Secured and Rugged LTEWLAN Router for IIoT

WR322GR Series

Industrial Secure Cellular Router

Innovative industrial secure LTE router WR322GR Series is designed for IIoT applications by dual-radio high-speed LTE routing and WLAN networks. Dual RS232/422/485 ports with Modbus support brings sensor and meter data to cloud wirelessly. The WR322 router supports LTE to WLAN redundancy and LTE/WLAN auto offload to guarantee continuous connections. To safeguard cybersecurity, security features such as Firewall, OpenVPN, GRE tunnel are supported. The embedded MQTTS, CoAP 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

High speed 4G LTE & Wi-Fi Network

- LTE Cat.4, 2x2 MIMO, 150M downlink and 50M uplink
- LTE Cat.6 with 2CA, 2T2R MIMO provides 300M downlink and 50M uplink
- 4G/3G/2G full cellular network compatibility
- LTE Global Band
  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
- Support GPS for location services
- IEEE 802.11ac compliant & backward compatible with 802.11a/b/g/n
- Selectable 5G/2.4G Wi-Fi for local coverage, up to 866Mbps bandwidth

Serial Communication & High Throughput Data Switching

- Dual serial ports with RS232/422/485 full functions for serial over LTE/Wi-Fi/Ethernet data switching
- 2-port Gigabit Ethernet supports routing and bridging mode
- Close to wire-speed NAT routing performance
- Hardware NAT for CPU utilization saving

Dynamic Routing with Redundancy Protection

- RIPv1&v2, OSPFv1&v2 for intra-domain routing within an autonomous system
- Efficient unicast/multicast* static routing
- VRRP guarantees sustainable routing in a single point of failure

Rugged Design for Wayside Surveillance, ITS Application

- EN50121-4 railway trackside EMC certificate design for Industrial IoT, ITS applications
- Opperating in -40~75°C environments
- CE Marking
- IEC61000-6-2/IEC61000-6-4 heavy industrial EMC compliance

