10G Core Switch
4G LTE Router
SyncE Switch
PoE Series
Serial Connectivity Series
EN 50155 Switch
IEC 61850-3 Switch

Industrial Ethernet
PRODUCT GUIDE
### 4G LTE Series

**Router/Gateways**
- 2 SIM slot for failover redundancy
- GNSS: GPS/GLONASS/Galileo
- LAN, DI/DO, RS-232/485 Serial interface
- IPsec VPN/Modbus RTU/TCP, Real-COM
- IEEE802.11b/g/n/ac
- Routing: RIP1/RIP2, OSPF, VRRP

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### SyncE Switch

- Build-in TCXO for transfer of synchronization signal
- Physical layer Synchronous Ethernet supported
- Precision Time Protocol IEEE 1588-2006 (v2 PTP) supported
- ITU-T G.8262, G.8264 compliant
- 8ports 30W PoE model available.
- Provide 4KV surge Protection for Ethernet port

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### IEC 61850-3 Switch

- IEC 61850-3 and IEEE 1613 compliant
- u-Ring and STP/RSTP/MSTP/ERPS for network redundancy
- Easy network management by web browser, CLI, Telnet/serial console and Windows utility.
- Wide 110/220 VDC/VAC power supply range and 24/48 VDC redundant power inputs.
- Modbus TCP, LLDP, RADIUS, TACACS+, QoS, IGMP snooping, IEEE 802.1X, HTTPS, SNMPv3, and SSH supported
- -40 to 85°C operating temperature range

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### Serial Connectivity Series

**FieldBus/Binary/Transducer**
- Modbus RS232/422/485 and Profinet IS485 to fiber converter
- Support one fiber or dual fiber redundancy.
- Redundant power input
- Auto baud rate from 9.6Kbps to 12Mbps
- Device failure isolation
- 2.5 kVrms isolation for serial port

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### Management Software

**SmartView™ & SmartConfig™**

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### 10G Core Switch

- 1GbE/10GbE product portfolio
- 24×4, 24×8 solutions
- Up to 24 IEEE802.3at PoE ports
- Up to 28 SFP GbE fiber ports
- Supports 14 μ-Ring instance in one switch

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### PoE Series

**Switch/Converter/Lan Extender/Injector**
- Ultra PoE++ 60W Solution
- 4KV Surge protection
- LAN extend up to 1.2Km with PoE power feeding
- 24VDC power booster and regulate power output
- Product range of Switch, Converter, Extender and Injector

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### EN 50155 Switch

- EN 50155 Certified
- IEC 61375 TTDP
- Auto-bypass for failover
- Power input range 24 to 110VDC
- IEEE 802.3at PoE 8/12/16-port product portfolio
- M12 connector, IP64/IP67 rugged design
Reliable Industrial Ethernet Products

- **Reliability Elements**

- **Certification**
  - CE/FCC
  - UL60950-1
  - EN50155
  - EN50121-4
  - IEC-61850-3
  - EN61000-6-2
  - EN61000-6-4
  - EN50155
  - EN61000-6-4

- **Redundant Ring**
  - μ-Ring
  - ITU-T.G.8032
  - 802.1d STP
  - 802.1w RSTP
  - 802.1s MSTP

- **Temperature**
  - Wide Temperature Models Available

- **High MTBF & 5 Years Warranty**
  - Industrial Grade Component
  - Fanless

- **Brief Comparison between general CE & EN50121-4**

<table>
<thead>
<tr>
<th></th>
<th>CE Compliant</th>
<th>EN50121-4 Compliant (Trackside)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Signal L-E</td>
<td>1kV</td>
<td>2kV</td>
</tr>
<tr>
<td>Signal L-L</td>
<td>N/A</td>
<td>2kV</td>
</tr>
<tr>
<td>DC Power L-E</td>
<td>0.5kV</td>
<td>2kV</td>
</tr>
<tr>
<td>DC Power L-L</td>
<td>0.5kV</td>
<td>2kV</td>
</tr>
<tr>
<td>ESD (Contact)</td>
<td>4kV</td>
<td>6kV</td>
</tr>
<tr>
<td>Radio frequency magnetic field</td>
<td>10V/m</td>
<td>20V/m</td>
</tr>
<tr>
<td>EFT (fast transient)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power magnetic field</td>
<td>10 A/meter</td>
<td>300 A/meter</td>
</tr>
<tr>
<td>Pulse magnetic field</td>
<td>N/A</td>
<td>300 A/meter</td>
</tr>
</tbody>
</table>

* Criteria A: During the test storage devices shall maintain normal operation both in read/write and in stand-by conditions.
* Criteria B: During and after the test failures which can be recovered by read and write retries are permissible (temporary delay in processing caused by this process is acceptable).

- **Key Certifications**
  - UL
  - E13
  - EN50121-4
  - NEMA TS2
  - IEC-61850-3
  - EN61000-6-2
  - EN61000-6-4
  - NEMA TS2
  - IEC-61850-3
  - EN61000-6-2
  - EN61000-6-4

- **Advanced 4KV Surge Protection for PoE & UTP**

To reduce risks of electric shocks, fire, energy related hazards, heat related hazards, mechanical hazards, radiation, and chemical hazards for operator, layman or service personnel.

For car and motorcycle spare parts and security products, noise and emissions, are required to act in accordance with the EU.

For trackside and railway applications.

For rolling stock, vehicle and moving machine applications.

For power substation applications.

For Heavy Industrial Environment application.

For traffic control.

