BRTSys

USER GUIDE

PanL Smart Living

Part 1 ~ System Installation

(Release 4.2.0)

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PanL

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Table of Contents

1 Introduction

1.1 About this Guide

This document describes PanL Smart Living (PSL) system installation – PanL Hub's hardware and software installation, configuration, and operating information.

As part of its explanation in some chapters, please note that this User Guide may include mobile app's screen captures from either Android or iOS smart phone.

1.2 Intended Audience

This user guide is for individuals, such as system integrators or technical users, who are interested in or responsible for configuring the PanL Hub and PanL Network to utilize the PanL Smart Living features.

1.3 Document References

Document Name	Document Type	Format
BRTSYS_AN_095_PSL User Guide - 2. PanL PD100 Display	Application Note/ User Guide	PDF
BRTSYS_AN_096_PSL User Guide - 3. PanL PD40 Display		
BRTSYS_AN_097_PSL User Guide - 4. iOS Mobile App		
BRTSYS_AN_098_PSL User Guide - 5. Android Mobile App		
BRTSYS_AN_099_PSL User Guide - 6. Voice Assistants		

1.4 What's New in PSL 4.2.0?

Feature	What's new
Mobile App & User Experience	Login Security – Added Touch ID and Face ID support. Home Page – Introduced layout customization options. Onboarding – New guided setup for hubs, time zone, software updates, and device discovery. Search – Enhanced device discovery with plugin and hub filters. Access Control – Updated user roles with Primary/Secondary and Local/Remote access.
PanL Display (PD) Device Enhancements	PD Device Control – Added Lock/Unlock feature for PD40 and PD100 devices. PD Sensor Support – Idle Page now supports up to four sensors on PD40/PD100 devices. PDAC Configuration – Improved PD100 AC setup; no longer dependent on room/group/zone members. Sleep Screen Saver – Added screen saver mode for PD40/PD100 devices during standby. Display Configuration - Added Reset Configuration and Factory Reset settings. The Display and Display Configuration pages have been merged.
LDS Controller, Sensors, Device & System Updates	LDS OTA – Enabled Over-The-Air updates for LDS devices. New Integrations – Added support for RFID, AQS, and SSR devices. Meter Integration – Integrated Energy Meter and Water Flow Meter via LDSBus. Charting – Added data charts for Energy and Water Flow Meters. PH44 Configuration Support: Can be configured for integration into a Zigbee network without a daughter board. DALI – EDA2 Integration: Allows integration with DALI EDA2 lighting controllers for automated control and event-based actions. IO Controller – Digital Input: Supports digital input devices (e.g.,

	switches, sensors) to trigger events, scenes, or automations. KNX-IP Gateway- Integrates with KNX-IP gateways, currently supporting motion sensors only. CTP40 Integration: Supports 1-, 2-, 3-, and 4-button CTP40 wall controllers to trigger events or control devices.
Feature & Event Management	Scene Control – Added support for enabling and disabling scene events. PD Events – Introduced new PD device actions, including lock and unlock. Voice Assistant – Improved relative control for volume and brightness. Event Management: Users can enable or disable events without deleting them, providing flexible automation control
Zigbee	Water Leak Sensors – Added support for Zigbee Water Leakage sensor. Presence Sensors – Integrated Zigbee Presence Sensor.

Table 1 - What's New

1.5 Known Issues and Limitations

NA

1.6 PSL System Overview

As a comprehensive platform, **PanL Smart Living (PSL)** consolidates various standalone smart solutions, offering enhanced accessibility to the benefits of modern living in homes, hotels, or office buildings. Whether it is controlling appliances like lighting, curtains, and air conditioners, or managing smart devices such as plugs, switches, or door locks, all can be seamlessly accomplished through a unified framework, eliminating the need for separate control systems, remotes, switches, or mobile apps.

PanL Smart Living platform provides a superior lifelong solution, as it is built with the flexibility to scale continuously with existing and future technologies as the application need arises. Apart from connecting to various BRTSys array of devices, the platform allows integration with smart devices from third-party manufacturers, thus giving users the freedom to enjoy unbounded features and cost benefits.

The PSL System, is centred around the PanL Hub, which facilitates the integration of a diverse range of devices using wired protocols (such as BACNet, DALI, DMX, LDS, and Modbus) or wireless protocols (such as Wi-Fi, ZigBee, and RF433).

In addition to native device support, the PSL System also enables integration with third-party platforms and solutions, such as Philips Hue, Lutron, KNX, Sonos, and Volumio. This allows for expanded control and automation possibilities, providing a unified network experience across both native and third-party devices.

The system is also complemented with a variety of BRTSys devices such as touch screen displays, lighting controllers, sensors, relays, IO controllers, and IR controllers. Refer to the relevant device's datasheet for more information.

Users can interact with the system through multiple options(clients):

- PSL mobile apps (iOS /Android)
- Wall-mounted PanL displays (10 inch / 4 inch)
- Hands-free voice-control via Amazon Alexa or Google Home

Enabling cloud connectivity unlocks additional features such as remote access, software updates, and push notifications to smartphones. Thus, it allows users to easily interact with and manage their smart devices, whether they are at home or on the go.

2 Getting Started

The documents listed below provide information on how to set up PanL Hub hardware:

PanL Hub44/80 Datasheet
PanL Hub44/80 Quick Start Guide

NOTE:
Ensure the PanL Hub is connected to power before proceeding with the onboarding steps outlined in Onboarding.

3 PanL Network Overview

A PanL Network consists of one primary PanL hub and up to seven secondary PanL hubs, each identified by a unique ID and Name.

3.1 Primary Hub

The first PanL Hub that is configured in a PanL Network, automatically becomes the primary hub and creates the PanL Network, which serves as the communication backbone within the PSL system.

Only one primary hub is allowed in each PanL Network.

3.2 Secondary Hubs

Secondary hubs are optional and are typically needed when the user has a large property or if the range of the primary hub is insufficient for the entire space.

For example, when wireless devices (ex: ZigBee lights) are connected to the hub, the range may be limited to just a few meters. In such cases, an additional secondary hub can be added to extend the reach of the PanL Network.

Secondary hubs are not directly connected to each other but instead connected to the router either directly or through switches, enhancing the network coverage across larger areas.

4 Onboarding

Mobile apps are required to setup a PanL Smart Living System. These apps can be downloaded by searching for "PanL Smart Living (PSL)" in the Google Play store or Apple App store. User signup is required.

PSL-App Store PSL-GooglePlay

Figure 1 – PSL Mobile App QR Code

Please refer to the following user guides for more details on creating a PSL account:

- PanL Smart Living User Guide – iOS Mobile App
- PanL Smart Living User Guide – Android Mobile App

After the account is successfully created, the user can proceed to set up a PanL Network.

4.1 Creating a PanL Network

A PanL Network is created when a hub is first added to it.

NOTE:
To onboard a PanL Hub to a PanL Network, it needs to be in an unconfigured state. Typically, brand new Hubs are already in this state. To re-onboard a previously configured PanL Hub, refer to PanL Hub Control Menu for the required steps.

If the user is not currently part of any existing PanL Network, a setup screen will appear, prompting the user to either create a new network or join an existing one.

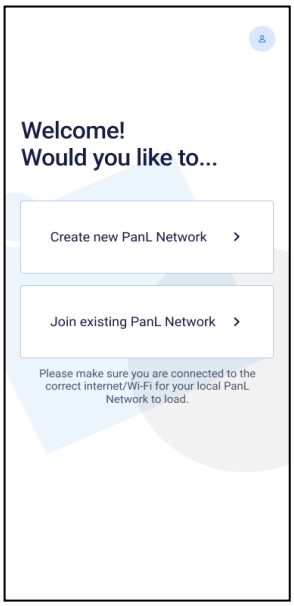


Figure 2 - PanL Network Setup Screen

- **Create new PanL Network** – When user clicks on Create new PanL Network, the app starts searching for available hubs, first detecting any wired hubs connected to the LAN,

followed by any nearby wireless hubs. The discovered hubs are displayed, allowing the user to proceed with the setup process detailed in Default Setup (Auto-Discovered Hubs).

If no hubs are detected, the user can manually onboard a PanL hub by following the steps outlined in Manual Setup.

For a PanL Hub to be discovered, both the hub and the mobile app must be connected to the same LAN.

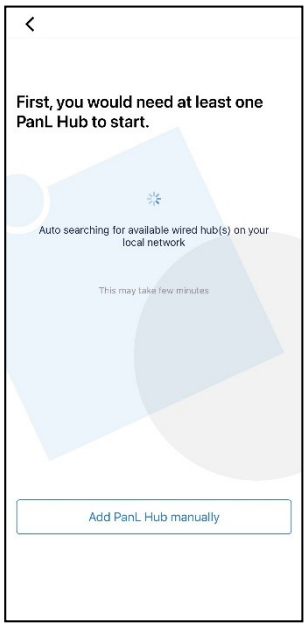


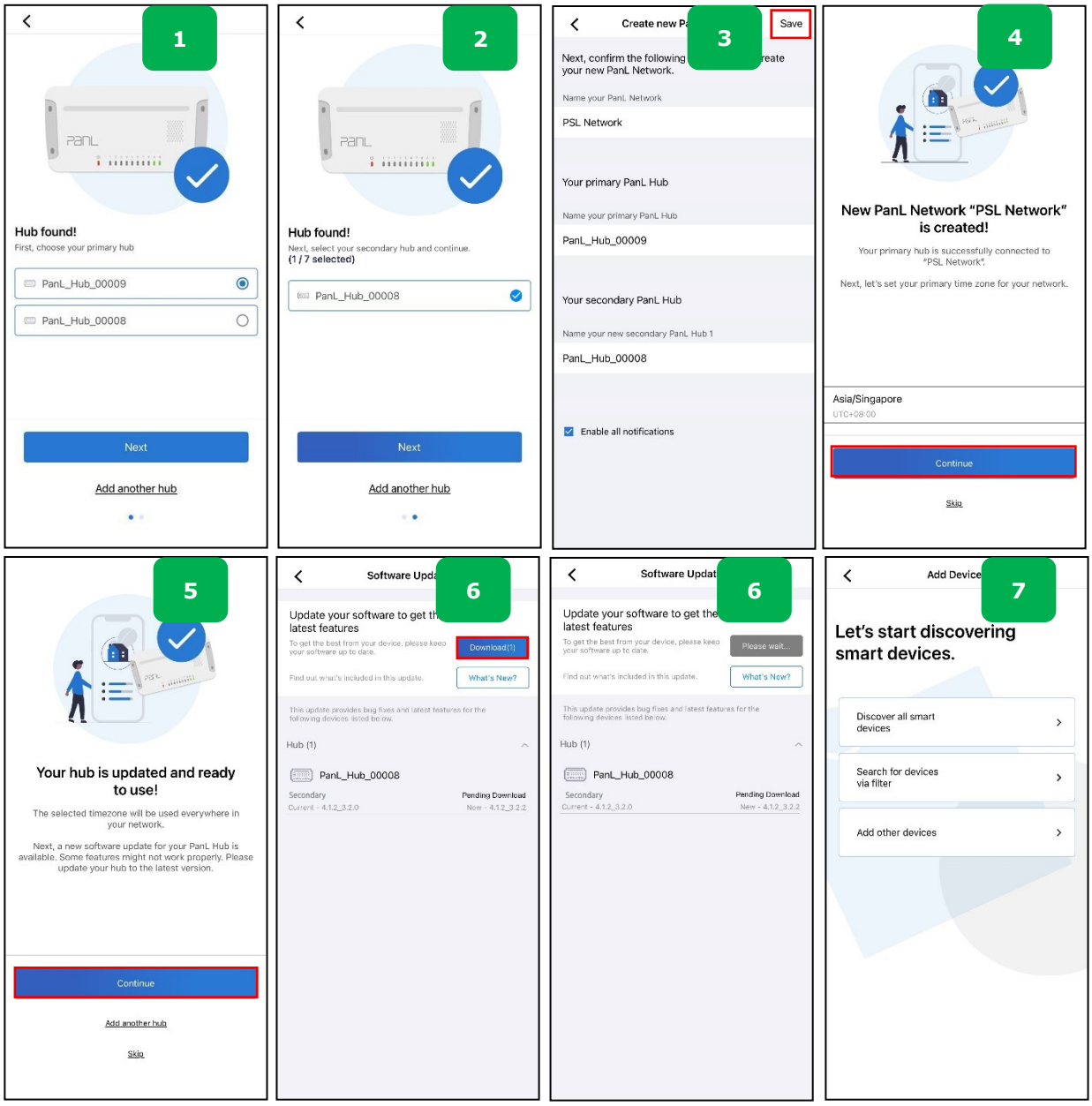
Figure 3 – Create New PanL Network

- **Join existing PanL Network** - To join an existing network, the user's phone must be connected to the same LAN; only then will the available PSL networks in that LAN be listed. Refer to section Join an Existing PanL Network for more information.

