

The Siemens logo is displayed in a white rectangular box with a teal border. The background of the entire page is a close-up of a Siemens industrial switch, model SCALANCE XC208-2SFP, with various ports and cables connected. The switch is dark grey with teal accents. The background is overlaid with a digital grid and binary code (0s and 1s) in teal and white, creating a high-tech, industrial atmosphere.

Technical
article

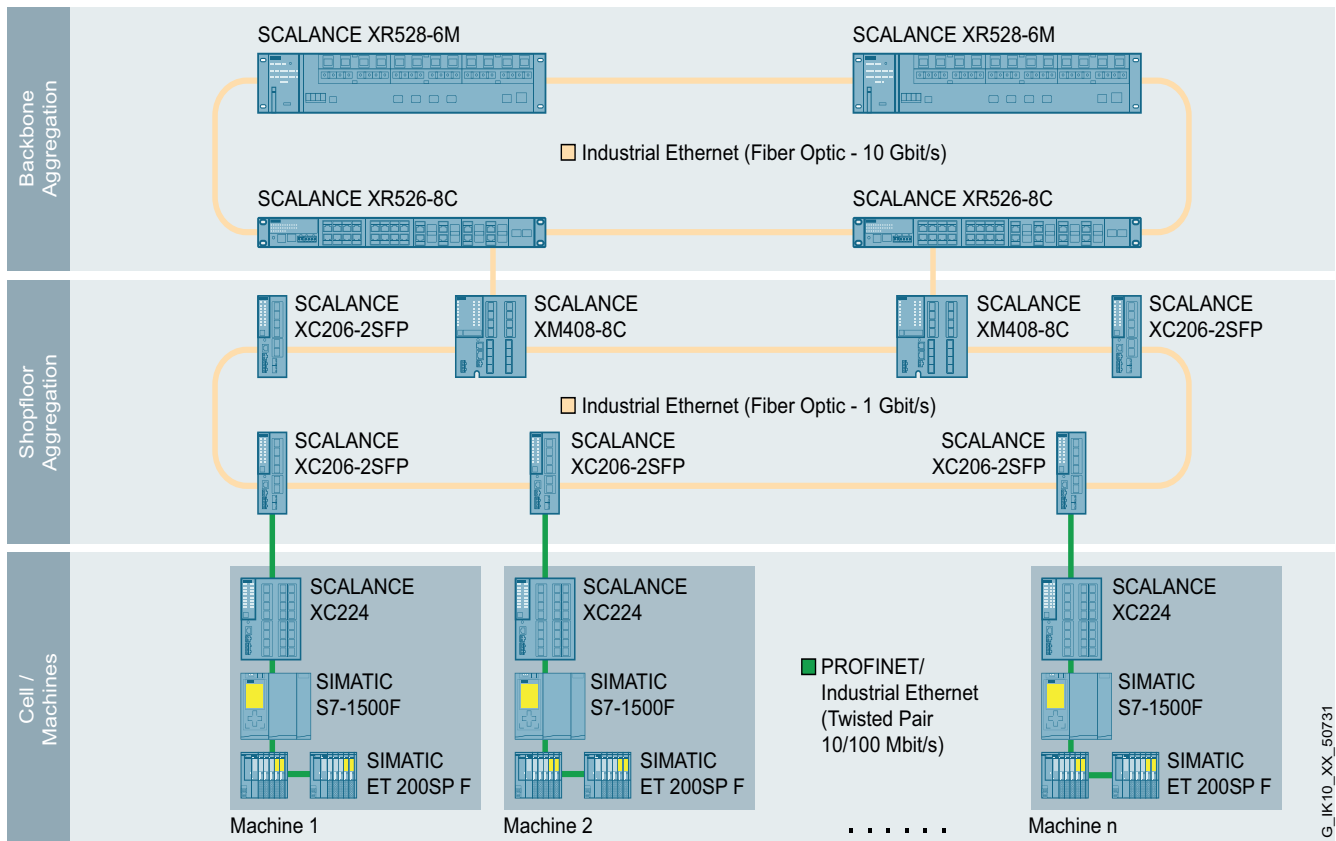
An Industrial Switch for all Purposes

High-performance Industrial Switches for large Automation Networks

Through digitalization, radical changes are expected, which should bring about a boost in productivity and greatly increased individualization. But what is the basic framework that enables these radical changes in the industrial production? It is the industrial network, which empowers devices to communicate with each other in the first place – and thus make optimizations to the processes. For this, rugged and powerful industrial network components are required.

