

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

WR222-WLAN+LTE/NB2 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.



Features & Benefits

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 B1/3/5/8/20/28A
LTE-G: for worldwide bands
FDD B1/B2/B3/B4/B5/B7/B8/B12/B13/B18/B19/B20/B21/TDD B38/B39/B40/B41
- 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)
- Cellular to Ethernet-WAN redundancy
- IEEE 802.11b/g/n for 2.4G 2T2R MIMO delivers up to 300Mbps throughput

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

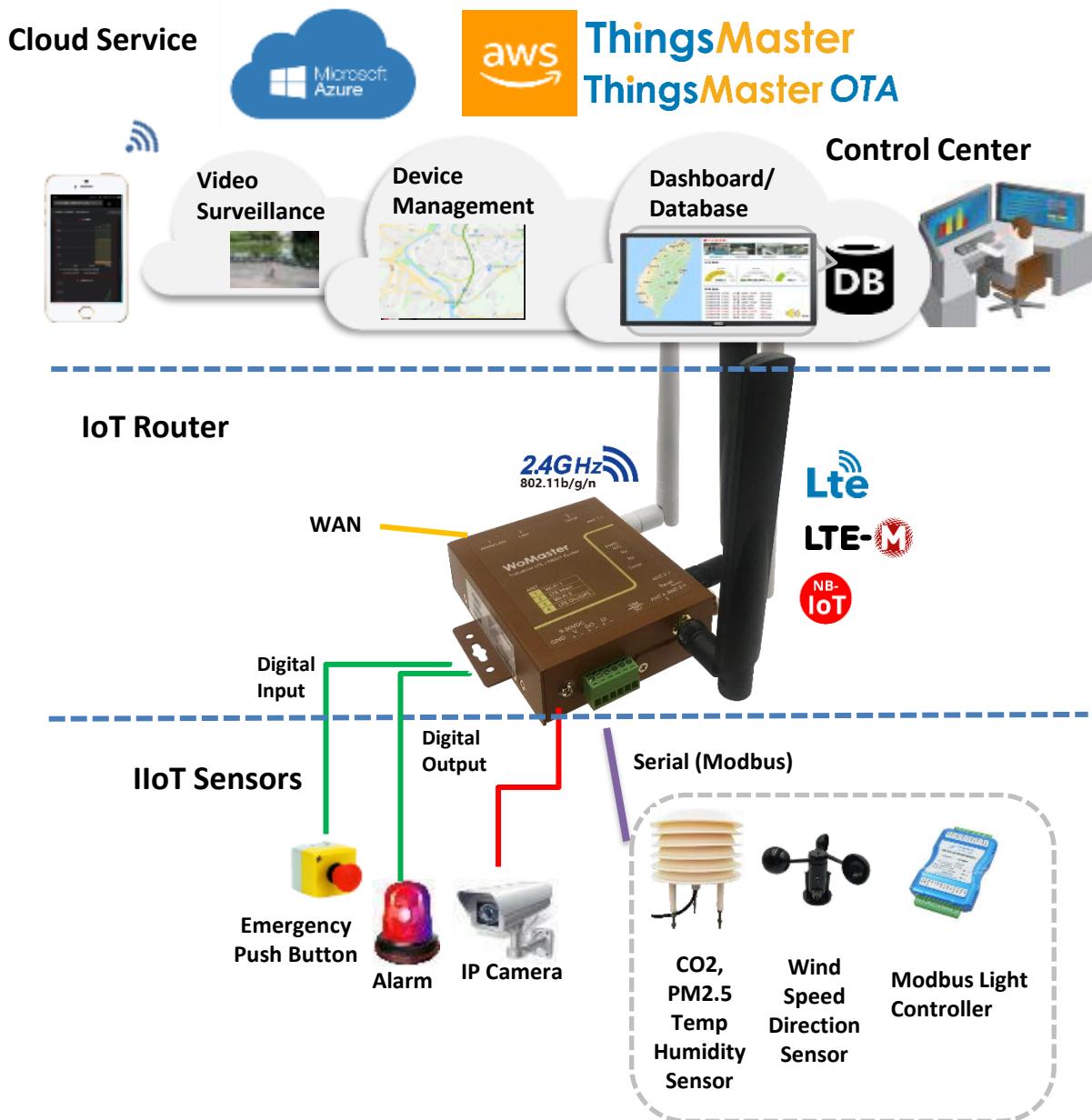
- Support Firewall for inbound/outbound traffic
- OpenVPN (server/client)
- Support L2TP with PPP, PAP, CHAP(LCP, IPCP)
- Support GRE tunnel
- HTTPS/SSH secure login
- Support TACACS+ multi-user authentication for privileged user management

