This guide is deprecated as of 2022-02-12 and should only be used for Classic RoPieee installs.

See https://ropieee.codexwilkes.com for the current RoPieee guide.

RoPieee

A Beginner's Guide

What is RoPieee?

RoPieee (https://ropieee.org) is a custom appliance that acts as a dedicated Roon endpoint and/or Roon display (https://roonlabs.com) running on modern Raspberry Pi hardware, with audio output over USB or a HAT. The project has three aims:

1. Easy to create appliance, with no linux knowledge required.
2. No ongoing maintenance required (self-updating).
3. Full integration with the Raspberry Pi official 7" display (to view artwork and track information from Roon in real time via the API).

Why not RoPieee?

RoPieee aims to offer an appliance-like endpoint experience for the Roon user. If you desire other non-supported functionality, specific custom settings, or extensive personalization options, it may not be a good fit for you: use a generic OS implementation such as DietPi or Raspbian instead.

Since RoPieee is volunteer-led and free of license cost, there are no commercial support mechanisms other than what is available through the Roon forum. If you desire traditional support, similarly a commercial product may be a better option for you.

Other preliminary notes

RoPieee does not support HDMI (neither for display nor audio), and disables the HDMI port after booting. This means that for Roon or other supported applications HDMI is not a valid output, and will not work.

RoPieee runs on a linux kernel, so any USB DAC must have reasonable, standard, existing linux support to work properly.

Roon Server does not run on ARM architecture, and therefore must be run elsewhere, often on a NUC running ROCK, a normal PC or Mac, or perhaps a Roon Nucleus. See
https://help.roonlabs.com/portal/en/kb/articles/architecture.

Table of contents

Hardware

RoPieee Hardware Prerequisites

- Raspberry Pi 2, 3, or 4 (preferred)
  - Appropriate, safe power supply (2.5 or 3 amp, depending on Pi model and installed hardware).
  - Raspberry Pi 3 B+ supported as of v91.
  - Raspberry Pi 4 supported as of v332.
  - Compute Module 4 IO Board as of v3.107
  - RoPieee only requires several hundred MB of memory to run well, so any supported Pi model is sufficient.
  - MicroSD card of at least 4g size.
- Audio HAT (if using as an audio endpoint and not using USB to connect to your DAC).
  - Check http://www.ropieee.org/audio_hardware/ for currently supported hardware.
  - "HAT" means "hardware attached on top", eg an add-on board such as DAC for analog output (RCA or XLR), a DIGI board for digital output (S/PDIF, Toslink, AES/EBU), or an amplifier (speaker terminals).
- Appropriate case for Pi model and whether using a HAT or display.
  - Flirc case for Pi 4 highly recommended (https://flirc.tv/more/raspberry-pi-4-case) if using USB.
- Official Raspberry 7" display (if using a display).
  - Case for display and Raspberry Pi (check case shape carefully if also using a HAT).

RoPieee Networking Prerequisites

- Working network connection
  - Working DNS access
  - Unfiltered outgoing connections to internet
- Ethernet (eg wired) for install and initial configuration
 - Wi-fi can be configured later after initial setup, though Ethernet is more reliable for audio streaming.

Possible hardware configurations

Example 1: Roon endpoint on a Raspberry Pi 2, 3, or 4 running RoPieee using USB to connect to a DAC. Pi 4 preferred.
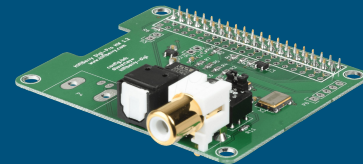

> Any RoPieee-supported audio HAT, including DIGI, DAC, and amplifier boards.

Example 2: Roon endpoint on a Raspberry Pi 2, 3, or 4 running RoPieee with a supported audio HAT to output a digital signal (S/PDIF) connected to an external DAC. ("DIGI boards").
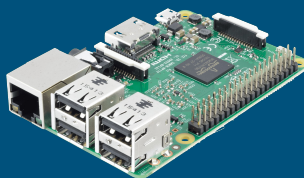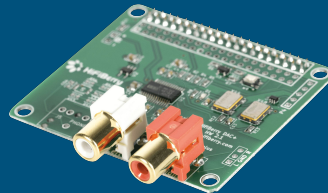

Example 3: Roon endpoint on a Raspberry Pi 2, 3, or 4 running RoPieee with an audio HAT that outputs an analogue signal connected to an external amplifier. ("DAC boards").
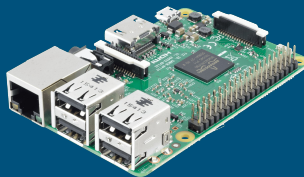
Which Raspberry Pi?

Although RoPieee runs on most modern Raspberry Pi hardware, many Roon forum members inquire about which model "sounds the best" or has the "best performance". RoPieee is neutral to the audio chain, as it delivers bit-perfect data to the USB port or onboard HAT. However, there are some advantages of the different models depending on your use case, notably improvements of USB in the Pi 4.

