Industrial Networks
Driving Digitalization for critical infrastructure

© Siemens 2020  siemens.com/industrial-networks
Digitalization and big data address key industry trends

**Industry trends**

**Time to market**
- Fast innovation
- More complex products
- ...

**Flexibility**
- Individualized mass production
- Volatile markets
- ...

**Quality**
- Closed-loop quality
- Traceability
- ...

**Efficiency**
- Resource & energy efficiency
- Demanded product / quantity
- ...

---

**Digitalization**

**Industrie 4.0**

**Industrial Internet of Things (IIoT)**

**Big Data**
Digitalization will change the way you work…

**Yesterday**
Non-digital industry

- Manual processes
- Intransparent processes
- Separated islands of automation
- Legacy systems
- No central alarms

**Tomorrow**
Digitalized manufacturing

- Secured remote access
- Industrial security
- Full automation
- Mobile applications
- Full process transparency
- Interoperability of processes
- Vertical integration
- Central alarm reporting
... and this requires powerful communication networks in the industrial space

**High performance communication networks to handle massive amounts of data required**

- **High speed**: Real-time communication
- **High data volumes**: Large bandwidth
- **Protect against spying and attacks**: Secure communication
- **Ensured connectivity**: Robust and reliable components and networks
- **Flexibility**: Plug’n’play, on demand and easy (re-)configuration
Digitalization results in a closed gap between enterprise and production layer

Yesterday: Limited interoperability

Limited communication between enterprise and production layer

Today: Arising challenges through increasing interoperability

Challenge to handle complexity of increasing communication

Future: Defined interface to handle complexity

Two dedicated networks with defined managed interface
Siemens enables you to meet your Digitalization needs

Together with our partner network we build Industrial Networks that fit your future needs
# Industrial Communication and Identification

**Expertise in industrial networks and industrial identification**

## Process Industries

## Industrial Networks

## Discrete Industries

### Industrial Communication

<table>
<thead>
<tr>
<th>Technology</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial Ethernet</td>
<td><img src="image" alt="Industrial Ethernet" /></td>
</tr>
<tr>
<td>Rugged Communication</td>
<td><img src="image" alt="Rugged Communication" /></td>
</tr>
<tr>
<td>Security</td>
<td><img src="image" alt="Security" /></td>
</tr>
<tr>
<td>Remote</td>
<td><img src="image" alt="Remote" /></td>
</tr>
<tr>
<td>Wireless</td>
<td><img src="image" alt="Wireless" /></td>
</tr>
<tr>
<td>CPs, Profinet and Profibus</td>
<td><img src="image" alt="CPs, Profinet and Profibus" /></td>
</tr>
</tbody>
</table>

### Industrial Identification & Locating

<table>
<thead>
<tr>
<th>Technology</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical Identification</td>
<td><img src="image" alt="Optical Identification" /></td>
</tr>
<tr>
<td>RFID</td>
<td><img src="image" alt="RFID" /></td>
</tr>
<tr>
<td>RTLS</td>
<td><img src="image" alt="RTLS" /></td>
</tr>
</tbody>
</table>
Siemens is your trusted partner for a broad range of reliable components for industrial communication

Siemens Portfolio

Remote

RUGGEDCOM
Rugged Communication

SCALANCE
Industrial Communication

Wired

Software

Security

Wireless
Our products exceed industry specific requirements while building on existing standards

**Industrial Features**

- User friendly configuration via web based management and TIA Portal
- Ring / redundant topologies
- Fanless design
- Flexible and integrated diagnostics
- C-PLUG for easy device exchange
- iPCF for real-time WLAN incl. safety over WLAN
- Temperature range up to -40 °C to +85 °C
- 5 years warranty

→ **Interoperability**  
All products are based on international standards, e.g. Ethernet, TCP/IP

→ **Industry specifications**  
e.g. ATEX, IECEx, UL, IEEE 1613, IEC 61850, IEC 62443/ISA 99 guarantee a perfect fit for industrial usage
**SCALANCE – Industrial Communication portfolio**

**SCALANCE: Industrial Communication proved to enable communication in production**

- **High availability** based on industrial features and industrial design
- **Fast & easy integration** for new and existing networks based on TIA design
- **Easy to use** with configuration via Web Based Management or TIA Portal
- **Easy device replacement** with C-PLUG, also by untrained staff
- **For all Ethernet networks** local, wireless and remote

