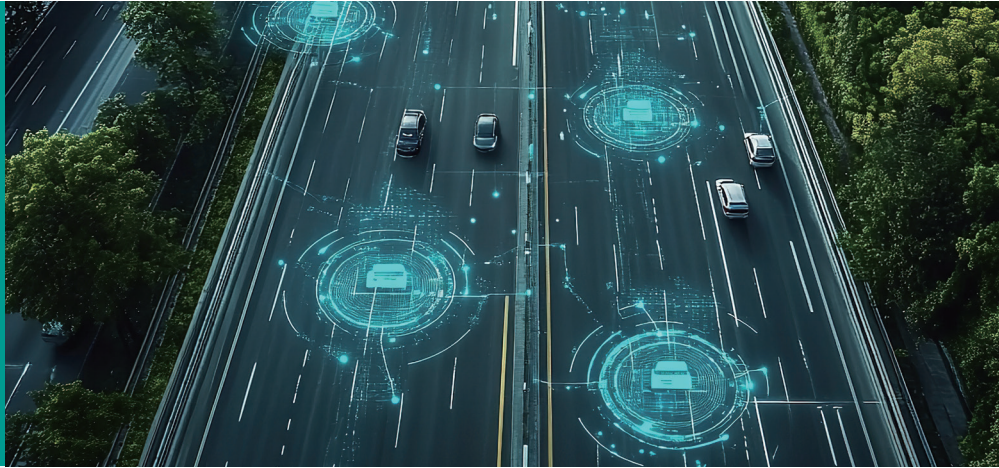


Real-time Communication and Bounded Low Latency With TSN

Country: China



System Requirements


- A single unified network that is easier to maintain, to scale for future expansion, and allows for seamless integration with existing infrastructure.
- Reliable, low-latency, real-time communication in challenging environments such as in tunnels and on highways.
- High bandwidth to integrate AI and machine learning applications without compromising the exchange of critical control data.

Why Moxa

- Compact, reliable 8-port TSN Gigabit Ethernet switches designed to seamlessly integrate isolated systems into a single network.
- TSN-powered deterministic and low-latency capabilities for real-time communication to enhance response times and operational efficiency.
- World's first to obtain the Avnu Alliance TSN Component Certification, and active partner in advancing TSN technology through expertise and participation in test beds.

Moxa Products

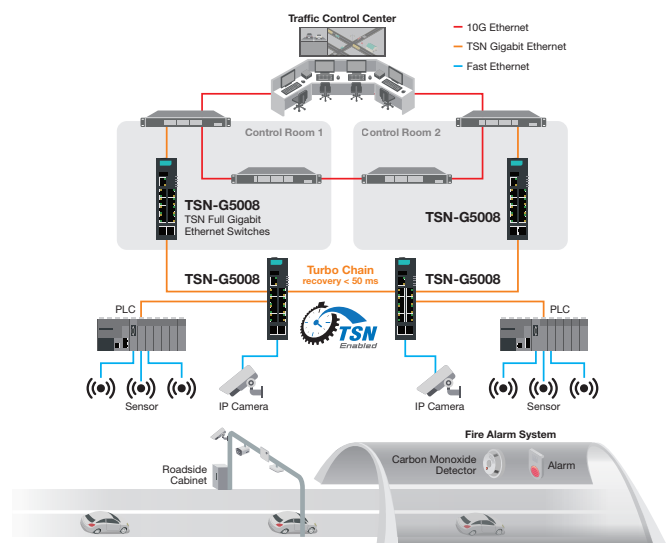


TSN-G5008 
8-port Full Gigabit Managed Ethernet Switches

A system integrator was tasked with optimizing a client's complex monitoring network infrastructure for highways and tunnels to advance the client's goal of building seamless vehicle-to-everything (V2X) communications. The original infrastructure was made up of isolated systems that operated on separate networks, which resulted in unwanted data latency and jitter. This fragmented setup created a high-maintenance, costly environment that limited scalability and made the adoption of advanced connectivity and automation solutions more difficult. To address these obstacles, the integrator turned to time-sensitive networking (TSN) solutions.