For rolling stock, vehicle and moving machine applications.
■ Powerful Cybersecurity - Port Security

**Step 1**
Add the allowed MAC address

**Step 2**
Enable un-know MAC limit at zero

<table>
<thead>
<tr>
<th>Static MAC Table Configuration</th>
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</thead>
<tbody>
<tr>
<td>Delete</td>
</tr>
<tr>
<td>☐</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Port</th>
<th>Mode</th>
<th>Limit</th>
<th>Action</th>
<th>State</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Disable</td>
<td>4</td>
<td>None</td>
<td>Disabled</td>
</tr>
<tr>
<td>2</td>
<td>Enable</td>
<td>0</td>
<td>Shutdown</td>
<td>Ready</td>
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<table>
<thead>
<tr>
<th>System Configuration</th>
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<tr>
<td>Mode</td>
</tr>
<tr>
<td>Aging Enable</td>
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<tr>
<td>Aging Period</td>
</tr>
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<table>
<thead>
<tr>
<th>Port Configuration</th>
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</thead>
<tbody>
<tr>
<td>Port</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
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<table>
<thead>
<tr>
<th>MAC Whitelist</th>
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<tbody>
<tr>
<td>F0-DE-F1-0B-65-8D</td>
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<tr>
<td>F0-DC-F1-5B-70-2D</td>
</tr>
<tr>
<td>F0-DF-F1-4B-7Z-9D</td>
</tr>
<tr>
<td>F0-DA-F4-3C-2Z-1A</td>
</tr>
</tbody>
</table>

■ Powerful Cybersecurity - NAS

**IEEE802.1X Authentication**

Send username & password

Send access request for authentication by ID

**MAB (MAC Authentication Bypass)**

Send MAC address (First packet)

Learn & authenticate the source MAC address

<table>
<thead>
<tr>
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<tr>
<td>Port</td>
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<tr>
<td>------</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
</tbody>
</table>
**IEEE 1588 PTP v2**

Ethernet equipment has become a widely accepted commodity as it replaces traditional and expensive legacy technology. The multitude of nodes needed to be synchronized as precisely as possible over the network are ever increasing. IEEE 1588 PTP v2 is a packet-based network protocol that carries time stamps in Ethernet format. The applications requiring this technology fall within the major markets for smart grids and telecommunication networks.

**µ-Ring Network Redundancy**

The µ-Ring is a proprietary redundancy protocol developed by CTC Union that supports flexible ring topologies.

- Supports 5 operating modes
  - Ordinary-Boundary
  - Peer to Peer Transparent Clock
  - End to End Transparent Clock
  - Master
  - Slave

**Friendly µ-Ring Configuration**

- Up to 5 rings
- Up to 250 devices in a ring
- µ-Ring, µ-Chain, Sub-Ring for different applications
- Recovery time < 10ms
- User Friendly configuration GUI

**µ-Chain topology**

- Benefit: Mix CTC and third party device in a ring topology

**Sub-Ring topology**

- Benefit: 1. Device redundancy (A & B)
  - 2. Cable redundancy

**Supports Standard ITU G.8032 ERPS, MSTP, RSTP, STP for Network Redundancy**

Other than the proprietary µ-Ring redundancy protocol, standard ring redundancy protocols such as ITU G.8032 ERPS, STP, RSTP and MSTP are also supported. Among standard redundancy protocols, G.8032 ERPS, achieves the fastest recovery time (<50ms) over others.
CTC Union’s Industrial Network Management System is a comprehensive management tool, including SmartView™ Element Management System (EMS) and SmartConfig™. Whether it is for monitoring, configuration, maintenance, or troubleshooting, the management software has a tool for every task.

**SmartView™ EMS**
(Element Management System)

- Main Functions (FCAPS):
  - Fault Management
  - Configuration Management
  - Accounting Management
  - Performance Management
  - Security Management
- Remote access control for efficient configuration
- Traffic / Performance monitoring and management
- Alarm Trap and event log management
- Auto Discovery and Device Viewer
- Allow up to 25 administrators to login

**SmartConfig™**

- Quick & Easy for mass configuration
- Multiple device auto discovery
- Group configuration, access
- Group firmware upgrade
- Export/Import Configuration

SmartConfig™ is a convenient configuration tool for mass deployment of switch product.
Industrial Product Series

—I 10G Core Switch

Features
- 10G backbone for high bandwidth transmission
- Each 10G switch support 14 ring for centralization
- Dual and wide range power input for power failure redundancy
- Full Gigabit 24+4, 24+8 solutions
- Up to 24 IEEE802.3at PoE ports
- Up to 28 SFP GbE fiber ports

10G Backbone with μ-Ring Technology Application

Related Products

Managed Switches

<table>
<thead>
<tr>
<th>Model</th>
<th>Total Ports</th>
<th>10/100/1000 Base-T (X) RJ45</th>
<th>100/1000 Base-X SFP &amp; RJ45</th>
<th>1G/2.5G/10G Base-X SFP*</th>
<th>Redundant Input Power</th>
<th>Safety/CE/FCC</th>
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</thead>
<tbody>
<tr>
<td>ICS-G4804X</td>
<td>52</td>
<td>48</td>
<td>4</td>
<td>4</td>
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<td></td>
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<tr>
<td>ICS-G24044X</td>
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<td>4</td>
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<td>ICS-G2452X</td>
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<td>20</td>
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<tr>
<td>IGS-4804SM</td>
<td>52</td>
<td>48</td>
<td>4</td>
<td>8</td>
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<td></td>
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<tr>
<td>IGS-2408SM</td>
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<td>24</td>
<td>8</td>
<td>4</td>
<td></td>
<td></td>
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<tr>
<td>IGS-52804TM</td>
<td>28</td>
<td>24</td>
<td>4</td>
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Managed PoE Switches