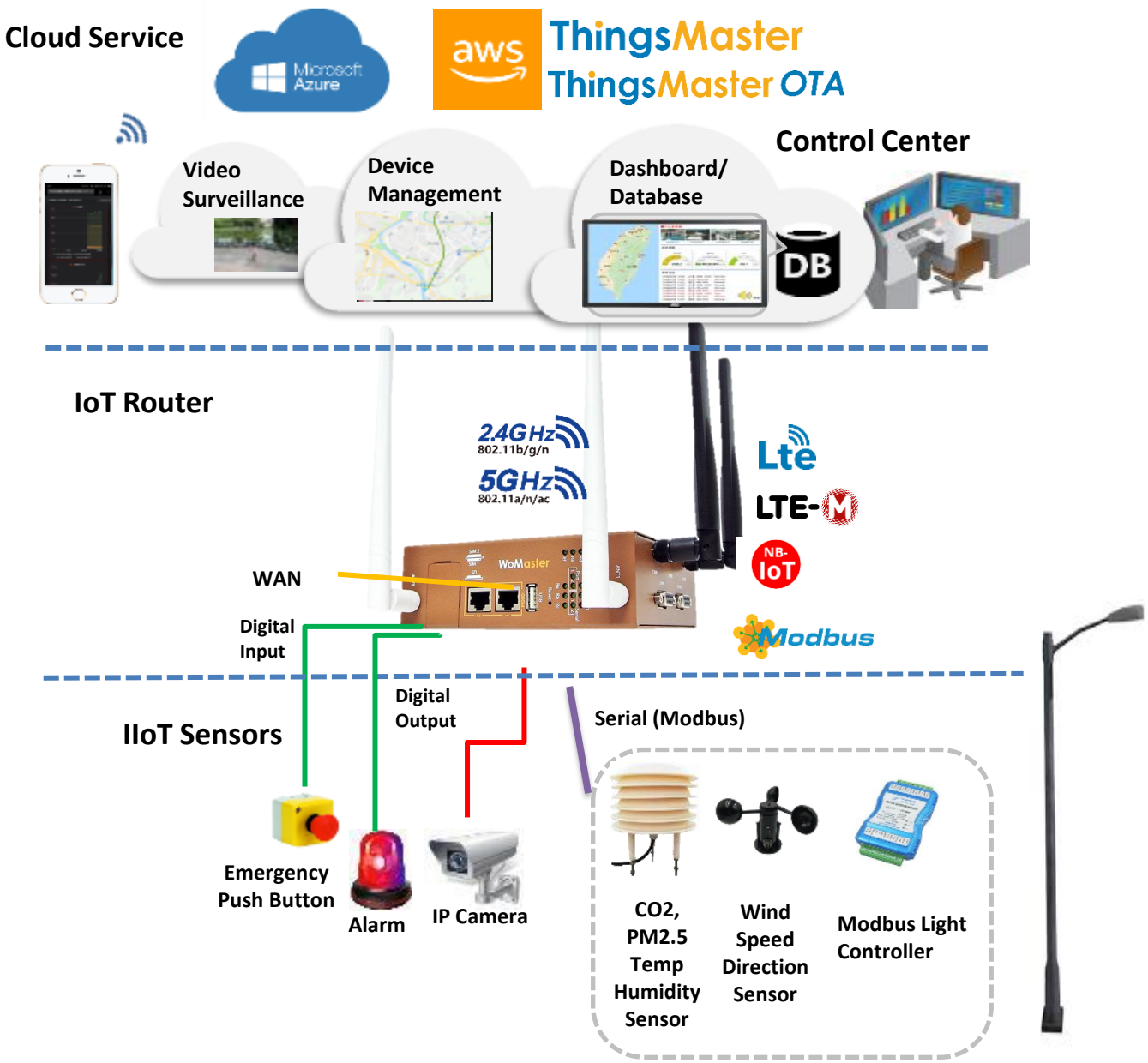
Enhanced Cyber Security & Redundancy

- Firewall for inbound/outbound traffic
- DMVPN(NHRP/mGRE), OpenVPN (server/client), and IPSec support AES256 for secure remote connection
- L2TP with PPP, PAP, CHAP(LCP, IPCP)
- GRE tunnel
- HTTPs/SSH secure login
- TACACS+ multi-user authentication for privileged user management
- Cellular to WAN redundancy, dual SIM backup
- Cellular to WLAN auto offload
- RSTP spanning tree protocol

Industrial IoT LAN & Cloud Management

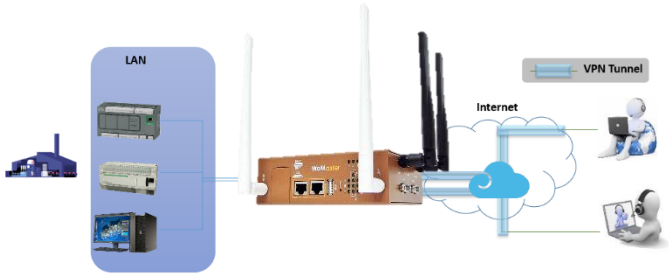
- Embedded Amazon AWS & Microsoft Azure cloud service
- Various configuration paths, including CGI WebGUI, CLI, SNMP and RMON*
- 1:1 NAT, port forwarding and NAPT for local traffic protection
- ARP response over 802.2 LLC SNAP
- Support SNMPv3 and entity-MIB (RFC4133), MIB II (RFC1213)
- NTP v3 time management
- WoMaster Software Utilities
  -**NetMaster:** Network Management System with VLAN visualization* and ERPS* Ring
  -**ViewMaster:** Configuration Management
  -**ThingMaster**: Interactive monitoring dashboard to collect data from field 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 MQTTS/CoAP 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



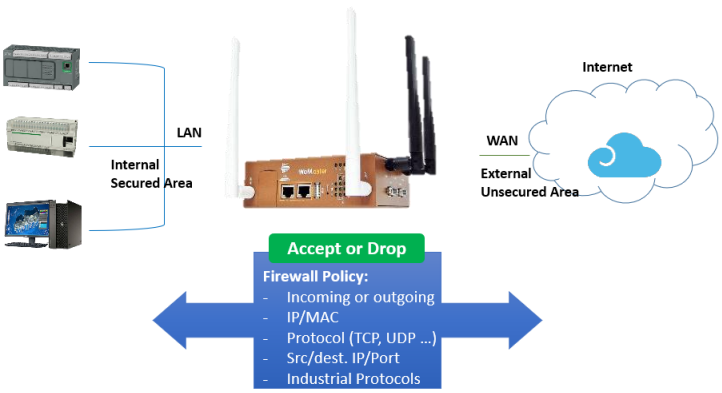
✓ Secured Remote Access by VPN

WR322 can act as a VPN server for data encryption and dynamic remote access. Multiple VPN protocols are supported such as OpenVPN, DMVPN, and L2TP. The channels between multiple networks, ex. private/public/hybrid networks are fully secured and with authentication features.



