MESHTEK®

MeshTek® 4 Channel 0-10V Smart Lighting Controller (SLC)

Human Centric Lighting Control

User Manual

Revision 2.0

TABLE OF CONTENTS

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 0-10V Smart Lighting Controller (SLC), user manual and data sheet (include literature number) you are using.

Chapter 1 **Introduction**

The MeshTek® 4 Channel 0-10V Smart Lighting Controller (SLC) is a plug & play controller providing an interface between a standard 0-10V LED driver and LED load to make an LED fixture/luminaire smart. They can be configured to have 0-10V analog or 10V PWM control signal; these signals are interfaced with the LED driver with dimming functionality. The SLC allows user to control the LED fixture remotely through the MeshTek iOS and Android app over a simple Bluetooth Low Energy (BLE) protocol. Multiple lighting fixtures can be controlled individually or together as a group.

All 0-10V SLCs form a reliable, secure and dynamic mesh network extending the range of the network. Each SLC has a PA/SLA (Power Amplifier/Sensitivity Level Amplifier) built-in for high signal strength and sensitivity that allows it to communicate to other SLCs up to a 200m range, requiring no external antenna, thereby saving costs in terms of material and assembly. The patented 0-10V SLC technology also has a Real-Time Clock for time stamping and scheduling purposes.

The simplicity of a BLE local mesh network removes the need of any additional wiring, installations and requirement of a pre-existing wireless network. This makes the MeshTek® SLC most suitable for human centric - white tunable lighting control and scheduling.

Chapter 2 **Overview**

2.1 **Device Overview**

The MeshTek® 4 Channel 0-10V SLC integrates:

- MeshTek-H52 - Bluetooth 5.0 ready module

- Range of up to 200m, with no external antenna required

- Real time clock for scheduling tasks

- 0-10V Analog or 10V PWM control signal with 1 or 4 channels

2.2 **Package Contents**

Package contains the following:

- Plug & Play MeshTek® 4 Channel 0-10V SLC

2.3 **MeshTek® 4 Channel 0-10V SLC**

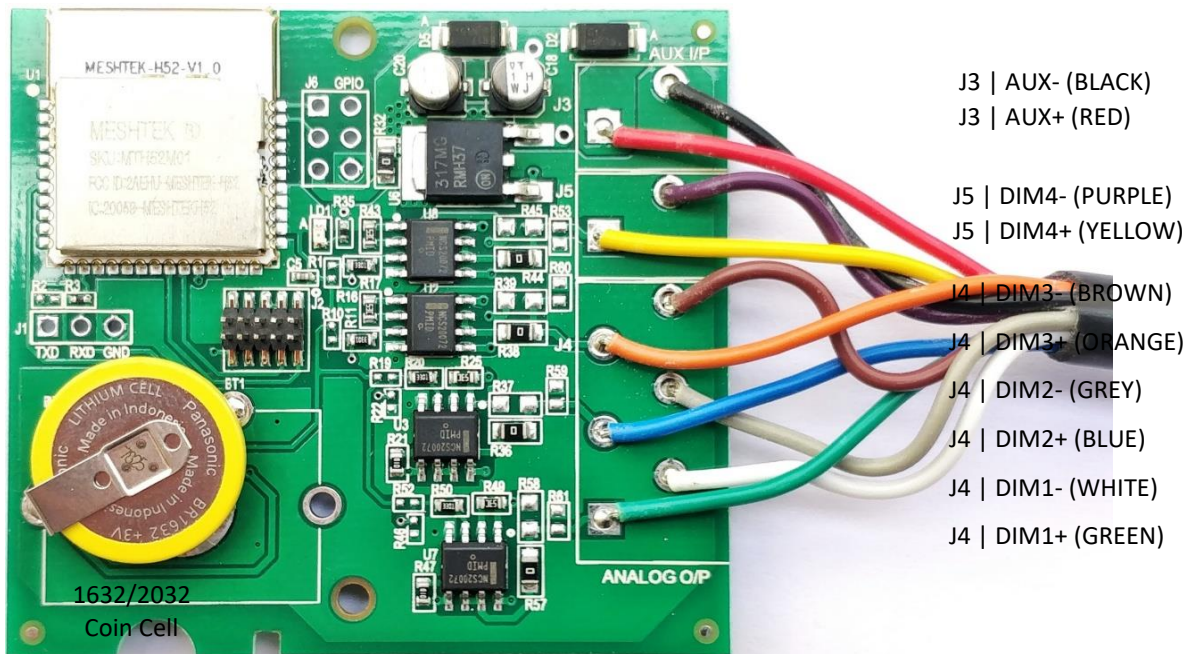- Representation of end user interface and connectors present on MeshTek® 4 Channel 0-10V SLC is shown below

J3 | AUX- (BLACK)
J3 | AUX+ (RED)

J5 | DIM4- (PURPLE)
J5 | DIM4+ (YELLOW)

J4 | DIM3- (BROWN)
J4 | DIM3+ (ORANGE)

J4 | DIM2- (GREY)
J4 | DIM2+ (BLUE)

J4 | DIM1- (WHITE)
J4 | DIM1+ (GREEN)

Figure 2-1   MeshTek® 4 Channel 0-10V SLC (56mm X 52mm)

2.4 MeshTek® 4 Channel 0-10V SLC Connectors

J3 - INPUT POWER; INPUT CONNECTOR	J4 - 0-10V ANALOG OUTPUT; OUTPUT CONNECTOR
J5 - 0-10V ANALOG OUTPUT; OUTPUT CONNECTOR	J2 - PROGRAMMING CONNECTOR

2.5 Benefits

- 0-10V analog or 10V PWM control signal suitable for Human Centric lighting control

- Stores up to 50 repeatable daily schedules such as ON/OFF and various brightness levels

- Plug & play integration with LED driver

- Proven BLE Mesh Technology with over 150,000+ MeshTek® end devices installed worldwide

- Proven state-of-the-art iOS and Android apps

- The only BLE solution with auto Firmware Over The Air (FOTA) update in a meshed network

- The only self-healing BLE Mesh for high data transfer and reliable communication

- 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

- MeshTek® 4 Channel 0-10V SLC is available only in open frame form

2.6 Control Options

- MeshTek® 4 Channel 0-10V SLC: Four 0–10V Analog Control Signal or Four channel 10V PWM Control Signal at 1KHz Frequency

2.7 Electrical specifications

ELECTRICAL SPECIFICATIONS - MeshTek® 4 Channel 0-10V SLC				
Description	**Min**	**Nom**	**Max**	**Notes**
Input Supply Voltage Channel-1 (AUX+ / AUX-)	10V	-	24V	
Input Supply Current (AUX)	10mA	-	100mA	With MeshTek mesh stack running
Analog Output Voltage Channel-1 (DIM1+ / DIM1-)	0	-	10V	Default: 0-10Vdc Can be configured to 10V PWM
Analog Output Voltage Channel-2 (DIM2+ / DIM2-)	0	-	10V	
Analog Output Voltage Channel-3 (DIM3+ / DIM3-)	0	-	10V	
Analog Output Voltage Channel-4 (DIM4+ / DIM4-)	0	-	10V	
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

- Input Supply Voltage (AUX or +VIN): 26V

- Ambient Temperature range: -20°C to 50°C

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 - MeshTek® 4 Channel 0-10V SLC

3.1.1   INPUT POWER CONNECTOR (J3)

J3 is available for supplying input power to the SLC. J3 pinout with wire color for reference is as mentioned below:

Pin No.1 (Red Wire)	Pin No.2 (Black Wire)
AUX+	AUX-

Note: AUX+ / AUX- can be powered from Auxiliary power available in the LED Driver or can be powered external power source.

