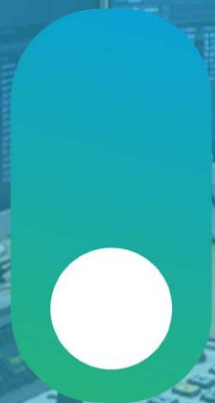




**TRIPLE AUDIO**  
Engineering & Broadcast



**Smart  
Control**  
Broadcast connected.

**Manual**

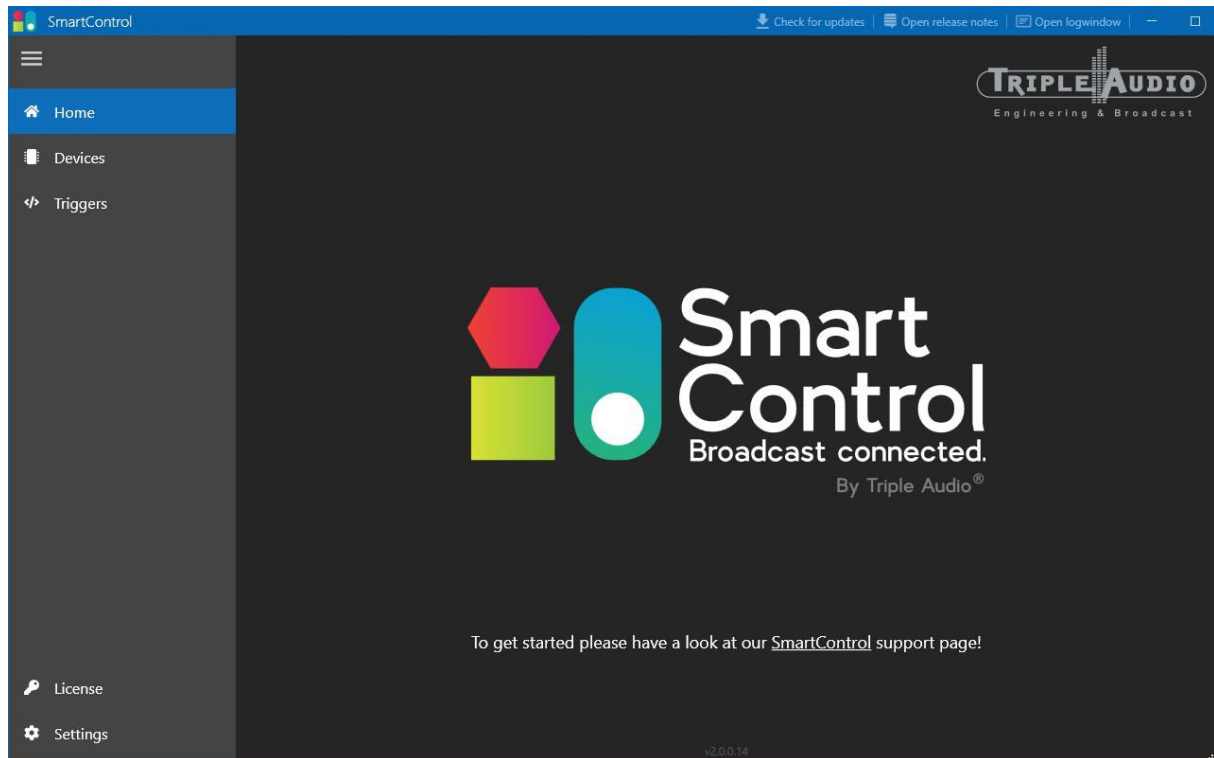
V2.1

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# Introduction



SmartControl is the connecting factor between the growing diversity in control protocols. In a world where we want to connect more and more, the need for smart connections is growing. SmartControl offers this in a simple way.

SmartControl is an application that runs on a server in the network and actively handles the various protocols so that real-time events can be generated.

The connection between parameters from different, or the same, control protocols are configured in triggers based on the "If This Than That" principle.

The basic license offers the possibility of having five triggers active. Extension is possible with an upgrade license.

## Supported protocols

- Livewire Routing Protocol (LWRP)
- Philips HUE basic & entertainment
- DHD Global logics
- Triple Audio SmartLed
- Livewire Control Protocol (LWCP)\*
- Ember+\*
- DMX (Artnet)\*
- OSC\*
- Blackmagic Router Control Protocol\*
- Triple Audio Chronoflex\*
- REST API\*

\* Coming soon. Want to know more? Get in touch with us.

# Install

## Download

You can download SmartControl from the Triple Audio website. Or you can download the software directly from:

[https://share.tripleaudio.nl/software/SmartControl\\_Latest/SmartControl.application](https://share.tripleaudio.nl/software/SmartControl_Latest/SmartControl.application)

The browser you open the link with asks if you want to open the installer directly, confirm this. It may be that Windows gives a message that the publisher of the software is not recognised. To install SmartControl anyway, click on "More info" in that window and then on the "Run anyway" button at the bottom.

If the system is supplied by Triple Audio, you will not get this message and SmartControl will be installed automatically.

## Activate license or demo use

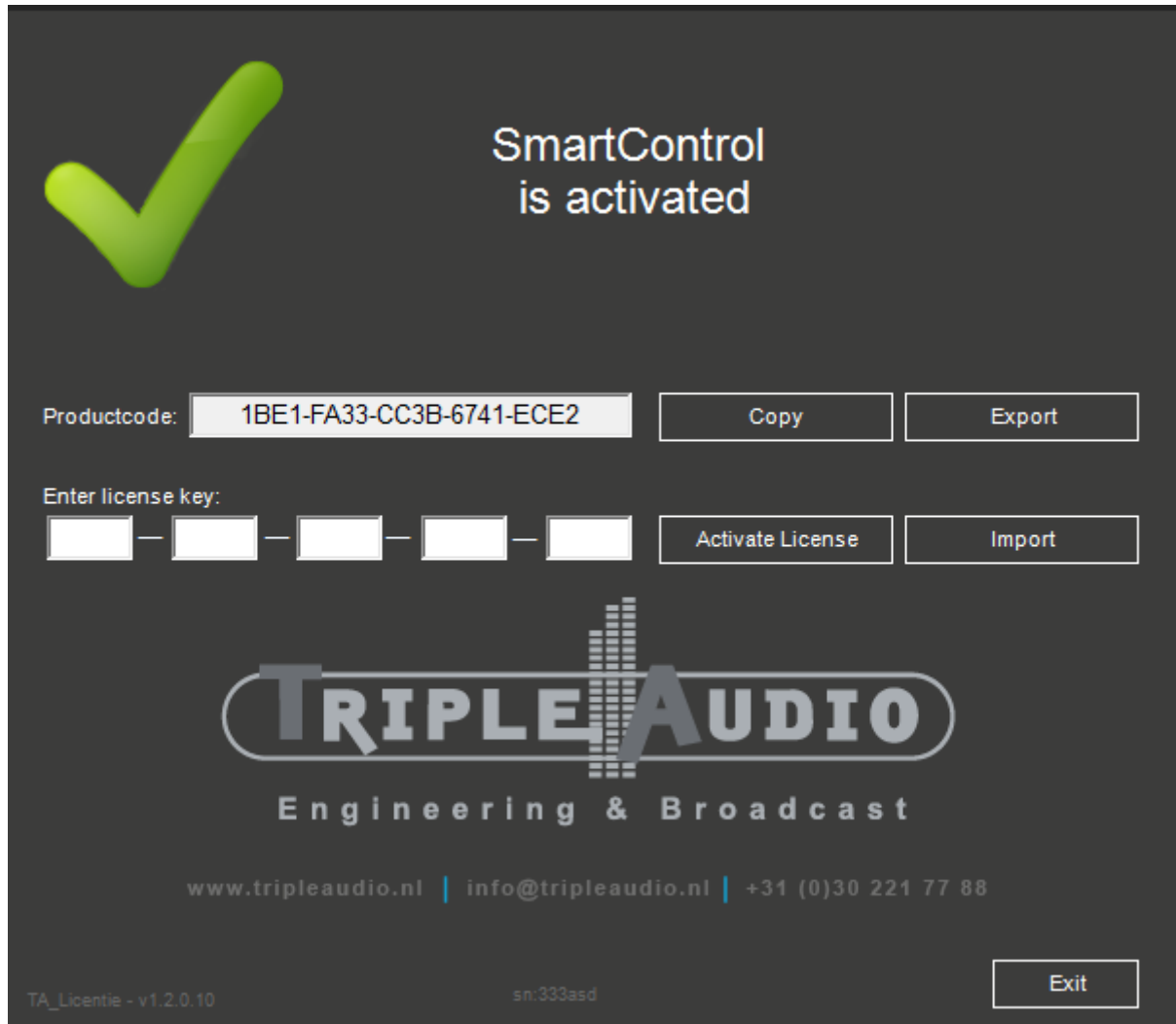
After installation, SmartControl starts up immediately. You will then see the following window.



## Activate

If you have a license for SmartControl, you must first activate it. This activation is bound to the computer. Triple Audio can generate a valid license key with the product code from the activation window.

Send the product code to your contact at Triple Audio. They will send you a license code which you can enter in the activation window. Then click on "Activate License". A window will open asking for a serial number. This serial number will be sent by your contact person. Then click on "Okay" and you will see that SmartControl is activated.

