

Specifications for

# DIY Enterprise LoRa Gateway

WisDevice Series

## RAK7249

Version V1.4 | July 2019



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## 1 Overview

### 1.1 Introduction

The Enterprise Grade DIY outdoor Gateway is an ideal product for IoT commercial deployment. It contains the Main Board, Operator-grade waterproof enclosure, backup battery and mounting accessories. The hardware main board completely integrates the WIFI, 4G, GPS and PoE main supply with an integrated back-up battery. The firmware implements a fully featured LoRaWAN™ compliant network base station. The Gateway has a range of over 15Km line-of-sight and over 2Km in dense urban environments.

The DIY Gateway brings more flexibility for the developer to create an enterprise grade solution: our most important difference is our flexible development support structure, allowing for faster development and time to market. We offer both a ready to go firmware image for openWRT based platforms and an open SDK for integration into hardware to support the needs of each customer.

### 1.2 Main Features

- Enterprise grade network gateway with your own configuration.
- LoRaWAN™ Stack Inside and integrate the Web UI for management.
- Complete Hardware specification including LoRa concentrator, Cellular, GPS and WIFI.
- Supports Power of Ethernet (PoE) IEEE 802.3af/at-Compliant Class 4, 48V.
- Battery Backup sustains operation for about 10 hours under typical conditions.
- IP67 waterproof enclosure with cable gland.

## 2 DIY Enterprise Gateway

Create your own Enterprise Gateway using the supplied building Blocks:

- Main Board
- Enclosure
- Backup Battery
- Accessories



Figure 1 | DIY Enterprise Gateway

*Note: All the pictures are just for reference, if any discrepancy, please adhere to the actual product instead.*

### 2.1 Main Board

- CPU: RAK634 Module (MT7628 inside)
- RAM: 128MB DDR2
- Flash: 16MB
- WiFi: 2x2 MIMO 802.11b/g/n

- LoRa concentrator  
Standard version with 8 channel Gateway and also support Max.16 channel Gateway.  
Tx Power is up to 27dBm and Rx sensitivity is down to -142dBm.
- 4G Cellular  
Quectel EG95 for CAT4 cellular network.
- L70 GPS Module
- Power-over-Ethernet (PoE)  
100M base-T Ethernet with IEEE802.3af/at standard Power-over-Ethernet.

## 2.2 Enclosure

- IP67 waterproof white color.
- Interface: 5 x N-Type connectors for Antenna, 1 PoE port and 1 reserve port.
- Weight (with cable): approximately 70.54oz (2kg).
- Dimensions: 220mm x 220mm x 104mm.
- Wall thickness: 2mm.
- Support up to 70~100 mm diameter pole mount.

## 2.3 Backup Battery

- The maximum space in the Enclosure can be placed 12V/10AH batteries for about 10 hours lifetime under typical operation.
- Battery powered real time clock.
- Battery Within 140 x 70 x 30mm.
- DC 5.5 x 2.1 circular joint with two interfaces, one male and one female.

## 2.4 Accessories

- Mounting Kit
- PoE Injector
- WiFi Antenna
- GPS Antenna
- LoRa Antenna
- LTE Antenna

### 3 DIY Configuration

The below table shows the main board configurations of the DIY Enterprise Gateway.

Part Number	8 Channel SX1301	16 channel SX1301	Cat4 Cellular	GPS	WIFI	Battery Backup
RAK7249-0x-14x	√		√	√	√	
RAK7249-1x-14x		√	√	√	√	
RAK7249-2x-14x	√		√	√	√	√
RAK7249-3x-14x		√	√	√	√	√
RAK7249-0x	√			√	√	
RAK7249-1x		√		√	√	
RAK7249-2x	√			√	√	√
RAK7249-3x		√		√	√	√

