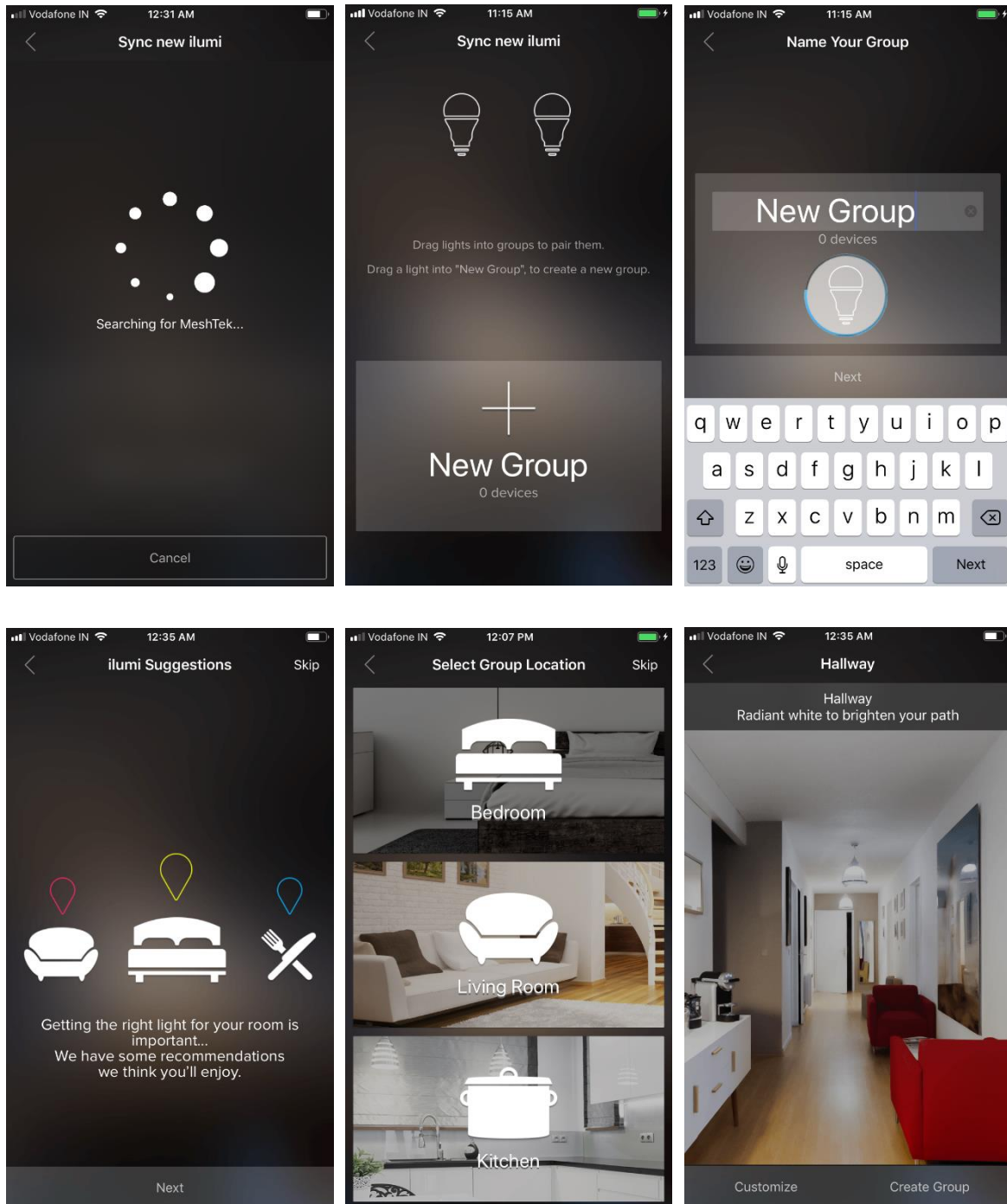


Figure 5-5 Commissioning / Pairing Process

Click on top left “<” button to return the dashboard screen. The New Group Item will appear on the screen, showing the number of SLCs available in the Group.

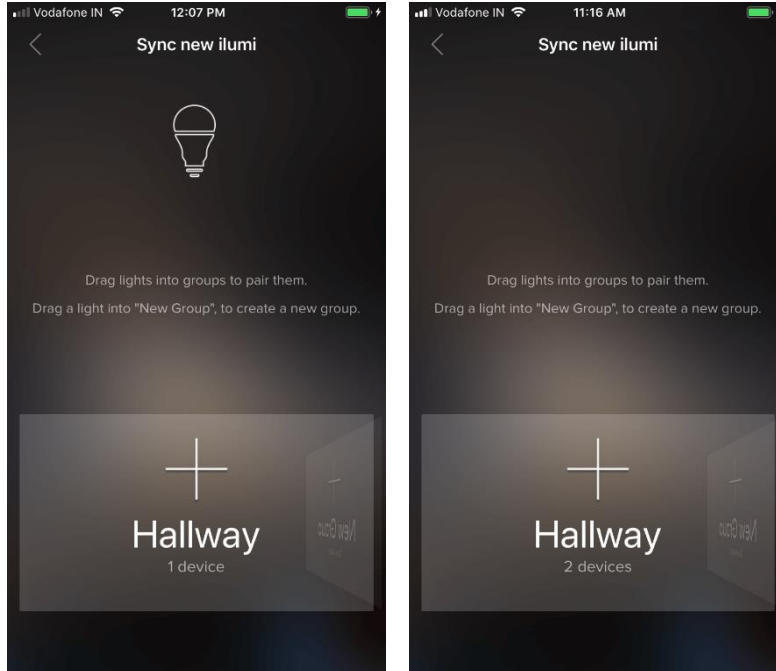


Figure 5-6 Commissioning / Pairing Process

5.2.2 Click the “Hallway” button preset on the Dashboard, to take you inside the Group and show all of the commissioned SLCs in this Group.

