

Choose ORing Make Excellence

ORing Industrial Networking Solutions



## Industrial Networking Solutions

Ethernet Switch  
PoE Switch/ PoE Accessory  
EN50155 Series  
IEC 61850-3 Series  
Cellular Router  
Wireless Solution  
Media Converter  
Serial Device Server  
Smart Lighting Controller

**ORing**  
www.ORingnet.com

## Unmanaged Switch

Standard/ Cost-effective

- Portfolio includes 10M T1L, FE, 1GbE, 2.5GbE, and 10GbE options
- Available in DIN-rail and wall mount types
- 5 to 24 ports supported
- Single-Pair Ethernet (SPE) solution available

## Managed Switch

Lite-managed/ Standard L2/ Advanced L2/ L3

- Portfolio includes FE, 1GbE, 2.5GbE, and 10GbE options
- Available in DIN-rail and rackmount types
- 5 to 28 ports supported
- Cyber-hardened series certified to IEC 62443-4-2
- PN series certified for PROFINET CC-B

## PoE Series

Switch/ Media Converter/ Injector/ Splitter

- Supports up to IEEE 802.3bt with 90W output per port
- PSE conformance tested by Sifos
- Comprehensive power booster products with 12V/24V input
- Advanced PoE features supported on managed switches

## EN50155 Series

Switch, WiFi AP, Cellular Router, PoE Injector/ Splitter

- Company is IRIS certified
- EN 50155 and EN 45545-2 compliant
- Switches support 5 to 24 ports
- Vibration-proof M12 and Q-ODC connectors
- Available SKUs: DC 24V, DC 110V, and DC 24-110V

## IEC 61850-3 Series

DIN-rail/ Rackmount/ Modular Design

- IEC 61850-3/IEEE 1613 certified
- MMS server, IEC 61850 QoS, PTP supported
- HSR/PRP seamless redundancy
- Up to 12/ 28 SFP sockets on DIN-rail and rackmount models
- Modular models allow customized interface combinations

## Media Converter

Serial Conversion/ Ethernet / PoE to Fiber

- Provides 100M, 1GbE, and 10GbE solutions
- Supports Link Fault Pass-Through
- Dual power inputs
- Standard and wide-temperature range SKUs available
- Fiber interfaces with SC or SFP connectors

## Cellular Router

4G/ 5G/ NB-IoT

- Available in DIN-rail, wall-mount, and pole-mount types
- Secure VPN connections: OpenVPN, PPTP, IPSec, Cloud VPN
- Supports WiFi, Serial, DI/DO, GPS (by model)
- Dual SIM redundancy
- E-mark and EN50155 models available for transport projects
- Provide products approved by AT&T, Verizon, and FirstNet

## Serial Connectivity

RS-232/422/485 to Ethernet/ WiFi/ Cellular

- Operating modes: TCP Server/Client, UDP, VCOM, Modbus Gateway
- Supports Modbus ASCII/RTU to Modbus TCP conversion
- Built-in ORing "Open Gateway" feature
- Dual power input
- OpenWRT SDK available on specific products

## Industrial IoT

For Smart City and Smart Grid Applications

- Smart lighting controller
- FCI (Overhead fault circuit indicator)
- Remote I/O

## WLAN AP/CPE

IEEE 802.11a/b/g/n/ac/ax

- Operating modes: AP, Client, Bridge, AP-Client, and Repeater
- X-Roaming with hand-off time under 100 ms
- IP67/IP68-rated APs for outdoor applications
- EN 50155 models available for railway projects

## Management System

Host Monitor / Topology View / CyberSIEM

## About ORing

Founded in 2005, ORing specializes in innovative industrial-grade products. With extensive experience in wired and wireless network communications, ORing provides high-quality products and excellent customer services for diverse sectors including factory automation, ITS, IP surveillance, railway, power utility, IIoT, and new energy, with global offices for real-time customer support.



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## Global Sales Offices and Services

 ORing Office



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Headquartered in Taiwan, ORing has established branches across the world, including the US, China, Europe, and India to address worldwide customers' needs more efficiently. ORing has also built long-term partnerships with regional distributors to provide products, customer services, and technical support in real time. Besides a solid understanding of our offerings and applications, ORing's well-trained sales representatives and channel partners have constantly stayed on top of the latest market industry trends. Therefore, we can help users make the most out of ORing's products and solutions to address their current and future needs. With the support of the internal R&D team, our sales team can help customers with technical problems related to a product or service immediately.

For more information, please contact ORing directly by email at [info@oringnet.com](mailto:info@oringnet.com) or through our worldwide distributors. You can also visit ORing's website at [www.oringnet.com](http://www.oringnet.com)



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### RMA Service

ORing provides maintenance and repair services for both warranty and out-of-warranty products. RMA items to be repaired or replaced will be defined in the following procedures:

- 1) The customer completes the RMA request form and submits to an ORing contact window.
- 2) Upon receiving a RMA number, the customer ships the product to be repaired to ORing.
- 3) ORing checks the product and identify the problem.
- 4) A service charge will be requested if the product is out of warranty and a pro-forma invoice will be issued to the customer.
- 5) ORing repairs or replaces the product.
- 6) The repaired or replaced product is shipped back to the customer with a RMA report.
- 7) ORing marks the RMA request as closed.

We are available at any time to provide you the most friendly and immediate service.

More Information: [oringnet.com/en/support/oring-rma-service](http://oringnet.com/en/support/oring-rma-service)



### Product Warranty



ORing products are provided with a warranty for up to five years.

### Choose ORing Make Excellence



Subscription



ORing is excited to share the latest updates, exclusive content, and special offers with you. Stay informed about the newest trends and expert insights by subscribing to the ORing newsletter today!

## Focused Vertical Markets with Industrial Grade Certifications

Over 100 models of ORing products have been deployed in a wide variety of applications and environments worldwide. Vertical markets have played a key role in ORing's business. As vertical markets adhere to standards and certification which can be complex, costly, and time-consuming, ORing has made sure all products are produced and tested in certificated labs and manufacturing stages. Also, ORing products are fully compliant with a variety of safety standards, To show our care for the environment, all of ORing's products are qualified with EU's WEEE and RoHS directives.

### IRIS

IRIS (International Railway Industry Standard) is an extension of ISO 9001, tailored for the railway industry. Developed by UNIFE, it ensures the quality and reliability of railway products. ORing has been IRIS certified since 2015, proving its commitment to high standards. This certification reassures partners and customers that ORing meets strict industry requirements and continuously improves its processes. It also helps partners save time and costs by using ORing's ready-certified solutions for safer and more efficient railway applications, with full support from development to management.

### IEC 62443

IEC 62443 is an international standard that address cybersecurity for industrial automation and control systems (IACS). It provides a comprehensive framework to secure these systems throughout their lifecycle, from design and implementation to operation and maintenance. The standards cover everything from organizational security measures to technical requirements, ensuring that industrial environments, such as manufacturing, energy, and critical infrastructure, are protected against cyber threats.

### EN50155

EN50155 is an international standard set for railway applications. EN50155 requires compliance with temperature, humidity, and electromagnetic interference. The standard guarantees the reliability of railway services by governing the operation, design, construction, and testing of electronic equipment.

### EN50121-4

EN50121-4 applies for emission and immunity of the signalling and telecommunications apparatus in railway applications. It specifies the limits of emission as well as immunity, and identifies products that can operate despite the extreme surge and emissions hazards of railway environments.

### EN 45545

EN 45545 specifies the fire protection requirements for materials and products used on railway vehicles. EN 45545-2 compliance demonstrates that the product is designed for fire safety in railway environments, meeting European regulatory requirements for material flammability, smoke, and toxicity performance.

### EN 60945

EN60945 specifies the use of maritime navigation and radio communication equipment on a ship. All such equipment must undergo various tests such as temperature, vibration, humidity, corrosion, water immersion, and electromagnetic emissions to prove their abilities to withstand severe conditions found across the world's oceans.

### C1D2/IECEX

C1D2 and IECEX are two standards for equipment used in hazardous areas such as oil and gas, mining, and energy detection systems. C1D2 is a US standard referring to situations in which ignitable concentrations of gases, vapors, or liquids are present but are contained. IECEX is an international standard regulating the use of electrical equipment and components in potentially explosive areas.

### E-mark

E-mark is an European standard specifying the safety requirements of vehicles and their components. To obtain an E-mark, the products must be tested by a Technical Service appointed by the VCA (Vehicle Certification Agency), which will issue the certificate and approval number to be marked on the product. E-mark is a mandatory requirement and all products installed on a vehicle must have an E-mark to be sold legally in Europe.

### IEEE 1613

IEEE-1613 is the IEEE standard specifying ratings, environmental performance, and testing requirements for communications networking devices installed in electric power substations. Within the standard, two classes (Class 1; Class2) of devices are defined, based on the outcome of a specific set of potentially destructive EMI type tests (EMI stress) designed to stimulate EMI phenomena in the substation.

### IEC 61850-3

IEC 61850 is a standard for the design of electrical substation automation while "-3" signifies general requirements. Abstract data models defined in IEC 61850 can be mapped to a number of protocols that run over TCP/IP networks or substation LANs using high speed switched Ethernet to obtain the necessary response times below four milliseconds for protective relaying.

### AT&T /Verizon Certifications

AT&T and Verizon device certifications are essential for manufacturers to ensure their devices meet network performance and reliability standards. AT&T's process involves regulatory certifications, IoT Network Certification, and performance testing. Verizon requires manufacturers to register with its Open Development program, provide detailed device information, and complete rigorous testing. These certifications guarantee that devices operate safely and effectively on each carrier's network.

### PTCRB

PTCRB is a US standard that ensures mobile devices are compliant with cellular network standards within the operators' networks so that operators can be sure the mobile devices will not harm their networks. Cellular devices to be sold in North America are required to have a PTCRB certificate because it is a requirement for launching cellular devices on the US operators such as AT&T, Verizon, etc.

### IEC 61010-1/ IEC 62368-1

IEC 61010-1 and IEC 62368-1 are two international safety standards that address different aspects of electrical and electronic equipment. IEC 61010-1 focuses on the safety requirements for electrical equipment used in measurement, control, and laboratory environments, ensuring they can be safely operated in those settings. IEC 62368-1, on the other hand, is a hazard-based standard that covers audio/video, information, and communication technology equipment. Both standards are crucial for ensuring that equipment can be used safely in various applications.

### FirstNet

FirstNet is a rigorous process that ensures devices meet stringent technical, performance, and security standards for operation on the FirstNet network, a dedicated broadband system for U.S. first responders. The certification process includes comprehensive testing for network compatibility, performance, and cybersecurity to guarantee reliable and secure communication during emergencies. Certified products benefit from priority access, enhanced security features, and dependable communication, which are vital for public safety.

### FCC

The FCC Declaration of Conformity or the FCC label or the FCC mark is a certification mark employed on electronic products manufactured or sold in the United States which certifies that the electromagnetic interference from the device is under limits approved by the Federal Communications Commission

### CE

The CE marking is a mandatory European conformity marking for certain products sold within, manufactured in, or targeted at the European Economic Area (EEA) since 1993. It consists of the CE-Logo and, if applicable, the four digit identification number of the notified body involved in the conformity assessment procedure. The CE marking is the manufacturer's declaration that the product meets the requirements of the applicable EC directives.



## Product Categories

**Standard**

- IES - 1000 Series
- IGS - 1000 Series
- IPS - 1000 Series
- IGPS - 1000 Series

**Cost-Effective**

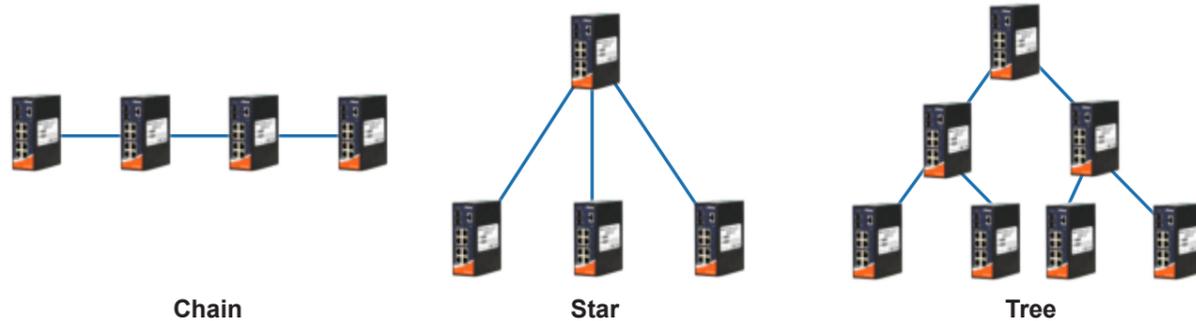
- IES - C1000 Series
- IGS - C1000 Series
- IDGS - C1000 Series
- IGPS - C1000 Series
- IDGPS - C1000 Series

## Industrial Unmanaged Ethernet Switches

- ✓ **High Reliability**
  - Most products feature dual power inputs
  - 5-year warranty
- ✓ **Complete Portfolio**
  - 35+ models available, from 5 to 24 ports
  - DIN-rail or wall mount options
- ✓ **Easy Maintenance**
  - Plug-and-play simplicity
  - Supports relay output for power failure



## Network Topology



### Factory Automation

Withstanding harsh industrial conditions while enabling fast, stable communication between machines and control systems through plug-and-play deployment.



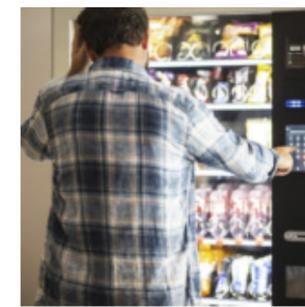
### Surveillance

Delivering reliable data and power to IP cameras in outdoor or factory environments, ensuring uninterrupted video streams with industrial-grade durability.



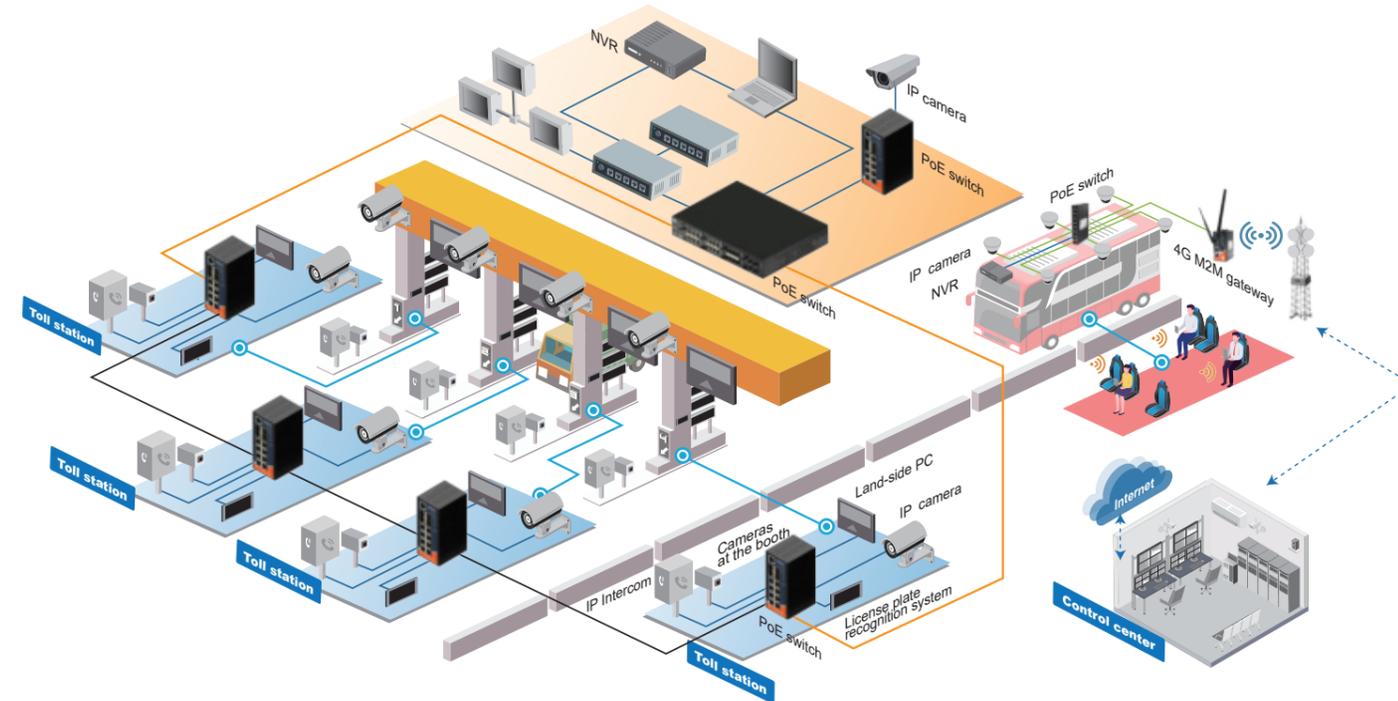
### Building Automation

Simplifying network setup for HVAC, lighting, and access control systems in utility rooms or control panels, with rugged design suited for non-climate-controlled areas.



### Retail

Ensuring stable connectivity for POS, signage, and surveillance devices in challenging environments like warehouses or large-format retail stores, while minimizing maintenance.



**E-MARK**

IES-150B 5FE

IGPS-1080-24V 8G/PSE



**IEC 60945 EN 60945**

IGS-1080A 8GE

IGPS-1411GTPA 4G/PSE + 1GE + 1G SFP slot



Model	Total Port	RJ-45			Fiber			Gigabit Combo	Power Input		DO	Specific Certificate
		10/100 Base-TX	10/100/1G Base-T	10/100/1G/2.5G Base-T	100 Base-FX	100/1G Base-X	100/1G/10G Base-X		Single	Redundant		
IES-1050	5	5							9-30VDC			
IES-150B	5	5								12-48VDC		E-Mark
IES-1050A	5	5								12-48VDC	✓	
IES-1041FX series	5	4			1 SC					12-48VDC	✓	
IES-1042FX series	6	4			2 SC					12-48VDC	✓	
IES-180B	8	8								12-48VDC	✓	
IES-1080A	8	8								12-48VDC	✓	
IES-1160	16	16								12-48VDC	✓	
IES-1162GC	18	16					2			12-48VDC	✓	
IES-1240	24	24								12-48VDC	✓	
IBS-102FX series	2						2 LC			12-48VDC	✓	
IGCS-E140	4		4						PCIe bus-powered			EN50155
IGS-1050A	5		5							12-48VDC	✓	
IGS-150B	5		5							12-48VDC	✓	
IGS-1041GPA	5		4			1 SFP				12-48VDC	✓	
IGS-1042GPA	6		4			2 SFP				12-48VDC	✓	
IGS-1080A	8		8							12-48VDC	✓	IEC/EN60945
IGS-182GP	10		8			2 SFP				12-48VDC	✓	

# C1000: Economical Ethernet Solution

Compared to the standard 1000 series, this lineup removes certain hardware features and adopts a unified design to offer a more cost-effective solution.

- ✔ Fast Ethernet and Gigabit Switch
- ✔ High speed model with 10Gbit/s
- ✔ PoE bt, up to 90W per port



### Compact Design

Saves space, installs easily in compact areas, simplifies maintenance, and is cost-effective, ideal where advanced features aren't needed.



### Built-in QoS

Ensures prioritized data flow and prevents network disruptions, enhancing reliability in demanding environments.



### Broadcast Storm Protection

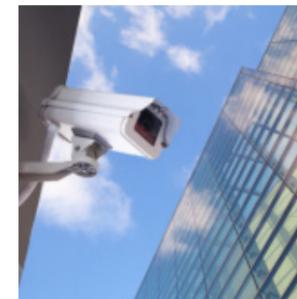
Prevents the impact of broadcast storms, which can severely degrade network performance and stability.

## Target Applications



### Factory Automation

Providing fast local communication between high-speed devices like vision systems or industrial PCs, with 10G uplinks supporting centralized data processing and monitoring.



### Surveillance

Delivering higher bandwidth for high-resolution IP cameras and smooth video streaming, while ensuring stable backhaul to the NVR or control center via 10G uplink.



### ITS

Ensuring fast data delivery from traffic sensors and cameras to central systems, while simplifying roadside deployments with 2.5G Ethernet and fiber connectivity



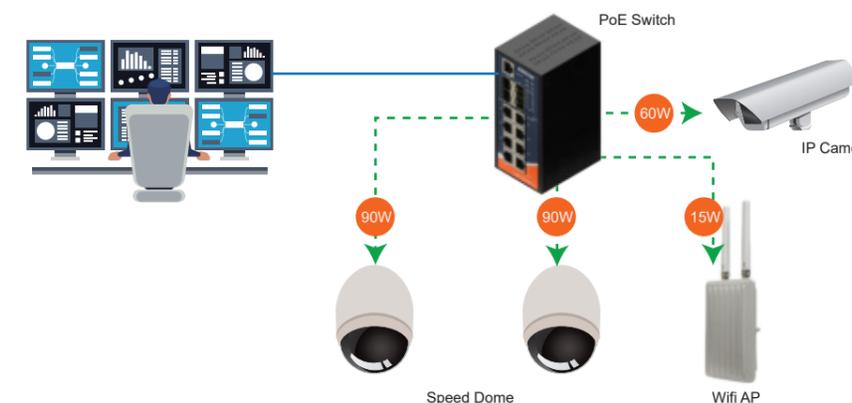
### Smart City

Powering edge devices like smart cameras or sensors with 2.5G PoE, while aggregating large data volumes through 10G fiber for real-time analysis and responsive services.

## Power Your Devices. Simplify Your Network.

PoE provides numerous benefits in terms of network efficiency and cost-effectiveness, such as flexible network designs, simplified, faster, and lower-cost installation, easy and fast rearrangement of existing deployments, and centralized power management.

The IEEE has ratified three PoE standards: IEEE 802.3af, IEEE 802.3at, and IEEE 802.3bt. IEEE 802.3af provides up to 15.4W of DC power to each device, IEEE 802.3at (also known as PoE+ or PoE plus) provides up to 30W, and the latest IEEE 802.3bt standard delivers up to 90W of power for high-power devices like PTZ IR cameras and multifunction endpoints.