3.1.2   0-10V ANALOG OUTPUT CONNECTOR (J4)

J4 is available for connecting 0-10V Analog Output to LED Driver. J4 pinout with wire color for reference is as mentioned below:

Pin No.1 (Green Wire)	Pin No.2 (White Wire)
*DIM1+	*DIM1-
Pin No.3 (Blue Wire)	**Pin No.4 (Grey Wire)**
*DIM2+	*DIM2-
Pin No.5 (Orange Wire)	**Pin No.6 (Brown Wire)**
*DIM3+	*DIM3-

Note: DIM1+ / DIM1-; DIM2+ / DIM2-; DIM3+ / DIM3- is by default configured to 0-10V Analog signal, if it is required to be configured as 10V PWM signal then remove R57, R36, R38 (0E resistor) and solder it at reference designator R58, R37, R39 for respective channels.
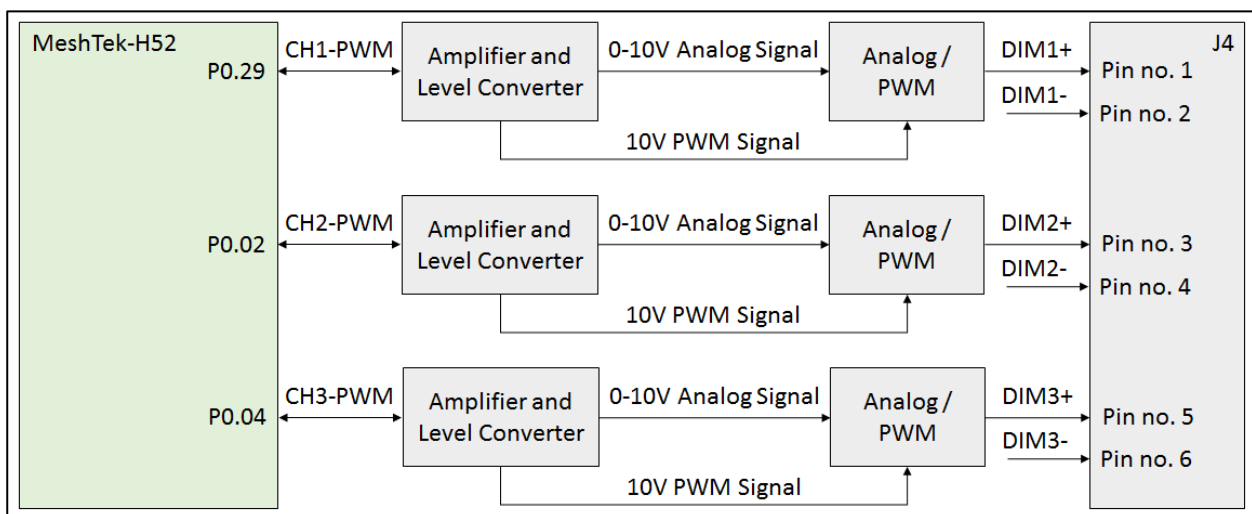

Figure 3-1   MeshTek® 4 Channel 0-10V SLC; Internal Connection Diagram for 0-10V Analog Output Connector

3.1.3   0-10V ANALOG OUTPUT CONNECTOR (J5)

J5 is available for connecting 0-10V Analog Output to LED Driver. J5 pinout with wire color for reference is as mentioned below:

Pin No.1 (Yellow Wire)	Pin No.2 (Purple Wire)
*DIM4+	*DIM4-

Note: DIM4+ / DIM4- is by default configured to 0-10V Analog signal, if it is required to be configured as 10V PWM signal then remove R44 (0E resistor) and solder it at reference designator R45.
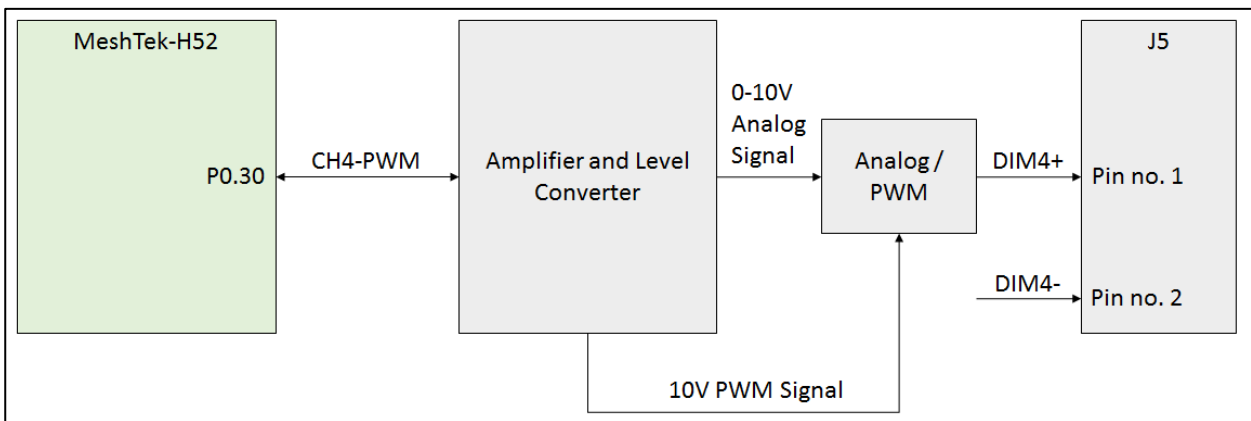

Figure 3-2   MeshTek® 4 Channel 0-10V SLC; Internal Connection Diagram for 0-10V Analog Output Connector

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

Chapter 4 Getting started

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

4.1 Connecting the 0-10V SLC to LED driver

Application setup for LED driver with dimming functionality (0-10V Analog or 10V PWM). For Human Centric Lighting Application, only Channel 1 and Channel 2 are to be used. Refer to the below setup diagram for reference.
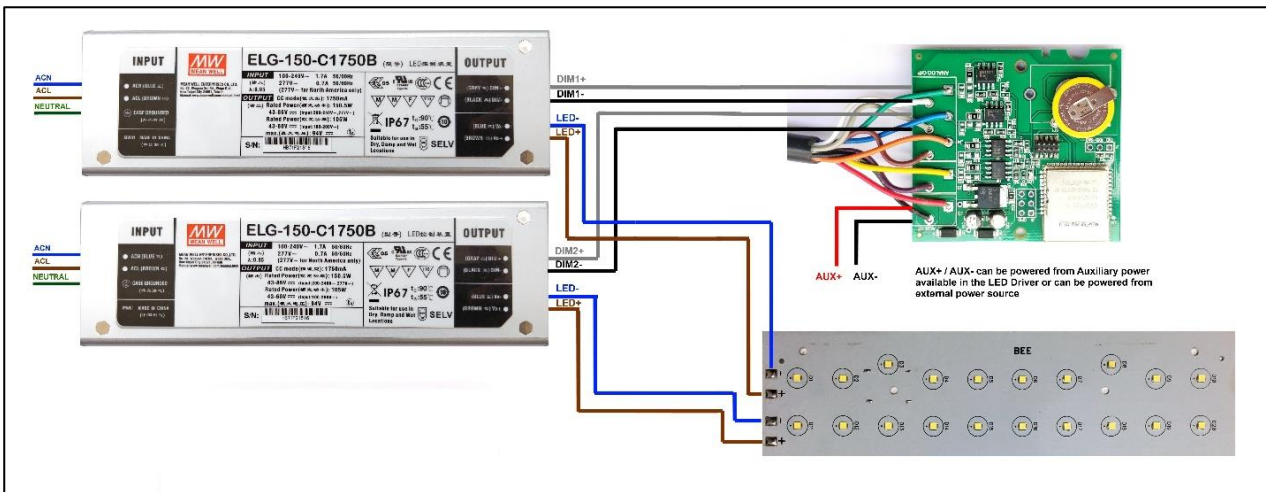

