



HCA Tech Note 615

Shelly WiFi devices with HCA MQTT Support (Updated 11-Jan-2022)

First a few remarks....

The Shelly package available in the online library is the Shelly “Basic” Package. This supports the 1-channel and 4-channel relays. You can receive asynchronous reports from the 1-channel relay by using the HTTP method outlined below. This lets you get messages when, for example, a switch/button attached to the device is activated and/or the relay goes on or off.

In case you are having trouble with my use of the term “asynchronous message” I will explain: That is a message that is produced by the device that is not caused by HCA doing something like requesting status. This is a message that the device itself sends prompted by whatever mechanism it has and HCA received. Those messages are used to report state changes and actions.

As you will read below there is a second method of getting asynchronous messages from these devices and that is called MQTT. This is a standard that will be used (maybe) by other IoT device types to send messages. All you need to know about this is that the 4-channel relay, and other Shelly devices, use MQTT to report stuff that may be nice to know beyond just state (is the relay on or off). Things like power consumption figures. In addition, the 4-channel relay uses only MQTT to report attached switch/button (if one is attached) actions.

*To make this work, HCA needs to understand MQTT messages and **that is no small task**.*

In addition to the Shelly “Basic” package, an “extended” package is available and is also described in this note. The extended Shelly package It is not free to download from the library. Included in the cost of the extended package are all updates made to it over time. In addition, purchase of the extended package gets you a commitment to add additional Shelly device support if requested and it can be done. There is no guarantee all device types will be supported in cases where adding support would require more than HCA can do.

For information on cost and how to purchase the extended package send an email to HCA Support.

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HCA Tech Note 615

This note describes the support for Shelly WiFi devices. Not all device types are supported at this time.

Step 1.

Use the instructions that come with the device to install it into your environment. You can use the Shelly app or its built-in web server. This note shows using the webserver and not the app to adjust necessary settings. But both would work.

Once installed, it is necessary to make sure that the device IP address doesn't change over time as HCA stores that address as part of the device configuration. Use whatever means are available for that - IP Reservations, Reserved IP address – in your router.

Step 2.

Import the Shelly package into your HCA design from the online library.

Step 3.

Create a new device of type “Shelly Relay”, “Shelly Multi Relay”, “Shelly Light”, or “Shelly Sensor”. When completed, open the properties of the device and on the “User Class Object” tab, enter the IP address of the device. For example:

Outside - Gate Properties

Name	Notes	Room	Type	User Class Object	P
This device is controlled by a User Implemented Class. T If needed, examine the class implementation to see what th					
ID of this device:				<input type="text" value="192.168.0.95"/>	

If you are using a multi-channel relay module, then suffix the ID with a **colon** followed by the relay number. For example, if you are using the 4-channel relay module with IP address 192.168.0.45, create 4 HCA devices and in the class id use 192:168.0.45:1 for the first relay, 192.168.0.45:2 for the second, 192.168.0.45:3 for the third, and 192.168.0.45:4 for the fourth.

Make sure you use a colon and not a dot before the relay number. Many users have made this error!

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HCA Tech Note 615

Step 4.

If the device controls a load, test the device by a right-click on the device name in the HCA left pane or on the icon in the right pane and select ON and OFF from the popup menu. The load controlled by the device should go on and off. If you are close to the device you should hear the relay click. If it doesn't go on and off, then check the IP address.

A few words about using MQTT and/or the HTTP method to receive asynchronous reports

The following steps are only needed if you want to handle actions sent from the devices. Some devices support an attached button/switch and you can receive messages if it is activated. If this isn't important – you will control the devices on and off only from HCA – you don't need this.

MQTT also gives you asynchronous reports providing additional information – depending upon the device – that may be useful. Some devices report status, power usage, or temperature and those reports arrive via MQTT and not via a Get-Status operation.

HCA supports the older method of asynchronous reports via HTTP messages and supports devices that report via MQTT messages. Some devices only have HTTP support, others only MQTT support, and others have both.

If your installation use as a mix of device types, some with MQTT support and others with only HTTP support you can configure both in HCA as it can simultaneously support both.

Step 5 for devices that report via **HTTP**

In HCA create a new interface of type "Generic Server". Name that interface "Shelly HTTP" and make sure its properties are configured like this:



HCA Tech Note 615

Configuration for: Shelly HTTP (Port:8082) ✕

A name is needed when referencing this generic IP Server in programs that use it.