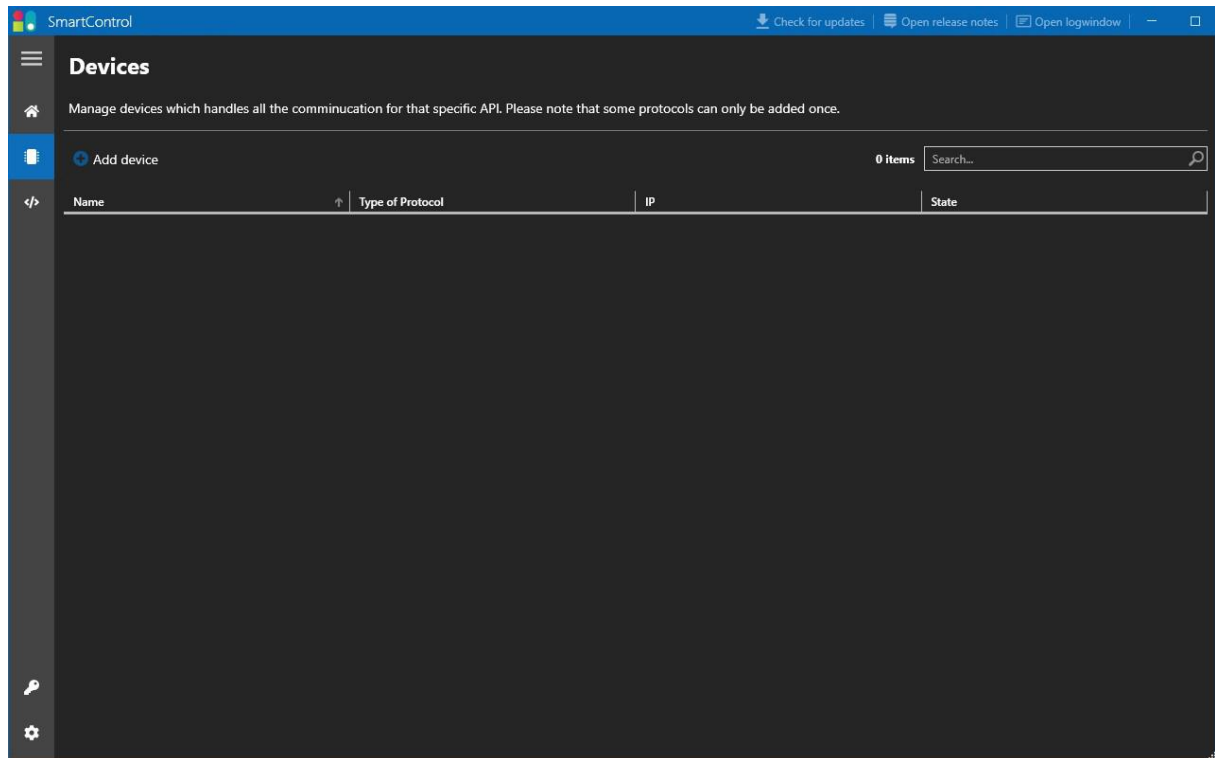


If you click on continue, SmartControl will be started. This window will only appear the first time you start SmartControl. After an update, it is not necessary to activate the license again.

## Demo use

You can also use SmartControl temporarily as a demo. When you click on "Exit" in the activation window, SmartControl will start up in demo mode. You will see a message about this in SmartControl. In demo mode, SmartControl will shut down after 120 minutes. You will still be able to use all the functions.

# Devices



First of all, it is necessary to specify a device. The following types of devices are supported by SmartControl.

- [Livewire Routing Protocol](#)
- [Livewire Multicast GPIO](#)
- [DHD Global Logic](#)
- [Phillips Hue](#)
- [Smartled](#)

Click on the "Add device" button to add a device. In the next window, select a protocol and click on next. How to configure each protocol is explained below. Please note that some protocols can only be added once.



# Livewire Routing Protocol

The Livewire Routing Protocol is supported by a wide range of [Telos Alliance](#) devices. For example an Axia xNode, Axia IQ, Axia Quasar and many more. Once you have selected this protocol, SmartControl logs into the device and listens for changes on the GPIO ports of that specific device. Which ports these are, is set in the trigger itself. This will be explained later in this manual.

See also: [Livewire GPIO](#) for more information.

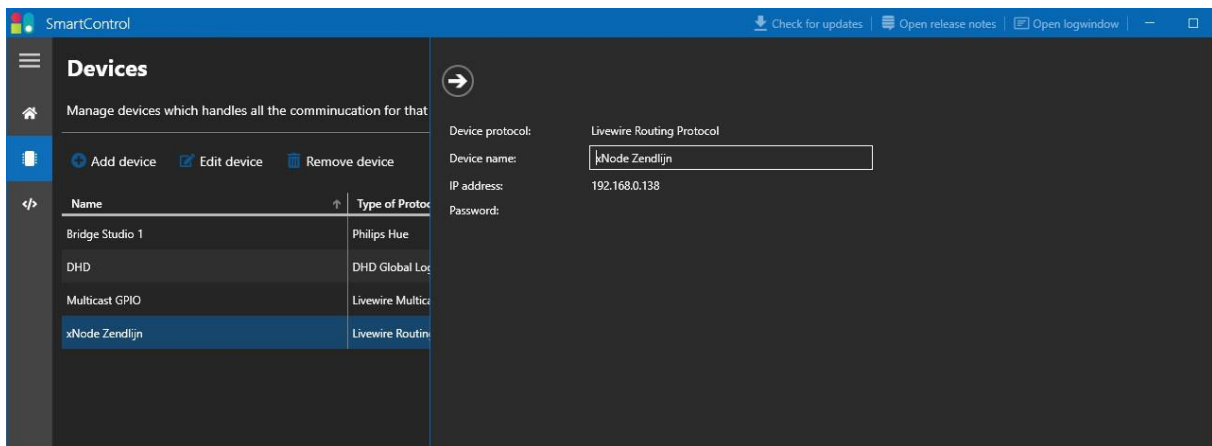
Fields:

- **Device Name:** Enter a simple name here. Useful for keeping multiple devices apart.
- **IP Address:** Enter the IP address of the device you wish to reach.
- **Password:** By default, devices have not entered the password. If you have changed this, enter the password here.



The screenshot shows a configuration window titled "Livewire Routing Protocol". At the top, there are four tabs: "Livewire Multicast", "Livewire Multicast GPIO", "192.168.0.138", and "Disconnected". The main area contains three input fields: "Device name:" with the value "Axia xNode Studio 1", "IP address:" with the value "192 . 168 . 0 . 138", and "Password:" with the value "Password". At the bottom right, there are two buttons: "Next" and "Cancel".

After clicking "Next", the device will be initialised and added to the list. Double-click the device in the list to open its settings. You can change its name in this way.



The screenshot shows the SmartControl interface. On the left, there is a "Devices" panel with a list of devices. The "xNode Zendlijn" device is selected. On the right, the configuration for this device is shown. The "Device protocol" is "Livewire Routing Protocol". The "Device name" is "xNode Zendlijn". The "IP address" is "192.168.0.138". The "Password" field is empty.

Name	Type of Protocol
Bridge Studio 1	Philips Hue
DHD	DHD Global Log
Multicast GPIO	Livewire Multicast
xNode Zendlijn	Livewire Routing Protocol

If you want to change the IP address, for example, you must remove the device and add it again. Note that the devices will also be removed from the triggers where you have used the device. You will have to reassign them in your trigger.



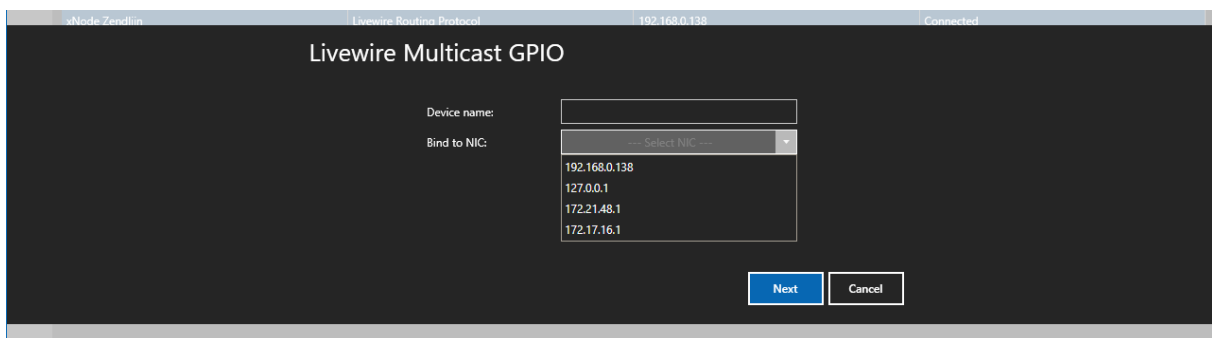
# Livewire Multicast GPIO

Livewire Multicast GPIO works slightly differently to the Livewire Routing Protocol. With this protocol GPIO commands are listened to on a selected network. This means that you do not need to create a separate device for each device. You can choose which Livewire channel you want to listen to per trigger. This will be explained later in this manual under Triggers. You can only create one device for the Livewire Multicast GPIO protocol.

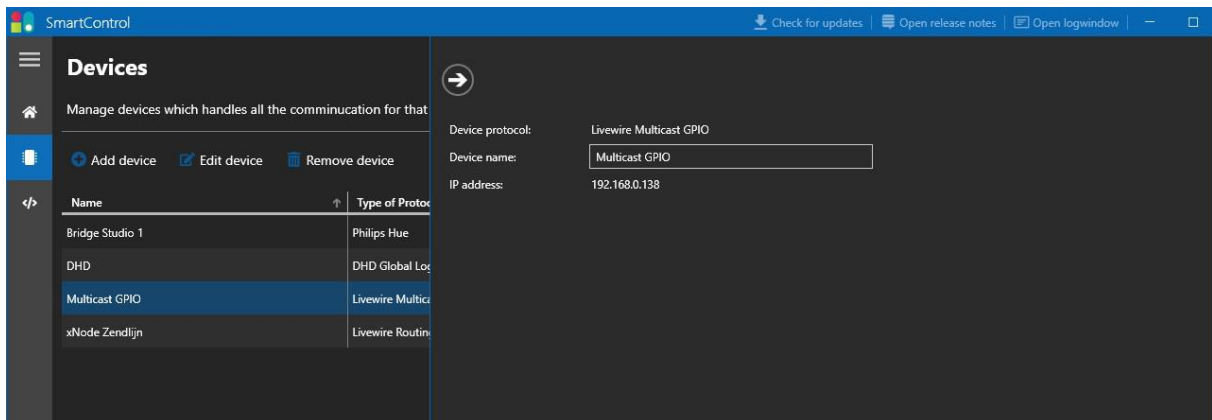
See also: [Livewire GPIO](#) for more information.

Fields:

- **Device Name:** Enter a simple name here. Useful for keeping multiple devices apart.
- **Network Interface:** This drop-down displays all the network interfaces of the computer running SmartControl. Select the IP of the network interface on which Livewire Multicast GPIO is available.



