



Technical
article

Digitalization needs (Infra-) Structure

Innovative Systems, Concepts and Services for the Digital Transformation

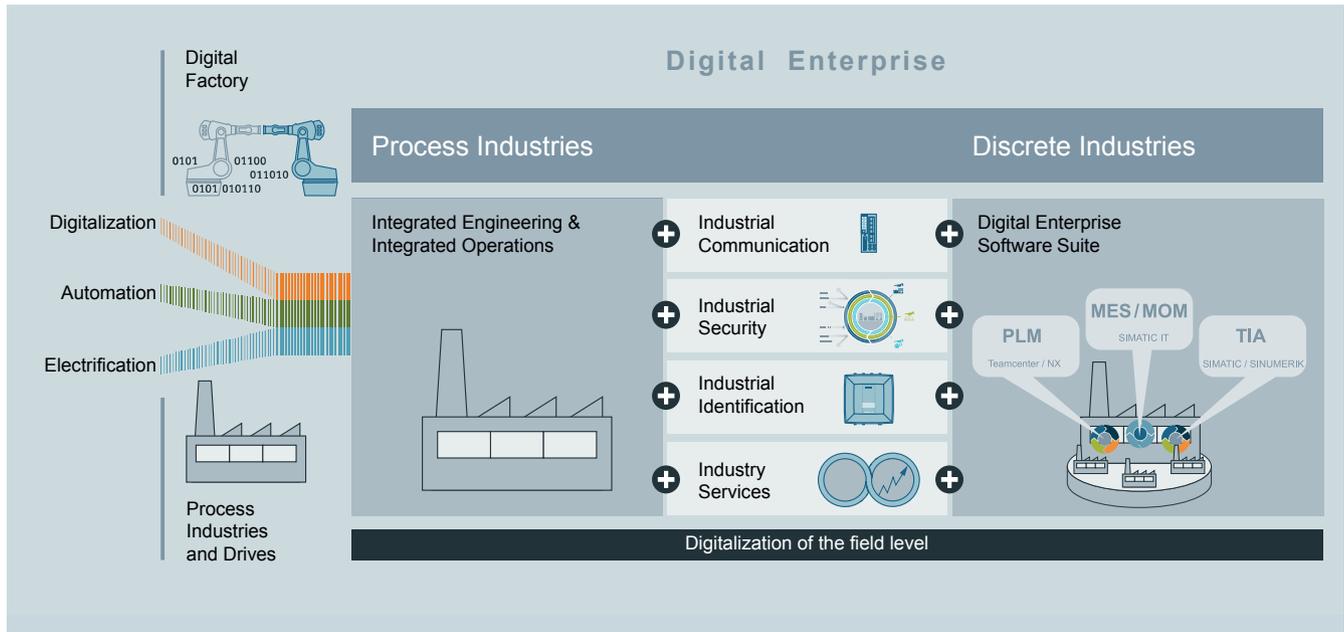
The advancing digitalization of industry needs sustainable, future-proof (infra-)structures. As one of the driving forces of the digital industrial (r)evolution, Siemens offers tailor-made components and concepts for it. Reliable, high-performance, open and secure industrial communication and identification systems play a leading role. Corresponding services support their easy integration and efficient use.

Manufacturing companies wanting to remain competitive in the future are now forced to act. New products have to be brought to market ever faster, dynamically changing markets demand ever more flexibility, and the constant push towards higher efficiency requires ever shorter development times. In doing so, resources and energy are to be saved while keeping the quality the same or even increasing it.

With the automation of the production practiced so far, there is little room for progress in this regard. Further potential can be realized through a holistic digital approach: the end-to-end digitalization of all processes along the value chain with a common database – from product design to production planning, and from engineering and production to service.

Ideally, suppliers and customers are also included in this flow of information and data. In this way, the experiences of all parties involved can influence the design and development of products, processes and also services – so that optimization capabilities can be identified and taken advantage of.

As a driver and at the same time user of the digitalization, Siemens supports companies in various industries on their way to the digital enterprise – to Industrie 4.0. Siemens focuses on the four core elements of the digital enterprise suite: a growing portfolio of intelligent software solutions, industrial communication and identification systems, industrial (IT) security (industrial security), and professional industrial services.



Tailor-made industrial network and identification technology from Siemens form the backbone of the digitalization and contributes significantly to increasing the industrial competitiveness.

Industrial Communication Networks – Robust Backbone for high-performance Data Flow

A horizontal and vertical end-to-end communication is essential for every automation solution. Connecting the real world with the virtual one requires a high-performance exchange of data along the entire value chain. This, in turn, requires a powerful network infrastructure and industrial-suited network mechanisms.