Raspberry Model	HAT (DAC, DIGI)	USB	Bluetooth	Official 7" Display
Pi 3	✔			Case dependant
Pi 3+ (Wifi)	✔			Case dependant
Pi 4 [1]	✔	✔	✔ [2]	Case dependant

[1] *1g ram model sufficient for RoPieee.*
[2] *Requires RoPieeeXL.*

RoPieee + Official Raspberry Pi 7" Display

RoPieee supports the official Pi 7" display to view Roon track information + artwork, as well as offer basic play controls, either display only configuration or display + audio. NB: only the official Raspberry Pi 7" display is supported.

The display is only detected at the time of initial installation and the software installed then. Re-flash if adding the display to an existing RoPieee endpoint.

Also, HDMI output is turned off once RoPieee boots, so attaching an external monitor is almost never beneficial.

+

Highly recommended.

RoPieee + Remote Control

RoPieee supports the use of a hardware remote control:

- https://osmc.tv/store/product/osmc-remote-control/ (OSMC)

- https://flirc.tv/ (Flirc)

Other hardware may be supported in the future: check the Roon forum for updates.

Hardware assembly tips

- The microSD card is installed in the Raspberry Pi "upside down", eg pins facing up. Some people find using a pair of tweezers helpful, especially with the video cable installed when using the Raspberry Pi official 7" display.
- Brass spacers often are easier to use than the plastic ones often included with audio HATs. Ebay has many brass M2.5 spacers of various lengths, along with screws and nuts. 12mm is a good length.
- Be sure to use a decent, safe, sufficient power supply.

Raspberry 7" Official Display Tips

- When attaching the cable from the display to the Raspberry Pi (see the right side), you may have to open the black tabs to slide the cable in ("out to the side" on the display board; "up" on the Pi board). This may take more force than expected. Be sure to install the correct side of the cable, as shown.
- If you want to attach an audio HAT as well, you will have to power the display and PI separately (eg you can't jumper the power, as shown in this picture). A dual microUSB cable is ideal for this if using a Pi 3. (See https://www.buyapi.ca/product/dual-microb-usb-power-cable/ for example.)
- Depending on display placement, microUSB right-angle adapters may be useful (see Ebay).
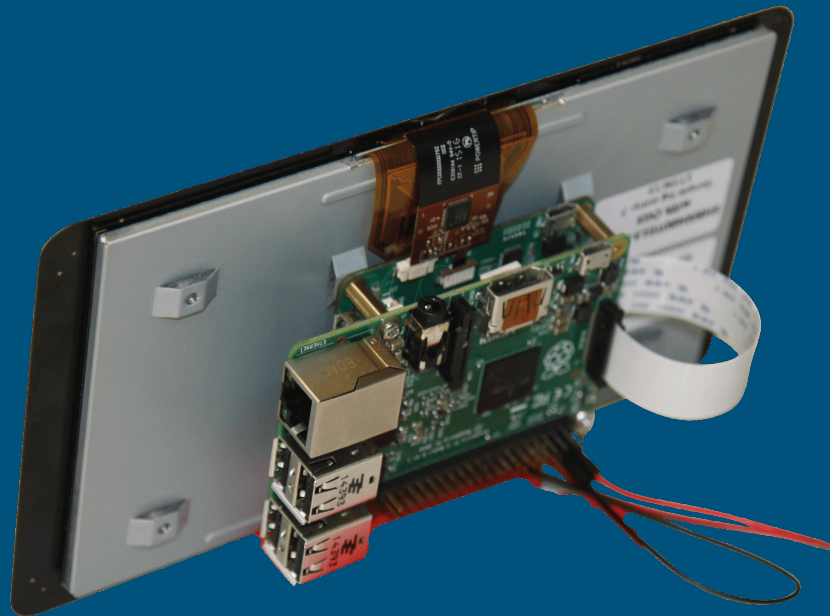
Software

II

RoPieee or RoPieeeXL

RoPieee has two versions: a standard version (RoPieee), and an extended version (RoPieeeXL) which offers support for some streaming protocols (like AirPlay®). For normal Roon usage, stick with RoPieee, as there is no performance or feature difference between the versions from a Roon perspective.

RoPieeeXL is installed from RoPieee via the **Advanced** tab of the web interface after the initial install is complete.

Functionality Matrix

	RoPieee	RoPieeeXL
Raspberry Pi 2, 3, or 4	✔	✔
Raspberry Official 7" Display	✔	Roon only
Hardware Remote	✔	Roon only
Roon Endpoint (running RoonBridge)	✔	✔
Bluetooth		✔ (Pi4 only)
DLNA		✔
AirPlay®		✔
Spotify®		✔
Squeezelite®		✔
HQPlayer NAA		✔

Installation

III

Install RoPieee overview

1. Download RoPieee from https://ropieee.org/software/.
2. Copy image to microSD card using a utility such as Etcher (https://www.balena.io/etcher/) or Rufus (https://rufus.ie/).
3. Install RoPieee.
4. Enjoy well-made latté.

1) Download RoPieee

- Download the latest RoPieee image from https://ropieee.org/software/.

Software

Download the latest RoPieee image.

Only using Roon's RAAT? Then there's no need for going XL. Just pick 'regular' RoPieee and you're set.

