LoRa module Manual

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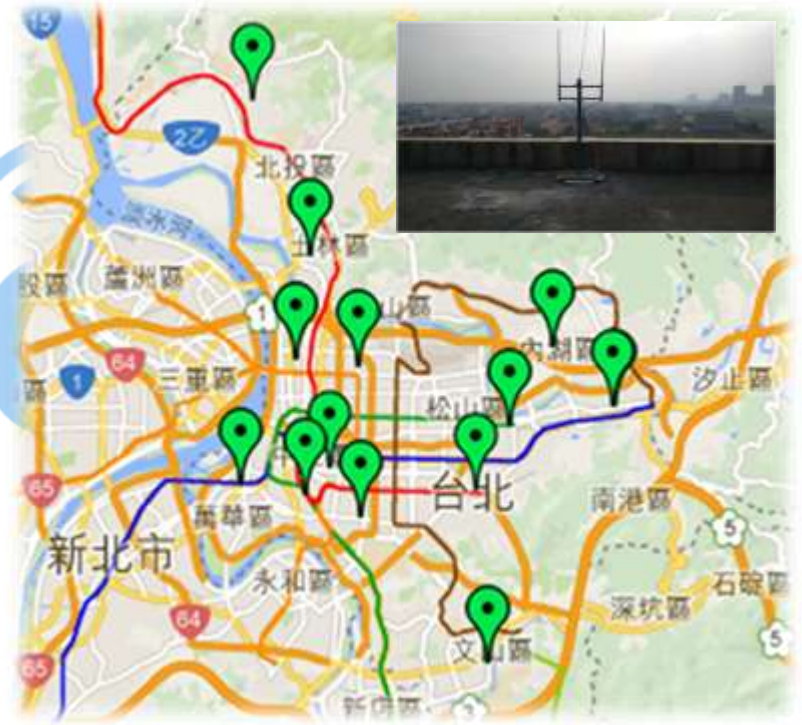
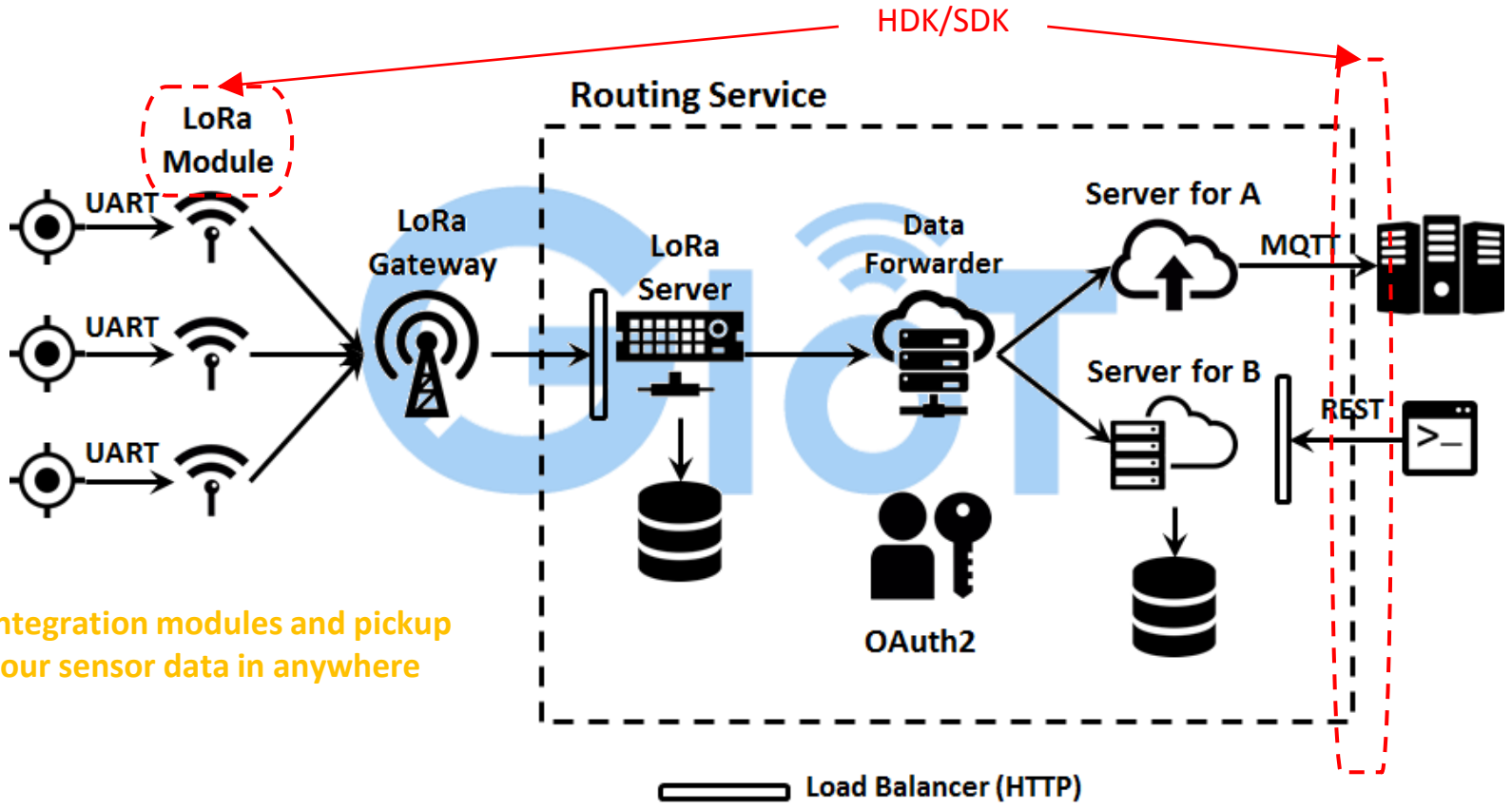
Taipei IoT Smart City

