# README - P44-DSB-X

Context

plan44.ch produces *and lives from selling* ready-to-use Digital Strom gateway products, the P44-DSB-DEH(2) and the P44-DSB-E(2) (currently). There's also a standalone DALI/EnOcean light controller P44-LC-DE, and several custom devices for smart LED chain applications (e.g. P44-LC-LED, P44-LC-E+L)

Starting with beta versions 2.7.0.x, P44-DSB devices also have support for the new matter home automation standard, see https://plan44.ch/matter.

While current P44 products are custom hardware, the P44-DSB-E was just a standard RaspberryPi, equipped with a EnOcean module and pre-installed firmware. The price you paid for a P44-DSB-E was not primarily for the hardware, but for the effort around to make it ready to use, to support it, to provide one click firmware updates and improve the software.

The firmware is based on OpenWrt (since version 1.9.3.0, before it was based on a stripped down Raspian), and is running the components needed for making it a Digital Strom gateway. In particular, this is the plan44 **vdcd**, an GPLv3 open source (https://plan44.ch/opensource/vdcd) implementation of multiple "virtual device connectors" (vdc) instances.
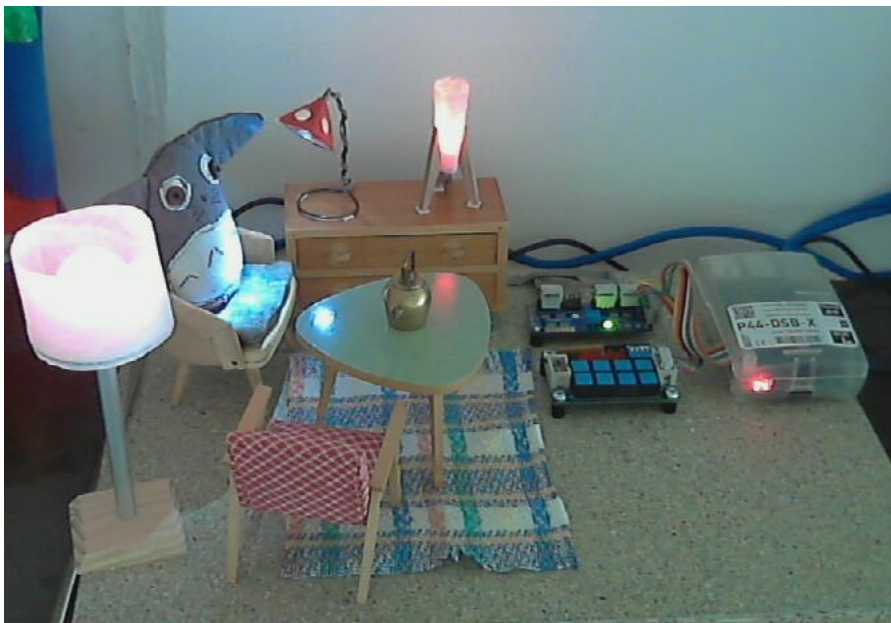
a P44-DSB-X controlled dollhouse living room

vdcd

Of course, the vdcd project needs to contain vdc implementations for DALI, EnOcean and hue as supported by the P44-DSB-DEH2 and P44-DSB-E2 products.

However, vdcd has to offer a lot more, in particular for people willing to experiment and build their own stuff:

- fully functional Digital Strom **button devices** based on digital inputs such as **GPIO** or **i2c port extender chip pins**.

- fully functional Digital Strom **dimmers** based on **i2c connected PWM chips** or **DMX512** devices via OLA (http://www.openlighting.org/, using a external USB-to-DMX adapter, e.g. DMXKing).

- fully functional **color lights** (RGB, RGBW or even RGBWA) based on i2c PWM or DMX512, or even more fancy "lamps" like the MessageTorch (https://github.com/plan44/messagetorch)

- **color LED chains** (WS2812 compatible chips) can be connected directly (data for WS28xx chain at RPi P1 connector pin 12 = PWM = GPIO18) and segments and areas with soft edges can be defined to be Digital Strom color lamps. To see what's possible with the **p44lrgraphics** subsystem that powers color LED chains, see this youtube video: https://youtu.be/vLZRrn7Mh5I and have a look at the plan44 techdocs at https://plan44.ch/p44-techdocs.

