

# WoMaster

## Smart City and Industrial IoT Guidebook



# Master in IIoT World

With over 20 years of industrial IoT market experience, WoMaster Group is deemed as one of the leading IoT providers in Industrial world. The company is joint ventured by global listed Industrial companies including QNAP for industrial computing and AIoT solutions, HMS Industrial Networks Group for Industrial Automation and AnyBus technology, and HolyStone Group for Industrial Electronics Components and Touch IC, for a clear vision to provide professional and innovative solutions and services for the booming IIoT market.

In China, WoMaster Group joint ventured with Jiangsu Yueda Group, the top 1 conglomerate in North Jiangsu, to setup WoM China for designing pioneer Industrial IoT and Smart City solutions.

Based on the core belief that the real success derived only from long term trust, WoMaster is devoted to design and manufacture 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 station, WoMaster adds value by the hardened design, public and private cloud platform, high levels of cyber security protection, and customer oriented solutions.



## Reliability Lab



To verify product design for vertical certificates, WoMaster setups in-house product verification labs where required environmental tests are conducted for meeting or exceeding industrial standards such as NEMA TS2, EN50155, IEC61850, eMark, or DNV. Due to fulfilling extensive test plans and procedures, we can guarantee safety, compatibility, stability and longevity of the products in highly critical applications, such as railway, heavy industries, traffic control, etc.



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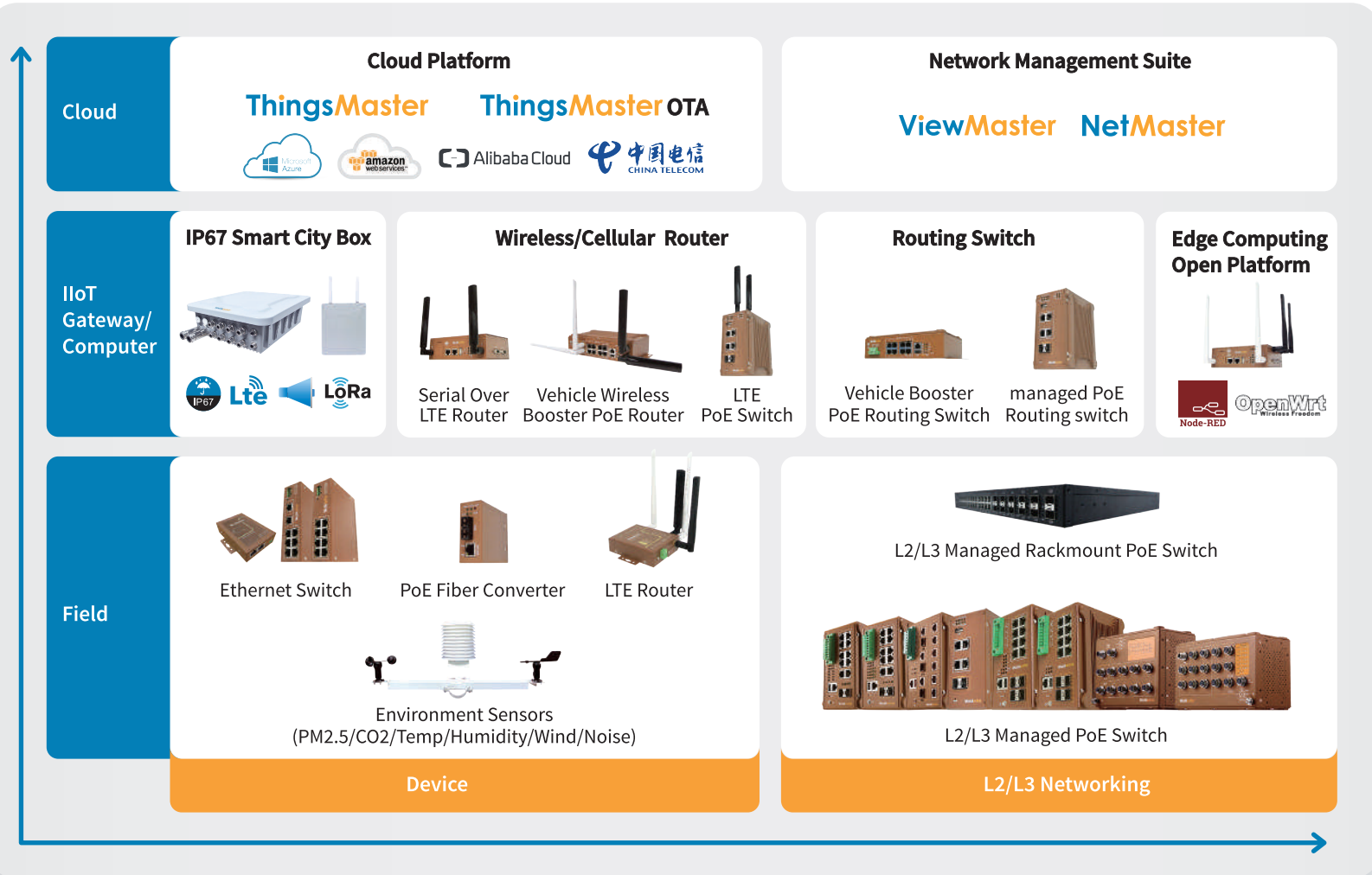
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WoMaster designs and manufactures complete and reliable IIoT solutions for smart city and industrial automation market. From end node serial and LoRa devices, outdoor environment sensors, to L2/L3 switching router devices, and to all-in-one box for Smart City applications can , WoMaster demonstrates master solutions in IIoT World. The devices withstand wide temperature from -40 to 70°C, and meet critical industrial EMC standards.

The software encompasses innovative cloud and group device management over the air solutions, as well as sophisticated security features by IEC62443. WoMaster owns many design patents for network redundancy, wireless backup, and routing features.

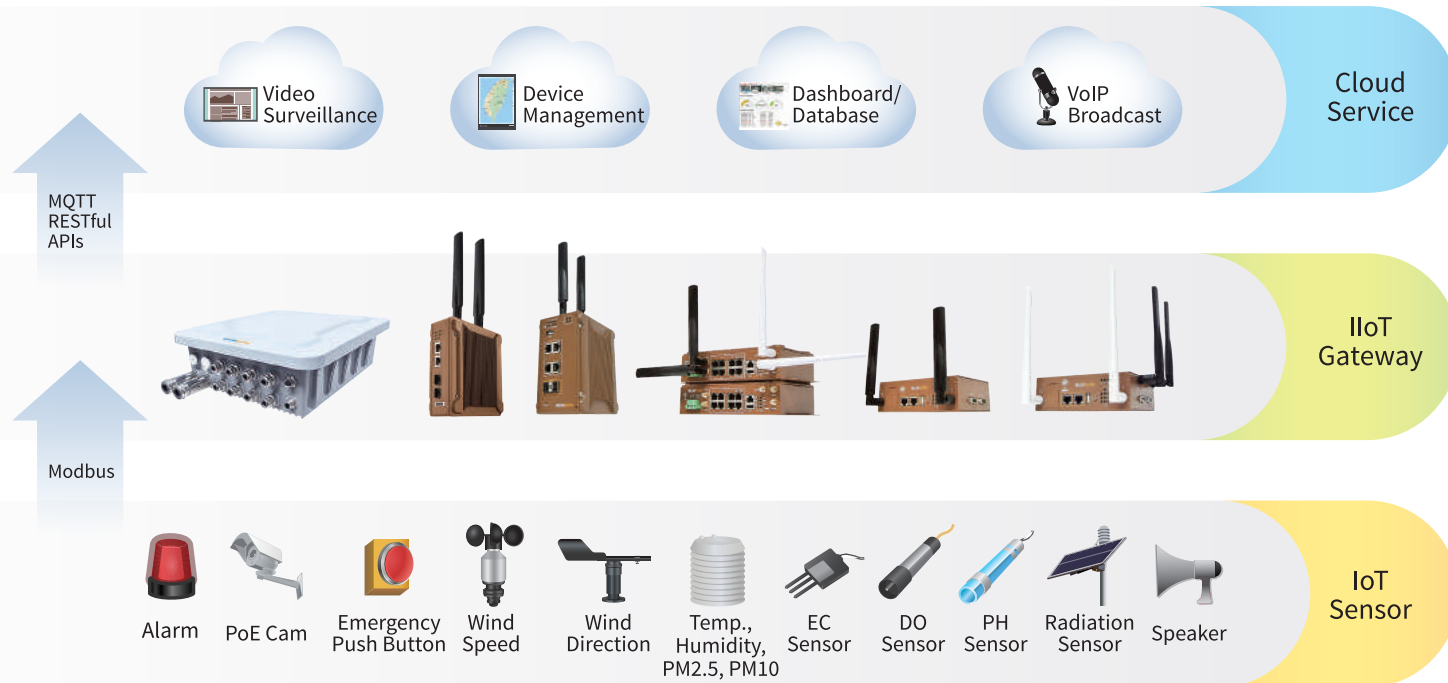


# Master in IIoT World

WoMaster Cloud Solution is a high-level, multi-platform, and flexible application development environment for WoMaster IIoT Gateways such as WR Series and SCB Series. It enables Modbus connectivity for data acquisition and processing, MQTT support for lightweight data transmission, and device management.

WoMaster Cloud Solution helps to handle the complexity of combining information and operational technology for IIoT applications. The field data such as video surveillance streaming, sensor's data, and RTSP streaming can be published and delivered directly to IoT Cloud with the latest TLS and X.509 protection. ThingsMaster IoT Private Cloud also equips Responsive Web Design, where all of the data is stored and accessed for monitoring, visualizing, and controlling purpose. ThingsMaster OTA, Over-the-Air device management, is an interactive monitoring dashboard and map that shows the device status, signal strength, and location. Fault alerts on critical events to prevent downtime can be added by using the Node-RED like flow-based programming tool.

## Ready To Use Cloud Solution



# Smart City

Smart City has a growing demand to improve the security and sustainability of urban spaces while reducing costs and resource consumption. Civic resources are under pressure and crime is harder than ever to police authorities. The task to collect and integrate vast amount of raw data and make analytics for actions is a posing challenge as well as opportunities to IT system integrators.

## Requirement:

- Smart city surveillance/IoT solution requires to be installed in outdoor environment, such as street light, traffic light, smart pole or wall/roof in the field.
- In Surveillance, the system needs to connect and power PoE cameras, with fiber or LTE as uplink path.
- The audio interface is needed for microphone and speaker, to communicate with field site people, collect local voice and also broadcast the alarm warning.
- Various sensors also need to be supported for environment measuring, such as PM2.5, Hum., Temp., wind speed, etc.
- A panic button is required for any emergency events, and sending alarm to inform administrator.
- Different power sources must be supported such as street light, solar panel and batteries.
- The integration and installation is a huge task, therefore an easy and safe batch configuration is a must. Management and cyber security level are as critical as the application.
- Public cloud must be supported such as Amazon AWS and Microsoft Azure, or China Aliyun. Most public projects are more interested in proprietary IoT platform which ThingsMaster addresses the need with security and availability.





# Embedded Smart City Box



SCB1000/1200 series are fully integrated communication systems within an IP67 enclosure for Smart City and Industrial Internet of Thing (IIoT) applications. The Gigabit 802.3bt ultra PoE /802.3at PoE plus ports, Fiber SFP, Serial, Voice, DI, DO are protected by weatherproof cable gland connectors. It is greatly flexible with different power in/out sources, internal USB, SD, Ethernet and mPCIe socket for wireless expansion. Comparing with traditional cabinets, the SCB1000/1200 series save you a lot of time and cost for system integration. The embedded MQTT and RESTful API enables public cloud integration such as AWS or Azure. The private cloud platform ThingsMaster can also be deployed for instant and secured access to for surveillance and IIoT management. With the versatile AC/DC/Solar power sources, you can easily install the box on roadside power tower, street light or wall mount on the wall/roof in the field.



## Weatherproof IP67 Enclosure and Cable Gland Connectors

- 4 Giga PoE ports
- 2 100/1000M Fiber SFP slots
- 1 RS232/422/485 RJ-45 port (SCB1200 only)
- 1 Audio RJ12 port (SCB1200 only)
- 2 Digital Inputs (SCB1200 only)
- 2 Relay Outputs (SCB1200 only)

### Weatherproof M12 connector

- 2 DC24V outputs
- 1 AC100~240V Input

Internal 1 RS232/422/485 DB9 port

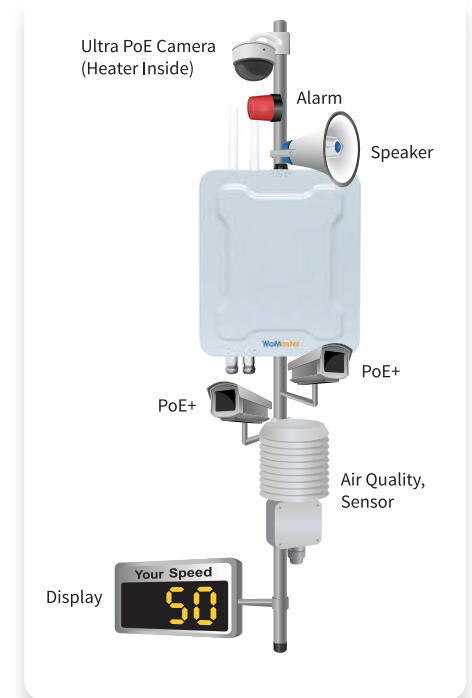
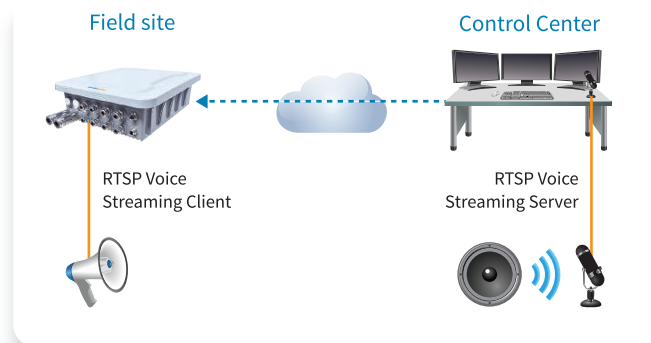
Internal 1 USB, and 1 SD socket for storage

## Weatherproof IP67 Enclosure and Cable Gland Connectors

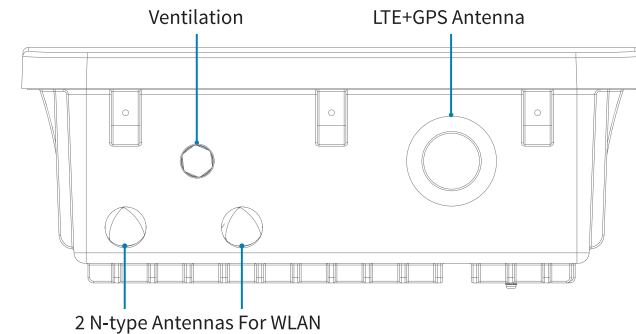
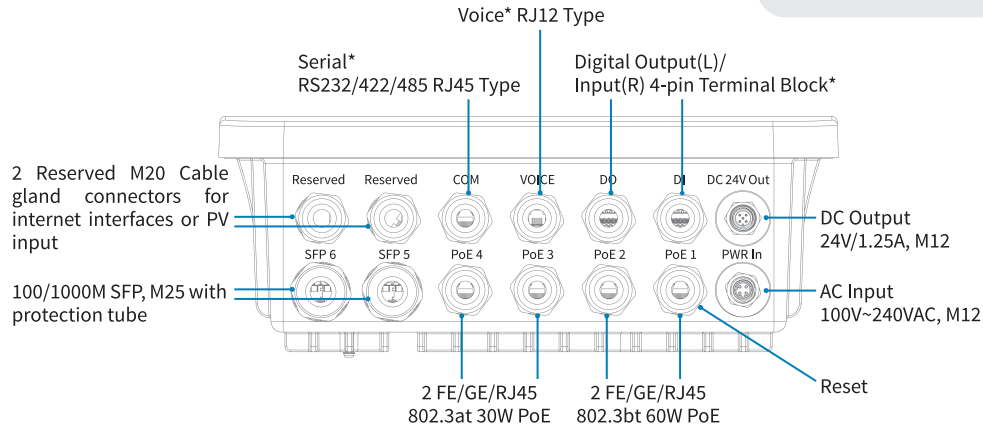
- 2 Giga Ultra PoE 802.3bt Ports with 60W/per port
- 2 Giga PoE+ 802.3at Ports with 30W/per port
- 1 internal PoE+ 802.3at WAN port for VPN, NAT, Routing Expansion
- PoE Enable/Disable, Budget Control, Port Control, Port Priority, PD Alive Check and port status
- Max. 240W power budget for PoE & DC Output

## VoIP Voice Broadcast

- RTSP voice streaming Server/Client for VoIP broadcast
- 1 to N VoIP broadcasting



\*Serial, Voice, DI/O only in SCB1200



Dimension: 346(W) x 406(D) x 135.5(H) mm

### Optional Wireless Expansion

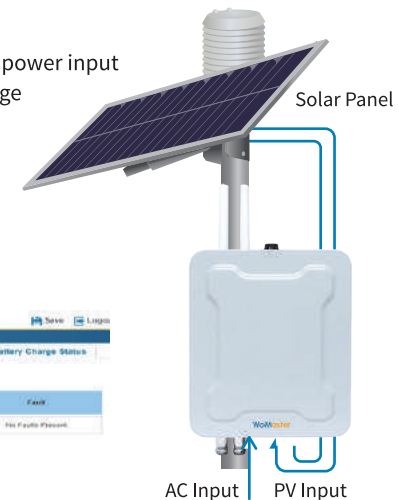
- mPCIe & SIM socket for wireless expansion
- SCB LTE Module and Antenna Kit
  - LTE Cat.4/6 Cellular Module
  - LTE+GPS Antenna on the top of the box
  - 300M(Cat.6)/150M(Cat.4) Downlink, 50M Uplink, FDD/TDD-LTE
- SCB Industrial WLAN Module
  - N-Type Antenna Socket on the top of the box
  - 5G/2.4G Qualcomm IEEE 802.11ac 2T2R MIMO, up to 866Mbps
  - WLAN AP/CPE mode