<table>
<thead>
<tr>
<th>Model</th>
<th>Total Ports</th>
<th>10/100/1000 Base-T (X) RJ45</th>
<th>100/1000 Base-X SFP</th>
<th>1G/2.5G/10G Base-X SFP*</th>
<th>PoE Port</th>
<th>Redundant Input Power</th>
<th>Safety/CE/FCC</th>
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</thead>
<tbody>
<tr>
<td>ICS-G24044X-24PH</td>
<td>32</td>
<td>24</td>
<td>4</td>
<td>4</td>
<td>IEEE802.3at (Budget)</td>
<td>48VDC</td>
<td></td>
</tr>
<tr>
<td>IGS-2408SM-24PH</td>
<td>32</td>
<td>24</td>
<td>8</td>
<td>4</td>
<td>IEEE802.3at (Budget)</td>
<td>48VDC</td>
<td></td>
</tr>
</tbody>
</table>
Industrial SyncE Switch

- **Features**
  - Supports SyncE Ethernet to deliver service with optimal stability and continuity in end-to-end connectivity
  - Supports IEEE 1588 PTP V2 for precise time synchronization to operate in Ordinary-Boundary, Peer to Peer Transparent Clock, End to End Transparent Clock, Master, Slave mode by each port
  - Supports negative voltage power input with isolated RS-232 console port (for example in telecom systems)
  - 2.25K VDC Hi-pot isolation protection for Ethernet ports and power
  - u-Ring for Redundant Cabling, recovery time < 10ms in 250 devices

- **Mobile Backhaul Application**

![Diagram of Mobile Backhaul Application]

**Figure 1**

![Diagram of Mobile Backhaul Application]

- **Related Products**

<table>
<thead>
<tr>
<th>Model</th>
<th>Total Ports</th>
<th>UTP 10/100/1000 Base-T</th>
<th>Fiber 10/100 Base-TX</th>
<th>PoE IEEE 802.3af/at</th>
<th>Power Budget (W)</th>
<th>Redundant Power Input</th>
<th>Certification</th>
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<tbody>
<tr>
<td>IGS-804SM-SE</td>
<td>12</td>
<td>8</td>
<td>4 SFP</td>
<td></td>
<td>12/24/48VDC</td>
<td>✓</td>
<td>EN60950-1</td>
</tr>
<tr>
<td>IGS-1608SM-SE</td>
<td>24</td>
<td>16</td>
<td>8 SFP</td>
<td></td>
<td>12/24/48VDC</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>IGS-804SM-SE-8PH</td>
<td>12</td>
<td>8</td>
<td>4 SFP</td>
<td>8</td>
<td>240W</td>
<td>✓</td>
<td>EN60950-1</td>
</tr>
<tr>
<td>IGS-1608SM-SE-8PH</td>
<td>24</td>
<td>16</td>
<td>8 SFP</td>
<td>8</td>
<td>240W</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
### 4G LTE Series (Router/Gateway)

**Features**
- 2 SIM slot for failover redundancy
- GNSS: GPS/GLONASS/Galileo
- LAN, DI/DO, RS-232/485 Serial interface
- IPsec VPN/Modbus RTU/TCP, Real-COM
- IEEE802.11b/g/n/ac
- Routing: RIP1/RIP2, OSPF, VRRP
- 2 SIM slot for failover redundancy
- GNSS: GPS/GLONASS/Galileo
- LAN, DI/DO, RS-232/485 Serial interface
- IPsec VPN/Modbus RTU/TCP, Real-COM
- IEEE802.11b/g/n/ac
- Routing: RIP1/RIP2, OSPF, VRRP

**Wireless Transmission in Logistics Center**
- Remote Control Center
- Bus Location Tracking
- Ticketing Information
- Bus/Stop Surveillance
- Advertisement Broadcasting
- Bus Stop Alarm tracking

### Smart City/Smart Bus
- Emergency Alarm (Digital Input)
- Digital Signage
- WiFi service
- Passenger Information
- Bus/Stop Surveillance

### Related Products

<table>
<thead>
<tr>
<th>Model</th>
<th>WAN</th>
<th>WAN/LAN</th>
<th>Local port</th>
<th>Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cellular Mod</td>
<td>GNSS (optional)</td>
<td>Wi-Fi</td>
<td>UTP Ethernet</td>
</tr>
<tr>
<td>ICR-W403</td>
<td>2G/3G/4G LTE</td>
<td>GPS</td>
<td>IEEE 802.11 ac/b/g/n (LAN or WAN)</td>
<td>2x GbE (LAN) + 1x GbE (LAN or WAN)</td>
</tr>
<tr>
<td>ICR-4103</td>
<td>2G/3G/4G LTE</td>
<td>1x FE (LAN) + 3x FE (LAN)</td>
<td>2x DI, 1x DO</td>
<td>2x RS232</td>
</tr>
<tr>
<td>ICR-W401 (Compact)</td>
<td>2G/3G/4G LTE</td>
<td>GPS</td>
<td>IEEE 802.11 b/g/n (LAN)</td>
<td>1x FE (LAN) + 1x FE (LAN)</td>
</tr>
</tbody>
</table>
EN 50155 Switch

Features
- Wide range products of 5, 8+2, 12+4, 22+4 Ethernet port available
- IEEE802.3af/at PoE 8, 12, 16-port for PD connection
- Fast Ethernet M12 D-code, Gigabit M12 X-code
- Supports 2 copper bypass for failover pass-through
- Certificated EN50155, EN50121-4, IEC 61375-2-3/5 TTDP, EN45545-2
- IP 64/67 rugged metal housing design

Smart Train
Modern transportation systems for rail are now incorporating many IOT devices, including PoE IP cameras, Wireless Access Points for Hotspots, Voice over IP communications, monitoring and digital signage. Ethernet switches, provided by CTC Union, for this market segment, include EN50155 certifications, utilize rugged M12 connectors and provide a wide range for DC power connections.

