



## PG1301 LoRaWAN Concentrator User Manual

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Document Version: 1.0.4

Image Version: v1.0

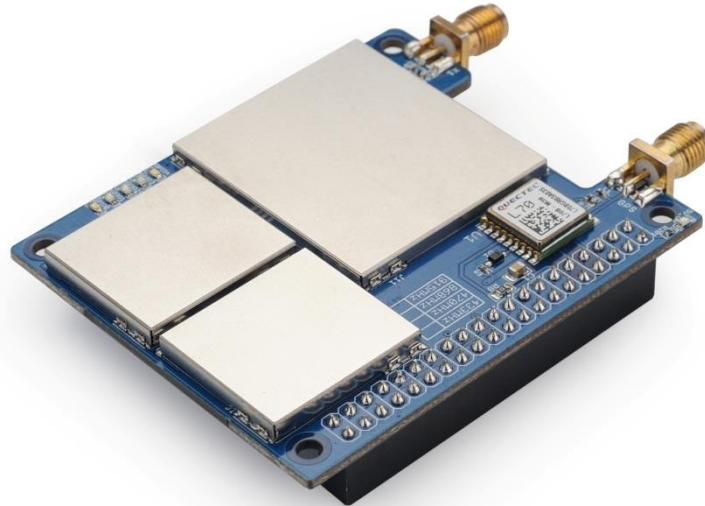
Version	Description	Date
1.0	Release	2019-Jun-24
1.0.1	Add FAQ for how to get <code>lorapktfwd.deb</code>	2019-Sep-5
1.0.2	Add SPI description	2019-Sep-23
1.0.3	Fix typo	2020-Mar-17
1.0.4	Add GPS info	2020-Apr-29
1.0.5	Add LED info	2021-Jan-5
1.0.6	Change LoRaWAN Server to use TTNv3	2022-Feb-5



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## 1. Introduction

### 1.1 What is PG1301 LoRaWAN Concentrator?



The PG1301 is a multi-channel high performance transmitter/receiver designed to simultaneously receive several LoRa packets using random spreading factors on random channels. Its goal is to enable robust connection between a central wireless data concentrator and a massive amount of wireless end-points spread over a very wide range of distances.

The PG1301 is design to use with Raspberry Pi to build smart metering fixed networks and Internet of Things applications with up to 5000 nodes per km<sup>2</sup> in moderately interfered environment.

PG1301 has built-in GPS module. The GPS module provide timing to SX1301 for accuracy timing and provide geographical coordinates to RPi for further process.

### 1.2 Features

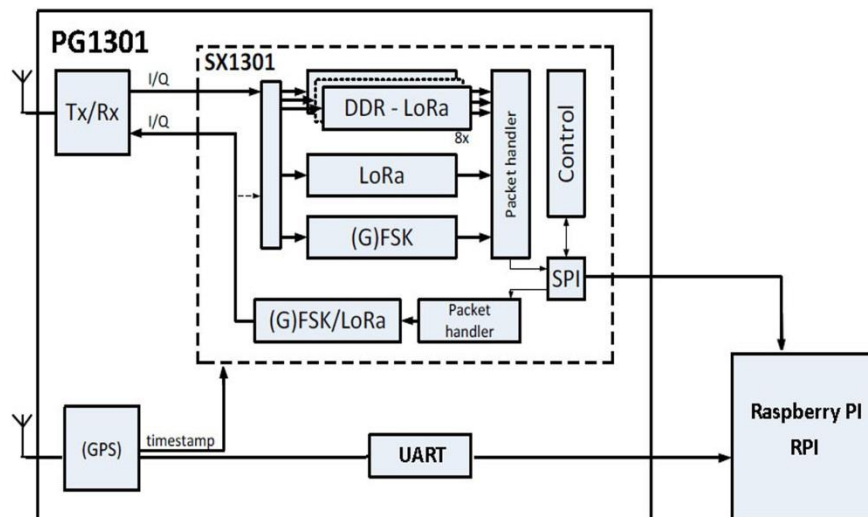
- ✓ Support Raspberry Pi 3B/3B+/4
- ✓ Up to -142.5dBm sensitivity with SX1257 Tx/Rx front-end (see reference design)
- ✓ 70 dB CW interferer rejection at 1 MHz offset
- ✓ Able to operate with negative SNR, CCR up to 9dB
- ✓ Emulates 49x LoRa demodulators and 1x (G)FSK demodulator