✓ Cyber Security Guard

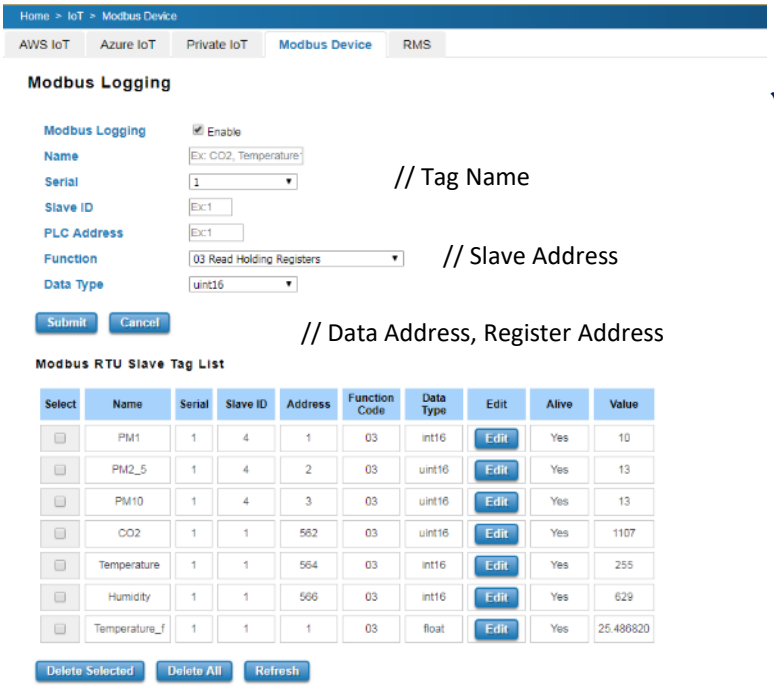
The stateful firewall can monitor the status of connection at all time. Multiple industrial fieldbus protocols, ex. Modbus TCP*, EtherNet/IP* are also supported for factory automation applications.



*by request

Secure IoT Modbus Tags

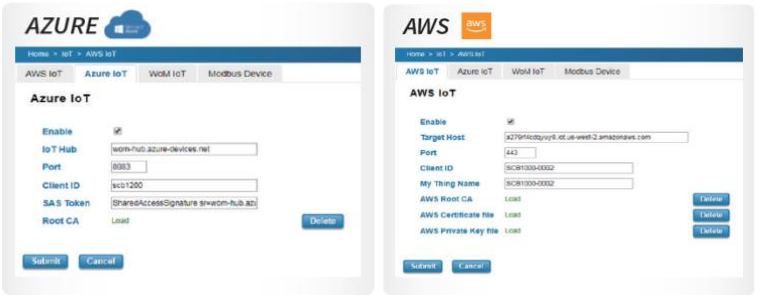
Tag-based data acquisition with MQTTS/CoAP support
MQTT client acting as publisher and subscriber
The latest TLS encryption and X.509 authentication
Selectable serial port and data type. Sensor alive check and display sensor value.



Secured Multi-sites Management

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

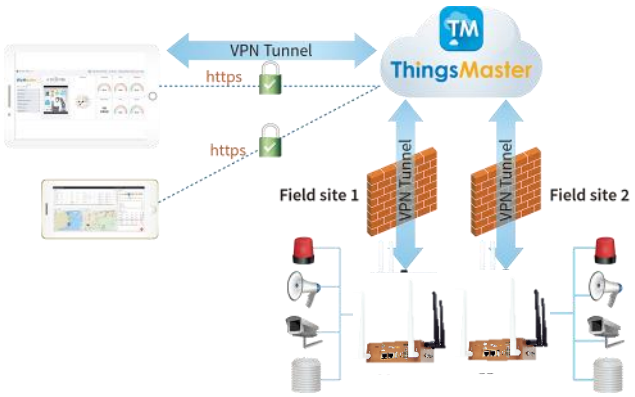
✓ Built-in Microsoft Azure and Amazon AWS agent