Figure 4-1   Application Setup for MeshTek® 4 Channel 0-10V SLC

Chapter 5 Using The MeshTek® Human Centric Smart Lighting 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.
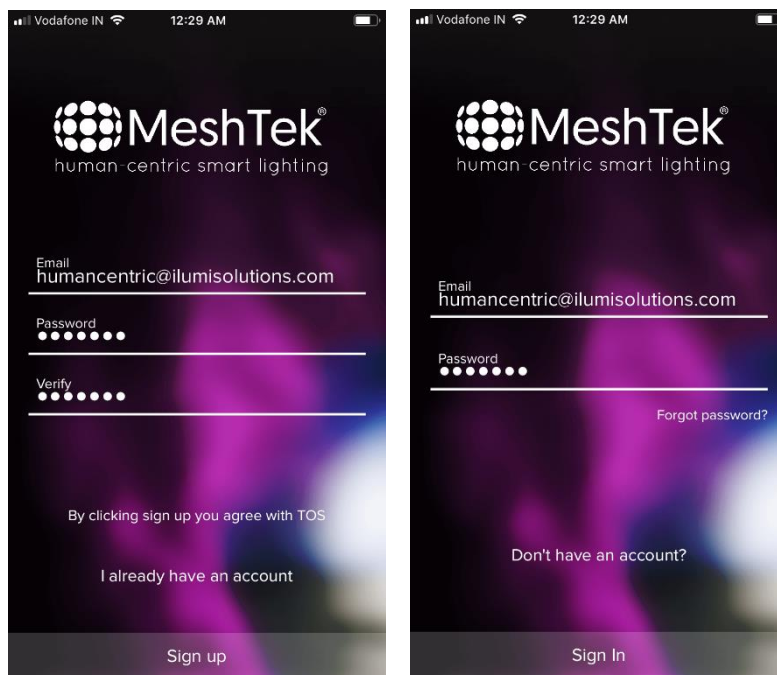

Figure 5-1   MeshTek® Human Centric Lighting App

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.
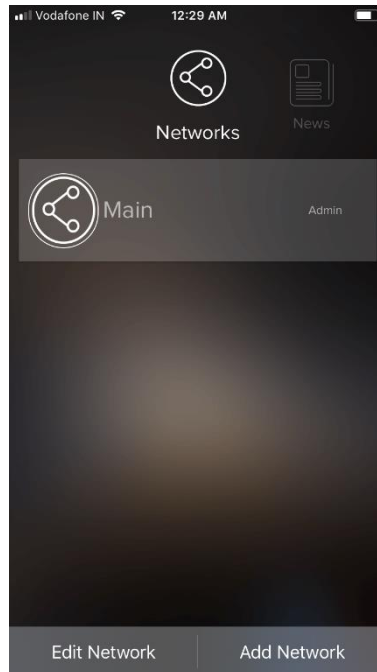
Figure 5-3   Networks

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.
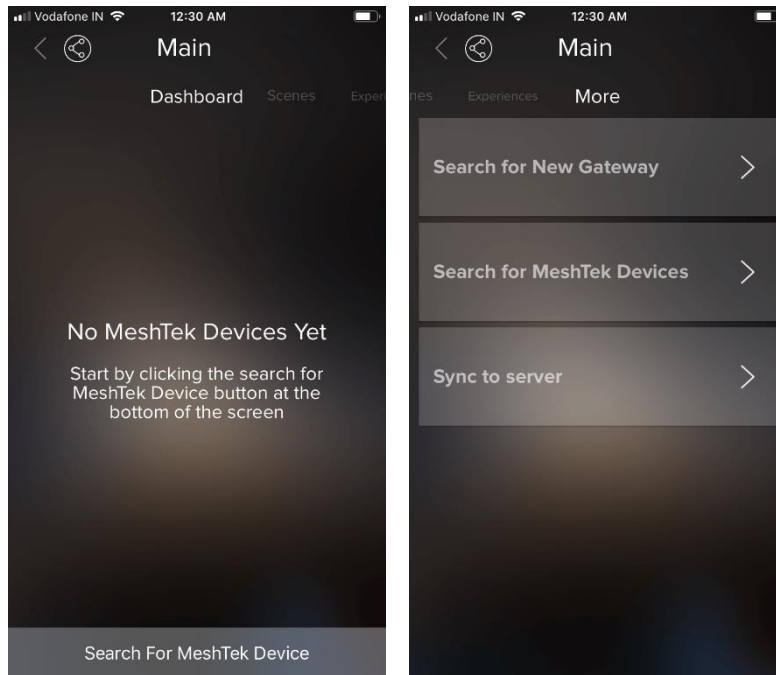
Figure 5-4   Search for MeshTek Devices

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.
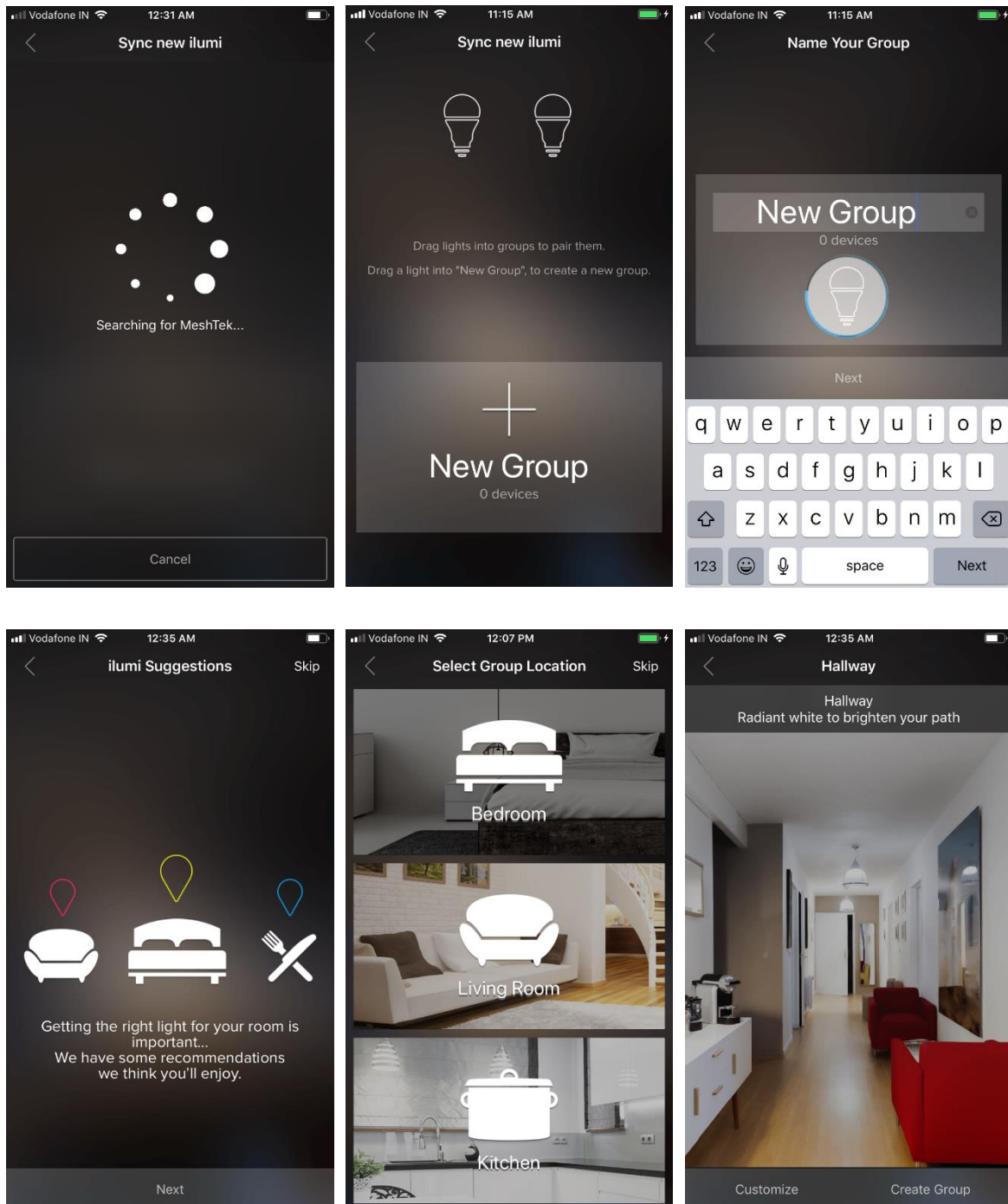
Figure 5-5   Commissioning / Pairing Process