- ✓ Dual digital TX&RX radio front-end interfaces
- ✓ 10 programmable parallel demodulation paths
- ✓ Dynamic data-rate (DDR) adaptation

### 1.3 General Interfaces

- ✓ SPI interface for LoRa
- ✓ Specifications:
- ✓ Power Input: 5v, 1A
- ✓ 1 x SMA antenna for LoRa
- ✓ 1 x SMA antenna for GPS

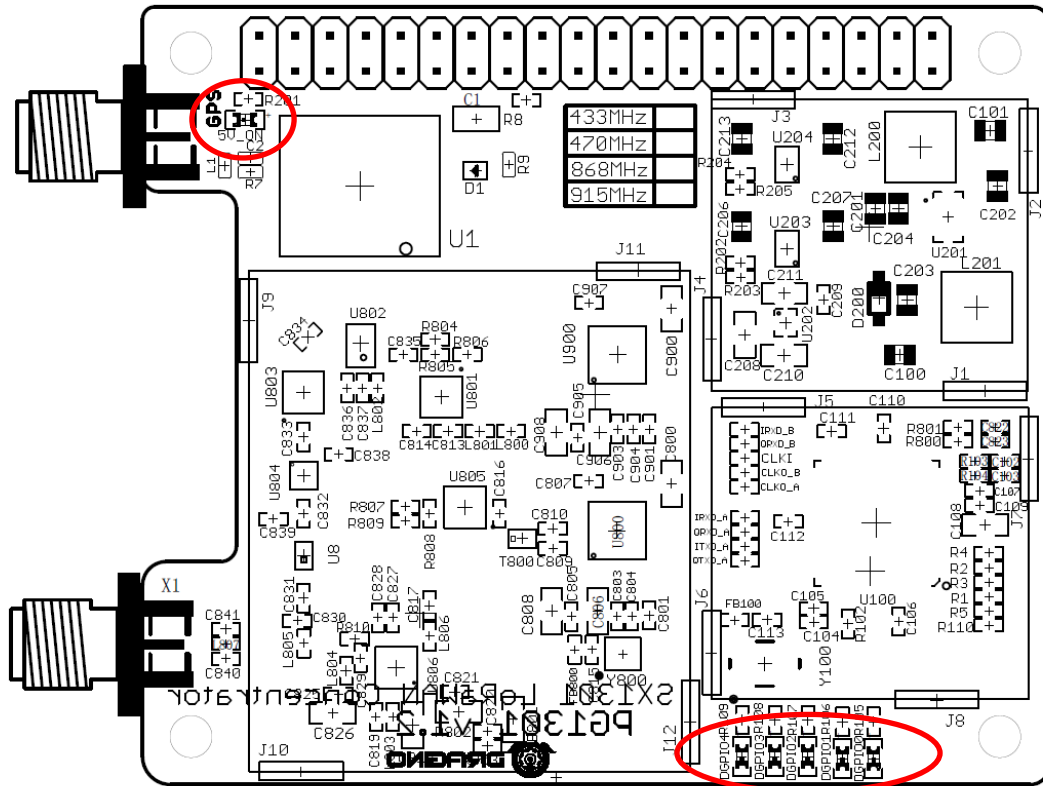
### 1.4 System Structure



## 1.5 Pin Mapping

Pin No	Raspberry Pi BCM pin number	PG1301 Definition
2	5V	5V
4	5V	5V
6	GND	GND
8	UART_TX	GPS_RX
9	GND	GND
10	UART_RX	GPS_TX
12	PPS	GPS_PPS
14	GND	GND
16	GPIO23	LoRa_RESET
19	GPIO10	LoRa_MOSI
20	GND	GND
21	GPIO9	LoRa_MISO
23	GPIO11	LoRa_SCK
24	GPIO8	LoRa_CSN
25	GND	GND
30	GND	GND
34	GND	GND
39	GND	GND

### 1.6 LEDs



- 5V\_ON: Always on after plug into RPI.
- GPIO0: to SX1301 GPIO[0] : No function.
- GPIO1: to SX1301 GPIO[1] : No function.
- GPIO2: to SX1301 GPIO[2] : No function.
- GPIO3: to SX1301 GPIO[3] : No function.
- GPIO4: to SX1301 GPIO[4] : Indicate tx on