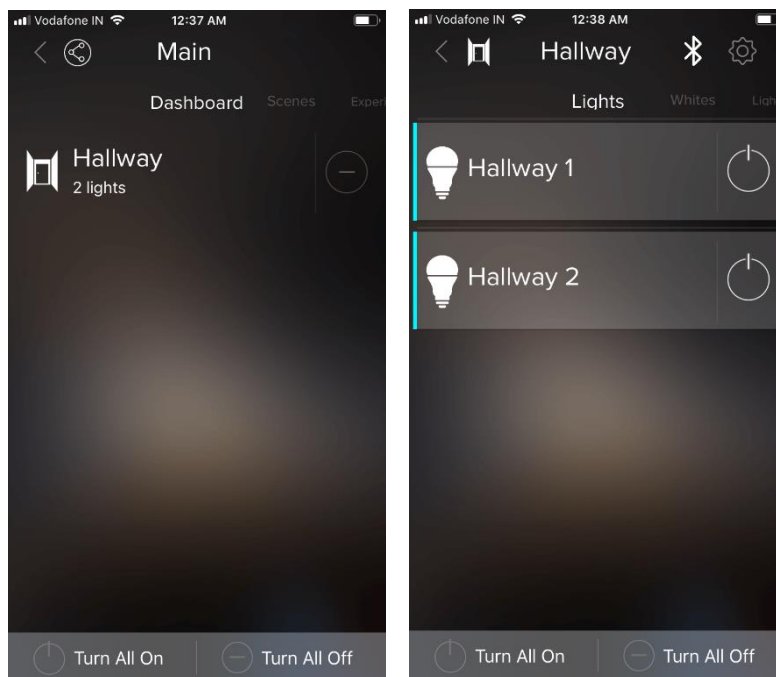


Figure 5-6 Dashboard and Group

User can change brightness of the whole group i.e., at the Dashboard level by Scrolling to the left on “Hallway” button. Individual SLC brightness can be controlled by doing the same once inside the Group.

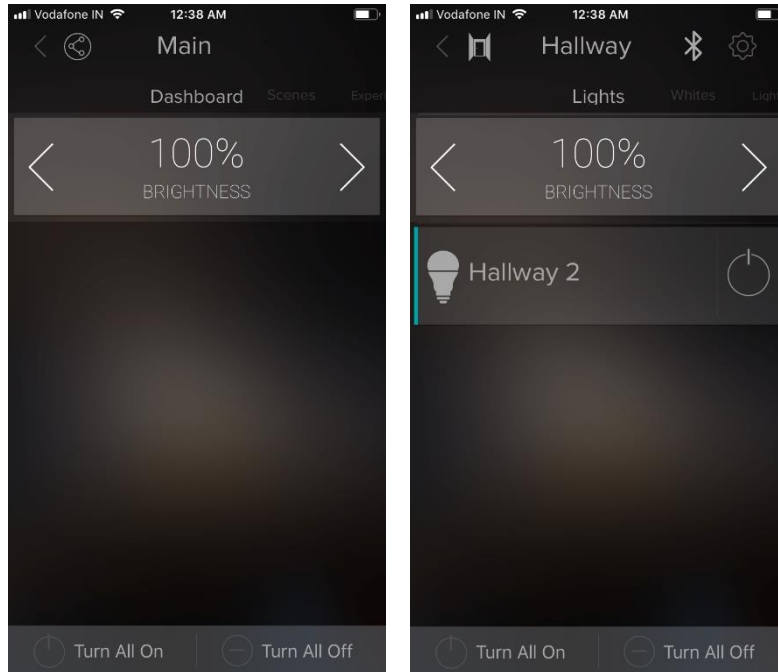


Figure 5-7 Brightness Control

App allows user to choose from pre-defined “Whites” light setting available or apply user defined “Light Setting” by controlling Color Temperature (CCT) and Brightness of the lights connected to the SLC. These settings can be applied at the Group level or Individual level.