Weatherproof LTE+GPS Antenna



### Optional Basic Solar Kit

- 54V Battery Charge Control board for Solar power input
- Typical 48V/2.5AH Battery for power shortage
- Management Interface for Battery Status



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	-	-	
mPCle 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	

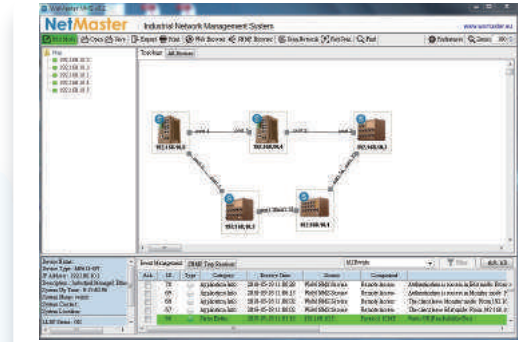


## Management Features

- Various configuration paths, including WebGUI, CLI SNMP, LAN Utility (ViewMaster), and NMS (NetMaster)
- ViewMaster Utility, Remote configuration software utility
- Redundancy: WAN to LTE redundancy
- Diagnostic tool includes Radio LED, Ping, TFTP, SNMP Trap, E-mail Alert and System Log
- LTE watchdog, auto-reconnect cellular connection

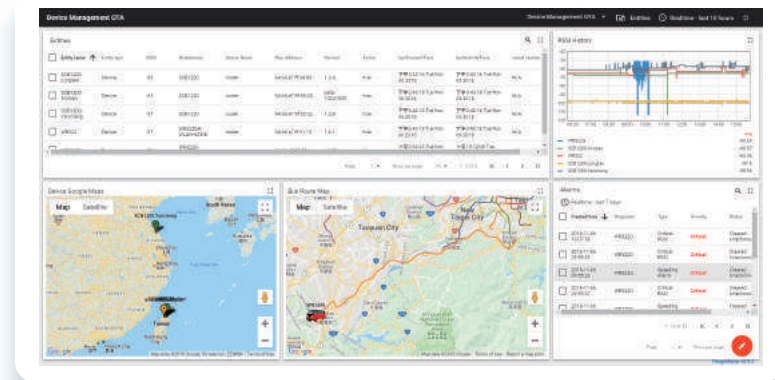
## ITU-T G.8032 v1/v2 ERPS Ring Redundancy

- Best Inter-Operability with 3rd Party devices
- Replace legacy Ring + Chain + Dual Homing Topology
- Supports HW-based CFM transmission for minimum 5ms recovery time and seamless restoration time (Patented)
- ERPS Group Settings and ERPS visualization via NetMaster



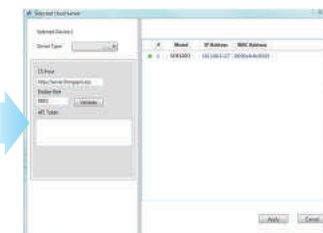
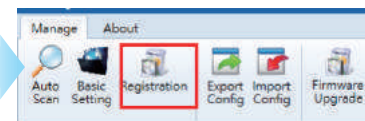
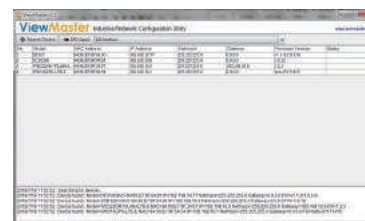
## Enhanced Cyber Security for Critical Application

- Firewall for traffic classification, port forwarding
- NAT, DMZ for LAN protection
- OpenVPN, IPsec for secure connection
- HTTPS/SSH secure login



## Device Management Over-the-Air

- Interactive monitoring dashboard and map to show the status, signal strength, and location of devices deployed
- 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)



# Weatherproof Environment Sensors

- Weatherproof Shelter for rain or snow
- Multiple sensor parameters
- Integration of independent and high sensibility parameters
- 2-wire RS485 standard Modbus-RTU protocol for high compatibility

## Integration With Smart City Box

- 24VDC power output from SCB Plug and Play
- Sensor device address modification



Sensor	Specification	Location
PM2.5	Laser Detection Detection range : 0-1000ug/m <sup>3</sup> Resolution : 0.1ug/m <sup>3</sup> Accuracy level : <±10% Operation: -40~80°C, 0-95%RH	Embedded
PM10	Laser Detection Detection range : 0-1000ug/m <sup>3</sup> Resolution : 0.3ug/m <sup>3</sup> Accuracy level : <±10% Operation: -40~80°C, 0-95%RH	Embedded
Temp.	Detection range: -40~80°C Accuracy level : ±0.5°C(25°C)	Embedded
Humidity	Detection range: : 0-100%RH : Accuracy level : ±3%RH	Embedded
Wind Speed	Detection range: : 0-60m/s Accuracy level : ±1m/s Operation: -40~80°C, 15-95%RH	External
Wind Direction	Detection range : 0-360°(16 Direction) Accuracy level : 22.5° (1 Direction) Operation: -40~80°C, 15-95%RH	External
ES101 (Soil pH)	Power Input: 12-24V DC Power Consumption: <0.15W (@12V DC, 25C) Accuracy: +/- 0.5pH Detection Range: 0-14pH Output: RS485 (Modbus) Operation: 0~65°C Protection: IP65	External
ES101 (Noise)	Power Input: 12-24V DC Detection Range: 30~130dB Frequency Range: 35Hz~20k Hz Output: RS485 (Modbus) Power Consumption: 0.4W Operation: -20~60°C Protection: IP65	External

Model	Specification
ES106	Integrated Sensors- PM2.5, PM10, Temperature, Humidity, Wind Speed, Wind Direction, Output : RS485
ES104	Integrated Sensors- PM2.5, PM10, Temperature, Humidity, Output : RS485
ES102	Integrated Sensors- Wind Speed, Wind Direction, Output : RS485

# Secured and Rugged LTE Router for IIoT

## WR302G/312G/322GR Industrial IoT Cellular Edge Gateway

- Single (WR312G) or dual (WR322GR) 4G LTE Cat.4 / Cat.6\* Routing
- One SIM + Micro SD or Dual SIM standby or Embedded SIM
- 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
- 2-port Gigabit Ethernet Routing and Bridging
- One or Two RS232/422/485 DB9 ports for IIoT devices
- OpenVPN, IPsec for secured connection
- USB for easy field configuration and firmware upgrade
- Cellular to WAN redundancy, dual SIM backup
- Cellular to WLAN auto offload
- 1:1 NAT, port forwarding and NATP for local traffic protection
- Static Routing, RIPV2, OSPFv2
- Built-in Cloud AWS Agent, Azure Agent
- TACACS+ multi-user authentication for privileged user management
- OpenWRT open platform
- -40~75°C wide operation temperature
- EN50121-4 railway



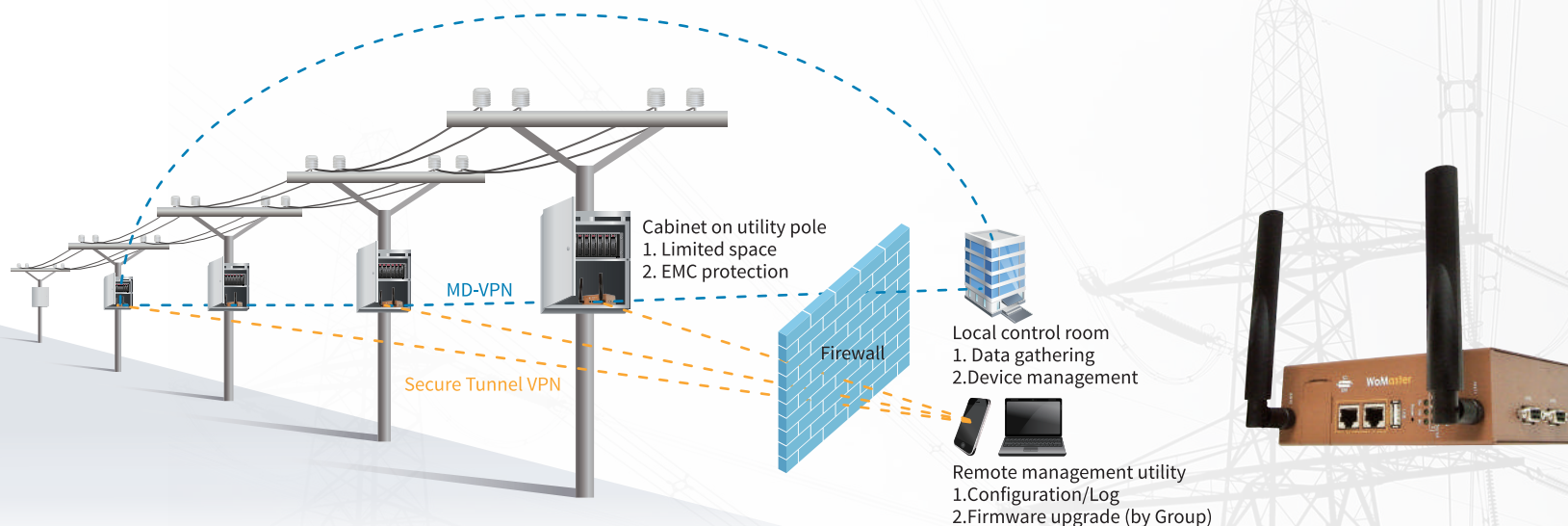
Model	WAN	LAN	Serial	Radio 1	Radio 2	USB	SD	SIM	GPS	DI/DO	Power Input	Temp.	Standard
WR302G	1xGE	1xGE	2xRS232/422/485	-	-	1	-	-	-	0/1	12/24/48VDC	-40~75℃	EN50121-4 EN61000-6-2/4 Radio RED
WR312G-WLAN				Wi-Fi 2.4G 11n/5G 11ac	-	1	-	-	-	0/1			
WR312G-LTE				LTE Cat.4	-	1	1 or 0	1 or 2	-	0/1			
WR312A-M12-WLAN	1xGE M12	1xGE M12		Wi-Fi 2.4G 11n/5G 11ac	-	-	-	-	-	2/1			EN50155 EN50121-4 EN61000-6-2/4
WR312A-M12-LTE				LTE Cat.4	-	-	-	2	*	2/1			
WR322GR-WLAN+LTE	1xGE	1xGE		Wi-Fi 2.4G 11n/5G 11ac	LTE Cat.4	1	1	2	Yes	0/1			EN50121-4 EN61000-6-2/4 Radio RED
Lite													
WR214-WLAN	1xFE	3xFE	-	Wi-Fi 2.4G 11n	-	-	-	-	-	-	12/24VDC	-40~70℃	EN61000-6-2/4 Radio RED
WR224-WLAN+LTE		3xFE		Wi-Fi 2.4G 11n	LTE Cat.4	-	-	2	Yes	-			
WR222-LTE		1xFE	1xRS232/422/485	Wi-Fi 2.4G 11n	LTE Cat.4	-	-	2	*	-			

\*LTE Cat.6 by request



# Power Distribution

**Power Distribution** An electric power distribution system is the final stage in the delivery of electric power; it carries electricity from the transmission system to individual consumers. The real time status of the system is critical to improve the efficiency of the power distribution system. As it is highly distributed throughout customer premises and is often installed in utility poles, the use of cellular network to send status report or event alarm is increasing. Rugged design for outdoor environment and support of VPN is the key factor to plan solution.



## Why WR312G-LTE :

- High-speed 4G LTE routing for remote monitoring
- 2-port Gigabit Ethernet Routing and Bridging and 2 RS232/422/485 ports for onsite devices (IED, power meter, thermometer, etc.)
- OpenVPN, IPsec for secured connectivity, and USB for easy field configuration and firmware upgrade
- SD for field diagnostic log or extended application
- -40~75°C wide operation temperature for unfavorable conditions
- Compact size for cabinet or utility pole installation

# Easy Programmable Edge Computer for IIoT

## Industrial IoT Edge Computer/Gateway

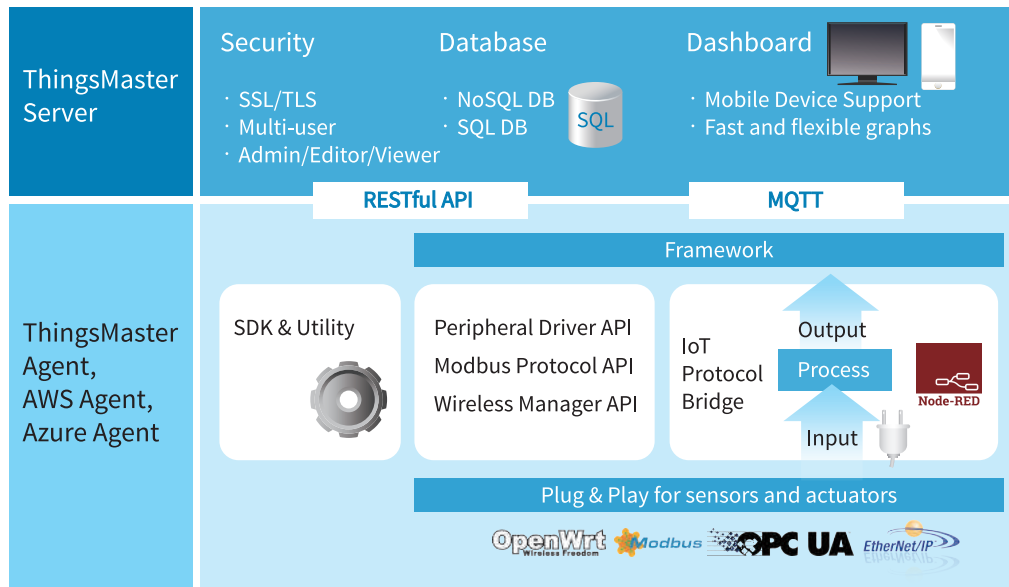
### WR322GR-EC Series

- Single (WR312G-EC) or dual (WR322GR-EC) 4G LTE Cat.4 / Cat.6\* Routing
- One SIM + Micro SD or Dual SIM standby or Embedded SIM
- 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
- 2-port Gigabit Ethernet Routing and Bridging
- One or Two RS232/422/485 DB9 ports for IIoT devices
- QCA9558 MIPS-based processor 700MHz processor
- SD socket for storage expansion
- Rich programmable LEDs and a programmable button for easy installation and maintenance
- Node-RED flow-based programming
- -40~75°C wide operation temperature
- EN50121-4 railway

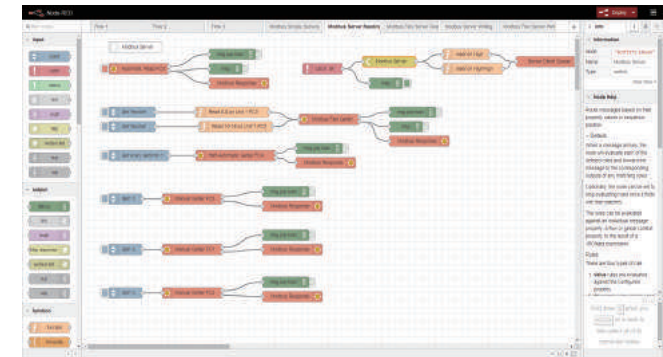


Model	WAN	LAN	Serial	Radio 1	Radio 2	USB	SD	SIM	GPS	DI/DO	Power Input	Temp.	Standard
WR302G-EC	1xGE	1xGE	2xRS232/422/485	-	-	1	1	-	-	0/1	12/24/48VDC	-40~75°C	EN50121-4 EN61000-6-2/4 Radio RED
WR312G-WLAN-EC				Wi-Fi 2.4G 11n/5G 11ac	-	1	1	-	-	0/1			
WR312G-LTE-E-EC				LTE Cat.4	-	1	1	1 or 2	-	0/1			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

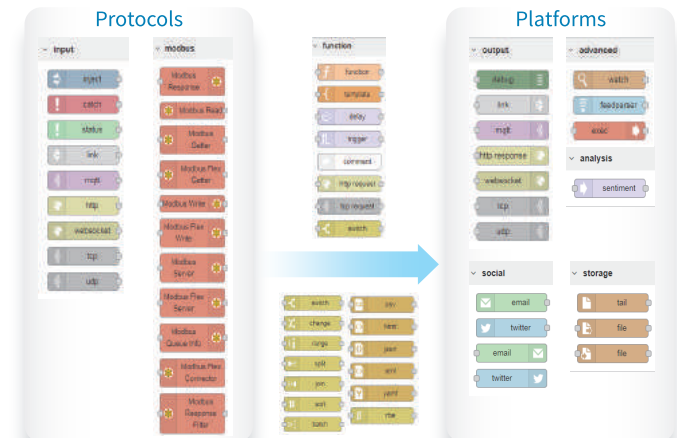
# Open Platform Software Architecture



As Easy as Drag and Drop



Connecting protocols and platforms



# Industrial Cellular PoE Routing Switch

## Wireless Backup for ERPS v2 Network by LTE PoE Router

### WR316GPS series

- High-speed LTE Cat.4 routing and dual SIM standby
- Full-Giga: 4x 1000M RJ45 Copper + 2x 100/1000M SFP Fiber
- 4-port IEEE PoE 802.3af/at 30W per port and 120W total PoE budget
- ITU-T G.8032 ERPS v2 Ring Redundancy
- Ring failure to LTE Redundancy
- VRRP redundancy
- OpenVPN, IPsec, L2TP for secured connection
- USB for easy field configuration and firmware upgrade
- Built-in Cloud AWS Agent, Azure Agent
- Support TACACS+ multi-user authentication for privileged user management
- -40~75°C wide operation temperature
- EN50121-4 railway compliance
- NetMaster- NMS system for individual node monitoring
- ViewMaster- Remote configuration software utility for distributed management



Model	LAN	PoE	Radio	USB	SD	SIM	DI/DO	Power Input	Temp.	Certification
WR316GPS-LTE	2xGF SFP	4xGE	LTE Cat.4	1	-	2	0/1	48/54 VDC	-40~75°C	EN50121-4 Radio RED
WR316GPS-LTE6	2xGF SFP	4xGE	LTE Cat.6	1	-	2	0/1	48/54 VDC	-40~75°C	EN50121-4 Radio RED

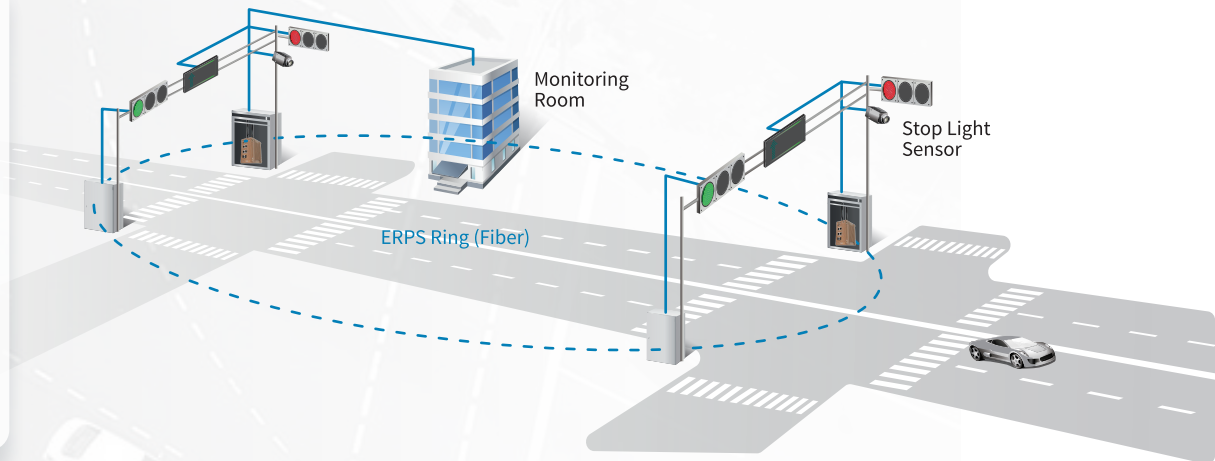


# Traffic Control

Road Traffic control systems are vital for safety of all pedestrians and vehicles. Thus, it is critically important to deploy dynamic network infrastructure with strong consideration of fast data transmission, long distance of the data communication and unfavorable weather conditions. The demand is growing for rugged equipment suitable for transmitting real-time data to Monitoring Center as well as providing PoE functionality with PD fault-detection and very low to zero network recovery time.