RoPieee

The latest RoPieee (2021/05/08) can be downloaded from here

XZ compressed version of the image (about 1/3th of the original size) here

RoPieeeXL

You can get XL by simply starting with 'Regular'. After installing it, go to the 'advanced' tab in the web interface and choose 'Upgrade to XL'. Simple as that!

2) Copy RoPieee image to microSD card

- Using an imaging tool such as Etcher (https://www.balena.io/etcher/) or Rufus (https://rufus.ie), copy the downloaded RoPieee image to an empty microSD card (4g or larger).
  - Etcher is available for Windows, MacOS, and linux.
  - Make sure the image is stored locally, not on a network share.
  - NB: if using Etcher, you can use the compressed image directly.

→ **Make sure the target destination (eg the blank microSD card) is the correct storage device being written to!**
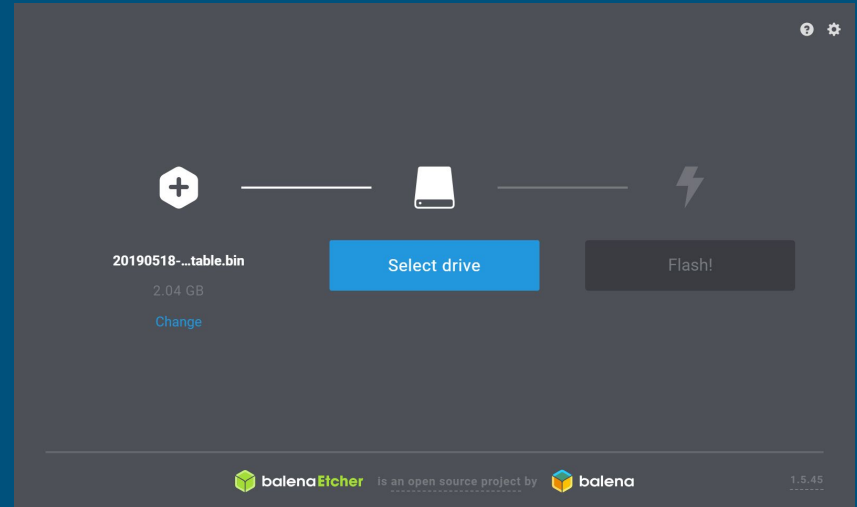
3) Install RoPieee

1. Physically install microSD card with RoPieee image into a supported Raspberry Pi.
2. Attach official Raspberry Pi 7" display (if using).
3. Attach HAT (if using)
4. Assemble everything in case.
5. Attach Ethernet cable (with known working internet including DNS).
6. Attach USB cable for power.
7. Wait until green status LED[1] flashes at ½ Hz (there will be several reboots).
8. Attach the USB DAC (if using) and ensure that it is powered on
9. Launch web administration interface for final configuration via a browser.

RoPieee is designed to be installed without the need for a computer screen or keyboard (i.e. headless), but must be connected via Ethernet to the Internet during setup. WiFi and other configuration options can be accessed via a web browser after installation is complete.

[1] *Not to be confused with the Ethernet activity LED.*

Advice from @spockfish

Wait for all of the installs to complete, ensuring that all of the reboots are finished. This may take up to 20 minutes if on a lower speed internet connection or located far away from RoPieee HQ.

@spockfish suggests that preparing and enjoying a well-made latté during this installation phase yields optimal RoPieee results; @wizardofoz reminds us that alternative beverages work well too.

https://49thcoffee.com/

Configuration

IV

RoPieee is ready for configuration

If all goes well, your new RoPieee device will now have finished installation and is ready for configuration. This is done in three steps:
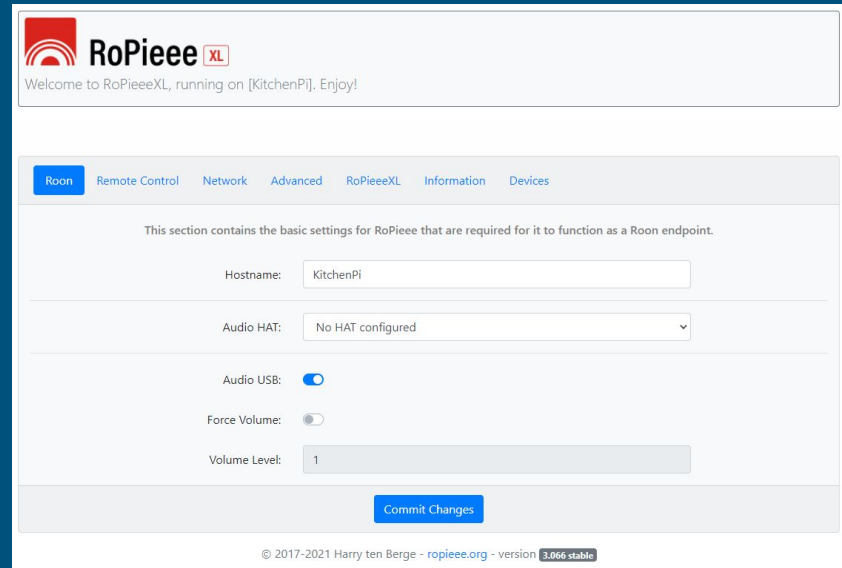
1. Adjust RoPieee settings via a browser.
2. Enable in Roon settings.
3. Adjust on-screen display settings (if applicable).

