TP-Link Device SmartThings Interface

This document describes the operations of the TP-Link devices with the SmartThings Classic app interface. The Samsung Connect App interface is a simplified and limited version of the SmartThings Classic App. This is a single document for all supported devices. Separate installation instructions as well as Cloud Service Manager operating instructions are provided in other files.

Contents

1. Supported Devices, Device Handlers, and Functionality

All the TP-Link and Kasa bulbs, plugs, and switches are supported with the exception of the power strip (which has a different control interface). The table below identifies the explicit models supported. TP-Link is constantly changing product nomenclature as well as adding products to the line; therefore, your device may not be supported.

Devices (Category)	On/ Off	Bright -ness	Color Temp	Circadian	Color	Energy Monitor
HS100, HS103, HS105, HS200, HS210, KP100, HS107, HS300, KP200, KP400	**X**					
HS110, HS115	**X**					**X**
HS220	**X**	**X (level)**				
LB100, LB200, KB100, LB200	**X**	**X**				
LB110, KL110	**X**	**X**				
LB120, KL120	**X**	**X**	**X**	**X**		
LB130, LB230, KB130, KL130	**X**	**X**	**X**	**X**	**X**	
RE270, RE370	**X**	**Requires IFTTT for on/off commands.**				

Note: The Energy Monitor functions require the 'EM' versions of the Device Handlers.

Test Status. All device categories have undergone developer testing except the HS110, LB100, and LB110. For the LB100 and LB110, testing has been completed on both the LB120 and LB130, devices which use the same firmware. The developer has also tested the basic plug functions for the HS110.

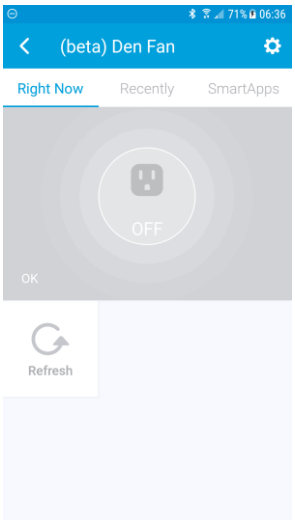
For other devices, users have provided feedback that the system functions acceptably.

State Machine. The application is designed as a state machine. In this implementation, setting the device through SmartThings will send a command through the Cloud or Hug to the device. The device then returns the state that is used by SmartThings to update the internal (displayed) state based. The only exception are the transition state of "Waiting" which is set internally when a command is sent.

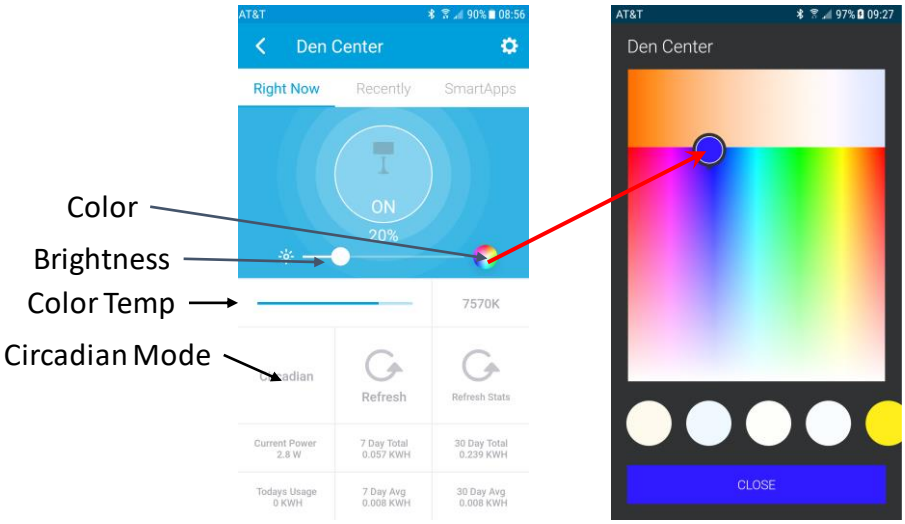
2. Functional Description

This section is in reference to the main screen for each device (accessed by depressing the device label (name) on the SmartThings application. Below are the main screen for the LB-30 with Energy Monitor and HS-Series. All others are derived from subtracting from this main screen of the LB130 with Energy Monitor.

TP-Link Device SmartThings Interface



HS-Series



LB30 with EM

(Note: energy monitor functions of bulbs no longer supported.)

Function: On/Off

Applicable: All.

Action: Touch the on-off button to toggle power.

Display states:

a. **ON. Color is blue.**
b. **WAITING** – SmartThings sent a command to the device and is waiting for the return state from the device. **Color is green**. Applies to all commands.
c. **OFF. Color is white.**
e **Comms Error** – There is an error in the bridge to device communications stream. **Color is orange**. Applies to all commands.

Notes (bulbs only):

1. Off. Turning bulb off when in circadian mode will also set the bulb to normal mode (this is a bulb function).
2. On. When turning on the bulb, it will turn on to the setting at the last off state. Exception: Circadian Mode. It will return the brightness and color temperature to the last setting made by Circadian Mode..

