The WAZIUP LoRa IoT kit

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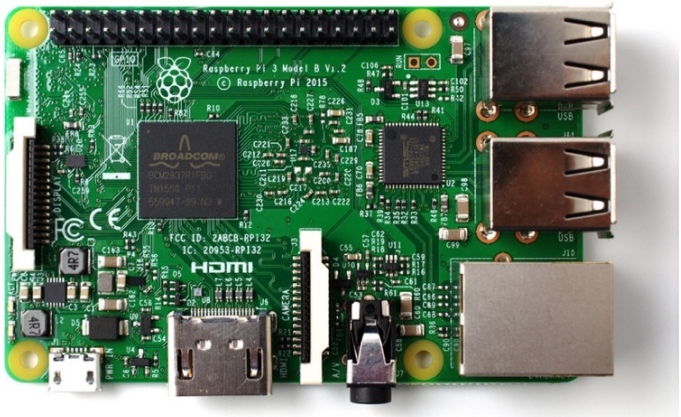
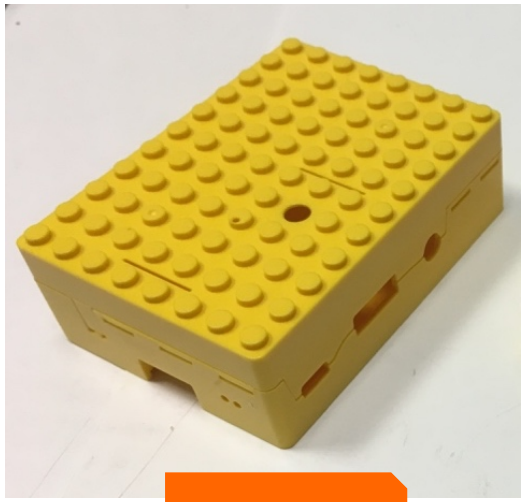
Contents

- We will show how to install/configure/use the WAZIUP LoRa IoT kit. The kit consits of
- A pre-configured LoRa gateway
  - The gateway will send data to the WAZIUP platform
  - The gateway will also send data to a ThingSpeak demo channel
- A pre-configured end-device
  - Equipped with a temperature sensor
  - When powered on, sends every 10 minutes a measure to the gateway
  - Has built-in low-power management: can run about 1 year with 4 AA batteries