Industrial IoT LAN & Cloud Management

- Various configuration paths, including CGI WebGUI, CLI, SNMP and RMON*
- 1:1 NAT, port forwarding and NAPT 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
 - 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
- USB for easy field configuration and firmware update
- Diagnostic tool includes Ping, TFTP, SNMP Trap, E-mail Alert and System Log

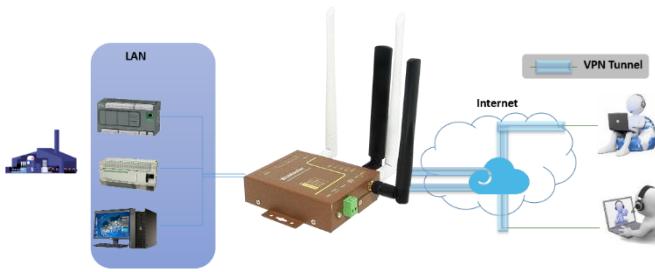


✓ Ready Total Solution for IoT



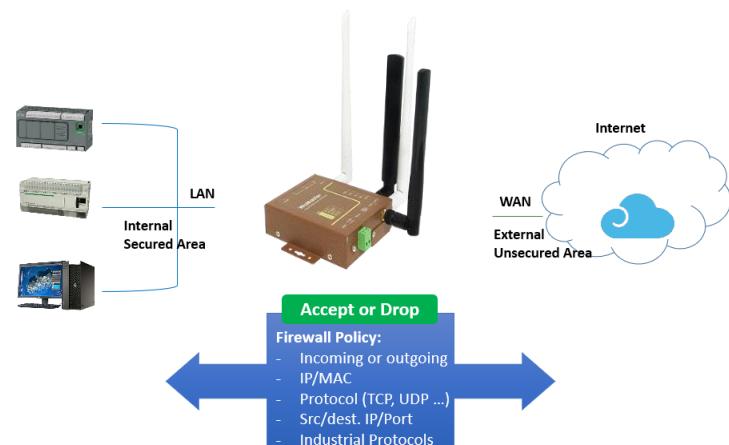
✓ Secured Remote Access by VPN

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.





Features & Benefits

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.

Home > IoT > Modbus Device

AWS IoT Azure IoT Private IoT Modbus Device RMS

Modbus Logging

Modbus Logging	<input checked="" type="checkbox"/> Enable
Name	Ex: CO2, Temperature
Serial	1
Slave ID	Ex:1
PLC Address	Ex:1
Function	03 Read Holding Registers
Data Type	uint16
<input type="button" value="Submit"/> <input type="button" value="Cancel"/>	
// Tag Name	
// Slave Address	
// 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	03	float	<input type="button" value="Edit"/>	Yes	25.486820	

Secured Multi-sites Management

N to N VPN

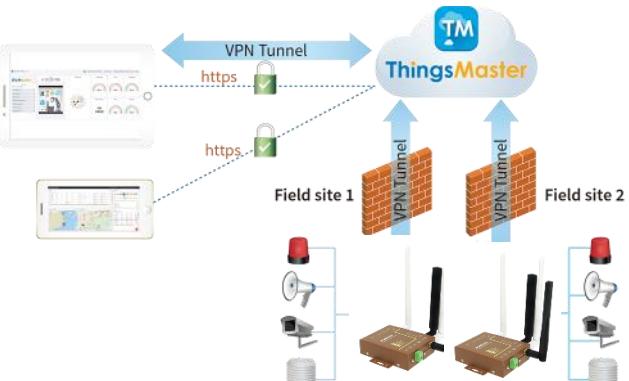
Latest TLS encryption and X.509 authentication

✓ Built-in Microsoft Azure and Amazon AWS agent

✓ 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.