### Our Portfolio

<table>
<thead>
<tr>
<th>Wired</th>
<th>Remote</th>
<th>Wireless</th>
<th>Security</th>
<th>Software</th>
</tr>
</thead>
</table>
| • Industrial features  
  • Industrial design  
  • Fast & easy integration | • Different medias (DSL, UMTS, LTE)  
  • Transparent connectivity  
  • Easy enrollment with SINEMA RC | • Indoor and outdoor applications  
  • Several country approvals  
  • Real-time capability | • Firewall & VPN  
  • Remote access  
  • Fits to industrial security concepts | • Transparency for the industrial network  
  • Integration into HMI / SCADA systems |
## SCALANCE X: The perfect switch for every application

<table>
<thead>
<tr>
<th>Functionality</th>
<th>Layer 3</th>
<th>Layer 2</th>
<th>Layer 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>managed</td>
<td>unmanaged</td>
</tr>
<tr>
<td><strong>Price</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>XR</strong></td>
<td>-500</td>
<td>XM-400</td>
<td>XR-500</td>
</tr>
<tr>
<td><strong>XM</strong></td>
<td>-400</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>XR</strong></td>
<td>-300</td>
<td>XC-200</td>
<td>XR-300</td>
</tr>
<tr>
<td><strong>XC</strong></td>
<td>-200</td>
<td>XP-200</td>
<td></td>
</tr>
<tr>
<td><strong>X</strong></td>
<td>-000 / XC-100</td>
<td>XB-200</td>
<td></td>
</tr>
<tr>
<td><strong>XB</strong></td>
<td>-200</td>
<td></td>
<td>XB-100</td>
</tr>
</tbody>
</table>

*SCALANCE X*: The perfect switch for every application.
RUGGEDCOM products have set the standard for communications networks deployed in harsh environments.

- **High reliability for mission critical networks** required in utility environments
- **Fully IEC 61850-3 compliant** smooth operation in extreme environmental conditions
- **IEEE 1613 rated** No data looses under EMI stress, shock and vibration
- **Easy to use** via web-based management or NMS system
- **Highest performance for various network types** LAN and WAN, wired, private and public wireless

<table>
<thead>
<tr>
<th>Our Portfolio</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wired</strong></td>
</tr>
<tr>
<td>- IEEE 1588 Time Sync</td>
</tr>
<tr>
<td>- IEC 62439 seamless redundancy</td>
</tr>
<tr>
<td>- Multi-Service Routing platform</td>
</tr>
<tr>
<td><strong>Remote</strong></td>
</tr>
<tr>
<td>- Different medias (EoVDSL, UMTS, LTE)</td>
</tr>
<tr>
<td>- Transparent connectivity</td>
</tr>
<tr>
<td>- High reliability, high bandwidth, low delays</td>
</tr>
<tr>
<td><strong>Wireless</strong></td>
</tr>
<tr>
<td>- Utility Grade, Wide Area Private Wireless Solution</td>
</tr>
<tr>
<td>- Low latency suitable for Distribution Automation</td>
</tr>
<tr>
<td>- Improved reach and “Non-Line of Sight” performance</td>
</tr>
<tr>
<td><strong>Security</strong></td>
</tr>
<tr>
<td>- Firewall &amp; VPN / IPsec</td>
</tr>
<tr>
<td>- Remote access compliant with NERC-CIP</td>
</tr>
<tr>
<td>- Fits to industrial security concepts</td>
</tr>
<tr>
<td><strong>Software</strong></td>
</tr>
<tr>
<td>- Ability to manage the network with one tool</td>
</tr>
<tr>
<td>- Secure access, data management, visualization and analytics</td>
</tr>
</tbody>
</table>
Siemens enables you to meet your Digitalization needs

Together with our partner network we build Industrial Networks that fit your future needs
Industrial Networks have critical requirements which need to be addressed.

- **High Availability**: To avoid significant economic losses or other damages.
- **Robustness**: Extreme temperatures, dusty or corrosive environments.
- **Flexibility**: Optimization and innovation causes changing production layouts.
- **Determinism**: Real-time requirements of automation tasks.
- **Security**: Threat of unauthorized access; secure remote access, e.g. for OEMs.
- **Mobile Applications**: Reliable communication, e.g. for automated guided vehicles, monorails.
- **Safety**: Fail-safe communication to provide safety for operators and assets.
Industrial Networks have critical requirements which need to be addressed