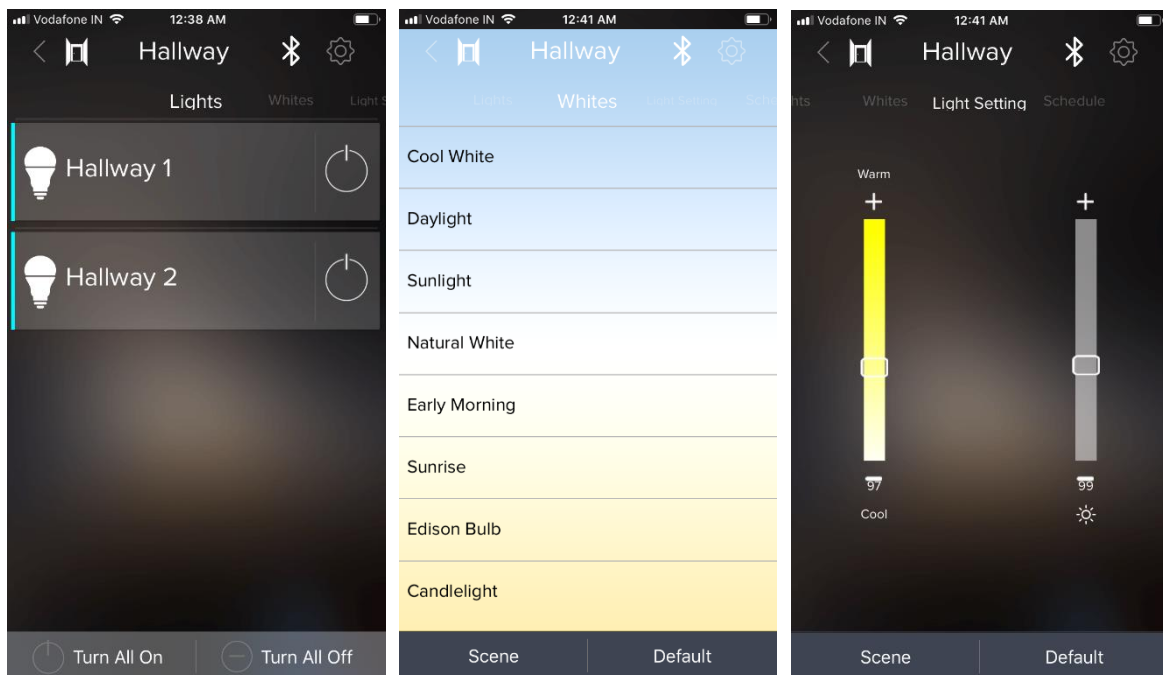


Figure 5-8 Whites and Light Setting

5.3 Setting Default and Creating Scenes

5.3.1 Setting a new Default overrides the existing setting with which the lights would turn ON every time the SLC is powered ON (either from the APP or from Wall Switch); unless there is any other schedule running (which is explained later in this manual)

User can set Default setting from both “Whites” and “Light Setting” window. Select the required setting and click on “Default” button present on the bottom right. Refer to below images for reference.

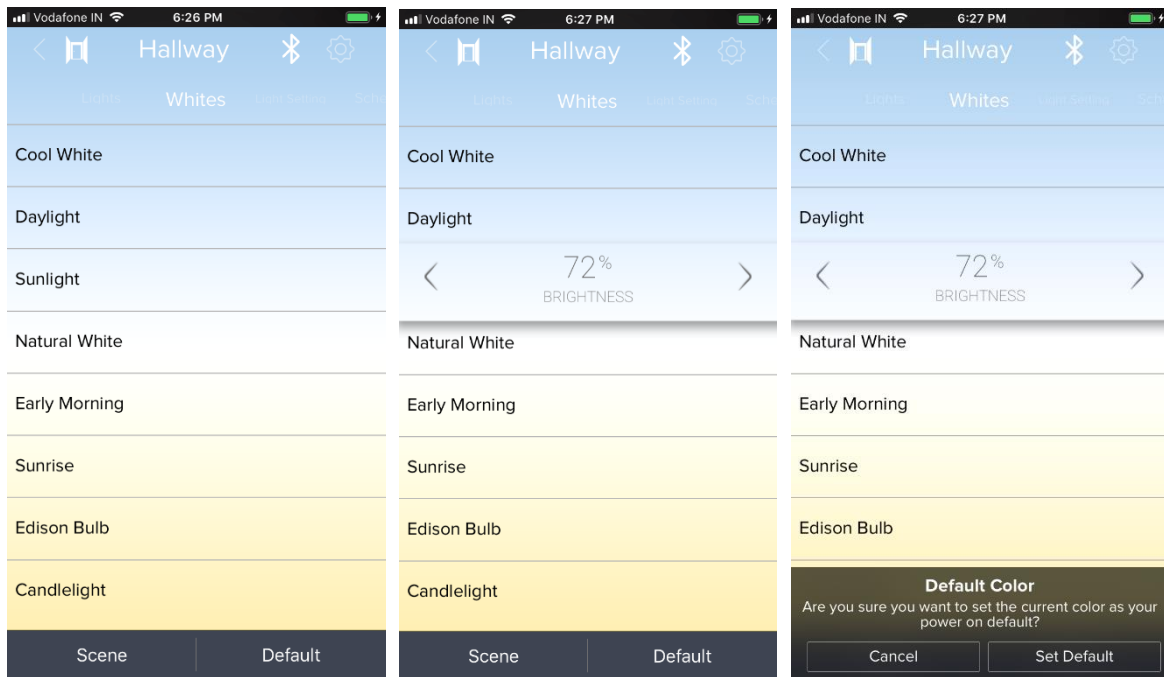


Figure 5-9 Set Default

5.3.2 User can create Scenes on both “Whites” and “Light Setting” windows. Select the required setting and click on the “Scene” button present on the bottom left and follow the instructions shown on the screen to create a Scene. Refer to below images for reference.

