



# Industrial IoT Solution Guide

[www.womaster.eu](http://www.womaster.eu)

**WoMaster**  
Master in IIoT World



### Industrial IoT Router

<b>5G Router</b> WR315GR 	<b>4G LTE Router + WLAN AP</b> WR312/322GR    WR312/322A-M12    WR222/224 	
<b>5G Router + MESH AP</b> WA512GM-D-5GM2 	<b>PoE 4G WLAN Router</b> WR316GPS WR319/329P 	<b>Programmable 4G LTE Router</b> WR312/322GR-EC 
<b>MESH AP</b> WA512GM-D 	<b>NB-IoT Gateway</b> WR222 	<b>LoRaWAN Gateway</b> WR312/322GR-EC-LoRaWAN 

### Outdoor City Box

<b>All-in-One Smart City Box</b> SCB1200/1000/400 	<b>Lte PoE+</b> 5GHz 802.11a/n/ac 2.4GHz 802.11b/g/n
<b>MESH WLAN AP Router</b> WA512GM-IP67 	<b>MESH</b> 5GHz 802.11a/n/ac 2.4GHz 802.11b/g/n
<b>Smart Meter Gateway</b> SCB211/270 	<b>M-Bus Modbus</b> <b>lte NB-IoT LTE-1</b>

<b>LoRa</b> <b>LoRa Controller</b> LM100 / LC144 	<b>LoRaWAN</b> <b>LoRaWAN Node</b> LR140 
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<b>Multiple Sensors</b> 	<b>Soil Sensors</b> 
<b>Air Sensors</b> 	<b>Water Sensors</b> 



<b>Streetlight Controller</b> <b>Parking Sensor</b> <b>Waste Bin Sensor</b> <b>Manhole Sensor</b> 
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### Industrial Ethernet Switch

<b>Rugged L3 L2 Managed/PoE Switches</b> RP628/RS628/RP428/RS428 DS612/DS412 DS610/DS410/DS410L DP612/DP412/DP410L 	<b>PoE+ -40~75°C</b> ViewMasterNetMaster E-mark EN50121-4 IEC61000-2-2 IEC61000-3-2 Cyber Security
<b>Entry Level PoE Switches Converters</b> DP210/DS210 DS208/DS205 DP208/DP208-LV DS108/DS105A/DS105 DS201/DS101/DP101 	<b>Railway M12 PoE Switches</b> MP614/MS614 MS208 
<b>PoE+ -40~70°C</b> Energy Efficient	<b>PoE+</b> EN50155 EN45545

# Dual Core and Dual WLAN Secured and Rugged 5G NR / LTE Serial Router for IIoT

## WR315GR-5GM2-2C

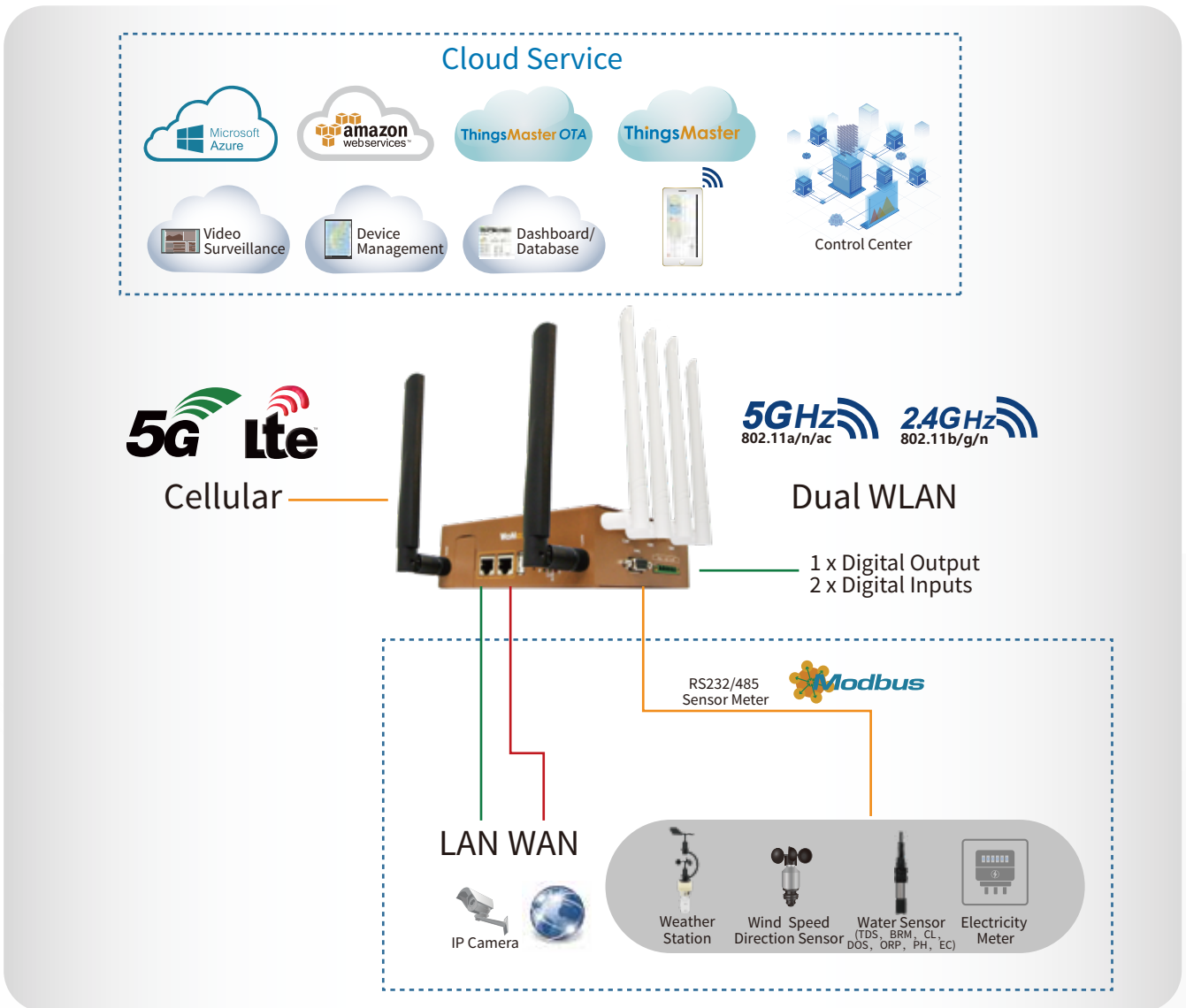
## WR312GR-LTE-2C / WR322GR-WLAN+LTE-2C

- Dual Core High Speed Processor
- 5G New Radio, SA+NSA, backward compatible LTE Cat.16-20 Downlink, LTE Cat.18 Uplink
- Dual Radio 5GHz + 2.4GHz Wi-Fi for local coverage, up to 1166(866Mbps + 300Mbps) bandwidth
- Gigabit Ethernet Routing and Bridging
- One RS232/422/485 DB9 port with Modbus TCP/RTU
- OpenVPN, IPSec, L2TP, GRE Tunnel for secured connection
- USB for easy field configuration and firmware upgrade
- Cellular to WAN redundancy, dual SIM backup
- 1:1 NAT, port forwarding and NAPT for local traffic protection
- RIPv1&v2, OSPFv2, VRRP routing
- MQTT with Built-in Cloud AWS Agent, Azure Agent, ThingsMaster OTA™
- TACACS+ /RADIUS multi-user authentication for privileged user management
- Reboot, Configuration and Firmware Upgrade over the air (OTA)
- -40~75°C wide operation temperature
- EN50121-4 railway compliance



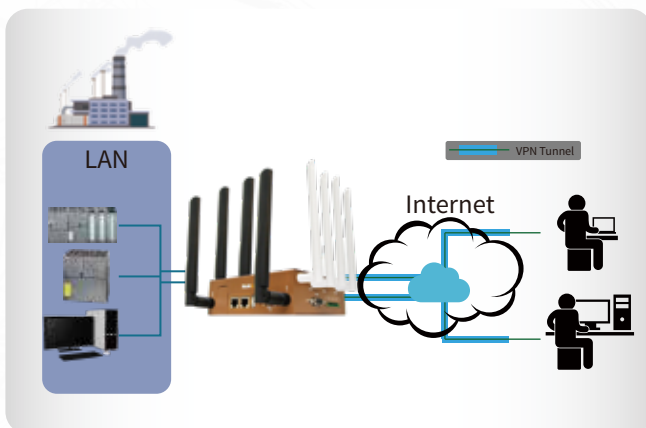
Model	CPU	Series	Serial	ETH	Radio 1	Radio 2	USB	SD	SIM	DI/DO	
WR315GR-5GM2-2C	2 Core		0	1 x GE WAN + 4 x GE LAN	5G NR EU/AE/GL	-	0	0	2	0	
WR315GA-5GM2-2C*			1		5G NR EU/AE/GL	-	0	0	2	2/1	
WR315GR-LTE-2C			0		LTE Cat.4/Cat.6 EUX/AU/G	-	0	0	2	0	
WR315GA-LTE-2C*			1		LTE Cat.4/Cat.6 EUX/AU/G	-	0	0	2	2/1	
WR312GR-LTE-2C		1 Core		1	1 x GE LAN + 1 x GE WAN	LTE Cat.4/Cat.6 EUX/AU/G	-	1	1	2	2/1
WR322GR-WLAN-2C				1		5Ghz 11ac	2.4Ghz 11n	1	1	0	2/1
WR322GR-WLAN+LTE-2C			C	1	LTE Cat.4/Cat.6 EUX/AU/G	2.4Ghz 11n + 5Ghz 11ac	1	1	2	2/1	
WR312G-LTE-2C (C Series)*				1	LTE Cat.4/Cat.6 EUX/AU/G	-	0	0	2	0	
WR312G-LTE-2C (D Series)*				D	2	LTE Cat.4/Cat.6 EUX/AU/G	-	1	0	2	0
WR312G-LTE					2	LTE Cat.4/ EUX/AU/G	-	1	1	1	0/1
WR312G-LTE (C Series)	C	1	LTE Cat.4/Cat.6 EUX/AU/G	-	0	0	2	0/1			

## √ Ready Total Solution for IoT



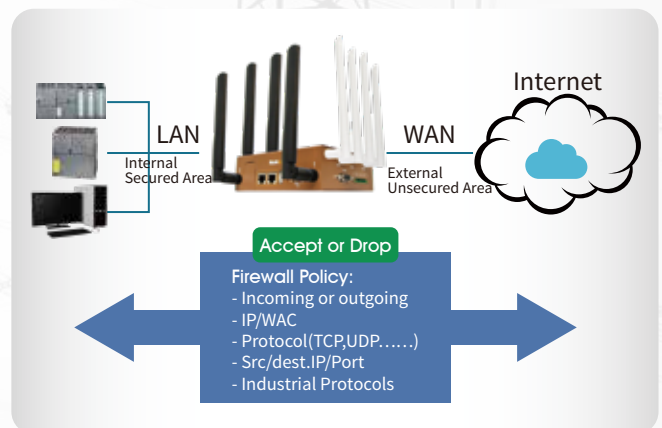
## √ Secured Remote Access by VPN

The router 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

Advanced cybersecurity features are included such as TLS v1.2, HTTPS/SSH, WLAN AP 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, Firewall Stateful Inspection firewall(SIP), IP/Port Filter, MAC ACL.



## Secure IoT Modbus Tags

Tag-based data acquisition with MQTT/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.

Home > IoT > Modbus Device > Modbus Logging

AWS IoT   Azure IoT   Private IoT   CoAP   Modbus Device   RMS/OTA

### Modbus Logging

Modbus Logging  Enable

Name  // Tag Name

Serial  // Slave Address

Slave ID  // Register Address

PLC Address (Base 1)  // Register Address

Function

Data Type

Swap Mode

Log to SD card  Enable

### Modbus RTU Slave Tag List

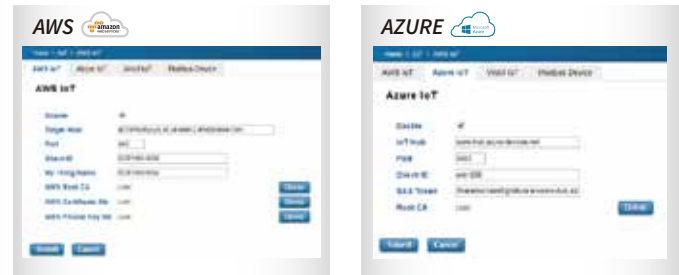
Select	Name	Serial	Slave ID	Address	Function Code	Data Type	Edit	Alive	Value
<input type="checkbox"/>	PM2.5	1	3	55	03	uint16	<input type="button" value="Edit"/>	Yes	21
<input type="checkbox"/>	CO2	1	4	5	03	uint32	<input type="button" value="Edit"/>	Yes	866
<input type="checkbox"/>	Temperature	1	3	2	03	uint16	<input type="button" value="Edit"/>	Yes	214
<input type="checkbox"/>	PM2.5	1	3	5	03	uint16	<input type="button" value="Edit"/>	Yes	18
<input type="checkbox"/>	Humidity	1	3	1	03	uint16	<input type="button" value="Edit"/>	Yes	536
<input type="checkbox"/>	Wind_Direction	1	2	24	03	uint16	<input type="button" value="Edit"/>	Yes	6
<input type="checkbox"/>	Wind_Speed	1	1	23	03	uint16	<input type="button" value="Edit"/>	Yes	6

## Secured Multi-sites Management

N to N VPN

Latest TLS encryption and X.509 authentication

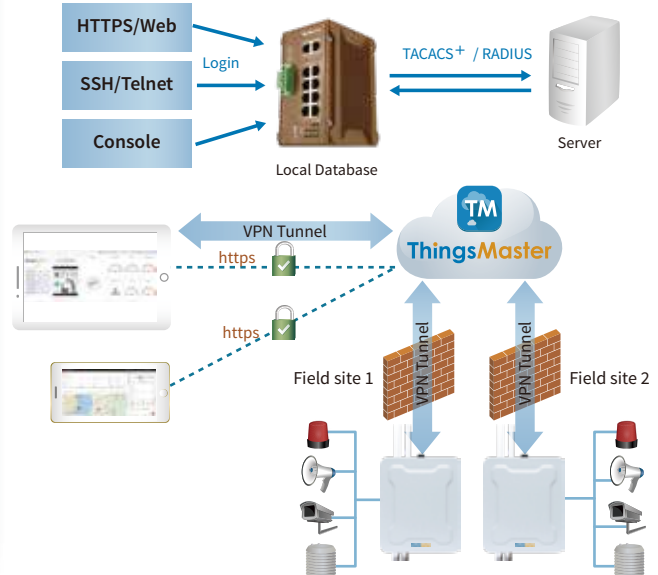
## √ Built-in Microsoft Azure and Amazon AWS agent



## √ Multi-Level User Passwords

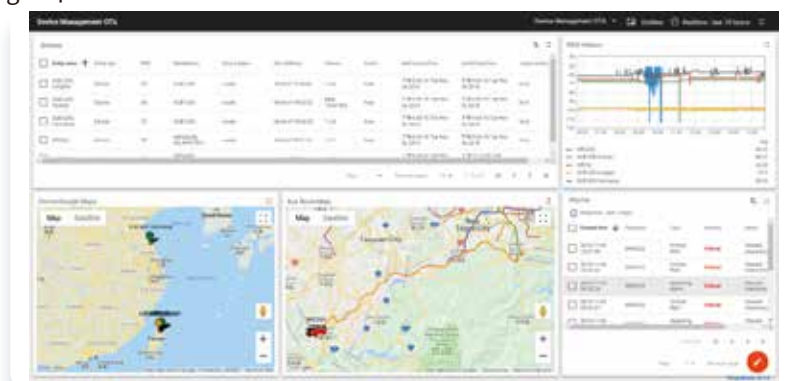
Different centralized authentication servers are supported such as RADIUS and TACACS+. Using a central authentication server simplifies account administration, when you have more than one switches in the network.

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.



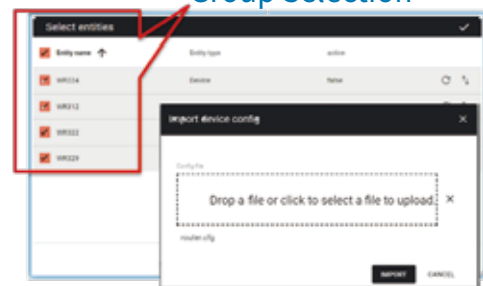
## √ ThingsMaster OTA™ (device management over the air)

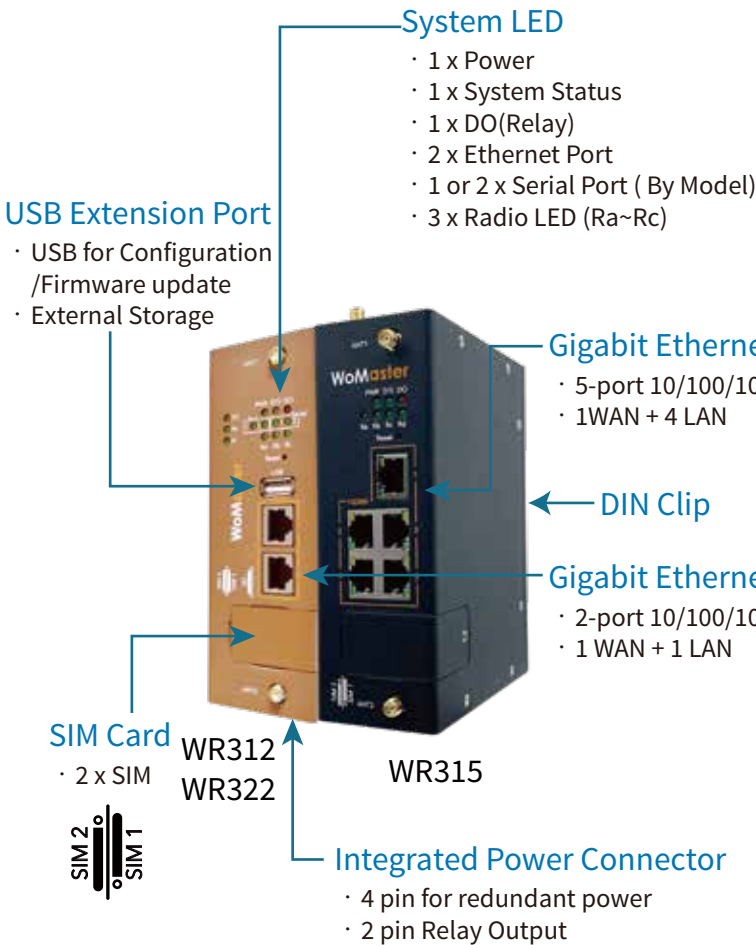
The OTA agent embedded in the router upgrades device management over the air, anywhere you are and any time you want over your mobile devices. ThingsMaster OTA™ is a secured local OTA software that can be installed in a private or public server or even QNAP NAS (network attached storage). With OTA, all 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.



## Batch configuration and Reboot OTA

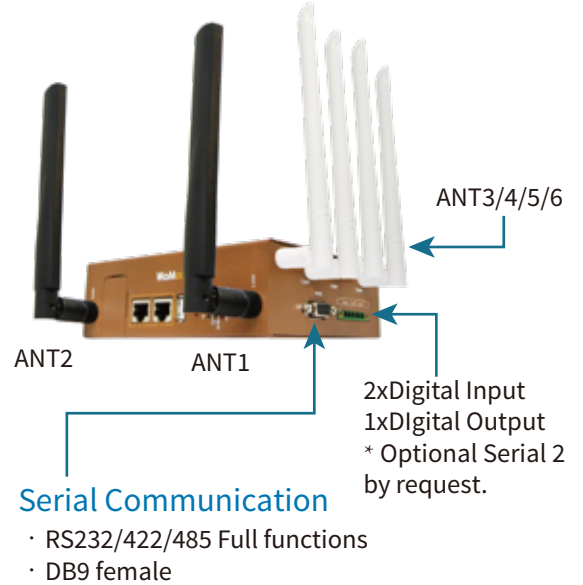
### Group Selection





	WR312GR-LTE WR315GR-LTE	WR315GR-5GM2	WR322GR-WLAN+LTE
Ant 1	LTE-Main	5GNR Main /4G/3G/2G	LTE-Main
Ant 2	LTE- Diversity/ GPS (by model)	5GNR Main /4G/3G/2G	LTE- Diversity/ GPS (by model)
Ant 3	-	5GNR/4GDL-MIMO 1	Wi-Fi 5 Main
Ant 4	-	5GNR/4GDL-MIMO 2	Wi-Fi 4 Main
Ant 5	-	GNSS*	Wi-Fi 5 Div.
Ant 6	-		Wi-Fi 4 Div.