Table 1 | DIY Configuration

## 4 Hardware Interfaces



Figure 2 | Hardware Interfaces - Front



Figure 3 | Hardware Interfaces - Rear



## 5 Product Specifications

### 5.1 Main Specifications

Feature	Specifications
Computing	<ul style="list-style-type: none"> <li>MT7628, DDR2RAM 128MB</li> </ul>
WIFI Feature	<ul style="list-style-type: none"> <li><b>Frequency:</b> 2.400-2.4835GHz(802.11b/g/n)</li> <li><b>RX Sensitivity:</b> -95dBm (Min), <b>TX Power:</b> 20dBm (Max)</li> <li><b>Operation Channels:</b> 2.4GHz: 1-13</li> </ul>
LoRa Feature	<ul style="list-style-type: none"> <li>SX1301 Mini PCIe card (connects maximum of two), 8Channels (Optional: 16channels)</li> <li><b>RX Sensitivity:</b> -142dBm (Min), <b>TX Power:</b> 27dBm (Max)</li> <li><b>Frequency:</b> EU433, CN470, EU868, US915, AS920, AS923, AU915, KR920, IN865</li> </ul>
Cellular Feature	<ul style="list-style-type: none"> <li><b>With EG95: LTE CAT 4</b></li> <li><b>Cellular Variant for Europe</b></li> <li>LTE FDD: B1/B3/B7/B8/B20/B28A</li> <li>WCDMA: B1/B8</li> <li>GSM: 900/1800MHz</li> <li><b>Cellular Variant for North America</b></li> <li>LTE FDD: B2/B4/B5/B12/B13</li> <li>WCDMA: B2/B4/B5</li> </ul>
Power Supply	<ul style="list-style-type: none"> <li>PoE(IEEE 802.3af/at-Compliant), 42~57VDC</li> </ul>
Power Consumption	<ul style="list-style-type: none"> <li>12W (typical)</li> </ul>
ETH	<ul style="list-style-type: none"> <li>RJ45(10/100M)</li> </ul>
Antenna	<ul style="list-style-type: none"> <li>5 N-Type connectors</li> </ul>
Ingress Protection	<ul style="list-style-type: none"> <li>IP67</li> </ul>
Enclosure Material	<ul style="list-style-type: none"> <li>Aluminum</li> </ul>
Weight	<ul style="list-style-type: none"> <li>Approximately 111.11oz (3.15kg)</li> </ul>
Dimension	<ul style="list-style-type: none"> <li>220mm x 220mm x 104mm</li> </ul>
Operating Temp.	<ul style="list-style-type: none"> <li>-30°C to 65 °C</li> </ul>
Installation method	<ul style="list-style-type: none"> <li>Pole or Wall mounting</li> </ul>

Table 2 | Main Specifications

## 5.2 RF Specifications

### 5.2.1 WiFi Radio Specifications

Feature	Specifications
<b>Wireless Standard</b>	• IEEE 802.11b/g/n
<b>Operating Frequency</b>	• ISM band: 2.412~2.472(GHz)
<b>Operation Channels</b>	• 2.4GHz: 1-13
<b>Transmit Power</b> (The max. power may be different depending on local regulations) -per chain	<ul style="list-style-type: none"> <li>• <b>802.11b</b> 19dBm@ 1Mbps 19dBm@ 11Mbps</li> <li>• <b>802.11g</b> 18dBm@ 6Mbps 16dBm@ 54Mbps</li> <li>• <b>802.11n (2.4G)</b> 18dBm@MCS0 (HT20) 16dBm@MCS7 (HT20) 17dBm@MCS0 (HT40) 15dBm@MCS7 (HT40)</li> </ul>
<b>Receiver Sensitivity</b> (Typical)	<ul style="list-style-type: none"> <li>• <b>802.11b</b> -95dBm@ 1Mbps -88dBm @11Mbps</li> <li>• <b>802.11g</b> -90dBm @6 Mbps -75dBm@54Mbps</li> <li>• <b>802.11n (2.4G)</b> -89dBm@MCS0 (HT20) -72dBm @MCS7(HT20) -86dBm @MCS0(HT40) -68dBm @MCS7(HT40)</li> </ul>

Table 3 | WiFi Radio Specifications

### 5.2.2 LoRa Radio Specifications

Feature	Specifications
<b>Operating Frequency</b>	<ul style="list-style-type: none"> <li>• EU433, CN470, EU868, US915</li> <li>• AS920, AS923, AU915, KR920, IN865</li> </ul>
<b>Transmit Power</b>	• 27dBm (Max)
<b>Receiver Sensitivity</b>	• -142dBm (Min)

Table 4 | LoRa Radio Specifications

## 5.3 Software Specifications

### 5.3.1 LoRa

- Supports class A, B & C
- Supports LoRaWAN protocol
- Supports country code setup
- Supports TX power setup
- Supports data logger
- Supports statistics
- Supports location setup
- Supports server address & port setup

### 5.3.2 Network

- Supports WiFi AP mode
- Supports LTE APN setup
- Supports uplink backup
- Supports 802.1q
- Supports DHCP Server/Client
- Supports router module NAT
- Supports firewall

### 5.3.3 Management

- Supports WEB Management
- Supports SSH2
- Supports firmware update
- Supports NTP

