

Document Number	
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# **GloT** **Outdoor Micro Gateway** **WAPS-232N**

## **Product Description**

## Revision History

Revision	Date	Description
1.1	Mar. 03, 2018	Updated



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# Chapter 1 – Introduction

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## Purpose and Scope

The purpose of this document is to describe the main functions, supported features, and system architecture of the WAPS-232N GLoT Outdoor Micro Gateway based on the latest LoRaWAN specification.

## Product Design

The dimension of the WAPS-232N GLoT Outdoor Micro Gateway is L:230 x W:200 x H:68 mm, with one (or two) external LoRa antenna port, one GPS antenna port and one WAN port with PoE capability. For 4G SKUs, one SIM slot and one 4G antenna port are available.



## Product Features

- Compliance with LoRaWAN 1.0.3
- Up to 16 concurrent channels for LoRa transmission
- 3G/4G backhaul supported (in different SKUs)
- Option support wide frequency range from 470MHz to 928MHz (in different SKUs)
- Long range over 15 kilometers radius
- 1 LAN port (10/100Mbps) with PoE
- Downlink LBT
- GPS built-in
- Cloud service to support easy deployment
- Thousands to millions devices depending on data model
- IP67 waterproof

## Product SKUs

SKU	Country	Channels	Frequency Band (MHz)	3G/4G Support	3G/4G Module
AU-16	Australia	16	AU920 (915~928)	N	N
AU-16-M	Australia	16	AU920 (915~928)	Y	EC25-AU
AU-8	Australia	8	AU920 (915~928)	N	N
AU-8-M	Australia	8	AU920 (915~928)	Y	EC25-AU
CN-470-16	China	16	CN470 (470~510)	N	N
CN-470-16-M	China	16	CN470 (470~510)	Y	EC20-CE
EU-8-M	Europe	8	EU868 (862~870)	Y	EC25-E
JP-16	Japan	16	920~928	N	N
JP-16-M	Japan	16	920~928	Y	EC25-J
MY-16	Malaysia	16	919~923	N	N
MY-16-M	Malaysia	16	919~923	Y	N
TW-16	Taiwan	16	920~925	N	EC25-AU
TW-16-M	Taiwan	16	920~925	Y	N
US-16	USA	16	US915 (902~928)	N	EC25-AU
US-16-M	USA	16	US915 (902~928)	Y	N

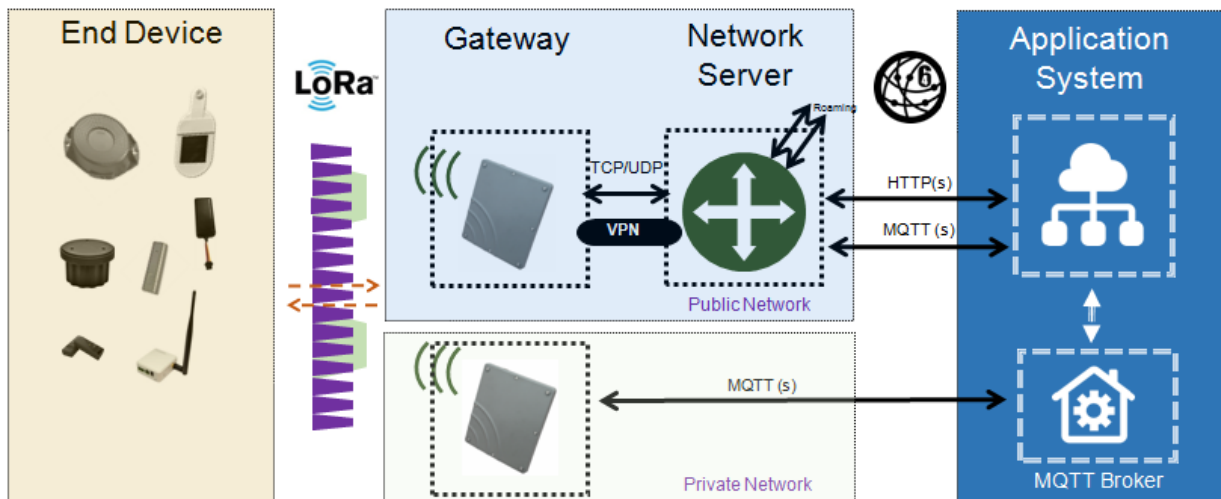
	EC25-E	EC25-J	EC25-A	EC25-AU	EC20-CE
Country	Europe Taiwan Malaysia	Japan	USA	Australia	China
LTE FDD	B1/B3/B5/B7/B8 /B20	B1/B3/B5/B8/B18 /B19/B26	B2/B4/B12	B1/B2/B3/B4/B5 /B7/B8/B28	B1/B3/B8
LTE TDD	B28/B40/B41	B41	X	B40	B38/B39/B40/B41
WCDMA	B1/B5/B8	B1/B6/B8/B19	B2/B4/B5	B1/B2/B5/B8	B1/B8
GSM	B3/B8	X	X	B2/B3/B5/B8	900/1800
TDSCDMA	X	X	X	X	B34/B39