As a leading supplier of automation technology, Siemens knows the industry's requirements for communication networks. Since the introduction of the first Industrial Ethernet bus system SINEC H1 over 30 years ago, Siemens has developed a comprehensive product portfolio for industrial communication. Core components include Industrial Ethernet switches of the SCALANCE X series in various versions for all layers and tasks of an industrial network – from compact switch modules for the interface expansion of controllers, to unmanaged switches for the simple machine networking, to (fully) modular managed switches for highly complex, also real-time-capable or redundant network infrastructures in all transmission media; in the high-end segment with easy to upgrade functionality through key-plugs (also while in operation), e.g., for layer 3 switching or routing for high-performance industrial backbone systems.

With transmission rates of up to 10 Gigabits in the backbone, the fully modular devices SCALANCE X-500 provide for end-to-end networking from the field level up to the management level. With them, large industrial network infrastructures can be individually structured and, for example, redundant subnets for increasing the availability be set up. In addition, these devices can also securely and reliably transmit very large amounts of data from the industrial facility to the IT environment and cloud applications.

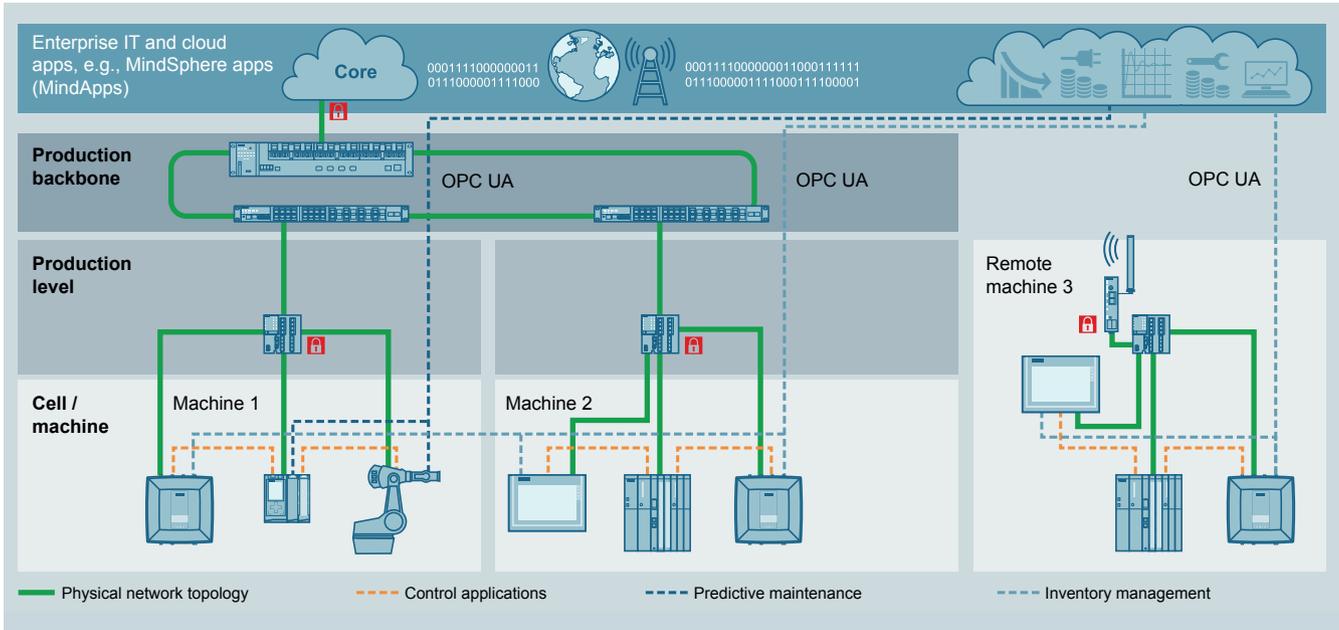
Network components from the RUGGEDCOM portfolio are intended for especially harsh operational and environmental conditions.

The compact, fanless devices are designed for the use at temperatures ranging from -40 to +85 °C and under increased vibration and shock loads. Metallic housings, versions with up to IP67 degree of protection and, if required, coated circuit boards provide resistance to electromagnetic interference, dust and also salt spray (corrosion). Among other things, they are thus predestined for applications in power generation and distribution, the oil and gas industry (also off-shore), as well as the transportation sector. The product range also includes particularly rugged private wireless broadband systems for harsh environments (RUGGEDCOM WIN based on the WiMAX standard IEEE) with high availability resulting from the exclusively private use.

In various other industrial applications, availability under harsh environmental conditions is also mandatory for wireless LAN solutions, and thus very demanding. Unlike in the office environment, a deterministic communication is generally indispensable in order to coordinate processes in exactly defined cycle times. Particularly critical in this regard are applications with failsafe communication. For this, the SCALANCE W portfolio offers scalable Industrial Wireless LAN solutions (IWLAN) for the highest indoor and outdoor requirements and for the control cabinet. The compact construction and corresponding approvals also make individual devices suitable for the use on trains and at rails.

