



**Ethernet Industrial**

**Phoenix Contact**

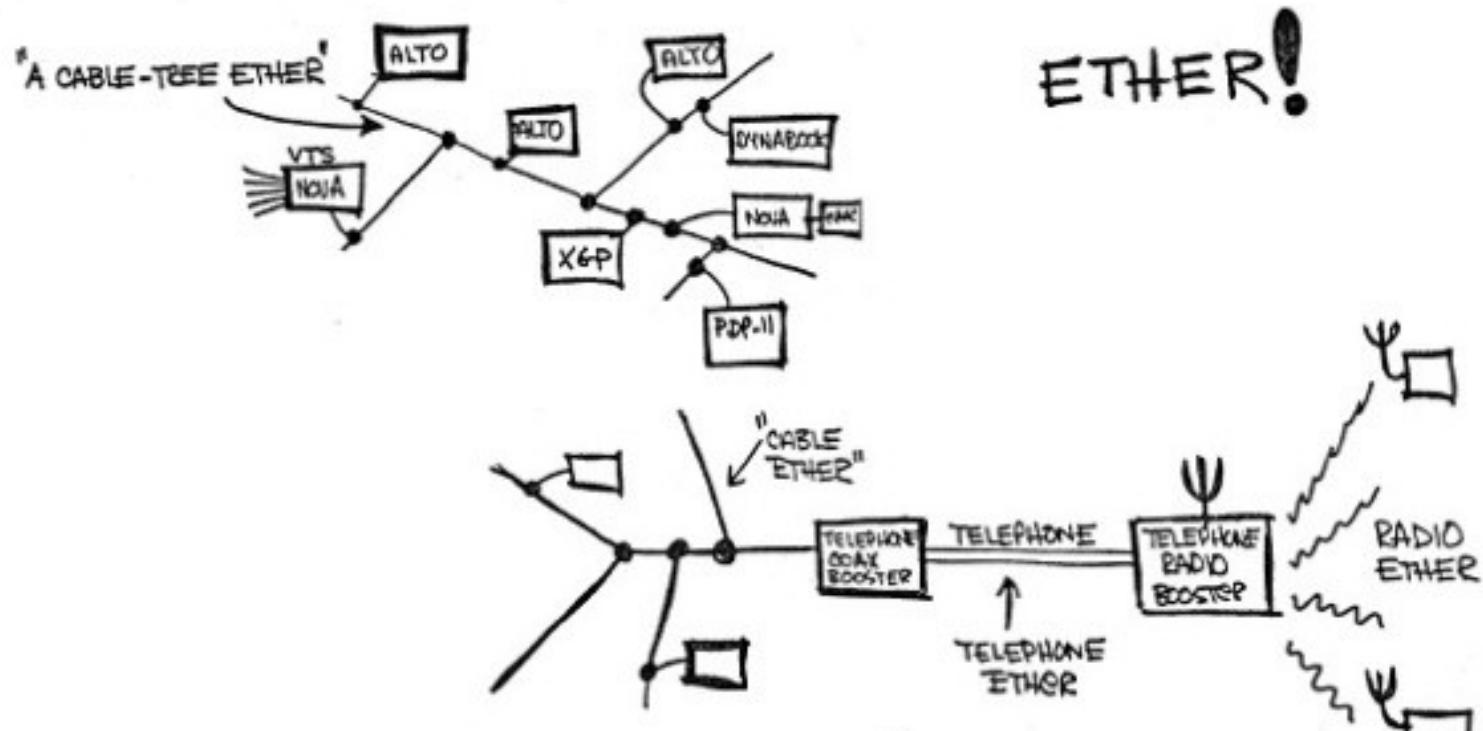
**Protocolos  
Tecnologías  
Productos**



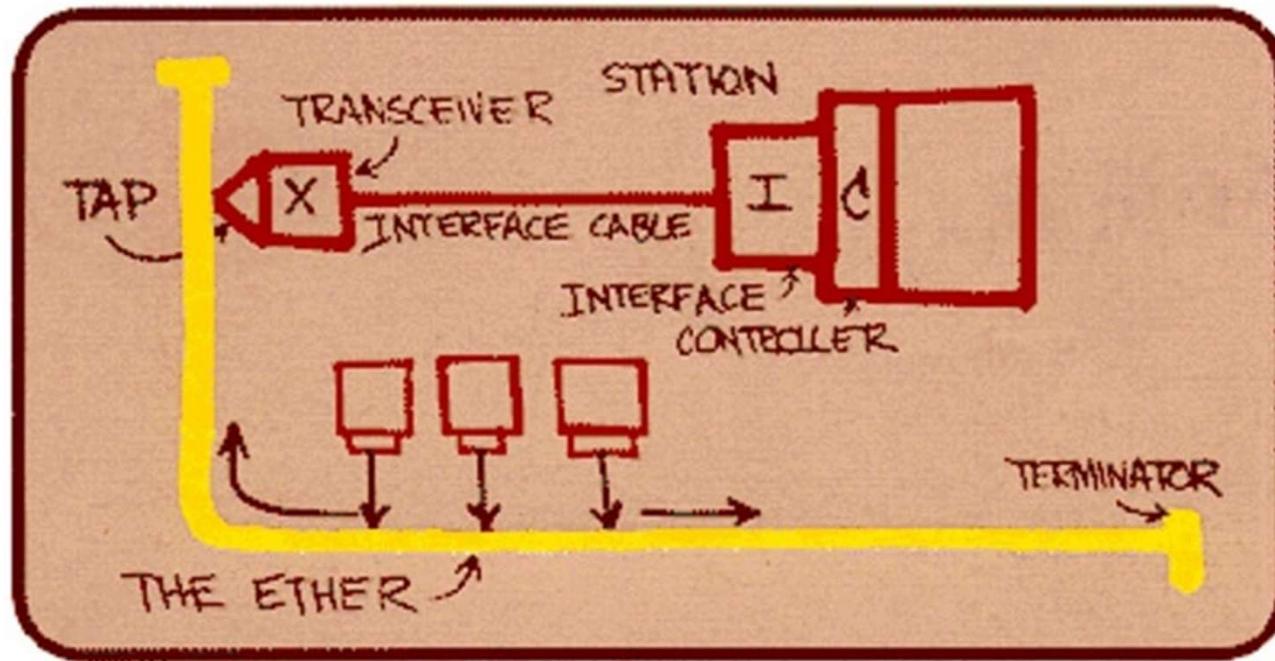
# Agenda

- Overview Ethernet
- Protocolos Ethernet
- Tecnologías
- Oferta de Productos

# Origen Ethernet



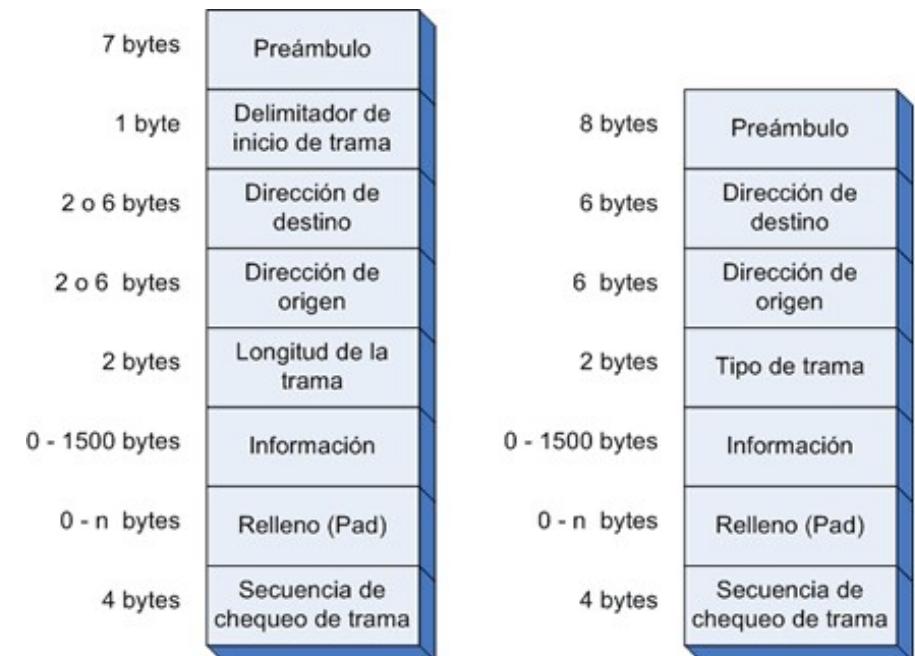
Bob Metcalfe's 1972 sketch of his original "ethernet" vision  
Image provided courtesy of Palo Alto Research Center Inc., a Xerox Company



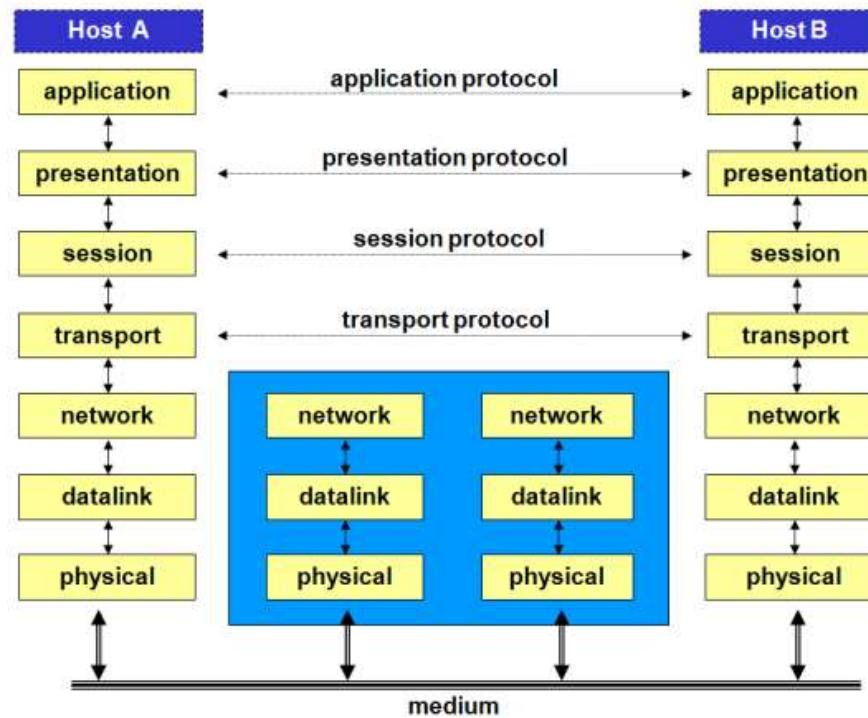
IEEE 802.3

## Trama Ethernet y Trama IEEE 802.3

Campos de la trama Ethernet							
?	1	6	6	2	46-1500	4	
Preámbulo	Inicio de delimitador de trama	Dirección Destino	Dirección Origen	Tipo	Datos	Secuencia de verificación de trama	



# OSI Model



**Figure 1.1:** The OSI model

# IEEE 802.3

## Ethernet

## Fast Ethernet

## Gigabit Ethernet

### 1BASE-5

El estándar IEEE para Ethernet en banda base a 1Mb/s sobre cable par trenzado a una distancia máxima de 250m.

### 10BASE-5

Es el estándar IEEE para Ethernet en banda base a 10Mb/s sobre cable coaxial de 50 Ω troncal y AUI (attachment unit interface) de cable par trenzado a una distancia máxima de 500m.

### 10BASE-2

El estándar IEEE para Ethernet en banda base a 10MB/s sobre cable coaxial delgado de 50 Ω con una distancia máxima de 185m.

### 10BROAD-36

El estándar IEEE para Ethernet en banda ancha a 10Mb/s sobre cable coaxial de banda ancha de 75 Ω con una distancia máxima de 3600m.

### 10BASE-T

El estándar IEEE para Ethernet en banda base a 10 Mb/s sobre cable par trenzado sin blindaje (Unshielded Twisted Pair o UTP) siguiendo una topología de cableado horizontal en forma de estrella, con una distancia máxima de 100m desde una estación a un hub.

### 10BASE-F

El estándar IEEE para Ethernet en banda base a 10Mb/s sobre fibra óptica con una distancia máxima de 2.000 metros (2Km).

### 100BASE-TX

El estándar IEEE para Ethernet en banda base a 100Mb/s sobre dos pares (cada uno de los pares de categoría 5 o superior) de cable UTP o dos pares de cable STP.

### 100BASE-T4

El estándar IEEE para Ethernet en banda base a 100Mb/s sobre 4 pares de cable UTP de categoría 3 (o superior).

### 100BASE-FX

Es el estándar IEEE para Ethernet en banda base a 100Mb/s sobre un sistema de cableado de dos fibras ópticas de 62.5/125 μm.

### 100BASE-T2

El estándar IEEE para Ethernet en banda base a 100Mb/s sobre 2 pares de categoría 3 (o superior) de cable UTP.

### 1000BASE-SX

El estándar IEEE para Ethernet en banda base a 1000Mb/s (1Gb/s) sobre 2 fibras multimodo (50/125 μm o 62.5/125 μm) de cableado de fibra óptica.

### 1000BASE-LX

El estándar IEEE para Ethernet en banda base a 1000Mb/s (1Gb/s) sobre 2 fibras monomodo o multimodo (50/125 μm or 62.5/125 μm) de cableado de fibra óptica.

### 1000BASE-CX

El estándar IEEE para Ethernet en banda base a 1000Mb/s (1Gb/s) sobre cableado de cobre blindado balanceado de 150 Ω. Este es un cable especial con una longitud máxima de 25m.

### 1000BASE-T

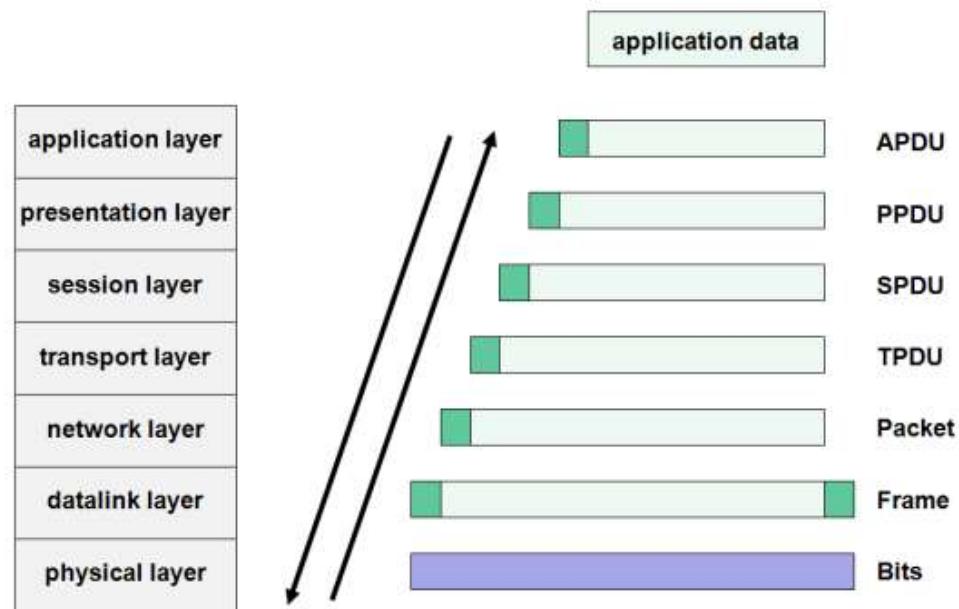
El estándar IEEE para Ethernet en banda base a 1000Mb/s (1Gb/s) sobre 4 pares de categoría 5 o superior de cable UTP, con una distancia máxima de cableado de 100m.

# Tecnologías Ethernet

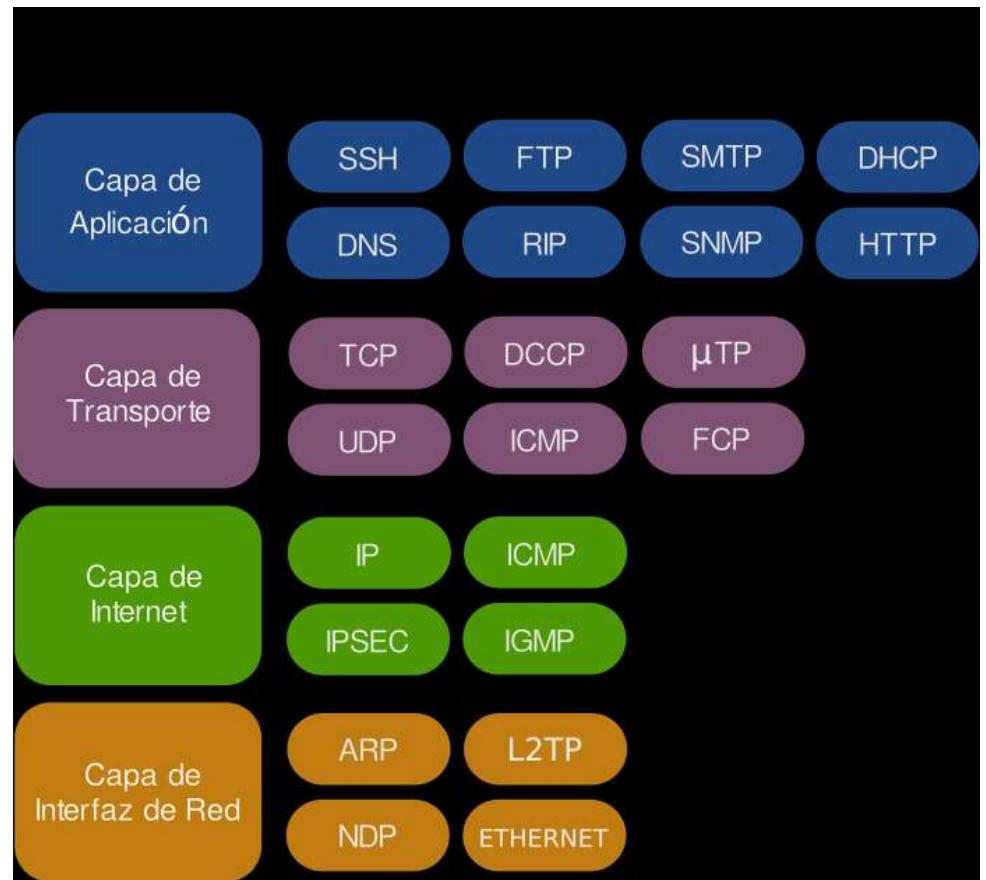
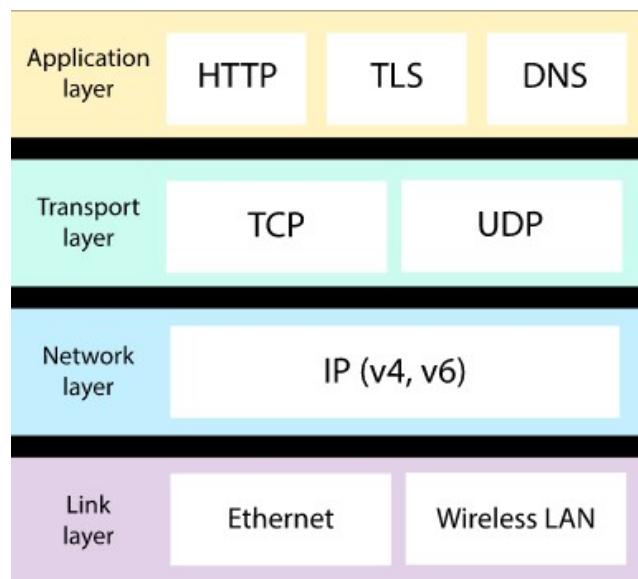
Tecnologías Ethernet

Tecnología	Velocidad de transmisión	Tipo de cable	Distancia máxima	Topología
10Base5	10 Mbit/s	Coaxial grueso	500 m	Bus (Conector AUI)
10Base2	10 Mbit/s	Coaxial delgado	185 m	Bus (Conector T)
10BaseT	10 Mbit/s	Par Trenzado	100 m	Estrella (Hub o Switch)
10BaseF	10 Mbit/s	Fibra óptica	2000 m	Estrella (Hub o Switch)
100BaseT4	100 Mbit/s	Par Trenzado (categoría 3UTP)	100 m	Estrella. Half Duplex (hub) y Full Duplex (switch)
100BaseTX	100 Mbit/s	Par Trenzado (categoría 5UTP)	100 m	Estrella. Half Duplex (hub) y Full Duplex (switch)
100BaseFX	100 Mbit/s	Fibra óptica	2000 m	No permite el uso de hubs
1000BaseT	1000 Mbit/s	Par Trenzado (categoría 5e o 6UTP)	100 m	Estrella. Full Duplex (switch)
1000BaseTX	1000 Mbit/s	Par Trenzado (categoría 6UTP )	100 m	Estrella. Full Duplex (switch)
1000BaseSX	1000 Mbit/s	Fibra óptica (multimodo)	550 m	Estrella. Full Duplex (switch)
1000BaseLX	1000 Mbit/s	Fibra óptica (monomodo)	5000 m	Estrella. Full Duplex (switch)
10GBaseT	10000 Mbit/s	Par Trenzado (categoría 6a o 7UTP)	100 m	
10GBaseLR	10000 Mbit/s	Fibra óptica (monomodo)	10000 m	
10GBaseSR	10000 Mbit/s	Fibra óptica (multimodo)	300 m	

# Protocolos Ethernet



# Protocolos Ethernet



Ethernet

## Protocolos Industriales



# Tecnologías

# **“PAVE THE WAY FOR FUTURE BUSINESS”**

by addressing relevant trends



**5G**



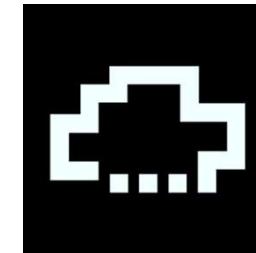
**TSN**



**SPE &  
APL**



**OPC  
UA**



**Edge &  
Cloud**



**Cyber  
Security**



**5G**



**TSN** – Time Sensitive Networking



**SPE** – Single Pair Ethernet &  
**APL** – Advanced Physical Layer



**OPC UA**



**Cyber Security**

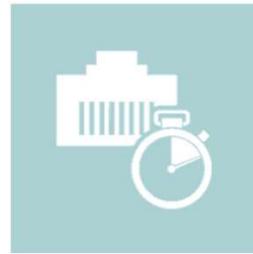


*"For the industry, **5G** is creating opportunities that it could only dream of before."*

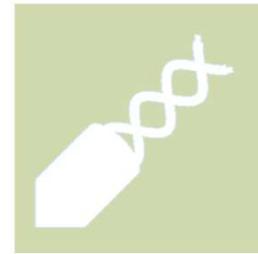
Christian Bauer, R & D for Basic Technologies Machine Tools at TRUMPF



**5G**



**TSN**



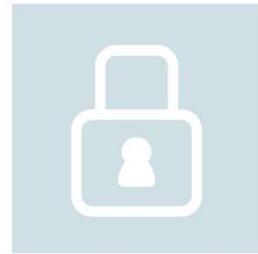
**SPE &  
APL**



**OPC  
UA**



**Edge &  
Cloud**



**Cyber  
Security**



***“Time-sensitive networking is a fundamental enabling technology for industrial automation”***

Yongbin Wei, vice president, engineering, Qualcomm Technologies, Inc



**5G**



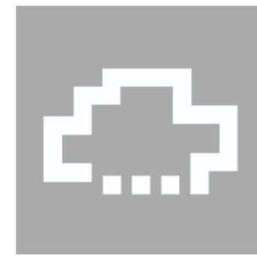
**TSN**



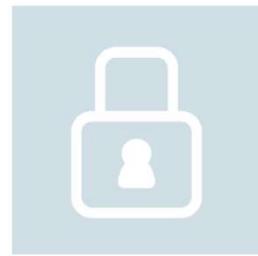
**SPE &  
APL**



**OPC  
UA**



**Edge &  
Cloud**



**Cyber  
Security**



***“Edge computing is already considered an indispensable core technology for IoT and Industrie 4.0 applications”***

Dr. Sebastian Ritz, CEO der German Edge Cloud (GEC).



**5G**



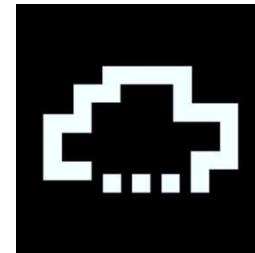
**TSN**



**SPE &  
APL**



**OPC  
UA**



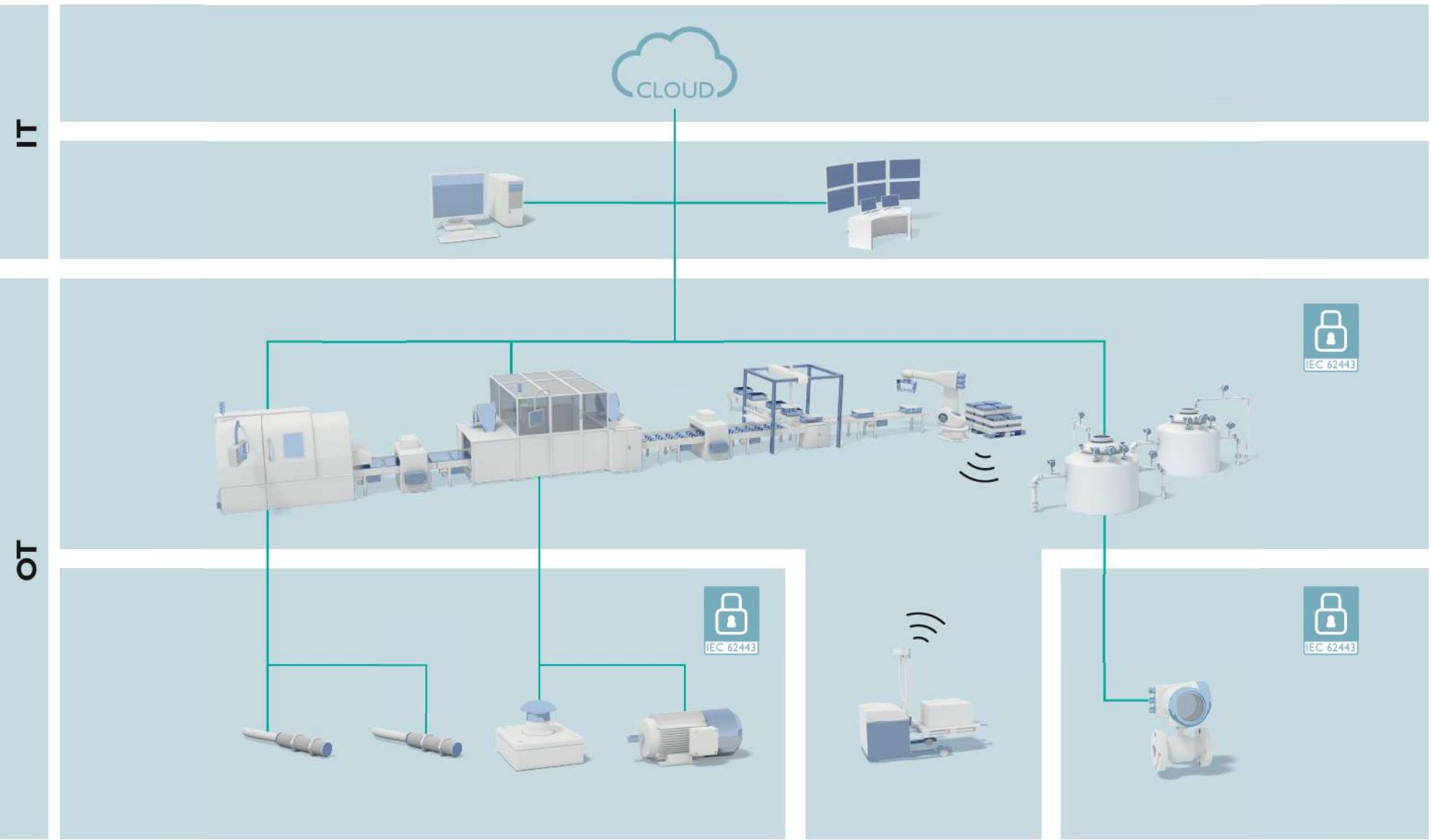
**Edge &  
Cloud**

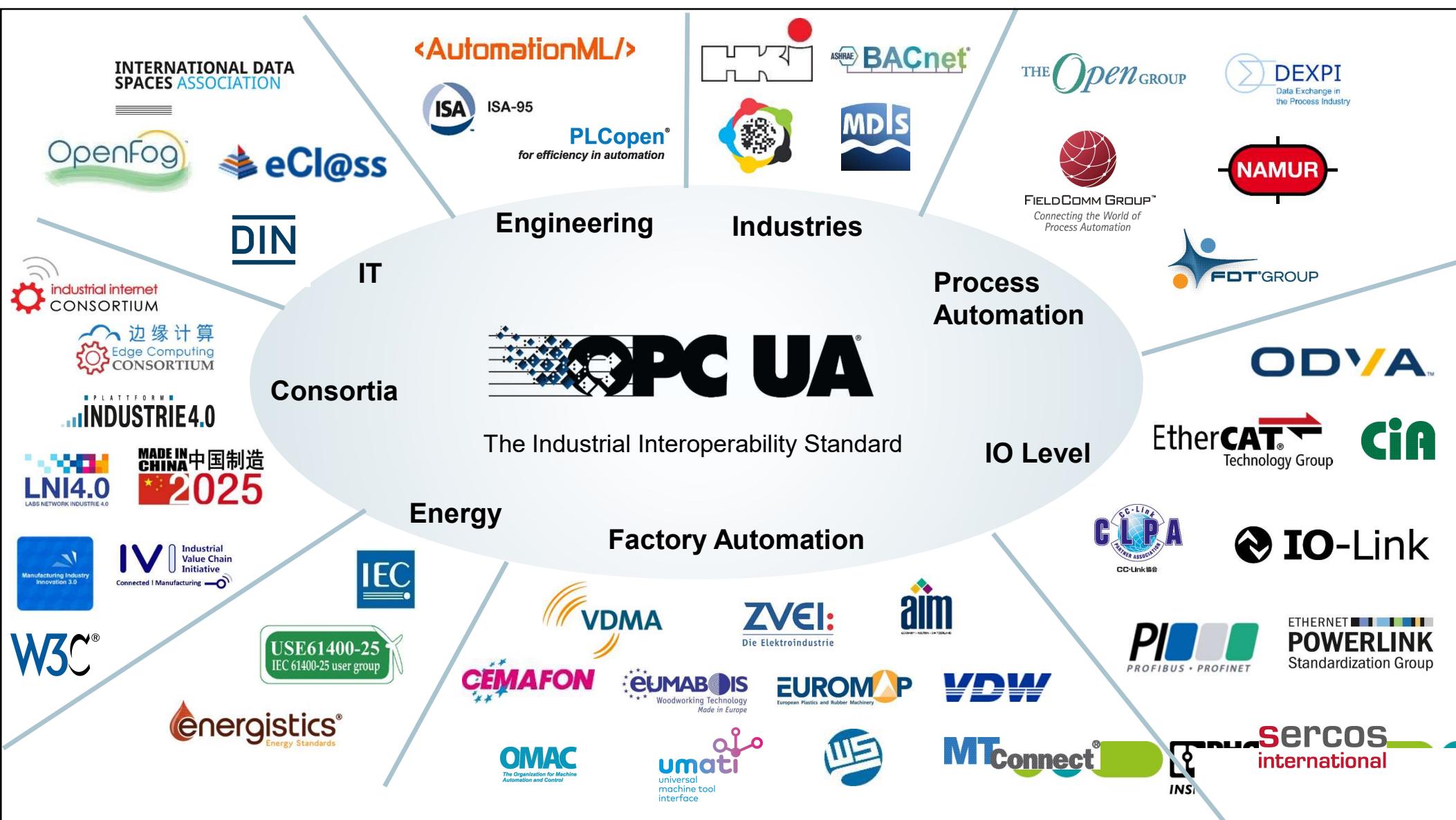


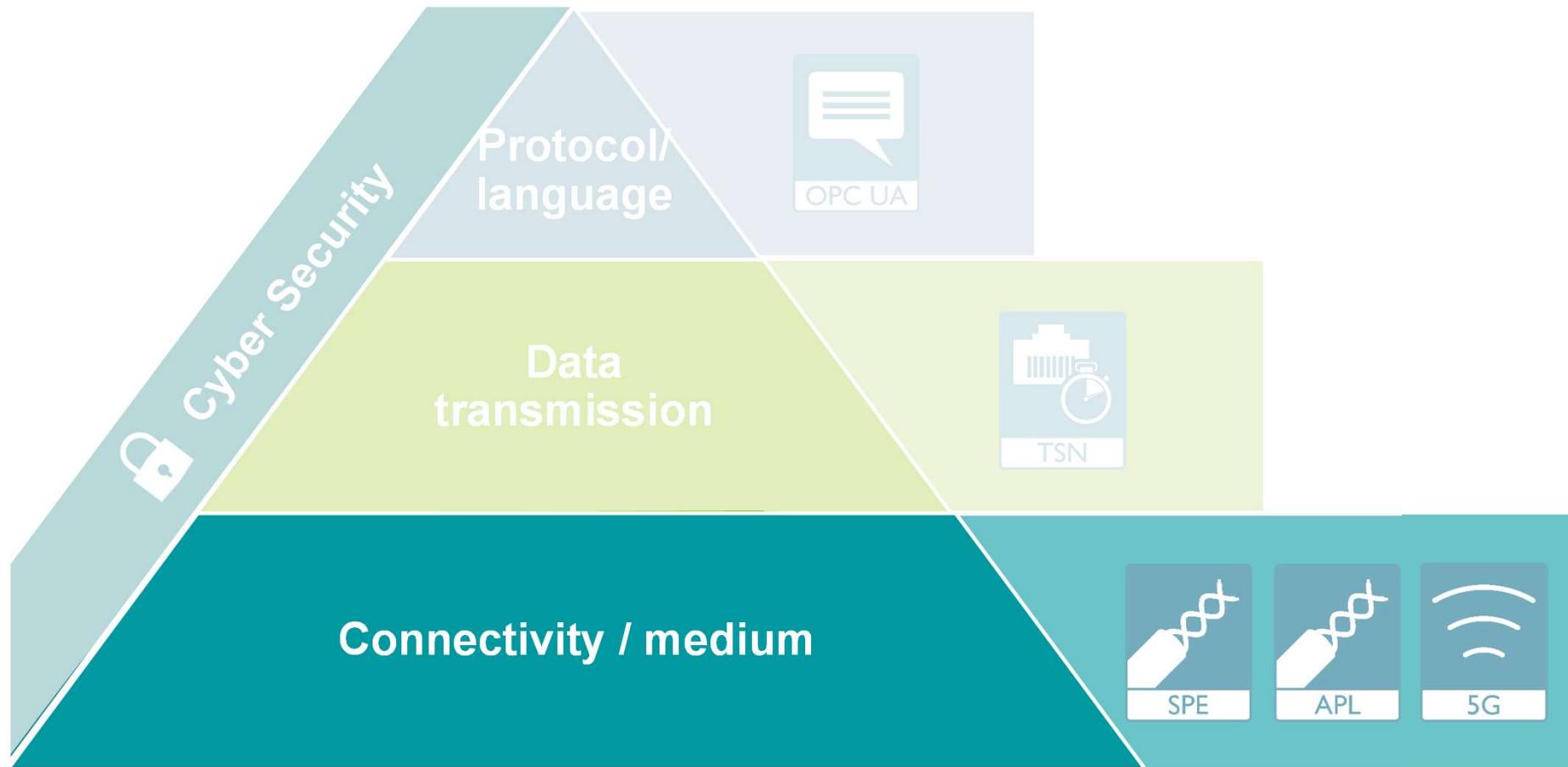
**Cyber  
Security**

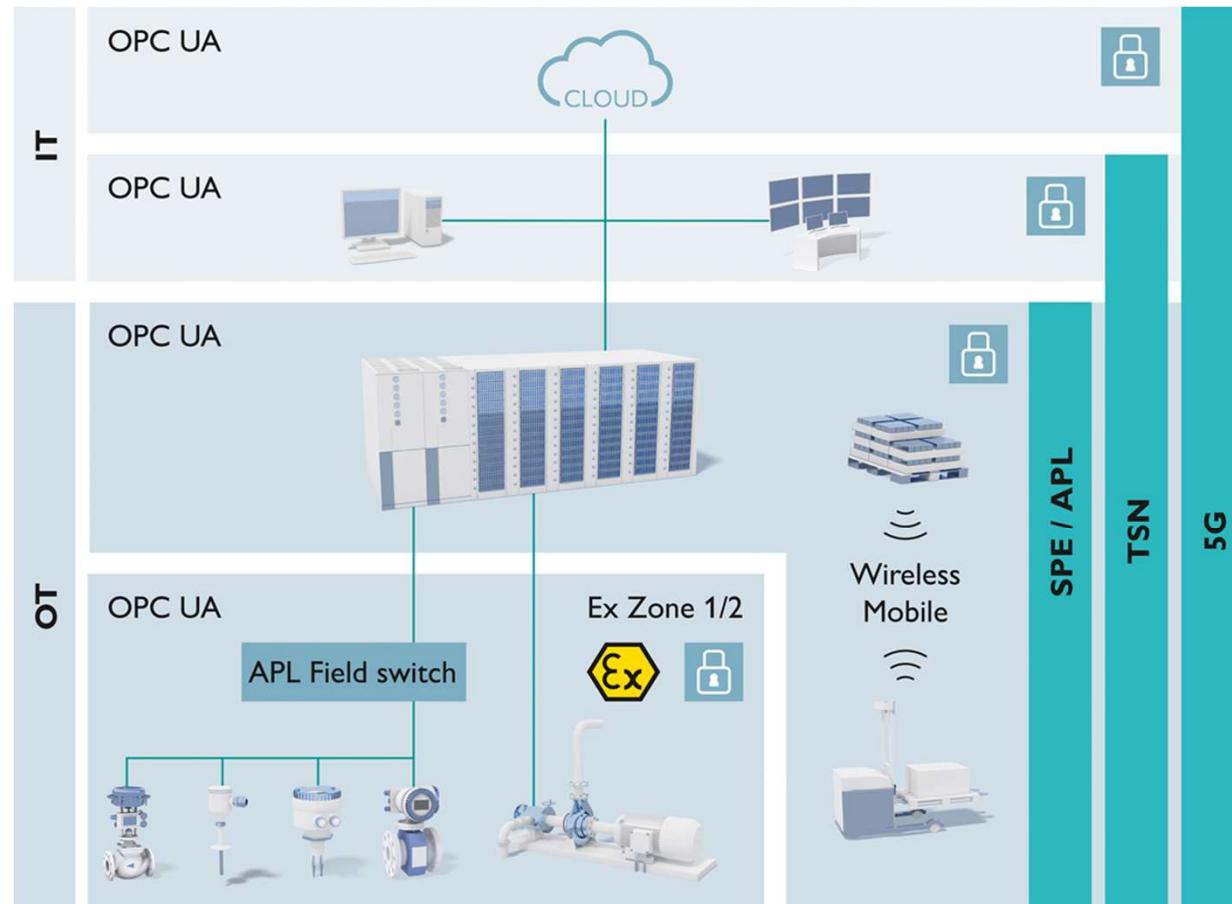
# The NEW TECHNOLOGIES are part of our ALL ELECTRIC SOCIETY story!