By deploying Moxa's TSN-G5008 Series switches, the integrator merged the various isolated systems and networks into a single unified network that provided several important benefits. Besides streamlining maintenance, bounded low latency kept latency within a set threshold for predictable performance, ensuring critical data from IP cameras and sensors was always transmitted to the right place at the right time. Second, merging all monitoring systems provided the operator better visibility of tunnel and highway conditions. Combining this improved visibility with Turbo Chain redundancy to ensure uninterrupted data flow in the event of a failure, the client could respond faster to emergencies and enhance road safety. Last, the network's high bandwidth allowed the operator to integrate resource-intensive applications, such as AI and machine learning, without affecting time-sensitive control data.

By fully integrating TSN into their network, the operator gained access to a powerful foundation capable of real-time data transmissions. These improvements made sure the network could support additional capabilities and seamless V2X communication to enable smarter, safer, and more advanced autonomous transportation solutions.



Automating Home Appliance Manufacturing With TSN Technology

Country: China



System Requirements


- Real-time, deterministic network infrastructure to enable precise control and synchronization of production line devices and processes.
- Superior performance to deliver high reliability, low latency, and deterministic traffic scheduling.
- Efficient data transmissions to support the integration of industrial cameras and the seamless transfer of large volumes of data.
- Scalable and futureproof network infrastructure to easily expand the production line and integrate additional devices without compromising network performance or reliability.

Why Moxa

- Highly reliable TSN Ethernet switches tailored for industrial automation and plug-and-produce manufacturing.
- Committed to co-developing TSN protocols and standards, and a trusted source for TSN knowledge with global implementation expertise.
- A broad portfolio of certified and field-proven networking devices with industry-leading warranties and customer support.

Moxa Products



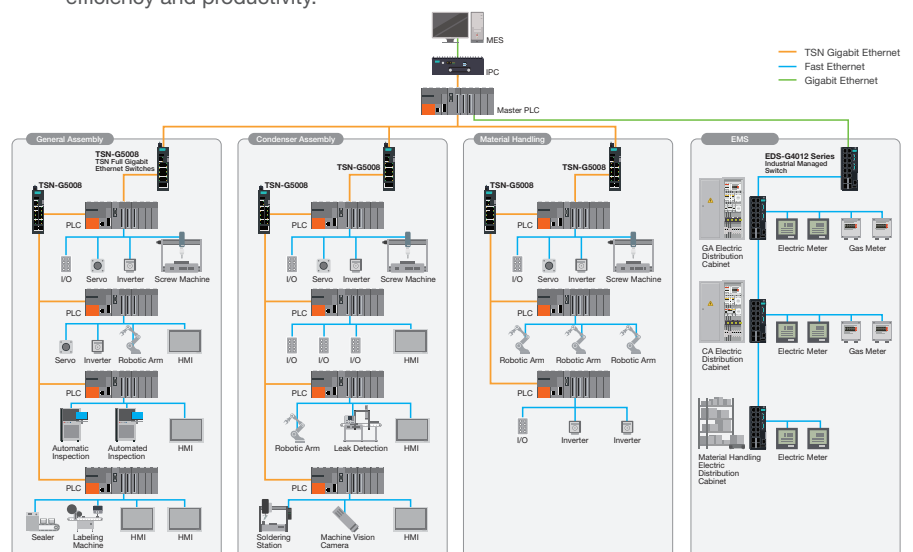
TSN-G5008 
8-port Full Gigabit Managed Ethernet Switches

Smart manufacturing improves efficiency, reduces production time, lowers costs, and minimizes resource and energy use. These benefits combined help businesses achieve their bottom line and sustainability goals more easily. A home appliance manufacturer had trouble managing increasing data volumes and could not meet performance and precision goals with their existing infrastructure. The manufacturer approached Moxa for a solution to modernize their existing network infrastructure to boost efficiency.

After researching and evaluating solutions, the manufacturer adopted TSN technology for their network infrastructure. The company collaborated with Moxa experts to design the network and integrate the TSN technology into their existing automated production line. The network was meticulously planned to ensure seamless integration with the production equipment and devices, while prioritizing real-time data transmission and control.

To facilitate the new network design, the company deployed the Moxa TSN-G5004 and TSN-G5008 Series TSN Ethernet switches. The network configuration was optimized to accommodate industrial cameras and handle large amounts of data. Engineers set up the network to prioritize control packets, making sure they reached their intended destination on time and free from interference.

The successful integration of TSN technology into the home appliance manufacturer's production line highlights the transformative impact of advanced networking solutions in the industrial sector. By harnessing TSN, the company achieved real-time, highly reliable, and deterministic network communication, leading to improved operational efficiency and productivity.