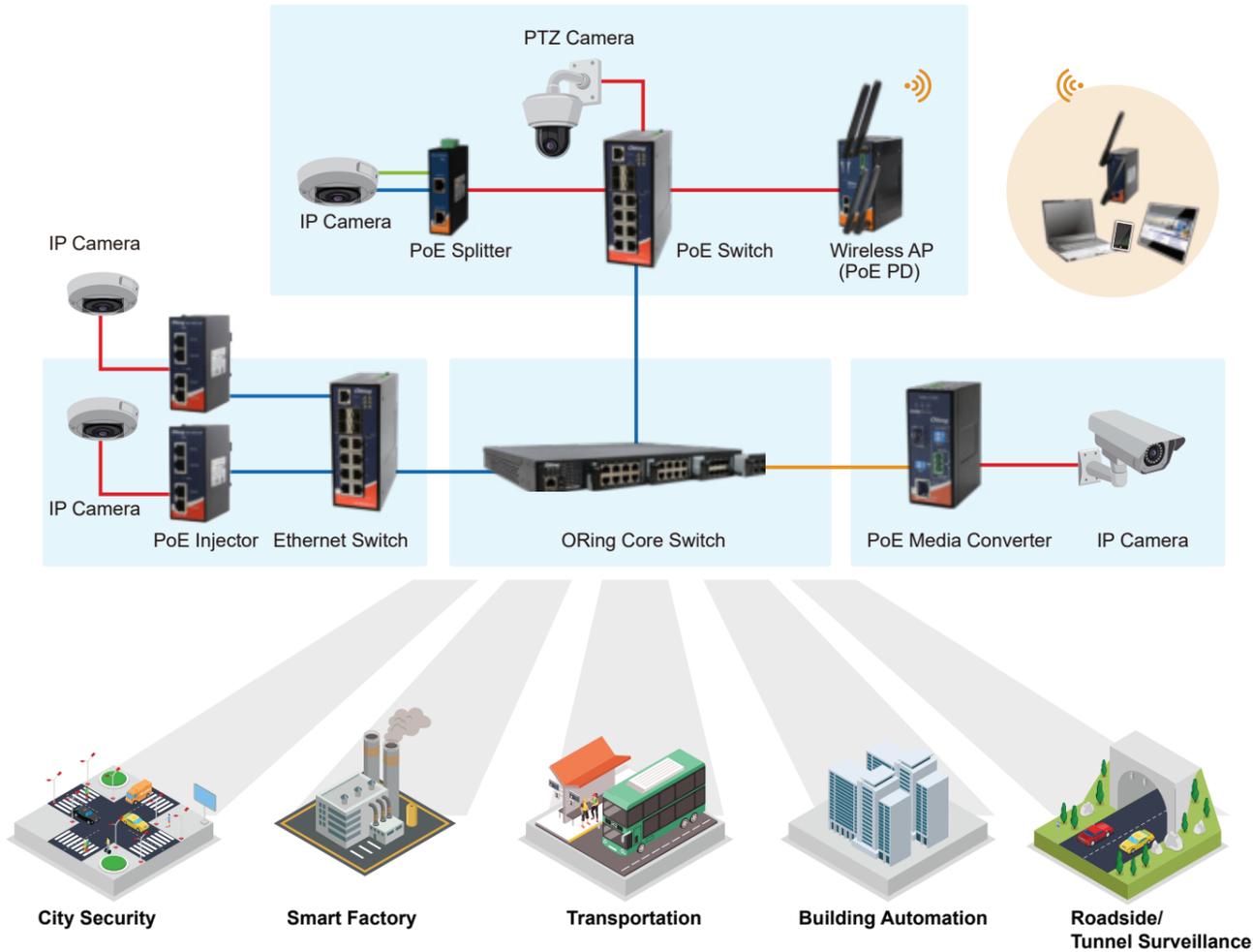
Model	Total Port	RJ-45			Fiber			Power Input	
		10/100 Base-TX	10/100/1G Base-T	10/100/1G/2.5G Base-T	100 Base-FX	100/1G Base-X	100/1G/10G Base-X	Single	Redundant
IES-C1050	5	5						9.6-60VDC/ 24VAC	
IES-C1041P	5	4				1 SFP		9.6-60VDC/ 24VAC	
IES-C1080	8	8						9.6-60VDC/ 24VAC	
IES-C1062P	8	6			1 SC	2 SFP		9.6-60VDC/ 24VAC	
IES-C1160	16	16			2 SC				9.6-60VDC/ 24VAC
IGS-C1050	5		5					9.6-60VDC/ 24VAC	
IGS-C1080	8		8					9.6-60VDC/ 24VAC	

## 10G Uplink Switches



Model Name	IDGS-C1042GP+	IDGPS-C1042GP+-BT
RJ45 Port	4x 2.5G Ethernet	4x 2.5G PSE
SFP Port	2x 1G/10G	2x 1G/10G
PoE	Not support	Support, IEEE 802.3bt
Enclosure	IP40	IP40
Power Input	Dual 12-48VDC	Dual 52-57VDC

## IP Surveillance Application



## Single Pair Ethernet (SPE)

A new IEEE Ethernet technology that transmits data and power over just one pair of twisted wires. It enables simplified cabling, reduced weight, and cost-effective connectivity for industrial automation, building control, and automotive applications.

- Simplified wiring**  
Only one twisted pair needed
- Long-distance communication**  
Up to 1000 meters
- Supports data + power**  
Via PoDL (Power over Data Line)
- Ideal for IIoT**  
Connects sensors, actuators, and field devices
- Space-saving**  
Perfect for compact and embedded applications

### ITPS-141TX-T1L

Industrial Unmanaged Single-Pair Ethernet Switch

- 4-port 10Base-T1L with PoDL
- 1-port 10/100Base-T(X)
- Compliant with IEEE 802.3cg and 802.3bu
- Up to 1km distance over SPE
- 40~70°C, dual 24VDC (20~30V)



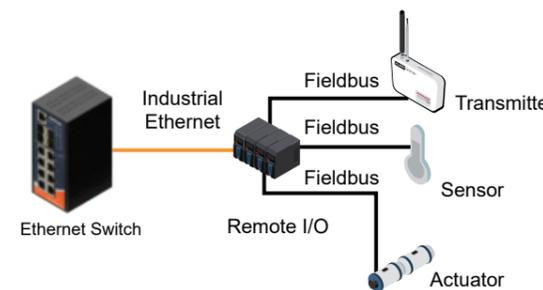
## Standard 1000 PoE Series

Model	Total Port	RJ-45		Fiber	IEEE 802.3	Power Input	DO	Specific Certificate
		10/100 Base-TX	10/100/1G Base-T	100/1G Base-X				
IPS-1080A	8	8 PSE			af/at	Dual 50-57VDC	✓	
IPS-1080-24V	8	8 PSE			af/at	Dual 12-57VDC	✓	
IGPS-1411GTPA	6		4 PSE + 1TX	1 SFP	af/at	Dual 50-57VDC	✓	IEC/EN60945
IGPS-1411GTP-24V	6		4 PSE + 1TX	1 SFP	af/at	Dual 12-57VDC	✓	
IGPS-1042GPA	6		4 PSE	2 SFP	af/at	Dual 50-57VDC	✓	
IGPS-1042GP-24V	6		4 PSE	2 SFP	af/at	Dual 12-57VDC	✓	
IGPS-1080-24V	8		8 PSE		af/at	Dual 12-57VDC	✓	E-Mark
IGPS-1080-24V-I	8		8 PSE		af/at	Dual 12-36VDC	✓	
IGPS-1082GP	10		8 PSE	2 SFP	af/at	Dual 50-57VDC	✓	
IGPS-1082GP-24V	10		8 PSE	2 SFP	af/at	Dual 12-57VDC	✓	

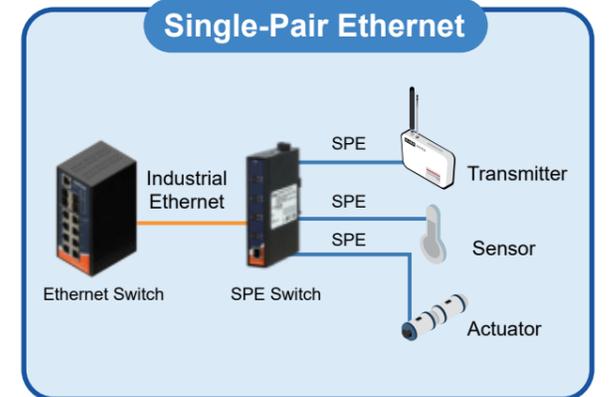
## Cost-Effective C1000 PoE Series

Model	Total Port	RJ-45			Fiber			IEEE 802.3	Power Budget	Power Input
		10/100 Base-TX	10/100/1G Base-T	10/100/1G/2.5G Base-T	100 Base-FX	100/1G Base-X	100/1G/10G Base-X			
IGPS-C1042GP	6		4 PSE			2 SFP		af/at	120W	Dual 48-57VDC
IDGPS-C1042GP+BT	6			4 PSE			2 SFP+	af/at/bt	240W	Dual 48-57VDC
IGPS-C1082GP	10		8 PSE			2 SFP		af/at	240W	Dual 48-57VDC

## Traditional Ethernet



## Single-Pair Ethernet

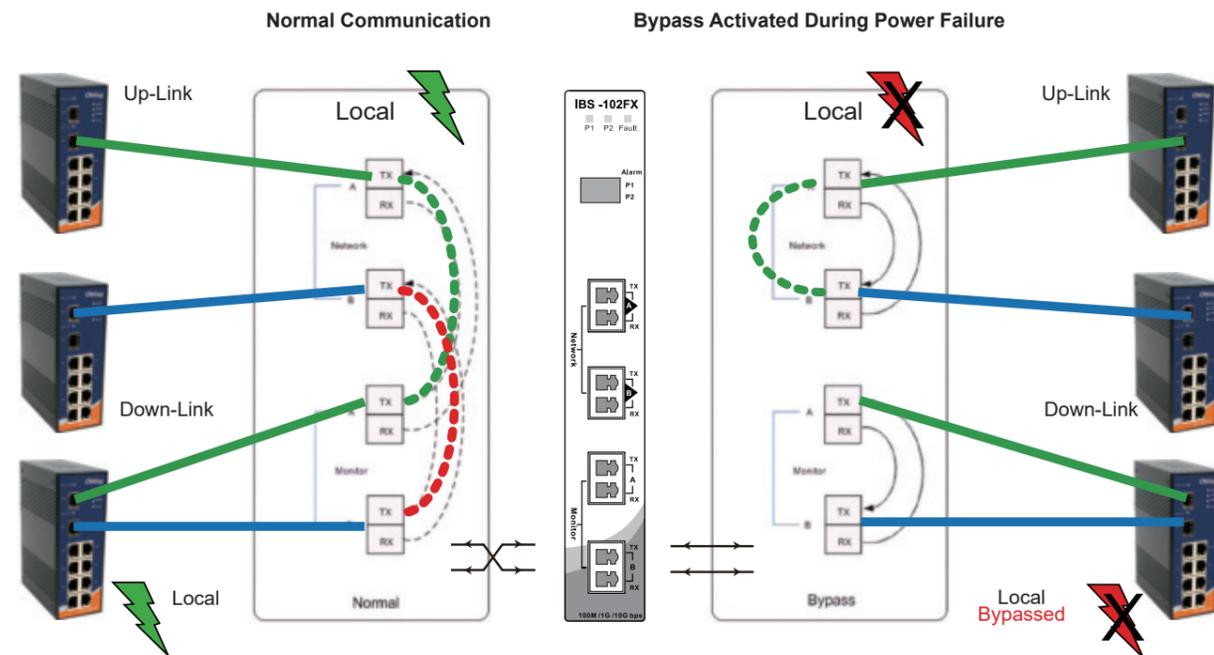


## Potential Applications

- Building automation
- Autonomous vehicle
- Elevator control
- Production line control
- Robotic arm
- Motor control
- Sensor connectivity
- Legacy network retrofit

## Optical Interface Bypass - IBS-102FX

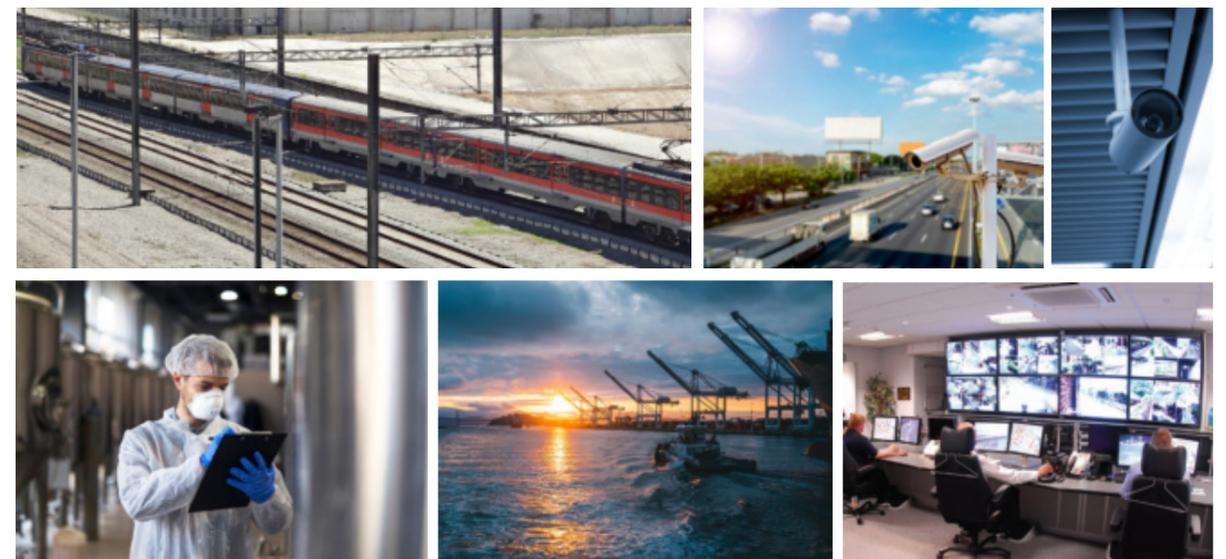
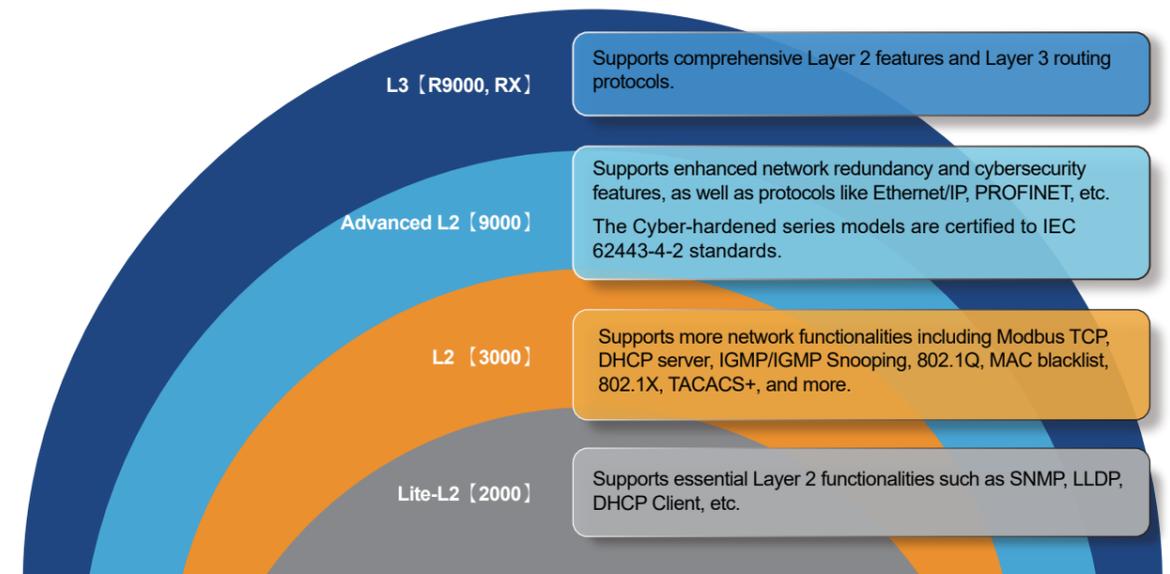
Same as copper interface but use optical for bypass feature.



Model	LC Connector	Fiber				Power Input	DO
		Mode	Wavelength	Switch time	Insert loss		
IBS-102FX-MM-LC	4	Multi-mode	1310, 1550 nm	< 8ms	Typical 1.2 dB , Maximum 2 dB	Dual 12-48VDC	✓
IBS-102FX-SS-LC	4	Single-mode	850, 1310 nm	< 8ms	Typical 1.2 dB , Maximum 1.6 dB	Dual 12-48VDC	✓

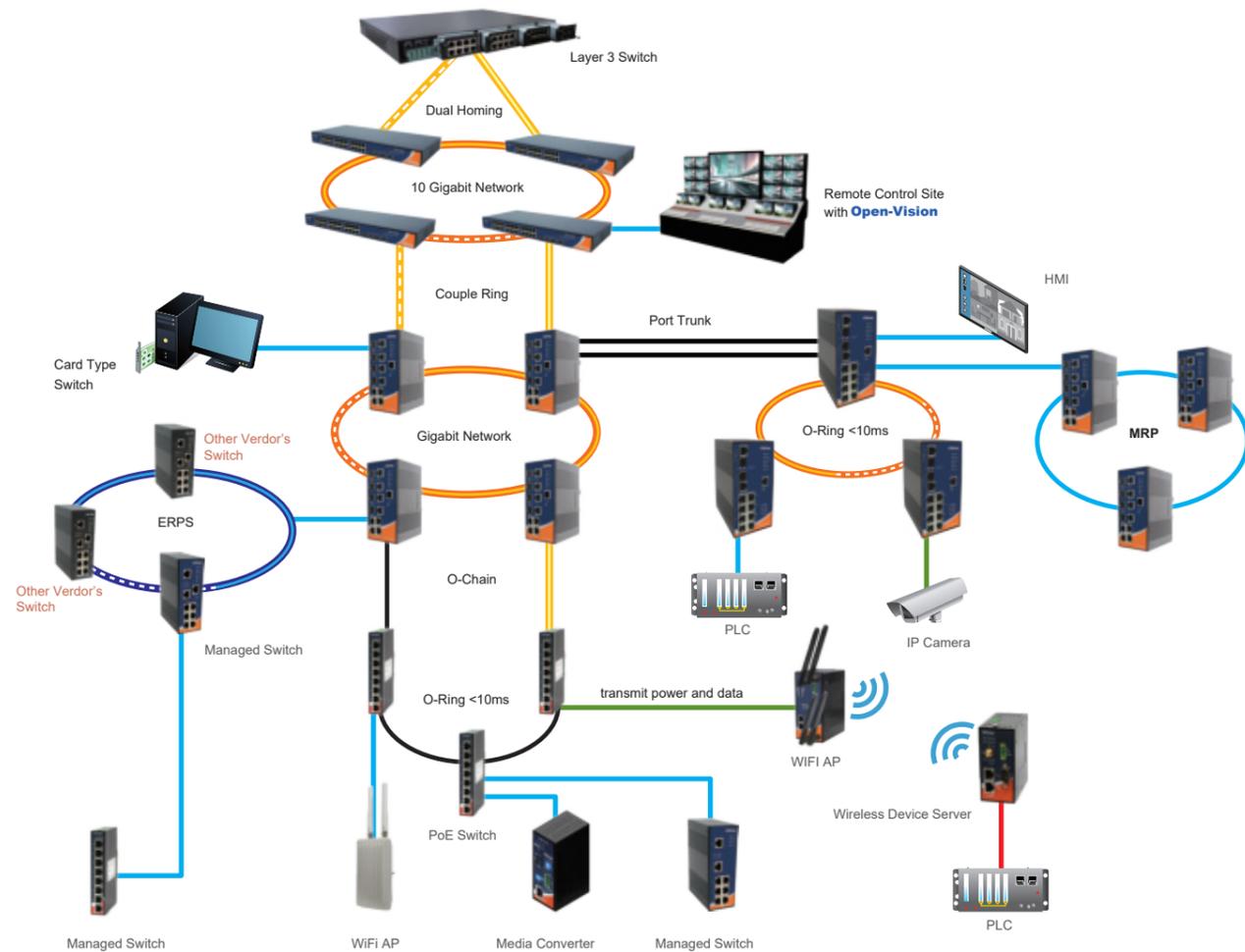
## Managed Switch

- ✓ 133+ managed models
- ✓ Modular design for greater versatility
- ✓ Up to 12 SFP sockets on DIN-Rail model
- 28 SFP sockets on Rackmount model



## Network Redundancy

Many network redundancy or recovery protocols have been defined by the IEEE, such as STP, RSTP, MSTP, to ensure recovery from network disconnections. However, industrial applications require a much shorter recovery time than commercial applications. Hence, industrial networking devices often use proprietary redundant ring technologies to minimize downtime. ORing has developed a variety of proprietary redundancy technologies including O-Ring and O-Chain. These proprietary redundant ring technologies not only meet the needs of different networking topologies, but also assure the reliability of the network.



Technology	O-Ring / O-Chain	RSTP	MSTP	MRP	ERPS
Standard	Proprietary	IEEE802.1w	IEEE 802.1s	IEC 62439-2	ITU-T G.8032
Topology	Ring	Any	Any	Ring	Ring
Failure Recovery Time	<30ms	3~10s	3~10s	10~500ms	<50ms
Support on ORing Model	All managed switch	All managed switch	3000 series 9000 series	9000 series	9000 series

## Lite-L2 series

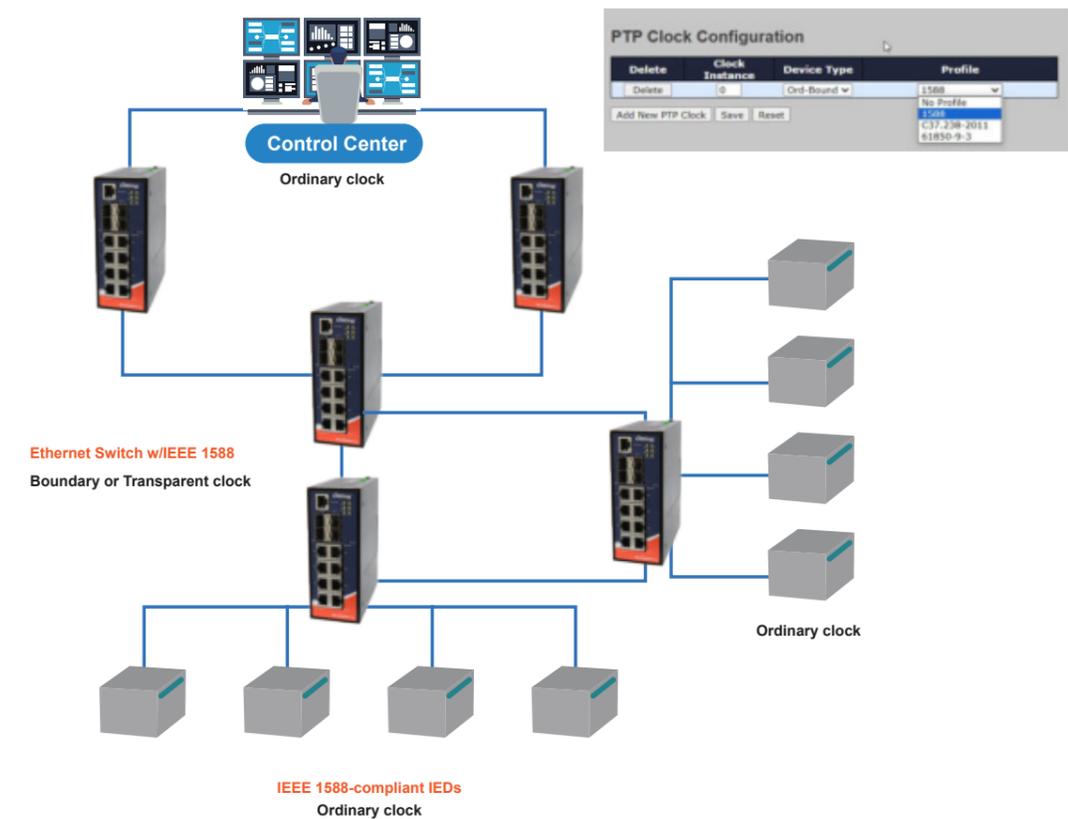
Model	Total Port	RJ-45		Fiber	Power Input	DO	Specific Certificate
		10/100 Base-TX	100 Base-FX	100 Base-FX			
IES-2050A	5	5			Dual 12-48VDC	✓	
IES-2042PA	6	4		2 SFP	Dual 12-48VDC	✓	
IES-2042FX series	6	4		2 SC	Dual 12-48VDC	✓	

## Jumbo Frame

ORing's Gigabit Ethernet switches, with 10 times the bandwidth of 1000Base-T Ethernet switches, feature Jumbo frame support, which enables Jumbo Frame is useful for transmitting mega-pixel IP surveillance videos since the CPUs have fewer frames to process as a larger payload is put into each frame. This will increase data transmission efficiency, thereby improving network performance.