Order is the most important Thing

For reasons of clarity as well as simplified administration, industrial networks are typically divided into different levels, which are based on the data streams and tasks. At the machine/cell level, the end devices – such as controllers, field devices, or HMI panels – are connected with Industrial Ethernet protocols – such as PROFINET – via switches. Since there are often several cells per production hall, they are brought together in a shop floor aggregation for structuring purposes. The various shop floor aggregations are then combined further at a higher level termed the backbone aggregation, which provides a protected connection to the office IT.

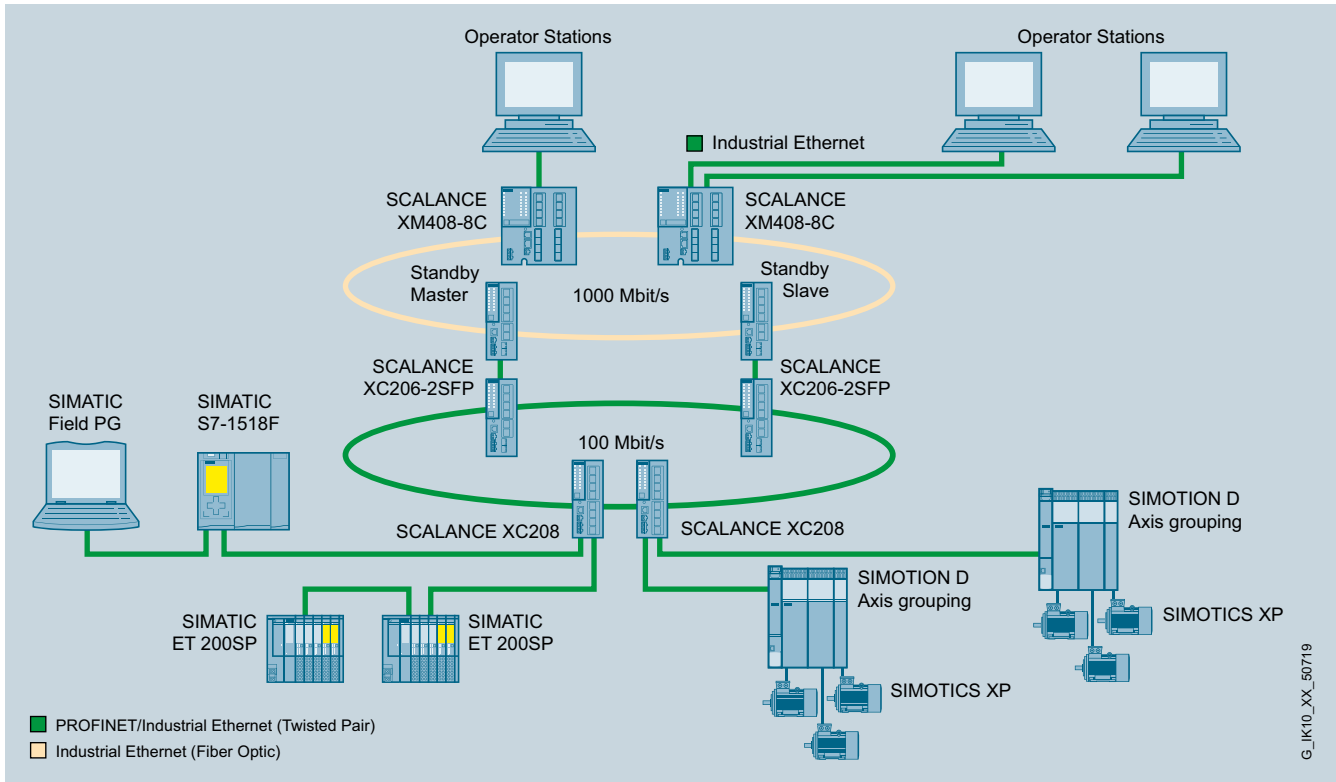


Typical structure of an industrial network – Siemens offers an appropriate industrial switch for every level.

Well-known for automation and proven in the field of industrial network technology, Siemens offers the right network solution for every level described above. For smaller machine networks, the integrated switching functionality can be utilized, or unmanaged switches can be used for machine-oriented networking. To handle larger networks, greater functionality and more comprehensive diagnostics are required, which is offered by the SCALANCE XC-200 in the form of an Industrial Ethernet layer 2 managed switch. Different port characteristics for electrical RJ45 as well as optical connections are available. By using SFP slots (small form-factor pluggable), the switch provides a flexible way to connect optical participants – in addition to the fixed optical transceivers with SC and ST/BFOC connection technology. Depending on the bandwidth and range required, the switch can be equipped with a wide selection of optical transceivers. Another advantage of the SFP variant is its configuration with SFPs with up to one Gbit/s, e.g., for the setup of fast gigabit connections when networking multiple cells (shop floor aggregation).