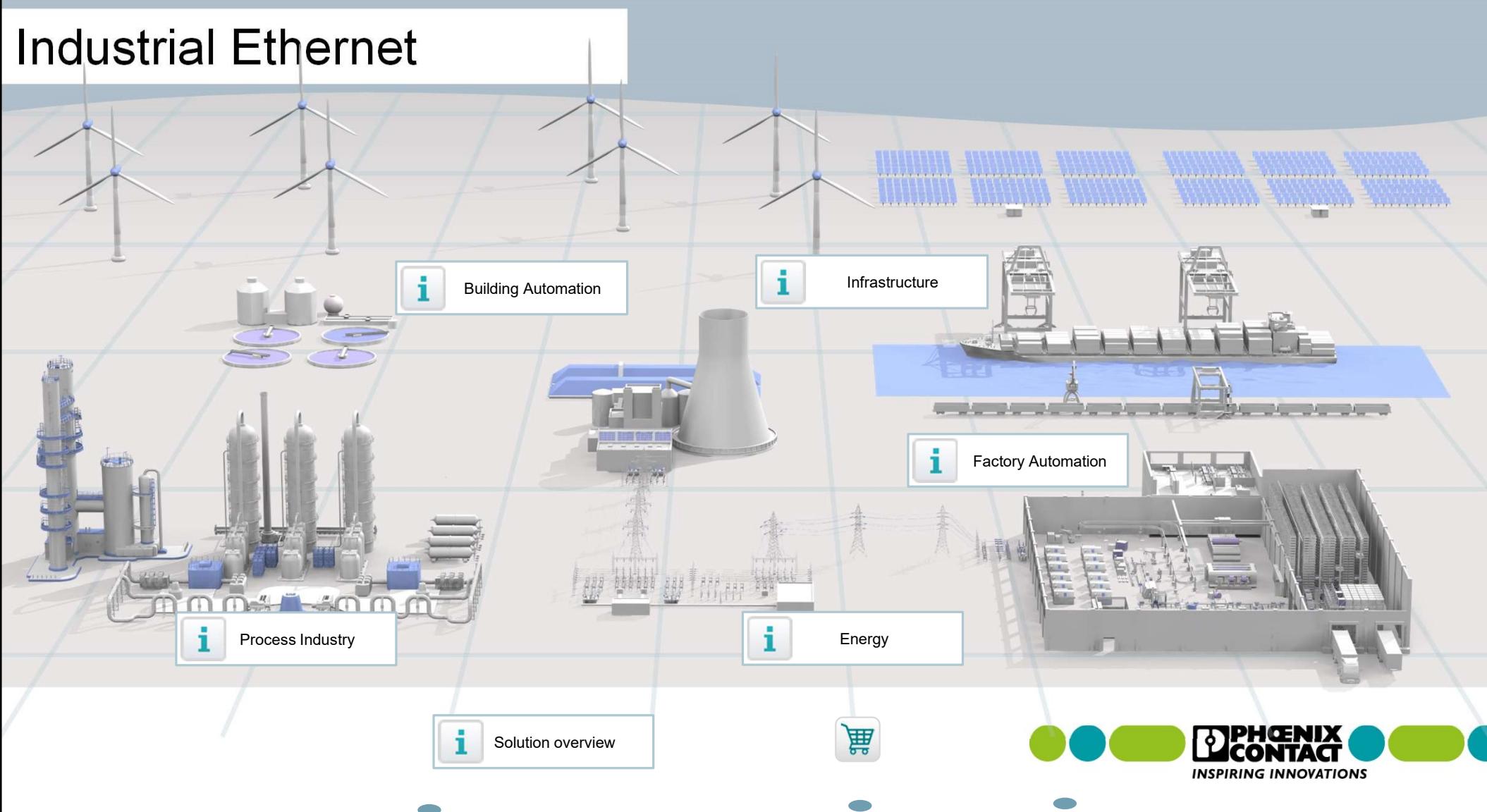






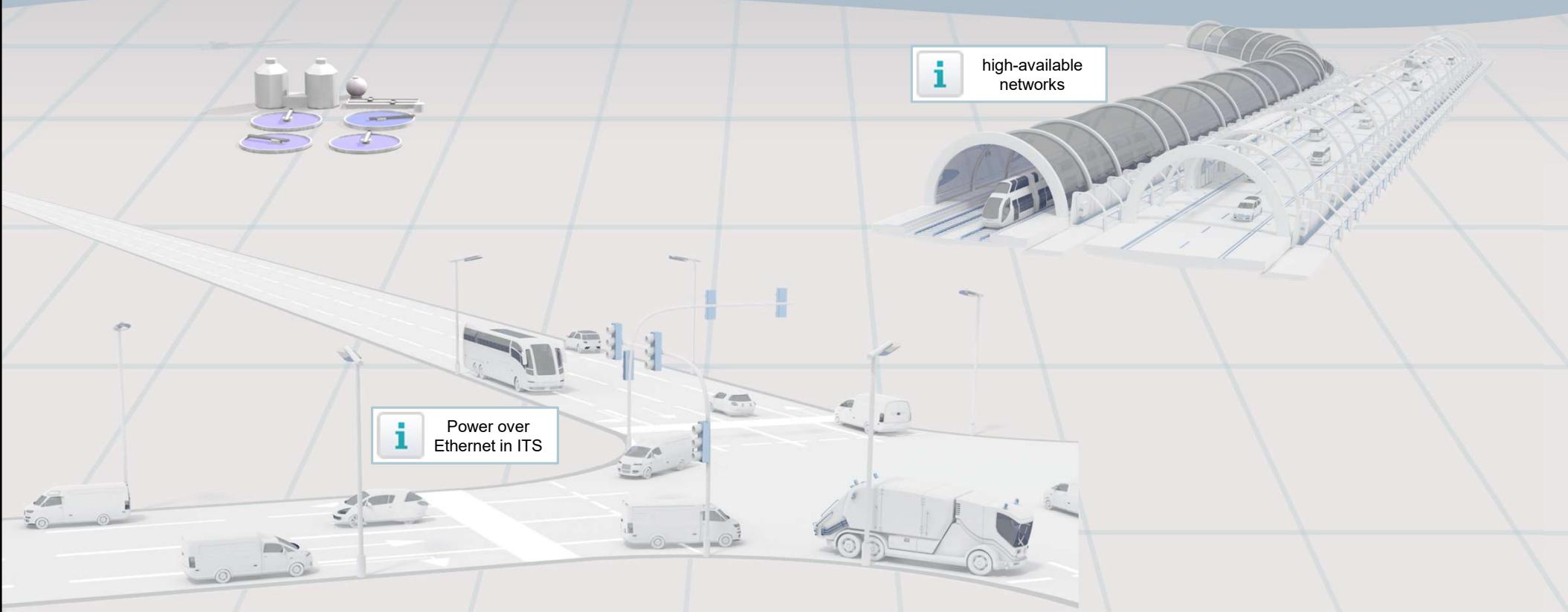


# Industrial Ethernet

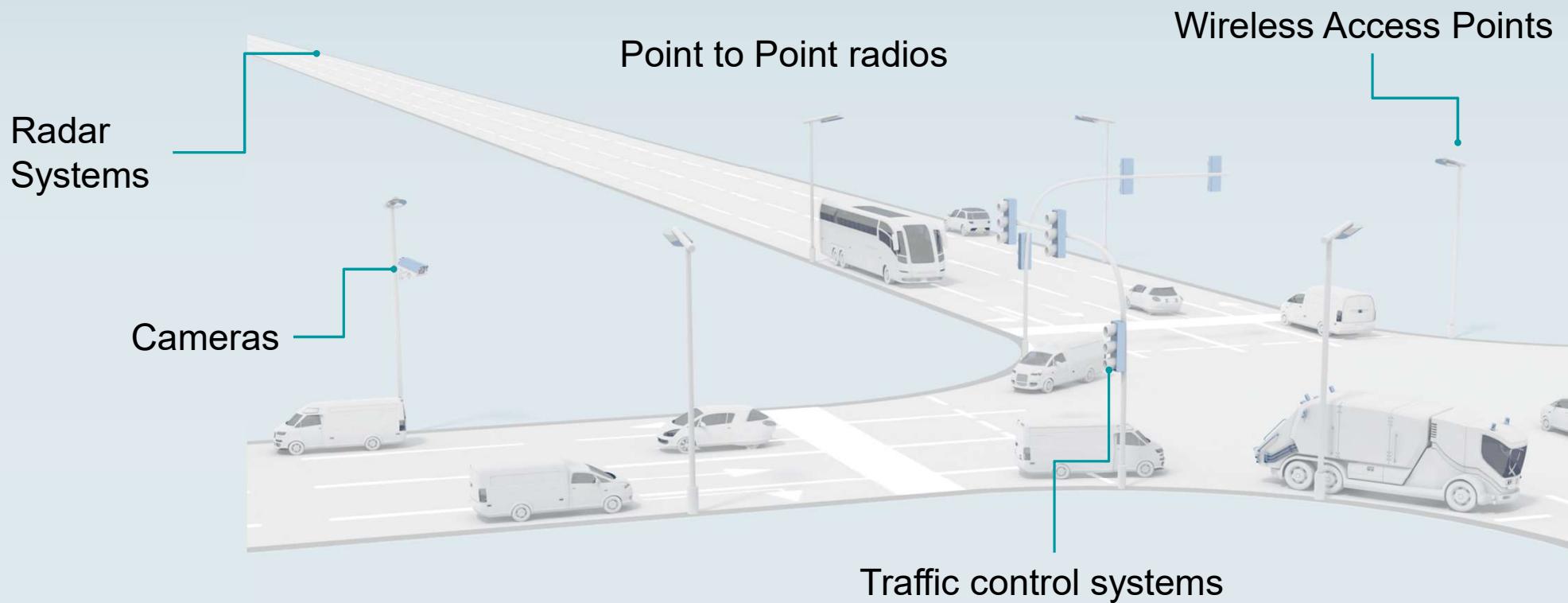


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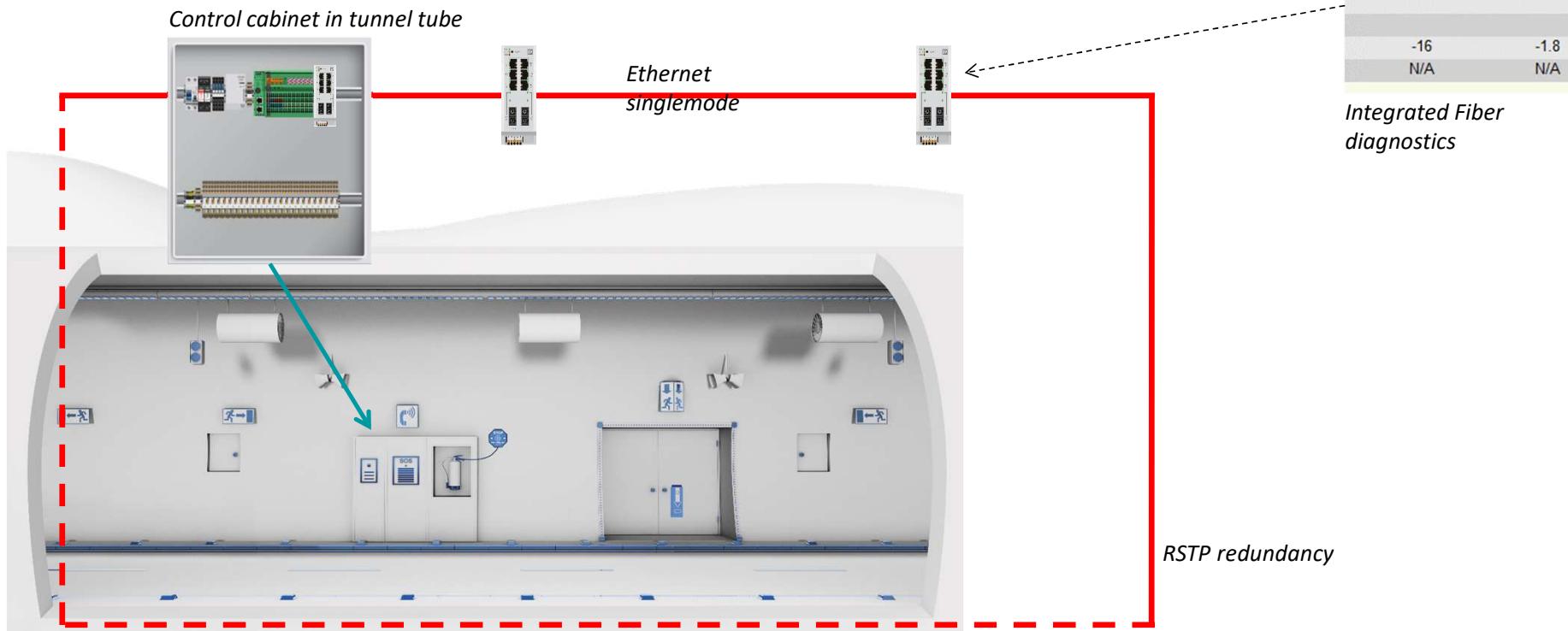
# Infrastructure



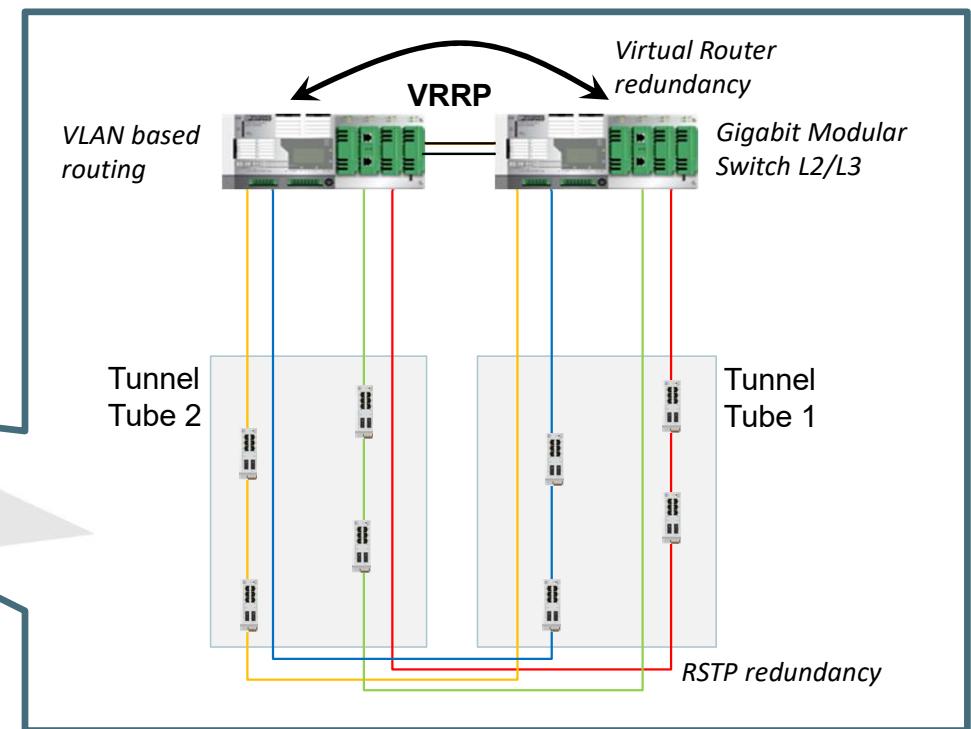
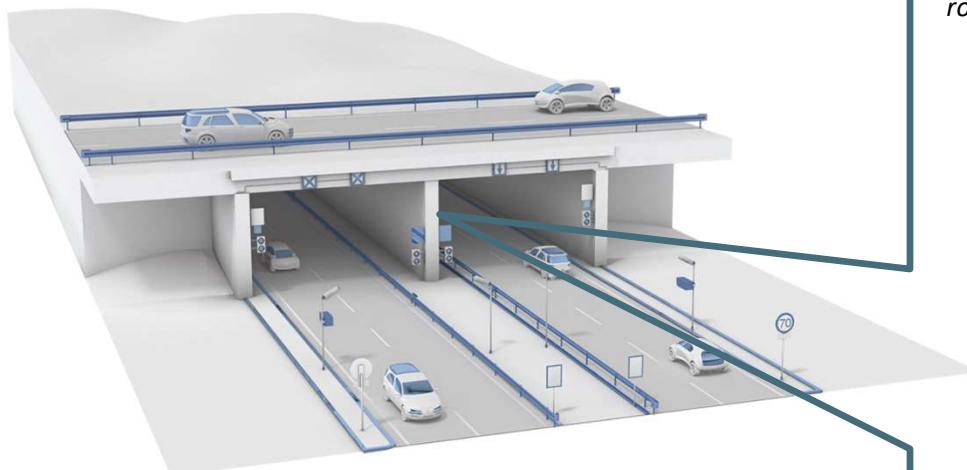
# ITS – Intelligent Transportation Systems



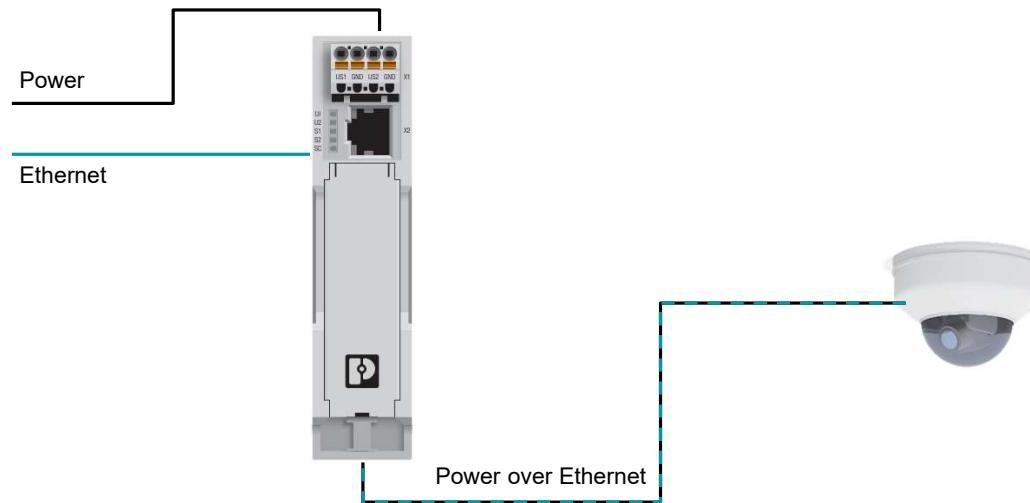
# High-available infrastructure networks



# High-available infrastructure networks



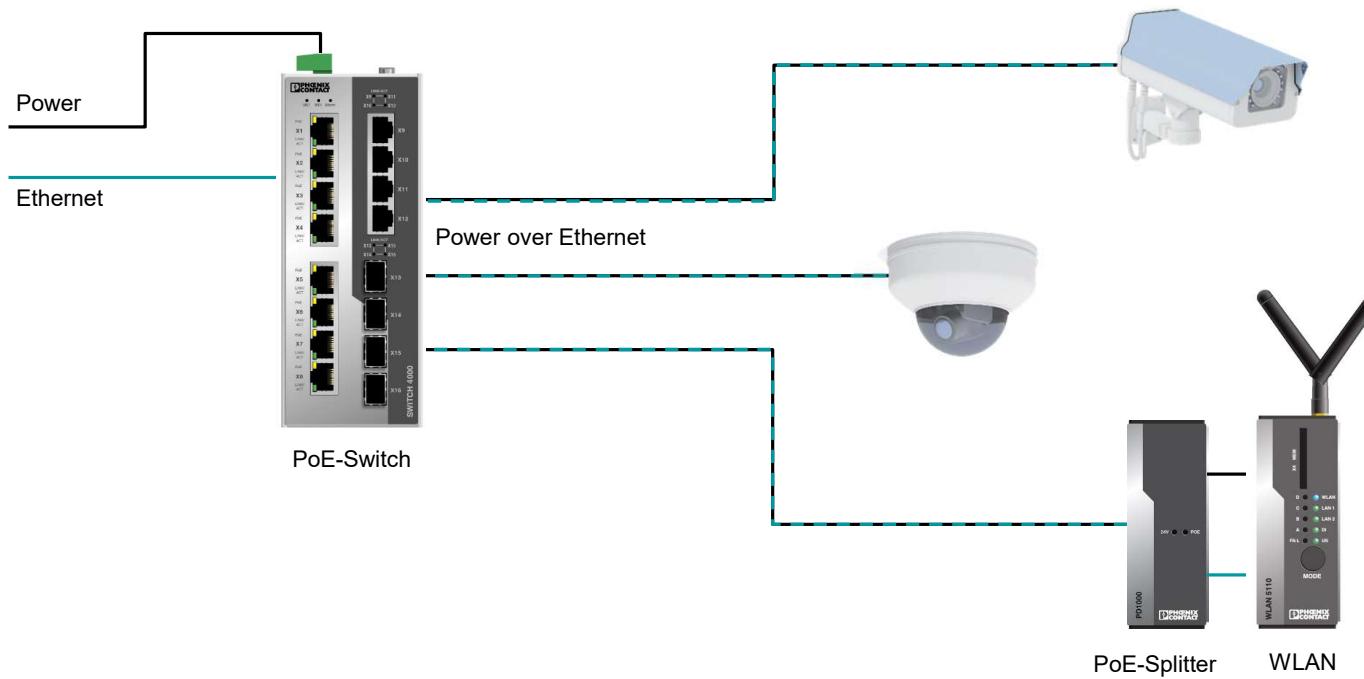
# Save installation costs with Power over Ethernet



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# Save installation costs with Power over Ethernet

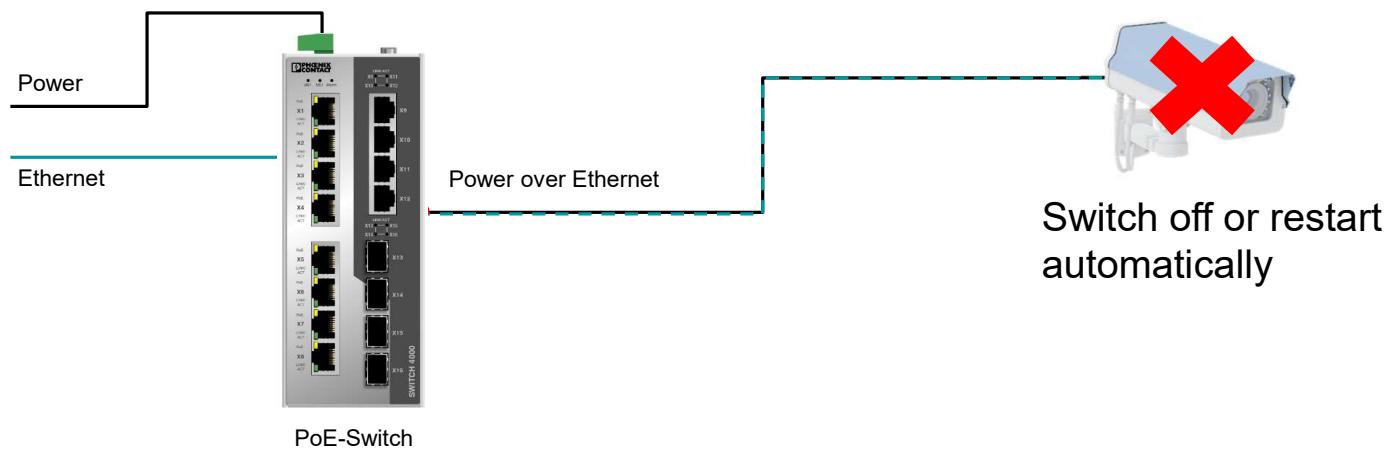


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# Save installation costs with Power over Ethernet

*Watchdog function*

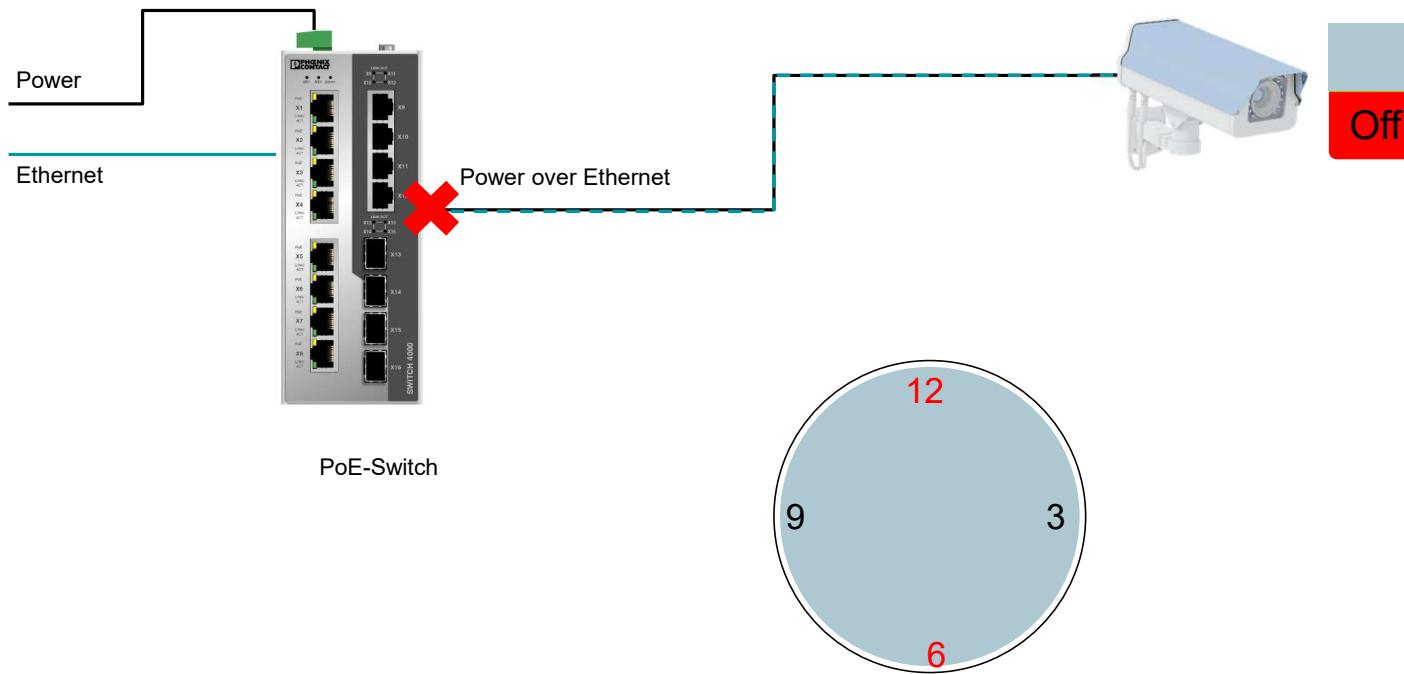


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# Save installation costs with Power over Ethernet

## PoE Scheduler

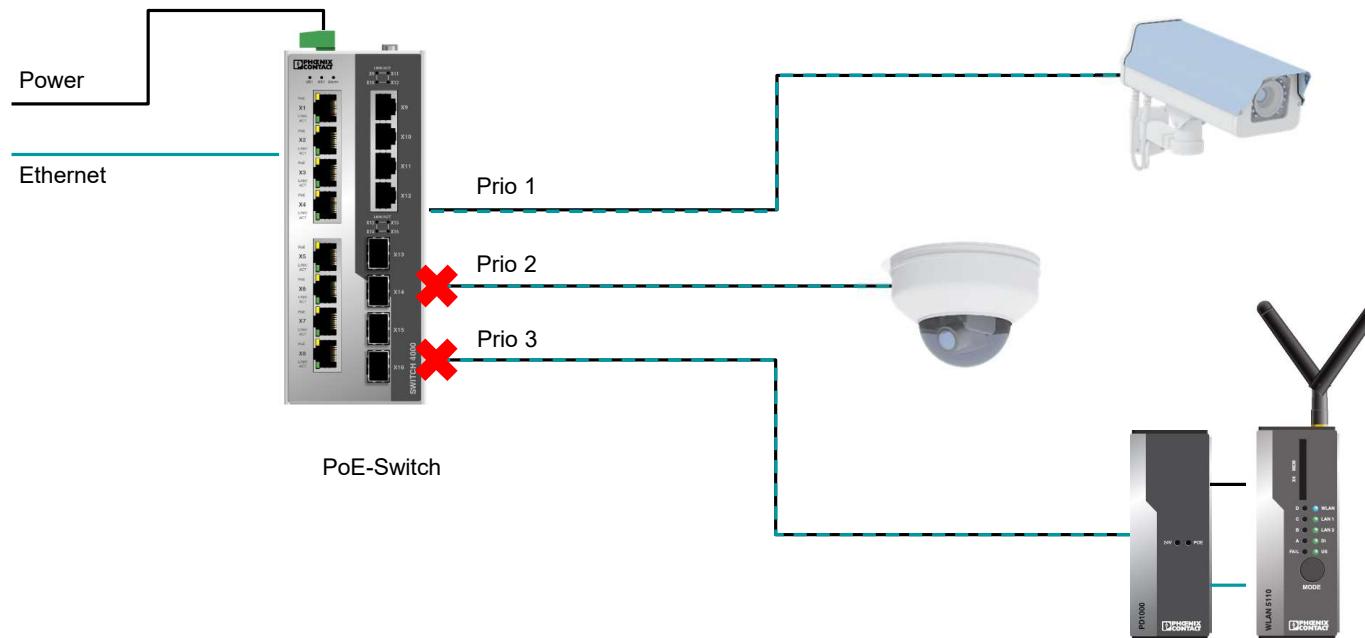


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# Save installation costs with Power over Ethernet

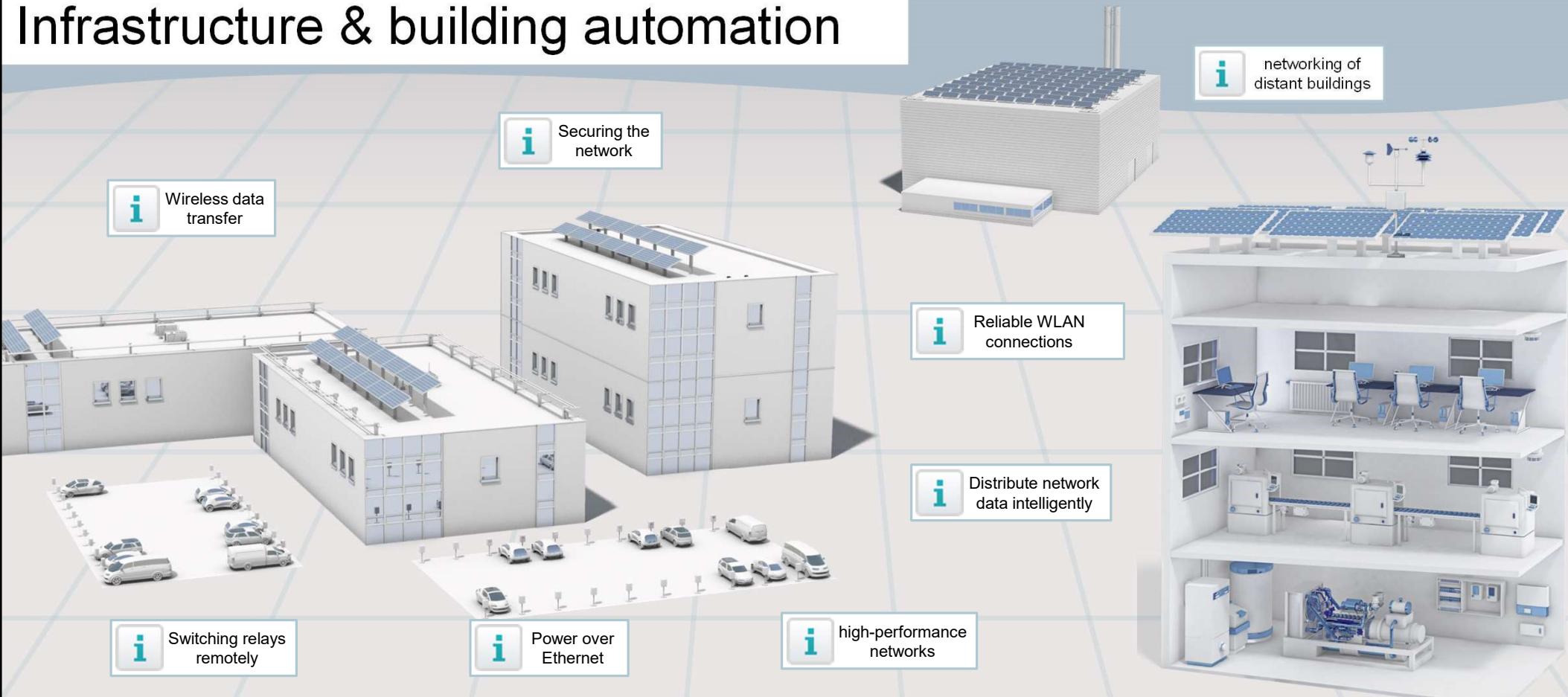
## PoE Prioritization



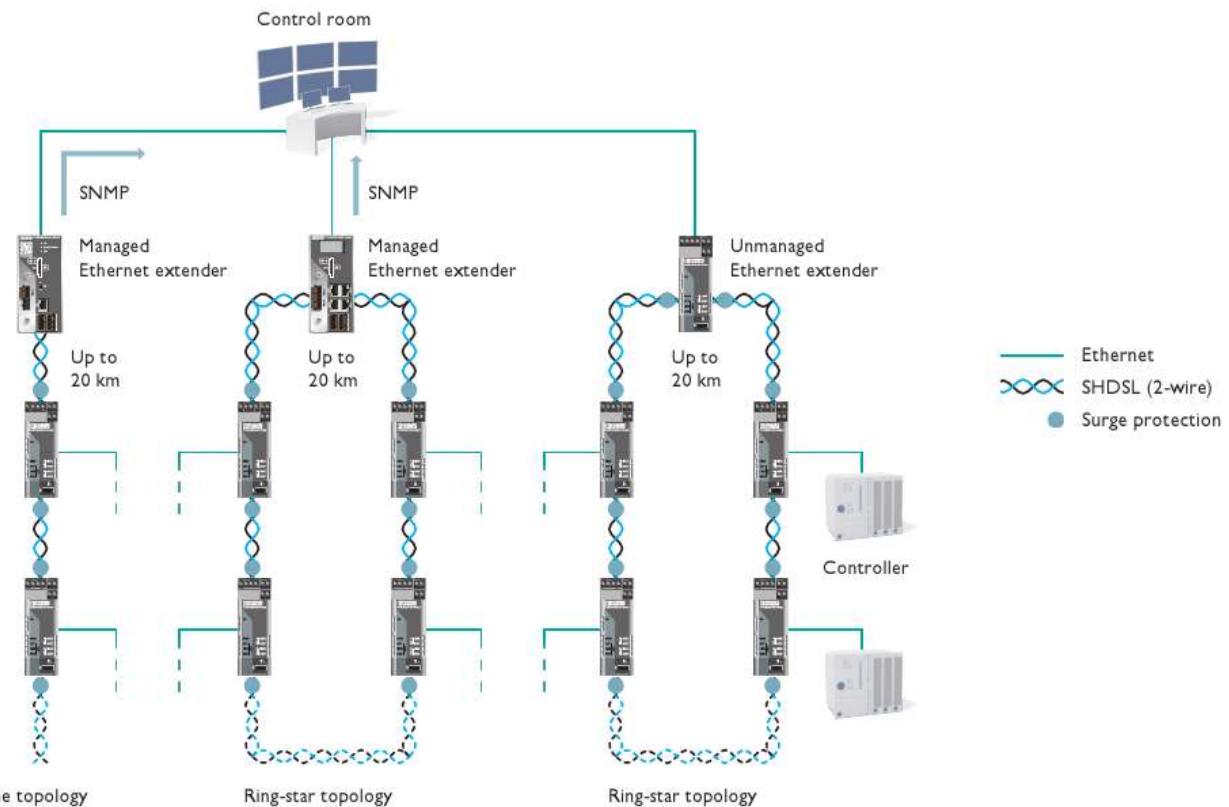
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# Infrastructure & building automation



# Subsequent networking of distant buildings



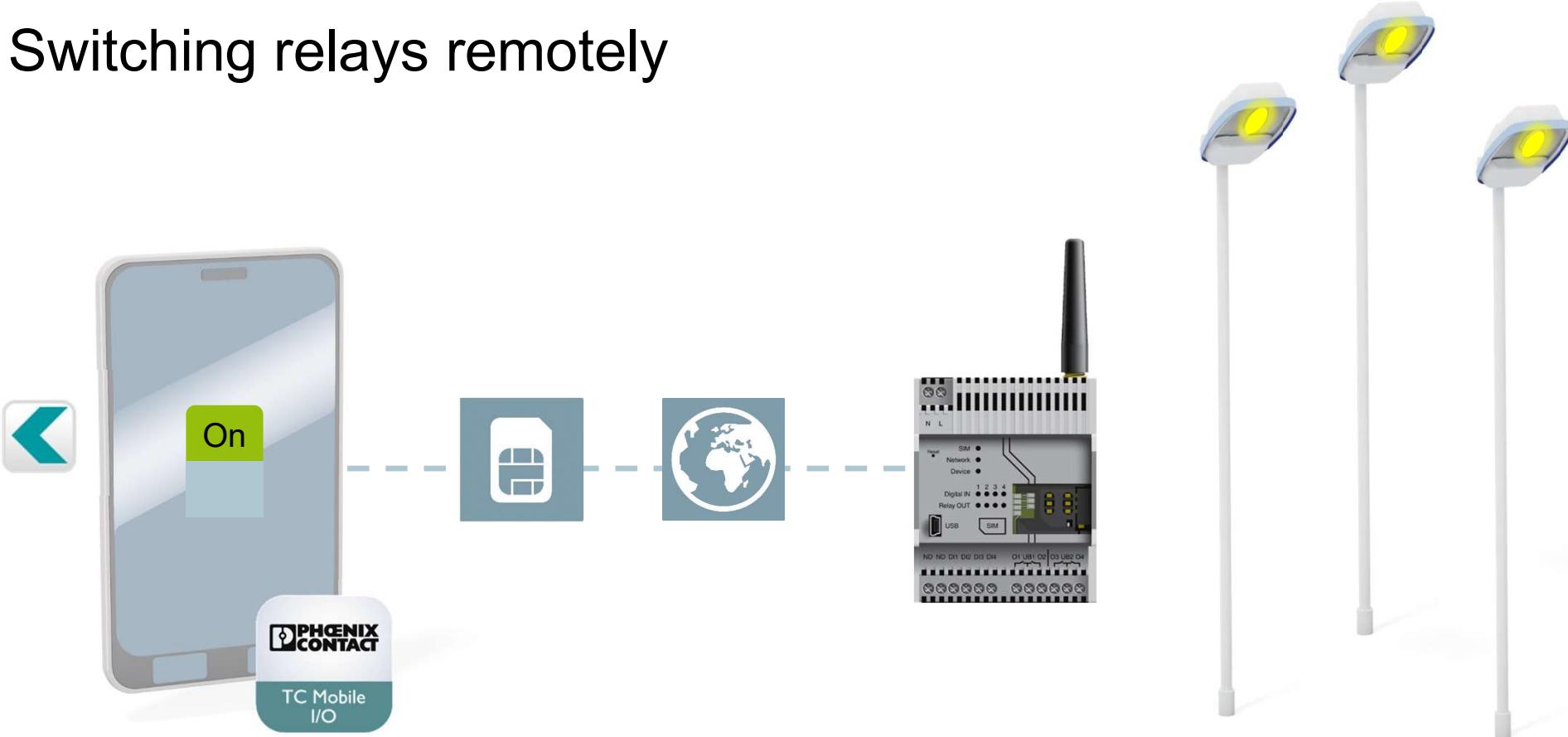
# Switching relays remotely



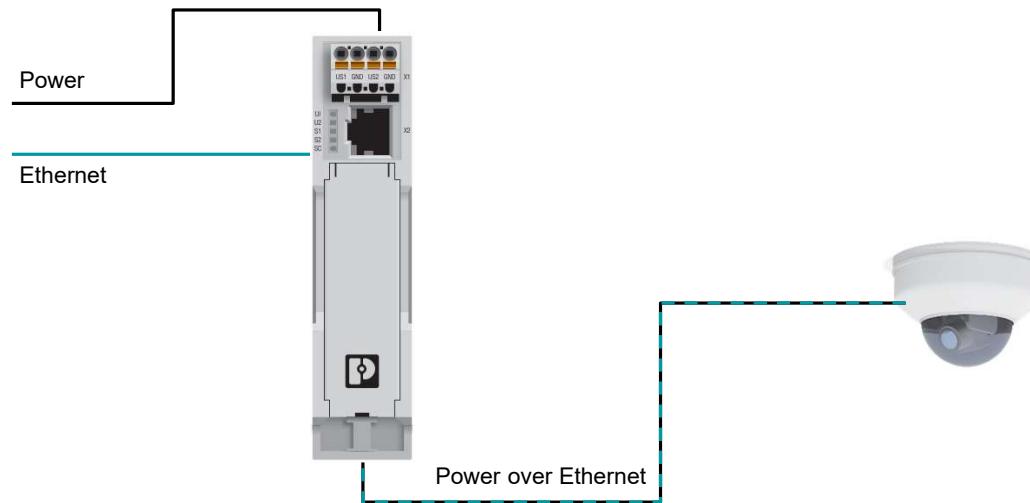
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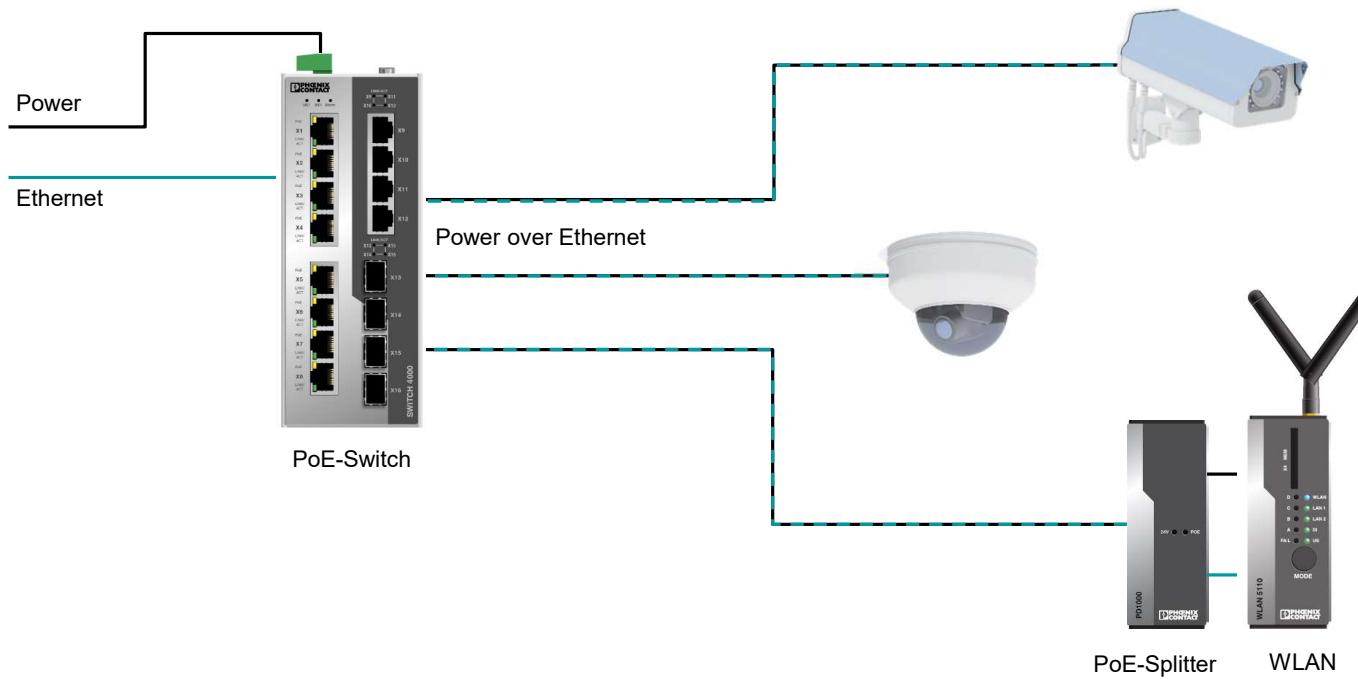
# Switching relays remotely



# Save installation costs with Power over Ethernet



# Save installation costs with Power over Ethernet

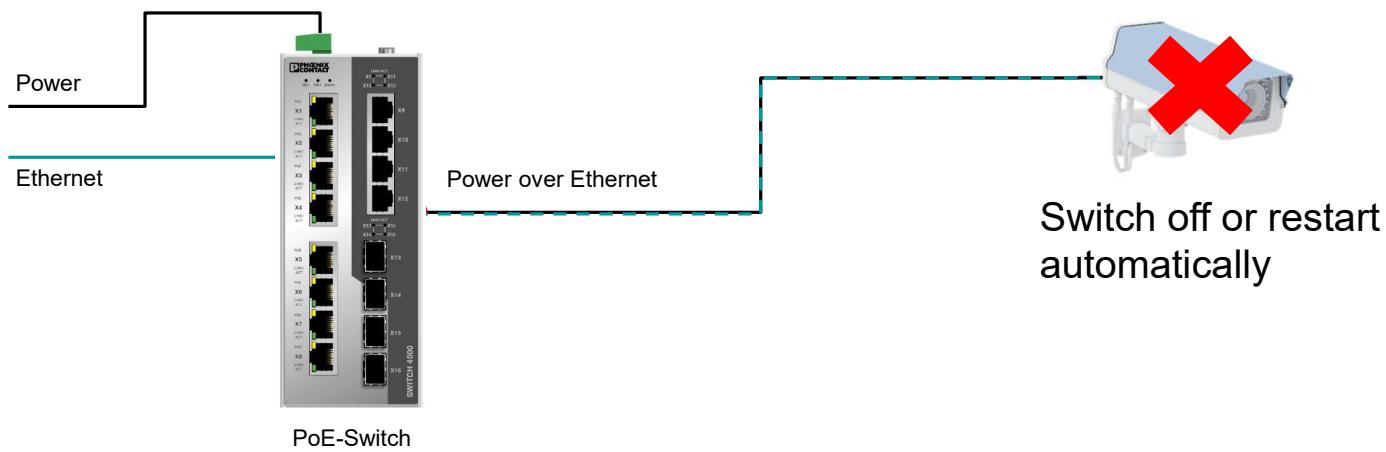


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# Save installation costs with Power over Ethernet

*Watchdog function*

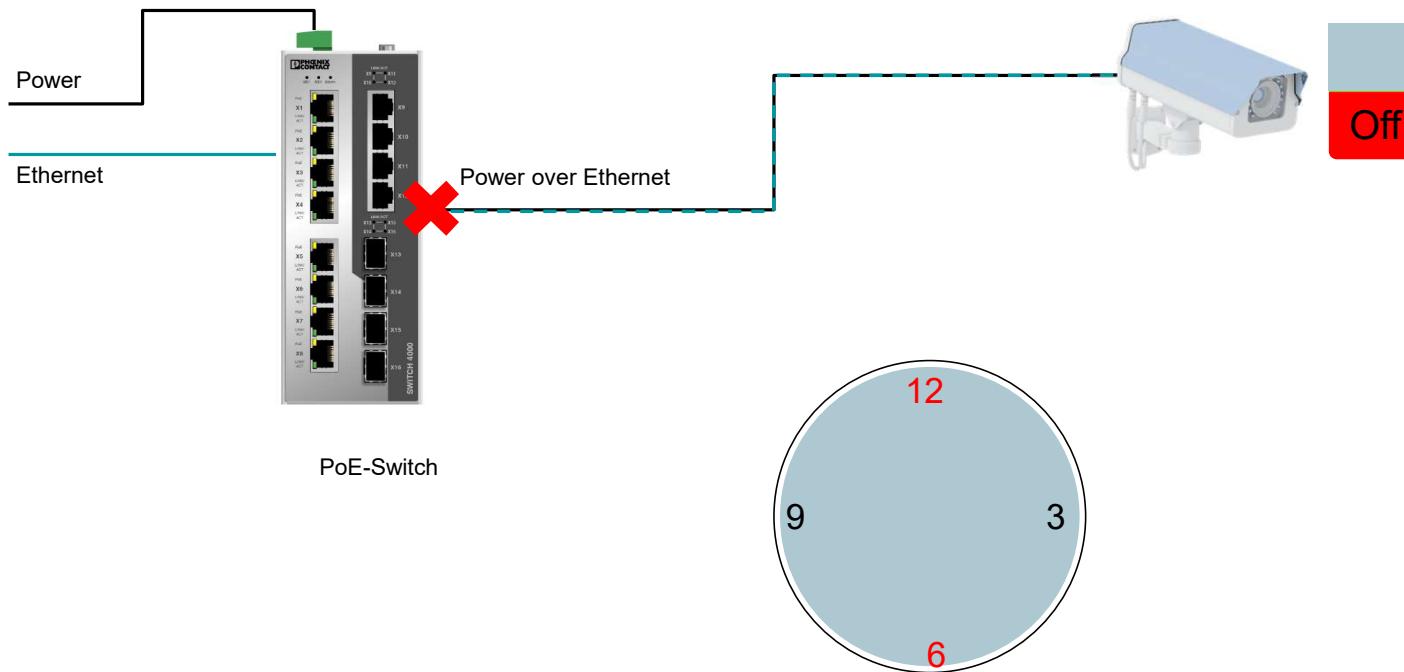


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# Save installation costs with Power over Ethernet

