

# INTERNET OF THINGS



FUNDACIÓ  
LACETÀPIA  
Per al foment de la Formació Professional

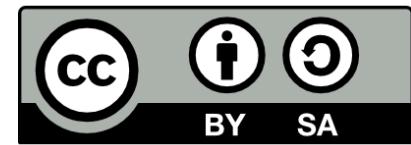


@rPrimTech

JAUME NOGUÉS

TBBT

TBBT



# Dispositius connectats

Cisco's Projections For The Internet of Things

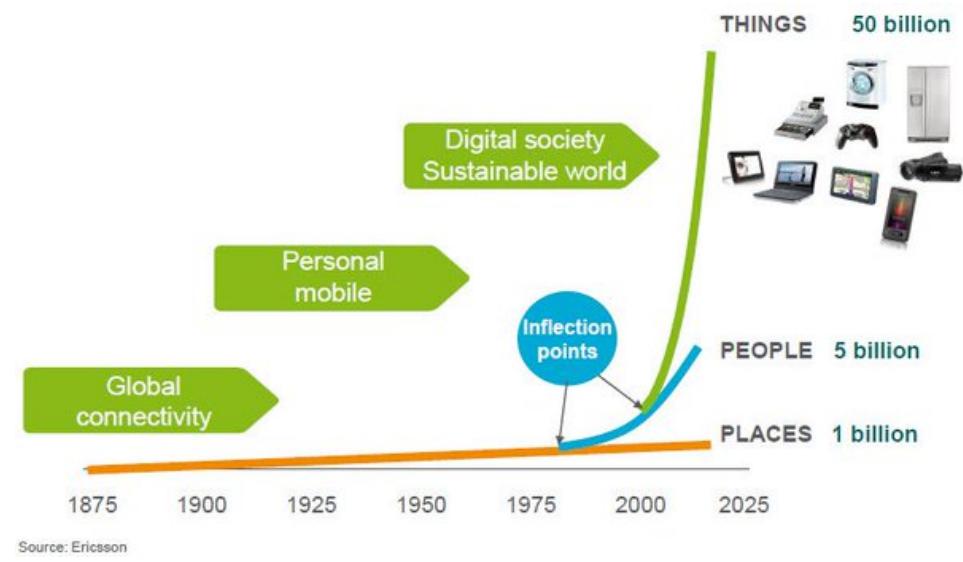
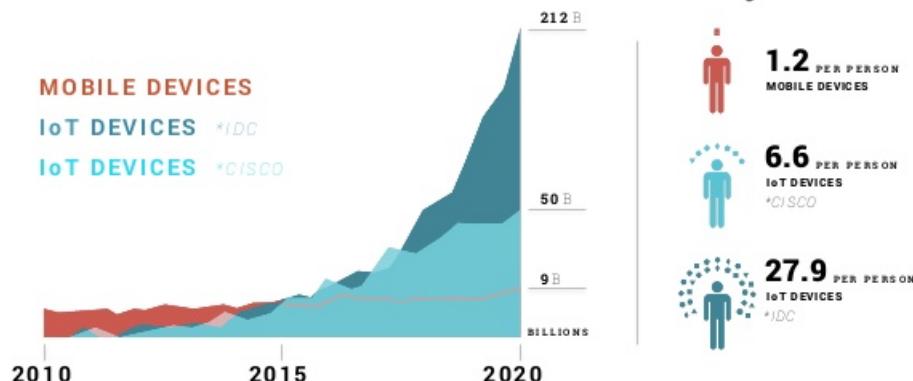