Function: Brightness

Applicable: All bulbs.

Action: Touch and slide the slider to change brightness.

Display: Displays the interger value of bulb brightness (0 - 100). This display scrolls with the Error Message display (discussed later).

Notes:

a. If the bulb is off, changing the brightness will turn on the bulb at the new brightness.
3. For the above, if the bulb is was color when turned-off, it will return to the previously selected color.
4. If you change the brightness to “0”, the bulb will go to the lowest possible brightness; however, the status will state brightness as “0”.
5. If the brightness is “0” and you turn on the bulb, the bulb will act as above.

Function: Color Temperature

Application: LB-120 and LB-130 bulbs.

Color Temperature Ranges:

a. LB-120: 2700 to 6500.
b. LB-130: 2500 to 9000.

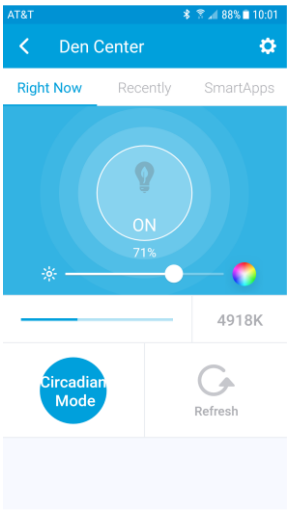
Action: Touch and slide the slider to change color temperature.

Display: Right of the slider is the Color Temperature value.

Notes:

1. If the bulb is off, changing the color temperature will turn on the bulb.
2. On the LB-130, the color temperature will appear as zero when a color has been selected.
3. On the LB-130, changing color temperature from zero will return the bulb to non-color at the selected color temperature.

Function: Circadian (and Normal)



Application: LB-120 and LB-130 bulbs.

Action: Touch the tile labeled “Circadian” to toggle to Circadian.

Notes:

1. Selecting Circadian will automatically turn the bulb on.
2. Circadian emulates outside light levels by controlling brightness and color temperature.

3. Turning the bulb off, changing level, or selecting a color will transition the bulb to Normal (this is a bulb function).

Function: Color

Application: LB-130 bulb.

Action: Touch the color wheel on the power tile. Then select the desired color either by touching the desired color on the color tile or selecting the preset color at the bottom of the page.

Notes:

1. If the bulb is turned off, the bulb will automatically turn on when selecting a color.
2. Selecting Circadian or changing the color temperature will return the bulb to non-color.

Function: Refresh

Applicable: All plugs, switches, and bulbs.

Action: Touch the Refresh button. This will update the state by sending a command to the device.

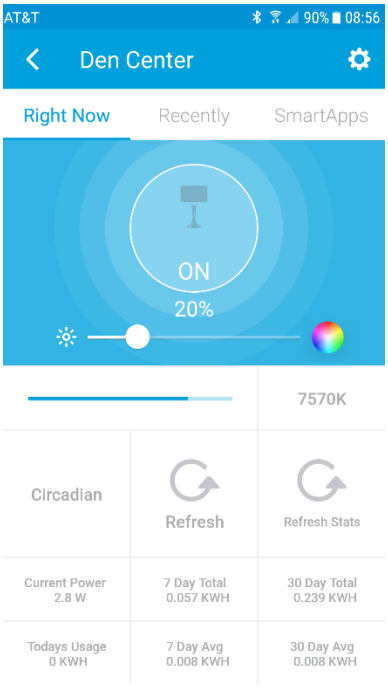
Use: Automatically run every 15 minutes. Occasional user use if the device state does not match the device state.

Function: Energy Monitor Display

Applicable: HS110, HS115

Energy monitor functions have been added to the relevant devices capable of Energy Monitor Functions. The following tiles are added:

a. Current power in watts.
b. Today's Usage in kilo watt-hours.
c. 7 Day Total
d. 7 Day Average
e. 30 Day Total
f. 30 Day Average
g. Refresh Stats

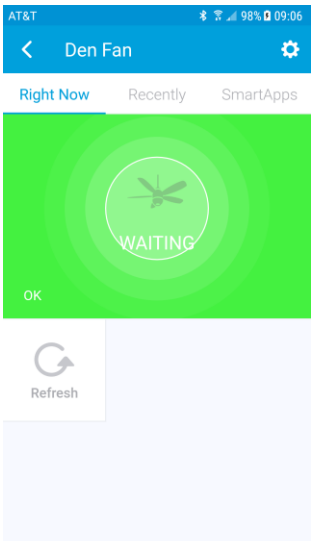


The Refresh function will refresh the bulb state as well as update the Current Power and Today's Usage tiles. Refresh is scheduled every 15 minutes and can also be activated manually.

The new Refresh Stats function will update the weekly and monthly stats. This is scheduled to run at 12:30 AM every day. It can also be manually updated.