Following sections outline how to onboard a wired/wireless PanL Hub via Default Setup (Auto-Discovered Hubs) or Manual Setup.

4.1.1 Default Setup (Auto-Discovered Hubs)

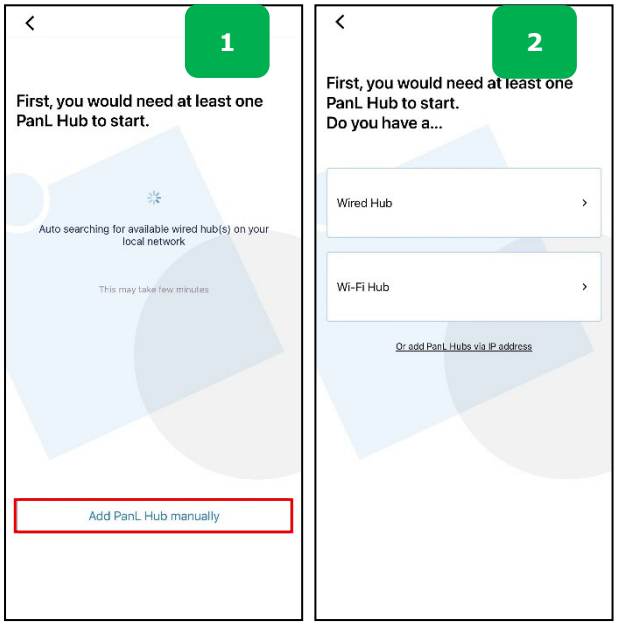
Below setup is followed when one or more connected wired/wireless hubs are discovered (refer Figure 3) via the PSL app.



1. Any hubs detected during the hub discovery process will be displayed. Select the desired primary hub and click [**Next**].
2. If multiple hubs are found, the user can select up to seven additional hubs as secondary for onboarding. To continue click [**Next**].
3. Assign names for the PanL Network and hubs and click on [**Save**] to confirm the changes.
4. Confirm the time zone and tap on [**Continue**].
5. After updating the time zone, click [**Continue**] to proceed with updating the hub to the latest software version.
6. Updates may be automatic or require manual download and installation. If all connected hubs have the latest firmware, the setup will skip this step.
7. Once the process is successful, the user can begin adding devices to the network using the available options on the page. Refer to Section Adding Devices to PanL Hub for more details.

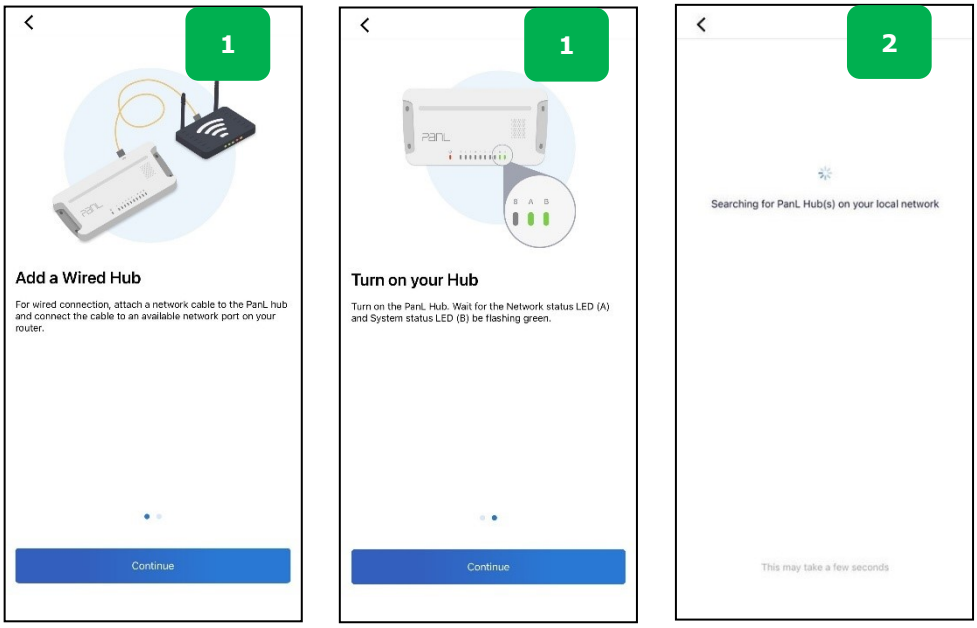
NOTE:
The creator (user) of the PanL Network receives the primary user's permissions by default. (Refer Table 5 for more details).
If the user wants to onboard a secondary hub later, follow the steps provided in Manual Addition of a Secondary Hub.

4.1.2 Manual Setup



1. If the hub is not automatically detected on the *Create New PanL Network* page (see Figure 2), the user can manually add it by selecting the option [**Add PanL Hub Manually**].
2. The types of hubs that can be added manually are displayed. Select the correct hub type to continue.

4.1.2.1 Creating a PanL Network with Wired Hub



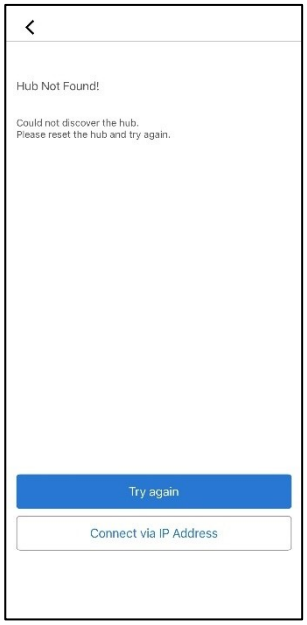
1. After the user selects the *Wired Hub* option (Refer section Manual Setup), the following page will be displayed. Follow the instructions and click [**Continue**] to proceed.
2. Wait as the PSL mobile app searches for the PanL Hub on the Local Network.

4.1.2.1.1 If PanL Hub is Detected

If a wired hub is detected, the user will proceed with the same setup process described in Default Setup (Auto-Discovered Hubs).

4.1.2.1.2 If PanL Hub is Not Detected

If no PanL Hub is found, an error message will be displayed. User can opt to either **Try Again** or **Connect via IP address.**



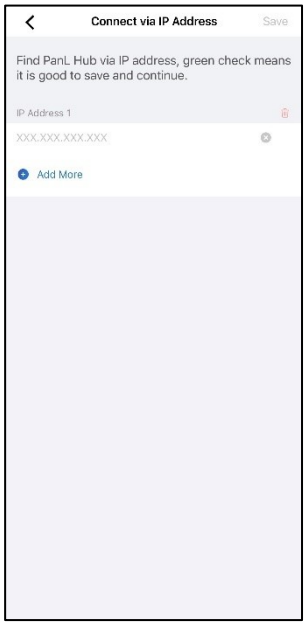
Retry Method 1: Try again

On selecting **Try Again** option, user will be directed to step #2 in Section Creating a PanL Network with Wired Hub to repeat the process.

Retry Method 2: Connect via IP Address

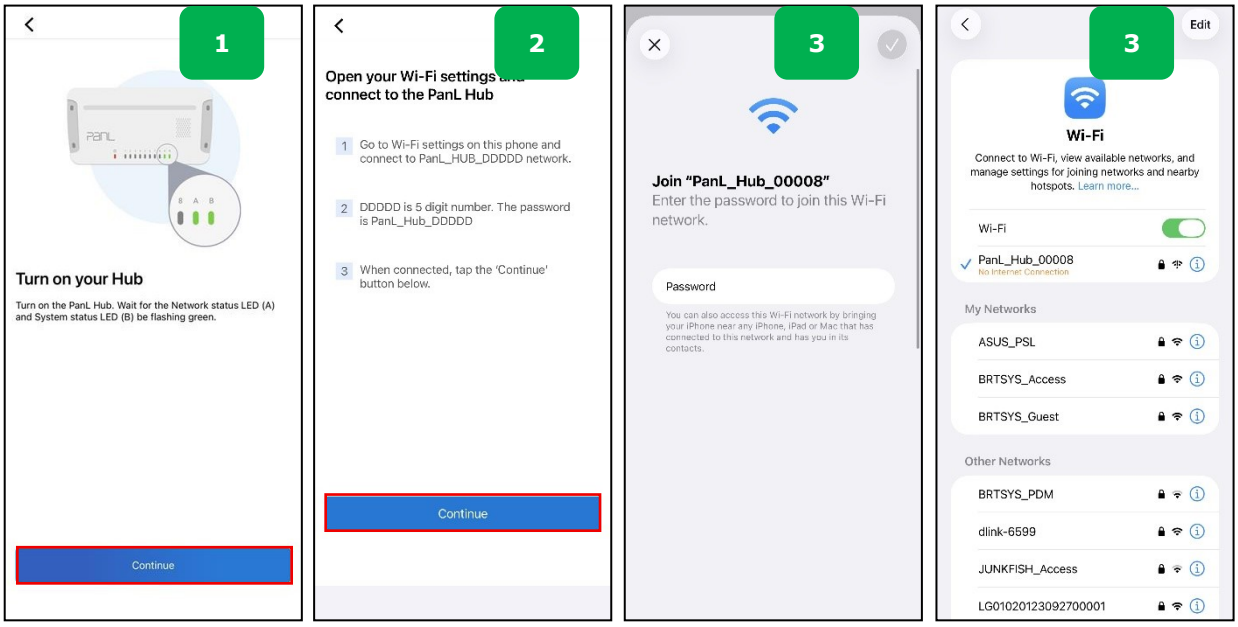
On selecting the option **Connect via IP Address**, user will be prompted to enter the PanL Hub's IP address and click **[Continue]**. The app will attempt to connect to the PanL Hub using the provided IP address.

Once successful, user will be redirected to Section Default Setup (Auto-Discovered Hubs) to complete Hub setup.

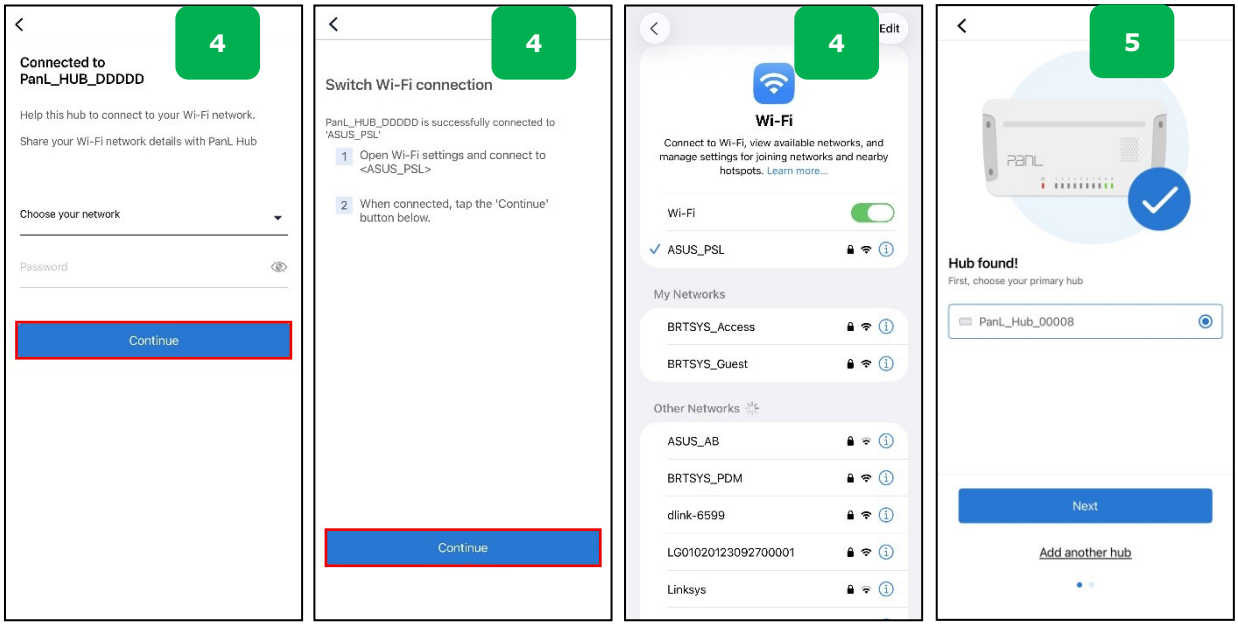


4.1.2.2 Creating a PanL Network with Wireless Hub

Follow the steps below to create a PanL Network using a wireless PanL hub.