## Topology

Multiple WR316GPS form Gigabit Fiber Ring network to connect all the traffic control devices to Control Center. Traffic control devices include: control units connected to road controllers, LED traffic lights, variable information signs, info screens, electronic devices for measuring vehicle movement parameters (control borders) using radio-frequency identification tools (readers).



## Why WR316GPS :

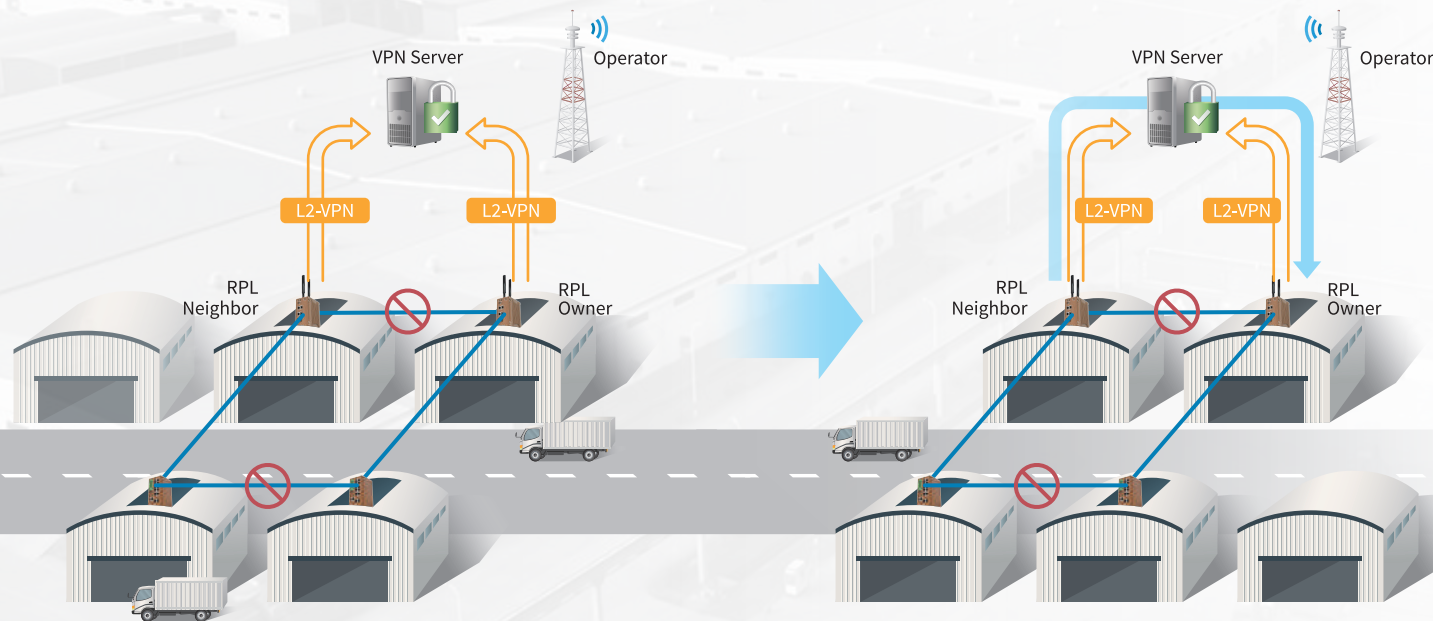
- High-speed LTE routing for fast data transmission and dual SIM card slots for selecting the best performing network
- Up to 4-port Giga PoE+ for delivering up to 30W per port PoE to traffic control system devices, collecting on-site data
- 2-port Giga SFP Fiber ports for long-distance connectivity with control center
- G.8032 v1/v2 ERPS Ring Redundancy for interoperability, loop protection and fast network recovery
- OpenVPN, IPsec for network security
- -40~75°C wide operation temperature for operation in harsh weather conditions

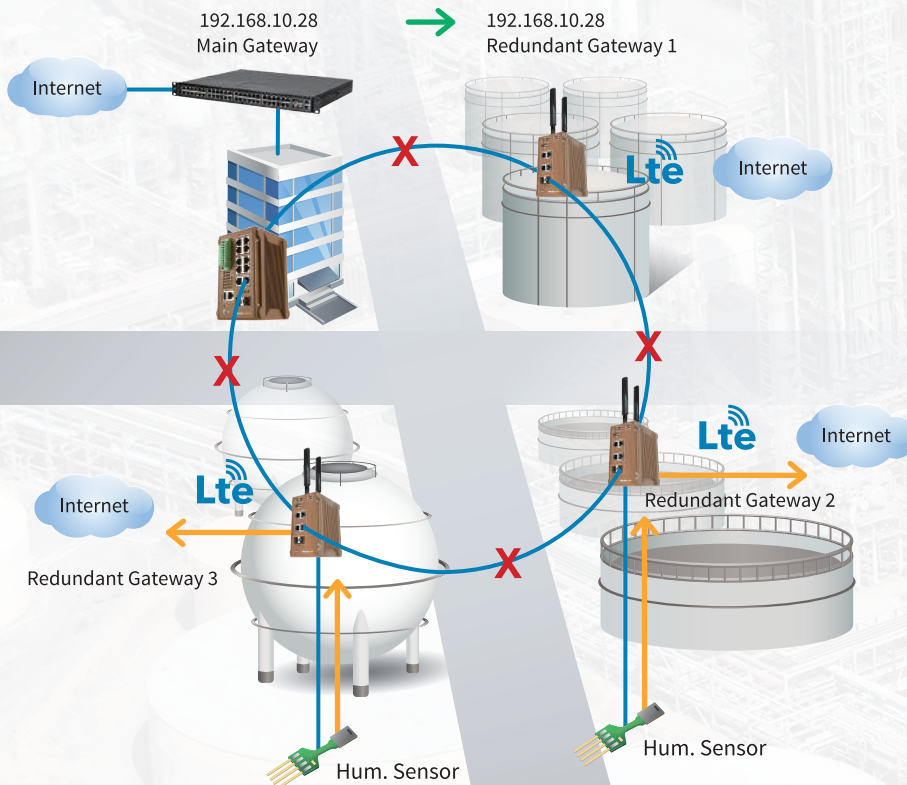




# ERPS Backup by Wireless Network

ITU-T G.8032 ERPS v2 is a crucial deployment in the industrial redundant network. However it can only protect in one link failure of a Ring. If there is more than one link failed, the ERPS Ring will still break. The patented Wireless ERPS Backup technology uses L2 VPN to provide the wireless L2 backup mechanism.





# Redundant Gateway

The open standard ITU-T G.8032 ERPS Ring topology is often deployed in industrial network applications to ensure the reliability of the network. In normal state, all traffic goes out through the main gateway. When a node in the ring network fails, the data packet will be transmitted through the redundant path to the main gateway. However, when there are multiple nodes in the ring network fail at the same time, the Ring redundant network will be cut in pieces, and cause some devices will not be able to transmit information and get on the network properly.

The Redundant Gateway technology is based on the ERPS mechanism to periodically check the main gateway status in the ERPS Ring network connection status. When the main gateway is not available, the redundant gateway will change its IP address to the main gateway's one, so the devices in the network can connect to the network in a seamless way. The multiple redundant gateway settings secure the network even when multiple nodes fail in a network.



# Industrial Cellular Wi-Fi PoE Routing Switch

Integrate Cellular Router and 24V Boost PoE Switch for BUS/Vehicle

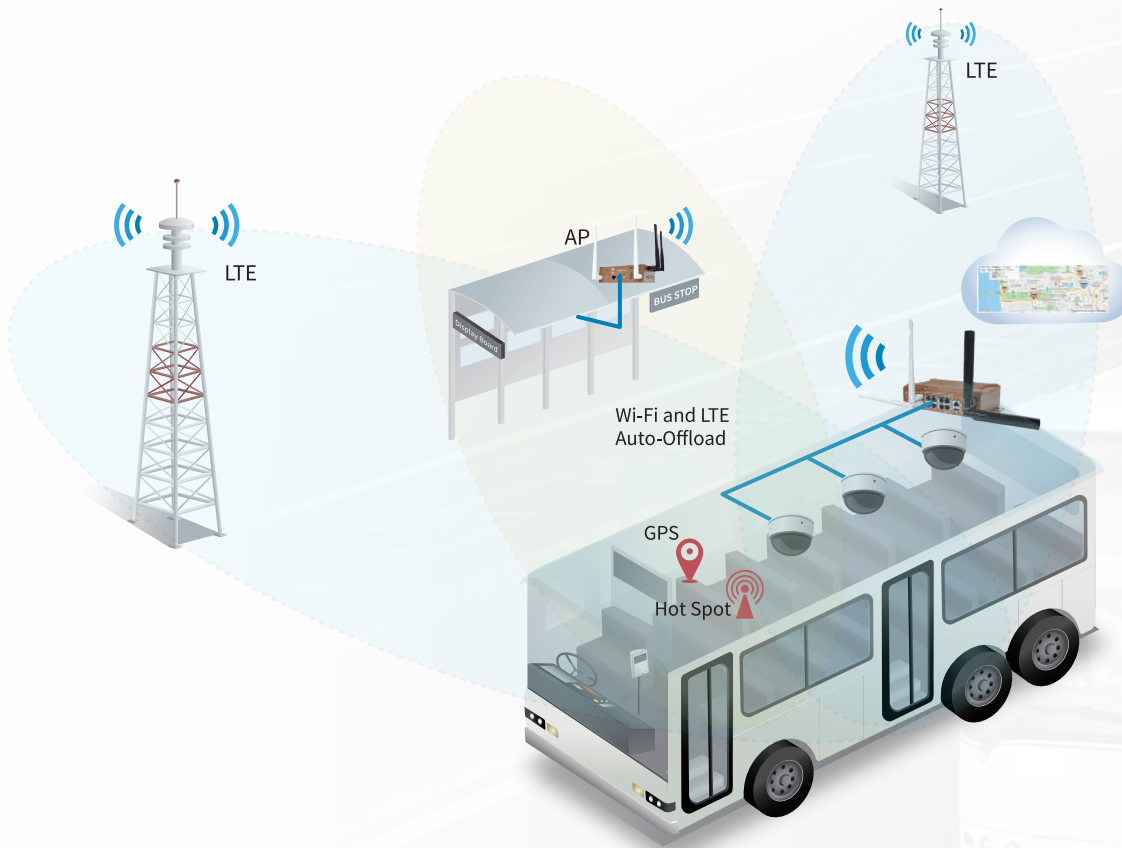
## WR329P Series

- LTE Cat.4/Cat.6, 2x2 MIMO, 150M/300M downlink and 50M uplink
- 5G/2.4G Wi-Fi for local coverage, up to 866Mbps bandwidth
- 8x Fast Ethernet PoE+ ports, up to 120W@70°C PoE power budget
- 12/24V to 54VDC Booster PoE
- 1x Gigabit Ethernet WAN port for uplink or NVR
- WAN to LTE Redundancy
- GNSS supports GPS/GLONASS/BeiDou/Galileo
- Periodically Report GPS data for Real time Location Tracking
- OpenVPN, IPsec, L2TP\*, GRE for secure connection
- Built-in Cloud AWS Agent, Azure Agent
- EN50121-4 Railway compliance
- EN61000-6-2/EN61000-6-4 heavy industrial EMC
- Vehicle: E-mark compliance
- -40~75°C wide operation temperature



Model	Radio 1	Radio 2	WAN	LAN	USB	SIM	DI/DO	eSIM(Optional)	GPS	Power Input	Temp.	Certificate
WR309	-	-	1xGE	8xFE	1	0	0/1	-	-	8~32VDC	-40~75°C	EN50121-4
WR309P	-	-	1xGE	8xFE PoE	1	0	0/1	-	-	8~32VDC	-40~75°C	EN50121-4
WA329	Wi-Fi 2.4G 11n/5G 11ac	Wi-Fi 2.4G 11n/5G 11ac	1xGE	8xFE	1	0	0/1	-	-	8~32VDC	-40~75°C	EN50121-4 Radio RED
WA329P	Wi-Fi 2.4G 11n/5G 11ac	Wi-Fi 2.4G 11n/5G 11ac	1xGE	8xFE PoE	1	0	0/1	-	-	8~32VDC	-40~75°C	EN50121-4 Radio RED
WR329-WLAN+LTE	Wi-Fi 2.4G 11n/5G 11ac	LTE Cat.4	1xGE	8xFE	1	2	0/1	1	Yes	8~32VDC	-40~75°C	EN50121-4 Radio RED
WR329P-WLAN+LTE	Wi-Fi 2.4G 11n/5G 11ac	LTE Cat.4	1xGE	8xFE PoE	1	2	0/1	1	Yes	8~32VDC	-40~75°C	EN50121-4 Radio RED
WR329-WLAN+LTE6	Wi-Fi 2.4G 11n/5G 11ac	LTE Cat.6	1xGE	8xFE	1	2	0/1	1	Yes	8~32VDC	-40~75°C	EN50121-4 Radio RED
WR329P-WLAN+LTE6	Wi-Fi 2.4G 11n/5G 11ac	LTE Cat.6	1xGE	8xFE PoE	1	2	0/1	1	Yes	8~32VDC	-40~75°C	EN50121-4 Radio RED





# BUS

For preventing and resolving emergency situations, transport administrators deploy IP-surveillance network capable of capturing high-definition video footage.

The process of network deployment on moving vehicles encounters a variety of challenges, such as climatic conditions, extended temperatures, humidity, shock and vibration. Therefore ruggedized network devices that can perform stably over harsh environment is the only solution.

## Topology

WR329P is combined functionalities of LTE/Wi-Fi router and 8-port power boost PoE+ switch, and installed on bus to boost 8~32V power to 54V and supply PoE to up to 8 onboard IP-cameras for real-time video footage. 2 wireless radio, one for transmitting data to bus stations, the other is for passengers use as hotspot.

## Auto-Offload

When the BUS approaches 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.



## Why WR329P

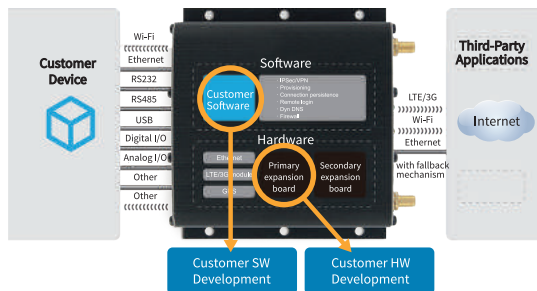
- Power booster from 8~32V to 54V for low voltage systems on vehicles
- 8-port IEEE 802.3af compliant PoE, up to 15.4W/port
- 1 x Gigabit WAN for NVR / Uplink
- Dual Radio, LTE/GPS + Wi-Fi
- Dual SIM & eSIM supported
- Seamless Wi-Fi Auto-offload

# LoRa WAN Gateway

Today, when there are so many types of things/devices to be monitored and managed, different types of processes and different ways to connect them, it's rather complicated for system integrators to realize the optimal performance connectivity network. Existing standards satisfy only 80% of diverse IoT market requirements.

To answer the challenge, WoMaster brings to the market the new generation IoT Gateway. It performs routing functions (LAN/WLAN to 3G) and provides GPS info.

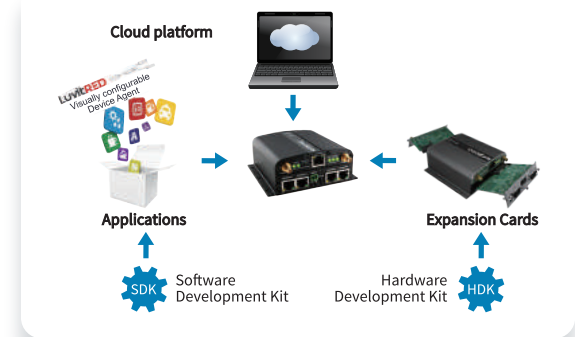
- Gateway: perform routing functions (LAN/WAN to 3G), provide GPS info
- Flexible: functionality can be extended with plugin cards
- Intelligent: on-board processor with Linux-based SW development environment
- Global: certified in Europe, Americas & Japan



One of the major benefits of the product is flexible functionality which is achieved by supporting a wide range of plugin expansion cards: Wi-Fi client/AP, Micro-SD holder, Wi-Fi AP, LoRa WAN, industrial serial / serial / 2 - port serial, 1-port-Ethernet / 4-port-Ethernet / 4-port-PoE, BLE card, KNX, telematics, 4-ports USB, Developer Card with serial port for on-site connectivity and USB port for firmware update.