- Location
  - Taipei, first-tier city in Taiwan
- Time
  - Infrastructure ready by feb, 2016
- Launch
  - Coverage: 271.8 Km^2
  - 12+ outdoor APs
  - Indoor APs for dead space and better coverage after field application deployed



GIOT Routing System



- Integration modules and pickup your sensor data in anywhere

What you need

- A LPWAN Module
- A Gateway
  - Indoor
  - If you are under coverage of outdoor gateway, you don't need this
- Reference document
  - GIOT AT command for LoRa module
  - Hardware spec.

Assist Gateway - Indoor

- 1 WAN port(10/100) + 2 LAN ports(10/100)
- Various internet connection: Ethernet, Wireless bridge, 3G/4G dongle
- Support repeater mode for last mile coverage
- Cloud service for gateway health monitor and control
- Web UI for router
- Support OTA and USB upgrade
- Support ADR
- Support class A/B/C end-devices

Features of LPWAN Module

General Features

- General Purpose LoRa module for sensor integration
- Different versions to support AT commands, ModBus
- generic GPIO and I2C & UART interfaces
- Compact form factor: 15 x 39 x 2.75 mm
- Castellated SMT edge for easy PCB mounting
- Optional version with pin header for quick prototyping
- Separate versions for 915 MHz and for 868 MHz
- High receiver sensitivity: down to -137.5 dBm
- Industrial grade

Operational

- Single operating voltage at 3.3V
- Temperature range: -40°C to +85°C
- Low-power consumption