Source: Cisco



Source: Cisco IBSG, April 2011

212BB Connected Devices by 2020



Source: Ericsson

# On trobem IOT

**SMART HOME**

**SMART DEVICE**

**CONNECTED HOME**

**D2D DEVICE TO DEVICE**

**M2M MACHINE TO MACHINE**

**SMART FARM**

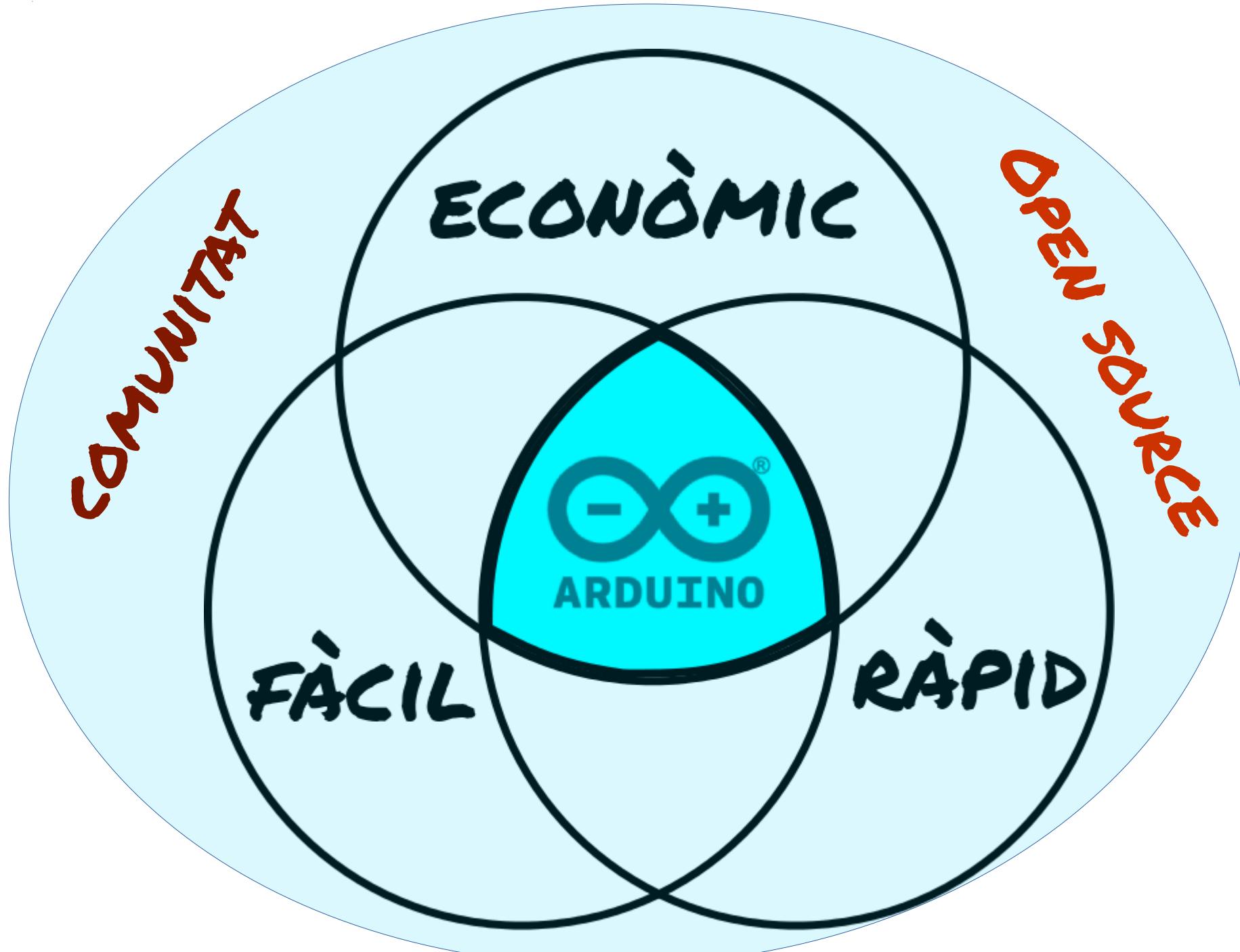
**SMART FACTORY**

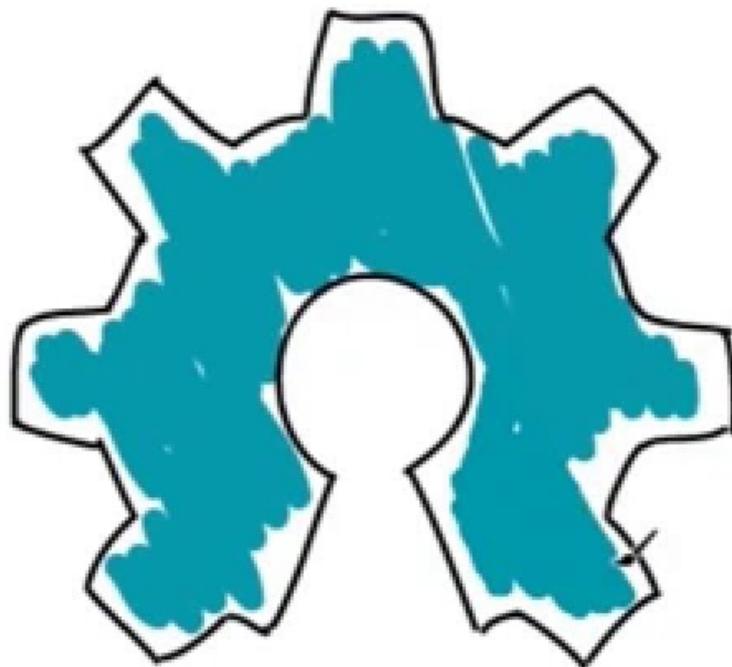
**CONNECTED CAR**



LIFE SIMPLIFIED WITH CONNECTED DEVICES

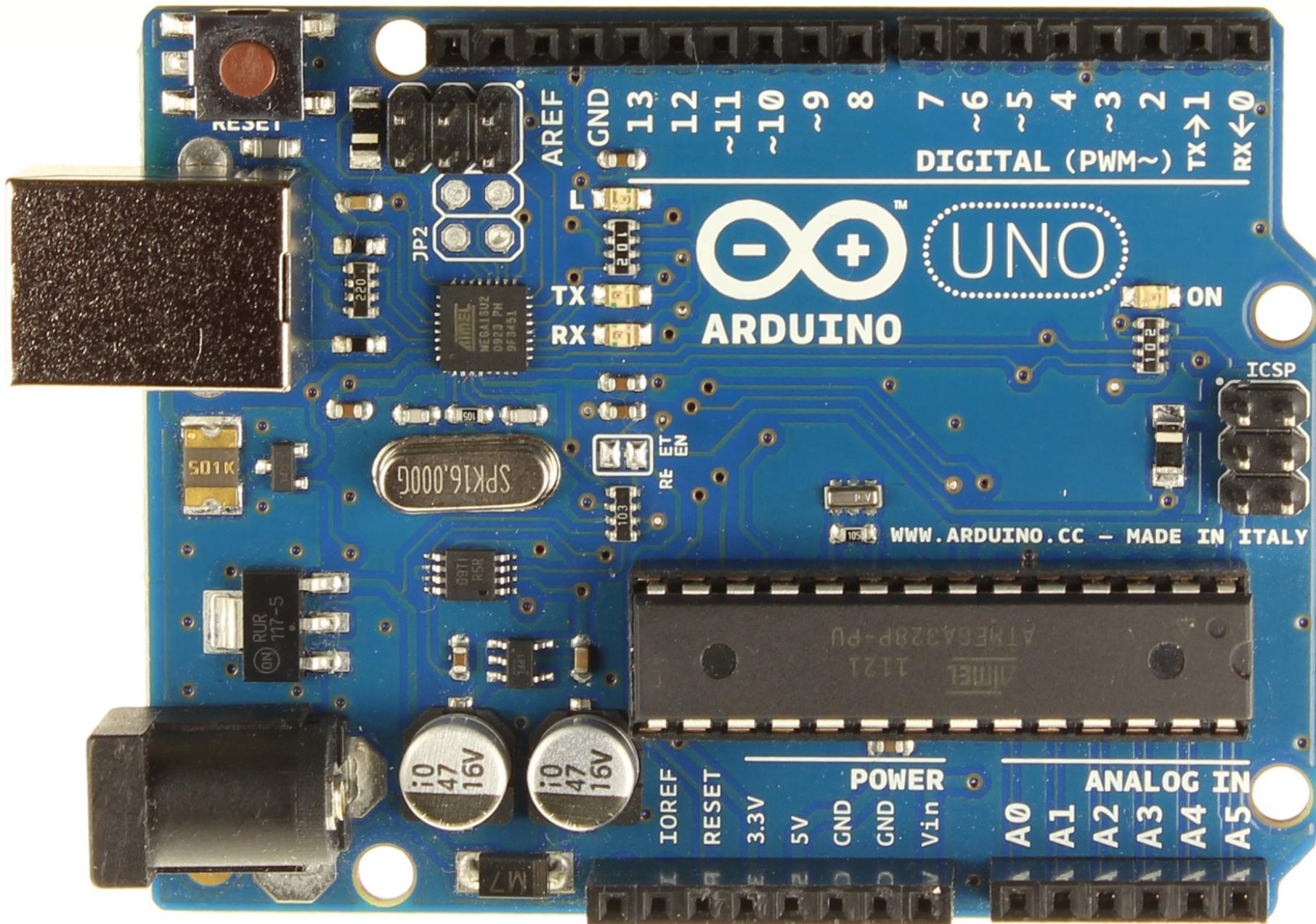
# IoT Do It Yourself





open source  
hardware

# Arduino uno, l'inici de tot



# l'equip

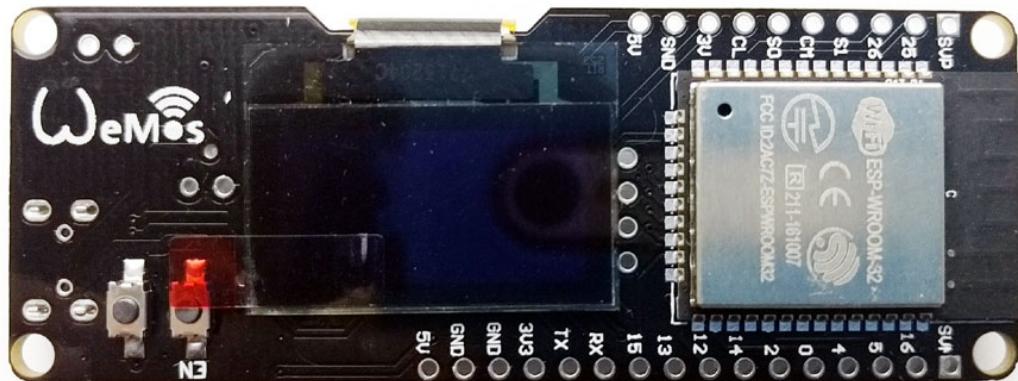
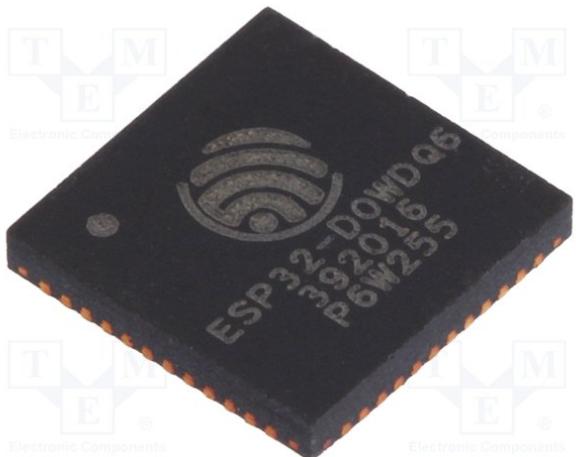