✓ Multi-Level User Passwords

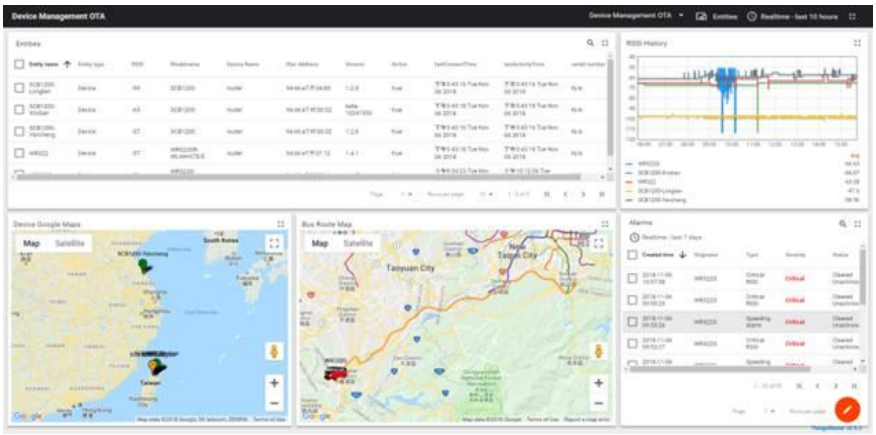
Different centralized authentication servers are supported such as RADIUS and TACACS+. Using a central authentication server simplifies account administration, when you have more than one switches in the network.

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)

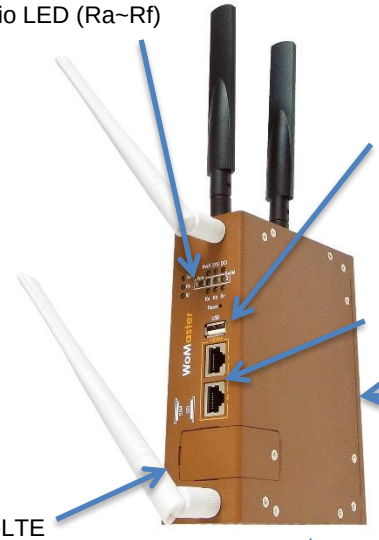
The OTA agent embedded in WR322 upgrades device management over the air, anywhere you are and any time you want over your mobile devices. ThingsMaster OTA is a secured local OTA software that can be installed in a private or public server or even QNAP NAS (network attached storage). With OTA, all device 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 DO
- 2 x Ethernet Port
- 1 or 2 x Serial Port (By Model)
- 6 x Radio LED (Ra~Rf)



USB Extension Port

- USB for Configuration/ Firmware update
- External Storage

Gigabit Ethernet

- 2-port 10/100/1000M RJ45
- WAN + LAN configurable

SIM Card

- WR312G-LTE
  1x SIM + 1x MicroSD
  or 2 x SIM
- WR322GR-WLAN+LTE
  2x SIM or
  2x SIM + 1x MicroSD

DIN Clip

Integrated Power Connector

- 1 x 6-pin terminal block
  4 pin for redundant power
  2 pin DO

	WR312G-LTE	WR322GR-WLAN+LTE
Ant 1	LTE-Main	Wi-Fi 1
Ant 2	LTE- Diversity/ GPS (by model)	Wi-Fi 2
Ant 3	-	LTE-Main
Ant 4	-	GPS (by model)
Ant 5	-	LTE-Diversity