<table>
<thead>
<tr>
<th>High Availability</th>
<th>To avoid significant economic losses or other damages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robustness</td>
<td>Extreme temperatures, dusty or corrosive environments</td>
</tr>
<tr>
<td>Flexibility</td>
<td>Optimization and innovation causes changing production layouts</td>
</tr>
<tr>
<td>Determinism</td>
<td>Real-time requirements of automation tasks</td>
</tr>
<tr>
<td>Security</td>
<td>Threat of unauthorized access; secure remote access, e.g. for OEMs</td>
</tr>
<tr>
<td>Mobile Applications</td>
<td>Reliable communication e.g. for automated guided vehicles, monorails</td>
</tr>
<tr>
<td>Safety</td>
<td>Fail-safe communication to provide safety for operators and assets</td>
</tr>
</tbody>
</table>

- **Ring redundancy** e.g. with MRP, HSR, PRP,…
- **Quick and easy replacement with C-PLUG**
- **Fanless design** to avoid downtimes
- **FastConnect** cables and plugs
- **Modularity**
- **Different interfaces** for electrical / optical connections
- **Guaranteed switchover** times in case of failures or **deterministic roaming** for wireless applications
- **Security modules** which fit to industrial security concepts
- **IWLAN RCoax Cable** for durable wireless connection during movement
- **Emergency shutdown over PROFINET** (wired as well as wireless)
Making Digitalization work – enabled by structured network solutions for connecting IT and Production

Enterprise Network:
Based on requirements from enterprise networks

Responsibility of IT

Production Backbone:
Defined interface between IT and production

Responsibility of production, but in agreement with IT

Production Cell:
Based on requirements from production and automation cells:
Reliable communication as critical factor

Responsibility of production

Recommended solution with two physically separated, but connected communication networks

OPC UA: OPC Unified Architecture (OPC UA) is an industrial machine to machine communication protocol for interoperability for IIoT and Industrie 4.0

Restricted © Siemens 2020
Availability – Avoid stops in production that can result in large damages

Importance of Availability

**Enterprise**
- Recovery times within seconds to minutes range are accepted
- Irregular downtimes because of SW roll-outs and security patches are common

**Industrial**
- 24/7 availability required
- Fast network recovery time
- Adapted redundancy concepts
- “Surviving” single point of errors
- “Bumpless” processes (no packet losses, no failover times)

Availability ensured by Siemens

Reliable topology based on redundancy, including e.g.

- **Redundant** network concepts
- **C-PLUG** for immediate device exchange by untrained staff
- **Fanless design** to avoid downtimes
- **Redundant** power supply
Importance of Robustness

**Enterprise**
- Distribution rooms
- Air conditioned, 19” rack mounting
- Temperatures from 0 °C to +45 °C
- AC 115/230 V power supply

**Industrial** – Harsh environments in industrial and remote locations
- Temperatures from -40 °C to +85 °C
- Outdoor applications (IP65/67)
- Universal mounting (e.g. horizontal, vertical, at the ceiling)
- DC 24 V power supply

---

**Robustness ensured by Siemens**

*Siemens products are built for industrial environments, e.g.*

**Corrosion-resistant**

**Protection level up to IP65/67**

**EMC / shock resistant**

**Temperature resistant** -40 °C to +85 °C

5 years warranty on functionality of RUGGEDCOM and SCALANCE
Flexibility – Ensure easy adaptability of communication to support ongoing optimizations and changes

Importance of Flexibility

**Enterprise** – No need for high flexibility in layout and cabling
- Structured star topologies at floor, building, site
- Raised floor for cabling

**Industrial** – Optimization and innovation cause changes in the production layout
- Flexible network topologies
- Modular components
- Ring- or Line Structures

Flexibility ensured by Siemens

**Leading Portfolio**
- Comprehensive portfolio with KEY-PLUG for additional functions
- Various mounting options

**Modular devices**
- Full- or semi modular (“hot swap functionality”)
- Combo Ports for port granular choice of different media

**Accessories**
- Field assembly plugs for easy connectivity
- Accessories made for industrial use cases

KEY-PLUG: enables additional device-specific functions
Industrial networks need to address your key aspects

Main aspects to be considered in network design

- **Cloud Connectivity**
  Easy and efficient integration of data points into the cloud infrastructure

- **Full TIA Conformity**
  All components are built and tested for TIA to achieve maximum of compatibility

- **Network Management**
  Highest transparency for industrial networks and all connected devices

- **Remote Communication**
  Enable secure and reliable remote access to service plants and machines

- **Network Security**
  Enabled by holistic security concept and security-integrated portfolio

- **Functional Safety**
  Safety-critical applications to protect personnel and machinery

- **Network Structure**
  Segmented and redundant architecture for reliable, communication networks

- **Mobile Applications**
  Easy and fast access to your data or applications from mobile devices
Thank you for your attention!

Brad Wilson
System Architect
Email: bradleywilson@siemens.com
Mobile: 0419 828 329

siemens.com/net