### 1.7 Power Consumption

TBD

### 1.8 Applications

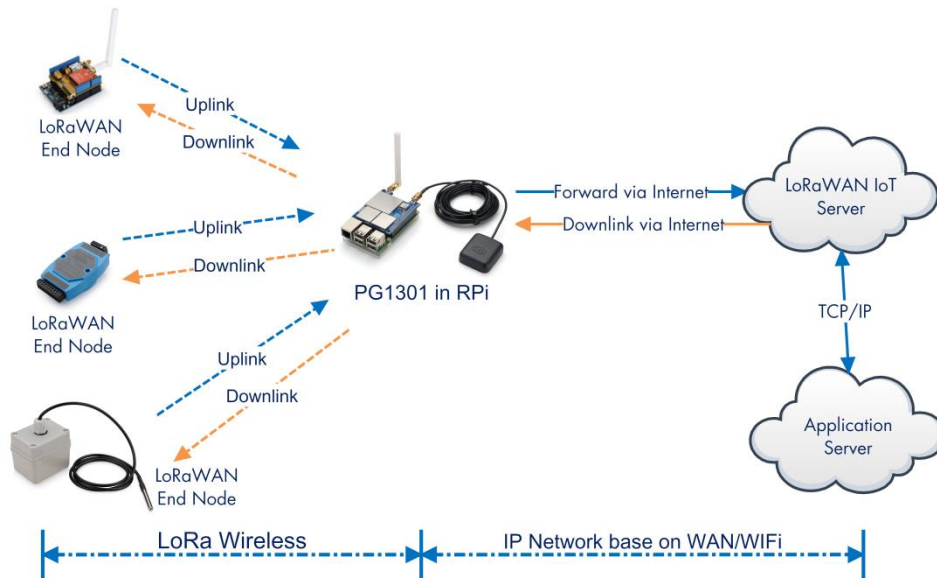
- ✓ Smart Buildings & Home Automation
- ✓ Logistics and Supply Chain Management
- ✓ Smart Metering
- ✓ Smart Agriculture
- ✓ Smart Cities
- ✓ Smart Factory

## 2. Example: Set up as LoRaWAN gateway.

### 2.1 System structure

This example is an example to show how to set up the PG1301 + RPi as a LoRaWAN gateway to use with [TheThingsNetwork](https://www.thingsnetwork.io/)(TTN) LoRaWAN server.. Set up method for other server are similar

**PG1301 + RPi In a LoRaWAN IoT Network:**





## 2.2 Hardware Installation

**Important Notice:** Please power the RPI with 5V,2A cable.



RPI in this example is RPI model 3B with fresh Raspbian OS install.

```
pi@raspberrypi:~$ cat /etc/os-release
PRETTY_NAME="Raspbian GNU/Linux 8 (jessie)"
NAME="Raspbian GNU/Linux"
VERSION_ID="8"
VERSION="8 (jessie)"
ID=raspbian
ID_LIKE=debian
HOME_URL="http://www.raspbian.org/"
SUPPORT_URL="http://www.raspbian.org/RaspbianForums"
BUG_REPORT_URL="http://www.raspbian.org/RaspbianBugs"
```

## 2.3 Install the software?

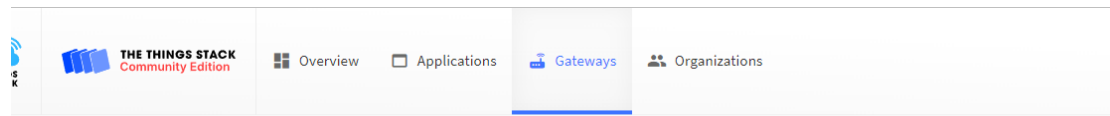
### 2.3.1 Get Gateway ID in Raspberry and input this in TTN v3.