CDMA 1x/EVDO	X	X	X	X	BC0
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## System Architecture

The WAPS-232N GloT Outdoor Micro Gateway can be provisioned to support different LoRa systems, as follows:

1. GloT mode - Works with the GloT network server, network management system and cloud service.
2. LoRaWAN mode - Network server embedded to support private network.
3. Packet Forwarder mode – Built with customized software that can work with specific network server.



## Definitions, Acronyms and Abbreviations

Item	Description
LPWAN	Low-Power Wide-Area Network
LoRaWAN™	LoRaWAN™ is a Low Power Wide Area Network (LPWAN) specification intended for wireless battery operated Things in a regional, national or global network.
ABP	Activation by Personalization
OTAA	Over-The-Air Activation
TBD	To Be Defined

## Reference

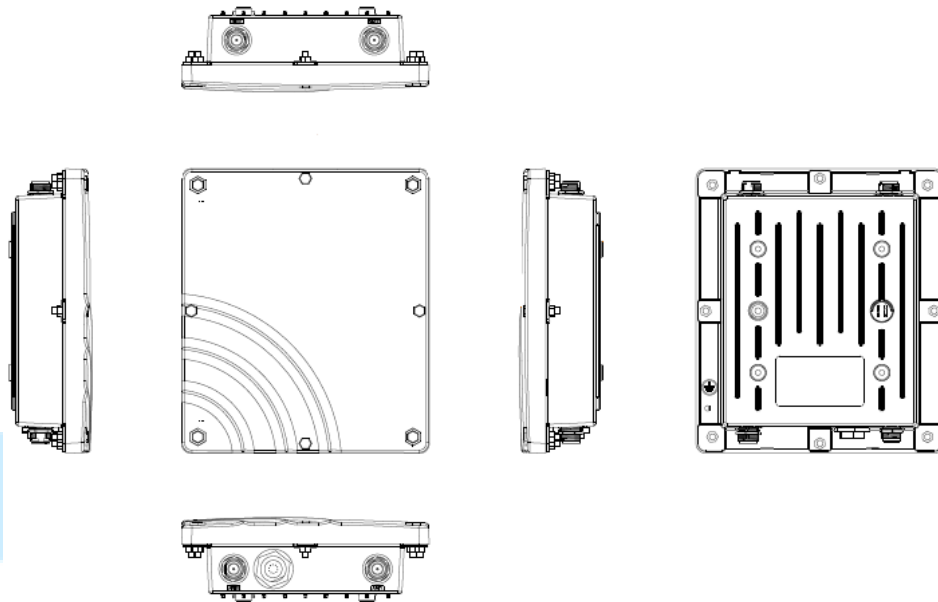
Document	Author
LoRaWAN Specification v1.0.3	LoRa Alliance
LoRaWAN Regional Parameters v1.0.3	LoRa Alliance
LoRaWAN Backend Interfaces Specification v1.0	LoRa Alliance