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.
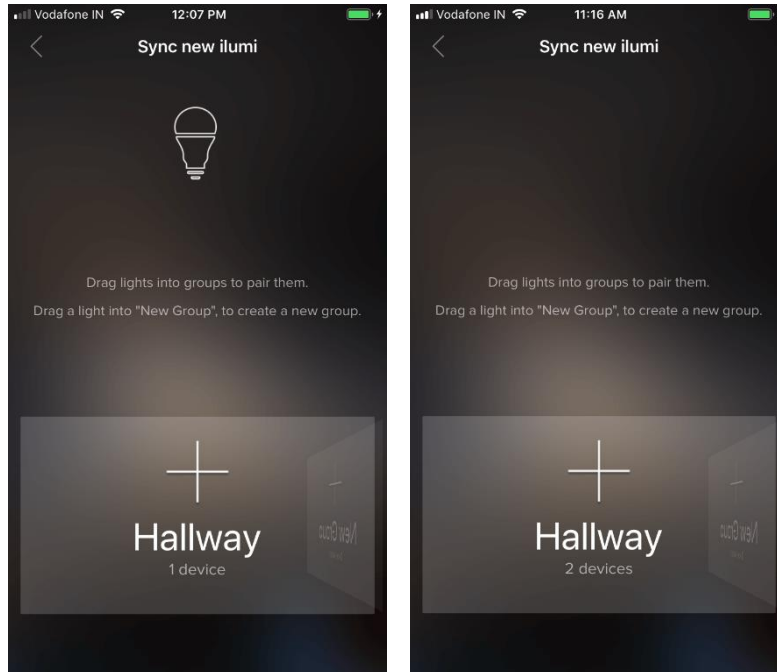
Figure 5-6   Commissioning / Pairing Process

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.
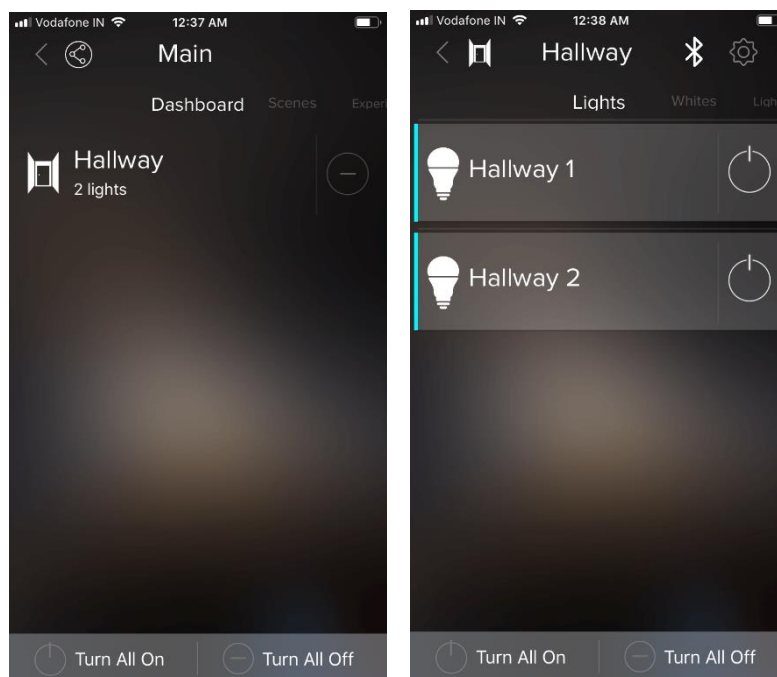
Figure 5-7   Dashboard and Group

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.
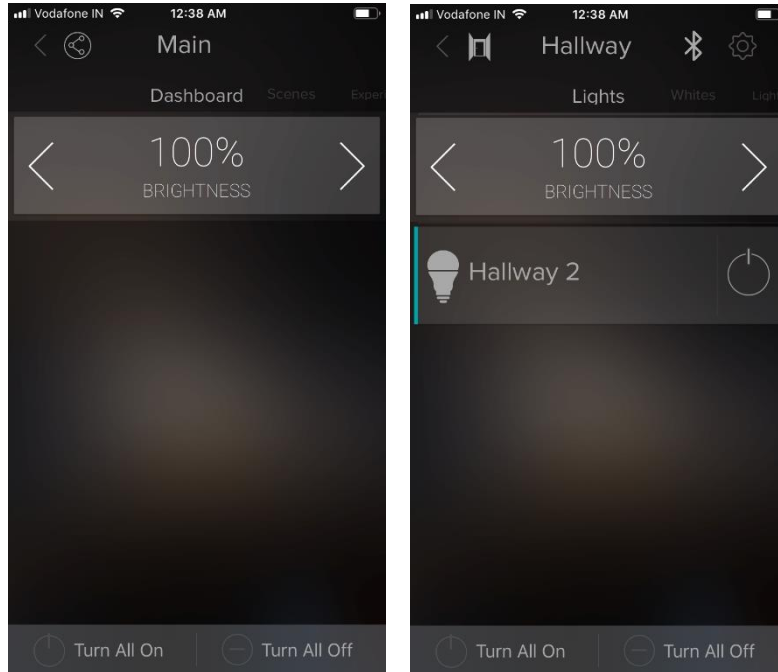
Figure 5-8   Brightness Control