## PoE Scheduler

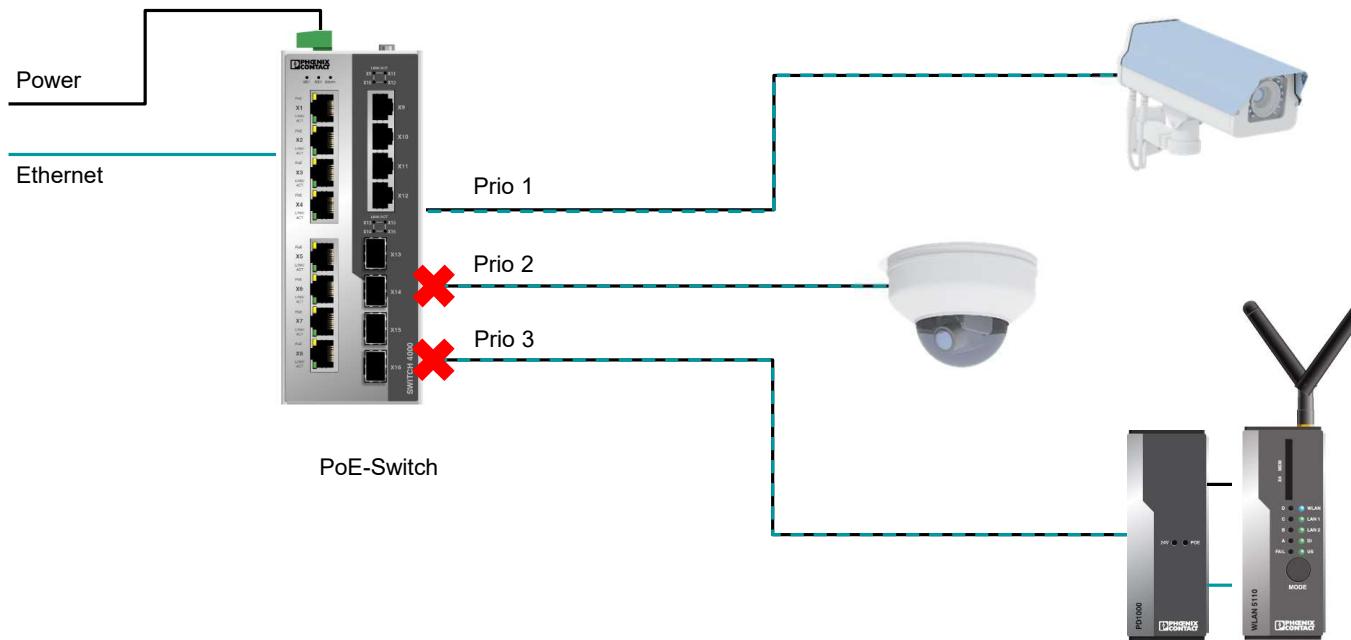


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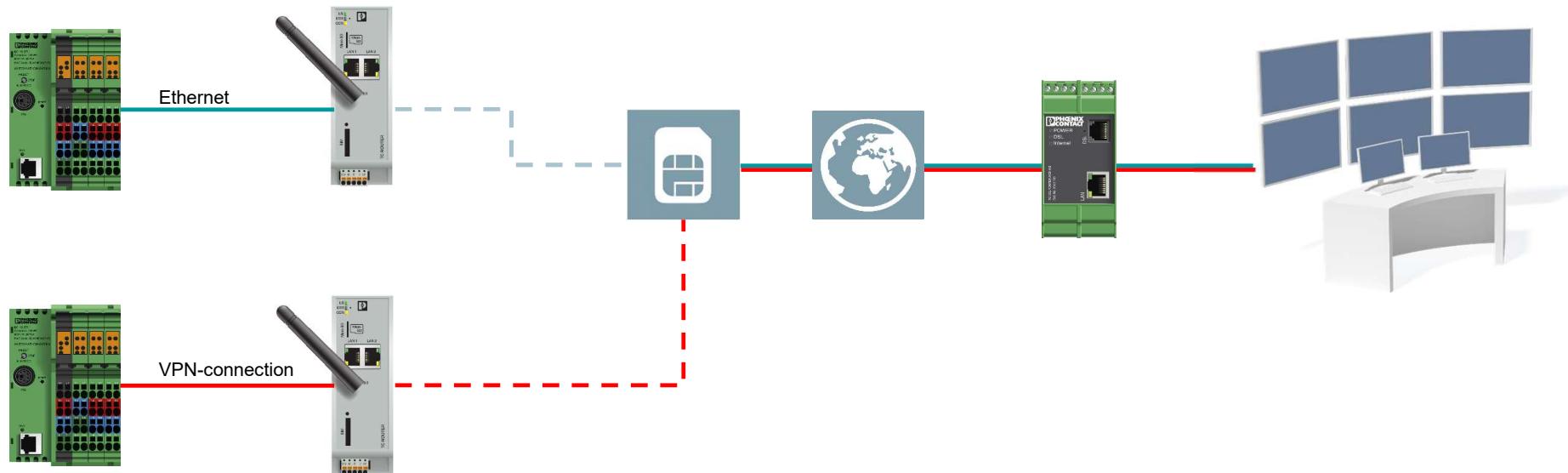


# Save installation costs with Power over Ethernet

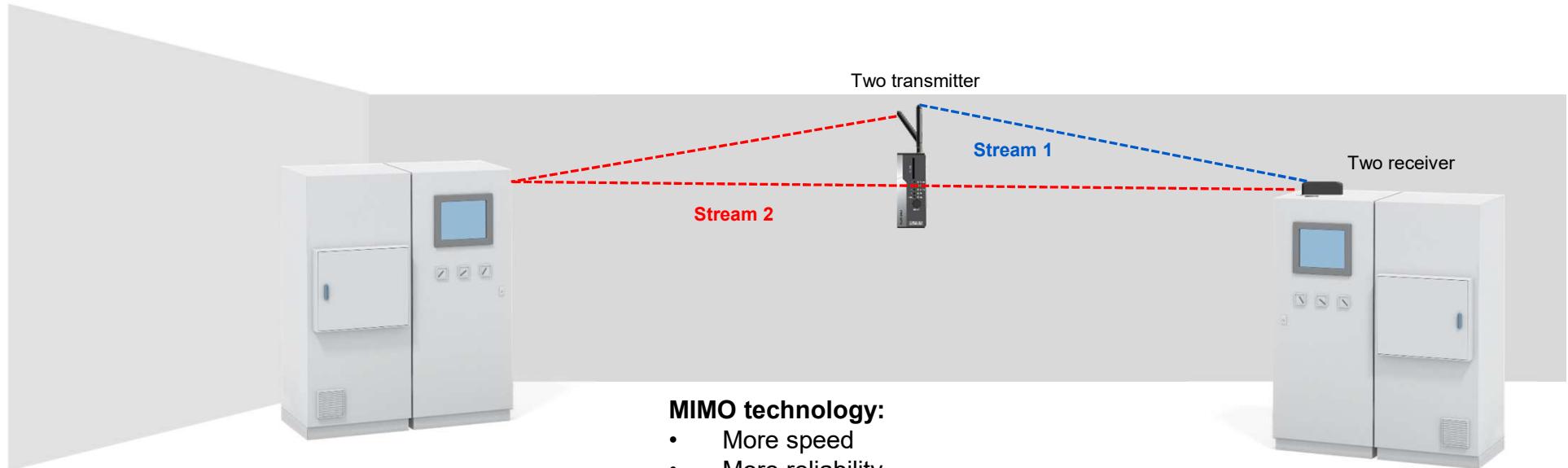
## PoE Prioritization



# Wireless data transfer from remote stations



# Establishing reliable WLAN connections



## MIMO technology:

- More speed
- More reliability
- More distance
- Better coverage



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# Distribute network data intelligently

*Typical problems in unmanaged networks: As the network grows, network stability declines*



215 Network devices



High broad-and multicast-traffic in the network

Unauthorized devices

Network loop

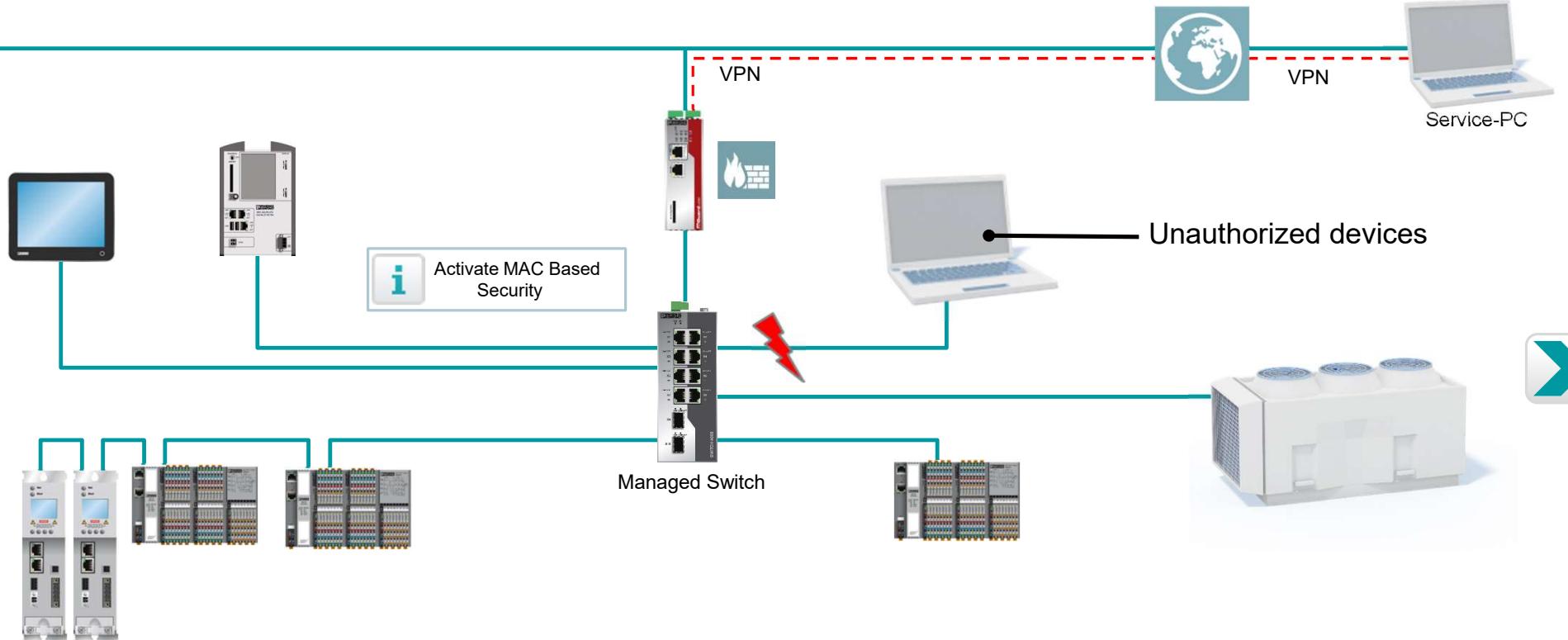
Cable and connector problems



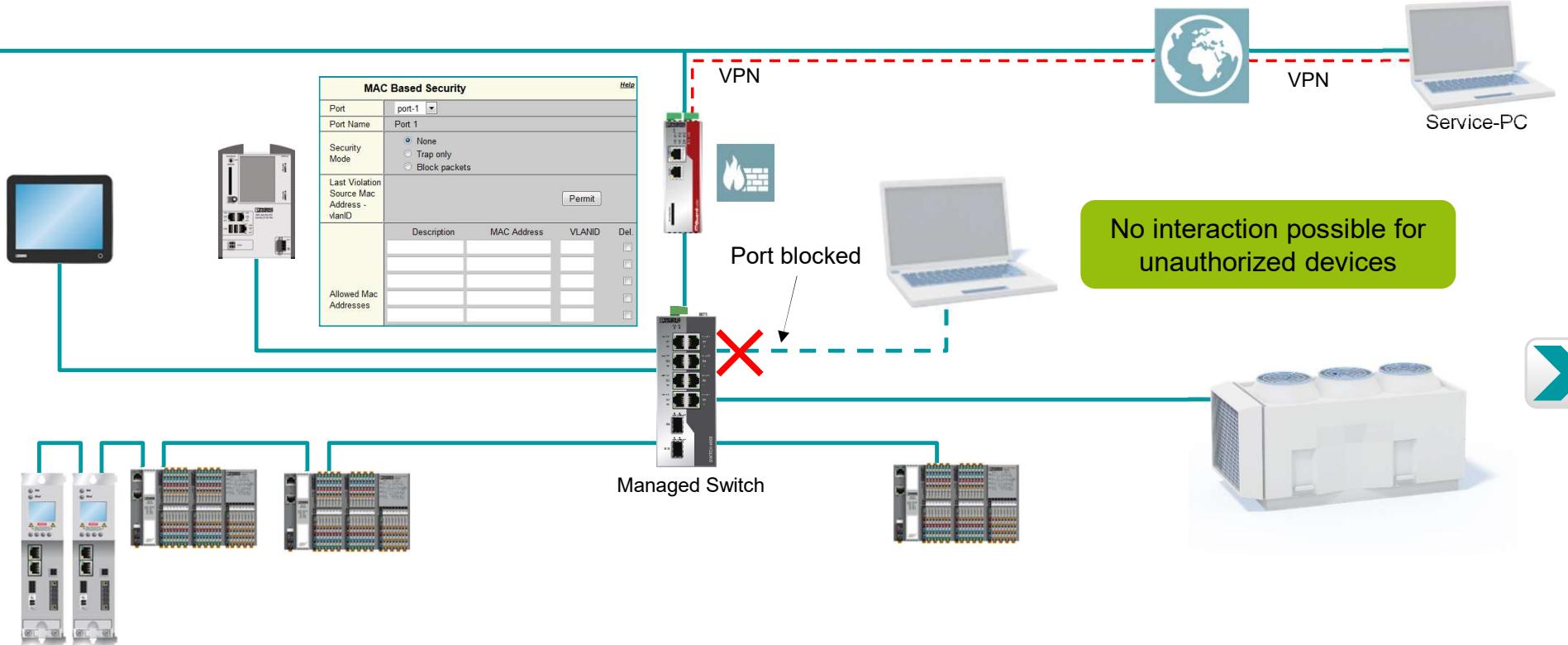
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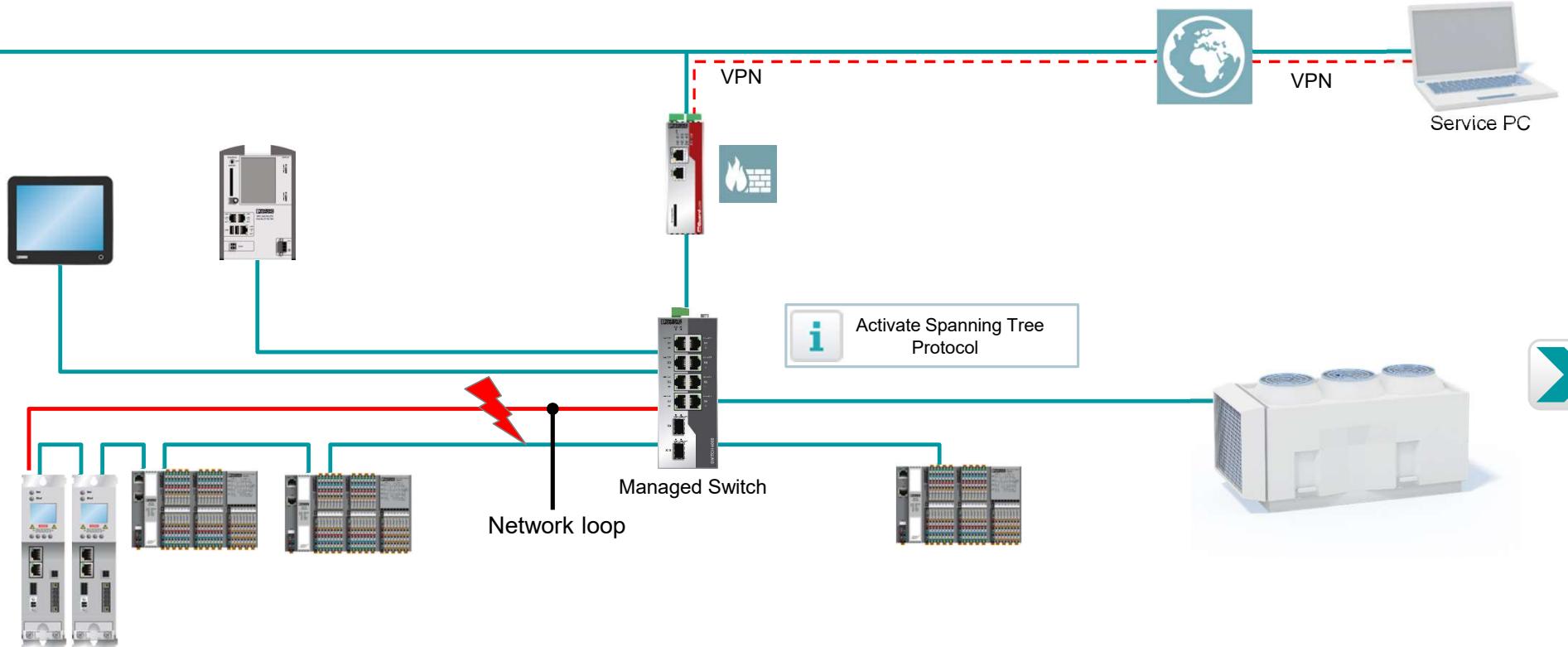
# Unauthorized devices



# Our Solution: MAC Based Security



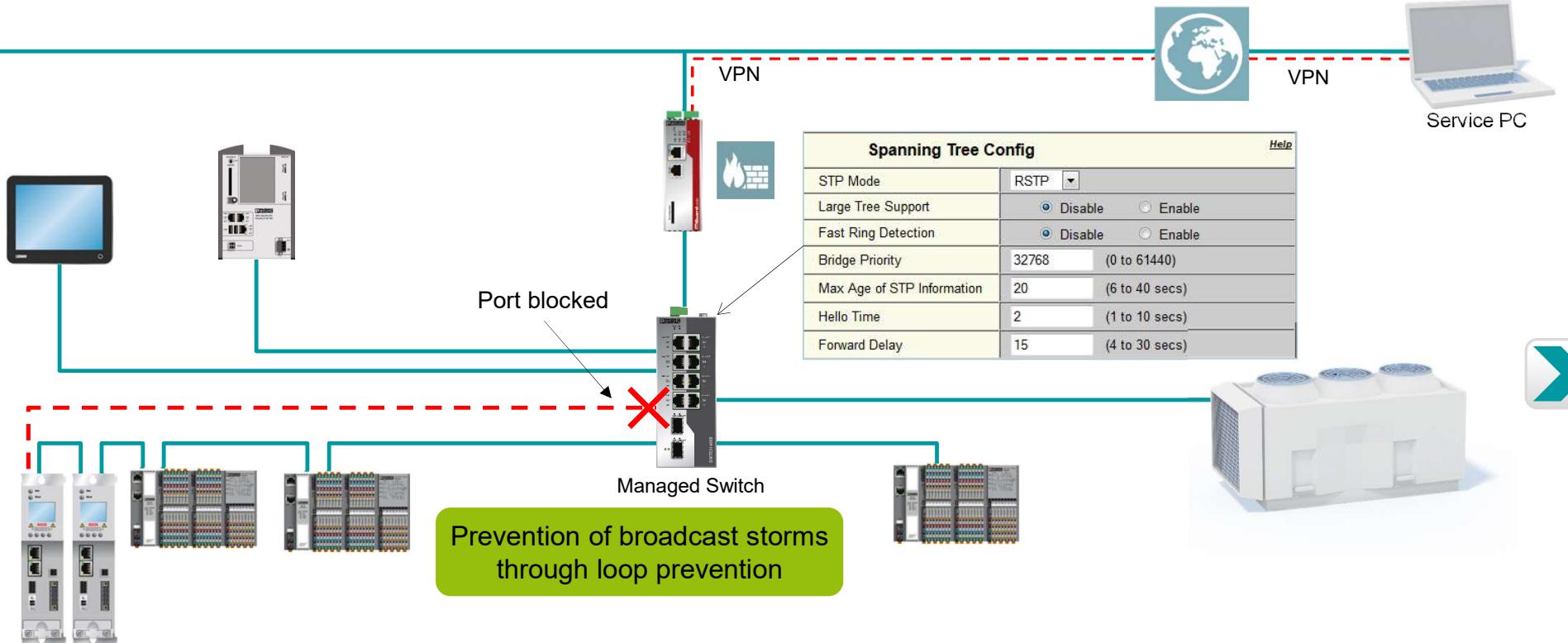
# Network Loops



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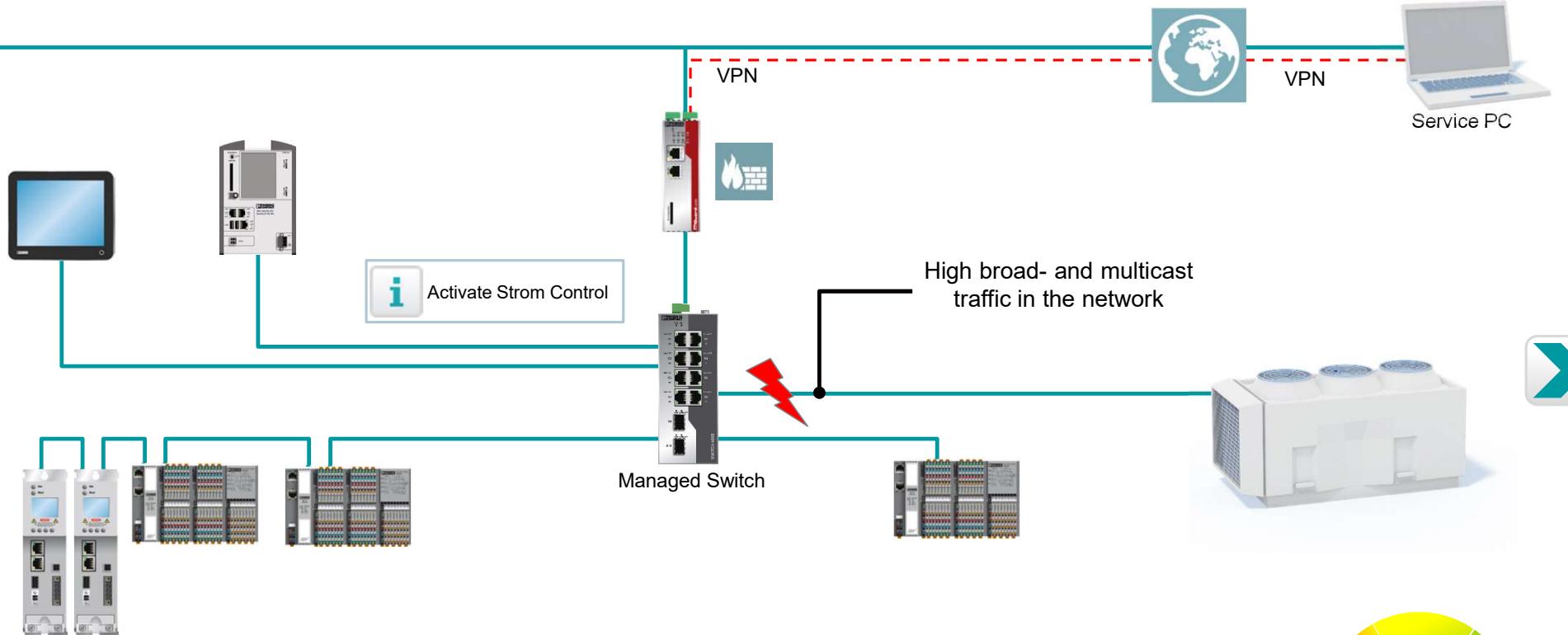
# Our Solution: Spanning Tree Protocol



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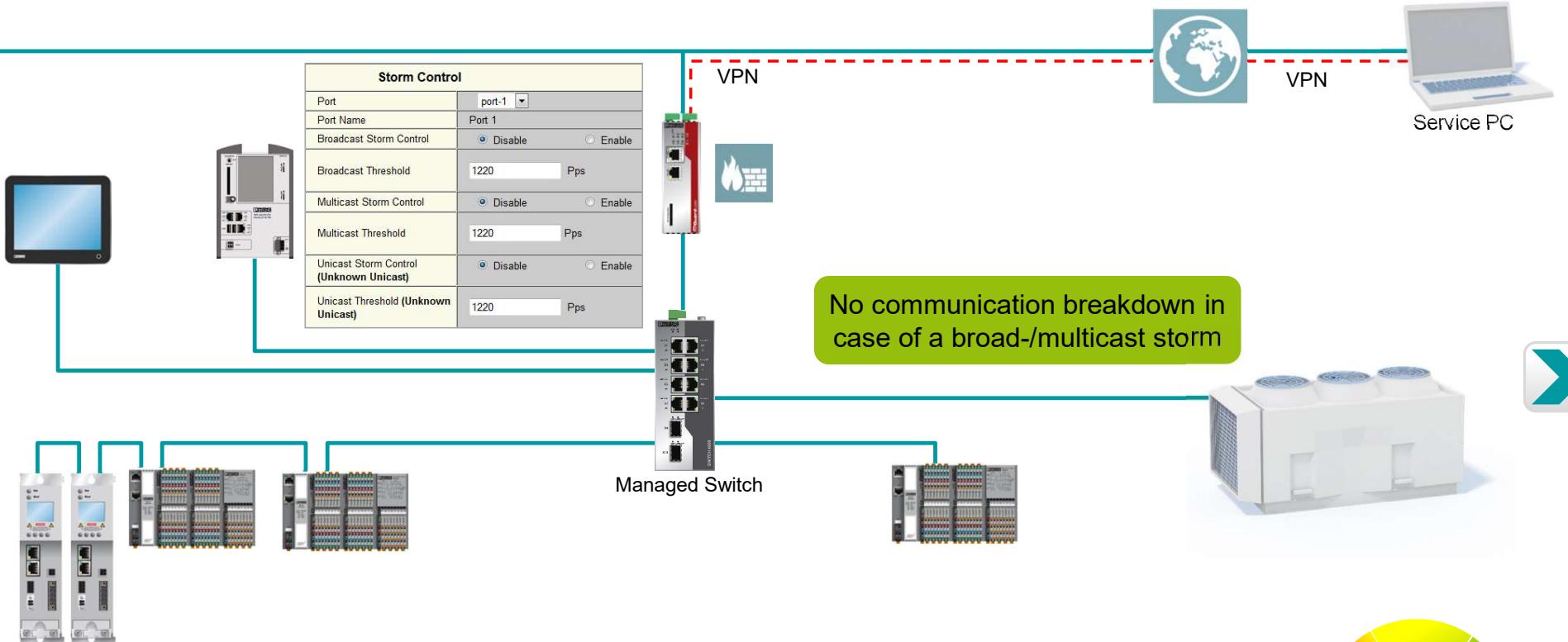
# High broad- and multicast traffic



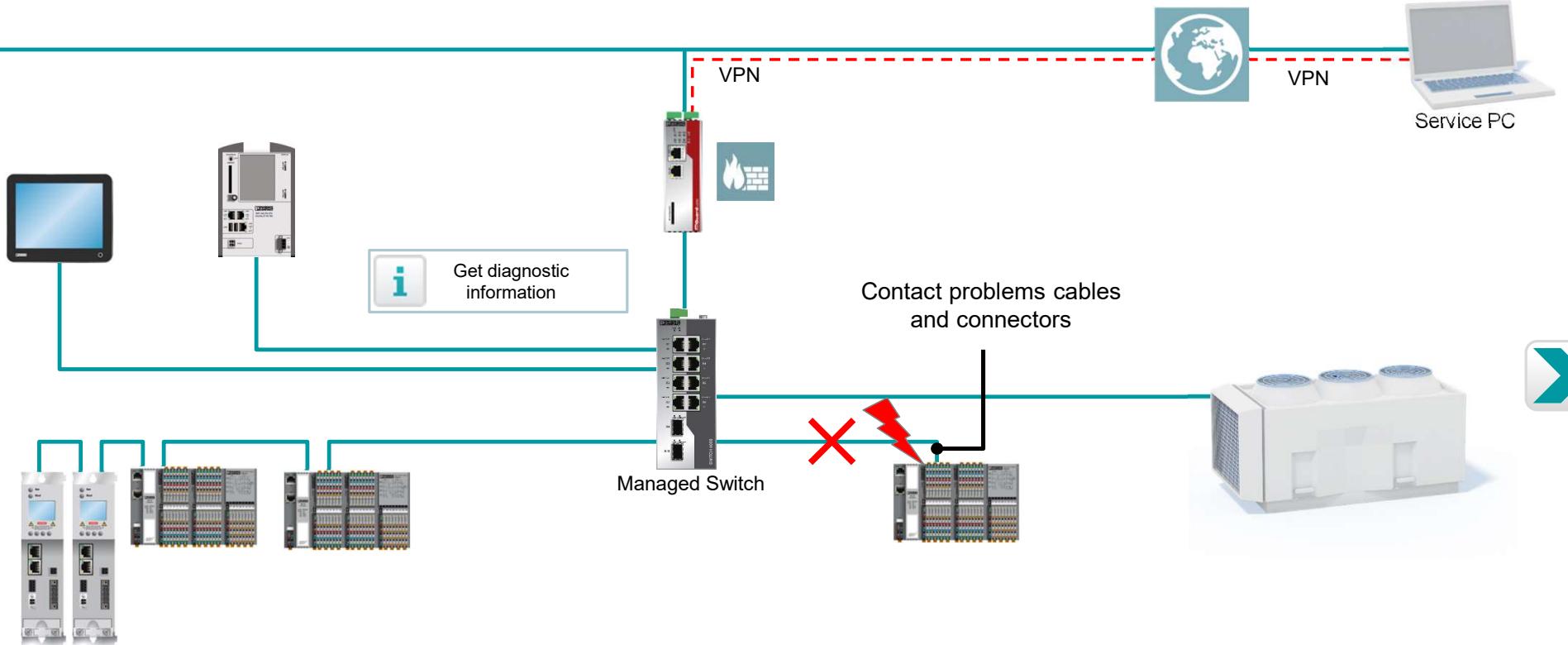
Realtime and availability



# Our solution: Storm control

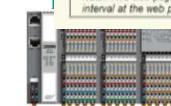
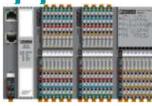


# Contact problems of cables and connectors



# Our solution: Diagnostic information

Event Table	
System Up Time	22 min 50 sec
Time	Event
20 min 35 sec	LLDP recognized new neighbor at port 5
20 min 35 sec	Link up on Port: 5
20 min 19 sec	Link up on Port: 7
20 min 16 sec	LLDP recognized new neighbor at port 3
20 min 16 sec	Link up on Port: 3
20 min 13 sec	Link down on Port: 3
17 min 55 sec	Configuration has been saved.
17 min 30 sec	The configuration has been modified the first time after the last storing.
59 sec	Link up on Port: 3
55 sec	Link down on Port: 3
29 sec	Configuration has been saved.
25 sec	The configuration has been modified the first time after the last storing.
3 sec	Link up on Port: 3
3 sec	Configuration has been saved.
3 sec	Boot.
0 sec	RSTP disabled.
0 sec	Power Supply US2 lost



Port Statistics	
Port Number	3
Packets	4103
up to 64 Octets	2969
65 to 127 Octets	631
128 to 255 Octets	71
256 to 511 Octets	425
512 to 1023 Octets	1
1024 to 1518 Octets	6
Broadcast	307
Multicast	50
Octets	448306
Fragments	0
Undersized Packets	0
Oversized Packets	0
CRC Alignment Errors	1
Drop Events	0
Jabbers	0
Collisions	0

Port Configuration of port 3: General | RSTP

Note: This web page will be refreshed in 23 sec automatically (change the interval at the web page General Configuration / User Interfaces)!

Managed Switch



Receive diagnostic information in case of problems with cables and connectors

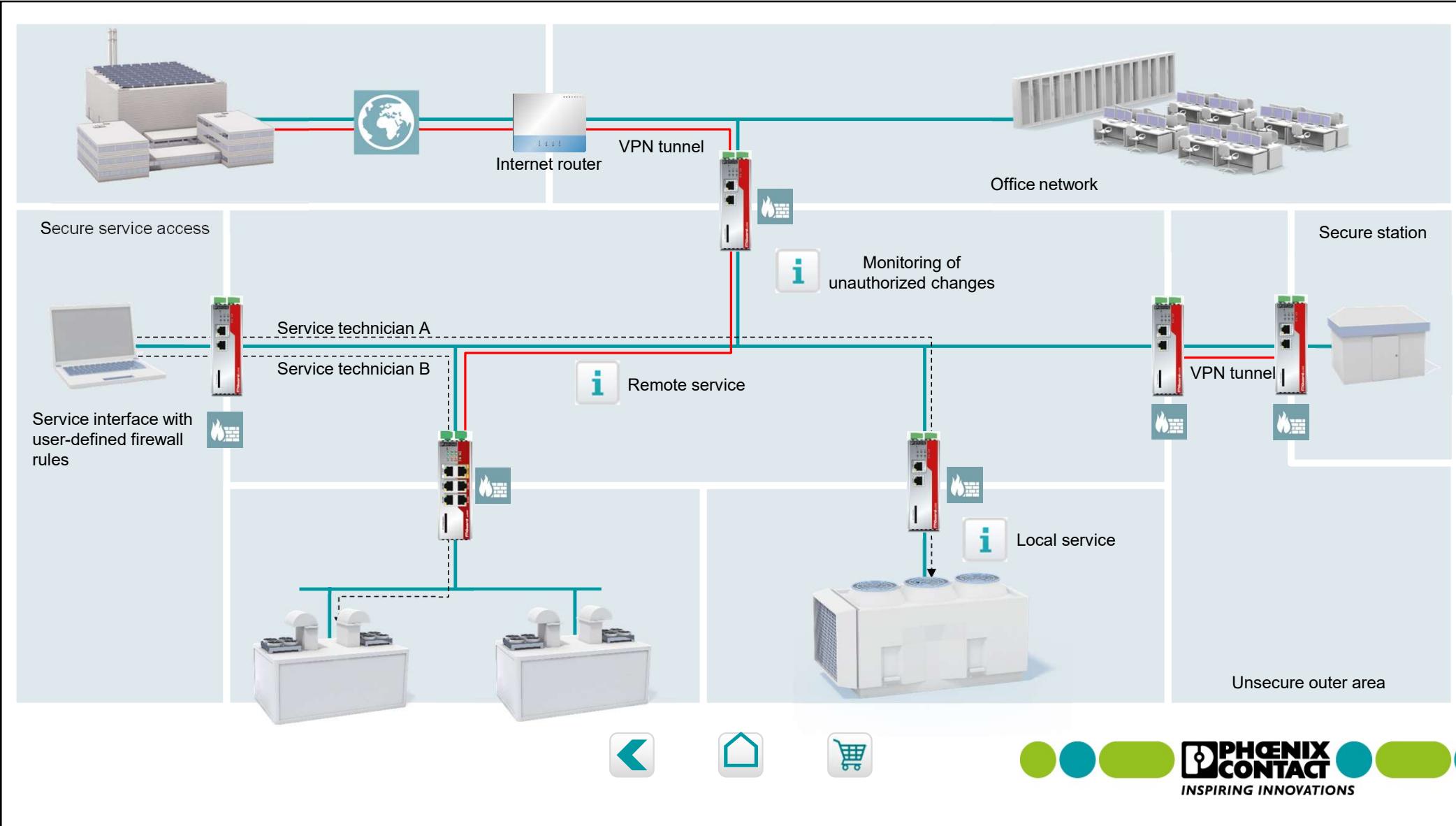


VPN

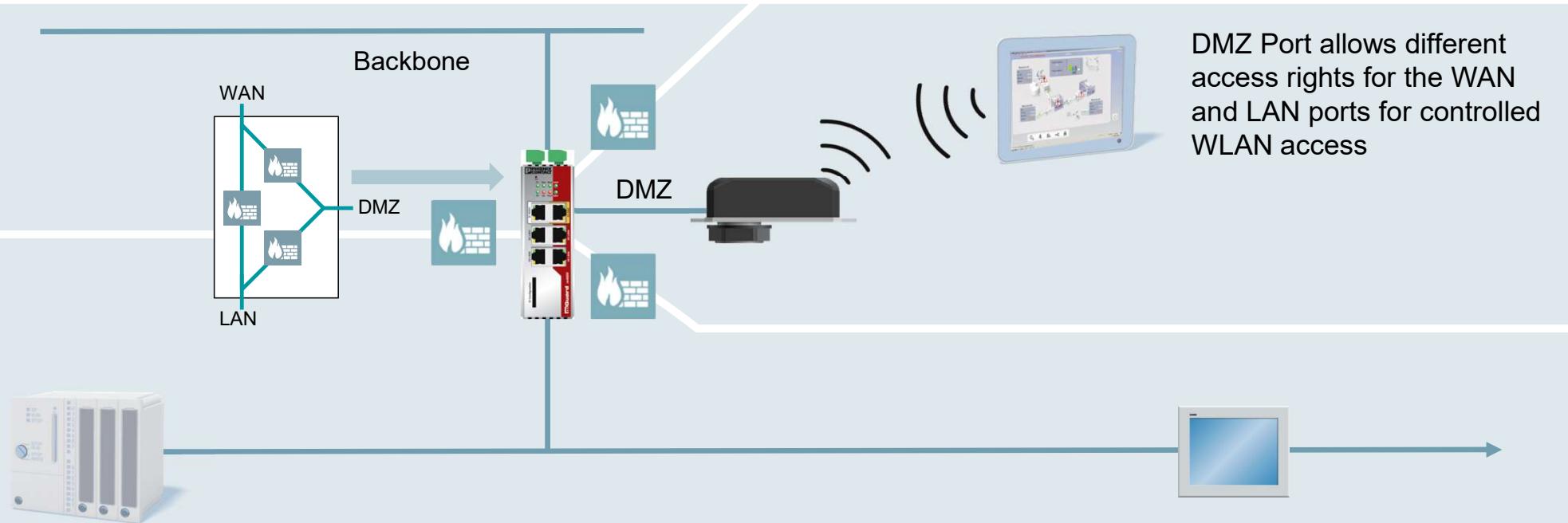


Service PC





# Secure WLAN machine network

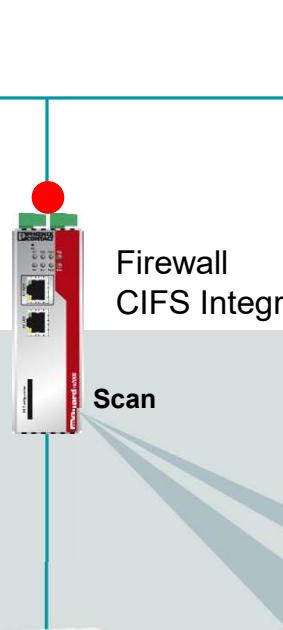


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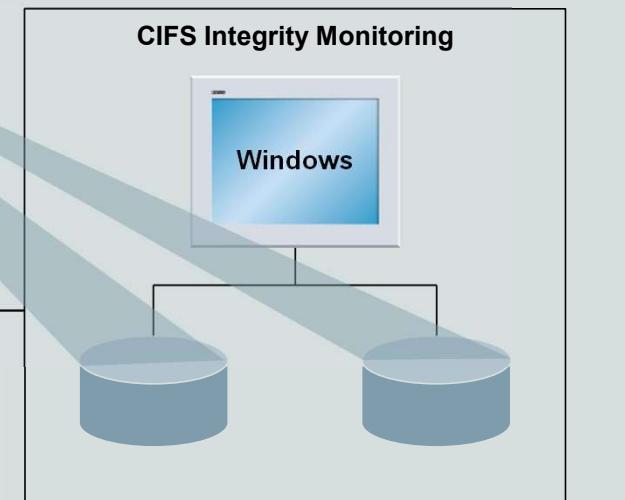
Ethernet



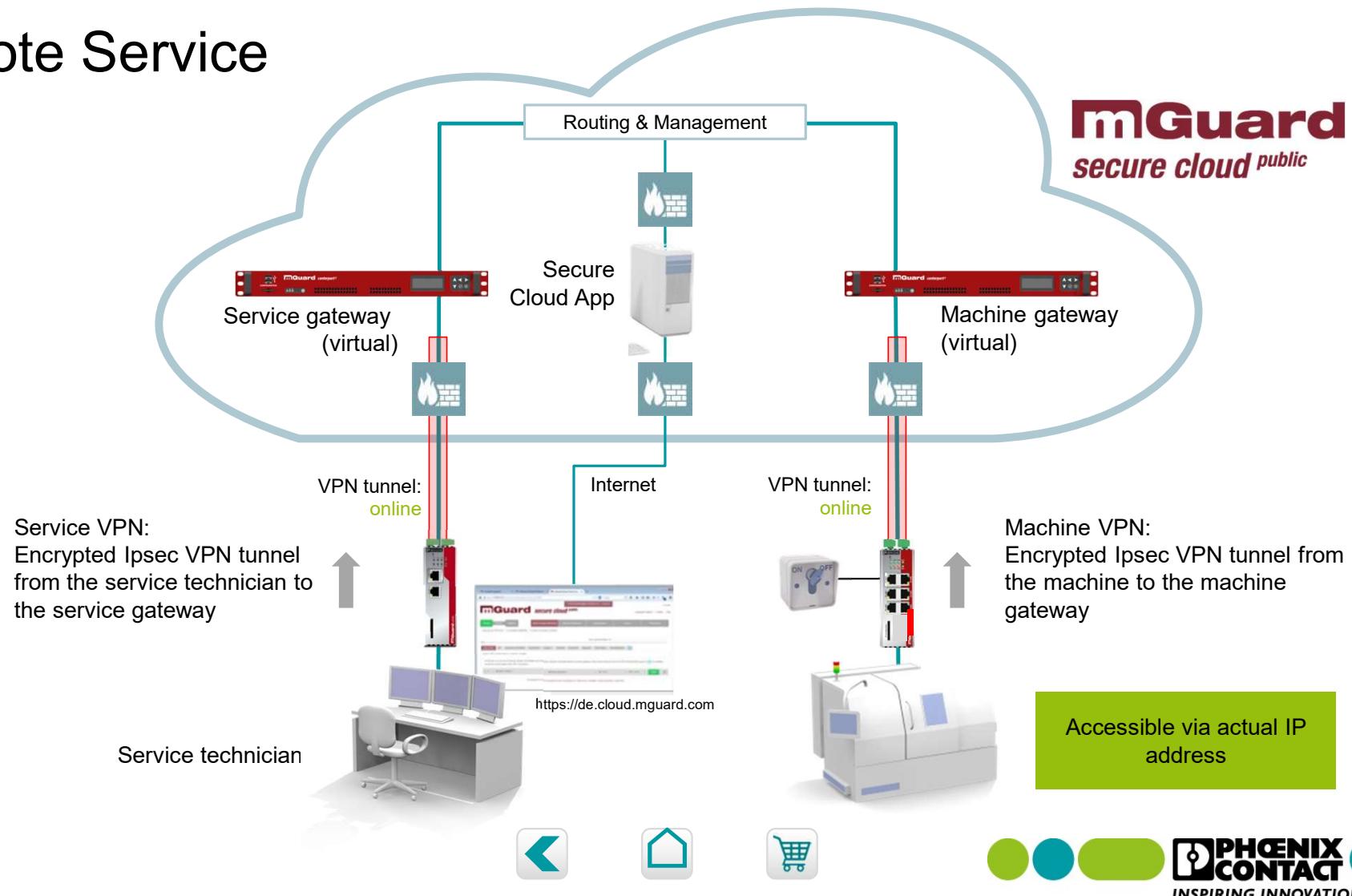
Firewall  
CIFS Integrity Monitoring



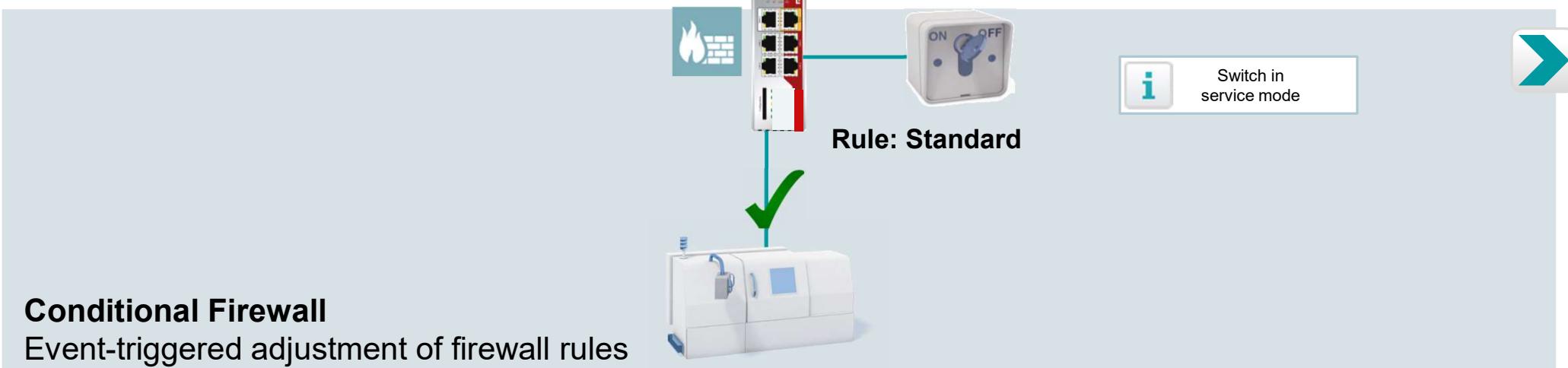
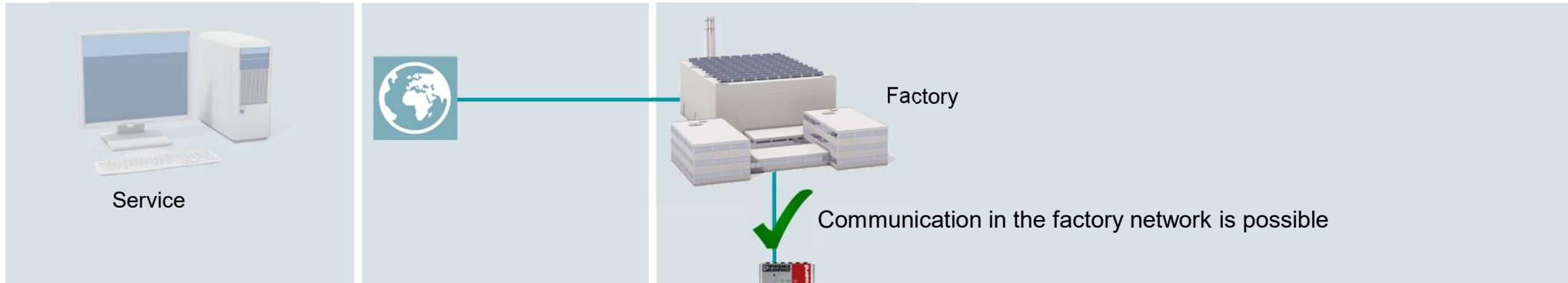
 **CIFS Integrity Monitoring**  
constantly monitors your file  
systems for unauthorized  
changes and alerts you if a  
change is detected