✓ 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)

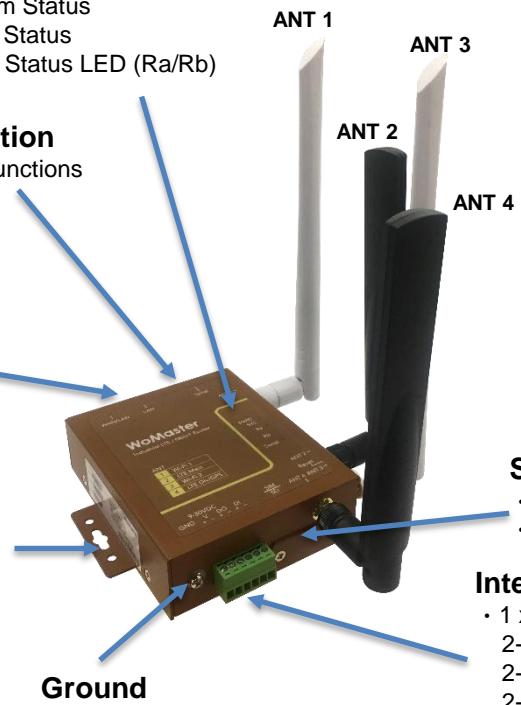
Serial Communication

- RS232/422/485 Full functions
- DB9 female

Ethernet Network

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

Wall/DIN Mounting Clip (Both Sides)



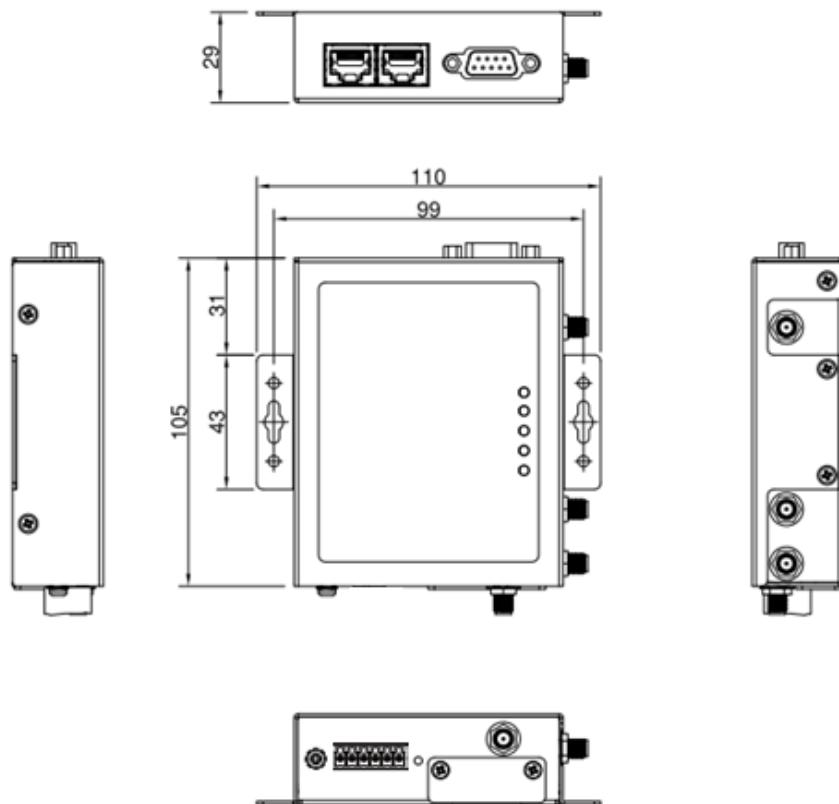
	WR222-WLAN-LTE	WR212-WLAN	WR222-WLAN +NB1+M1
ANT 1	Wi-Fi 1	Wi-Fi 1	Wi-Fi 1
ANT 2	LTE-Main	--	LTE-NB-IoT/M1
ANT 3	Wi-Fi 2	Wi-Fi 2	Wi-Fi 2
ANT 4	LTE-DIV/GPS	--	GPS

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

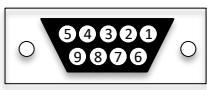


Dimensions

(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"> <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-EUX	LTE: FDD B1/B3/B7/B8/B20/B28A LTE: TDD B38/B40/B41 WCDMA: FDD B1/B8, GSM: B3/B8																																								
Band Information: LTE-ECGA	LTE: FDD B1/B3/B7/B8/B20/B28A WCDMA: FDD B1/B8, GSM: B3/B8																																								
Band Information: LTE-AU	LTE: FDD B1/B2*/B3/B4/B5/B7/B8/B28 LTE: TDD B40 WCDMA: FDD B1/B2/B5/B8, GSM: B2/B3/B5/B8																																								
Band Information: LTE-G (By MoQ Request)	LTE: FDD B1/B2/B3/B4/B5/B7/B8/B12/B13/B18/B19/B20/B25/B26/B28 LTE: TDD B38/B39/B40/B41 WCDMA: FDD B1/B2/B4/B5/B6/B8/B19, GSM: B2/B3/B5/B8																																								