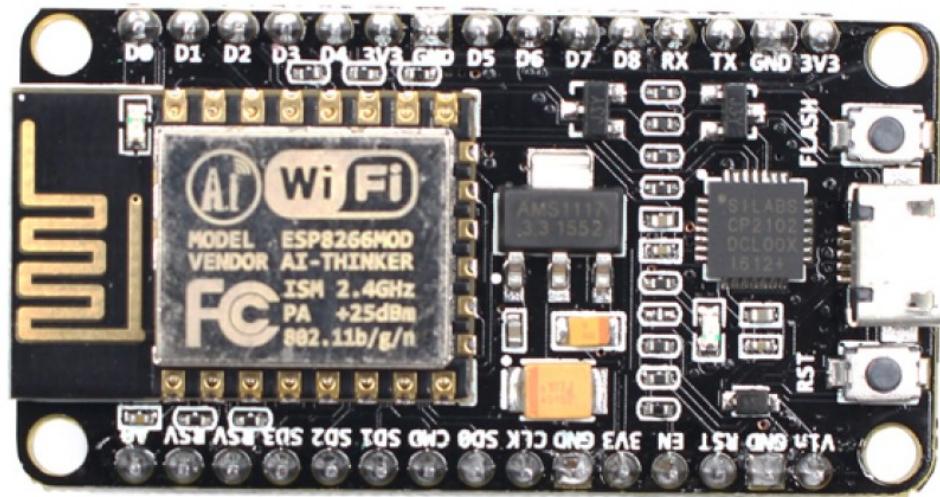
## Il Team Arduino



# Esp8266 / esp32, present i futur



1 €

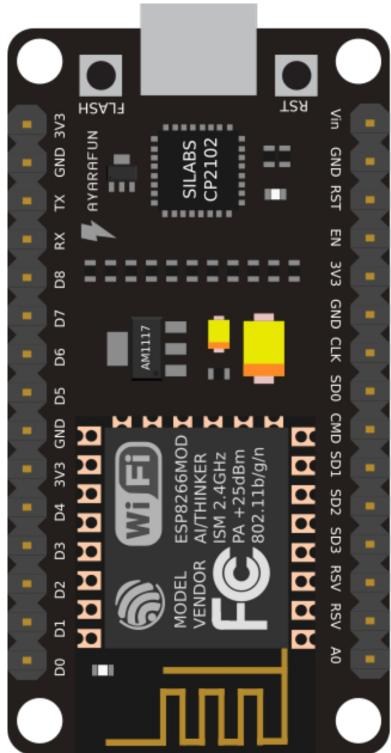


# hardware

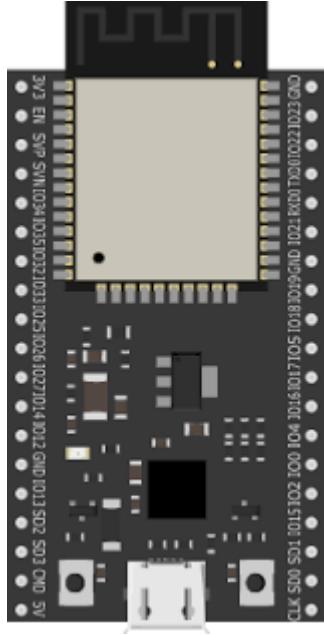


MKR WIFI 1010

NODEMCU ESP8266



ESP32

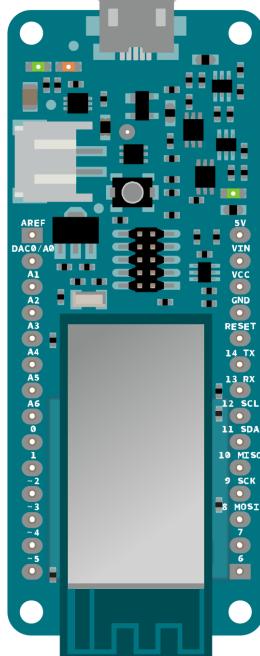


MKR WAN 1300

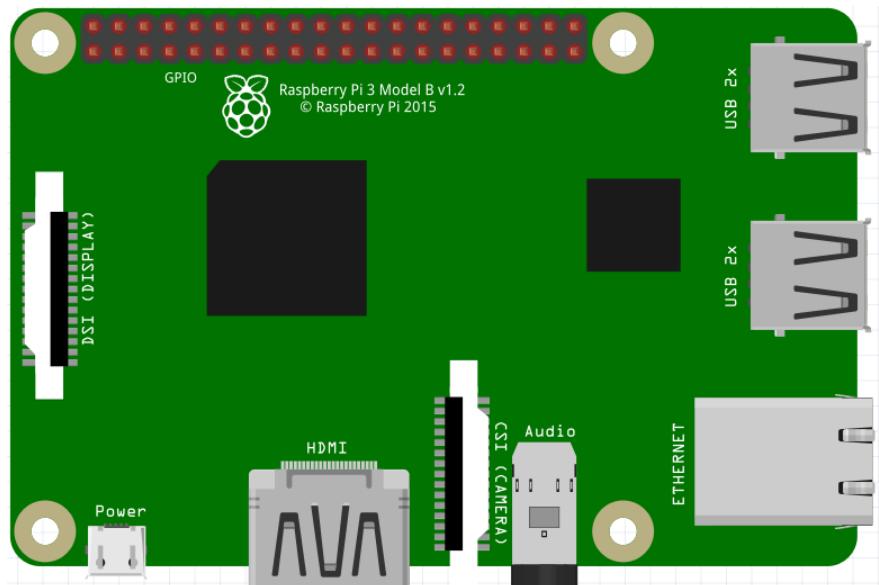


WHITECATBOARD

MKR1000



MKR FOX 1200



RASPBERRY PI

# Tecnologies de connectivitat



NB-IoT™



ZigBee®



sigfox

# ARDUINO IDE

Es tracta de crear una versió portable de l'IDE que sigui exportable a la resta d'ordinadors d'una aula.