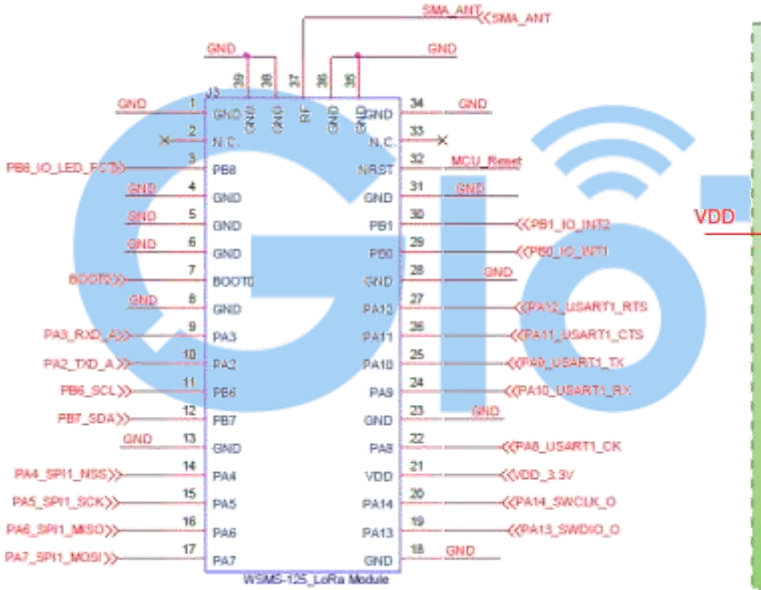
Hardware

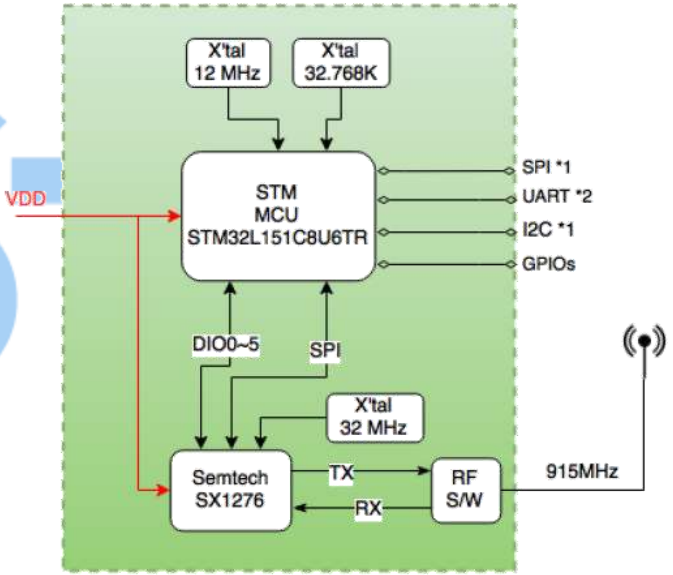
Interface

- GPIO x 4
- IRQ x 2
- ADC x 2
- I2C x1
- UART x2
- SPI x1

Voltage

- 3.3v





Characteristic

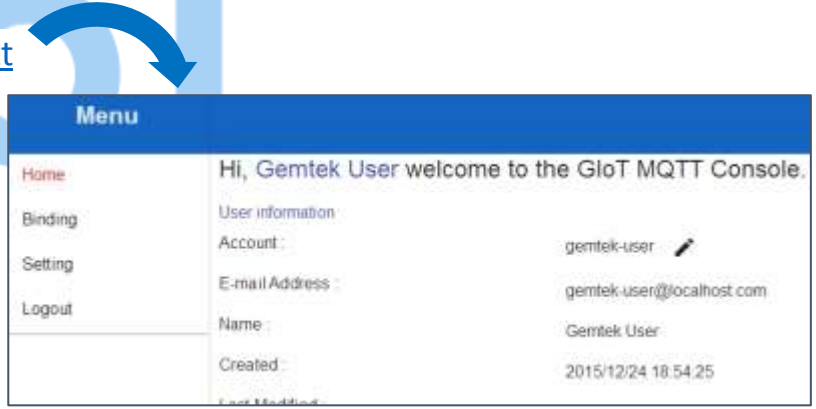
- **Module is like a SIM card**
  - AES key support
  - Identity - LoRa mac address (IEMI)
  - 11 bytes of user-assigned payload
  - Max length is 11 Ascii or 22 Hex
- **Module software interface**
  - Modbus
  - AT-command (Recommend)
- **Routing server provide two ways for partners**
  - MQTT subscription (Recommend)
  - RestFul API
- **Routing System doesn't decode message from your payload**

11 bytes example:

Status	Temperature	Battery level	GPS Latitude	GPS Longitude
0xff	0xff	0xff	0xffff ffff	0xffff ffff

How-to

- Apply for your cloud account (Taipei government)
  - Please contact to your sales
- Go to Account management web site
  - Please contact to your sales for this URL
    - TPE: https://cust00-01.giotgateway.com/giot-mqtt
- Bind module IDs to your account on Web
- Subscribe data through MQTT API
  - Username/Password/Topic is on account page (Web)



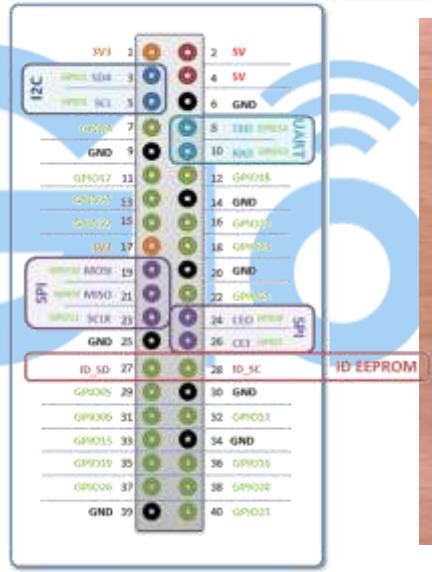
Example - Raspberry

Host

- Raspberry pi B+

Interface

- UART to LPWAN Module
  - P8,10
  - RX/TX
- 3.3v power support
  - P1/G
  - VDD/G