NB-IoT/M1 Properties		NB2+M1 (NB-IoTv2+M1, New)
Standard	LTE 3GPP Release 14	
Data Rate	Data Rate: Cat M1: Max. 588kbps(DL), Max. 1119Kbps(UL), Cat NB2: Max. 127kbps(DL), Max. 158.5Kbps(UL) EDGE: Max. 296Kbps (DL), Max. 236.8Kbps (UL), GPRS: Max. 107Kbps (DL), Max. 85.6Kbps (UL)	
Band Information	Cat M1: LTE-FDD: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B25/B26/B27/B28/B66/B85 Cat NB2: LTE-FDD: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B25/B28/B66/B71/B85 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	17.67db (Max. output power: 15.17dbm/802.11b, 12.66dbm/802.11g, 12.42dbm/802.11n20M, 11.48dbm/802.11n40M + 2.5dBi default antenna) Check detail TX/RX information in User Manual or contact us	
Antenna (Default in package)		
LTE Antenna	Frequency: 704~960/1710~2690 MHz	
	Gain: 2 dBi	
	Direction: Omni-directional	
	Dimension: 161xΦ13 mm	
Wi-Fi Antenna	Frequency: 2400~2500/ 4900~5900 MHz	
	Gain: 2.4GHz: 2.5±0.5 dBi, 5GHz: 3±0.5 dBi	
	Direction: Omni-directional	
	Dimension: 196xΦ13 mm	
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
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, NAPT(SNAT/DNAT), DMZ Firewall: Stateful Inspection firewall, IP/Port Filter, MAC Filter VPN: OpenVPN, L2TP, GRE, IPsec (WR222A series)
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
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	3 years
Approval	
CE	RED Compliance Safety: EN 62368-1 EN 62311 MPE assessment EN 301 489-1/17/52, EN 55032/55024 includes EN61000-4-2, EN61000-4-3, EN61000-4-4, EN61000-4-5, EN61000-4-6, EN61000-4-11 EN 300 328 EN 301 908-1
FCC	FCC part 15B Class A Compliance FCC Approved LTE/WLAN Module
EMC	EN61000-6-2/EN61000-6-4 includes EN61000-4-2, EN61000-4-3, EN61000-4-4, EN61000-4-5, EN61000-4-6, EN61000-4-8



Ordering Information

Model Name	Description
WR212-WLAN	Industrial Wireless IIoT Field Router, 2FE+1 Serial, DI+DO, SD, 802.11b/g/n WLAN
WR222-WLAN+LTE-(Region)	Industrial Wireless IIoT Field Router, 2FE+1 Serial, DI+DO, SD+1SIM, 802.11b/g/n WLAN, LTE-EUX/ECGA/AU/G*(choose one by region)
WR222-WLAN+N2B+M1	Industrial Wireless IIoT Field Router, 2FE+1 Serial, DI+DO, SD+1SIM, 802.11b/g/n WLAN, NB2+M1
WR212A-WLAN*	Industrial Wireless IIoT Field Router, 32MB Flash, 2FE+1 Serial, SD, 802.11b/g/n WLAN
WR222A-WLAN+LTE-E-(Region)*	Industrial Wireless IIoT Field Router, 32MB Flash, 2FE+1COM, SD, 802.11b/g/n WLAN, 1SIM, LTE-EUX/ECGA/AU/G*(choose one by region)
WR222A-WLAN+N2B+M1*	Industrial Wireless IIoT Field Router, 32MB Flash, 2FE+1COM, SD, 802.11b/g/n WLAN, 1SIM, NB2+M1
	*GPS support by request
Package List	
	1 x Product Unit
	1 x 6-pin Removable Terminal Connector
	1 x Din Clip Mounting Kit
	Default Enclosed Antennas: WR212-WLAN/ WR212A-WLAN: 2 x WLAN Antennas, White WR222-WLAN+N2B+M1: 1xLTE Antennas, Black+2xWLAN Antennas, White WR222-WLAN+LTE/ WR222A-WLAN+LTE: 2xLTE Antennas, Black+ 2xWLAN Antennas, White
	1 x Quick Installation Guide