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.
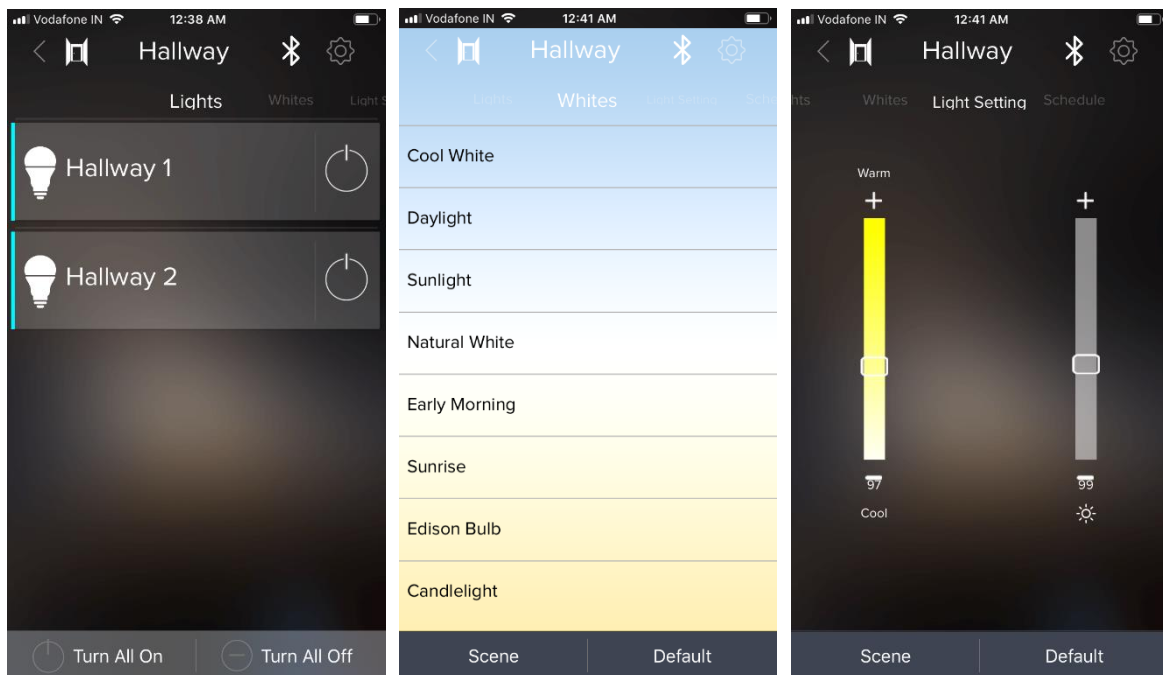
Figure 5-9   Whites and Light Setting

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.
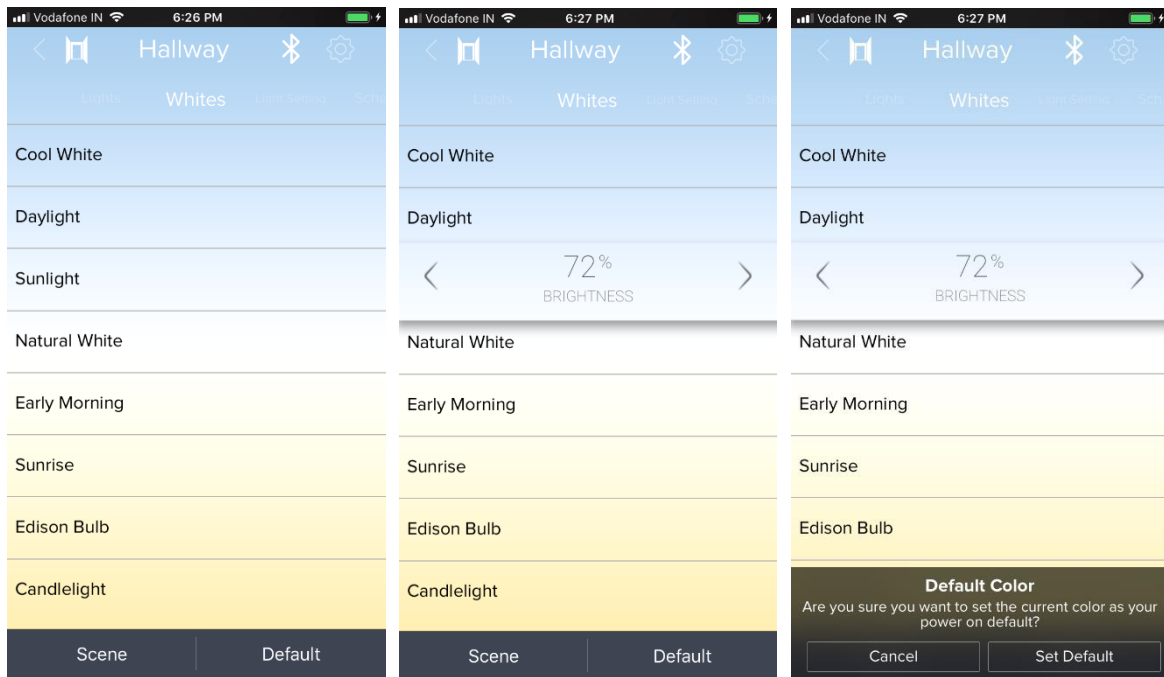

Figure 5-10   Set Default

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.
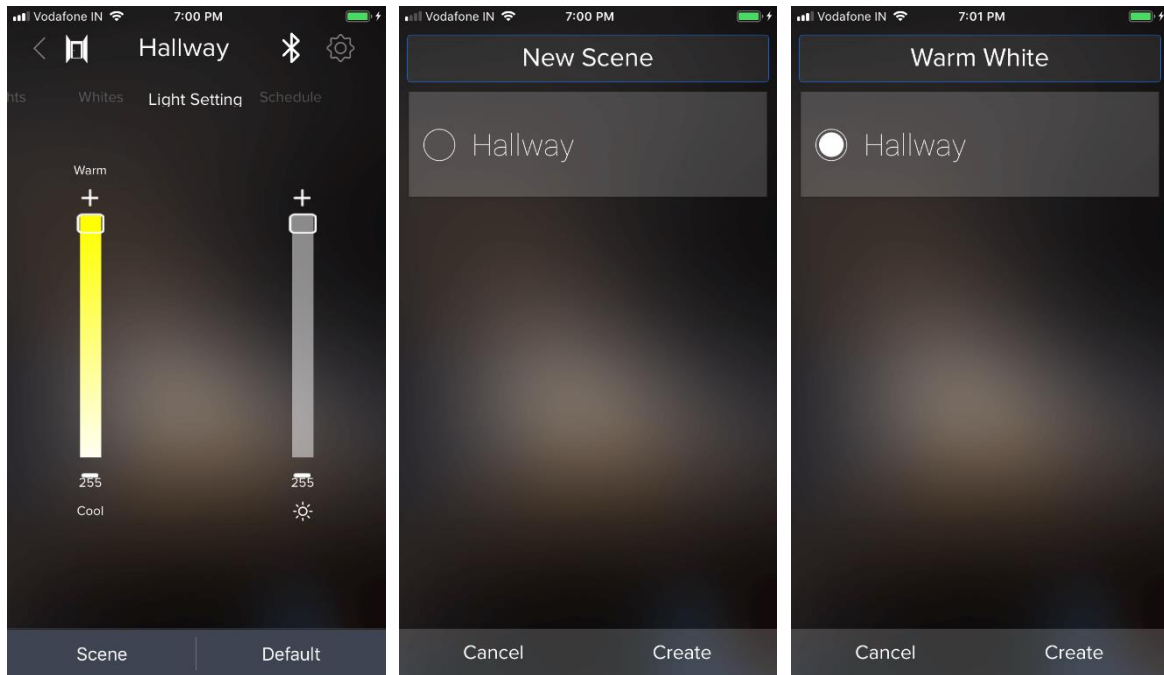