Name:

Connection

IP Port:

Clients connect using WebSocket Protocol

Logging

Log receptions from this interface

Log sends to this interface

Data

Data is binary

Data is text

What character(s) delimit each message SENT TO this interface?

What character(s) delimit each message RECEIVED FROM this interface?

You can use any port number you want just make note of your choice. Make sure that data is specified as “text” and that the delimiters are both set to “None”.

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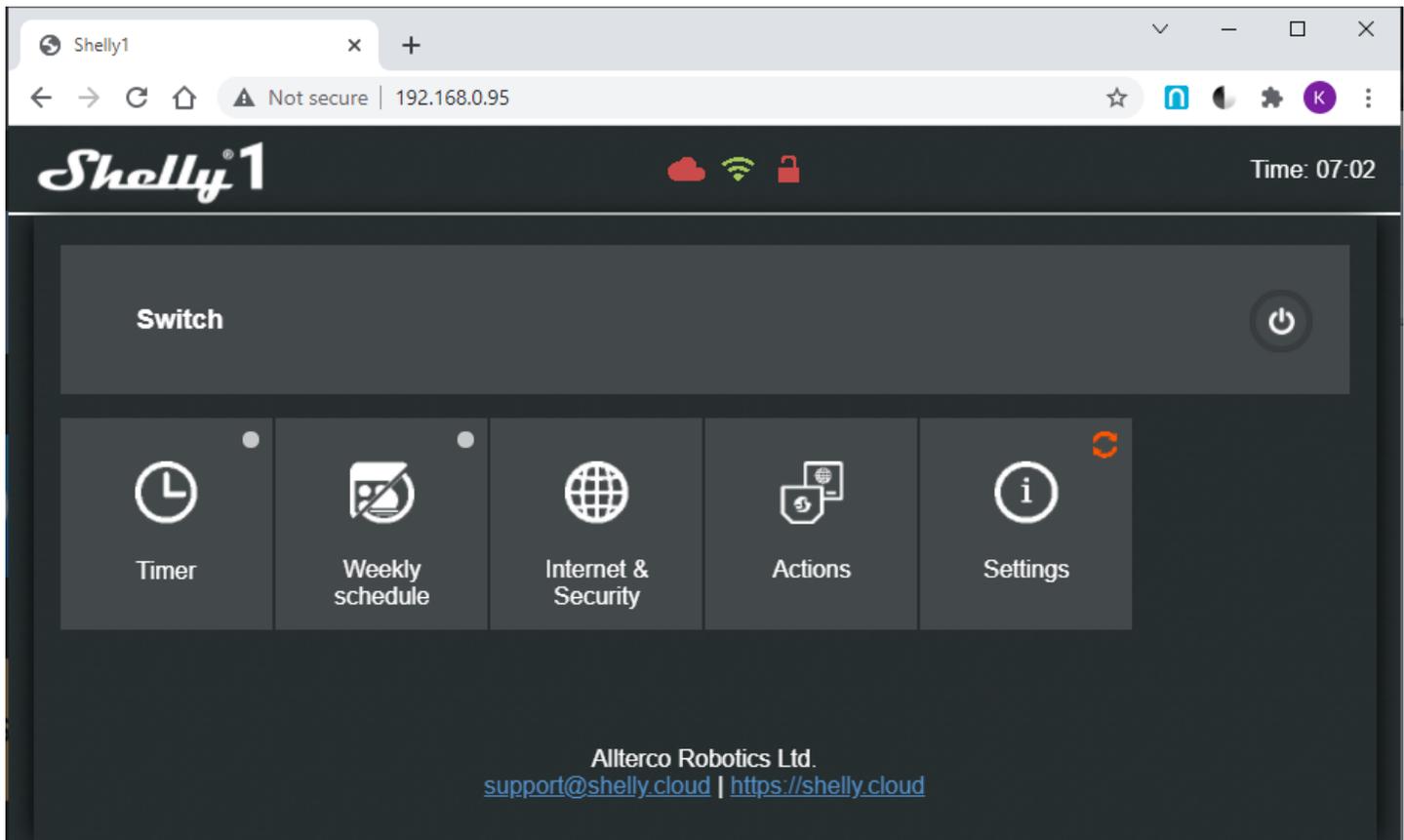
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HCA Tech Note 615

Step 6 for device reports via HTTP

The next step configures the Shelly device. Open a browser and enter the IP address of the device in the address bar. This could be in a section called *Action*. If you don't see this section then the device probably only has MQTT support.



Open the *Actions* section and edit the URL for each button action you want HCA to be notified for.