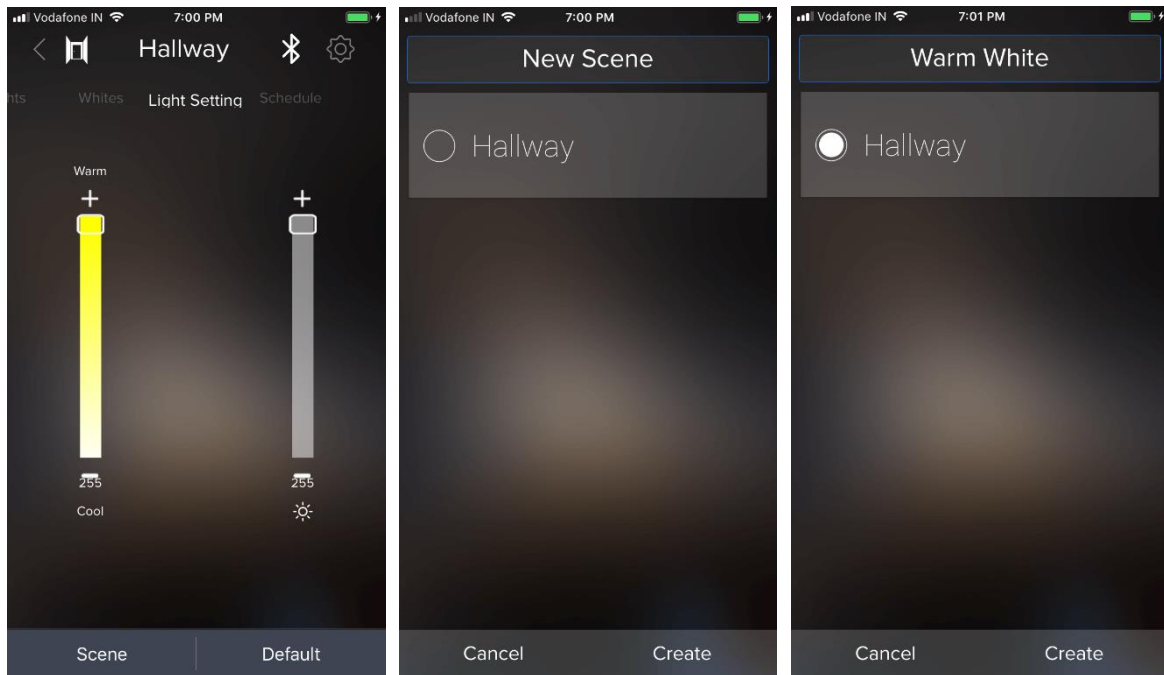


Figure 5-10 Create Scenes

The scenes created can be accessed, modified, renamed, deleted and run from the Scenes screen which can be navigated from the Dashboard screen.

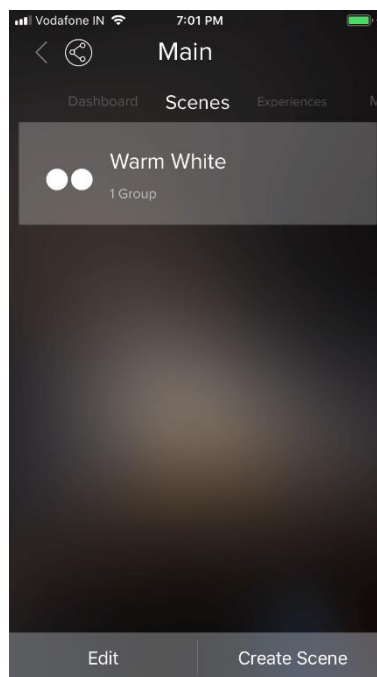


Figure 5-11 Run Scenes

Note: User can create multiple Scenes. Scenes are applied at Group level only and not to Individual SLC.

5.4 Creating Schedules through App

The Scheduling feature enables User to schedule Turing On / Off the devices or schedule to Turn On the lights (SLCs) at specific Lighting Setting or Scene or White. More than one schedule can be set via the App to an Individual SLC or the Group. To create a schedule the user needs to be near the lights to be scheduled and the lights should be powered on and connected to the app.

5.4.1 Click on the Group or individual SLC inside the Group, and scroll to the right until the Schedule tab appears, as shown in first image of [Figure 5-13](#). Click on the “Schedule” button and then select on the appropriate type of schedule required to be set by the User. Follow the instructions shown on the screens until finished to create the schedule.