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



5G NR-EU Frequency Bands	5G NR NSA/SA: 700M/3500MHz compliance (n1/n3/n7/n8/n20/n28/n41/n77/n78) LTE FDD: B1/B2/B3/B4/B5/B7/B8/B20/B28/B32 LTE TDD: B38/B40/B41/B42 WCDMA: B1/B3/B5/B6/B8 GSM/GPRS/EDGE: 900/1800/850/1900MHz GNSS L1+L5 GPS/GLONASS/BeiDou(Compass)/Galileo *For other frequency bands not listed, please inquire with our sales. *GNSS software by request
5G NR-GL Frequency Bands (By Request)	5G NR NSA: n41/n77/n78/n79 5G NR SA: n1/n2/n3/n5/n7/n8/n12/n20/n28/n38/n40/n41/n48*/n66/n71/n77/n78/n79 LTE FDD B1/B2/B3/B4/B5/B7/B8/B12/B13/B14/B17/B18/B19/B20/B25/B26/B28/B29/B30/B32/B66/B71 LTE TDD B34/B38/39/B40/B41/B42/B48 LTE LAA B46 WCDMA B1/B2/B3/B4/B5/B6/B8/B19 GNSS GP/GLONASS/BeiDou(Compass)/Galileo
Band Information:LTE Cat.6-EAU	LTE FDD: B1/3/5/7/8/20/28/32 LTE TDD: B38/40/41 WCDMA: B1/3/5/8 Support DL 2CA
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-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

# Secured and Rugged Dual Core LTE M12 Router for Vehicle and Railway

## WR322A-M12 2C Series

- Dual Core High Speed Processor
- Cellular High speed 4G LTE Cat.4/Cat.6, 2x2 MIMO, 150M downlink and 50M uplink
- Dual Radio 5GHz + 2.4GHz Wi-Fi for local coverage, up to 1166(866Mbps + 300Mbps) bandwidth
- 2-port M12 Connector Gigabit Ethernet Routing and Bridging
- One RS232/422/485 DB9 port with Modbus TCP/RTU
- OpenVPN, IPSec, L2TP, GRE Tunnel for secured connection
- USB for easy field configuration and firmware upgrade
- Cellular to WAN redundancy, dual SIM backup
- 1:1 NAT, port forwarding and NAPT for local traffic protection
- RIPv1&v2, OSPFv2, VRRP routing
- MQTT with Built-in Cloud AWS Agent, Azure Agent, ThingsMaster OTA™
- TACACS+ /RADIUS multi-user authentication for privileged user management
- Reboot, Configuration and Firmware Upgrade over the air (OTA)
- -40~75°C wide operation temperature
- Railway Shock/Vibration: EN 50155:2017/EN 61373:2010

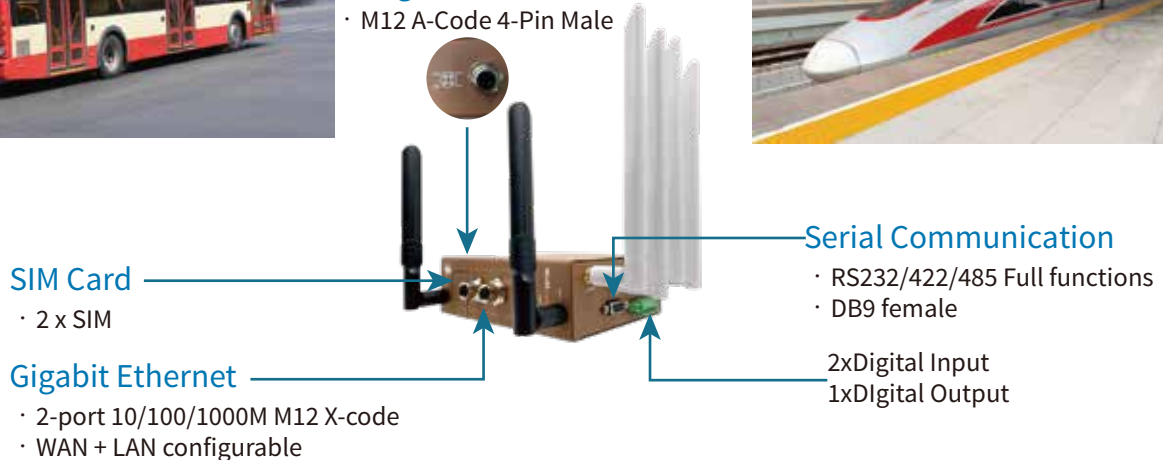


Model	CPU	Serial	ETH	Radio 1	Radio 2	USB	SD	SIM	Relay	DI/DO
WR312A-M12-LTE-2C	Dual Core	1	1x GE LAN	LTE Cat.4 EUX/AU/G	-	1	1	2	1	2/1
WR322A-M12-WLAN-2C		1	+ 1x GE WAN	5Ghz 11ac	2.4Ghz 11n	1	1	0		2/1
WR322A-M12-WLAN+LTE-2C		1		LTE Cat.4 EUX/AU/G	2.4Ghz 11n + 5Ghz 11ac	1	1	2		2/1



### Integrated Power Connector

- M12 A-Code 4-Pin Male



# Industrial 4G Cellular PoE Router + WLAN AP

## WR319P / WR329P Series

## WR316GPS Series

- Cellular High speed 4G LTE Cat.4/Cat.6/CBRS and Wireless LAN
- Wi-Fi networks (5G 802.11ac/a/n or 2.4G 802.11b/g/n)
- 2T2R Wi-Fi radio delivers up to 866Mbps high throughput
- 4-port(WR316GPS) or 8-port(WR319/329) IEEE 802.3af/at PoE up to 30W per port
- OpenVPN, IPSec, L2TP, GRE Tunnel for secured connection
- USB for easy field configuration and firmware upgrade
- Cellular to WAN redundancy, dual SIM backup
- 1:1 NAT, port forwarding and NAPT for local traffic protection
- RIPv1&v2, OSPFv2, VRRP routing
- MQTT with Built-in Cloud AWS Agent, Azure Agent, ThingsMaster OTA™
- TACACS+ /RADIUS multi-user authentication for privileged user management
- -40~75°C wide operation temperature



WR329P-WLAN-LTE



WR316GPS

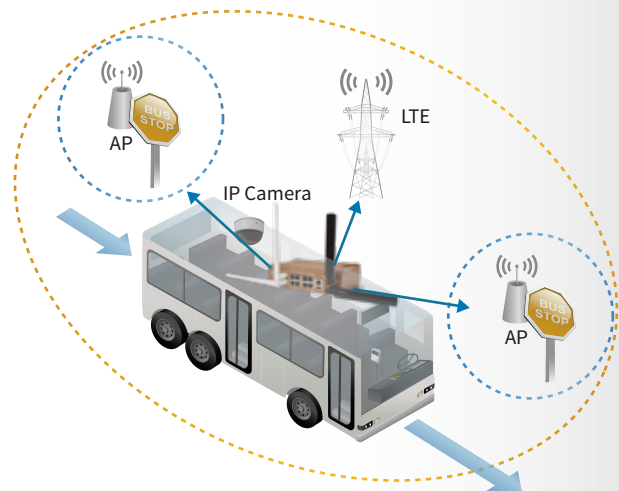


Model	Serial	Eth	Radio 1	Radio 2	USB	SD	SIM	DI/DO	Power Input
WR316GPS-LTE	0	4 GE PoE + 2 GE SFP	LTE Cat.4 EUX /AU/G	-	1	0	2	0	48VDC
WR319-LTE-E	-	8 FE LAN + 1 GE WAN	LTE Cat.4 EUX /AU/G	-	1	-	2	-	8-32VDC
WR319A-LTE-E	1	8 FE LAN + 1 GE WAN						3/1	
WR319P-LTE-E	-	8 FE POE LAN + 1 GE WAN						-	
WR319PA-LTE-E	1	8 FE POE LAN + 1 GE WAN						3/1	
WR329-WLAN+LTE-E	-	8 FE LAN + 1 GE WAN						-	
WR329A-WLAN+LTE-E	1	8 FE LAN + 1 GE WAN						3/1	
WR329P-WLAN+LTE-E	-	8 FE POE LAN + 1 GE WAN						-	
WR329PA-WLAN+LTE-E	1	8 FE POE LAN + 1 GE WAN						3/1	

### Auto-Offload

When the BUS approaches to the main station, it will transmit the data of surveillance videos and traffic information to the station via Wi-Fi network of the station.

The Patented Auto-Offload technology allows moving devices to seamlessly switch Wi-Fi network to LTE network without stopping the communication.

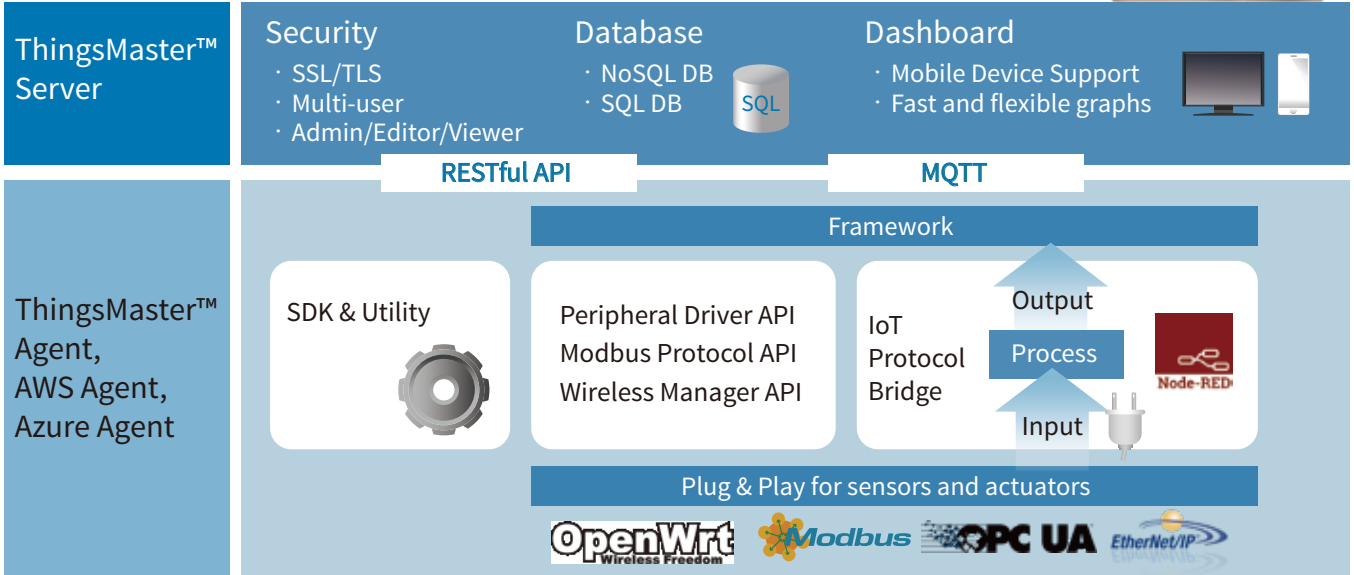


# Industrial IoT Edge Computer / Gateway

## WR312/WR322 EC Series

### √ Open Platform Software Architecture

- Linux OpenWRT LEDE (kernel v4.4)
- Latest Node-RED 0.19



## Node-RED As Easy as Click and Drop

Library With Building Blocks

CO<sub>2</sub>, Humidity, Temperature

Information Panel

Model	WAN	LAN	Serial	Radio 1	Radio 2	USB	SD	SIM	GPS	DI/DO	Power Input	Temp.	Standard
WR302G-EC				-	-	1	1	-	-	0/1			EN50121-4 EN61000-6-2/4 EN61000-4-12/16/17/18/29
WR312G-WLAN-EC	1xGE	1xGE	2xRS232/ 422/485	Wi-Fi 2.4G 11n/5G 11ac	-	1	1	-	-	0/1	12/24/48VDC	-40~75°C	EN50121-4 EN61000-6-2/4 EN61000-4-12/16/17/18/29 Radio RED
WR312G-LTE-EC				LTE Cat.4	-	1	1	1	-	0/1			
WR322GR-WLAN+LTE-EC				Wi-Fi 2.4G 11n/5G 11ac	LTE Cat.4	1	1	2	Yes	0/1			

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

## WR222-WLAN+LTE/NB2

## WR224-WLAN+LTE

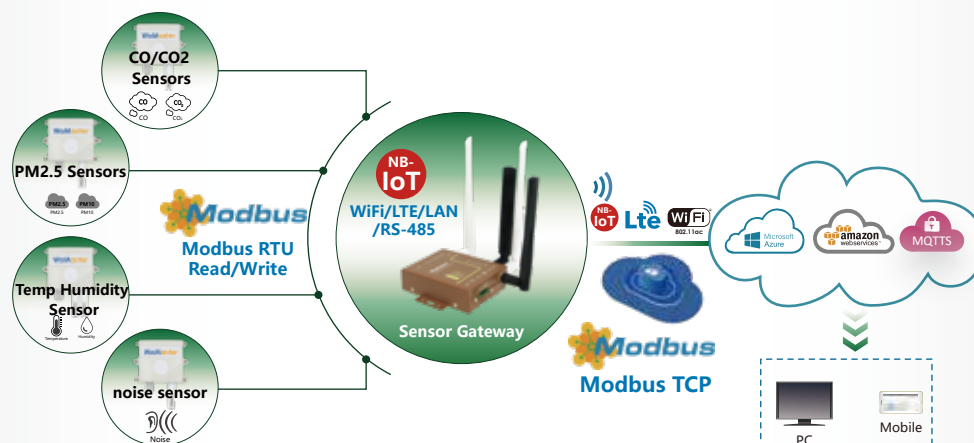
- Dual Radio 4G LTE Cat.4 (or NB-IoT/Cat.M1) + 2.4GHz Wi-Fi Network
- 2-port (WR222) / 4-port (WR224) Ethernet Routing and Bridging
- WR222: One RS232/422/485 DB9 port with Modbus TCP/RTU
- Firewall, OpenVPN, HTTPs/SSH, GRE Tunnel for secured connection
- LTE to WAN auto-offload, Multi-port LAN/WAN routing
- 1:1 NAT, port forwarding and NAPT for local traffic protection
- L2TP with PPP, PAP, CHAP(LCP, IPCP)
- MQTT with Built-in Cloud AWS Agent, Azure Agent, ThingsMaster OTA™
- TACACS+ /RADIUS multi-user authentication for privileged user management
- Reboot, Configuration and Firmware Upgrade over the air (OTA)
- -40~70°C wide operation temperature



Model	Serial	ETH	Radio 1	Radio 2	USB	SD	SIM	DI/DO
WR214-WLAN	0	3 FE LAN + 1 FE WAN	2.4Ghz 11n	-	0	0	0	0
WR224-WLAN+LTE	0		2.4Ghz 11n	LTE Cat.4 EUX/AU/G	0	0	2	0
WR212-WLAN	1	1 FE LAN + 1 FE WAN	2.4Ghz 11n	-	0	1	0	1/1
WR222-WLAN+LTE	1		2.4Ghz 11n	LTE Cat.4 EUX/AU/G	0	1	1	1/1
WR222-WLAN+NB+M1	1		2.4Ghz 11n	LTE-NB-IoT/CAT M1	0	1	1	1/1

## IIoT Cloud Security

- Firewall for inbound/outbound traffic
- OpenVPN (server/client)
- L2TP with PPP, PAP, CHAP(LCP, IPCP), GRE tunnel
- HTTPs/SSH secure login
- MQTTS with TLS encryption and X.509 authentication



# Industrial MESH WLAN 2.4G+5GHz 802.11ac Wave 2 AP/Router with Add-On 5GNR/LTE Cat.6 Cellular

## WA512GM-D/WA512GM-D-M2

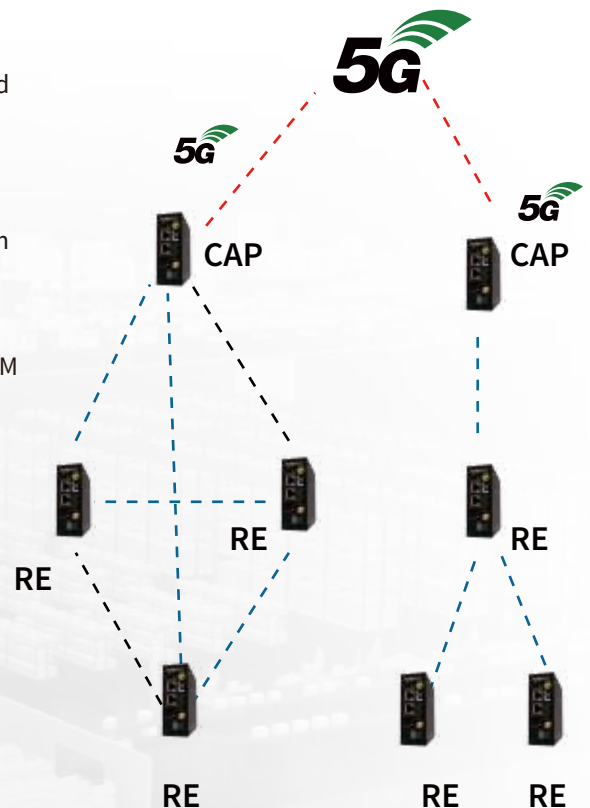
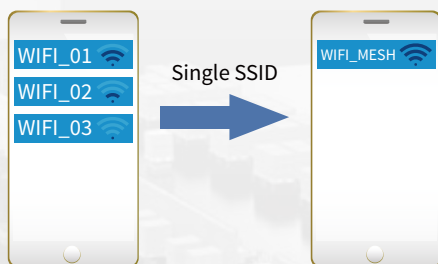


- Quad-Core ARM Processor with Optional Add-On 5GNR / LTE6 modules
- Concurrent dual-band WiFi 2.4 G+5GHz radio, up to 866Mbps + 300Mbps Bandwidth
- Dual Gigabit Ethernet ports in Router mode for WLAN/LAN to Eth-WAN routing
- Wi-Fi SON MESH Network with Self Healing
- Multi-hop up to 4 layers and 7 Range Extenders
- Self-Configuring Plug-and-play via Wireless network with ViewMaster utility
- Easy MESH setup and Group MESH setup and MESH Network Status Monitoring
- Autonomous performance optimization (802.11k)
- Interference management via band steering (802.11v)
- Seamless roaming
- Enhanced Security with Firewall, OpenVPN, IPSec, L2TP, GRE, TACACS+
- Slim size Din-Rail mounting with dual radio in one antenna to save cost and space
- Effective heat dissipation design for operating in -40~70°C environments
- Power Input 802.3af PD by Industrial PoE switch as a complete wire/wireless solution.
- 24VDC Power input with 9~50VDC range