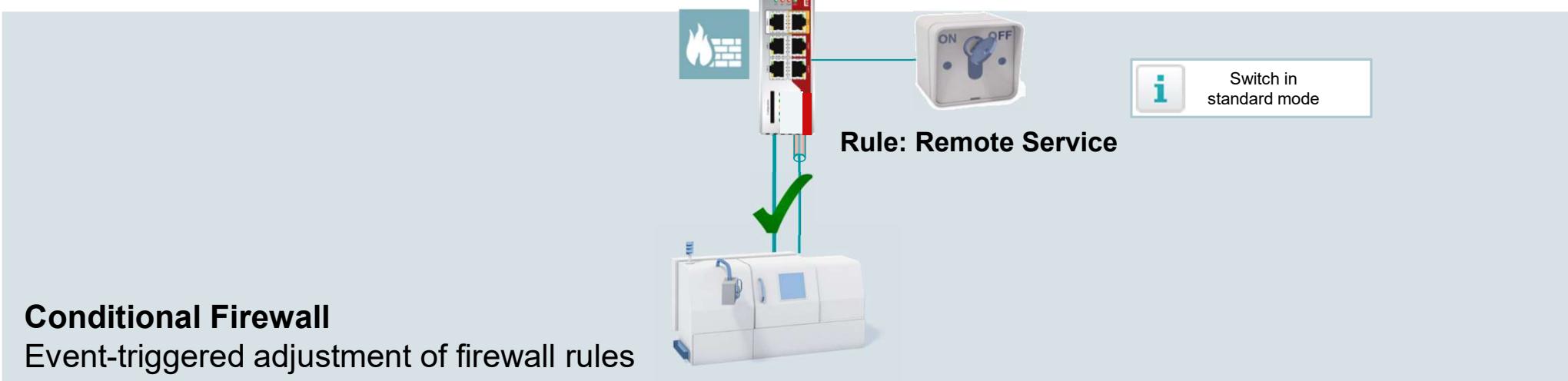
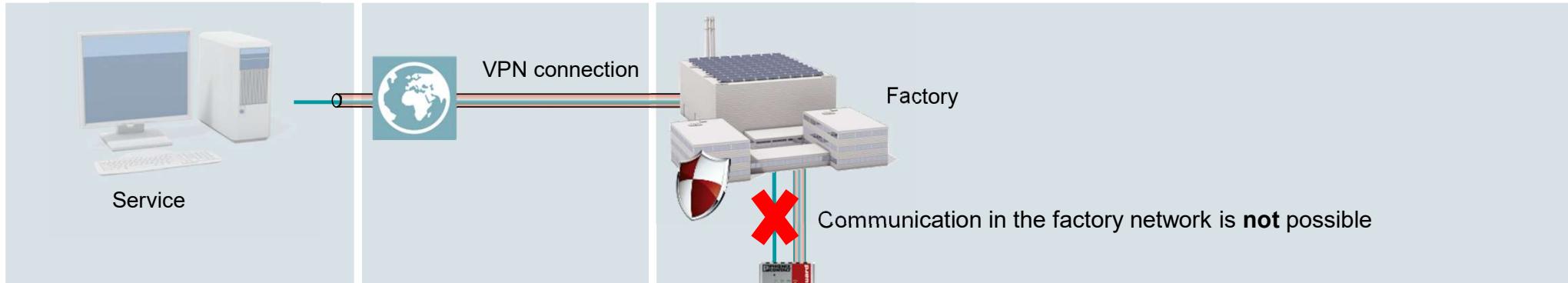
# Remote Service



# Prevention of unauthorized access



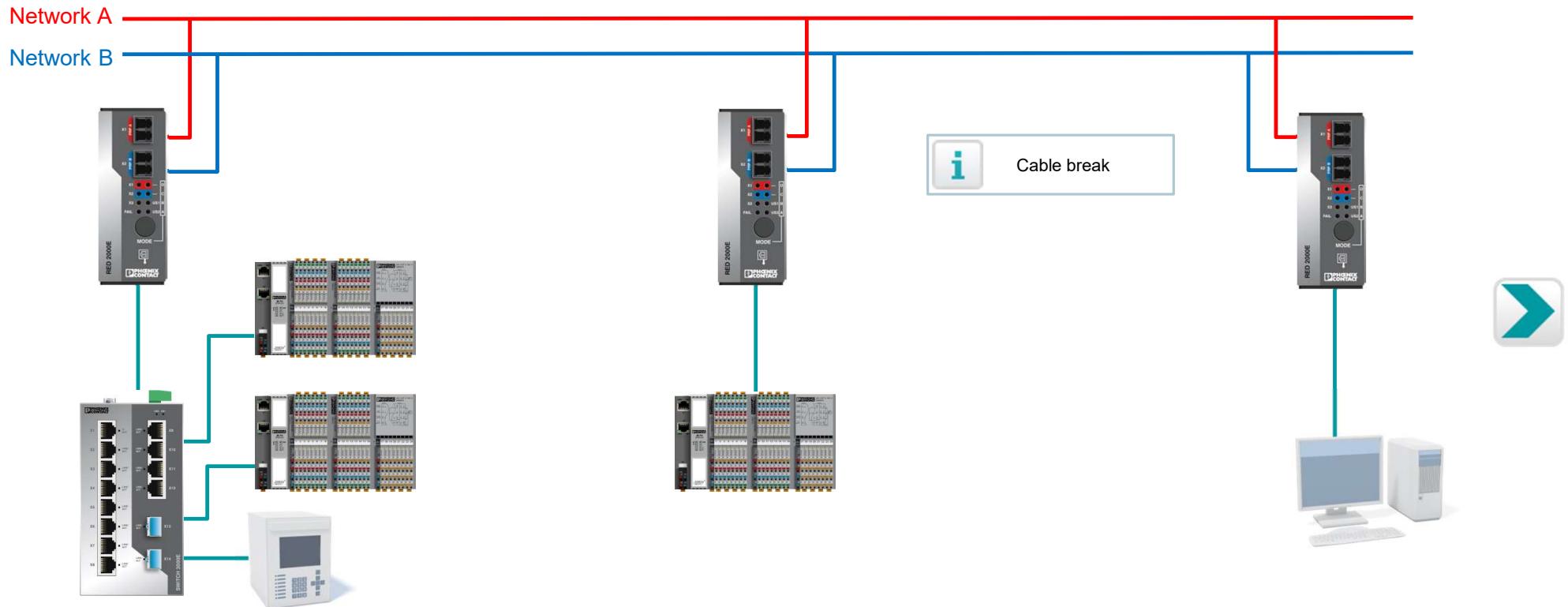
# Prevention of unauthorized access



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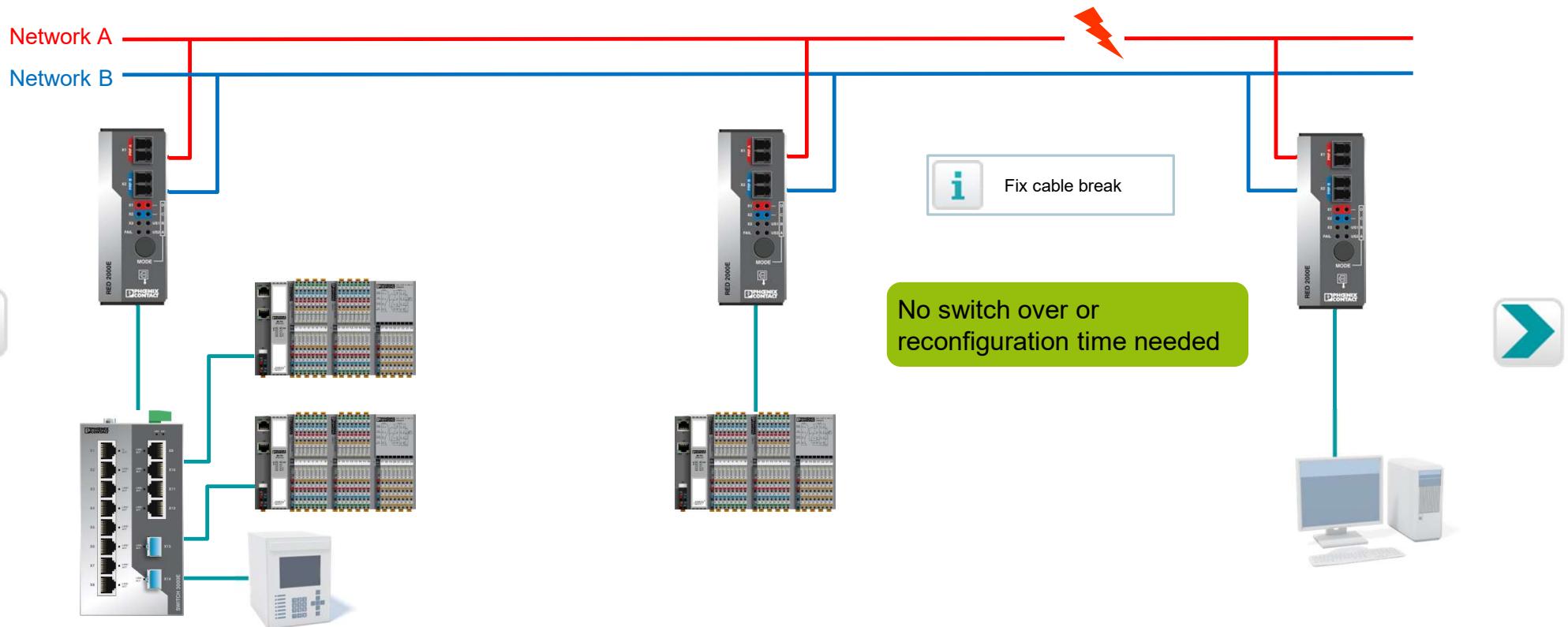


# Availability through Parallel Redundancy Protocol

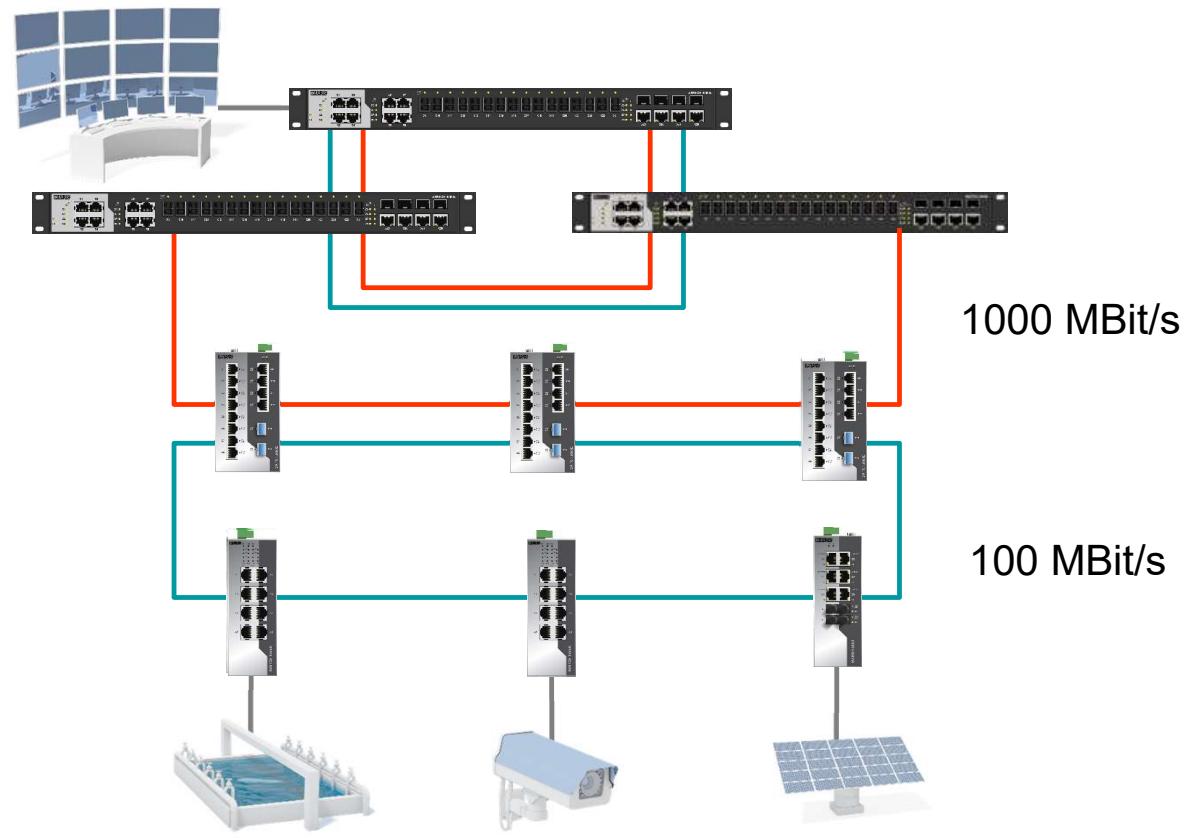


**PHOENIX  
CONTACT**  
INSPIRING INNOVATIONS

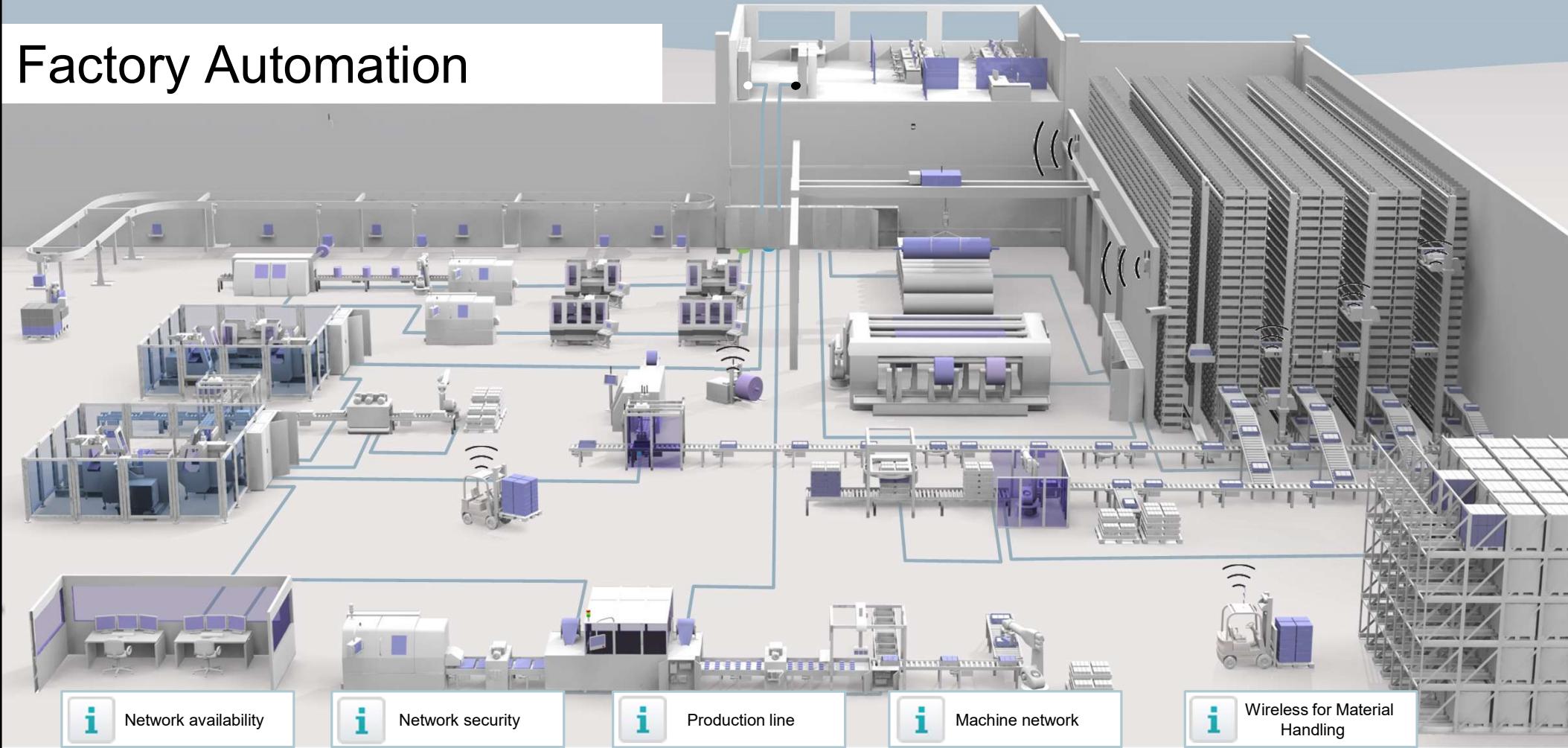
# Availability through Parallel Redundancy Protocol



# Availability through Extended Ring Redundancy

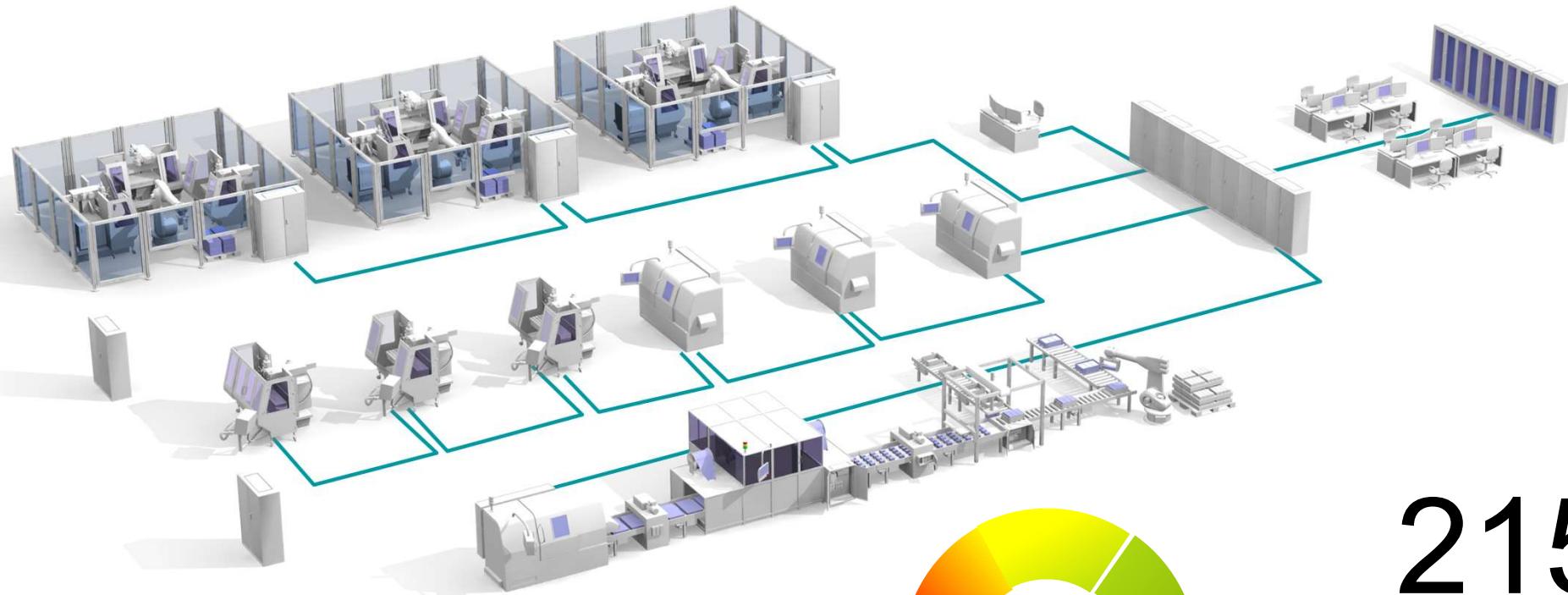


# Factory Automation



# Typical problems in unmanaged networks

*As the network grows, network stability declines*



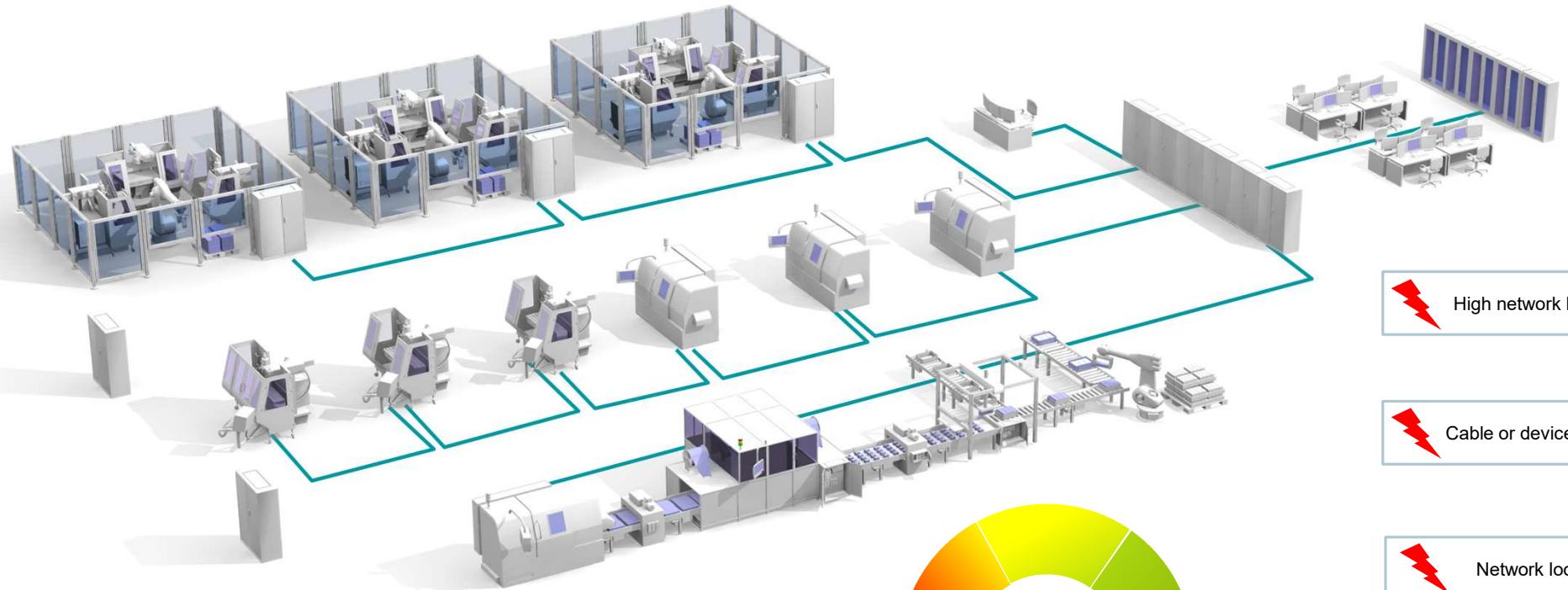
215

Network devices



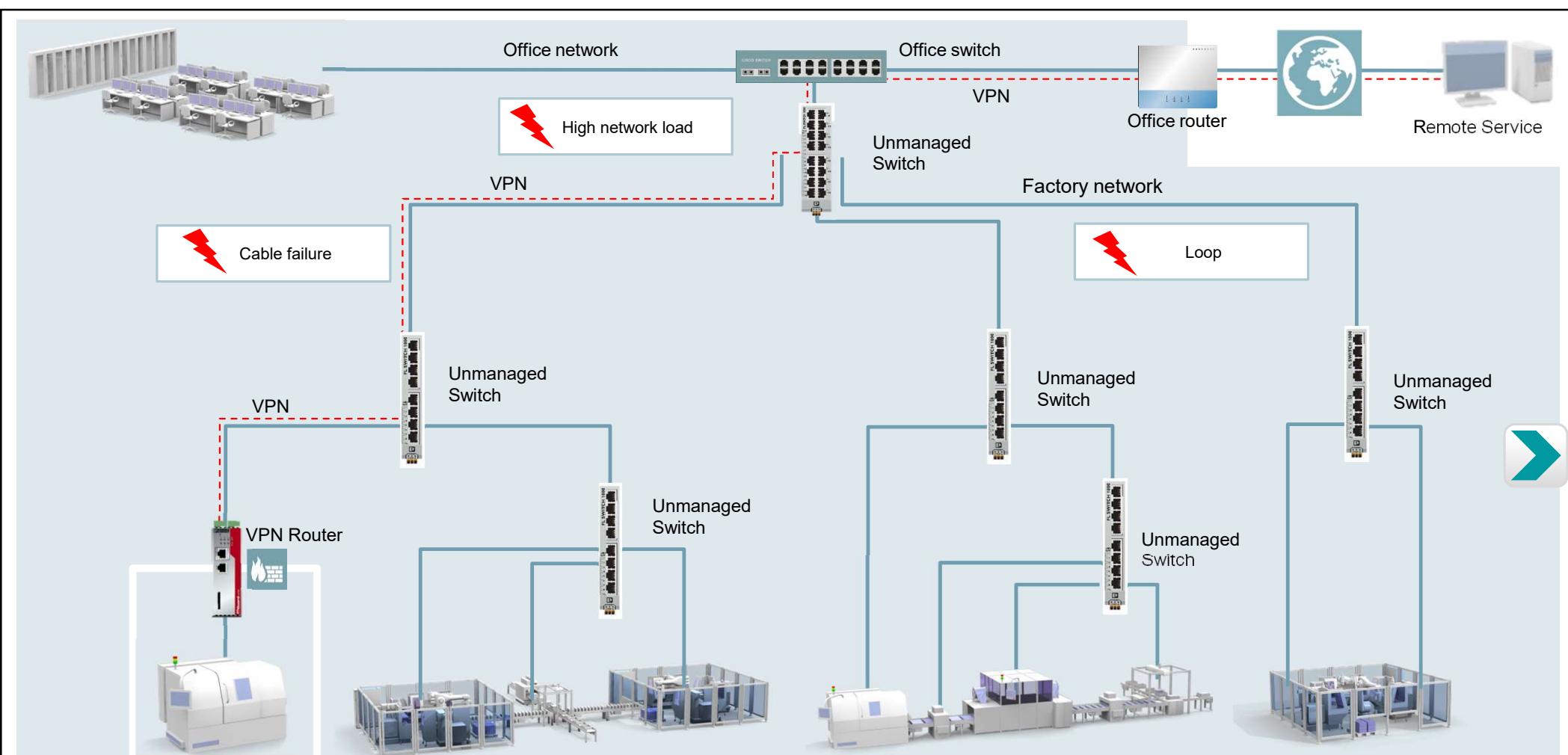
# Typical problems in unmanaged networks

*As the network grows, network stability declines*

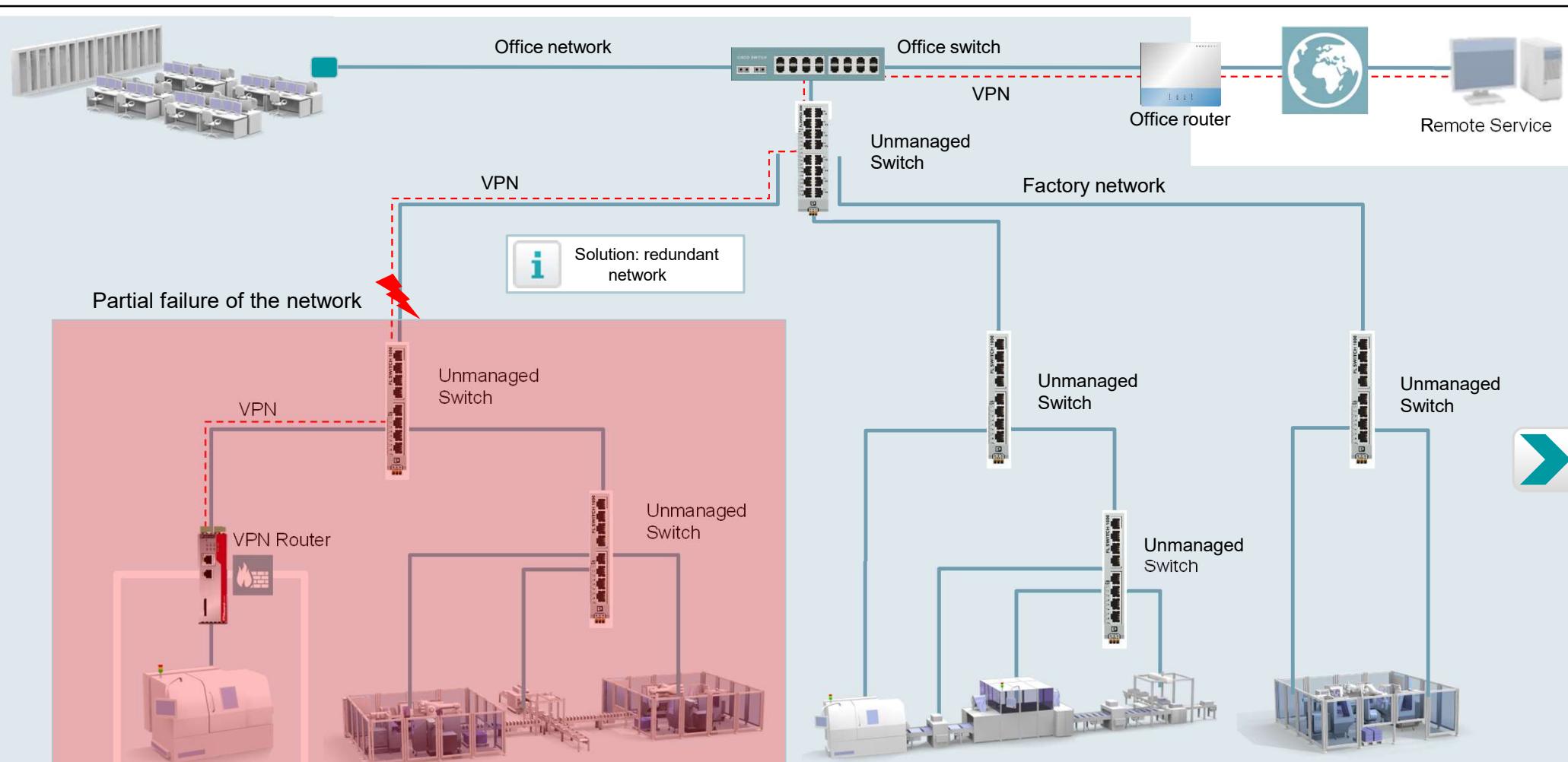


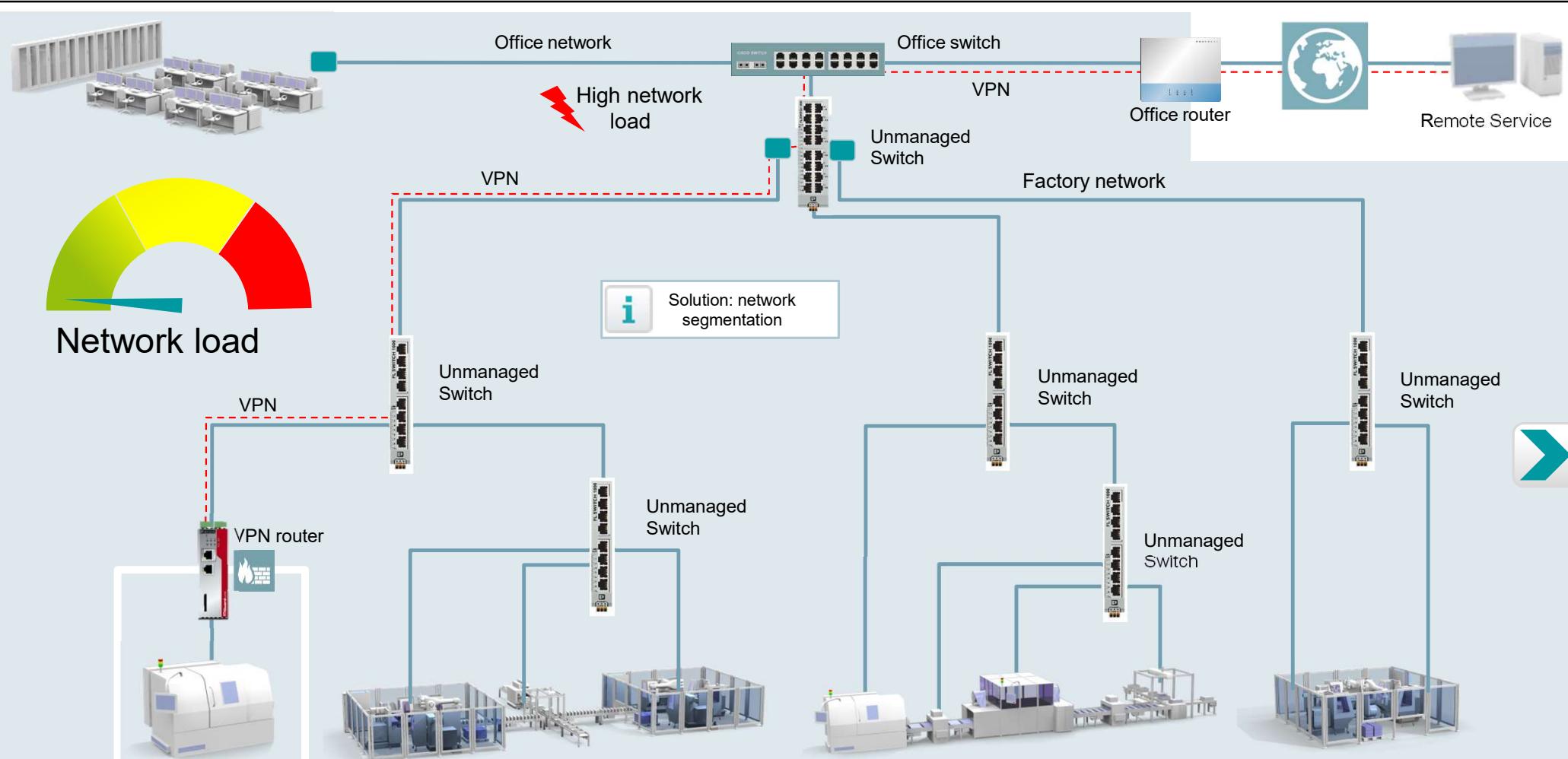
2D-Topology

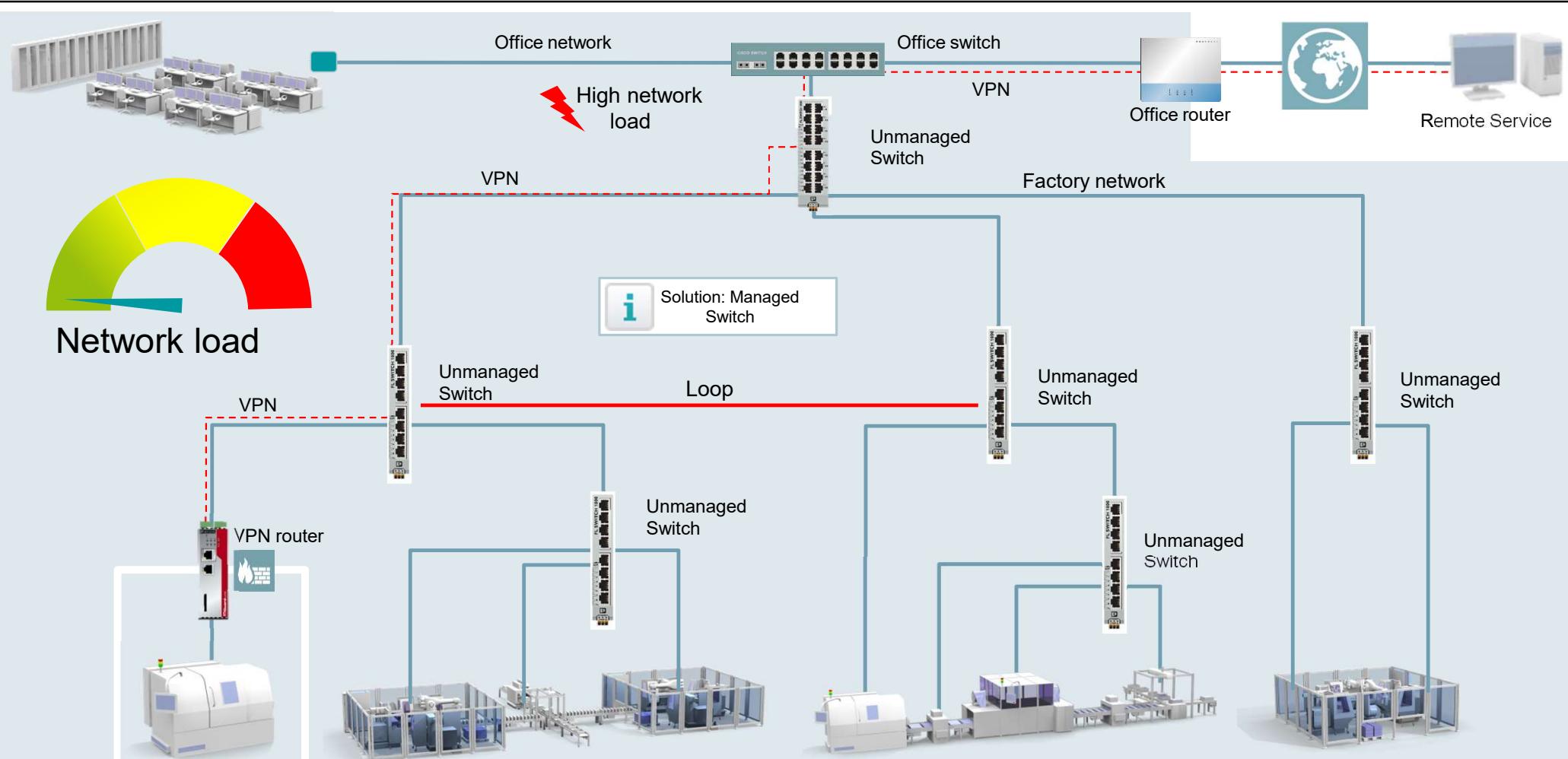




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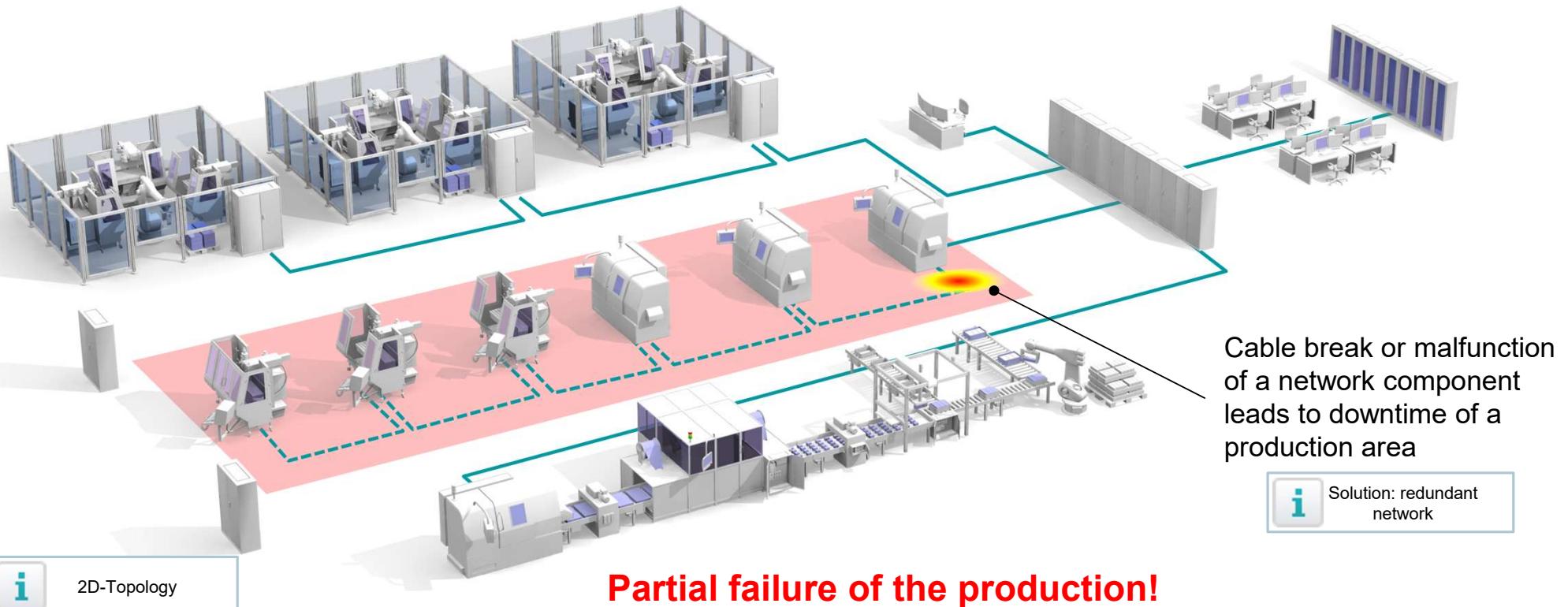






# Typical problems in unmanaged networks

*Cable or device faults*

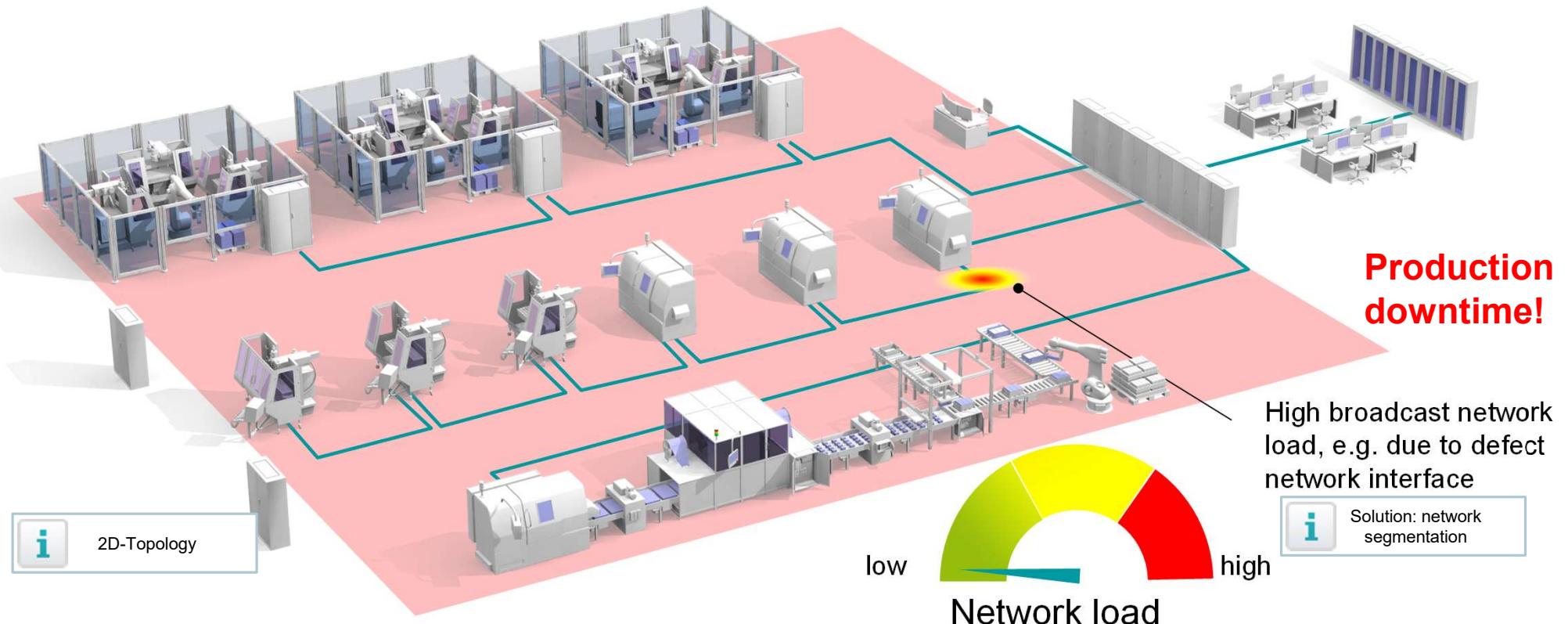


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# Typical problems in unmanaged networks

