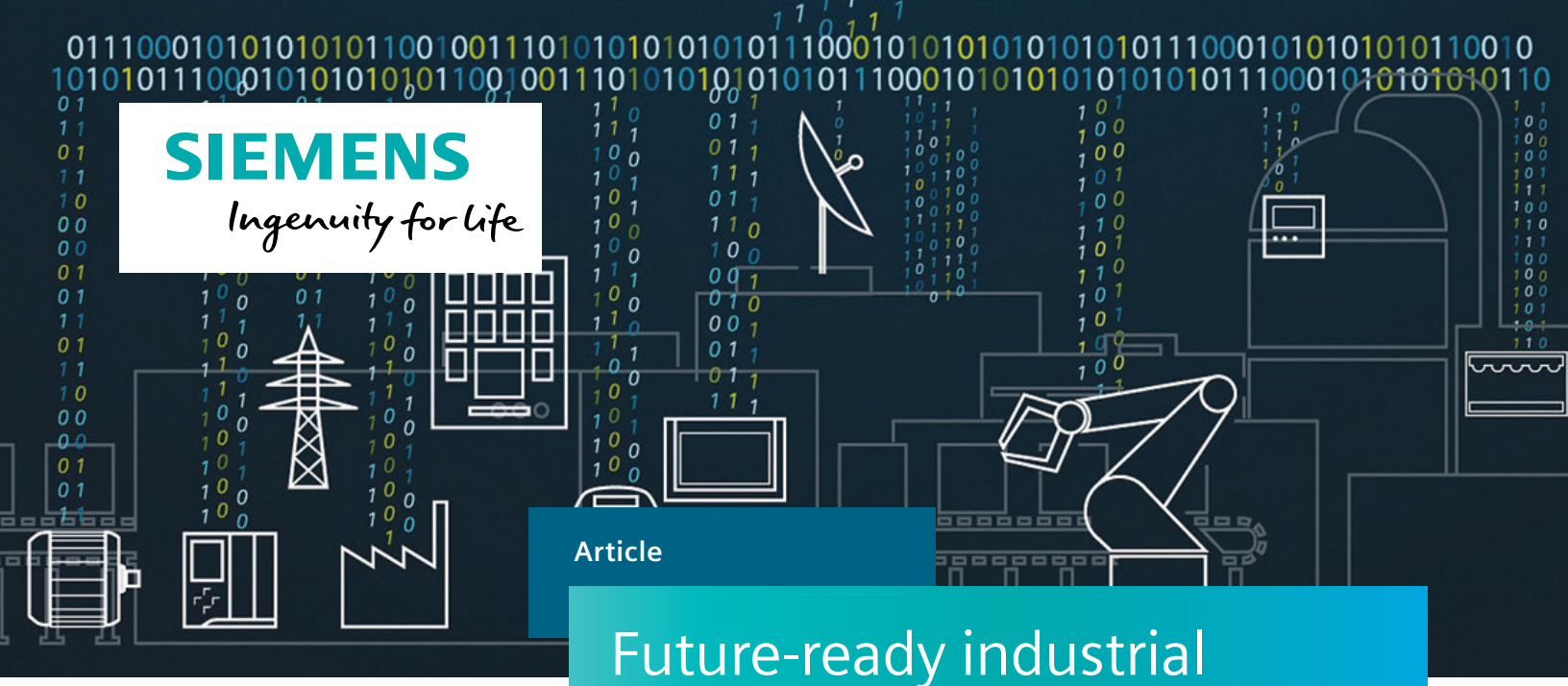

Article

Future-ready industrial networks...a checklist for decision-makers

With the exponential rise in Internet connectivity in the past 15 years, the idea of an "Internet of Things" was born. This seems an inevitable outcome from the Internet itself being a vast, global network of networks but less useful without connected smart devices, initially just PCs as end-points. Conversely, the impact of those end-points – today not only PCs but also tablets, smartphones, and now even smartwatches, cars, and appliances – would be much less without networks to connect them.