Engineering and Network Management – Simply efficient

A prerequisite for high user acceptance is maximum ease of use concerning setup, configuration, commissioning and monitoring of network components as well as of more complex industrial network infrastructures.



Cloud connectivity via industrial networks – wired or wireless

The vast majority of these tasks can be intuitively and comfortably solved in the Totally Integrated Automation Portal (TIA Portal), Siemens' comprehensive engineering framework. Furthermore, the network management system SINEMA Server makes the extensive automation networks transparent and easy to manage during "runtime", e.g., via automatically generated error messages transmitted in various ways in the case of malfunctions or failures.

Professional for Industrial Networks, companies are able to qualify their own specialists for the dynamically progressing digitalization.

Companies without the necessary personnel resources can utilize Siemens' tailor-made Professional Services and fall back on a global network of industry- and IT-experienced Siemens Solution Partners.



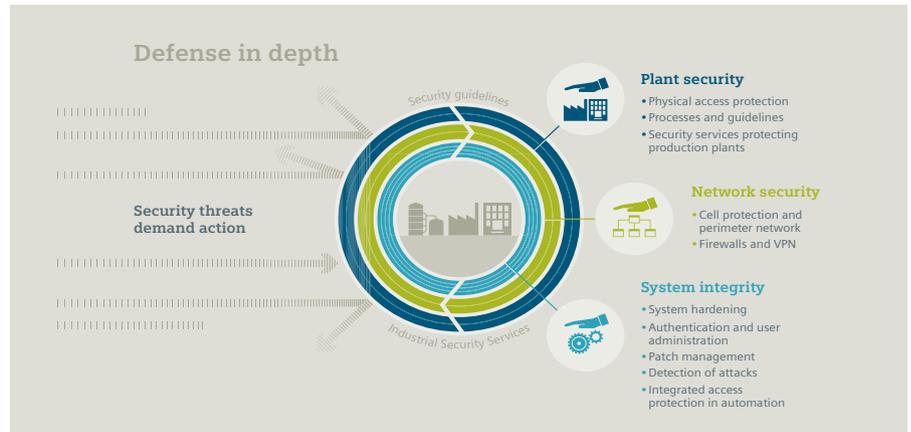
Over 30 years of experience in industrial communication and identification

Competence for Industrial Networks

Powerful networks are indispensable for the further digitalization of the industry and with that also the know-how to plan, implement, and connect these networks to a company network. This know-how must be established and continuously expanded in addition to the specific application and industry know-how. Here, too, Siemens comprehensively supports the users with, among other things, tailor-made training courses held by trainers with practical experience. With the advanced training to become a Siemens Certified

Industrial Identification – Always on top of the Processes and Inventories

A part of the industrial communication relates to the automatic identification of products. Siemens has over 30 years of technology and industry know-how in this field. As a provider of industrial identification systems, Siemens develops and delivers a wide range of solutions based on radio frequency identification (RFID) technology and optical identification systems. These can be easily integrated into the automation and connected to MES/ERP systems – in part directly via the integrated PROFINET interface, in part via



Comprehensive network security is a central component in the “defense in depth” concept from Siemens.

interface modules for SIMATIC as well as third-party systems. The application support from Siemens assists beginners in the selection and optimization of the best arrangement and combination of readers, antennas and transponders. During setup and fine-tuning, convenient software tools – easy to access via a web browser – quickly lead to good, process-reliable results.

Industrial Security – Always on the safe Side

By now inseparably associated with the benefits of digitalization is the subject of IT security in the industrial environment – referred to as Industrial Security. In order to comprehensively protect industrial facilities from internal and external cyber attacks, all levels must be approached simultaneously – from the company level to the field level, and from the access control to the copy protection. As one of the leading

suppliers of automation technology, Siemens is also very familiar with that. The “defense in depth” concept was developed for this – a deeply staggered defense as an overarching protection concept according to the recommendations of ISA99/IEC 62443, the leading standard for security in industrial automation.

Fit for Digitalization

Products and services for industrial communication networks, industrial identification systems, training courses matched to them, decades of experience and comprehensive industry as well as IT know-how from Siemens and its partners contribute substantially to making the industry fit for the challenges of Industrie 4.0.

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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Professional Services - Comprehensive Support in all Aspects of Industrial Communication Networks and Industrial Identification Systems

Together with industry- and IT-experienced Siemens Solution Partners, Siemens offers coordinated Professional Services. A successful implementation is based on a site visit and analysis of already existing network structures or identification systems, including, if necessary, the radio field coverage to eliminate interference. This results in specific recommendations for the implementation. On request, experienced specialists advise on the design of the WLAN/network infrastructures and mechanisms, and also take on the commissioning and optimization on-site. This speeds up the implementation and allows for some know-how transfer to the user. Furthermore, various standard and customized training courses convey sound product and network know-how. The user also gets full transparency in the project as well as adherence to deadlines, if the project coordination is likewise assigned to Siemens.