⊘ **Connection Failure**

It seems there's a problem with the connection.

- Is Roon Core running?
- Is the RoPieee Remote Control extension enabled In Roon?

For configuring RoPieee you can point your browser to http://KitchenDisplay or 10.0.1.236
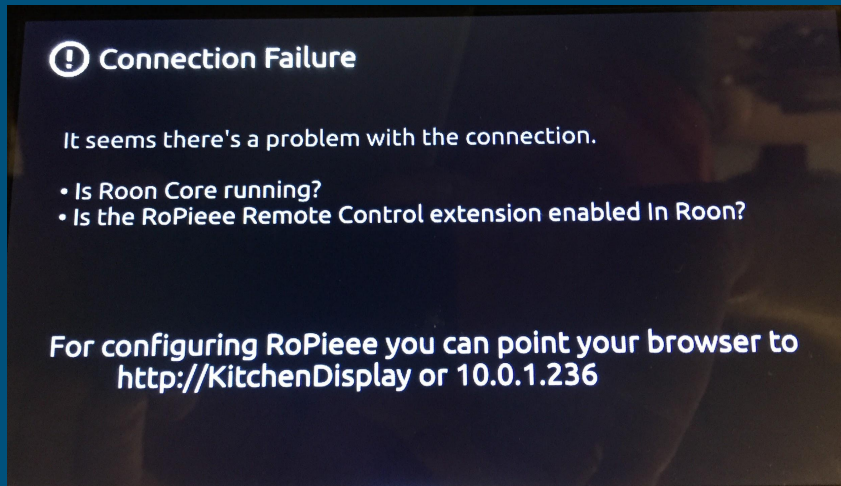
1) RoPieee web interface

Open the web interface of the new RoPieee device by going to http://ropieee.local or directly via the IP address (example: http://10.0.1.238). You can determine the IP using a port scan application or via your router interface, often in a DHCP tab. If using the official 7" Pi display, the opening error message will indicate the IP assigned by DHCP.

Port scan applications, such as Fing (https://www.fing.io) for iOS or Android, can be used to determine the IP address. The default machine name is "ropieee" or "ropieeexl".

1a) RoPieee installation error

If the installation failed for some reason, you may see an error message instead of the normal RoPieee configuration screen.
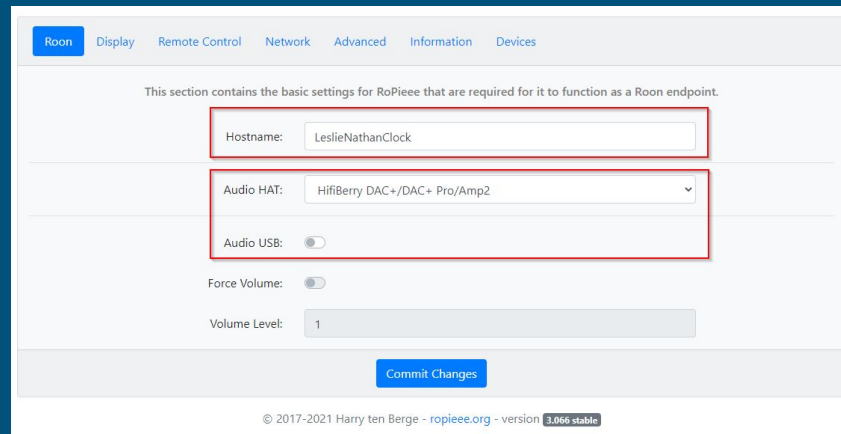
You may need to re-flash or check your network carefully. RoPieee needs to access the internet in order to complete the installation process, so ensure you are using a known good ethernet cable and known good network / DNS without any filtering or other general impediments.
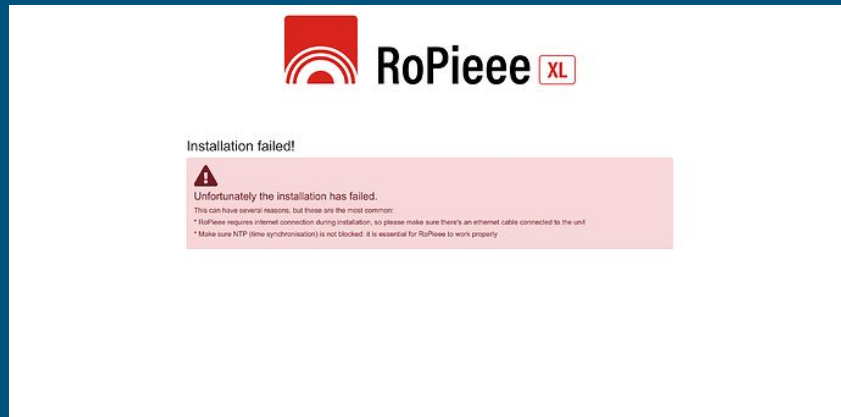
1b) Adjust the general settings

- Change the hostname.
- Select the supported audio HAT from the dropdown or adjust the "Audio USB" tick box if using a USB DAC

Once you commit the changes, you may be asked to reboot the device; do so whenever requested.