As more and more industrial machines gained connectivity features embedded with Ethernet protocol standards, from field-level sensors to controllers and HMIs to distributed control systems, the notion of an "Industrial Internet of Things" (IIoT) emerged. This connectivity has become a key enabler of Industry 4.0, the digitalization of work through greater automation and data exchange. And it's why bandwidth and data throughput speeds are becoming ever-more critical to production performance.

Industrial networks: Vital to operational visibility, decision-making, and profitability

Investments in industrial networking to date have served to improve operational visibility and decision-making with better data and analytics in real-time. Error-prone, time-consuming manual data collection, collating, and reporting are quickly fading, as smart sensors and other technologies help industrial and logistics operators improve quality, speed, flexibility, and costs.

For example, condition-based monitoring using real-time data analyzed by artificial intelligence makes predictive maintenance possible, so equipment performance issues can be mitigated or remediated before production disruptions occur. And this monitoring can be done from hundreds or thousands of miles away. High-speed networks enabling high resolution video allows plant operators and owners to receive up-to-the minute snapshots of work-in-progress, feedstocks and finished goods. Transportation companies can keep watch on their vehicle fleets. Midstream oil and gas operators can gauge the health of pump stations and piping anywhere along the length of their pipelines.

Data-intensive OT applications: Soon Fast Ethernet won't be fast enough

This list of IIoT examples can go on and on, but the point is, as these types of IIoT-enabled applications proliferate, today's industrial networks must be ready to move more data than ever before. For this reason, industrial network devices with data speeds up to 100 Mbps are expected to become insufficient for the increasing demands of connected operational technology (OT). Among those are:

- **Increased use of robots and automated guided vehicles** requiring extremely fast data throughput to support the precise, deterministic timing for motion control of robots and automated guided vehicles;
- **More deployments of intelligent, high-definition video applications** for production and quality control as well as for facility and asset monitoring and management;
- **Expanding interactive machine-to-machine (M2M) applications** on plant floors and even between plants and external suppliers of feedstocks and equipment (i.e. OEMs);
- **Rising numbers of OEMs seeking to monitor and manage** their equipment fleets in real time, including remote diagnostics and issue resolutions;
- **Collaboration of OT and enterprise IT networks,** requires a strong industrial network as the backbone of the operation to quickly transmit valuable data to the enterprise network for analysis.
- **Growing use of data pre-processing at the network edge** before sending to cloud-based data analytics and higher-level systems (e.g., ERP and MES platforms).

The good news for industrial enterprises is that Gigabit Ethernet (GigE), originally designed as a high-speed backbone protocol for aggregated data traffic, is ready to meet future challenges while keeping existing processes running smoothly. Many Gigabit devices are backwards compatible with existing Ethernet networks and devices. This prevents stranding prior networking investments that industrial operators may have made years ago.

In industrial environments, GigE is facilitated by managed gigabit switches, such as the **Siemens SCALANCE XC200 G.** This switch, which is designed, engineered, and manufactured for temperature extremes and other harsh conditions of industrial environments, offers many unique features making it easy to deploy, operate, and scale as needs grow.

Future-ready networks: Seven criteria to consider when upgrading your OT networks

While Fast Ethernet is sufficient for some of today's OT automation and control applications, industrial operations should anticipate eventually having to meet the requirements of more bandwidth-hungry applications.

If high-tech's progress over the past four decades has taught the world anything, it's that the price-performance of processing, storage, and networking is always improving and, as far as networks are concerned, capacity demands are always growing.

At the same time – and coinciding with the rise of Industry 4.0 retrofits and greenfield new-builds – many industrial operations are having to replace long-depreciated production infrastructure with new equipment. That's why, as next-generation machinery is deployed on plant floors, operators should consider adding GigE switching capabilities to their networks.

