

## LoRa Base Station

V2.1 Outdoor Series

## Outdoor LoRa V2.1 Gateway

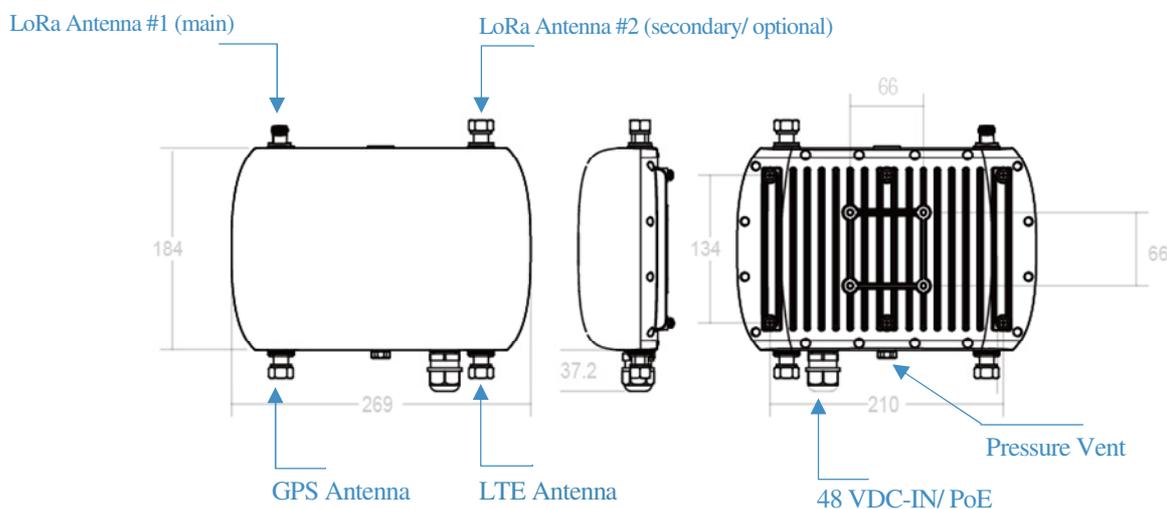
This Outdoor LoRa Gateway is designed with Semtech version 2.0 technology to provide low power and wide area (LPWA) unlicensed band wireless connection. This gateway supports connectivity for wide range of Internet of Things (IOT) applications.



### Product Overview

This outdoor gateway uses LoRaWAN technology from Semtech and is complied with specification defined by LoRa Alliance. This gateway has two LoRa, one GPS & one LTE antenna ports and is powered through 48 VDC PoE. Its LoRa interface operates in ISM bands and supports end-devices with class A & C, Listen Before Talk, Spreading Factor, Adaptive Data Rate (ADR), GPS Timing and Geo-Localization Service.

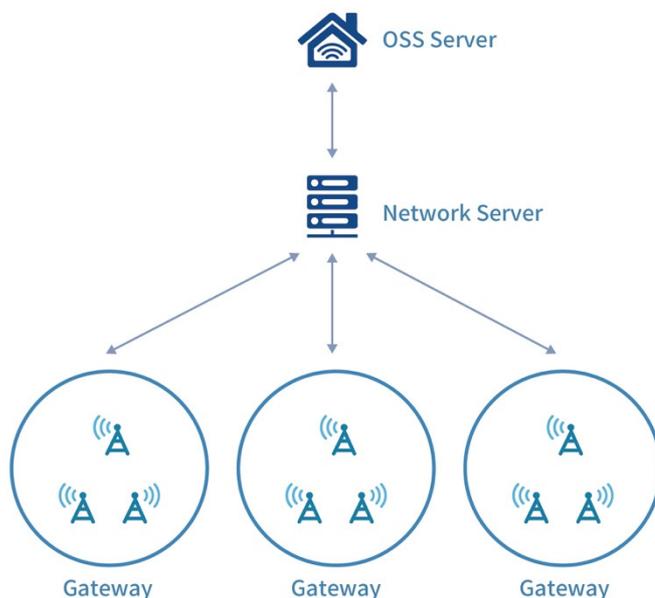
**Figure 1. Gateway External Ports**



## LoRa Network Solution

This outdoor LoRa gateway receives data from end-devices, then relay it to a backend server and routed to a application server for information processing.