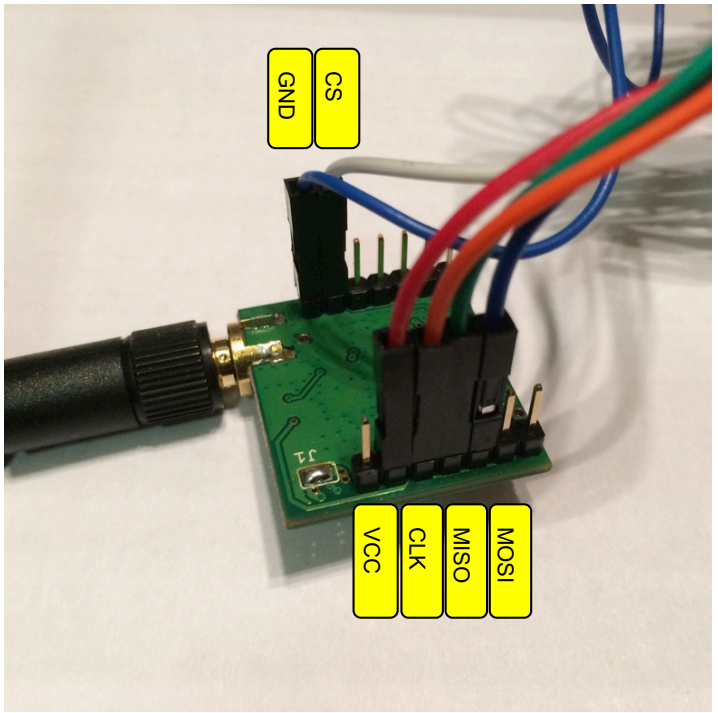
THE GATEWAY PARTS



Raspberry PI 3



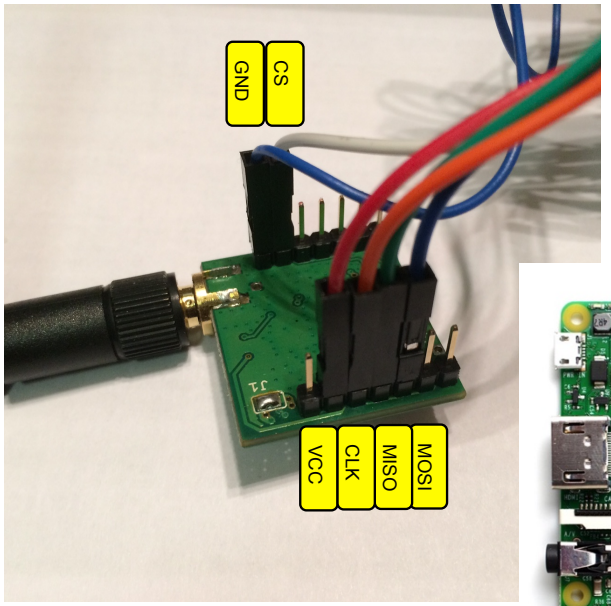
The case

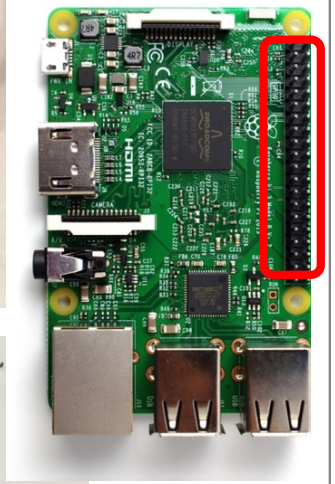


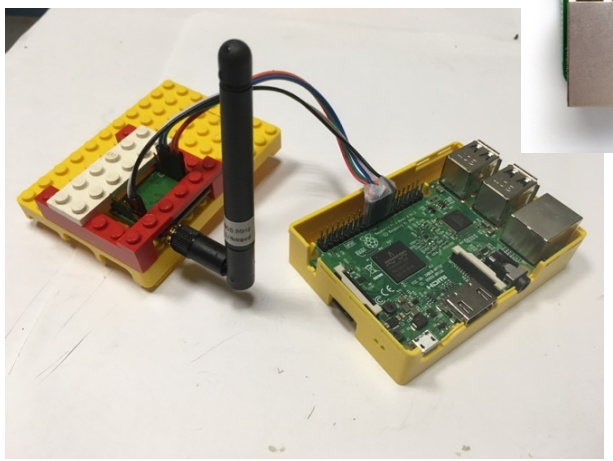
The LoRa radio module

The SD card

Connecting the radio module







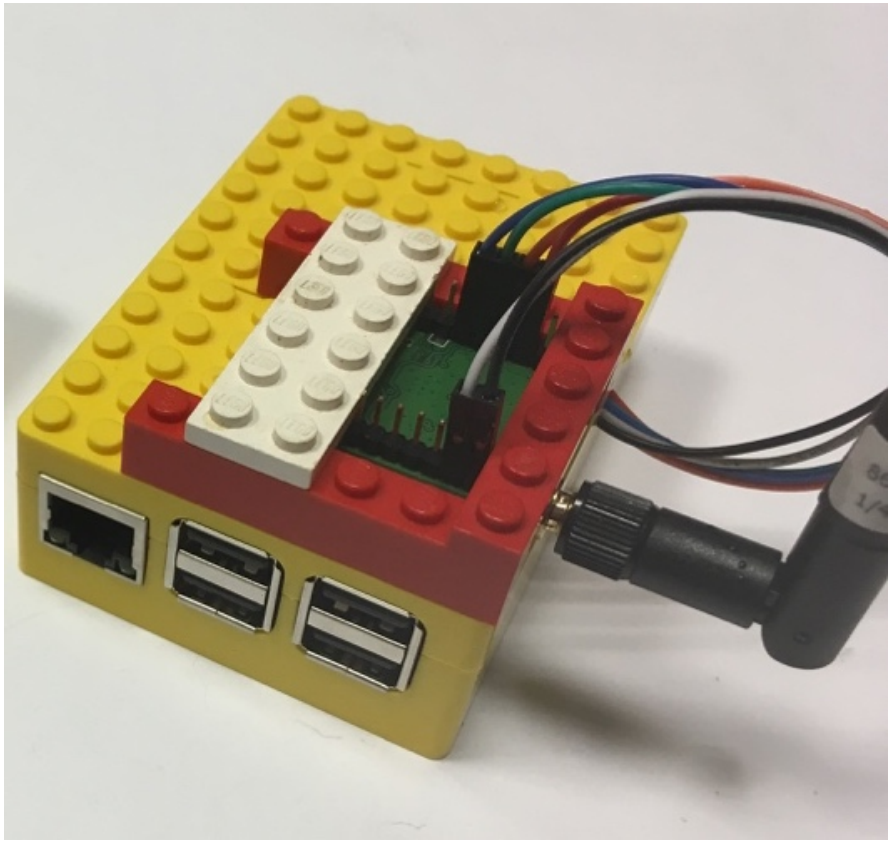
Raspberry Pi2 GPIO Header

Pin#	NAME		NAME	Pin#
01	3.3v DC Power		DC Power 5v	02
03	GPIO02 (SDA1 , I²C)		DC Power 5v	04
05	GPIO03 (SCL1 , I²C)		Ground	06
07	GPIO04 (GPIO_GCLK)		(TXD0) GPIO14	08
09	Ground		(RXD0) GPIO15	10
11	GPIO17 (GPIO_GEN0)		(GPIO_GEN1) GPIO18	12
13	GPIO27 (GPIO_GEN2)		Ground	14
15	GPIO22 (GPIO_GEN3)		(GPIO_GEN4) GPIO23	16
VCC	3.3v DC Power		(GPIO_GEN5) GPIO24	18
MOSI	GPIO10 (SPI_MOSI)		Ground	20
MISO	GPIO09 (SPI_MISO)		(GPIO_GEN6) GPIO25	22
CLK	GPIO11 (SPI_CLK)		(SPI_CE0_N) GPIO08	CS
GND	Ground		(SPI_CE1_N) GPIO07	26
27	ID_SD (I²C ID EEPROM)		(I²C ID EEPROM) ID_SC	28
29	GPIO05		Ground	30
31	GPIO06		GPIO12	32
33	GPIO13		Ground	34
35	GPIO19		GPIO16	36
37	GPIO26		GPIO20	38
39	Ground		GPIO21	40

