

# README - P44-LC-PANEL pilot

## Context

[plan44.ch](https://plan44.ch) produces *and lives from selling* ready-to-use digitalSTROM gateway products, the P44-DSB series, and standalone light and automation controllers, P44-LC and P44-AC series, focusing on DALI, EnOcean, and hue components.

**Starting with version 1.7.0, all P44-LC devices have beta support for the new matter home automation standard, see <https://plan44.ch/matter>.**

Starting with beta 1.8.2.8, P44-LC devices **can also take control of digitalSTROM devices** at the dS485 level and provide full matter bridging.

The current P44 products are based on hardware developed by plan44, but all use OpenWrt as the operating system, which also runs on the RaspberryPi (see free [P44-DSB-X](#) and [P44-LC-X](#) images)

## P44-LC-PANEL pilot

plan44 is working to leverage new platforms for future P44-xx devices, and Rockchip rv1106 is among the hot candidates for future products.

To explore rv1106 better and to work on OpenWrt for it, plan44 makes use of various Luckfox dev boards. In particular, the [Luckfox Pico 86 panel](#) is interesting as it has a rv1106 based SoM in a nice case with a touchscreen, ethernet, two relays and RS485. So plan44 uses this as a pilot platform for upcoming products - and you can do that, too!

Installing the P44-LC-PANEL images on a Luckfox Pico 86 panel makes it a full featured smart home automation controller, providing custom configurable UI via the touch screen and lvgl, and matter bridging for integration with controllers such as Home Assistant, IKEA dirigera, Apple, Google, Alexa, SmartThings etc. The RS485 interface is configured as DMX512 for controlling lights by default, but can also be used for modbus RTU or other serial protocols.



The controller functionality is implemented in the plan44 **vdcd**, a GPLv3 open source (<https://github.com/plan44/vdcd>) implementation originally developed for digitalSTROM interfacing, but grown far beyond by now. For becoming a standalone controller, the **--localcontroller** command line option enables local "zone" and "scene" management, so vdcd becomes a small but full-featured home automation solution.

vdcd can team up with **p44mbrd** (<https://github.com/plan44/p44mbrd>), a **generic matter bridge** linux daemon, which uses vdcd's bridge API to bridge devices to matter. The **bridge API** of vdcd can also be used to make one vdcd's locally controlled devices available in another vdcd instance (see **--proxydevices** vdcd command line option) - this can be useful for more complex setups that need multiple controllers.

## P44-xx features

In the Luckfox panel, the available hardware interfaces are limited. But the rv1106 based SoM has many hardware outputs that could be used, with a bit of DIY (for example it is possible to repurpose the relay0 GPIO to drive WS28xx LEDs). Even without hacking, P44-xx can interface with many socket or http accessible devices (shelly etc.) by using the built-in p44script IDE, building a bridge between cool DIY things and a matter smarthome. Also, controlling hue lights is a built-in standard feature.

Some of the building blocks it provides:

- **button devices** based on **onscreen buttons** or digital hardware inputs such as **GPIO** or **i2c port extender chip pins** with built-in detection of single, double, triple, quadruple-clicks to directly call scenes, as well as click-and-hold for dimming, not only brightness, but any device channel, such as color.
- fully functional **dimmed lights** based on **i2c connected PWM chips** or **DMX512** devices directly connected to a RS485 UART (as available on the Luckfox 86 panel).
- fully functional **color lights** (RGB, RGBW or even RGBWA) based on i2c PWM or **DMX512**
- **switching outputs** (e.g. the two on board relays) based on **GPIO** or **i2c port extenders**
- **sensors** based on analog inputs or scripted calculations.
- **scripted devices** using the built-in p44script language to integrate devices and services e.g. via http REST APIs, websockets, MIDI, serial ports (UART), UDP packets, i2c, SPI, modbus and even a number of highly exotic special purpose "features" (drivers for things like Swiss Railway splitflap displays, RFID readers). See the plan44 techdocs at <https://plan44.ch/p44-techdocs>..
- All these devices can be **directly controlled** via the Web-UI, **grouped** into "zones", **orchestrated** via "scenes" and **automated** via "triggers" that can respond to input signals, sensor values, various other events and also date and time (including time relative to sunrise/sunset).
- much more...

# A P44-xx for Makers

So, besides being a pilot for future plan44 commercial products, a Luckfox pico panel86 is also a **great starting point for learning p44script** and use it to build your own solution. I really want to encourage this, so that's what the P44-LC-PANEL pilot image is about (the same way as the P44-DSB-X and P44-LC-X allows DIY on Raspberry Pi).

Notes:

- You need a Luckfox Pico Panel86 (also called "Luckfox Core1106 Smart 86 Box Development Board"): <https://www.luckfox.com/Luckfox-Pico-86-Panel>
- This firmware image is not a product, plan44 cannot provide **commerical official support** for it. Of course, feedback by email and true questions are welcome - but not those of the "I'm too lazy, make my stuff work for me, fast!" type ;-). Also have a look at the plan44 forum (see below).
- DIY devices are not *entitled* to get all one-click online updates (but usually, these *are* made available).