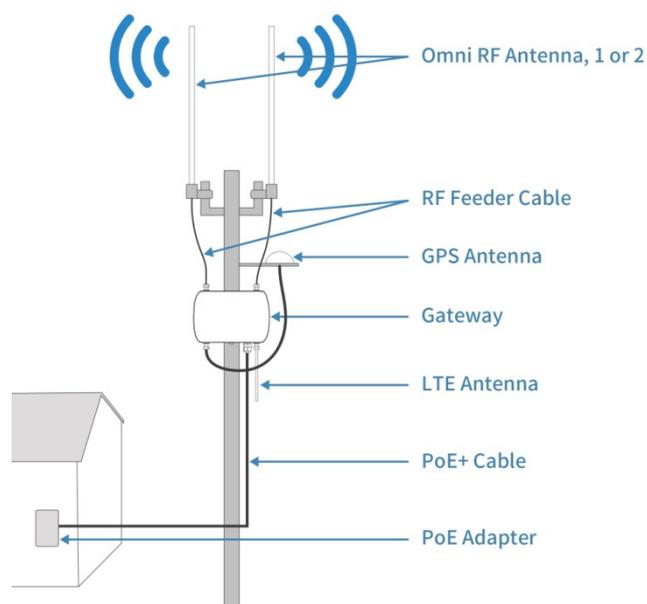
**Figure 2. LoRa Network**



## Deployment

This outdoor gateway supports Wall and Pole mount installations.

**Figure 3. A Typical Pole Mount Deployment**



**Table 1. Features and Benefits**

Features	Benefit
<b>16 LoRa Channels</b>	<ul style="list-style-type: none"> <li>Fully utilize the ISM band and complied with LoRa Alliance channel plan.</li> </ul>
<b>High Output TX Power</b>	<ul style="list-style-type: none"> <li>Support up to +27 dBm high power output channel in ISM band</li> </ul>
<b>Class A, B &amp; C</b>	<ul style="list-style-type: none"> <li>Support Class A and C end-devices defined in LoRa Alliance specification</li> </ul>
<b>End-Devices Supports</b>	<ul style="list-style-type: none"> <li>Class B pending</li> </ul>
<b>RF Channel Scanning</b>	<ul style="list-style-type: none"> <li>Support detection of RF channel noise before RF transmission</li> </ul>
<b>Geo-Localization</b>	<ul style="list-style-type: none"> <li>Identify end-device location base on TDOA technology</li> </ul>
<b>Improvement of Coexistence with LTE</b>	<ul style="list-style-type: none"> <li>Reduce interference to LTE band 20</li> </ul>
<b>VPN</b>	<ul style="list-style-type: none"> <li>IPSec (StrongSwan) / OpenVPN (optional)</li> </ul>
<b>Link Monitor</b>	<ul style="list-style-type: none"> <li>Configurable connection monitoring</li> <li>Auto-reconnect</li> <li>Fail-over detection</li> </ul>
<b>Zero-Touch Provisioning</b>	<ul style="list-style-type: none"> <li>SCEP registration</li> </ul>
<b>Flexible Upgradability</b>	<ul style="list-style-type: none"> <li>Dual partitions</li> <li>Remote and local upgrade</li> <li>Full/ partial/ patch upgrade</li> </ul>
<b>Security</b>	<ul style="list-style-type: none"> <li>Firewall (iptables)</li> <li>Encrypted key/ certificate</li> <li>Signed FW image</li> </ul>
<b>Time Synchronization</b>	<ul style="list-style-type: none"> <li>NTPD (5 servers at most)</li> <li>Quick adjust to last know time</li> </ul>
<b>Listen Before Talk</b>	<ul style="list-style-type: none"> <li>S. Korea</li> </ul>