Rev. 1
26/01/2014

http://www.element14.com

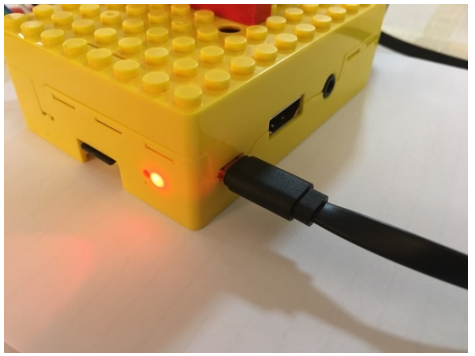
What you should get



Place the RPI3 in the case and insert the SD card

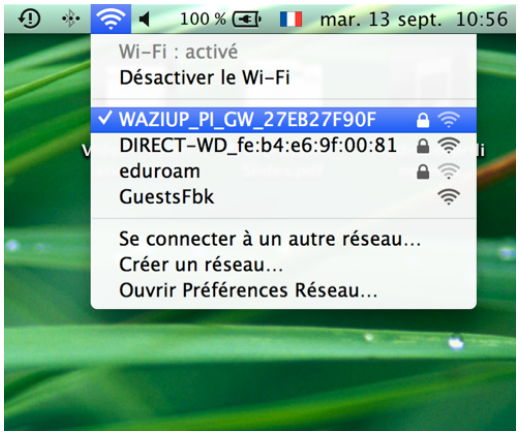
CONNECTING & POWERING THE GATEWAY

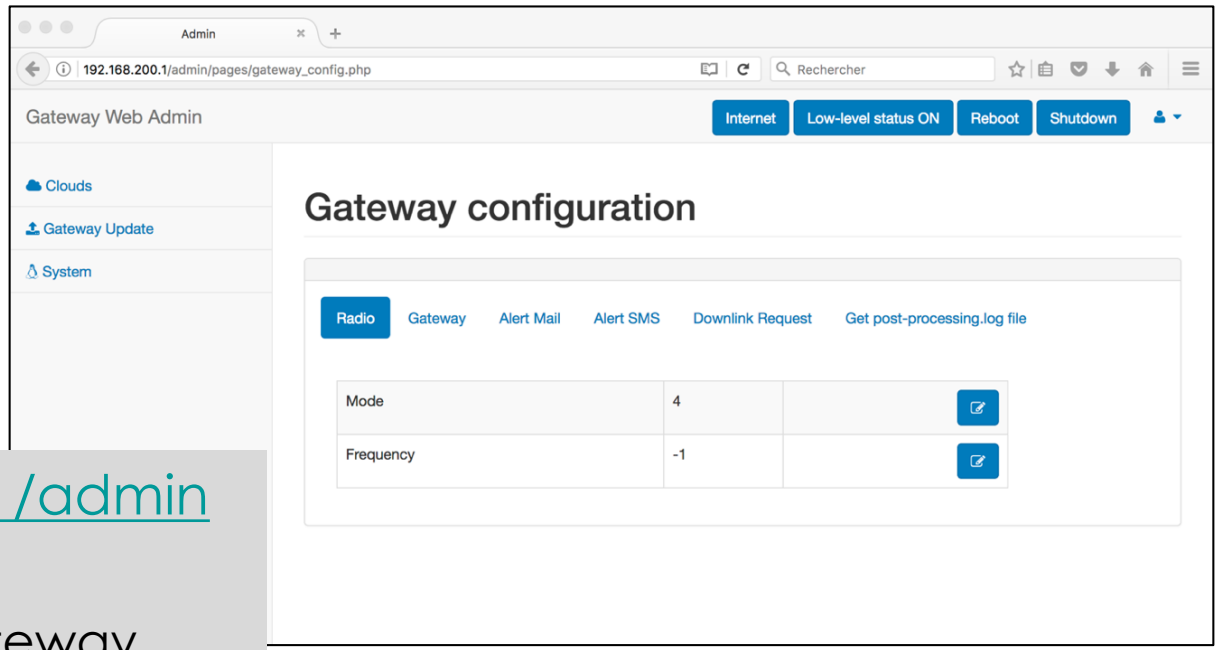
- Connect the gateway with an Ethernet cable to your LAN that provides DHCP
- Alternatively
  - Configure a laptop to share a WiFi Internet connection on its Ethernet port
  - Connect the gateway to your laptop with an Ethernet cable
- Power the gateway with a USB cable connected to a 5V adaptor or a USB entry (e.g. laptop)
- Wait about 1 minute for the gateway to boot
- The gateway should get an IP address from your LAN/laptop DHCP server
- Normally the gateway has now Internet access
- Use dedicated tool to discover the gateway IP address
  - Angry IP scanner (MacOSX)



CONNECT TO THE GATEWAY THROUGH WIFI

- The gateway is also configured as a WiFi access point with address 192.168.200.1
- Select the WAZIUP_PI_GW_xxxxxxxxxx WiFi
- WiFi password is loragateway