In RPI, run below command to get a Gateway ID

```
ifconfig eth0
```

```
pi@raspberrypi:~/pi_gateway_fwd$ ifconfig eth0
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.130.2.56 netmask 255.255.255.0 broadcast 10.130.2.255
    inet6 fe80::73a9:f7ec:7662:1b21 prefixlen 64 scopeid 0x20<link>
    ether b8:27:eb:49:62:bc txqueuelen 1000 (Ethernet)
    RX packets 275633 bytes 351399638 (335.1 MiB)
    RX errors 0 dropped 179 overruns 0 frame 0
    TX packets 140253 bytes 11036711 (10.5 MiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

We got the ether (eth0 MAC) address is b8:27:eb:49:62:bc). Add ffff at the end and remove ":" to get the gateway ID: b827ebxxxxbcffff. Input this to TTN v3. Make sure to select legacy packet forwarder.



## Add gateway

### General settings

Owner\*

killight

Gateway ID ⓘ \*

raspberrymwd1301

Gateway EUI ⓘ

B8 27 EB 49 62 BC FF FF

Gateway name ⓘ

raspberry

Gateway description ⓘ

Description for my new gateway

Optional gateway description; can also be used to save notes about the gateway

Gateway Server address

eu1.cloud.thethings.network

The address of the Gateway Server to connect to

Require authenticated connection ⓘ

+ Add attributes

Attributes can be used to set arbitrary information about the entity, to be used by scripts, or simply for your own organization

LoRaWAN options

Frequency plan <sup>Ⓞ</sup> \*

Europe 863-870 MHz (SF9 for RX2 - recommended) | v

Schedule downlink late <sup>Ⓞ</sup>

Enabled  
Enable server-side buffer of downlink messages

Enforce duty cycle <sup>Ⓞ</sup>

Enabled  
Recommended for all gateways in order to respect spectrum regulations

Schedule any time delay <sup>Ⓞ</sup> \*

530 | milliseconds | v  
Configure gateway delay (minimum: 130ms, default: 530ms)

Gateway updates

Automatic updates

Enabled  
Gateway can be updated automatically

Channel

Stable  
Channel for gateway automatic updates

Create gateway

After set up, the status should show not connected as below:

The screenshot shows the 'Gateways' management page for a gateway named 'raspberry' (ID: raspberrypiwd). The status is 'Disconnected'. The configuration details are as follows:

- General information:**
  - Gateway ID: raspberrypiwd
  - Gateway EUI: BB 27 EB 49 62 BC FF FF
  - Gateway description: None
  - Created at: Feb 8, 2022 10:30:02
  - Last updated at: Feb 8, 2022 10:30:02
  - Gateway Server address: eu1.cloud.thethings.network
- LoRaWAN information:**
  - Frequency plan: EU\_863\_870\_TTN
- Live data:**
  - 10:30:02 Create gateway
- Location:**
  - No location information available

### 2.3.2 Download and install LoRaWAN packet forwarder

Enable SPI first:

- a) SPI needs to be enabled on the Raspberry Pi
- Run `sudo raspi-config` to open the config window

```

| Raspberry Pi Software Configuration Tool (raspi-config)
1 Change User Password Change password for the current user
2 Network Options      Configure network settings
3 Boot Options         Configure options for start-up
4 Localisation options Set up language and regional settings to match your location
5 Interfacing Options Configure connections to peripherals
6 Overclock           Configure overclocking for your Pi
7 Advanced Options    Configure advanced settings
8 Update              Update this tool to the latest version
9 About raspi-config  Information about this configuration tool

                <Select>                                <Finish>

```

```

| Raspberry Pi Software Configuration Tool (raspi-config)
P1 Camera             Enable/Disable connection to the Raspberry Pi Camera
P2 SSH                Enable/Disable remote command line access to your Pi using SSH
P3 VNC                Enable/Disable graphical remote access to your Pi using RealVNC
P4 SPI              Enable/Disable automatic loading of SPI kernel module
P5 I2C               Enable/Disable automatic loading of I2C kernel module
P6 Serial            Enable/Disable shell and kernel messages on the serial connection
P7 1-Wire            Enable/Disable one-wire interface
P8 Remote GPIO       Enable/Disable remote access to GPIO pins

                <Select>                                <Back>

```

In RPI , run:

wget [http://www.dragino.com/downloads/downloads/LoRa\\_Gateway/PG1301/software/lorapktfwd.deb](http://www.dragino.com/downloads/downloads/LoRa_Gateway/PG1301/software/lorapktfwd.deb)

```

pi@raspberrypi:~$ wget http://www.dragino.com/downloads/downloads/LoRa_Gateway/PG1301/software/lorapktfwd.deb
--2019-06-24 11:16:31-- http://www.dragino.com/downloads/downloads/LoRa_Gateway/PG1301/software/lorapktfwd.deb
Resolving www.dragino.com (www.dragino.com)... 173.254.28.23
Connecting to www.dragino.com (www.dragino.com)[173.254.28.23]:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 72168 (70k)
Saving to: 欵檣lorapktfwd.dep欵?
lorapktfwd.dep 100%[=====] 70.48K 197KB/s in 0.4s
2019-06-24 11:16:32 (197 KB/s) - 欵檣lorapktfwd.dep欵?saved [72168/72168]
pi@raspberrypi:~$

```

This will download the packet forwarder package from Dragino Server to RPI.

run “`sudo dpkg -i lorapktfwd.deb`” to install pkt fwd, pktfwd will auto run after this command. But the TTN will still show not connected because the Gateway ID doesn't match.