## Product Specifications

**Table 2.1 LoRa Specifications (EU, USA, South Korea)**

Specification	Description		
LoRa	EU	USA	South Korea
<b>LoRa Frequency</b>	<ul style="list-style-type: none"> <li>863 – 870 MHz and its</li> </ul>	<ul style="list-style-type: none"> <li>902 – 928 MHz and its</li> </ul>	<ul style="list-style-type: none"> <li>920.9 – 923.3 MHz and its</li> </ul>

	subset, complying with region/ country local radio requirements	subset, complying with region/ country local radio requirements	subset, complying with region/ country local radio requirements
<b>TX Power</b>	<ul style="list-style-type: none"> <li>Up to 27 dBm/ ERP @ 869.525 MHz, 14 dBm @ other channels (with 8 dBi antenna + 1.5 dB cable loss)</li> </ul>	<ul style="list-style-type: none"> <li>Up to 27 dBm @ 902 – 928 MHz, (with 8 dBi antenna + 1.5 dB cable loss)</li> </ul>	<ul style="list-style-type: none"> <li>Up to 23 dBm @ 920.9 – 923.3 MHz, (with 8 dBi antenna + 1.5 dB cable loss)</li> </ul>
<b>RX Sensitivity</b>	<ul style="list-style-type: none"> <li>-138 dBm @ SF12</li> </ul>	<ul style="list-style-type: none"> <li>-138 dBm @ SF12</li> </ul>	<ul style="list-style-type: none"> <li>-138 dBm @ SF12</li> <li>917.1- 923.3 MHz</li> </ul>
<b>Sectorization</b>	<ul style="list-style-type: none"> <li>Omni</li> </ul>	<ul style="list-style-type: none"> <li>Omni</li> </ul>	<ul style="list-style-type: none"> <li>Omni</li> </ul>
<b>LoRa Channels</b>	<ul style="list-style-type: none"> <li>8 @ 867.1-868.5 MHz</li> </ul>	<ul style="list-style-type: none"> <li>0-63 @ 902.3-914.9 MHz, BW= 125KHz</li> <li>64-71 @ 903-914.2 MHz, BW= 500KHz</li> <li>0-7 @ 902.3-914.9 MHz, BW= 500 KHz</li> </ul>	<ul style="list-style-type: none"> <li>13 @ 920.9 – 923.3 MHz</li> </ul>
<b>ADR Support</b>	<ul style="list-style-type: none"> <li>YES</li> </ul>	<ul style="list-style-type: none"> <li>YES</li> </ul>	<ul style="list-style-type: none"> <li>YES</li> </ul>
<b>Data Rate</b>	<ul style="list-style-type: none"> <li>250 bps to 50 kbps</li> </ul>	<ul style="list-style-type: none"> <li>980 bps – 21.9 kbps</li> </ul>	<ul style="list-style-type: none"> <li>250 bps - 5.470 kbps</li> </ul>
<b>End Device Support</b>	<ul style="list-style-type: none"> <li>Class A &amp; C</li> <li>Class B pending</li> </ul>	<ul style="list-style-type: none"> <li>Class A &amp; C</li> <li>Class B pending</li> </ul>	<ul style="list-style-type: none"> <li>Class A &amp; C</li> <li>Class B pending</li> </ul>
<b>Applicable Regions</b>	<ul style="list-style-type: none"> <li>Europe</li> </ul>	<ul style="list-style-type: none"> <li>USA</li> </ul>	<ul style="list-style-type: none"> <li>South Korea</li> </ul>
<b>LTE</b>	<b>EU</b>	<b>USA</b>	<b>South Korea</b>
<b>LTE</b>	<ul style="list-style-type: none"> <li>Band 3/ 7/ 20/ 28</li> </ul>	<ul style="list-style-type: none"> <li>Band 2/ 5</li> </ul>	<ul style="list-style-type: none"> <li>NA</li> </ul>