## IEEE 1588 (Precision Time Protocol, PTP)

- ✓ Developed by IEEE for clock synchronization over packet-based networks
- ✓ Enables precise time alignment using data packet transmission
- ✓ Supported by NIST and widely adopted in the communications industry
- ✓ Evolved alongside packet-switched networks (PSNs)
- ✓ Latest version: IEEE 1588v2, offering improved accuracy and performance



	2000 series	3000 series	9000/ R9000/ RX series
IEEE 1588 v2 (HW)	-	PTP Client	PTP Client/Server

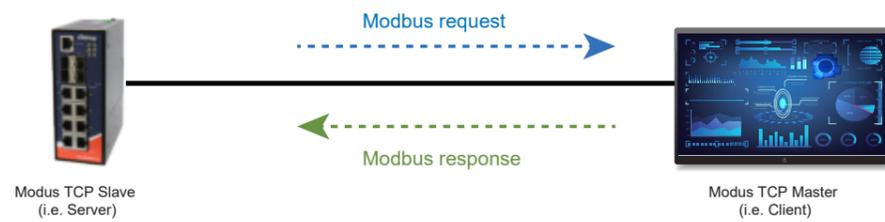
\* Not support on 3000-LA series

## Industrial Communication Protocols



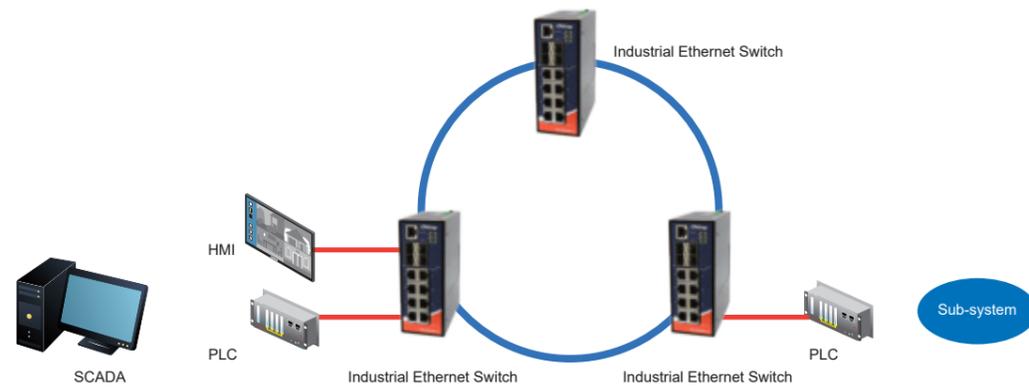
### Modbus TCP

Based on the Modbus RTU protocol, this version runs over TCP/IP to enable communication via Ethernet networks. Commonly used to connect PLCs, I/O modules, and gateways, it also allows SCADA systems to monitor and control industrial Ethernet switches efficiently.



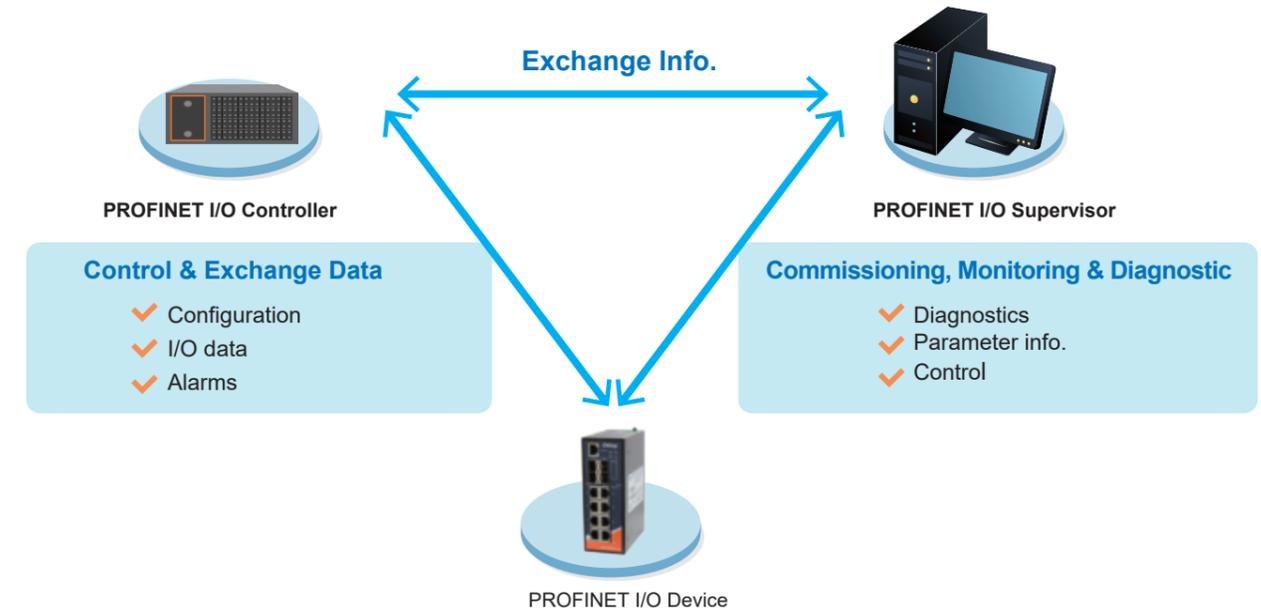
### EtherNet/IP

Ethernet Industrial Protocol, developed by ODVA, is widely used in factory automation for real-time data exchange between controllers and field devices. With support for CIP, it enables seamless integration of Ethernet switches, allowing reliable, high-speed communication in time-critical industrial networks



### PROFINET

Developed by PROFIBUS & PROFINET International (PI), this protocol enables real-time, deterministic communication in automation systems. With PROFINET support, Ethernet switches can ensure low-latency data exchange and reliable integration of controllers and field devices.



### PROFINET CC-B Product List



	2000 series	3000 series	9000/ R9000/ RX series
Modbus TCP	-	Support	Support
Ethernet/IP	-	-	Support
PROFINET	-	-	Support

### Standard 3000 Series

Model	Total Port	RJ-45		Fiber			Gigabit Combo	Dual Power Input	Specific Certificate
		10/100 Base-TX	10/100/1G Base-T	100 Base-FX	100/1G Base-X	1G/2.5G Base-X			
IES-3080	8	8						12-48VDC	
IES-3062FX series	8	6		2 SC				12-48VDC	
IES-3082GP-LA	10	8			2 SFP			24-48VDC	
IES-3082GP	10	8			2 SFP			12-48VDC	
IES-3082GC	10	8					2	12-48VDC	
IES-3073GC	10	7					3	12-48VDC	
IES-P3073GC-HV	10	7					3	85-264VAC/ 88-373VDC	IEC 61850-3, IEEE 1613
IES-P3073GC-LV	10	7					3	12-48VDC	IEC 61850-3, IEEE 1613
IES-3160	16	16						12-48VDC	
IES-3162GC	18	16					2	12-48VDC	UL C1D2
IES-3164GP-LA	20	16			4 SFP			12-48VDC	
IES-3240	24	24						12-48VDC	
IGS-3032GC	5		3				2	12-48VDC	
IGS-C3042GP	6		4			2 SFP		24-48VDC	
IGS-C3082GP	10		8			2 SFP		24-48VDC	
IGS-3084GP-LA	12		8		4 SFP			24-48VDC	
IGS-3164GP-LA	20		16		4 SFP			24-48VDC	
RGS-3244GP	28		24		4 SFP			100-240VAC	

### Cyber-Hardened Series

The Cyber-Hardened Ethernet Switch series have achieved IEC 62443-4-2 certification, providing enhanced security and reducing the risk of cyber incidents in critical sectors such as power generation, transportation, and manufacturing.

Ethernet Switch	IEC 61850-3 Switch	EN50155 Switch
IGS-9084GP-LA	IGS-P9812GP series	TGPS-9084GT-M12X-BP2-WV
IGPS-9084GP-LA series	IGS-P9164GC series	
IGS-9168GP	RES-P9242GCL series	
RGS-92222GCP-NP series	RGS-P9000 series	
RGPS-92222GCP series		
RGPS-9244GP series		
RGPS-R9244GP+ series		

### Cybersecurity

**IEC 62443**  
**Cybersecurity for Industrial Automation and Control Systems**  
 IEC 62443 establishes a framework to safeguard IACS throughout their lifecycle

- Guidelines for component manufactures
- Practices for system integrators
- Policies for asset owners
- Applicable across industries



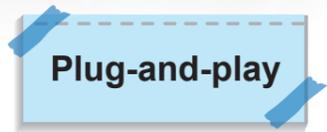
General	Policies & Procedures	System	Component
IEC 62443-1-1 Concepts and models	IEC 62443-2-1 Requirement for an IACS security management system	IEC 62443-3-1 Security technologies for IACS	IEC 62443-4-1 Product development requirements
IEC 62443-1-2 Master glossary of terms and abbreviations	IEC 62443-2-2 Implementation guidance for an IACS security management system	IEC 62443-3-2 Security risk assessment and system design	IEC 62443-4-2 Technical Security Requirements for IACS components
IEC 62443-1-3 System security conformance metrics	IEC 62443-2-3 Patch management in the IACS environment	IEC 62443-3-3 System security requirements and security levels	
IEC 62443-1-4 IACS security life-cycle and use-cases	IEC 62443-2-4 Requirements for IACS solution suppliers		

To meet growing demands for industrial network security and compliance, ORing's 9000-series products come with the latest S12 firmware. Aligned with IEC 62443, S12 enhances cybersecurity, access control, and integration flexibility—helping users build secure and resilient networks for future challenges.

**Enhancements in S12 Firmware**

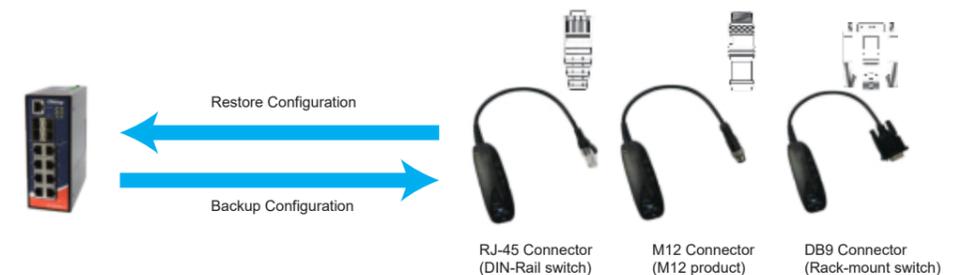
- 802.1x + Device Binding
- Password Policy Enforcement
- No Default Password
- Group-based User Privilege
- Account Lockout
- Audit Logging
- Auto Logout Configuration

### DBU-01 : Device Configuration Backup Unit



Its purpose is to save or restore configuration files from ORing's managed products. The standalone unit connects to the console port of ORing's managed devices and supports operation across different product families, including:

- DIN-rail/ Rackmount switch: All 9000 series
- EN50155 products: TGS/ TGPS/ TRGPS-9000 series, TGAP/ TGAR series
- Wireless AP/Router: All products except IGAP-610H and IGAP-W series



## Advanced 9000 Series

IEC 62443-4-1 Certified, with cybersecurity features aligned to IEC 62443-4-2.

Model	Total Port	RJ-45		Fiber				Gigabit Combo	Dual Power Input	Specific Certificate
		10/100 Base-TX	10/100/1G Base-T	100 Base-FX	100/1G Base-X	1G/2.5G Base-X	100/1G/10G Base-X			
RES-9242GC	26	24						2	100-240VAC	
RES-P9242GCL-HV	26	24						2	125-370VDC/100-240VAC	IEC 61850-3 IEEE 1613 IEC 62443-4-2
RES-P9242GCL-LV	26	24						2	24-72VDC	IEC 61850-3 IEEE 1613 IEC 62443-4-2
IGS-C9042GP	6		4			2 SFP			24-48VDC	
IGS-9042GP-LA-PN	6		4		2 SFP				12-48VDC	PROFINET CC-B
IGS-9080-LA-PN	8		8						12-48VDC	PROFINET CC-B
IGS-C9082GP	10		8			2 SFP			24-48VDC	
IGS-9084GP	12		8		4 SFP				12-48VDC	IEC/EN60945
IGS-9084GP-LA	12		8		4 SFP				12-48VDC	IEC 62443-4-2
IGS-9822DGP+	12		8			2 SFP	2 SFP+		12-48VDC	
IGS-9084GP-FB2 series	12		8		4 SFP				12-48VDC	
IGS-9122GP-PN	14		12		2 SFP				12-48VDC	PROFINET CC-B
IGS-9812GP	20		8		12 SFP				12-48VDC	IEC/EN60945
IGS-P9812GP-HV	20		8		12 SFP				85-264VAC/88-373VDC	IEC 61850-3 IEEE 1613 IEC 62443-4-2
IGS-P9812GP-LV	20		8		12 SFP				12-48VDC	IEC 61850-3 IEEE 1613 IEC 62443-4-2
IGS-P9164FX-MM-SC-HV	20		16	4 SC					85-264VAC/88-373VDC	IEC 61850-3 IEEE 1613
IGS-P9164FX-MM-SC-LV	20		16	4 SC					12-48VDC	IEC 61850-3 IEEE 1613
IGS-P9164FX-SS-SC-HV	20		16	4 SC					85-264VAC/88-373VDC	IEC 61850-3 IEEE 1613
IGS-P9164FX-SS-SC-LV	20		16	4 SC					12-48VDC	IEC 61850-3 IEEE 1613
IGS-P9164GF-MM-SC-HV	20		16		4 SC				85-264VAC/88-373VDC	IEC 61850-3 IEEE 1613
IGS-P9164GF-MM-SC-LV	20		16		4 SC				12-48VDC	IEC 61850-3 IEEE 1613
IGS-P9164GF-SS-SC-HV	20		16		4 SC				85-264VAC/88-373VDC	IEC 61850-3 IEEE 1613
IGS-P9164GF-SS-SC-LV	20		16		4 SC				12-48VDC	IEC 61850-3 IEEE 1613
IGS-P9164GC-HV	20		16					4	85-264VAC/88-373VDC	IEC 61850-3 IEEE 1613 IEC 62443-4-2
IGS-P9164GC-LV	20		16					4	12-48VDC	IEC 61850-3 IEEE 1613 IEC 62443-4-2
IGS-9168GP	24		16		8 SFP				12-48VDC	IEC/EN60945 IEC 62443-4-2
IGS-9168GP-PN	24		16		8 SFP				12-48VDC	PROFINET CC-B
RGS-9168GCP	24				8 SFP			16	100-240VAC	
RGS-9168GCP-E	24				8 SFP			16	100-240VAC, dual 48VDC	
RGS-9222GCP-NP	26		22		2 SFP			2	100-240VAC	IEC 62443-4-2
RGS-9222GCP-NP-E	26		22		2 SFP			2	100-240VAC, dual 48VDC	IEC 62443-4-2
RGS-9244GP	28		24		4 SFP				100-240VAC	
RGS-9244GP-E	28		24		4 SFP				100-240VAC, dual 48VDC	

## Unmanaged PoE Switch

An unmanaged PoE switch provides a simple, cost-effective way to power IP devices. It supports plug-and-play setup, reduces wiring, and ensures reliable performance in tough environments.

Plug-and-Play

Easy Setup

Power + Data

## Standard 1000 PoE Series

Model	Total Port	RJ-45			Fiber			IEEE 802.3 PoE Standard	Power Input	DO	Specific Certificate
		10/100 Base-TX	10/100/1G Base-T	10/100/1G/2.5G Base-T	100 Base-FX	100/1G Base-X	100/1G/10G Base-X				
IPS-1042FA series	6	4 PSE			2 SC			af/at	Dual 50-57VDC	✓	
IPS-1042FX series	6	4 PSE			2 SC			af/at	Dual 24-36VDC	✓	
IPS-1080A	8	8 PSE						af/at	Dual 50-57VDC	✓	
IPS-1080-24V	8	8 PSE						af/at	Dual 12-57VDC	✓	
IGPS-1411GTPA	6		4 PSE + 1TX			1 SFP		af/at	Dual 50-57VDC	✓	IEC/EN60945
IGPS-1411GTP-24V	6		4 PSE + 1TX			1 SFP		af/at	Dual 12-57VDC	✓	
IGPS-1042GPA	6		4 PSE			2 SFP		af/at	Dual 50-57VDC	✓	
IGPS-1042GP-24V	6		4 PSE			2 SFP		af/at	Dual 12-57VDC	✓	
IGPS-1080-24V	8		8 PSE					af/at	Dual 12-57VDC	✓	E-Mark
IGPS-1080-24V-I	8		8 PSE					af/at	Dual 12-36VDC	✓	
IGPS-1082GP	10		8 PSE			2 SFP		af/at	Dual 50-57VDC	✓	
IGPS-1082GP-24V	10		8 PSE			2 SFP		af/at	Dual 12-57VDC	✓	

## Cost-effective C1000 PoE Series

Model	Total Port	RJ-45			Fiber			IEEE 802.3 PoE Standard	Power Input	DO	Specific Certificate
		10/100 Base-TX	10/100/1G Base-T	10/100/1G/2.5G Base-T	100 Base-FX	100/1G Base-X	100/1G/10G Base-X				
IGPS-C1042GP	6		4 PSE			2 SFP		af/at	Dual 48-57VDC		
IDGPS-C1042GP+-BT	6			4 PSE			2 SFP+	af/at/bt	Dual 52-57VDC		
IGPS-C1082GP	10		8 PSE			2 SFP		af/at	Dual 48-57VDC		

## Hot Selling Products



### IPS-1080-24V

- 8x 10/100 PSE
- 120W Budget
- Dual 12-57VDC
- -40-75°C



### IGPS-1042GPA

- 4x 10/100/1000 PSE
- 2x 100/1000FX SFP
- Dual 50-57VDC
- -40-75°C



### IGPS-1411GTP-24V

- 4x 10/100/1000 PSE
- 1x 10/100/1000 TX
- 1x 1000FX SFP
- Dual 12-57VDC
- -40-75°C



### IDGPS-C1042GP+-BT

- 4x 10/100/1000/2500 PSE
- 2x 1G/10GBase-FX SFP+
- Dual 52-57VDC
- -40 to 75°C
- IP40



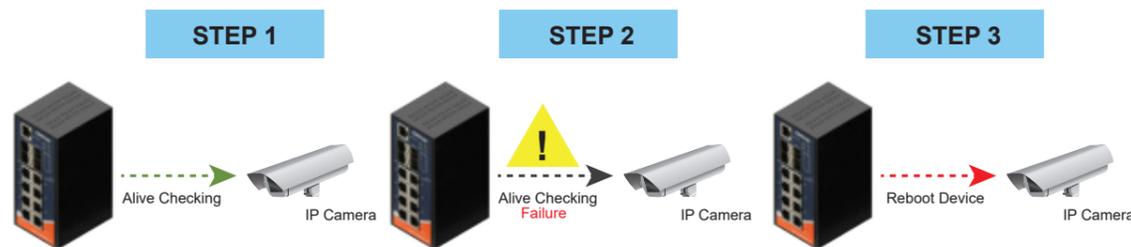
# Managed PoE Switch

An industrial managed PoE switch offers advanced control, monitoring, and security for powering IP devices. It enables VLANs, QoS, and remote management to optimize network performance. Designed for harsh environments, it ensures reliable operation and efficient power distribution.

Configurable	Advanced PoE Features	Network Redundancy
QoS Traffic Prioritization	SNMP/LLDP	Enhanced Network Security

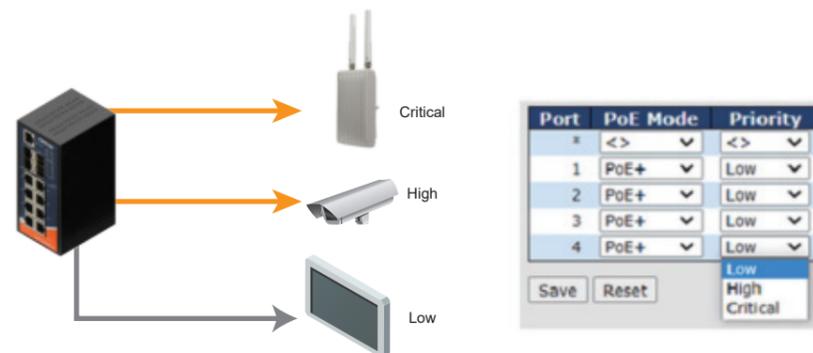
## Alive Checking

ORing's managed/Lite-managed PoE switches could be configured to monitor the real-time status of connected powered devices (PD). The PoE switches could send alive-checking packets to assure the connected PDs are in working state. If the connected PDs fail to response, the PoE switches would reactivate the connected PDs to assure the reliability of the network.



## Port Priority for Critical Devices

PoE port priority determines which devices get power first if the switch's PoE budget is insufficient. It's a way to prioritize which devices receive power, ensuring critical devices stay powered even when the switch's power is limited.



## PoE Boot Delay

The PoE Boot Delay function allows users to postpone power delivery to a specific port on a PoE switch. This is especially useful when the connected powered device (PD), such as a camera, has a longer boot time. By delaying PoE activation, the switch ensures the PD is ready to receive power and communicate properly, improving system stability and preventing startup issues.

Port No.	Delay Mode	Delay Time(0~300)
Port.01	Disable	0 Second(s)
Port.02	Disable	0 Second(s)
Port.03	Disable	0 Second(s)

## Power Scheduling

Power scheduling allows the administrator to set up power supply schedules based on their operation modes such as power on, power off, restart, or sleep needs so that network devices will be powered at a specified time, instead of consuming power around the clock even when not in use. For example, if the factory wireless PoE access point only needs to be powered on during work hours, the network administrator can enable power output for the device from 6:00 to 22:00 and disable power output from 22:00 to 6:00.

