

Compact LTE/NB-IoT Wi-Fi Router for IIoT Applications

WR222-WLAN+LTE/NB1 and WR212-WLAN Industrial Compact LTE/NB-IoT WLAN Serial Router

The LTE/NB-IoT Wireless LAN IoT router WR222-WLAN+LTE/NB1 brings serial and wireless LAN data to the cellular network. It supports LTE/NB-IoT to wireless LAN redundancy and LTE/WLAN auto offload to optimize network performance. The RS232/422/485 port connects to meters, sensors, or RTU can send data to the remote cloud or data center over the cellular or WLAN network. The WR212-WLAN is a smart wireless LAN router for serial devices. To safeguard cybersecurity, security features such as Firewall, OpenVPN, GRE tunnel are supported. The embedded MQTT and RESTful API enables instant public cloud integration such as AWS or Azure. The private cloud platform ThingsMaster and ThingsMaster OTA can also be set up for an instant and secured access to receive data or manage devices remotely.



Dual Radio 4G/LTE/NB-IoT + Wi-Fi Wireless Network

- LTE Cat.4, 2T2R MIMO provides 150M downlink and 50M uplink
- 4G/3G/2G full cellular network compatibility
- LTE-E:
FDD B1/3/5/7/8/20 (2100/1800/850/2600/900/800MHz)
TDD B38/40/41 (2600/2300/2500MHz)
- LTE-CN:
FDD B1/3/5/8 (2100/1800/850/900MHz)
TDD: B38/39/40/41 (2600/1900/2300/2500MHz)
- IEEE 802.11b/g/n for 2.4G 2T2R MIMO delivers up to 300Mbps throughput
- **Support NB-IoT + M1**
LTE FDD: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B26/B28
LTE TDD: B39 (For Cat M1 Only)

Serial Communication & High Throughput Data Switching

- RS232/422/485 full functions for serial over LTE/Wi-Fi/Ethernet data switching
- 2-port Ethernet supports routing and bridging mode

Rugged Design for Wayside Surveillance, ITS Application

- Effective heat dissipation design for operating in -40~70°C environments
- CE Marking
- IEC61000-6-2/IEC61000-6-4 heavy industrial EMC compliance

Enhanced Cyber Security & Redundancy

- Support Firewall for inbound/outbound traffic
- OpenVPN (server/client)
- Support L2TP with PPP, PAP, CHAP(LCP, IPCP)
- Support GRE tunnel
- HTTPs/SSH secure login
- Support TACACS+ multi-user authentication for privileged user management

Industrial IoT LAN & Cloud Management

- Various configuration paths, including CGI WebGUI, CLI, SNMP and RMON*
- 1:1 NAT, port forwarding and NAT for local traffic protection
- ARP response over 802.2 LLC SNAP
- Support SNMPv3 and entity-MIB (RFC4133), MIB II (RFC1213)
- NTP v3 time management
- WoMaster Software Utilities
- NetMaster**: Network Management System with VLAN visualization* and ERPS* Ring
- ViewMaster**: Configuration Management
- ThingMaster**: Interactive monitoring dashboard by Modbus Tag to collect data from Modbus devices
- ThingMaster OTA**: Realtime map showing the status, signal strength, location of the remote devices, over-the-air batch device registration, configuration and firmware upgrade*, alerts on critical events to prevent downtime
- Support MQTT protocol, ready to use AWS/Azure and Private Cloud Agent for cloud management
- LLDP* for topology control, auto-topology drawing
- USB for easy field configuration and firmware update
- Diagnostic tool includes Ping, TFTP, SNMP Trap, E-mail Alert and System Log