**Table 2.2 LoRa Specifications (Singapore, Taiwan, Australia, New Zealand)**

Specification	Description
<b>LoRa</b>	<b>ASIA Pacific</b>
<b>LoRa Frequency</b>	<ul style="list-style-type: none"> <li>TX: 920-928 MHz, RX: 915-928 MHz and its subset, complying with region/ country local radio requirements</li> </ul>
<b>TX Power</b>	<ul style="list-style-type: none"> <li>Up to 23 dBm/ EIRP @ 920 - 928 MHz (with 8 dBi antenna + 1.5 dB cable loss)</li> </ul>
<b>RX Sensitivity</b>	<ul style="list-style-type: none"> <li>-138 dBm @ SF12</li> </ul>
<b>Sectorization</b>	<ul style="list-style-type: none"> <li>Omni</li> </ul>
<b>LoRa Channels</b>	<ul style="list-style-type: none"> <li>TBD</li> </ul>

<b>ADR Support</b>	<ul style="list-style-type: none"> <li>▪ YES</li> </ul>
<b>Data Rate</b>	<ul style="list-style-type: none"> <li>▪ 250 bps to 50 kbps</li> </ul>
<b>End Device Support</b>	<ul style="list-style-type: none"> <li>▪ Class A &amp; C</li> <li>▪ Class B pending</li> </ul>
<b>Applicable Regions</b>	<ul style="list-style-type: none"> <li>▪ Asia Pacific: Singapore, Taiwan, Australia, New Zealand</li> </ul>
<b>LTE</b>	
<b>LTE</b>	<ul style="list-style-type: none"> <li>▪ Singapore: band 3 and 7</li> <li>▪ Taiwan: band 3 and 28</li> <li>▪ Australia: band 3, 5, 7 and 28.</li> <li>▪ New Zealand: band 3 and 28</li> </ul>

**Table 2.3 Hardware Specifications**

Specification	Description
<b>Compute &amp; Storage</b>	
<b>Processor</b>	<ul style="list-style-type: none"> <li>▪ Cortex-A8</li> </ul>
<b>Flash/ Memory</b>	<ul style="list-style-type: none"> <li>▪ 4GB eMMC/ 4Gb DDR3</li> </ul>
<b>USB</b>	<ul style="list-style-type: none"> <li>▪ One internal USB 2.0 port</li> </ul>
<b>Reset Button</b>	<ul style="list-style-type: none"> <li>▪ One internal system reset button</li> </ul>
<b>Antenna Interface</b>	
<b>LoRa Antenna Connector</b>	<ul style="list-style-type: none"> <li>▪ Two extendable N type RF antenna port</li> </ul>
<b>GPS Antenna Connector</b>	<ul style="list-style-type: none"> <li>▪ One extendable N type RF antenna port</li> </ul>
<b>LTE Antenna Connector</b>	<ul style="list-style-type: none"> <li>▪ One extendable N type RF antenna port</li> </ul>
<b>WAN Interface</b>	
<b>Ethernet</b>	<ul style="list-style-type: none"> <li>▪ 10/100/1000 Mbps RJ45 port</li> </ul>
<b>LTE</b>	<ul style="list-style-type: none"> <li>▪ With built-in LTE NGFF M.2 card (optional)</li> </ul>
<b>WiFi</b>	<ul style="list-style-type: none"> <li>▪ IEEE 802.11 b/g/n 2.4 GHz</li> </ul>
<b>GPS</b>	
<b>GPS</b>	<ul style="list-style-type: none"> <li>▪ With built-in 1575.42 MHz, GLONASS, BeiDou module</li> <li>▪ With 3.3 VDC output for active GPS antenna</li> </ul>
<b>Power</b>	
<b>Power Input</b>	<ul style="list-style-type: none"> <li>▪ PoE ( 47-57 VDC )</li> </ul>