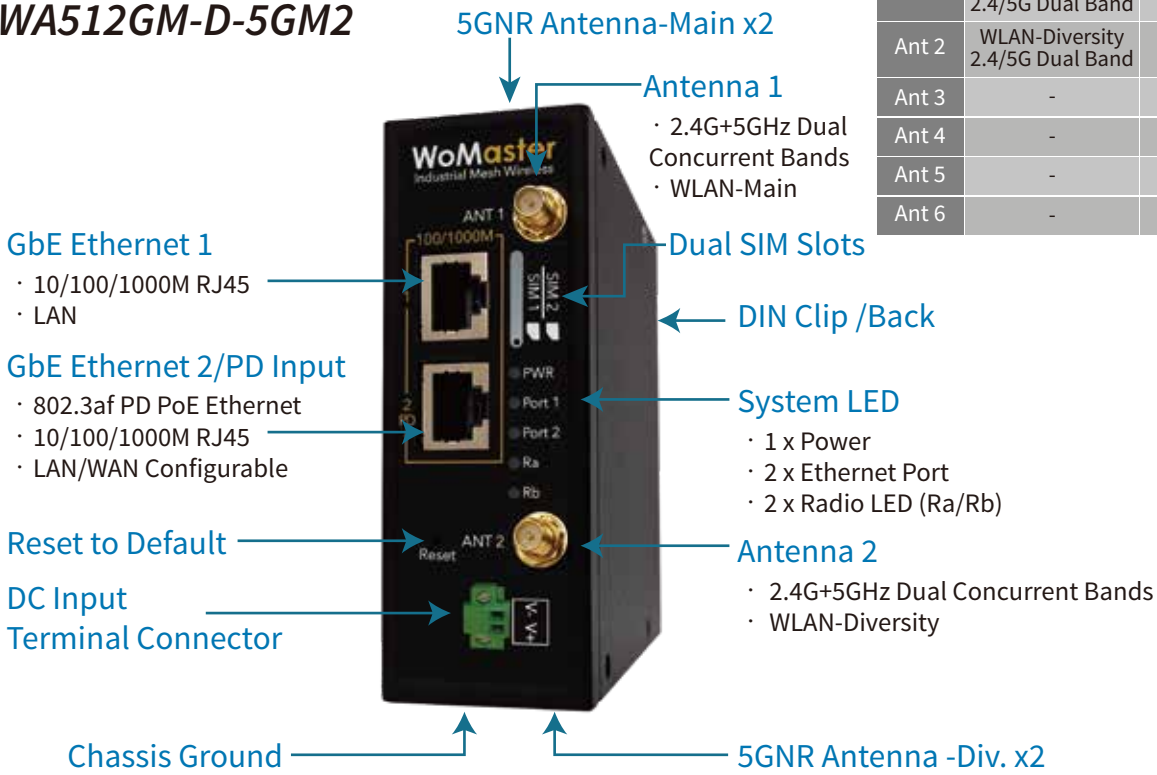
### √ Cellular 5G and MESH WiFi Dual Wireless

- Each Mesh AP communicates with each other to automatically find best path for packets transmission.
- CAP- Central AP with WAN connection
- RE- Range Extender connected to CAP directly or indirectly
- Single SSID for all CAP/RE for easy/fast roaming
- 1 CAP extends up to 7 Range extenders or up to 4 layers for minimum performance
- All devices can be configured as CAP or RE (by default)
- Hop Distance- Max 50M with default omni antenna
- Optional Directional Long-Range antenna for long distance up to 10KM



# WA512G-D WA512GM-D-5GM2

	WA512GM-D	WA512GM-D-5GM2
Ant 1	WLAN-Main 2.4/5G Dual Band	WLAN-Main 2.4/5G Dual Band
Ant 2	WLAN-Diversity 2.4/5G Dual Band	WLAN-Diversity 2.4/5G Dual Band
Ant 3	-	5GNR-Main
Ant 4	-	5GNR-Main
Ant 5	-	5GNR-Div
Ant 6	-	5GNR-Div



Model Name	Description
WA512GM-D	Industrial 802.11ac Din-Rail Dual Radio 2.4+5GHz Concurrent Wireless Mesh AP, 802.11ac Wave 2 +802.11b/g/n WLAN, 2 x GbE, Din-Rail, 24VDC Terminal Block
WA512GM-D-M2	Industrial Din-Rail Wireless Router with M.2 expansion slot, 802.11ac Wave 2+802.11b/g/n WLAN MESH, 2 x GbE, 2SIM, M.2+4SMA, 24VDC
Cellular Module	
WM-5GNR-M2Q-E Kit	Wireless 5GNR M.2 Module Kit, 5GNR Module, Heat Pad, 4xAntennas, Screws, QIG, EU Bands
WM-LTE6-M2Q-E Kit	Wireless LTE Cat6 M.2 Module kit, LTE Cat.6 Module, Heat Pad, 2xAntennas, Screws, QIG, EU Bands



Outdoor Model	Description
WA512GM-IP67-U	Industrial Dual Radio 2.4+5GHz Concurrent Wireless MESH AP, 802.11ac Wave 2 + 802.11b/g/n WLAN, 2 x GbE, USB, IP67 Enclosure, US-plug
WA512GM-IP67-E	Industrial Dual Radio 2.4+5GHz Concurrent Wireless MESH AP, 802.11ac Wave 2 + 802.11b/g/n WLAN, 2 x GbE, USB, IP67 Enclosure,EU-plug

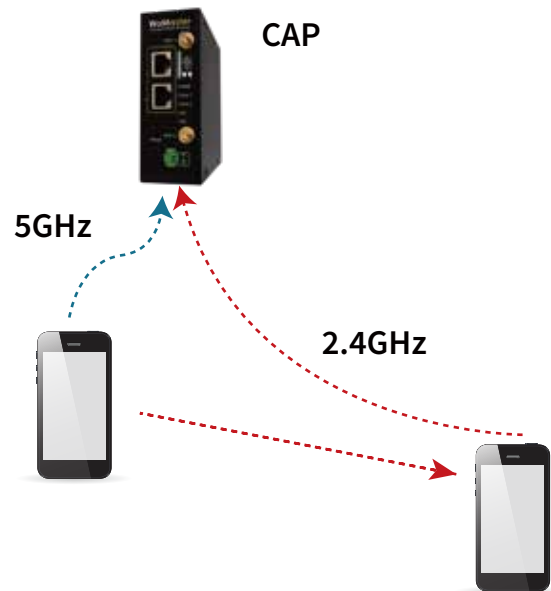
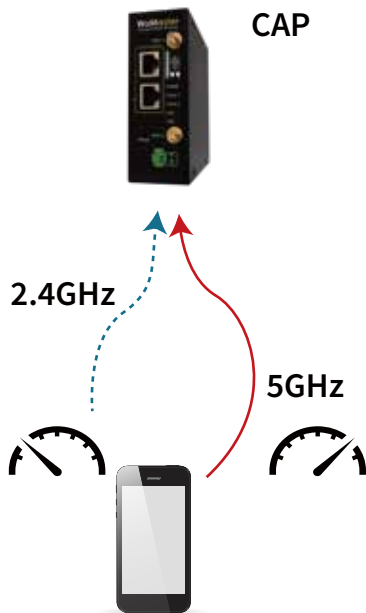
## √ Self-Organized Mesh Network

1. **Band Steering:** Auto select the best performance band and path.

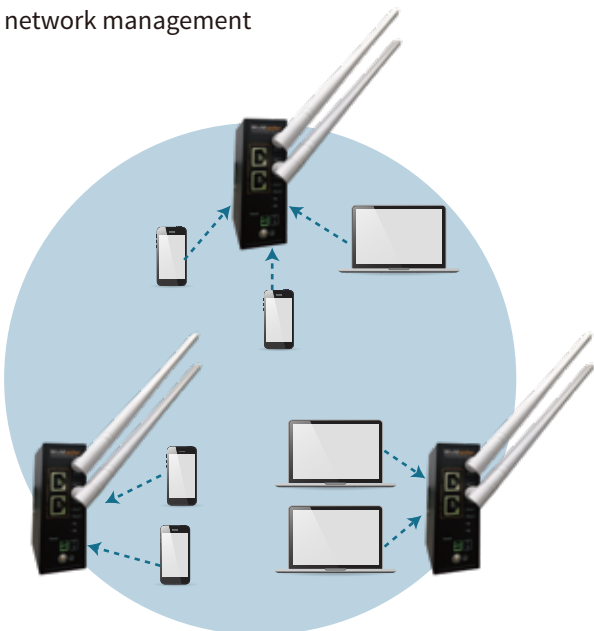
2. **Concurrent 2.4G+5GHz:** AP offers concurrent services of 2.4GHz and 5GHz Bands for different clients with default omni antennas

· Performance degradation detected- Change uplink to 5GHz

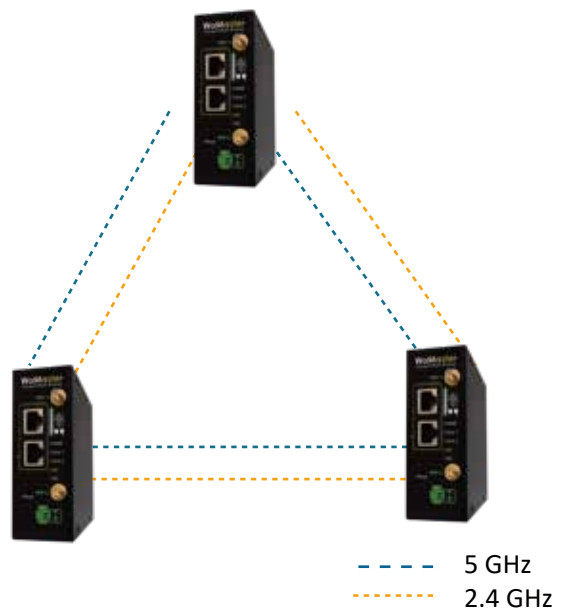
· Longer distance detected- Change uplink to 2.4GHz



3. **AP Steering:** the wireless devices are always connected in the best AP via 802.11v Wireless network management

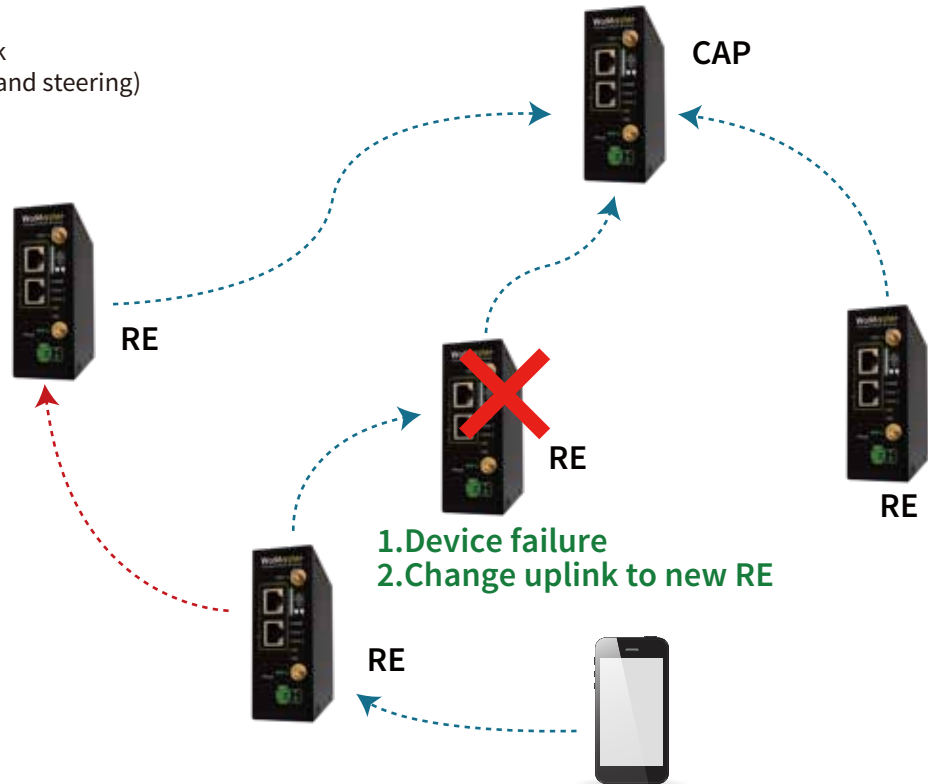


4. **Multiple Backhaul Links:** Failsafe and load-balancing backhaul links



## √ Self-Healing Mesh Technology

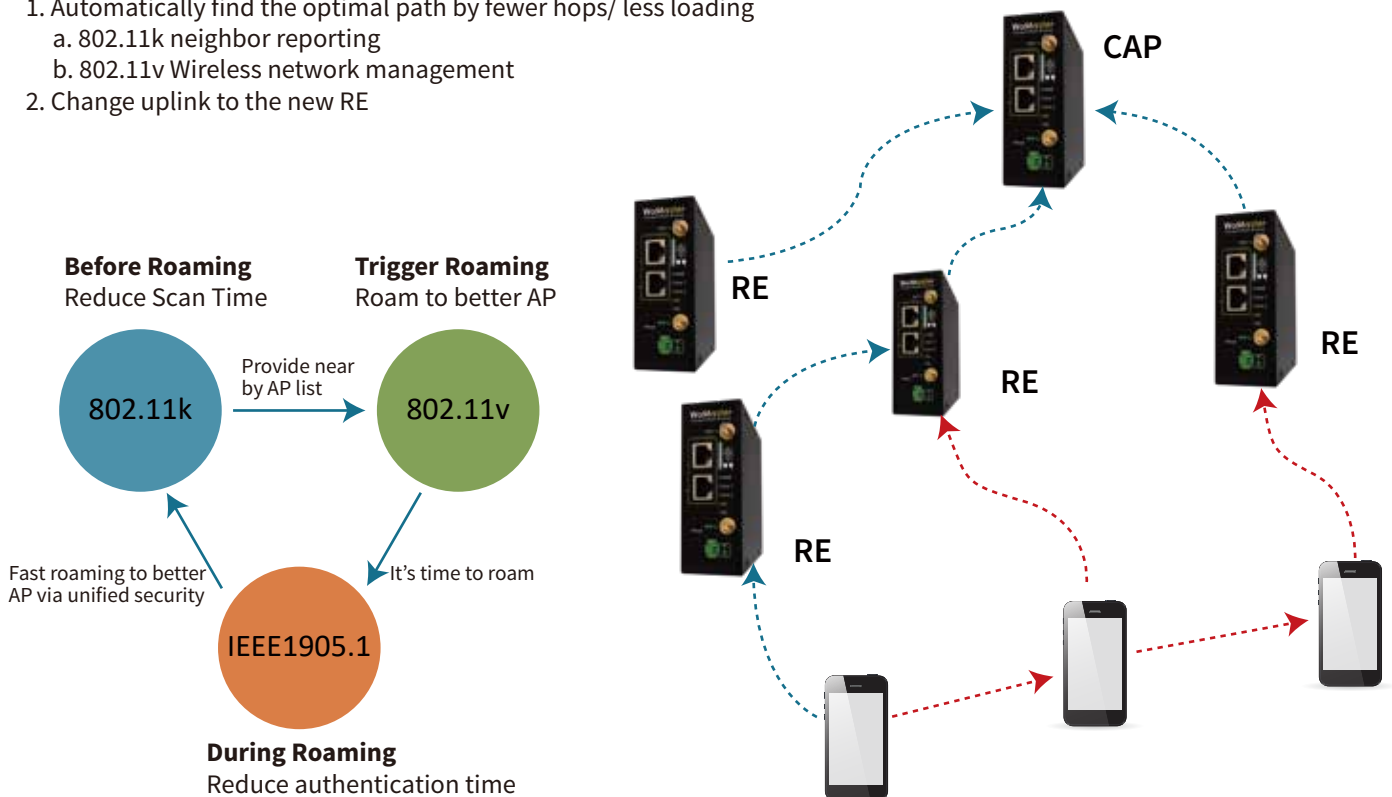
- Auto reroute when AP failed
- Eliminate network bottleneck
- Interference management (band steering)
- Airtime fairness
- Seamless roaming



## √ Seamless Roaming

- 802.11k (Radio Resource Measurement): Sends Clients list of neighbors.
- 802.11v (BSS Transition Management Frames): BSS Transition sends clients the new best AP.
- IEEE 1905.1: Enable AP auto-configuration and join the network with a unified security procedure.

1. Automatically find the optimal path by fewer hops/ less loading
  - a. 802.11k neighbor reporting
  - b. 802.11v Wireless network management
2. Change uplink to the new RE



# Complete LoRa Controller for Analog In/Output, PWM Output, and RS485

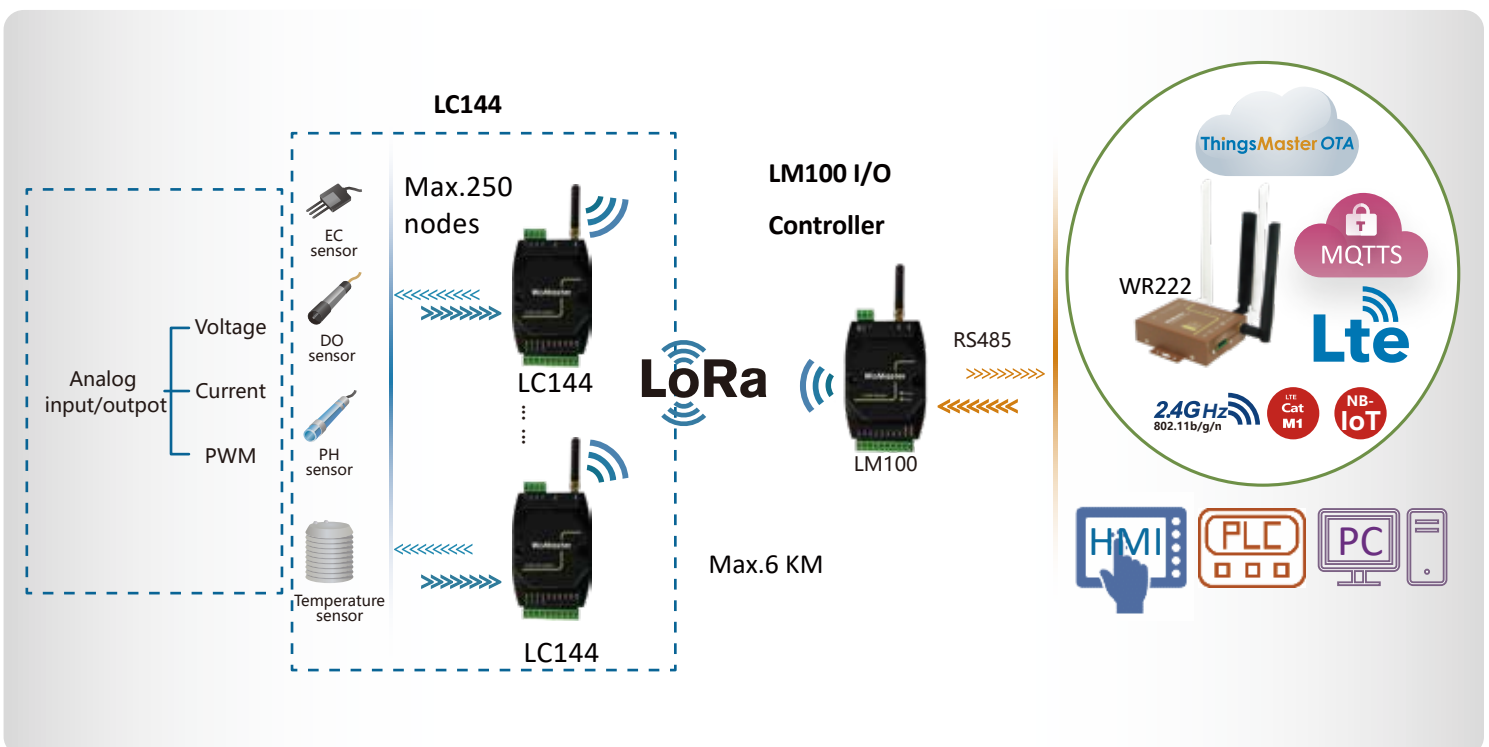
## LM200 / LM100 / LC144 / LR140 Series

- Extend Modbus Control or Receive Modbus data over Wireless Private LoRa Network
- Max 1 LM100 LoRa Master to 250 LC144 LoRa Clients up to 6KM distance
- Transparent Two-Way Modbus Communication by Private LoRa
- Analog 0-10V and 4-20mA inputs/outputs, and PWM outputs on LC144
- Easy Configuration by USB Window Utility
- Secured AES 128 Data Encryption
- Adjustable Spreading Factor (SF6,SF7,SF8,SF9,SF10,SF11,SF12) for On-Air Reliability
- 10~30V DC wide power range input
- Industrial -40~75°C / 90%H Operating Temperature / Humidity
- EN301489 / EN300220 / EN62368-1 Compliance
- LoRa Frequency Adjustable LC144-900 (850~930Mhz), LC144-400(410~493Mhz)