TTDP
TTDP (Train Topology Discovery Protocol) for train inauguration is a process where the network devices can automatically reconfigure for topology changes (i.e., as carriages are swapped). TTDP identifies the order of the Ethernet switches in a train backbone from the head and allows auto-reconfiguration of the other switches in the entire network.
Resilient Bypass

EN50155 compliant products offer two copper interfaces with auto bypass function in the event of sudden power loss, particularly in daisy chain or linear topology networks. When power failure occurs in one of the switches on a train, the bypass relay function can activate, automatically bypassing the internal circuits and maintaining link between neighboring equipment. With this function, secure data transmission from terminals to backbone and higher network availability can be guaranteed.

From Ground to Train

Outdoor wireless AP/4G router is the ideal ruggedized wireless solution for railway onboard train-to-ground applications such as CCTV and CBTC communications. That enable operators to manage carriage-to-carriage and train-to-ground communications with increased efficiency and create attractive onboard multimedia services that give passengers safe and environmentally friendly transportation.

M12 LAN Extender via Coaxial

Some of the old generation train with only exist coaxial cable between the carriages, it is difficult to implement its ETB, the M12 LAN Extender will be a good solution to use its coaxial cable convert to Ethernet communication.

Related Products

EN50155 PoE Switches

<table>
<thead>
<tr>
<th>Model</th>
<th>Managed</th>
<th>Protection</th>
<th>Total Port</th>
<th>UTP Ports</th>
<th>Fiber ports</th>
<th>PoE Port</th>
<th>Redundant Input Power</th>
<th>Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITP-1204GTM-12PH</td>
<td>✓</td>
<td>IP64</td>
<td>16 12 4</td>
<td>10/100Base-TX M12</td>
<td>10/100/1000 Base-T M12</td>
<td>EEE 802.3at</td>
<td>12(120W) 24/48/72/96/110VDC</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>ITP-2204GTM-12PH</td>
<td>✓</td>
<td>IP64</td>
<td>26 22 4</td>
<td>10/100Base-TX M12</td>
<td>10/100/1000 Base-T M12</td>
<td>EEE 802.3at</td>
<td>16(300W) 24/48/72/96/110VDC</td>
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<tr>
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<td>✓</td>
<td>IP67</td>
<td>10 8 2</td>
<td>2 SFP</td>
<td>100/1000Base-X</td>
<td>EEE 802.3at</td>
<td>8(600W) 24/48VDC</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>ITP-802GMT-8PH24</td>
<td>✓</td>
<td>IP67</td>
<td>10 8 2</td>
<td>2 SFP</td>
<td>100/1000Base-X</td>
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<td>ITP-G802SM-8PH24</td>
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<td>10 8 2</td>
<td>2 SFP</td>
<td>100/1000Base-X</td>
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<td>10 8 2</td>
<td>2 SFP</td>
<td>100/1000Base-X</td>
<td>EEE 802.3at</td>
<td>8(600W) 24/48VDC</td>
<td>✓ ✓ ✓ ✓ ✓</td>
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<tr>
<td>ITP-802GMT-8PH24</td>
<td>✓</td>
<td>IP67</td>
<td>10 8 2</td>
<td>2 SFP</td>
<td>100/1000Base-X</td>
<td>EEE 802.3at</td>
<td>8(600W) 24/48VDC</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>ITP-800-8PH24</td>
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<td>IP67</td>
<td>8 8 2</td>
<td>2 SFP</td>
<td>100/1000Base-X</td>
<td>EEE 802.3at</td>
<td>8(1500W) 24/48VDC</td>
<td>✓ ✓ ✓ ✓ ✓</td>
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</table>

EN 50155 Switches

<table>
<thead>
<tr>
<th>Model</th>
<th>Managed</th>
<th>Protection</th>
<th>Total Port</th>
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<th>Redundant Input Power</th>
<th>Certification</th>
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</thead>
<tbody>
<tr>
<td>ITP-1204GTM</td>
<td>✓</td>
<td>IP64</td>
<td>16 12 4</td>
<td>10/100Base-TX M12</td>
<td>10/100/1000 Base-T M12</td>
<td>24/48/72/96/110VDC</td>
<td>✓ ✓ ✓ ✓ ✓</td>
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<tr>
<td>ITP-2204GTM</td>
<td>✓</td>
<td>IP64</td>
<td>26 22 4</td>
<td>10/100Base-TX M12</td>
<td>10/100/1000 Base-T M12</td>
<td>24/48/72/96/110VDC</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>ITP-G802SM</td>
<td>✓</td>
<td>IP67</td>
<td>10 8 2</td>
<td>2 SFP</td>
<td>100/1000Base-X</td>
<td>12/24/48VDC or 110/220VDC</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>ITP-G802TM</td>
<td>✓</td>
<td>IP67</td>
<td>10 8 2</td>
<td>2 SFP</td>
<td>100/1000Base-X</td>
<td>12/24/48VDC or 110/220VDC</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>ITP-800-8PH24</td>
<td>✓</td>
<td>IP67</td>
<td>8 8 2</td>
<td>2 SFP</td>
<td>100/1000Base-X</td>
<td>12/24/48VDC or 110VDC</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>ITP-500</td>
<td>✓</td>
<td>IP67</td>
<td>5 5 1</td>
<td>12/24VDC</td>
<td>12/24/48VDC</td>
<td>✓ ✓ ✓ ✓</td>
<td></td>
</tr>
<tr>
<td>ITP-800</td>
<td>✓</td>
<td>IP67</td>
<td>8 8 1</td>
<td>12/24VDC</td>
<td>12/24/48VDC</td>
<td>✓ ✓ ✓ ✓</td>
<td></td>
</tr>
</tbody>
</table>