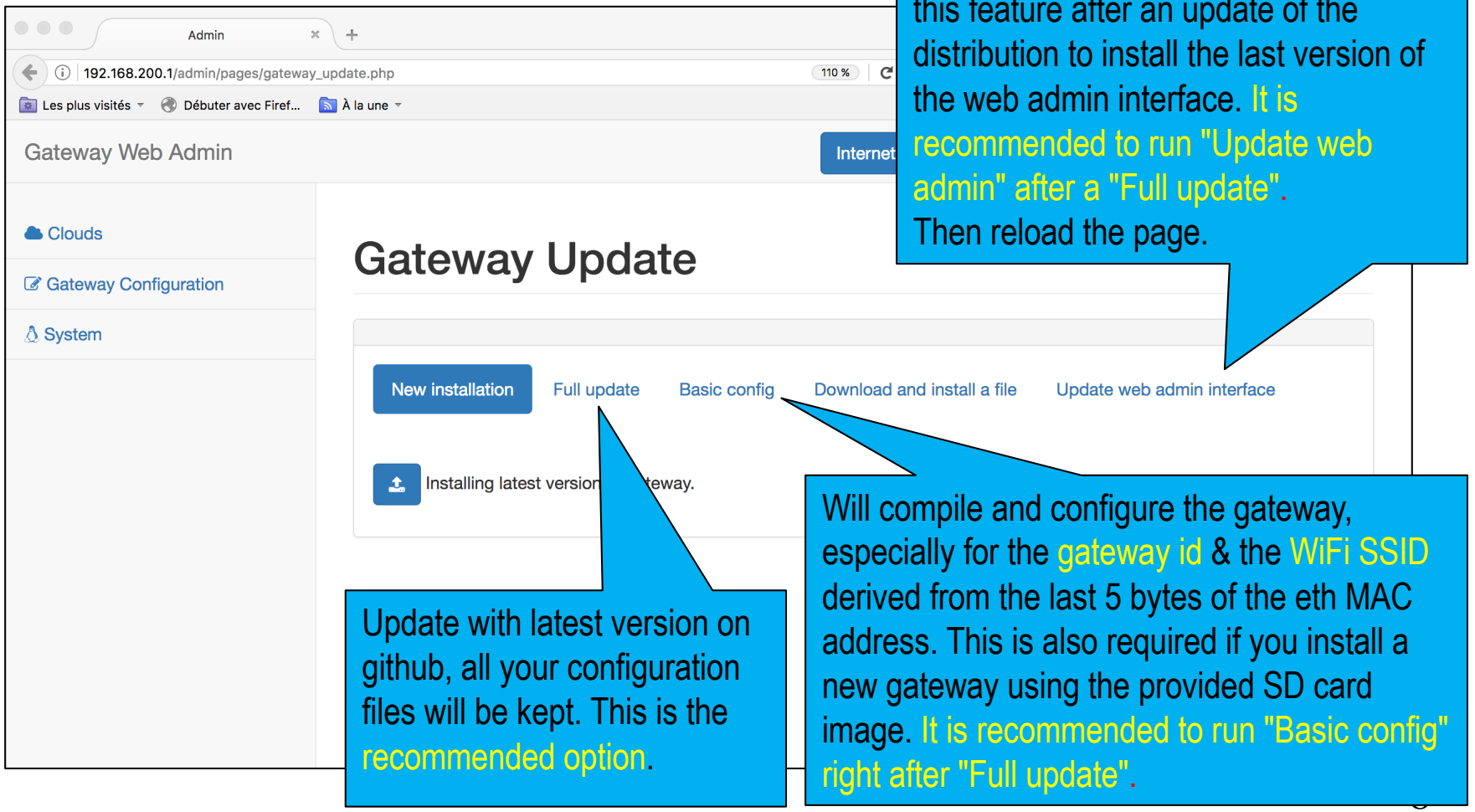




- http://192.168.200.1/admin
  - Login: admin
  - Password: loragateway

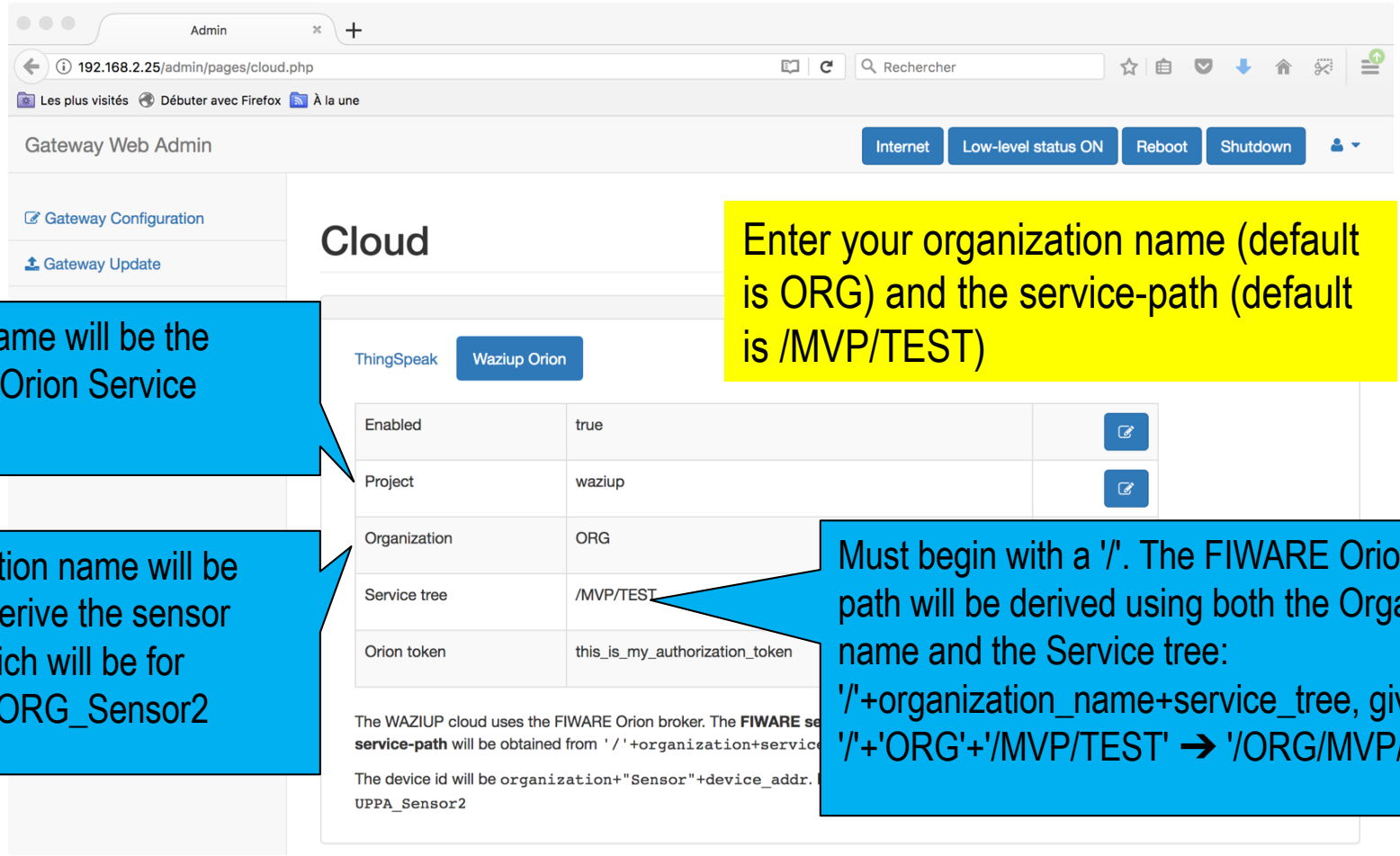
UPDATING THE GATEWAY

- Gateway update section

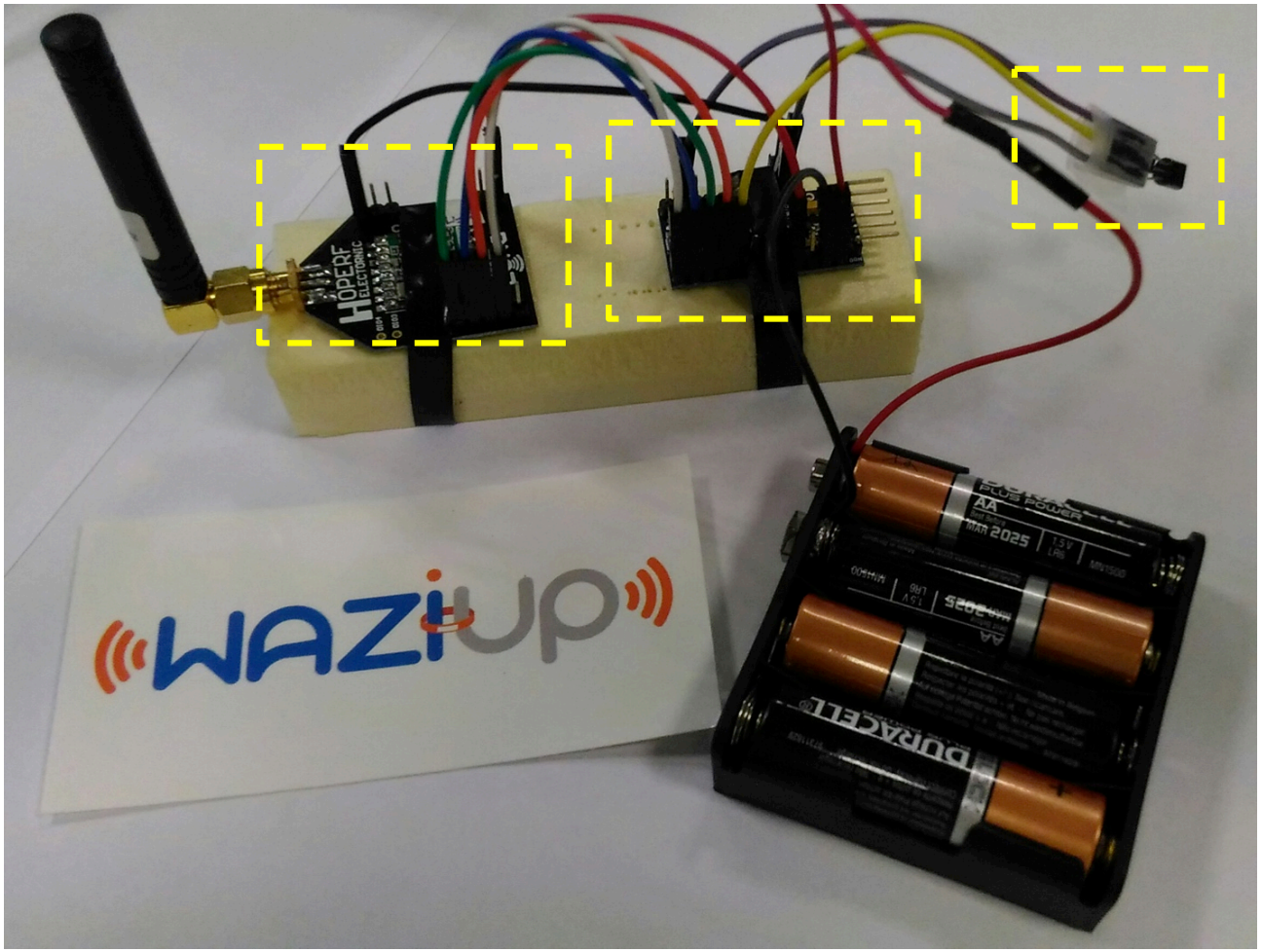


CONFIGURE WAZIUP CLOUD

- Configuring WAZIUP Orion cloud

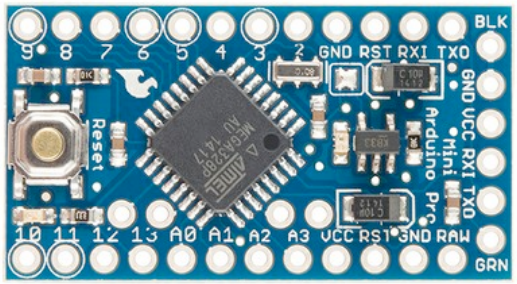


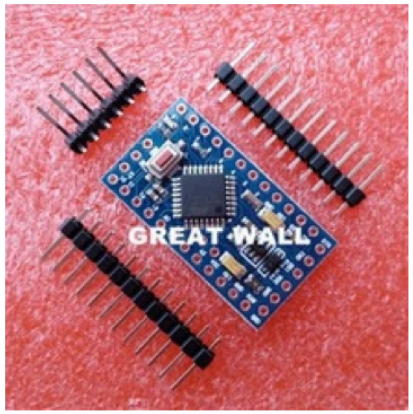