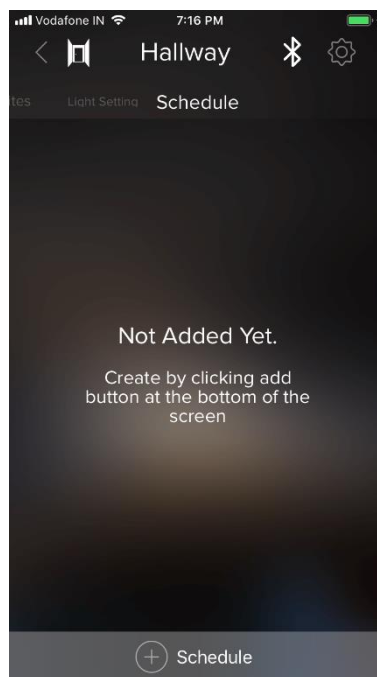


Figure 5-13 Schedule Screen

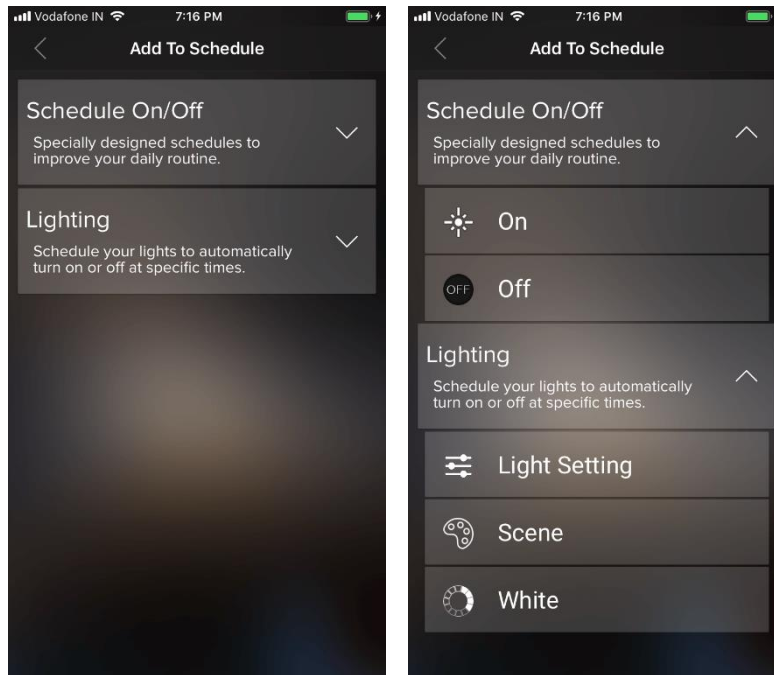


Figure 5-14 Select Schedule Type

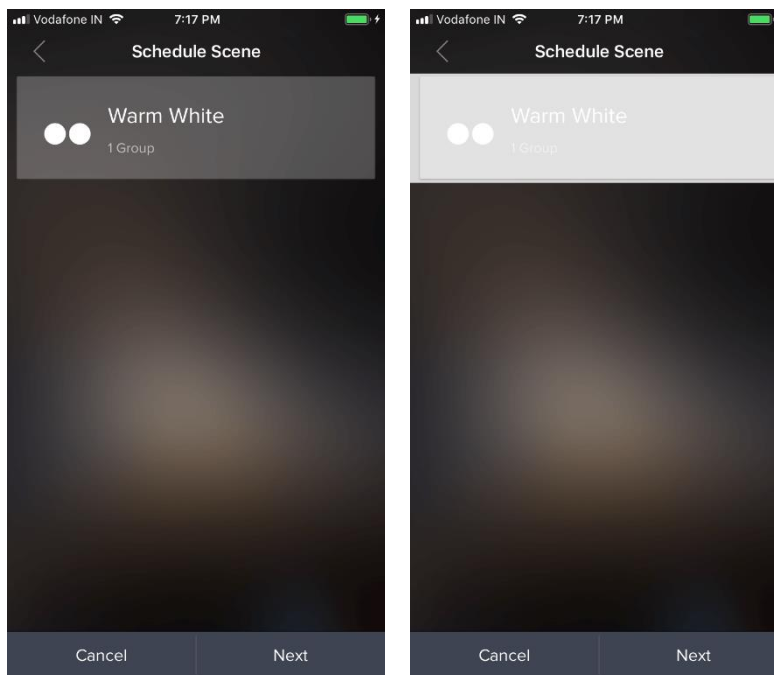


Figure 5-15 Select Scene

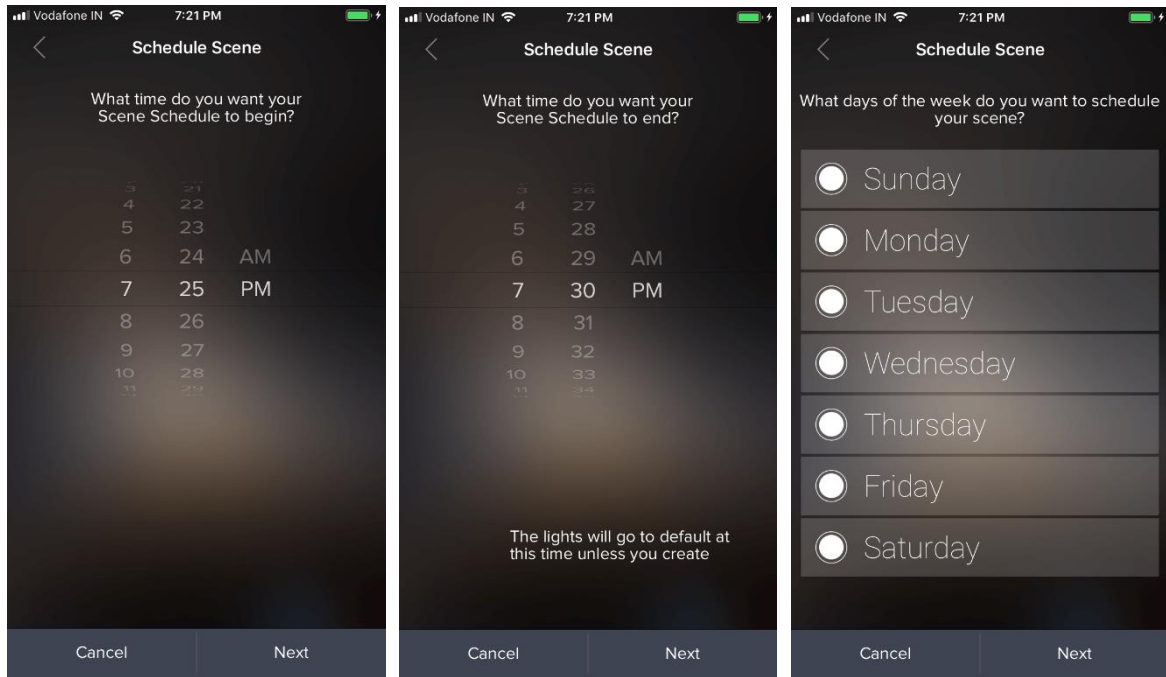


Figure 5-16 Select Start Time, End Time and Days of week

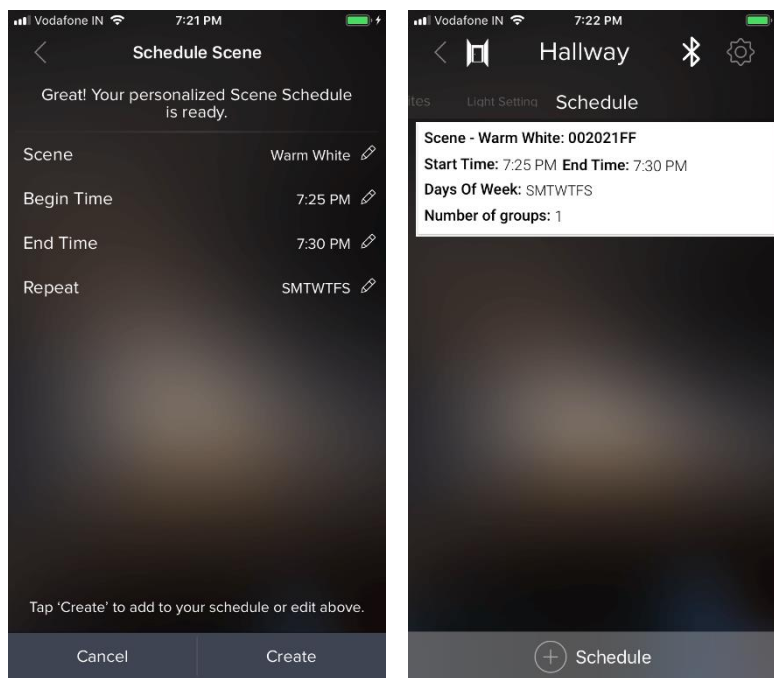


Figure 5-17 Preview Schedule

The created schedule is transferred to the SLCs memory and each SLC with a schedule runs the light settings or scenes as required.

5.4.2 To delete a Schedule, go to the Schedule screen. Schedule screen would show all the user created schedule, click on the schedule you want to delete and then click on the “Delete” button present at the bottom of the screen as shown in [Figure 5-18](#).

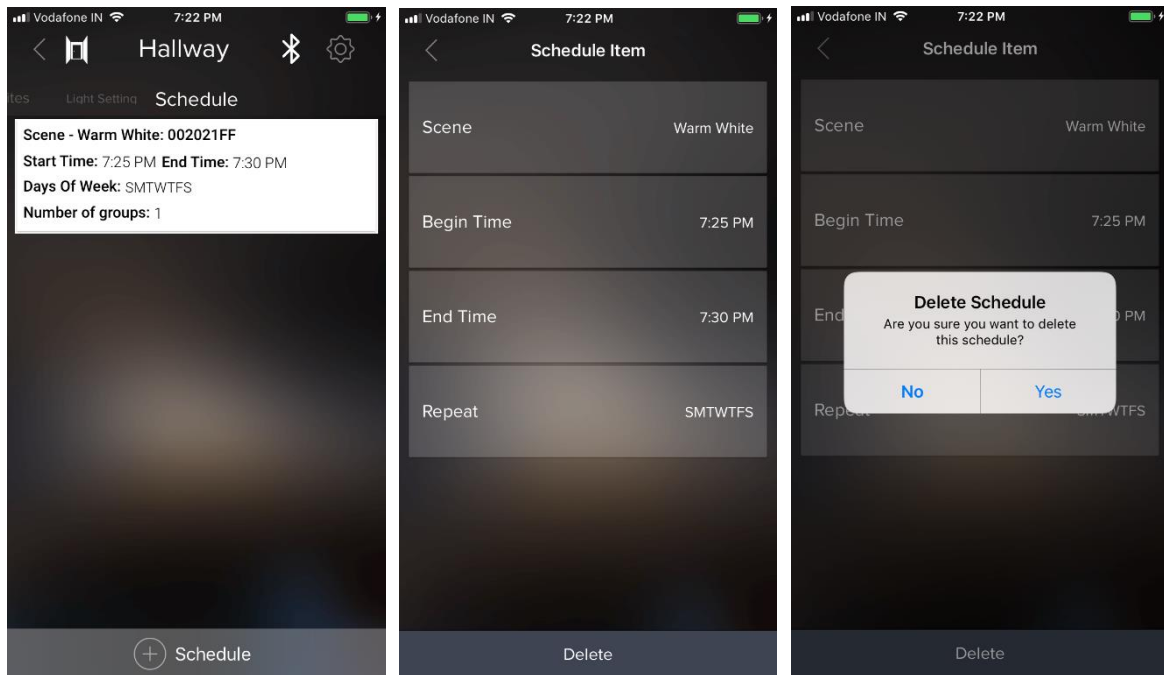


Figure 5-18 Delete Schedule

5.5 Adding and Editing a Network

Creating additional networks can be useful for scenarios where you want two separate dashboards (home vs. office, for instance), as well as providing a channel for you to allow other users to share access/control of certain groups that you approve (and not others).

Note: User can have maximum of 20 SLCs commissioned in a Network. If more than 20 SLCs needs to be installed in a single setup (location), then user needs to either create a new Network for the next 20 SLCs or add an ilumi MeshTek Gateway to the setup. Ilumi MeshTek Gateway allow users to control up to 150 SLCs from a single network; it is ideal for large installation. Refer to www.ilumisolutions.com for more information on ilumi MeshTek Gateway or reach out to us at sales@ilumisolutions.com.

5.5.1 Click on “Add Network” button present on the bottom right of the Networks page. Give the logical name and description to the Network and click on “Save”.