Your device requires a reboot for the latest changes to take effect. REBOOT

| Roon | Display | Remote Control | Network | Advanced | Information | Devices |

This section contains the basic settings for RoPieee that are required for it to function as a Roon endpoint.

Hostname: LeslieNathanClock

Audio HAT: HifiBerry DAC+/DAC+ Pro/Amp2

Audio USB: ⬤

Force Volume: ⬤

Volume Level: 1

Commit Changes

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1c) Adjust the display settings (if using)

- If the display is upside down, change the the display orientation setting to "Rotated" (this is case dependant).
- Type the Roon control zone that the display should be associated with (e.g. what content should display): this must be exactly as is specified in Roon settings. (Please copy and paste if there is any doubt.)
- Remember to enable in **Roon Settings → Extensions**, if necessary.

  NB: The display can connect to any Roon Control Zone, not just the same device.

1d) Adjust the remote control settings (if using)

- The OSMC remote and Flirc USB dongle are currently supported (detected automatically).
- Type the Roon control zone that the remote control should be associated with: this must be exactly as is specified in Roon settings. (Copy and paste if there is any doubt.)
- Remember to enable in **Roon Settings → Extensions**, if necessary.
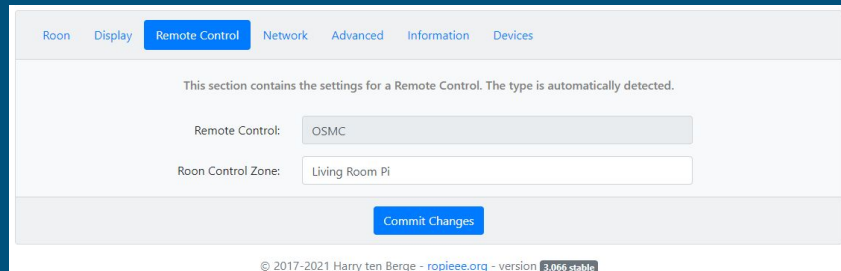
OSMC control notes

- As at RoPieee v. 282, on the OSMC remote, the play/pause button, forward, back, and volume (if applicable) buttons are active.

Flirc USB notes

- As at RoPieee v. 337, use the 'Media Keys' profile when setting up the Flirc USB dongle.

See https://flirc.tv/support/flirc-usb for Flirc support.
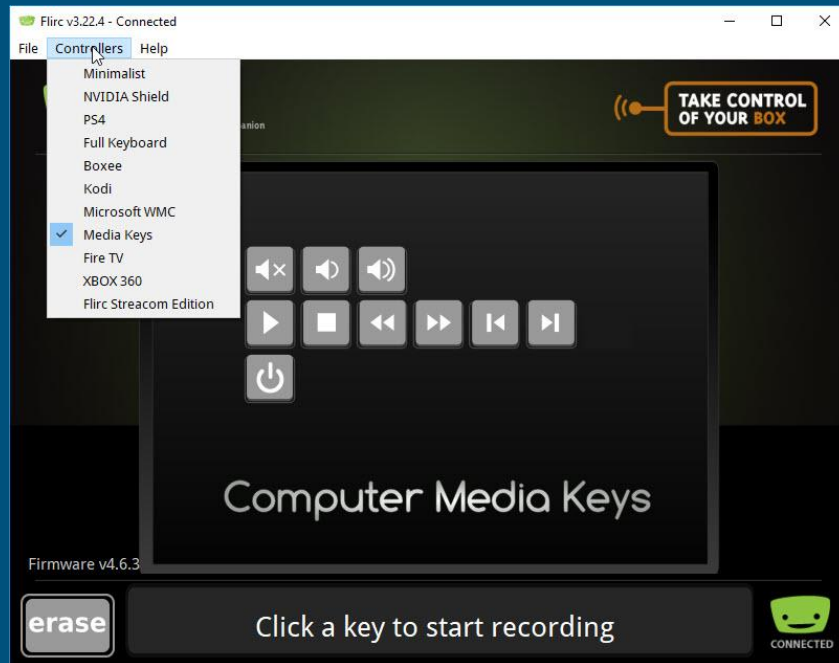
1e) Network settings

- If using WiFi or static IP, this can be configured once all of the other setup parameters are complete.
- Wireless must be enabled before it can be configured, usually requiring a reboot in between.

→ **TIP: use DHCP reservations in your router rather than using a fixed IP.**
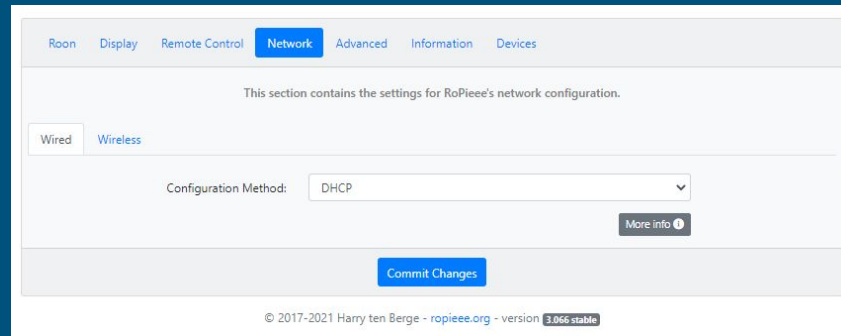
1f) Advanced settings

- The **Advanced** tab contains optional settings regarding the update or reboot schedule, and other additional functionality.
- The blinking LED on the PI can be turned off, if desired.
- The great Alarm Clock extension (@Jan_Koudijs) can be enabled and run directly from a RoPieee endpoint.
- The RoPieeeXL OS upgrade option adds other streaming functionality.