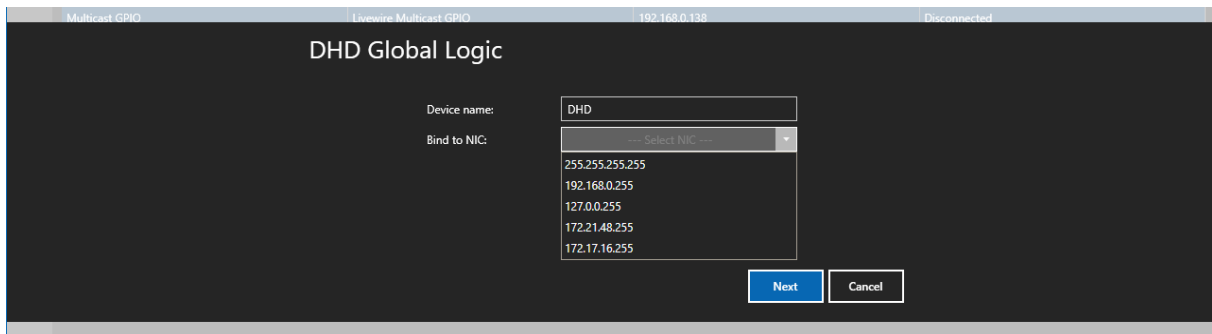
After clicking "Next", the device will be initialised and added to the list. Double-click the device in the list to open its settings. You can change its name in this way.



If you want to make a change to the "Bind to NIC" setting, for example, you must remove the device and add it again. Please note that the devices will also be removed from the triggers where you used them. You will have to reassign them in your trigger.

# DHD Global Logic

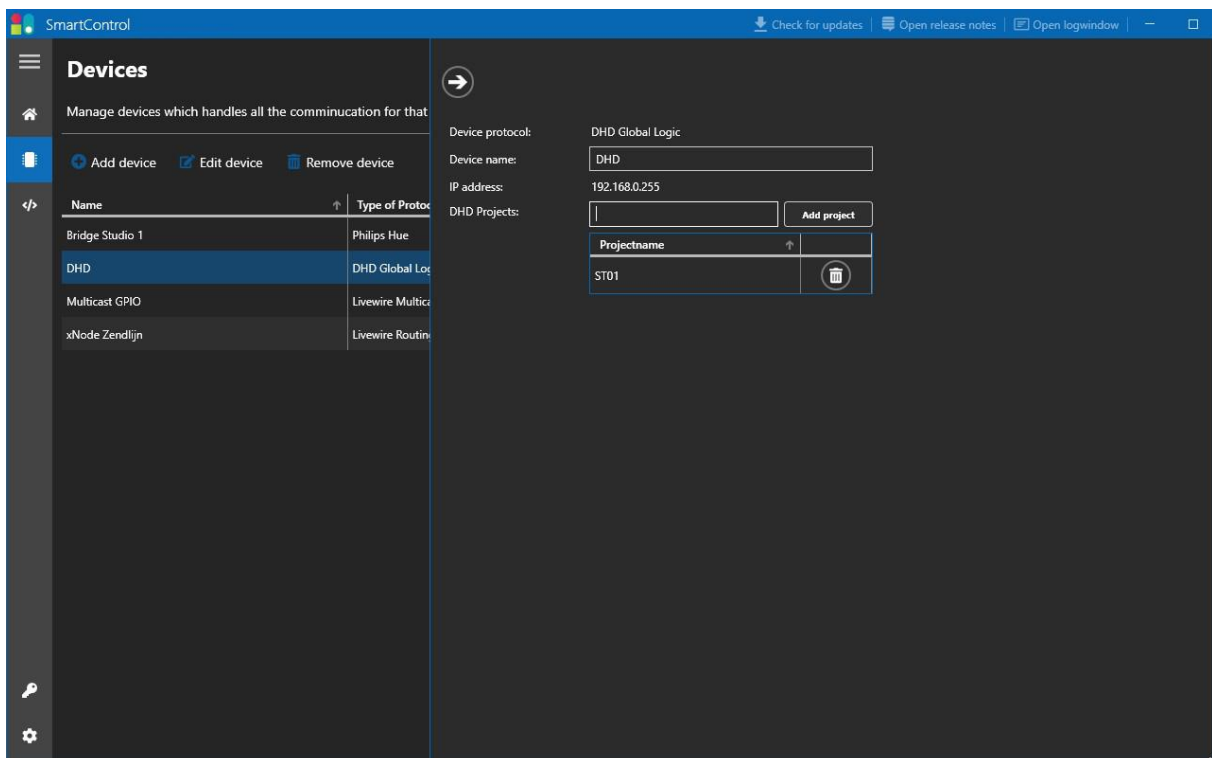
This protocol is supported by a wide selection of DHD products. You can only create one device for the DHD Global Logic protocol.



Fields:

- **Device Name:** Enter a simple name here. Useful for keeping multiple devices apart
- **Bind to NIC:** This drop-down lists all network interfaces of the computer the SmartControl is running on. Choose 255.255.255.255 to listen to all interfaces of the computer on which SmartControl is running.

After clicking "Next", the device will be initialised and added to the list. Double-click the device in the overview to open its settings. This way, you can change the name and add DHD Projects to use as a trigger.



If you want to change the IP address, for example, you must remove the device and add it again. Note that the devices are also removed from the triggers where you have used the device. You will have to reassign them in your trigger.

# Phillips Hue

With SmartControl it is possible to control Phillips Hue lamps. SmartControl can do this in several ways, via the standard protocol or via the Entertainment protocol. The standard protocol works in a conventional way that is good to use in the home environment, where lamps only change colour once in a while. With version 2 of the Hue Bridge, Philips has introduced the Entertainment protocol. With this it is possible to have lamps change colour 25 times per second. A lot faster than with the standard protocol. It is therefore advisable to control lamps via the Entertainment protocol.

If you want to know more about it, read [this article](#).

To ensure that SmartControl can control the lamps, it is first necessary to connect the Hue lamps to the Hue Bridge and set them up. This is easy and quick via the Hue app. You can download the app in the app store of your phone. For more information, visit the [support website of Philips](#).

## Setting bulbs in the Hue app

Make sure the Hue Bridge is connected to the same network as the computer running SmartControl. It is important that the network has a DHCP server which can assign an IP address to the Hue Bridge. Since you need to use your phone to set up the Hue Bridge, it's necessary that the network is reachable via WiFi.

The Hue App is fairly self-explanatory. The steps you need to take are:

- Connecting the Hue Bridge.
- Add lamps.
- Create a room(group) and add the lamps.
- *Optional:* Add your lamps to an Entertainment group and Entertainment room.

You connect the lamps to the Hue Bridge and the settings of a lamp are stored there. So you use the Hue App once to set the lamps or add lamps. After that, the app and WiFi connection are no longer needed.

## Hue Bridge IP Address

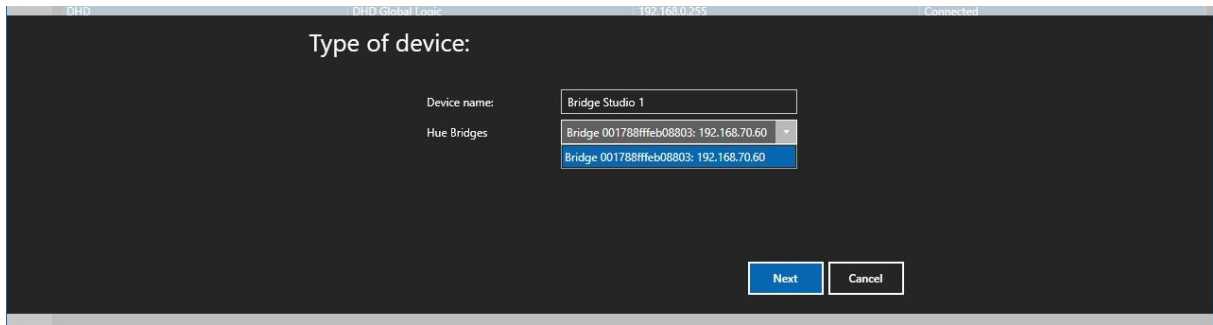
If the network to which the Hue Bridge and SmartControl is connected has no internet, it is important to remember the IP-Address of the Hue Bridge. You can find this in the app under: Settings > Hue Bridges > And then click on the added Bridge in the list. The IP-Address can be found at the bottom.

If you want to give the Bridge a fixed IP-Address, you can do so via the Hue app. Go to Settings > Bridge Settings > Network Settings. Then uncheck the DHCP button and fill in your details.

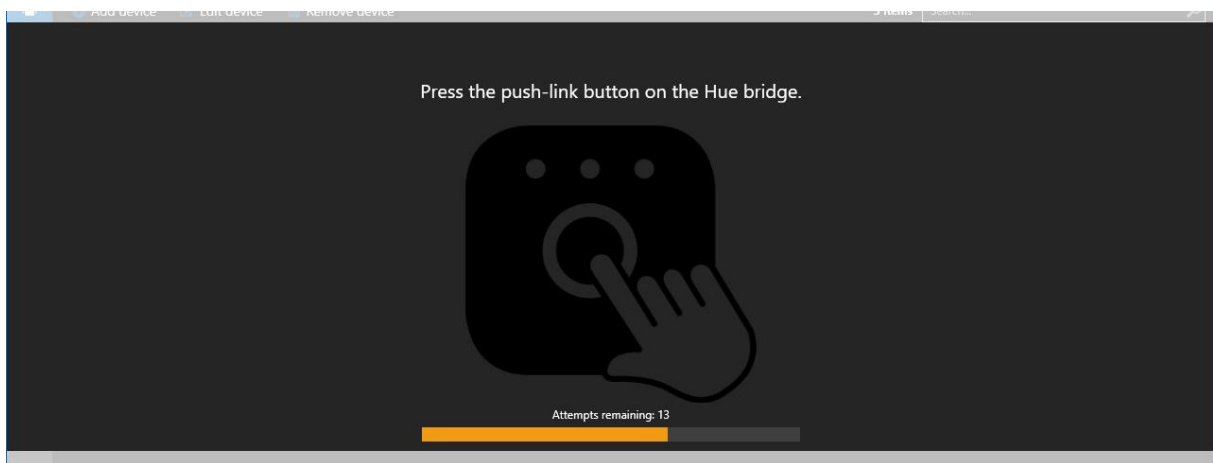
## Hue Bridge Pairing

The Hue Bridge must be connected to SmartControl in order to function. To do this, it is necessary for SmartControl and the Hue Bridge to have access to the same network.

Click on "Add device", select "Phillips Hue" and click on "Next". The network is searched for a Hue Bridge. After the search, all the bridges that have not yet been added to SmartControl can be found in the "Hue Bridges" dropdown.