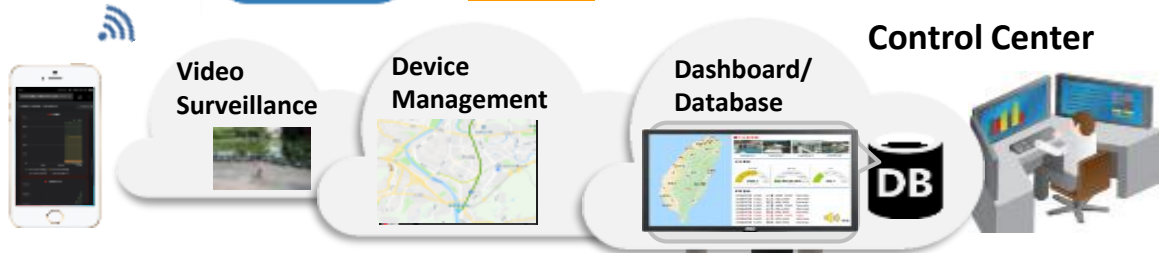


✓ Ready Total Solution for IoT

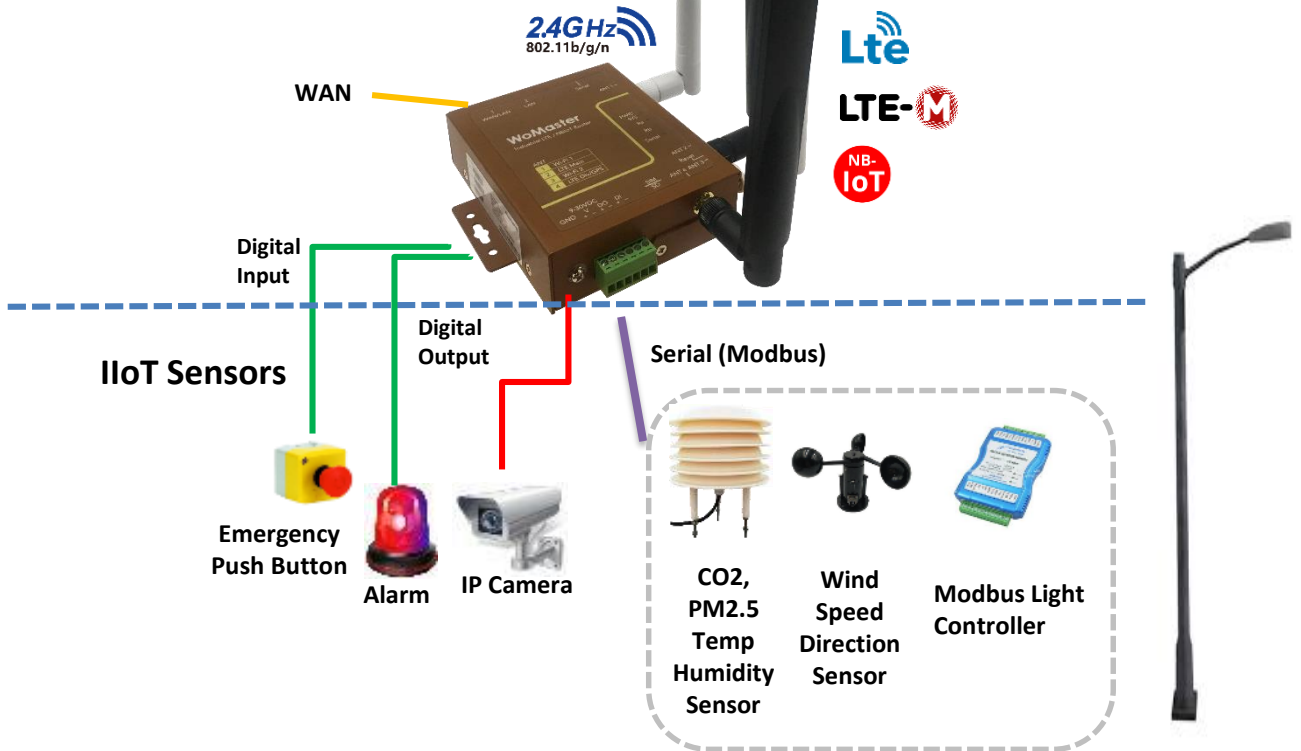
Cloud Service



ThingsMaster
ThingsMaster OTA



IoT Router



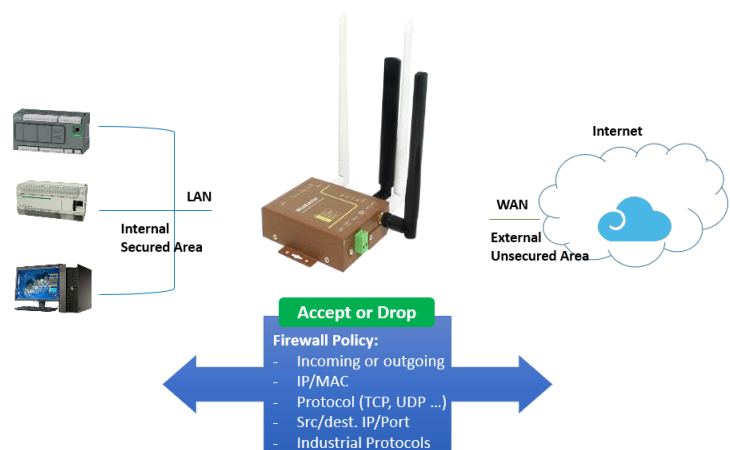
✓ Secured Remote Access by VPN

WR222 can act as VPN server for data encryption and dynamic remote access. Multiple VPN protocols are supported such as OpenVPN, GRE, and L2TP. The channels between multiple networks, ex. private/public/hybrid networks are fully secured and with authentication features.