4G LTE WiFi Gateway

Outdoor AP/4G router is the ideal ruggedized wireless solution for railway onboard train-to-ground applications such as CCTV and CBTC communications. That enable operators to manage carriage-to-carriage and train-to-ground communications with increased efficiency and create attractive onboard multimedia services that give passengers safe and environmentally friendly transportation.
PoE Series
(Switch/Converter/LAN Extender/Injector)

Industrial Ethernet Switch

Features
- Supports PoE/PoE+/PoE++ IEEE802.3af/at/atz: 15.4/30/36/60 Watts high power budget
- Up to 8-port PoE (DIN-RAIL models) and 24-port PoE (Rackmount)
- Redundant dual power input of 24/48VDC (20–57VDC)
- High efficiency of power boost (94%–97%)
- Supports 4KV Surge protection
- Advance PoE management: PD auto check and reset, PoE on/off scheduling (weekly/hour)

Remote PD Auto Test & Reset
- Auto checking and auto reset Powered Devices (PDs), when PD link failure
- The feature helps to reduce the operation and maintenance cost

![Step 1: PD Status is Good](image1)
![Step 2: No Response from PD](image2)
![Step 3: Reset PD](image3)

High Efficiency Boost Technology for PoE
- Regulated PoE output voltage (55VDC) to stabilize PoE device
- Guarantee delivery PoE power distance to 100 meters
- Wide range input power 24/48VDC (20–57VDC)
- Built-in very high efficiency (94%–97%) to boost PoE output voltage

Intersection Monitoring System
“Smart City” includes intersection monitoring. Our hardened and manageable PoE switches can streamline deployment in this and other applications when all connecting devices (IP Cameras, IP Phones, Access Points and digital signage) are PoE enabled devices.
**Related Products**

**Managed PoE Switches**

<table>
<thead>
<tr>
<th>Model</th>
<th>Total Ports</th>
<th>UTP</th>
<th>Fiber</th>
<th>PoE Port</th>
<th>Redundant Power Input</th>
<th>Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>IGS-1608SM-4PH</td>
<td>24 16</td>
<td>8 SFP</td>
<td>1000Base-X</td>
<td>IEEE 802.3at (PSE)</td>
<td>48VDC</td>
<td>UL60950-1</td>
</tr>
<tr>
<td>IGS-402SM-4PH</td>
<td>6 4</td>
<td>2 SFP</td>
<td>1000Base-X</td>
<td>IEEE 802.3at (PSE)</td>
<td>48VDC</td>
<td>UL60950-1</td>
</tr>
<tr>
<td>IFS-1608SM-4PH</td>
<td>24 16</td>
<td>8 SFP</td>
<td>1000Base-X</td>
<td>IEEE 802.3at (PSE)</td>
<td>48VDC</td>
<td>UL60950-1</td>
</tr>
</tbody>
</table>

**Unmanaged PoE Switches**

<table>
<thead>
<tr>
<th>Model</th>
<th>Total Ports</th>
<th>RJ45 UTP Port</th>
<th>Fiber Port</th>
<th>PoE Port</th>
<th>Redundant Power Input</th>
<th>Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>IGS-600-4PH24</td>
<td>6 6</td>
<td>1</td>
<td>1000Base-X</td>
<td>IEEE 802.3at (PSE)</td>
<td>48VDC</td>
<td>12/24V/48VDC</td>
</tr>
<tr>
<td>IMC-1000MS-PH12</td>
<td>1</td>
<td>1 SFP</td>
<td>100Base-X</td>
<td>IEEE 802.3at (PSE)</td>
<td>30V</td>
<td>12/24/48VDC</td>
</tr>
</tbody>
</table>

**PoE Converters**

<table>
<thead>
<tr>
<th>Model</th>
<th>Managed</th>
<th>UTP</th>
<th>Fiber</th>
<th>PoE</th>
<th>Redundant Power Input</th>
<th>Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMC-1000S-PH12</td>
<td>1</td>
<td>1 SFP</td>
<td>100Base-X</td>
<td>IEEE 802.3at (PSE)</td>
<td>30V</td>
<td>12/24/48VDC</td>
</tr>
</tbody>
</table>

**PoE LAN Extender**

**Features**
- High-speed long distance copper connection; up to 300m at 100Mbps and up to 1.2km at 50Mbps (over coaxial cable); 16Mbps (over twisted-pair copper wires)
- Complies with IEEE 802.3at PoE long distance; up to 300m at 30W power budget over coaxial cable
- Plug and Play to reduces configuration time
- One step to upgrade the existing CCTV to IP cameras

**Remote Power Feeding Enable**

- **Copper/Coaxial**
  - Remote Power Feeding Simultaneously
  - Don’t need power supply
  - 40-60 VDC or External AC to DC Adaptor

**PoE LAN Extender**

<table>
<thead>
<tr>
<th>Model</th>
<th>UTP</th>
<th>Long Distance</th>
<th>PoE Port</th>
<th>Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEXT224-4PH</td>
<td>4</td>
<td>1</td>
<td>IEEE 802.3at</td>
<td>CE</td>
</tr>
</tbody>
</table>
PoE Injectors