0. Instal·lar els drivers USB [link](#).

1. Descarregar l'Arduino IDE 1.8.5 [link](#). La versió zip, no instal·lable.

2. Descomprimir per exemple en C:\arduino1.8.5.

3. Crear una carpeta anomenada portable: C:\arduino1.8.5\portable.

4. Llançar l'executable arduino.exe.

5. Instal·lar suport per ESP8266:

Start Arduino and open Preferences window.

Enter [http://arduino.esp8266.com/stable/package\\_esp8266com\\_index.json](http://arduino.esp8266.com/stable/package_esp8266com_index.json) into Additional Board Manager URLs field. You can add multiple URLs, separating them with commas.

Open Boards Manager from Tools > Board menu and install esp8266 platform (and don't forget to select your ESP8266 board from Tools > Board menu after installation).

# ARDUINO IDE

6. Tancar l'Arduino IDE.
7. Descarregar el contingut de la carpeta portable [link](#) .
8. Descomprimir a C:\arduinol.8.5\portable
9. Descarregar el suport per ESP32 [link](#) .
10. Descomprimir el contingut en una carpeta C:\arduinol.8.5\portable\sketchbook\hardware\espressif\esp32
11. Entrar a la carpeta C:\arduinol.8.5\portable\sketchbook\hardware\espressif\esp32\tools i executar get.exe.
12. Ara ja podem utilitzar l'IDE:-)

# ARDUINO IDE

PubSubClient

SimpleTimer [link](#)

Adafruit Unified Sensor

DHT Sensor library

Dallas Temperature

OneWire

Blynk [link](#)

Settimino [link](#)

Justwifi V2\* [link](#)

Time [link](#)

Adafruit BME280

ArduinoJson 5.13.12\*

Embedis

IRRemoteESP8266

AsyncMqttClient [link](#)

DebounceEvent [link](#)

ESPAsyncTCP [link](#)

ESPAsyncWebServer [link](#)

ESPSoftwareSerial [link](#)

MDNSResolver [link](#)

Embedis

NoFUSS [link](#)

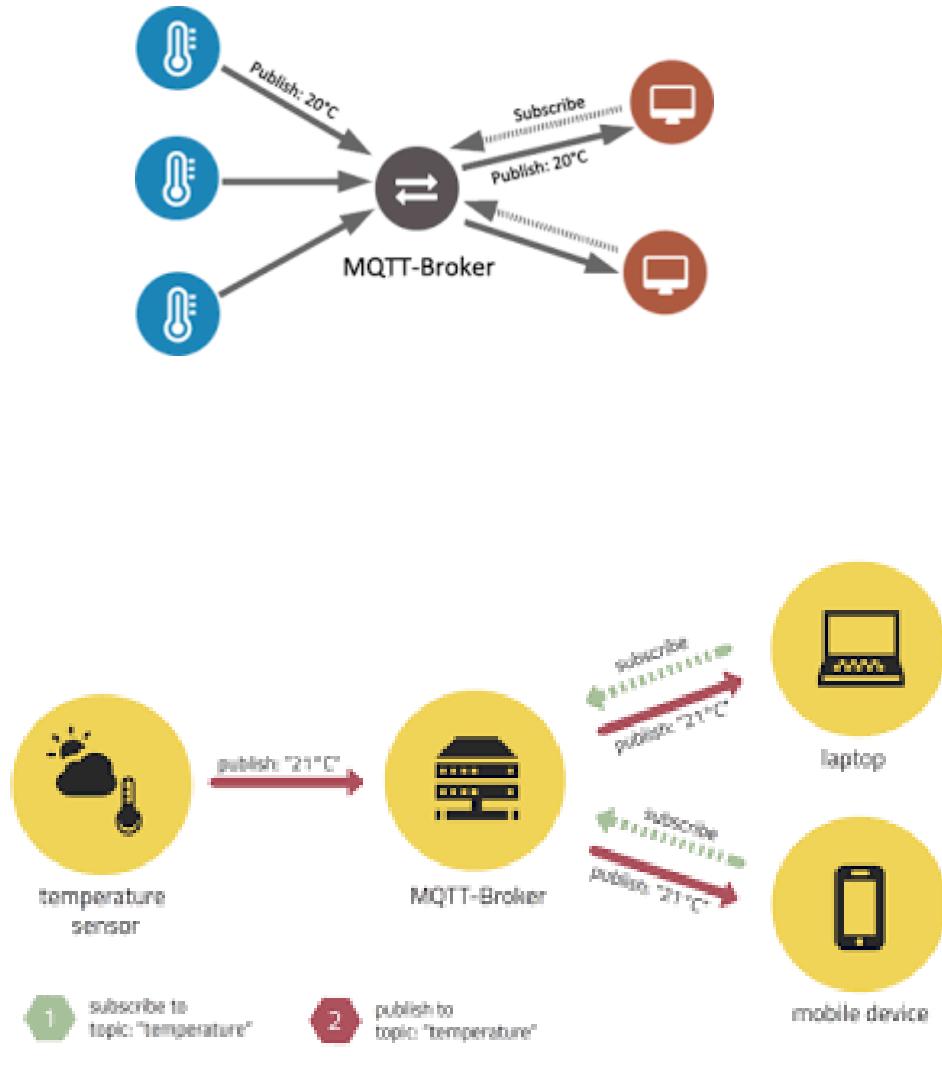
NtpClientLib [link](#)

Oled [link](#)