PoE Feature	3000 series	9000/ R9000/ RX series
Alive Checking	Support	Support
PoE Boot Delay	Support	-
Port Priority	Support	Support
Power Scheduling	Support	Support

## Industrial DIN-rail L2 PoE Switch

Model	Total Port	RJ-45			Fiber			Gigabit Combo	Power Input	Specific Certificate
		10/100 Base-TX	10/100/1G Base-T	10/100/1G/2.5GBase-T	100/1G Base-X	1G/2.5G Base-X	100/1G/10G Base-X			
IPS-3082GC-AT	10	8 PSE						2	Dual 50-57VDC	
IPS-3082GC-24V	10	8 PSE						2	Dual 24-36VDC	
IGPS-C3082GP	10		8 PSE			2 SFP			Dual 50-57VDC	
IGPS-3084GP-LA	12		8 PSE		4 SFP				Dual 48-57VDC	
IGPS-3164GP-LA	20		16 PSE		4 SFP				Dual 48-57VDC	
IGPS-9622DGP+-BT	10		6 PSE	2 PSE			2 SFP+		Dual 50-57 VDC	
IGPS-9084GP	12		8 PSE		4 SFP				Dual 50-57VDC	IEC/EN60945
IGPS-9084GP-LA	12		8 PSE		4 SFP				Dual 50-57VDC	IEC 62443-4-2
IGPS-9084GP-LA-24V	12		8 PSE		4 SFP				Dual 12-57VDC	IEC 62443-4-2
IGPS-P9084GP-LA	12		8 PSE		4 SFP				Dual 50-57VDC	IEC 61850-3 IEEE 1613 EN 50121-4
IGPS-9822DGP+	12		8 PSE			2 SFP	2 SFP+		Dual 50-57VDC	
IGPS-9084GP-LA-PN	12		8 PSE		4 SFP				Dual 50-57VDC	PROFINET CC-B
IGPS-9842GTP	14		8 PSE + 4 TX		2 SFP				Dual 50-57VDC	
IGPS-9842GTP-24V	14		8 PSE + 4 TX		2 SFP				Dual 12-57VDC	

### Hot Selling Products



**IGPS-3164GP-LA**

- 16x 1G PSE
- 4x 100/1G SFP
- 150W Budget



**IGPS-9084GP-LA**

- 8x 1G PSE
- 4x 100/1G SFP
- 240W Budget



**IGPS-9622DGP+-BT**

- 6x 1G PSE
- 2x 2.5G PSE
- 2x 1G/10G SFP+
- 360W Budget



### Industrial Rackmount L2 PoE Switch

Model	Total Port	RJ-45	Fiber	Gigabit Combo	Power Input	Built-in Power Supply	Specific Certificate
		10/100/1G Base-T	100/1G Base-X				
RGPS-92222GCP-NP	26	22 PSE	2 SFP	2 PSE	50-57VDC		IEC 62443-4-2
RGPS-92222GCP-NP-LP	26	22 PSE	2 SFP	2 PSE	100-240 VAC	450W (320W budget)	IEC 62443-4-2
RGPS-92222GCP-NP-P	26	22 PSE	2 SFP	2 PSE	100-240 VAC	1000W (720W budget)	IEC 62443-4-2
RGPS-92222GCP-NP-P-E	26	22 PSE	2 SFP	2 PSE	100-240 VAC Dual 50-57VDC	1000W (720W budget)	IEC 62443-4-2
RGPS-3244GP-P	28	24 PSE	4 SFP		100-240 VAC	450W (360W budget)	
RGPS-9244GP-LP-HV	28	24 PSE	4 SFP		Dual 100-240 VDC	500Wx2 (300W budget)	

Model Name	IGPS-R9084GP	IGPS-RX884GTP+	RGPS-R9244GP+-P	RGPS-R9244GP+-LP
<b>Interface</b>				
10/100/1G Base-T RJ45	8 PSE	8 PSE + 8 TX	24 PSE	24 PSE
100/1G Base-X SFP	4			
1G/2.5G/10G Base-X SFP+		4	4	4
Fault Contact	✓	✓		
Console	RS-232 in RJ45	RS-232 in DB9	RS-232 in DB-9	RS-232 in DB-9
<b>Layer 3 Protocol</b>				
Static Route	✓	✓	✓	✓
RIP	✓	✓	✓	✓
OSPF		✓		
PIM-SM/ PIM-DM		✓		
<b>Power over Ethernet</b>				
PoE Standard	IEEE 802.3af/at	IEEE 802.3af/at	IEEE 802.3af/at	IEEE 802.3af/at
Power Budget	240W	100W@75°C 180W@60°C	720 Watts (-20°C~50°C) 320 Watts (50°C~60°C)	300Watts (-20°C~50°C) 240Watts (50°C~60°C)
<b>Power</b>				
Power Input	Dual 50-57VDC	Dual 50-57VDC	100-240VAC	100-240VAC
Built-in Power Supply			1000W	390W
<b>Approvals</b>				
CE	✓	✓	✓	✓
FCC	✓	✓	✓	✓
IEC 62443-4-2			✓	✓

### Hot Selling Products



**RGPS-92222GCP-NP-P**

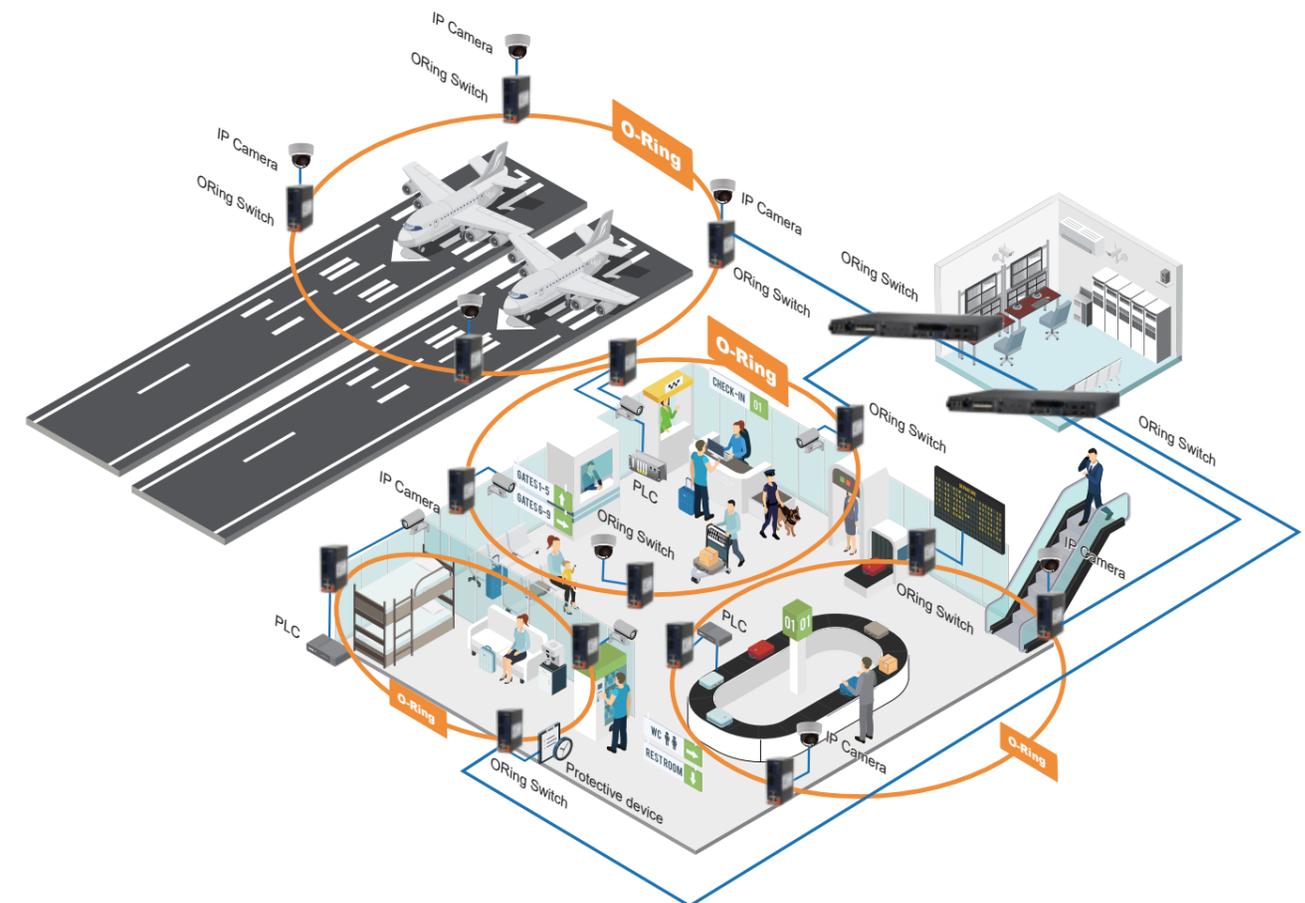
- 22x 1G PSE
- 2x 1G Combo PSE
- 2x 100/1G SFP
- 720W Budget



**RGPS-3244GP-P**

- 24x 1G PSE
- 4x 100/1G SFP
- 360W Budget

### PoE Applications and Device Connections

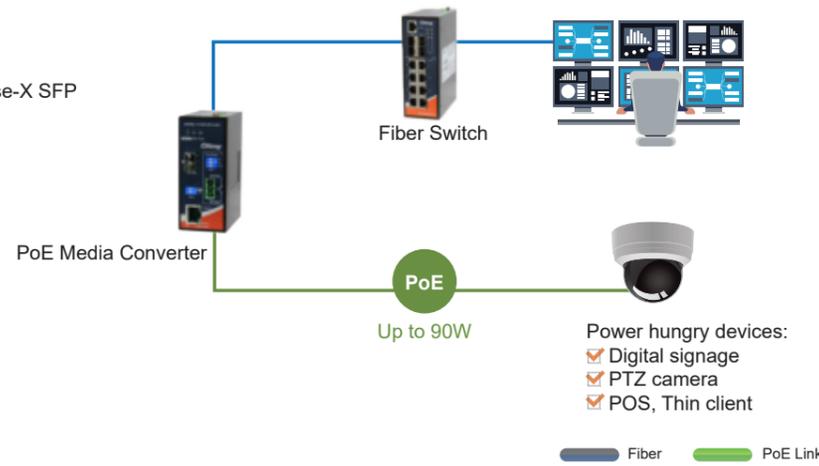


## PoE Media Converter

Designed for harsh environments, the industrial PoE media converter seamlessly integrates copper and fiber networks while supplying power to remote devices through PoE. Supporting IEEE 802.3af/at/bt standards, it eliminates the need for separate power lines, making it ideal for powering IP cameras, wireless access points, and other PoE-enabled equipment in factory automation, transportation, and smart city applications.

### IGPMC-111GP-BT-24V

- 1 Gigabit Ethernet to 100/1000Base-X SFP
- IEEE 802.3bt PoE
- Supports LFP
- Supports relay output
- Dual 12~57VDC inputs
  - PoE 30W: >=12V
  - PoE 60/90W: 24-57V

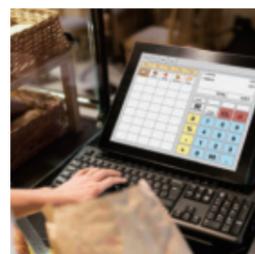
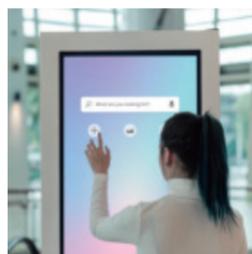


## PoE Injector

The industrial PoE injector delivers both power and data to PoE-enabled devices over a single Ethernet cable, simplifying installation and reducing cabling costs.



Functionality	Integrates PoE capability into a network	Add PoE capability to non-PoE networks
Port Requirement	More PoE ports	Fewer PoE ports
Flexibility	Centralized power management	Less scalable at larger scales



Model	Product Type	PoE Port	Max. PoE Output	IEEE 802.3	Power Input
INJ-101GT++-60W	PoE Injector	1	60W	af/at	50-57VDC
INJ-101GT++-60W-24V	PoE Injector	1	30W @9-24VDC 60W @24-57VDC	af/at	9-57VDC
INJ-102GT	PoE Injector	2	30W	af/at	50-57VDC
INJ-102GT-24V	PoE Injector	2	30W	af/at	12-57VDC
INJ-102GT++	PoE Injector	2	90W	af/at	50-57VDC
INJ-102GT++-24V	PoE Injector	2	60W @12-24VDC 90W @24-57VDC	af/at	12-57VDC
INJ-101GT-BT-24V	PoE Injector	1	30W @ 12-24VDC 60W @ 24-52VDC 90W @ 52-57VDC	af/at/bt	12-57VDC

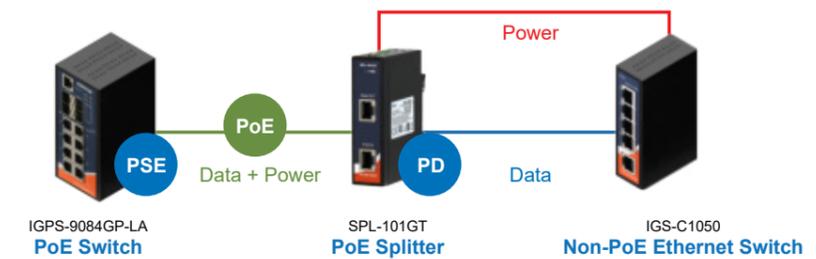
## PoE Splitter

The industrial PoE splitter enables non-PoE devices to be powered through a PoE-enabled Ethernet connection by separating power and data at the device end. Supporting IEEE 802.3af/at standards, it delivers a stable 24VDC output to legacy equipment such as Ethernet switches, controllers, or embedded systems. It features robust construction, wide operating temperature range, and DIN-rail mounting, ensuring reliable performance in factory automation, surveillance, and outdoor applications.

Supports non-PoE devices

Simplifies cabling setup

Industrial-grade durability



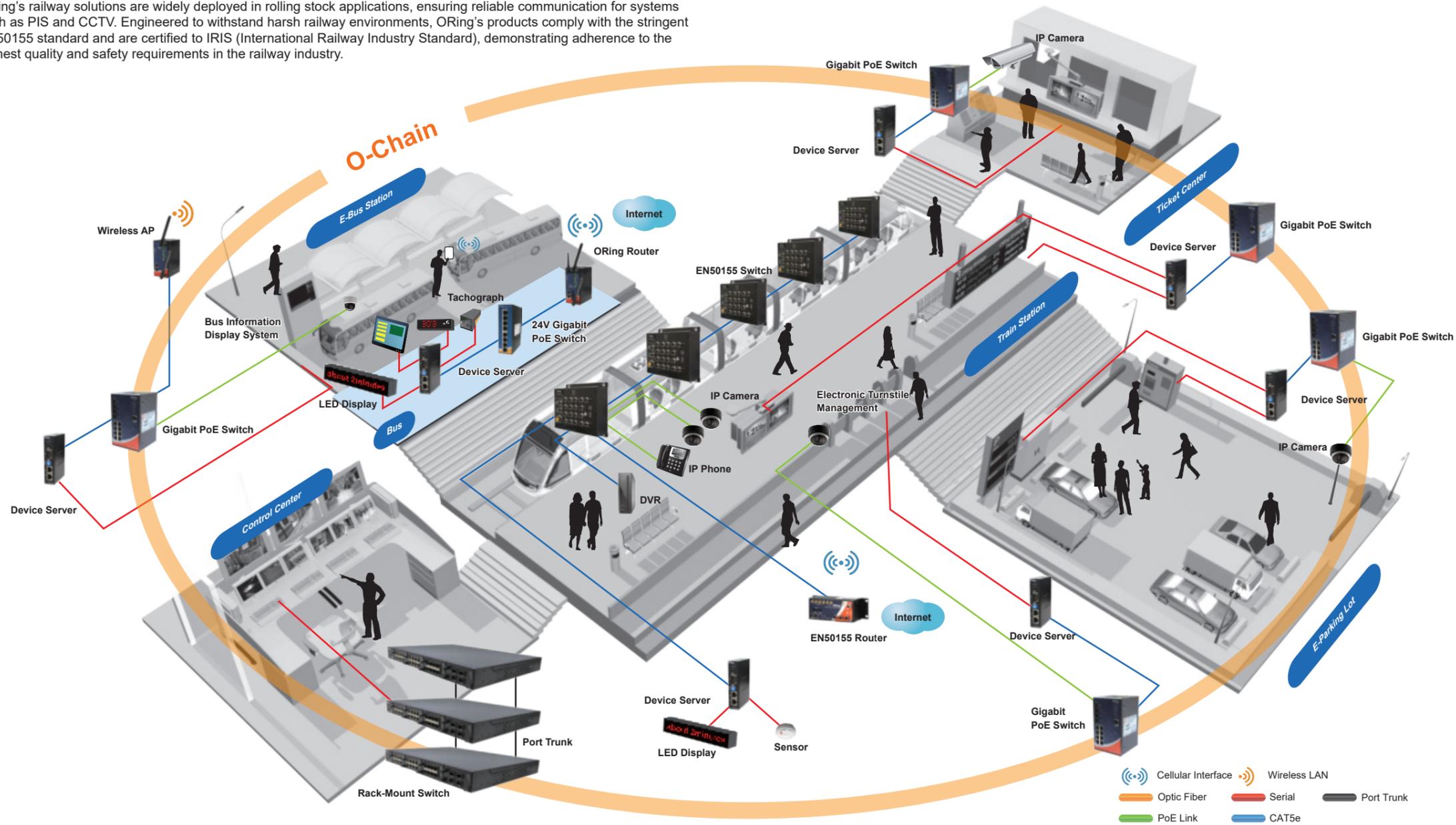
ORing's PoE splitter supports Gigabit transmission, ensuring reliable high-speed data and power delivery. The TSPL series is specifically designed for railway applications and is compliant with the EN50155 standard.



Model Name	SPL-101GT	SPL-101GT+-24V	TSPL-101GT-M12-12V	TSPL-101GT-M12-24V
Interface				
Ethernet Port with P.S.E. Input	1G RJ45	1G RJ45	1G M12 A-coded	1G M12 A-coded
Ethernet Port Output	1G RJ45	1G RJ45	1G M12 A-coded	1G M12 A-coded
Power Output Connector	4-pin terminal block	4-pin terminal block	5-pin M12 A-coded	5-pin M12 A-coded
Operating Voltage				
Input Voltage	36-57 VDC from PSE	90W PSE input	36-57VDC from PSE	36-57VDC from PSE
Output Voltage	24VDC @ 0.9A	24VDC @ 2.5A	12VDC @ 2A Max.	24VDC @ 1A Max.

# EN50155 Series

ORing's railway solutions are widely deployed in rolling stock applications, ensuring reliable communication for systems such as PIS and CCTV. Engineered to withstand harsh railway environments, ORing's products comply with the stringent EN50155 standard and are certified to IRIS (International Railway Industry Standard), demonstrating adherence to the highest quality and safety requirements in the railway industry.



**Onboard**

ORing's Transporter-series complies with EN50155 standard and is a perfect fit for building TCN (Train Communication Network), CCTV, PIS (Passenger Information System) and passenger Wi-Fi networks.



**Train to Ground**

Data transmission between the train and ground facility is realized via wireless connectivity. When a train approaches or stops at the station, the wireless router's transmission mode will shift from cellular to Wi-Fi to save data transmission costs.



**Wayside**

Trackside and onboard devices need to exchange data in real time via wayside networks, so building a secure and reliable wayside network is necessary.

## Benefits from ORing



**IRIS Certified**  
Meets the railway industry's extremely rigorous demands on quality



**5G NR**  
Enables high performance and low latency communications



**PoE**  
Simplifies installation and maintenance while reducing deployment costs



**Wi-Fi Connectivity**  
Provides fast, reliable and secure 802.11n/ac Wi-Fi connections on trains



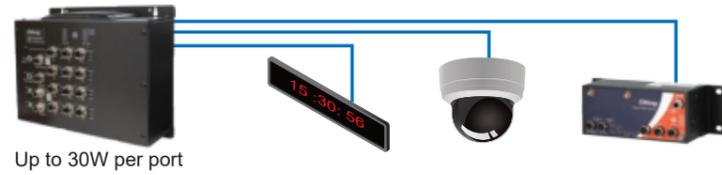
**Versatile Options**  
Offers a wide variety of interface including 10GbE, 2.5GbE, GbE, FE, fiber and wireless



**Wide Voltage**  
Power range 24-110VDC, providing maximum flexibility for using the EN50155 products

## Feature Highlight

### IEEE 802.3at PoE



### Hardware Bypass



### 500Mb/s over 4-wire Ethernet

Fast Ethernet Switch with 500Mbps per port.  
Cost-Effective retrofit with Low-Cost implementation!



TGXS-1080-M12 series TXPS-141XT-M12 series TGXPS-1080-M12 series

### Q-ODC Interface

Long range fiber connectivity.

	Copper	Fiber Optics
Distance	100 meters	>500 meters
Immunity to EMI & RFI	Low	Completely immune
Security	Susceptible to tapping	Hard to tap

## EN50155 Unmanaged Ethernet Switch

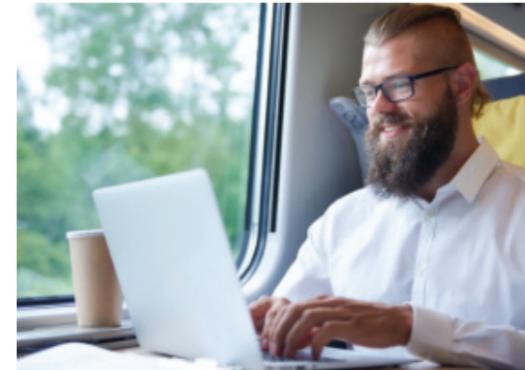
Model	Mounting	Total Port	Managed	RJ-45			Hardware Bypass	Power Input			
				10/100 Base-TX	10/100/500 Base-TX	10/100/1G Base-T		12VDC	24VDC	110VDC	24-110VDC
TXES-150-M12	Wall	5			5			✓			
TXES-180-M12	Wall	8			8			✓			
TXES-180-M12-WV	Wall	8			8						✓
TGXS-1080-M12	Wall	8				8		✓			
TGXS-1080-M12-BP2	Wall	8				8	✓	✓			
TGXS-1080-M12-MV	Wall	8				8				✓	
TGXS-1080-M12-BP2-MV	Wall	8				8	✓			✓	
TES-W180-M12-MV-IP67	Wall	8				8					✓

## EN50155 Managed Ethernet Switch

Model	Mounting	Total Port	Managed	RJ-45			Hardware Bypass	Power Input			
				10/100 Base-TX	10/100/500 Base-TX	10/100/1G Base-T		12VDC	24VDC	110VDC	24-110VDC
TGS-9120-M12-BP2	Wall	12	✓			12	✓	✓			
TES-W9124GT-M12X-BP2-24V-IP54	Wall	16	✓	12		4	✓	✓			
TGS-W9160-M12X-BP2-WV-IP54	Wall	16	✓			16	✓				✓
TGS-9200-M12-BP2	Wall	20	✓			20	✓	✓			
CPGS-9080-C	Card	8	✓			8					PCI bus-powered
CPGS-9120-M12-C	Card	12	✓			12					PCI bus-powered
CPGS-9120-C	Card	12	✓			12					PCI bus-powered
CPGS-9160-M12-C	Card	16	✓			16					PCI bus-powered

## Success Story

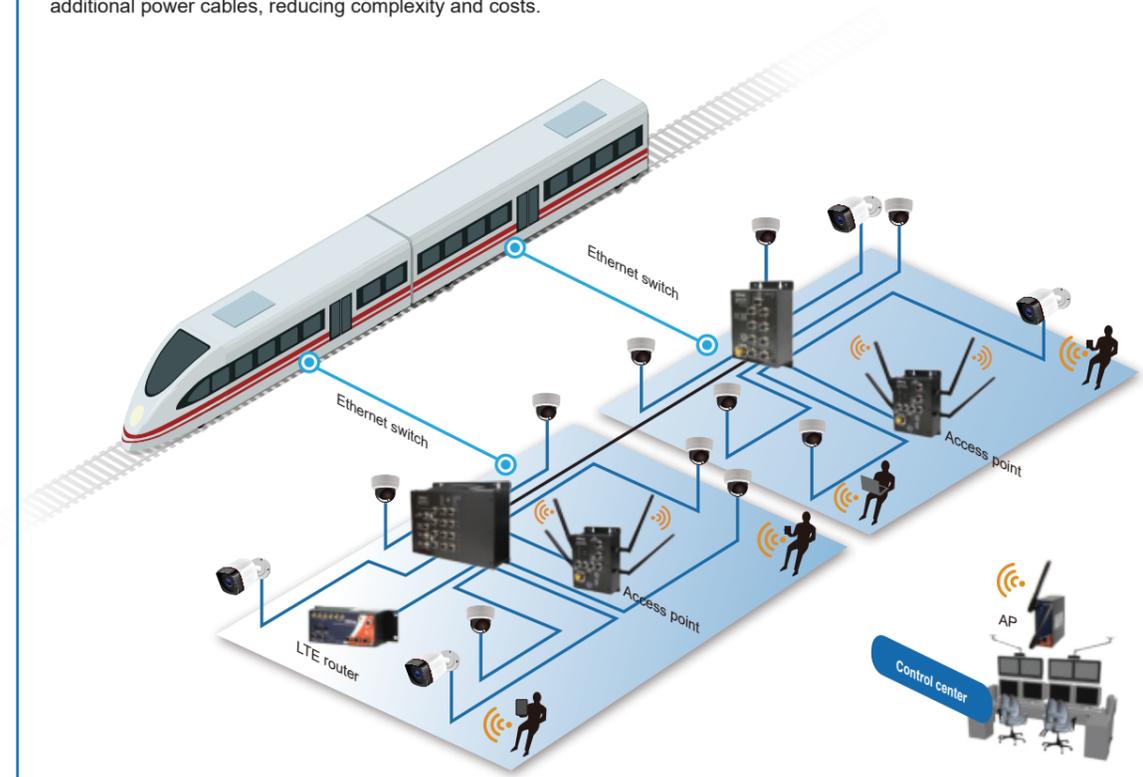
### Slovakian Railway Company Improves Travel Experience with ORing's Networking Solutions



A Slovakian railway operator upgraded its trains and implemented a modern passenger information system to improve the travel experience. To ensure smooth network connections for passengers watching videos or listening to music during their journey, the operator deployed a combination of wired and wireless networking solutions.