One Unified Network to Realize Modern Mass Customization

Country: China



System Requirements

- One unified network that enables seamless communications for machine-to-machine, machine-to-device, and machine/device-to-supervisory networks to reduce production cycle times and total cost of ownership
- Deterministic communications for precise device control and Gigabit network capabilities to connect various systems
- Easy-to-use, easy-to-configure, and futureproof technology for real-time production optimization and mass customization

Why Moxa

- Field-proven TSN solutions that are an ideal fit for commercial off-the-shelf production and tailor-made for industrial automation and plug-and-produce manufacturing
- Reliable TSN Ethernet switches with 4/8-port TSN Gigabit connectivity
- Committed to developing and evolving TSN technology by collaborating with industry players in the ecosystem

Moxa Products



TSN-G5004
4-port Full Gigabit Managed Ethernet Switches

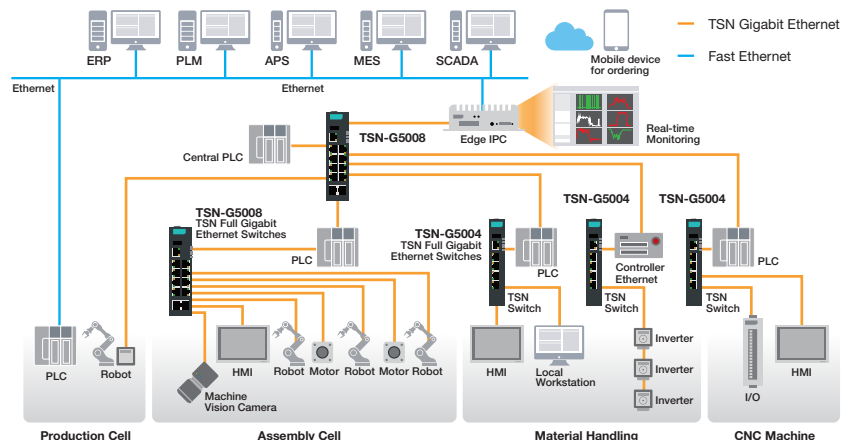


TSN-G5008
8-port Full Gigabit Managed Ethernet Switches

A product manufacturer planned to connect their various systems—including production, assembly lines, and logistics systems—on one unified network to realize shorter production cycle times and lower total cost of ownership. This initiative came out of the company's drive to make mass customization possible to fulfill the variety of needs in the market. In the automation industry, TSN technology is essential to achieving these kinds of goals. Specifically, TSN facilitates high-speed networking, handling large volumes of data transmission, ensuring highly accurate motion control, and keeping latency low by prioritizing network traffic. All of this is necessary to ensure that critical data is delivered to the right place at the right time.

To enable mass customization of their Commercial-Off-the-Shelf (COTS) products, the manufacturer deployed Moxa's TSN-G5004 and TSN-G5008 TSN Ethernet switches to build a TSN-capable network that combined the existing proprietary networks into one unified network. This unified network used a simpler network topology that reduced cabling and maintenance costs, and minimized the training needed to understand the different protocols being used. Now, the company can adjust their entire production process with substantially lower cycle times to manufacture customized COTS products as needed at the same or even lower cost. With the new TSN network, the company achieved digital transformation for their automation site by converging their IT and OT networks and enabling adaptive production, mass customization, and operational excellence for Industry 4.0 and IIoT applications.

From a production viewpoint, TSN accomplishes integration of control with reduced cycle times, reduces total cost of ownership through a simplified topology with fewer assets to manage, and realizes service-as-a-service through one unified network. By implementing such a TSN network, the company made modern mass customization possible, completing their digital transformation and enabling adaptive production.