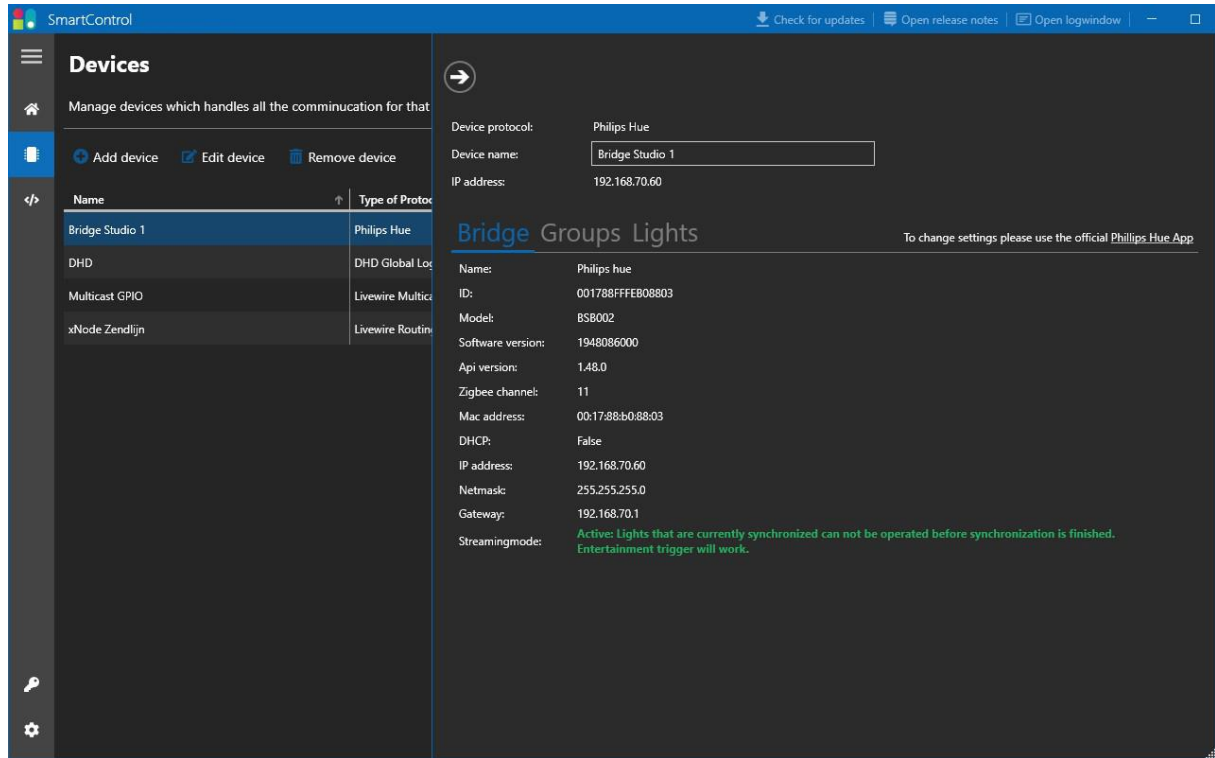
Click "Next" again to pair the Bridge with SmartControl. Then press the "push-link" button on the Bridge within 20 seconds.



If successful, the Bridge is added to the device list and can be used for triggers. How this works is explained in the [triggers](#) chapter.

## Edit Bridge device

Double-click on the device in the overview to open its settings. In this way you can change the name, see which lamps belong to which group and view some details about the Bridge and the lamps themselves.



When the Streaming Mode is set to "Active" it means that SmartControl can control the Hue Bridge according to the entertainment protocol. In some cases, the streaming mode may be inactive. In this case, the Hue bulbs may no longer respond.

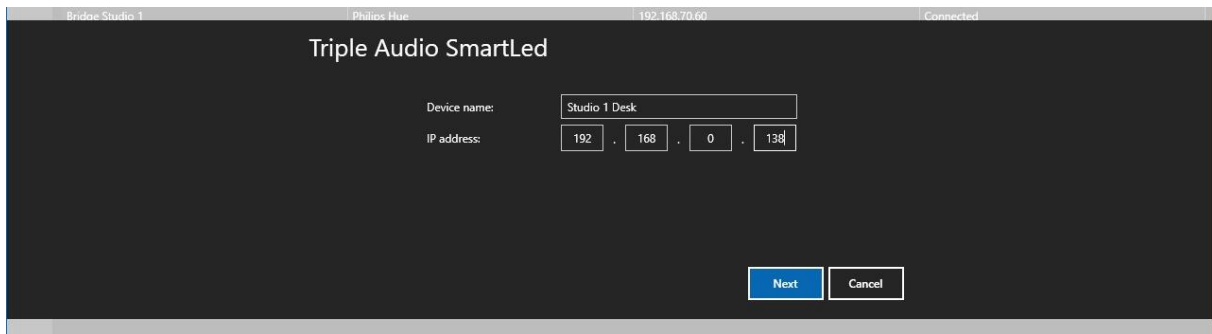
There are several causes that may cause the streaming mode to become inactive. SmartControl monitors this in an active way and will try to restore the streaming mode if this is not the case.

On the tabs "Groups" and "Lights" you can see which lamps are connected to the Bridge. With the button on the top right of the tab you can make the selected group or lamp blink. In this way you can easily identify a lamp.



# SmartLed

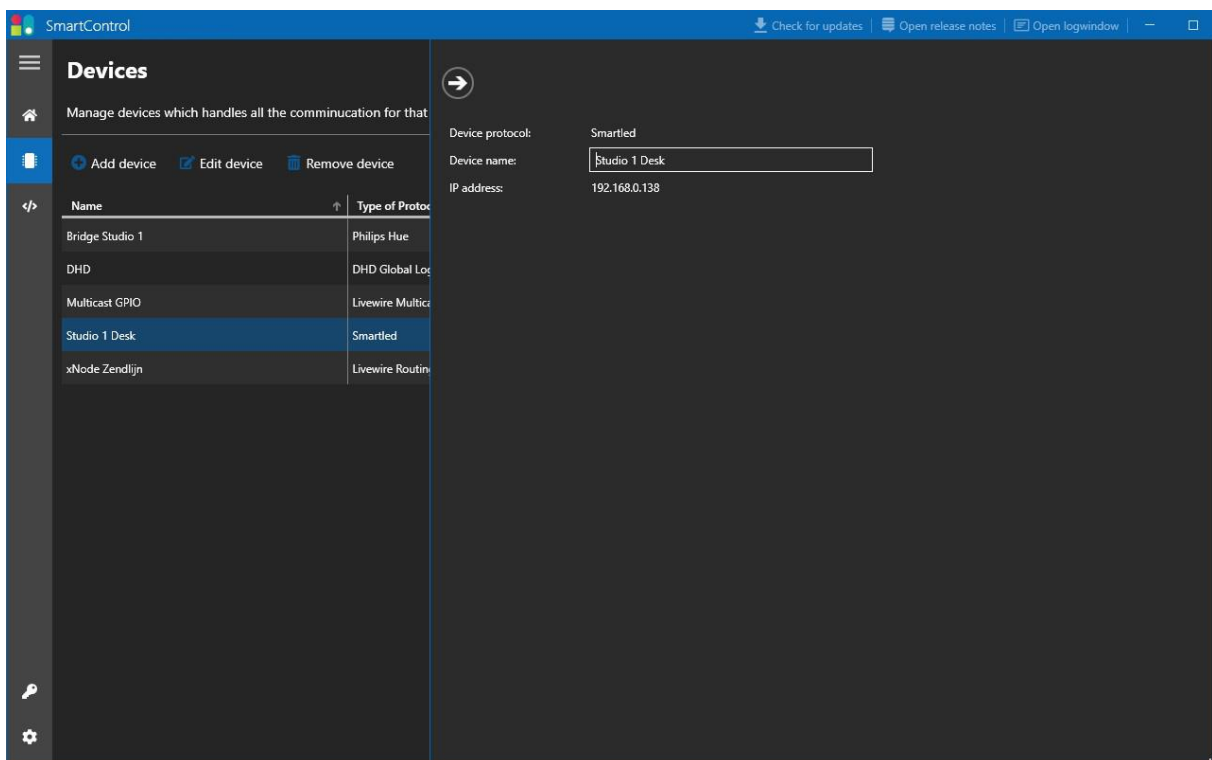
The standard version of SmartLed works together with SmartControl to control the SmartLed objects. Would you like to know more about SmartLed? Then get in touch with [Triple Audio](#).



Fields:

- **Name:** Enter a simple name here. Useful for keeping multiple devices apart
- **IP address:** Enter the IP address of the SmartLed server.

After clicking "Next", the device will be initialised and added to the list. Double-click the device in the list to open its settings. You can change its name in this way.

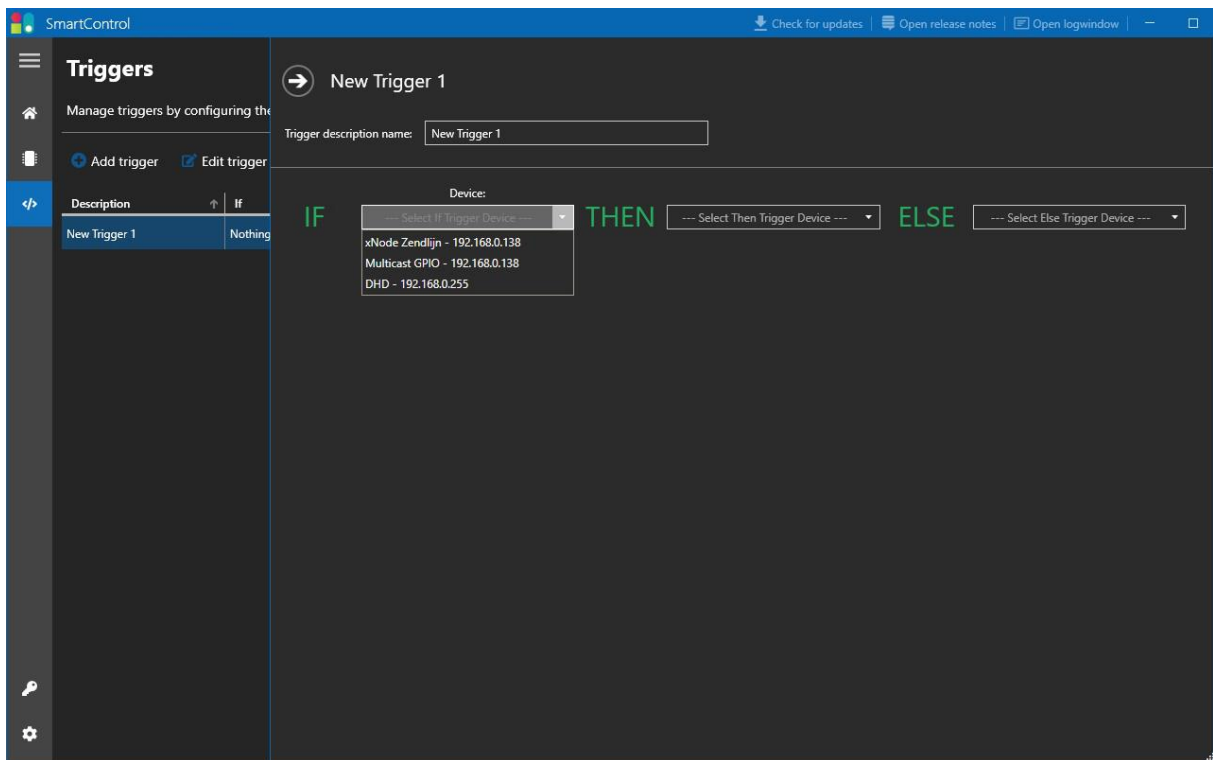


If you want to make a change to the IP address, for example, you have to remove the device and add it again.