Moreover, a breadboard can be a primary extension board (customized Hardware Development). Firmware guarantees enhanced data security by supporting IPSec/VPN, Provisioning, Connection Persistence, Remote Login, Dyn DNS, Firewall.

Intelligent design of Linux-based Software development kit allows implementing customer software meeting the requirements of local markets and highly specialized applications.



Due to its' reliable performance, extended and flexible functionality, and Hardware/Software customization option, Smart IoT gateway solutions cover the vast variety of applications:

- Implementation of WoMaster's IoT Gateway in automotive, transport and logistics brings forward not only "track and trace" opportunity by ID badging/verification and GPS location tracking, but also vehicle security by automatic violation detection and vehicle remote analysis and diagnosis helping to prevent road accidents.
- Wireless connectivity of the different types of devices on businesses' and dwellers' levels has become an integral part of Smart City Environmental monitoring. The typical applications of IoT gateway include street lighting, climate control, boat surveillance, smart meters, KNX home control, independent living monitoring, smart grid in your home, and other submetering applications.
- Reliable M2M connectivity is critical for Industrial remote asset management. To name the few, machine control, data logging (Modbus), food cold chain, water metering in irrigation and high rise buildings, temperature and humidity monitoring, motion and light detection, and many other industrial applications.

Bringing the Internet of Things and smart city M2M wireless connectivity with WoMaster's IoT Gateway benefits to optimizing existing business processes, as well as to creating new products and services, therefore, developing new age Smart City infrastructure. The product can be deployed globally as it obtained required certifications in Europe, North/South Americas, and Japan.



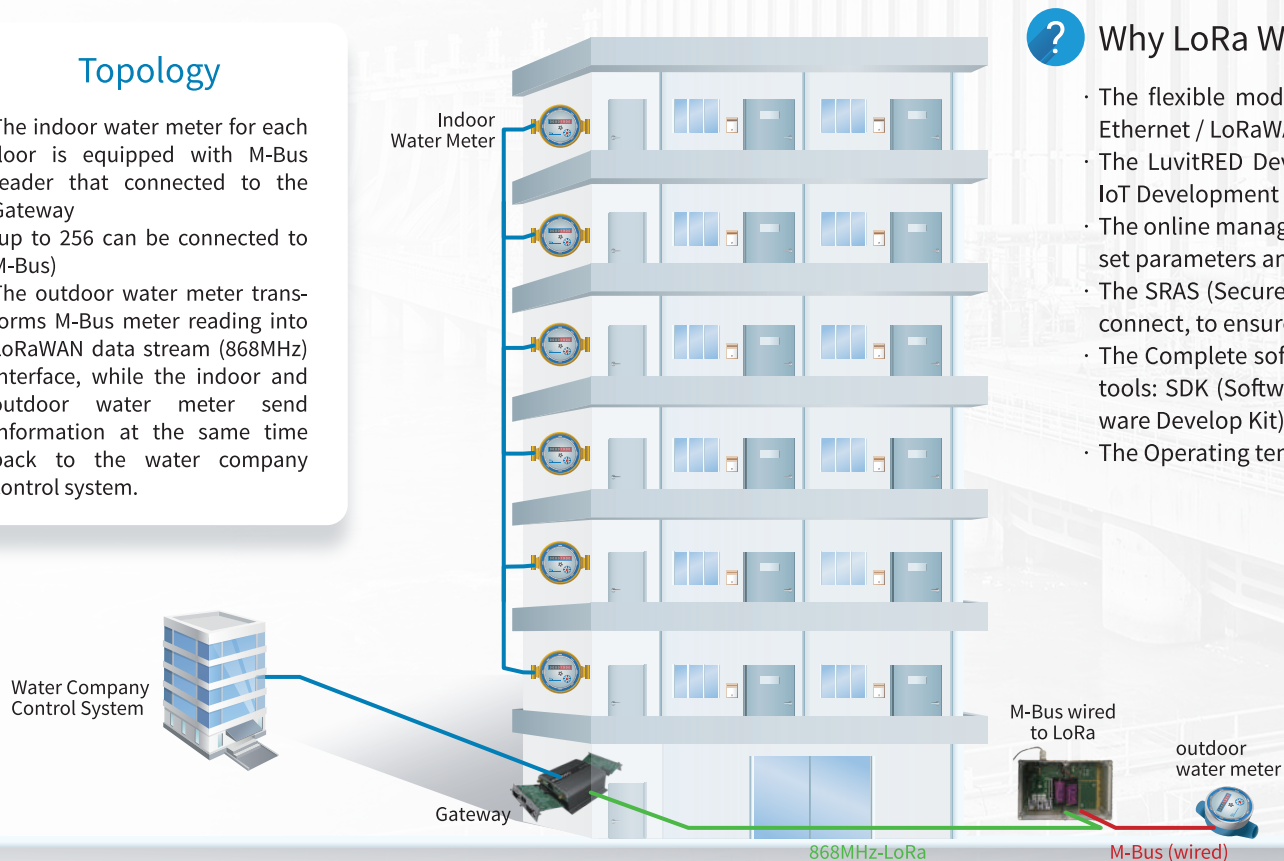
# Remote Water Meter

According to statistics, the water pipeline leakage has wasted over 20% of the total utilization of water resources. By adapting the automatic water meter reading technology, it can quickly address the leakage and alarm issue and feedback to users by digital management. The efficiency is improved by reading the water meter every 15 minutes.

## Topology

The indoor water meter for each floor is equipped with M-Bus reader that connected to the Gateway (up to 256 can be connected to M-Bus)

The outdoor water meter transforms M-Bus meter reading into LoRaWAN data stream (868MHz) interface, while the indoor and outdoor water meter send information at the same time back to the water company control system.



## ? Why LoRa WAN Gateway :

- The flexible modular expansion interface, M-Bus / Ethernet / LoRaWAN
- The LuvitRED Development Application: Visualized IoT Development Tools, Reduces Development Costs
- The online management software, update firmware, set parameters and report status
- The SRAS (Secure Remote Access Service) is easy to connect, to ensure the security of data transmission.
- The Complete software and hardware development tools: SDK (Software Development Kit), HDK (Hardware Develop Kit)
- The Operating temperature is from -30~70°C

## Outdoor Combo Antenna Series

Outdoor high gain, IP67 waterproof and -40~85°C wide temperature design for roof of vehicle, railway, roadside monitoring and industrial installations. Integrated with 5 RF cables for LTE MIMO, 2.4G/5G Wi-Fi MIMO and GPS/GLONASS/GALILEO/BEIDOU to save field installation effort.

### A-LTE\_WLAN\_G-4\_4-RSM-2M

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

### A-LTE\_WLAN\_G-3\_2-RSM-2M

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



### A-LTE\_WLAN\_G-4\_4-RSM-2M





### A-LTE\_WLAN\_G-3\_2-RSM-2M





## Combo Antenna

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


## LTE Antenna

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

## Wi-Fi Antenna

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

## GPS Antenna

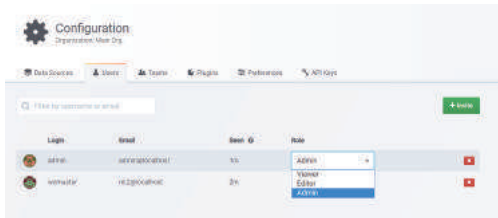
	Model	Type	Frequency (MHz)	Gain (dBi)	Connector	Dimension (mm)	Cable (M)	Operating Temp.	Application
	A-GPS-27-RSM-3M	Omni	1575.42	27	RP SMA Male	36x36x13.9	3	-20~ 65°C	Indoor

## RF Cable

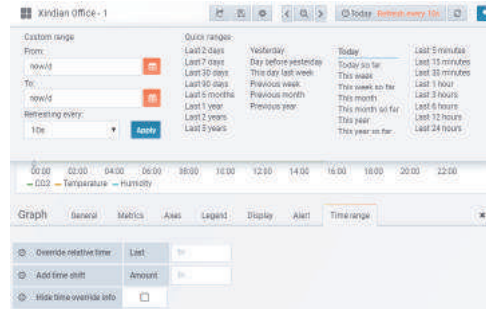
Model	Connect	Length(M)
C-RF-R-RSF_RSM-1M	RP-SMA female to RP-SMA male	1
C-RF-C2-NF_RSM-2M	N-type female to RP-SMA male	2

## User Management

Provides multi-user management, each logged-in user has his own privilege.

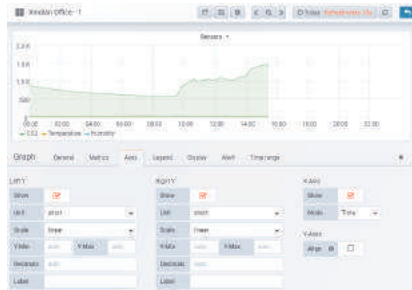


## Configurable Time Range and Refresh Interval



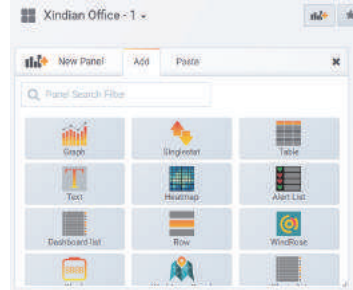
## Fast and Flexible Graphs Options

Fast and flexible client side graphs with many options. Panel plugins for different ways to visualize metrics and logs.



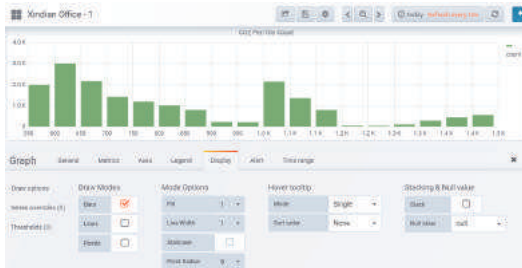
## Easy Add Graph Panel

From heat maps to histograms. A variety of display options to help data visualization



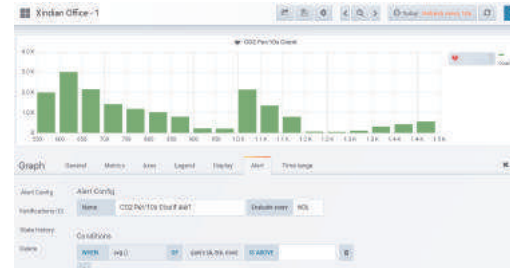
## Analyze Logged Data

Show histogram of time series data.



## Alert

Visually define alert rules for important metrics



# Build Your Private IIoT Platform for Industrial Plant Networks



**ThingsMaster** is an intelligent private IIoT platform that fits for your private IIoT platform requirement. It provides flexible and secured access from any web browser either in PC or smart phone. It also supports RTSP streaming which allows you to broadcast from cloud to remote gateways via Voice over IP. Field site video surveillance is also supported from the cloud for environment monitoring via IP cameras.

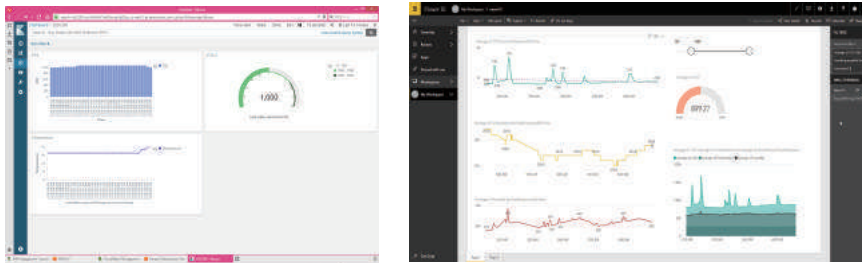
ThingsMaster enables fast, flexible, secured dashboard for multi-user and supports MQTT and RESTful APIs for easy access to data from an IIoT gateway. It is also designed for central network management such as device configuration, firmware version upgrade, fault alert and event records.

# Cloud Management over ThingsMaster

- Interactive monitoring dashboard and map shows the status, signal strength, and location of all WR series deployed
- MAP shows devices online/offline/warning status in Green/Red/Orange color, respectively
- Supports over-the-air batch device configuration update
- Set alerts on critical events to prevent downtime (i.e. signal strength is too low or temperature is too high)
- Node-RED like flow-based programming
- Support the latest TLS encryption and X.509 authentication
- Supports over-the-air batch device scheduled firmware update\*
- Support up to 10,000 nodes device management\*

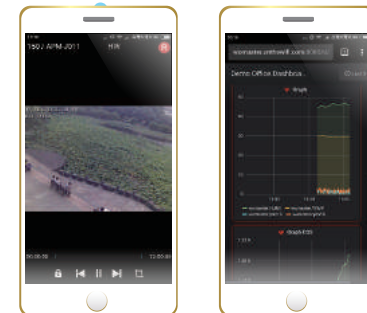
## Amazon and Microsoft Dashboard

- Powered by AWS and Azure
- AWS Kibana Dashboard
- Azure Power BI Dashboard



## Mobile Management Anytime, Anywhere

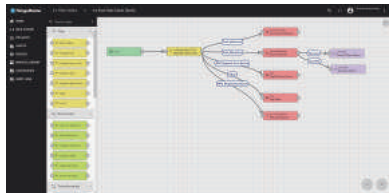
- Multi-user management, each logged-in user has his own Dashboard
- Meet RWD (Responsive Web Design) requirements for desktop and mobile devices



# ThingsMaster OTA - Group Management

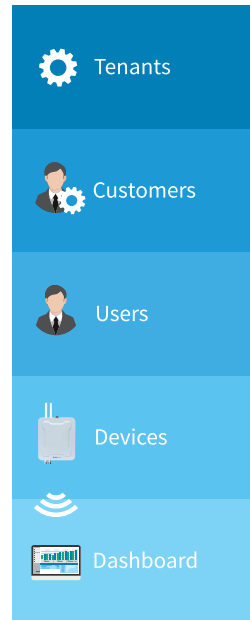
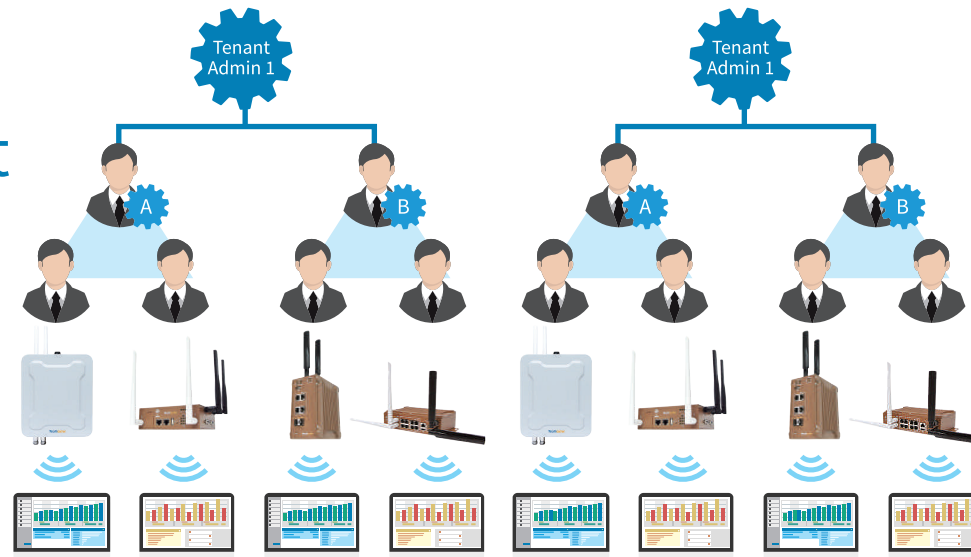
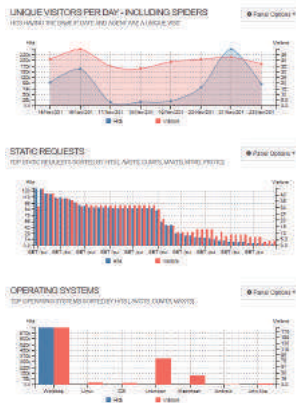
- Multi-Tenant Architecture
- Grouping and organize tasks for IoT deployment
- Each user has his own Dashboard
- Node-RED like flow-based programming

## ThingsMaster OTA - Rule Engine



## ThingsMaster Statistics

Unique visitors per day, visitor hostnames and IPs, Requested URLs



## Secured Multi-Sites Management

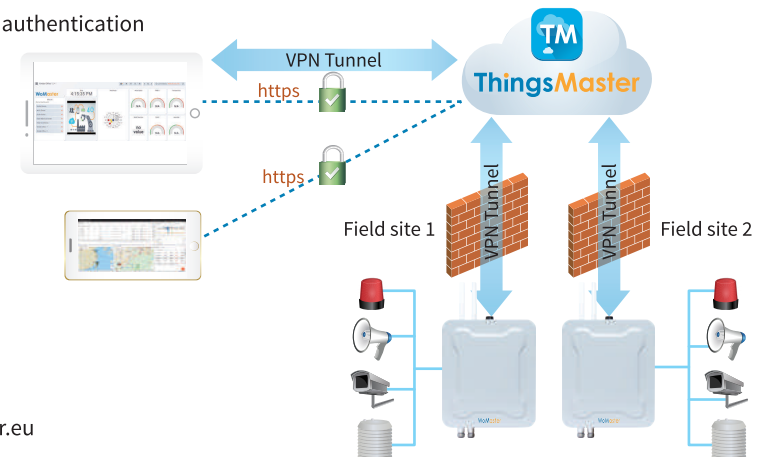
- N to N VPN
- Latest TLS encryption and X.509 authentication
- Demo sites:



**ThingsMaster**  
Username: womaster  
Password: womaster101



**OTA**  
Username: womaster@womaster.eu  
Password: womaster101





# Ubiquitous Applications

## Smart Energy Solution

Monitor meter voltage, frequency, power, current, energy consumption, etc.