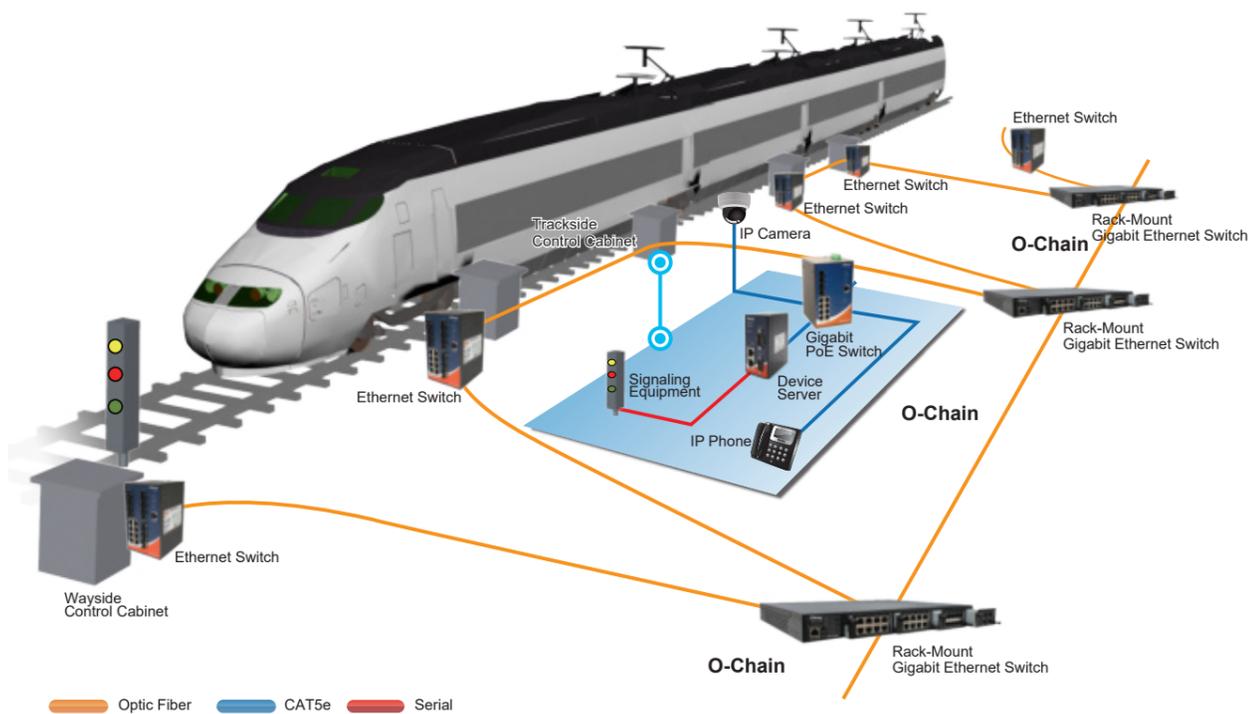
They installed ORing industrial Ethernet switches, connected to IP surveillance cameras, an LTE router, and access points, providing on-board wireless services. These EN-50155 compliant switches and APs can withstand shock and vibration, ensuring reliable network connections at all times.

The Gigabit speed of the network allows bandwidth-heavy traffic like IP surveillance videos or streaming to be transmitted without delays. The X-roaming support of access points reduces handoff time between access points to less than 60 milliseconds, ensuring reliable wireless connectivity. Furthermore, the APs' PoE PD function simplifies deployment by eliminating the need for additional power cables, reducing complexity and costs.



IP Camera IP Camera (outdoor)

## Long-range Fiber Communication



**On-board**  
EN50155

TGPS-W9082GF-MM-M12X-QS-MV-IP54

**Wayside**  
EN50121-4

RGPS-92222GCP series  
RGS-92222GCP-NP series  
IGPS-P9084GP-LA

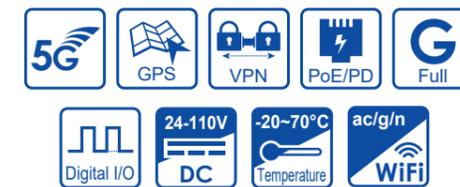
## EN50155 PoE Switch, PoE Injector, and PoE Splitter

Model	Mounting	Total Port	Managed	RJ-45			Hardware Bypass	Power Input			
				10/100 Base-TX	10/100/500 Base-TX	10/100/1G Base-T		12VDC	24VDC	110VDC	24-110VDC
TINJ-101-M12-24V	Wall	1		1 PSE				✓			
TINJ-101GT-M12-24V	Wall	1				1 PSE			✓		
TSPL-101GT-M12-12V	Wall	1				1 PSE	✓				
TSPL-101GT-M12-24V	Wall	1				1 PSE			✓		
TXPS-141XT-M12-24V	Wall	5			4 PSE + 1 TX				✓		
TXPS-141XT-M12-MV	Wall	8			4 PSE + 1 TX					✓	
TGXPS-1080-M12-24V	Wall	8				8 PSE			✓		
TGXPS-1080-M12-BP2-24V	Wall	8				8 PSE	✓		✓		
TGXPS-1080-M12-MV	Wall	8				8 PSE				✓	
TGXPS-1080-M12-BP2-MV	Wall	8				8 PSE	✓			✓	
TPS-3082GT-M12X-BP1-MV	Wall	10	✓	8 PSE		2	✓				✓
TPS-W9124GT-M12X-BP2-24V-IP54	Wall	16	✓	12 PSE		4	✓	✓			
TPS-3162GT-M12X-BP1-MV	Wall	18	✓	16 PSE		2	✓				✓
TPS-3882GT-M12-BP1-24V	Wall	8	✓	8 PSE, 8 TX		2	✓	✓			
TGPS-9080-M12A-MV	Wall	8	✓			8 PSE					✓
TGPS-W9082GF-MM-M12X-QS-MV-IP54	Wall	10	✓			8 PSE					✓

Model	Mounting	Total Port	Managed	RJ-45			Hardware Bypass	Power Input			
				10/100 Base-TX	10/100/500 Base-TX	10/100/1G Base-T		12VDC	24VDC	110VDC	24-110VDC
TGPS-9084GT-M12X-BP2-WV (IEC 62443-4-2)	Wall	12	✓			8 PSE + 4TX	✓				
TRGPS-9084GT-M12X-BP2-MV	Rack	12	✓			8 PSE + 4TX	✓			✓	✓
TRGPS-9084TG-M12X-BP2-MV	Rack	12	✓			8 PSE + 4 10G	✓			✓	
TGPS-W9124GT-M12X-BP2-WV-IP54	Wall	16	✓			12 PSE + 4TX	✓				
TGPS-9164GT-M12X-BP2-24V	Wall	20	✓			16 PSE + 4TX	✓	✓			✓
TGPS-9164GT-M12X-BP2-MV	Wall	20	✓			16 PSE + 4TX	✓			✓	
TGPS-9168GT-M12-BP2-24V	Wall	24	✓			16 PSE + 8TX	✓	✓			



## EN50155 AP/Router: TDGAP/TDGAR Series



### Features

- EN50155-compliant for rolling stock application
- 3x 10/100/1000Base-T(X) Ethernet with M12 X-coding
- Support 4G LTE or 5G NR (By model)
- IEEE 802.11ac up to 867Mbps link speed
- Support wireless AP/Client mode
- WAN connection : Dynamic/Static IP, PPPoE, Modem Dial Up
- Provide SNAT/PAT/1:1 NAT
- Support VPN for secured connection (Open VPN, IPsec, Cloud VPN)
- 1KV isolation for PoE P.D. port
- Event warning by Syslog, Email, SNMP Trap
- Wall mounting enabled

	TDGAP-830D+-M12X-WV	TDGAR-1083D+-D4GS-M12X-WV	TDGAR-1083D+-D5GS-M12X-WV	TDGAR-2083D+-D4GS-M12X-WV
Ethernet	3GE X-Coding	3GE X-Coding	3GE X-Coding	3GE X-Coding
WiFi	802.11n/ac	802.11n/ac	802.11n/ac	802.11n/ac
Cellular		4G LTE	5G NR	Dual 4G LTE
GPS		✓	✓	✓

WiFi only

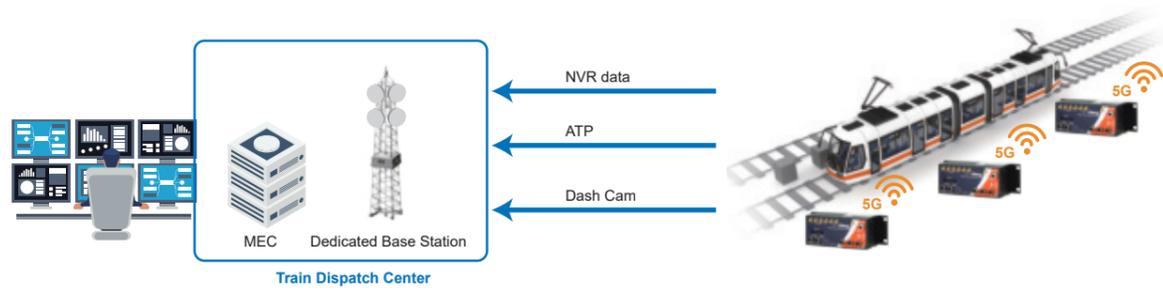
WiFi + 4G

WiFi + 5G

WiFi + Dual 4G

## 5G Private Network for Railway Applications

After the train returns to the train dispatch center, it uploads its operational records via 5G to the internal data platform. The backend conducts data analysis to provide visualized insights and quantitative statistics.



	Current Situation	With 5G Network
Central Control Center	Data collected cannot be effectively quantified and consolidated.	Effective data aggregation and visualization
Train Dispatch Center	<ul style="list-style-type: none"> <li>Manually downloading driving records from onboard systems is time-consuming and incurs labor costs.</li> <li>Driving records cannot be effectively utilized.</li> </ul>	<ul style="list-style-type: none"> <li>Automatic transmission of driving records significantly reduces scheduling costs and time.</li> <li>Analysis of driving data reduces accidents by:                             <ul style="list-style-type: none"> <li>-Identifying abnormal shifts/drivers.</li> <li>-Monitoring system status and timelines.</li> <li>-Implementing proactive maintenance schedules.</li> </ul> </li> </ul>
Train	Using Wi-Fi or 4G involves considering signal interference and transmission delays.	Adopting 5G NR technology with both high bandwidth and low latency characteristics.

## EN50155 Wireless AP, Cellular Router

Model	10/100/1G Base-T	Cellular	WLAN	GPS	DI/DO	Power Input		Specific Certificate
						DC Power	PoE PD	
TDGAP-830D+-M12X-WV	3 (M12)		1 WIFI5		1/1	Dual 24-110V	✓	EN50155
TDGAR-1083D+-D4G12S-M12X-WV	3 (M12)	1 4G LTE	1 WIFI5	✓	1/1	Dual 24-110V	✓	EN50155
TDGAR-1083D+-D5GS-M12X-WV	3 (M12)	1 5G NR	1 WIFI5	✓	1/1	Dual 24-110V	✓	EN50155
TDGAR-2083D+-D4G12S-M12X-WV	3 (M12)	2 4G LTE	1 WIFI5	✓	1/1	Dual 24-110V	✓	EN50155

## IEC 61850-3 Series



ORing's IEC 61850-3 Ethernet switch is designed for robust performance in industrial environments, particularly in power substations and other critical infrastructure. It adheres to the stringent IEC 61850-3, and IEEE 1613 standard, ensuring reliability and durability under harsh conditions. The switch supports high-speed data transmission, seamless network redundancy protocols like PRP and HSR, and features such as ruggedized design and wide operating temperature range. Ideal for applications requiring high availability and reliability, ORing's IEC 61850-3 Ethernet switch is a trusted choice in industrial networking solutions.



DIN-Rail Type

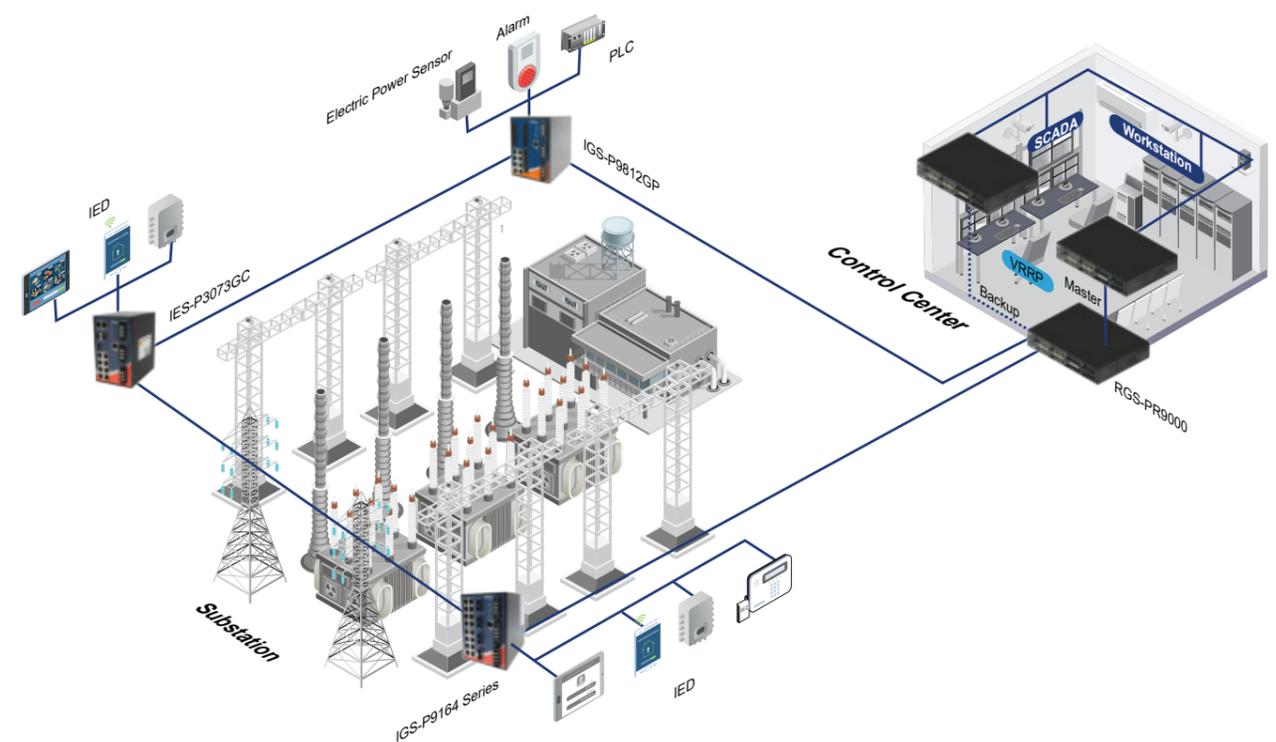


Rackmount

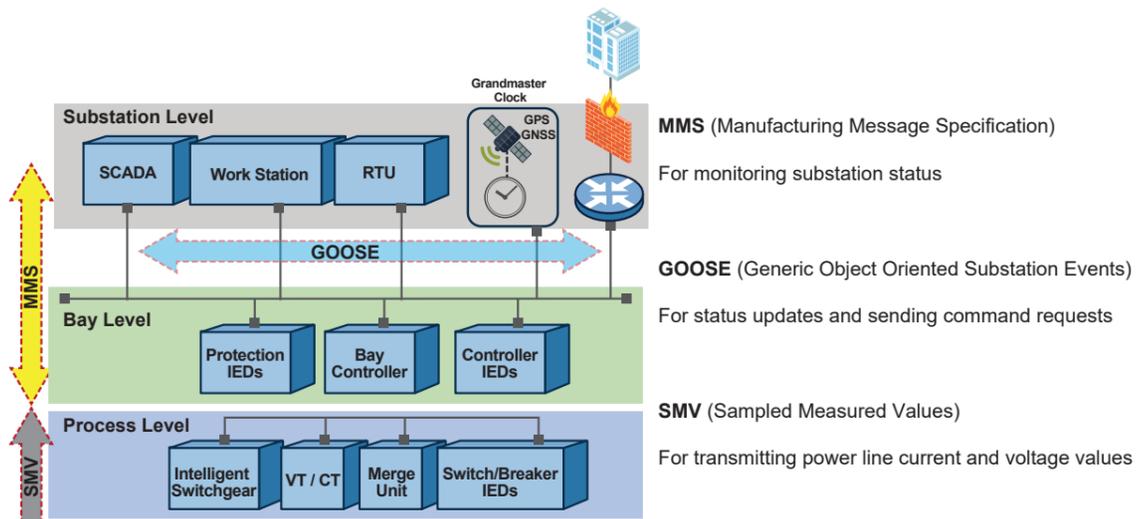


Modular Design

## Networking Scenario

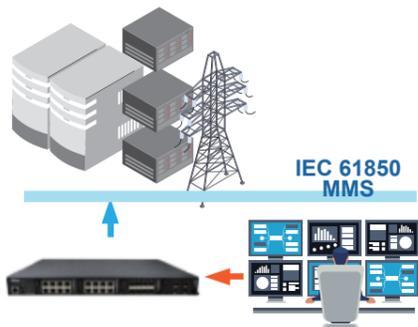


IEC 61850 is a substation automation standard for electric power systems. The IEC 61850 standards have been expected to ensure seamless communication and integration among IEDs from different manufacturers at a hierarchical level. A key focus of the standards lies in its transmission protocols tailored for distinct data transfer requirements.



### Feature Highlights

#### Built-in MMS Server



The MMS is based on IEC 61850-90-4 switch data modeling for power SCADA. Through MMS, administrators possess the capability to monitor and control IEDs, switches, as well as other MMS supported devices in substations.

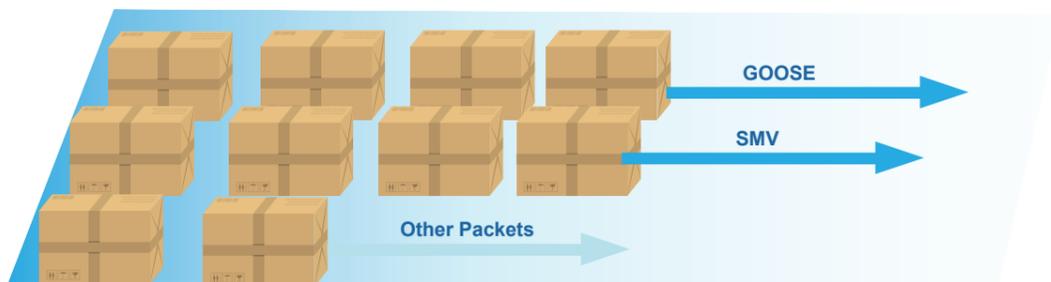
#### IEEE 1588 V2



Precise time synchronization is essential within a substation to guarantee the synchronized operation of measurement devices linked to the power grid. The precision of these clocks can range from milliseconds to microseconds, contingent upon the specific application.

#### Packet Priority: IEC 61850 QoS

Substation automation devices are required to establish flawless communication for IEC 61850 multicasts, placing the utmost importance on prioritizing these transmissions. By giving precedence to the transmission of GOOSE/SMV packets, we ensure the seamless reception of these messages across the entire network, irrespective of potential concurrent communication congestion.



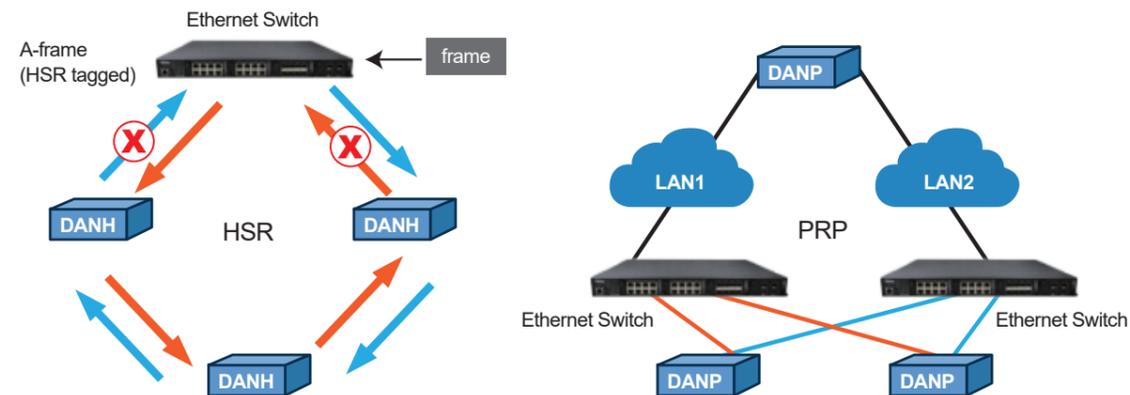
### HSR/PRP Protocols for Zero Recovery Time

ORing has developed a pluggable module compliant with IEC 62439-3 and equipped with HSR/PRP protocols. This module is designed to fit the RGS-P9000/PR9000 series and IGS-P9084GPMI.

The HSR and PRP protocols provide seamless failover from a single point of failure. These protocols are essential for mission-critical network applications.