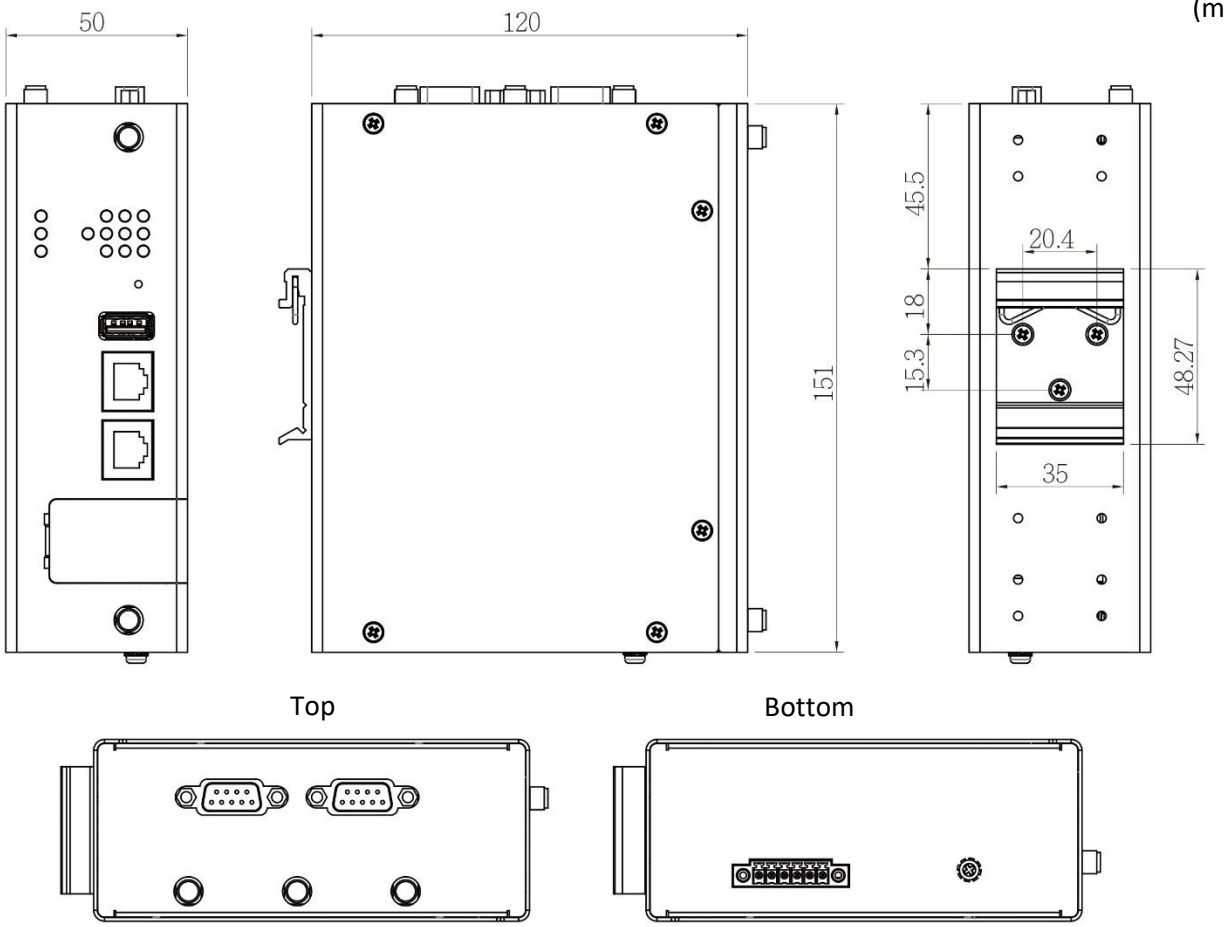
*Antenna: Wi-Fi in White; LTE in Black

Serial Communication

- RS232/422/485 Full functions
- DB9 female

Dimensions

(mm)



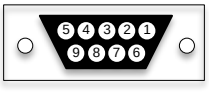
Technology

Standard	3GPP Release 11/12 Long Term Evolution (LTE), fallback 3GPP Release 7,8,9 for HSPA/UMTS
	IEEE 802.11ac wireless local area network (WLAN), Backward support 802.11n/g/a/b Wireless LAN
	IEEE 802.3 10Base-T Ethernet
	IEEE 802.3u 100Base-TX Fast Ethernet
	IEEE 802.3ab 1000Base-T Gigabit Ethernet Copper
	IEEE 802.1D-2004 Rapid Spanning Tree Protocol (RSTP)
	IEEE 802.1Q for VLAN

Interface

Ethernet Port	2 x 10/100/1000MBase-T RJ45, Auto Negotiation, Auto-MDI/MDIX
System LED	1 x PWR: Green On 1 x SYS: Ready: Green On, Firmware Updating: Green Blinking 1 x DO: Red On 2 x Ethernet Ports: Link: Green On, Activity: Green Blinking 2 x Serial Ports (Serial 1/2, by model): Activity: Green Blinking **WR312G-LTE:** 3 x Radio (Ra, Rb, Rc): Radio status Ra: SIM detected: Green On, SIM not inserted: Off Rb: 2/3G connection: Green On, Not 2/3G connection: Off Rc: 4G connection: Green On, Not 4G connection: Off **WR322GR-WLAN+LTE:** 6 x Radio (Ra, Rb, Rc, Rd, Re, Rf): Radio status Ra: AP mode: Green On, Station mode connected: Green Blinking, Station mode/radio disable: Off Rb/Rc: Reserved Rd: SIM detected: Green On, SIM not inserted: Off Re: 4G connection: Green On, 2/3G connection: Green Blinking, disconnected: Off Rf: Base station connected: Green On for 2 sec period, Base station disconnected: Green Off for 2 sec period
USB	1 x USB for Configuration/Firmware Update
Reset	System Reset(2~6 Seconds) / Default Settings Reset(over 7 Seconds)
SMA Socket	**WR312G-LTE: U**p to 2 x RP-SMA Female LTE 2T2R: ANT1 for LTE Main, ANT2 for LTE Aux OR LTE + GPS: ANT1 for LTE Main, ANT2 for GPS **WR322GR-WLAN+LTE:** Up to 5 x RP-SMA Female Wi-Fi 2T2R: ANT1 for Wi-Fi1, ANT2 for Wi-Fi2, LTE 2T2R: ANT3 for LTE Main, ANT 5 for LTE Aux GPS: ANT4
SIM Socket	2 x Nano SIM with redundancy
MicroSD	(Only for **E Series**) 1x for field diagnostic data logging
Serial	Up to 2 x RS232/422/485, DB9