## Industrial 4.0 Solution

Monitor machine downtime, speed, utilization rate, yield rate, productivity, etc.



## Smart Farming Solution

Monitor silos weights, silos temperature, silos humidity, etc



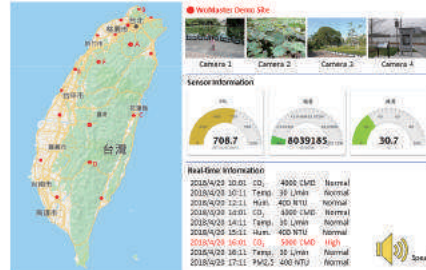
## Smart Bus Tracking Solution

Monitor bus route, speed, passenger count, fuel etc.



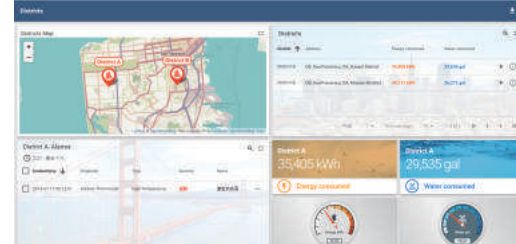
## Smart Environment Solution

Monitor PM1/2.5/10, CO<sub>2</sub>, temperature, humidity, radiation, wind speed, etc.



## Smart Metering Solution

Monitor district energy consumed, water consumed, etc.



# Rugged Ethernet L2/L3 Switch

## ITU-T G.8032 v1/v2 ERPS Ring Redundancy

- The ITU-T standard for Ring redundancy Protocol
- Provide sub-50ms protection and recovery switching for Ethernet traffic
- Interoperate with 3rd party industrial switch and still remain fast recovery time
- Interoperate with commercial switch instead of STP/RSTP
- Efficient network interconnection and topology with ERPS Chain, multiple chains

## Dynamic L3 Routing with Redundancy Protection

- RIPV1&v2, OSPFv1&v2 for intra-domain routing within an autonomous system
- Efficient unicast/multicast static routing
- VRRP guarantees sustainable routing in a single point of failure

## Management Features

- Various configuration paths, including WebGUI, CLI, SNMP and RMON
- IEEE 1588v1/v2 PTP time management
- LLDP topology control
- USB for easy field configuration and firmware update
- ViewMaster for batch device configuration and version control
- NetMaster for Network Management, auto topology and ERPS Group Setting

## Enhanced Cyber Security for Critical Applications

- L2-L7 IPv4/IPv6 Access Control List (ACL)
- DHCP Snooping, IP Source Guard, Dynamic ARP Inspection
- 802.1Q VLAN, Private VLAN, Advanced Port Security
- Multi-Level user passwords
- HTTPS/SSH/SFTP, 256-bit encryption
- 802.1X MAB for non-802.1X compliant end devices
- RADIUS/TACACS+ centralized password authentication

## Rugged Design for Wayside Surveillance

- EN50121-4 for railway trackside applications
- Top level EMC protection and excellent heat dissipation design for operating in -40~75°C environment
- EN 61000-6-2/4 Heavy Industrial Environment



Model	Ethernet Cooper	Ethernet Fiber	L3 Managed	L2 Managed	ERPS v2	USB	Power Input	Vertical Standard
DS101	1 x FE	1 x FE SC/ST	-	-	-	-	12/24/48V DC	EN50121-4
DS105	5 x FE	-	-	-	-	-	24V DC or USB 5V DC	Heavy Industrial
DS108	8 x FE	-	-	-	-	-	12/24/48V DC	Heavy Industrial
DS108F	6 x FE	2 x FE SC/ST	-	-	-	-	12/24/48V DC	Heavy Industrial
DS208	8 x GE	-	-	-	-	-	12/24/48V DC	Heavy Industrial
DS210	8 x FE + 2 x GE	-	-	-	-	-	12/24V DC	EN50121-4
DS310	8 x FE	2 x GE Combo	-	Yes	Yes	1	24/48V DC	EN50121-4
DS406	4 x GE	2 x GE SFP	-	Yes	Yes	1	12/24/48V DC	EN50121-4
DS409	6 x GE	3 x GE Combo	-	Yes	Yes	1	12/24/48V DC	EN50121-4
DS410F	2 x GE	6 x GE SFP + 2 x GE Combo	-	Yes	-	-	12/24/48V DC	EN50121-4
DS412	8 x GE	4 x GE SFP	-	Yes	Yes	1	12/24/48V DC	EN50121-4 IEC61850-3
DS612	8 x GE	4 x GE SFP	Yes	Yes	Yes	1	12/24/48V DC	EN50121-4 IEC61850-3

# Rugged L2/L3 PoE Switch

## Dynamic Routing with Redundancy Protection

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

## Management Features

- Various configuration paths, including WebGUI, CLI, SNMP and RMON
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## ITU-T G.8032 v1/v2 ERPS Ring Redundancy

- The ITU-T standard for Ring redundancy Protocol
- Provide sub-50ms protection and recovery switching for Ethernet traffic
- Interoperate with 3rd party industrial switch and still remain fast recovery time
- Interoperate with commercial switch instead of STP/RSTP
- Efficient network interconnection and topology with ERPS Chain, multiple chains

## Rugged Design for Wayside Surveillance

- EN50121-4 for railway trackside applications
- Top level EMC protection and excellent heat dissipation design for operating in -40~75°C environment
- 240W extra high power budget for all kinds of power requirements
- EN 61000-6-2/4 Heavy Industrial Environment

## Enhanced Cyber Security for Critical Applications

- L2-L7 IPv4/IPv6 Access Control List (ACL)
- DHCP Snooping, IP Source Guard, Dynamic ARP Inspection
- 802.1Q VLAN, Private VLAN, Advanced Port Security
- Multi-Level user passwords
- HTTPS/SSH/SFTP, 256-bit encryption
- 802.1X MAB for non-802.1X compliant end devices
- RADIUS/TACACS+ centralized password authentication

## Extreme PoE Capability

- 8-port IEEE 802.3af/at compliant PoE, up to 30W/port
- Up to 240W power budget
- Complete PoE management including per-port Power Budget Control, PoE Scheduling and PoE Status



Model	PoE	Ethernet Cooper	Ethernet Fiber	L3 Managed	L2 Managed	ERPS v2	USB	Power Input	Vertical Standard
DP101	1 x FE 802.3bt	-	1 x FE SC/ST	-	-	-	-	54V DC	EN50121-4
DP208	8 x GE 802.3at	-	-	-	-	-	-	48/54V DC	Heavy Industrial
DP210v2	8 x FE 802.3at	2 x GE	-	-	-	-	-	12/24V DC	EN50121-4
DP210	8 x FE 802.3af	2 x GE	-	-	-	-	-	12/24V DC	EN50121-4
DP310	8 x FE 802.3at	-	2 x GE Combo	-	Yes	Yes	1	48/54 VDC	EN50121-4
DP310-LV	8 x FE 802.3at	-	2 x GE Combo	-	Yes	Yes	1	8~57 VDC	EN50121-4
DP406	4 x GE 802.3at	-	2 x GE SFP	-	Yes	Yes	1	48/54 VDC	EN50121-4
DP412	8 x GE 802.3at	-	4 x GE SFP	-	Yes	Yes	1	48/54 VDC	EN50121-4
DP612	8 x GE 802.3at	-	4 x GE SFP	Yes	Yes	Yes	1	48/54 VDC	EN50121-4
DP612-LV	8 x GE 802.3at	-	4 x GE SFP	Yes	Yes	Yes	1	8~57 VDC	EN50121-4

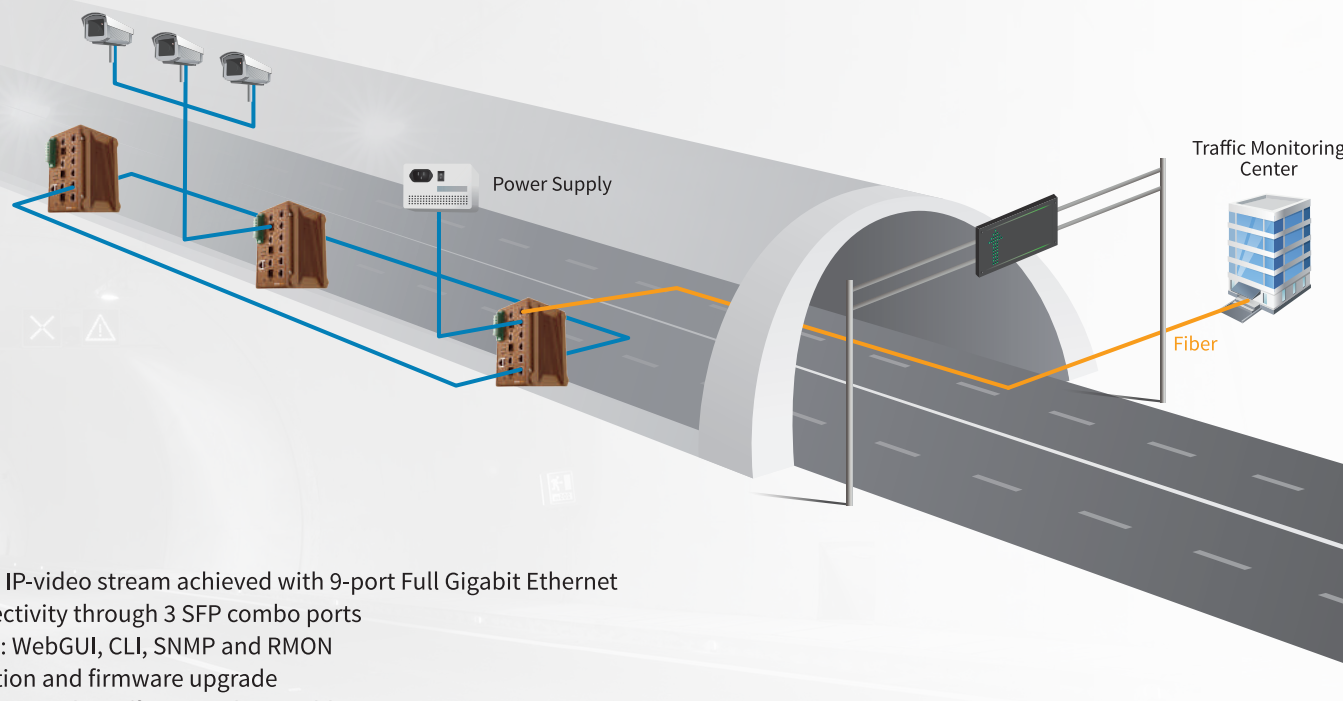


City Administrations widely adapt IP-surveillance for remote tunnel traffic monitoring and data driven decision making in case of accidents and other emergencies. When deploying IP-surveillance network in tunnels, system integrators encounter a number of challenges need to be addressed, such as long distances, humid and dusty environmental conditions in tunnels, as well as frequent vibrations and shock caused by moving vehicles.

# Tunnel

## Topology

DS409 are connected in Gigabit Fiber Ring topology. They collect and further transfer the captured IP-video streams to the Traffic Monitoring Center.



## ? Why DS409 :

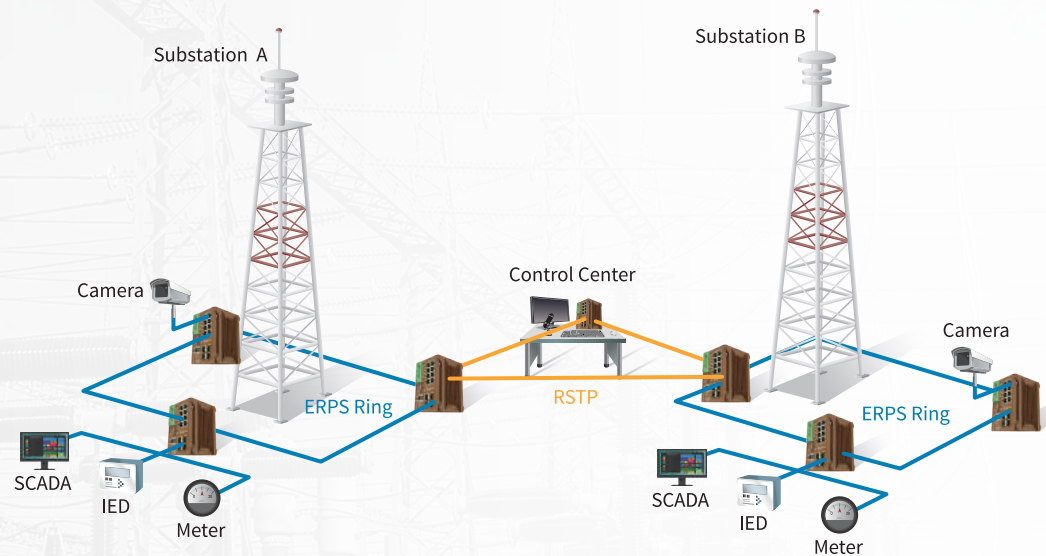
- Ultra-high throughput for IP-video stream achieved with 9-port Full Gigabit Ethernet
- Long distance fiber connectivity through 3 SFP combo ports
- Convenient management: WebGUI, CLI, SNMP and RMON
- USB for on-site configuration and firmware upgrade
- NEMA TS2 compliance for wayside traffic control assemblies
- 10~60V wide power range design with redundant power inputs suitable for different types of tunnel power supply equipment
- Rugged design for unfavorable tunnel environments with excellent heat dissipation for operating in -40~75°C
- High level EMC protection exceeding traffic control requirements
- Supports the latest ITU-T G.8032 v1/v2 ERPS Ring Redundancy for sub50ms protection recovery switching and high interoperability with 3rd party industrial switches

# Power Substation

As Power Utilities locations are remotely distributed, DCS is usually implemented in power plant automation system for increasing working productivity as well as for smart energy production with eliminated influence on environment. Vital role of data communication between various automation components is evident though it brings the problem of data protection from cyber-attacks and network redundancy as it is based on Ethernet and Internet.

## Topology

DS612 is installed in power substation to ensure overcoming high level of electromagnetic interference on power plants. DS612 collect IP cameras, IEDs, meters and SCADAs data and transmit to the control center. Several DS612 in power plants connect with a ERPS ring for network redundancy.



## Why DS612 :

- Dual redundant 10~60VDC power input
- Hi-pot isolation and operating temperature -40~75°C
- 8 Gigabit Ethernet copper ports can be connected with IP surveillance cameras
- 4 Gigabit SFP Combo ports are used for uplink data transmission to Control Center



# Railway M12 PoE L2/L3 Switch

## 2 Giga Link Bypass Ports

- Link Bypass function provides fail safe solution when the device power fails and bypasses the traffic to the onward switch Management Features
- Various configuration paths, including WebGUI, CLI, Telnet, SNMP v1/v2c/v3 and RMON
- IEEE 1588v1/2 PTP time management
- LLDP topology control
- Modbus/TCP, Ethernet/IP for factory automation
- M12 USB for easy field configuration and firmware update
- ViewMaster for batch device configuration and version control
- NetMaster for Network Management, auto topology and ERPS Group Setting

## ITU-T G.8032 v1/v2 ERPS Ring Redundancy

- The ITU-T standard for Ring redundancy Protocol
- Provide sub-50ms protection and recovery switching for Ethernet traffic
- Interoperate with 3rd party industrial switch and still remain fast recovery time
- Interoperate with commercial switch instead of STP/RSTP
- Efficient network interconnection and topology with ERPS Chain, multiple chains

## Enhanced Cyber Security for Critical Application

- L2-L7 IPv4/IPv6 Access Control List (ACL)
- DHCP Snooping, IP Source Guard, Dynamic ARP Inspection
- 802.1Q VLAN, Private VLAN, Advanced Port Security
- Multi-Level user passwords
- HTTPS/SSH/SFTP, 256-bit encryption
- 802.1X MAB for non-802.1X compliant end devices
- RADIUS/TACACS+ centralized password authentication

## Extreme PoE Capability

- 8-port IEEE 802.3af/at compliant PoE, up to 30W/port
- Up to 100W system power budget at 70°C operating temperature
- Complete PoE management including per-port Power Budget Control, PoE Scheduling and PoE Status

## Rugged Design for Surveillance in Rail, Rolling Stock applications

- EN50155/IEC61373 railway certification
- Railway 110VDC(77~137.5V) or 54V DC(46~57V) or 24/48/110V DC(16.8~137.5V) on-board power design
- Outstanding mechanical design with good heat dissipation and lightweight
- Rugged M12 connectors for harsh environments
- Wide operating temperature range from -40~70°C



Model	PoE	Cooper	L3 Managed	L2 Managed	Bypass	ERPS v2	USB	Power Input	Vertical Standard
MP310	7 x FE + 1 x GE 802.3at	2 x GE (Bypass)	-	Yes	Yes	Yes	1 x M12	110V DC (HV) 8~57VDC (LV)	EN50155
MP414	8 x GE 802.3at	4 x GE + 2 x GE (Bypass)	-	Yes	Yes	Yes	1 x M12	110V DC (HV) 8~57VDC (LV) 48/54V DC (MV) 24/48/110V DC (WV)	EN50155
MP614	8 x GE 802.3at	4 x GE + 2 x GE (Bypass)	Yes	Yes	Yes	Yes	1 x M12	110V DC (HV) 8~57VDC (LV) 48/54V DC (MV) 24/48/110V DC (WV)	EN50155

# Railway

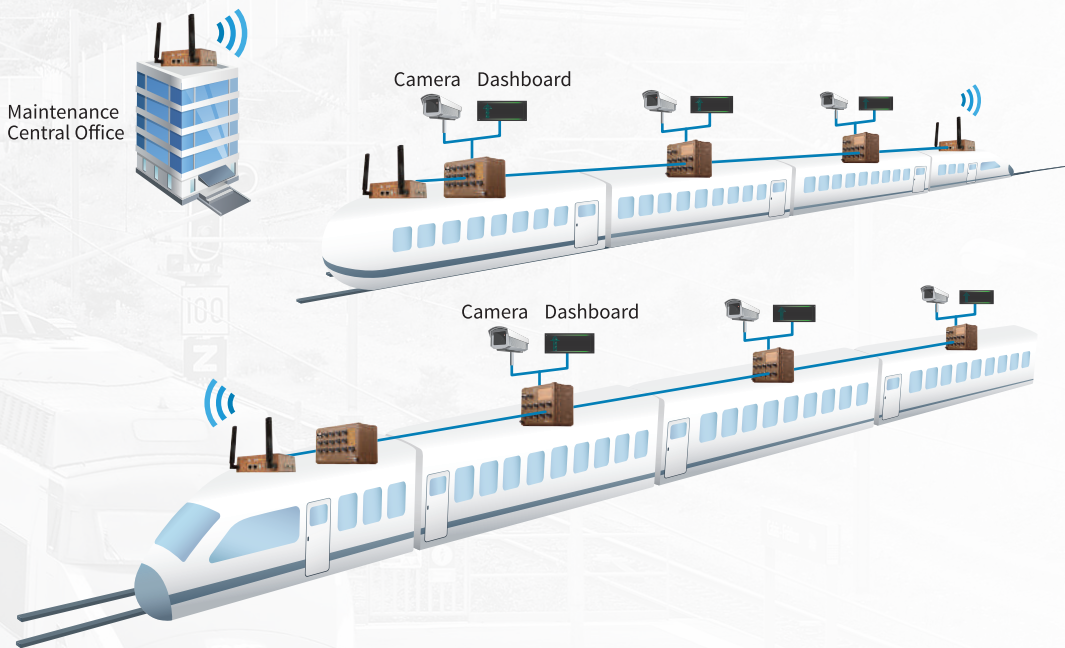
Safety for passengers and staff is provided by real-time IP video surveillance onboard and on train stations. For this purpose, reliable and secure Ethernet and wireless networks for high-speed video transmission is a must. Railway applications are composed by a number of critical requirements have to be met. All the equipment deployed on board train must comply with Railway Standard EN50155, and must sustain uniquely harsh environment, vibration, and shock

## Topology

MP310 is installed on each cabinet of the train for connecting PoE surveillance cameras and information panel. MP614 is installed on the cab's room for connecting the dashboard, NVR and control components, and provided L3 routing.