- **switching outputs** (like black joker terminal block) based on **GPIO or i2c port extenders**

- **scripted devices** using the built-in p44script language to integrate devices and services e.g. via http REST APIs, websockets, 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.

- **external device API** to create devices as external scripts or programs which connect via a socket to the vdcd. See the plan44 techdocs at https://plan44.ch/p44-techdocs.

A P44-DSB for Makers

So, besides being the base for plan44 commercial products, a RaspberryPi running a vdcd is also a great starting point for experiments extending what can be done with Digital Strom for people who want to *make* things themselves. I really want to encourage this, so that's what the P44-DSB-X is about.

The P44-DSB-X is a firmware image, which can be put on a SD card turning a RaspberryPI B, B+, 2 B v1.x and Rpi 3 into an almost ready to use variant of the P44-DSB-E!

- You just need to buy a Raspberry, a SD card, and copy the firmware image to a SD card!

- No EnOcean support configured. It's not forbidden and entirely possible to enable it if you dig in deep enough (if you don't want to do that - buy a P44-DSB-E2...)

- **No official support.** 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 ;-)

- No one-click online updates guaranteed (there will be some, from time to time, but there's no entitlement to get them all).

- Version for Onion Omega2 (that's what is inside the P44-LC) is planned.

- Beta versions with matter support available for download from https://plan44.ch/automation/p44-dsb-x.php

How to use

- Flash the **correct** image (the RPi B+ image does not run on Rpi 2/3 and vice versa!) onto a SD card of at least 1GB size. A good tool for flashing SD cards on all platforms is Etcher (https://etcher.io/)

- Insert SD card into a RaspberryPi, Model B, B+, 2+ or 3+ **(RPi 4 is not yet supported by OpenWrt at the time of writing)**

- connect to your LAN (must have DHCP)

- connect power **and wait ~1 min** (if you have connected a HDMI screen, you can watch the boot process). **Note**: after very first boot, reboot the device once again, because some configuration becomes active only then.

- if there is a dSS version >=1.13 in your LAN, **it will find and automatically connect the P44-DSB-X** (you'll see it in the dSS Configurator Hardware tab)

- There's the P44-DSB-X configuration website available on port 80 **(default user/pw = vdcadmin)**

- **You can login via ssh as** *root* **with password** *eXperiment* - you should change this when your RPi is accessible from the open internet! The ssh service is also advertises via DNS-SD, so on macOS you can see it in the "New Remote Connection…" window.

- Using the "+ Device" button in the P44-DSB-X configuration, you can add DMX512, GPIO, LED, spi and i2c devices.

- For technical information, in particular regarding the p44script language, visit https://plan44.ch/p44-techdocs where a lot of reference information and examples in English and German is provided.

- Currently supported i2c chips are the TCA9555 (16 digital I/O, e.g. http://shop.e-lab.de/de/Module/Boards/I2C/I2C-DigIO), PCF8574 (8 digital I/O, e.g. http://www.ereshop.com/shop/digital-outputs-c-143_182/) and PCA9685 (16 channel 12bit PWM, e.g. http://www.play-zone.ch/de/adafruit-16-channel-12-bit-pwm-servo-driver-i2c-interface-pca9685.html), MCP23017 (16 digital I/O), LM75 (temperature sensor).

- Currently supported SPI chip is MCP23S17 (16 digital I/O, as used in PiFace 2), MCP3008 (8 analog inputs), MCP3002 (2 analog inputs).

- The OS on the P44-DSB-X 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 OLA (for DMX512) website is available at port 9090

- The vdcd drives the DMX universe number 42, so to use DMX, you need to create universe 42 in OLA connected to your DMX512 output device.

How to participate

- Use it! This already makes you part of the virtual Digital Strom 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.

- Provide feedback (automation@plan44.ch email, pull requests in github, @plan44ch on twitter)