SWM-20GT-HSR



### Substation Ethernet Switches with Fixed Ports

Model	Total Port	RJ-45		Fiber		Gigabit Combo	IEEE 1588v2	MMS Server	IEC 61850 QoS	Dual Power Input	Specific Certificate
		10/100 Base-TX	10/100/1G Base-T	100 Base-FX	100/1G Base-X						
IES-P3073GC-HV	10	7				3	Client			85-264VAC/88-373VDC	IEC 61850-3 IEEE 1613
IES-P3073GC-LV	10	7				3	Client			12-48VDC	IEC 61850-3 IEEE 1613
RES-P9242GCL-HV	26	24				2	Client/ Server	✓	✓	125-370VDC/100-240VAC	IEC 61850-3 IEEE 1613 IEC 62443-4-2
RES-P9242GCL-LV	26	24				2	Client/ Server	✓	✓	24-72VDC	IEC 61850-3 IEEE 1613 IEC 62443-4-2
IGS-P9084GP-HV	12		8		4 SFP		Client/ Server	✓	✓	85-264VAC/88-300VDC	IEC 61850-3 IEEE 1613
IGS-P9084GP-LV	12		8		4 SFP		Client/ Server	✓	✓	12-48VDC	IEC 61850-3 IEEE 1613
IGS-P9812GP-HV	20		8		12 SFP		Client/ Server	✓	✓	85-264VAC/88-373VDC	IEC 61850-3 IEEE 1613 IEC 62443-4-2
IGS-P9812GP-LV	20		8		12 SFP		Client/ Server	✓	✓	12-48VDC	IEC 61850-3 IEEE 1613 IEC 62443-4-2
IGS-P9164FX-MM-SC-HV	20		16	4 SC			Client/ Server	✓	✓	85-264VAC/88-373VDC	IEC 62443-4-2
IGS-P9164FX-MM-SC-LV	20		16	4 SC			Client/ Server	✓	✓	12-48VDC	IEC 61850-3 IEEE 1613
IGS-P9164FX-SS-SC-HV	20		16	4 SC			Client/ Server	✓	✓	85-264VAC/88-373VDC	IEC 61850-3 IEEE 1613
IGS-P9164FX-SS-SC-LV	20		16	4 SC			Client/ Server	✓	✓	12-48VDC	IEC 61850-3 IEEE 1613
IGS-P9164GF-MM-SC-HV	20		16		4 SC		Client/ Server	✓	✓	85-264VAC/88-373VDC	IEC 61850-3 IEEE 1613
IGS-P9164GF-MM-SC-LV	20		16		4 SC		Client/ Server	✓	✓	85-264VAC/88-373VDC	IEC 61850-3 IEEE 1613
IGS-P9164GF-SS-SC-HV	20		16		4 SC		Client/ Server	✓	✓	85-264VAC/88-373VDC	IEC 61850-3 IEEE 1613
IGS-P9164GF-SS-SC-LV	20		16		4 SC		Client/ Server	✓	✓	12-48VDC	IEC 61850-3 IEEE 1613
IGS-P9164GC-HV	20		16				Client/ Server	✓	✓	85-264VAC/88-373VDC	IEC 61850-3 IEEE 1613 IEC 62443-4-2
IGS-P9164GC-LV	20		16				Client/ Server	✓	✓	12-48VDC	IEC 61850-3 IEEE 1613 IEC 62443-4-2
IGPS-P9084GP-LA	12		8 PSE		4 SFP		Client/ Server	✓	✓	50/57VDC	IEC 61850-3 IEEE 1613 IEC 62443-4-2 EN50121-4

## Substation Ethernet Switches with Modular Design



### IGS-P9084GPMI

- 8 GE + 4 100/1G SFP ports
- 1 slot for optional module
- Support IEEE 1588v2 clock synchronization
- Support multiple MRP rings and domains
- Support IEC 62439-3 HSR/PRP (with SWM-20GT-HSR module)
- Operating temperature: -40 to 85°C
- Dual power input: LV 12-48VDC or HV 85-264VAC / 88-300VDC



### RGS-P9000 (Layer 2) RGS-PR9000 (Layer 3)

- 4 slots for optional modules
- RGS-P9000 is certified to IEC 62443-4-2
- Support IEEE 1588v2 clock synchronization
- Support multiple MRP rings and domains
- Support IEC 62439-3 HSR/PRP (with SWM-20GT-HSR module)
- Dual power input: LV 24-72VDC or HV 100-240VAC / 100-370VDC

IGS-P9084GPMI  
RGS-P9000 slot 1-3  
RGS-PR9000 slot 1-3

RGS-P9000 slot 4  
RGS-PR9000 slot 4

## Optional Module List

### Ethernet



**SWM-80GT**  
8 GE RJ45 ports



**SWM-60GT-M12**  
6 GE M12 ports



**SWM-04FX-MM-SC**  
• 4-port FX SC  
• Multi-mode, 2km



**SWM-04FX-SS-SC**  
• 4-port FX SC  
• Single-mode, 30km



**SWM-04FX-MM-ST**  
• 4-port FX ST  
• Multi-mode, 2km



**SWM-04FX-SS-ST**  
• 4-port FX ST  
• Single-mode, 30km



**SWM-04GF-MM-SC**  
• 4-port 1G FX SC  
• Multi-mode, 550m



**SWM-04GF-SS-SC**  
• 4-port 1G FX SC  
• Single-mode, 10km



**SWM-04GF-MM-ST**  
• 4-port 1G FX ST  
• Multi-mode, 550m



**SWM-04GF-SS-ST**  
• 4-port 1G FX ST  
• Single-mode, 10km



**SWM-08GP**  
8 100/1000 SFP socket



**SWM-20GT-HSR**  
• 2 Gigabit Combo  
• Supports HSR/PRP



**SWM-06TIL**  
• 6-port 10Base-T1L  
• Single-pair Ethernet (SPE)

### Wireless



**APM-820**  
• 802.11n/ac WIFI  
• 1GE RJ45



**RTM-1002-D5G**  
• 5G NR  
• 1GE RJ45

### Serial



**DSM-221-I**  
2-port RS422/485



**DSM-141**  
4-port RS232



**IOM-11400**  
• 4 AI, 1 DI, 1DO  
• 1-port RS485



**IOM-44000**  
• 4 DI, 4 DO  
• 1-port RS485

### X86 CPU Module



**MFS-CE10**  
• Atom® X6413E  
• 1GE RJ45



**SWM-04GP\_4**  
4-port 1G SFP socket



**SWM-02GP+\_4**  
2-port 10G SFP+ socket



**SWM-04GP+\_4**  
4-port 10G SFP+ socket



**SWM-04GF-MM-SC\_4**  
• 4-port 1G FX SC  
• Multi-mode, 550m



**SWM-04GF-SS-SC\_4**  
• 4-port 1G FX SC  
• Single-mode, 10km



**SWM-04GF-MM-ST\_4**  
• 4-port 1G FX ST  
• Multi-mode, 550m



**SWM-04GF-SS-ST\_4**  
• 4-port 1G FX ST  
• Single-mode, 10km



**RGS-P9160GCM1**

- 16G Combo ports and 1 slot for optional module
- Support IEEE 1588v2 clock synchronization
- Supports Modbus TCP and Ethernet/IP
- Operating temperature: -40 to 85°C
- Dual power input: LV 24~72VDC or HV 100~240VAC / 100~370VDC

**Optional Module List**



**SWM-80GT**  
8 GE RJ45 ports



**SWM-60GT-M12**  
6 GE M12 ports



**SWM-04FX-MM-SC**  
• 4-port FX SC  
• Multi-mode, 2km



**SWM-04FX-SS-SC**  
• 4-port FX SC  
• Single-mode, 30km



**SWM-04FX-MM-ST**  
• 4-port FX ST  
• Multi-mode, 2km



**SWM-04FX-SS-ST**  
• 4-port FX ST  
• Single-mode, 30km



**SWM-04GF-MM-SC**  
• 4-port 1G FX SC  
• Multi-mode, 550m



**SWM-04GF-SS-SC**  
• 4-port 1G FX SC  
• Single-mode, 10km



**SWM-04GF-MM-ST**  
• 4-port 1G FX ST  
• Multi-mode, 550m



**SWM-04GF-SS-ST**  
• 4-port 1G FX ST  
• Single-mode, 10km



**SWM-08GP**  
8 100/1000 SFP socket



**RGS-PRX004GP+MG**

- 4x fixed 1G/2.5G/10G SFP+ sockets
- 3 slots for optional modules
- Support TSN protocol – IEEE 802.1AS, Qav, Qat
- L3 feature: RIP, OSPF v2/v3, PIM-SM/PIM-DM, VRRP

**Optional Module List**



**SWM-80GT-MG**  
8 GE RJ45 ports



**SWM-08GP-MG**  
8 100/1000 SFP sockets



**SWM-44GTP-MG**  
4 GE RJ45 ports and 4 100/1000 SFP socket

**IEC 62443-4-2 Certified Product List**



IGS-P9812GP-HV  
IGS-P9812GP-LV



IGS-P9164GC-HV  
IGS-P9164GC-LV



RES-P9242GCL-HV  
RES-P9242GCL-LV

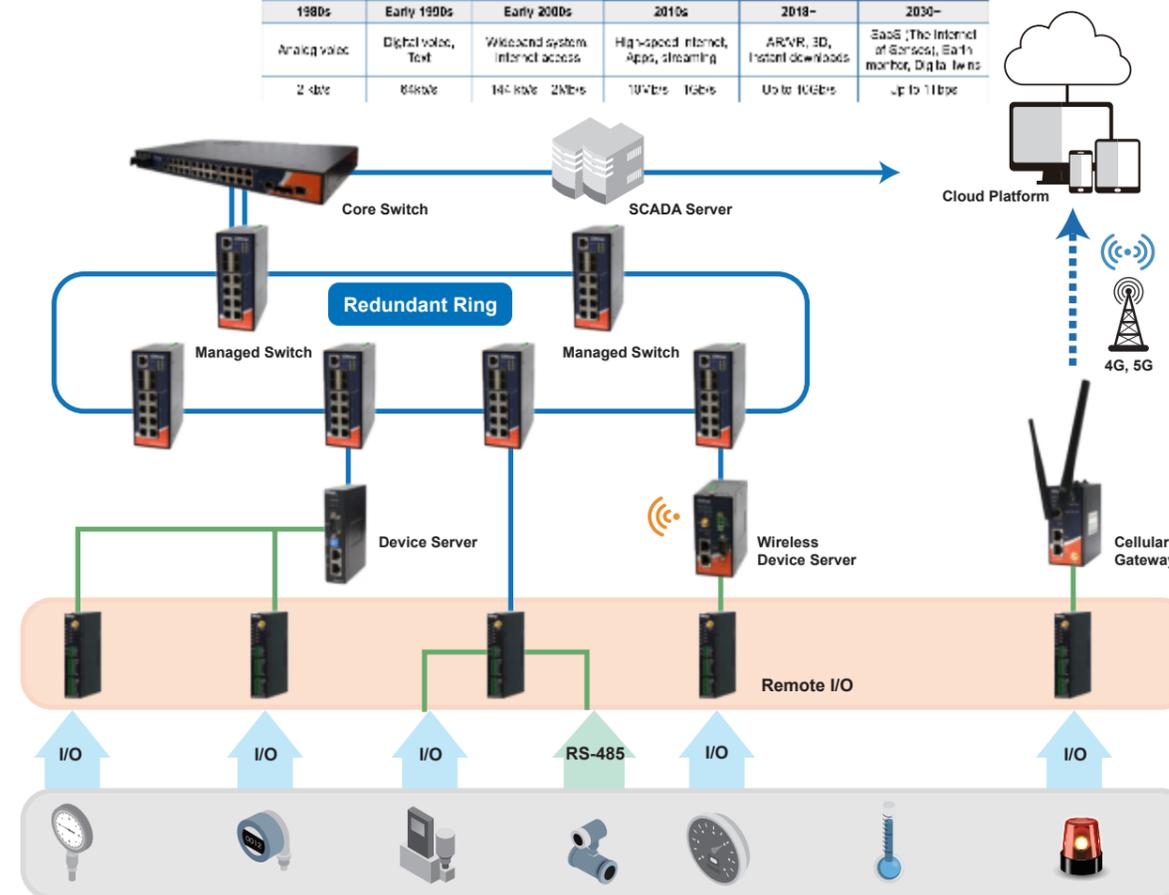


RGS-P9000-HV  
RGS-P9000-LV

**Cellular Router / Gateway**

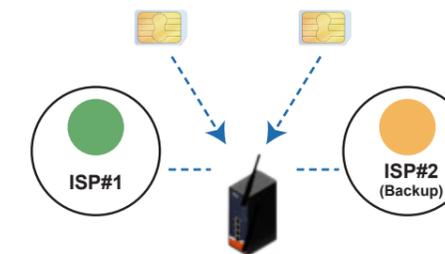
ORing's cellular solutions provide reliable and secure wireless connectivity for a wide range of industrial applications. Supporting 4G LTE, 5G, and NB-IoT technologies, these devices enable flexible deployment in diverse environments—from high-speed data transmission in smart cities and low-power, wide-area coverage for remote monitoring and IoT applications.

1G	2G	3G	4G	5G	6G
1980s	Early 1990s	Early 2000s	2010s	2018-	2030-
Analog voice	Digital voice, Text	Wideband system, Internet access	High-speed internet, Apps, streaming	AR/VR, 3D, Instant downloads	5G-AI (The Internet of Sensors), Earth monitor, Digital twins
2-dbit	84kbit/s	14.4kbit/s 2Mbps	10Mbps 1Gbit/s	Up to 10Gbit/s	Up to 1Tbit/s



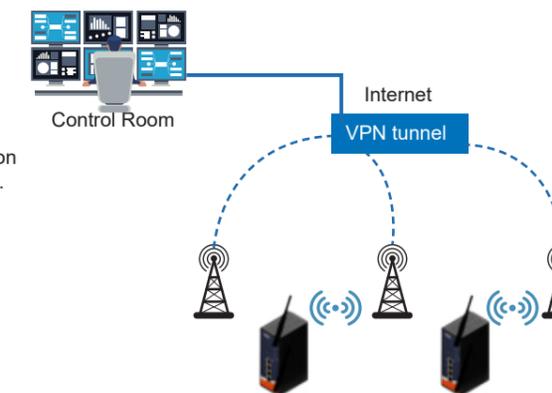
**Dual SIM Redundancy**

When two SIM cards from different ISPs are inserted, the router automatically switches to the secondary SIM if the primary connection fails. This seamless failover mechanism ensures continuous and reliable cellular connectivity.



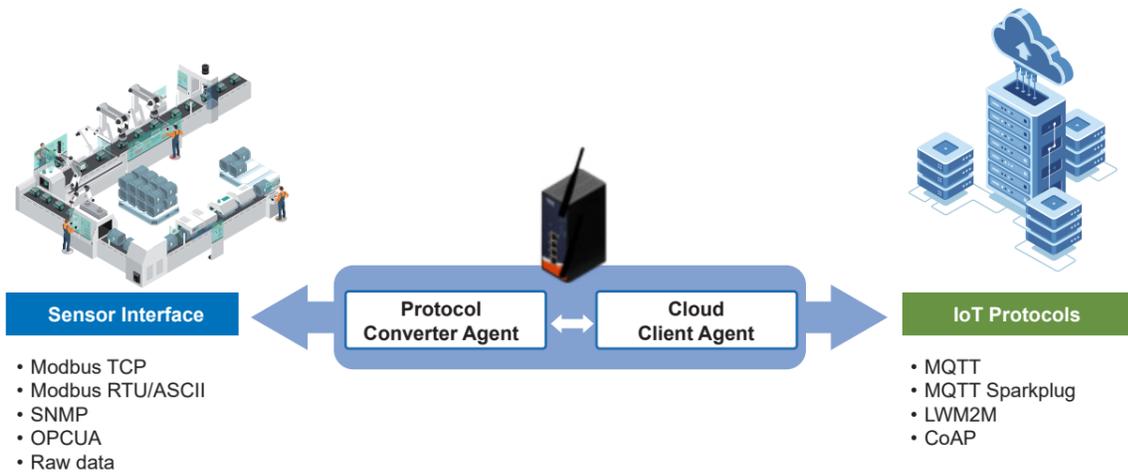
**Secure VPN Connection**

ORing's industrial cellular routers support VPN protocols like OpenVPN and IPSec, enabling secure, encrypted communication between remote sites and central systems over public networks.



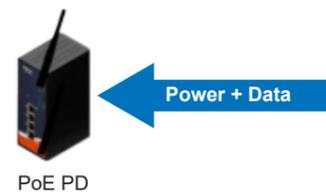
### “Open Gateway” Feature

Open Gateway supports MQTT, MQTT Sparkplug, LWM2M, and CoAP for cloud connections, and Modbus TCP, RTU/ASCII, SNMP for end devices. Available on IDS, IMG, and IGMG series, it enables fast IIoT deployment and value creation.



### Power Made Simple

Most ORing wireless models can be powered through PoE-enabled devices such as PoE injectors or switches, enabling simplified installation and flexible deployment without the need for separate power supplies.

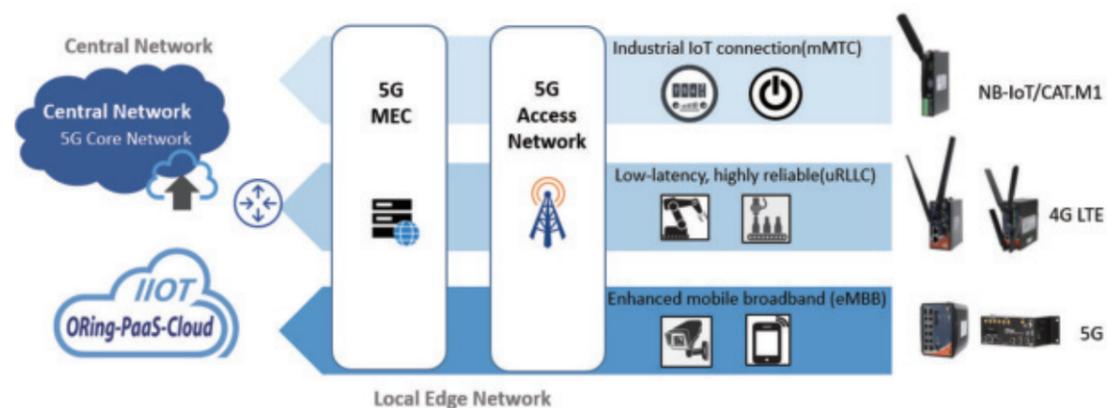


### PPPoE

PPPoE (Point-to-Point Protocol over Ethernet) is a network protocol for encapsulating Point-to-Point Protocol (PPP) frames inside Ethernet frames. It is used mainly with DSL services where individual users connect to the xDSL modem over Ethernet to build up network connection.

DDNS (Dynamic Domain Name Server) is a method, protocol, or network service that provides the capability for a networked device using the Internet Protocol Suite, such as an IP router or computer system, to notify a domain name server to change, in real time, the active DNS configuration of its configured hostnames, addresses or other information stored in DNS. When the connection is established through PPPoE and the IP address is floated, end users may not be able to configure device server. However, through DDNS method, it's easy for different IP domain users to connect to ORing cellular products.

PPPoE enables clients to adopt the traditional dial-up access mode, which allows end users to use the familiar hardware and similar software to access the Internet. Moreover, clients can also use Ethernet adapters to connect PCs and xDSL modems, which allow PCs to share xDSL lines and thus saves investment.



### Cellular Products at a Glance



Model Name	IMG-311DL-MN	IMG-311DL-4GS	IGMG-P83244GC+-D4G
<b>Interface</b>			
Cellular Standard	NB-IoT	LTE Cat 4	LTE Cat 4
SIM Card Slot	1	1	2
Cellular Antenna	1	2	2
10/100 Base-TX	1	1	
10/100/1000 Base-T			4
Gigabit Combo			4
Serial	1x RS-232/422/485 in DB9	1x RS-232/422/485 in DB9	1x RS-422/485 in Terminal block
DI/DO	1/1	1/1	0/1
GPS		✓	
<b>Power</b>			
Power Input	Dual 12-48VDC	Dual 12-48VDC	Dual 12-48VDC or PoE PD
<b>Physical Characteristic</b>			
Enclosure	IP30	IP30	IP30
Dimension (W x D x H)	26.1 x 94.9 x 144.3 mm	26.1 x 94.9 x 144.3 mm	116.4 x 170 x 154 mm
Mounting	DIN-Rail Kit	DIN-Rail Kit	DIN-Rail Kit
<b>Approvals</b>			
EMC	CE, FCC	CE, FCC	CE, FCC
Radio	RED	RED	RED, PTCRB
Carrier Certified			AT&T





Model Name	IGAR-1004-D5G_EU	IMG-4312-4G	IMG-4312D+-D4G
<b>Interface</b>			
Cellular Standard	5G sub-6 GHz	LTE Cat.4	LTE Cat.4
SIM Card Slot	2	1	2
Cellular Antenna	4	2	2
10/100 Base-TX		2	2
10/100/1000 Base-T	4		
WiFi IEEE 802.11		b/g/n (2.4GHz)	b/g/n (2.4GHz)
WiFi Antenna		1	1
Serial		1x RS-232/422/485 in DB9	1x RS-232/422/485 in DB9
DI/DO			1/1
GPS			
<b>Power</b>			
Power Input	Dual 12-24VDC	Dual 12-48VDC	Dual 12-48VDC or PoE PD
<b>Physical Characteristic</b>			
Enclosure	IP40	IP30	IP30
Dimension (W x D x H)	55.2 x 125 x 158 mm	45 x 80.6 x 95 mm	45 x 80.6 x 95 mm
Mounting	DIN-Rail Kit	DIN-Rail Kit	DIN-Rail Kit
<b>Approvals</b>			
EMC	CISPR 25, CE, FCC	CE, FCC	CE, FCC
Radio	RED	RED	RED, PTCRB
Bus	ECE R10 ECE R118 (Fire protection)		
Petrochemical		UL C1D2	
Carrier Certified			AT&T, Verizon, FirstNet



IMG-4312D+-D4G

IMG-4312D+-D4G LTE cellular M2M gateway is an innovative solution for cloud, IoT, and Industry 4.0 applications. Supporting LTE with 4G, Ethernet, Serial, and Wi-Fi connectivity options, it communicates via Modbus RTU/TCP protocols and supports VPN (OpenVPN, PPTP, IPSec).



Model Name	IAR-142-4G	IAR-142+-4G	IGMG-8224D-D5G
<b>Interface</b>			
Cellular Standard	LTE Cat.4	LTE Cat.4	5G sub-6 GHz
SIM Card Slot	1	1	2
Cellular Antenna	2	2	4
10/100 Base-TX	2	2	
10/100/1000 Base-T			4
WiFi IEEE 802.11	b/g/n (2.4GHz)	b/g/n (2.4GHz)	a/b/g/n/ac
WiFi Antenna	1	1	2
DI/DO			2/2
SD Card Slot			✓
Power Input	Dual 12-48VDC	Dual 12-48VDC or PoE PD	Dual 12-48VDC
<b>Physical Characteristic</b>			
Enclosure	IP30	IP30	IP30
Dimension (W x D x H)	45 x 80.6 x 95 mm	45 x 80.6 x 95 mm	60 x 125 x 158 mm
Mounting	DIN-Rail Kit	DIN-Rail Kit	Wall Mount Kit
<b>Approvals</b>			
EMC	CE, FCC	CE, FCC	CE, FCC
Radio	RED	RED	RED
Petrochemical	UL C1D2	UL C1D2	



Model Name	TDGAR-1083D+-D4G12S-M12X-WV	TDGAR-1083D+-D5GS-M12X-WV	TDGAR-2083D+-D4G12S-M12X-WV
<b>Interface</b>			
Cellular Standard	LTE+ Cat.12	5G sub-6 GHz	Dual LTE+ Cat.12
SIM Card Slot	2	2	4
Cellular Antenna	2	4	4
10/100 Base-TX			
10/100/1000 Base-T	3 (M12 X-coded)	3 (M12 X-coded)	3 (M12 X-coded)
WiFi IEEE 802.11	a/b/g/n/ac	a/b/g/n/ac	a/b/g/n/ac
WiFi Antenna	2	2	2
DI/DO	1/1	1/1	1/1
GPS	✓	✓	✓
<b>Power</b>			
Power Input	24-110VDC or PoE PD	24-110VDC or PoE PD	24-110VDC or PoE PD
<b>Physical Characteristic</b>			
Enclosure	IP30	IP30	IP30
Dimension (W x D x H)	200 x 100 x 89 mm	200 x 100 x 89 mm	200 x 100 x 89 mm
Mounting	Wall Mount Kit	Wall Mount Kit	Wall Mount Kit
<b>Approvals</b>			
EMC	CE, FCC	CE, FCC	CE, FCC
Radio	RED	RED	RED
Rail	EN50155	EN50155	EN50155

## Secure Remote Access Made Easy

The ORing router series now features a built-in IXON agent, enabling quick and secure VPN connections to the IXON Cloud. This allows users to access and manage the routers remotely—without the need for additional setup or external hardware.