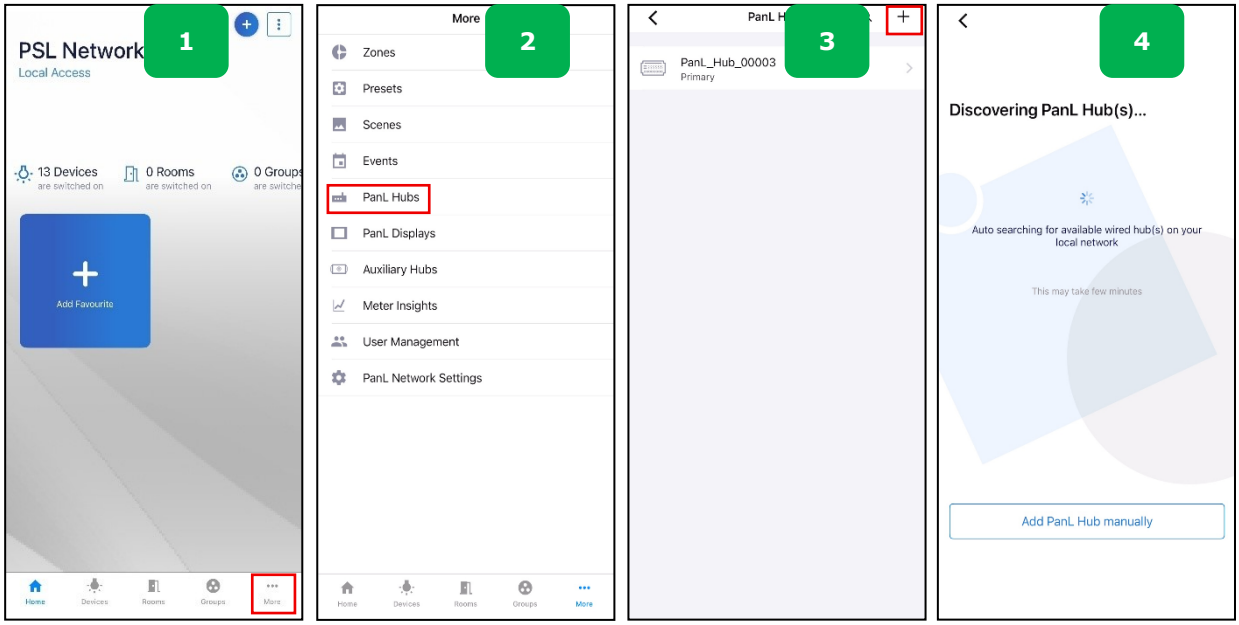
1. Upon selecting the **Wi-Fi Hub** option (Refer Manual Setup), follow the on-screen instructions and click [**Continue**].
2. Instructions to connect to PanL Hub's Wi-Fi are listed.
3. Complete the steps to connect to the PanL Hub's Wi-Fi. Return to page shown in step#2 and click on [**Continue**] to proceed.



4. Enter the Wi-Fi network details to transfer the credentials to the PanL Hub. Tap on [**Continue**] to proceed.
3. Once the hub is successfully connected via Wi-Fi, follow the setup process outlined in Default Setup (Auto-Discovered Hubs) to complete the hub onboarding.

4.2 Manual Addition of a Secondary Hub

Secondary hubs are added to widen the coverage area of the PanL. Each PanL Network can have a maximum of 1 x primary hub and 7 x secondary hubs.



1. In PanL Smart Living app's home page, select [**...More]** from the bottom menu bar.
2. Select [**PanL Hubs**].
3. The connected PanL hubs along with their UUIDs and roles(primary/secondary) will be displayed. Tap [**+**] to add a new PanL Hub to the current PanL Network.
4. The app automatically searches for any hubs connected to the internet and will follow the setup outlined in section Manual Setup. Once successfully connected, the new PanL Hub will be displayed as a secondary hub.

5 Adding Devices to PanL Network

5.1 PanL Hub Connection Interfaces

PanL Hub ports may be configured as:

- LDSBus (Long Distance Sensor Bus) or
- BACnet (Building Automation and Control Network)
- Modbus RTU (Modbus Remote Terminal Unit)

The following table displays the default configurations for PanL Hub80 and PanL Hub44:

	1	2	3	4	5	6	7	8
PH80	Modbus RTU	LDSBus	BACnet	BACnet	BACnet	BACnet	BACnet	BACnet
PH44	Modbus RTU	LDSBus	BACnet	BACnet	N/A	N/A	N/A	N/A

Table 2 – PanL Hub Default Port Configurations

Following diagram shows connection between PanL Hub and different devices.

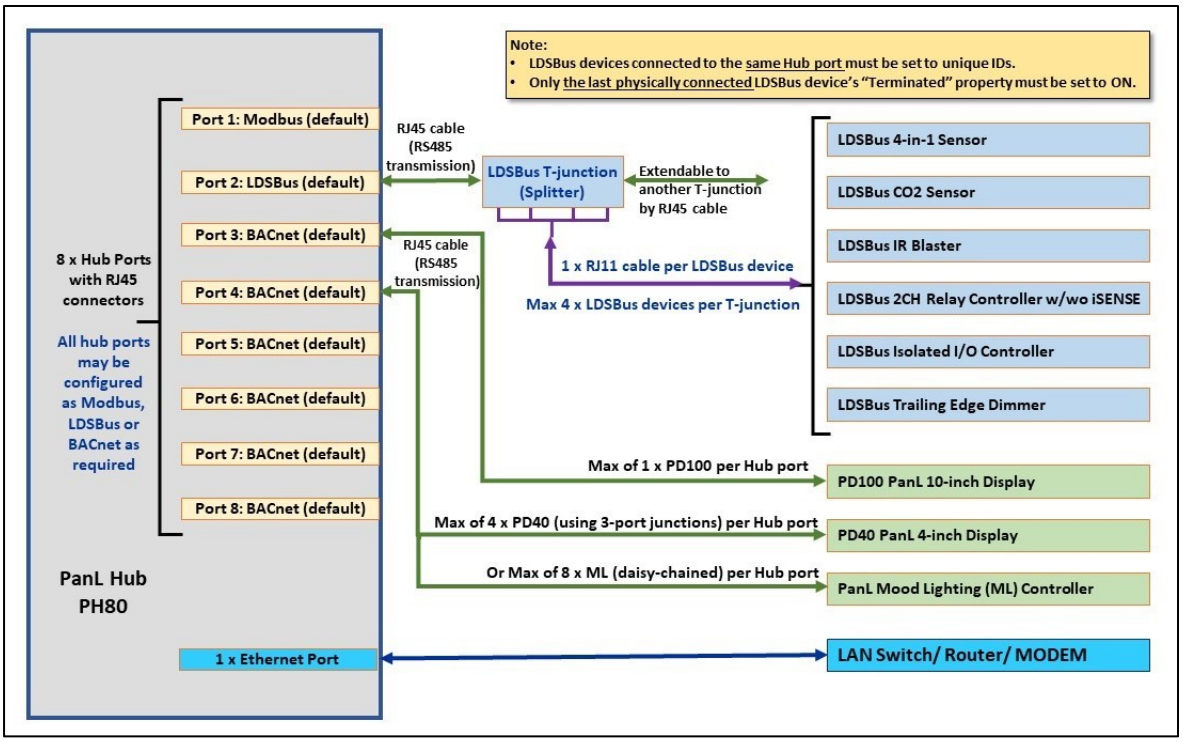


Figure 4 - Connecting Devices to PanL Hub80 Ports

NOTE:
For LDSBus devices, the maximum is 80 x LDSBus devices per PanL Hub's port. This can be achieved by using 20 x LDSBus Quad T-junctions (where each LDSBus Quad T-junction hardware can support a maximum of 4 x LDSBus devices).

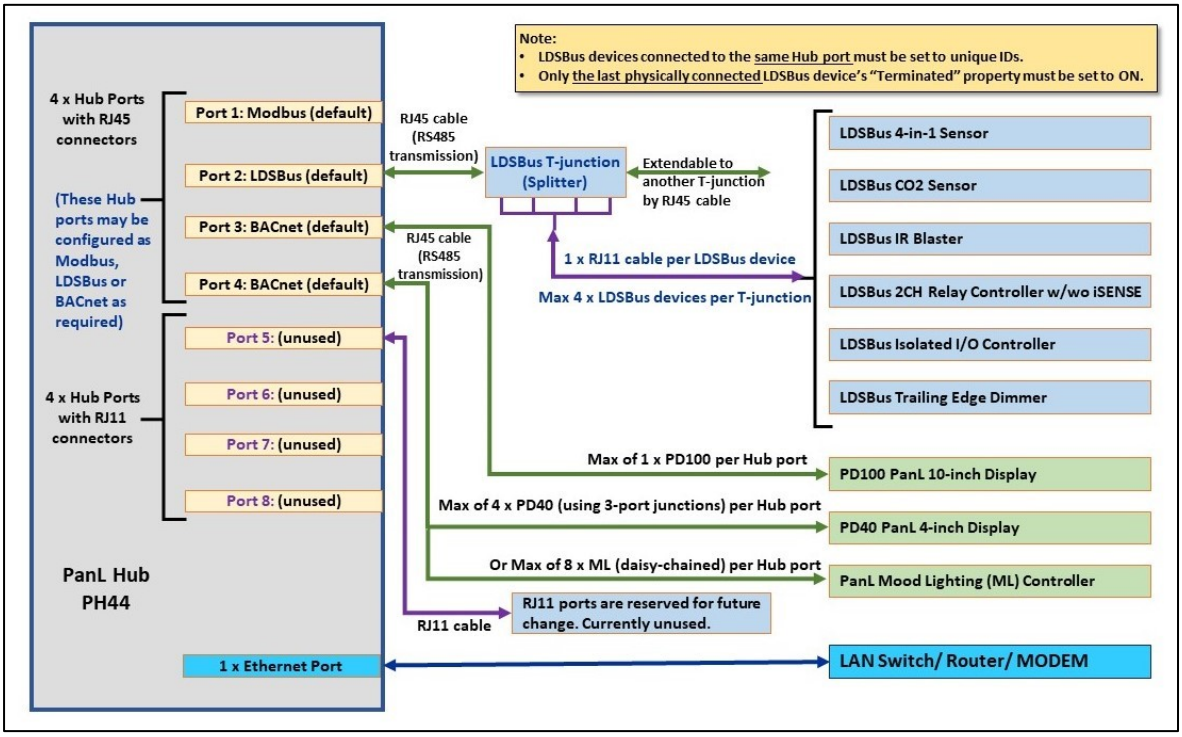


Figure 5 - Connecting Devices to PanL Hub44 Ports

Please refer to the relevant PanL Hub Datasheet for maximum wiring connection details.