The IoT demo end-device



Arduino Pro Mini with LoRa radio module & temperature sensor

The IoT end-device hardware platform

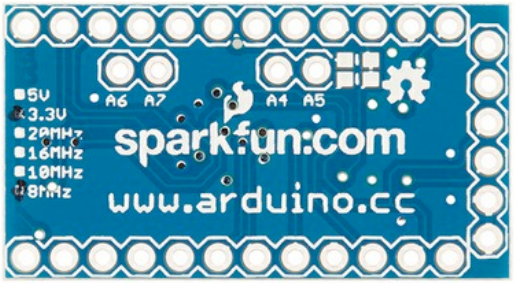




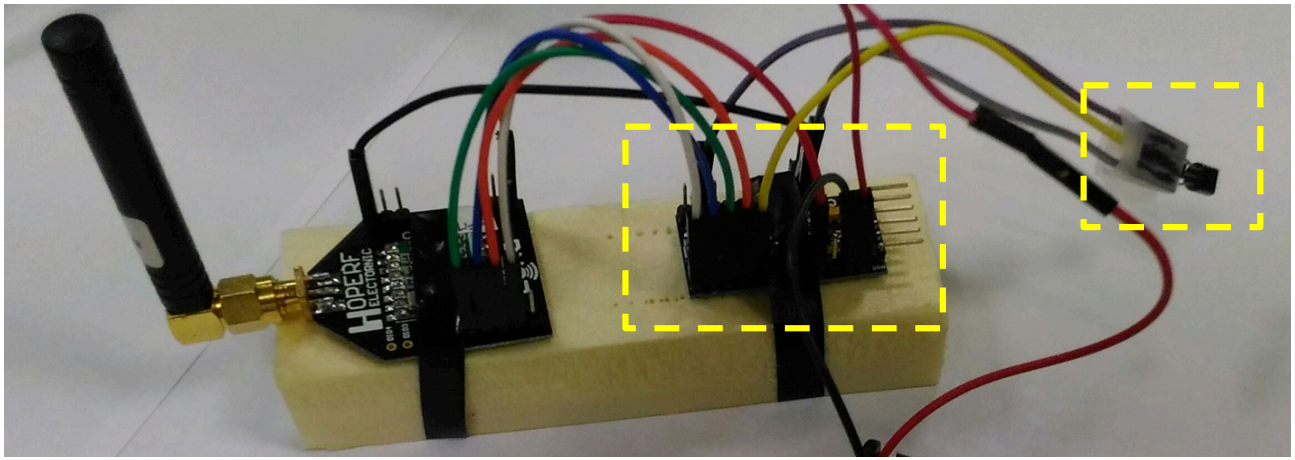
With the bootloader 1pcs **pro mini** atmega328 **Pro Mini** 328 **Mini** ATMEGA328 3.3V/8MHz for **Arduino**

GREAT WALL Electronics Co., Ltd.

Chat now!