DB9 Female



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 Output	6-Pin Removable Terminal Block Connector 4 Pin for Redundant Power 2 Pin for DO (Relay Alarm) DO: Dry Relay Output with 1A/24V DC

Cellular Properties	(LTE Cat. 6)
Standard	UMTS/HSPA 3GPP Release 8 LTE 3GPP Release 12 (LTE Cat.6)
Data Rate	TD-SCDMA: DL Max 4.2Mbps, UL: Max 2.2Mbps HSPA: DL: Max. 42 Mbps, UL: Max. 5.76 Mbps WCDMA: DL: Max 384Kbps, UL: Max 384Kbps LTE-FDD: DL: Max. 300 Mbps, UL: Max. 50 Mbps, 2x2 DL MIMO LTE-TDD: DL: Max. 226 Mbps, UL: Max. 28 Mbps, 2x2 DL MIMO
Band Information: LTE-E	LTE-FDD: B1/B3/B5/B7/B8/B20/B28 LTE-TDD: B38/B40/B41 WCDMA: B1/B3/B5/B8
Cellular Properties	**(LTE Cat. 4)**
Standard	GSM/GPRS/EDGE 3GPP Release 6 UMTS/HSPA 3GPP Release 8 LTE 3GPP Release 11
Data Rate	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 Cat.4: DL: max. 150 Mbps, UL: max. 50 Mbps, 2x2 DL MIMO LTE-TDD Cat.4: 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
GPS Properties	
GNSS	GPS/GLONASS/BeiDou/Galileo
Performance	Cold start: 18s, Warm start: 2.2s, Hot start: 1.8s
Sensitivity	Cold start: -146dBm, Reacquisition: -157dBm, Tracking: -157dBm
Accuracy	<1.5M
GNSS Frequency	GPS/Galileo: 1575.42±1.023 MHz GLONASS: 1597.5~1605.8 MHz BeiDou: 1561.098±2.046 MHz
Antenna (Optional Accessory-A-GPS-27-RSM-3M)	Frequency range: 1561~1615MHz Polarization: RHCP or linear VSWR: <2 (Typ.) Passive antenna gain: >0dBi
Wi-Fi Properties	
Standard	IEEE 802.11ac/a/b/g/n, 2T2R MIMO 802.11ac: OFDM (BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM)
Data Rate	802.11ac: MCS0 ~ 9, max. 866Mbps 802.11b: 11Mbps / 802.11a/g: 54Mbps / 802.11n: MCS0 ~ 15, max. 300Mbps Check detail TX/RX information in User Manual
Frequency	ISM Band, 2.412GHz ~ 2.472GHz, 5.180MHz ~ 5.825MHz
RSSI	≦20db/≦23db, compliant with CE 2.4G/5G request