## How to flash

- **Flash on your own risk! This is a pilot beta firmware, plan44 cannot give any guarantees!** However, as long as you don't flash the bootloader, you should always be able to restore the official luckfox images in case something goes wrong.
- Flash the **boot.img**, **rootfs.img** and **env.img** images from this archive to the corresponding partitions of the eMMC. See LuckFox Wiki on details. <https://wiki.luckfox.com/Luckfox-Pico-RV1106/Luckfox-Pico-86-Panel/Flash-image>.
- You still need the **download.bin** from the official Luckfox downloads
- You can use the proprietary Rockchip SocToolKit.exe or upgrade\_tool as described in the Luckfox Wiki.
- You can also use the open-source rkdeveloptool (<https://github.com/rockchip-linux/rkdeveloptool>) - when you are on macOS, you might prefer my slightly updated version: <https://github.com/plan44/rkdeveloptool> which builds and runs on modern Apple Silicon macs. With rkdeveloptool, the flashing commands are as follows:

```
# use download.bin from official Luckfox SDK
rkdeveloptool db download.bin
# use env, boot, rootfs from P44-xx Openwrt builds
rkdeveloptool wl 0x0 env.img
rkdeveloptool wl 0x640 boot.img
rkdeveloptool wl 0x190640 rootfs.img
# reset/restart the flashed device
rkdeveloptool rd
```

## How to use

- Connect the Panel86 to your LAN (**must have DHCP**)
- Connect power **and wait ~1 min** for the UI to appear.
- If everything is ok, you'll get the UI as shown in the picture above, with a clock, two buttons for operating the relays and a slider for DMX channel #1.
- More precisely, the buttons are **switching the light room state** of "RoomA" and "RoomB", in which the relay devices are placed by default. Also, the slider is a **room dimmer** for the "DMX"

room, which has one single-channel DMX light by default. You can re-assign all of this in the Web-UI - it's not just a simple demo app, **but a real smarthome controller!**

- To **get to the web interface** for inspecting, configuring and programming (built-in IDE!) the device, you can scan the QR code. The webUI is usable, but far from ideal on phones, works much better on a tablet or desktop. Or just use the IP address displayed as `http://ip.ip.ip.ip` URL in your browser.
- If you are on macOS, you can use a tool like (plan44's) [LocalSites](#) app, or another DNS-SD browser to conveniently discover the P44-LC-PANEL web interface. On Linux, use **avahi-browse**. On Windows, the P44-LC-PANEL should show up in the **network neighbourhood** via uPnP-SD.
- The **default login** for the P44-LC-PANEL webinterface is *p44ladmin* (both user and pw)
- **You can login via ssh as root with password *eXperiment*** - you should change this when your device is accessible from the open internet! The ssh service is also advertised via DNS-SD, so in macOS Terminal.app you can see and select it in the "New Remote Connection..." window.
- You can access the serial console as described in the luckfox wiki: <https://wiki.luckfox.com/Luckfox-Pico-RV1106/Luckfox-Pico-86-Panel/Login/#25-serial-login-case-removal-required> (Note: the ADB bridge related info does not apply, only direct serial port and ssh works)
- Note: **Wifi is not yet supported**, this will come in a future firmware release (for the Luckfox panel with wifi hardware). For reliable home automation, ethernet is better, anyway ;-)
- For basic information about the operating concept (zones, scenes, devices, triggers), have a **look at the P44-LC product manuals**, available from <https://plan44.ch/automation/p44-lc-de.php>. Your P44-LC-PANEL does not have DALI or EnOcean (so you can skip these paragraphs), but it does have hue support and everything else described in that manual.
- For technical information, in particular regarding the p44script language, visit <https://plan44.ch/p44-techdocs>. There are tutorials for simple and advanced P44-LC-X based projects, and there is a lot of reference information and examples in English and German. Most of it applies to the P44-LC-PANEL as well.
- The OS on the P44-LC-PANEL is a customized OpenWrt with little packages installed. So you can use it more or less like a regular OpenWrt on the command line. The default feed URLs point to the plan44 server providing the packages specific for the P44-LC, but you can add feeds like on any other OpenWrt box. See <https://openwrt.org> for general information about the OpenWrt embedded Linux distribution.

## How to participate

- Use it! This already makes you part of the P44 device community :-)
- Ask questions, present your projects in the plan44 community forum <https://forum.plan44.ch/>
- Improve it - **vdcd** is Open Source on github <https://github.com/plan44/vdcd>, as well as the **plan44 OpenWrt** feed at <https://github.com/plan44/plan44-feed> and the **p44mbrd matter bridge**, see <https://github.com/plan44/p44mbrd>.
- Provide feedback (in the [forum](#), via email to [automation@plan44.ch](mailto:automation@plan44.ch), pull requests in [github](#), [@plan44@social.tchncs.de](https://social.tchncs.de) on Mastodon)