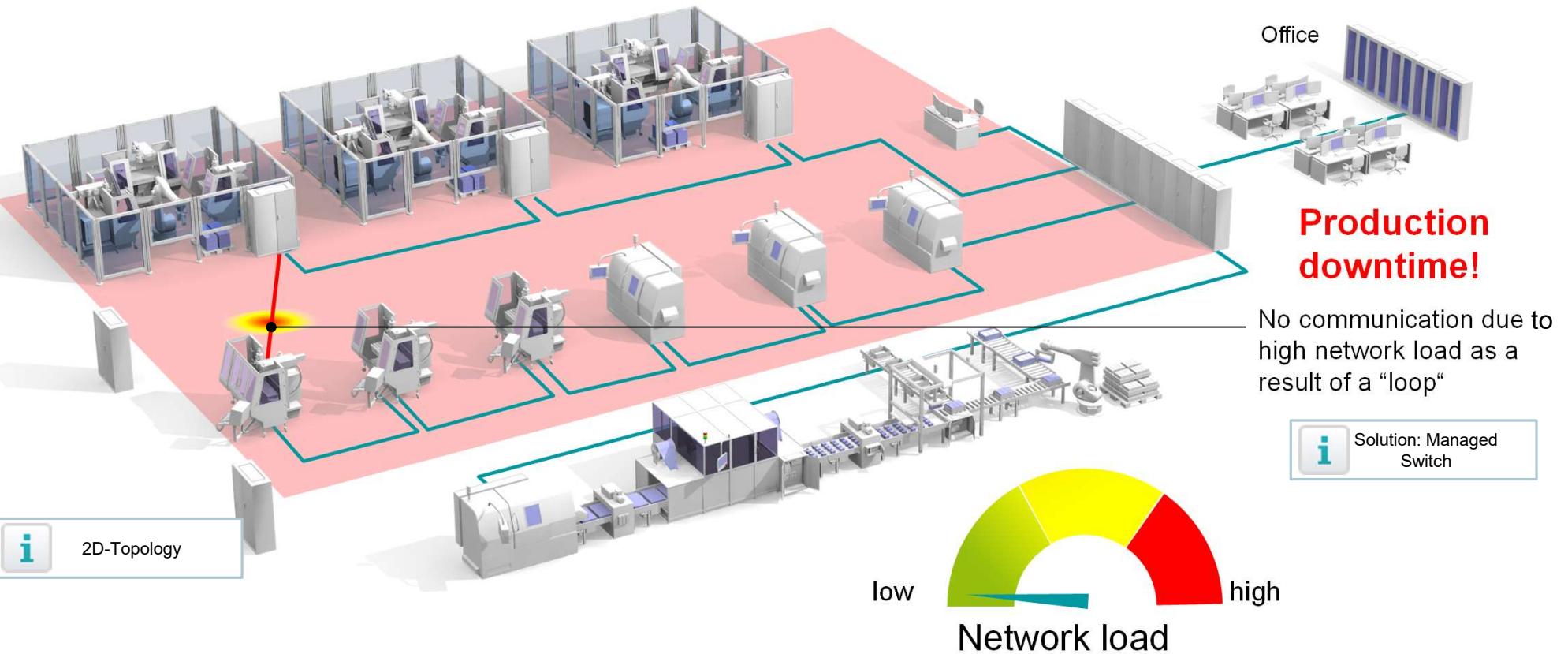
*High network load*



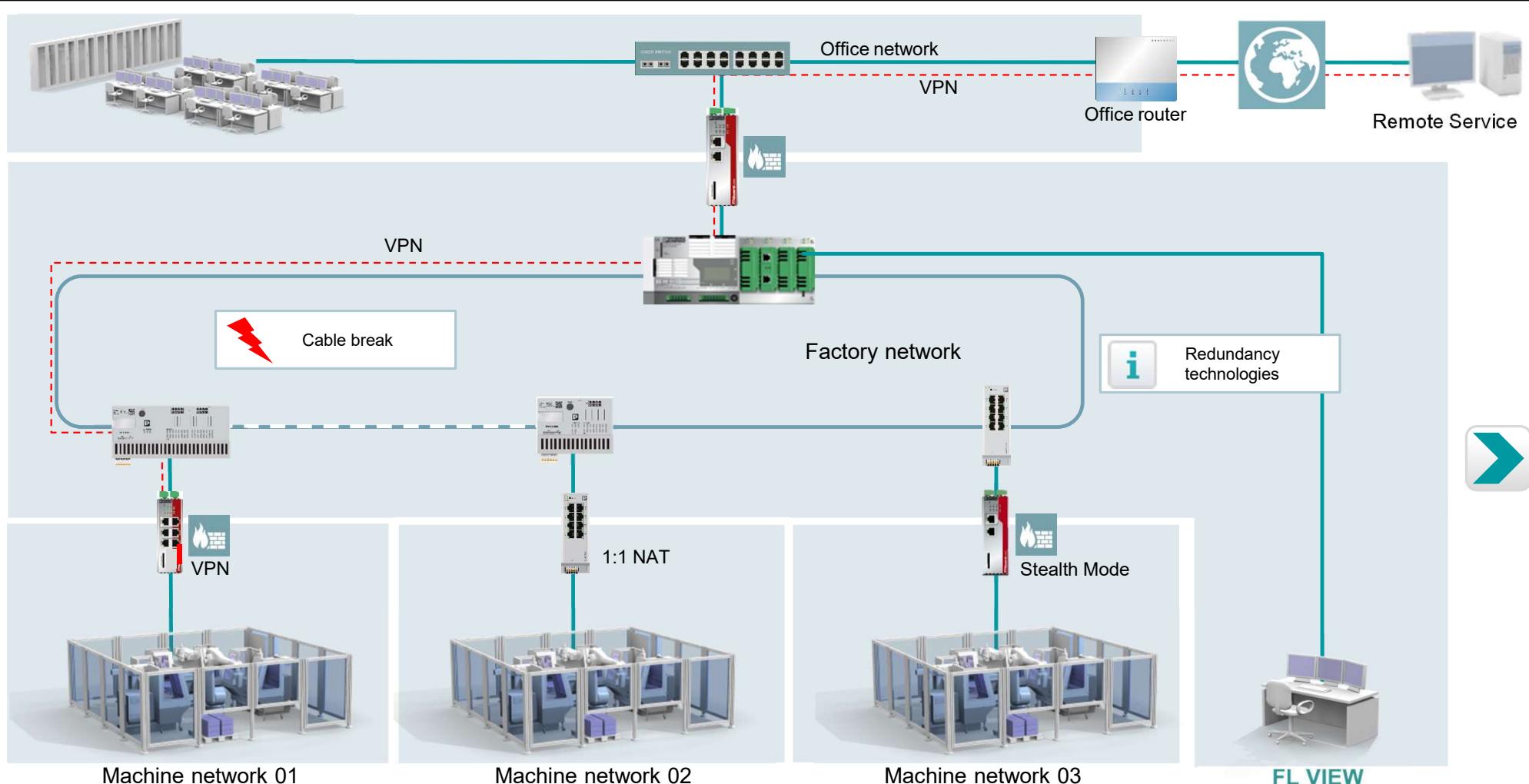
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# Typical problems in unmanaged networks

## *Network loop*



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Machine network 01

Machine network 02

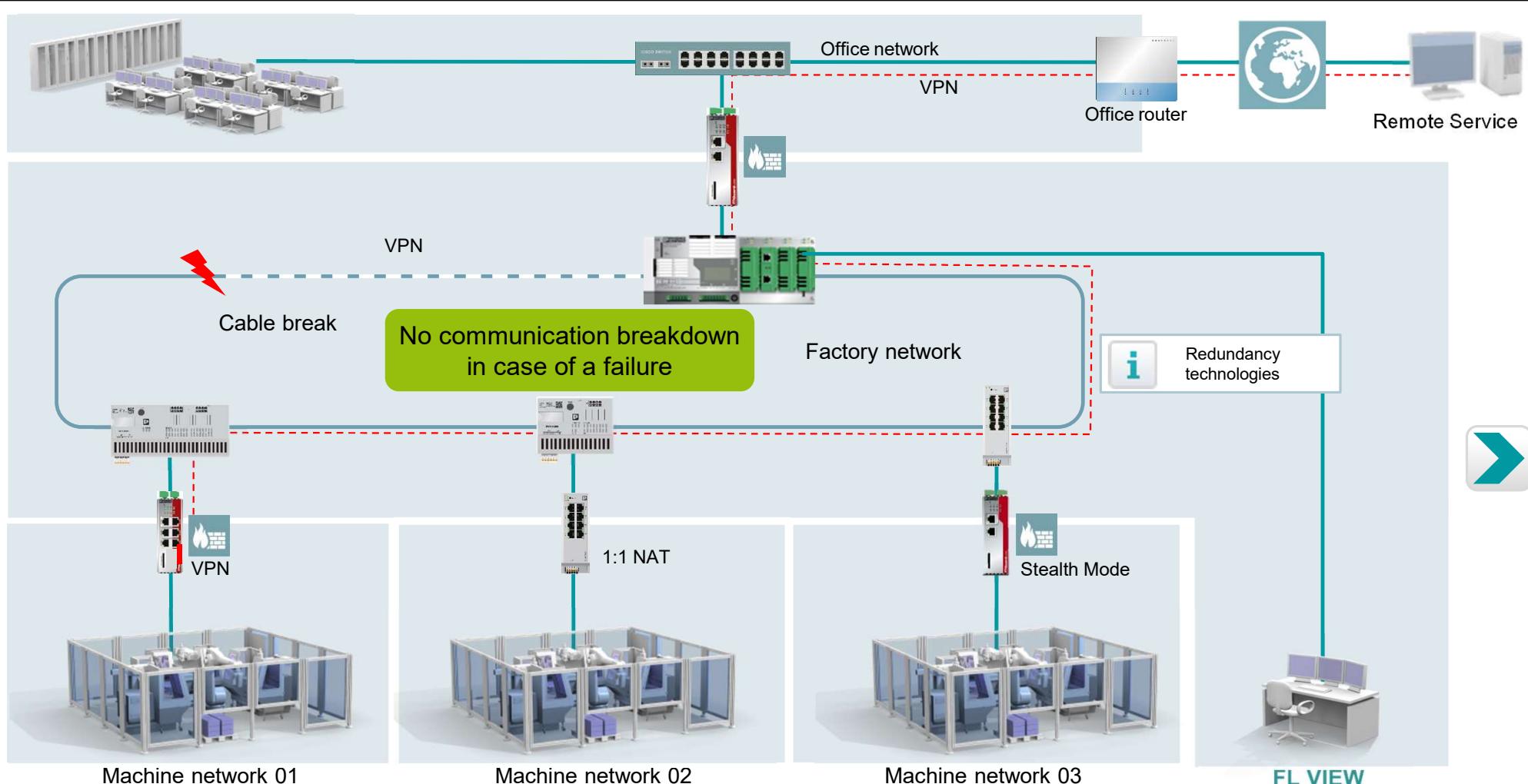
Machine network 03

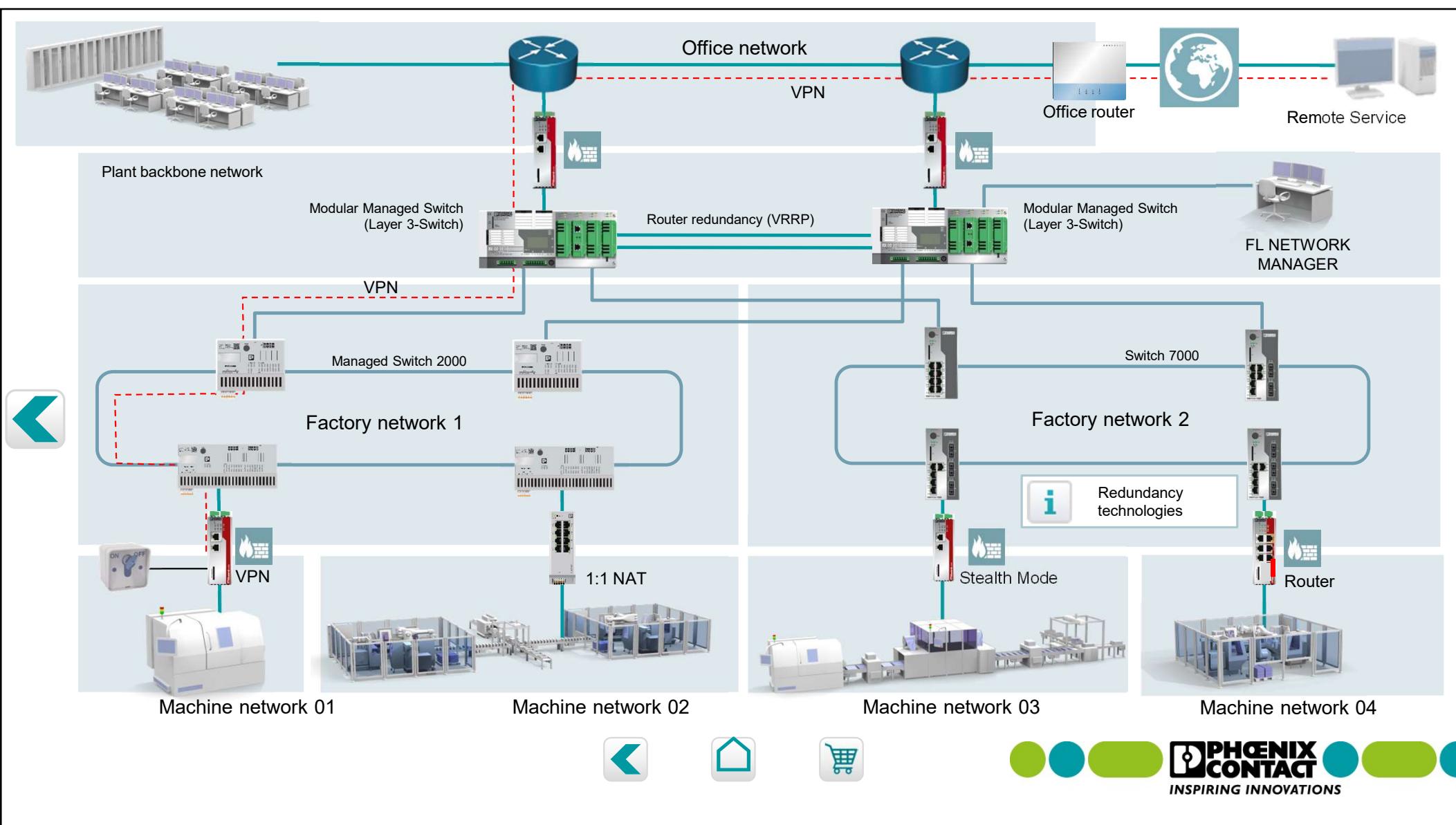
**FL VIEW**

Network Overview

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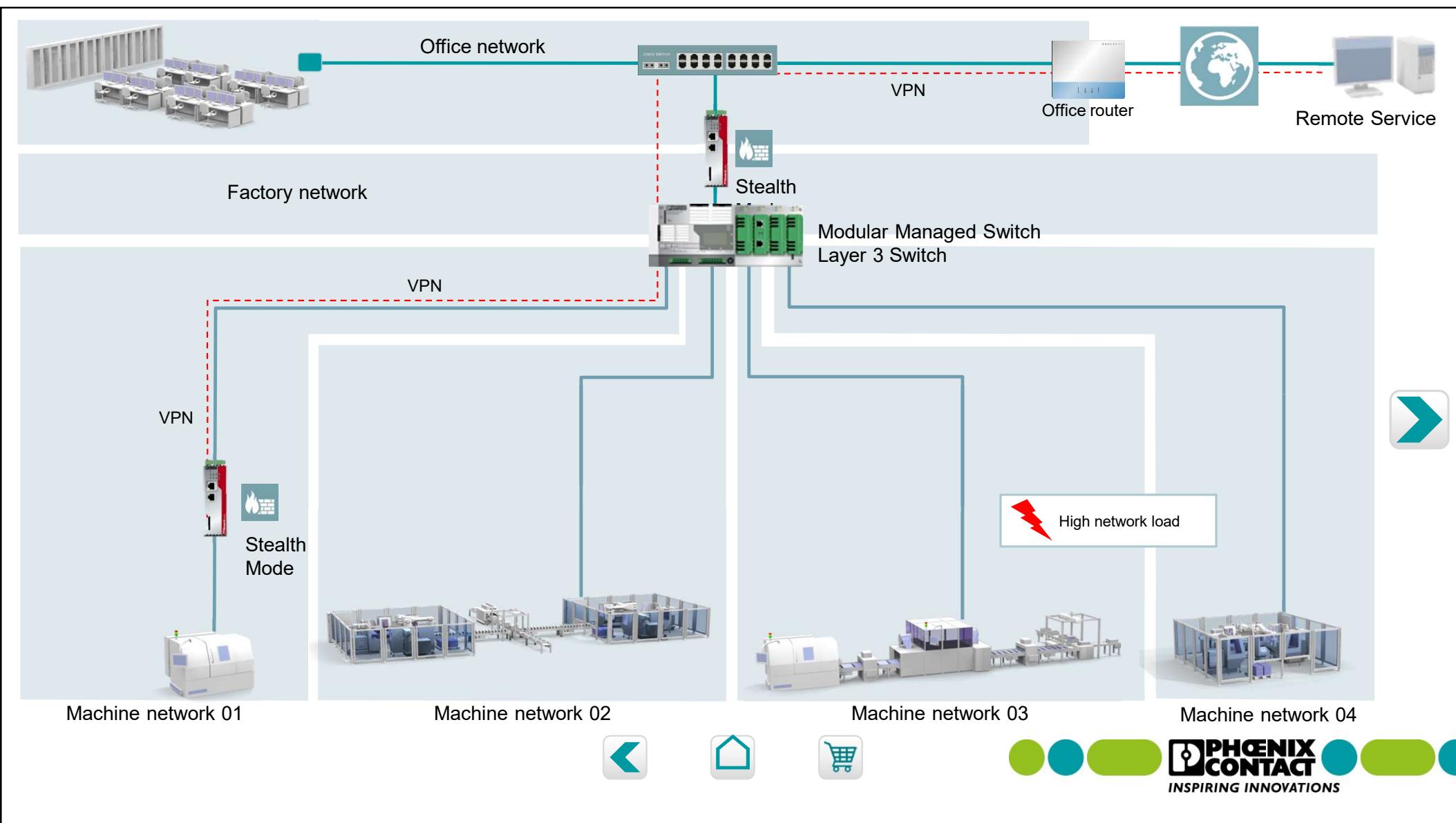


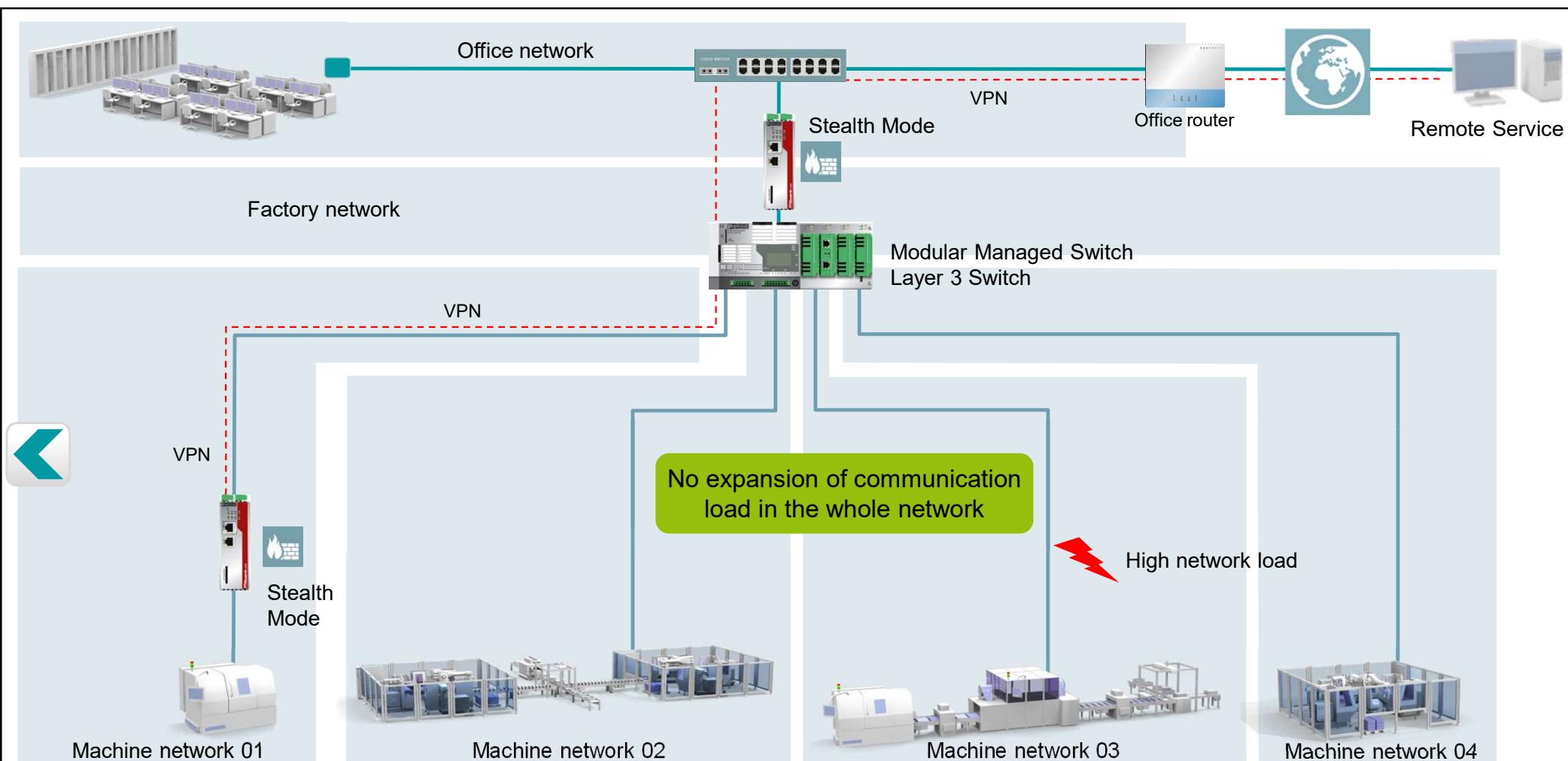


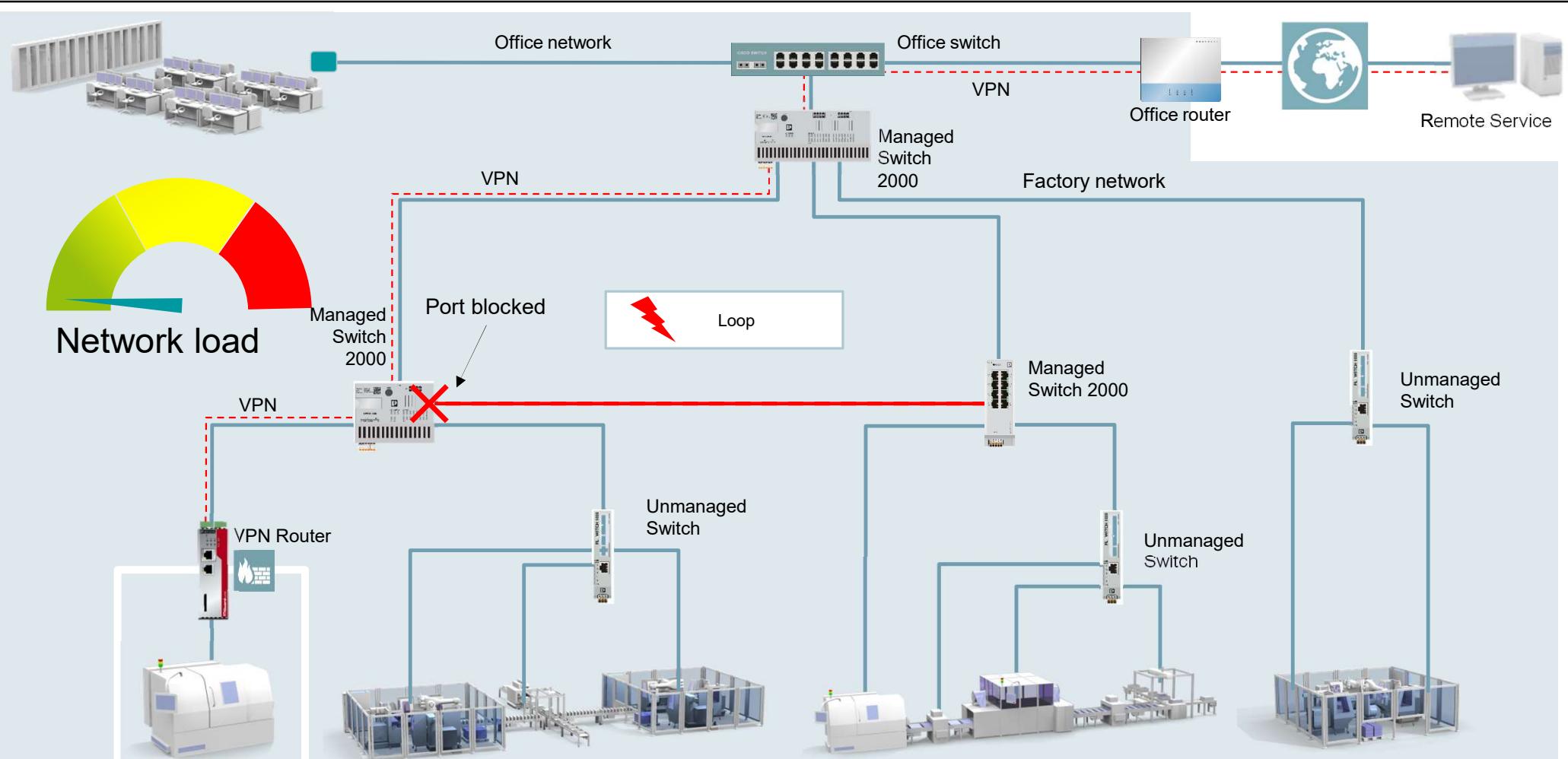


Standard	Products	Standard	Reconfiguration time	Topologies	Max. devices	Ring coupling	Applications
<b>RSTP/STP</b> Rapid Spanning Tree Protocol	Lean/Smart/Modular/Standard Managed	IEEE 802.1D-2004	Up to several seconds	Ring, meshed structures, star, tree	15 (for ring structure)	Yes	IT and automation networks
<b>RSTP</b> Fast ring detection + Large Tree Support	Lean/Smart/Switch 7000, GHS	-	100 to 500 ms	Ring, meshed structures, star, tree	57 (for ring structure)	Yes	Automation networks
<b>MRP</b> Media Redundancy Protocol	Smart Managed and Modular Managed Switch	IEC 62439-2	200 ms	Ring	50	No	PROFINET automation networks
<b>DLR</b> Device Level Ring	Switch 7000	-	3 ms	Ring	50	No	EtherNet/IP automation networks
<b>PRP</b> Parallel Redundancy Protocol	RED 2000E	IEC 62439-3	Bumpless	Double networks in line, star or tree formation	Any	-	Energy systems. Infrastructure
<b>ERR</b> Extended Ring Redundancy	Switch 3000/4000	-	15 ms	Ring	200	Yes	Infrastructure
<b>VRP</b> Virtual Router Redundancy Protocol	RFC 3768	-	Up to several seconds	Double and multiple routers	Any	-	Connection to the company network

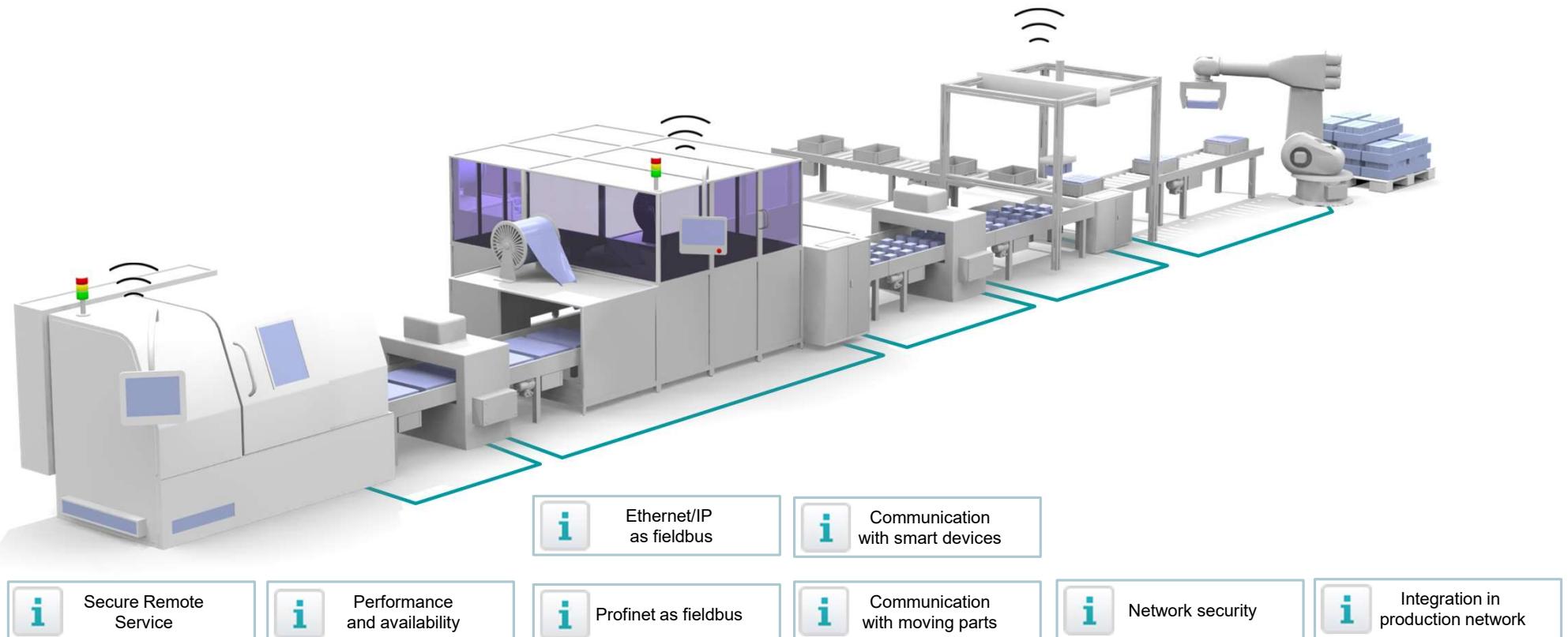








# Typical problems in machine networks



Factory network



Machine network

Machine core network

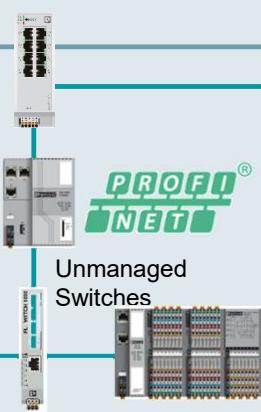
**PROFI**  
NET® MRP ring

Managed  
Switch 2000

Managed  
Switch 2000

IRT Switches

**PROFI**  
NET®  
IRT Switches



Managed  
Switch 2000

Unmanaged  
Switches

**PROFI**  
NET®

**PROFI**  
NET®

**PROFI**  
NET®

**PROFI**  
NET®

**PROFI**  
NET®



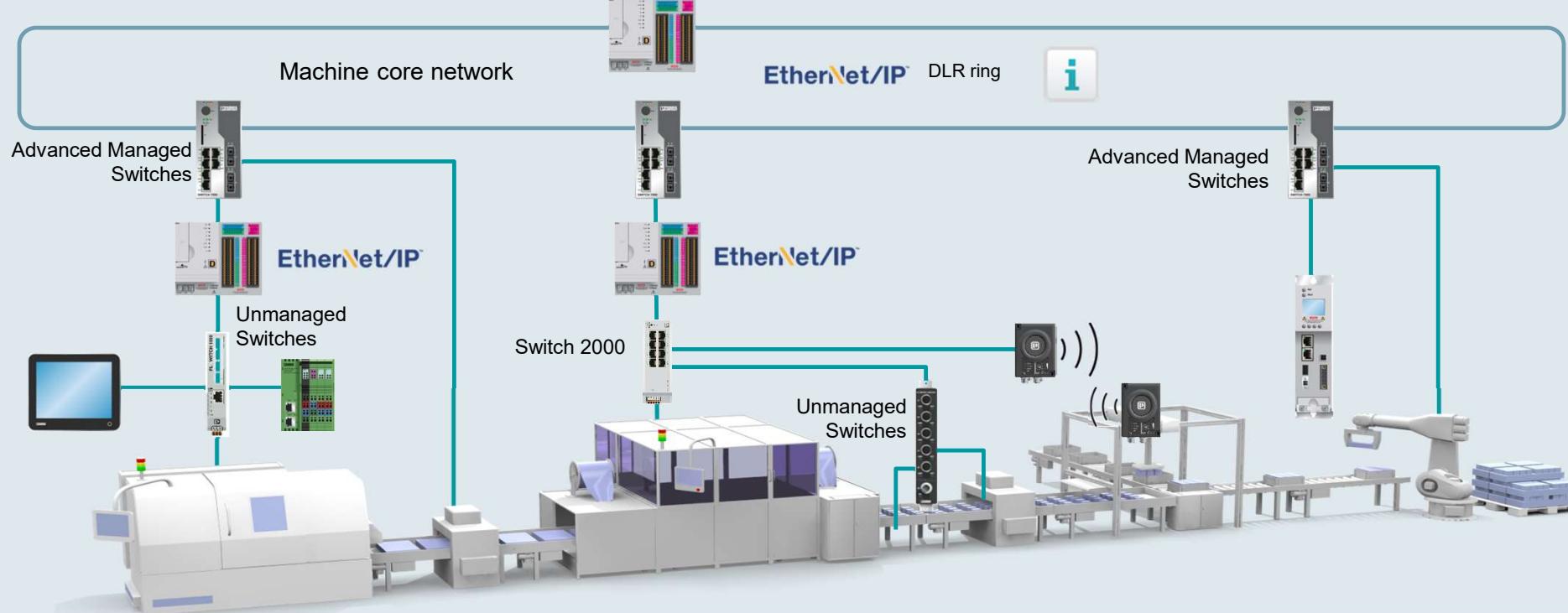
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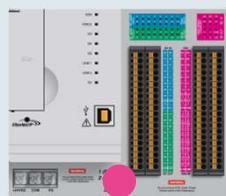