Use the "Send Feedback" button to send diagnostic logs if requested; report the unique number identifier to the Roon forum.

1g) Security settings

- The **Advanced** tab also contains some security settings that can be adjusted.
  - SSH access can be turned off to the Pi.
  - Web GUI authentication can be turned on and a password set.
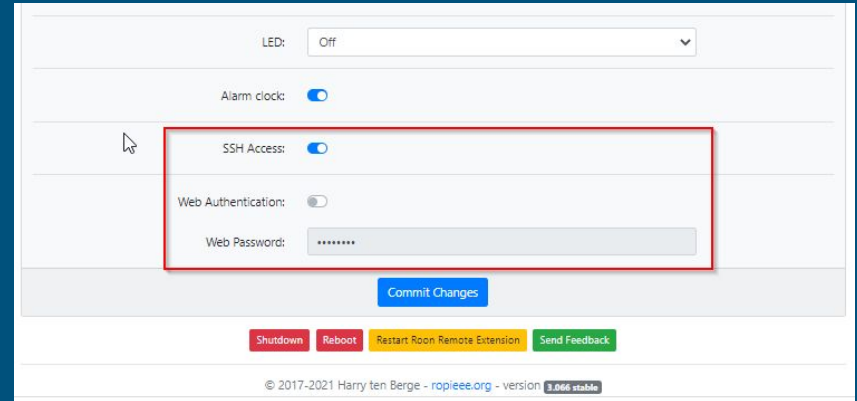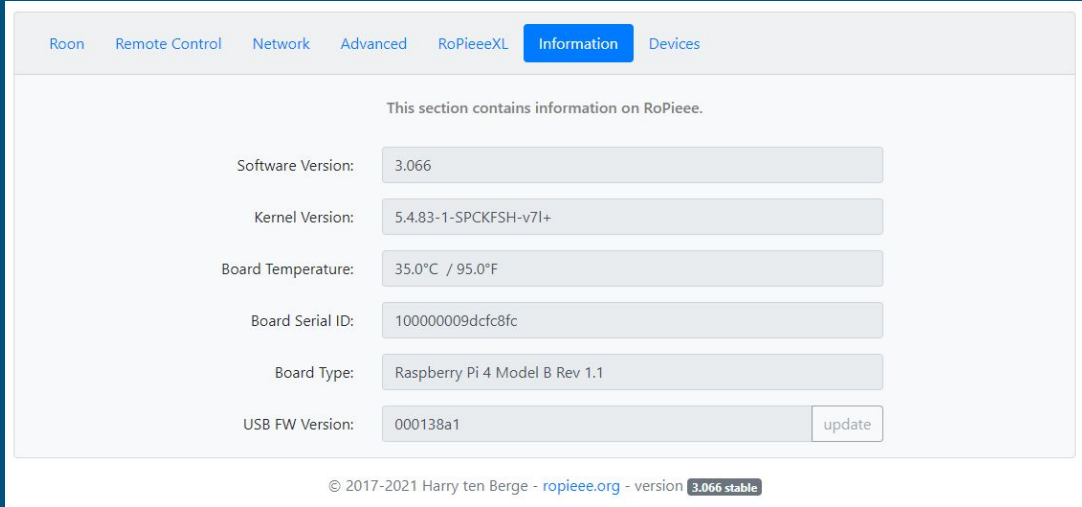
1h) RoPieeeXL tab

If you have upgraded to the RoPieeeXL version of RoPieee, the **RoPieeeXL** configuration tab is displayed next. Configuration options of RoPieeeXL are not included in the scope of this beginner's guide.