✓ Cyber Security Guard

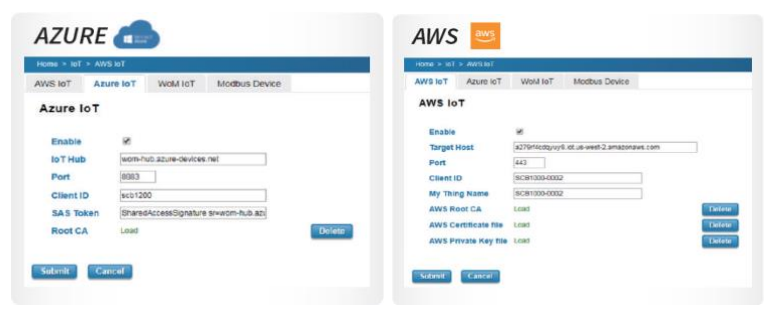
The stateful firewall can monitor the status of connection at all time. Multiple industrial fieldbus protocols, ex. Modbus TCP*, EtherNet/IP* are also supported for factory automation applications.



Secure IoT Modbus Tags

- Tag-based data acquisition with MQTT support
- MQTT client acting as publisher and subscriber
- The latest TLS encryption and X.509 authentication
- Selectable serial port and data type. Sensor alive check and display sensor value.

✓ Built-in Microsoft Azure and Amazon AWS agent



Modbus Logging

Enable
Name: // Tag Name
Serial:
Slave ID:
PLC Address:
Function: // Slave Address
Data Type:
 // Data Address, Register Address

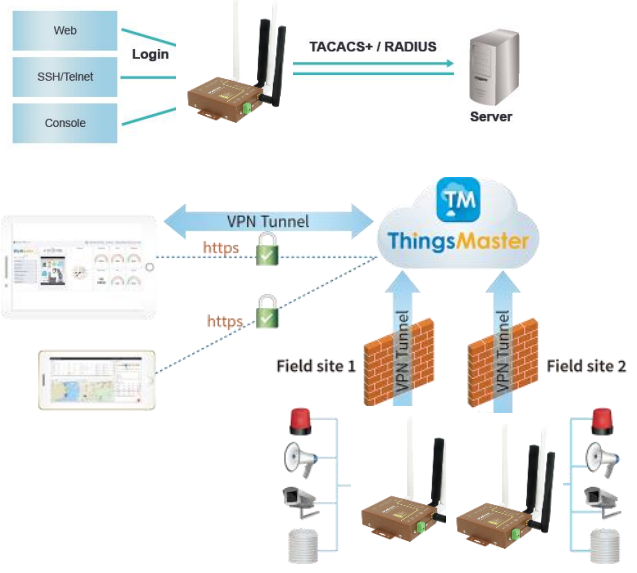
Modbus RTU Slave Tag List

Select	Name	Serial	Slave ID	Address	Function Code	Data Type	Edit	Alive	Value
<input type="checkbox"/>	PM1	1	4	1	03	int16	<input type="button" value="Edit"/>	Yes	10
<input type="checkbox"/>	PM2_5	1	4	2	03	uint16	<input type="button" value="Edit"/>	Yes	13
<input type="checkbox"/>	PM10	1	4	3	03	uint16	<input type="button" value="Edit"/>	Yes	13
<input type="checkbox"/>	CO2	1	1	562	03	uint16	<input type="button" value="Edit"/>	Yes	1107
<input type="checkbox"/>	Temperature	1	1	564	03	int16	<input type="button" value="Edit"/>	Yes	255
<input type="checkbox"/>	Humidity	1	1	566	03	int16	<input type="button" value="Edit"/>	Yes	629
<input type="checkbox"/>	Temperature_f	1	1	1	03	float	<input type="button" value="Edit"/>	Yes	25.490820

✓ Multi-Level User Passwords

Different centralized authentication servers are supported such as RADIUS and TACACS+. Using a central authentication server simplifies account administration, when you have more than one switches in the network.

Authentication Chain is also supported. An authentication chain is an ordered list of authentication methods to handle more advanced authentication scenarios. For example, you can create an authentication chain which first contacts a RADIUS server, and then looks in a local database if the RADIUS server does not respond.