Factory network



Machine network

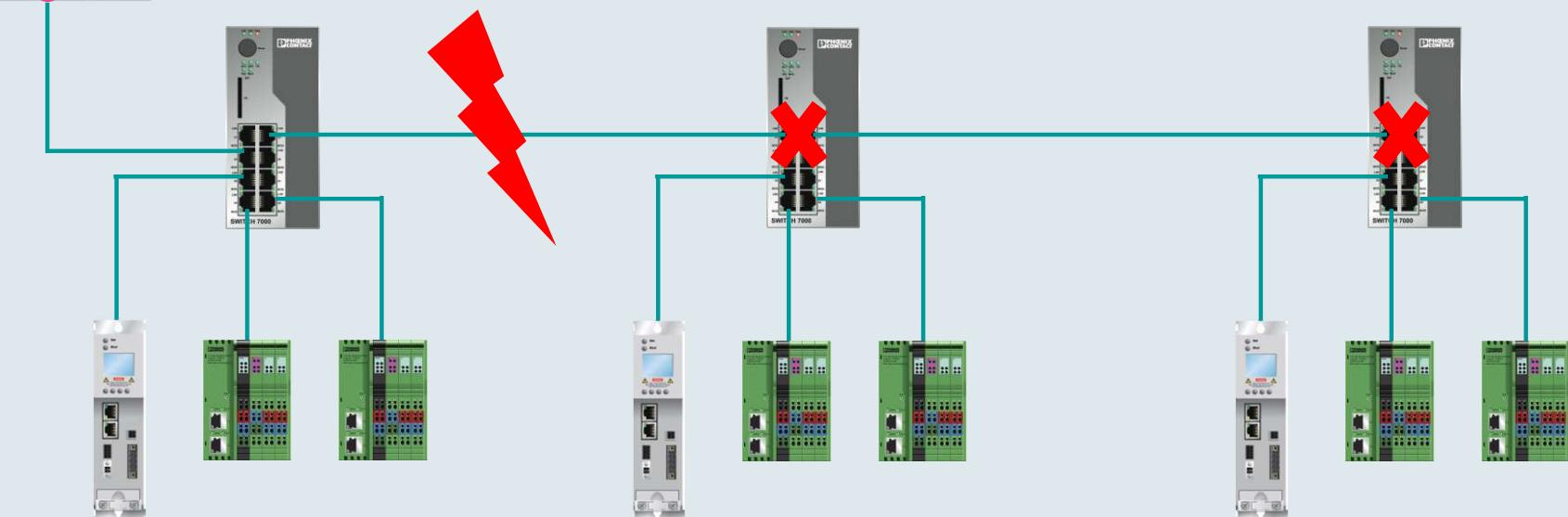


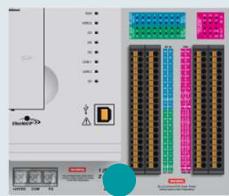


EtherNet/IP  
Controller

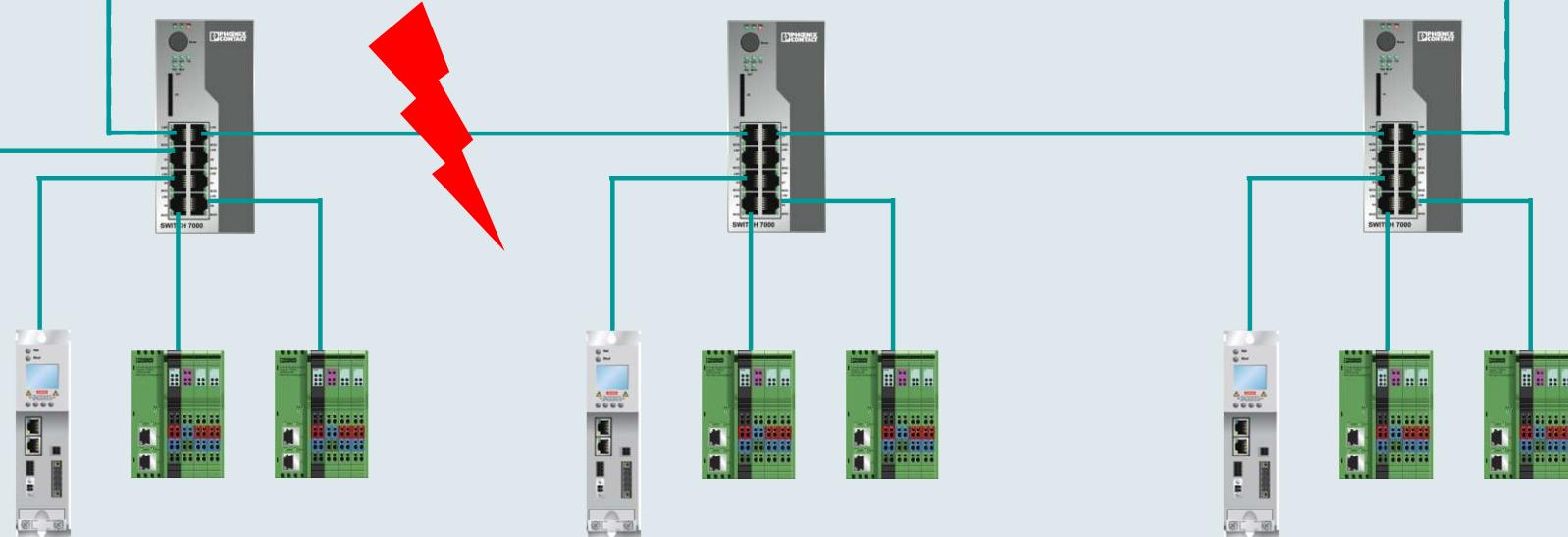


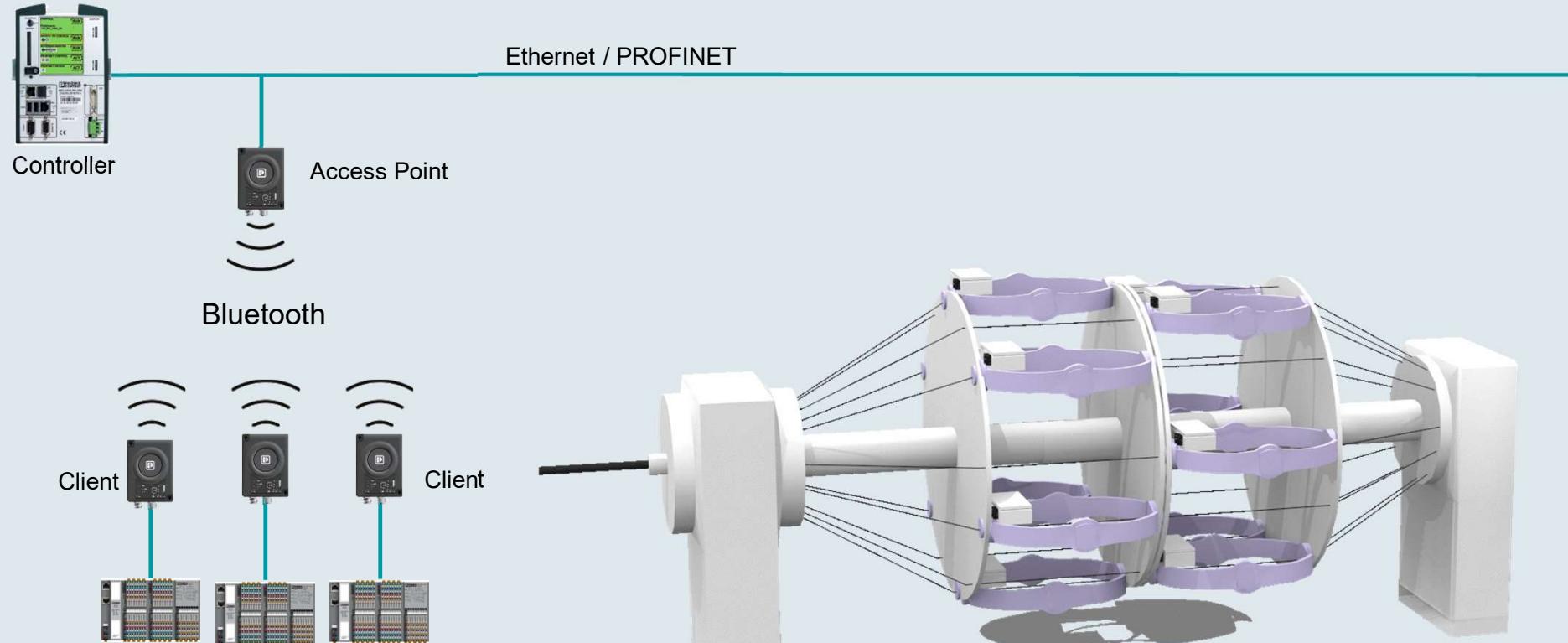
Activate redundancy  
mechanism



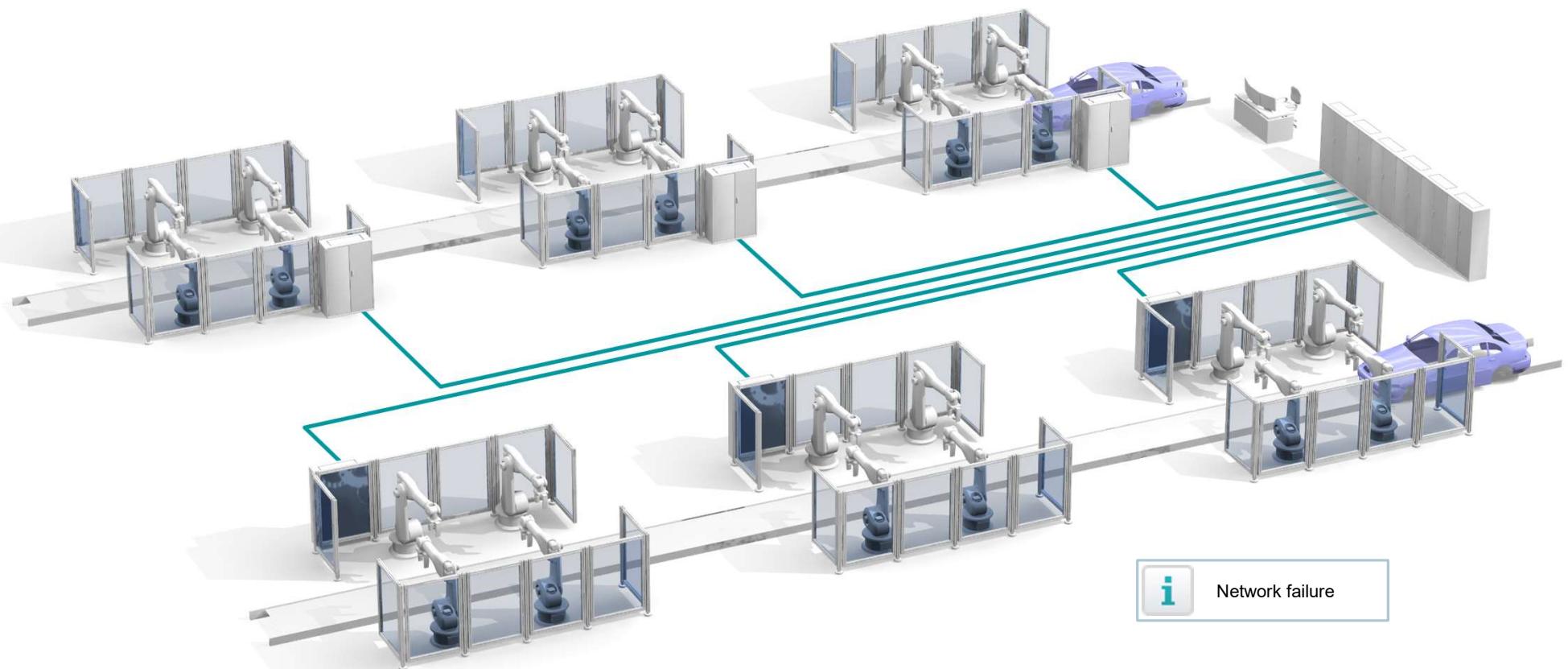


DLR redundancy – recovery time < 3 ms





# Production line



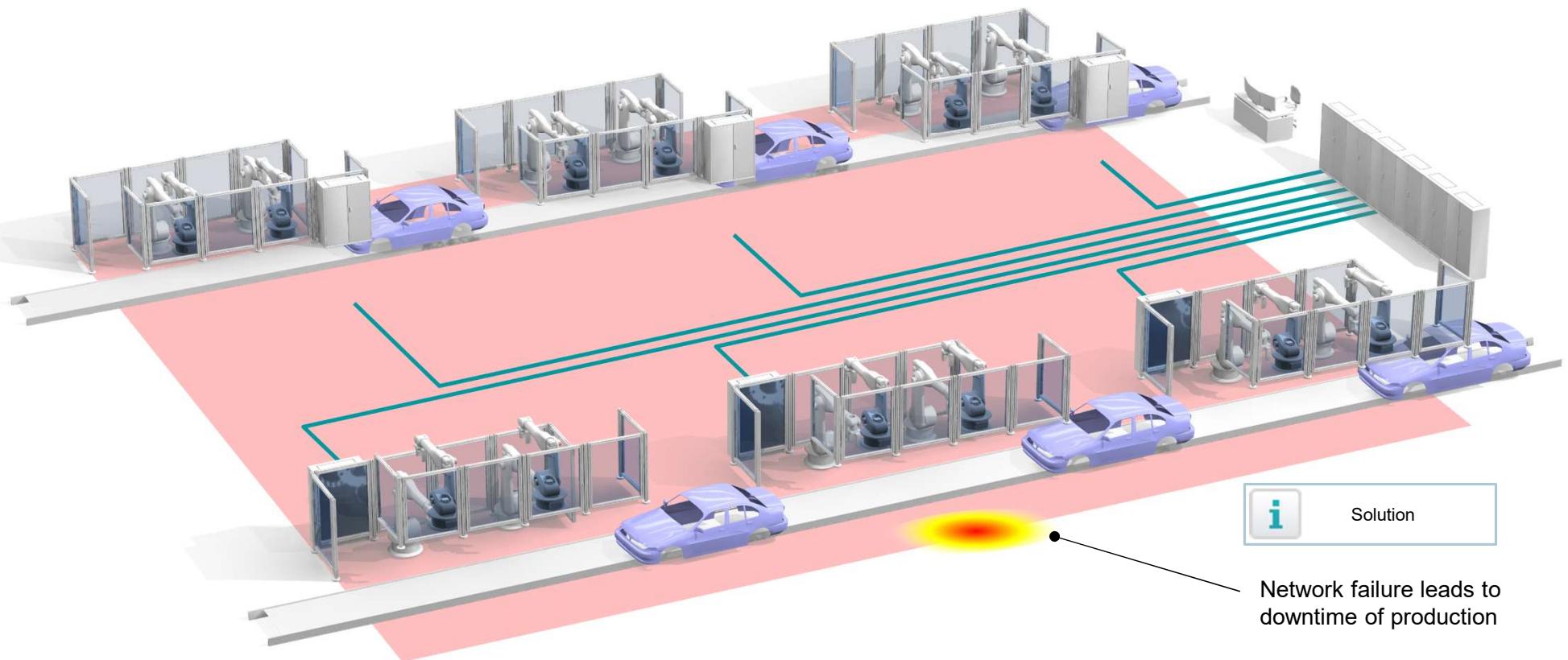
Network failure



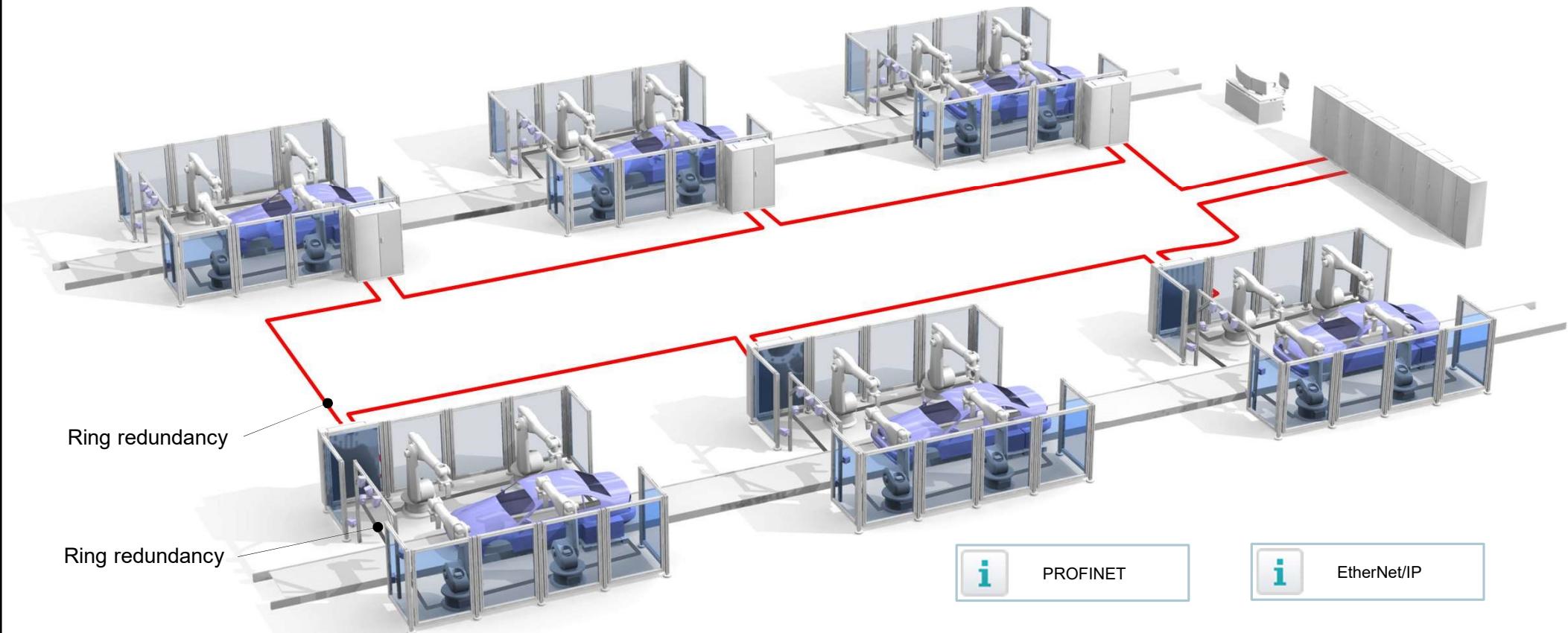
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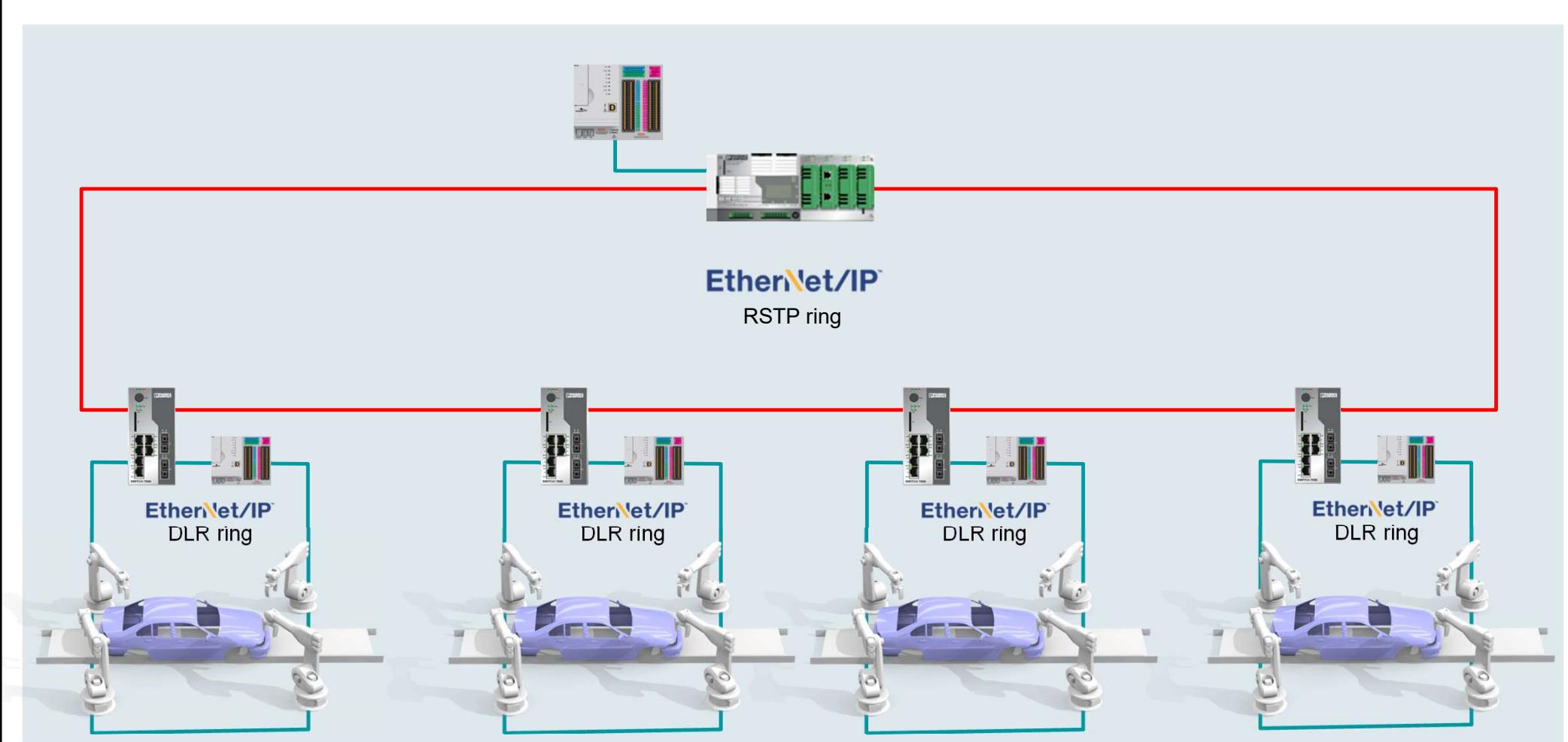


# Production line

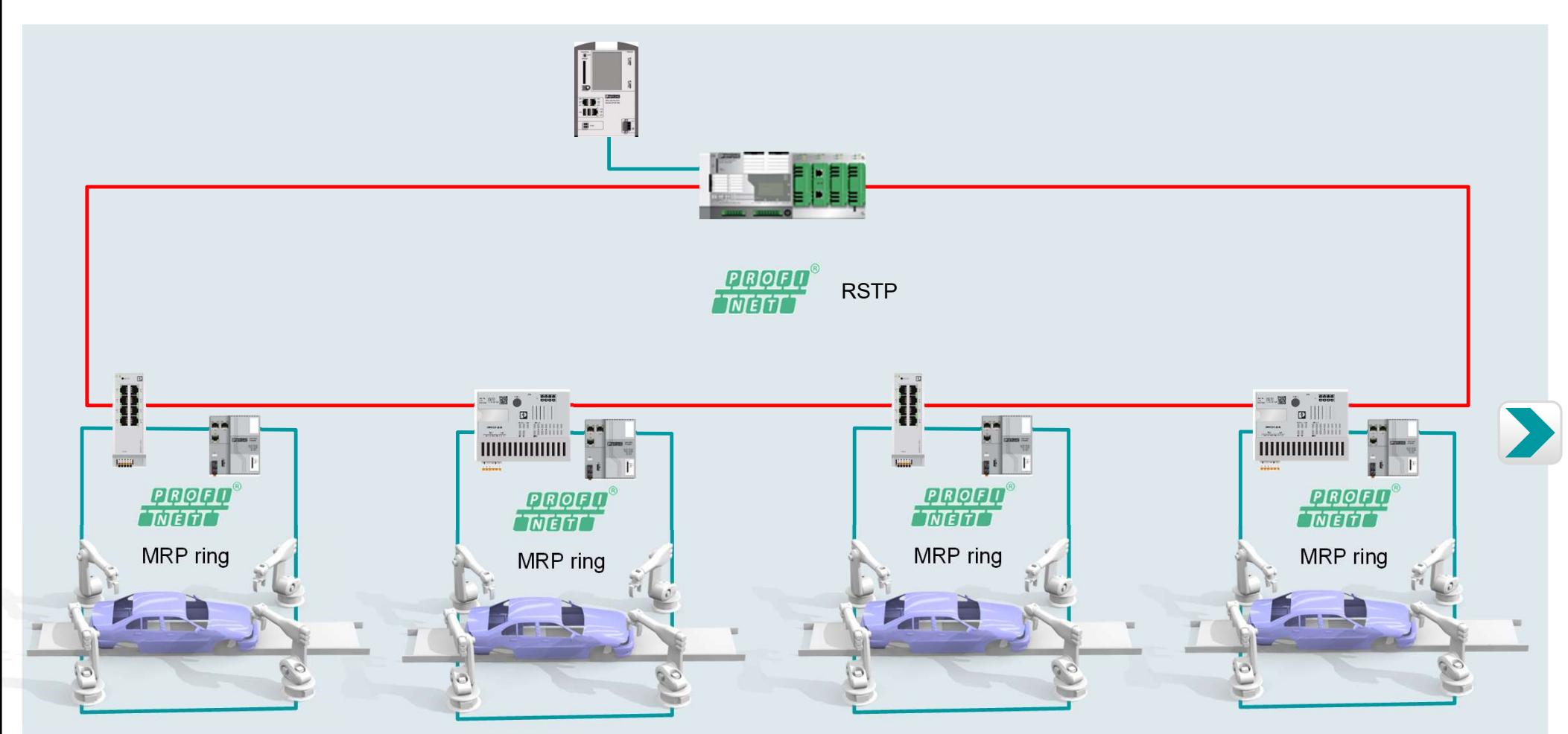


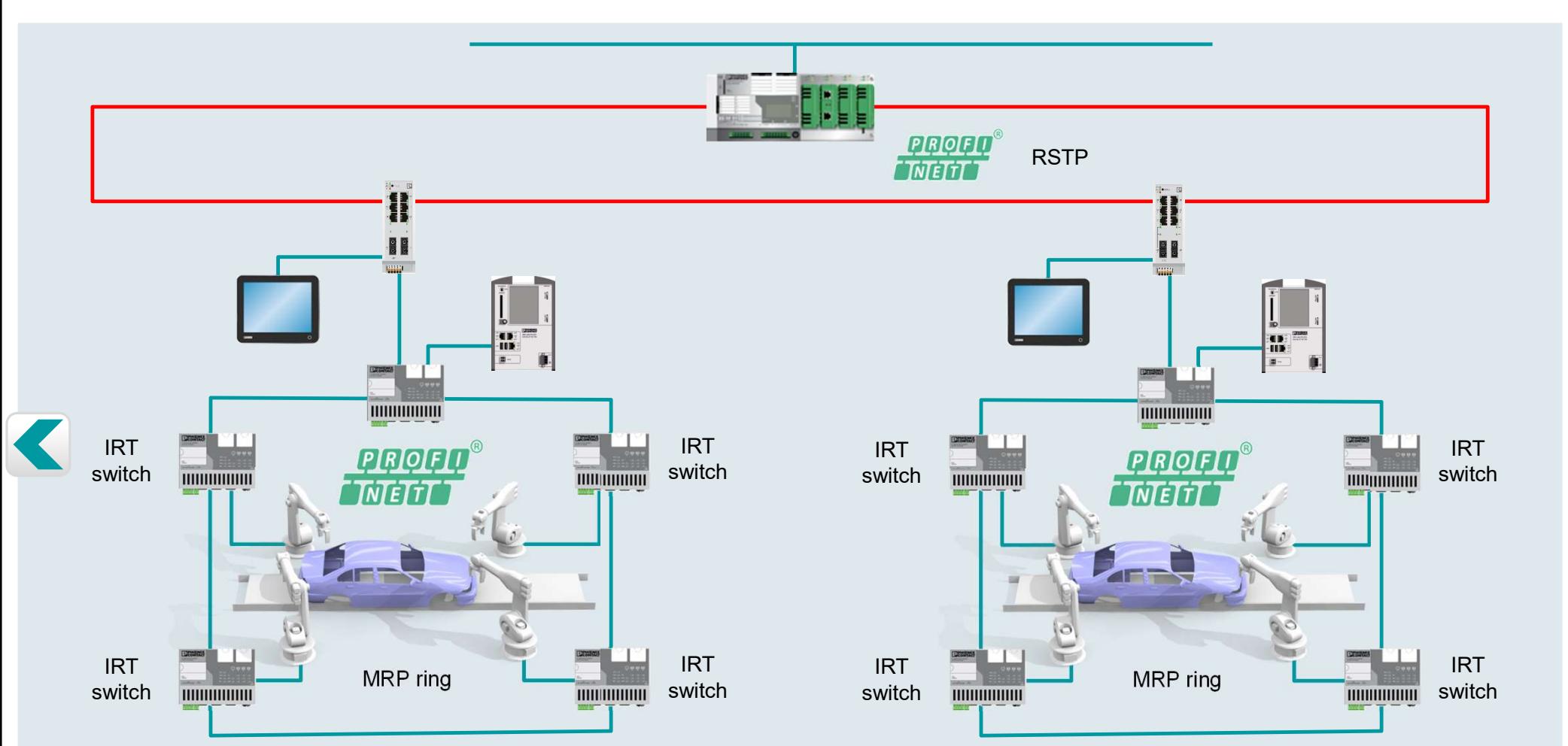
# Reliable production line network structure





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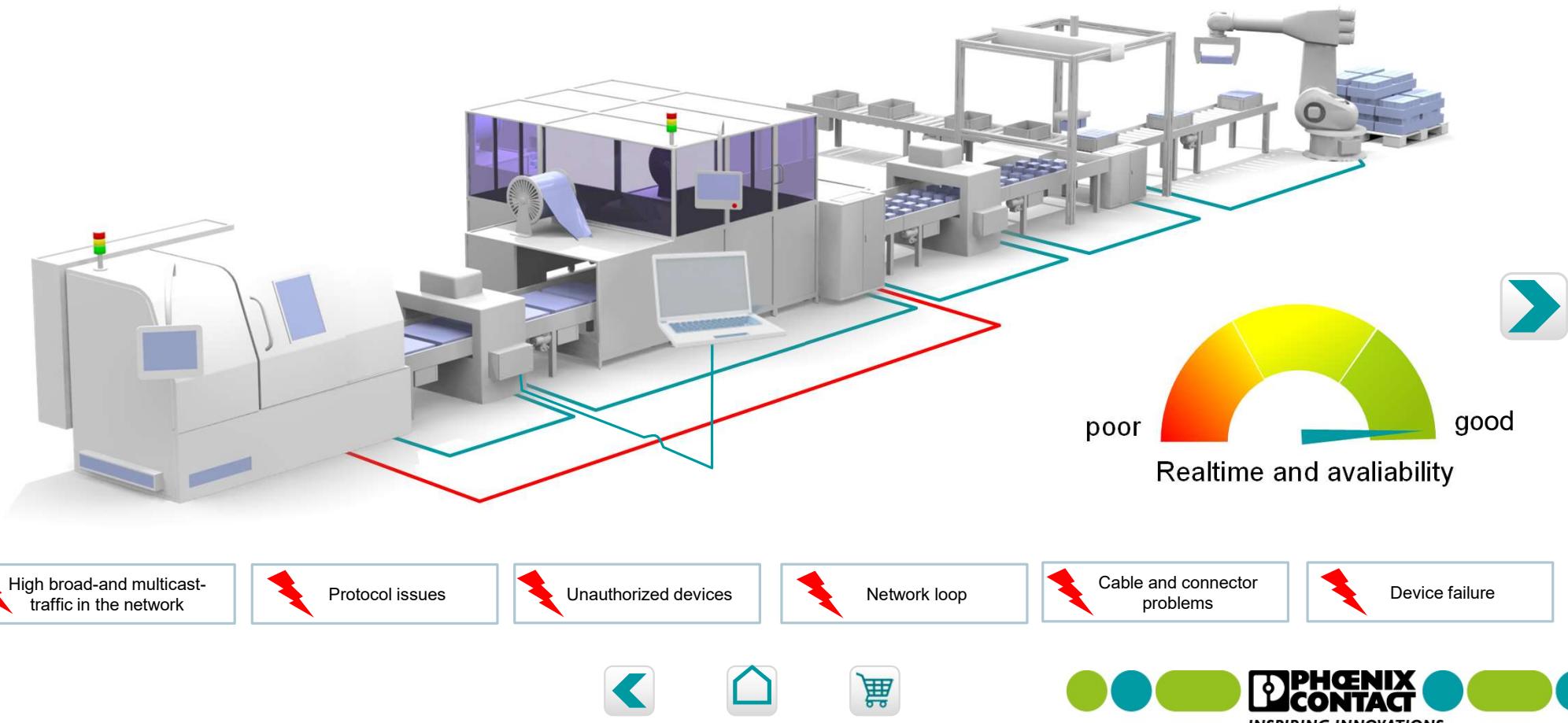


**PHOENIX CONTACT**  
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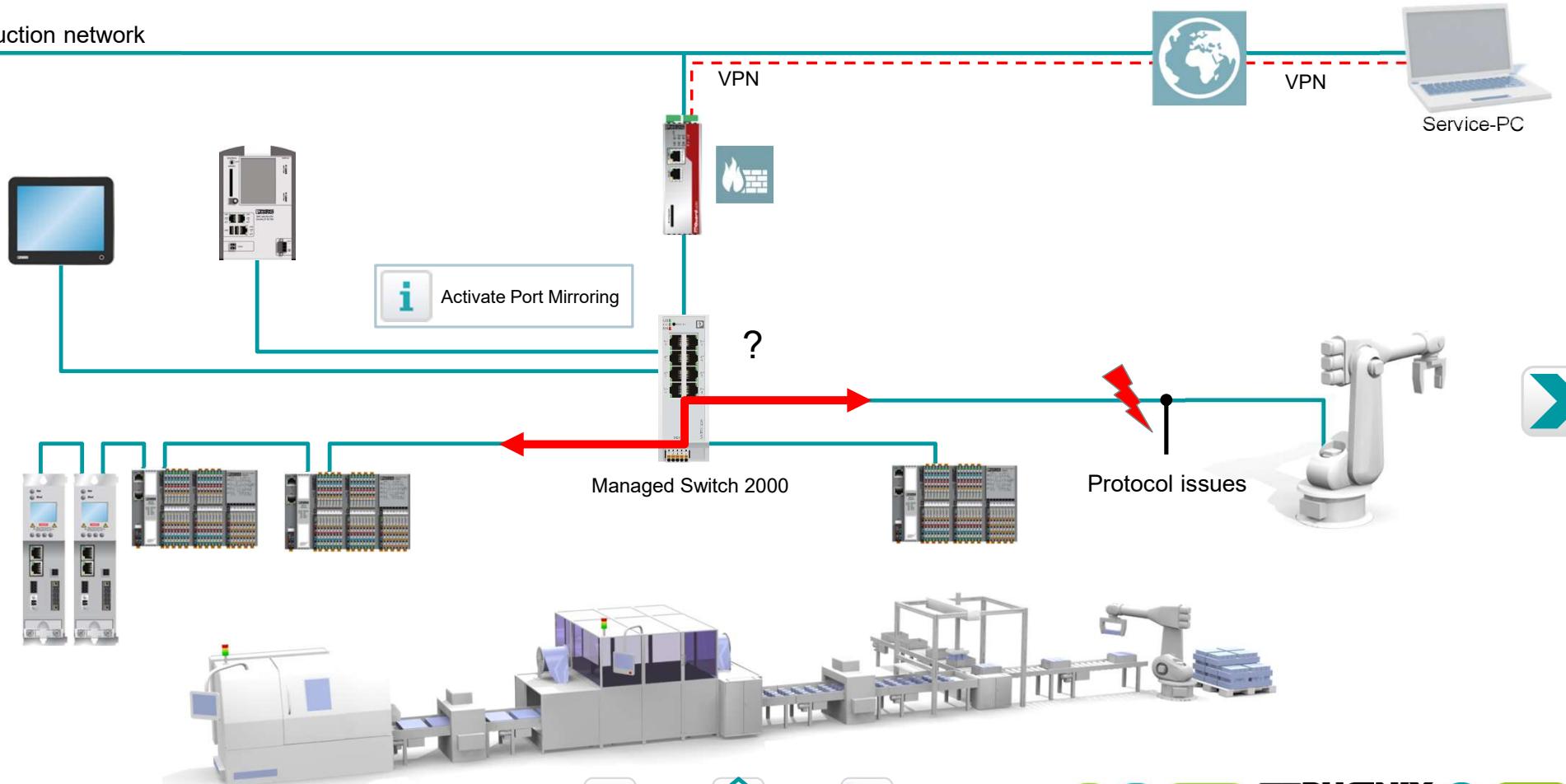
# Typical problems in unmanaged machine networks

### *Performance and availability*



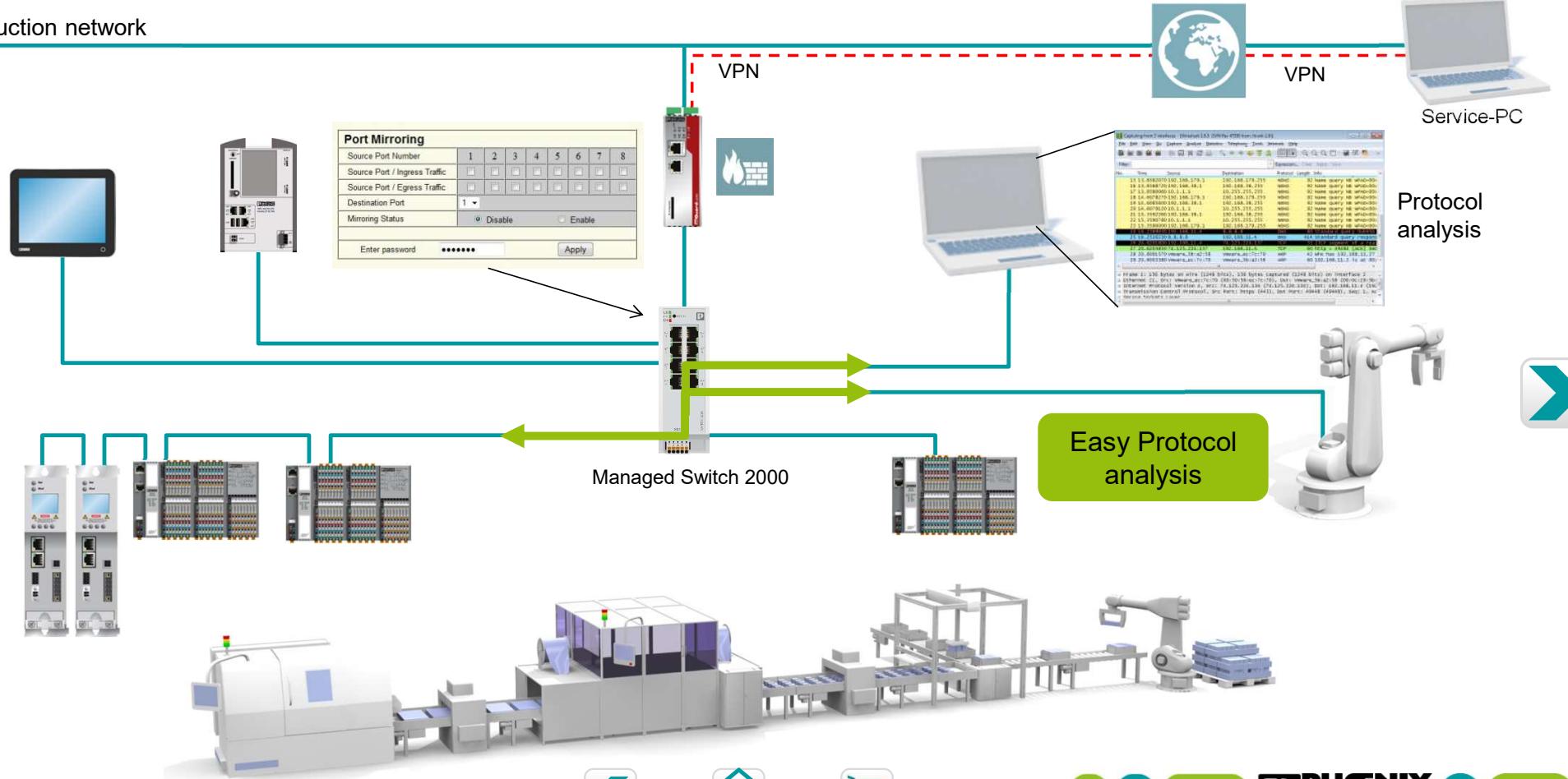
# Protocol issues

Production network



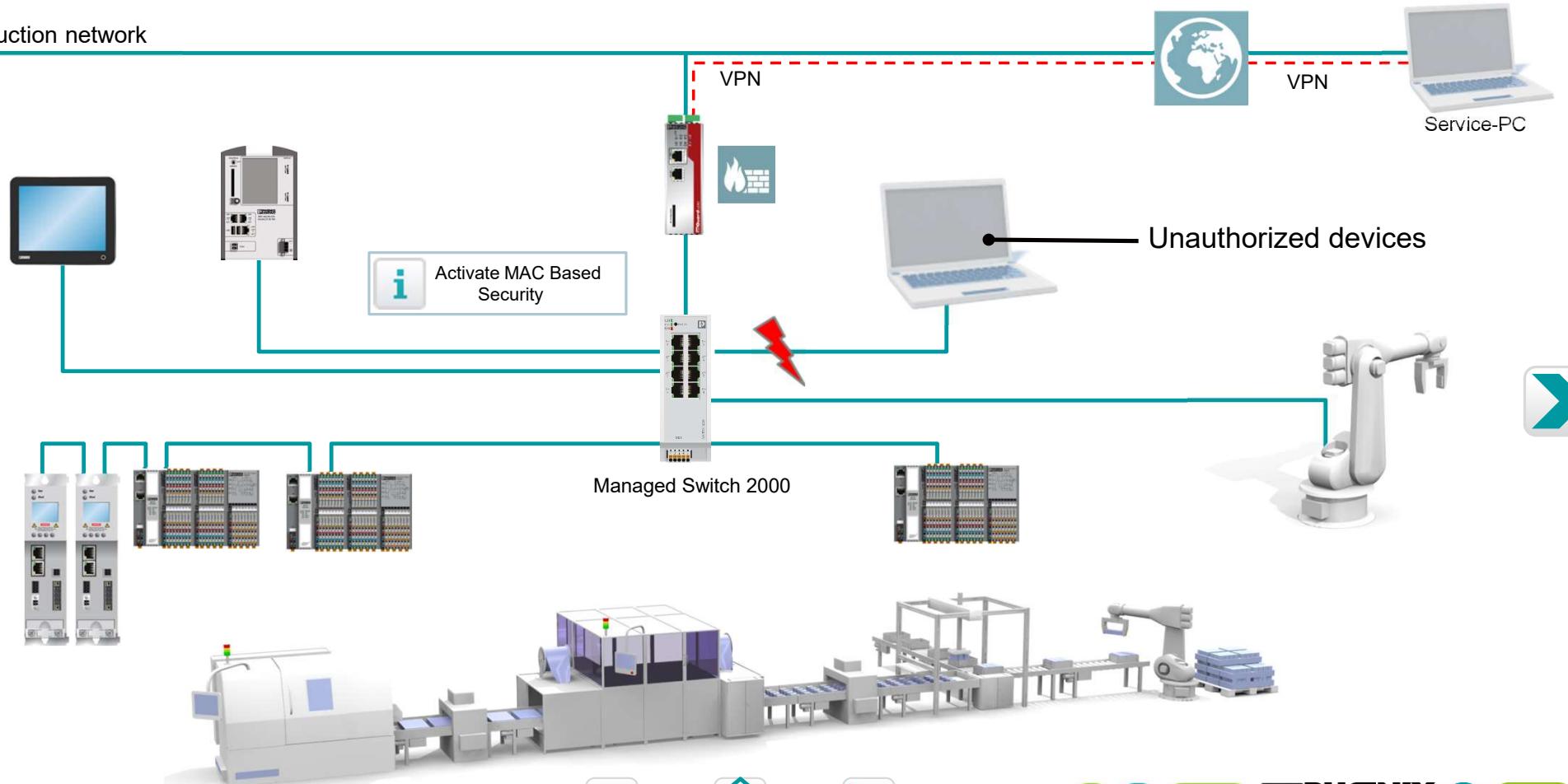
# Our solution: Port Mirroring

## Production network



# Unauthorized devices

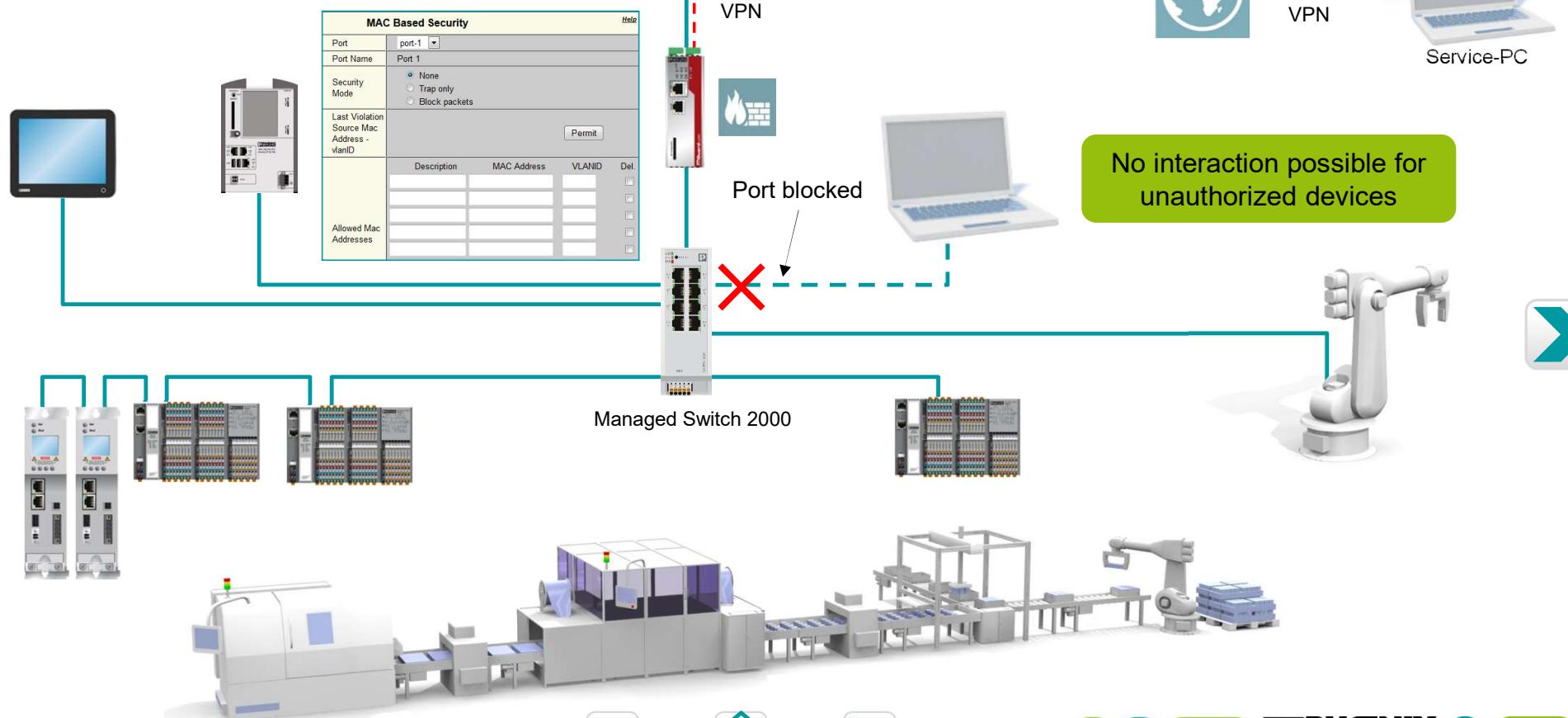
Production network



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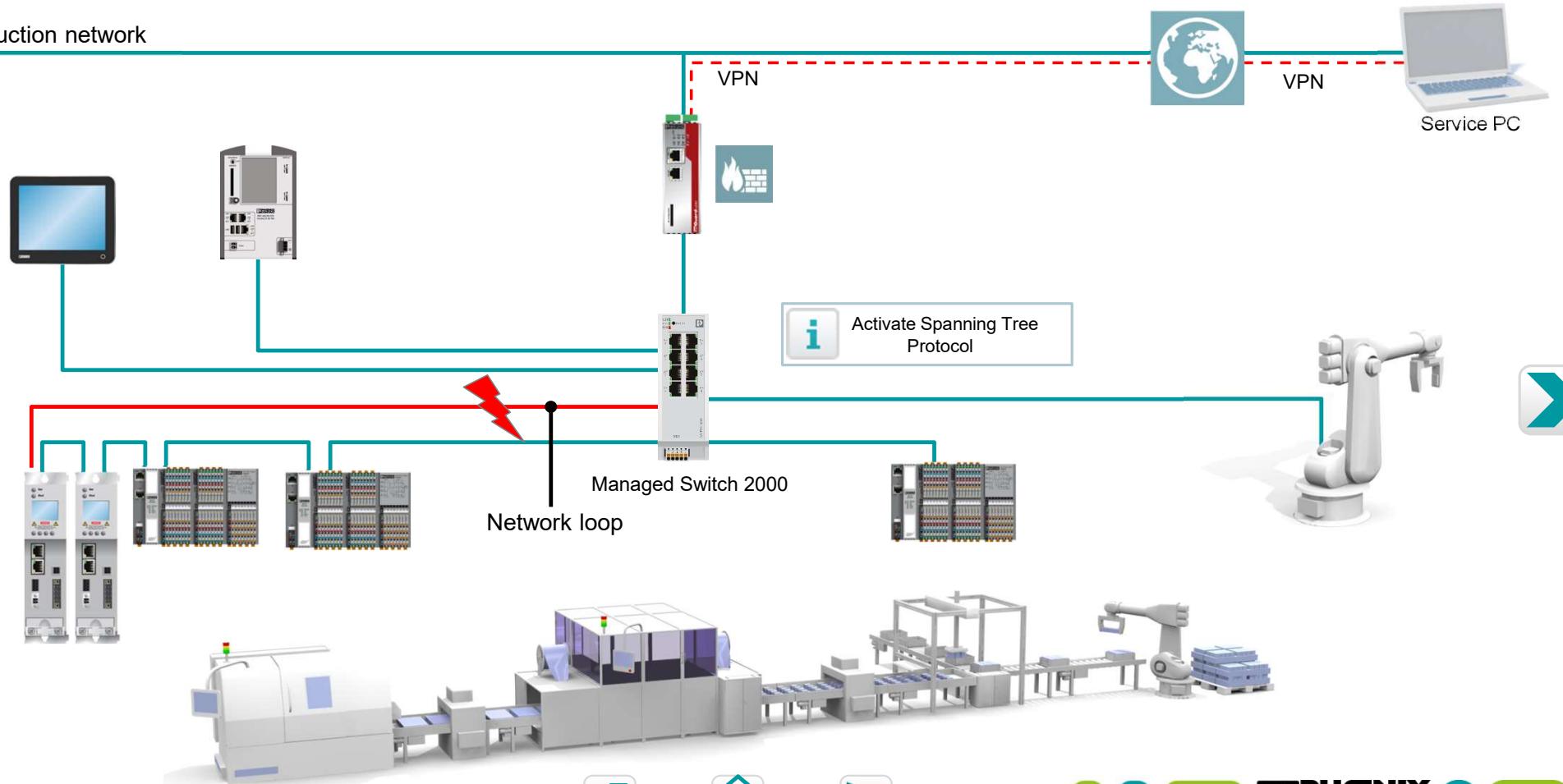
# Our Solution: MAC Based Security

Production network



# Network Loops

Production network

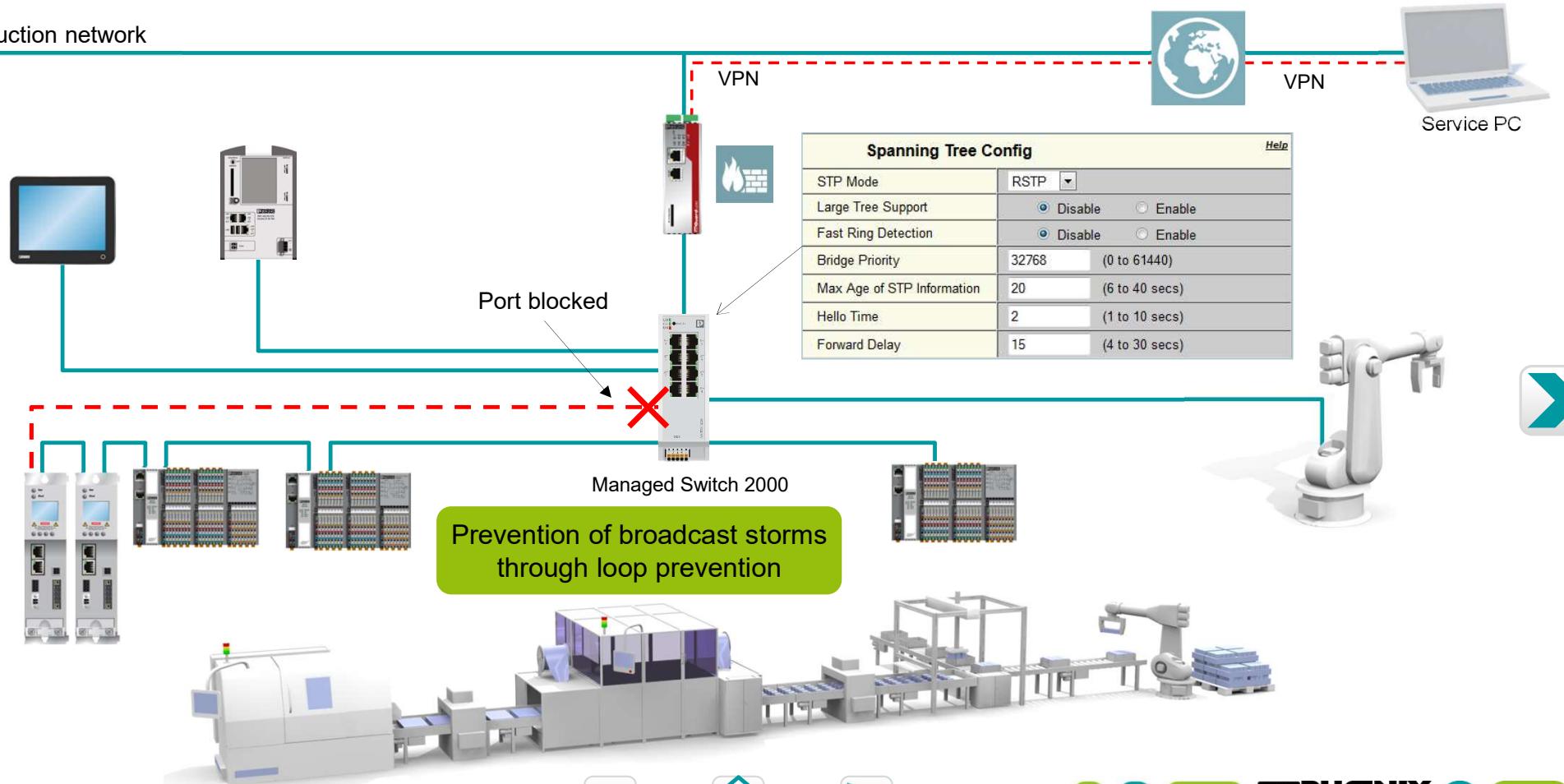


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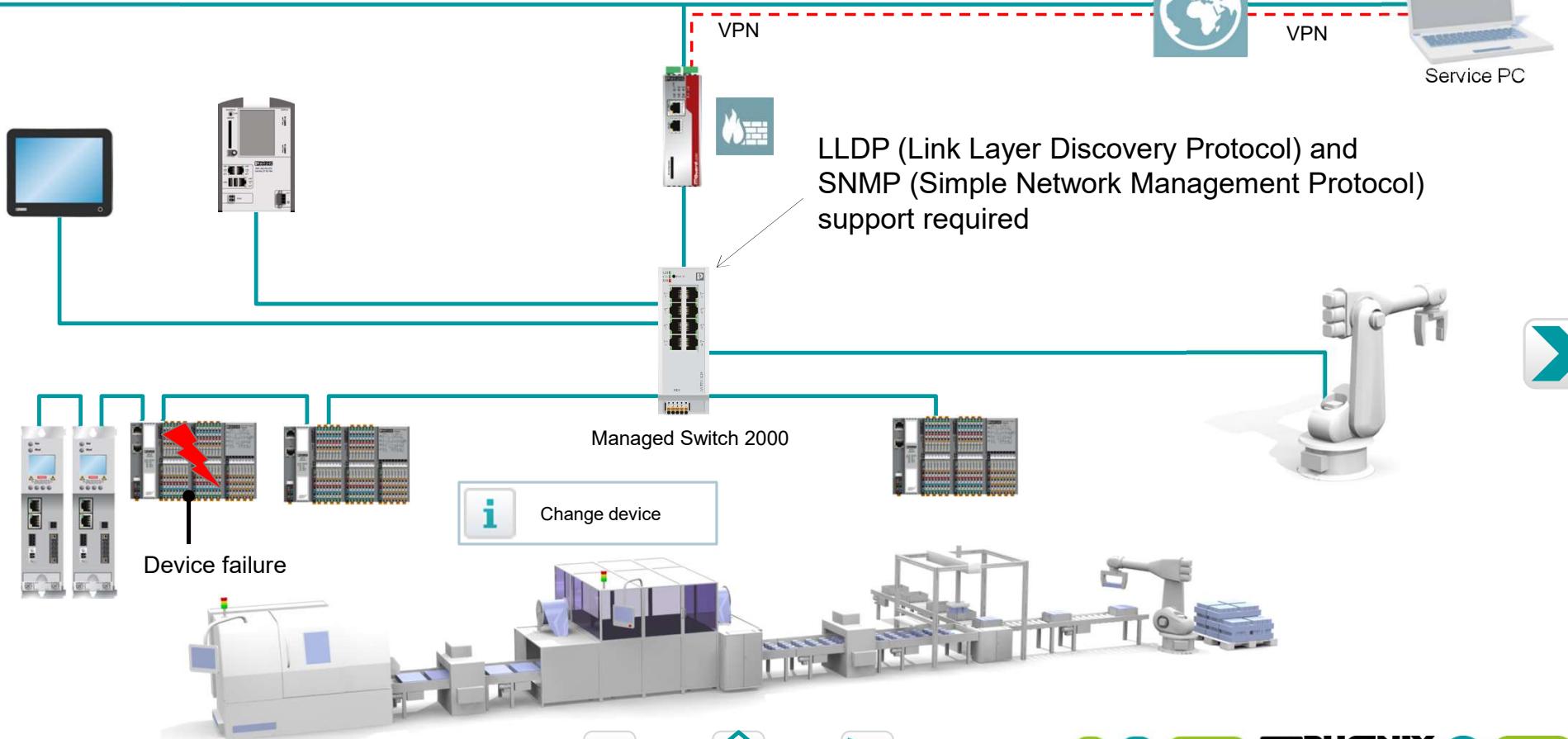
# Our Solution: Spanning Tree Protocol