Use AT command

"*AT DTX <msg>*"

- Transmit message to LoRa gateway

  with "UTC seconds" every 10s (60s)

Example Arduino

Host

- Arduino

Interface

- UART to LPWAN Module
  - P8,10
  - RX/TX
- 3.3v power support
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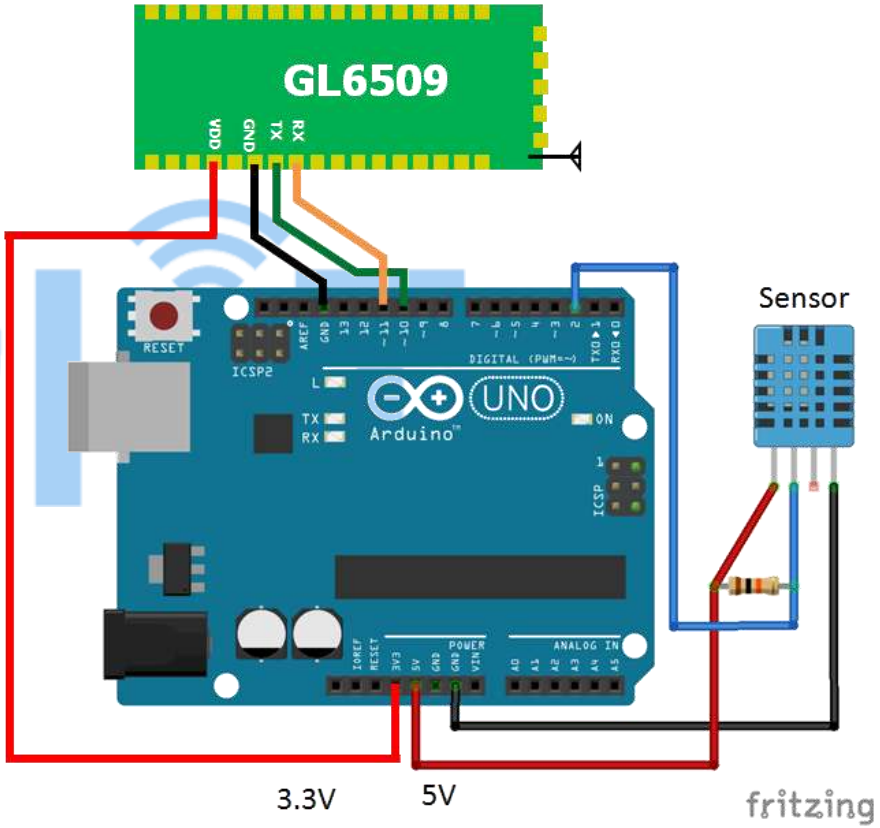
  - VDD/G



Example - MQTT

- Install Mosquitto package in Linux
- Get configuration from Web https://cust00-01.giotgateway.com/giot-mqtt
  - MQTT (example)
    - "host": "SERVER IP",
    - "port": 1883,
    - "topic": "client/700000000/700000000-MQTT",
    - "clientId": "700000000",
    - "username": "700000000",
    - "password": "PASSWORD"
- **mosquitto_sub** -h <Server_IP> -p 80 -t client/200000001/200000001-GIOT-MAKER -I 200000001-generic-service -u 200000001 -P PASSWORD

Example - Data

- **Receive data**

```
$ mosquitto_sub -h <Server_IP> -p 80 -t client/200000001/200000001-GIOT-MAKER -I 200000001-generic-service -u 200000001 -P PASSWORD
RECV:
{
    "id" : "e18a47a2-9c3c-4157-b61a-5131e34e6813",   // Unique index for this message
    "macAddr" : "04000011",                          // Module ID
    "data" : "1459268303",                           // Your Data
    "buff" : "2016-03-09T09:18:56.310Z",             // LoRa Gateway receive timestamp
    "recv" : "2016-03-09T09:18:55.000Z",             // Cloud server receive timestamp
    "extra" : {                                      // Lora Gateway which receive your data
        "gwip" : "192.168.1.110",                    // Lora Gateway Wan IP
        "gwid" : "00001c497b48db94",                 // Lora Gateway ID
        "repeater" : "00000000ffffffff",             // Lora Repeater ID, if bypass
        "systype" : 4,                               // System ID for indicating service area
        "rssi" : -94,                                // RSSI when this frame is into Gateway
        "snr" : 93                                   // SNR when this frame is into Gateway
    }
}
```

Thank You!