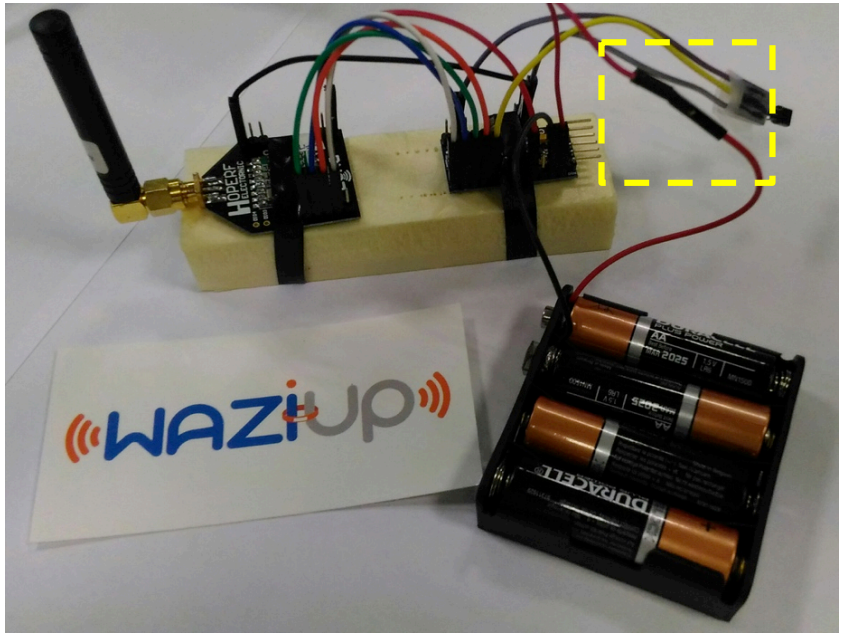


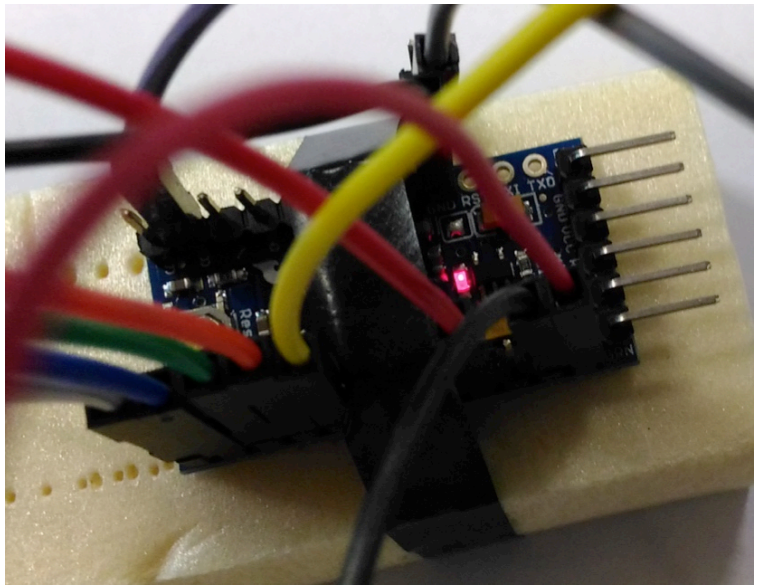
Arduino Pro Mini in the 3.3v and 8MHz version: ~2€



SWITCH ON THE END-DEVICE

- Put 4 AA batteries in battery pack if needed
- Connect the 2 floating VCC wire (red), don't touch the end side connected to the board
- Check that power led of the board is on



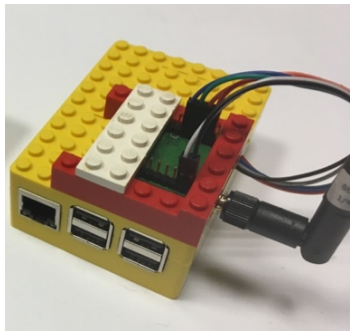


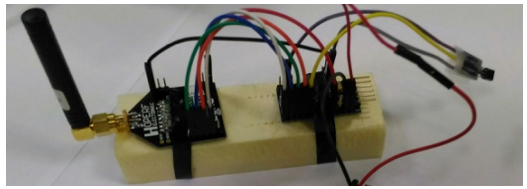
End-device behavior

- Once switched on the end-device will
  1. Initialize the radio
  2. Take a measure (temperature)
  3. Send the measure to gateway

  } Takes about 4s

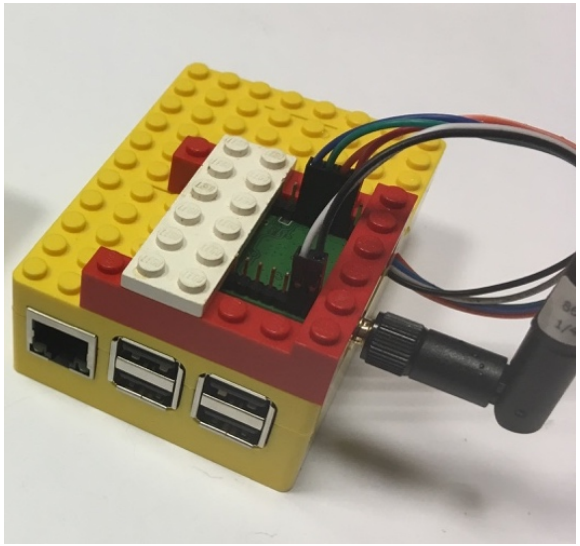
  4. Go to sleep for 10 minutes and repeat from step 2



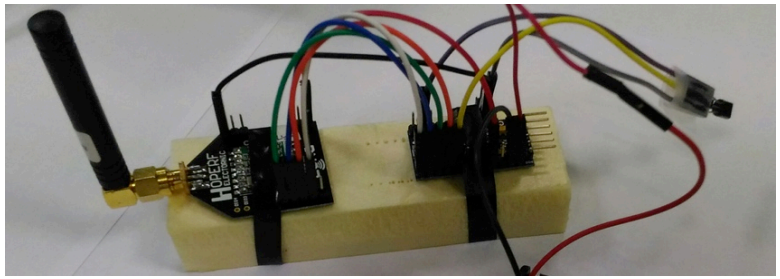


- After demonstration, just disconnect the VCC wires (red)
- No need to remove the batteries