MP614 and MP310 in each cabinet connect as an ERPS ring to provide fast redundancy, and they both support bypass technology to keep data transmitting, in case there is a device powered down or fail.

WR312G supports high-speed LTE transmission, which transmits information on the train to the Control Room via LTE.



## Why MP310 :

- IP31 industrial hardware design with M12 rugged connectors to withstand vibration, shock, and temperature extremes
- 8-port PoE+ with 100W total power budget, including 7 Fast Ethernet ports and 1 Gigabit Ethernet port, enable connected IP-cameras
- 2 Gigabit Ethernet ports with link bypass function ensure network connectivity even in case of device/power failure

# Rackmount L2/L3 Switch

## 10G High Throughput Ethernet Switching

- 52-port Ethernet, including 48-port Gigabit Ethernet and 4-port 1/10GbE dual speed SFP+
- Outstanding throughput and flexibility for high-density and ultra high speed connection
- 131Mbps maximum forwarding rate, 176Gps switching capacity
- 32K MAC address table, 4MBytes packet buffer, 12Kb Jumbo Frame

## High Throughput Ethernet Switching (RS428/628)

- 28-port Full GbE, by 20-port GbE RJ45 and 4-port GbE RJ45/SFP Combo, and 4 1G/2.5G SFP fiber ports
- DDM function for high quality fiber connectivity monitoring
- Less than 12.5W power consumption at full loading
- 16K MAC address table, 4MBytes packet buffer, 9Kb Jumbo Frame

## Enhanced Cyber Security for Critical Applications

- ACL for L2/L3/L4, IPv6 ACL for L3/L4
- IP Source Guard, DAI, DHCP Snooping
- 802.1X/RADIUS, TACACS+
- Port MAC secure learning
- Private VLAN/IP Security/Port Security
- Management IP filtering (SNMP/Web/Telnet/SSH)

## Dynamic Routing with Redundancy Protection

- IPv4 and IPv6 routing: OSPF, OSPFv3, BGP4, and ECMP
- Multicast routing features for IGMP v1/v2/v3, PIM-DM/SM, MLD v1/v2 and PIM-DM6/SM6
- VRRP guarantees sustainable routing in a single point of failure

## Management Features

- Various configuration paths, including WebGUI, CLI, SNMP and RMON
- IEEE 1588v1 PTP time management
- LLDP topology control
- USB for easy field configuration and firmware update
- ViewMaster for batch device configuration and version control
- NetMaster for Network Management, auto topology and ERPS Group Setting

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

- EN50121-4 compliance for Railway Trackside, Roadside, Industrial Control Room applications
- IEC61850/IEEE1613 compliance for power substation
- Excellent heat dissipation design for operating in -40~75°C environments
- EN 61000-6-2/4 Heavy Industrial Environment



Model	Cooper	Fiber	L3 Managed	L2 Managed	USB	Power Input	Vertical Standard
RS328	24 x FE	4 x GE SFP	-	Yes	Yes	110/220V AC	EN50121-4
RS428	20 x GE	4 x GE Combo 4 x GE SFP	-	Yes	Yes	110/220V AC	EN50121-4
RS428-2AC						2 x 110/220V AC	
RP428-AC-P200	20 x GE 802.3at	4 x GE Combo(PoE) 4 x GE SFP	-	Yes	Yes	110/220V AC	EN50121-4
RP428-AC-P200+2DC54V						110/220V AC+ 2 x 54V DC	
RS628	20 x GE	4 x GE Combo 4 x GE SFP	Yes	Yes	Yes	110/220V AC	EN50121-4
RS628-2AC						2 x 110/220V AC	
RP628-AC-P200	20 x GE 802.3at	4 x GE Combo(PoE) 4 x GE SFP	Yes	Yes	Yes	110/220V AC	EN50121-4
RS752	48 x GE	4 x 1GE/10GE SFP	Yes	Yes	-	2 x 110/220V AC	-

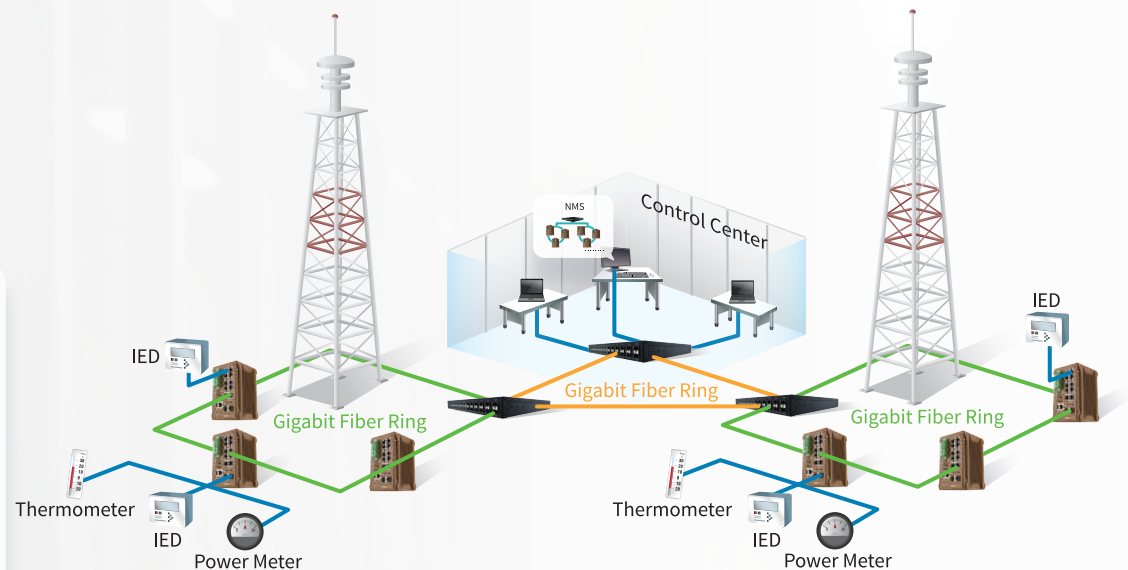


# Control Center

Control centers play a vital role in large scale industrial networks. The switches in control centers collect remote data and send to backbone networks, therefore the support of resilient network is important as well as the high port density and bandwidth. To protect from network attack, comprehensive cyber security features are network administrators first priority.

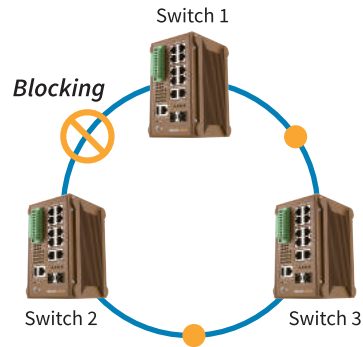
## Topology

To constitute Distributed Control Systems of power substations, rackmount 28G L3 switch RS628 were deployed to provide 20 Giga copper ports to connect all network devices, and up to 8 fiber Gigabit ports are used to form gigabit fiber ring network topology to connect between remotely located control centers, as well as to link and collect the field data from on-site switches also equipped with fiber connectors.



## ? Why RS628 :

- Rugged design and high EMC immunity ideal for power substations Control Centers
- Outstanding throughput and ultra high speed connection with high port density: 28-port Full GbE, by 20-port GbE RJ45 and 4-port GbE RJ45/SFP Combo, and 4 GbE SFP fiber ports
- Up to 8 GbE fiber ports add more fiber links to field switches and 20 GbE ports provide ultra-high speed and maximum bandwidth
- Supported multicast routing at Layer 3 provides fast data packet flow between distributed IP subnets
- Data security is ensured by enhanced Cyber Security features including 802.1X/RADIUS/TACACS+ port-based access control, Private VLAN/IP Security/Port Security, HTTPS/SSH/ Management IP secure access, IP Source Guard, DHCP Snooping, Dynamic ARP Inspection



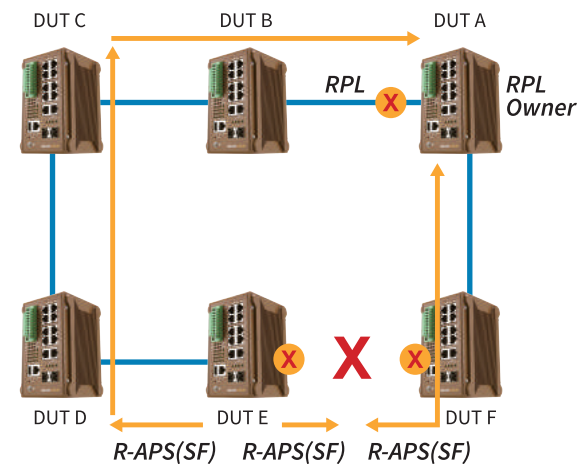
ERPS (Ethernet Ring Protection Switching) is the first industry standard (ITU-T G.8032) for Ethernet ring protection switching. It is achieved by integrating matured Ethernet operations, administration, and maintenance (OAM) functions and a simple automatic protection switching (APS) protocol for Ethernet ring networks. It provides sub-50ms protection for Ethernet traffic in a ring topology and ensures that there are no loops formed at the Ethernet layer. The first version supported a single ring architecture and the second version is expected to address multiple inter-connected rings.

## The Failure Condition

When a failure is detected on a ring port, known as a Signal Fail (SF), the node detecting the failure will generate an R-APS (SF) message. The RPL nodes remove the block on the RPL link, and all the nodes perform a Forwarding Database (FDB) flush which allows traffic to quickly return. When a node on the link detects a fault, it immediately blocks the faulty node and reports the fault message (R-APS (SF)) to all the other devices in the ring. After receiving the message, all other nodes refresh the FDB. The RPL owner port receives the fault message, and the recovery port is in the forwarding state. The ERPS ring enters the protection state.

## The Failure Recovery

- When the RPL Owner receives R-APS(NR) message it starts WTR timer. Once WTR timer expires, RPL Owner blocks RPL and transmits R-APS (NR, RB) message
- Nodes receiving the message – perform a FDB Flush and unblock their previously blocked ports.
- Ring is now returned to Idle state



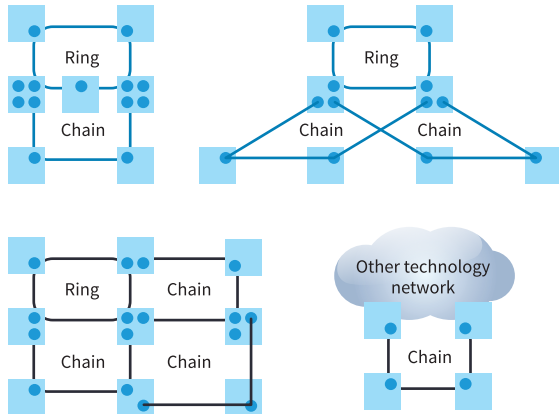
## Benefits of adapting ITU-T G.8032 v2 Ethernet Ring Protection Switching

- The mechanisms and protocol defined in G.8032 v2 ERPS is tending to replace proprietary ring redundancy and standard Ethernet Ring Switching, as it provides stable protection of the entire Ethernet Ring from any loops.
- G.8032 v1 standard supported single ring topology, whilst G.8032 version 2 additionally provides 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 multipoint connectivity with reduced number of links.
- Important to note, deploying switches supporting G.8032 v2 ERPS provides economical and highly resilient Ethernet infrastructure, as they can interoperate with third party switches

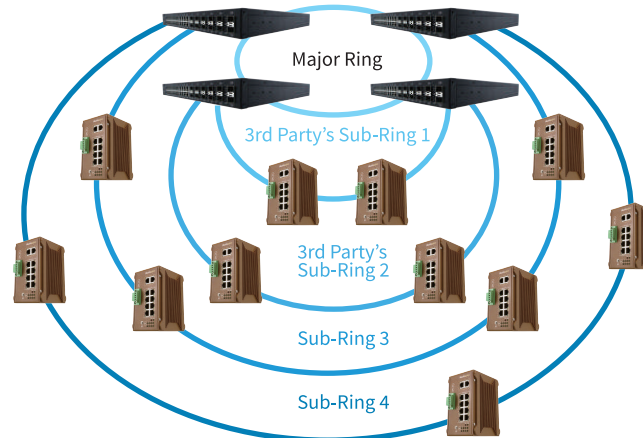


# Advanced ITU-T G.8032 ERPSv2

## Legacy Ring / Chain Solution



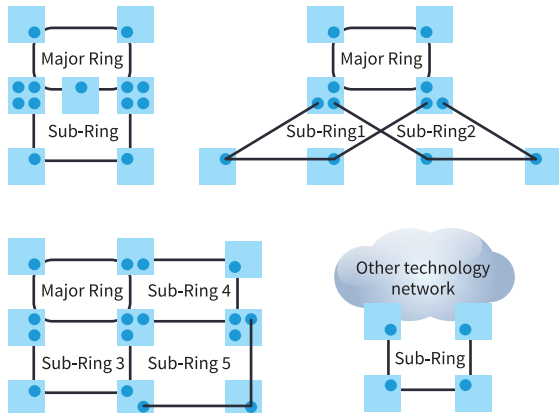
## ERPS v2 is flexible to replace Chain



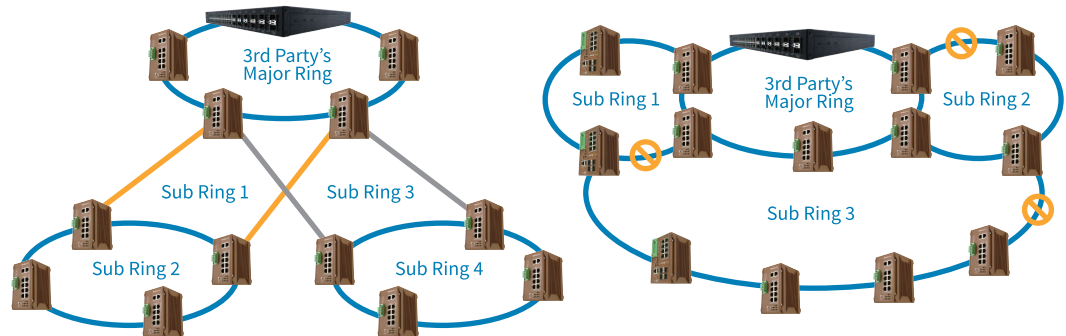
- Support ERPSv2, HW-based CFM
- Overcome GbE copper physical limitation
- Recovery time < 20ms@250pcs, seamless restoration
- Inter-Operability with 3rd Party devices
- Replace Ring + Chain + Dual Homing

Interface	Recovery time
100M Copper/Fiber	10ms@250pcs
GbE Copper w.CCM	20ms@250pcs
GbE Fiber	20ms@250pcs
10GbE Copper/Fiber	20ms@250pcs

## New ERPS v2 Standard



## ERPS v2 can easily replace Dual Homing to 3rd party proprietary Ring



# IEC62443 Cyber Security

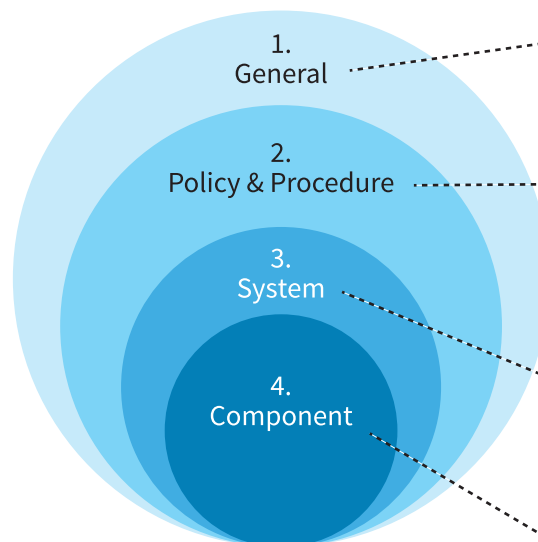
## Industrial Automation & Control System

As the Industrial IoT (IIoT) demand continues growing, the closed industrial networks is facing challenges to be accessible over the public Internet. While it enhances operational efficiency, however, it brings more cyber security threats. The governments and enterprises are more concerned about the potential cyber security damages.