Features

- Easy to install PoE PD in the existing network topologies
- Provides 1 port IEEE802.3af/at power supplying
- Selectable 15.4W/30W/36W,60W,72W PoE power output
- Supports PoE mode A (Midspan) and mode B (Endspan)
- Regulate PoE output voltage to stabilize power device, and guarantee the power feeding distance up to 100meter
- Supports 4 pairs (60W/72W) PD handshake request (such as AXIS® IP Camera)

Gigabit Ethernet PoE Injector application

<table>
<thead>
<tr>
<th>INJ-IG01-PH</th>
<th>INJ-IG02-PH</th>
<th>INJ-IG60-24 &amp; INJ-IG01-PH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data + PoE</td>
<td>Data + Passive PoE</td>
<td>15.4W, 30W, 36W, 60W</td>
</tr>
</tbody>
</table>

PoE Injectors

Non-PoE Ethernet Switch/HUB

INJ-IG01-PH

15.4W/30W/36W/60W/72W 48VDC

INJ-IG02-PH

30W (passive) 24/48VDC

INJ-G30

15.4W/30W Power Adapter

Industrial Ethernet Switch

Features

- 4KV surge protection for LAN port
- 2.25KVDC Hi-pot isolation protection for Ethernet ports and power
- SmartConfig™ for Quick & easy mass configuration
- SmartView™ for centralized management
- µ-Ring (up-to 5 rings) for redundancy cabling
- SNMP, Web, Telnet, CLI, IPv6, DHCP, RMON, MIB II, QoS, CoS, ACL, Security, IGMP, VLAN, LACP, IEEE 1588 V2, UL60950-1, EN60950-1, NEMA-TS2, EN50121-4, EN61000-6-2, EN61000-6-4, CE, FCC certified

Related Products

<table>
<thead>
<tr>
<th>PoE Injectors</th>
<th>LAN UTP Port</th>
<th>PoE UTP Port</th>
<th>Power Input</th>
<th>Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>10/100/1000Base-T (X)</td>
<td>10/100/1000Base-T (X)</td>
<td>PoE Power Budget</td>
<td>EN60950-1</td>
</tr>
<tr>
<td>INJ-IG60-24</td>
<td>✓</td>
<td>✓</td>
<td>15.4W/30W/36W/60W/72W</td>
<td>✓</td>
</tr>
<tr>
<td>INJ-IG01-PH</td>
<td>✓</td>
<td>✓</td>
<td>15.4W/30W/36W/60W</td>
<td>✓</td>
</tr>
<tr>
<td>INJ-IG02-PH</td>
<td>✓</td>
<td>✓</td>
<td>30W/60W (passive)</td>
<td>✓</td>
</tr>
<tr>
<td>INJ-G30</td>
<td>✓</td>
<td>✓</td>
<td>15.4W/30W</td>
<td>Power Adapter</td>
</tr>
</tbody>
</table>
Features
- Supports SC/ST/LC single mode optical connectors
- Optical bypass switching time <10ms with Low insertions loss
- Provides rotary switch to set delay boot time (0~180 seconds)
- Redundant dual DC input power 12/24/48VDC (9.6 ~ 60VDC)
- Wide temperature range model available for -20 to 70°C environments

Related Products
Managed Switches

<table>
<thead>
<tr>
<th>Model</th>
<th>Total Ports</th>
<th>UTP Port</th>
<th>Fiber Port</th>
<th>Redundant Power Input</th>
<th>Certificate</th>
</tr>
</thead>
<tbody>
<tr>
<td>IGS-1604SM</td>
<td>20</td>
<td>16</td>
<td>4 SFP</td>
<td>12/24/48VDC</td>
<td>Safety UL60950-1, Railway EN50121-4, Traffic Control NEMA T52, EN61000-6-2, CE/FCC</td>
</tr>
<tr>
<td>IGS-812SM</td>
<td>20</td>
<td>8</td>
<td>1.2 SFP</td>
<td>12/24/48VDC</td>
<td>Safety UL60950-1, Railway EN50121-4, Traffic Control NEMA T52, EN61000-6-2, CE/FCC</td>
</tr>
<tr>
<td>IGS+803SM</td>
<td>11</td>
<td>8</td>
<td>3 SFP</td>
<td>12/24/48VDC, UL60950-16, EN60950-1</td>
<td>Safety UL60950-1, Railway EN50121-4, Traffic Control NEMA T52, EN61000-6-2, CE/FCC</td>
</tr>
<tr>
<td>IGS+404SM</td>
<td>8</td>
<td>4</td>
<td>4 SFP</td>
<td>12/24/48VDC</td>
<td>Safety UL60950-1, Railway EN50121-4, Traffic Control NEMA T52, EN61000-6-2, CE/FCC</td>
</tr>
<tr>
<td>IGS-803SM</td>
<td>11</td>
<td>8</td>
<td>1 SFP</td>
<td>12/24/48VDC</td>
<td>Safety UL60950-1, Railway EN50121-4, Traffic Control NEMA T52, EN61000-6-2, CE/FCC</td>
</tr>
<tr>
<td>IGS-404SM</td>
<td>8</td>
<td>4</td>
<td>2 SFP</td>
<td>12/24/48VDC</td>
<td>Safety UL60950-1, Railway EN50121-4, Traffic Control NEMA T52, EN61000-6-2, CE/FCC</td>
</tr>
<tr>
<td>IFS-1604GSM</td>
<td>20</td>
<td>16</td>
<td>4 SFP</td>
<td>12/24/48VDC</td>
<td>Safety UL60950-1, Railway EN50121-4, Traffic Control NEMA T52, EN61000-6-2, CE/FCC</td>
</tr>
<tr>
<td>IFS-803GSM</td>
<td>11</td>
<td>8</td>
<td>3 SFP</td>
<td>12/24/48VDC</td>
<td>Safety UL60950-1, Railway EN50121-4, Traffic Control NEMA T52, EN61000-6-2, CE/FCC</td>
</tr>
<tr>
<td>IFS-402GSM</td>
<td>8</td>
<td>4</td>
<td>2 SFP</td>
<td>12/24/48VDC</td>
<td>Safety UL60950-1, Railway EN50121-4, Traffic Control NEMA T52, EN61000-6-2, CE/FCC</td>
</tr>
</tbody>
</table>

