Secured and Rugged LTE 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 Wi-Fi networks. LTE Cat.4/6 technology provides up to 300Mbps data rate, while IEEE 802.11ac Wi-Fi delivers up to 866Mbps high throughput. Dual RS232/422/485 ports are able to connect to local serial devices over cellular and Ethernet network. Cyber redundancy includes wireless auto-offload, LTE/WAN backup, redundant SIM ensure the best connectivity. The embedded MQTT and RESTful API enables public cloud integration such as AWS or Azure. The private cloud platform ThingsMaster can also be setup for instant and secured access to track location and monitor data over cloud.

Features & Benefits

High speed 4G LTE & Wi-Fi Network

- LTE Cat.6 with 2CA, 2T2R MIMO provides 300M downlink and 50M uplink
- 4G/3G cellular network compatibility
  - LTE-E: FDD B1/3/5/7/8/20/28/32; TDD B38/40/41
  - LTE-AP: FDD B1/3/5/7/8/18/19/21/26; TDD B38/39/40/41
  - LTE-U: FDD B2/4/5/7/12/13/17/25/26/29/30/66 TDD B41
- IEEE 802.11ac/a/b/g/n for 2.4G/5G dual band selectable and 2T2R MIMO delivers up to 866Mbps throughput

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

Enhanced Cyber Security & Redundancy

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

Management Features

- Various configuration paths, including Web GUI, Telnet, LAN Utility (ViewMaster), and NMS (NetMaster)
- Supports cellular to WAN redundancy, dual SIM backup
- Supports Cellular to WLAN auto offload
- Supports RSTP spanning tree protocol
- 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

Cloud Management over ThingsMaster

- Interactive monitoring dashboard and map shows the status, signal strength, and location of all WR series deployed
- Supports over-the-air batch device registration, configuration and firmware update
- Set alerts on critical events to prevent downtime (i.e signal strength is too low or temperature is too high)