DEFAULT CONFIGURATION



\!#4#TC/24.81

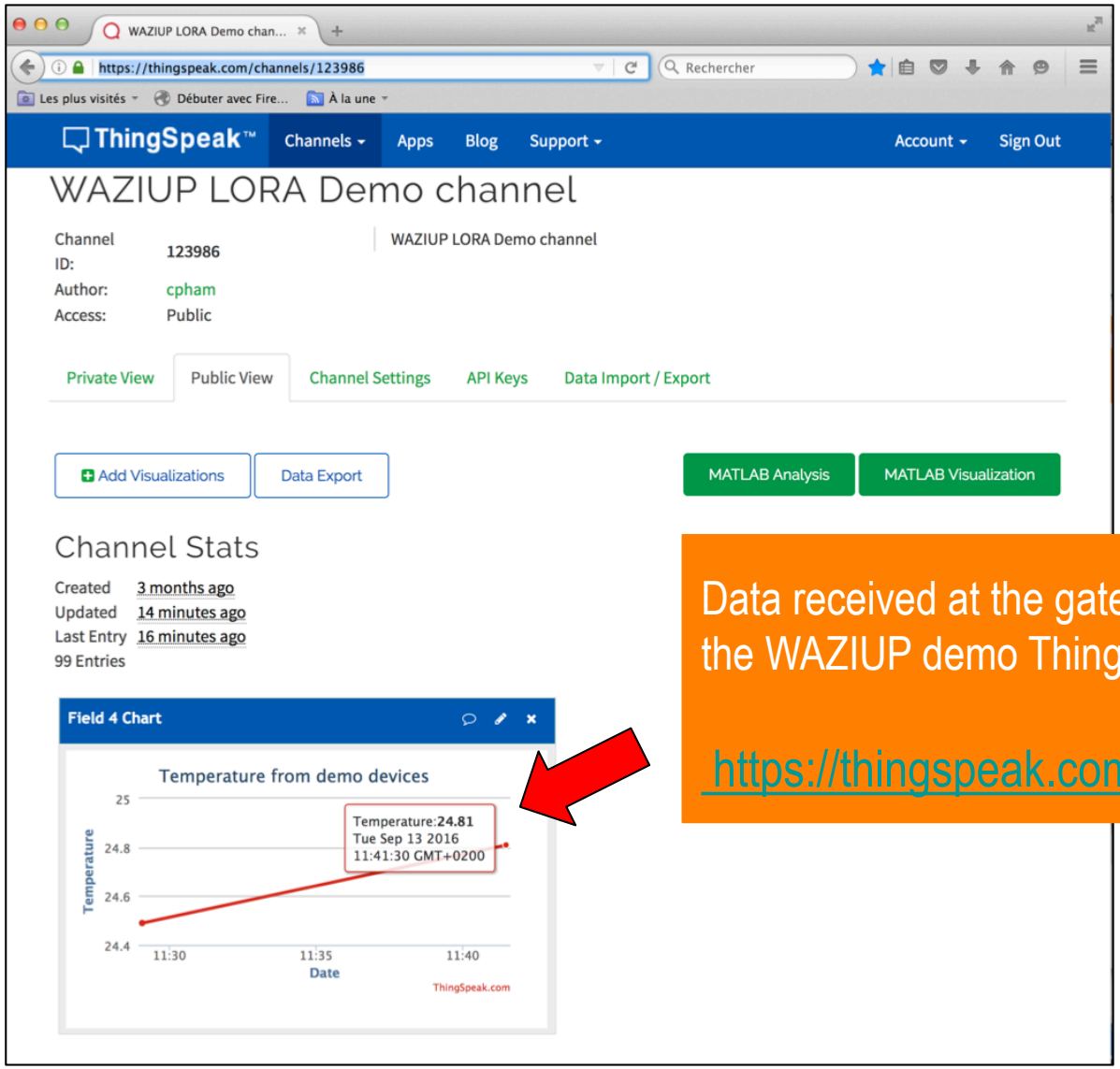


24.81 is an example, real temperature will be read by temperature sensor

The default configuration in the Arduino_LoRa_Simple_temp example is:

Send packets to the gateway
Use LoRa mode 1
Node short address is 8

Gateway to cloud



Data received at the gateway will be pushed to the WAZIUP demo ThingSpeak channel

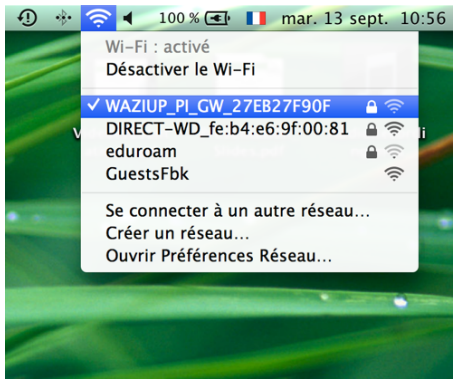
https://thingspeak.com/channels/123986

ADVANCED CONFIGURATION

- Use ssh to connect to the gateway
- Change the gateway WiFi password
- Change the web admin interface password

SSH TO THE GATEWAY WITH WIFI

- The gateway is also configured as a WiFi access point with address 192.168.200.1
- Select the WAZIUP_PI_GW_xxxxxxxxxx WiFi
- WiFi password is loragateway
- Then ssh pi@192.168.200.1
- Login password is loragateway