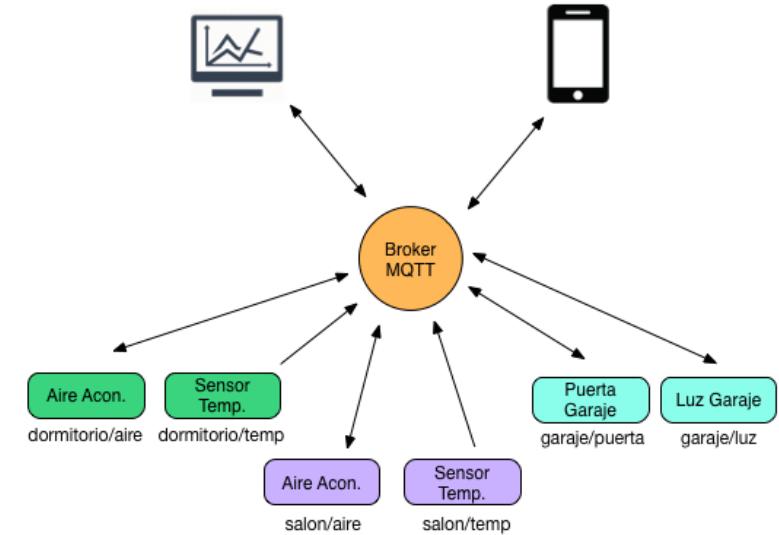
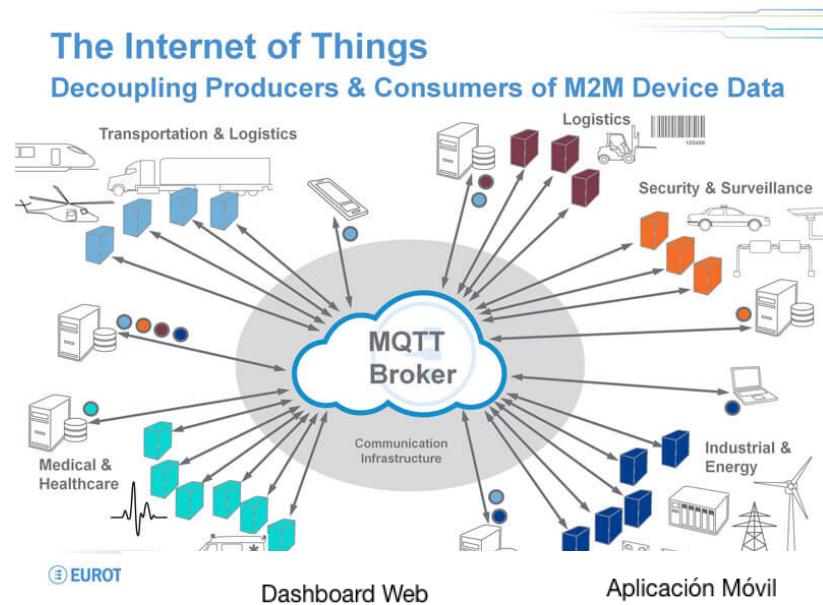
eeprom\_rotate [link](#)

# MQTT

# Message Queuing Telemetry Transport



The Internet of Things  
Decoupling Producers & Consumers of M2M Device Data



# MQTTmosquitto broker



Instalar mosquitto:

- Windows [link](#)

- Raspberry Pi:

```
sudo apt-get update
```

```
sudo apt-get install mosquitto
```

```
sudo apt-get install mosquitto-clients
```

·Ubuntu/Mint/Debian:

```
sudo apt-add-repository ppa:mosquitto-dev/mosquitto-ppa
```

```
sudo apt-get update
```

```
sudo apt-get install mosquitto mosquitto-clients
```

Brokers lliures:

iot.eclipse.org test.mosquitto.org

RPi3 192.168.100.17

Rpi2 192.168.100.222

# MQTTmosquitto broker



Iniciar mosquitto en W7/W10:

C:\mosquitto\mosquitto -v

Parar o iniciar mosquitto com servei en linux:

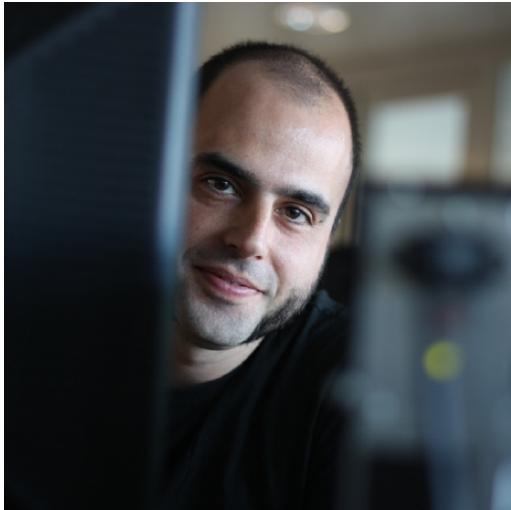
```
sudo service mosquitto stop  
sudo service mosquitto start  
sudo service mosquitto status
```

Client mqtt per Chrome [link](#)

mosquitto-clients

```
mosquitto_sub -v -h iot.eclipse.org -t /lacetania/#  
mosquitto_pub -h iot.eclipse.org -t /lacetania/juan -m Hola  
mosquito_sub -v -u pi -P raspberry -h 192.168.100.222 -t /lacetania/juan - m Hola
```

# ESPurna, client mqtt esp8266



Creat per Xosé Pérez ([thinkerman](#))

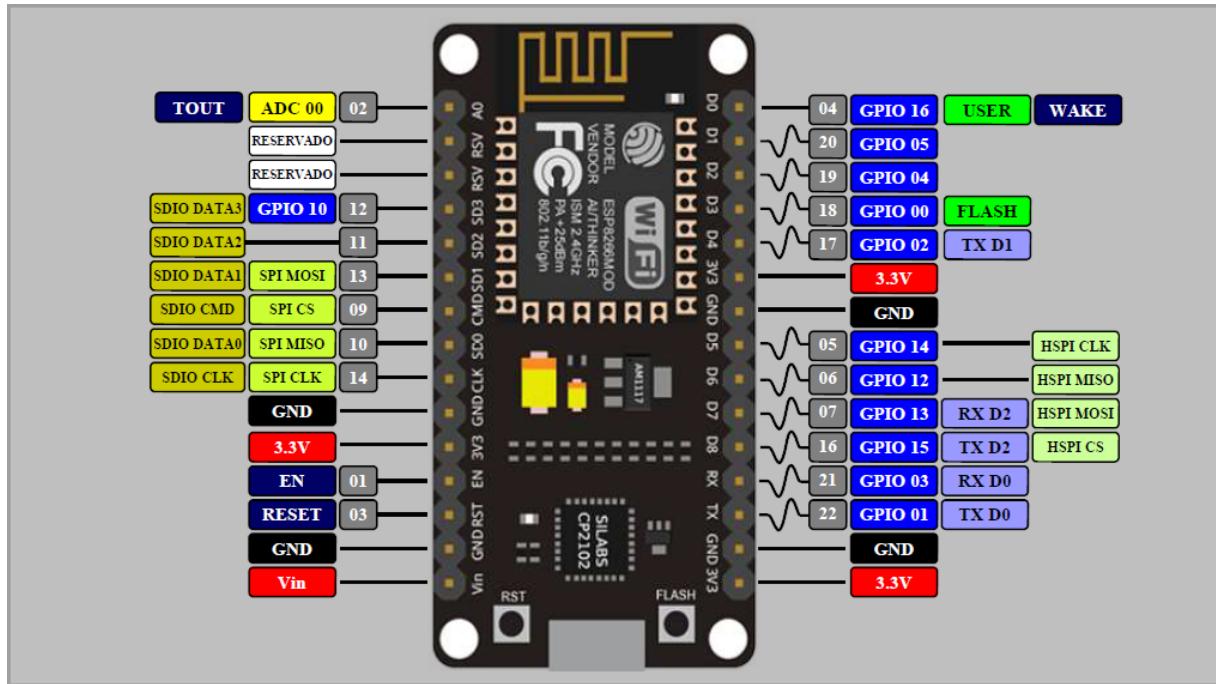
GitHub [link](#)

Interessant escoltar aquest podcast  
[link](#) per conèixer el projecte.