AI-driven Operational Efficiency for a Hydropower Plant

Country: China



System Requirements


- Deploy one AI system on the control network to access the data in a real-time manner without sacrificing the performance and safety of the power generation facilities and occupying the bandwidth that is supposed to transmit the critical control data
- One unified network to merge different applications for seamless communications
- Supports Gigabit communication

Why Moxa

- Reliable TSN Ethernet switches with 5 or more ports
- Over 35 years of OT networking experience
- Committed to developing and evolving TSN technology by collaborating with industry players in the ecosystem

Moxa Products

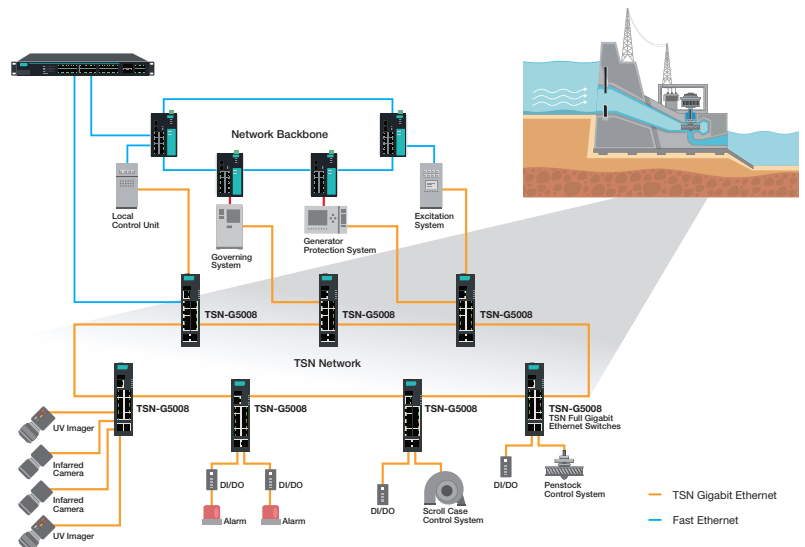


TSN-G5008 
8-port Full Gigabit Managed Ethernet Switches

A hydropower plant planned to upgrade and modernize their systems to generate power more efficiently. Compared to a traditional system, a modern hydropower plant relies on combining multiple systems to achieve higher performance and stability at a lower cost. Traditionally, key systems responsible for excitation, governing, spiral casing, penstock, and water turbines run on different network protocols. Costs to maintain these various networks are high, and additional engineers and a complex network structure are often required.

The operating company was determined to bring all of their isolated networks together and implement an AI system for their control network by embracing time-sensitive networking, which was a perfect fit for this kind of use case. First, controlling diversified applications through one unified network significantly reduces costs through a simplified network structure. This simplified network structure can also guarantee high speeds, highly accurate control, and advanced network security. Second, TSN solves interoperability issues between their control network and the new AI system, allowing them to realize an AIoT solution for their needs. Third, Moxa's TSN-G5008 Ethernet switch offers 8 Gigabit ports to connect all their different control systems together to create one unified network. With ample bandwidth and low latency, their new TSN network provides real-time communication of large volumes of data for the AI system.

The result? The hydropower plant has improved efficiency and the ability to quickly adjust total power output to the grid as needed, giving rise to a new hydropower plant with lower costs, easier maintenance, higher efficiency, and improved adaptability.



Enabling Multiple Applications on a Unified TSN Network

Country: Japan



System Requirements

- Supports time-sensitive networking (TSN)
- Networking devices with reliable, compact design
- Supports Gigabit communication

Why Moxa

- Experience in OT networking for more than 30 years
- Committed to developing TSN technology by collaborating with multiple industry players
- Product design with rugged and compact DNA

Moxa Products



TSN-G5008 
8-port Full Gigabit Managed Ethernet Switches

A global leading manufacturer of industrial machinery is leveraging time-sensitive networking (TSN) technology to aggregate multiple applications in one CNC machinery. To achieve its scalable, accelerated sensing and advanced machine control applications, the deterministic laser control and machine control need to work harmoniously together. However, they used to be different proprietary networks that required much effort to integrate and maintain the components, especially when the machinery was shipped abroad.

To enhance scalability and efficiency, the company introduced a built-in unified TSN network in its machinery. First, the TSN-G5008 full Gigabit managed Ethernet switch connected multiple remote I/O, delivering deterministic communication to the servo drivers to enable critical machine control. Second, the TSN-G5008 switch connected remote I/Os to the machine vision cameras in order to feed information back to the industrial PC. In the past, it was not possible to carry critical data on the same wire due to the nature of Ethernet –first in, first served. With its compact design, the TSN-G5008 switch fitted perfectly in the space-constricted machinery, saving engineers effort on integrating all components in the network.

With the standard Ethernet TSN infrastructure, the company now has unprecedented potential in producing advanced machinery and making a great impact on manufacturing.