Unmanaged Switches

<table>
<thead>
<tr>
<th>Model</th>
<th>Total Ports</th>
<th>UTP Port</th>
<th>Fiber Port</th>
<th>Power Input</th>
<th>Certification</th>
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</thead>
<tbody>
<tr>
<td>IGS-800</td>
<td>8</td>
<td>8</td>
<td>12/24/48VDC</td>
<td>12/24/48VDC</td>
<td>Safety UL60950-1, Railway EN50121-4, Traffic Control NEMA T52, EN61000-6-2, CE/FCC</td>
</tr>
<tr>
<td>IGS-501S</td>
<td>6</td>
<td>5</td>
<td>1 SFP</td>
<td>12/24/48VDC</td>
<td>Safety UL60950-1, Railway EN50121-4, Traffic Control NEMA T52, EN61000-6-2, CE/FCC</td>
</tr>
<tr>
<td>IGS-500</td>
<td>5</td>
<td>5</td>
<td>2 SFP</td>
<td>12/24/48VDC</td>
<td>Safety UL60950-1, Railway EN50121-4, Traffic Control NEMA T52, EN61000-6-2, CE/FCC</td>
</tr>
<tr>
<td>IGS-402S</td>
<td>6</td>
<td>4</td>
<td>2 SFP</td>
<td>12/24/48VDC</td>
<td>Safety UL60950-1, Railway EN50121-4, Traffic Control NEMA T52, EN61000-6-2, CE/FCC</td>
</tr>
<tr>
<td>IGS-402F</td>
<td>6</td>
<td>4</td>
<td>2 SC/ST</td>
<td>12/24/48VDC</td>
<td>Safety UL60950-1, Railway EN50121-4, Traffic Control NEMA T52, EN61000-6-2, CE/FCC</td>
</tr>
<tr>
<td>IFS-1602GS</td>
<td>18</td>
<td>16</td>
<td>2 SFP</td>
<td>12/24/48VDC</td>
<td>Safety UL60950-1, Railway EN50121-4, Traffic Control NEMA T52, EN61000-6-2, CE/FCC</td>
</tr>
<tr>
<td>IFS-800</td>
<td>8</td>
<td>8</td>
<td>12/24/48VDC</td>
<td>12/24/48VDC</td>
<td>Safety UL60950-1, Railway EN50121-4, Traffic Control NEMA T52, EN61000-6-2, CE/FCC</td>
</tr>
<tr>
<td>IFS-402F</td>
<td>6</td>
<td>4</td>
<td>2 SC/ST</td>
<td>12/24/48VDC</td>
<td>Safety UL60950-1, Railway EN50121-4, Traffic Control NEMA T52, EN61000-6-2, CE/FCC</td>
</tr>
<tr>
<td>IFS-401F</td>
<td>5</td>
<td>4</td>
<td>1 SC/ST</td>
<td>12/24/48VDC</td>
<td>Safety UL60950-1, Railway EN50121-4, Traffic Control NEMA T52, EN61000-6-2, CE/FCC</td>
</tr>
<tr>
<td>IFS-500C</td>
<td>6</td>
<td>5</td>
<td>12/24/48VDC</td>
<td>12/24/48VDC</td>
<td>Safety UL60950-1, Railway EN50121-4, Traffic Control NEMA T52, EN61000-6-2, CE/FCC</td>
</tr>
</tbody>
</table>

Optical Fiber Bypass Switch

- Supports SC/ST/LC single mode optical connectors
- Optical bypass switching time <10ms with Low insertions loss
- Provides rotary switch to set delay boot time (0~180 seconds)
- Redundant dual DC input power 12/24/48VDC (9.6 ~ 60VDC)
- Wide temperature range model available for -20 to 70°C environments

**Bypass Mode**

Power Failure

- Power Switch over (Bypass)

**Normal Mode**

Power Ready

- Power Ethernet Switch

Switch over

IBP-202

Next
### Industrial Media Converter

#### Features
- 4KV surge protection for LAN port
- 2.25K VDC Hi-pot isolation protection for Ethernet ports and power
- SmartConfig™ for Quick & easy mass configuration
- SmartView™ for centralized management