The Shelly UI has some quirks. Make sure you both tick the “Enabled” box and enter the URL before saving. If you don't tick the *enabled* box and only enter a URL, it will not get saved. Also, don't forget to press the “Save” button.

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HCA Tech Note 615

The screenshot shows a configuration window titled "BUTTON LONG PRESSED URL". It has a dark background with white text. At the top left is a small icon of a house with a gear. Below the title, there is a checked checkbox labeled "Enabled". Underneath is the label "Url to be hit when the button is held down" followed by a text input field containing the URL "http://192.168.0.144:8082/HCA?action=buttonLong". At the bottom left is another checked checkbox, and at the bottom right is a button labeled "SAVE".

For actions, the URL should be of the form:

`http://<ip address of the HCA computer>:<port #>/HCA?action=<action>`

For the 1-button relay with the optional button, the actions are buttonLong, buttonShort, buttonOn, buttonOff, relayOn, relayOff

This is all documented in the Shelly package program "Receive HTTP message" in the program notes. For other devices types you can use whatever actions names you want. See more below for working with Sensors.

NOTE: Make sure that you use a colon and not a dot before the port number when creating this configuration. Many users have made this mistake.

Step 5 for devices with **MQTT** Support:

In HCA create a new interface of type "Generic Server". Name that interface "Shelly MQTT" and make sure its properties are configured like this:

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HCA Tech Note 615

Configuration for: Shelly MQTT (Port:1883) ✕

A name is needed when referencing this generic IP Server in programs that use it.

Name:

Connection

IP Port:

Clients connect using WebSocket Protocol

Logging

Log receptions from this interface

Log sends to this interface

Data

Data is binary

Data is text

Binary reception type:

Binary send formatted same as reception type

The port must be configured as 1883, data is binary, and the binary type is “MQTT Packet”. Do not tick the final checkbox in the configuration dialog.

Note that the “MQTT Packet” is only available in 17.0.41 or later HCA

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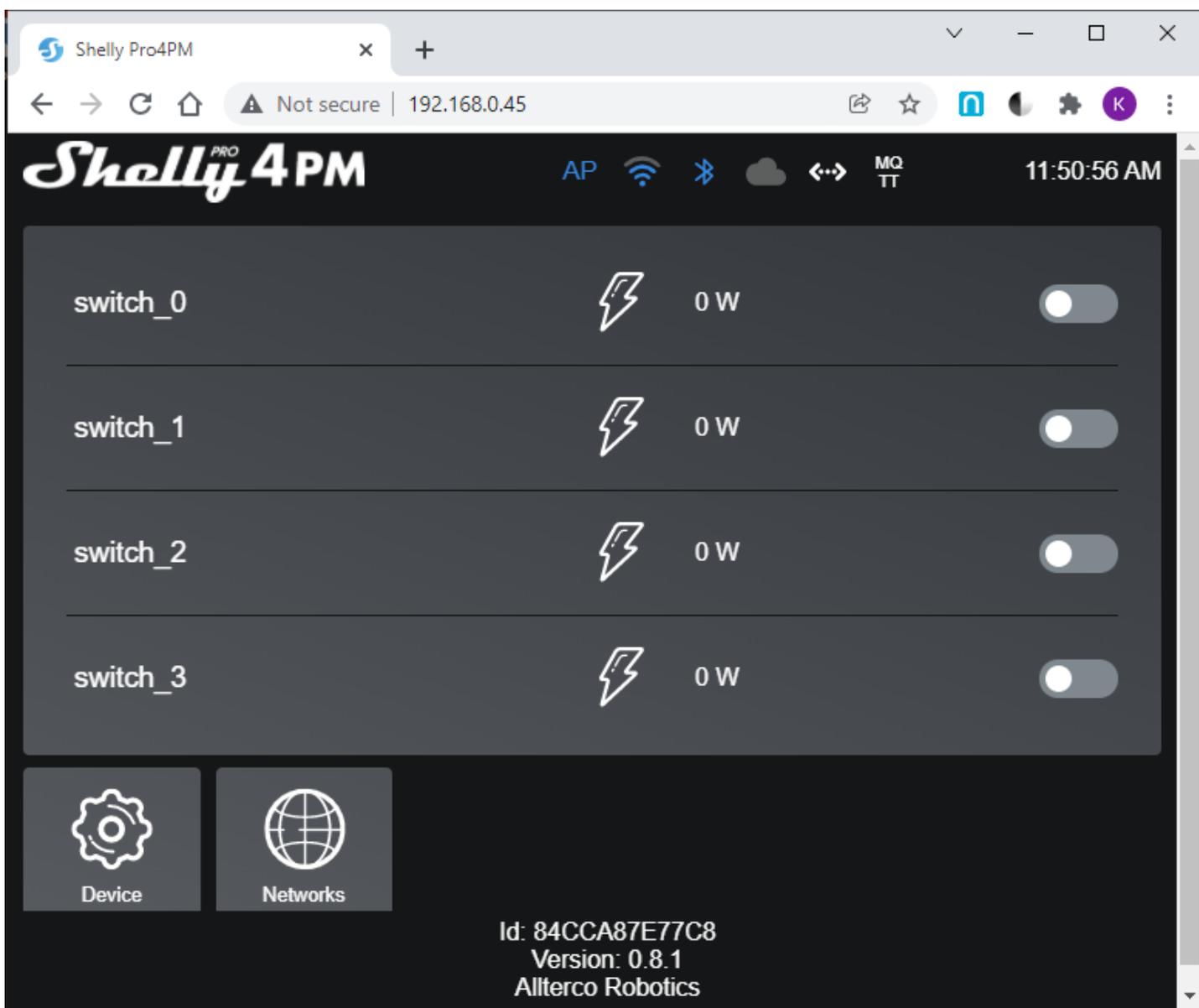
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HCA Tech Note 615