Production network



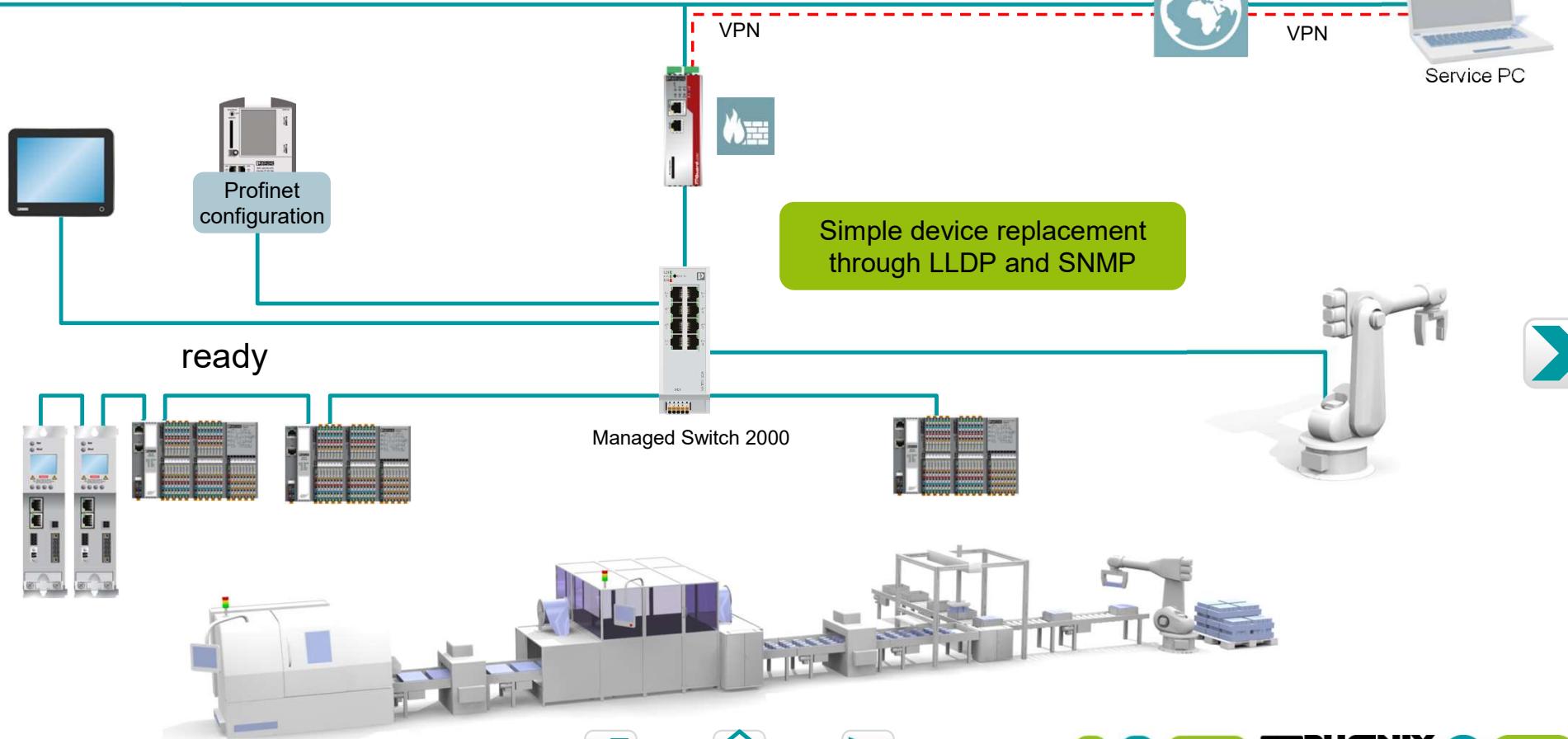
# Profinet simple device replacement

Production network



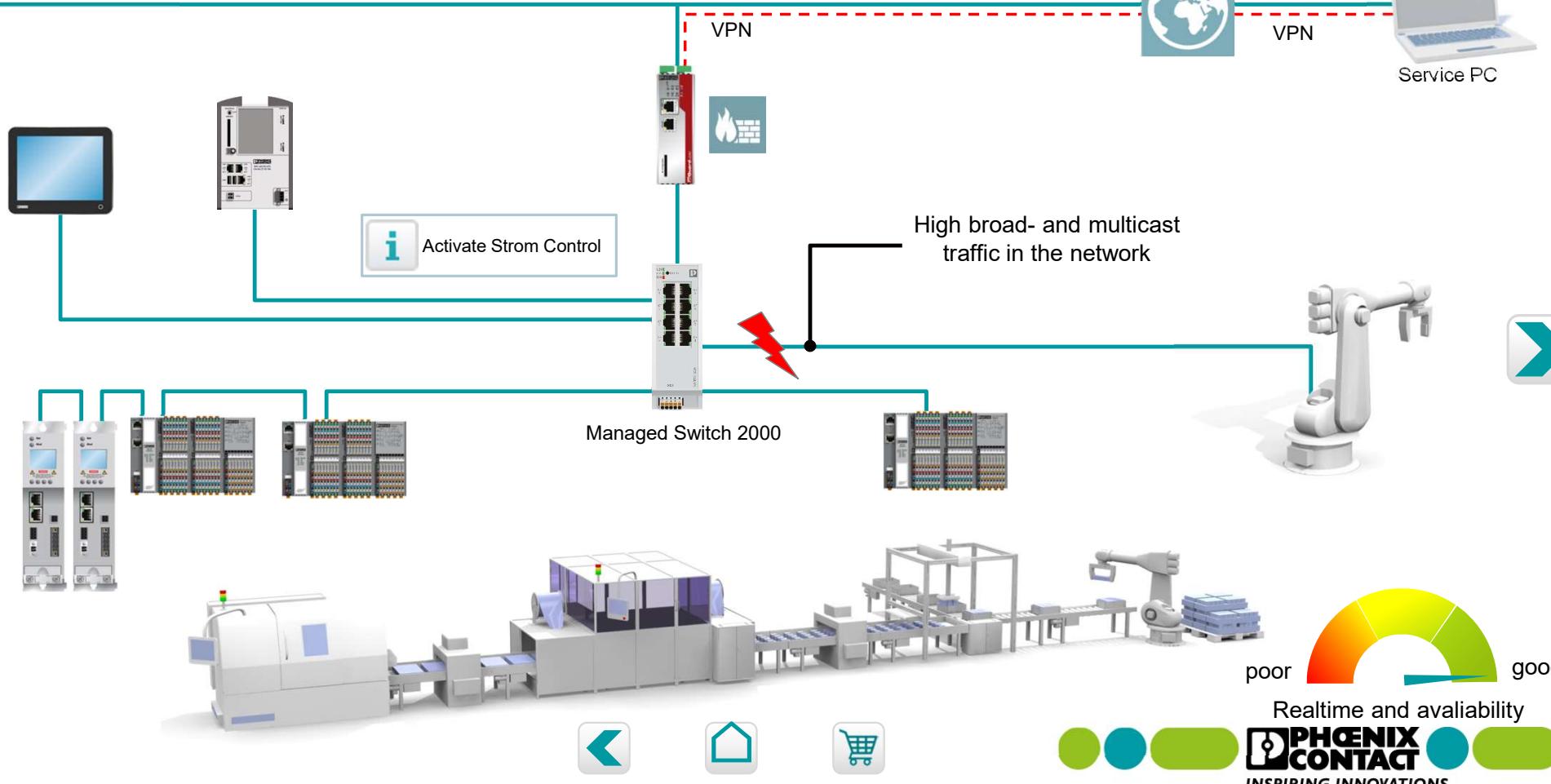
# Profinet simple device replacement

Production network



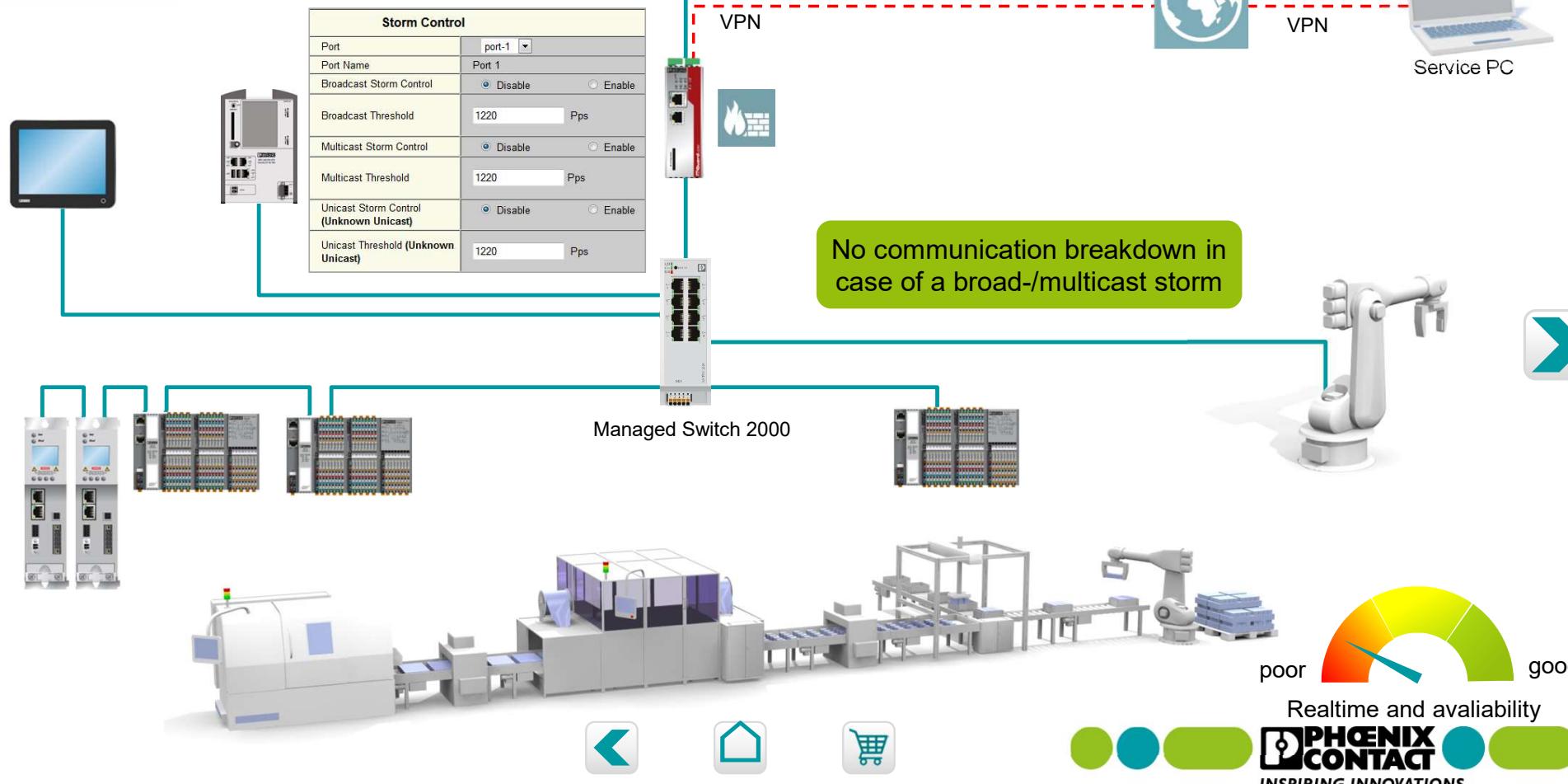
# High broad- and multicast traffic

Production network



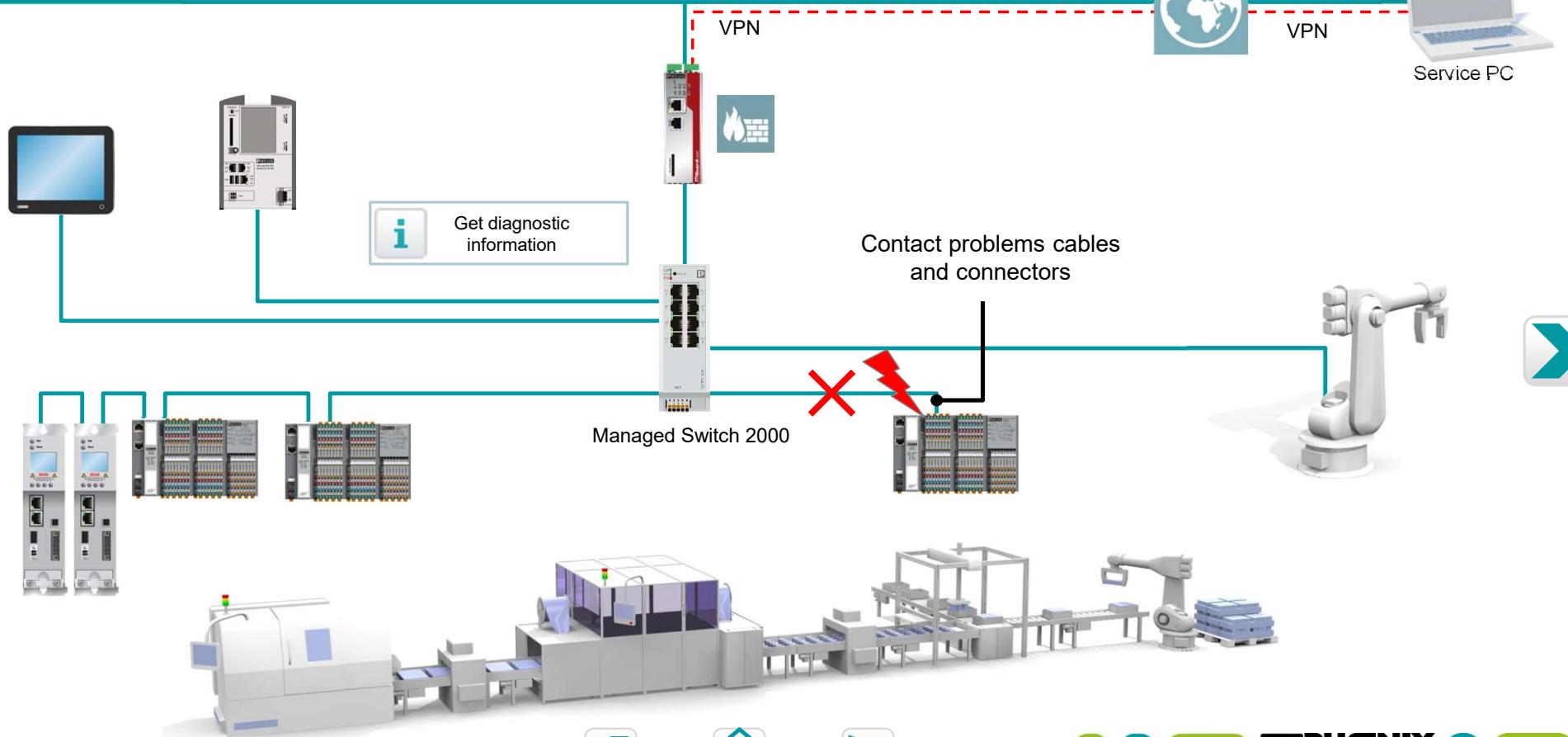
# Our solution: Storm control

Production network



# Contact problems of cables and connectors

Production network



# Our solution: Diagnostic information

Production network

Event Table	
System Up Time	22 min 50 sec
Time	Event
20 min 35 sec	LLDP recognized new neighbor at port 5
20 min 35 sec	Link up on Port: 5
20 min 19 sec	Link up on Port: 7
20 min 16 sec	LLDP recognized new neighbor at port 3
20 min 16 sec	Link up on Port: 3
20 min 13 sec	Link down on Port: 3
17 min 55 sec	Configuration has been saved.
17 min 30 sec	The configuration has been modified the first time after the last storing.
59 sec	Link up on Port: 3
55 sec	Link down on Port: 3
29 sec	Configuration has been saved.
25 sec	The configuration has been modified the first time after the last storing.
3 sec	Link up on Port: 3
3 sec	Configuration has been saved.
3 sec	Boot.
0 sec	RSTP disabled.
0 sec	Power Supply US2 lost



Port Statistics	
Port Number	3
packets	4103
up to 64 Octets	2969
65 to 127 Octets	631
128 to 255 Octets	71
256 to 511 Octets	425
512 to 1023 Octets	1
1024 to 1518 Octets	6
Broadcast	307
Multicast	50
Octets	448306
Fragments	0
Undersized Packets	0
Oversized Packets	0
CRC Alignment Errors	1
Drop Events	0
Jabbers	0
Collisions	0

Clear counters

You can set the statistic counters of all switch ports to zero.

Enter password

Port Configuration of port 3: General | RSTP

Note: This web page will be refreshed in 23 sec automatically (change the interval at the web page General Configuration / User Interfaces!)

Managed Switch 2000



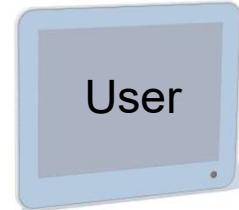
Receive diagnostic information in case of problems with cables and connectors





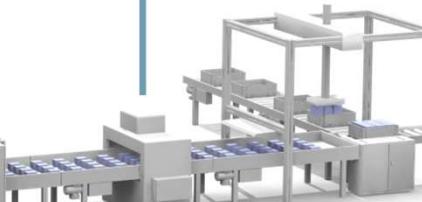
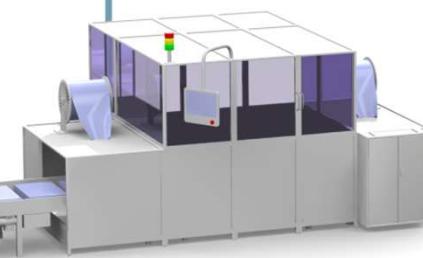
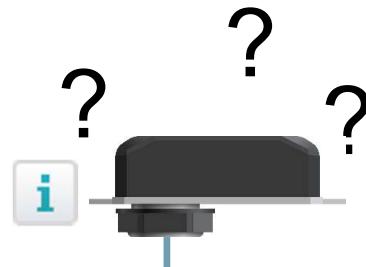
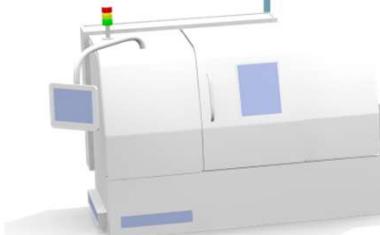
Unlimited service access into machine network

- Access on all devices



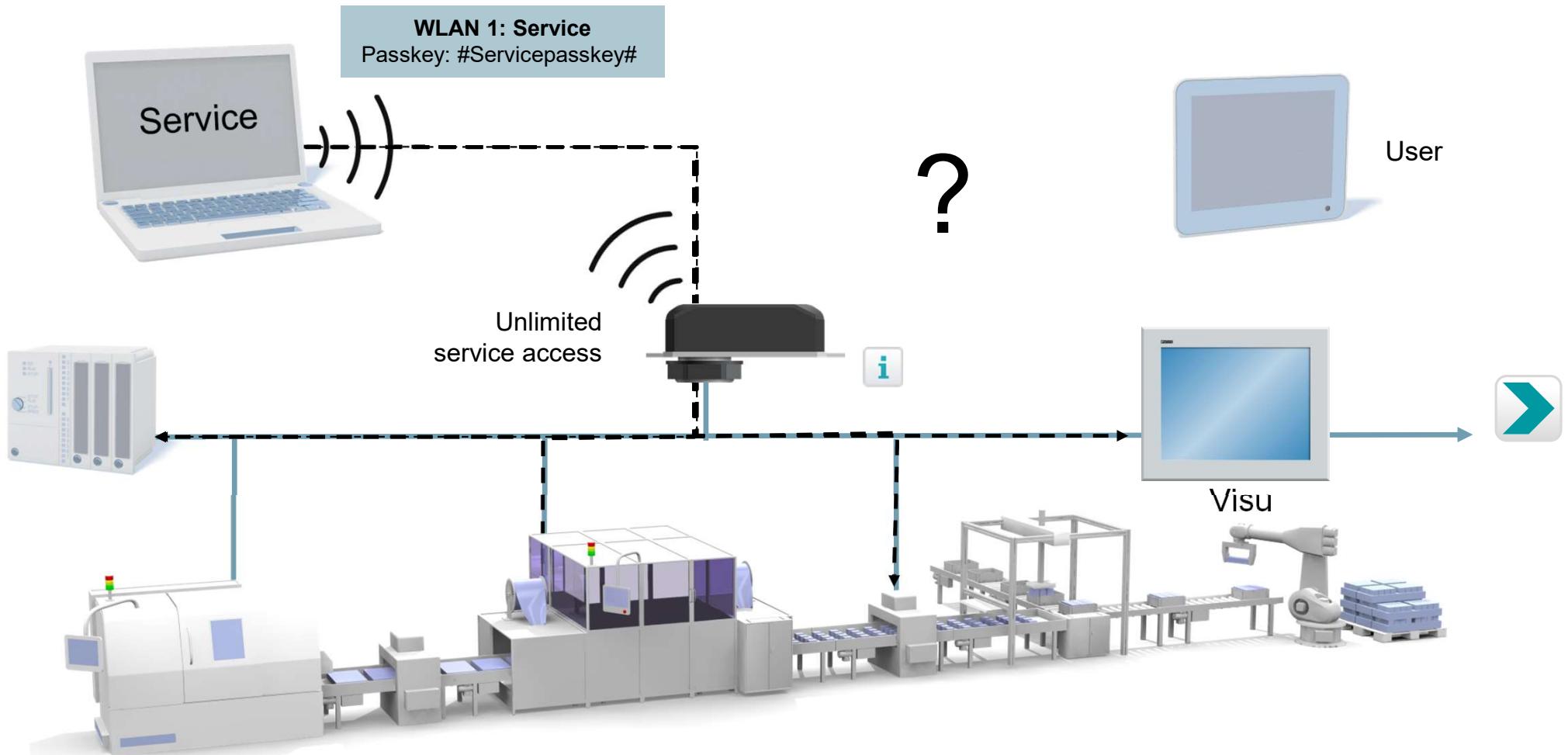
Restricted, temporary user access into machine network

- Access only on authorized devices, e.g. visualization
- Simple use of one-time passkeys for the WLAN



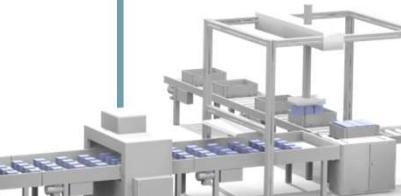
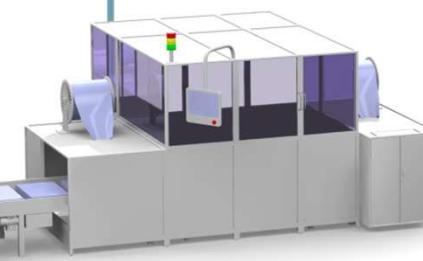
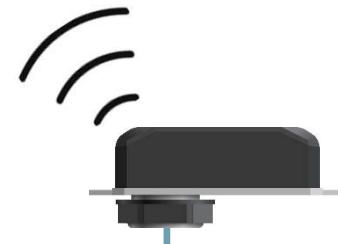
Visu







WLAN 1: Service  
Passkey: #Servicepasskey#

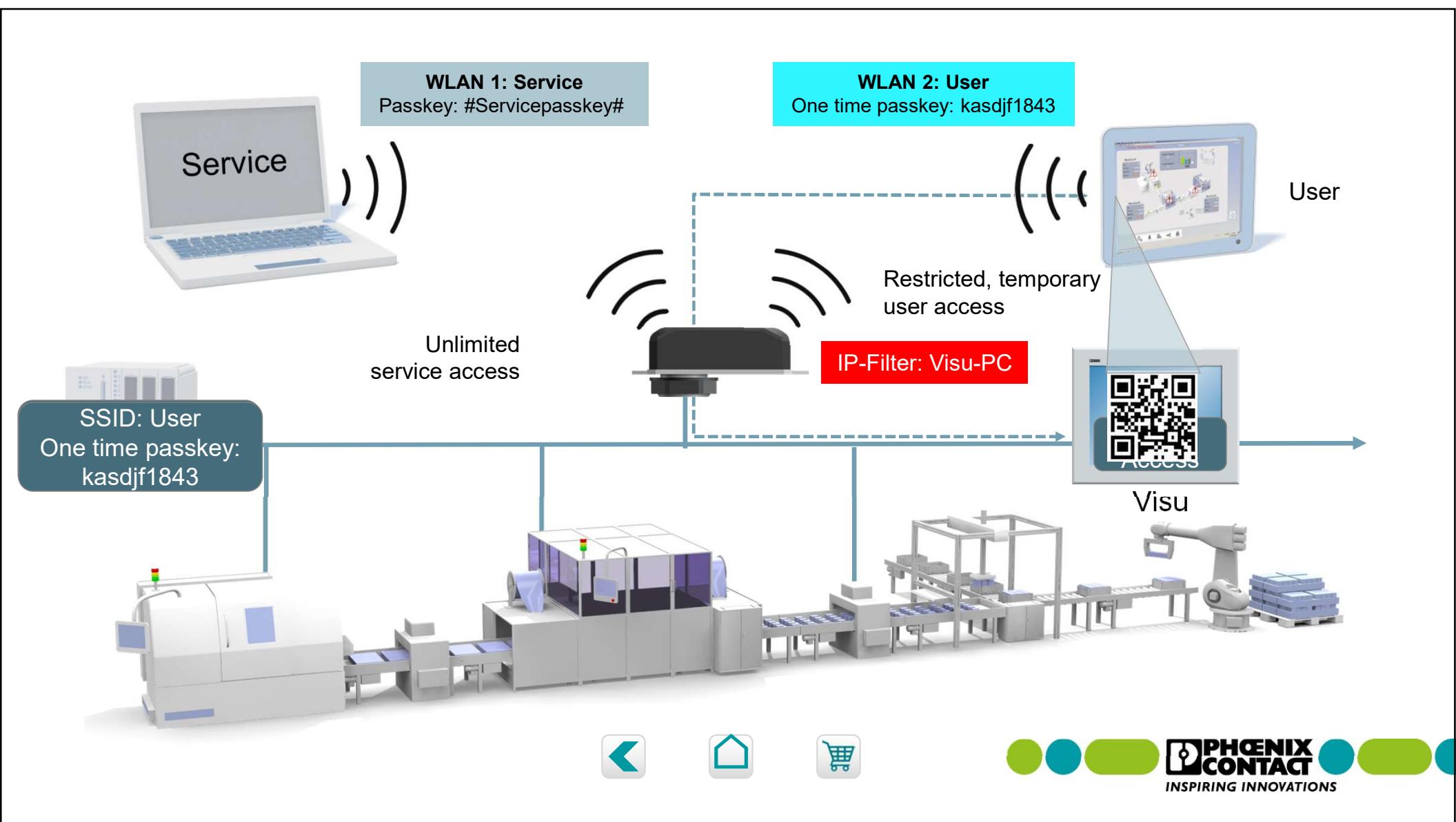


Visu

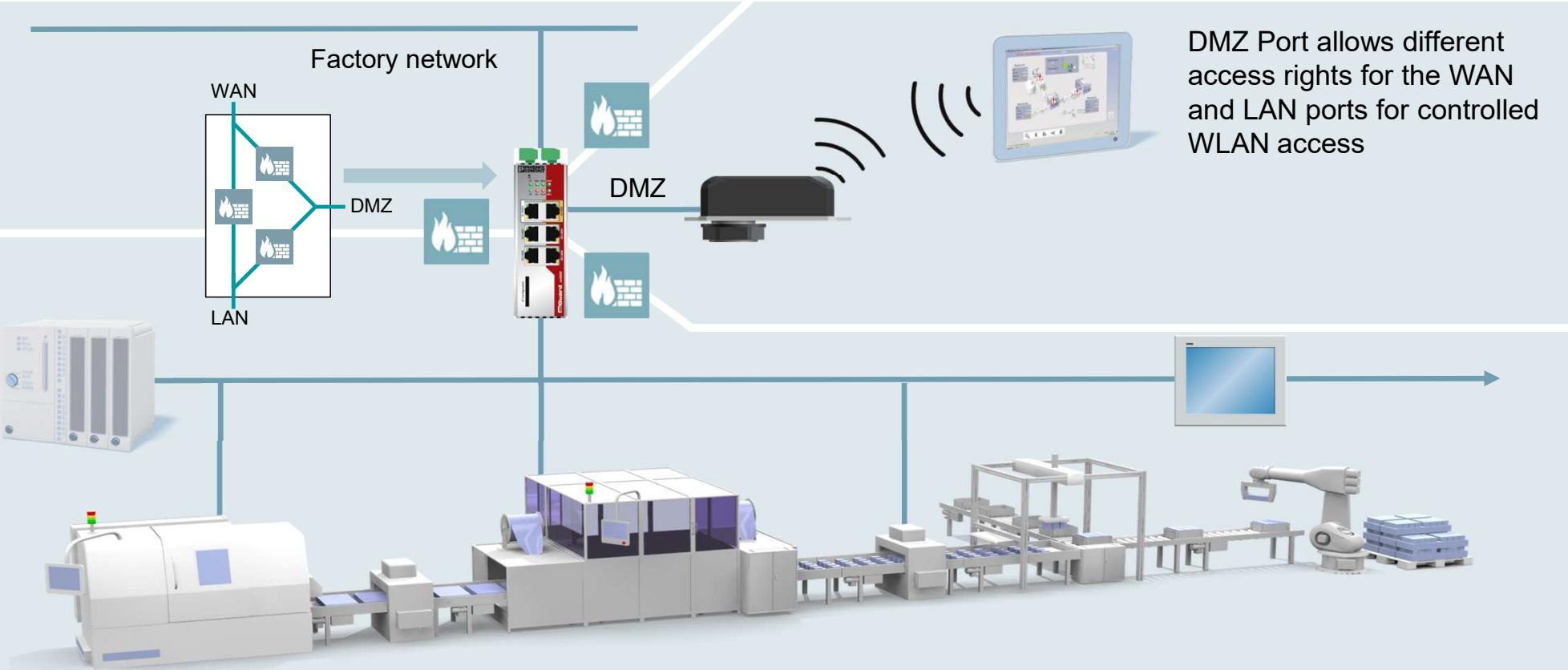


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# Secure WLAN machine network



# Integration in production network

## 1:1NAT

Integrate your machine networks and solve IP address conflicts



Factory network  
(192.168.0.0/16)

LAN 1

LAN 1

LAN 1



LAN 2

LAN 2

LAN 3



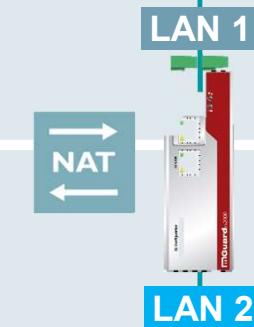
# Integration in production network

## 1:1NAT

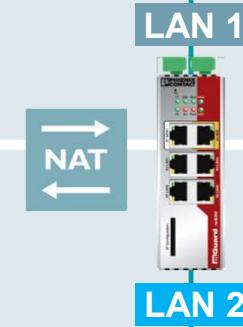
Integrate your machine networks and solve IP address conflicts



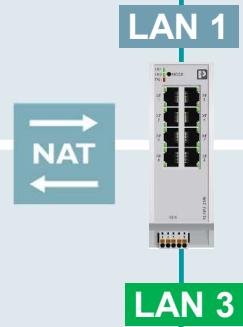
Factory network  
(192.168.0.0/16)



Machine network (172.16.0.0/24)



Machine network (172.16.0.0/24)



Machine network (10.0.0.0/24)

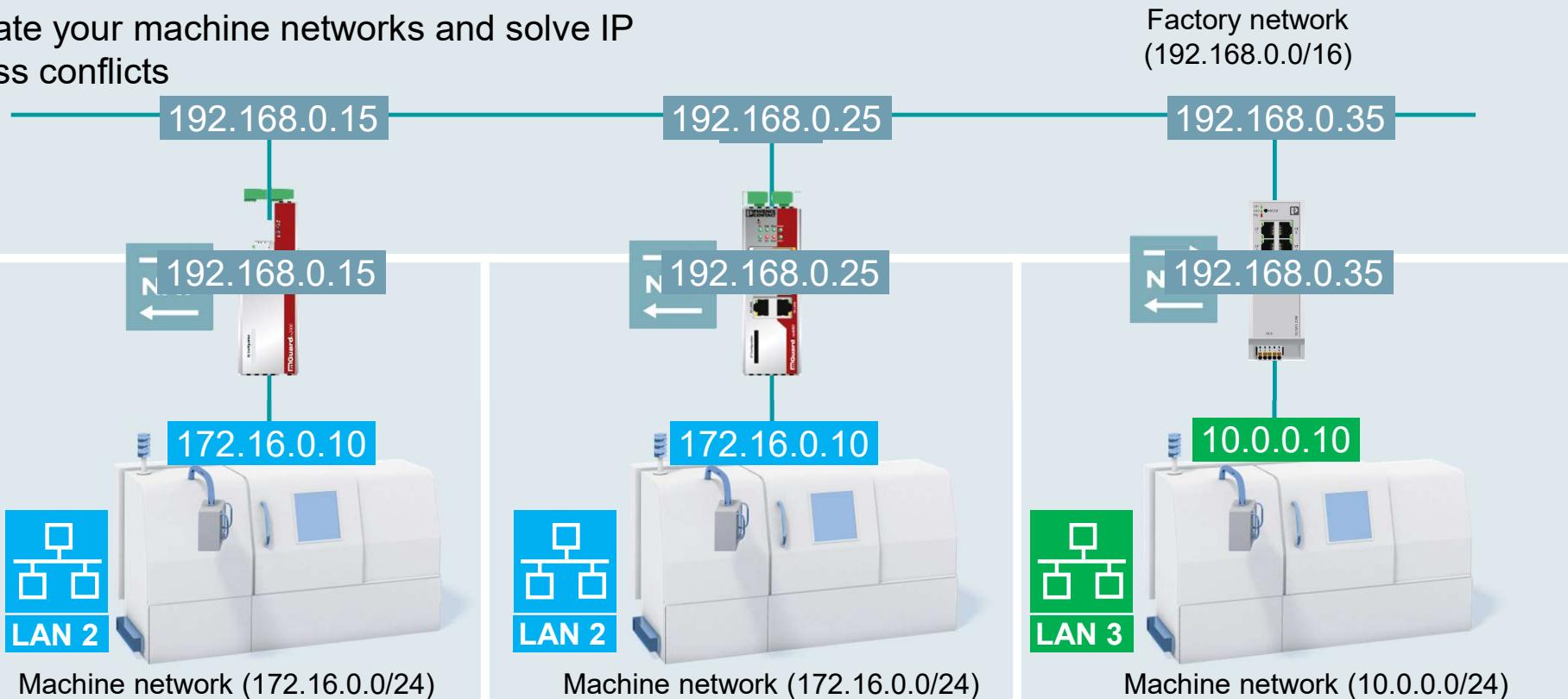


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INSPIRING INNOVATIONS

# Integration in production network

## 1:1NAT

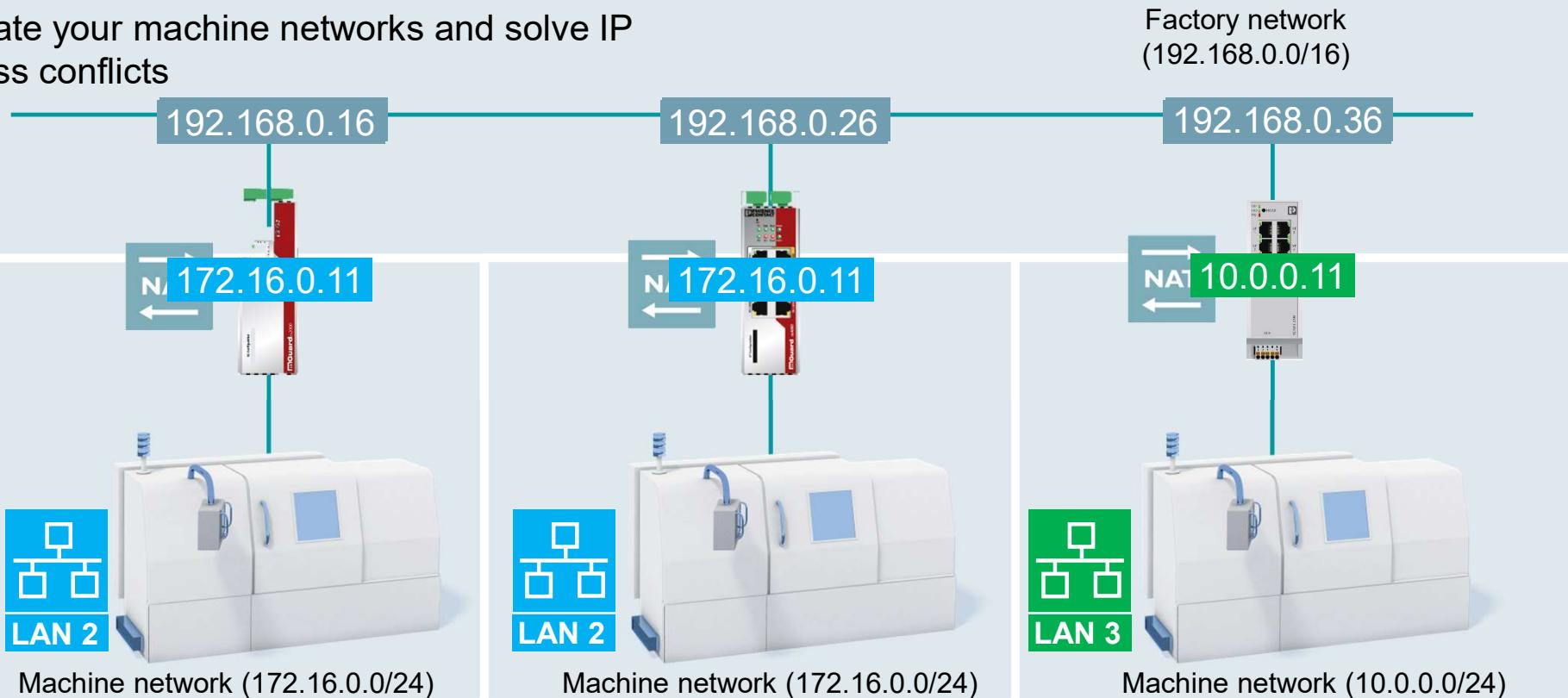
Integrate your machine networks and solve IP address conflicts



