Use Case

Digital Connectivity –
the decisive factor for a paperless factory

What if the factory of the future runs completely paperless?

The idea: the modeling of document-based processes in IT systems. A digital twin is the basis for dispensing with the individual documents, which are now realized in bits and bytes instead of on paper. Here it makes sense to link different data sources to form a comprehensive, end-to-end front end for the users so that they do not have to switch between different applications.
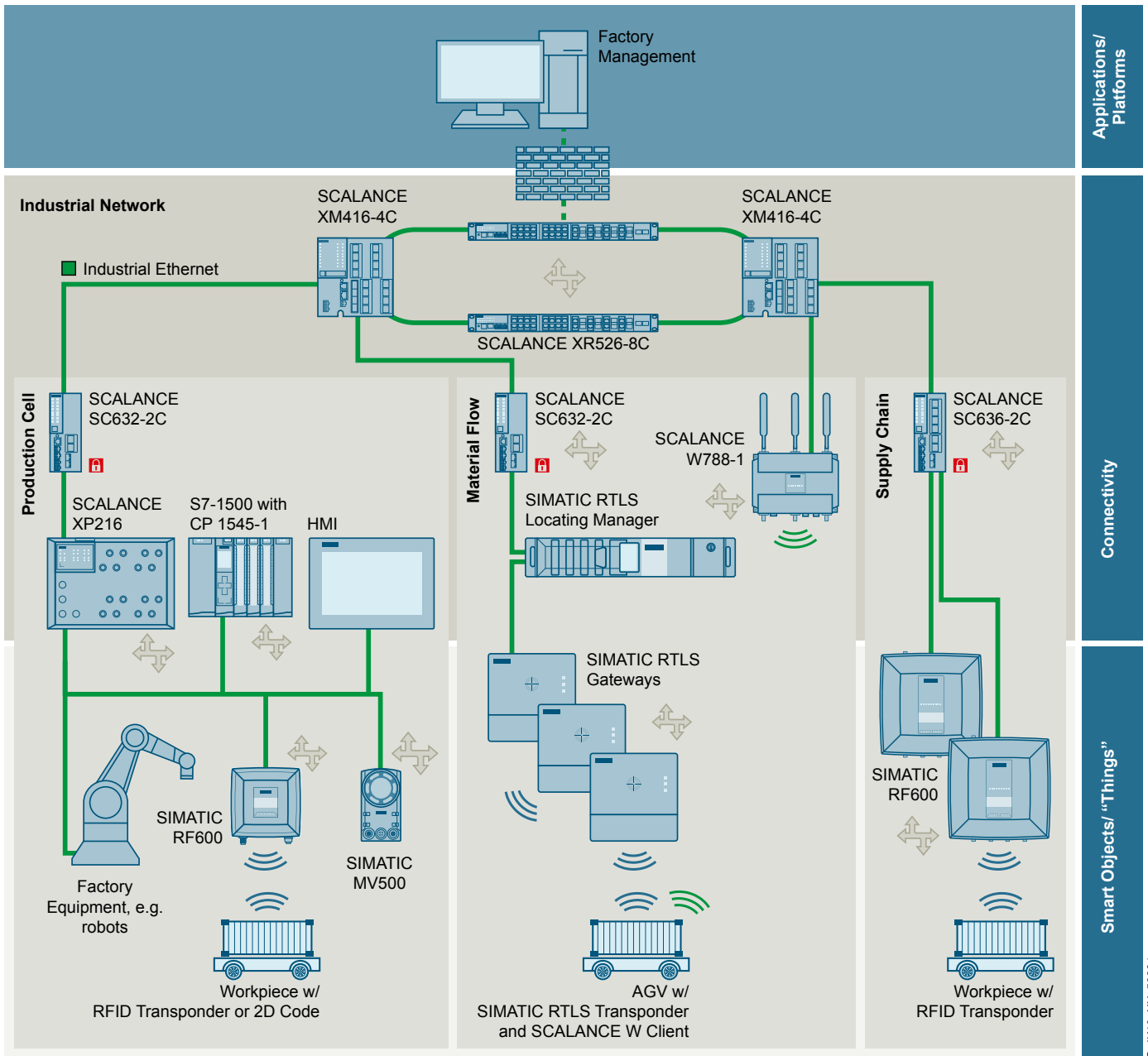
The basis for this is a comprehensive communication network in the factory enabling users to access the information from every terminal or HMI display.

The network is structured into different segments and levels in order to achieve an optimal balance between the requirements: high-performance access to IT systems (hence 1G/10G industrial backbones), high reliability (setup of ring topologies with MRP), path to automation systems (use of PROFINET in cell networking), as well as a sufficient level of security through the use of inserted, multistage firewalls.

Slips of paper – what causes chaos on the desk is an annoying source of lost productivity and quality issues in manufacturing because all of these goods accompanying notes, manufacturing instructions, or order documentations must be read, interpreted, and processed instead of them automatically controlling or documenting. What if all users could access the information needed from every operating station? What was unthinkable up to now can be realized through the new "paperless factory" concept.

SIEMENS

siemens.com/digital-connectivity

Factory Management

Industrial Network

SCALANCE XM416-4C

SCALANCE XM416-4C

■ Industrial Ethernet

SCALANCE XR526-8C

Production Cell

SCALANCE SC632-2C

SCALANCE XP216

S7-1500 with CP 1545-1

HMI

Material Flow

SCALANCE SC632-2C

SCALANCE W788-1

SIMATIC RTLS Locating Manager

SIMATIC RTLS Gateways

Supply Chain

SCALANCE SC636-2C

SIMATIC RF600

SIMATIC MV500

Factory Equipment, e.g. robots

SIMATIC RF600

Workpiece w/ RFID Transponder or 2D Code

AGV w/ SIMATIC RTLS Transponder and SCALANCE W Client

Workpiece w/ RFID Transponder

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This is followed by the integration of different information from the field or automation level. To this end, the identification of the components and products is initially necessary in order to assign the obtained data to the respective production objects. RFID or 2D codes are the tools of choice. Mobile means of production must also be synchro- nized with the paperless documentation, for example, to transmit transport orders for AGVs.

To generate a gapless location information, SIMATIC RTLS is used. This also makes new logistics concepts possible, for example, the dynamic routing of semi-finished products in the factory. Wireless LAN enables the transmission of larger amounts of data between AGVs or location- independent robots as well as between mobile equipment and the digital map.

In the next step, information from the automation is used, for example, to record the production status. To make this data available in a non-proprietary manner, a semantic modeling with OPC UA and an event-driven communication with MQTT are recommended. For SIMATIC S7, various modules are available: the SIMATIC CP 1545-1 communications processor for the S7-1500 or SIMATIC CloudConnect 7 for the S7-300/400.

Finally, RFID is used to identify the products at the important transfer points, e.g., when transporting between two subsections or at the loading gate. Particularly suitable for logistical processes due to its long range is the SIMATIC RF600.

Digital Connectivity – the decisive factor for a paperless factory
- Transparent access to all process objects through the use of Ethernet-based communication
- Complete capture and integration of products and materials via identification and locating
- Everything from a single source – from network components (wired and wireless) and security components to identification and locating
- Flexible and expandable infrastructure for future applications