The IEC 62443 Standard includes up-to-date security guidelines and a list of best practices for different parts of a network. It also includes information for those who perform different responsibilities on the network in order to protect against known security leaks and unknown attacks. The ultimate goal of the standard is to help improve the safety of networks and enhance industrial automation and control settings security.

At present, many system integrators, such as Siemens and ABB, require component suppliers to comply with the IEC 62443-4-2 subsection that specifically pertains to the security of end devices. This subsection defines four security threat levels.

- Level 1 is to protect against accidental and unauthenticated access
- Level 2 is the baseline requirement of the automation industry. It relates to cyber threats posed by hackers, which is the most common attack experienced by system integrators
- Level 3 and 4 are against intentional access by hackers who utilize specific skills and tools



## The Scope of IEC 62443 standard

- 1-1 : Terminology and concepts
- 1-2 : Master glossary
- 1-3 : System security compliance metrics
- 1-4 : IACS security lifecycle and use-case

- 2-1 : Requirements for an IACS security management system
- 2-2 : Implementation guidance
- 2-3 : Patch management
- 2-4 : Installation & maintenance

✓ **Apply to Asset Owner**

- 3-1 : Security technologies for IACS
- 3-2 : Security levels for zones conduits
- 3-3 : System security requirements and levels

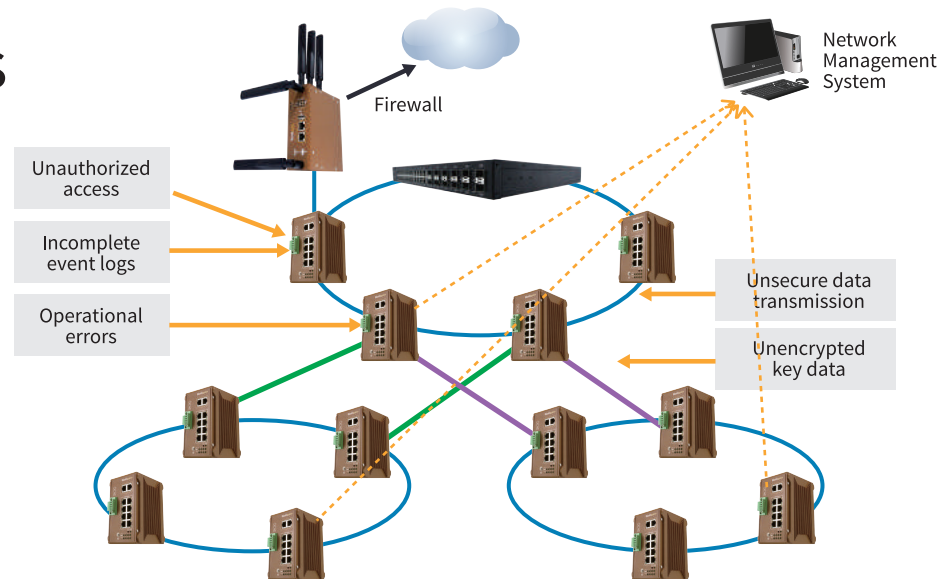
✓ **Apply to System Integrator**

- 4-1 : Product development requirements
- 4-2 : Technical security requirement for IACS components

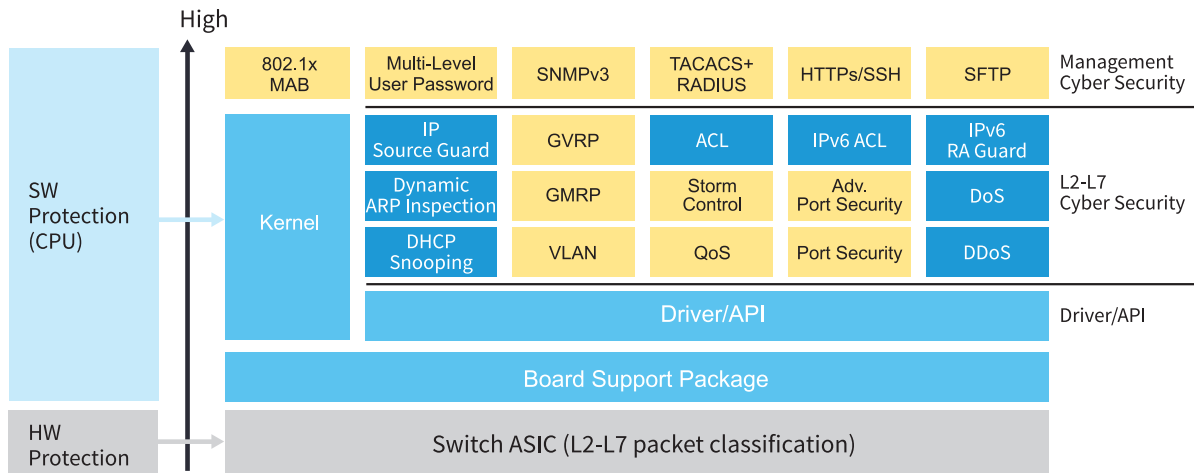
✓ **Apply to Component Supplier**

# Cyber Security Solutions

From the viewpoint of cyber security experts, the major cyber security threats that can affect internal networks include unauthorized access, unsecured data transmission, unencrypted key data, incomplete event logs, and operational errors.



- IEC62443-4-2 Level 2 Security
- IEC62443-4-2 Level 3/4 Security

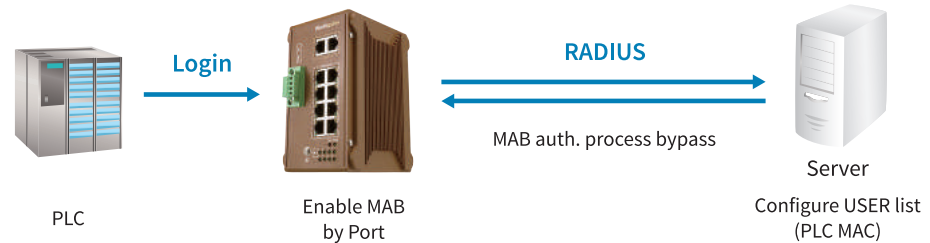


WoMaster provides SW & HW(ASIC) integrated protection mechanism, which applies the latest Application-Specific Integrated Circuit (ASIC) secure technology (L2-L7 packet classification), that covers from level 1 to level 4 of IEC 62443-4-2 range.

# Level 2 Security

## IEEE802.1x MAB (MAC Authentication Bypass)

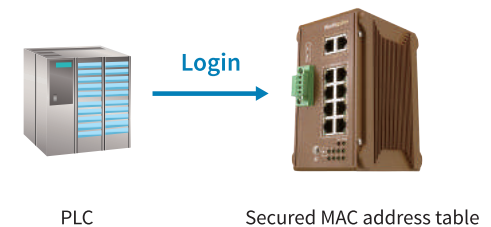
MAB enables port-based access control by bypassing the MAC address authentication process to RADIUS Server. Prior to MAB, the endpoint's (ex. PLC) identity is unknown and all traffic is blocked. The switch examines a single packet to learn and authenticate the source MAC address. After MAB succeeds,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



## Advanced Port Based Security

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 pre-configured 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 remain 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-shut down the port, if a security violation event occurs.





1

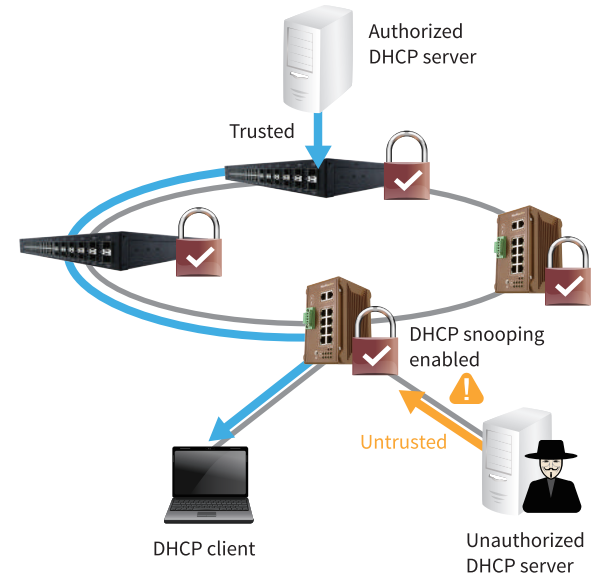
# Level 3/4 Security

2

## 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.



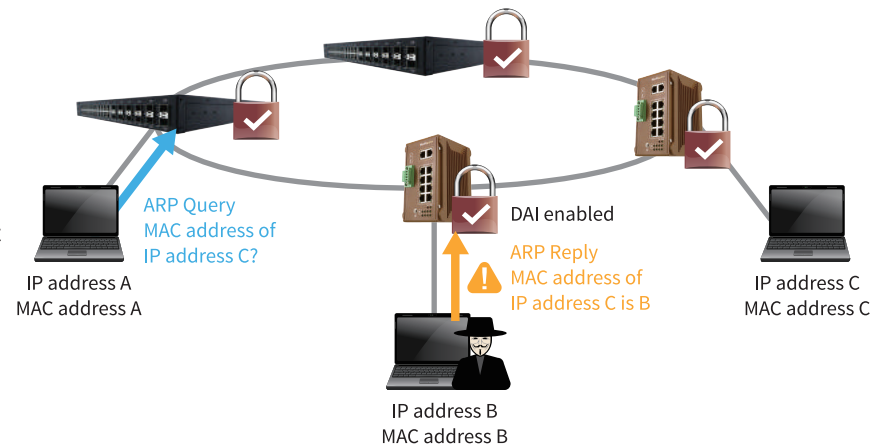
3

## 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

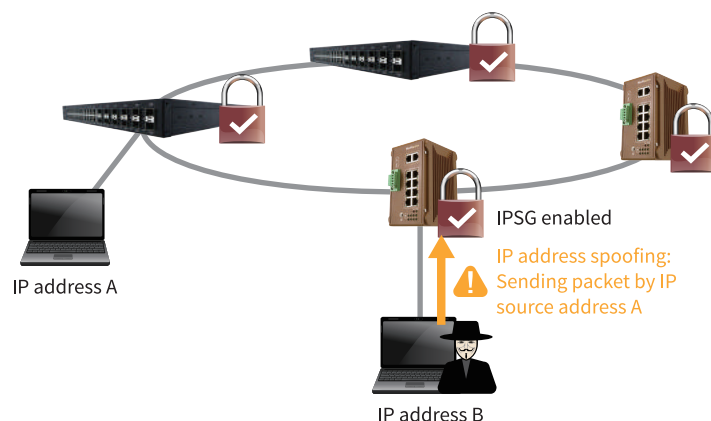


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DAI determines the validity of an ARP packet based on valid IP-to-MAC address bindings stored in a trusted database, the DHCP snooping binding database. This database is built by DHCP snooping if DHCP snooping is enabled on the VLANs and on the switch. 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 exceeds IEC62443-4-2 Level 2 requirements to build most secure systems for industrial applications.

# Level 3/4 Security

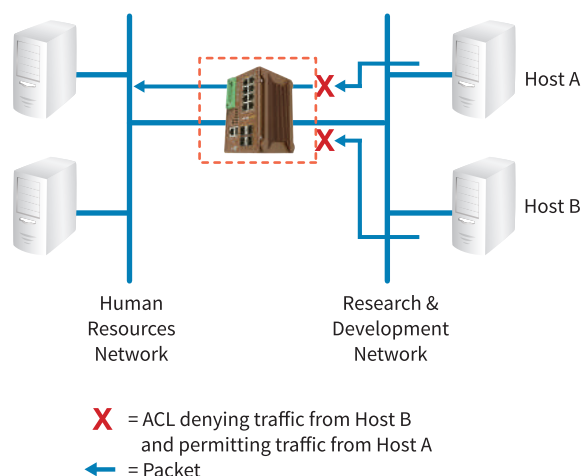
## IP Source Guard (IPSG)



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 / IPv6 Access Control List (ACL)



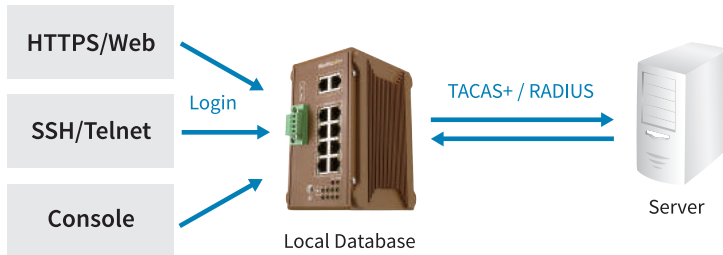
Packet filtering limits network traffic and restricts network use by certain users or devices. ACLs filter traffic as it passes through a switch and permits or denies packets crossing specified interfaces. An ACL is a sequential collection of permit and deny conditions that apply to packets. When a packet 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).

1

# Network Management

2



## Multi-Level User Passwords

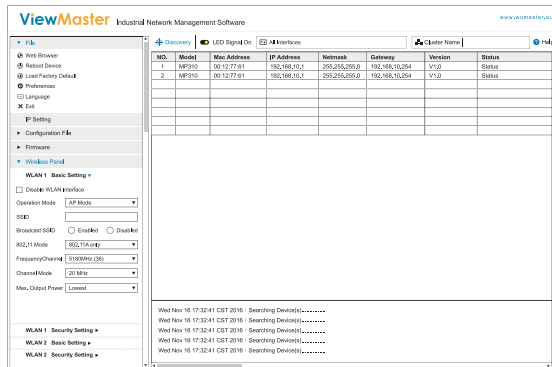
Different centralized authentication server is supported such as RADIUS and TACACS+. Using a central authentication server simplifies account administration, in particular when you have more than one switch in the network. Authentication Chain is also supported. An authentication chain is an ordered 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.

3

## ViewMaster Configuration Utility

ViewMaster is the network management utility for WoMaster devices. It can automatically discover network devices for batch configuration and upgrade, thus helps system integrators install the system more easily.

ViewMaster can also put alarm and reminder for cyber security events.



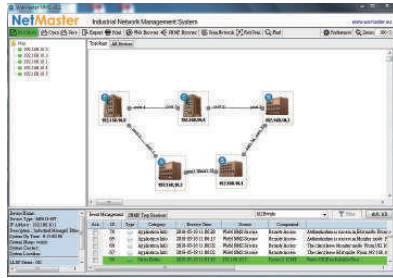
4

NetMaster is a full featured, scalable, management software for monitoring, configuring and maintaining industrial mission-critical networks. It provides an integrated management platform that can discover SNMP/IP networking devices on subnets. All selected network devices can be managed from both local and remote sites.

- Discovers and visualizes network devices and physical connections automatically, up to 2k devices
- Real-time monitoring and notification of events, alarms and thresholds through SMS, email, and SNMP trap
- Continuous collection of traffic statistics for analysis and reporting
- Centralized configuration and firmware management
- Periodic backup device configuration
- Supports 3rd-party devices with MIB compiler and MIB browser

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

Automatic Discover and Intuitive Visualization of Network Devices and Topology



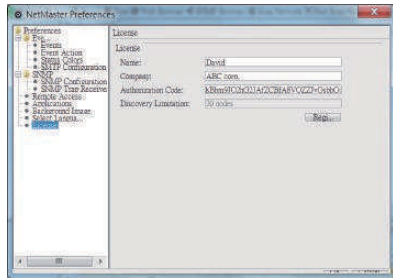
IP Device Lists, Device Information, Fault Alert and Event Logs

A screenshot of the NetMaster software interface showing a table of IP device lists. The table has columns for IP, Name, Type, and Status. Below the table, there is a section for device information, including fields for Name, IP, and Status. The interface also shows a tree view on the left and a status bar at the bottom.

## 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

High Scalability for up to 2000 network nodes by license upgrade



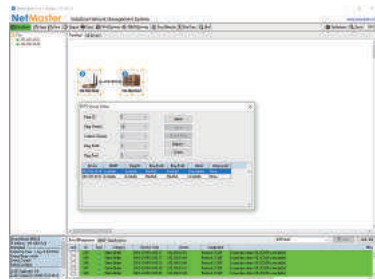
MIB Browser and Compiler for 3rd Party Device Management

A screenshot of the NetMaster software interface showing the MIB Browser and Compiler for 3rd Party Device Management. The interface displays a tree view of MIBs on the left, a table of MIBs in the center, and a text area for MIB compilation on the right. The table has columns for MIB Name, MIB ID, and MIB Key.