<b>Power Consumption</b>	<ul style="list-style-type: none"> <li>Maximum 40 watts</li> </ul>
<b>Antenna</b>	
<b>LoRA</b>	<ul style="list-style-type: none"> <li>0/ 8 dBi antenna</li> </ul>
<b>LTE</b>	<ul style="list-style-type: none"> <li>&lt; 1.6 dBi antenna</li> </ul>
<b>GPS</b>	<ul style="list-style-type: none"> <li>3.3 VDC active antenna</li> </ul>
<b>Lightning Protection</b>	<ul style="list-style-type: none"> <li>Earth ground connection with a surge protection cable</li> </ul>
<b>Physical Specifications</b>	
<b>Mounting</b>	<ul style="list-style-type: none"> <li>Wall and pole mount</li> </ul>
<b>Housing Material</b>	<ul style="list-style-type: none"> <li>Aluminum, plastic</li> </ul>
<b>IP Rating</b>	<ul style="list-style-type: none"> <li>IP67</li> </ul>
<b>Operation Humidity</b>	<ul style="list-style-type: none"> <li>20 % ~ 90 %</li> </ul>
<b>Operation Temperature</b>	<ul style="list-style-type: none"> <li>-20 ~ 70 °C</li> </ul>
<b>Net Weight</b>	<ul style="list-style-type: none"> <li>2.4 kg</li> </ul>
<b>Dimension</b>	<ul style="list-style-type: none"> <li>269 × 184 × 85 mm</li> </ul>
<b>Reliability</b>	
<b>MTBF</b>	<ul style="list-style-type: none"> <li>5 years at 25 °C prediction</li> </ul>
<b>Operating System</b>	
<b>Firmware</b>	<ul style="list-style-type: none"> <li>Base on Linux with kernel 3.14</li> </ul>

**Table 3. LoRa Antenna Specifications**

Specification	Description
<b>0 dBi</b>	
<b>Frequency Band</b>	<ul style="list-style-type: none"> <li>863 – 928 MHz</li> </ul>
<b>Peak Gains</b>	<ul style="list-style-type: none"> <li>0 dBi</li> </ul>
<b>VSWR</b>	<ul style="list-style-type: none"> <li>&lt; 3.5</li> </ul>
<b>Impedance</b>	<ul style="list-style-type: none"> <li>50 ohm</li> </ul>
<b>Connector</b>	<ul style="list-style-type: none"> <li>N-Type</li> </ul>
<b>Polarization</b>	<ul style="list-style-type: none"> <li>Vertical Linear</li> </ul>
<b>Mount</b>	<ul style="list-style-type: none"> <li>To unit's N-Type antenna port</li> </ul>
<b>Dimension</b>	<ul style="list-style-type: none"> <li>215 x 22 x 11 (mm)</li> </ul>
<b>Operating Temperature</b>	<ul style="list-style-type: none"> <li>-10 °C ~ +60 °C</li> </ul>
<b>IP Rating</b>	<ul style="list-style-type: none"> <li>IP67</li> </ul>

8 dBi	
<b>Frequency Band</b>	▪ 863 – 928 MHz
<b>Peak Gains</b>	▪ 8 dBi
<b>VSWR</b>	▪ < 1.5
<b>Impedance</b>	▪ 50 ohm
<b>Connector</b>	▪ N-Type (female pin)
<b>Polarization</b>	▪ Vertical
<b>Mount</b>	▪ Pole Mount/ to unit's N-Type antenna port
<b>Dimension</b>	▪ 1050 x 23 (mm)
<b>Operating Temperature</b>	▪ -40 °C ~ +60 °C
<b>IP Rating</b>	▪ IP67

**Table 4. LTE Antenna Specifications**

Specification	Description
<b>Frequency Band</b>	▪ 698~960MHz /1710~2700MHz
<b>Average Gains</b>	▪ 0~1 dBi
<b>VSWR</b>	▪ < 3.5
<b>Impedance</b>	▪ 50 ohm
<b>Connector</b>	▪ N-Type
<b>Polarization</b>	▪ Vertical linear
<b>Mount</b>	▪ To unit's N-Type antenna port
<b>Dimension</b>	▪ 215 x 22 x 11 (mm)
<b>Operating Temperature</b>	▪ -10 °C ~ +60 °C
<b>IP Rating</b>	▪ IP67