Antenna	
LTE Default Antenna	**Frequency:** 704~960/1710~2690 MHz
	Gain: 2 dBi
	Dimension: 161xΦ13 mm
Wi-Fi Default Antenna	**Frequency:** 2400~2500/ 4900~5900 MHz
	Gain: 2.4GHz: 2.5 dBi, 5GHz: 3dBi
	Direction: Omni-directional
	Dimension: 196xΦ13 mm
Power Requirement	
Input Voltage	24V (12~60VDC)
Reverse Polarity Protect	Yes
Input Current	**WR312G-LTE:** 0.23A@24V **WR322GR-WLAN+LTE:** 0.26A@24V
Power Consumption	**WR312G-LTE:** Max 5.52W@24VDC full traffic, suggest to reserve 15% tolerance **WR322GR-WLAN+LTE:** Max 6.24W@24VDC full traffic, suggest to reserve 15% tolerance
Software	
Management	CGI WebGUI, Command Line Interface (CLI), IPv4/IPv6*, Telnet, SNMP v1/v2c/v3, DDNS, DHCP server/client, DHCP Relay, TFTP, FTP(active/passive), System Log, SMTP, ARP response over 802.2 LLC SNAP, Proxy ARP, DNS (client/proxy), PPPOE*
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), MAC Filter
Advanced Security	TACACS+, Mutli-user authentication
Time Management	NTP, SNTP, Cellular Time
Redundancy Protocol	WAN/LTE Redundancy, Rapid Spanning Tree Protocol (RSTP)
WAN / Routing / NAT/ Firewall / VPN	Routing: RIPv2, OSPFv2, VRRPv2 NAT: 1-1 NAT, NAPT(SNAT/DNAT), Port Forwarding, DMZ Firewall: Stateful Inspection firewall, IP/Port Filter, MAC ACL VPN: IPSec, OpenVPN (Multipoint VPN), L2TP, GRE, PPTP, DMVPN, NHRP, mGRE
Watchdog	Hardware watchdog for system status monitoring Software cellular watchdog/ ping watchdog for connection monitoring SMS Remote Reboot, Periodic Reboot
IIoT Industrial Protocol	Modbus RTU, MQTTS, CoAP, RESTful API
Private Cloud	ThingsMaster, ThingsMaster OTA
Public Cloud	AWS Agent, Azure Agent
Location	Google map, Baidu map
MIB	MIB-II, Entity MIB, WoMaster Private MIB for monitoring
Utility	ViewMaster, NetMaster, Ping, Traceroute, IP SLA*
Serial communication	TCP Server/TCP Client/UDP mode, TCP Alive check, Force TX Delimiter/Timeout/interval/length, Long Distance Termination, DLMS*
Cellular Configuration	Radio on/off, 2G, 3G and 4G modes configurable, SIM Security, Connection Status, Cellular to Eth-WAN Redundancy, GPS positioning (by model), Backup SIM Retry (1-10 times)
WLAN Configuration	WLAN Basic Settings: Radio on/off, AP/client mode, 2.4G 11n/5G 11ac Band and Frequency selection, SSID/Multi-SSID configuration, SSID broadcast, VLAN ID, WLAN to LAN Link fault pass-through*, Cellular to WLAN Auto Offload and advanced WLAN settings, 802.1X
Mechanical	
Installation	DIN Rail
Enclosure Material	Steel Metal with Aluminum
Dimension	50 x 151 x 120 mm(W x H x D) / without DIN Rail Clip
Ingress Protection	IP30
Weight	WR312G: ~600g without package WR322GR: ~660g without package

*By Request

Environmental	
Operating Temperature & Humidity	-40°C~75°C , 5%~95% Non- Condensing
Storage Temperature	-40°C~85°C
MTBF	>200,000 hours at 40º full cycle
Warranty	3 years
Approval	
Safety	EN 62368-1:2014/AC:2017
EMC	Railway Roadside EN 50121-1/4, EN61000-6-4 EN61000-4-2 ESD, EN61000-4-3 RS, EN61000-4-4 EFT, EN61000-4-5, EN61000-4-6 CS, EN61000-4-8 Magnetic Field EN61000-4-12/16/17/18/29 for power application
CE	CE RED Compliance Safety: EN 62368-1 EN 62311 MPE assessment EN 301 489-1/17/19/52, EN 55032/55024 EN 300 328/EN 301 893*, EN 301 908-1*
FCC	FCC part 15B Class A Compliance, FCC Approved LTE/WLAN Module
Environmental	Shock/Vibration: EN 50155:2017/EN 61373:2010 Railway Shock/Vibration Shock: IEC60068-2-27 Compliance Free fall: IEC60068-2-31 Compliance Vibration: IEC 60068-2-6 Compliance