Band/Frequency	Description
Band Information: LTE-EUX	LTE: FDD B1/B3/B7/B8/B20/B28A LTE: TDD B38/B40/B41 WCDMA: FDD B1/B8, GSM: B3/B8
Band Information: LTE-ECGA	LTE: FDD B1/B3/B7/B8/B20/B28A WCDMA: FDD B1/B8, GSM: B3/B8
Band Information: LTE-AU (By MoQ Request)	LTE: FDD B1/B2*/B3/B4/B5/B7/B8/B28 LTE: TDD B40 WCDMA: FDD B1/B2/B5/B8, GSM: B2/B3/B5/B8
Band Information: LTE-G (By MoQ Request)	LTE: FDD B1/B2/B3/B4/B5/B7/B8/B12/B13/B18/B19/B20/B25/B26/B28 LTE: TDD B38/B39/B40/B41 WCDMA: FDD B1/B2/B4/B5/B6/B8/B19, GSM: B2/B3/B5/B8
Band Information: NB2+M1	Cat M1: LTE-FDD: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B25/B26/B27/B28/B66/B85 Cat NB2: LTE-FDD: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B25/B28/B66/B71/B85 EGPRS: 850/900/1800/1900MHz Data Rate: Cat M1: Max. 588kbps(DL), Max. 1119Kbps(UL) Cat NB2: Max. 127kbps(DL), Max. 158.5Kbps(UL)



Optional Accessory

Outdoor WLAN Directional Antennas

- 2.4Ghz / 5.8Ghz Wireless Access Point to Point
- High Gain, Long Distance Coverage
- Vertical Polarization, 50Ω **Input Impedance**
- IP65 Protection Enclosure and Prevention of Rust
- -40°C ~ +60°C operation temperature
- 190 * 190*30 mm (L x W x H)
- N Type Female Connector
- Two 1-meter RF Cables (C-RF-LMR200-NM_NM-1M)



Model	Frequency	Transmission	Gain	Max. Distance	Beam
A-D1T1R-2.4GHZ-14DB-6KM-NF	2.4 GHz	1T1R	14dBi	6KM	30° for Horizontal Plane and 28° Vertical
A-D1T1R-5GHZ-12DB-5KM-NF	5.8Ghz	1T1R	12dBi	5KM	40° for Horizontal Plane and 38° Vertical
A-D2T2R-5GHZ-15DB-6KM-NF	5.8Ghz	2T2R	15dBi	6KM	35° for Horizontal Plane and 16° Vertical
A-D2T2R-5GHZ-19DB-8KM-NF	5.8Ghz	2T2R	19dBi	8KM	90° for Horizontal Plane and 4° Vertical

Outdoor Omni Antennas

Model		Frequency	Gain	Enclosure	Dimension	RF Cable
A-2.4/5GHZ-2-RSM-2Mx2		2400-2500/5150~5850	2dBi	IP67	Φ80×15mm	Two 2-meter RG174 cables RP SMA male connector
A-LTE-2-SM-2M		700~960/1710~2690 /2900~3600	2dBi	IP67	Φ80×15mm	Two 2-meter RG174 cables SMA male connector
A-GPS-38-SM-3M		GPS 1575	38dBi	outdoor	50×38×17mm	3M RG174 cable SMA male
A-LORA433-7-SM-3M		433	7dBi	outdoor	Φ30×175mm	3M RG174 cable SMA male
A-LORA850-925-7-SM-3M		850~925	7dBi	outdoor	Φ30×290mm	3M RG174 cable SMA male

Outdoor Combo Antennas

Model		Frequency (MHz)	Gain (dBi)	Connector	Dimension (mm)	Cable (M)
A-LTE_WLAN_G-4_4-RSM-2M		LTE: 698~960/1710~2690/2900~3600 WLAN: 2400~2483.5/4900~5825 GNSS: 1561.1~1610 (GPS/GLONASS/GALILEO/BEIDOU)	4 4 28	3x SMA Male (LTE/GPS) 2x RP-SMA Male (Wi-Fi)	189x182x107	2
A-LTE_WLAN_G-3_2-RSM-2M		LTE: 698~960/1710~2690 WLAN: 2400~2483.5/4900~5825 GNSS: 1575.42~1610 (GPS/GLONASS)	3 2 28	3x SMA Male (LTE/GPS) 2x RP-SMA Male (Wi-Fi)	110x110x80	2
A-LTE_WLAN_G-5_5-RSM-1M		LTE: 700~2700 WLAN: 2400~2500 GNSS: 1575.42	5 5 28	2x SMA Male (LTE/GPS) 1x RP-SMA Male (Wi-Fi)	70x70x15	1