## Chapter 2 – Product Details

### I/O Ports



Port	Count	Description
ANT1	1	External N-Type GPS antenna
ANT2	1	External N-Type 3/4G antenna (Optional)
ANT3	1	External N-Type LoRa antenna for CH 1-8
ANT4	1	External N-Type LoRa antenna for CH 9-16
RJ45	1	10/100Mbps Ethernet port with power over Ethernet (PoE) function
SIM Slot	1	Mini SIM card slot for 3/4G module

## Package Content

No.	Description	Quantity
1	The product	1
2	GPS antenna & RF cable	1
3	Mounting kit	1
4	RJ45 water proof kit	1
5	3G/4G antenna	1
6	PoE power adapter & cord	1



# Chapter 3 – System Specification

## Hardware Specification

No.	Item	Description
1	Model Name	WAPS-232N
2	Frequency Band	EU 862~870 MHz / US 902~928 MHz / India 865~867 MHz / AS 923 MHz / CN 470~510 MHz / AU915~928 MHz
3	CPU	Quad-core Cortex-A9 up to 1.6GHz
4	RAM/Flash	DDRIII 4GB / NAND 8GB
5	RF Transceiver	SX1301 with SX1257 or SX1255 for CN-470 SKU
6	Number of Channels	8 or 16 Channels
7	WiFi	N/A
8	WAN Port	-10/100Mbps fast Ethernet with PoE - Withstands 6 KV surge at Ethernet RJ45 Port
9	Transmit RF Power	0.5W (up to 27 dBm)
10	Receive Sensitivity	Down to -142 dBm
11	Modulation	LoRa AES 128 bit
12	Security	AES 128 bit
13	USB Port	N/A
14	Working Temperature	-40°C ~ 60°C
15	Storage Temperature	-40°C ~ 60°C
16	Power Supply	55V / 0.6A via PoE Adaptor (Onsemi PD-9001GR 802.11at)
17	Antenna Type	External N-Type antennas
18	Ingress Protection	IP67
20	Interfaces	1 LAN port, 2 LoRa antenna connectors, 1 GPS antenna connector, One (1) 3G/4G antenna (option), 1 SIM slot (option)
21	Indicators	N/A
22	Dimensions	L:230 x W:200 x H:68 mm
23	Weight	2.05 Kg

## LoRa Specification

No.	Item	Description
1	Standard	LoRaWAN v1.0.3
2	LoRa Classes	- Class A: supported - Class B: to be supported in later release - Class C: supported
3	ADR	Adaptive data rate is supported to control spreading factor of nodes
4	Activation	Both Activation-by-Personalization (ABP) and Over-the-Air-Activation (OTAA) are supported
5	MAC Commands	LoRaWAN v1.0.3

## LoRa RF Specification

No.	Item	Capability				Remarks
		Min	Typ	Max	Units	
1	Frequency Range	<ul style="list-style-type: none"> <li>- EU 862~870 MHz</li> <li>- US 902~928 MHz</li> <li>- India 865~867 MHz</li> <li>- AS 923 MHz</li> <li>- CN 470~510 MHz</li> </ul>			MHz	Separated SKU
2	Channel Band Width	125/500			KHz	8 (or 16) uplink + 2 downlink
3	Output Power (TX)			27	dBm	Downlink
4	Sensitivity (RX)		-136	-142	dBm	BW=125KHz with SF=10