	Traditional VPN	Cloud VPN
<b>IT Setup</b>	Complex	Plug & play
<b>Public IP Required</b>	Yes	No public IP needed
<b>VPN Server Hosting</b>	Self-hosted or third-party configuration	Included in the cloud platform
<b>Time to Deploy</b>	Days to weeks	Minutes
<b>Accessibility</b>	PC-based, static settings	Access via PC, tablet, smartphone

## Smarter Connectivity Starts with IXON Cloud



**VPN servers across 17 locations**  
automatically connects to the nearest server.



**VPN Stealth Mode™**  
for connections in countries with internet censorship.



**VPN client installs automatically**  
from IXON Cloud, works on Windows, Mac, Linux, iOS, and Android.



**Configurable VPN over TCP or UDP**  
Select between reliable or efficient connection.

## Get Connected in 4 Easy Steps



### Support on

- IGAR-1004-D5G
- IGMG-8224D-D5G
- IGMG-P83244GC+-D4G
- IGR-40D
- TDGAR-1083D+-D5GS-M12X-WV
- TDGAR-1083D+-D4G12S-M12X-WV
- TDGAR-2083D+-D4G12S-M12X-WV

## WLAN AP/CPE

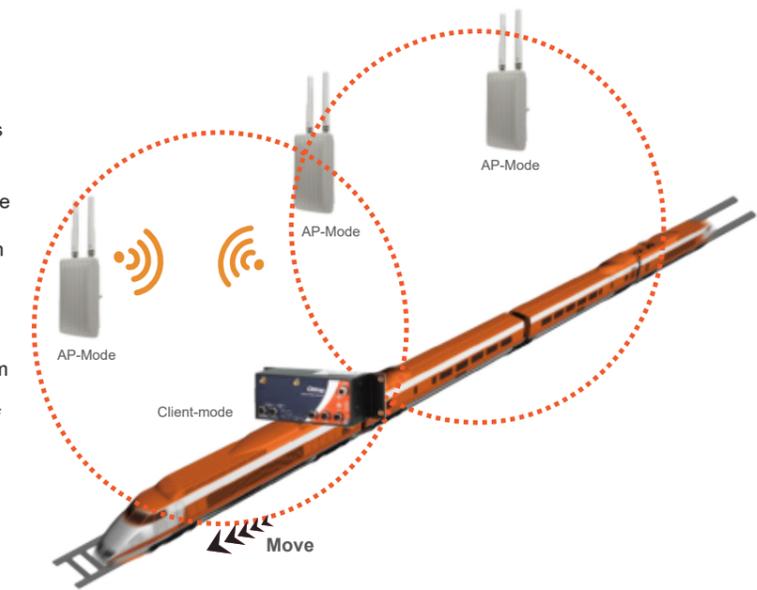
ORing's industrial Wireless access points are made for rugged and seamless long distance wireless and wireless roaming networks. All of ORing's industrial wireless products feature long communication range with X-Roaming technology, support for IEEE 802.11 standard, and AP/ Bridge/ Repeater/ AP-client/ Client operation modes. Some of these Wireless Access Points are even waterproof (the IP-67 models) – perfect for outdoor use. Additionally, some models are EN50155-certified, making them especially suitable for rolling stock applications.

Year	Standard	Peak PHY rate	Frequency
1997	802.11	2 Mbps	2.4GHz
1999	802.11b	Wi-Fi 1 11 Mbps	2.4GHz
1999	802.11a	Wi-Fi 2 54 Mbps	5GHz
2003	802.11g	Wi-Fi 3 54 Mbps	2.4GHz
2009	802.11n	Wi-Fi 4 600 Mbps	2.4GHz/5GHz
2013	802.11ac	Wi-Fi 5 1.73 Gbps (Wave 1) 3.46 Gbps (Wave 2)	5GHz only
2020	802.11ax	Wi-Fi 6 9.6 Gbps	2.4GHz/5GHz

## X-Roaming

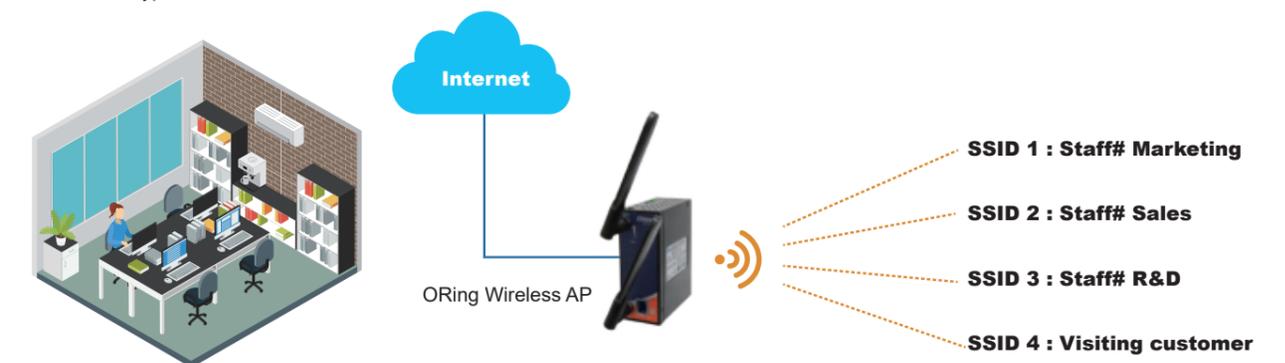
IEEE 802.11 networks can only transmit data within a few hundred meters. As for mobile data application, the devices should handoff from one access point to another. ORing's X-Roaming technology, which is available in all of ORing's new wireless access point models, reduces the handoff time between two different access points to less than 100 milliseconds, and makes seamless wireless communication possible.

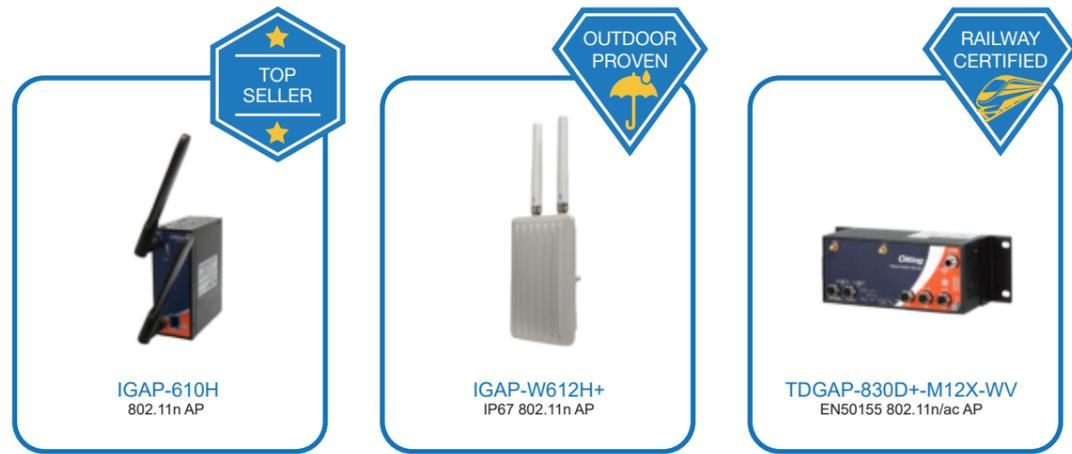
With ORing's X-Roaming technology, the client can roam seamlessly among different access points. ORing also provides the feature of load balance — to prevent traffic jam of mobile data transmission while roaming, i.e. to limit the total amount of AP clients that connected to the products of ORing APs.



## Multiple SSIDs

SSID (Service Set Identifier) is an arbitrary sequence of characters that uniquely name for a wireless local area network. The SSID is broadcast by stations in beacon packets to announce the presence of a network. The wireless user can see the SSIDs for the available networks from wireless access point and join one of them. ORing wireless APs support Multiple SSIDs. When enable this mode, the access point is able to create and broadcast multiple wireless networks. Each wireless network has its own profile that includes SSIDs, channel, security and other options. The benefit of Multiple SSIDs support is to separate connections by wireless network through different encryptions.





Model Name	IAP-420	IAP-420+	IGAP-610H+	IGAP-840D	IGAP-W612H+	TDGAP-830D+-M12X-WV
<b>Interface</b>						
10/100 Base-TX	2	2				
10/100/1000 Base-T			1	4	1	3 (M12 X-coded)
WiFi IEEE 802.11	b/g/n (2.4GHz)	b/g/n (2.4GHz)	a/b/g/n	a/b/g/n/ac	a/b/g/n	a/b/g/n/ac
WiFi Antenna	1	1	2	2	2	2
DI/DO				2/2		1/1
<b>WLAN</b>						
Operation Mode	AP/ Bridge/ AP-Client	AP/ Bridge/ AP-Client	AP/ Client/ Repeater	AP/ Client/ Repeater	AP/ Client/ Repeater	AP/ Client
Transmission Rate	UP to 150 Mbps	UP to 150 Mbps	Up to 300 Mbps	Up to 867Mbps	Up to 300Mbps	Up to 867Mbps
<b>Power</b>						
Power Input	Dual 12-48VDC	Dual 12-48VDC or PoE PD	Dual 12-48VDC or PoE PD	Dual 12-48VDC	48VDC from PoE	24-110VDC
<b>Physical Characteristic</b>						
Enclosure	IP30	IP30	IP30	IP30	IP67	IP30
Dimension (W x D x H)	41 x 81 x 95 mm	41 x 81 x 95 mm	45 x 95 x 115 mm	60 x 125 x 158 mm	220.42 x 127.42 x 75 mm	200 x 100 x 89 mm
Mounting	DIN-Rail Kit Wall Mount Kit	Pole Mount Kit	Wall Mount Kit			
<b>Approvals</b>						
EMC	CE, FCC	CE, FCC	CE, FCC	CE, FCC	CE, FCC	CE, FCC
Radio	RED	RED	RED	RED	RED	RED
Rail						EN50155

Model Name	IDS-4312D+
<b>Interface</b>	
10/100 Base-TX	2
WiFi IEEE 802.11	b/g/n
WiFi Antenna	1
Serial	1
DI/DO	1/1
<b>WLAN</b>	
Operation Mode	Client
Frequency Band	America / FCC: 2.412~2.462 GHz Europe CE / ETSI: 2.412~2.472 GHz
Transmission Rate	UP to 150 Mbps
<b>Serial</b>	
Connector	DB9
Serial Mode	RS-232/422/485
Operating Mode	Virtual COM, Serial Tunnel, TCP Server/ Client, UDP, Modbus Gateway
<b>Power</b>	
Power Input	Dual 12-48VDC or PoE PD
<b>Physical Characteristic</b>	
Enclosure	IP30
Dimension (W x D x H)	41 x 81 x 95 mm
Mounting	DIN-Rail Kit
<b>Approvals</b>	
EMC	CE/FCC
Radio	RED
Petrochemical	UL C1D2

# Media Converter

ORing offers Serial to Serial, Fiber to Ethernet (PoE), and Gigabit Fiber to Ethernet media converters. Also, ORing's serial converters allow devices to communicate effortlessly across different serial interfaces and offer convenient, intelligent features

## Target Markets



Industrial Automation



ITS



Building, Facility

## Success Story

Location: Hubei, China

Project: Smart Bridge Monitoring – Wuhan 3rd Ring Road

To ensure the long-term structural health of 42 bridges, over 1,929 sensors have been deployed to monitor key indicators such as wind speed, wind direction, stress, vibration, and settlement. Data is transmitted to a cloud platform, enabling personnel to monitor the status of each bridge in real time via PC or mobile app. Considering factors such as wiring, cost, and deployment efficiency, the monitoring system is divided into three layers:

### Front-End Access System

Two sensors connect to one IMC-121FB-SS-SC media converter via LAN port for data transmission.

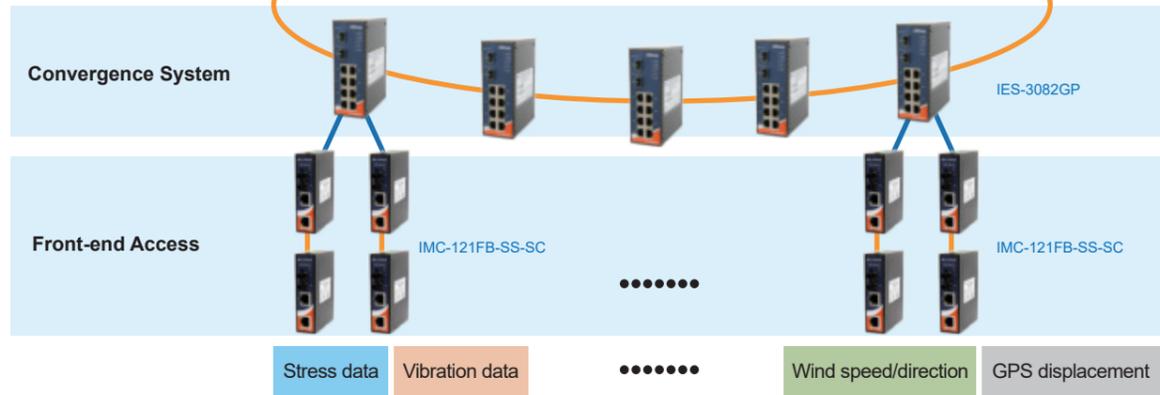
### Convergence System

Each bridge features 5 aggregation points, each equipped with an IES-3082GP switch.

### Back-End Core System

The IES-3082GP managed switch connects to the nearest Internet access point and transmits collected data to the cloud.

Through the Open-Vision centralized management platform, system administrators can efficiently monitor and manage devices, significantly improving operational efficiency and reducing maintenance costs.



## LFP (Link Fault Pass-Through)

Link Fault Pass-Through is the technology that actively "passes" any link failure of one side of the media converter to the other side, enabling subsequent devices connected to the other side to respond properly. Traditional media converters usually suffer from inability to transfer link failure from one side to another. In other words, when link failure occurs on one side, the other side is still transmitting packets without actual data, causing subsequent devices of the link to wait for a response that will never arrive.

LFP effectively solves such problem of media converters by actively relaying link failures from one side to another. For example, if the links on the Ethernet side of the media converter fails, the media converter reinitiates auto-negotiation on the Ethernet side but stays in the link failure state. Additionally, the converter actively stop transmitting on links of the optical fiber side so subsequent devices connected to the optical fiber link would respond to network failure properly. With LFP technology, link failure would be noticed swiftly, minimizing data loss caused by such failure.

### Normal Condition

Both fiber and Ethernet links are active, and data transmission operates smoothly without interruption.



### Without LFP Function

If one side of the link fails, the media converter without LFP will keep the opposite port active, causing the connected device to remain unaware of the disconnection, which may lead to data loss or communication issues.



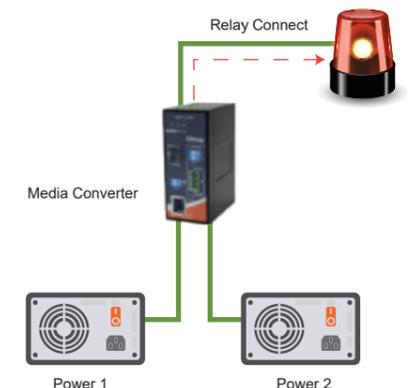
### With LFP Function

If one side of the link fails, the media converter with LFP will automatically disable the opposite port, instantly notifying the connected device of the fault, enabling faster response and troubleshooting.



## Dual Power Input

Ensures continuous operation in critical environments. If one power source fails, the system automatically switches to the backup, minimizing downtime and enhancing power stability.



## Relay Output

This feature instantly triggers alerts upon unexpected power failures. This feature enables real-time notifications to external alarm systems, ensuring timely response, minimizing downtime, and enhancing network reliability in industrial environments.



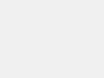
**RMC-1000**  
**Industrial Ethernet to Fiber Media Converter Chassis**  
 ✓ Supports 18 slots for media converter  
 ✓ Dual power supply design  
 ✓ Hot-swappable for converters and power supplies  
 ✓ 19 inches Rack-mount enabled

Optional module list

Card Type Ethernet to Fiber Media Converter

Power Supply Module

-  **RMC-121FB-MM-SC**  
2FE to 1 100FX (MM 2km, SC)
-  **RMC-121FB-SS-SC**  
2FE to 1 100FX (SM 30km, SC)
-  **RGMC-111GPB**  
1GE to 1 100/1000 SFP socket

-  **RPM-130-AC-EU**  
130W (12VDC/10.8A) with 100~240VAC input, EU power cord
-  **RPM-130-AC-US**  
130W (12VDC/10.8A) with 100~240VAC input, US power cord

 **IGPMC-111GP-BT-24V**  
**Gigabit PoE to Fiber Media Converter**  
 ✓ 1 Gigabit PoE to 100/1000Base-X SFP slot  
 ✓ 802.3bt, up to 90W PoE output

 **IGMC-111GPB-LFP**  
**Gigabit Ethernet to Fiber Media Converter**  
 ✓ 1GE to 100/1000Base-X SFP slot  
 • Up to 120km w/ Single-mode SFP  
 • Up to 2km w/ Multi-mode SFP

 **IMC-121FB series**  
**2FE to 1 100FX Media Converter**  
 ✓ SC fiber connector  
 • Single-mode: 30km  
 • Multi-mode: 2km

**Gigabit PoE to Fiber Media Converter**



Model Name	IGPMC-111GP-BT-24V
<b>Interface</b>	
10/100/1000 Base-T	1 PSE
100/1000 Base-X SFP	1
Relay Output	Support
<b>PoE</b>	
802.3	af/at/bt
Power Output	90W
<b>Feature</b>	
LFP	Support
<b>Power</b>	
Power Input	Dual 12-57VDC
<b>Physical Characteristic</b>	
Enclosure	IP30
Dimension (W x D x H)	41 x 70 x 95 mm
Mounting	DIN-Rail Kit, Wall Mount Kit
Operating Temperature	-40 to 75°C

**10G Ethernet to SFP+ Media Converter**



Model Name	ITGMC-111GP+
<b>Interface</b>	
10/100/1G/10G Base-T	1
1G/10G Base-X SFP+	1
Relay Output	Support
<b>Feature</b>	
LFP	-
<b>Power</b>	
Power Input	Dual 12-48 VDC
<b>Physical Characteristic</b>	
Enclosure	IP30
Dimension (W x D x H)	40 x 108 x 154 mm
Mounting	DIN-Rail Kit, Wall Mount Kit
Operating Temperature	-20 to 60°C

**Serial Media Converter**



Model Name	ISC-1112-I
<b>Interface</b>	
RS-232	DB9
RS-422/485	10-pin Terminal Block
<b>Power</b>	
Power Input	9-30VDC
<b>Physical Characteristic</b>	
Serial Isolation	3000VDC
Enclosure	IP30
Dimension (W x D x H)	71.2 x 25.3 x 100.6 mm
Mounting	DIN-Rail Kit, Wall Mount Kit
Operating Temperature	-10 to 70°C

**Rackmount Media Converter Chassis**



Model Name	RMC-1000
<b>Interface</b>	
Slot	18
<b>PoE</b>	
RMC-121FB-MM-SC	2FE to 1 100FX (Multi-mode, 2km, SC)
RMC-121FB-SS-SC	2FE to 1 100FX (Single-mode, 30km, SC)
RGMC-111GPB	1GE to 1 100/1000 SFP socket
<b>Power</b>	
Power Input	Optional 100-240VAC
<b>Physical Characteristic</b>	
Dimension (W x D x H)	430 x 243 x 132 mm
Mounting	Rackmount
Operating Temperature	-10 to 60°C

**Ethernet to Fiber Media Converter**



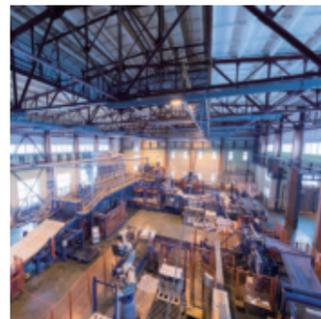
Model Name	IMC-C121FB		IMC-121FB		IGMC-111GPB	IGMC-1011GP	IGMC-111GPB-LFP
	MM-SC	SS-SC	MM-SC	SS-SC			
<b>Interface</b>							
10/100 Base-TX	2		2				
10/100/1000 Base-T					1	1	1
100 Base-FX SC	1		1				
100/1000 Base-X SC							
100/1000 Base-X SFP					1	1	1
Relay Output						Support	
<b>Fiber</b>							
Fiber Mode	Multi-mode	Single-mode	Multi-mode	Single-mode			
Wavelength	1310 nm	1310 nm	1310 nm	1310 nm			
Distance (km)	2km	30km	2km	30km			
<b>Feature</b>							
Broadcast Storm Protection	Support (DIP-switch)						
QoS	Support (DIP-switch)						
LFP						Support	
<b>Power</b>							
Power Input	9.6-60VDC /18-30VAC		Dual 12-48VDC		Dual 12-48VDC	Dual 12-48VDC	Dual 12-48VDC
<b>Physical Characteristic</b>							
Enclosure	IP40		IP30		IP30	IP30	IP30
Dimension (W x D x H)	26 x 64 x 103 mm		26.1 x 70 x 95 mm		26.1 x 70 x 95 mm	26.1 x 94.9 x 144.3	26.1 x 70 x 95 mm
Mounting	DIN-Rail Kit		DIN-Rail Kit		DIN-Rail Kit	DIN-Rail Kit	DIN-Rail Kit
Operating Temperature	-10 to 60°C		-40 to 70°C		-40 to 70°C	-40 to 70°C	-40 to 75°C

# Serial Device Server

ORing's serial device servers support various operation modes: TCP server, TCP client, UDP, Virtual COM and Modbus gateway. All device server models include free-bundled management utility, plus DS-Tool with Virtual COM drivers.