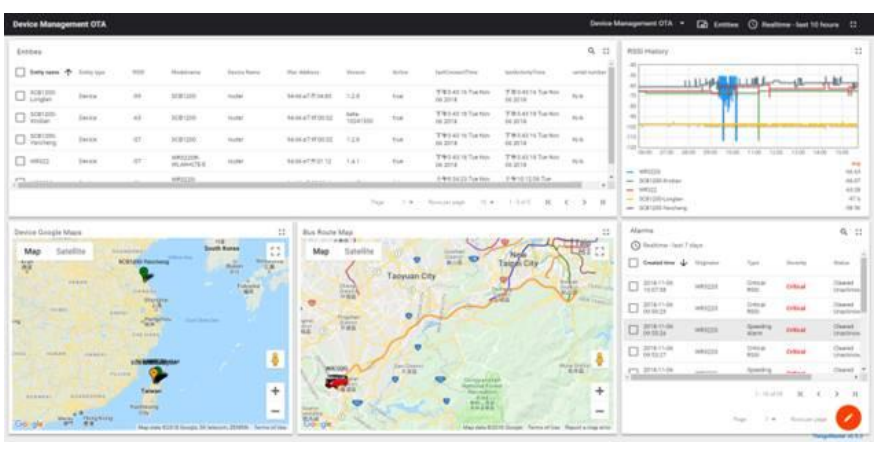


Secured Multi-sites Management

- N to N VPN
- Latest TLS encryption and X.509 authentication

✓ ThingsMaster OTA (device management over the air)

The OTA agent embedded in WR222 upgrades device management over the air, anywhere you are and any time you want over your mobile devices. ThingsMaster OTA is a secured local OTA software that can be installed in a private or public server or even QNAP NAS (network attached storage). With OTA, all device information such as location, warning event can be shown in real time. The maintenance such as configuration reload, or device reboot can also be run by group.





Interfaces

System LED

- 1 x Power
- 1 x System Status
- 1 x Serial Status
- 2 x Radio Status LED (Ra/Rb)

Serial Communication

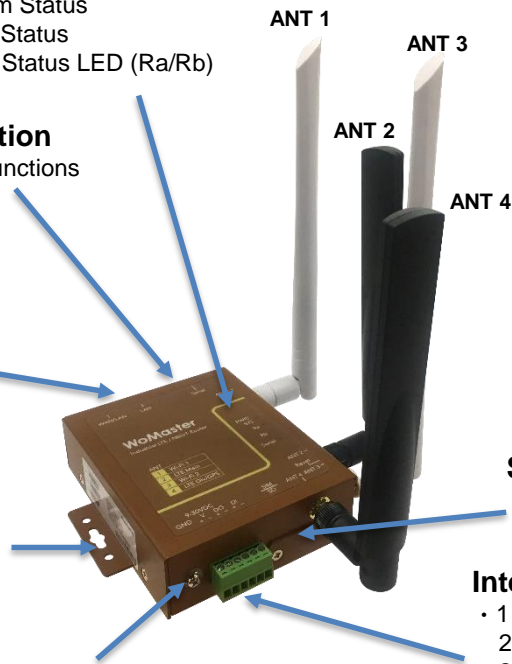
- RS232/422/485 Full functions
- DB9 female

Ethernet Network

- 2-port 10/100M RJ45
- 1 WAN + 1 LAN

Wall/DIN Mounting Clip (Both Sides)

Ground



SIM Card & SD

- 1x SIM
- 1x MicroSD

Integrated Power Connector

- 1 x 6-pin terminal block for
 - 2-pin for 12V power input
 - 2-pin for DI
 - 2-pin for DO

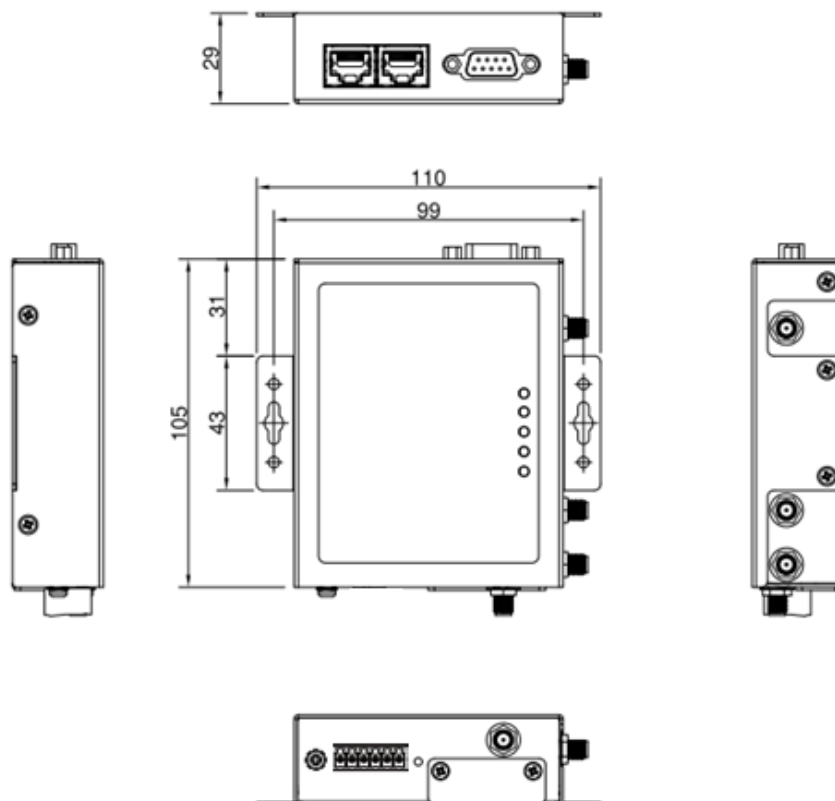
	WR222-WLAN-LTE	WR212-WLAN	WR222-WLAN+NB1+M1
ANT 1	Wi-Fi 1	Wi-Fi 1	Wi-Fi 1
ANT 2	LTE-Main	--	LTE-NB IoT/M1
ANT 3	Wi-Fi 2	Wi-Fi 2	Wi-Fi 2
ANT 4	LTE-DIV/GPS	--	GPS