Inicialment pensat pels dispositius Sonoff de ITEAD [link](#). Adaptable a multitud de sistemes basats en el esp8266.

- Wiki [link](#)
- Dispositius suportats [link](#)

# ESPurna en la nodeMCU



Sketch per Arduino IDE [link](#)

Cal assegurar-nos de tenir instal·lades totes  
aquestes llibreries [link](#)

# ESPurna, hardware.h

```
// -----
// Development boards
// -----  
  
#elif defined(NODEMCU_LOLIN)  
  
// Info  
#define MANUFACTURER      "NODEMCU"  
#define DEVICE            "LOLIN"  
  
// Buttons  
//  
#define BUTTON1_PIN        5  
#define BUTTON1_MODE       BUTTON_PUSHBUTTON //| BUTTON_DEFAULT_HIGH  
#define BUTTON1_PRESS      BUTTON_MODE_NONE  
#define BUTTON1_CLICK      BUTTON_MODE_TOGGLE //| BUTTON_MODE_ON //| BUTTON_MODE_OFF  
#define BUTTON1_DBCLICK    BUTTON_MODE_NONE //| BUTTON_MODE_AP  
#define BUTTON1_LNGCLICK   BUTTON_MODE_NONE //| BUTTON_MODE_RESET  
#define BUTTON1_LNGLNGCLICK BUTTON_MODE_NONE //| BUTTON_MODE_FACTORY  
#define BUTTON1_RELAY      1  
  
#define BUTTON2_PIN        4  
#define BUTTON2_MODE       BUTTON_PUSHBUTTON //| BUTTON_DEFAULT_HIGH  
#define BUTTON2_RELAY      2  
  
#define BUTTON3_PIN        14  
#define BUTTON3_MODE       BUTTON_PUSHBUTTON //| BUTTON_DEFAULT_HIGH  
  
#define BUTTON4_PIN        12  
#define BUTTON4_MODE       BUTTON_PUSHBUTTON //| BUTTON_DEFAULT_HIGH  
  
//PIR  
#define BUTTON5_PIN        10  
#define BUTTON5_MODE       BUTTON_PUSHBUTTON | BUTTON_DEFAULT_HIGH | BUTTON_SET_PULLUP  
#define BUTTON5_CLICK      BUTTON_MODE_TOGGLE  
#define BUTTON5_DBCLICK    BUTTON_MODE_NONE //| BUTTON_MODE_AP  
#define BUTTON5_LNGCLICK   BUTTON_MODE_NONE //| BUTTON_MODE_RESET  
#define BUTTON5_LNGLNGCLICK BUTTON_MODE_NONE //| BUTTON_MODE_FACTORY  
#define BUTTON5_RELAY      4  
  
// Relays  
#define RELAY1_PIN          15  
#define RELAY1_TYPE         RELAY_TYPE_NORMAL  
#define RELAY2_PIN          13  
#define RELAY2_TYPE         RELAY_TYPE_NORMAL  
#define RELAY3_PIN          2  
#define RELAY3_TYPE         RELAY_TYPE_INVERSE  
#define RELAY4_PIN          0  
#define RELAY4_TYPE         RELAY_TYPE_INVERSE
```

# ESPurna, hardware.h

```
// LEDs
#define LED1_PIN          16
#define LED1_PIN_INVERSE   1

// DB18B20//if (gpio == 10) return true;//Jaume Nogués al gpio.ino
#define DALLAS_SUPPORT      0
#define DALLAS_PIN           10
#define DALLAS_UPDATE_INTERVAL 5000
#define TEMPERATURE_MIN_CHANGE 1.0

//DHT-11/22
#define DHT_SUPPORT         0
#define DHT_PIN              10
#define DHT_TYPE             DHT_CHIP_DHT11 //DHT_CHIP_DHT22

// BME280/BMP280
#define BMX280_SUPPORT       0
#define I2C_SDA_PIN          12//SDA
#define I2C_SCL_PIN          14//SCL
#define BMX280_ADDRESS        0x76    // 0x00 means auto
#define BMX280_MODE            1      // 0 for sleep mode, 1 or 2 for forced mode, 3 for normal mode
#define BMX280_STANDBY         0      // 0 for 0.5ms, 1 for 62.5ms, 2 for 125ms
                                         // 3 for 250ms, 4 for 500ms, 5 for 1000ms
                                         // 6 for 10ms, 7 for 20ms
#define BMX280_FILTER          0    // 0 for OFF, 1 for 2 values, 2 for 4 values, 3 for 8 values and 4 for 16 values
#define BMX280_TEMPERATURE     1    // Oversampling for temperature (set to 0 to disable magnitude)
#define BMX280_HUMIDITY         1    // Oversampling for humidity (set to 0 to disable magnitude, only for BME280)
#define BMX280_PRESSURE         1    // Oversampling for pressure (set to 0 to disable magnitude)

//Analog input
#define ANALOG_SUPPORT        1
#define ADC_VCC_ENABLED        1
```

# Alternativa a ESPurna amb ESP8266

Si volem utilitzar un sketch menys complexe, podem fer servir aquest [link](#).

Cal descomentar algunes línies segons els perifèrics que tinguem connectats, DHT11/DHT22, DS18B20, BME280 o NEOPIXEL.

Dins del codi podem veure els diferents comandaments per interactuar amb el hardware, Per exemple q15on, q15off, q15tog, q15?, ...

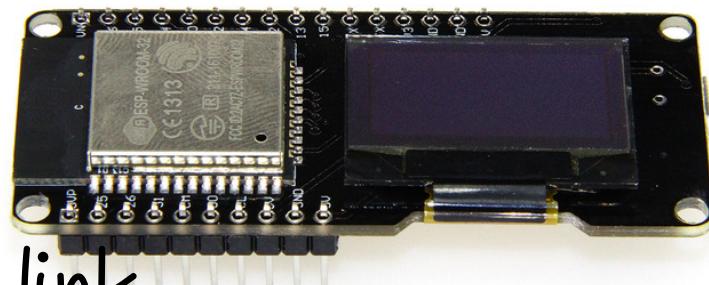
# Alternativa a ESPurna amb ESP32

Utilitzar l'ESP32 encara és una mica experimental, cal no desanimar-se. Sembla que en poc temps hi haurà el plugin per l'Arduino IDE. De moment la instal·lació és una versió beta [link](#).