# Triggers

After you have successfully created the right devices for the equipment you want to control, you can start putting together triggers. The triggers in SmartControl work with the "If this, Then that, Or else" principle.

Add a new trigger via the "Add trigger" button to get started. Per item you can specify how the trigger should behave.





## If (This)

Here you define the condition that SmartControl can trigger on. Not every device can receive triggers, so not every device is shown in the dropdown.

In the "Device" dropdown, select the device to which you want the trigger to respond. Each protocol associated with the device has a number of settings that you can then define.

## Livewire Routing Protocol

See: [Livewire GPIO](#) for more information.

Fields:

- **Type: Specify** the type of GPIO here. GPI stands for *General Purpose Input*, i.e. the inputs of the device. GPO stands for *General Purpose Output*, i.e. the outputs of the device.
- **GPIO Block No:** This is the physical GPIO port number of the device.
- **Pinnr:** The pin number of the port. You can choose from 1 to 5
- **State:** Determine when the trigger fires. If the gate goes On, or Off.

## Livewire Multicast GPIO

See: [Livewire GPIO](#) for more information.

Fields:

- **Channel ID:** Enter the Livewire channel ID here.
- **Type: Specify** the type of GPIO here. GPI stands for *General Purpose Input*, i.e. the inputs of the device. GPO stands for *General Purpose Output*, i.e. the outputs of the device.
- **Pinnr:** The pin number of the port. You can choose from 1 to 5
- **State:** Determine when the trigger fires. If the gate goes On, or Off.

## DHD Global Logic

Fields:

- **Project ID:** Select an item from the drop-down menu. Project IDs can be set in [devices](#).
- **Global Logic Number:** Enter the Global Logic number. Probably a value from 1 to 200.
- **State:** Determine when the trigger fires. If the gate goes On, or Off.

## Then / Else

Here you specify the task that SmartControl should perform when the trigger is fired. Here too you have the choice of several protocols.

Select the device to be triggered from the "Device" dropdown. Each protocol that belongs to the device has a number of settings that you can then define.

### Livewire Routing Protocol

See: [Livewire GPIO](#) for more information.

Fields:

- **Type: Specify** the type of GPIO here. GPI stands for *General Purpose Input*, i.e. the inputs of the device. GPO stands for *General Purpose Output*, i.e. the outputs of the device.
- **GPIO Block No:** This is the physical GPIO port number of the device.
- **Pinnr:** The pin number of the port. You can choose from 1 to 5
- **State:** Determine what state the port is to be switched to. On or Off.

### Livewire Multicast GPIO

See: [Livewire GPIO](#) for more information.

Fields:

- **Channel ID:** Enter the Livewire channel ID here.
- **Type: Specify** the type of GPIO here. GPI stands for *General Purpose Input*, i.e. the inputs of the device. GPO stands for *General Purpose Output*, i.e. the outputs of the device.
- **Pinnr:** The pin number of the port. You can choose from 1 to 5
- **State:** Determine what the state of the port should be switched to. On or Off.

### DHD Global Logic

Fields:

- **Project ID:** Select an item from the drop-down menu. Project IDs can be set in [devices](#).
- **Global Logic Number:** Enter the Global Logic number. Probably a value from 1 to 200.
- **State:** Determine what the state of the port should be switched to. On or Off.

### Phillips Hue

See the explanation for configuring the Bridge, for more information on the difference between an Entertainment Light/Group and a normal Light/Group.

Fields:

- **Type:** Select the type which the SmartControl is to control here. There is a choice of the following:
  - **Light:** These are the lights in normal mode.
  - **Group:** These are groups in normal mode
  - **Entertainment Light:** These are the lights that have been selected as entertainment.
  - **Entertainment Group:** These are the groups selected as entertainment.
  - **Smartplug:** This is the Phillips switched socket.
- **Select objects:** Tick the lamps or groups you want to control from this list.
- **Action:** Choose which action the lamp should perform here
  - **On:** This turns the lamp on with its colour settings as below.
  - **Off:** This turns the lamp off immediately, without a fade.

- **Alert:** Flashes the lamp continuously for a short time.
- **Flash:** Allows the lamp to flash continuously. With the "Transition Time" you set the fade.
- **Colour:** Here you can select the colour of the lamp when the trigger is executed. There are a number of predefined colours. But via the tab "Advanced" you can create your own colour.
- **Brightness:** This is the brightness of the lamp
- **Transition Time:** This is the fade time of the lamp when the trigger is executed.

## SmartControl Trigger

With this action, it is possible to overwrite other triggers and then refer back to them. For example, you can temporarily change the colour of a Hue lamp when a telephone ring signal is received. When the ring signal is deactivated, the trigger takes over the state of the selected SmartControl trigger.

Fields:

- **SmartControlTrigger:** Select a trigger.

# Failover

New from version 2 of SmartControl is the failover function. This makes it possible to run SmartControl redundantly. In this way, the failover on another system can take over the functionality when SmartControl fails on the main system.

If everything is configured correctly, the failover behaves as a silent copy of the main system. All changed settings are immediately applied to the failover as well. The failover continuously checks whether the main system is accessible. If that is not the case, the failover takes over. When the main system is up and running again, the failover becomes inactive again.

The failover function requires a separate license. More information on licenses can be found in the chapter on [licenses](#).

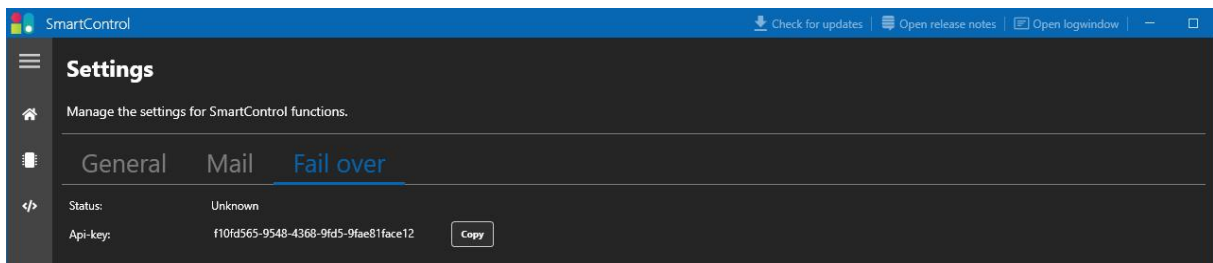
## Setting up a failover system

### Installing and activating

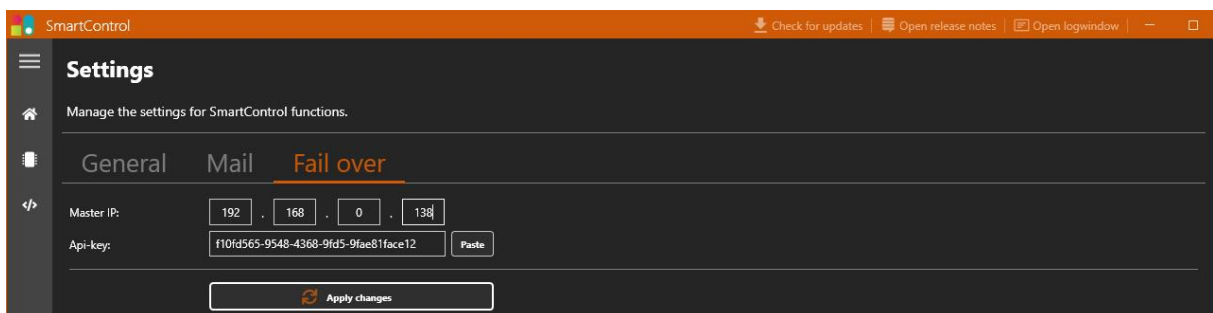
Follow the [install](#) section to install SmartControl. At the point of activation, enter the code with the failover option. When done, SmartControl will start up in failover mode. In failover mode, the window will be orange.

### Failover and master pairing

At startup you get a message "Could not find master...". This is logical as the failover does not yet know where to find the master. For this you need to exchange the API Keys. This key can be found on the master's settings page under the tab "Failover". Make a note or copy it.



Enter this API Key in the failover. This can be done on the settings page under the failover tab. Then click on the "Apply changes" button. You will then get the message whether you want to restart SmartControl. Click on "Yes" here. After SmartControl has been fully restarted, the failover will be active immediately. This can be recognised by the orange bar of the SmartControl window.