## 5.4 Block Diagram

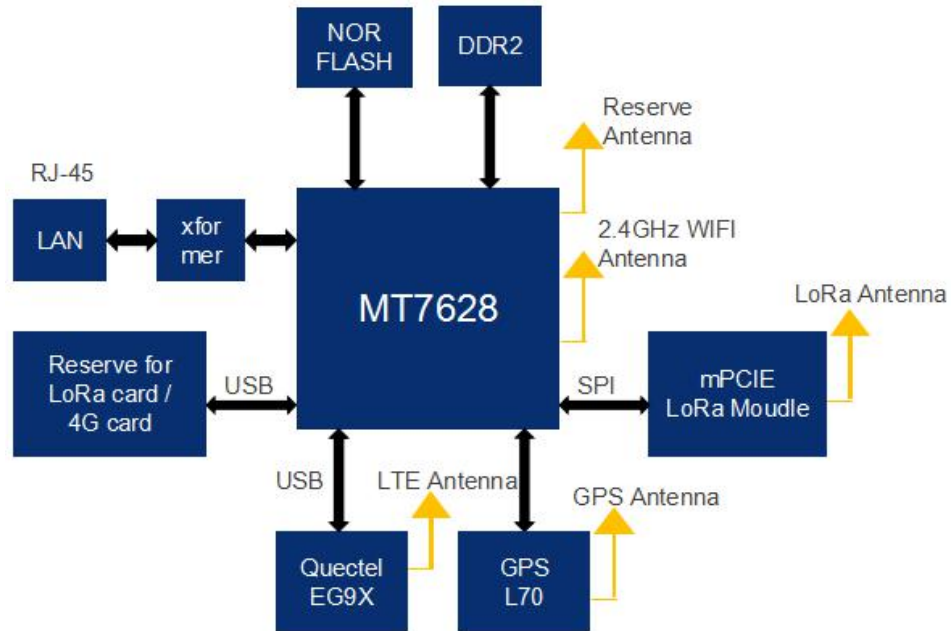


Figure 4 | Block Diagram

## 5.5 Main Board Overview



Figure 5 | Circuit Board

The RAK7249 mainboard provide a Reset key and 6\* LEDs for status indication. The The function of the Reset key is as follows:

**Short press:** Restart the Gateway;

**Long press (5s and above):** Restore Factory Settings;

The status of the LEDs is described as below. Please refer to the printing of the LEDs on the mainboard.

LEDs	Status Indication Description
<b>LED1(PWR)</b>	<ul style="list-style-type: none"> <li>Power Indicator, Led on when device power on</li> </ul>
<b>LED2(ETH)</b>	<ul style="list-style-type: none"> <li><b>ON</b> - linkup</li> <li><b>OFF</b> - linkdown</li> <li><b>Flash</b> - Data Transmitting and Receiving</li> </ul>
<b>LED3(LoRa1)</b>	<ul style="list-style-type: none"> <li><b>ON</b> - LoRa1 is working</li> <li><b>OFF</b> - LoRa1 is not working</li> <li><b>Flash</b> - Indicate that LoRa1 Packet receiving and sending</li> </ul>
<b>LED4(LTE)</b>	<ul style="list-style-type: none"> <li><b>Slow Flash 1</b>(200ms Bright/1800ms Dark) - unregistered network (in search)</li> <li><b>Slow Flash 2</b>(200ms Dark/1800ms Bright) - idle status(online)</li> <li><b>Flash</b> - Data Transmitting and Receiving</li> <li><b>ON</b> - Voice is working</li> </ul>
<b>LED5(LoRa2 for 16 channel)</b>	<ul style="list-style-type: none"> <li><b>ON</b> - LoRa2 is working</li> <li><b>OFF</b> - LoRa2 is not working</li> <li><b>Flash</b> - Indicate that LoRa2 Packet receiving and sending</li> </ul>
<b>LED6(WLAN)</b>	<ul style="list-style-type: none"> <li><b>AP Mode :</b> <b>ON</b> - WLAN is working; <b>Flash</b> - Data Transmitting and Receiving</li> <li><b>STA Mode :</b> <b>Slow Flash</b>(1Hz) - Connection Disconnected; <b>ON</b> - Connection Successful;</li> <li><b>Flash</b> - Data Receiving and Sending;</li> </ul>

Table 5 | LEDs Status Description

## 6 Configure the Gateway

You can login to the WEB Management page to overview the status of your gateway and configure your gateway.

For more information about the WEB Management platform and the configuration guide of the gateway, please refer to this document:

[RAK\\_LoRaWAN\\_Industrial\\_Gateway\\_Configuration\\_Guide](#)

## 7 Contact Information

Please contact us if you need technical support or want to know more information.

Support center: <https://forum.rakwireless.com/>

Email us: [info@rakwireless.com](mailto:info@rakwireless.com)

## 8 Revision History

Revision	Description	Date
1.0	Initial version	2019-01-15
1.1	Modify pictures and the right context	2019-01-21
1.2	Modify the WEB configuration guide chapter	2019-03-11
1.3	Add the LEDs Status Indication Description	2019-03-13
1.4	Modify the title	2019-07-10

## 9 Document Summary

Prepared by	Checked by:	Approved by:
Terry & Penn	Jose & Jeff	



### About RAKwireless:

RAKwireless is the pioneer in providing innovative and diverse cellular and LoRa connectivity solutions for IoT edge devices. It's easy and modular design can be used in different IoT applications and accelerate time-to-market.

For more information, please visit RAKwireless website at [www.rakwireless.com](http://www.rakwireless.com).