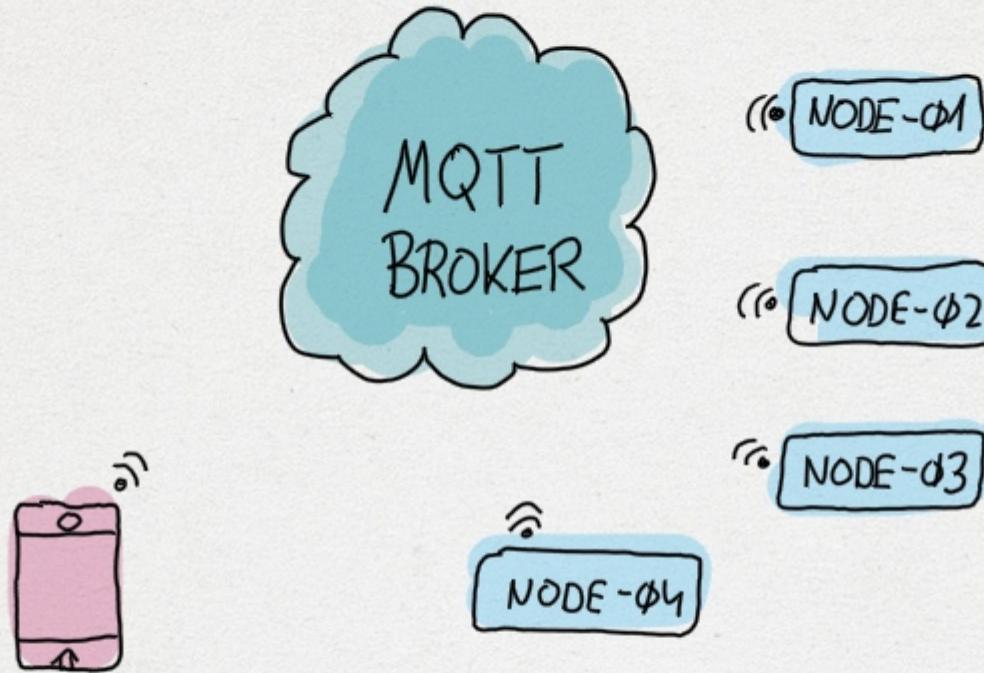
Hi ha multitud de formats de l'ESP32. Cap d'ells sembla que triomfi per damunt dels altres.

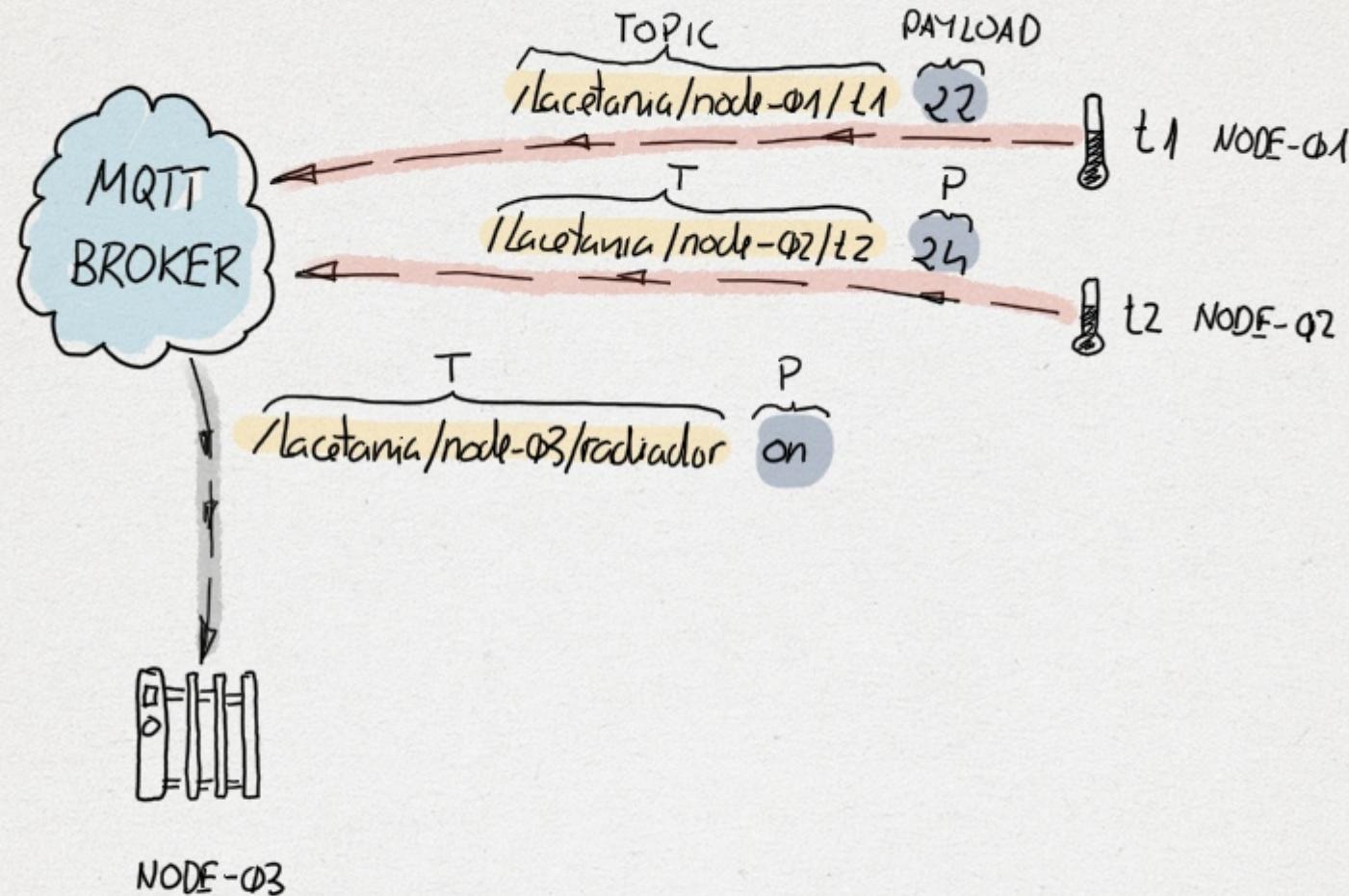
Nosaltres utilitzarem aquest:

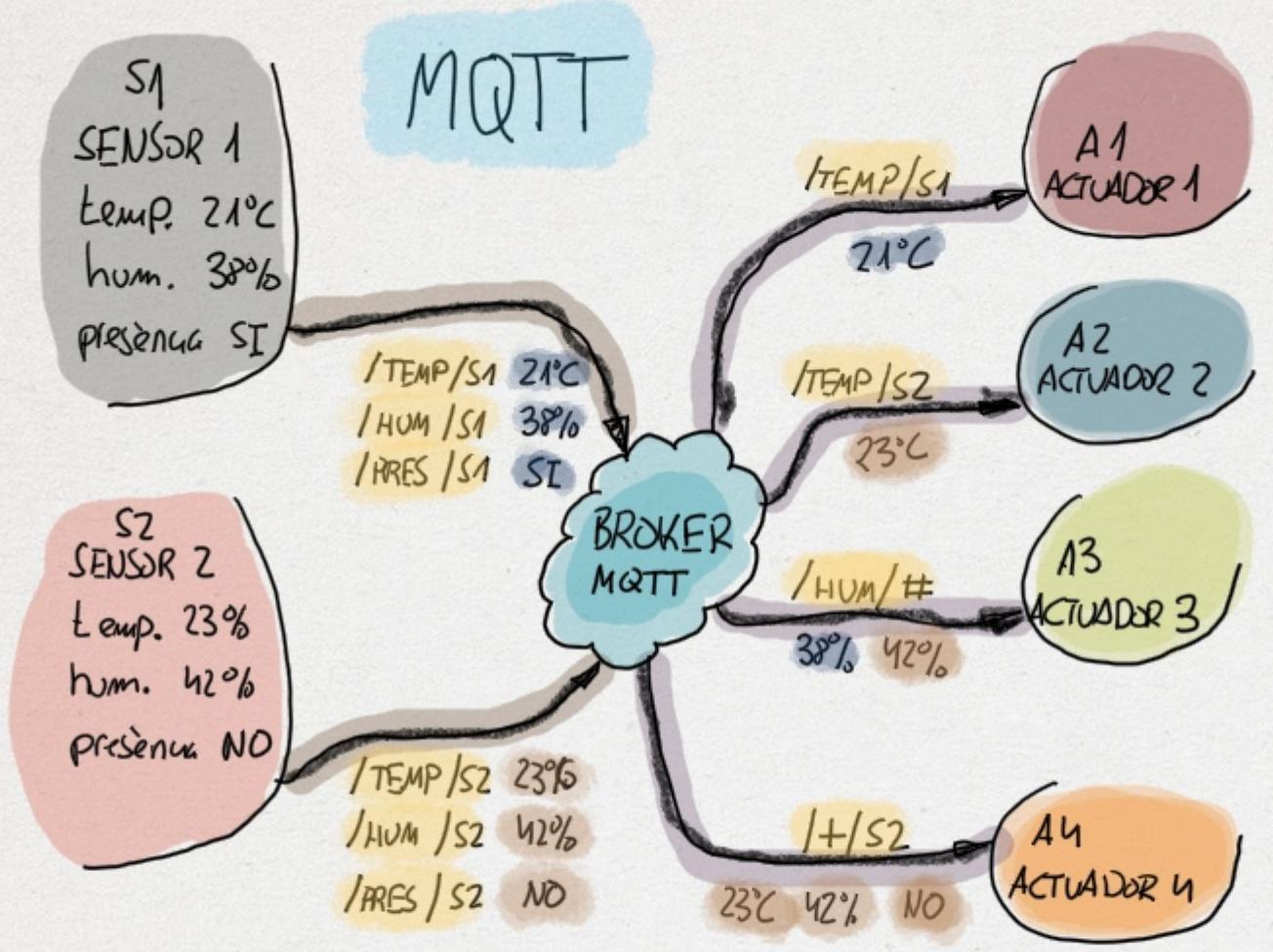
L'sketch necessari serà aquest [link](#).



vps249990.ovh.net  
iot.eclipse.org







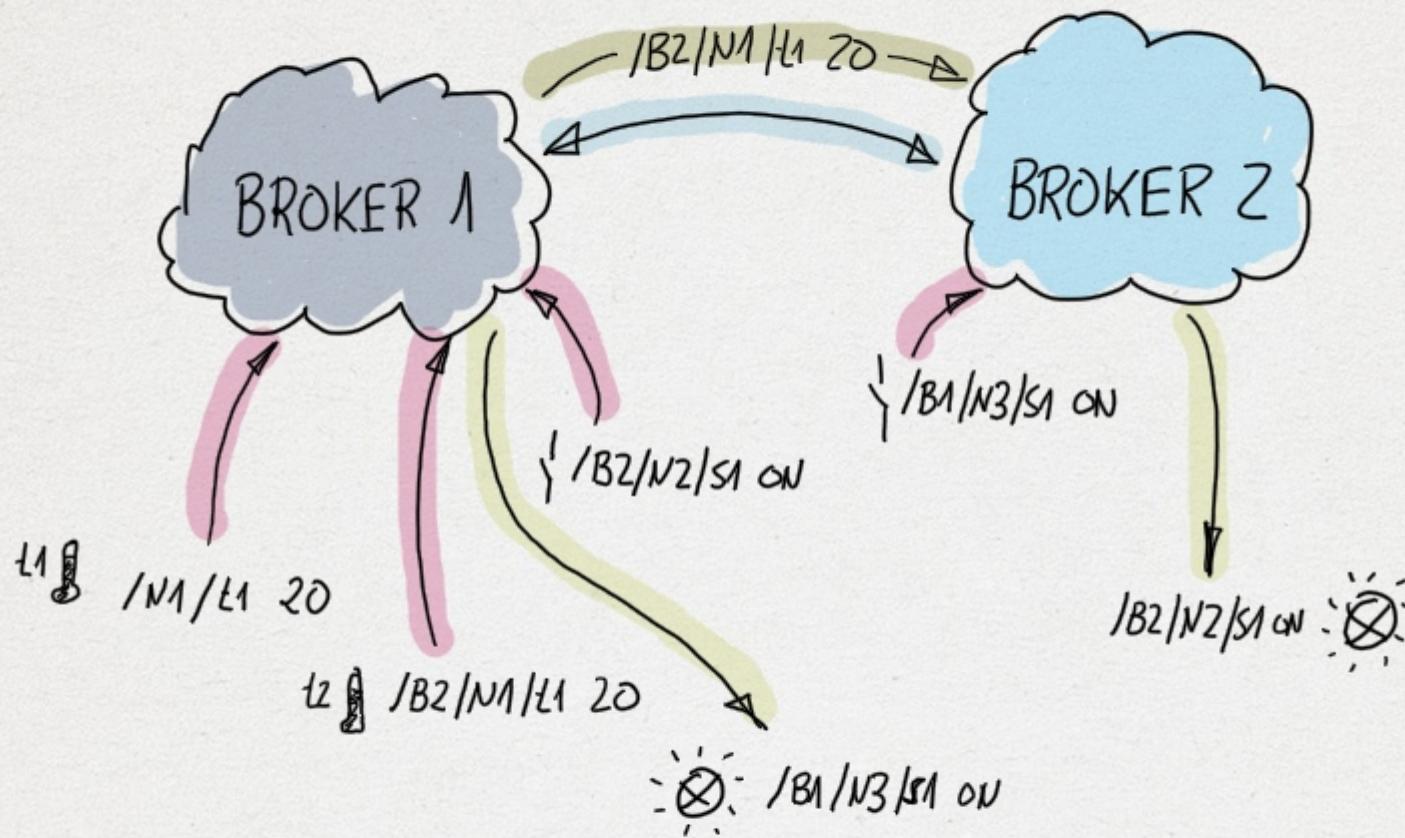
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WILDCARD #

+



# MqttDash (android)



Instalar mqttDash [link](#)