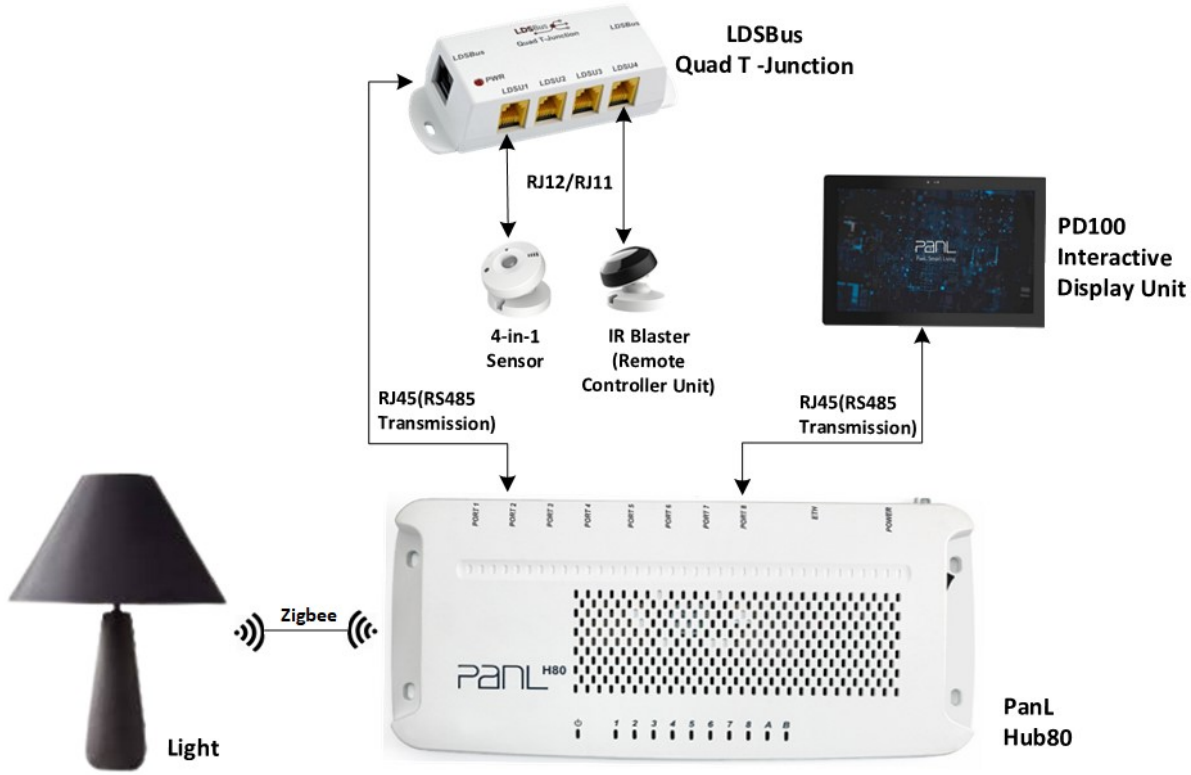


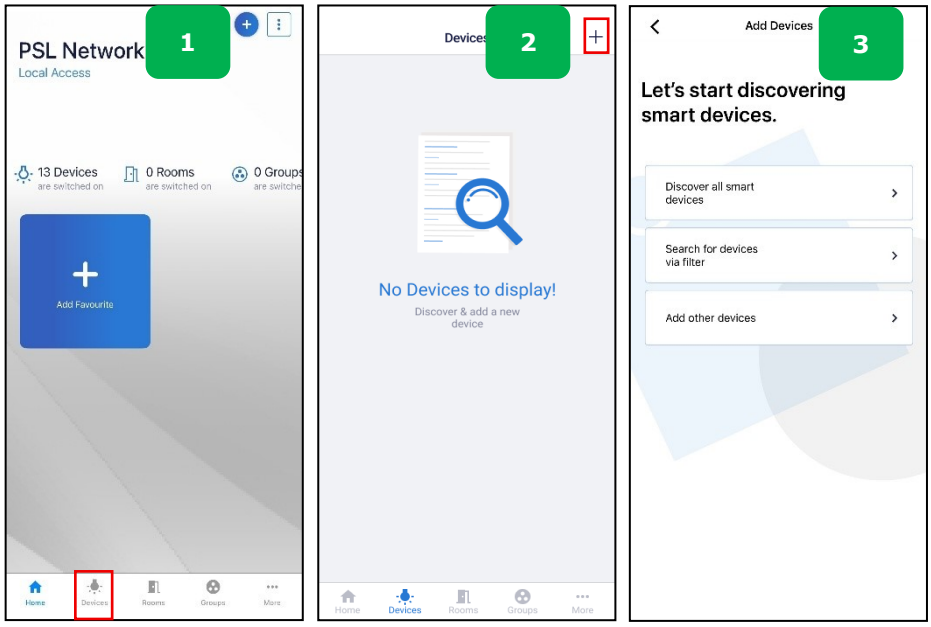
Figure 6 - PanL Hub Setup Example

5.2 Adding Devices to PanL Hub

After successfully creating the PanL network, follow the steps below to onboard devices to the PanL Smart Living ecosystem.

PSL supports a variety of wired, wireless, and network devices. See Supported Devices for a list of supported devices. Once added, the devices can be accessed from their respective categories (Lights / Sensors / Switches / Speakers / Others).

There are three ways to add devices using the PSL app:



To add devices to PanL Hub:

1. Select [**Devices**] from home page.
2. Select [**+**] to add devices.
3. Users can add devices in three ways: Discover All Smart Devices, Discover using filter and Add Devices – Manual Setup.

5.2.1 Discover All Smart Devices

Using the "**Discover all smart devices**" feature, all connected devices can be automatically detected and added to the PSL app.

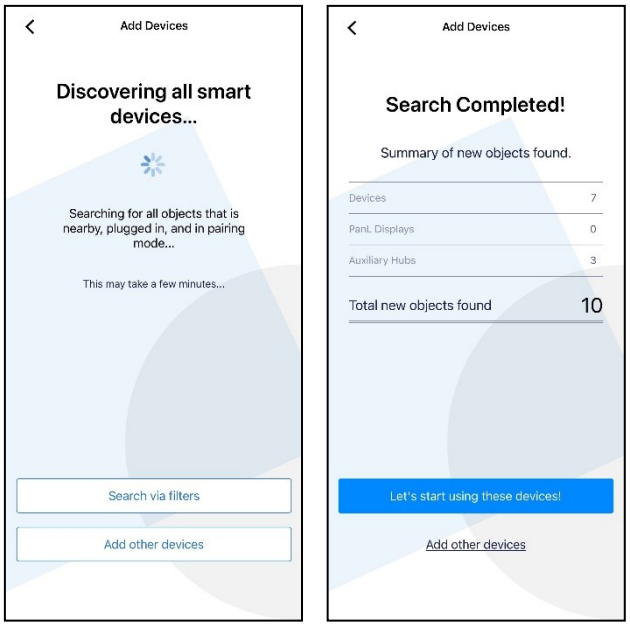
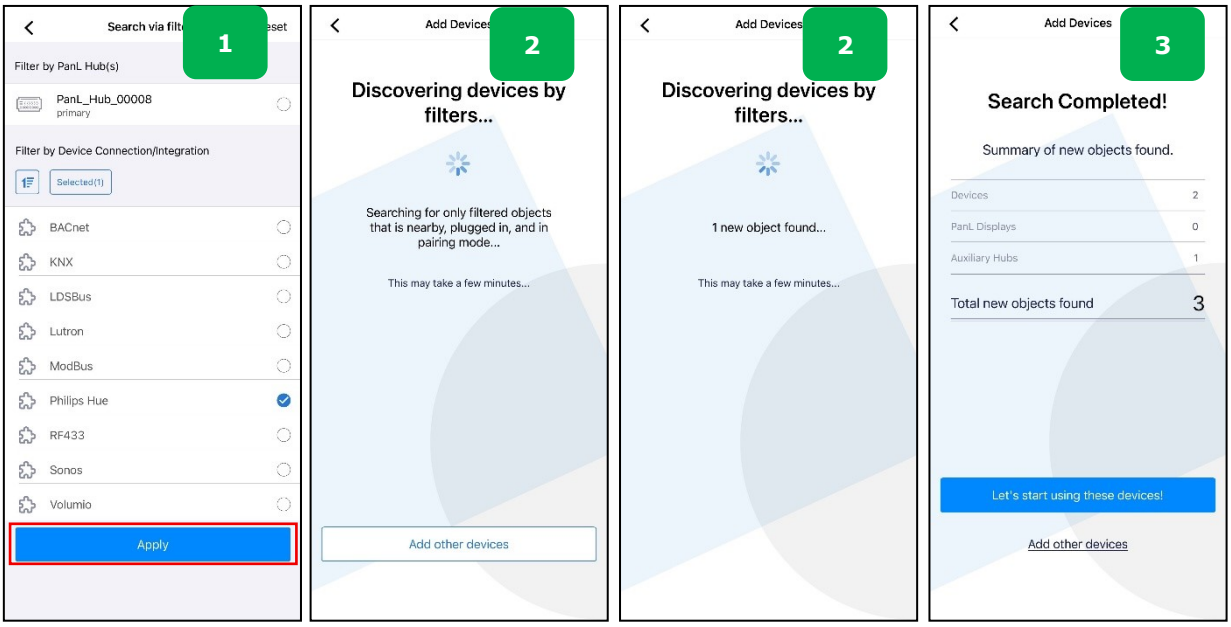


Figure 7 - Discover Smart Devices

5.2.2 Discover using filter

Using this feature, device discovery can be targeted—for example, it can be triggered to discover only Zigbee devices on a specific hub, rather than all devices across all protocols.



To add a device using filter-

1. Select the desired filter for device connection or integration, then tap [**Apply**].
2. The app begins searching for available devices.
3. Once a device is successfully detected, it will appear in the list.

5.2.3 Add Devices – Manual Setup

Certain devices require additional setup information, such as DALI switch configuration, DMX decoder slot address etc. These devices can be onboarded to the PSL system using the "**Add other devices"** option. The following device types are currently supported by PSL:

- **IR Devices**: Air Conditioner, Fan, TV
- **RF Devices**: Switch, Curtain/Blinds
- **DALI/DMX Devices**: DALI Buttons, DMX Lights
- **KNX Devices**: KNX Motion Sensors

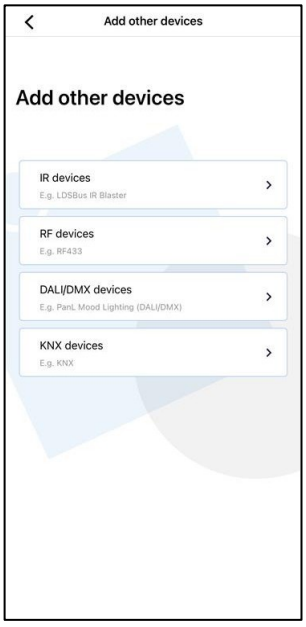
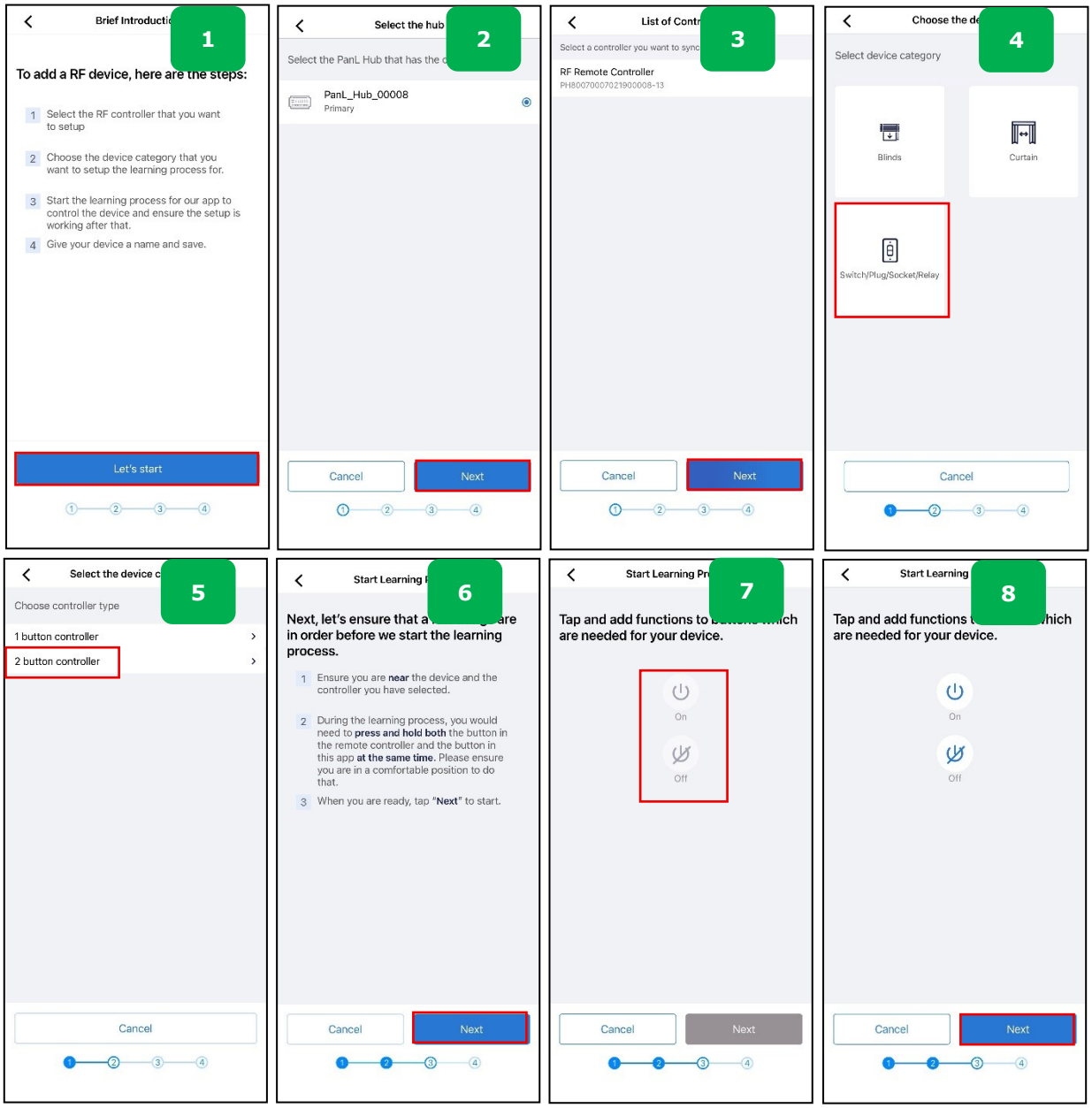


Figure 8 - Add Device Manually

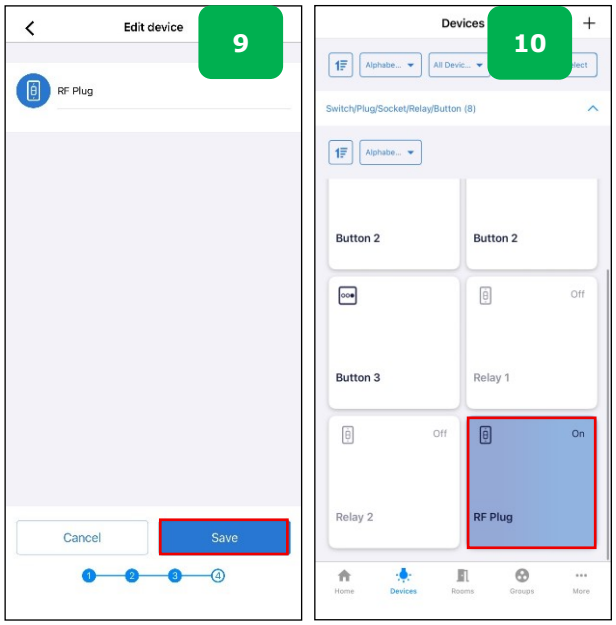
The images below illustrate how users can manually add an RF plug device. To begin, select [**RF devices**] from the page shown in Figure 8:



To add an RF device:

1. Overview of the setup process is displayed, to start setup click on [**Let's start**].
2. Select the PanL hub to which the RF device is connected and click on [**Next**].
3. Select the device.
4. Select device category.
5. Select device type.
6. Learning process steps are displayed, to proceed click [**Next**].
7. Setup the respective buttons with the desired function.
8. Once setup is complete, click [**Next**] to save the changes.