Step 6 for devices with MQTT support

Someplace there will be a section to enable/disable MQTT. The image below is from the 4-channel relay module, but other device types could appear differently. In this device type the *Networks* section contains the MQTT setting.



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HCA Tech Note 615

Mqtt

Disconnected

Enable:

Configure the [Shelly](#) device to execute actions via MQTT.

WARNING: Changing these settings requires a device reboot!

Connection type:

MQTT

MQTT prefix

RPC status notifications over MQTT:

Generic status update over MQTT:

192.168.0.145:1883

username

password

Apply

Enable both MQTT sliders, the connection type is MQTT, leave “prefix” blank, and use the IP address of the computer running the HCA Server followed by a **colon** and then “1883”. The username and password should be left blank.

Remember that other device types could look different!

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HCA Tech Note 615

Step 7.

Once MQTT support is enabled in the device and you have configured the “Shelly MQTT” interface in HCA, that’s all you need do. When MQTT messages arrive, they will be examined by programs in the Shelly package and any useful data relating to state or other device properties will be extracted and saved as tags on the device. You can create Tag-Change triggers and use the ObjectTag functions in expressions to programmatically access that data.

If you want to create a program that is started when an attached button/switch attached to the device is activated, then you need to configure tags on the device to say which program to start

Open the properties of the Shelly device with the attached button/switch. If this is a multi-channel device open the properties of the device for that channel that has the attached switch. On the “Tags” tab enter a tag called “ShellyAction” like this:

Tag Name	Current Value
ShellyAction	true,Home-Switch on, false, Home-Switch off 
LastAction	true at 1/5/2022 10:05:34 AM
Voltage	123.969
apower	0.000
aenergy_total	0.000
temperatureC	null
temperatureF	null

The ShellyAction tag value is a comma separated list like this: <action name>,<program to start>,...

The actions are “true” and “false”. When the switch is closed the program associated with “true” is started. When the switch is opened the program associated with “false” is started.

In the above example configuration, when an action “true” is received, the program “Home – Switch on” is started. If an action “false” is received, the program “Home – Switch off” is started. The started program is supplied with two value parameters: The first is the name of the device sending the action and the second parameter is the action. In this way one program could handle multiple actions from multiple devices if desired.



HCA Tech Note 615

Number of parameters:

	Type	Default for value parameter if not supplied by calling program
Parameter 1: <input type="text" value="Device"/> <small>What HCA Device</small>	Value <input type="text" value="v"/>	<input type="text"/>
Parameter 2: <input type="text" value="Action"/> <small>What action</small>	Value <input type="text" value="v"/>	<input type="text"/>

Note also in the images of the Tags tab that other values are populated. This device – the Shelly 4-channel relay – provides temperature and power usages and HCA has captured them from the MQTT messages.

Handling Sensors

The Shelly Sensor class implements a Get-Status operation. This allows the device to be polled and results decoded. To determine what elements of the status result you want to capture, tags are added to the sensor device. For example, this humidity sensor is configured to capture 2 items of state from the get-status report.