* Antennas are optional accessory and are not included in the package



Dimensions

(mm)



Technology																																									
Standard	3GPP Release 11 Long Term Evolution, fallback 3GPP Release 7,8,9 for HSPA/UMTS 3GPP Release 13 NarrowBand IoT IEEE 802.11b/g/n for Wireless LAN IEEE 802.11i for Wireless Security IEEE 802.3 10Base-T Ethernet IEEE 802.3u 100Base-TX Fast Ethernet																																								
Interface																																									
Ethernet Port	2 x 10/100Base-TX RJ45, Auto Negotiation, Auto MDI/MDI-X Router Mode: 1 WAN + 1 LAN, Bridge Mode: 2 LAN																																								
System LED	1 x Power: Green ON 1 x SYS: Ready: Green On, Firmware Updating: Green Blinking 1 x Ra: 4G connection: Green On, 2/3G connection: Green Blinking, disconnected: Off 1 x Rb: AP mode: Green On, Station mode connected: Green Blinking, Station mode/radio disable: Off 1 x Serial Port: Activity: Green Blinking																																								
Reset	System Reset(2~6 Seconds) / Default Settings Reset(over 7 Seconds)																																								
SMA Socket	Up to 4 x RP-SMA Female ANT1/3 for Wi-Fi, ANT2/4 for LTE (Main/Div/GPS)																																								
SIM Socket	1x Nano SIM																																								
MicroSD	1x for field diagnostic data logging																																								
Serial	1x RS232/422/485, DB9 Female  <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Pin</th> <th>RS232</th> <th>RS485-4w/422</th> <th>RS485-2w</th> </tr> </thead> <tbody> <tr><td>1</td><td>DCD</td><td>TX-</td><td>Data-</td></tr> <tr><td>2</td><td>TXD</td><td>RX+</td><td>-</td></tr> <tr><td>3</td><td>RXD</td><td>TX+</td><td>Data+</td></tr> <tr><td>4</td><td>DSR</td><td>-</td><td>-</td></tr> <tr><td>5</td><td>GND</td><td>GND</td><td>GND</td></tr> <tr><td>6</td><td>DTR</td><td>RX-</td><td>-</td></tr> <tr><td>7</td><td>CTS</td><td>-</td><td>-</td></tr> <tr><td>8</td><td>RTS</td><td>-</td><td>-</td></tr> <tr><td>9</td><td>RI</td><td>-</td><td>-</td></tr> </tbody> </table>	Pin	RS232	RS485-4w/422	RS485-2w	1	DCD	TX-	Data-	2	TXD	RX+	-	3	RXD	TX+	Data+	4	DSR	-	-	5	GND	GND	GND	6	DTR	RX-	-	7	CTS	-	-	8	RTS	-	-	9	RI	-	-
Pin	RS232	RS485-4w/422	RS485-2w																																						
1	DCD	TX-	Data-																																						
2	TXD	RX+	-																																						
3	RXD	TX+	Data+																																						
4	DSR	-	-																																						
5	GND	GND	GND																																						
6	DTR	RX-	-																																						
7	CTS	-	-																																						
8	RTS	-	-																																						
9	RI	-	-																																						
Power Input Digital Input/Digital Output	6-Pin Removable Terminal Block Connector 2 Pin for Power (V+,V-) 2 Pins for DI with isolation High: DC 2~30V Low: DC 0~1V 2 Pins for 1x DO: 0.1A/30V with isolation																																								
Cellular Properties																																									
LTE Cat 4																																									
Standard	GSM/GPRS/EDGE 3GPP Release 6 UMTS/HSPA 3GPP Release 8 LTE 3GPP Release 11																																								
Data Rate	LTE Cat.4: GPRS: DL: Max. 85.6 kbps, UL: Max. 85.6 kbps EDGE: DL: Max. 236.8 kbps, UL: Max. 236.8 kbps HSPA: DL: Max. 42 Mbps, UL: Max. 5.76 Mbps LTE-FDD: DL: Max. 150 Mbps, UL: Max. 50 Mbps, 2x2 DL MIMO LTE-TDD: DL: Max. 130 Mbps, UL: Max. 35 Mbps, 2x2 DL MIMO																																								
Band Information: LTE-E	LTE: FDD B1/B3/B5/B7/B8/B20 (2100/1800/850/2600/900/800MHz) LTE: TDD B38/B40/B41 (2600/2300/2500MHz) WCDMA: FDD B1/B5/B8 (2100/850/900MHz) GSM: B3/B8 (1800/900MHz)																																								
Band Information: LTE-AU	LTE: FDD B1/B2/B3/B4/B5/B7/B8/B28 (2100/1900/1800/1700/850/2600/900/700MHz) LTE: TDD B40 (2300MHz) WCDMA: FDD B1/B2/B5/B8 (2100/1900/850/900MHz) GSM: B2/B3/B5/B8 (1900/1800/850/900MHz)																																								
Band Information: LTE-U	LTE: FDD B2/B4/B12 (1900/1700/700MHz) WCDMA: B2/B4/B5 (1900/1700/850MHz)																																								
Band Information: LTE-CN	LTE FDD: B1/B3/B5/B8 (2100/1800/850/900MHz) LTE TDD: B38/B39/B40/B41 (2600/1900/2300/2500MHz) TD-SCDMA: B34/B39 (2000/1900MHz) WCDMA: B1/B8 (2100/900MHz) CDMA: BC0 GSM: 900/1800MHz																																								