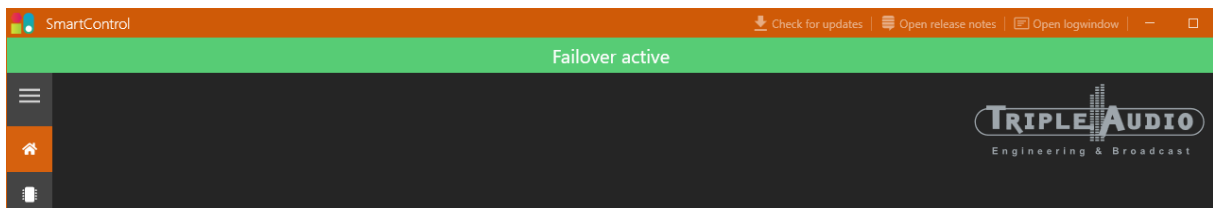


## Failover statuses

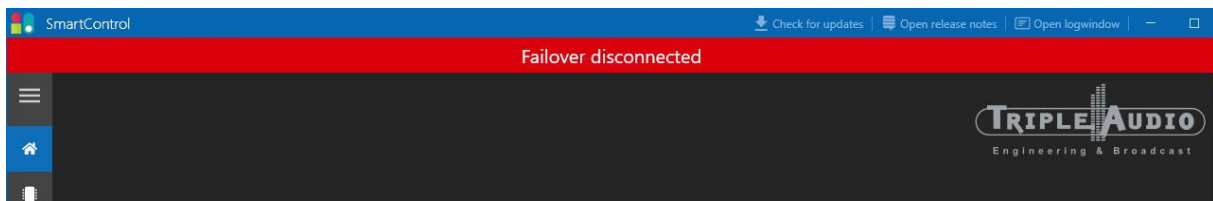
The message "Failover idle" appears at the top of the window. This means that the failover is ready to take over if the master fails.



If the master fails, the orange bar turns green and the text changes to "Failover active", which means that the failover has taken over all operations from the master.



If the failover fails, this is indicated in the master by a red bar with the text "Failover disconnected".



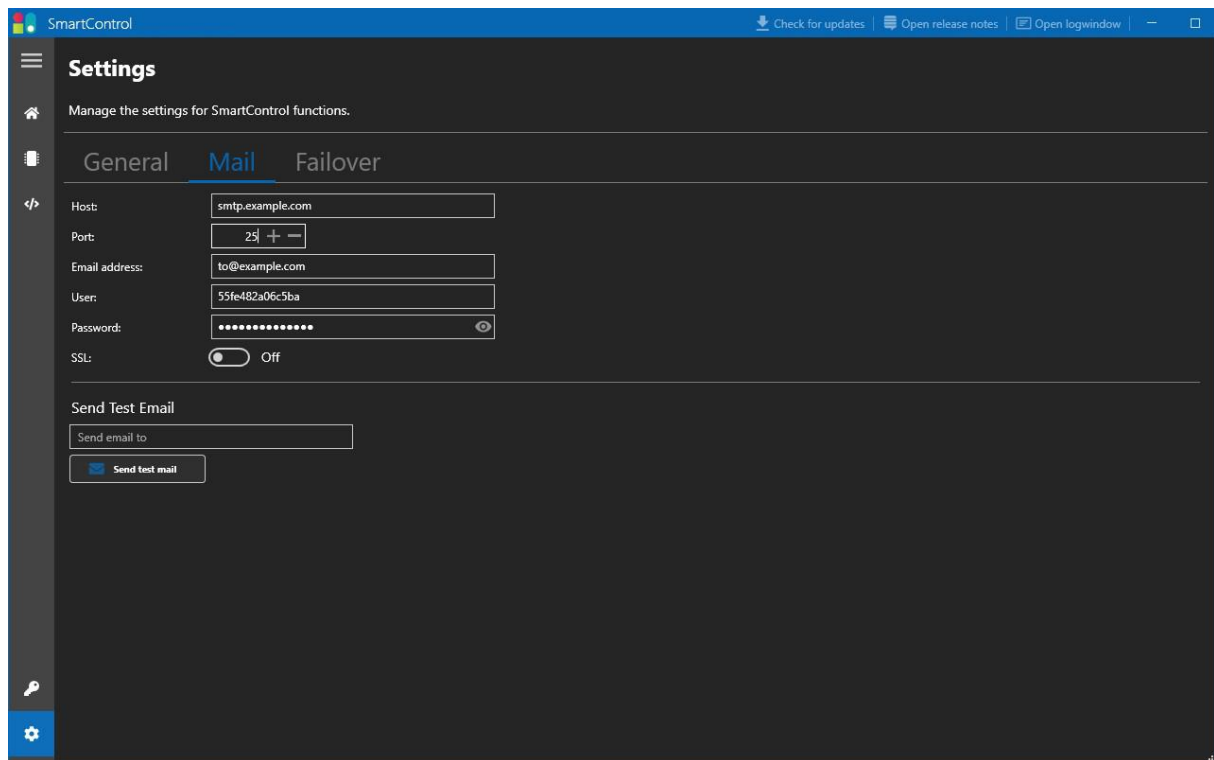
## Failover exceptions

Important to know: Currently, only the master can control a Hue Bridge. For technical reasons, this is not yet possible from the failover.

If you still want to make this possible, please contact Triple Audio. We will then see if we can find a proper solution.

## Notification mail

SmartControl can automatically send a notification e-mail if something is wrong with the failover or master. This requires the details of an SMTP server to be entered in the settings of SmartControl.



It is advisable to send a test e-mail to check the settings. If these are in order, SmartControl will automatically send an e-mail when the following events occur:

- If the master fails
- If the failover fails
- When the master is back online
- When the failover is back online

# Licenses

The licensing model of SmartControl works with different levels. The higher the level, the more triggers you can create. A trigger update is available from the [Triple Audio webshop](#).

Level	Triggers
0	5
1	20
2	50
3	100
4	150
5	200
6	250
7	Unlimited

To be able to use the failover function of SmartControl you need a failover license. This is available from the [Triple Audio webshop](#).

For more information, please contact Triple Audio.



# Settings

## General

### Startup minimised

Check this option to have SmartControl start up minimally. SmartControl will then disappear from the taskbar.

### Config ex/import

It is possible to export the configuration of SmartControl for backup or if you want to transfer SmartControl to another computer, for example. If you restore the configuration to another computer, the license will not be included. You will need to have a license code generated again, please contact your Triple Audio contact person.

### Backup

If the computer has a D drive, the configuration is saved on this drive. If the computer does not have a D disk, the configuration is saved in the folder "%localappdata%"-"SmartControl".

### Close application

As SmartControl is an application designed to run continuously, the window's cross is hidden. Do you still want to close the application? Then click on the "Close Application" button.

## Mail

You can set up an SMTP server to automatically send an e-mail when the failover becomes active. Fill in the server details and possibly send a test mail to check the settings. See the chapter [Notification mail](#) at failover for more information.

## Failover

Here you set up the failover function. More information can be found in the chapter [Failover](#).

# How To's

As SmartControl is very versatile and can sometimes be quite complex, we have put together a few how-to's to help you set up SmartControl and the associated devices.

## Mic live signalling with Phillips Hue and Axia IQ(x)

Follow these steps to make a Phillips Hue lamp function as a "mic live" red light signalling device in combination with an Axia IQ(x). It is assumed that the IQ(x) and the Hue bridge are in the network and on the same subnet as the computer running SmartControl.

### Configure Phillips Hue device.

The manual in the [Devices](#) section, [Phillips Hue](#) explains how to set up the Hue bulbs and how to link the Hue Bridge to SmartControl. Make sure the Hue lamp is marked as "Entertainment Lamp". Give the lamp a recognisable name.

### Configure Livewire Multicast GPIO.

Go to the [Devices](#) section, [Livewire Multicast GPIO](#) and configure a Livewire Multicast GPIO device.

### Configure IQ(x).

The Control Room monitor is switched off when a Control Room mic is opened. We can use this to trigger SmartControl.

Open the web page of the IQ(x) and go to "Shows". Click on the show profile that is used by default. If you are using more than one show profile, you will need to adjust the settings below there as well.

Check the IP address of the IQ(x). For example, if it is 192.168.1.150 then use 15099 as the Livewire channel. It is usual for the Livewire GPIO channels of a device to start at 99, as mentioned above. An extensive explanation on how to classify Livewire channels can be found here: [Livewire Channel Numbering - TelosHelp \(telosalliance.com\)](#)

Enter this channel number in the "Logic port" of the "CR Monitor" section. (Circled in red)

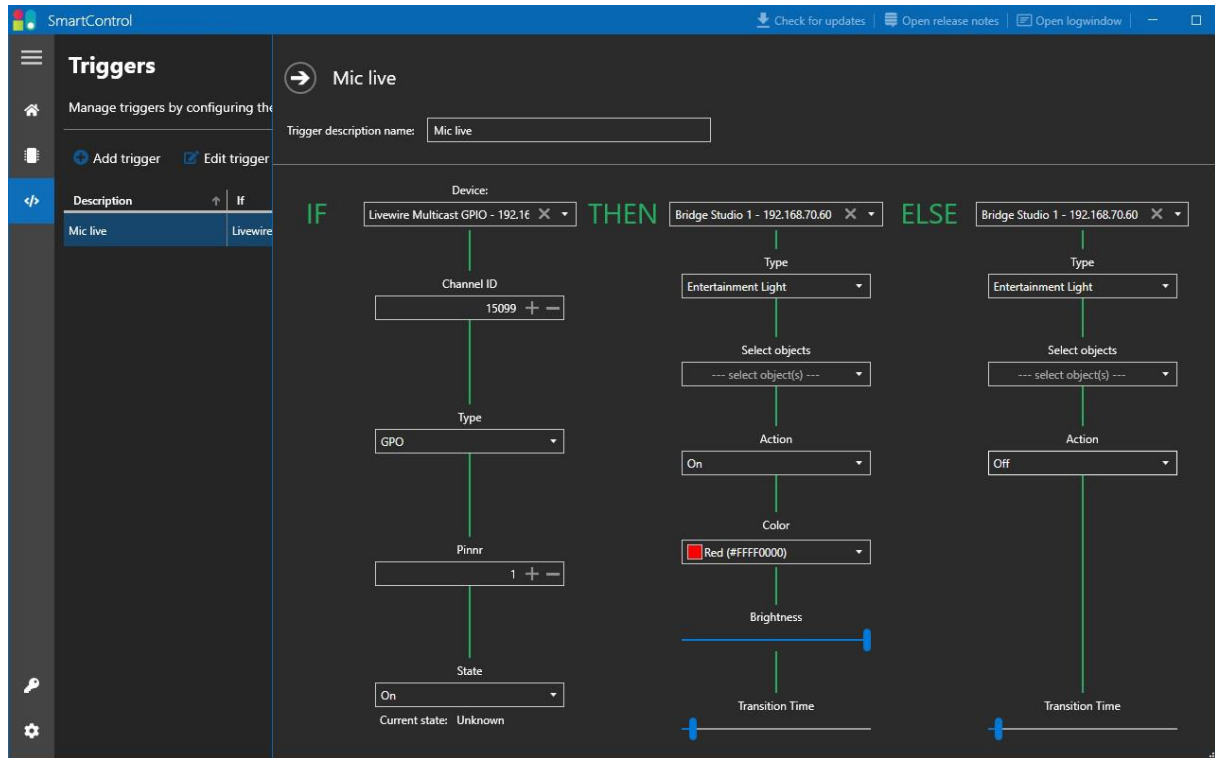
Monitor Section				
	CR Monitor	CR Headphones	Preview	Studio Monitor
Volume (-85 .. 0 dB):	<input type="checkbox"/> Set <input type="text" value="-30.0"/> dB	<input type="checkbox"/> Set <input type="text" value="-30.0"/> dB	<input checked="" type="checkbox"/> Set <input type="text" value="-12.0"/> dB	<input checked="" type="checkbox"/> Set <input type="text" value="-85.0"/> dB
Volume adjust:	<input checked="" type="checkbox"/> Allowed	<input checked="" type="checkbox"/> Allowed	<input checked="" type="checkbox"/> Allowed	<input type="checkbox"/> Allowed
Dim gain: (-inf, -30 .. 0 dB)	<input type="text" value="-12.0"/> dB	<input type="text" value="-inf"/> dB		<input type="text" value="-inf"/> dB
Gain in Muted state: (-inf, -85 .. 0 dB)	<input type="text" value="-inf"/> dB		<input type="text" value="-inf"/> dB	<input type="text" value="-inf"/> dB
Source:	<input type="text" value="Program 1"/> ▾			<input type="text" value="--- no source ---"/> ▾
Source selection:	<input checked="" type="checkbox"/> Allowed			<input type="checkbox"/> Allowed
Preview in:	<input type="checkbox"/> Enabled	<input checked="" type="checkbox"/> Enabled		
Preview mode:		<input type="text" value="Normal"/> ▾		
Logic port:	<input type="text" value="15099"/>			<input type="text" value="0"/>