\* All the radio performance is validated from - 0 to 40 °C

## Software Specification

No.	Item	Description
1	Internet Connectivity	<ul style="list-style-type: none"> <li>- thru WAN port with fixed IP/ DHCP client</li> <li>- thru 3G/LTE module</li> </ul>
2	WiFi Configuration	N/A
3	Network Configuration	<ul style="list-style-type: none"> <li>- DHCP server for IP leasing</li> <li>- Diagnostics with Ping, TraceRoute and NSlookup</li> </ul>
4	System Status	N/A
5	LoRa Information	<ul style="list-style-type: none"> <li>- Current LoRa channel configuration and Gateway ID</li> <li>- Supported spreading factors</li> <li>- Provision code</li> <li>- External network server configuration and logs by provision code.</li> <li>- Channel scan by provision code.</li> </ul>
6	LoRaWAN Configuration (LoRaWAN mode with embedded network server)	<ul style="list-style-type: none"> <li>- Current OTAA end-node list</li> <li>- Detailed end-node logs at Gateway</li> <li>- ABP table for managing end-node device with ABP mode (user-defined DevAddr/ NwkSKey/ NwkSKey/ AppSKey)</li> <li>- OTAA table for managing end-node with OTAA mode (user-defined AppEUI/ DevEUI/ AppKey/ DevAddr Start Counts/ Aging Out time)</li> </ul>
7	Provisioning	<ul style="list-style-type: none"> <li>- Current LoRa channel configuration and Gateway ID</li> <li>- Supported spreading factors</li> <li>- Provision code</li> <li>- External network server configuration and logs</li> <li>- Channel scan</li> </ul>
8	Channel Scan	<p>The gateway can scan all supported channels based on ISM band regulation.</p> <p>SX1301 with SX1257:</p> <ul style="list-style-type: none"> <li>- EU 863-870 MHz</li> <li>- US 902-928 MHz</li> <li>- AU 915-928 MHz</li> </ul> <p>SX1301 with SX1255:</p> <ul style="list-style-type: none"> <li>- CN 470-510 MHz</li> </ul>
9	Time Sync	Support Network Time Protocol (NTP)
10	Firmware Upgrade	- Over-the-air (OTA) upgrade
11	Remote Management	<ul style="list-style-type: none"> <li>- Managed and configured by GloT Network Management System (GNMS) at GloT mode</li> <li>- Manual provisioning with public and private data model</li> <li>- Keepalive with CPU load, memory usage and in/out traffic</li> </ul>
12	LoRa Uplink Message	Uplink Message (to network server) includes:

No.	Item	Description
	Format (LoRaWAN mode with external MQTT broker)	<ol style="list-style-type: none"> <li>1. Channel info</li> <li>2. Spreading factor</li> <li>3. Received time</li> <li>4. Gateway IP</li> <li>5. Gateway ID</li> <li>6. Received RSSI</li> <li>7. Received SNR</li> <li>8. Device address of end-node</li> <li>9. Uplink data</li> <li>10. Frame count</li> <li>11. F-port</li> <li>12. Option length</li> </ol>
13	LoRa Downlink Message Format (LoRaWAN mode with external MQTT broker)	Downlink Message (from network server) includes: <ol style="list-style-type: none"> <li>1. Device address of end-node</li> <li>2. Downlink data</li> <li>3. Gateway ID</li> <li>4. Any string ID (for tracking purpose)</li> <li>5. Un-confirmed or confirmed data</li> <li>6. Receive window (RX1 or RX2)</li> </ol>

## Regulatory Specification

No.	Item	Standard
1	FCC	ID: MXF-WAPS232N
2	Telec	Low Power No: 201-163369 / 00 High Power No: 201-170679 / 00
3	CE	EN 303 413 V1.1.1 EN 301 489-1-3-19-52 EN 300 220 V3.1.1 EN 301 908-1 V11.1.1 EN 55032 + EN 55024 EN 50385 + EN 62311
4	NCC	ID: CCAF18LP2180T2
5	SRRC	CMIIT ID:2015DJ6089
6	Dekra	Low Power Report No. 1720041R-RFJPP17V00-A