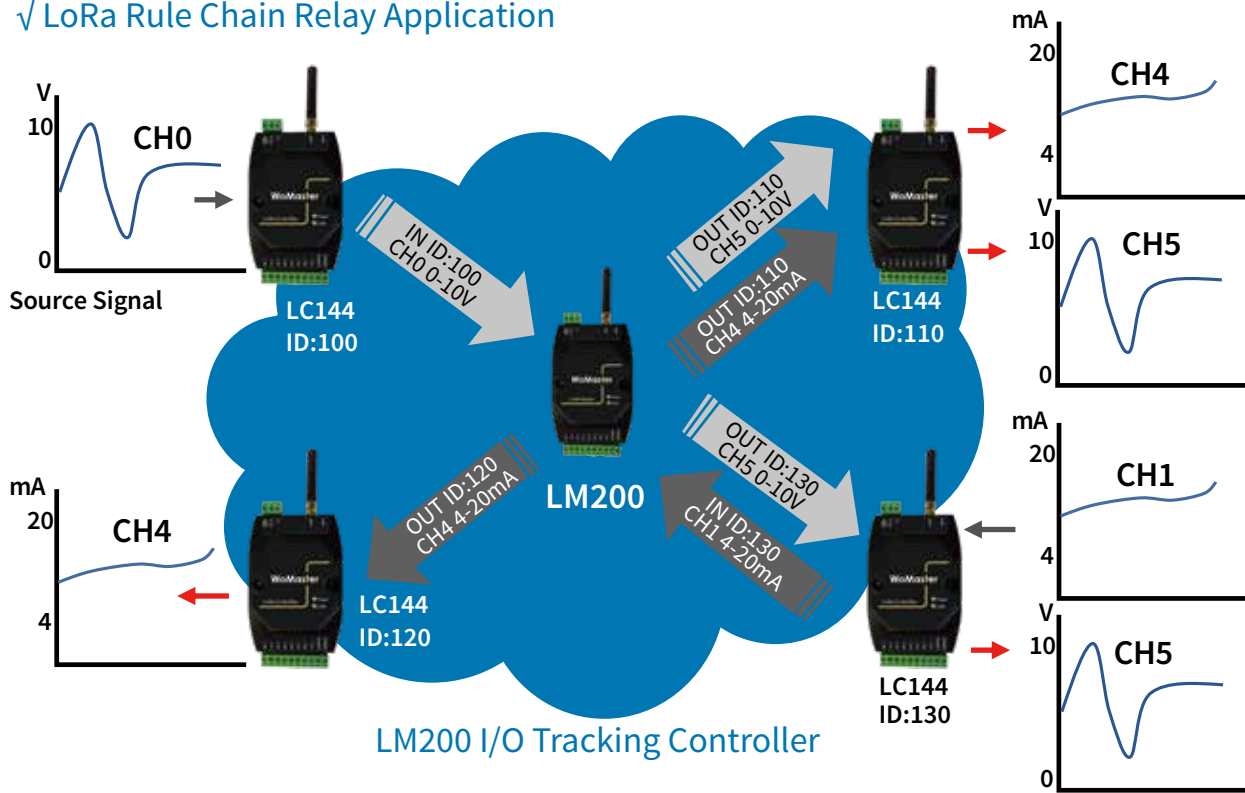


Model	LoRa	Modbus	Analog Input	Analog Output	PWM
LC144	LoRa Client	1 x RS485	2 x 0-10V 2 x 4-20mA	2 x 0-10V 2 x 4-20mA	2 x 0-10V 2 x 4-20mA
LM100	LoRa Master	1 x RS485	-	-	-
LM200	LoRa Logic	-	-	-	-
LR140	LoRaWAN Node	1 x RS485	2 x 0-10V 2 x 4-20mA	-	-

CH0	Input Voltage 0~10V Positive
CH1	Input Current 4~20mA Positive
CH2	Input Voltage 0~10V Positive
CH3	Input Current 4~20mA Positive
CH4	Output Current 4~20mA Positive
CH5	Output Voltage(OC) 0~10V Positive
CH6	Output PWM Voltage 0~5V Positive
CH7	Output PWM(OC) 0~10V Positive
RS485A	Serial RS485-A
RS485B	Serial RS485-B



## √ LoRa Rule Chain Relay Application



Tag Name (Rule Name)	Tracking Rule - Input	Tracking Rule -Output
Chain-1	ID:100-CH0	ID:130-CH5
Chain-2	ID:100-CH0	ID:110-CH5
Chain-3	ID:130-CH1	ID:110-CH4
Chain-4	ID:130-CH1	ID:120-CH4

## √ User Friendly Utility to configure Analog IO parameters

Serial
Group Net
LoRa
LoRaWan
I/O
RF
RTU
Rule Chain
Chain Monitor

**Rule Parameters**

Tag :

In Device ID:

In Device\_CH:

Type :

Out Device ID:

Out Device\_CH:

Loop Time:  s

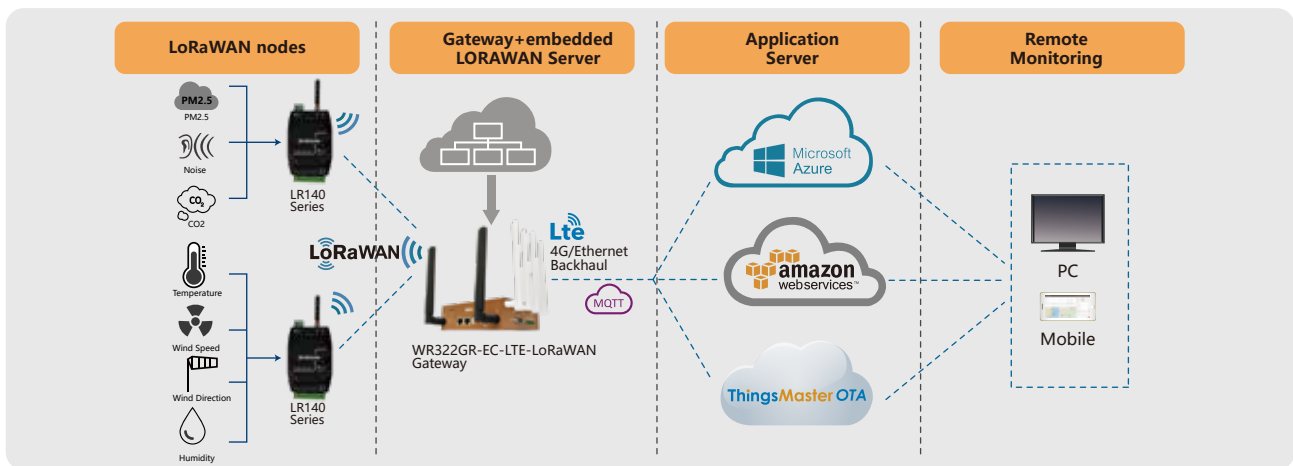
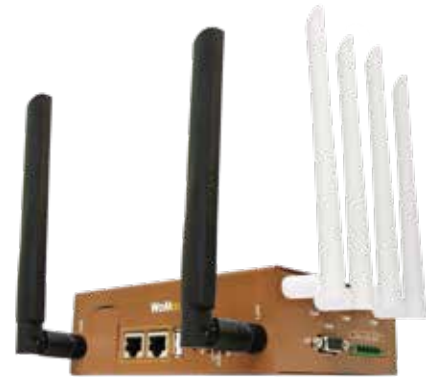
Tag	IN Dev_ID	IN_CH	Type	OUT Dev_ID	OUT_CH
Chain-1	100	0	V-V	130	5
Chain-2	100	0	V-V	110	5
Chain-3	130	1	A-A	110	4
Chain-4	130	1	A-A	120	4

- Easy Created Rule Chain
- V-V, V-A, A-A, A-V Ratio Control
- Single Input chains to Multiple Outputs
- Loop Delay Setting

# Read Analog and RS485 Data to LoRaWAN Gateway

## WR312/322-EC-LoRaWAN Server

- Built-in LoRaWAN™ Server
- LoRaWAN™ 1.0.2 protocol, Class A, B, C
- LoRaWAN™ Frame filtering (node whitelisting)
- MQTT v3.1 Bridging with TLS encryption
- Support up to 1000 LoRaWAN™ nodes
- Support ThingsMaster OTA cloud service
- Receive 0~10V, 4~20mA and RS485 Modbus from LR140 remotely
- WAN Connectivity by Ethernet or LTE Cellular
- Node-RED flow-based programming
- Internal SD Storage



### ✓ LoRaWAN Cloud Server on ThingsMaster OTA™

The LoRaWAN data can be sent to the ThingsMaster OTA™ server, located in the public domain or your corporate server. The device can be easily added and monitored on ThingsMasterOTA™ through the LoRaWAN gateway. WoMaster provides free demo account on ThingsMaster OTA™ for WR322GR-EC-LoRaWAN gateway. License for more nodes can be requested and supported.



Model	Input	ETH	Radio 1	Radio 2	USB	SD	SIM	DI/DO
WR312GR-EC-LORAWAN-(Region)	2 x RS232/422/485	1 GE WAN 1 GE LAN	LoRaWAN EU 868MHz LoRaWAN EU 433MHz LoRaWAN US 915MHz LoRaWAN AS 923MHz	-	1	1	0	0/1
WR322GR-EC-LTE-LORAWAN-(Region)			LTE Cat.4 EUX/AU/G	LoRaWAN EU 868MHz LoRaWAN EU 433MHz LoRaWAN US 915MHz LoRaWAN AS 923MHz	1	1	1	0/1
LR140-(Region)	2 x RS232/422/485	-	LoRaWAN EU 868MHz LoRaWAN EU 433MHz LoRaWAN US 915MHz LoRaWAN AS 923MHz	-	-	-	-	-

# All-in-One IP67 Smart City Box

## SCB1200/1000/400 Series

- Waterproof IP67 Protection
- Two 802.3bt Ultra PoE, max. 60W/port and Two 802.3at PoE+, max. 36W per port
- Solar Power 18V to 54V booster PoE
- Dual Giga Fiber long distance transmission with ERPS Redundancy
- 1GT WAN port with 802.3at PoE+ inside
- IIoT Expansion, include Voice, one Serial port, DI and DO
- Internal One Serial, one SD, and one USB for data storage and expansion
- WIFI/LTE Expansion with outdoor Antenna, dual SIM
- AC 100~240V Power Input and DC24V Power Output
- Lithium Battery UPS (18650x13)
- Solar PV Input & Charger Board pack
- Management through the air ThingsMaster OTA™
- Interface Customization by requirement



SCB1000

SCB1200

SCB400/400A-AC/DC

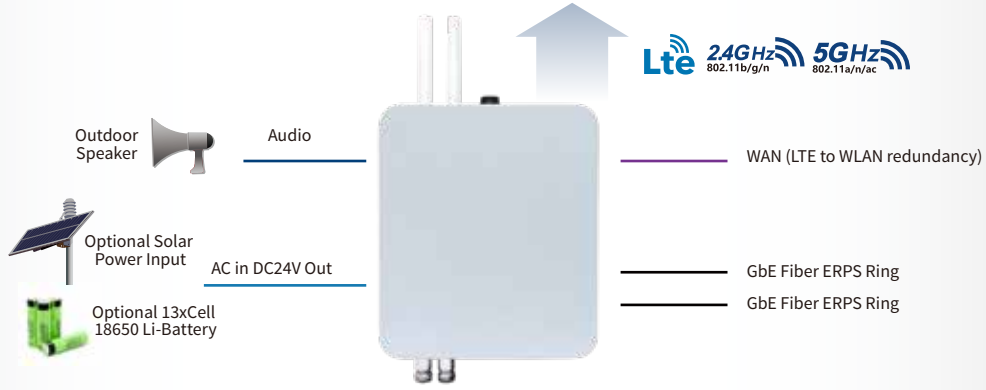
SCB400/400A-NP-AC/DC

External Interfaces				
Ethernet-LAN	2x10/100/1000M, 802.3bt UPoE, 60W/port 2x10/100/1000M, 802.3at PoE+, 30W/port	2x10/100/1000M, 802.3bt UPoE, 60W/port 2x10/100/1000M, 802.3at PoE+, 30W/port	2x10/100/1000M, 802.3at PoE+, 30W/port 1x10/100/1000M Ethernet-WAN	2x10/100/1000M Ethernet-LAN, 1x10/100/1000M Ethernet-WAN
Ethernet-LAN/Fiber	2x100/1000M SFP	2x100/1000M SFP	-	-
Power Input	100~240V AC	100~240V AC	100~240VAC or 24VDC(8~30V)	100~240VAC or 24VDC(8~30V)
DC Output	24VDC	24VDC	-	-
Serial	-	1xRS232/422/485, RJ45	1xRS232/485, 5-pin M8	1xRS232/485, 5-pin M8
Voice	-	1xMic. & 1x Speaker, RJ12	Audio Output, Audio amplifier board by option	Audio Output, Audio amplifier board by option
Digital Input	-	2xDI	2xDI	2xDI
Digital Output	-	2xRelay	1xRelay	1xRelay
Antenna Socket	2xN-Type female	2xN-Type female	2xN-Type female	2xN-Type female
Internal Interfaces				
Ethernet - WAN	1x10/100/1000M, 802.3at PoE+	1x10/100/1000M, 802.3at PoE+	(External Waterproof WAN Port)	(External Waterproof WAN Port)
Serial	-	1xRS232/422/485, DB9	-	-
mPCIe Socket	max.2	max.2	max.2	max.2
SIM Socket	2xNANO SIM or eSIM	2xNANO SIM or eSIM	2xNANO SIM or eSIM	2xNANO SIM or eSIM
USB Socket	-	1xUSB A-Type	1xUSB A-Type	1xUSB A-Type
SD Socket	-	1xmicro SD	-	-
Software				
L2 Management	VLAN, QoS, IGMP Snooping, LLDP, SNMP, Rate Control, Port/MAC/IP Security	VLAN, QoS, IGMP Snooping, LLDP, SNMP, Rate Control, Port/MAC/IP Security	VLAN, IPv4/IPv6, SNMP,Trap, Rate Control, DHCP server/client, TFTP, System Log	VLAN, IPv4/IPv6, SNMP,Trap, Rate Control, DHCP server/client, TFTP, System Log
Redundancy	STP/RSTP, ITU-T G.8032 ERPSv2, VRRP	STP/RSTP, ITU-T G.8032 ERPSv2, VRRP	-	-
Security	Port Security, HTTPs, SSH, Firewall, DMZ, Port Forwarding, NAT, Firewall, OpenVPN/IPSec VPN	Port Security, HTTPs, SSH, Firewall, DMZ, Port Forwarding, NAT, Firewall, OpenVPN/IPSec VPN	HTTPs, SSH, Force Changing password first time, Firewall, DMZ, Port Forwarding, NAT, Firewall, OpenVPN/IPSec/L2TP VPN	HTTPs, SSH, Force Changing password first time, Firewall, DMZ, Port Forwarding, NAT, Firewall, OpenVPN/IPSec/L2TP VPN
Wireless Expansion				
SCB WLAN Expansion	5G/2.4G 802.11ac/n	5G/2.4G 802.11ac/n	5G/2.4G 802.11ac/n	5G/2.4G 802.11ac/n
SCB LTE Expansion	LTE Cat.4, 150M DL/50M UL, 1x LTE+GPS Antenna	LTE Cat.4, 150M DL/50M UL, 1x LTE+GPS Antenna	LTE Cat.4, 150M DL/50M UL	LTE Cat.4, 150M DL/50M UL
Other expansions				
Solar Charger Board	LV(18V) to 54V charger	LV(18V) to 54V charger	-	-
Battery UPS	48V/2.5AH	48V/2.5AH	-	-
Others	-	-	Optional Audio Amp. Board	Optional Audio Amp. Board

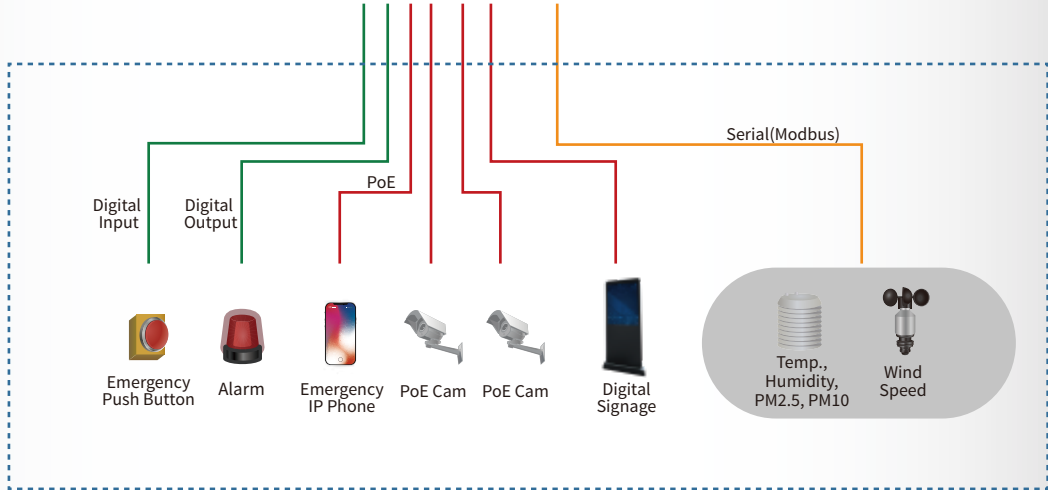
## Cloud Service



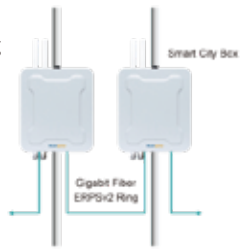
## Smart City Box



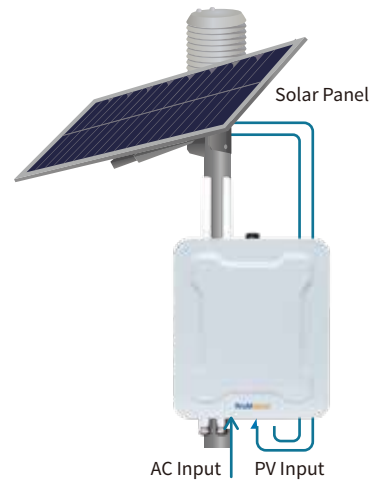
## IIoT Sensors



ERPS v2 Ring with Two Gigabit Fiber ports
Two Gigabit SFP Ports -Each supports 100M or 1000M SFP -Wire-speed Switching, no traffic loss
Ring Redundancy -802.1D-2004 Rapid Spanning Tree Protocol -ITU-T G.8032 Ethernet Ring Protection Switch version 2, <50ms recovery time, flexible Ring architectures
L2 Managements -VLAN, QoS, IGMP Snooping -LLDP, SNMP, Rate Control -Port/MAC/IP Security



SCB1200 Basic Solar Kit
Basic Solar Kit · Typ. 48V/2.5AH Battery · 54V Battery charger board · Reserved 2xM20 hole for PV input
Test and Assembly prior to shipment
MC4 Connector for PV+/PV- Input
Other optional Solar Power Band by Request · High Power Solar Panel or Panel farm · Pole mount external Battery · Other optional Battery



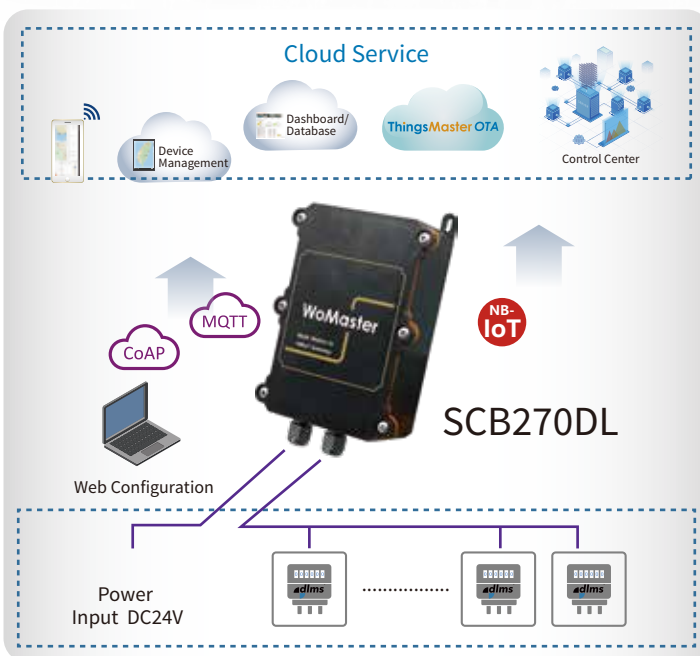
# Outdoor NB-IoT / CAT M1 / CAT 1 / 4G LTE Gateway for Single / Multi / MBUS / Modbus Meter Reading