```

pi@raspberrypi:~$ sudo dpkg -i lorapktfwd.deb
(Reading database ... 127839 files and directories currently installed.)
Preparing to unpack lorapktfwd.deb ...
unpacking lorapktfwd (1) over (1) ...
Removed symlink /etc/systemd/system/multi-user.target.wants/lorapktfwd.service.
Setting up lorapktfwd (1) ...
Created symlink from /etc/systemd/system/multi-user.target.wants/lorapktfwd.service to /lib/systemd/system/lorapktfwd.service.
pi@raspberrypi:~$

```

### 2.3.3 Config Gateway ID, Frequency Band and Server address

After installation, user can find the configuration file in `/etc/loragateway`. Replace the gateway ID we got above to the `gateway_ID` in file `local_conf.json`

The default frequency band is EU868 in `global_conf.json` file and the default LoRaWAN server points to localhost, user need to put the correct server address to the `server_address` field, like below.

```
"gateway_conf": {  
  "gateway_ID": "B827EB4962BCFFFF",  
  "server_address": "eu1.cloud.thethings.network",  
  "serv_port_up": 1700,  
  "serv_port_down": 1700,  
  "keepalive_interval": 10,  
  "stat_interval": 30,  
  "push_timeout_ms": 100,  
  "forward_crc_valid": true,  
  "forward_crc_error": false,  
  "forward_crc_disabled": false,  
  "gps_tty_path": "/dev/ttyS0",  
  "beacon_period": 128,  
  "beacon_freq_hz": 869525000,  
  "beacon_datarate": 9,  
  "beacon_bw_hz": 125000,  
  "beacon_power": 14,  
  "beacon_infodesc": 0  
}
```

User can find the TTN v3 server address from:

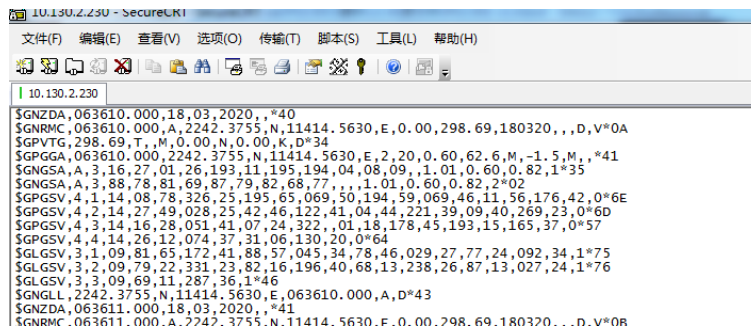
[Server Addresses | The Things Stack for LoRaWAN \(thethingsindustries.com\)](https://thethingsindustries.com/docs/lorawan-server-addresses)

- If user want to change to other frequency bands, User can copy the file from `/etc/lora-gateway/cfg` and rename it to `global_conf.json` and put it into `/etc/lora-gateway`.
- If user wants to change to other LoRaWAN server, modify the `global_conf.json` file.

### 2.3.4 Add GPS support

The PG1301 has a built-in GPS module, this module can provide GPS location info and PPS to uplink packets. There is no need to configure for PPS. For GPS location info, the GPS module use the RPi TXD(GPIO15) and RXD(GPIO16) pins. Make sure your RPi has configure these TXD/RXD pins are working as console. In RPi3, this UART interface is by default use for BLE, so you need to disable it and free it as console, (Please google to search related instruction).

Assume we have already set the RPi has valid console in /dev/ttyAMA0, we can use minicom to check the GPS info. (baud rate if 9600) and we can see below output in minicom.