Please note that the application names listed refer to copyrighted services that cannot be displayed directly in RoPieeeXL.
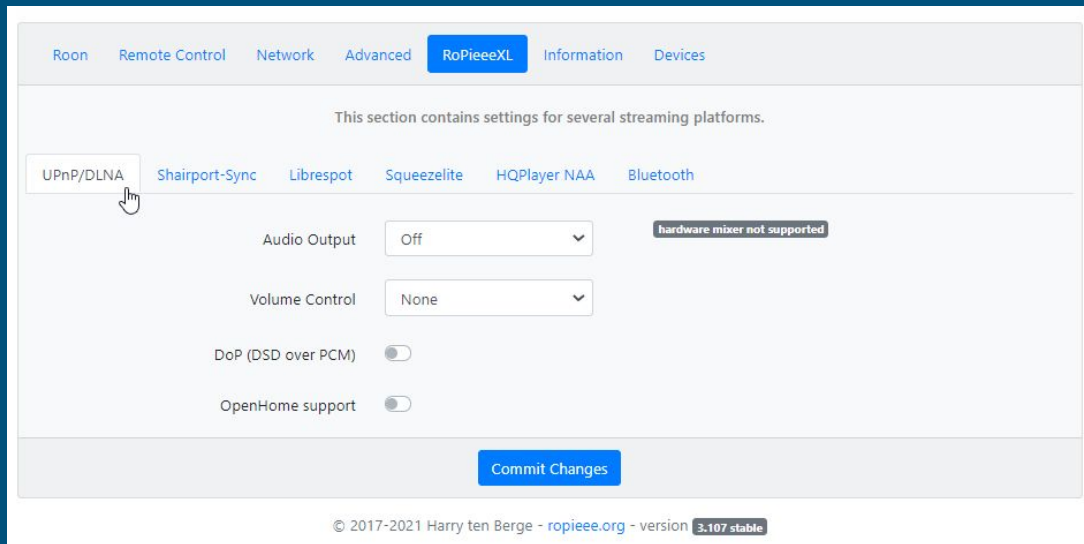
1i) Information tab

Information about the Raspberry Pi may be found in the **Information** tab. Please note that if there is a USB firmware upgrade available, it will be found here.

1j) Devices tab

If you have more than one RoPieee device in your network, the **Devices** tab will present information about each one, along with links to the respective configuration pages.

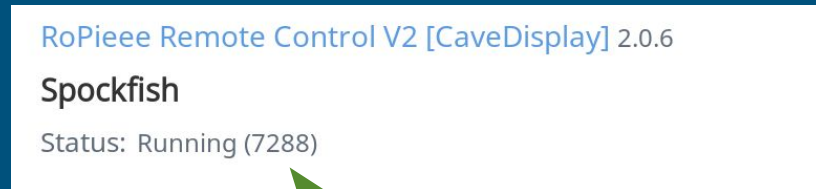If you only have one RoPieee device, the tab will not appear.

| Roon | Remote Control | Network | Advanced | RoPieeeXL | Information | Devices |

This section shows all discovered RoPieee devices in your network.

Name	IP Address ▲	Temperature	Uptime	Version
CavePi [RoPieeeXL]	10.0.1.223	42.9°C / 109.2°F	0:31	3.066 [stable]
CaveDisplay [RoPieee]	10.0.1.224	46.7°C / 116.0°F	0:25	3.066 [stable]
KitchenPi [RoPieeeXL]	10.0.1.235	34.5°C / 94.1°F	0:46	3.066 [stable]
KitchenDisplay [RoPieee]	10.0.1.236	45.1°C / 113.1°F	0:19	3.066 [stable]
LivingRoomPi [RoPieeeXL]	10.0.1.237	37.4°C / 99.3°F	0:47	3.066 [stable]
LivingRoomDisplay [RoPieee]	10.0.1.238	41.9°C / 107.4°F	0:22	3.066 [stable]
LeslieNathanClock [RoPieee]	10.0.1.240	42.9°C / 109.2°F	0:37	3.066 [stable]

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2) Enable in Roon settings

- If using as an audio endpoint, eg using a HAT (audio add-on board) or USB DAC, enable in **Roon Settings → Audio**.
  - If using an USB DAC, it must be connected to your Pi and powered on to appear in Roon settings.
  - Any installed HAT must be supported by RoPieee and specified correctly in RoPieee to appear in Roon settings.
- If using as a display, enable the RoPieee extension in **Roon Settings → Extensions**. You may need to use a PC or tablet to make this change, as some mobile devices don't display this settings area.
- If using the remote control, this may need to be enabled in **Roon Settings → Extensions** if it hasn't been already (eg as a display too).

What is typed in RoPieee settings must match exactly what is defined in Roon Settings → Audio.

roon   KitchenPi   10.0.1.235   Linux 4.14.76-1-SPO...H

snd_rpi_hifiberry_digi
ALSA

Zone Name

Kitchen Pi

RoPieee Remote Control V2 [CaveDisplay] 2.0.6

Spockfish

Status: Running (7288)

Number of seconds since last extension start.

3) Display settings

- The following display settings are accessed by tapping the lower right corner of the physical display:
    - Screen brightness (turn down to reduce power requirements).
    - Clock brightness.

⟶ **To adjust most other display settings, use the Display tab.**

Troubleshooting

Potential installation problems

- Using a display and it doesn't seem to work?
  - Make sure you are using the official Raspberry Pi 7" Display, and make sure that it is connected during the initial software install (if not, simply re-flash).
  - Make sure the Roon Control Zone is spelled exactly the same: copy and paste the value if there is any doubt.
- Is the Raspberry Pi not seeming to boot? Maybe the LED is blinking 7 times on and off?
  - Ensure that the Raspberry Pi is a supported model, eg a 2, 3, or 4 (not an earlier model).
- Is the install process seeming to fail?
  - Check your DNS settings, and check for basic networking connectivity, including being connected via Ethernet. RoPieee needs to download critical components during the initial install.
- Is the RoPieee endpoint not showing up in Roon?
  - Check that your USB DAC is attached and powered on, if using, or that your HAT is supported by RoPieee.
  - Verify that the RoPieee settings for USB/HAT are set correctly.