## SCB211/270 Series

- Read Single or Multi Utility Meters of COSEM, MBUS, Modbus protocols
- Internal RJ45 Ethernet Port and WEB UI for Configuration
- Support MQTTS/COAP cloud protocol
- LTE Cat. NB-IoT v2: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B25/B28/B66/B71/B85
- LTE Cat. M1: B1/B2/B3/B4/B5/B8/B12 /B13/B18/B19/B20/B25/B28/B66/B71/B85
- EGPRS: 850/900/1800/1900MHz
- LTE Cat. 1: B1/B3/B7/B8/B20/B28
- Configuration and Firmware Upgrade over the air (ThingsMaster OTA™)
- IP67 Protection for operating in -40~70°C environments
- Support Firewall for inbound/outbound traffic and HTTPs/SSH secure login
- Support TACACS+ /RADIUS multi-user authentication for privileged user management
- NAT for local traffic protection
- Support SNMPv3 and entity-MIB (RFC4133), MIB II (RFC1213)



Model	Meter	Cellular	ETH (WEBUI)	Power	OTA	MQTT	CoAP
SCB211DL-NB-DC	Single	NB-IoT + Cat. M1	1	24V DC	YES	YES	YES
SCB211RS-NB-DC	Single Modbus	NB-IoT + Cat. M1	1	24V DC	YES	YES	YES
SCB270DL-NB-DC	Multi	NB-IoT + Cat. M1	1	24V DC	YES	YES	YES
SCB270DL-C1-DC*	Multi	4G LTE Cat.1	1	24V DC	YES	YES	YES
SCB270DL-LTE-DC	Multi	4G LTE Cat. 4	1	24V DC	YES	YES	YES
SCB270MB-NB-DC	Multi MBUS	NB-IoT + Cat. M1	1	24V DC	YES	YES	YES
SCB270MB-C1-DC*	Multi MBUS	4G LTE Cat.1	1	24V DC	YES	YES	YES



Single Meter(SCB211DL)  
Up to 70 Meter(SCB270DL)

### √ Support COSEM Standard

#### Serial Port 1 Settings

##### Basic Settings

Interface: RS485-2w

Baudrate: 9600

Parity: NONE

Databit: 8 bits

Stopbit: One Stopbit

Flow Control: NONE

**Service Mode: DLMS**

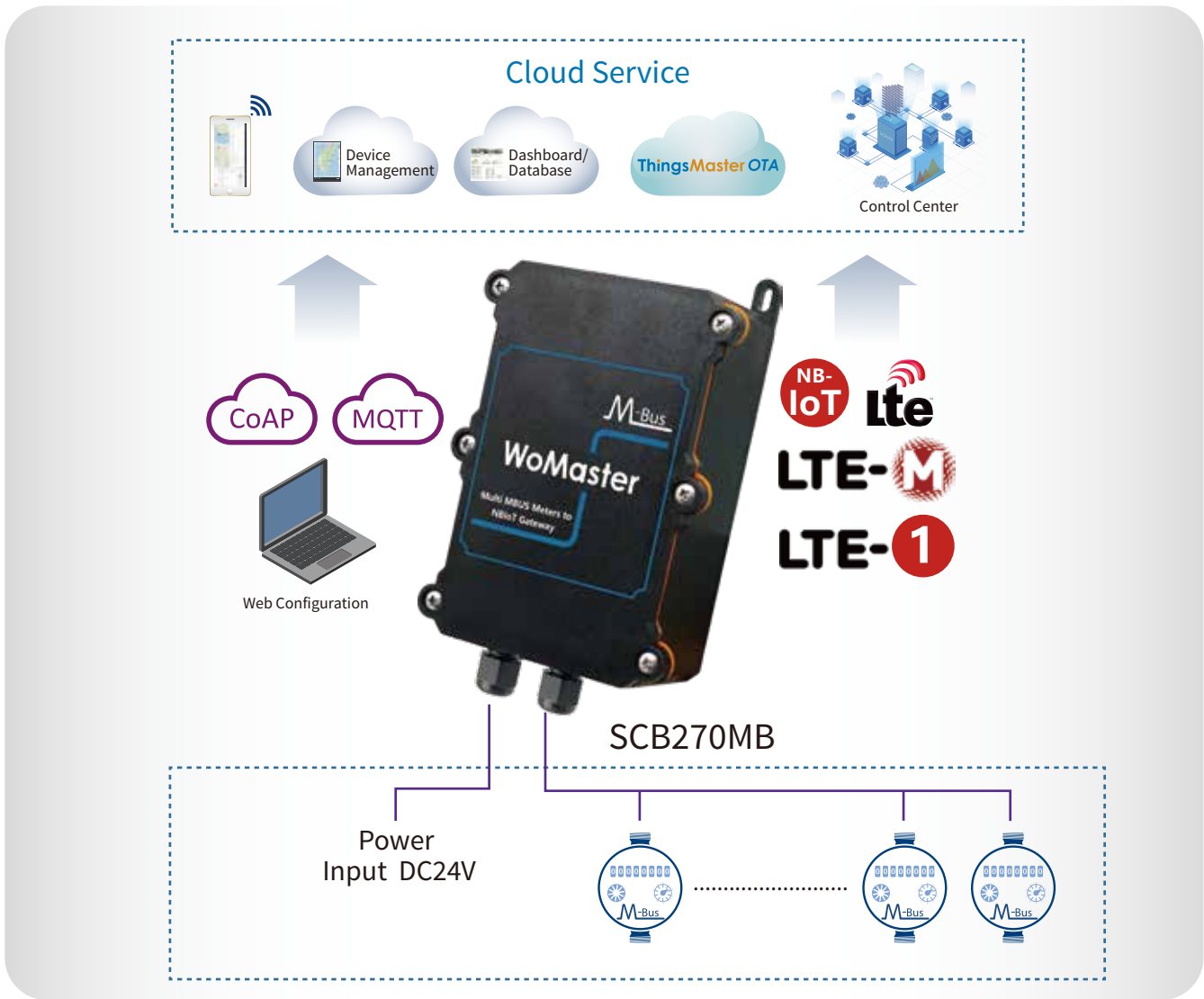
Interval: 10 (s)

Server Address: 1

Client Address: 16

Authentication: NONE

Submit Cancel



### ✓ Periodic MBUS Meter Reading to Head End System

Home > IoT > M-Bus

AWS IoT   Azure IoT   Private IoT   CoAP   Modbus Device ▾   RMS/OTA   DLMS   M-Bus

**Mbus Slave List**

Serial	Name	Primary Address	Man	Medium	Alive
1	ITRON ECHODIS+	0	ITW	Water	Yes

**Mbus Data List**

Select	Index	Name	Edit	Alive	Value
<input type="checkbox"/>	1		<a href="#">Edit</a>	Yes	15015350.000000
<input type="checkbox"/>	2	V	<a href="#">Edit</a>	Yes	922.419000 m³
<input type="checkbox"/>	3		<a href="#">Edit</a>	Yes	616268178.000000
<input type="checkbox"/>	4		<a href="#">Edit</a>	N/A	.
<input type="checkbox"/>	5		<a href="#">Edit</a>	Yes	
<input type="checkbox"/>	6	R_V	<a href="#">Edit</a>	Yes	0.000000 m³
<input type="checkbox"/>	7		<a href="#">Edit</a>	Yes	9151.000000
<input type="checkbox"/>	8		<a href="#">Edit</a>	Yes	922.419000 m³
<input type="checkbox"/>	9	F_R	<a href="#">Edit</a>	Yes	0.000000 m³3h
<input type="checkbox"/>	10	Temp	<a href="#">Edit</a>	Yes	0.000000 °C

**Basic Settings**

- Interface: M-Bus
- Baudrate: 2400
- Parity: NONE
- Databit: 8 bits
- Stopbit: One Stopbit
- Flow Control: NONE
- Service Mode: M-Bus

[Submit](#)   [Cancel](#)

# IP68 Compact Modbus RS485 / MBUS to CAT M1 / NBloT Gateway

## SCB111 Series

- One Internal Nano SIM slot LTE NBloT v2/ Cat.M1 B1/3/4/5/8/12/13/14/18/19/20/25/26/27 /28/66/71(Global Band) /72 (Europe Band) /85
- GSM850, EGSM900, DCS1800, PCS1900
- One Modbus 2-wire RS485A, RS485B and One Dry Relay Output
- Single MBUS Meter Periodic Reading
- Palm-size Wall Mounting
- Complete Serial RTU Parameters Configuration
- Configuration through micro-USB Interface
- ThingsMaster OTA™ for device remote management



✓ Ready Total Solution for IoT



Model	Device	Cellular	ETH (WEBUI)	USB Windows Utility	Power	OTA	MQTT
SCB111-485-NBM1-DC	Modbus	NBLoT + Cat.M1	No	YES	24V DC (9-30V)	YES	YES
SCB111-MB-NBM1-BT14	MBUS	NBLoT + Cat.M1	No	YES	Battery	YES	YES

✓ SCB111MB Single MBUS Meter Periodic Reading to Head End System







## 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 ~ 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	RF Cable
A-2.4/5GHZ-2-RSM-2Mx2		2400-2500/5150~5850	2dBi	IP67	2 x RG174 Cables, 2 Meters, RP SMA Male
A-LTE-2-SM-2M		700~960/1710~2690 /2900~3600	2dBi	IP67	2 x RG174 Cables, 2 Meters, SMA Male
A-GPS-25-SM-3M		GPS 1575	25dBi	outdoor	RG174 Cable, 3 Meters, SMA
A-LORA433-7-SM-3M		433	7dBi	outdoor	RG174 Cable, 3 Meters, SMA
A-LORA850-925-7-SM-3M		850~925	7dBi	outdoor	RG174 Cable, 3 Meters, SMA

## 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: 698~960/1710~2690/2900~3600 WLAN: 2400~2483.5/4900~5825 GNSS: 1561.1~1610 (GPS/GLONASS/GALILEO/BEIDOU)	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

# Private Cloud Platform for Device Management Over The Air

## ThingsMaster OTA™

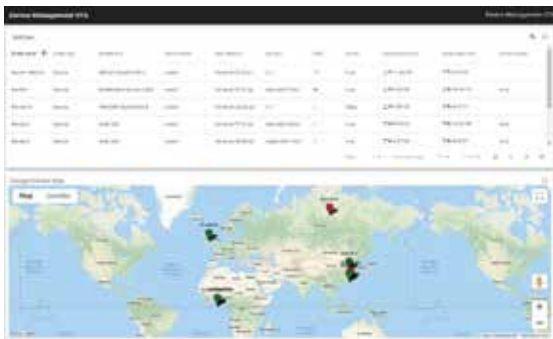
- Interactive monitoring dashboard with a map that displays device status, wireless signal strength, and the location of all deployed LTE/5G routers
- MAP shows devices online/offline/warning status in Green/Red/Orange color, respectively
- Supports over-the-air batch device configuration and firmware update and batch register
- Set alerts on critical events to prevent downtime (i.e. signal strength is too low or temperature is too high)
- Support the latest TLS encryption and X.509 authentication
- Multi-Tenant and Project oriented IoT deployment
- Supports MQTT and RESTful APIs



Private Cloud Server Requirement	
CPU	Intel Xeon level Processor or above
RAM	16GB DDR3 or above
Storage	1TB or above

- Model name/MAC address/FW version/RSSI/Last Connection Time/Last Activity Time
- MAP shows devices online/offline/Warning status in Green/Red/Orange color, respectively

### Google/Tencent/OpenStreet/Image Map



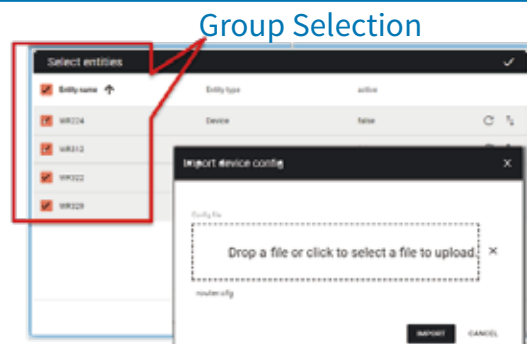
### Monitor Device Information



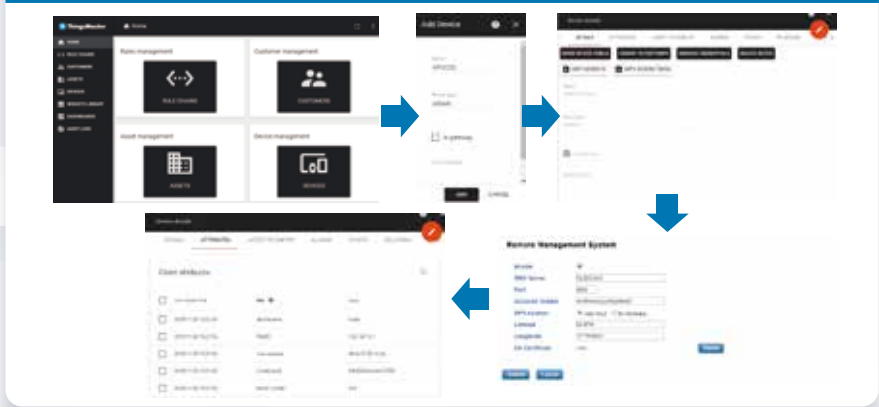
### Display device location, route and speed on the Map



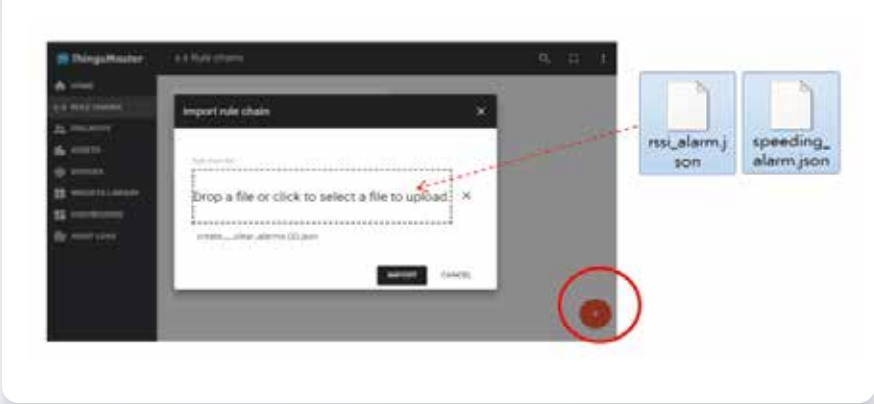
### Group Configuration and Firmware Upgrade



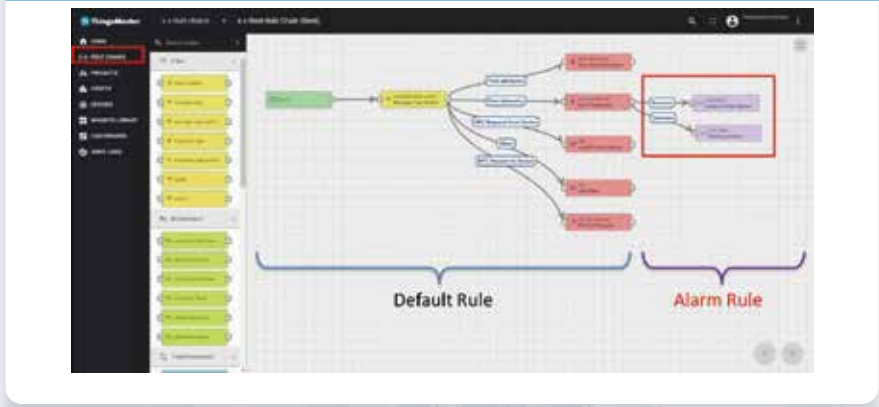
## Copy and Paste to add Devices



## Rule Import from Examples



## Rule Engine: Node-RED-like flow-based programming



Model	Description
ThingsMaster OTA-Annual-100	ThingsMaster OTA Online OTA annual fee for 100 nodes
ThingsMasterOTA-5GW	ThingsMaster OTA for 5 gateways, one year license
ThingsMasterOTA-10GW	ThingsMaster OTA for 10 gateways, one year license
ThingsMasterOTA-50GW	ThingsMaster OTA for 50 gateways, one year license
ThingsMasterOTA-100GW	ThingsMaster OTA for 100 gateways, one year license
ThingsMasterOTA-300GW	ThingsMaster OTA for 300 gateways, one year license
ThingsMasterOTA-500GW	ThingsMaster OTA for 500 gateways, one year license
ThingsMasterOTA-1000GW	ThingsMaster OTA for 1000 gateways, one year license

# Industrial Rackmount L2/L3 Secured Ethernet PoE Switches

## √ High Throughput Ethernet Switching & Extreme 802.3at PoE+ Capacity

- 28-port Full GbE, by 20-port GbE RJ45 and 4-port GbE RJ45/SFP Combo, and 4 100M/1G SFP fiber ports.
- Up to 24 GbE IEEE 802.3at/af compliant PoE+ ports, up to 30W per port, 400W PoE Budget
- Up to 8 100M/1GbE fiber ports add more fiber links to field switches
- DDM function for fiber connectivity monitoring
- Powerful 1.2GHz ARM Cortex-A9 processor
- Energy-Efficient Ethernet for power saving
- Non-blocking switch fabric design
- 8 flexible Class of Service(CoS) queues, 512 L2 Multicast Groups for video applications
- 16K MAC address table, 9KB Jumbo Frame
- PoE management including per-port Power Budget Control, PoE Scheduling, Priority, PD Alive Check and PoE Status

## √ IEC62443-4-2 Level 3 / 4 Cyber Security

- 802.1X/RADIUS port-based access control
- IP Security/Port Security
- HTTPs/SSH Management IP secure access
- Supports advanced cyber security features, 802.1x MAB, TACACS+, DHCP Snooping, IP Source Guard, Dynamic ARP Inspection, advanced Port Security & L2-L7 Access Control List



## √ Layer 3 Dynamic Routing with Redundancy Protection

- RIPv1&v2, OSPFv2 for intra-domain routing within an autonomous system
- Efficient unicast/multicast static routing
- VRRP guarantees sustainable routing in a single point of failure

## √ Management Features

- Various configuration paths, including WebGUI, CLI, SNMP and RMON
- IEEE 1588 v2 PTP time management
- LLDP topology control
- USB for easy field configuration and firmware update
- Software utility interface for LAN devices management
- NMS for individual component monitoring

## √ Rugged Design for Industrial Control Room and Wayside Network Switching

- EN50121-4 compliance for Railway Trackside, Roadside, Industrial Control Room applications
- Seamless forwarding while EMC attack (TBD)
- Excellent heat dissipation design for operating in -40~75°C environments
- High level EMC protection exceeding traffic control and heavy industrial standards' requirements
- IEC 61000-6-2/4 Heavy Industrial Environment

# Railway M12 L3 Secured PoE Ethernet Switch

## √ Rugged Design for Surveillance in Rail, Rolling Stock application

- EN50155/IEC61373 railway certification compliance
- EN45545-2 Fire protection on railway vehicle
- 8 Giga PoE M12 ports with 4 Giga M12 ports and 2 Giga M12 Bypass ports
- Outstanding mechanical design 100W Power Budget in 70°C
- Wide range operating temperature from -40 ~ 70°C
- Wide Power Input Options: 24VDC / 54VDC / 110VDC



Model	Eth Copper	ETH Fiber	PoE	L3 Managed	L2 Managed	Redundancy
RS752-AC	48 GE	4 x 10G SFP	-	YES	YES	VRRP v2, ERPS v2
RS628-AC	20 GE	4 100/1000 SFP + 4 100/1000 SFP RJ Combo	-	YES	YES	VRRP v2, ERPS v2
RS428-AC	20 GE		-	-	YES	ERPS v2
RP628-AC	20 GE PoE	4 100/1000 SFP+ 4 100/1000 SFP RJ PoE Combo	30W/port	YES	YES	VRRP v2, ERPS v2
RP428-AC	20 GE PoE		Max.200W	-	YES	ERPS v2
MP614	8 Giga PoE M12 6 Giga M12 (2 bypass)	-	30W/port Max.100W	YES	YES	VRRP v2, ERPS v2
MS208	8 Giga M12	-	-	-	-	-

# Industrial Din-Rail L2/L3 Secured Ethernet PoE Switches

## ✓ WoMaster ERPS v2 PLUS Ring Technology

- ITU-T G.8032 v1/v2 ERPS Ring Redundancy & HW-based CFM for quick acknowledgement while GbE copper link failure, providing 20ms recovery time and seamless restoration.
- ERPSv2 available to replace legacy Ring + Chain + Dual Homing
- Inter-Operability with 3rd party industrial switch and still remain fast recovery time.
- Support Enhanced RSTP for large ring network topology with up to 80 switches.