Rugged Design for Wayside Surveillance, ITS Application

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

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

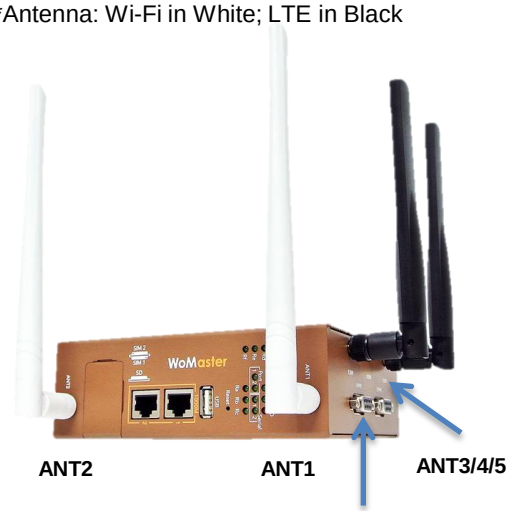
DIN Clip

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

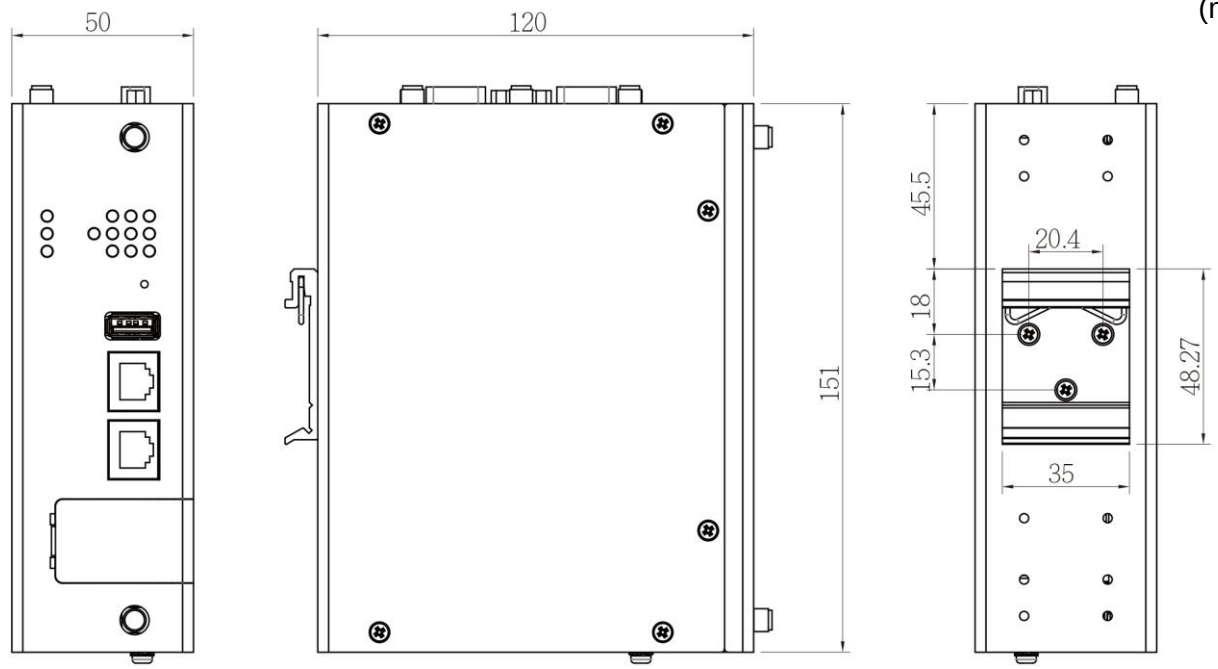


Serial Communication

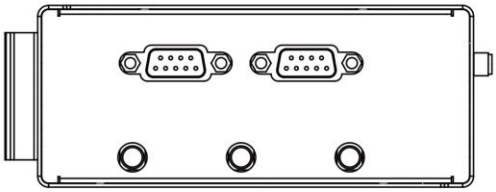
- RS232/422/485 Full functions
- DB9 female

Dimensions

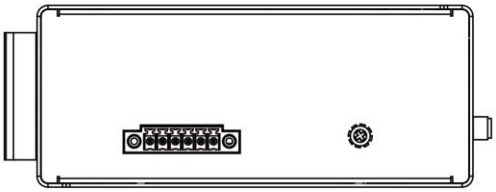
(mm)



Top



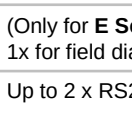
Bottom



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  Pin / RS232 / RS485-4w/422 / RS485-2w 1 / DCD / TX- / Data- 2 / TXD / RX+ / - 3 / RXD / TX+ / Data+ 4 / DSR / - / - 5 / 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/B32 (2100/1800/850/2600/900/800/700/1500MHz) LTE-TDD: B38/B40/B41 (2600/2300/2500MHz) WCDMA: B1/B3/B5/B8 (2100/1800/850/900MHz)
Band Information: LTE-U	LTE-FDD: B2/B4/B5/B7/B12/B13/B17/B25/B26/B29/B30/B66 (1900/1700/700/2600/700/700/700/1900/850/700/2300/1700MHz) LTE-TDD: B41 (2500MHz) WCDMA: B2/B4/B5 (1900/1700/850MHz)
Band Information: LTE-AP	LTE-FDD: B1/B3/B5/B7/B8/B18/B19/B21/B26 (2100/1800/850/2600/900/850/850/1500/850MHz) LTE-TDD: B38/B39/B40/B41 (2600/1900/2300/2500MHz) WCDMA: B1/B5/B6/B8/B9/B19 (2100/850/UMTS only/900/1800/850MHz) TD-SCDMA: B39 (1900MHz)
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-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
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	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(Band 1,4)
RSSI	≦20db, compliant with CE request

Power Requirement	
Input Voltage	24V (12~48VDC)
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	
Network Protocols	TCP/IP, UDP, DHCP, Telnet, DNS, SNMP, HTTP, HTTPS, SMTP, NTP, ARP, ICMP, DDNS
Management Interface	CGI WebGUI, Command Line Interface (CLI), Telnet, SNMP
User Management	Radius client, TACACS+, local database
Serial communication	TCP Server/TCP Client/UDP mode, TCP Alive check, Force TX Delimiter/Timeout/interval/length, Long Distance Termination
Time Management	NTPv3, SNTP, Cellular Time
IoT	AWS Agent, Azure Agent, ThingsMaster Agent
Network Management	IPv4, SNMP v1/v2c/v3/Trap, MIB II, Entity MIB, DHCP server/client, DHCP relay*, TFTP, ARP response over 802.2 LLC SNAP, Proxy ARP, DNS (client/proxy)
Traffic Management	Traffic Control, 1:1 NAT, Customized NAT, NAPT(SNAT/DNAT), Port Forwarding
Routing	RIPv2*, Static Route
Security	Firewall, DMZ, HTTPs, SSH, IEEE 802.1X/RADIUS
Redundancy Protocol	Rapid Spanning Tree Protocol (RSTP)
VPN	IPsec, OpenVPN (server/client), L2TP*, GRE
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
Utility	ViewMaster, NetMaster, Ping, Traceroute
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
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	5 years