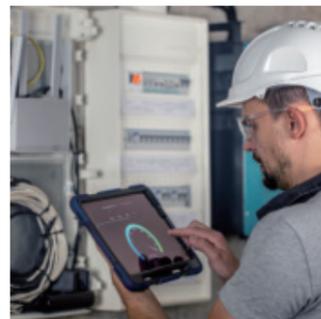
## Use Cases



Remote monitoring of factory automation equipment



Uploading smart meter / PLC data to central control systems



Integrating legacy serial devices with SCADA systems



Networking data from parking systems, ticket machines, and so on

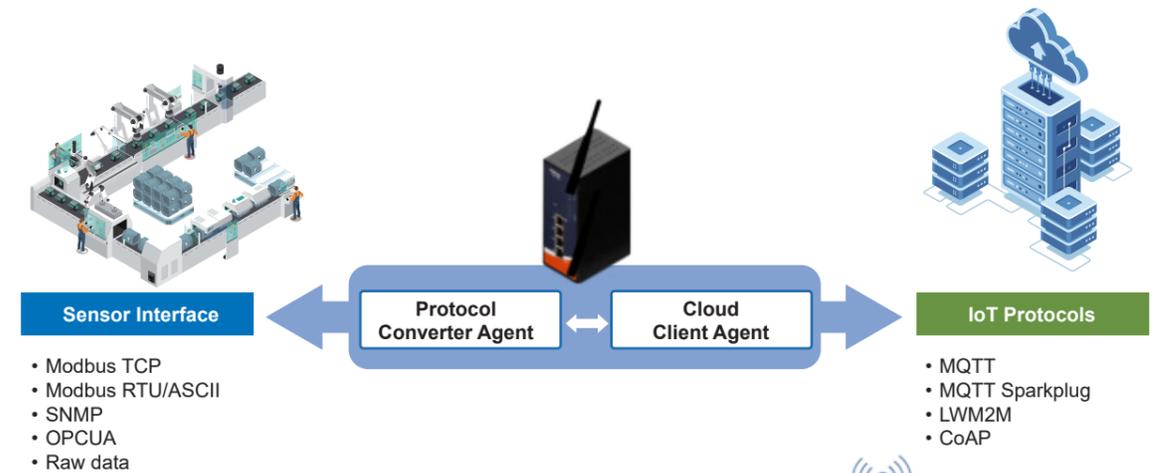
## Feature Highlights

### Modbus Gateway

ORing offers Modbus gateway feature which serves as a converter between Modbus TCP and Modbus RTU/ASCII devices. ORing's serial device server allow Modbus RTU/ASCII devices to be easily connected with network-based Modbus TCP devices without changing existing structure. The device servers are able to support dozens of RTU/ASCII devices through the serial ports, connecting a high density of Modbus nodes to the same network.

## Open Gateway

ORing's Open Gateway supports MQTT, MQTT Sparkplug, LWM2M, and CoAP for cloud connections, and Modbus TCP, RTU/ASCII, SNMP for end devices. Available on serial device servers and gateways, it enables fast IIoT deployment and value creation.



## Network Security

The serial device server supports secure management via HTTPS and SSH for encrypted access, and an IP white list to restrict access to trusted addresses, ensuring only authorized users can configure the device safely.



## Management System: DS-Tool

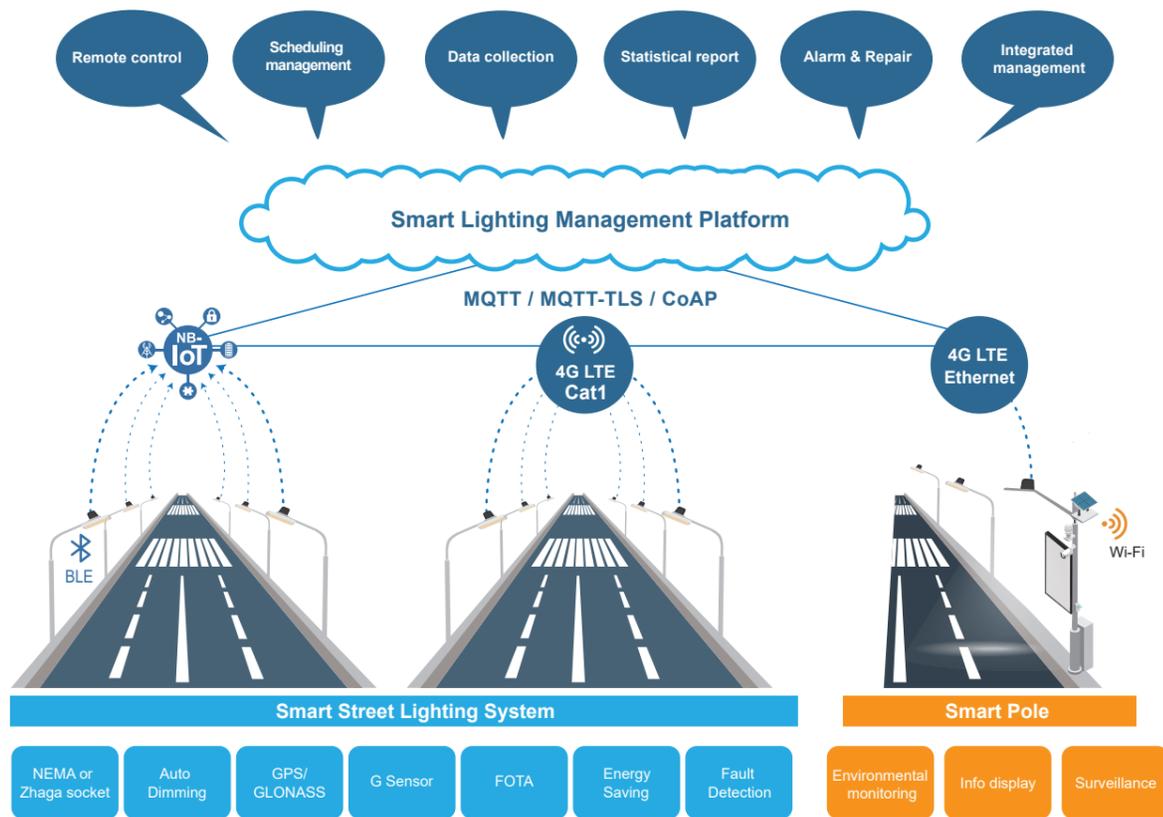
DS-Tool is a Windows-based application for managing devices with features like network and serial port configuration, access IP control, password and firmware management. It also includes group setup wizards, VCOM status monitoring, system logs, email alerts, SNMP traps, and IP address collection for efficient and secure operation.



Model Name	IDS-312L	IDS-322	IDS-4312D+
<b>Interface</b>			
10/100 Base-TX	2	2	2
RS-232/422/485	1 (DB9)	2 (DB9)	1 (DB9)
WiFi IEEE 802.11			b/g/n (2.4GHz)
DI/DO			1/1
<b>WLAN</b>			
Operation Mode			Client
Transmission Rate			UP to 150 Mbps
<b>Power</b>			
Power Input	Dual 12-48VDC	Dual 12-48VDC	Dual 12-48VDC or PoE PD
<b>Physical Characteristic</b>			
Enclosure	IP30	IP30	IP30
Dimension (W x D x H)	26 x 75 x 110 mm	45 x 81 x 95 mm	45 x 81 x 95 mm
Mounting	DIN-Rail Kit, Wall Mount Kit	DIN-Rail Kit, Wall Mount Kit	DIN-Rail Kit, Wall Mount Kit
<b>Approvals</b>			
EMC	CE, FCC	CE, FCC	CE, FCC
Petrochemical			UL C1D2

# Smart Lighting Controller

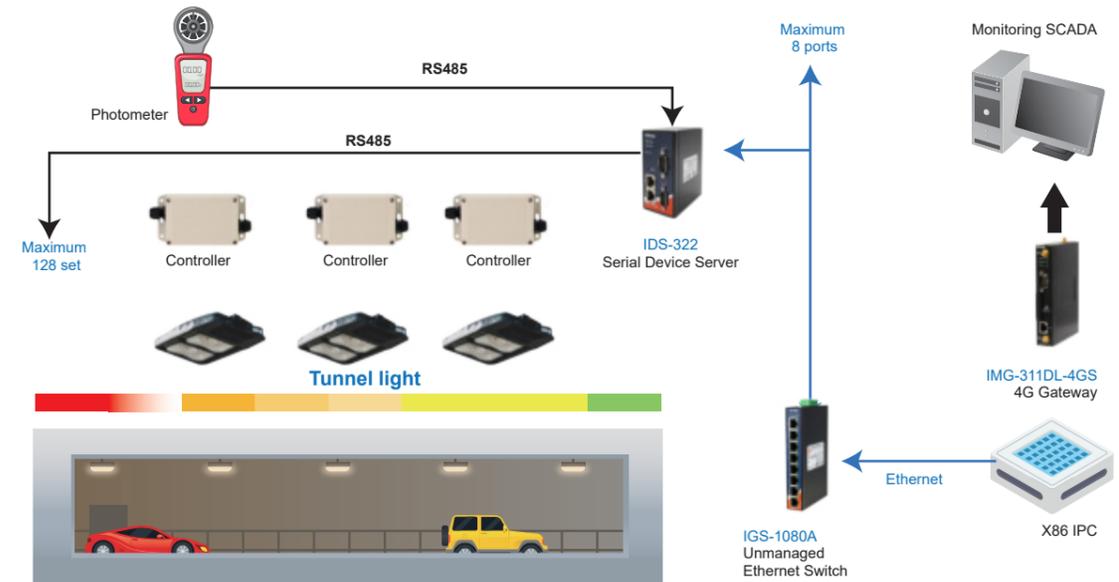
ORing's smart lighting controller are innovative solutions for smart city and smart grid applications. They are compatible with most major LED drivers, including Philips, OSRAM, TCI, Inventronics, and Tridonic, ensuring seamless integration and efficient street lighting management.



## Use Case

In smart tunnel application scenarios, ORing offers an integrated solution featuring Ethernet switches, device servers, cellular gateways, and smart lighting controllers.

The system concept includes using RS-485 communication for brightness adjustment and adopting segmented lighting control to optimize visibility based on real-time conditions. This approach aims to balance driving safety with energy efficiency and environmental sustainability.



## Smart Lighting Controller Category



**OL-N2 series**

- Conforms to NEMA standard
- 0-10V or DALI
- NB-IoT/Cat M1



**OL-B-NB series**

- Conforms to NEMA standard
- 0-10V or DALI
- NB-IoT/Cat M1



**OL-Z-NB series**

- Conforms to Zhaga Book18
- DALI2/D4i Protocol
- NB-IoT/Cat M1
- Built-in GPS

## Success Story

Location : Taoyuan, Taiwan

The Taoyuan City Government decided to replace 160,000 traditional street lights with smart street lights. So far, more than 100,000 ORing smart lighting controllers have been installed. By establishing a wireless communication platform, administrators are able to remotely control the lights and monitor power consumption.

### Direct benefits

- Annual electricity bill will be reduced from NT\$219 million to 66 million
- Cutting 60,000 tons of carbon emissions per year
- Effective lighting maintenance rate of street lamps over 99.7%
- Shortened repair time of street lamp failure

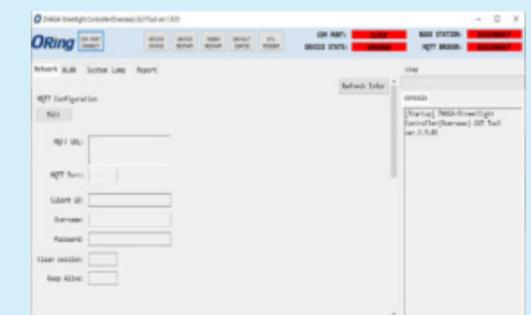


## How to start?

We offer a Zhaga controller starter kit for purchase, allowing users to test and evaluate its functionality before full-scale deployment.

- 1pcs OL-Z1D603D1-NBGTF-1-A1
- 1pcs Zhaga socket
- 1 USB to TTL serial cable

(MOQ:2, only even quantities are allowed to be ordered.)



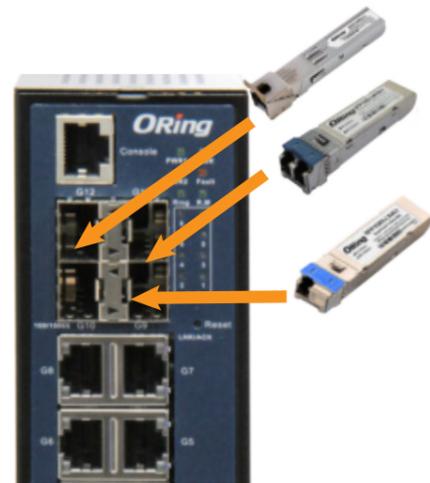
Visit our Smart City web section to learn more.



# Industrial SFP Transceiver

ORing's small form-factor pluggable (SFP) fiber modules support data rates up to 10G and include models with Digital Diagnostic Monitoring (DDM). These modules offer enhanced reliability, real-time performance monitoring, and flexibility for various industrial networking applications.

- 
**Flexibility**  
 Multiple fiber types with one Ethernet switch
- 
**Scalability**  
 Easily add or extend SFPs for future needs
- 
**Convenience**  
 Hot-swappable for seamless operation



Model Name	Fiber Mode	Typical Distance	Wavelength	DDM	Operating Temperature
SFP100B5-SS40	Single-mode	40km	TX: 1550nm, RX: 1310nm		0~70°C
SFP100B5-SS40-I	Single-mode	40km	TX: 1550nm, RX: 1310nm		-40~85°C
SFP100B5-SS40-I-DDM	Single-mode	40km	TX: 1550nm, RX: 1310nm	V	-40~85°C
SFP100B3-SS60	Single-mode	60km	TX: 1310nm, RX: 1550nm		0~70°C
SFP100B3-SS60-I	Single-mode	60km	TX: 1310nm, RX: 1550nm		-40~85°C
SFP100B5-SS60	Single-mode	60km	TX: 1550nm, RX: 1310nm		0~70°C
SFP100B5-SS60-I	Single-mode	60km	TX: 1550nm, RX: 1310nm		-40~85°C

## 125Mbps 100Base-TX Ethernet SFP

Model Name	Connector	Cable Type	Typical Distance	Operating Temperature
SFP100RJ	RJ45	UTP CAT 5	100m	0~70°C
SFP100RJ-I	RJ45	UTP CAT 5	100m	-40~85°C

## 155Mbps 100Base-FX Fiber SFP

Model Name	Fiber Mode	Typical Distance	Wavelength	DDM	Operating Temperature
SFP100-MM	Multi-mode	2km	1310nm		0~70°C
SFP100-MM-I	Multi-mode	2km	1310nm		-40~85°C
SFP100-MM-I-DDM	Multi-mode	2km	1310nm	V	-40~85°C
SFP100-MM5	Multi-mode	5km	1310nm		0~70°C
SFP100-MM5-I	Multi-mode	5km	1310nm		-40~85°C
SFP100-SS30	Single-mode	30km	1310nm		0~70°C
SFP100-SS30-DDM	Single-mode	30km	1310nm	V	0~70°C
SFP100-SS30-I	Single-mode	30km	1310nm		-40~85°C
SFP100-SS30-I-DDM	Single-mode	30km	1310nm	V	-40~85°C
SFP100-SS60	Single-mode	60km	1310nm		0~70°C
SFP100-SS60-I	Single-mode	60km	1310nm		-40~85°C
SFP100-SS60-I-DDM	Single-mode	60km	1310nm	V	-40~85°C
SFP100-SS100	Single-mode	100km	1550nm		0~70°C
SFP100-SS100-I	Single-mode	100km	1550nm		-40~85°C
SFP100-SS120	Single-mode	120km	1550nm		0~70°C
SFP100-SS120-I	Single-mode	120km	1550nm		-40~85°C
SFP100B3-MM	Multi-mode	2km	TX: 1310nm, RX: 1550nm		0~70°C
SFP100B3-MM-I	Multi-mode	2km	TX: 1310nm, RX: 1550nm		-40~85°C
SFP100B3-MM-I-DDM	Multi-mode	2km	TX: 1310nm, RX: 1550nm	V	-40~85°C
SFP100B5-MM	Multi-mode	2km	TX: 1550nm, RX: 1310nm		0~70°C
SFP100B5-MM-I	Multi-mode	2km	TX: 1550nm, RX: 1310nm		-40~85°C
SFP100B5-MM-I-DDM	Multi-mode	2km	TX: 1550nm, RX: 1310nm	V	-40~85°C
SFP100B3-SS20	Single-mode	20km	TX: 1310nm, RX: 1550nm		0~70°C
SFP100B3-SS20-I	Single-mode	20km	TX: 1310nm, RX: 1550nm		-40~85°C
SFP100B3-SS20-I-DDM	Single-mode	20km	TX: 1310nm, RX: 1550nm	V	-40~85°C
SFP100B5-SS20	Single-mode	20km	TX: 1550nm, RX: 1310nm		0~70°C
SFP100B5-SS20-I	Single-mode	20km	TX: 1550nm, RX: 1310nm		-40~85°C
SFP100B5-SS20-I-DDM	Single-mode	20km	TX: 1550nm, RX: 1310nm	V	-40~85°C

### 1.25Gbps 1000Base-X Fiber SFP

Model Name	Fiber Mode	Typical Distance	Wavelength	DDM	Operating Temperature
SFP1GB3-LX10-DDM	Single-mode	10km	TX: 1310nm, RX: 1550nm	V	0~70°C
SFP1GB5-LX10-DDM	Single-mode	10km	TX: 1550nm, RX: 1310nm	V	0~70°C
SFP1GB3-LX10-I-DDM	Single-mode	10km	TX: 1310nm, RX: 1550nm	V	-40~90°C
SFP1GB5-LX10-I-DDM	Single-mode	10km	TX: 1550nm, RX: 1310nm	V	-40~90°C
SFP1G-MLX	Multi-mode	2km	1310nm		0~70°C
SFP1G-MLX-DDM	Multi-mode	2km	1310nm	V	0~70°C
SFP1G-MLX-I	Multi-mode	2km	1310nm		-40~85°C
SFP1G-MLX-I-DDM	Multi-mode	2km	1310nm	V	-40~85°C
SFP1G-SX	Multi-mode	550m	850nm		0~70°C
SFP1G-SX-DDM	Multi-mode	550m	850nm	V	0~70°C
SFP1G-SX-I	Multi-mode	550m	850nm		-40~85°C
SFP1G-SX-I-DDM	Multi-mode	550m	850nm	V	-40~85°C
SFP1G-LX10	Single-mode	10km	1310nm		0~70°C
SFP1G-LX10-DDM	Single-mode	10km	1310nm	V	0~70°C
SFP1G-LX10-I	Single-mode	10km	1310nm		-40~85°C
SFP1G-LX10-I-DDM	Single-mode	10km	1310nm	V	-40~85°C
SFP1G-LX20	Single-mode	20km	1310nm		0~70°C
SFP1G-LX20-I	Single-mode	20km	1310nm		-40~85°C
SFP1G-LX20-I-DDM	Single-mode	20km	1310nm	V	-40~85°C
SFP1G-LHX30	Single-mode	30km	1310nm		0~70°C
SFP1G-LHX30-I	Single-mode	30km	1310nm		-40~85°C
SFP1G-LHX40	Single-mode	40km	1310nm		0~70°C
SFP1G-LHX40-I	Single-mode	40km	1310nm		-40~85°C
SFP1G-XD50	Single-mode	50km	1550nm		0~70°C
SFP1G-XD50-I	Single-mode	50km	1550nm		-40~85°C
SFP1G-ZX70-I	Single-mode	70km	1550nm		-40~85°C
SFP1G-ZX70-I-DDM	Single-mode	70km	1550nm	V	-40~85°C
SFP1G-ZX80	Single-mode	80km	1550nm		0~70°C
SFP1G-ZX80-I	Single-mode	80km	1550nm		-40~85°C
SFP1G-EZX120	Single-mode	120km	1550nm		0~70°C
SFP1G-EZX120-I	Single-mode	120km	1550nm		-40~85°C
SFP1GB3-LX10	Single-mode	10km	TX: 1310nm, RX: 1550nm		0~70°C
SFP1GB3-LX10-I	Single-mode	10km	TX: 1310nm, RX: 1550nm		-40~85°C
SFP1GB5-LX10	Single-mode	10km	TX: 1550nm, RX: 1310nm		0~70°C
SFP1GB5-LX10-I	Single-mode	10km	TX: 1550nm, RX: 1310nm		-40~85°C
SFP1GB3-LX20	Single-mode	20km	TX: 1310nm, RX: 1550nm		0~70°C
SFP1GB3-LX20-I	Single-mode	20km	TX: 1310nm, RX: 1550nm		-40~85°C
SFP1GB5-LX20	Single-mode	20km	TX: 1550nm, RX: 1310nm		0~70°C
SFP1GB5-LX20-I	Single-mode	20km	TX: 1550nm, RX: 1310nm		-40~85°C
SFP1GB3-LX40	Single-mode	40km	TX: 1310nm, RX: 1550nm		0~70°C
SFP1GB3-LX40-I	Single-mode	40km	TX: 1310nm, RX: 1550nm		-40~85°C
SFP1GB5-LX40	Single-mode	40km	TX: 1550nm, RX: 1310nm		0~70°C
SFP1GB5-LX40-I	Single-mode	40km	TX: 1550nm, RX: 1310nm		-40~85°C
SFP1GB3-LX60	Single-mode	60km	TX: 1310nm, RX: 1550nm		0~70°C
SFP1GB3-LX60-I	Single-mode	60km	TX: 1310nm, RX: 1550nm		-40~85°C
SFP1GB5-LX60	Single-mode	60km	TX: 1550nm, RX: 1310nm		0~70°C
SFP1GB5-LX60-I	Single-mode	60km	TX: 1550nm, RX: 1310nm		-40~85°C
SFP1GB4-LX80	Single-mode	80km	TX: 1490nm, RX: 1550nm		0~70°C
SFP1GB4-LX80-I	Single-mode	80km	TX: 1490nm, RX: 1550nm		-40~85°C
SFP1GB5-LX80	Single-mode	80km	TX: 1550nm, RX: 1490nm		0~70°C
SFP1GB5-LX80-I	Single-mode	80km	TX: 1550nm, RX: 1490nm		-40~85°C

### 1G Base-T Ethernet SFP

Model Name	Connector	Cable Type	Typical Distance	Operating Temperature
SFP1GRJ	RJ45	UTP CAT 5e	100m	0~70°C
SFP1GRJ-I	RJ45	UTP CAT 5e	100m	-40~85°C

### 2.5G Base-T Ethernet SFP

Model Name	Connector	Cable Type	Typical Distance	Operating Temperature
SFP2G5RJ-I	RJ45	UTP CAT 6	100m	-40~85°C

### 10G Base-X Fiber SFP+

Model Name	Fiber Mode	Typical Distance	Wavelength	DDM	Operating Temperature
SFP10G-LR10	Single-mode	10km	1310nm		0~70°C
SFP10G-LR10-I	Single-mode	10km	1310nm		-40~85°C
SFP10G-LR20	Single-mode	20km	1310nm		0~70°C
SFP10G-LR20-I	Single-mode	20km	1310nm		-40~85°C
SFP10G-ER40	Single-mode	40km	1550nm		0~70°C
SFP10G-ER40-I	Single-mode	40km	1550nm		-40~85°C
SFP10G-MM	Multi-mode	300m	850nm		0~70°C
SFP10G-MM-I	Multi-mode	300m	850nm		-40~85°C
SFP10G-ZR80	Single-mode	80km	1550nm		0~70°C
SFP10G-ZR80-I	Single-mode	80km	1550nm		-40~85°C
SFP10GB27-LR40-I	Single-mode	40km	TX: 1270nm, RX: 1330nm		-40~85°C
SFP10GB33-LR40-I	Single-mode	40km	TX: 1330nm, RX: 1270nm		-40~85°C

### 10G Base-T Ethernet SFP+

Model Name	Connector	Cable Type	Typical Distance	Operating Temperature
SFP10GRJ	RJ45	UTP CAT 6A	100m	0~70°C
SFP10GRJ-I	RJ45	UTP CAT 6A	100m	-40~85°C