```

10.130.2.230
$GNZDA,063610.000,18,03,2020,,*40
$GNRMC,063610.000,A,2242.3755,N,11414.5630,E,0.00,298.69,180320,,D,V*0A
$GPVTG,298.69,T,M,0.00,N,0.00,K,D*34
$GPGGA,063610.000,2242.3755,N,11414.5630,E,2,20,0.60,62.6,M,-1.5,M,*41
$GNGSA,A,3,16,27,01,26,193,11,195,194,04,08,09,,1.01,0.60,0.82,1*35
$GNGSA,A,3,88,78,81,69,87,79,82,68,77,,1.01,0.60,0.82,2*02
$GPGSV,4,1,14,08,78,326,25,195,65,069,50,194,59,069,46,11,56,176,42,0*6E
$GPGSV,4,2,14,27,49,028,25,42,46,122,41,04,44,221,39,09,40,269,23,0*6D
$GPGSV,4,3,14,16,28,051,41,07,24,322,,01,18,178,45,193,15,165,37,0*57
$GPGSV,4,4,14,26,12,074,37,31,06,130,20,0*64
$GLGSV,3,1,09,81,65,172,41,88,57,045,34,78,46,029,27,77,24,092,34,1*75
$GLGSV,3,2,09,79,22,331,23,82,16,196,40,68,13,238,26,87,13,027,24,1*76
$GLGSV,3,3,09,69,11,287,36,1*46
$GNGLL,2242.3755,N,11414.5630,E,063610.000,A,D*43
$GNZDA,063611.000,18,03,2020,,*41
$GNRMC,063611.000,A,2242.3755,N,11414.5630,E,0.00,298.69,180320,,D,V*0B
    
```

After seeing this, exit minicom. And add /dev/ttyAMA0 to /etc/lora-gateway/global\_conf.json

```

"forward_crc_error": false,
"forward_crc_disabled": false,
"gps_tty_path": "/dev/ttyAMA0", ---> Make sure this line use ttyAMA0
"beacon_period": 128,
    
```

### 2.3.5 Check result

Run below command to restart the pkt\_fwd:

```

sudo systemctl stop lorapktfwd
sudo systemctl start lorapktfwd
    
```

The pktfwd will start with the new gateway ID and TTN v3 should show the connection ok:

Overview Applications **Gateways** Organizations

EU1 Community Fair use policy applies

Gateways > raspberry

**raspberry**  
ID: rasperryfwd

↑ 2 ↓ 0 • Last activity just now

1 Collaborator 0 API keys

**Live data** See all activity →

- 12:26:28 Receive uplink message DevAddr: 26 8B FB 6C FCnt: 317
- 12:26:18 Receive gateway status Metrics: { ackr: 0, rxfw: 1, rxin: 1, rxok: 2, txin: 0, txok: 0 } Versions: { ttn-ls-gateway-sezve: "3.17.2" }
- 12:25:59 Receive uplink message DevAddr: 26 8B F0 8D FCnt: 2019
- 12:25:48 Connect gateway
- 10:30:02 Create gateway

**General information**

Gateway ID: rasperryfwd

Gateway EUI: 88 27 EB 49 62 BC FF FF

Gateway description: None

Created at: Feb 8, 2022 10:30:02

Last updated at: Feb 8, 2022 10:30:02

Gateway Server address: eu1.cloud.thethings.network

**LoRaWAN information**

Frequency plan: EU\_863\_870\_TTN

Global configuration: Download global\_conf.json

**Location** Change location settings →

No location information available

We can check pkt\_fwd running states in RPI by running:

`sudo journalctl -u lorapktfwd -f`