## ✓ Rugged Design for Wayside Network Switching with Wide Power Input Range

- 10~60V wide power range design with redundant power input
- Excellent heat dissipation design for operating in -40~75°C environments
- High level EMC protection exceeding traffic control and heavy industrial standards requirements
- IEC 61000-6-2/4 Heavy Industrial Environment
- EN50121-4 railway trackside EMC compliance

## ✓ IEC62443-4-2/-3/-4 Level Cyber Security

- 802.1X/RADIUS port-based access control
- IP Security/Port Security
- HTTPs/SSH Management IP secure access
- Supports advanced cyber security features, 802.1X MAB, TACACS+ , DHCP Snooping, IP Source Guard, Dynamic ARP Inspection, advanced Port Security & L2-L7 Access Control List

## ✓ Management Features

- Various configuration paths, including WebGUI, CLI, SNMP and RMON
- IEEE 1588v2 PTP time management
- LLDP topology control
- USB for easy field configuration and firmware update
- Software utility interface for LAN devices management
- NMS for individual component monitoring

## ✓ Extreme PoE Capability

- 8-port IEEE 802.3af/at compliant PoE, up to 30W/port
- Support 12V/24V to 54V booster PoE design
- Up to 240W@54V input, 120W@24V input, 60W@12V input power budget
- Complete PoE management including per-port Power Budget Control, PoE Scheduling and PoE Status

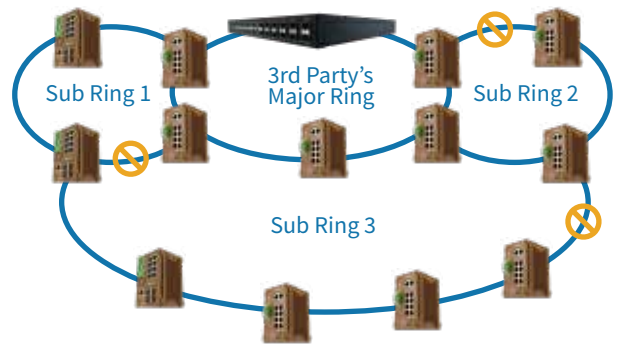
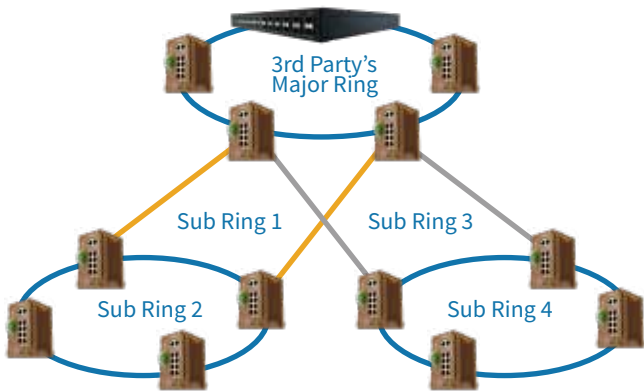


ViewMaster NetMaster

Model	Eth Copper	ETH Fiber	PoE	L3 Managed	L2 Managed	Redundancy	Power Input	IP
DS622	16 GE	6 100/1000 SFP	-	YES	YES	VRRP v2, ERPS v2 eRSTP	24VDC (10-60VDC)	IP31
DS422	16 GE	6 100/1000 SFP	-	-	YES	ERPS v2, eRSTP		IP31
DS612 v2	8 GE	4 100/1000 SFP	-	YES	YES	VRRP v2, ERPS v2 eRSTP		IP31
DS412 v2	8 GE	4 100/1000 SFP	-	-	YES	ERPS v2, eRSTP		IP31
DRS610	8 GE	2 100/1000 SFP	-	YES NAT/VPN/Firewall	YES	VRRP v2, ERPS v2 eRSTP, Dual WAN		IP31
DS610	8 GE	2 100/1000 SFP	-	YES	YES	VRRP v2, ERPS v2 eRSTP		IP31
DS410	8 GE	2 100/1000 SFP	-	-	YES	ERPS v2, eRSTP		IP31
DS410L	8 GE	2 100/1000 SFP	-	-	YES	eRSTP		IP31
DS410L-MM-SC-2	8 GE	2 GbE SC Multi-Mode 2KM	-	-	YES	eRSTP		IP31
DS410L-SS-SC-40	8 GE	2 GbE SC Single-Mode 40KM	-	-	YES	eRSTP	IP31	
DP612 v2*	8 GE PoE	4 100/1000 SFP	30W/port Max.240W	YES	YES	VRRP v2, ERPS v2 eRSTP	48VDC (46~57VDC)	IP31
DP412 v2*	8 GE PoE	4 100/1000 SFP	-	-	YES	ERPS v2, eRSTP		IP31
DP412-LV v2	8 GE PoE	4 100/1000 SFP	30W/port Max. 120W	-	YES	ERPS v2, eRSTP	24VDC	IP31
DP412-4GT-LV	8 GE PoE+ 4 GE	-	-	-	YES	ERPS v2, eRSTP	24VDC	IP31
DP410L-LV	8 GE PoE	2 100/1000 SFP	30W/port Max. 145W	-	YES	eRSTP	24VDC	IP31

## ✓ ITU-T G.8032 ERPS v2 gives ultimate Inter-Operability, Flexibility, and Scalability

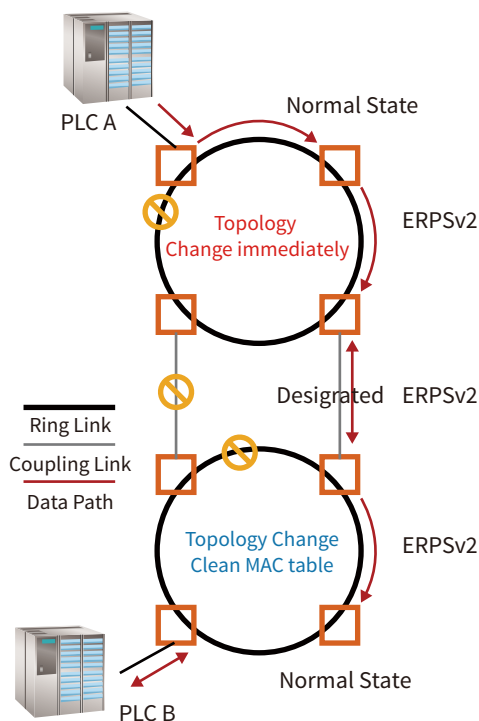
ITU-T G.8032 ERPS v2 is becoming the most common standard for redundancy on industrial networks and replacing proprietary ring redundancy and standard Ethernet Ring Switching, as it provides stable protection of the entire Ethernet Ring from any loops and open standard for 3rd party devices. The ITU-T G.8032 ERPS v2 recovers the network break within less than 20ms recovery time thus significantly increases network reliability for critical IIoT applications, such as heavy industrial automation (power substation and oil and gas vertical markets), ITS (traffic control, public transportation), railway networks, and other smart city applications concerning public safety.



G.8032 v1 only supports single ring topology, whilst G.8032 v2 additionally features recovery switching for Ethernet traffic in Multiple Ring (ladder) of conjoined Ethernet Rings by one or more interconnections which saves deployment costs by providing wide-area multi-point connectivity with reduced number of links. Deploying switches with support of G.8032 v2 ensures highly resilient Ethernet infrastructure whilst simultaneously saving costs, as they can interoperate with third-party switches and still guarantee fast network recovery time without any data loss.

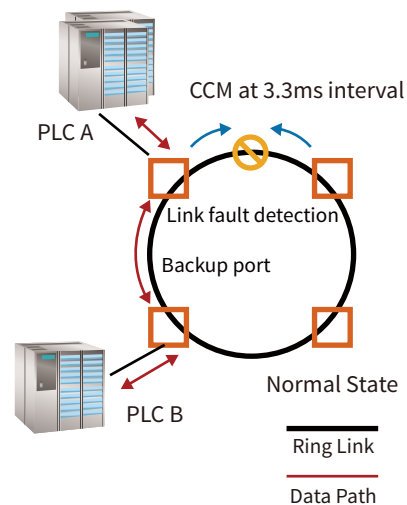
## ✓ ITU-T G.8032 ERPS v2 reduces coupling Ring failure recovery time

The G.8032 ERPS v2 technology effectively saves the recovery time for coupling ring link breakdown from 300 sec to less than 20ms by immediately change the topology of both major ring and sub ring.



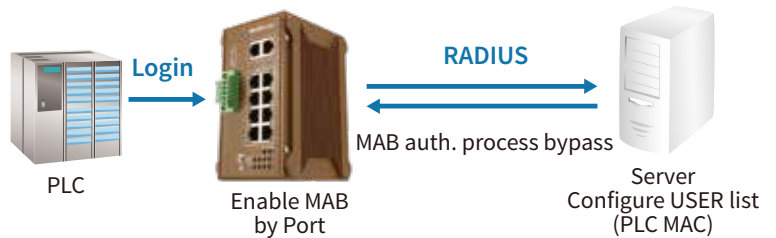
## ✓ WoMaster ERPS v2 PLUS Technology – Fast Giga Copper Recovery Time

The adaption of Broadcom® CFM Technology can reduce CFM Transmission for link failure within 3.3ms, thus to detect the ring link fault within 11.55ms (3.5 times the CFM Interval) for ERPS v2 mechanism to respond. Once the ring port fails, the ERPS RPL-Owner will forward the backup port and recover the GbE copper within 20ms under the condition that 250pcs nodes in one ring.

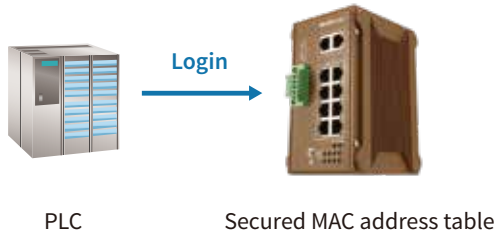


## √ Advanced Port Based Security- IEEE 802.1x MAB (MAC Authentication Bypass)

MAB enables port-based access control by bypassing the MAC address authentication process to RADIUS Server. Prior to MAB, the endpoint's (ex. PLC) identity is unknown and all traffic is blocked. The switch examines a single packet to learn and authenticate the source MAC address. After MAB succeeds, the endpoint's identity is known and all traffic from that endpoint is allowed. The switch performs source MAC address filtering to help ensure that only the MAB-authenticated endpoint is allowed to send traffic.



In addition to MAB, the authentication can also be done by the pre-configured static or auto-learn MAC address table in the switch.

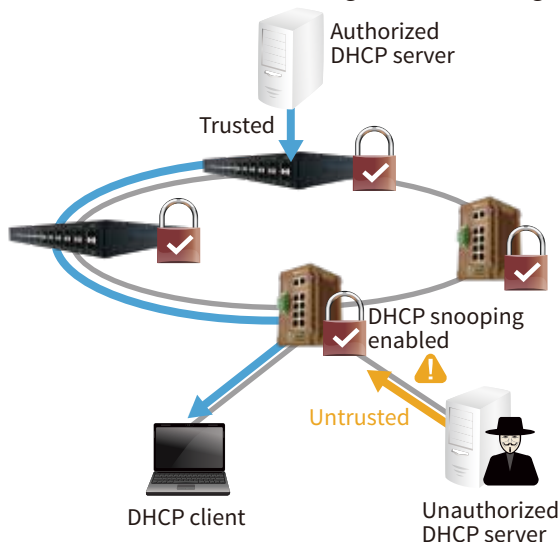


- MAC address Auto Learning enables the switch to be programmed to learn (and to authorize) a preconfigured number of the first source MAC addresses encountered on a secure port. This enables the capture of the appropriate secure addresses when first configuring MAC address-based authorization on a port. Those MAC addresses are automatically inserted into the Static MAC Address Table and remained there until explicitly removed by the user.
- The port security is further enhanced by Sticky MAC setting. If Sticky MAC address is activated, the MACs/Devices authorized on the port 'sticks' to the port and the switch will not allow them to move to a different port.
- Port Shutdown Time allows users to specify for the time period to auto shutdown the port if a security violation event occurs.

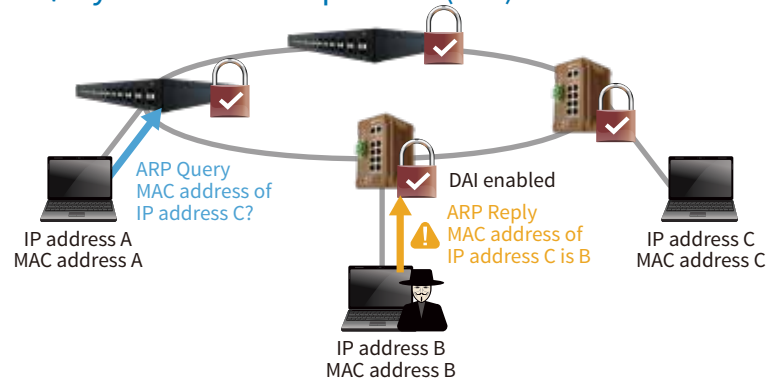
## √ DHCP Snooping

DHCP snooping acts like a firewall between untrusted hosts and trusted DHCP servers. It performs the following activities:

- Validates DHCP messages received from untrusted sources and filters out invalid messages.
  - Rate-limits DHCP traffic from trusted and untrusted sources.
  - Builds and maintains the DHCP snooping binding database, which contains information about untrusted hosts with leased IP addresses.
  - Utilizes the DHCP snooping binding database to validate subsequent requests from untrusted hosts.
- DHCP snooping is enabled on a per-VLAN basis. By default, the feature is inactive on all VLANs. You can enable the feature on a single VLAN or a range of VLANs.



## √ Dynamic ARP Inspection (DAI)



DAI validates the ARP packets in a network. DAI intercepts, logs, and discards ARP packets with invalid IP-to-MAC address bindings. This capability protects the network from some man-in-the-middle attacks.

DAI ensures that only valid ARP requests and responses are relayed. The switch performs these activities:

- Intercepts all ARP requests and responses on untrusted ports
- Verifies that each of these intercepted packets has a valid IP-to-MAC address binding before updating the local ARP cache or before forwarding the packet to the appropriate destination
- Drops invalid ARP packets.

DAI determines the validity of an ARP packet based on valid IP-to-MAC address bindings stored in a trusted database, the DHCP snooping binding database. This database is built by DHCP snooping if DHCP snooping is enabled on the VLANs and on the switch. If the ARP packet is received on a trusted interface, the switch forwards the packet without any checks. On untrusted interfaces, the switch forwards the packet only if it is valid.

## ✓ IP Source Guard

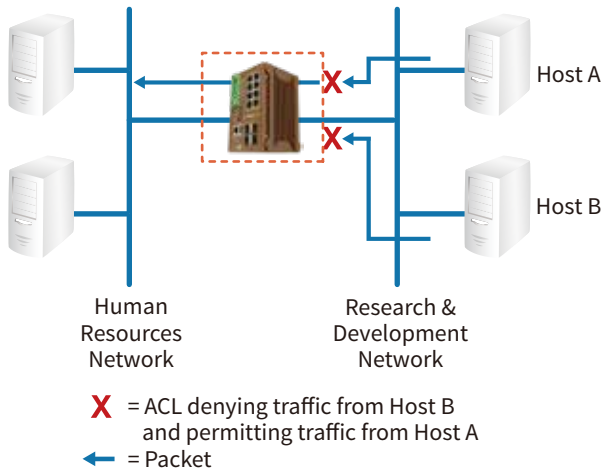
IP source guard provides source IP address filtering on a Layer 2 port to prevent a malicious host from impersonating a legitimate host by assuming the legitimate host's IP address. The feature uses dynamic DHCP snooping and static IP source binding to match IP addresses to hosts on untrusted Layer 2 access ports.

Initially, all IP traffic on the protected port is blocked except for DHCP packets. After a client receives an IP address from the DHCP server, or after static IP source binding is configured by the administrator, all traffic with that IP source address is permitted from that client. Traffic from other hosts is denied. This filtering limits a host's ability to attack the network by claiming a neighbor host's IP address.

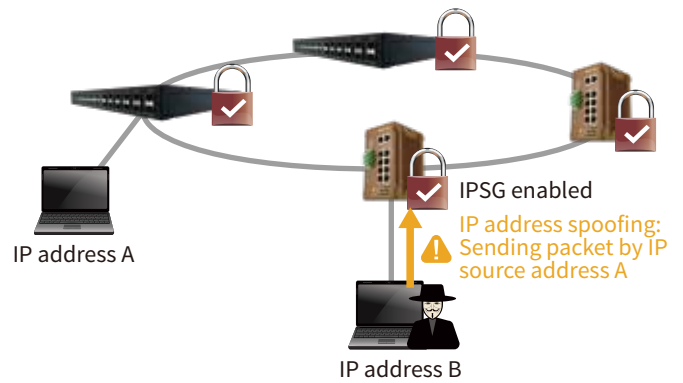
## ✓ IPv4/v6 Access Control List (ACL)

Packet filtering limits network traffic and restricts network use by certain users or devices. ACLs filter traffic as it passes through a switch and permits or denies packets crossing specified interfaces. An ACL is a sequential collection of permit and deny conditions that apply to packets. When a packet is received on an interface, the switch compares the fields in the packet against any applied ACLs to verify that the packet has the required permissions to be forwarded, based on the criteria specified in the access lists.

WoMaster supports L2-L7 ACLs, parsing up to 128 bytes/packet and L2-L7 packet classification and filtering IPv4/IPv6 traffic, including TCP, User Datagram Protocol (UDP), Internet Group Management Protocol (IGMP), and Internet Control Message Protocol (ICMP).



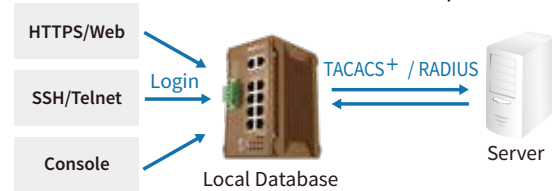
## ✓ Virtual Router Redundancy Protocol (VRRP)



## ✓ Multi-Level User Passwords

Different centralized authentication server is supported such as RADIUS and TACACS+. Using a central authentication server simplifies account administration, in particular 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.



## ✓ Broadcom® L3 Routing at wire speed Performance

The Layer 3 switch with Broadcom® ASIC (A Dedicated Chip) can perform routing at wire-speed, which is much faster and efficient than software routing by CPU loading. Compared with a that simply makes routing functions, the Layer 3 switch can handle larger networks with a lot of broadcasts, subnets and/or VLANs that require higher performance.

The layer 3 switch also handles complicated routing network topologies involving Inter VLAN routing, Dynamic routing, OSPF v2, RIP v1/2, Static routing with broadcast traffic control.