Cellular Properties		NB1oT+M1
Standard	EGPRS 3GPP Release 6 LTE 3GPP Release 13	
Data Rate	Cat M1: Max. 375Kbps (DL), Max. 375Kbps (UL) Cat NB1: Max. 32Kbps (DL), Max. 70Kbps (UL) EDGE: Max. 296Kbps (DL), Max. 236.8Kbps (UL) GPRS: Max. 107Kbps (DL), Max. 85.6Kbps (UL)	
Band Information	Cat M1/Cat NB1: LTE FDD: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B26/B28 LTE TDD: B39 (For Cat M1 Only) EGPRS: 850/900/1800/1900MHz	
Wi-Fi Properties		
Standard	IEEE 802.11b/g/n, Up to 2T2R MIMO	
Data Rate	802.11b: 11Mbps / 802.11g: 54Mbps / 802.11n: MCS0 ~ 15, max. 300Mbps Check detail TX/RX information in User Manual	
Frequency	ISM Band, 2.412GHz ~ 2.462GHz (CH1~11), programmable by regional regulation	
RSSI	≤20db, compliant with CE request	
Power Requirement		
Input Voltage	24V (9~30VDC)	
Reverse Polarity Protect	Yes	
Input Current	WR222-WLAN+LTE: 0.18A@24V	
Power Consumption	WR222-WLAN+LTE: Max 4.32W@24VDC full traffic, suggest to reserve 15% tolerance	
Software		
Management Interface	CGI WebGUI, Command Line Interface (CLI), IPv4/IPv6*, Telnet, SNMP v1/v2c/v3, DDNS, DHCP server/client, DHCP Relay, TFTP, System Log, SMTP, ARP response over 802.2 LLC SNAP, Proxy ARP, DNS (client/proxy)	
Traffic Management	Flow Control*, Traffic shaping	
Filter	IEEE802.1Q VLAN*	
Security	IEEE 802.1X/RADIUS, TLS v1.2, HTTPs/SSH, First login password management WLAN AP Security: Share Key, WPA/WPA2-PSK(Pre-Shared Key), WPA/WPA2 Enterprise Encryption: 64/128-bit WEP(Wired Equivalent Privacy), TKIP(WPA-PSK), AES(WPA2-PSK)	
Advanced Security	TACACS+, Multiple-user authentication	
Time Management	NTP, SNTP, Cellular Time	
Redundancy Protocol	WAN/LTE Redundancy	
WAN/Routing/NAT/Firewall/VPN	Routing: Static Route NAT: 1-1 NAT, NATP(SNAT/DNAT), DMZ Firewall: Stateful Inspection firewall, IP/Port Filter, MAC Filter VPN: OpenVPN, L2TP, GRE	
IIoT Industrial Protocol	Modbus RTU, MQTT, RESTful API	
Private Cloud	ThingsMaster, ThingMaster OTA	
Public Cloud	AWS Agent, Azure Agent	
Location	Google map, Baidu map	
MIB	MIB-II, Entity MIB, WoMaster Private MIB	
Utility	ViewMaster, NetMaster, Ping, Traceroute	
Serial communication	TCP Server/TCP Client/UDP mode, TCP Alive check, Force TX Delimiter/Timeout/interval/length, Long Distance Termination	
Cellular Configuration	Radio on/off, 2G, 3G and 4G modes configurable, SIM Security, Connection Status, Cellular to Eth-WAN Redundancy, GPS positioning, Backup SIM Retry (1-10 times)	
WLAN Configuration	WLAN Basic Settings: Radio on/off, AP/client mode, 2.4G 11n Band and Frequency selection, SSID/Multi-SSID configuration, SSID broadcast, Cellular to WLAN Auto Offload and advanced WLAN settings, 802.1X	
Wi-Fi Max. Client	Up to 20	