```

Jun 25 14:23:19 raspberrypi lora_pkt_fwd[1373]: ##### END #####
Jun 25 14:23:19 raspberrypi lora_pkt_fwd[1373]: RXTX: {"stat":{"time":"2019-06-25 14:22:49 GMT","rxnb":2,"rxok":1,"rxfw":1,"ackr":0.0,"dwnb":0,"txnb":0}}
Jun 25 14:23:19 raspberrypi lora_pkt_fwd[1373]: RXTX: {"rxpk":{"tmst":1631340292,"chan":0,"rfch":1,"freq":868.100000,"stat":1,"modu":"LORA","dadr":"SF12BW125","codr":1/5,"lsm":12.0,"rssi":-37,"size":24,"data":"OGSUSASARWACKKPOOSR3TKFAlqtDlW3jJ"}
Jun 25 14:23:19 raspberrypi lora_pkt_fwd[1373]: REPORT: ##### Report at: 2019-06-25 14:23:19 GMT #####
Jun 25 14:23:19 raspberrypi lora_pkt_fwd[1373]: REPORT: ## [UPSTREAM] ##
Jun 25 14:23:19 raspberrypi lora_pkt_fwd[1373]: REPORT: # RF packets received by concentrator: 1
Jun 25 14:23:19 raspberrypi lora_pkt_fwd[1373]: REPORT: # CRC_OK: 100.00%, CRC_FAIL: 0.00%, NO_CRC: 0.00%
Jun 25 14:23:19 raspberrypi lora_pkt_fwd[1373]: REPORT: # RF packets forwarded: 1 (24 bytes)
Jun 25 14:23:19 raspberrypi lora_pkt_fwd[1373]: REPORT: # PUSH_DATA datagrams sent: 2 (319 bytes)
Jun 25 14:23:19 raspberrypi lora_pkt_fwd[1373]: REPORT: # PUSH_DATA acknowledged: 0.00%
Jun 25 14:23:19 raspberrypi lora_pkt_fwd[1373]: REPORT: ## [DOWNSTREAM] ##
Jun 25 14:23:19 raspberrypi lora_pkt_fwd[1373]: REPORT: # PULL_DATA sent: 6 (50.00% acknowledged)
Jun 25 14:23:19 raspberrypi lora_pkt_fwd[1373]: REPORT: # PULL_RESP(onse) datagrams received: 0 (0 bytes)
Jun 25 14:23:19 raspberrypi lora_pkt_fwd[1373]: REPORT: # RF packets sent to concentrator: 0 (0 bytes)
Jun 25 14:23:19 raspberrypi lora_pkt_fwd[1373]: REPORT: # TX errors: 0
Jun 25 14:23:19 raspberrypi lora_pkt_fwd[1373]: REPORT: # TX rejected (collision packet): 0.00% (req:2, rej:0)
Jun 25 14:23:19 raspberrypi lora_pkt_fwd[1373]: REPORT: # TX rejected (collision beacon): 0.00% (req:2, rej:0)
Jun 25 14:23:19 raspberrypi lora_pkt_fwd[1373]: REPORT: # TX rejected (too late): 0.00% (req:2, rej:0)
Jun 25 14:23:19 raspberrypi lora_pkt_fwd[1373]: REPORT: # TX rejected (too early): 0.00% (req:2, rej:0)
Jun 25 14:23:19 raspberrypi lora_pkt_fwd[1373]: REPORT: # BEACON queued: 0
Jun 25 14:23:19 raspberrypi lora_pkt_fwd[1373]: REPORT: # BEACON sent so far: 0
Jun 25 14:23:19 raspberrypi lora_pkt_fwd[1373]: REPORT: # BEACON rejected: 0
Jun 25 14:23:19 raspberrypi lora_pkt_fwd[1373]: REPORT: ## [JIT] ##
Jun 25 14:23:19 raspberrypi lora_pkt_fwd[1373]: INFO: # Sx3301 time (PPS): 1622469559
Jun 25 14:23:28 raspberrypi lora_pkt_fwd[1373]: srtw receive:1155: FIFO content: 1 32 1 5 18
    