## ✓ Open Shortest Path First (OSPF)



# Entry Level Ethernet PoE Switches and Converters

## √ Full Gigabit Switching

- Full-Giga Ethernet with Auto Negotiation
- 4K MAC address table
- Support 9KBytes Jumbo Frame

## √ Rugged Mechanical Design

- Robust design protects from mechanical deformation
- IP40 ingress protection
- Wide operating temperature range -40 ~ 70°C
- CE marking
- IEC61000-6-2/IEC61000-6-4 heavy industrial EMC

## √ IEEE 802.3az EEE Power Management

- Ultra low power design, 2.6W when full loading
- Energy Efficient Ethernet for low power requirement
- Idle power saving mode for energy efficiency

## √ QoS Service for Time-Sensitive Applications

- Supports QoS for heavy traffic priority



Model	Eth Copper	ETH Fiber	PoE	Power Input	IP
DS101M-SC-2	1 FE	1 SC Multi-mode 2KM	-	24VDC (10~60VDC)	IP41
DS101S-SC-30	1 FE	1 SC Single-mode 30KM	-		
DS201	1 GE	1 FE/GE SFP	-	24VDC (10~60VDC) 24VAC (18-30VAC)	IP31
DS201-M-SC-05	1 GE	1 SC Multi-mode 550M	-		
DS201-S-SC-10	1 GE	1 SC Single-mode 10KM	-		
DS105	5 FE	-	-	5-30VDC (USB)	IP40
DS105A	5 FE	-	-	24VDC (10~60VDC) 24VAC (18-30VAC)	IP31
DS105A-M-SC-2	4 FE	1 SC Multi-mode 2KM	-		
DS105A-S-SC-30	4 FE	1 SC Single-mode 30KM	-		
DS205	5 GE	-	-	24VDC (10~60VDC)	IP31
DS108	8 FE	-	-		
DS108-MM-SC-2	6 FE	2 SC Multi-mode 2KM	-		
DS108-SS-SC-30	6 FE	2 SC Single-mode 30KM	-	24VDC (10~60VDC) 24VAC (18-30VAC)	IP40
DS208	8 GE	-	-		
DS210 v2	8 FE + 2 GE	2 Giga RJ45 / SFP Combo	-	24VDC (10~30VDC)	IP31
DP101-M-SC-2	1 PoE FE	1 SC Multi-mode 2KM	90W	48/54 VDC (46~57VDC)	IP40
DP101-S-SC-30	1 PoE FE	1 SC Single-mode 30KM	90W		
DP208	8 PoE FE	-	30W/port Max.120W	12VDC (12~40VDC)	IP30
DP208-LV	8 PoE FE	-			
DP210 v2	8 PoE FE + 2 GE	2 Giga RJ45 / SFP Combo	30W/port Max.120W	24VDC (10~30VDC)	IP31

AC/DC Power Supply	
MDR-40-24	INPUT:85-264VAC, 120-370VDC, OUTPUT: 24VDC/1.7A, -20 ~ +70 °C
MDR-60-48	INPUT:85-264VAC, 120-370VDC, OUTPUT: 48VDC/1.25A, -20 ~ +70 °C
EDR-120-24	INPUT:90-264VAC, 120-370VDC, OUTPUT: 24VDC/5A, -20 ~ +60 °C
SDR-480P-48	INPUT:90-264VAC, 120-370VDC, OUTPUT: 48VDC/10A, -25 ~ +70 °C
NDR 480-48	INPUT:90-264VAC, 120-370VDC, OUTPUT: 48VDC/10A, -20 ~ +70 °C

# NMS Manage Large and Resilient Wired/Wireless Networks for up to 2000 nodes

# NetMaster™

## √ Network Discovery and Visualization

- Automatic discovery and intuitive visualization of network devices, wireless devices, physical link and network topology
- Real-time status of device availability and traffic performance for physical links
- Server-client operation to ensure network system reliability especially in large scale networks
- High scalability for up to 2000 network nodes by license upgrade
- Free download and permanently valid for 20 nodes trial
- VLAN view for VLAN network in topology

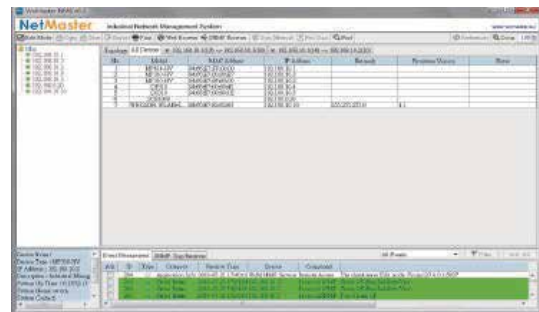
## √ Configuration & Fault Management

- Centrally manage configurations and firmware versions
- Group IP Address assignment
- Group ERPS ring configuration & assignment
- MIB compiler and MIB browser for private MIBs and MIBs of 3rd party device
- Fault Alert and event logs including source IP filter, network error, login record and warning
- SNMP Trap receiver for all or specific IP addresses
- Multi-language support including English, Chinese & Russian

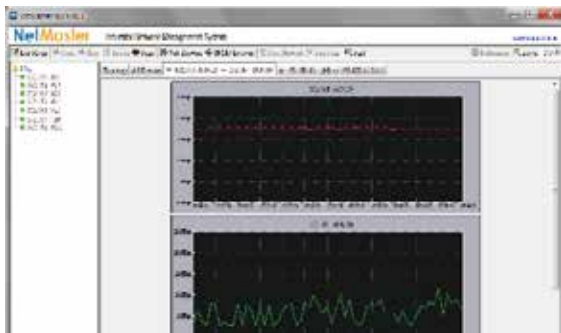
Automatic Discover and Intuitive Visualization of Network Devices and Topology



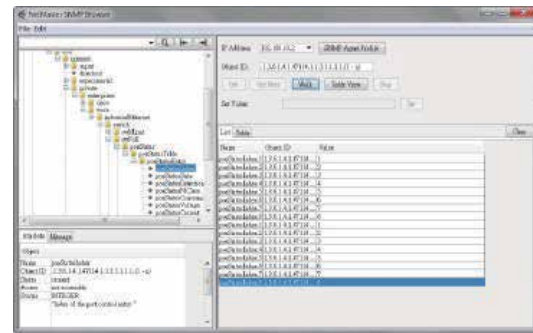
IP Device Lists, Device Information, Fault Alert and Event Logs



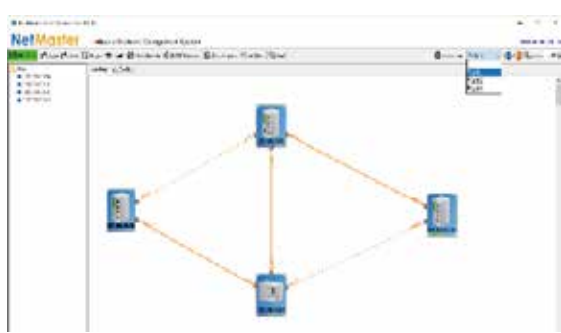
Physical Link Path Status and Monitoring



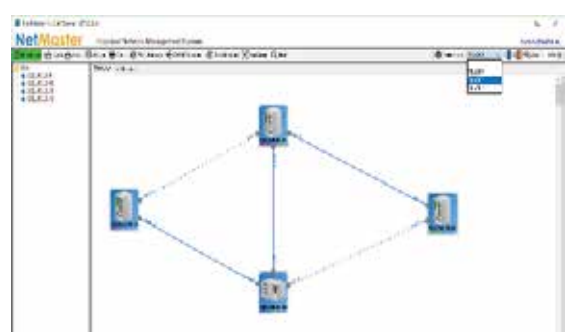
MIB Browser and Compiler for 3rd Party Device Management



Devices, ports, and links with the VLAN ID will be colored-coded



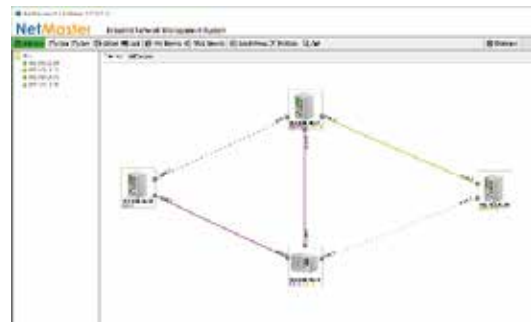
Device in Blue, trunk port/access port in Blue/Orange, link in Blue/Orange/Grey for trunk/access/mixed link



ERPS Group Settings for Ring ID, Ring Version, Control Channel, and Ring Ports



ERPS Visualization. Display ERPS Major ring and Sub ring in Purple/Yellow color



Model Name	Description
NetMaster-20	Industrial Network Management System software with a free license for 20 nodes
NetMaster-50	Industrial Network Management System software with a license for 50 nodes
NetMaster-100	Industrial Network Management System software with a license for 100 nodes
NetMaster-250	Industrial Network Management System software with a license for 250 nodes license
NetMaster-500	Industrial Network Management System software with a license for 500 nodes license
NetMaster-1000	Industrial Network Management System software with a license for 1000 nodes license
NetMaster-2000	Industrial Network Management System software with a license for 2000 nodes license

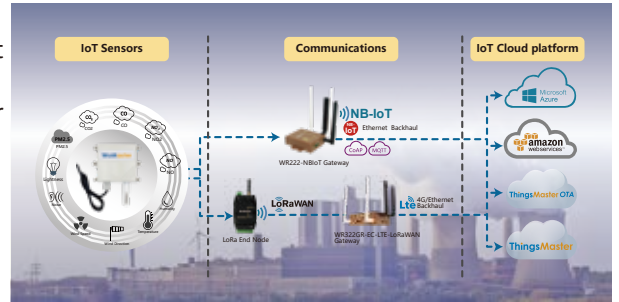
## Accessory: SFP Fiber Transceivers for Switches

Model	XG(10G)/GE(Giga), S/M(Single/Multi), KM, T(Wide temperature), D(DDM)
SFPFEM2	SFP, 100Mbps, LC, multi-mode, 2KM, 0~70°C
SFPFEM2T	SFP, 100Mbps, LC, multi-mode, 2KM, -40~85°C
SFPFES30	SFP, 100Mbps, LC, single-mode, 30KM, 0~70°C
SFPFES30T	SFP, 100Mbps, LC, single-mode, 30KM, -40~85°C
SFPGEM05	SFP, 1000Mbps, LC, multi-mode, 550M, 0~70°C
SFPGEM05T	SFP, 1000Mbps, LC, multi-mode, 550M, -40~85°C
SFPGEM05D	SFP, 1000Mbps, LC, multi-mode, DDM, 550M, 0~70°C
SFPGEM05DT	SFP, 1000Mbps, LC, multi-mode, DDM, 550M, -40~85°C
SFPGEM2	SFP, 1000Mbps, LC, multi-mode, 2KM, 0~70°C
SFPGEM2T	SFP, 1000Mbps, LC, multi-mode, 2KM, -40~85°C
SFPGEM2D	SFP, 1000Mbps, LC, multi-mode, DDM, 2KM, 0~70°C
SFPGEM2DT	SFP, 1000Mbps, LC, multi-mode, DDM, 2KM, -40~85°C
SFPGES10	SFP, 1000Mbps, LC, single-mode, 10KM, 0~70°C
SFPGES10T	SFP, 1000Mbps, LC, single-mode, 10KM, -40~85°C
SFPGES10D	SFP, 1000Mbps, LC, single-mode, DDM, 10KM, 0~70°C
SFPGES10DT	SFP, 1000Mbps, LC, single-mode, DDM, 10KM, -40~85°C
SFPGES30	SFP, 1000Mbps, LC, single-mode, 30KM, 0~70°C
SFPGES30T	SFP, 1000Mbps, LC, single-mode, 30KM, -40~85°C
SFPGES30D	SFP, 1000Mbps, LC, single-mode, DDM, 30KM, 0~70°C
SFPGES30DT	SFP, 1000Mbps, LC, single-mode, DDM, 30KM, -40~85°C
SFPGES40	SFP, 1000Mbps, LC, single-mode, 40KM, 0~70°C
SFPGES40T	SFP, 1000Mbps, LC, single-mode, 40KM, -40~85°C
SFPGES40D	SFP, 1000Mbps, LC, single-mode, DDM, 40KM, 0~70°C
SFPGES40DT	SFP, 1000Mbps, LC, single-mode, DDM, 40KM, -40~85°C
SFPGEX120	SFP, 1000Mbps, LC, single-mode, 120KM, 0~70°C

Model	XG(10G)/GE(Giga), S/M(Single/Multi), KM, T(Wide temperature), D(DDM)
SFPGETX	SFP, 1000Base-T, Copper, RJ45, 100m, 0~70°C
SFPGETXT	SFP, 1000Base-T, Copper, RJ45, 100m, -40~85°C
SFPGSM10-Az	SFP, 1000Mbps, LC, single-mode, 10KM, BiDi TX-1310nm, RX-1550nm, 0~70°C
SFPGSM10T-A	SFP, 1000Mbps, LC, single-mode, 10KM, BiDi TX-1310nm, RX-1550nm, -40~85°C
SFPGSM10-B	SFP, 1000Mbps, LC, single-mode, 10KM, BiDi TX-1550nm, RX-1310nm, 0~70°C
SFPGSM10T-B	SFP, 1000Mbps, LC, single-mode, 10KM, BiDi TX-1550nm, RX-1310nm, -40~85°C
SFPGSM10D-A	SFP, 1000Mbps, LC, single-mode, DDM, 10KM, BiDi TX-1310nm RX-1550nm, 0~70°C
SFPGSM10DT-A	SFP, 1000Mbps, LC, single-mode, DDM, 10KM, BiDi TX-1310nm RX-1550nm, -40~85°C
SFPGSM10D-B	SFP, 1000Mbps, LC, single-mode, DDM, 10KM, BiDi TX-1550nm RX-1310nm, 0~70°C
SFPGSM10DT-B	SFP, 1000Mbps, LC, single-mode, DDM, 10KM, BiDi TX-1550nm RX-1310nm, -40~85°C
SFPXGM03D	SFP+, 10Gbps, LC, multi-mode, DDM, 300M, 0~70°C
SFPXGM03DT	SFP+, 10Gbps, LC, multi-mode-mode, DDM, 300M, -40~85°C
SFPXGS10D	SFP+, 10Gbps, LC, single-mode, DDM, 10KM, 0~70°C
SFPXGS10DT	SFP+, 10Gbps, LC, single-mode, DDM, 10KM, -40~85°C

## Outdoor Environment IoT Sensor

- Outdoor Protective Design against direct ultraviolet radiation
- Single or multiple parameters in small shutter, small size, light weight and easy to install
- 2-Wire RS485 Modbus output to connect to optional cellular gateway WR222 or LC144/LR140 LoRa/LoRaWAN nodes
- 24VDC (10~30) Power Input and Real-time measurement
- 4~20mA or 0~10V Output by Special Order



Model			Measurement	Accuracy	Dimension
ES102-TH	Outdoor Temperature and Humidity Sensor		Temperature: -40~+80°C Humidity: 0~100%RH	Temperature accuracy: 0.5°C(25°C) Humidity: 3%RH (5~95%RH, 25°C)	110x85x44(mm)
ES101-AT	Outdoor Air Atmospheric Pressure Sensor		Air Pressure:0-120kpa	Air Pressure ±0.15kpa (25°C/75Kpa)	110x85x44(mm)
ES101-NL	Outdoor Noise Level Sensor		30~120dB (20Hz~12.5KHz)	0.5dB	110x85x44(mm)
ES101-UW	Outdoor Ultrasonic Wind Speed Direction Sensor		0~70Meters/Second Compass , 360 degree	0.1Meter/Second 1 degree	Base Φ141mm Height 115mm
ES101-WS	Outdoor Anemometer Wind Speed Sensor		0~70Meters/Second	±0.3Meter/Second	Base Φ80mm Height 160mm
ES101-WD	Outdoor Wind Direction Sensor		Compass , 360 degree	1 degree	Base Φ80mm Height 190mm
ES101-RG	Outdoor Rain Measurement Sensor		0~4mm/Min (Max.8mm/Min)	0.5mm/Min	Φ200mm
ES101-UV	Outdoor UV Measurement Sensor		0~15 mW/ cm2	UV Strength: ±10% FS 0.01 mW/ cm2	110x85x44(mm)
ES101-SR	Solar Radiation Sensor		1800 w/m2 0.3 ~3 um	1 w/m2	Base Φ80mm Height 90mm
ES101-FL (5M/10M /20M/30M)	Outdoor Flood Water Detection Sensor		Water Detection Length 5M, 10M, 20M, 30M	Water Leakage	110x85x44(mm)

## Outdoor Air Quality Sensor

- Outdoor Protective Design against direct ultraviolet radiation
- Well ventilated for measuring changes in external detection parameters
- Single or multiple parameters in a small shutter, small size, light weight and easy to install
- 2-Wire RS485 Modbus output to connect to optional cellular gateway WR222GR& LC144/LR140 LoRa/LoRaWAN nodes
- 24VDC (10~30) Power Input and Real-time measurement
- 4~20mA or 0~10V Output by Special Order



Model		Measurement	Accuracy	Dimension
ES101-CO-2000	Outdoor CO Carbon Monoxide Sensor	0~2000ppm	±3%, 1ppm	110x85x44(mm)
ES101-O3-10	Outdoor Ozon O <sub>3</sub> Sensor	0-10ppm	±6%, 0.01ppm	110x85x44(mm)
ES101-CO2-5000	Outdoor CO <sub>2</sub> Carbon Dioxide Sensor	0-5000ppm	±40ppm +3%FS	110x85x44(mm)
ES101-O2	Outdoor Oxygen O <sub>2</sub> Sensor	0~25%Vol	±3%FS, 0.1%VOL	110x85x44(mm)
ES101-PM	Outdoor Air Monitor Quality Sensor (PM <sub>2.5</sub> , PM <sub>10</sub> )	0~1000ug/m <sup>3</sup>	1ug/m <sup>3</sup> , 10%	110x85x44(mm)
ES101-TVOC	Outdoor TVOC (Total Volatile Organic Compounds) Sensor	0~60000ppb	1ppb±8%FS±125ppb	110x85x44(mm)
ES101-NO2-2000	Outdoor Nitrogen Dioxide NO <sub>2</sub> Sensor	0-2000ppm	0.1ppm	110x85x44(mm)
ES101-SO2-2000	Outdoor Sulphur Dioxide SO <sub>2</sub> Sensor	0-2000ppm	1ppm +3%FS	110x85x44(mm)
ES101-NH3-500	Outdoor Ammonia NH <sub>3</sub> Sensor	0-500ppm	1ppm±20%	110x85x44(mm)
ES101-H2S-100	Outdoor Hydrogen Sulfide H <sub>2</sub> S Sensor	0-100ppm	1ppm +3%FS	110x85x44(mm)
ES101-H2-1000	Outdoor Hydrogen H <sub>2</sub> Sensor	0-1000ppm	1ppm +3%FS	110x85x44(mm)
ES101-CH4	Outdoor Methane CH <sub>4</sub> Sensor	0-100% Lower Explosive Limit (LEL)	1% LEL +5%FS	110x85x44(mm)

## Outdoor Multiple Air Sensor

- Outdoor IP65 grade Anti-U/V lightweight ABS louver radiation shield 140x114mm
- Up to 5 Air quality modules in a small shutter, max 3 type A sensors and 2 type B sensors
- 2-Wire RS485 Modbus output to connect to optional cellular gateway WR222GR& LC144/LR140 LoRa/LoRaWAN nodes
- 24VDC (10~30) Power Input and Real-time measurement



ES105M-A1-A2-A3-B1-B2	Outdoor Multi Air Sensor RS485 Modbus, 10-30V Power, Max 3 x A type and 2 x B Type
A: TVOC	TVOC Sensor Module 0~60000 ppb (0~60 ppm), Resolution 1ppb ±125 ppb
A: CH <sub>2</sub> O	CH <sub>2</sub> O Sensor Module 0~5 ppm Resolution 0.01ppm ±5%
A: O <sub>3</sub>	O <sub>3</sub> Sensor Module 0~10 ppm Resolution 0.01ppm ±6%
B: O <sub>2</sub>	O <sub>2</sub> Sensor Module 0~25%Vol Resolution 0.1%Vol ±2%
B: H <sub>2</sub> S	H <sub>2</sub> S Sensor Module 0~100 ppm Resolution 1ppm ±10%
B: CH <sub>4</sub>	CH <sub>4</sub> Sensor Module 0~100% LEL Resolution 1% LEL ±5%
B: CO	CO Sensor Module 0~1000 ppm Resolution 1ppm ±10%
B: NO <sub>2</sub>	NO <sub>2</sub> Sensor Module 0~20 ppm Resolution 0.1ppm ±5%
B: SO <sub>2</sub>	SO <sub>2</sub> Sensor Module 0~20 ppm Resolution 0.1ppm ±5%
B: H <sub>2</sub>	H <sub>2</sub> Sensor Module 0~1000 ppm Resolution 1ppm ±5%
B: NH <sub>3</sub>	NH <sub>3</sub> Sensor Module 0~100 ppm Resolution 1ppm ±8%