Tag Name	Current Value
ShellyStatus1	state,humidity_sensor,sensor_state
ShellyStatus2	humidity,humidity,percent

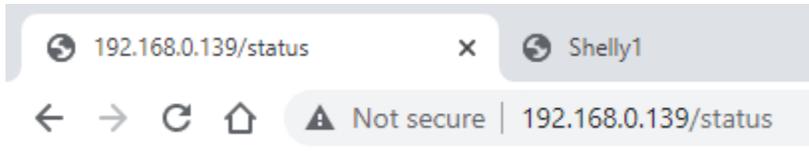
Each data item you want to capture is given as a tag name ShellyStatus#. The tag value is structured as the name of the tag to hold the data and the JSON path to that data.

In this example there are two pieces of information to be captured. The first will be called the “state” and the second will be called the “humidity”. The JSON path to the first item is “humidity_sensor, sensor_state”. The path to the second item is “humidity, percent”.

To determine the path to an item, start a browser and in the address bar enter the IP address of the device followed by /Status. Copy the returned JSON and paste into a JSON viewer.



HCA Tech Note 615



I use this JSON viewer: <http://json.parser.online.fr/>

```
{
  "wifi_sta": {},
  "cloud": {},
  "mqtt": {},
  "time": "06:39",
  "unixtime": 1636353587,
  "serial": 1,
  "has_update": true,
  "mac": "10521C47C1F6",
  "humidity_sensor": {
    "sensor_state": "normal",
    "self_test_state": "not_completed",
    "alarm_state": "none"
  },
  "humidity": {
    "percent": 67,
    "is_valid": true
  },
  "update": {},
  "ram_total": 50608,
  "ram_free": 39916,
  "fs_size": 233681,
  "fs_free": 135289,
  "uptime": 230579
}
```

From this the path to the items to be captured is easily determined. When the device is polled for status, those configured items are decoded from the reply and saved as tag values, named as you specified, in the device.

NOTE: At this time (10-Jan-21) MQTT reports from sensor devices are not yet implemented.

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HCA Tech Note 615

A few additional notes

Shelly Duo Lightbulb

The Shelly Duo lightbulb is supported by the class ShellyLight.

While HCA knows how to command the light on, off, and dim, selection of color temperature is not built-in. The helper program called “Shelly Light Set White Temp” is in the package to control that. It needs to be started by the Start-Program element supplying the device name and color temperature desired.

 This element starts another program and waits until it finishes before continuing the current program unless the "don't wait" option enabled.

Start this program:

Don't wait for this program to complete before continuing to the next element

Delay program start for: hours minutes seconds

Arguments

DeviceName	<input type="text" value="Home-Duo"/> <small>HCA Device name</small>
ColorTemp	<input type="text" value="5000"/> <small>Number for color temperature (2700-6500)</small>
WhiteLevel	<input type="text" value="100"/> <small>[Optional] White Level (0-100). Don't use for color capable bulbs</small>



HCA Tech Note 615

Shelly Color Bulbs

The Shelly Color lightbulb is supported by the class ShellyLight.

While HCA knows how to command the light on, off, and dim, changing color settings are not built-in. The helper program called “Shelly Light Set RGB” is in the package to control that. It needs to be started by the Start-Program element supplying the device name and color desired.

 This element starts another program and waits until it finishes before continuing the current program unless the "don't wait" option enabled.

Start this program:

Don't wait for this program to complete before continuing to the next element

Delay program start for: hours minutes seconds

Arguments

DeviceName	<input type="text" value="Home-Color Light"/>
	<small>HCA Device name</small>
Red	<input type="text" value="250"/>
	<small>Red</small>
Green	<input type="text" value="128"/>
	<small>Green</small>
Blue	<input type="text" value="114"/>
	<small>Blue</small>
WhiteBrightness	<input type="text"/>
	<small>[Optional] White Brightness</small>
Gain	<input type="text"/>
	<small>[Optional] Gain for all channels</small>

This sets the bulb color to a nice Salmon color.

Shelly 1 channel relay

If you are using an attached button/switch with the Shelly 1, and you want HCA to start a program when the button/switch is activated you should use the HTTP method as explained above even if you also enable MQTT. The reason for this is that every MQTT message provides the state of the attached button/switch and not just

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HCA Tech Note 615

when the button/switch is activated. The 4-channel relay device does this differently and the MQTT reports with the state of the button/switch arrive only when the button/switch is activated.

Startup state

Once MQTT reports are enabled, the Shelly devices seem to periodically report their state. This means that if HCA terminates – perhaps due to a Windows restart – after HCA restarts then over time it will acquire the current state of each Shelly device without needing to poll the devices for status.

##end##