*by request

Mechanical	
Installation	Wall Mount/DIN Rail (DIN bracket not included)
Enclosure Material	Steel Metal
Dimension	86 x 105 x 29mm(W x D x H) / without mounting Clip
Ingress Protection	IP30
Weight	Around 350g without package/antenna
Environmental	
Operating Temperature & Humidity	-40°C~70°C , 5%~95% Non- Condensing
Storage Temperature	-40°C~85°C
MTBF	>200,000 hours
Warranty	5 years
Approval	
Safety	EN60950-1 Compliance
EMC	EN61000-6-2/EN61000-6-4 compliance
EMI	CISPR 22, FCC part 15B Class A
EMS	EN61000-4-2 ESD, EN61000-4-3 RS, EN61000-4-4 EFT, EN61000-4-5, EN61000-4-6 CS, EN61000-4-8 Magnetic Field
Radio	RED Compliance Safety: EN 62368-1 EN 50385/EN62311 MPE assessment EN 301 489-1/17/19, EN 55032/55024 EN 300 328 EN 301 908-1 FCC Part 15B



Ordering Information

Model Name	Description
WR212-WLAN	Industrial Wireless IIoT Field Router, 2FE+1 Serial, SD, 802.11b/g/n WLAN
WR222-WLAN+LTE	Industrial Wireless IIoT Field Router, 2FE+1 Serial, SD, 802.11b/g/n WLAN, LTE, 1SIM
WR222-WLAN+NB1+M1	Industrial Wireless IIoT Field Router, 2FE+1 Serial, SD, 802.11b/g/n WLAN, NB1+M1, 1SIM, FDD B1-5/8/12/13/18/19/20/26/28, TDD B39
	*GPS support by request
	Package List
	1 x Product Unit
	1 x 6-pin Removable Terminal Connector
	NOTE: Antennas are not included in the package. Please order the antennas from the optional accessories.
	1 x Quick Installation Guide
Band Information: LTE-E	LTE: FDD B1/B3/B5/B7/B8/B20 (2100/1800/850/2600/900/800MHz) LTE: TDD B38/B40/B41 (2600/2300/2500MHz) WCDMA: FDD B1/B5/B8 (2100/850/900MHz) GSM: B3/B8 (1800/900MHz)
Band Information: LTE-AU	LTE: FDD B1/B2/B3/B4/B5/B7/B8/B28 (2100/1900/1800/1700/850/2600/900/700MHz) LTE: TDD B40 (2300MHz) WCDMA: FDD B1/B2/B5/B8 (2100/1900/850/900MHz) GSM: B2/B3/B5/B8 (1900/1800/850/900MHz)
Band Information: LTE-U	LTE: FDD B2/B4/B12 (1900/1700/700MHz) WCDMA: B2/B4/B5 (1900/1700/850MHz)
Band Information: LTE-CN	LTE FDD: B1/B3/B5/B8 (2100/1800/850/900MHz) LTE TDD: B38/B39/B40/B41 (2600/1900/2300/2500MHz) TD-SCDMA: B34/B39 (2000/1900MHz) WCDMA: B1/B8 (2100/900MHz) CDMA: BC0 GSM: 900/1800MHz