Figure 5-11   Create Scenes

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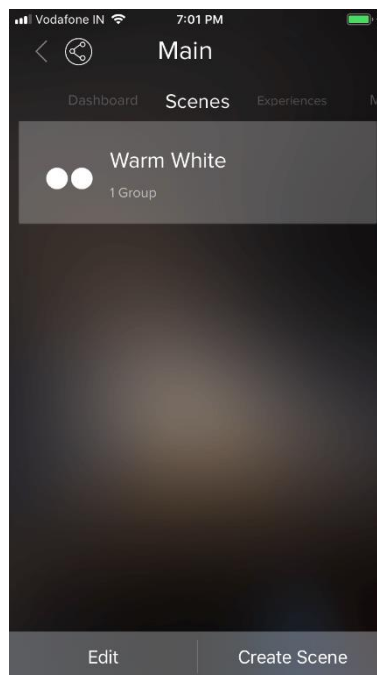

Figure 5-12   Run Scenes

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.
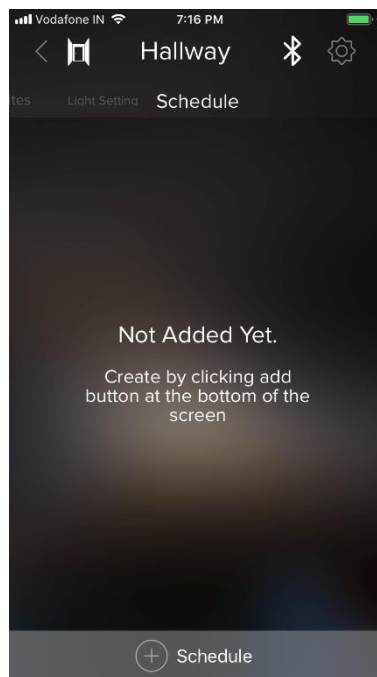

Figure 5-13   Schedule Screen
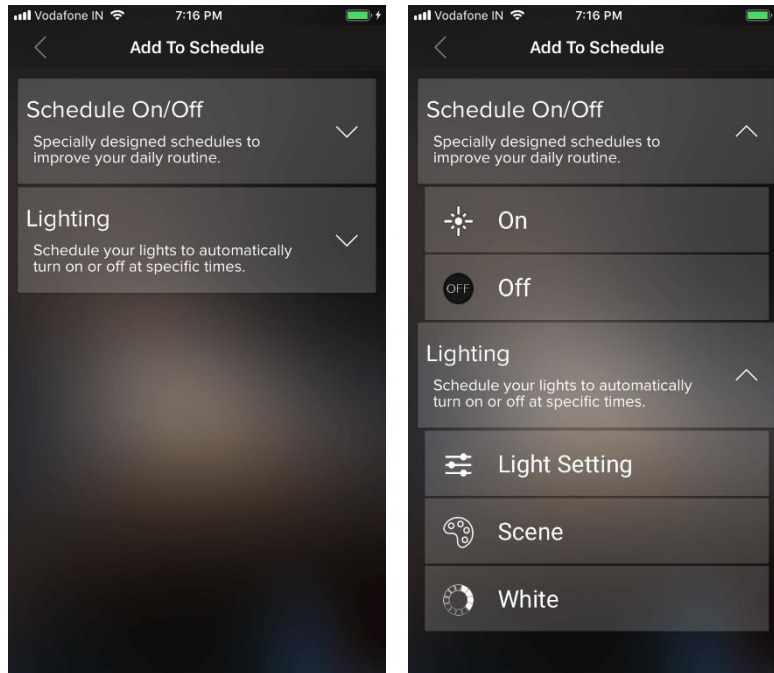
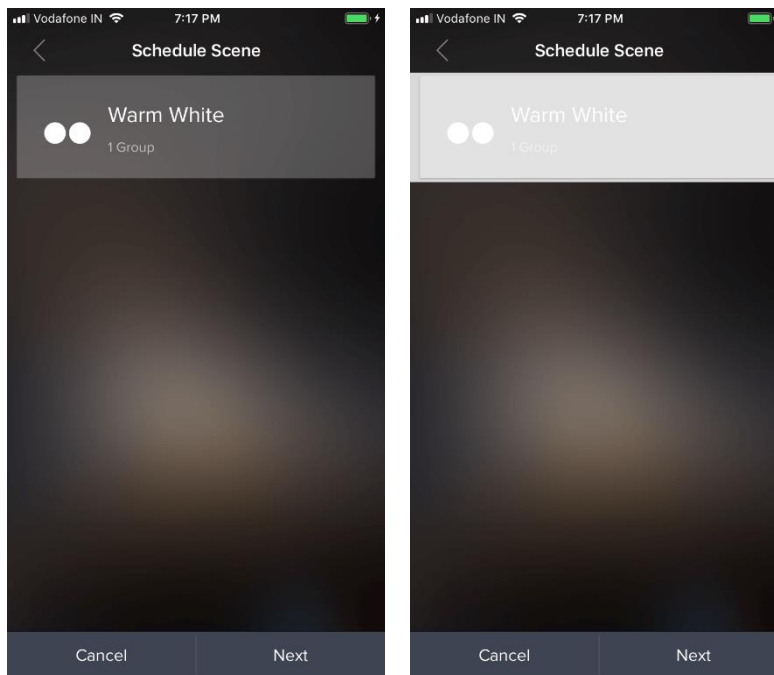Figure 5-14   Select Schedule Type
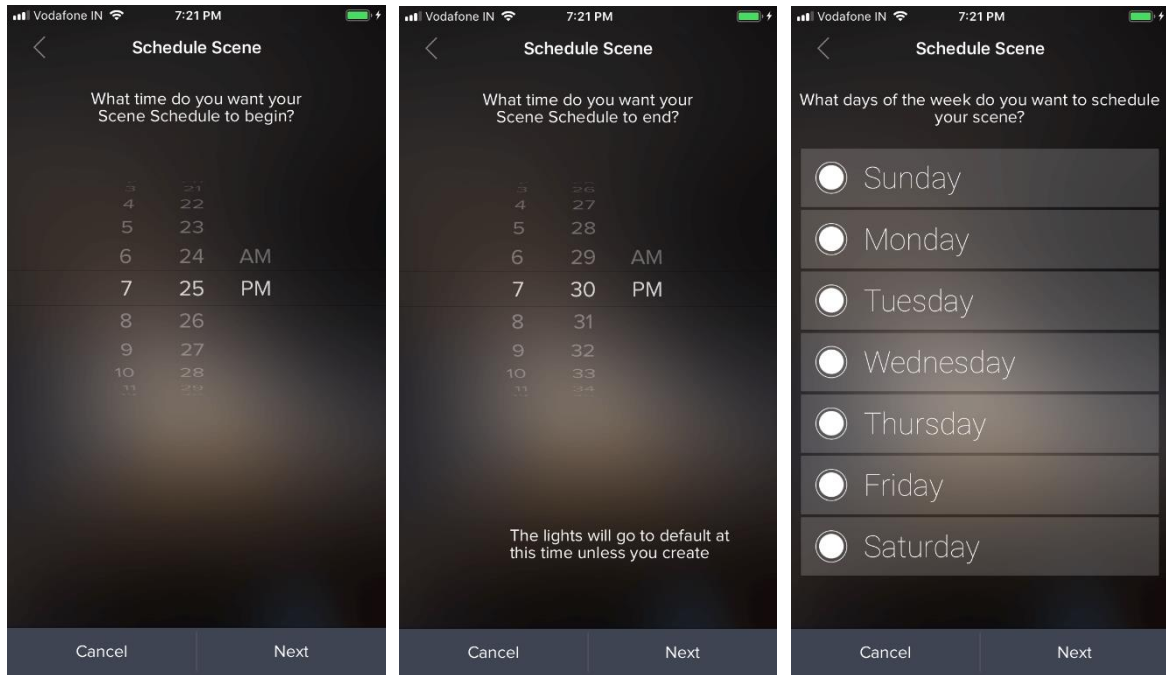