3. ERROR INDICATIONS AND CORRECTIVE ACTIONS

Continuous Waiting State



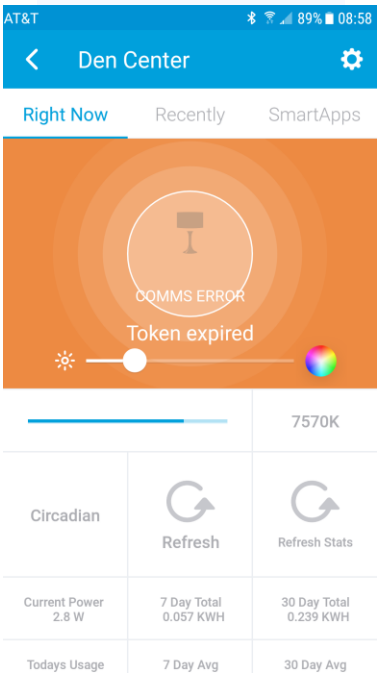
Applicable: All.

Indication: The ON/OFF tile is a steady green and the cue “WAITING”. This indicates that SmartThings attempted to send a command, but no response was received from the Service Manager or Hub

Corrective Action:

1. Press the ‘>’ at the top left then return to the device.
2. Press REFRESH on the device being controlled. If corrected, it is probably transitory.
3. HUB - Check the hub hardware and software status; including, the log file (looking for error conditions).

Communications Error



Applicable: Cloud versions only

Indication. The ON/OFF tile is a steady orange with the cue ‘COMMS ERROR”. Additionally, the message area contains a short-form of the error for the command.

Messages, Indications, and Corrective Actions:

a. ‘Device is offline’. The TP-Link Cloud can’t communicate with the device. There are three possible reasons:

   1) The device is physically turned-off. Turn it on.

   2) The device wifi is not properly linking. Turn it off then on.

   3) The TP-Link server has changed for the device. Run Add Devices from the Service Manager (this will automatically update the server address,

b. ‘Account is not binded to the device’. The TP-Link Cloud thinks the device is not in Remote Control. Use the Kasa app and assure the device is in ‘Remote Control’ mode (and not ‘Local Control Only’.

c. ‘Token expired’. The token that is captured by the Service Manager has expired and the Service Manager has not automatically updated.

The Service Manager automatically tries to detect and clear the 'Token expired' error every 5 minutes. Other errors will require user intervention. Below are all encountered errors and probable causes:

```
[error_code:-20104, msg:Parameter doesn't exist]
     Cause:     improper format of message
     Function:  Any.  Software Error

[error_code:-20571, msg:Device is offline]
     Causes:    device is turned off
                device not on local wifi
                appServerUrl has changed
     Function:  Device Handler commands

[error_code:-20580, msg:Account is not binded to the device]
     Cause:     device is 'local only'
     Function:  Device Handler commands

[error_code:-20600, msg:Account not found]
     Cause:     invalid username
     Functions: Service Manager Get Token
                Service Manager Initial Install

 [error_code:-20601, msg:Password incorrect]
     Cause:     invalid password
     Functions: Service Manager Get Token
                Service Manager Initial Install

 [error_code:-20615, msg:Password format error]
     Cause:     invalid password format
     Functions: Service Manager Get Token
                Service Manager Initial Install

[error_code:-20651, msg:Token expired]
     Cause:     incorrect (expired) token (will attempt auto correct)
     Functions: Service Manager Add Devices
                Device Handler commands
```

4. Token Update and Automatic Error Handling

The Service Manager has built-in token update and error handling methods.

Token Update. The Token is automatically updated once a week (Currently at 0430 local time). One month of experience indicates that the tokens last for at least a week. Max length is currently undetermined.

Automatic Error Handling. Every five minutes, checkError method is run that checks for a current error. If there is a current error, the method will try to correct the problem to the extent possible.

a. The getDevices method is run to query for devices. If this is successful, the value of the appServerUrl (the request address for commands from devices) is updated from the latest file. The method is then exited.

b. If the getDevices method returns an error, the getToken method is run to update the token, using the current username and password. If this is unsuccessful, the method will exit. If successful, then the getDevices method is run again to assure that appServerUrl is correct.

The checkError method keeps track of the number of consecutive failures. When that exceeds five times, the method will bypass the getToken method. The user will have to manually update the token through the Service Manager.

5. Refresh Rate and Updating Refresh Rate

Refresh is a multi-purpose function that will obtain and refresh the state of the device. This function is of value when the display does not display the known state. There are two actions that cause refresh to occur:

a. The user presses the “Refresh” tile. This is useful if the state does not match expectations or if someone has recently used the Kasa App to control a device.

b. Automatic Refresh. This refresh is periodically done. Historically, this is accomplished every 15 minutes to assure the device is still present and to update the IP address (in case it has changed). However, since the TP-Link cloud does this maintenance, this program uses a default of every 30 minutes.

Changing the default Refresh rate is easy. If you want other than 30 minute period, go to the details page for the device and selecting the setting icon (upper right-hand corner). Then tap the text “Select Refresh Rate” in the Refresh Rate area. This will pop-up a screen with the available refresh rates. Select your desired rate.