SFP slots (small form-factor pluggable) allow the SCALANCE X switches to be flexibly fitted with transceivers.



High degree of network availability through the coupling of redundant rings using the HRP standby function.

A high-performance Network helps to reduce Downtimes

Another important aspect besides a fast and high-performance communication is the availability of a reliable and robust network. The failure of network components and their replacement should be avoided as much as possible, since plant downtimes also mean production losses. To prevent this, the Industrial Ethernet switch SCALANCE XC-200 offers various physical characteristics in a rugged design and appropriate software mechanisms to increase the availability. The possibility of a redundant power supply as well as the rugged participant connections with industrial-grade RJ45 connectors, which provide additional strain and bending relief through latching onto the housing, reduce the risk of a failure. Furthermore, the function "Fiber Monitoring" monitors the optical line by detecting attenuation changes on the optical path at an early stage. This allows premature aging or possible dirt contamination to be recognized so that appropriate maintenance can be scheduled.

If, however, the connection to a participant fails, a solution is sought after that does not interrupt the data traffic. This is accomplished via redundant paths in the network structure – often in the form of a ring. For this purpose, the switch SCALANCE XC-200 offers the PROFINET-compliant Media Redundancy Protocol (MRP) and the High Speed Redundancy Protocol (HRP) with a deterministic re-configuration time. Furthermore, a slot for a removable storage medium (C-Plug) is available, on which the device configuration can be stored and, in the case of a replacement, be loaded from quickly and without expert knowledge onto a new device.

To handle the ever-larger networks, the switch XC-200 comes with virtual LANs (VLAN) for the structured subdivision of large networks into smaller, logical sub-networks. Through the logical separation, the broadcast load can be reduced, sensitive areas be separated from the main network, or the network be split into logical work groups. Furthermore, when using multicast protocols, e.g., for video applications or with EtherNet/IP, the multicast load on the network can be effectively reduced. In doing so, the switch can learn multicast sources and targets through IGMP snooping – thus filtering the multicast data traffic and limiting the load on the network.

Pulse of the Network

Various diagnostic tools – both centrally and locally – provide additional assistance to keep downtimes as low as possible. The management platform SINEMA Server utilizes its monitoring functionality, in addition to a centralized firmware management, to continuously check on the “health” of the network. This is made possible through the exchange of information via SNMP (Simple Network Management Protocol), the SINEMA Server, and the SCALANCE X switch. Furthermore, the online diagnostics in the TIA Portal is organized identically to the web-based management (WBM) of the device, which makes for a convenient evaluation of events across systems. Directly at the machine, the NFC function (near-field communication) provides quick access to the WBM of the device. Activated on a tablet or smart phone and the SCALANCE XC-200, the IP address of the device can be determined immediately with the aid of NFC, and the WBM be accessed with an established WLAN connection.

Very easy Configuration and Diagnostics, even in the Engineering Software

An increasingly important aspect focused on by the industry is the simple and intuitive operation (“usability” in the technical jargon), which in the private sector is expected as a matter of course. The hardware construction of the switch SCALANCE XC-200 is distinguished by a remote LED field (diagnostic island). There, the LEDs for the diagnostics can be seen at a glance, even if all cables are plugged in. The port status, the device status via signaling contact, and the redundancy manager status are clearly shown. On the software side, the configuration is supported by a web server, in which the settings can be made intuitively. This is in addition to the text-based CLI. Still, the integrated online help is available as a reference text. The use of the layer 2 managed switches as a PROFINET devices and the seamless integration into the central engineering software TIA Portal allow for an easy configuration, with which the automation specialist is already familiar from other SIMATIC components.

For the realization of a plant configuration consisting of controller, I/Os, and end devices, the XC-200 switches can be very easily incorporated into the project and be managed centrally via the TIA Portal. The most frequently used real-time protocol for this, PROFINET, is supported as well. Its versatile application is further enhanced through the support of the EtherNet/IP profile and the integration into EtherNet/IP diagnostics.

With their broad range of functions, the SCALANCE XC-200 switches meet the requirements asked of a future-proof and industrial-suited Industrial Ethernet switch employed at the cell level and in the shop floor aggregation layer. The varied options of redundancy, the multi-layered configuration and diagnostic options, as well as the wide selection of variants enable the automation specialist to optimally implement her desired network concept with the switch SCALANCE XC-200.



The Industrial Ethernet managed switches SCALANCE XC-200 are gigabit-capable, support VLAN and redundancy mechanisms, and can be employed in a wide range of applications thanks to their diverse certifications.

Security information

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions only form one element of such a concept. For more information about industrial security, please visit <http://www.siemens.com/industrialsecurity>

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Technical article
FAV-404-2016-PD-PA
BR 112016 En
Produced in Germany

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