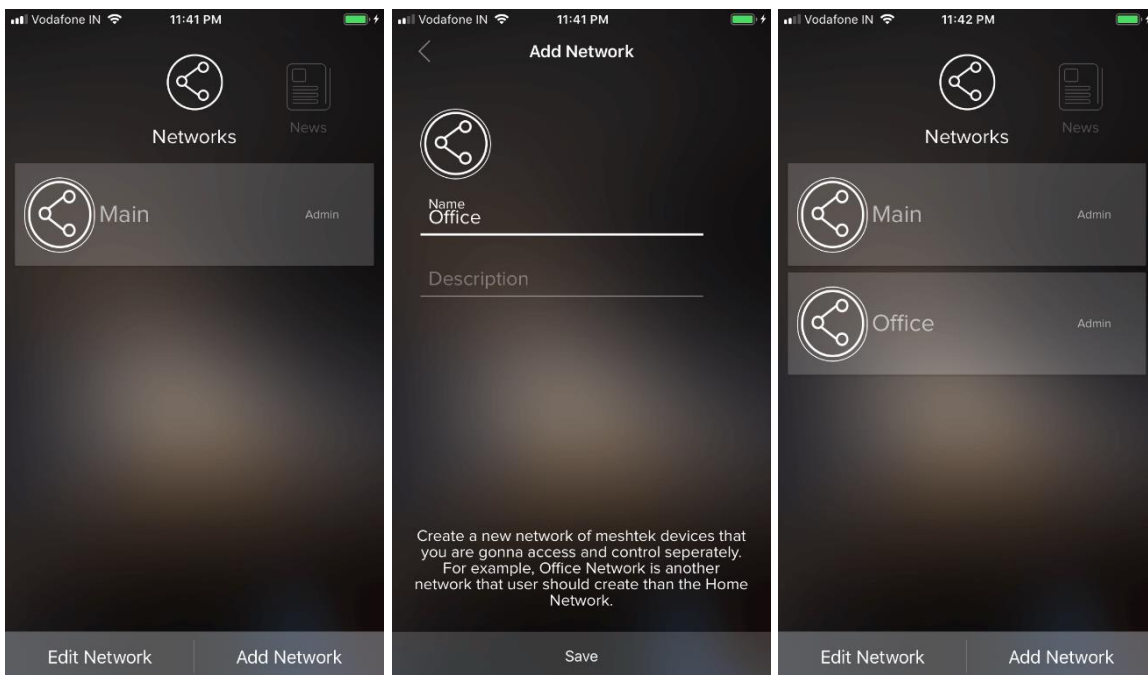


Figure 5-19 Add Network

5.5.2 Click on “Edit” button present on the bottom left of the Networks page. Edit icon would appear against each of the Network, by clicking on the icon you can Rename, Change Photo or Delete the Network as shown in below images.

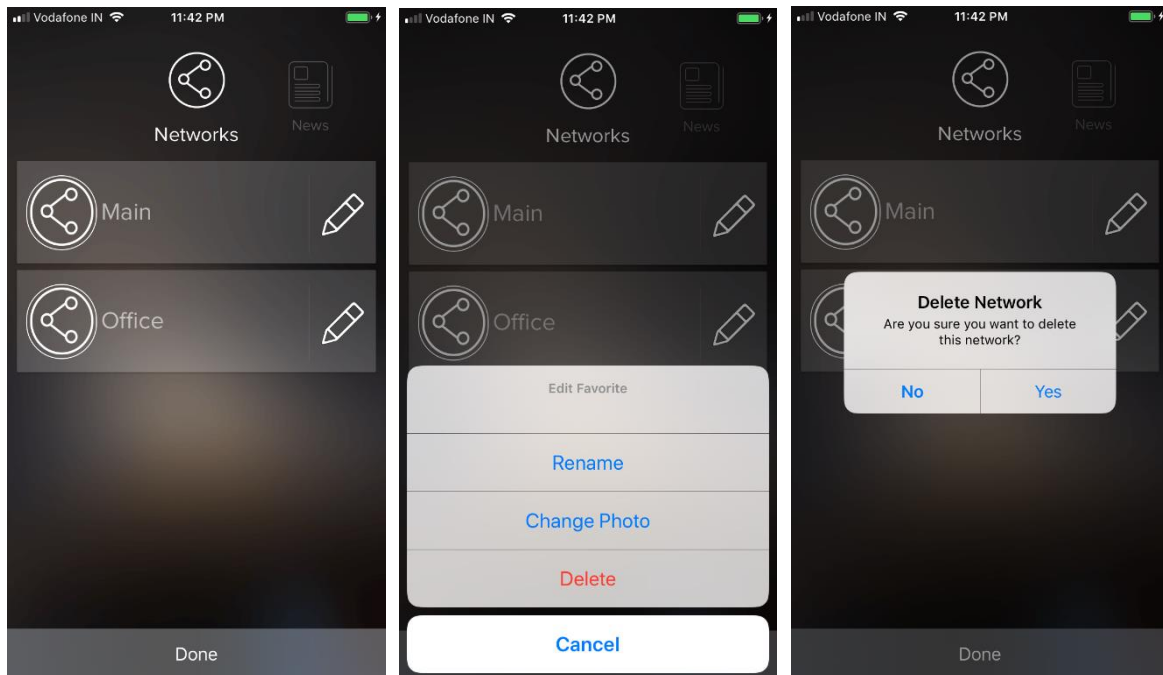


Figure 5-20 Edit Network

5.6 Sharing Access to Your MeshTek Devices

Please follow the link below, which showcases this feature of MeshTek powered ilumi smart bulbs

<https://ilumi.zendesk.com/hc/en-us/articles/115000626754-Sharing-Access-to-Your-ilumi>

5.7 Reset SLC

There are two ways to reset a SLC: hard reset or soft reset.