Product Selection Guide

Model	Series	Firmware	Eth-WAN	Eth-LAN	Serial	Radio 1	Radio 2	USB	SD	SIM	GPS	DI/DO
WR302G	--	Embedded	1 x GE	1 x GE	2 x RS232/422/485	-	-	1	1	-	-	0/1
WR312G-WLAN		Embedded	1 x GE	1 x GE	2 x RS232/422/485	Wi-Fi 2.4G 11n/5G 11ac	-	1	1	-	-	0/1
WR312G-LTE		Embedded	1 x GE	1 x GE	2 x RS232/422/485	LTE Cat.4	-	1	1	1	-	0/1
WR312G-LTE6		Embedded	1 x GE	1 x GE	2 x RS232/422/485	LTE Cat.6	-	1	1	1	-	0/1
WR322GR-WLAN+LTE		Embedded	1 x GE	1 x GE	2 x RS232/422/485	Wi-Fi 2.4G 11n/5G 11ac	LTE Cat.4	1	1	2	Yes	0/1
WR322GR-WLAN+LTE6		Embedded	1 x GE	1 x GE	2 x RS232/422/485	Wi-Fi 2.4G 11n/5G 11ac	LTE Cat.6	1	1	2	Yes	0/1
WR312G-LTE	D	Embedded	1 x GE	1 x GE	2 x RS232/422/485	LTE Cat.4	-	1	-	2	*1	0/1
WR312G-LTE6		Embedded	1 x GE	1 x GE	2 x RS232/422/485	LTE Cat.6	-	1	-	2	*1	0/1
WR312G-LTE	C	Embedded	1 x GE	1 x GE	1 x RS232/422/485	LTE Cat.4	-	-	-	2	*1	0/1
WR312G-LTE6		Embedded	1 x GE	1 x GE	1 x RS232/422/485	LTE Cat.6	-	-	-	2	*1	0/1
WR322GR-WLAN+LTE		Embedded	1 x GE	1 x GE	1 x RS232/422/485	Wi-Fi 2.4G 11n/5G 11ac	LTE Cat.4	-	-	2	Yes	0/1
WR322GR-WLAN+LTE6		Embedded	1 x GE	1 x GE	1 x RS232/422/485	Wi-Fi 2.4G 11n/5G 11ac	LTE Cat.6	-	-	2	Yes	0/1

***1: GPS support for WR312G-LTE series is by request**

Ordering Information

Model Name	Description
WR302G	Industrial Secure Serial Server, 2GbE+2COM, USB, SD
WR312G-WLAN	Industrial Secure Wireless Router, 2GbE+2COM, USB, SD, 802.11ac/n WLAN
WR312G-LTE-E-(Region)	Industrial Secure Cellular Router, 2GbE+2COM, USB, SD, LTE-E, 1SIM, LTE-EUX/ECGA/AU/G*(choose one by region)
WR312G-LTE6-E	Industrial Secure Cellular Router, 2GbE+2COM, USB, SD, LTE-E Cat.6,1SIM, FDD B1/3/5/7/8/20/28/32, TDD B38/40/41
WR322GR-WLAN+LTE-(Region)	Industrial Secure Cellular Router, 2GbE+2COM, USB, SD, 802.11ac/n WLAN, LTE-E, GPS, 2SIM, LTE-EUX/ECGA/AU/G*(choose one by region)
WR322GR-WLAN+LTE6-E	Industrial Secure Cellular Router, 2GbE+2COM, USB, SD, 802.11ac/n WLAN, LTE-E Cat.6, GPS, 2SIM, FDD B1/3/5/7/8/20/28/32, TDD B38/40/41
WR312G-LTE-(Region) (C Series)	Industrial Secure Cellular Router, 2GbE+1COM, LTE-E, 2SIM, LTE-EUX/ECGA/AU/G*(choose one by region)
WR322GR-WLAN+LTE- (Region) (C Series)	Industrial Secure Cellular Router, 2GbE+1COM, 802.11ac/n WLAN, LTE-E, GPS, 2SIM, LTE-EUX/ECGA/AU/G*(choose one by region)
WR312G-LTE-E-(Region) (D Series)	Industrial Secure Cellular Router, 2GbE+2COM, USB, LTE-E, 2SIM, LTE-EUX/ECGA/AU/G*(choose one by region)
	*GPS support for WR312G-LTE series by request ***NBIoT + M1 by request**
	Package List
	1 x Product Unit
	1 x 6-pin Removable Terminal Connector
	1 x Quick Installation Guide
	1 x Attached Din Clip
	Default Enclosed Antennas: **WR312G-LTE**: 2 x LTE Antennas, Black **WR312G-WLAN**: 2 x Wi-Fi Antennas, White **WR322GR-WLAN+LTE**: 2 x LTE Antennas, Black + 2 x Wi-Fi Antennas, White

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