9. Add name for the device and click [**Save**].
10. Device added successfully and displayed under Switch/Plug/Socket/Relay/Button category.



NOTE:
Refer to the PSL iOS Mobile Application User Guide (iOS users) or PSL Android Mobile Application User Guide (Android Users) for information related to adding IR,RF,DALI/DMX and KNX devices.

5.3 Supported Devices

The PSL app currently supports the following devices (but is not limited to these):

5.3.1 Wired Devices

Devices that connect to the PanL Hub via physical cables include:

- PanL PD40 or PD100 Displays
- PanL Mood Lighting Controller
- LDSBus Sensors (4in 1/CO2/Gas & True VOC/AQS)
- LDSBus Relay Controller
- LDSBus Trailing Edge Dimmer
- LDSBus I/O Controller
- LDSBus IR Blaster
- LDSBus RFID Reader
- LDSBus 4CH Solid State Relay
- LDSBus CTP40 Touch Button

NOTE:
LDSBus devices may require pre-configuration using the LDSBus Configuration Utility.

These LDSBus devices can be integrated with various smart home devices such as:

LDSBus Device	Integrated Device Type	Supported Features
LDSBus IO Controller	Lighting	ON/OFF, Brightness control (Dimming)
	Lighting	ON/OFF, Brightness control, Adjustable color temperature (Warm ↔ Cool)
	Button	Button press detection, Action / Scene trigger

LDSBus 2CH Relay Controller /2CH NL Relay Controller /4CH Solid State Relay Controller	Switch	On/Off Switch
	3 buttons	Open/Stop/Close – Curtains, Blinds
	Meter Devices	Energy/Water Meter
PanL MLC DALI/DMX	Lighting	Dimmable Lighting - DALI
	Push Button	Button - DALI
	Motion/Presence Sensor	Sensor - DALI
	DMX Light	RGB Lighting - DMX
LDSBus Trailing Edge Light Dimmer	Lighting	Dimmable Light
LDSBus 4-in-1 Sensor/ Air Quality/CO2 Multi Sensor/Gas & TrueVOC Sensors	Sensor	
LDSBus RFID Reader	Access control	Door
LDSBus CTP40	Button Control	Button
LDSBus IR Blaster	Remote Control	Aircon, TV, Fan, Lighting, Speaker

Table 3 - LDSBus Device Integrations

5.3.2 Wireless Devices

Devices that communicate over short-range wireless signals such as:

a) ZigBee Devices

- Activate pairing mode on the Zigbee device. Refer to the device's user manual for specific steps.
- Confirm the device is in pairing mode. The device should begin flashing or blinking, indicating that it is discoverable.
- **Discover** the device using the PSL app. Open the PSL app, navigate to *Devices* and tap on *Search for devices?*
- The app will detect the Zigbee device and automatically add it to the PanL Network.

Refer to Zigbee Device List for the list of Zigbee devices supported by PanL Smart Living system.

5.3.3 Networked Devices

Devices that connect to a local network (LAN/Wi-Fi) and can be controlled over IP:

a) Philips Hue Bridge

- Set up the Hue Bridge, connect it to your router via Ethernet, and ensure it is on the same local network as the PanL Hub.
- Enter pairing mode by pressing the link button on the Hue bridge.
- **Discover** the device using the PSL app. Open the PSL app, navigate to *Devices* and tap on *Search for devices?*
- *The* app will detect all connected Hue bulbs and devices and automatically add it to the PanL Network.

b) Smart Speakers

- **Sonos**
  - Setup Sonos device using Sonos app and ensure that the speaker device and PanL hub are on the same network.
  - **Discover** the device using the PSL app. Open the PSL app, navigate to *Devices* and tap on *Search for devices?*
  - The app will detect the speaker device and automatically add it to the PanL Network.

- **Volumio**
  - Setup Volumio device using Volumio app and ensure that the Volumio and PanL hub are on the same network.
  - **Discover** the device using the PSL app. Open the PSL app, navigate to *Devices* and tap on *Search for devices?*
  - The app will detect the speaker device and automatically add it to the PanL Network.

5.3.4 Hybrid Devices

Devices that combine multiple connection types, such as wired + wireless or LAN + protocol-based mesh networks:

a) KNX Devices

- Connect all KNX devices and the KNX gateway to the KNX bus. Configure them using KNX software (e.g., ETS), assign group addresses, and link the devices as needed.
- Add the KNX devices to the PSL via the Add Devices-Manual setup process. Manual setup is required as user must enter the individual and group address in the PSL app. Currently, only KNX motion sensor is supported.

b) Lutron Devices

Mobile application support for configuring and adding Lutron devices will be available in a future release. To enable this feature on your network, please contact our support team. After setup is completed, follow below steps:

- Connect the Lutron device to the same network as the PanL Hub.
- Add the connected device using the **Discover Devices** option. Currently, only dimmable light devices are supported.

NOTE:
The list of supported devices above is not exhaustive. To request support for a new device in the PSL ecosystem, contact BRTSys.

For more information on the devices, refer to the list of Datasheets / Application Notes provided under the Document Reference section.

Users can control the added devices in the Devices page. Each device category can be expanded by clicking the icon.

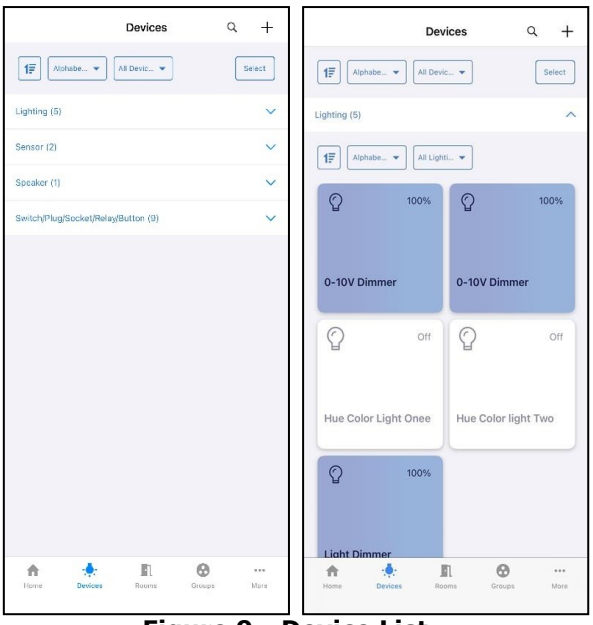
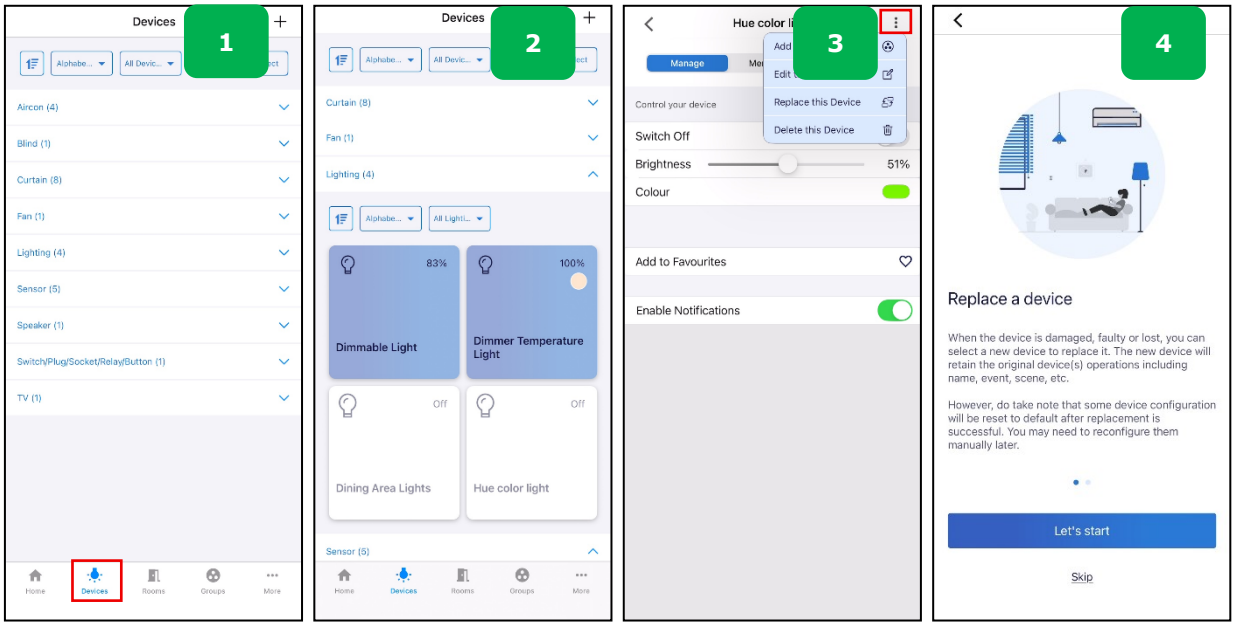


Figure 9 - Device List

6 Replacing Devices in PanL Network

If a device becomes faulty or outdated and needs replacement, the PSL app provides a "*Replace This Device*" feature. The new device will keep the original device's name, events, scenes, and settings, ensuring a quick and hassle-free replacement.

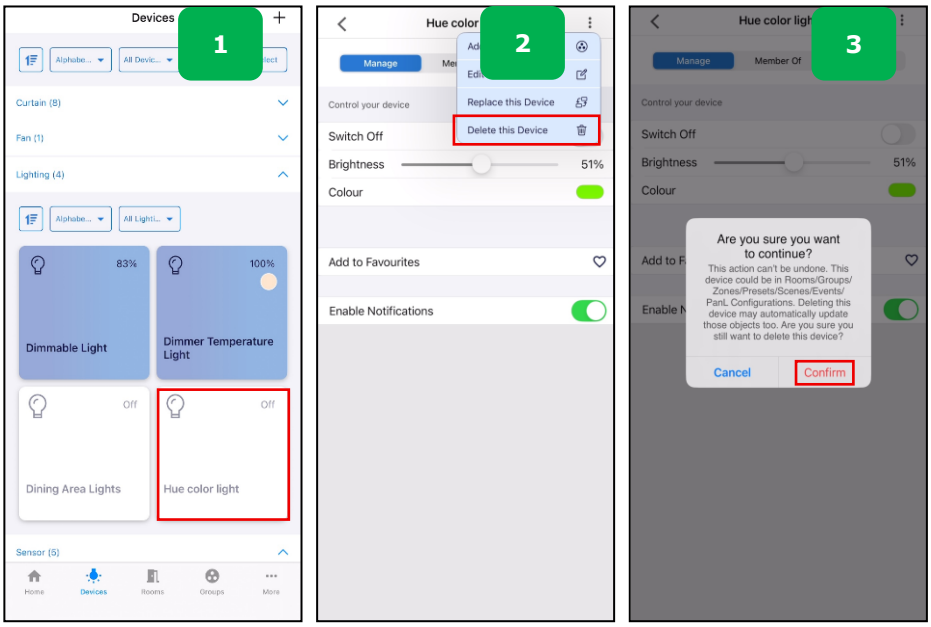
Access this feature by performing a long tap on the device name from the device page.



1. Select [**Devices**] to open the connected devices page.
2. Expand device category by clicking on the ⌄ icon.
3. Click the ⋮ icon to open the additional functions menu. Select [**Replace this Device**] option.
4. Follow the instructions on the page to replace the device.