Hard Reset:

Power ON / OFF the SLC four times (one second ON, one second OFF).

**Note: Power On/Off duration for hard reset might change depending on the charge holding capacity of the driver. The ideal way is to look for the power-on LED to turn Off and then turn the driver On/Off again.*

Soft Reset:

Click on the “Hallway” group present on the Dashboard screen, it would all the paired SLCs as shown in [Figure 5-21](#).

Click on the top right “Setting” icon in same screen, then click on the “Pencil” icon which appears in front of each paired SLC. The app provides functionality to remove individual SLCs or the entire Group. Deleting the Group will reset all the SLCs present in the Group. Perform the necessary action as per the requirement and the SLC will reset and will be available for pairing once again.

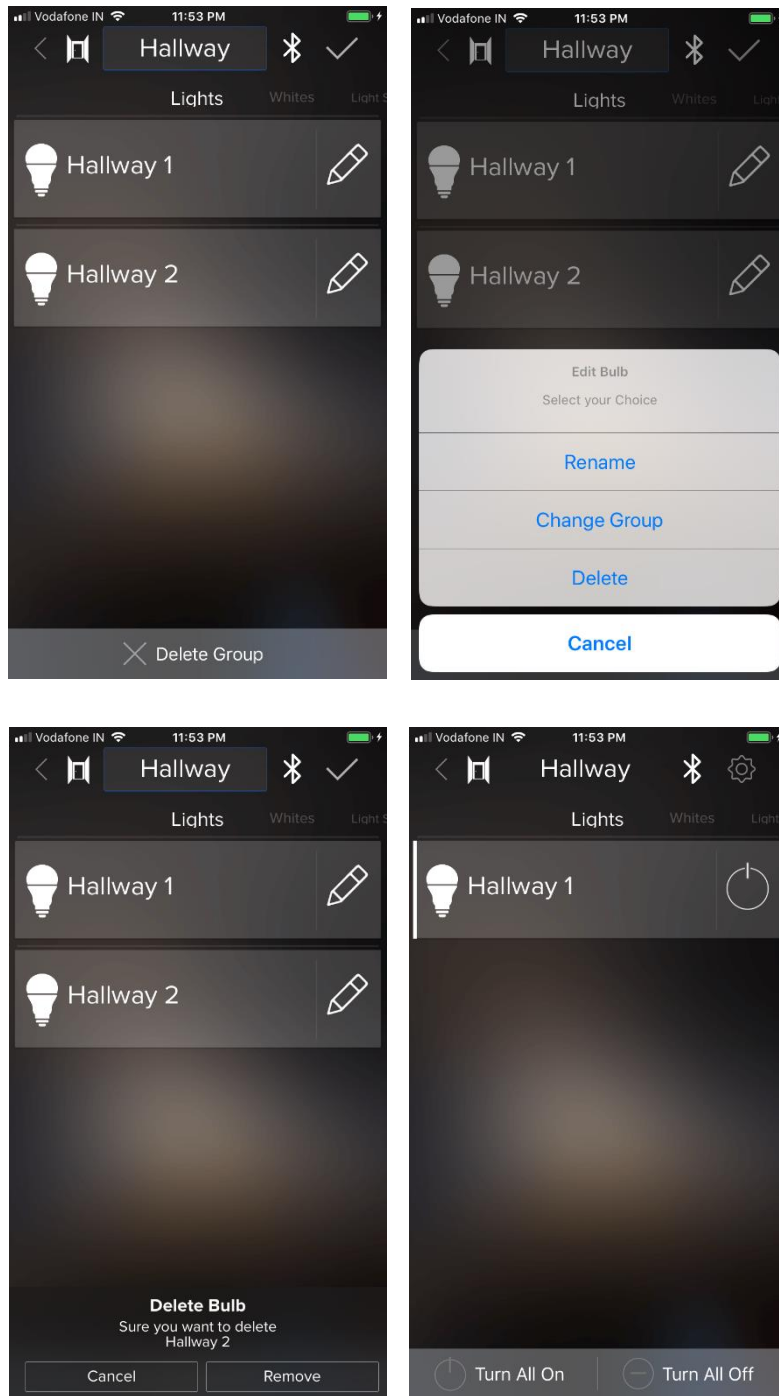


Figure 5-21 Soft Reset

Note: If a hard reset is done and the app is open, then the SLC would be restored automatically or you can delete the existing group by following Soft Reset procedure.

Chapter 6 Packaging and Labeling

6.1 Packaging

MeshTek® 4 Channel PWM SLC is placed in an antistatic bag and sealed.



Figure 6-1 Packaging Box

6.2 Packaging Label



Company: ilumi solutions
Brand: MeshTek
SKU: MTDSLCO1
Model: MeshTek-MLC-PWM
Description: PWM Smart Lighting
 Controller
Quantity: 1



For documentation, please visit www.ilumisolutions.com.

Figure 6-2 Packaging Label

6.3 ORDERING INFORMATION

Ordering information for the MeshTek® 4 Channel PWM SLC

Part Number	Description
MTDSLCO1	MeshTek® 4-Channel PWM SLC

Note: For custom applications, contact ilumi Solutions Inc. representative.

Chapter 7 Revision History

Revision	Date	Status / Comments
1.0	January 2019	Initial Release
1.1	February 2019	Review draft
2.0	March 2019	Customer Revision