Potential installation problems (2)

- Do you have a recently manufactured Pi4 and an expected feature isn't available (like bluetooth support in RoPieeeXL)?
  - It may be that RoPieee needs to be updated with the new hardware CPU revision codes in order to identify the device correctly. Send feedback via the Roon forum and this will get fixed.
- Did you remember to enable the RoPieee extension, if applicable?
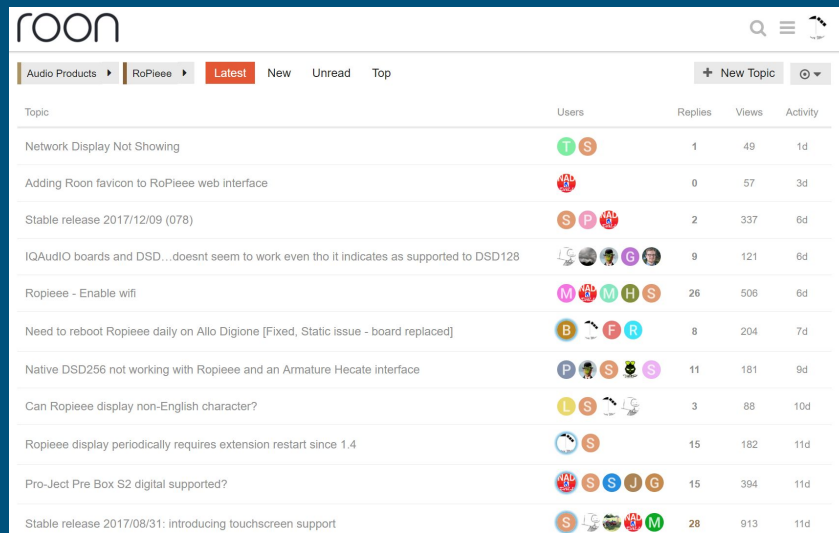
Other diagnostic steps

- Re-flashing your microSD card is always a good first step, in case of file or card corruption, after first trying a few reboots (both the Pi itself and the Roon Core).
- Also, take note of the status LED: is it flashing at ½ Hz (good) or faster (install still in progress)?
- Sometimes rebooting your Roon Core on its own is beneficial, especially for display update issues.
- If networking seems to be the issue, rebooting your network infrastructure, from the core router outwards, is occasionally helpful.

Getting Help

For technical support or RoPieee questions, see the RoPieee section in the Roon forum:

https://community.roonlabs.com/c/audio-products/ropieee

Submitting feedback

In some cases, you may be asked to submit technical feedback (logs and such). This can be done via the **Advanced** tab.

Be sure to capture the **unique identifier** when posting back to the Roon forum.
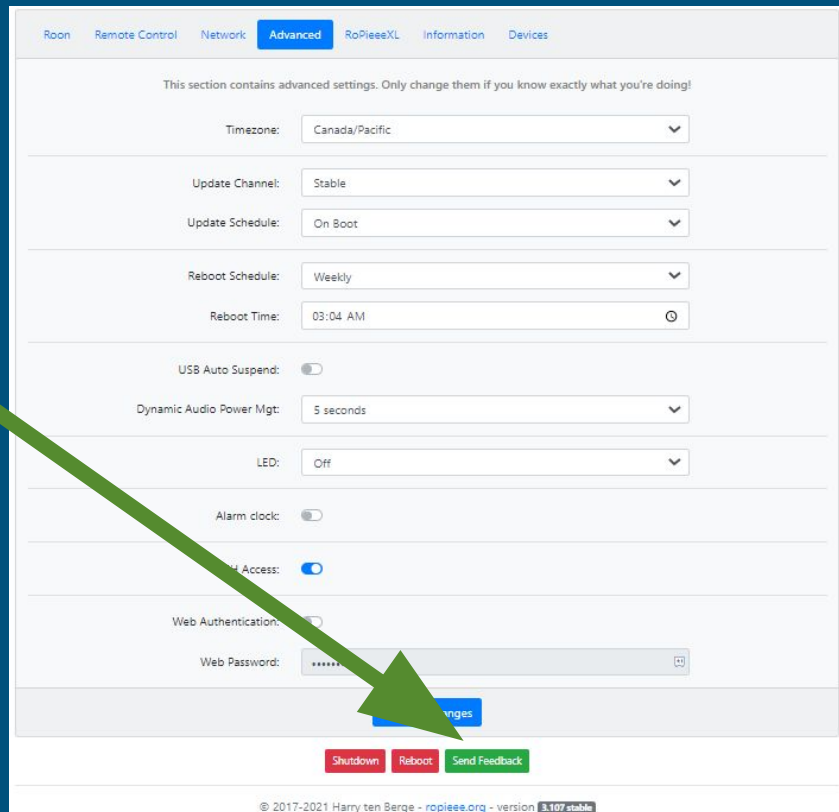
Donate

RoPieee is a volunteer-led project (thank you @spockfish), with hosting and other direct costs. If you use RoPieee, please consider contributing on an annual basis:

https://ropieee.org/donate/

RoPieee

Enjoy the music!