## Water Quality Sensor

- Reliable IP68 Water Quality Sensor for drinking water, sewage treatment, wastewater treatment, aquaculture and environmental monitoring
- Built-in Water Temperature sensor for 0~60°C
- 24VDC (10~30) Power Input and Real-time measurement
- Dual Output by 2-Wire RS485 Modbus output and 4~20mA
- 2-Wire RS485 Modbus output to connect to optional cellular gateway WR222GR&LC144/LR140 LoRa/LoRaWAN nodes
- 5 Meter cable, 0.5kg



Model		Measurement	Resolution/Accuracy	Pressure Range	Shell Material
WS102-PH	Water PH Sensor	0~14pH	0.01pH ±0.02pH	0~300KPa	PPS
WS102-DOS	Water Dissolved Oxygen Sensor	0~20mg/L	0.01mg/L ±0.2%FS	0~300KPa	PC+316L
WS102-ORP	Water Oxidation Reduction Potential Sensor	-2000~2000mV	0.01mV ±0.01mV	0~300KPa	PPS
WS102-CL	Water Residual Chloride Ion (CL-) Sensor	0~20mg/L	0.01mg/L ±0.2%FS	0~100KPa	PC+316
WS102-EC	Water Electric Conductivity Sensor	1~2000µS/cm	1 µS ±1 µS	0~400KPa (0 – 4 Bar)	ABS, PPS
WS102-BRM	Water Bromine Level Sensor	0.4~50000ppm	0.001ppm ±1%	0~300KPa	PC+316
WS102-TDS	Water Total Dissolved Solid Sensor	0~5000mg/L	0.01mg/L ±0.01mg/L	0~400KPa	PC, PBT

## Soil Quality Sensor



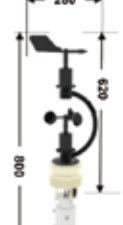

- Size: 45\*15\*123mm, Probe length: 70 mm
- RS485 2-Wire Modbus Output, 5-30VDC Power Input
- Probe material: Anti-corrosion special electrode
- Sealing material: IP68 Epoxy resin (black flame retardant)
- Cable length: standard 2 meters (Can be customized)
- 2-Wire RS485 Modbus output to connect to optional cellular gateway WR222GR&LC144/LR140 LoRa/LoRaWAN nodes



Model		Measurement	Resolution/Accuracy
ES101-SM	Soil Moisture Temperature Sensor	0~100% RH -40 ~80°C	Moisture accuracy: 0-50% ±2%RH, 50-100% ±3%RH, Temperature accuracy: ±0.5°C
ES101-SPH	Soil pH sensor	0~14ph	±0.5pH
ES101-SEC	Soil EC and Moisture Sensor	EC:0-20000us/cm Moisture: 0~100%RH Temperature: -40~80°C	EC: 10us/cm, 0-10000us/cm: ±3%; 10000-20000us/cm: ±5% Moisture: 0.02%, 0-50% 1%; 50-100% 3% Temperature: 0.1°C , ±0.5°C

## Integrated Outdoor Weather Station Sensor

- Outdoor Protective Design against direct ultraviolet radiation
- Well ventilated for measuring changes in external detection parameters
- Multiple parameters in a small shutter, small size, light weight and easy to install
- 2-Wire RS485 Modbus output to connect to optional cellular gateway WR222GR& LC144/LR140 LoRa/LoRaWAN nodes
- 24VDC (10~30) Power Input and Real-time measurement

	ES104	ES105-5-PM ES105-5-CO2	ES107-PM ES107-CO2	ES108-PM ES108-CO2
				
Power Input	10~30VDC			
Output	RS485 Modbus RTU 2-Wire			
Enclosure	IP65 Shelter Box, ABS UL94V0 Anti-UV			
Temperature	-40~120 °C ±0.5 °C	-40~120 °C ±0.5°C	-40~120 °C ±0.5°C	-40 ~80 °C±0.5 °C
Humidity	0~100% RH ±3% RH	0~100% RH ±3% RH	0~100% RH ±3% RH	0%RH~99%RH±3%RH
PM2.5 PM10	Laser Detection 0-1000ug/m <sup>3</sup> 1ug/m <sup>3</sup> ±10%	ES105-5-PM2 Laser Detection 0-1000ug/m <sup>3</sup> 0.1ug/m <sup>3</sup> ±10%	ES107-PM2 Laser Detection 0-1000ug/m <sup>3</sup> 1ug/m <sup>3</sup> ±10%	ES108-PM2 0-1000ug/m <sup>3</sup> ±10ug/m <sup>3</sup>
CO2	-	ES105-5-CO2 0~5000ppm ±40ppm +3%FS	ES107-CO2 0~5000ppm ±40ppm +3%FS	ES108-CO2
Atmospheric Pressure	-	0~120Kpa ±1.5Kpa	0~120Kpa ±1.5Kpa	0-5000ppm±50ppm 0-120Kpa±0.15Kpa
Illumination	-	0~200000 Lux ±7%	-	0~200000 Lux ±7%
Noise	-	20Hz~12.5Hz 30dB~120dB ±0.5dB	20Hz~12.5Hz 30dB~120dB ±3dB	30dB~130dB±0.5dB
Wind Speed	-	-	-0~60m/s ±0.1m/s	0~60m/s ±(0.2m/s±0.02*v)
Wind Direction	-	-	8 Directions	0~359°±3°

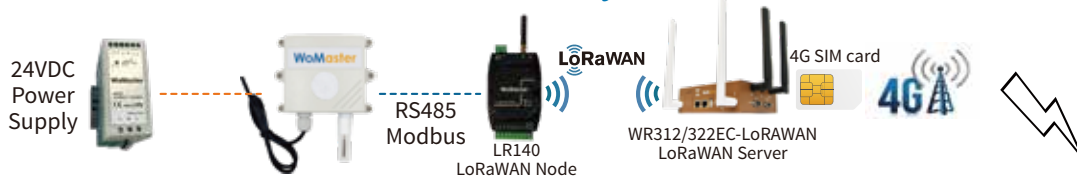
1) Sensor Connect to PC/HMI/PLC



2) Sensor Connect to Private LoRa to PC/HMI/PLC



3) Sensor Connect to LoRaWAN Gateway



4) Sensor Connect to LTE NB-IoT Gateway SCB111-485-NB



5) Sensor Connect to WiFi + LTE Gateway WR222-WLAN+LTE



Item	
MDR-40-24	Din-Rail Power Supply INPUT:85-264VAC, 120-370VDC, OUTPUT: 24VDC/1.7A, -20 ~ +70 °C
ThingsMaster OTA-5GW	ThingsMaster OTA for 5 gateways, One Year License
LM100	LoRa Master / Modbus RTU Client (Must work with LC144) (with LoRa antennas)
LC144	LoRa End-Node, 8CH AIO, 1 Modbus RTU 485 2-wire, 2 x 0~10V input, 2 x 4~20mA input, 1 x 0~10V Output, Open Collect (O.C.), 1 x 4~20mA Output, 1 x PWM Output (0~5V), 1 x PWM (0~10V), Open Collect (O.C.) Type, 1 x SMA /LoRa Antenna (Must work with LM100 or LM200)
LR140	LoRa WAN End-Node, 4CH AI, 1 Modbus RTU 485 Host, 1 x RS485 Host, 2-wire, 1 x SMA /LoRa Antenna Connector (with LoRa antennas)
WR322GR-EC-LTE-LORAWAN	Industrial LoRaWAN Gateway, 2GbE+2COM, LTE 2SIM, (with LTE and LoRa antennas)(Must work with LR140)
WR312GR-EC-LORAWAN	Industrial LoRaWAN Gateway, 2GbE+2COM (Must work with LR140)
WR222-WLAN+LTE	Industrial Wireless IIoT Field Router, 2FE+1COM, SD, 802.11b/g/n WLAN, 1SIM (with WiFi, LTE Antennas)
SCB111-485-NB-DC	Outdoor Modbus RS485 to NB-IoT / LTE Cat M1 Gateway

## Smart City NBloT / LoRaWAN Sensor

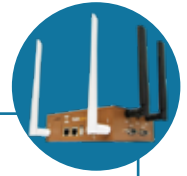
- Outdoor IP67/68 Protection LPWAN Sensors
- Power Saving for Battery Power up to 8 years
- High Sensitivity Detection for Waste Bin Level, Parking Space, and Manhole Security
- NBloT Model with TCP protocol uplink to Cloud Server or ThingsMaster OTA™
- LoRaWAN Model uplink to WR322GR-EC-LoRaWAN server

	Fill-Level Ultrasonic Sensor	Parking Space Ultrasonic plus Geomagnetic Sensor	Manhole Security and Water Level Detection Sensor	Streetlight LED NBloT Controller
	IS101-FL-NB-BT8-4M IS101-FL-LR-BT8-4M	PS102-USGM-NB-BT8-SB PS102-USGM-LR-BT8-SB	MS102-MHWL-NB-BT8 MS102-MHWL-LR-BT8	SL102-10V
				
Detection Technology	Ultrasonic	Ultrasonic + Geomagnetic	Leveling Detection and Ultrasonic Detection	LED Dimming Control Energy Management
Object	Solid or Liquid Level	Parking Space Occupancy	Manhole	Streetlight LED
Range	4 meter	10~60cm	8 Meters Vertical	-
Enclosure	IP68 ABS	IP67 ABS	IP67 ABS	IP66
Installation	Mount on Container Cover	Surface mount	Bottom side of Manhole	ANSI C136.41, ANSI C136.10 Dimming Receptacle
Dimension	(D)115 x (H)40 mm	(D)115 x (H)50 mm	Ø115mm Round, 80mm depth	Ø 96 x 90 (H)
LoRaWAN	IS101-FL-LR-BT8-4M Class A EU868,AS923,AU915, US915,KR920, RU868	PS102-USGM-LR-BT8-SB LoRaWAN Class A EU868,AS923,US915, USS915,CN470	MS102-MHWL-LR-BT8 LoRaWAN Class A EU868,AS923,US915, USS915,CN470	-
NBloT	IS101-FL-NB-BT8-4M TCP ThingsMaster OTA NBloT (B1/3/5/8/20/28), 1 Micro SIM	PS102-USGM-NB-BT8-SB TCP ThingsMaster OTA NBloT (B1/3/5/8/20/28), 1 Micro SIM	MS102-MHWL-NB-BT8 TCP ThingsMaster OTA NBloT (B1/3/5/8/20/28), 1 Micro SIM	MQTT ThingsMaster OTA Cat-M1: B1,B3,B4,B5,B8,B12,B13, B18,B19,B20,B25,B26,B27,B66,B85 CatNB1/2:B1,B3,B4,B5,B8,B12,B13, B18,B19,B20,B25,B26,B28,B66,B71
Weight	150g	150g	150g	240g
Operating Temperature	-20 ~70°C	-20 ~70°C	-20 ~70°C	-40 ~70°C
Power Supply	ER26500 lithium battery 8500mAh 3.6v	ER26500 lithium battery 8500mAh 3.6v	ER26500 lithium battery 8500mAh 3.6v	Standard 7-Pin NEMA Socket Power Input Rating: AC110V/ 220V (AC 86V~277V)
Battery Life	8 years(4 transmission times/day)	3 years(6 transmission times/day)	8 years(4 transmission times/day)	-
Application	Waste Bin, Postbox,	Parking Lot	Manhole	Streetlight Management



- European and South America Electricity Company
- Real time power monitor via serial, Ethernet, LTE
- Compatible with current monitor equipment and protocol

### Power Distribution



- -40~75 °C wide temperature
- Enhanced Cybersecurity
- Dual SIM and LTE to WAN Redundancy
- High Compatibility over 2G/3G/4G

### WR312G-LTE Serial over LTE Router



- Middle East Oil Gas Company
- Long Distance Communication to multiple Oil Wells
- Wide Operation Temperature

### Oil Well Data Logger



- Private LoRa Network Distance >3 KM
- Multiple Analog Interfaces Management
- Modbus Protocol and Utility
- -40~75 °C wide temperature

### LM100/LC144 LoRa Gateway Node



- National Water and Electricity Company
- Single and Multiple meter NBloT Gateway
- Wide Support for Cellular Networks
- Central Management over OTA

### Smart Meter Gateway



- COSEM, MBUS, Modbus Meters
- NBloT, Cat M1, Cat 1, Cat 4 LTE Cellular
- MQTT CoAP Cloud Protocols
- ThingsMaster OTA to manage devices over the air

### SCB270 Multiple Meter Gateway



- Taiwan National Wastewater Plant
- Wide Wireless Coverage in Underground Level
- Wide Temperature and High Humidity

### Wastewater Tunnel Network



- MESH Group up to 8 MESH AP to save wiring cost
- Easy Installation and Auto Configuration
- Wide Temperature -40~70°C under 95% Humidity

### WA512GM Industrial MESH AP



- City Government
- NBloT Controller over Street Light
- Cybersecurity

### Smart Street Light



- NBloT Light Controller
- Cybersecurity
- OTA Device Management
- Compact Size

### NBloT Light Controller



- European Shopping Mall
- Real-Time Monitoring of Air Quality and Environment
- VPN Network for multiple sites

### Environment Monitoring



- Multiple VPN channels
- Enhanced Cybersecurity
- LTE over WAN Redundancy
- ThingsMaster OTA™ management

### WR222 LTE Gateway + ES105 Sensors



- Taiwan Starbucks Chain Sores
- WAN + LTE Redundant Network
- Cybersecurity
- OTA Management

### Chain Store Management



- Enhanced Cybersecurity
- LTE over WAN Redundancy
- ThingsMaster OTA™ for Configuration and Firmware Upgrade

### WR224 LTE + WLAN Gateway



- International Cloud Platform
- Temperature and Door Sensor
- NBloT Gateway and GPS Tracker
- Battery and Power Saving Mode

### Refrigerator Management



- MQTT Protocol and OTA Device Management
- Temperature and Door Sensor
- NBloT Gateway and GPS tracker
- Battery Power

### NBloT Refrigerator Controller



- China International Airport
- Baggage Transport, Passenger Information, Video Surveillance, Runway Surveillance System

### International Airport Management



- Layer 2 ERPS Redundancy
- Layer 3 Routing Redundancy
- Enhanced Cybersecurity
- High Power PoE Surveillance

### RS628, RP428 Rackmount L3 L2 PoE Switch



- European Railway Company
- Railway Certificated M12 Switches
- Layer 3 Management
- High Reliability

### Railway Communication



- EN50155 Railway Certificate
- EN45545 Fire Resistance Certificate
- Layer 3 Management
- Enhanced Cybersecurity

### MP614 M12 Layer 3 Managed PoE Switch



- European BUS Company
- PoE Surveillance
- Layer 2 Management
- Industrial Design

### BUS Surveillance



- EN50121-4 wayside certificate
- Enhanced Cybersecurity
- 24V DC Power Booster to PoE
- Wide Operation Temperature -40~70 °C

### DP412-LV Managed PoE 24V Boost Switch



- European BUS Company
- PoE Surveillance
- WiFi Service for Passengers

### Smart BUS WiFi System



- GPS Tracking
- Enhanced Cybersecurity
- Passenger WiFi Service
- 24V DC Power Booster to PoE

### WR329P LTE PoE 24V Router

# Master in IIoT World

With over two decades of experience in the industrial IoT market, WoMaster Group has established itself as one of the leading providers of IoT solutions in the industrial sector. WoMaster is a joint venture between globally-listed industrial companies, which include QNAP Group for AIoT solutions, HMS Industrial Networks Group in Sweden, and HolyStone Group for industrial electronics components and touch IC. This partnership aims to offer innovative and professional solutions and services to cater to the rapidly growing IIoT market.

WoMaster firmly believes that long-term trust is the key to success. Therefore, the company is committed to designing and producing high-quality industrial products for critical applications, such as railway, power and utility, intelligent transportation, and smart city surveillance. From networking devices to all-in-one communication stations, WoMaster ensures added value through its hardened design, public and private cloud platform, high levels of cyber security protection, and customer-centric solutions.

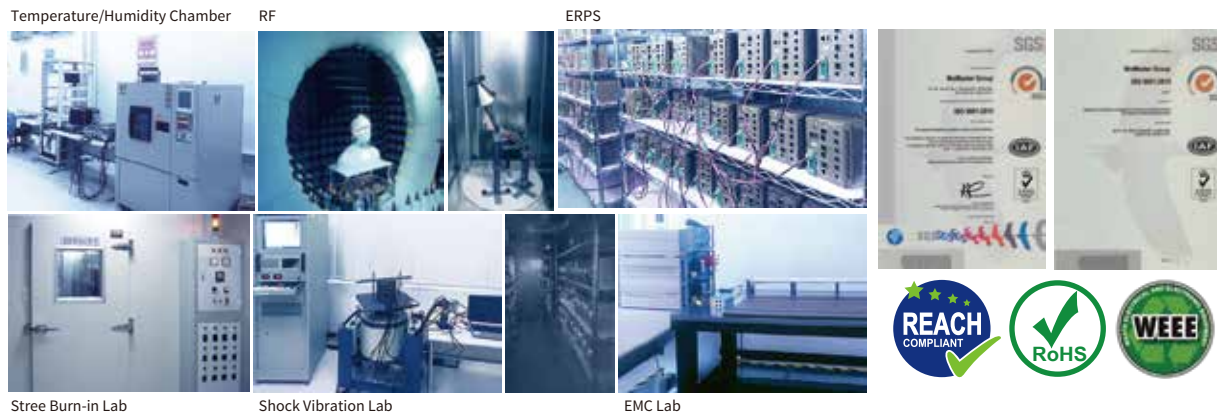


## Reliability Lab

At WoMaster, we place great emphasis on Design Quality Assurance (DQA) and the implementation of new product development processes throughout the entire product life cycle of every WOM product. The DQA stage begins with conceptual projects and product development by our highly qualified and elite engineering team, followed by environmental laboratory tests that ensure compliance with FCC/CE/UL/IEC standards.

In order to verify product design for vertical certificates, WoMaster has established in-house product verification labs, including an EMC lab, shock/vibration lab, and environmental simulation lab. These labs are used to conduct required environmental tests that meet or exceed industrial standards such as NEMA TS2, EN50155, IEC61850, eMark, or DNV. Our extensive test plans and procedures enable us to guarantee the safety, compatibility, stability, and longevity of our products in highly critical applications such as railway, heavy industries, and traffic control.

WoMaster adheres to ISO 9001 certification standards for Manufacturing Quality Assurance. We build all of our products in a static-free environment using production and quality testing equipment. Our products undergo rigorous testing on the production line, including in-process quality control and final quality control. Before packaging, all products are required to pass a 60C, 4-hour burn-in test



**WoMaster Group** [www.womaster.eu](http://www.womaster.eu) [info@womaster.eu](mailto:info@womaster.eu)

### WoM Europe

Carrer Tallador, 37, Santa Coloma de Cervello, Barcelona, Spain  
Tel: 34-662-296-449

### ADM21

273 Rue Gabriel  
P éri 92700 COLOMBES, France  
Tel: 01.46.52.01.03

### WoM Asia

4F., no.86-2, Yi Wen 1st St.,  
Taoyuan dist., Taoyuan 330, Taiwan  
Tel: 886-3-2522490

13F., No.192, Sec. 2, Zhongxing Rd.,  
Xindian Dist., New Taipei 231, Taiwan  
Tel: 886-2-55964238

### WoM China

Room 501, Building 4, No.5, South Hope Avenue, Economic Development Zone, Yang Cheng, Jiangsu 22400, China  
Tel: 86-0515-8838-3599