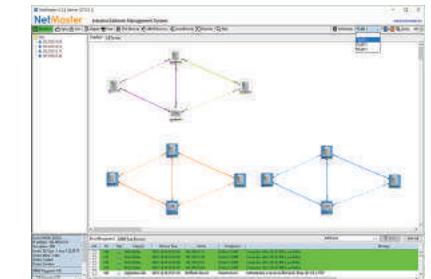
## Configuration & Fault Management

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



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





## Ordering Information- Wireless

Industrial Wireless AP	Radio	Copper	Fiber	
WA329	11AC	8+1G	-	Industrial 8FE+1GE port Wireless AP/Client, Dual 802.11ac/n WLAN
WA329P	11AC	8P+1G	-	Industrial 8FE PoE + 1GE port Wireless AP/Client, Dual 802.11ac/n WLAN
WA211	11a/n	-	-	Industrial Wireless 802.11an AP IP55 5dBi External Ant
WA211B-E / U	11a/n	-	-	Industrial Wireless 802.11an AP IP55 13dBi Internal Ant
Industrial Wireless Router	Radio	Copper	Fiber	
WR214-WLAN	11b/g/n	4	-	Industrial Wireless IIoT Field Router, 4FE, 802.11b/g/n WLAN (no antennas included)
WR214-WLAN+LTE-E	LTE+11b/g/n	4	-	Industrial Wireless IIoT Field Router, 4FE, 802.11b/g/n WLAN, LTE-E, 2SIM, FDD B1/3/5/7/8/20, TDD B38/40/41 (no antennas included)
WR212-WLAN	11b/g/n	2	-	Industrial Wireless IIoT Field Router, 2FE, 1COM, 802.11b/g/n WLAN (no antennas included)
WR222-LTE	LTE+11b/g/n	2	-	Industrial Wireless IIoT Field Router, 2FE, 1 COM, 802.11b/g/n WLAN, LTE-E, 2SIM, FDD B1/3/5/7/8/20, TDD B38/40/41 (no antennas included)
WR312A-M12-WLAN	11n/ac	2G M12	-	Industrial Railway Cellular Router, 2G M12 +1 COM, 802.11ac/n WLAN (with WiFi antennas)
WR312A-M12-LTE	LTE	2G M12	-	Industrial Railway Cellular Router, 2G M12 + 1 COM, LTE-E (with LTE antennas)
WR302G	-	2G	-	Industrial Secure Gigabit IIoT Router, 2GbE+2COM
WR312G-LTE-E	LTE	2G	-	Industrial Secure Cellular Router, 2GbE+2COM, LTE-E (with LTE antennas)
WR312G-LTE6-E	LTE6	2G	-	Industrial Secure Cellular Router, 2GbE+2COM, LTE6-E(with LTE antennas)
WR312G-WLAN	11AC	2G	-	Industrial Secure Cellular Router, 2GbE+2COM, 802.11ac/n WLAN (with WiFi antennas)
WR322G-WLAN+LTE-E	LTE+11AC	2G	-	Industrial Secure Wireless Router, 2GbE+2COM, LTE-E + Wi-Fi (with LTE and WiFi antennas)
WR322GR-WLAN+LTE-E+GPS	LTE+11ac	2G	-	Industrial Secure Wireless Router, 2GbE+2COM, LTE-E Dual SIM + Wi-Fi + GPS (with LTE and WiFi antennas), MQTT, Cloud Agent
WR316GPS-LTE-E	LTE	4GP	2GF	Industrial 6G Cellular PoE Routing Switch, 2SFP, LTE-E, FDD B1/3/5/7/8/20, TDD B38/40/41 (with LTE antennas)
WR329-WLAN+LTE-E	LTE+11ac	8+1G	-	Industrial 8+1G port Cellular Ethernet Routing Switch, 802.11ac/n WLAN, LTE-E, FDD B1/3/5/7/8/20, TDD B38/40/41 (antenna not included)
WR329P-WLAN+LTE-E	LTE+11ac	8P+1G	-	Industrial 8+1G port Cellular PoE Routing Switch, 802.11ac/n WLAN, LTE-E, FDD B1/3/5/7/8/20, TDD B38/40/41(antenna not included)
*WR329-2xLTE-E	2xLTE	8+1G	-	Industrial 8+1G port Cellular Ethernet Routing Switch, LTE-E, FDD B1/3/5/7/8/20, TDD B38/40/41(antenna not included)
*WR329P-2xLTE-E	2xLTE	8P+1G	-	Industrial 8+1G port Cellular PoE Routing Switch, LTE-E, FDD B1/3/5/7/8/20, TDD B38/40/41(antenna not included)

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

## Ordering Information- SmartCityBox and Software

Embedded Safe City Box	Radio	Copper	Fiber	
SCB400/400A-AC/DC	L3	2GP+1G	-	Industrial Embedded IP67 Smart City Box with 2GT PoE, 1GT WAN, 1xCOM,2xDI,1xDO,Voice, 1xUSB
SCB400/400A-NP-AC/DC	L3	2G+1G	-	Industrial Embedded IP67 Smart City Box with 2GT, 1GT WAN, 1xCOM,2xDI,1xDO,Voice, 1xUSB
SCB1000-AC	L3	4GP+1G	2GF	Industrial Embedded IP67 Smart City Box with 4GT PoE + 2GF, 1GT WAN, AC Input
SCB1200-AC	L3	4GP+1G	2GF	Industrial Embedded IP67 Smart City Box with 4GT PoE + 2GF, 1GT WAN, IIoT interfaces, AC Input (IIoT Interfaces: External 1xCOM,2xDI,2xDO,Voice; Internal 1GT WAN, 1xCOM, 1xUSB, 1xSD)
SCB1000-AC+BasicSolar	L3	4GP+1G	2GF	Industrial Embedded IP67 Smart City Box with 4GT PoE + 2GF, 1GT WAN, IIoT interfaces, AC Input (IIoT Interfaces: External 1xCOM,2xDI,2xDO,Voice; Internal 1GT WAN, 1xCOM, 1xUSB, 1xSD) (Basic Solar Kit: Typ. 48V/2.5AH Battery and AC/PV charger board pre-installed inside.)
SCB1200-AC+BasicSolar	L3	4GP+1G	2GF	Industrial LTE Cellular Module EU: FDD B1/B3/B5/B7/B8/B20, TDD B38/B40/B41, WCDMA: B1/B5/B8, GSM: B3/B8 Antenna: LTE+GPS Antenna on the top of case.
SCB LTE Module & Antenna-EU	LTE	-	-	Industrial LTE Cellular Module, CN FDD B1/B3/B8, TDD B38/B39/B40/B41, TDSCDMA: B34/B39, WCDMA: B1/B8, GSM:900/1800 Antenna: LTE+GPS Antenna on the top of case.
SCB LTE Module & Antenna-CN	LTE	-	-	Industrial LTE Cellular Module, CN Band CN: FDD B1/B3/B8, TDD B38/B39/B40/B41, TDSCDMA: B34/B39, WCDMA: B1/B8, GSM:900/1800 Antenna: LTE+GPS Antenna on the top of case
SCB LTE Module & Antenna-US	LTE	-	-	Industrial LTE Cellular Module, USBand US: FDD B2/B4/B12, WCDMA: B2/B4/B5 Antenna: LTE+GPS Antenna on the top of case.
SCB WiFi Module	11ac	-	-	Industrial 5G/2.4G 802.11ac/n Wifi 2T2R Module Pre-install 2x N-Type Female Antenna sockets on the top of case
<b>Outdoor Environment Sensors</b>				
ES106	-	-	-	Outdoor Integrated Sensors- PM2.5, PM10, Temperature, Humidity, Wind Speed, Wind Direction, Output : RS485
ES104	-	-	-	Outdoor Integrated Sensors- PM2.5, PM10, Temperature, Humidity, Output : RS485
ES102	-	-	-	Outdoor Integrated Sensors- Wind Speed, Wind Direction, Output : RS485
ES101 (Soil pH)	-	-	-	Outdoor Soil pH Sensors, 0~14pH, Output : RS485
ES101 (Noise)	-	-	-	Outdoor Noise Sensors, 30~130dB, Output : RS485

<b>Cloud NMS Software</b>	
ThingsMaster-1GW (Trial Version)	1 gateways and each gateway supports 20 Modbus tags
ThingsMaster-10GW	10 gateways and each gateway supports 20 Modbus tags
ThingsMaster-50GW	50 gateways and each gateway supports 20 Modbus tags
ThingsMaster-100GW	100 gateways and each gateway supports 20 Modbus tags
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 license
NetMaster-100	Industrial Network Management System software with a license for 100 nodes license
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

## Ordering Information- Ethernet Switches

Industrial PoE Switch	Managed	Copper	Fiber	
DP612	L3	8GP	4GF	Industrial 8G PoE+4G SFP L3 Managed PoE Switch
DP412	L2	8GP	4GF	Industrial 8G PoE+4G SFP L2 Managed PoE Switch
DP406	L2	4GP	2GF	Industrial 4G+2G SFP L2 Managed PoE Switch
DP310	L2	8P	2GC	Industrial 8 PoE+2G Combo L2 Managed PoE Switch
WR309P	L2	8P+1G	-	Industrial 8 PoE+1G Managed Power Boost PoE Switch
DP210	-	8P+2G	-	Industrial 8 PoE(af/at)+2G unmanaged Boost PoE Switch
DP208	-	8GP	-	Industrial 8G PoE(af/at) unmanaged Switch 48V
DP101-MM-SC	-	1	1F	Industrial Fiber Converter, Multimode, 2KM, -40~75°C, PoE feeding 90W
DP101-MM-SC	-	1	1F	Industrial Fiber Converter, Singlemode, 30KM, -40~75°C, PoE feeding 90W
Industrial Ethernet Switch				
DS612	L3	8G	4GF	Industrial 8G+4G SFP L3 Managed Switch
DS412	L2	8G	4GF	Industrial 8G+4G SFP L2 Managed Switch
DS410F	L2	2G	6GF+2GC	Industrial 2G+2GC+6GF L2 Managed Switch
DS409	L2	6G	3GC	Industrial 6G+3G Combo L2 Managed Switch
DS406	L2	4G	2GF	Industrial 4G+2G SFP L2 Managed Switch
DS310	L2	8	2GC	Industrial 8+2G Combo L2 Managed Switch
WR309	L2	8+1G	-	Industrial 8+1G port Routing Switch
DS306-MM-SC-2	L2	4G	2F	Industrial 4G+2F L2 Managed Switch, multi-mode, 2km/1310nm, SC/ST
DS306-SS-SC-30	L2	4G	2F	Industrial 4G+2F L2 Managed Switch, single-mode, 30km/1310nm, SC/ST
DS210	-	8+2G	-	Industrial 8+2G unmanaged Switch
DS208	-	8G	-	Industrial 8G unmanaged Switch
DS108	-	8	-	Industrial 8 port unmanaged Switch
DS108-MM-SC-2	-	6	2F	Industrial 6+2F unmanaged Switch, multi-mode, 2km/1310nm, SC
DS108-SS-SC-30	-	6	2F	Industrial 6+2F unmanaged Switch, single-mode, 30km/1310nm, SC
DS105	-	5	-	Industrial 5 port unmanaged switch (5~30VDC)
DS101-M-SC	-	1	1F	Industrial Fiber Converter, multi-mode, 2km/1310nm, SC
DS101-S-SC	-	1	1F	Industrial Fiber Converter, single-mode, 30km/1310nm, SC
Industrial M12 Managed Switch				
MP614-WV	L3	8GP+6G	-	Industrial 14G L3 Managed M12 PoE Switch, 2G Bypass, 16~137VDC
MP614-HV	L3	8GP+6G	-	Industrial 14G L3 Managed M12 PoE Switch, 2G Bypass, 110VDC
MP614-LV	L3	8GP+6G	-	Industrial 14G L3 Managed M12 PoE Switch, 2G Bypass, 8~57VDC
MP414-WV	L2	8GP+6G	-	Industrial 14G L2 Managed M12 PoE Switch, 2G Bypass, 16~137VDC
MP414-HV	L2	8GP+6G	-	Industrial 14G L2 Managed M12 PoE Switch, 2G Bypass, 110VDC
MP414-LV	L2	8GP+6G	-	Industrial 14G L2 Managed M12 PoE Switch, 2G Bypass, 8~57VDC
MP310-HV	L2	7P+1GP+2G	-	Industrial 7+3G L2 Managed M12 PoE Switch, 7 M12 FE+3 M12 GbE, 2G Bypass, 110VDC
MP310-MV	L2	7P+1GP+2G	-	Industrial 7+3G L2 Managed M12 PoE Switch, 7 M12 FE+3 M12 GbE, 2G Bypass, 48VDC
MP310-LV	L2	7P+1GP+2G	-	Industrial 7+3G L2 Managed M12 PoE Switch, 7 M12 FE+3 M12 GbE, 2G Bypass, 8~57VDC

## Ordering Information- Rackmount

Industrial Rackmount Switch	Managed	Copper	Fiber	
RS752	L3	48G	4x10GF	Industrial Rackmount 48G+4x10G SFP+ L3 Switch, dual AC
RS628	L3	20G	4GC+4G SFP	Industrial L3 20G+4GC+4G SFP Managed Ethernet Switch, AC
RS628-2AC	L3	20G	4GC+4G SFP	Industrial L3 20G+4GC+4G SFP Managed Ethernet Switch, dual AC
RP628-AC-P200	L3	20GP	4GC+4G SFP	Industrial L3 20G+4GC+4G SFP Managed Ethernet Switch, 200W PoE Budget
RS428	L2	20G	4GC+4G SFP	Industrial L2 20G+4GC+4G SFP Managed Ethernet Switch, AC
RS428-2AC	L2	20G	4GC+4G SFP	Industrial L2 20G+4GC+4G SFP Managed Ethernet Switch, dual AC
RP428-AC-P200	L2	20GP	4GC+4G SFP	Industrial L3 20G+4GC+4G SFP Managed Ethernet Switch, 200W PoE Budget
RP428-ACP200+2DC54V	L2	20GP	4GC+4G SFP	Industrial L3 20G+4GC+4G SFP Managed Ethernet Switch, 200W PoE Budget, DC54V
RS328	L2	24	4GC SFP	Industrial 24+4G L2+ Managed Ethernet Switch, AC

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



## Ordering Information- SFP Fiber Modules

SFP	Speed	Distance	Fiber	XG(10G)/GE(Giga), S/M(Single/Multi), KM, T(Wide temperature), D(DDM)
SFPFEM2	100M	2KM	Multi	SFP, 100Mbps, LC, multi, 2KM, 1310nm, 0~70°C
SFPFEM2T	100M	2KM	Multi	SFP, 100Mbps, LC, multi, 2KM, 1310nm, -40~85°C
SFPFES30	100M	30KM	Single	SFP, 100Mbps, LC, single, 30KM, 1310nm, 0~70°C
SFPFES30T	100M	30KM	Single	SFP, 100Mbps, LC, single, 30KM, 1310nm, -40~85°C
SFPGETX	1000M	Copper	-	SFP, 1000Base-T, Copper, RJ45, 100m, 0~70°C
SFPGETXT	1000M	Copper	-	SFP, 1000Base-T, Copper, RJ45, 100m, -40~85°C
SFPGEM05	1000M	550M	Multi	SFP, 1000Mbps, LC, multi, 550M, 850nm, 0~70°C
SFPGEM05T	1000M	550M	Multi	SFP, 1000Mbps, LC, multi, 550M, 850nm, -40~85°C
SFPGEM05D	1000M	550M	Multi	SFP, 1000Mbps, LC, multi, DDM, 550M, 850nm, 0~70°C
SFPGEM05DT	1000M	550M	Multi	SFP, 1000Mbps, LC, multi, DDM, 550M, 850nm, -40~85°C
SFPGEM2	1000M	2KM	Multi	SFP, 1000Mbps, LC, multi, 2KM, 1310nm, 0~70°C
SFPGEM2T	1000M	2KM	Multi	SFP, 1000Mbps, LC, multi, 2KM, 1310nm, 0~70°C
SFPGEM2D	1000M	2KM	Multi	SFP, 1000Mbps, LC, multi, DDM, 2KM, 1310nm, 0~70°C
SFPGEM2DT	1000M	2KM	Multi	SFP, 1000Mbps, LC, multi, DDM, 2KM, 1310nm, -40~85°C
SFPGES10	1000M	10KM	Single	SFP, 1000Mbps, LC, single, 10KM, 1310nm, 0~70°C
SFPGES10T	1000M	10KM	Single	SFP, 1000Mbps, LC, single, 10KM, 1310nm, -40~85°C
SFPGES10D	1000M	10KM	Single	SFP, 1000Mbps, LC, single, DDM, 10KM, 1310nm, 0~70°C
SFPGES10DT	1000M	10KM	Single	SFP, 1000Mbps, LC, single, DDM, 10KM, 1310nm, -40~85°C
SFPGES30	1000M	30KM	Single	SFP, 1000Mbps, LC, single, 30KM, 1310nm, 0~70°C
SFPGES30T	1000M	30KM	Single	SFP, 1000Mbps, LC, single, 30KM, 1310nm, -40~85°C
SFPGES30D	1000M	30KM	Single	SFP, 1000Mbps, LC, single, DDM, 30KM, 1310nm, 0~70°C
SFPGES30DT	1000M	30KM	Single	SFP, 1000Mbps, LC, single, DDM, 30KM, 1310nm, -40~85°C
SFPGES40	1000M	40KM	Single	SFP, 1000Mbps, LC, single, 40KM, 1310nm, 0~70°C
SFPGES40T	1000M	40KM	Single	SFP, 1000Mbps, LC, single, 40KM, 1310nm, -40~85°C
SFPGES40D	1000M	40KM	Single	SFP, 1000Mbps, LC, single, DDM, 40KM, 1310nm, 0~70°C
SFPGES40DT	1000M	40KM	Single	SFP, 1000Mbps, LC, single, DDM, 40KM, 1310nm, -40~85°C
SFPGES10-A	1000M	10KM	Single	SFP, 1000Mbps, LC, single, 10KM, BiDi TX-1310nm RX-1550nm, 0~70°C
SFPGES10T-A	1000M	10KM	Single	SFP, 1000Mbps, LC, single, 10KM, BiDi TX-1310nm RX-1550nm, -40~85°C
SFPGES10-B	1000M	10KM	Single	SFP, 1000Mbps, LC, single, 10KM, BiDi TX-1550nm RX-1310nm, 0~70°C
SFPGES10T-B	1000M	10KM	Single	SFP, 1000Mbps, LC, single, 10KM, BiDi TX-1550nm RX-1310nm, -40~85°C
SFPGES10D-A	1000M	10KM	Single	SFP, 1000Mbps, LC, single, DDM, 10KM, BiDi TX-1310nm RX-1550nm, 0~70°C
SFPGES10DT-A	1000M	10KM	Single	SFP, 1000Mbps, LC, single, DDM, 10KM, BiDi TX-1310nm RX-1550nm, -40~85°C
SFPGES10D-B	1000M	10KM	Single	SFP, 1000Mbps, LC, single, DDM, 10KM, BiDi TX-1550nm RX-1310nm, 0~70°C
SFPGES10DT-B	1000M	10KM	Single	SFP, 1000Mbps, LC, single, DDM, 10KM, BiDi TX-1550nm RX-1310nm, -40~85°C
SFPXGM03D	10G	300M	Multi	SFP+, 10Gbps, LC, multi, DDM, 300M, 850nm, 0~70°C
SFPXGM03DT	10G	300M	Multi	SFP+, 10Gbps, LC, multi, DDM, 300M, 850nm, -40~85°C
SFPXGS10D	10G	10KM	Single	SFP+, 10Gbps, LC, single, DDM, 10KM, 1310nm, 0~70°C
SFPXGS10DT	10G	10KM	Single	SFP+, 10Gbps, LC, single, DDM, 10KM, 1310nm, -40~85°C



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