7 Offboarding Functions

7.1 Delete Device

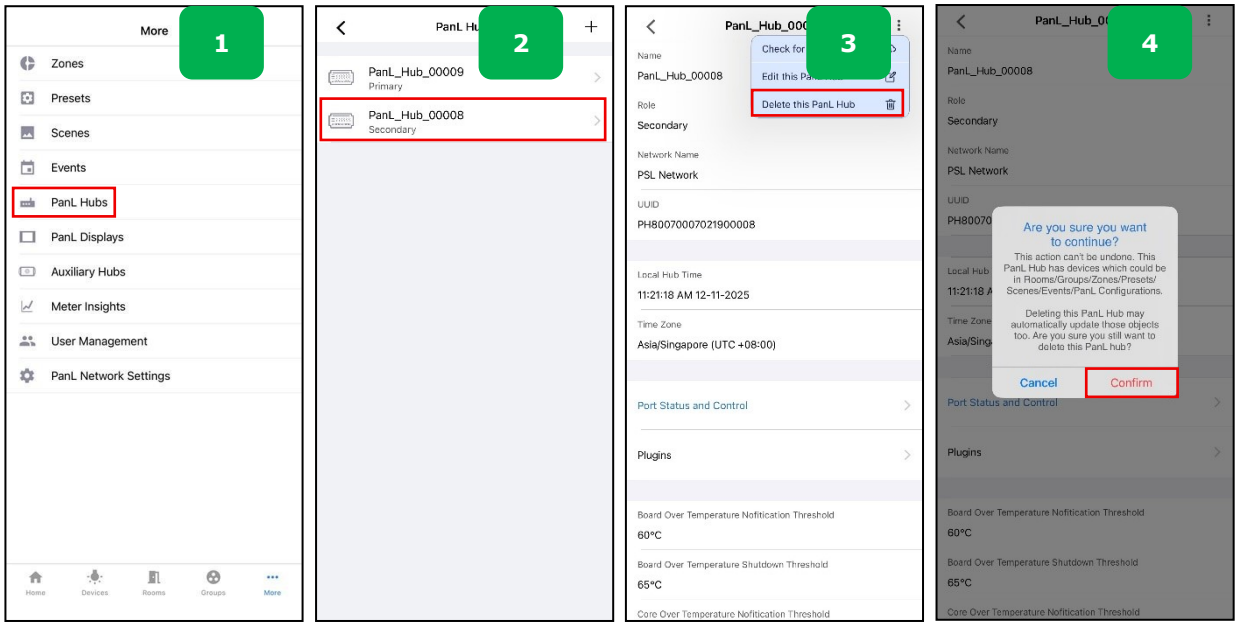


To offboard devices from PanL Network:

1. Select [**Devices**] from the home page to open the devices page. Long tap on the device to be removed.
2. Select the ⋮ button to open additional functions menu. Select [**Delete this device**].
3. Confirm device deletion by clicking on [**Confirm**]. The device will be removed from the device list. To re-add the device, follow the instructions outlined in Adding Devices to PanL Hub.

7.2 Delete Hub

To delete the Primary Hub, User must delete the entire network, as it cannot be removed individually. On the other hand, Secondary Hubs can be deleted separately without affecting the network.

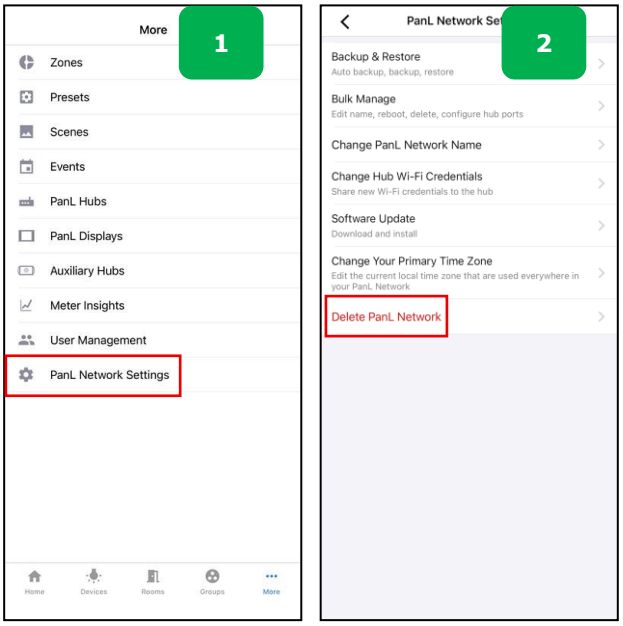


To offboard a secondary hub from a PanL Network:

1. Select [**...More**] option from the main menu screen. Tap on [**PanL Hubs**].
2. A list of all connected PanL Hubs will be displayed. Select the secondary hub to be deleted.
3. Tap ⋮ icon to open additional functions menu. Select [**Delete this PanL Hub**].
4. Confirm hub deletion. The secondary hub and all its connected devices will be removed from the PanL Network. To re-add the hub, follow the instructions outlined in Section Manual Addition of a Secondary Hub.

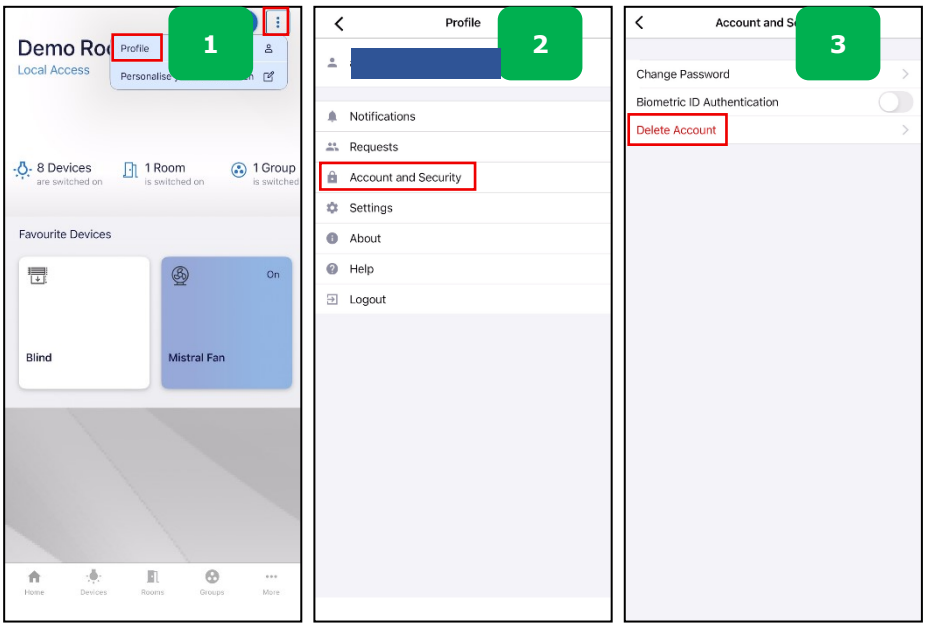
7.3 Delete a PanL Network

When required, a primary user may wish to remove a PanL Network from their PanL Smart Living platform.



1. Access [**...More]** option from the menu screen. Select [**PanL Network Settings**].
2. To offboard the PanL Network, select the option [**Delete PanL Network]**. The network including all the connected devices will be removed from the app. To re-create the PanL Network, follow steps outlined in Creating a PanL Network.

7.4 Delete Account



To delete the PanL Smart Living mobile app account –

1. From the dropdown menu, select **[Profile]** to open the user profile page.
2. Choose **[Account and Security]**.
3. Tap **[Delete Account]** and follow the on-screen instructions to complete the account deletion process.

8 Other Functions

8.1 Join an Existing PanL Network

If the user has already set up their PanL Hub's, all the available PanL Networks will be displayed to the user upon logging in or reopening the app. Choose a network to view/control the devices connected to it.

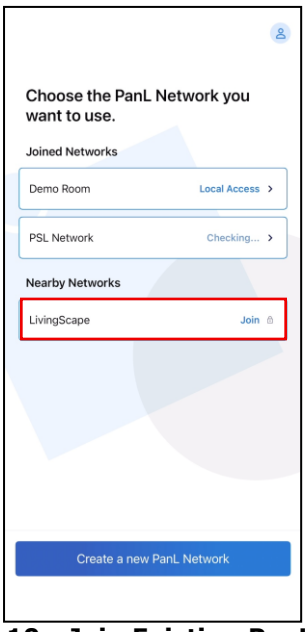


Figure 10 - Join Existing PanL Network

Users can submit a request to join a PanL Network they are not authorized for by choosing any existing PanL Network name. The request will then be sent as a push notification to the primary user of the selected PanL Network.

Similarly, users have the option to join a network by accepting an invitation sent to them by the owner of the PanL Network. Once accepted, the user will be able to control the devices connected to the selected PanL Network.

Refer to the PSL iOS Mobile Application User Guide (iOS users) or PSL Android Mobile Application User Guide (Android Users) for more information.

8.2 PanL Hub Control Menu

PanL Hub's control menu can be accessed through the [**Reset**] button located at the side of the hub as shown in figure below:

Figure 11 - PanL Hub Reset Button

The following actions are available in the PanL Hub control menu:

Action	Instruction
Activate Control Menu	To activate the control menu, press and hold the [**Reset**] button until the system health LED indicators (LED A & B) flash green and then release. Quickly press the button again to enter the control menu. The Port 1-Port 4 indicator will flash green, indicating that the control menu has been successfully triggered. Short press the [**Reset**] button and the flashing will stop, and Port 1 LED indicator will be lit.
Function Selection	After successfully triggering the control menu, the corresponding 4 functions below can be toggled by doing short presses on the [**Reset**] button. This will be reflected on Port 1-Port 4 LED indicators: Port 1) Rollback to previous firmware Port 2) Set Hub back to un-configured state Port 3) Reset Hub to Factory Settings Port 4) Go back to Port 1 selection Once the desired function is selected, press and hold the button, and the selected port indicator will change from green to yellow, signalling that the function has been successfully executed. If no input is selected for a period after the control menu is triggered, the hub will automatically return to normal operation mode.
Reboot	To perform a reboot function, simply do a short press (0.1-1 seconds) on the [**Reset**] button.
System Shutdown	To perform system shutdown, simply press the [**Reset**] button for more than 5 seconds and release. LED A will flash blue while LED B will flash green indicating entry into shutdown.

Table 4 - Hub Control Menu

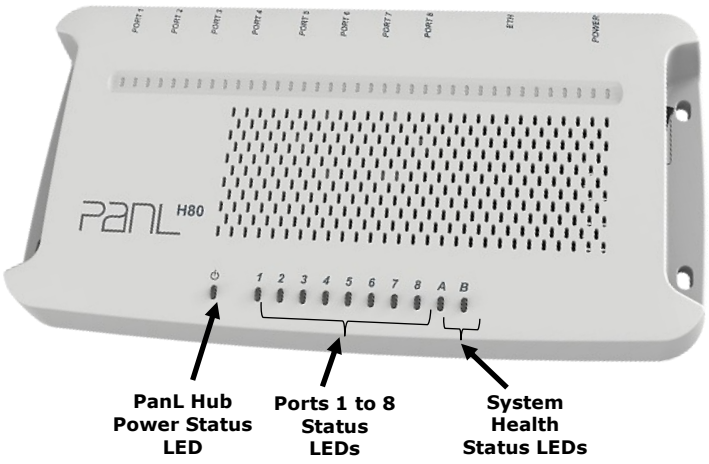


Figure 12 - PanL Hub Status LEDs

PanL Hubs shipped from the factory will always be in unconfigured state, so the below instructions are only necessary if the user needs to offboard and onboard the hub again due to any issue.

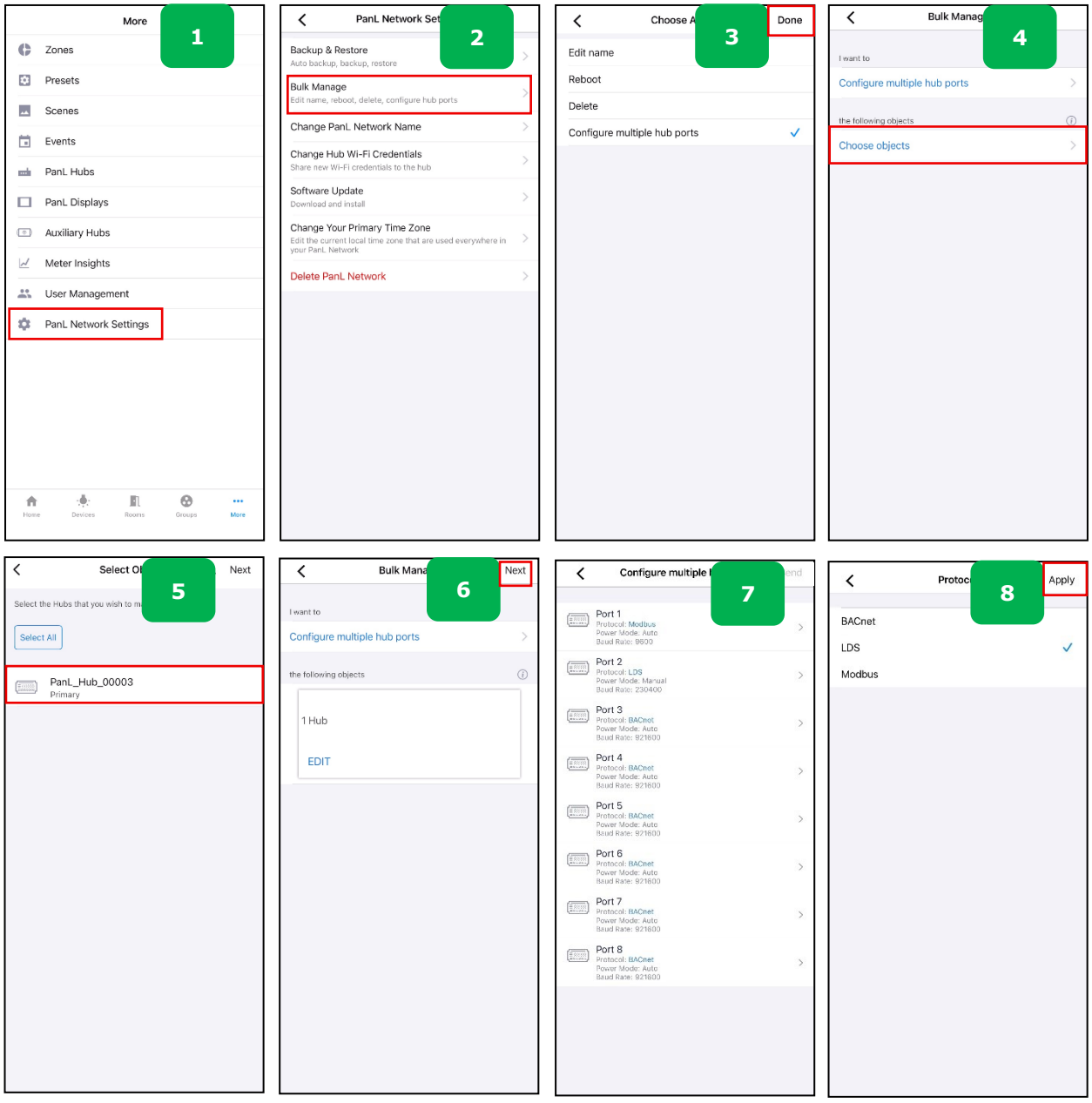
To reset a previously configured PanL Hub follow the below steps:

1. Do a long press in [**Reset**] pinhole until both LED A and LED B flash in green.
2. Perform a short press in the [**Reset**] pinhole to access PanL Hub's Control Menu. This state is achieved when Port 1 to Port 4's LEDs start flashing in green.
3. Next, perform two quick presses on the [Reset] pinhole. This will stop the 4 green flashing LEDs from Step 2 and trigger a flashing green light to appear at Port 1's LED, which will then move sequentially to Port 2's LED.
4. Perform a long press when the flashing green light is at Port 2's LED to select "*Set Hub back to unconfigured state*" function. The halted light will change from green to yellow.
5. Continue to wait as PanL Hub undergoes required internal changes. Finally, both LED A and LED B will flash in green to indicate that PanL Hub has changed back to unconfigured state.

Now the PanL Hub is ready for onboarding.

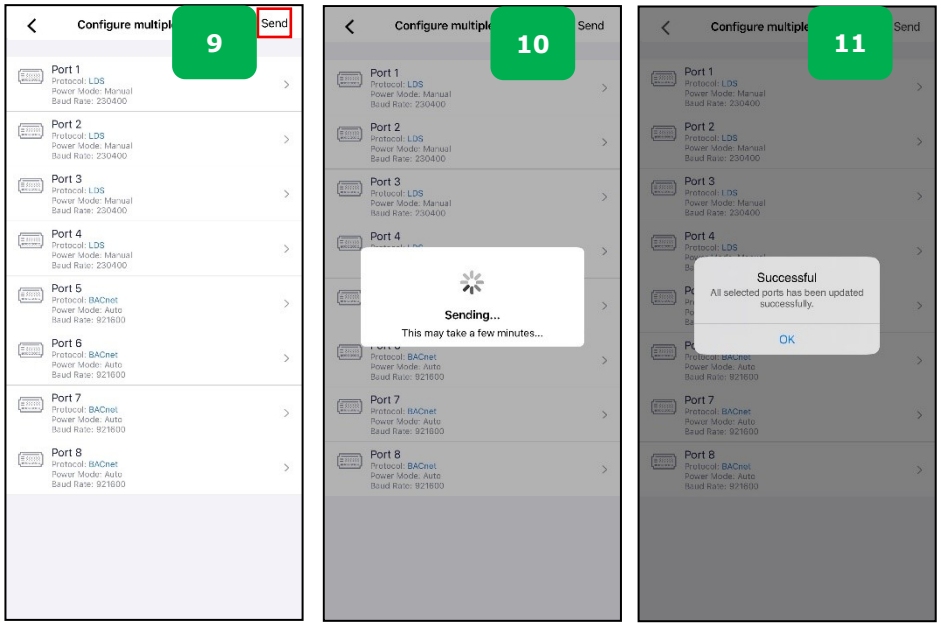
8.3 Configure Hub Ports

Users can adjust the hub port configurations dynamically at any time to cater user's requirements. This can be done using the *Bulk Manage* feature in the app.



The following steps outline how user can configure hub ports 1, 3 and 4 to LDS protocol:

1. Access [**...More]** option from the menu screen. Select [**PanL Network Settings**].
2. From the PanL Network Settings page, select [**Bulk Manage**].
3. Choose [**Configure multiple hub ports**] to change the PanL Hub configuration.Tap on [**Done**] to proceed.
4. Tap on [**Choose objects**] to select which hubs to be configured.
5. Choose the PanL Hub/s that is required to update the configuration.
6. To proceed with bulk update, click [**Next**].
7. Select ports 1, 3 and 4 to change the configuration.
8. Change the configuation to *LDS* for each port and tap on [**Apply**] to confirm the changes.



9. Once the required configuration/s have been changed, select [**Send**] to confirm.
10. Updated configuration is sent to the selected PanL Hub/s.
11. Successful message will be displayed if send configuration was a success. Now user is able to connect LDSBus devices to ports 1,3 and 4.

8.4 User Access

PSL app users are categorized into two types: primary and secondary. Primary users have access to more features and privileges within the app than secondary users.

For example, primary users can add/delete objects, groups, zones etc., while secondary users can only view/control the objects, groups etc. Refer to Figure 13 to view the features available for primary vs secondary users.

In a home setting, this might include the family head or power users such as the husband/wife or adults, while secondary users are typically children or guests with limited access.

In a building or organizational setting, primary users would be admins or managers who oversee the system, while secondary users would be the regular occupants, employees, or visitors with more restricted access.

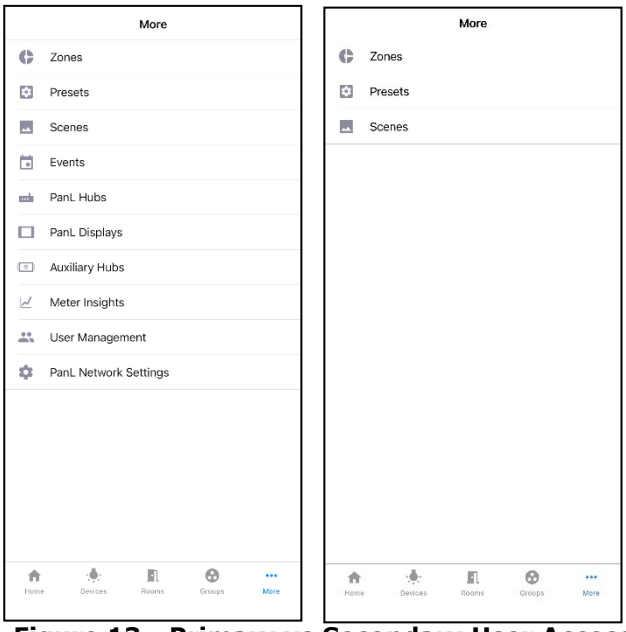


Figure 13 - Primary vs Secondary User Access

PSL app can be accessed in the following ways:

- Local Access – If user is connected to the same network as the PanL hub, user can control all the connected devices. This type of access ensures seamless interaction with the devices within the local network, providing full control over functions and settings.

- Remote Access – Remote access, which is enabled by default for Primary Users, allows users to control their connected devices from anywhere, regardless of their physical location. Remote access ensures that users can monitor or control devices even when they are away from home or the office, offering added convenience and flexibility.

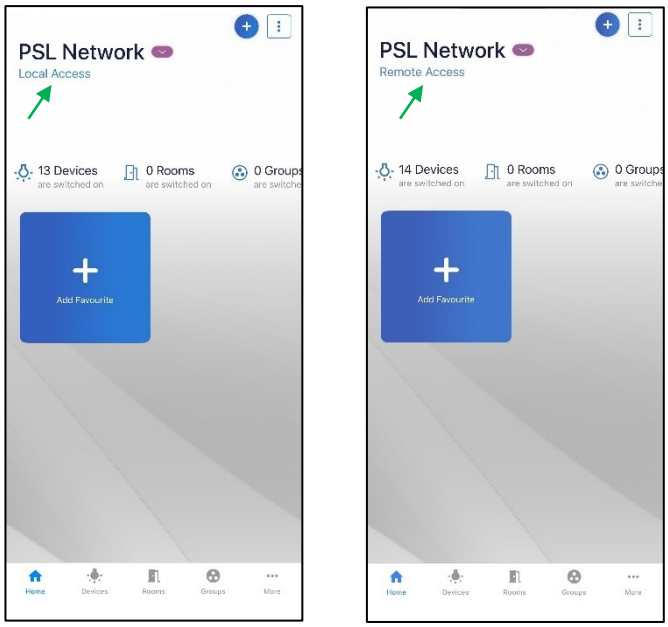


Figure 14 - Local vs Remote Access

Following are the functions available to each type of users:

Function Access		Primary Users		Secondary Users	
		Local Access	Remote Access	Local Access	Remote Access
PanL Network List	View	Yes	Yes	Yes	Yes
	Join	Yes	No	Yes	No
	Exit	Yes	No	Yes	No
	Delete	Yes	No	No	No
	Troubleshoot	Yes	No	No	No
Devices	Auto Discovery	Yes	No	No	No
	Smart Search via filters	Yes	No	No	No
	Manual Set Up	Yes	No	No	No
	View	Yes	Yes	Yes	Yes
	Edit	Yes	Yes	No	No
	Replace	Yes	No	No	No
	Delete	Yes	Yes	No	No
	Activate Objects	Yes	Yes	Yes	Yes
	Add to Group	Yes	Yes	No	No
	Add to Room	Yes	Yes	No	No
	Add to Zone	Yes	Yes	No	No
	Add to Scene	Yes	Yes	No	No
	Add to Preset	Yes	Yes	No	No
Rooms	Create	Yes	Yes	No	No
	View	Yes	Yes	Yes	Yes
	Edit	Yes	Yes	No	No
	Delete	Yes	Yes	No	No
	Add Device	Yes	Yes	No	No

	Add to Zone	Yes	Yes	No	No
Groups	Create	Yes	Yes	No	No
	View	Yes	Yes	Yes	Yes
	Edit	Yes	Yes	No	No
	Delete	Yes	Yes	No	No
	Add Device	Yes	Yes	No	No
Zones	Create	Yes	Yes	No	No
	View	Yes	Yes	Yes	Yes
	Edit	Yes	Yes	No	No
	Delete	Yes	Yes	No	No
	Add Device	Yes	Yes	No	No
	Add Room	Yes	Yes	No	No
Presets	Create	Yes	Yes	No	No
	View	Yes	Yes	Yes	Yes
	Edit	Yes	Yes	No	No
	Delete	Yes	Yes	No	No
Scenes	Create	Yes	Yes	No	No
	View	Yes	Yes	Yes	Yes
	Edit	Yes	Yes	No	No
	Delete	Yes	Yes	No	No
Events	Create	Yes	Yes	No	No
	View	Yes	Yes	No	No
	Edit	Yes	Yes	No	No
	Delete	Yes	Yes	No	No
PanL Hub	View	Yes	Yes	No	No
	Add	Yes	No	No	No
	Edit	Yes	Yes	No	No
	Delete	Yes	No	No	No
	Software Update	Yes	No	No	No
PanL Displays	View	Yes	Yes	No	No
	Edit	Yes	Yes	No	No
	Add to Group	Yes	Yes	No	No
	Add to Room	Yes	Yes	No	No
	Add to Zone	Yes	Yes	No	No
	Delete	Yes	Yes	No	No
	Replace	Yes	No	No	No
	Create Configuration	Yes	Yes	No	No
	View Configuration	Yes	Yes	No	No
	Send Configuration	Yes	No	No	No
	Edit Configuration	Yes	Yes	No	No
	Delete Configuration	Yes	Yes	No	No
	Identify Display	Yes	No	No	No
	Reboot Display	Yes	No	No	No
	Lock/Unlock Display	Yes	Yes	No	No

	Software Update	Yes	No	No	No
Auxiliary Hubs	View	Yes	Yes	No	No
	Edit	Yes	Yes	No	No
	Replace	Yes	No	No	No
	Delete	Yes	Yes	No	No
	Edit Device Name under hub	Yes	Yes	No	No
	Identity	Yes	Yes	No	No
	Reboot	Yes	Yes	No	No
	Software Update	Yes	No	No	No
	Failsafe Mode	Yes	No	No	No
PanL Network	View	Yes	Yes**	No	No
	Delete	Yes	No	No	No
	Configure	Yes	No	No	No
	Software Update	Yes	No	No	No
	Backup/Restore	Yes	No	No	No
	Bulk Manage – Edit Name, Reboot, Delete, Configure Hub Ports	Yes	No	No	No
	Change Hub's time zone	Yes	No	No	No
Meter Insights	View & Create	Yes	Yes	No	No

Table 5 - Function Access

**** - Only View, No access**

A primary user can upgrade a user's profile from secondary to primary and enable remote access through the PSL mobile app. Refer to the PSL iOS Mobile Application User Guide (iOS users) or PSL Android Mobile Application User Guide (Android Users) for more information.