```

If there are LoRaWAN nodes transmits nearby, we can see the traffic in TTN v3 → Gateway →

Live data

Overview Applications **Gateways** Organizations

EU1 Community No support plan

Gateways > raspberry > Live data

Verbose stream  Export as JSON  Pause  Clear

Time	Type	Data preview
13:33:18	Receive gateway status	Metrics: { ackr: 0, rxfw: 2, rxin: 2, rxok: 2, txin: 0, txok: 0 } Versions: { ttn-ls-gateway-sezve: "3.17.2" }
13:32:59	Receive uplink message	DevAddr: 26 8B F0 8D FCnt: 317 FPort: 2 Confirmed uplink Data rate: SF7BW125 SNR: -4 RSSI: -129
13:32:57	Receive uplink message	DevAddr: 26 8B D2 C6 FCnt: 41459 FPort: 2 Confirmed uplink Data rate: SF10BW125 SNR: -2.8 RSSI: -128
13:32:48	Receive gateway status	Metrics: { ackr: 0, rxfw: 1, rxin: 2, rxok: 1, txin: 0, txok: 0 } Versions: { ttn-ls-gateway-sezve: "3.17.2" }
13:32:24	Receive uplink message	DevAddr: 26 8B 88 9C FCnt: 42888 FPort: 10 Data rate: SF7BW125 SNR: -3.5 RSSI: -128
13:32:18	Receive gateway status	Metrics: { ackr: 0, rxfw: 1, rxin: 1, rxok: 1, txin: 0, txok: 0 } Versions: { ttn-ls-gateway-sezve: "3.17.2" }
13:31:59	Receive uplink message	DevAddr: 26 8B F0 8D FCnt: 316 FPort: 2 Confirmed uplink Data rate: SF7BW125 SNR: -4.2 RSSI: -129
13:31:48	Receive gateway status	Metrics: { ackr: 0, rxfw: 2, rxin: 2, rxok: 2, txin: 0, txok: 0 } Versions: { ttn-ls-gateway-sezve: "3.17.2" }
13:31:41	Receive uplink message	DevAddr: 26 8B 6C 5B FCnt: 48141 FPort: 2 Data rate: SF7BW125 SNR: 9.8 RSSI: -99
12:27:26	Receive uplink message	DevAddr: 26 8B C9 24 FCnt: 2818 FPort: 2 Data rate: SF7BW125 SNR: -5 RSSI: -132
12:27:24	Receive uplink message	DevAddr: 26 8B 08 58 FCnt: 2818 FPort: 2 Data rate: SF7BW125 SNR: 4.5 RSSI: -121
12:27:22	Receive uplink message	DevAddr: 26 8B 95 58 FCnt: 2819 FPort: 2 Data rate: SF7BW125 SNR: -8.2 RSSI: -134
12:27:18	Receive gateway status	Metrics: { ackr: 0, rxfw: 4, rxin: 6, rxok: 4, txin: 0, txok: 0 } Versions: { ttn-ls-gateway-sezve: "3.17.2" }
12:27:05	Receive uplink message	DevAddr: 26 8B E3 F8 FCnt: 2819 FPort: 2 Data rate: SF7BW125 SNR: -4 RSSI: -129
12:26:59	Receive uplink message	DevAddr: 26 8B F0 8D FCnt: 250 FPort: 2 Confirmed uplink Data rate: SF7BW125 SNR: -7.2 RSSI: -132

### 2.3.6 Commands to handle service

- **Stop** lorapktfwd service: `sudo systemctl stop lorapktfwd`
- **Disable** lorapktfwd auto run after boot: `sudo systemctl disable lorapktfwd`
- **Start** lorapktfwd : `sudo systemctl start lorapktfwd`
- **Auto run** lorapktfwd after boot: `sudo systemctl enable lorapktfwd`
- **Show status** of lorapktfwd: `sudo systemctl status lorapktfwd`

## 3. Order Info

Part Number: **PG1301-XX**

- **PG1301-868** (For Bands: EU868,IN865)
- **PG1301-915** (For Bands: US915,AU915,AS923,KR920)
- **PG1301-470** (For Band: CN470)

## 4. Packing Info

### Package Includes:

- ✓ PG1301 x 1
- ✓ LoRa Antenna x 1
- ✓ GPS antenna x 1

### Dimension and weight:

- ✓ Device Size: cm
- ✓ Device Weight:
- ✓ Package Size / pcs : cm
- ✓ Weight / pcs :

## 5. FAQ

### 5.1 How to compile the pkt-fwd for RPi?

#### Step 1: Update Raspian to the latest one.

```
sudo apt-get update
sudo apt-get upgrade
```

#### Step 2: Get source code:

```
git clone https://github.com/dragino/pi\_gateway\_fwd.git
```

#### Step3: Enter into pi\_gateway\_fwd and run

```
make && make deb
```

Then you will get the `lorapktfwd.deb`



## 6. Reference

✧ Datasheet, User Manual & Software Download:

[http://www.dragino.com/downloads/downloads/LoRa\\_Gateway/PG1301/](http://www.dragino.com/downloads/downloads/LoRa_Gateway/PG1301/)

## 7. Support

- Support is provided Monday to Friday, from 09:00 to 18:00 GMT+8. Due to different timezones we cannot offer live support. However, your questions will be answered as soon as possible in the before-mentioned schedule.
- Provide as much information as possible regarding your enquiry (product models, accurately describe your problem and steps to replicate it etc) and send a mail to

[support@dragino.com](mailto:support@dragino.com)