**Table 5. GPS Antenna Specifications**

Specification	Description
<b>Frequency Band</b>	▪ 1575.42 ± 3 MHz/ 1602 ± 3 MHz
<b>Antenna Absolute Gain @Zenith</b>	▪ +5.5 dBi with R.H.C.P. (Right Handed Circular Polarization)

<b>Antenna Minimum Gain</b>	▪ -1 dBi @ 10° elevation
<b>Overall Peak Gains</b>	▪ 32 dBi (includes LNA gain & cable loss)
<b>VSWR</b>	▪ < 2.0
<b>Impedance</b>	▪ 50 ohm
<b>Noise Figure</b>	▪ < 2.0
<b>LNA Gain</b>	▪ 34 dB
<b>Connector</b>	▪ N-Type
<b>Current Consumption</b>	▪ 10 mA ± 2 mA @ 2 – 3.5 VDC
<b>Dimension</b>	▪ 137.5 x 63 (mm)
<b>Operating Temperature</b>	▪ -40 °C ~ +85 °C
<b>Type</b>	▪ Outdoor
<b>Water Resistance</b>	▪ IP67

**Table 6. Compliance**

<b>Compliance</b>	<b>Description</b>		
<b>Radio</b>	<b>EU</b>	<b>USA</b>	<b>South Korea</b>
	▪ EN 300 220-1/-2	▪ FCC Part 15.247	Certified
	▪ EN 300 220-1/-2		
<b>EMC Emission</b>			
	▪ EN 55032 Class B	▪ FCC Part 15 B & C	
<b>EMC Immunity</b>			
	▪ EN55024		
	▪ EN 301-489-1/-3 /-17/-24		
<b>Safety</b>			
	▪ EN 60950-1/-22	▪ UL 60950-22	
	▪ EN 60950-1	▪ UL 60950-1	
	▪ EN 50385	▪ FCC Part 2	
<b>Surge</b>			
	▪ EN301.489-1, 3, 17 @ ± 1 KV, passed with criteria A		

## Ordering Information

**Table 7. Base Unit Ordering Information**

Model #	Description
<b>Base Unit</b>	
<b>T771868.00</b>	▪ EU: Outdoor LoRa V2.1 Gateway, 863 – 870 MHz
<b>GML820U-915U</b>	▪ USA: Outdoor LoRa V2.1 Gateway, 902 – 928 MHz
<b>GME820K-920U</b>	▪ S. KOREA: Outdoor LoRa V2.1 Gateway, 920.9 – 923.3 MHz
<b>GML820P-923U</b>	▪ Asia Pacific: Outdoor LoRa V2.1 APAC/ AS923 Gateway, 915-928 MHz

**Table 8. Accessory Ordering Information**

Model #	Description
<b>LoRa Antenna</b>	
<b>QMA3R0Z-0</b>	▪ 0 dBi @ 863 - 928 MHz antenna
<b>QMA8R0E-8</b>	▪ 8 dBi @ 863 – 928 MHz antenna
<b>GPS Antenna</b>	
<b>QMGXR0Z</b>	▪ 3.3 VDC, active GPS antenna
<b>LTE Antenna</b>	
<b>QMA3R0Z-0</b>	▪ 0 dBi antenna
<b>LoRa/ LTE/ GPS Antenna Extension Cable</b>	
<b>QMCXR0Z</b>	▪ LoRa Antenna extension cable for LoRa, GPS, LTE antenna (< 1.5 dB loss) ▪ N-Type connector
<b>PoE Adapter</b>	
<b>QMPXP0E-60</b>	▪ EU: 60 Watts PoE adapter

If you need further assistance for purchasing a PoE adapter for USA region, please contact ufiSpace for more information.

## Warranty Coverage

The ufiSpace Gateway comes with a 1-year limited hardware warranty.

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