8.5 PanL Network & Hub Software Update

Users can manage software updates for a range of devices within the PSL ecosystem. They can check for updates, download, and install the latest software for the following device categories:

- PanL Hubs – primary and secondary
- PanL Displays – PD40, PD100 and MLC (BACnet based)
- LDS based Devices - LDS Relay, IO Controller, CTP40 device etc.

Refer to the PSL iOS Mobile Application User Guide (iOS users) or PSL Android Mobile Application User Guide (Android Users) for more information on software updates for PanL Network and PanL Hub.

Appendix A

Web References

Display Panels - BRT Systems Pte Ltd

Hubs - BRT Systems Pte Ltd

PanL Smart Living

LDSBus Configuration Utility Tool

PanL Mood Lighting Controller – Datasheet / Application Note

LDSBus 4in1 Sensor Datasheet

LDSBus CO2 Multi-Sensor Datasheet

LDSBus Gas and True VOC Sensor Datasheet

LDSBus AQS Sensor Datasheet

LDSBus Relay Controller Datasheet / Application Note

LDSBus Trailing Edge Dimmer Datasheet

LDSBus Isolated I/O Controller Datasheet

LDSBus IR Blaster Datasheet / Application Note

LDSBus RFID Reader

Acronyms / Abbreviations

Acronym	Definition
ANSI	American National Standards Institute
BACnet	Building Automation and Control Network
DALI	Digital Addressable Lighting Interface
DMX	Digital Multiplex
FCC	Federal Communications Commission
HTTPS	Hypertext Transfer Protocol Secure
iOS	iPhone Operating System
IEC	International Electrotechnical Commission
IP	Internet Protocol
IR	Infra-red
LDSBus	Long-Distance Sensor Bus
LED	Light Emitting Diode
ModBus RTU	ModBus Remote Terminal Unit (Serial Protocol)
NFPA	National Fire Prevention Association
OTP	One-time Password
PSL	PanL Smart Living
RTC	Real-Time Clock
SSR	Solid State Relay

List of Figures

List of Tables

Safety Guidelines

Important Safety Instructions:

WARNINGS:

- This symbol,  , when used on the product, is intended to alert the user of the presence on uninsulated dangerous voltage within the product's enclosure that may present a risk of electric shock.
- If the product is damaged and any internal components can be seen through the damaged area; unusual odours or unusual noises are detected; disconnect the device from the electric outlet and contact our support.

ATTENTION:

 - This symbol, when used on the product, is intended to alert the user of important operating and maintenance (Servicing) instruction in the literature provided with equipment.

WARNING: To reduce the risk of fire or electric shock, do not expose this equipment to rain or moisture.

General Guidelines:

Follow these sensible guidelines:

- Read instructions- Read and understand all safety and operating instructions before installing or using the equipment.
- Retain instructions- Keep the safety instructions for further reference.
- Follow warnings- Follow all warnings and instructions marked on the equipment or in the user information.
- Comply with codes- Install all products in accordance with international, national, and local electrical and building safety codes. Some examples for reference are as follows:
  - In the United States of America, refer to ANSI/NFPA 70, US National Electrical Code (NEC).
  - In Canada. Consult the Canadian Electrical Code, Part I, CSA C22.1.
  - Elsewhere, refer to International Electro Technical Commission (IEC) guideline 60364, parts 1-7.
- Avoid attachments- Do not use tools or attachments that are not recommended by the equipment manufacturer because they may be hazardous, and they may void the warranty.
- Avoid water - Do not use this or other electrical equipment near water or objects filled with water. Clean the device with dry cloth only.
- Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
- Only use attachments/accessories specified by the manufacturer.
- Unplug this equipment during lightning storms or when unused for prolonged periods of time.
- This equipment shall not be exposed to dripping or splashing and no objects filled with liquids, such as vases, shall be placed on the equipment.
- Refer all servicing to qualified service personnel. Servicing is required when the equipment has been damaged in any way, such as when power supply cord or plug is damaged, liquid has been spilled, or objects have fallen into the equipment, the equipment has been exposed to rain or moisture, does not operate normally, or has been dropped.

Grounding (Earthing):

- Grounding faceplates- For products with metal faceplates, ground the faceplates to the product ground, and tie all the products in a system to a common ground. This prevents electrostatic discharge and can prevent video ground loops.
- Do not defeat the safety purpose of the polarized or grounding –type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and third grounding prong. The wide blade or the third prong is provided for user's safety. If the provided plug does not fit into the outlet, consult an electrician for replacement of the obsolete outlet.

Power and Electrical Supply:

- **Appropriate power supply**
  - Use only provided power supplies and power sources with our products. Use of unauthorized power supplies may harm the equipment, may void the warranty, and will void the regulatory compliance status.
  - For power adapters with detachable DC cords, consult the Manufacturer for guidance.
  - Power supplies are intended for continuous operation.
  - Our power supplies are universal input voltage supplies that operate from 100-240 VAC and are intended to function at 50 to 60 Hz. The ambient temperature shall not exceed 50°C and the altitude shall not exceed 2000m. Consult the Manufacturer if the input power supply being used is not provided by us. Make sure to use the appropriate power supply for corresponding models. If use an LPS or Class2 type, and that it is marked as "LPS" or "Class 2".

- **Location of power supplies**
  - External power supplies with either plastic enclosures or metal enclosures with vents must not be located within environmental air handling spaces or a wall cavity.
  - Our power supplies are intended for indoor use only.
  - The power supply must not be permanently fixed to the building or similar structure.

Power Sources:

- This equipment should be operated only from the power source indicated on the product. This equipment is intended to be used with main power system with a grounded neutral conductor or Line to Line. The third (grounding) pin is a safety feature, do not attempt to bypass or disable it.

WARNING for Class I Products:

Class I products must be connected only to a mains socket outlet with a protective Earthing (Grounding) connection.

- Power and IT system- Consult us before installation if the product will be connected to an IT power distribution system.
- Servicing

WARNING: Disconnect the equipment from the AC main before performing any service to the equipment.

- There are no user serviceable parts inside our equipment.
- Refer all servicing to qualified service personnel. To prevent the risk of shock, do not attempt to service this equipment by yourself because opening or removing covers may expose users to dangerous voltage or other hazards and may void the warranty.
- **Batteries**
  Read, keep, and heed these instructions.

CAUTION:

- To avoid risk of fire, burns, or explosion, do not open, crush, incinerate, or pierce the battery. Do not disassemble the battery or dispose of it in fire.
- Do not replace the battery with an incorrect type. Dispose of used batteries according to the instructions.
- Do not open the unit to replace the battery if the product literature so indicates. If the battery needs replacing, please contact us.
- Be careful when handling the battery so you do not short circuit the terminals. Do not allow liquid, dirt, or other foreign objects onto the terminals, and do not allow items such as rings, bracelets, coins, or keys to touch the battery terminals.
- Do not expose batteries, battery packs, or coin batteries to heat in excess of 70°C (158°F).
- Dispose of used batteries according to the manufacturer's instructions or consult local waste management codes for disposal instructions.

Ventilation, Mounting and Temperature:

- Ventilation slots and opening- If the equipment has slots or holes in the enclosure do not block any ventilation opening, as this may cause the product to malfunction. Install the device in accordance with the manufacturer's instructions
- Temperature – Do not install electronic devices near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat. If possible, do not expose the product to direct sunlight. Also see "Rack mounding guidelines" below for temperature guidelines.

Rack Mounting Guidelines:

The following guidelines pertain to the safe installation of our products in an equipment rack.

- Elevated operating ambient temperature – If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient temperature. Therefore, install the device in an environment compatible with the maximum ambient temperature (Tma) specified by us.
- Reduced air flow – Install the equipment in a rack so that the amount of air flow required for safe operation of the equipment is not compromised.

Electromagnetic Interference/Compatibility:

FCC Class A Notice (See the product datasheet specifications to determine whether this class applies).
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. The Class A limits provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates uses and can radiate radio frequency energy and if not installed and used in accordance with the Instruction manual, may cause harmful to radio communications.

Operation of this equipment in a residential area is likely to cause interference; the user must correct the interference at his own expense.

- Any modifications made to these devices that are not approved by us, it may void authority granted to the user by the FCC to operate this equipment.
- This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:
- This device may not cause harmful interference and
- This device must accept any interference received, including interference that may cause undesired operation.

FCC Class B Notice (See the product datasheet specifications to determine whether this class applies)

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits provide reasonable protection against harmful interference in residential installation. This equipment generates uses and can radiate radio frequency energy and if not installed and used in accordance with the instruction, may cause harmful interference to radio communications. There is no guarantee that interference will not occur. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, users are encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.
- Any modifications made to these devices that are not approved by us, it may void the authority granted to the user by the FCC to operate this equipment.

- This device compiles the part 15 of the FCC rules. Operation is subject to the following two conditions:

  i. This device may not cause harmful interference, and
  ii. This device must accept any interference received, including interference that may cause undesired operation.

NOTE: This unit was tested with shielded cables. Using shielded cables, ensure that users maintain the appropriate EMC classification for the intended environment.

Appendix B

Zigbee Device List

The following table lists the Zigbee devices that have been tested and verified for compatibility with the PanL Smart Living (PSL) system. However, this is not an exhaustive list, many other Zigbee devices can also work with PSL, even if they are not included here.

Product Name	Product Link	Product Image	Specification
Aqara Door/Window Detection Sensor	https://www.aqara.com/en/product/door-and-window-sensor/		MCCGQ11LM
IKEA Zigbee Light	https://www.ikea.com/sg/en/p/tradfri-led-bulb-e27-1055-lumen-smart-wireless-dimmable-white-spectrum-globe-70489742/		TRÅDFRI LED bulb E27 1055
Aqara Occupancy sensor	https://www.aqara.com/en/product/human-motion-sensor/		RTCGQ11LM
iHORN Smoke Detector sensor	https://www.ihorn-tech.com/		LH-99 Series
Aqara Temperature Sensor	https://www.aqara.com/en/product/temperature-humidity-sensor/		WSDCGQ11LM
Aqara Light Bulb	https://www.aqara.com/en/product/smart-light-bulb/		ZNLDP12LM
Philips Hue Light Strip	https://www.philips-hue.com/en-us/products/smart-light-strips		Philips Hue Indoor/Outdoor Usage Indoor Special Feature color changing, adjustable, dimmable. Light Source Type LED Power Source Corded Electric Light Color White

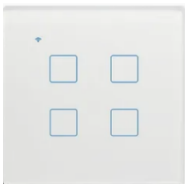
Hue OSRAm Lightify Strip	https://www.ledvance.com/en-int/professional-lighting/lighting-insights/product-stories/led-strip-system		LEDINT203
Aqara water leak sensor	https://www.aqara.com/en/product/water-sensor/		Water Leak Sensor - SJCGQ11LM
Metering Smart Plug	https://smartenit.com/product/smartplug/		5010Q ZBMPlug15
Philip Hue bulb	https://www.philips-hue.com/en-sg/products/smart-lightbulbs		806 Lumen, A60 9W 60mA
Aqara Occupancy sensor P1	https://www.aqara.com/en/product/motion-sensor-p1/		MS-S02
4 Gang switch	Smart Switch 4 Gang 1 Way ZigBee Capacitive Touch Switch		Smart Switch 4 Gang 1 Way ZigBee Capacitive Touch Switch
Aqara mini switch	https://www.aqara.com/en/product/wireless-mini-switch/		WXKG11LM
Zigbee Triac AC Dimmer	https://gledopto.com/h-nd-144.html		GLEDOPTO ZigBee 3.0 Triac AC Dimmer

Table 6 - Zigbee Device List

Revision History

Document Title : BRTSYS_AN_094 PSL User Guide - 1. System Installation
Document Reference No.: BRTSYS_000222
Clearance No. : BRTSYS#XXX
Product Page : https://brtsys.com/smart-living/
Document Feedback : Send Feedback

Revision	Changes	Date
Version 1.0	Initial release for PSL Version 4.1.0	15-09-2025
Version 2.0	Updated release as per PSL Version 4.2.0	02-02-2026