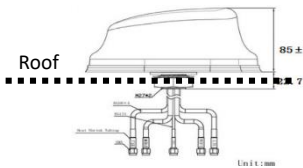
Ordering Information

A-LTE_WLAN_G-4_4-RSM-2M	Combo IP67 Antenna, LTE WW 4dBi, Wi-Fi 2.4/5GHz dual band Omni-directional 4/4dBi, GPS 1561-1670MHz 28dBi, RP-SMA male, 2M
A-LTE_WLAN_G-3_2-RSM-2M	Combo IP67 Antenna, LTE WW 3dBi, Wi-Fi 2.4/5GHz dual band Omni-directional 2/2dBi, GPS 1575-1610MHz 28dBi, RP-SMA male, 2M
A-LTE-3-NM	LTE Antenna, LTE WW 3dBi, N-type male
A-WLAN-6-NM	Wi-Fi Antenna, Wi-Fi 2.4/5GHz dual band Omni-directional 4/6dBi, N-type male
A-GPS-27-RSM-3M	GPS Antenna, GPS 1575MHz 27dBi, RP-SMA male, 3M
C-RF-R-RSF_RSM-1M	RF cable, RP-SMA female to RP-SMA male, 1M
C-RF-C2-NF_RSM-2M	RF cable, N-type female to RP-SMA male, CFD200, 2M

Outdoor Vehicle Combo Antenna

A-LTE_WLAN_G-4_4-RSM-2M

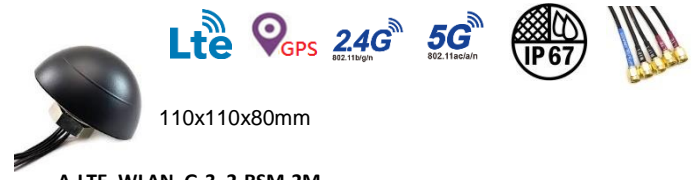
- 5 RF cables, LTE MIMO, Wi-Fi MIMO, GPS/GLONASS/GALILEO/BEIDOU
- 4dBi gain for LTE and 4dBi gain for 2.4G/5G WIFI RF
- High WLAN gain is perfect for train to ground vehicle application
- 5 x 2-meter cables in RP SMA male connector
- Outdoor high gain, IP67 waterproof and -40°~85°C wide temperature design
- 189x182x107mm



A-LTE_WLAN_G-4_4-RSM-2M
189x182x107mm

A-LTE_WLAN_G-3_2-RSM-2M

- 5 RF cables, LTE MIMO, Wi-Fi MIMO, GPS&GLONASS
- 3dBi gain for LTE and 2dBi gain for 2.4G/5G WIFI
- Suitable for in-vehicle, roadside box and short-range coverage WLAN to LTE communication environment
- 5 x 2-meter cables in RP SMA male connector
- Outdoor IP67 waterproof and -40°~85°C wide temperature
- 110x110x80mm slim size



110x110x80mm

A-LTE_WLAN_G-3_2-RSM-2M

	Model	Type	Frequency (MHz)	Gain (dBi)	Connector	Dimension (mm)	Cable (M)	Operating Temp.	Application
	A-LTE_WLAN_G-4_4-RSM-2M	Omni	LTE: 698~960/1710~2690/2900~3600 WLAN: 2400~2483.5/4900~5825 GNSS: 1561.1~1610 (GPS/GLONASS/GALILEO/BEIDOU)	4 4 28	5x RP SMA Male	189x182x107	2	-40°C~85°C	Outdoor
	A-LTE_WLAN_G-3_2-RSM-2M	Omni	LTE: 698~960/1710~2690 WLAN: 2400~2483.5/4900~5825 GNSS: 1575.42~1610 (GPS/GLONASS)	3 2 28	5x RP SMA Male	110x110x80	2	-40°C~85°C	Outdoor

LTE Antenna

	Model	Type	Frequency (MHz)	Gain (dBi)	Connector	Dimension (mm)	Cable (M)	Operating Temp.	Application
	A-LTE-2-RSM	Omni	704~960/1710~2690	2	RP SMA Male	161xΦ13	-	-20°C~ 65°C	Indoor
	A-LTE-3-NM (require RF cable)	Omni	704~960 1710~2700	2 3	N-Type Male	187xΦ20	-	-20°C~ 65°C	Outdoor

Wi-Fi Antenna

	Model	Type	Frequency (MHz)	Gain (dBi)	Connector	Dimension (mm)	Cable (M)	Operating Temp.	Application
	A-WLAN-3-RSM	Omni	2400~2500 4900~5900	2.5 3	RP SMA Male	196xΦ13	-	-40°C~ 65°C	Indoor
	A-WLAN-6-NM (require RF cable)	Omni	2400~2500 5150~5850	4 6	N-Type Male	187xΦ20	-	-20°C~ 65°C	Outdoor

GPS Antenna (optional)

	Model	Type	Frequency (MHz)	Gain (dBi)	Connector	Dimension (mm)	Cable (M)	Operating Temp.	Application
	A-GPS-27-RSM-3M	Omni	1575.42	27	RP SMA Male	36x36x13.9	3	-20°C~ 65°C	Indoor