Figure 5-15   Select Scene

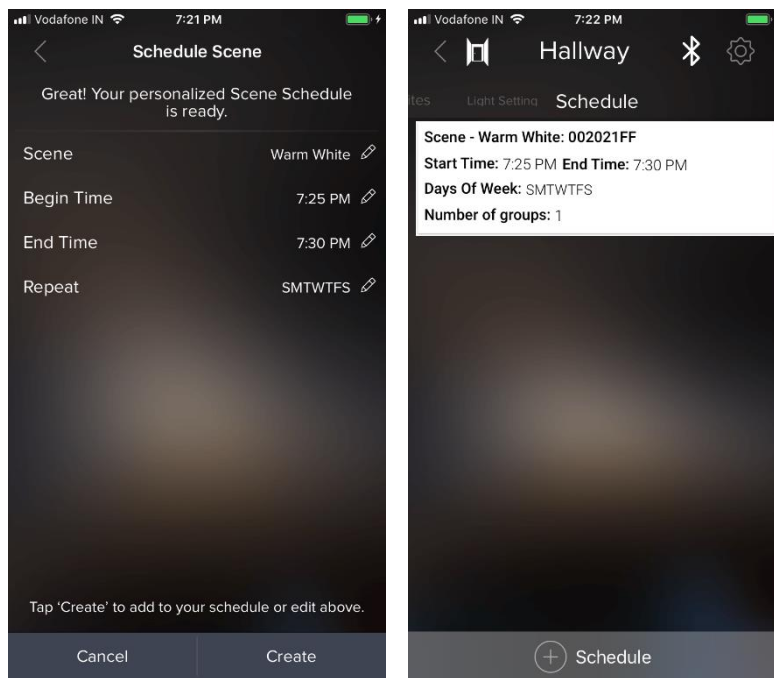Figure 5-16   Select Start Time, End Time and Days of week

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.
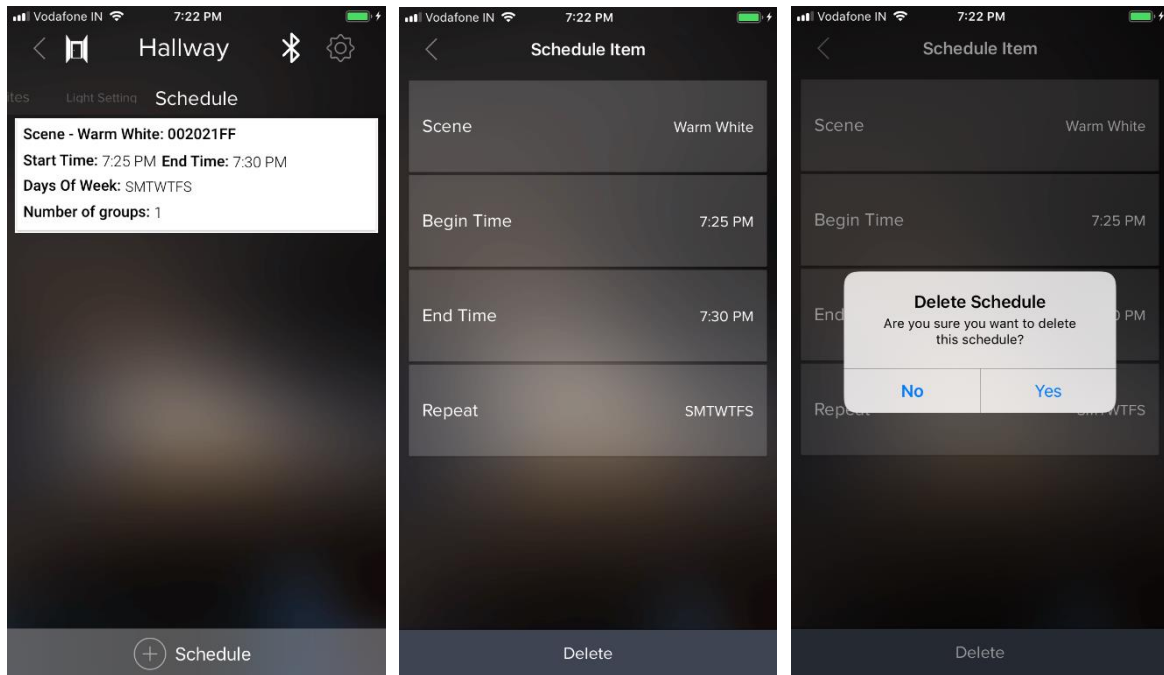

Figure 5-18   Delete Schedule

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".
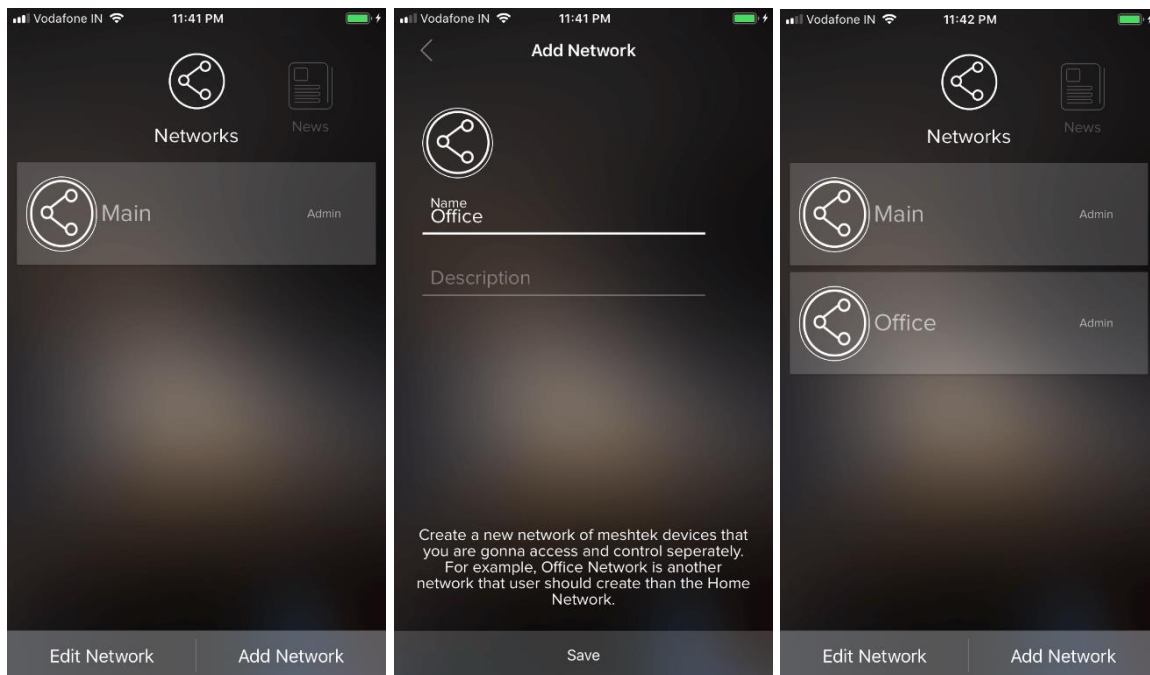