Click on "Ok" at the bottom of the page to save the settings.

Note: Make sure that you reload the show profile on the IQ(x). Otherwise, these settings will not be activated.

## Create a trigger

If the above settings are correct, we can start creating a trigger in SmartControl.



- To get started, click "Add trigger" on the trigger page.
- It is useful to change the name of the trigger, do this in the field "Trigger description name".

## IF Column

First you select the trigger action, in the first column "IF". At "Device" choose "Livewire Multicast GPIO".

- For Channel ID, enter the same number that you entered for "Logic Port" in the IQ(x) settings.
- Select type "GPO".
- Pinnr: 1
- And set "State" to "On".

More information on pin numbers can be found in the IQx manual, on page 45: [Axia IQx Console Manual \(telosalliance.com\)](#)

## Then column

Now we set what should happen when the trigger becomes active.

- In the second column under "THEN", choose the Hue bridge you set up in Devices.
- Under "Type", choose "Entertainment Light". (More info on these types can be found in the chapter [Devices, Phillips Hue](#))

- In "Select objects" all lamps are listed which are configured for this Hue bridge. You can select multiple lamps.
- Select the action you want to perform when the trigger is executed. In this case "On".
- Choose a colour, for example red.
- Use the "Brightness" slider to set how bright the lamp should be when switched on.
- And finally, set the fade time with the "Transition Time" slider.

### **Else column**

Here we set what should happen when the "IF" trigger is deactivated.

- This is almost the same as the "THEN" column, but in "Action" we choose "Off".

You are now ready. The settings are active immediately and are saved automatically.

## Combining GPIOs

With SmartControl it is possible to combine pins of GPIO ports of several Livewire channels on a single GPIO port. In this way you can combine red light signalling of several channels on one GPIO port. In this example we are assuming that you are using an Axia IQx and an xNode GPIO.

Make sure all the devices are accessible on the network.

### Configure Livewire Multicast GPIO.

Go to Devices > Livewire Multicast GPIO and configure a Livewire Multicast GPIO device.

### Configure xNode GPIO

Enter a Livewire channel for each GPIO port.

Check what the IP address of the xNode GPIO is. If this is, for example, 192.168.1.150, then use 15001 to 15006 as the Livewire channel. An extensive explanation on how to classify Livewire channels can be found here: [Livewire Channel Numbering - TelosHelp \(telosalliance.com\)](http://telosalliance.com/Livewire_Channel_Numbering_TelosHelp)

### IF Column

First you select the trigger action, in the first column "IF".

- Under "Device" choose the "Livewire Multicast GPIO" device.
- Enter the Channel ID of the Livewire channel of the first microphone invested on the IQx. For example 1101.
- Choose type "GPO", Pinnr: 1 and set "State" to "On".

More information on pin numbers can be found in the appendix to this manual: [Livewire GPIO](#)

### Then column

Now we set what should happen when the trigger becomes active in the second column under "THEN".

- Under "Device" choose the "Livewire Multicast GPIO" device.
- Enter the Channel ID of a GPIO port on the GPIO xNode e.g. 15001
- Choose type "GPO", Pinnr: 1 and set "State" to "On".

### Else column

Here we set what should happen when the "IF" trigger is deactivated.

- This is almost the same as the "THEN" column, but for "Trigger on" we choose "Off".

You can repeat the above steps for each microphone channel. Then fill in the Livewire channel of the microphone on the mixer in the IF column. And in the THEN and ELSE columns, make the "Pinnr" one higher each time.

# Troubleshooting

We have a few tips on how to detect problems. This may come in handy when you have lost the proverbial thread.

## Manually operate Livewire GPIO

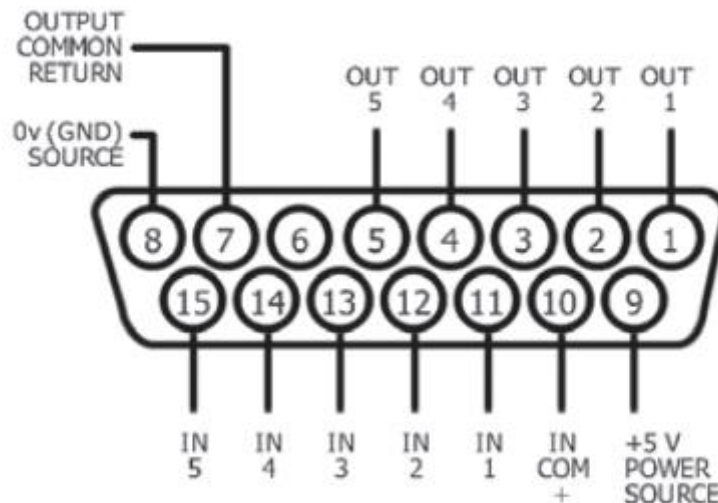
It is possible to switch and view the virtual GPIO pins of the Axia IP driver. The Telos Alliance has created a handy manual to do this. You can find it here: [Troubleshooting IP-Driver GPIO - TelosHelp \(telosalliance.com\)](https://telosalliance.com/Troubleshooting-IP-Driver-GPIO-TelosHelp)

# Attachments

## Livewire GPIO

### Introduction

GPIO stands for General Purpose Input/Output. In the Livewire domain, each GPIO port consists of 5 inputs and 5 outputs, physical and virtual. The image below shows the pin assignment of a physical GPIO port.



Standard Axia GPIO port

For more information on the electrical specifications of a GPIO port, see [this manual](#), Chapter 8, pages 45 to 48.

Each Livewire channel consists of a dozen components which control the audio transport, timing and logic. Each Livewire channel also has 1 virtual GPIO port.

In addition, physical devices from Telos Alliance may also have one or more GPIO port(s). With these devices it is possible to link the virtual GPIO port, which belongs to a Livewire channel, to the physical port on the device.

There are 2 ways to retrieve or manipulate the status of a GPIO port. Namely via the Livewire Routing Protocol or via the Livewire Multicast GPIO Protocol.

### Livewire Routing Protocol

This protocol looks directly at the physical GPIO ports on a device, so to speak. For example: SmartControl logs in to the device and asks the device to send back to SmartControl all changes that occur on the pins of all GPIO ports. And also vice versa, when SmartControl wants to set a pin high or low, SmartControl communicates directly with the device.

This way is direct but has some disadvantages. Because you communicate directly with the device, you have to create a connection for each device. For larger installations, this is a lot of administrative work and can be confusing.

To avoid this, it is better to listen to the state of a GPIO port via the Livewire Multicast GPIO protocol. This is explained in more detail below.



## **Livewire Multicast GPIO**

All changes of each GPIO port pin of a Livewire channel in the network are published on a single "channel". This channel is communicated over the network by multicast. Multicast is an efficient way of distributing data over an IP network.

The GPIO channel is monitored for changes by each Livewire device in the network. It is good to know that there is no reference network in the network that keeps track of which channels are currently high or low. So only changes (pin goes up or pin goes down) are published on the GPIO "channel".

With this information, it is very easy for a Livewire device in the network to monitor changes to all GPIO ports. And that without knowing the device itself.