*Future Release

Approval	
Safety	EN 60950-1 Compliance EN 62368-1:2014/AC:2017 Compliance IEC 60255-27:2013 Compliance
EMC	EN61000-6-2/EN61000-6-4 Compliance
EMI	CISPR 22, FCC part 15B Class A Compliance
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 EN61000-4-12/16/17/18/29
Radio	RED Compliance Safety: EN 62368-1 EN 50385/EN62311 MPE assessment EN 301 489-1/17/19/52, EN 55032/55024 EN 300 328/EN 301 893 EN 301 908-1 FCC Part 15B
Railway	EN50121-4
Environmental	EN 60870-2-2:1998 Compliance IEC 60068-2-21:2006 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
WR312G-LTE	E	OpenWRT	1 x GE	1 x GE	2 x RS232/422/485	LTE Cat.4	-	1	1	1	-	0/1
WR312G-LTE6		OpenWRT	1 x GE	1 x GE	2 x RS232/422/485	LTE Cat.6	-	1	1	1	-	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	Industrial Secure Cellular Router, 2GbE+2COM, USB, SD, LTE-E, 1SIM, FDD B1/3/5/7/8/20, TDD B38/40/41
WR312G-LTE-CN	Industrial Secure Cellular Router, 2GbE+2COM, USB, SD, LTE-CN, 1SIM, FDD B1/B3/B5/B8, TDD B38/B39/B40/B41
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-E	Industrial Secure Cellular Router, 2GbE+2COM, USB, SD, 802.11ac/n WLAN, LTE-E, GPS, 2SIM, FDD B1/3/5/7/8/20, TDD B38/40/41
WR322GR-WLAN+LTE-CN	Industrial Secure Cellular Router, 2GbE+2COM, USB, SD, 802.11ac/n WLAN, LTE-CN, GPS, 2SIM, FDD B1/B3/B5/B8, TDD B38/B39/B40/B41
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-E (C Series)	Industrial Secure Cellular Router, 2GbE+1COM, LTE-E, 2SIM, FDD B1/3/5/7/8/20, TDD B38/40/41
WR312G-LTE-CN (C Series)	Industrial Secure Cellular Router, 2GbE+1COM, LTE-CN, 2SIM, FDD B1/B3/B5/B8, TDD B38/B39/B40/B41
WR312G-LTE6-E (C Series)	Industrial Secure Cellular Router, 2GbE+1COM, LTE-E Cat.6, 2SIM, FDD B1/3/5/7/8/20/28/32, TDD B38/40/41
WR322GR-WLAN+LTE-E (C Series)	Industrial Secure Cellular Router, 2GbE+1COM, 802.11ac/n WLAN, LTE-E, GPS, 2SIM, FDD B1/3/5/7/8/20, TDD B38/40/41
WR322GR-WLAN+LTE-CN (C Series)	Industrial Secure Cellular Router, 2GbE+1COM, 802.11ac/n WLAN, LTE-CN, GPS, 2SIM, FDD B1/B3/B5/B8, TDD B38/B39/B40/B41
WR322GR-WLAN+LTE6-E (C Series)	Industrial Secure Cellular Router, 2GbE+1COM, 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-E (D Series)	Industrial Secure Cellular Router, 2GbE+2COM, USB, LTE-E, 2SIM, FDD B1/3/5/7/8/20, TDD B38/40/41
WR312G-LTE-CN (D Series)	Industrial Secure Cellular Router, 2GbE+2COM, USB, LTE-CN, 2SIM, FDD B1/B3/B5/B8, TDD B38/B39/B40/B41
WR312G-LTE6-E (D Series)	Industrial Secure Cellular Router, 2GbE+2COM, USB, LTE-E Cat.6, 2SIM, FDD B1/3/5/7/8/20/28/32, TDD B38/40/41
WR312G-LTE-E (E Series)	Industrial Secure Cellular Router, 2GbE+2COM, USB, SD, LTE-E, 1SIM, FDD B1/3/5/7/8/20, TDD B38/40/41
WR312G-LTE-CN (E Series)	Industrial Secure Cellular Router, 2GbE+2COM, USB, SD, LTE-CN, 1SIM, FDD B1/B3/B5/B8, TDD B38/B39/B40/B41
	*Embedded SIM by request *LTE-AU/LTE-U by request *Dual LTE concurrent by request *GPS support for WR312G-LTE series by request
	Package List
	1 x Product Unit
	1 x 6-pin Removable Terminal Connector
	WR312G-LTE: 2 x LTE Antenna, Black **WR312G-WLAN**: 2 x Wi-Fi Antenna, White **WR322GR-WLAN+LTE**: 2 x LTE Antenna, Black + 2 x Wi-Fi Antenna, White
	1 x Attached Din Clip
	1 x Quick Installation Guide

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