Figure 5-19   Add Network

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.
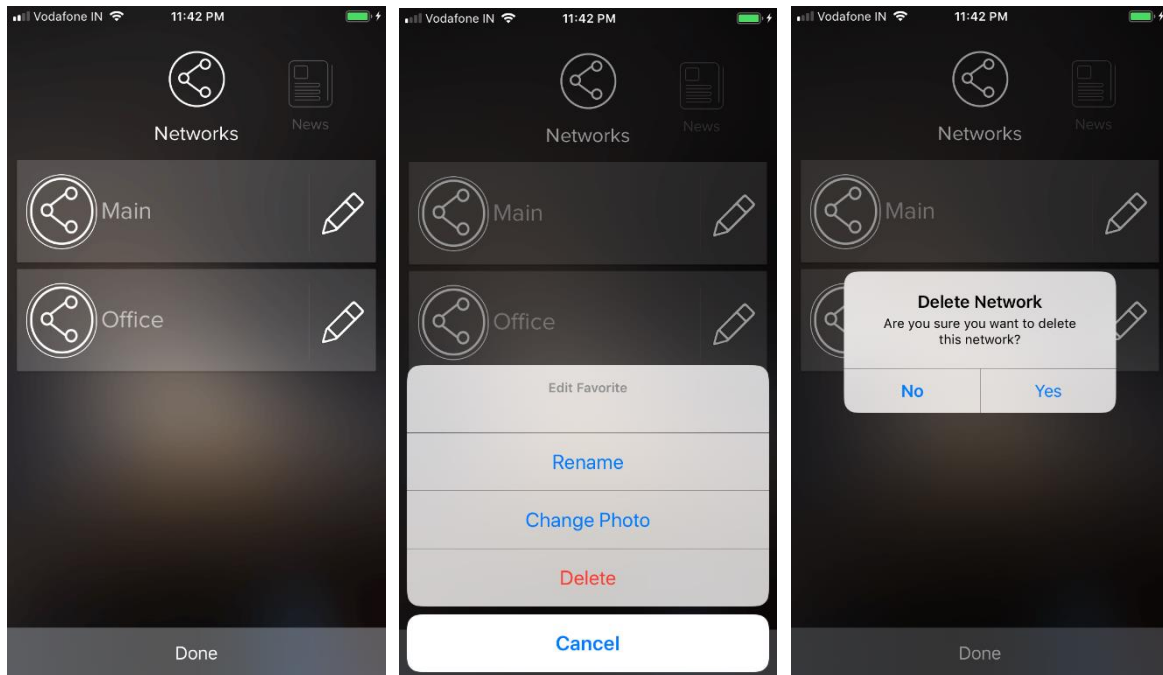

Figure 5-20   Edit Network

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.
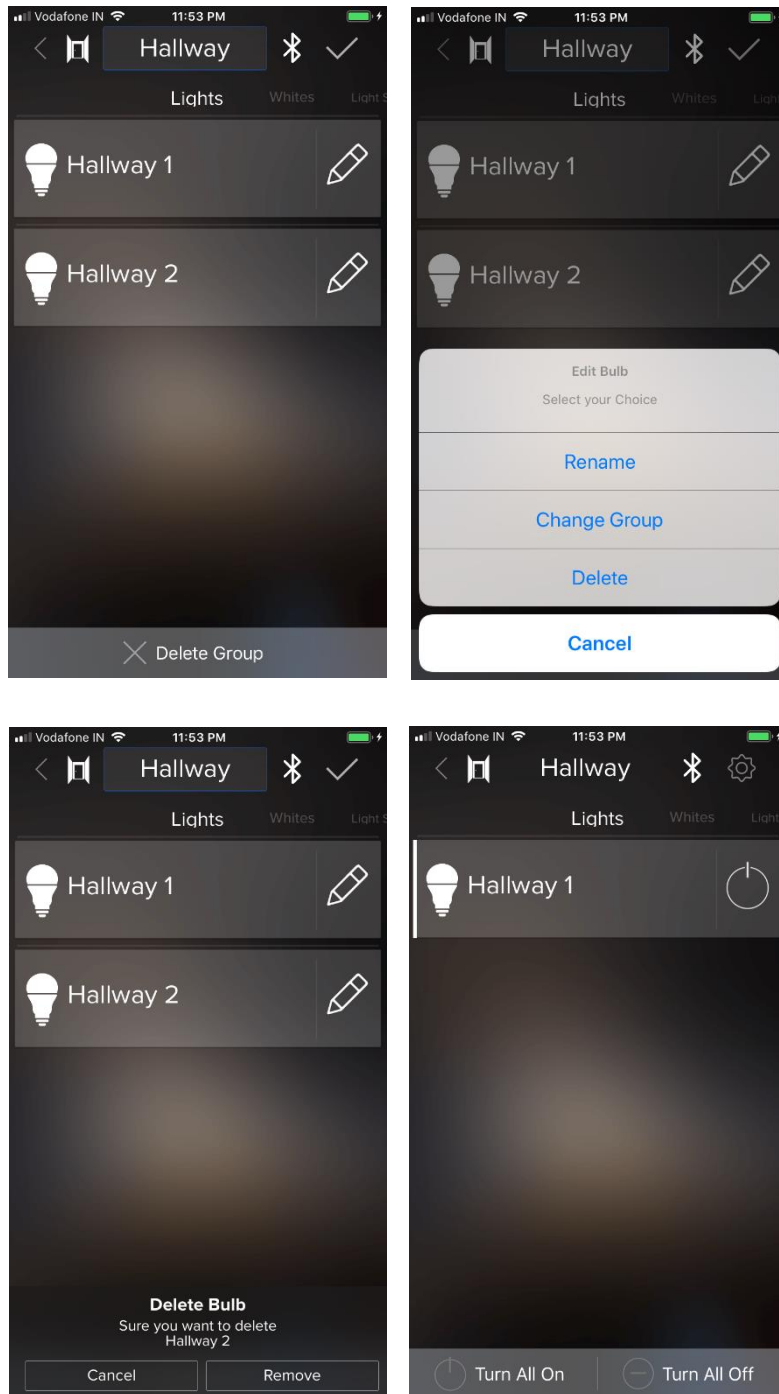
Figure 5-21   Soft Reset

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

Boards are packed in antistatic bag and the bag is sealed.

Figure 6-1   Packaging: MeshTek® 4 Channel 0-10V SLC

6.2 Packaging Label

Company: ilumi solutions
Brand: MeshTek
SKU: MTA4SLC
Model: MeshTek-MLC-4CHAnalog
Description: Four Channel Analog
Smart Lighting Controller
Quantity: 1

For documentation, please visit www.ilumisolutions.com.

Figure 6-2   Packaging Label: MeshTek® 4 Channel 0-10V SLC

6.3 Ordering Information

Ordering information for the MeshTek® 4 Channel 0-10V SLC

Part Number	Description
MTA4SLC	MeshTek® 4 Channel 0-10V SLC

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

Chapter 7 Revision History

Revision	Date	Status / Comments
1.0	March 2019	Initial Release