## Contact



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# Phillips Hue Entertainment protocol

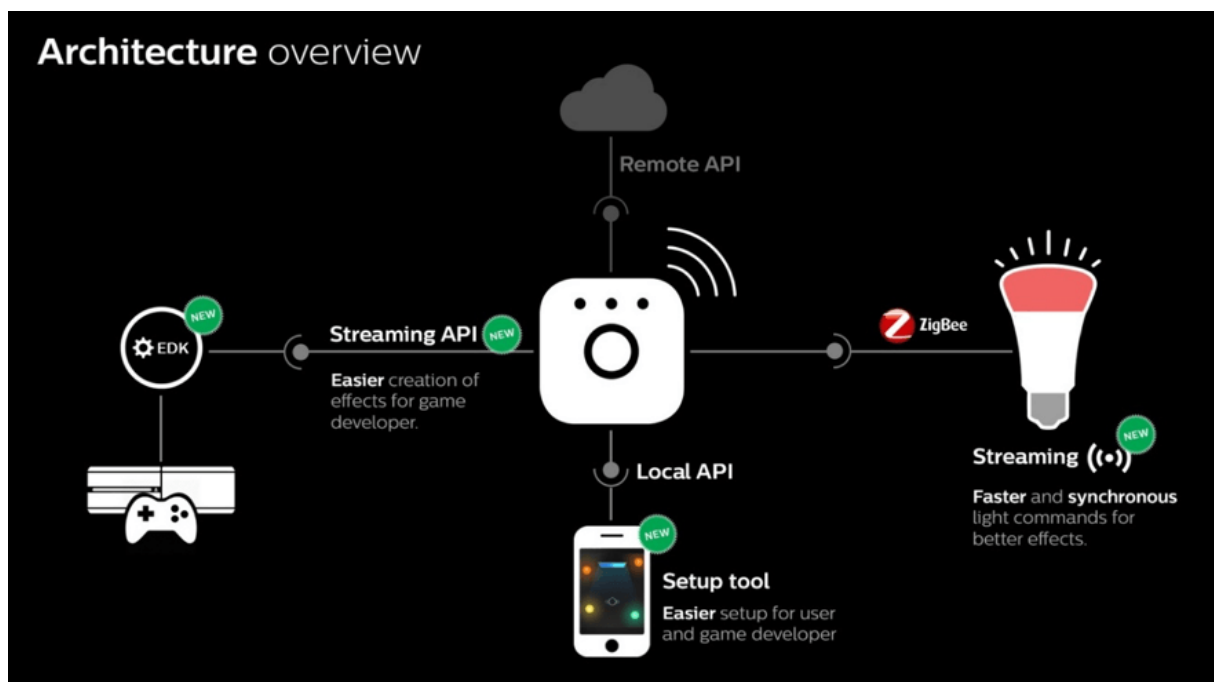
Article from the Phillips Hue developer's website.

Source: <https://developers.meethue.com/philips-hue-a-natural-ingredient/>

## Phillips Hue - a natural ingredient of any gaming, movie or audio experience

**Phillips Hue Entertainment'** is a major software update for the Philips Hue v2 bridge, Philips color capable lights and the Philips Hue app which is going to strengthen the lighting system's integration into any home entertainment experience.

Our goal with Hue Entertainment is to fully immerse Hue users in their music, TV, movies and video games with high-quality, synchronized lighting effects.



As we're sure you know, wireless communication with Philips Hue is based on the 'Zigbee' protocol. Zigbee uses a mesh network where every light repeats a message, providing simple, secure and reliable coverage in any home. This technology is fantastic for scene setting and automated-command use cases but runs into limitations when we try to push fast-changing special effects in live entertainment content.

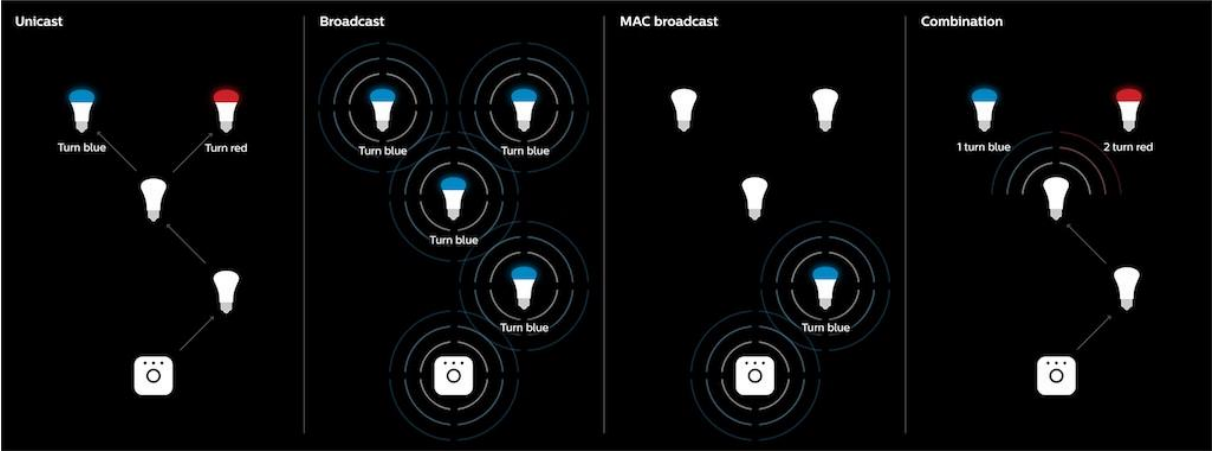
To create the synchronised effect we wanted, Hue Entertainment is developed as a new streaming-optimised interface which co-exists next to Zigbee.

### How Hue Entertainment works

A Hue Entertainment command is built through the following process:

1. The command packages together the target state of up to 10 light channels in a custom Zigbee message.
2. This message is sent as a unicast over the mesh network to an automatically chosen proxy node in the target entertainment room.
3. This proxy node sends out a non-repeating low level MAC layer broadcast which all nearby lights will hear.
4. The nearby lights unbundle the message and act on their states.

Since the command is unicasting together with MAC broadcasts, we can stream commands 25 times per second to any light in the home whilst still creating spatial effects across multiple lights, all without causing network congestion. Additionally, the mechanism has no retries, which benefits an entertainment setting where synchronization is critical: for example, a delayed frame from an explosion in an action movie is worse than skipping the frame entirely.



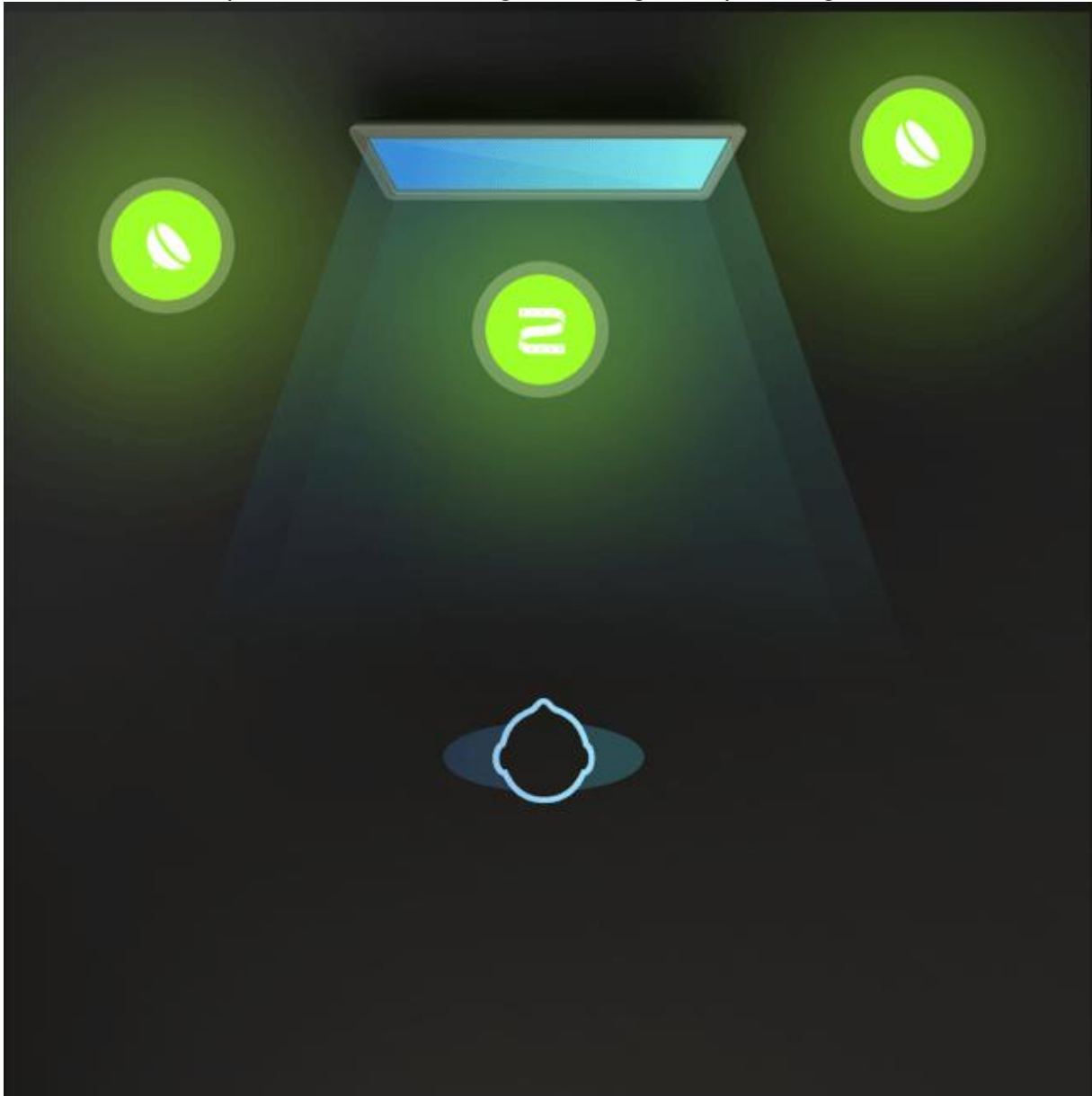
Unicast	Broadcast	MAC broadcast	Combination
~25/s	~3/s	~25/s	~25/s
1 light at a time	Multiple lights at a time. Same state or pre-stored	Multiple lights at a time	Multiple lights at a time. Ad hoc states
Any light using mesh	Any light using mesh	Only nearby lights	Any light near the proxy
Great for light control and scene creation.	Great for room control and scene recall	Great for room based entertainment synchronization	
Explicit retries for confirmed delivery	Implicit retries from many neighbours	No retries	No retries

**A new API and SDK**

The need for a time synchronisation-driven interface led us towards a new bridge-streaming API for Hue Entertainment. This bridge API is based on UDP and DTLS rather than HTTP, allowing us to drop frames to maintain synchronization as necessary.

We plan to release the source code for a dedicated software development kit we've created, so developers can easily build applications combining lighting and entertainment. Called the **Hue Entertainment Development Kit (EDK)**, it is written in C++ with portability and usability in the gaming world in mind.

The EDK not only wraps the Hue bridge discovery and streaming API, but also provides a light effect-rendering engine. Often, replicating effects in a room needs to be independent of the specific home setup, so the EDK takes care of mapping spatial effects onto the user's specific entertainment layout, which is created in the Hue app. This means the explosion or lightning to your left can be programmed to affect all three lights on that side of the room, or just one light, depending on your setup. It also offers other primitives for controlling or iterating over specific lights.



### **What happens next?**

As we put the final touches to the API, we're already busy working on content in the labs, and also with our potential partners and developer community.

If you'd like to stay up to date on the entertainment Beta version and launch, you need to be a registered developer and can sign up at <https://developers.meethue.com/entertainment>.