#### Industrial Fiber Converter Application

Transportation, Electric, Metallurgy, Coal, Petrochemical, Water Treatment

Fiber

Industrial Fiber Switch

Industrial Fiber Converter

#### Related Products

<table>
<thead>
<tr>
<th>Model</th>
<th>Managed</th>
<th>UTP 10/100 Base-T</th>
<th>Fiber 100Base-FX</th>
<th>Redundant Power Input</th>
<th>Safety UL60950-1</th>
<th>Railway EN50121-4</th>
<th>EN61000-6-2</th>
<th>EN61000-6-4</th>
<th>CE/ FCC</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMC-1000MS</td>
<td>8</td>
<td>1</td>
<td>1 SFP</td>
<td>12/24/48VDC</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>IMC-1000S</td>
<td>6</td>
<td>1</td>
<td>1 SFP</td>
<td>12/24/48VDC</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>IMC-1000C</td>
<td>5</td>
<td>1</td>
<td>1 SC/ST</td>
<td>12/24/48VDC Single Power</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>IMC-1000CS</td>
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<td>1</td>
<td>1 SFP</td>
<td>12/24/48VDC Single Power</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
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<td>6</td>
<td>1</td>
<td>1 SC/ST</td>
<td>12/24/48VDC</td>
<td>✓</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td>IMC-100C</td>
<td>18</td>
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<td>1 SC/ST</td>
<td>12/24/48VDC Single Power</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

#### Serial Connectivity Series

(FieldBus Fiber Converter & Contact Closure Fiber Converter)

#### FieldBus Fiber Converter

- Redundant fiber ring with zero recovery time
- Auto baudrate detection and data speed up to 12Mbps for ProFiBus series
- Protocol transparent of Modbus, ProFIbus and CAN bus
- Alarm by relay output

- 2.5KV isolation protection
- Dual-power inputs for redundancy
- Extends PROFIBUS transmission distance up to 60 km
- Wide temperature range model available for -40 to 75°C environments
### Application for Modbus or ProfiBus

- **IFC-FDC-PRO**
  - 1 Profibus
  - 12M
  - 2.5KV
  - 2
  - 12/24/48VDC
  - UL60950-1
  - CE

- **IFC-Serial-PRO**
  - 1 Modbus or others
  - 1M
  - 2.5KV
  - 1
  - 12/24/48VDC

- **IFC-Serial**
  - 2 Modbus or others
  - 1M
  - 2.5KV
  - 1
  - 12/24/48VDC

### Contact Closure Fiber Converter

**Features**
- 4 isolated binary input (Bl-1, Bl-2, Bl-3, Bl-4)
- 4 MSR contact relay output (K1, K2, K3, K4), maximum breaking capacity 2000VA for AC load, 50-280W for DC resistive load, or 30W for DC inductive load
- Support multi mode fiber 2KM or single mode 30KM/60KM fiber for transmit distances
- CE, FCC, heavy industrial grade EMS, EMI, EN61000-6-2, EN61000-6-4 certified
- Fanless and DIN-Rail design for harsh industrial environment

### Related Products

<table>
<thead>
<tr>
<th>Model</th>
<th>Dual Channel</th>
<th>Serial</th>
<th>Baud rate Max (bps)</th>
<th>Isolation</th>
<th>Redundancy</th>
<th>Power Input</th>
<th>Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>IFC-FDC-PRO</td>
<td>1</td>
<td>Profibus</td>
<td>12M</td>
<td>2.5KV</td>
<td>2</td>
<td>12/24/48VDC</td>
<td>UL60950-1</td>
</tr>
<tr>
<td>IFC-Serial-PRO</td>
<td>1</td>
<td>Profibus</td>
<td>12M</td>
<td>2.5KV</td>
<td>1</td>
<td>12/24/48VDC</td>
<td></td>
</tr>
<tr>
<td>IFC-Serial</td>
<td>2</td>
<td>Modbus or others</td>
<td>1M</td>
<td>2.5KV</td>
<td>2</td>
<td>12/24/48VDC</td>
<td></td>
</tr>
<tr>
<td>IFC-Serial</td>
<td>2</td>
<td>Modbus or others</td>
<td>1M</td>
<td>2.5KV</td>
<td>1</td>
<td>12/24/48VDC</td>
<td></td>
</tr>
</tbody>
</table>

**IFC-CCF40-HP**

- 4x Channel Binary
- 4x MSR Contact Relay
- 1x SC/ST/Bidi
- 60-264VAC or 60-300VDC
- UL60950-1
- CE
- FCC
**IEC 61850-3 Switch**

**Features**
- IEC 61850-3, IEEE 1613 certified is designed to fulfill power substations
- Supports u-Ring and u-Chain, RSTP/STP/MSTP, and ERPS G.8032 for network redundancy
- Isolated redundant power supplies with universal 24/48 VDC or 110/220 VDC/NAC power supply range
- Hot-swappable interface modules for rackmount model
- Cable diagnostic and Green Ethernet
- -40 to 85°C operating temperature range

**GOOSE Message**
For mission-critical applications, GOOSE messages can be placed into the highest Qos priority so as to avoid packet loss and delay
- IPS series Ethernet switches can communicate with GOOSE multicasts
- Critical communications are prioritized with the highest QoS priority
- Achieve zero packet loss to ensure reliable transmissions.

**Power Substation Application**

**Related Products**
**IEC 61850-3 Switches**

<table>
<thead>
<tr>
<th>Model</th>
<th>Total Port</th>
<th>UTP 10/100 Base-TX</th>
<th>UTP 100/1000 Base-X</th>
<th>Fiber 100/1000 Base-X</th>
<th>Redundant PowerInput</th>
<th>Certification</th>
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<tbody>
<tr>
<td>IPS-G803SM</td>
<td>11</td>
<td>8</td>
<td>3 SFP</td>
<td>24/48VDC or 110/220VDC/AC</td>
<td>✓</td>
<td>✓ ✓ ✓ ✓ ✓ ✓</td>
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<tr>
<td>IPS-893GSM</td>
<td>11</td>
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<td>3 SFP</td>
<td>24/48VDC or 110/220VDC/AC</td>
<td>✓</td>
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