To help OT engineers and their IT counterparts develop future-ready networking strategies and implementation plans, they should consider the following seven criteria as a checklist for their decision-making:

- **High bandwidth:** Advances in connected machines and devices, the edge and cloud data processing and analytics, as well as video applications have increased the need to handle large amounts of data, which makes GigE managed switches a practical choice for upgrades of existing OT networks and new-builds.
- **Communication versatility:** More connected devices require not just more data to be transmitted, but more types of data. Examples include high-priority, real-time, mission-critical, sensor data, and image and video data. Switches must handle a variety of communication protocols, such as PROFINET, E/IP, OPC UA, MQTT and newer technologies like Time-Sensitive Networking (TSN).

- **Scalability and modularity:** Networks need to be flexible to expand and adjust to system requirements by upgrading from layer 2 to layer 3 with a C-plug, adding ports with port extenders or changing transmission medium with SFPs, as more bandwidth-hungry devices and applications are connected and deployed.
- **Diagnostics:** Managed switches provide network transparency for the visibility needed to identify performance issues before costly downtime and consequent production disruptions occur. They can be configured for high availability and used to segment networks for optimized data flows. Network monitoring and management tools also provide valuable diagnostics and performance information.
- **OT and IT collaboration:** Communication between OT and IT networks is important to maximize data flows and, ultimately, value to the industrial enterprise. It's crucial to ensure the seamless communication between these networks, despite each having different requirements and operating principles. For example, OT networks are deterministic, which means packets carrying command-and-control data must arrive at the right time to keep an operation running smoothly. In contrast, IT networks are best-effort, which means packets can drop and be re-sent without noticeable impacts or consequences to users.
- **PoE capability:** Technology has simplified many aspects of networks, including options for powering devices with Power-over-Ethernet (PoE) cabling, which can save substantial wiring costs.
- **Security** may be the most important aspect to the future of your network. Cyberattacks are on the rise due to sophisticated attackers and increased device connectivity. Assets, equipment, uptime, trade secrets, brand value, Intellectual Property and even personal safety need to be protected from malicious network intrusions, employee sabotage or accidental manipulation. It's important to have a security strategy. An Industrial Network Security Assessment is a great first step to securing a network.

Siemens SCALANCE XC200 G Layer 2 Gigabit Ethernet Managed Switch

This newest member of the Siemens SCALANCE family of industrial-grade managed switches offers multiple Full Gigabit port densities. The XC224-4C G is 24 ports (20x 10/100/1000 Mbps RJ45 ports; 4 x 1000 Mbps combo ports) to establish your network as the backbone of your operation.

All features of the SCALANCE XC200 G managed switch are fully functional out of the box – no hidden licensing fees.

Switch configuration and diagnostics can be done in the Web Based Management (WBM), Command Line Interface (CLI) or TIA Portal, the Siemens common software engineering framework. In addition, Siemens SINEC NMS provides advanced, easy-to-use network monitoring and management tools for one or many switches. Status indicator LEDs are group-mounted on a front panel for easy observation.

The future starts today: Find out more about the next-generation Siemens SCALANCE XC200 G managed switch for gigabit speeds, versatility, and scalability with our discounted promotional offer.

Years ago, as industrial networks began interconnecting machines and production cells, the pace of change was just a fraction of what it is today. The competitive imperatives of superior speed, quality, and margins were paramount then, but they are even more so today – and will only grow in years to come.

Industrial operations that are considering upgrades to their networks should consider the next-generation Siemens SCALANCE XC200 G managed switch. Designed, engineered, and built for the rigors of industrial environments, it can provide the gigabit speeds, versatility, and scalability to support a wide variety of existing and emerging high-speed data throughput needs well into the future.

SCALANCE XC216-4C G

To help prepare your network for the future, contact us at siemensci.us@siemens.com for a free 15-minute industrial network consultation. Or visit us at usa.siemens.com/future-ready-networks

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Published by
Siemens Industry, Inc. 2019.

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Order No: NTAR-FRNET-0719
Printed in U.S.A.