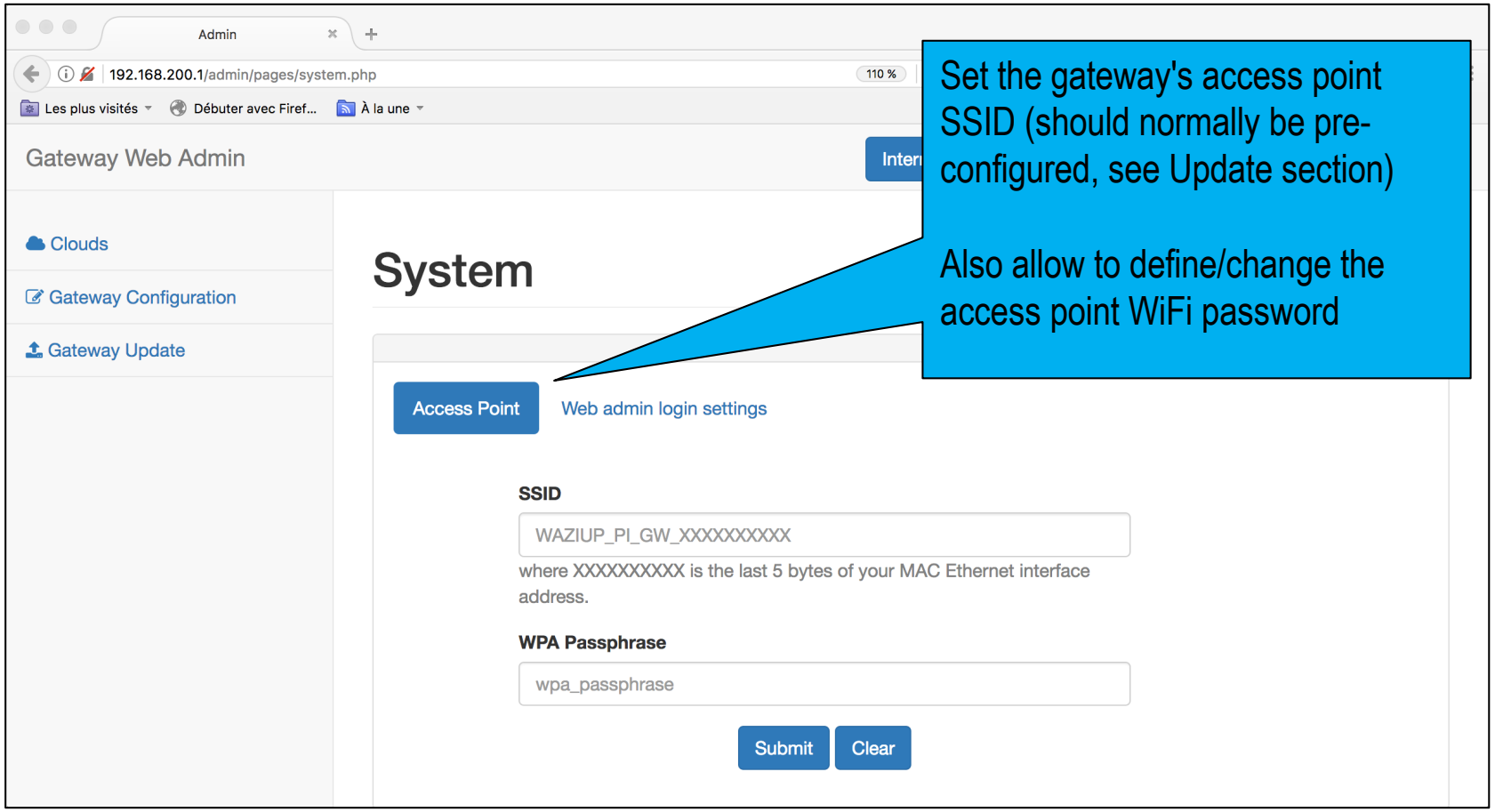

```
cpham — pi@raspberrypi: ~/lora_gateway —
MacBookProRetina-de-Congduc-Pham:~ cpham$ ssh pi@192.168.200.1
pi@192.168.200.1's password:

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Thu Aug  4 17:19:00 2016 from 192.168.200.102
pi@raspberrypi:~ $ cd lora_gateway/
pi@raspberrypi:~/lora_gateway $ ll
total 864
-rw------- 1 pi   pi    44155 Aug  3 16:55 arduPi.cpp
-rw------- 1 pi   pi    16715 Aug  3 16:55 arduPi.h
-rw-r--r-- 1 pi   pi    35164 Aug  3 17:01 arduPi.o
-rw------- 1 pi   pi    43310 Aug  3 16:55 arduPi_pi2.cpp
-rw------- 1 pi   pi    14043 Aug  3 16:55 arduPi_pi2.h
-rw------- 1 pi   pi    77976 Aug  3 16:55 bcm2835.h
```

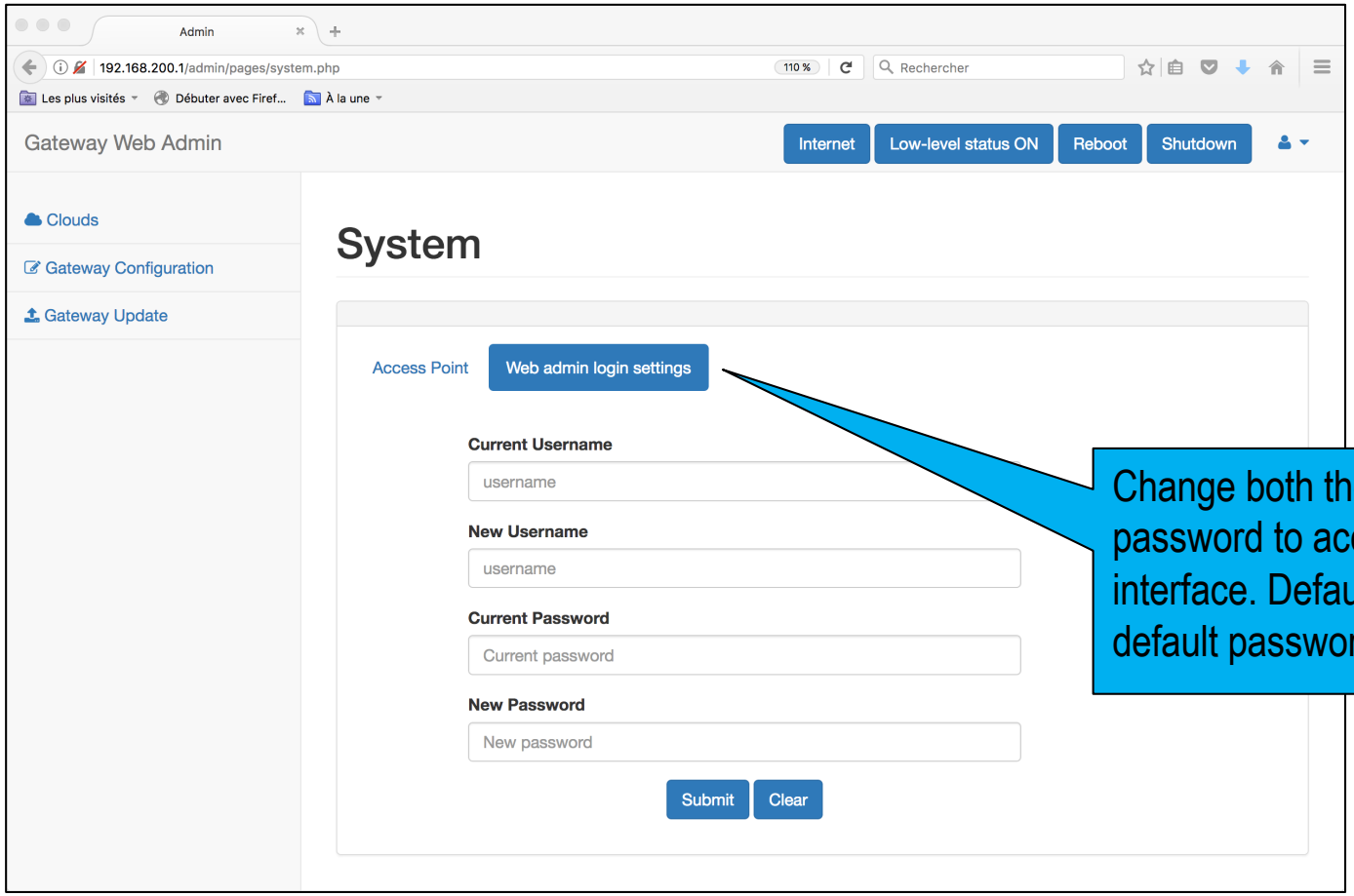
Gateway system configuration (1)

- Gateway WiFi access point



Gateway system configuration (2)

- Gateway web admin interface



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