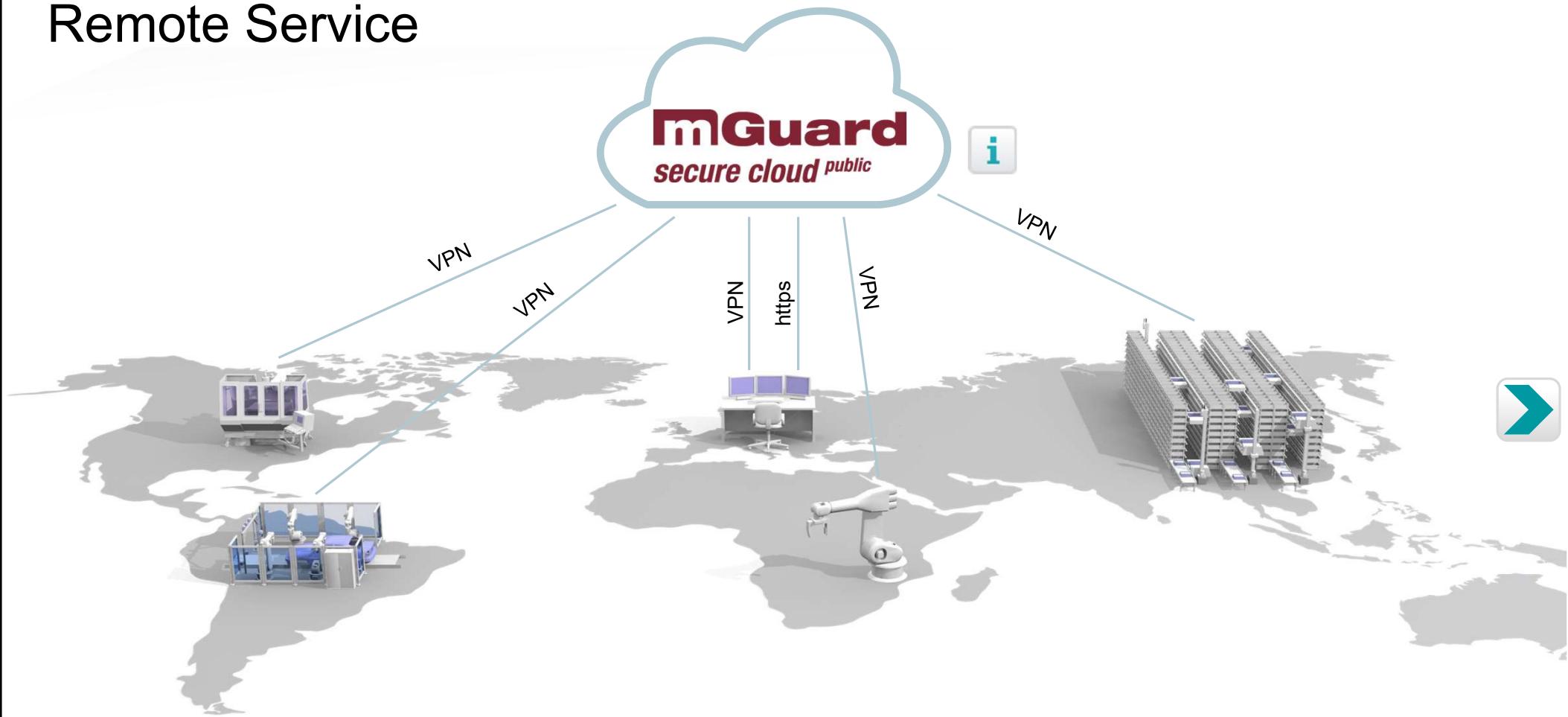
# Integration in production network

## 1:1NAT

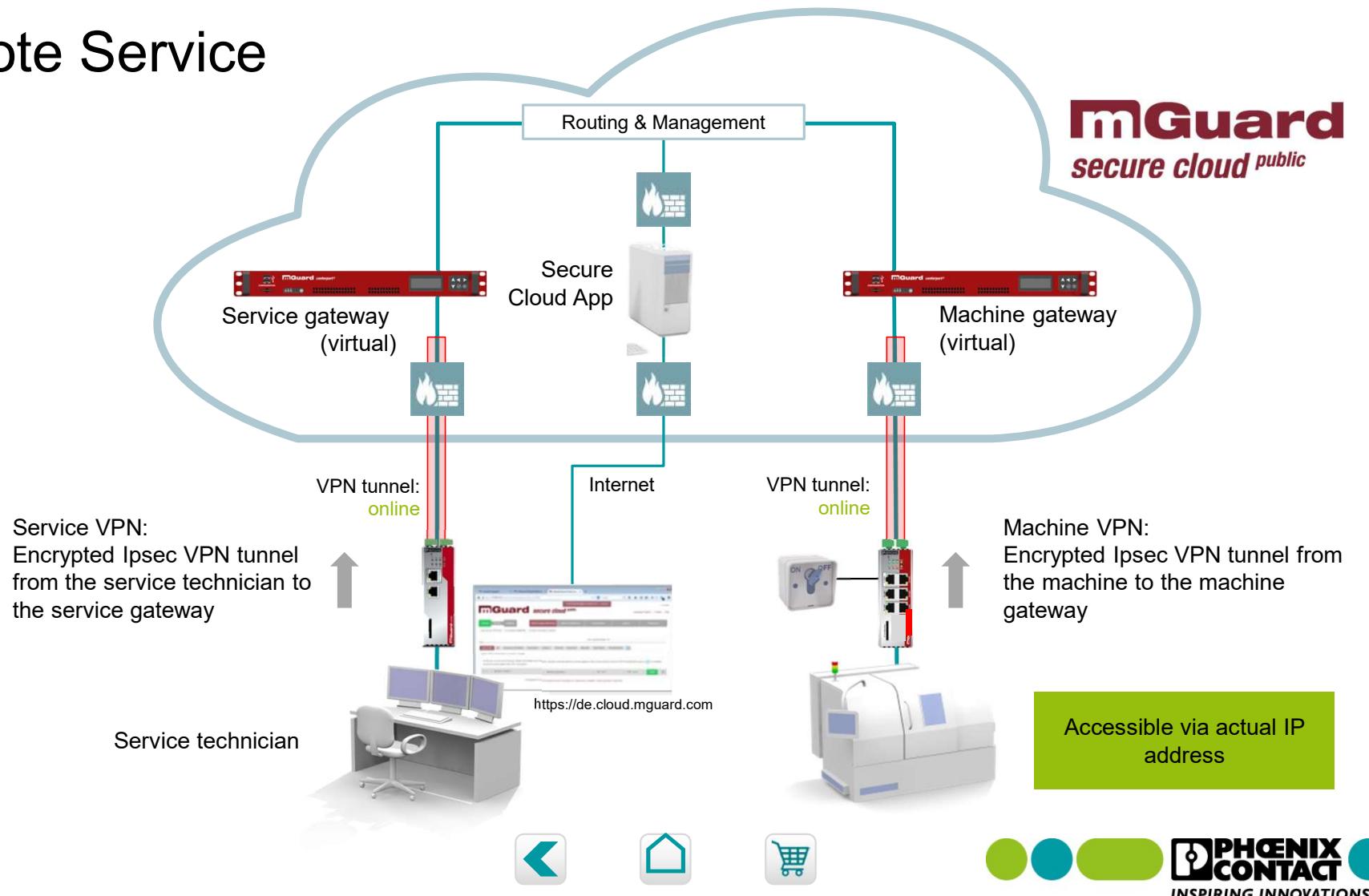
Integrate your machine networks and solve IP address conflicts



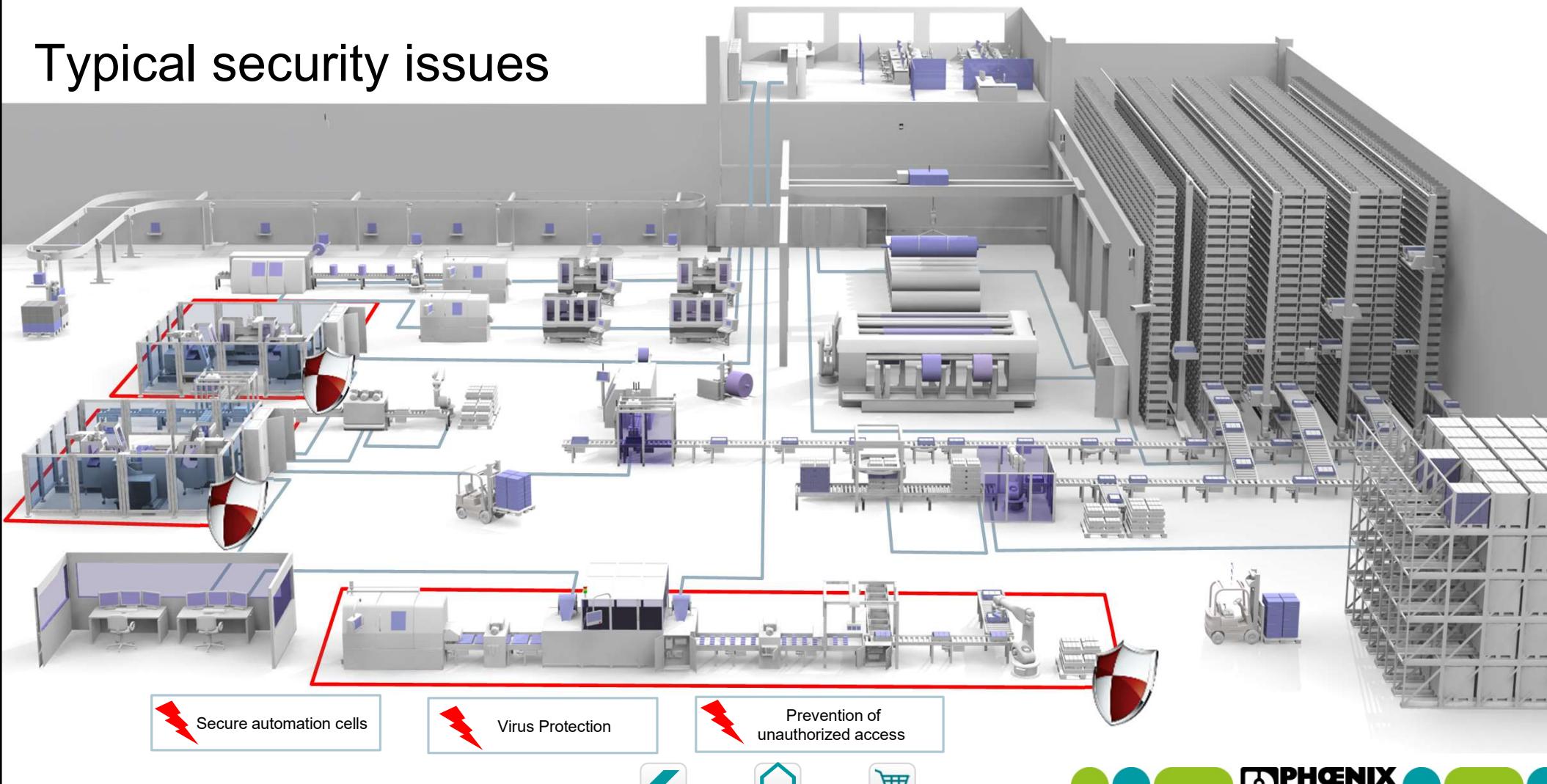
# Remote Service



# Remote Service



# Typical security issues

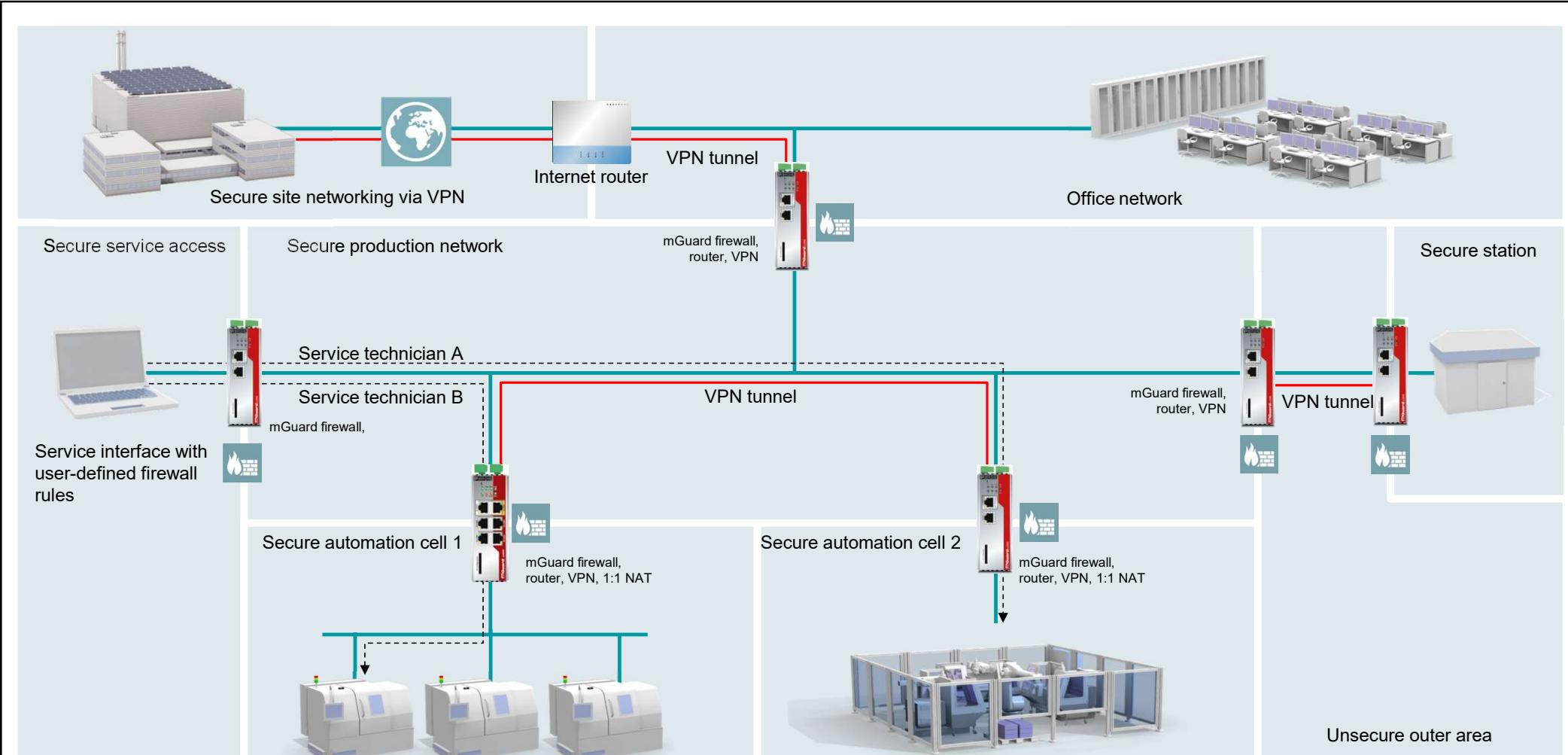


Secure automation cells

Virus Protection

Prevention of  
unauthorized access







Ethernet



Firewall  
CIFS Integrity Monitoring

Scan

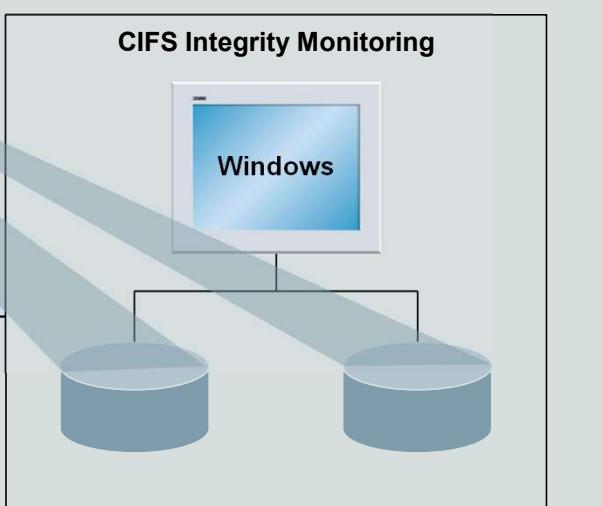


## CIFS Integrity Monitoring

constantly monitors your file systems for unauthorized changes and alerts you if a change is detected

### CIFS Integrity Monitoring

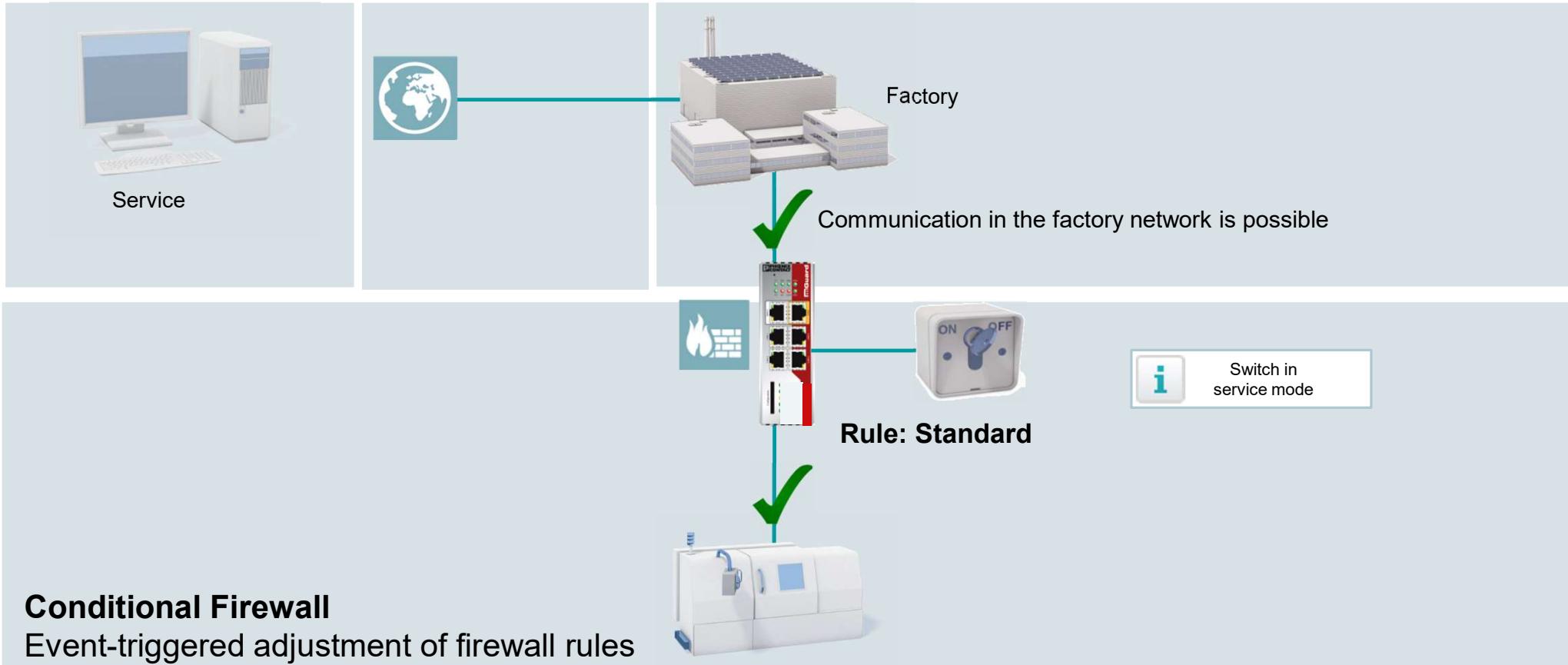
Windows



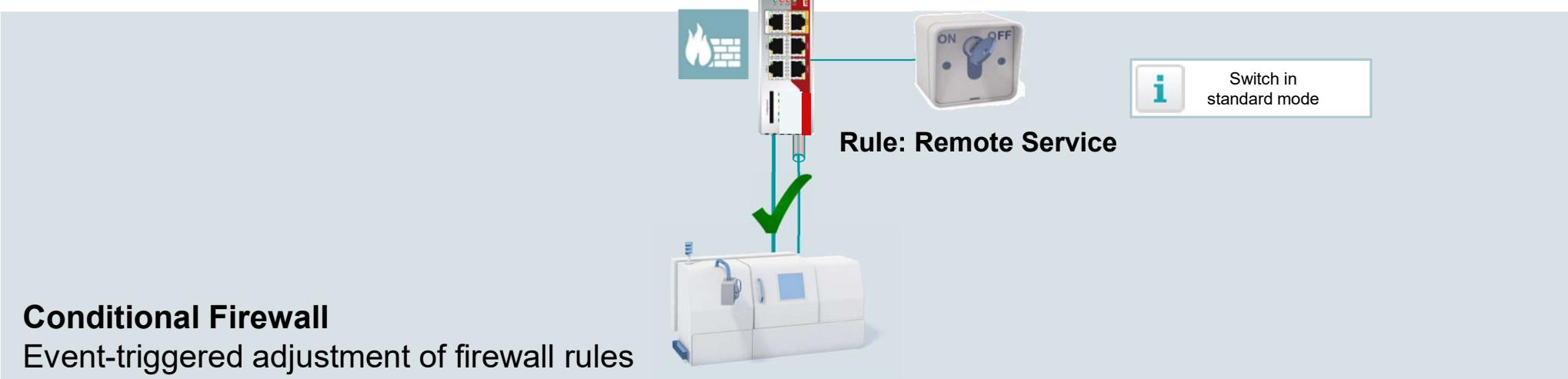
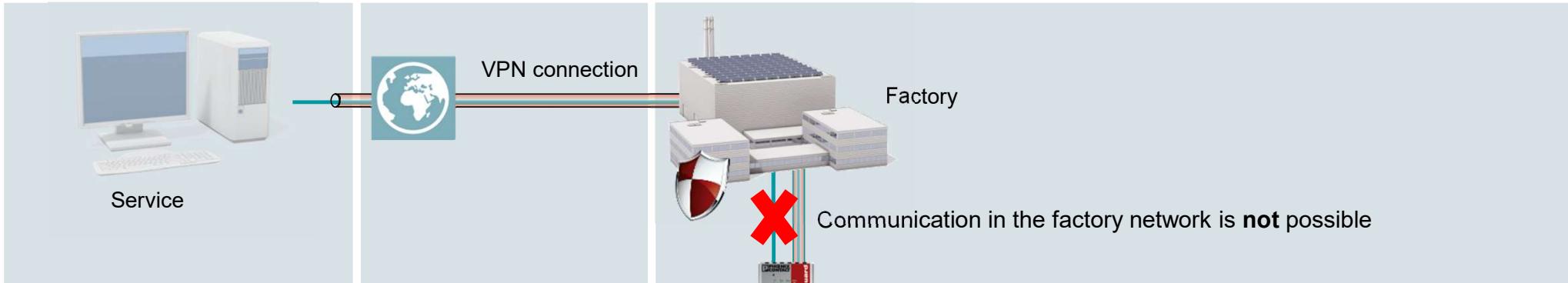
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INSPIRING INNOVATIONS



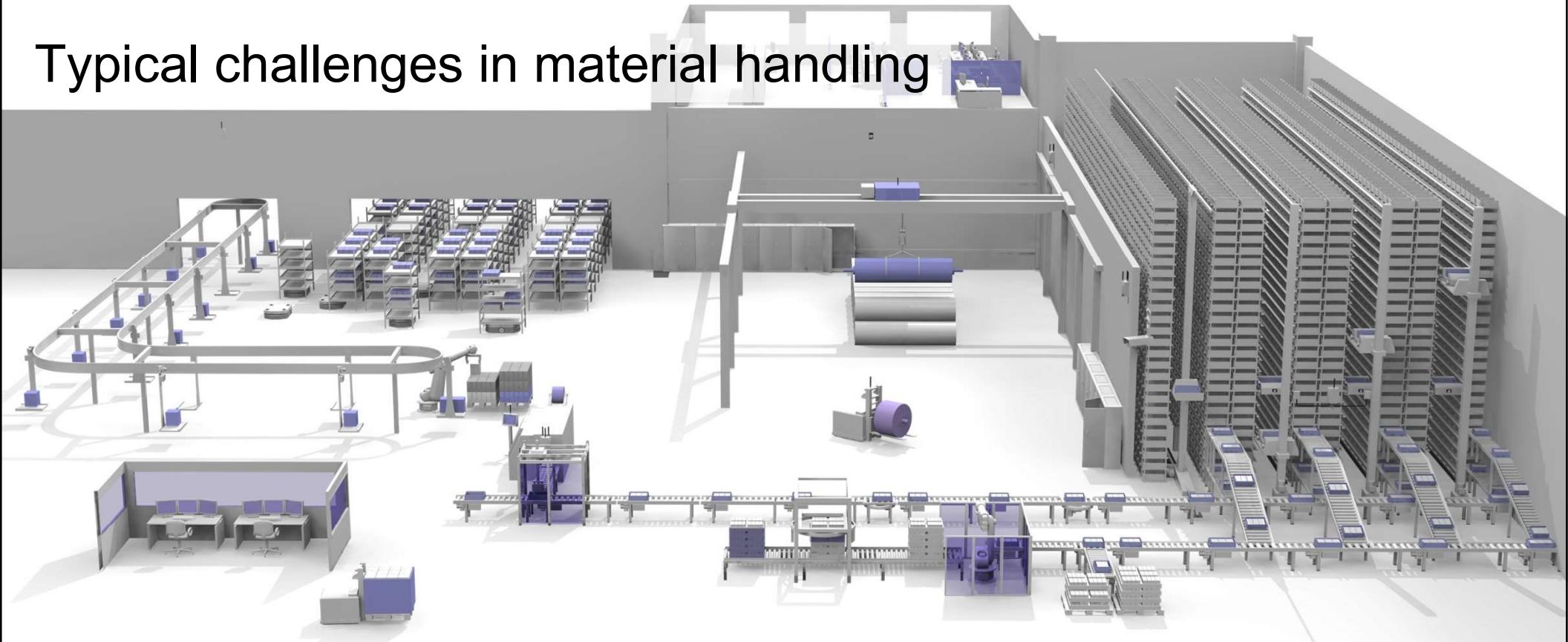
# Prevention of unauthorized access



# Prevention of unauthorized access



# Typical challenges in material handling



**i** Automated guided vehicle

**i** Typical WLAN network structure

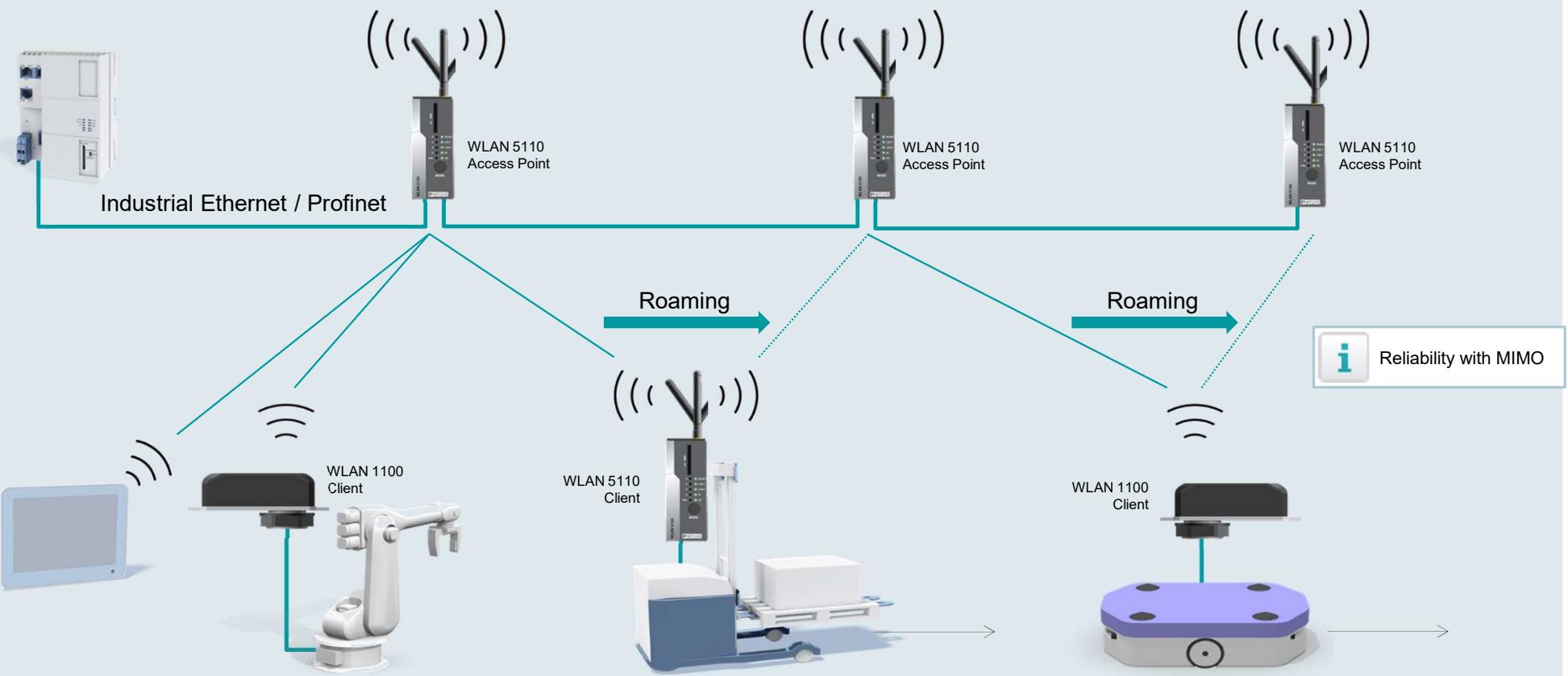
**i** Electric monorail conveyor

**i** Moving parts

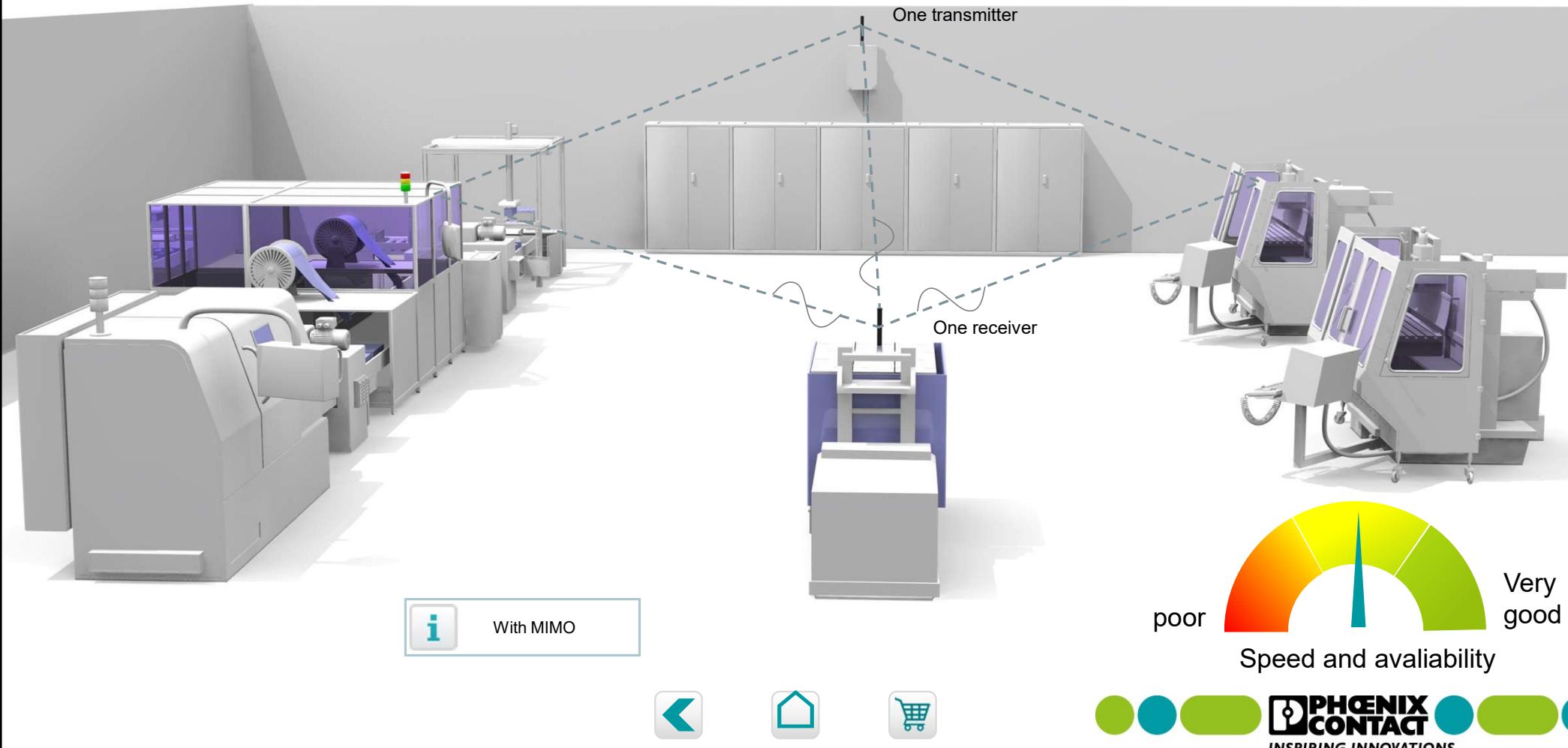
**i** Automatic shuttle warehouse

**i** Wireless for cranes

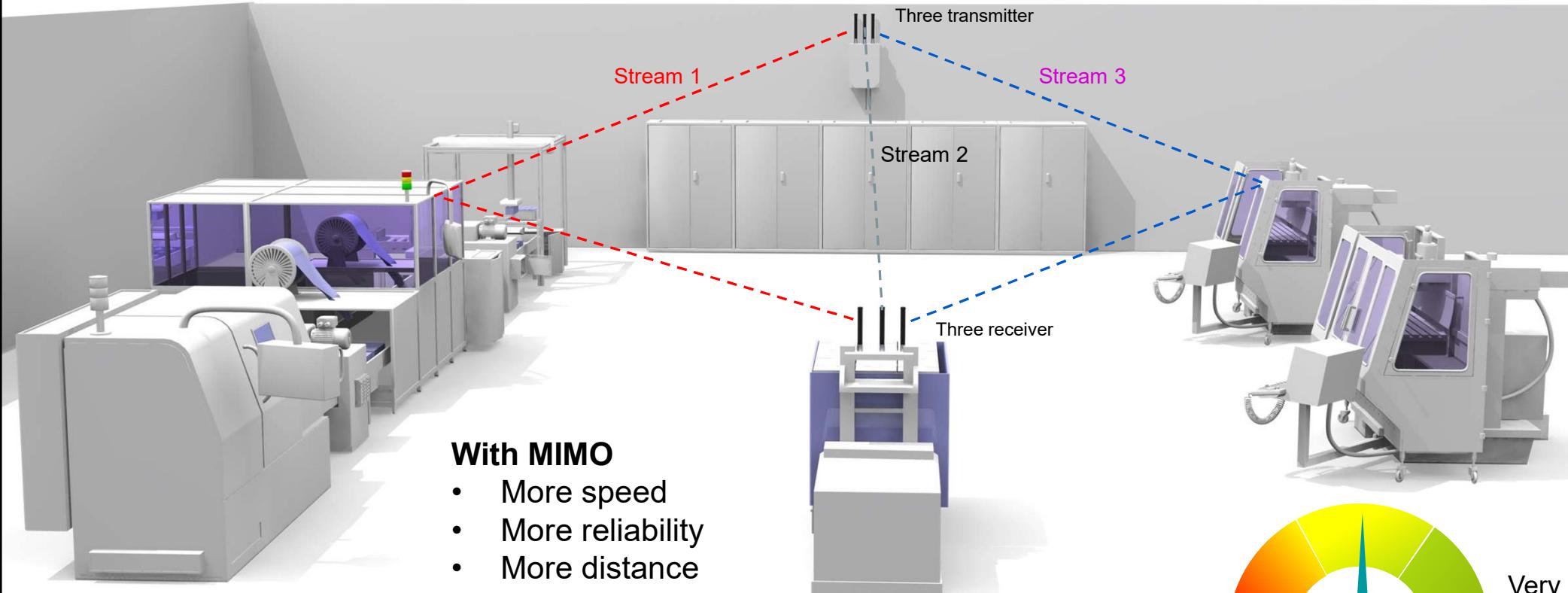




# Standard antenna technology

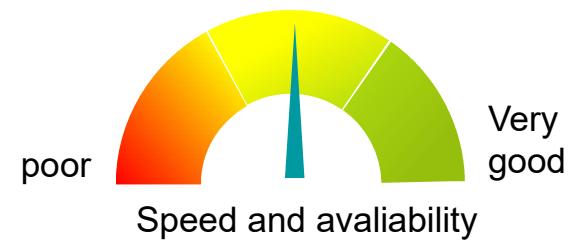


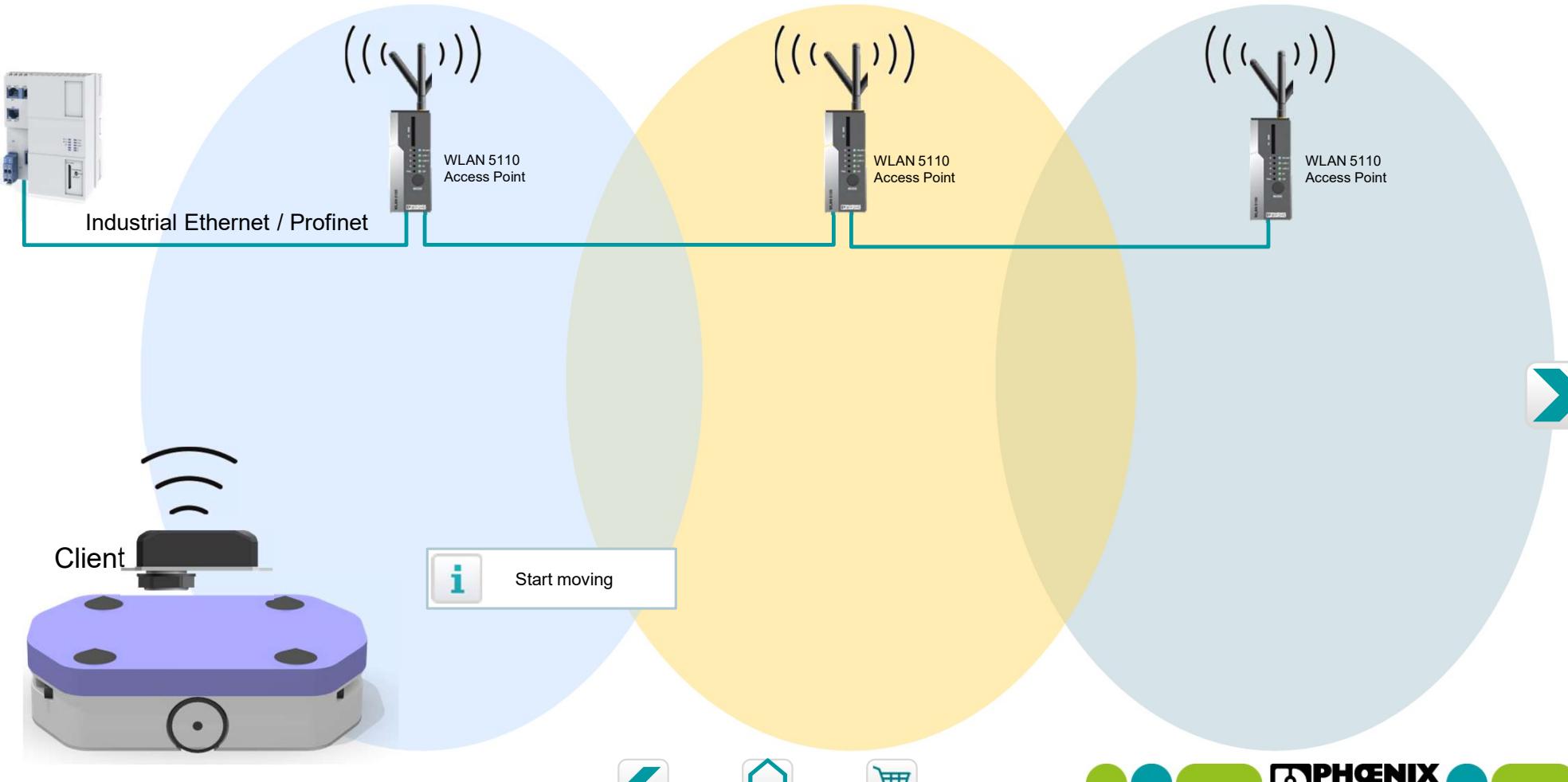
# MIMO antenna technology

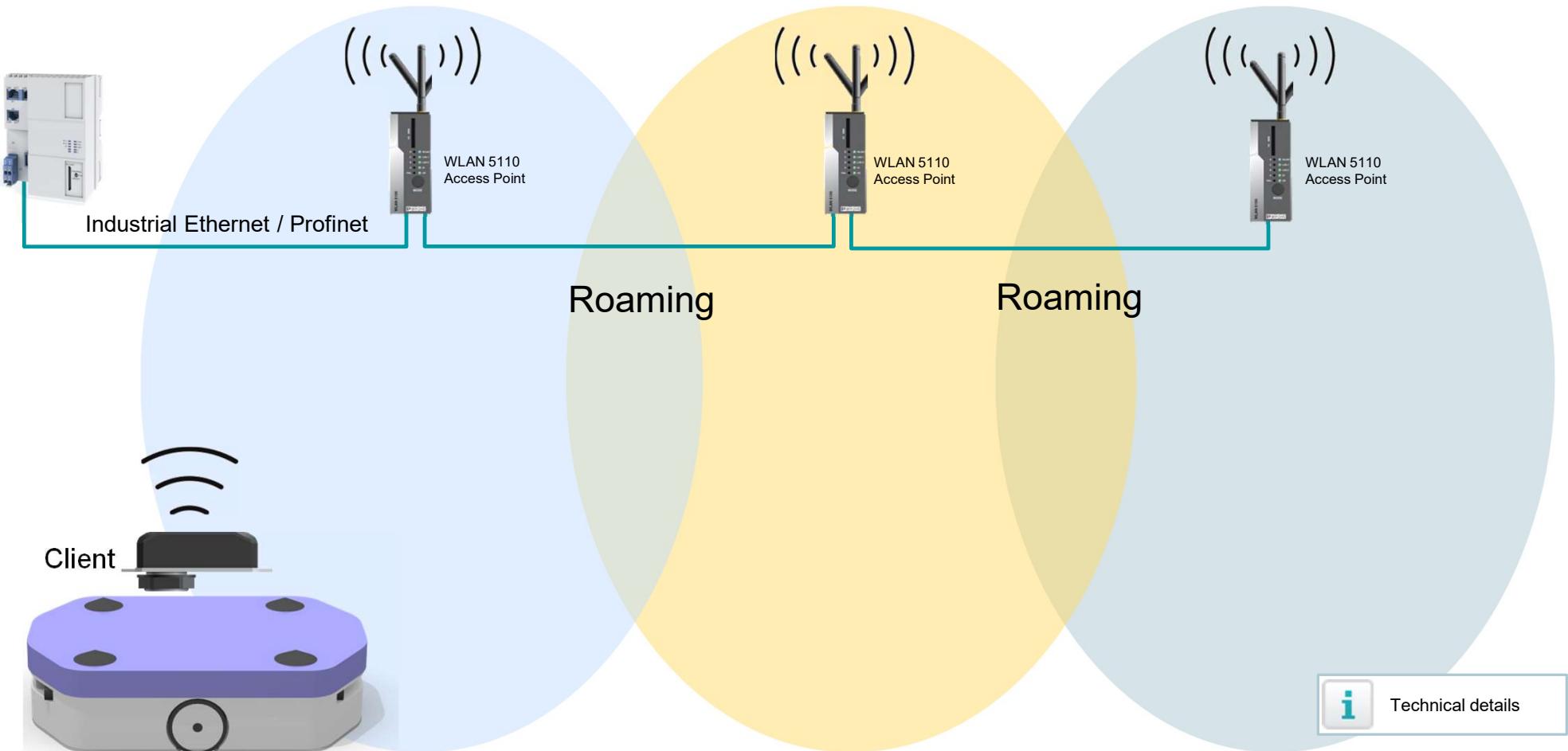


## With MIMO

- More speed
- More reliability
- More distance
- Better coverage



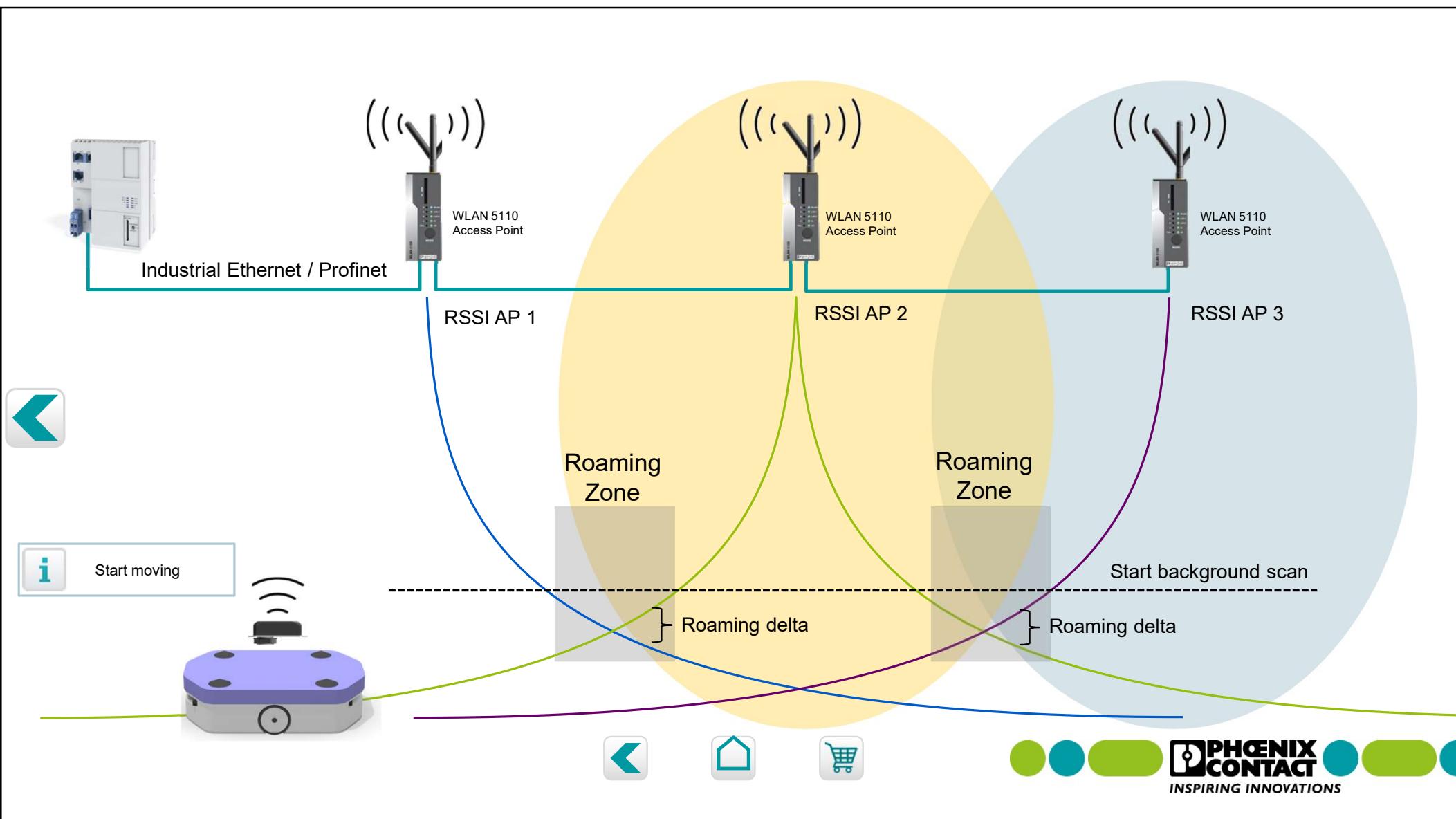


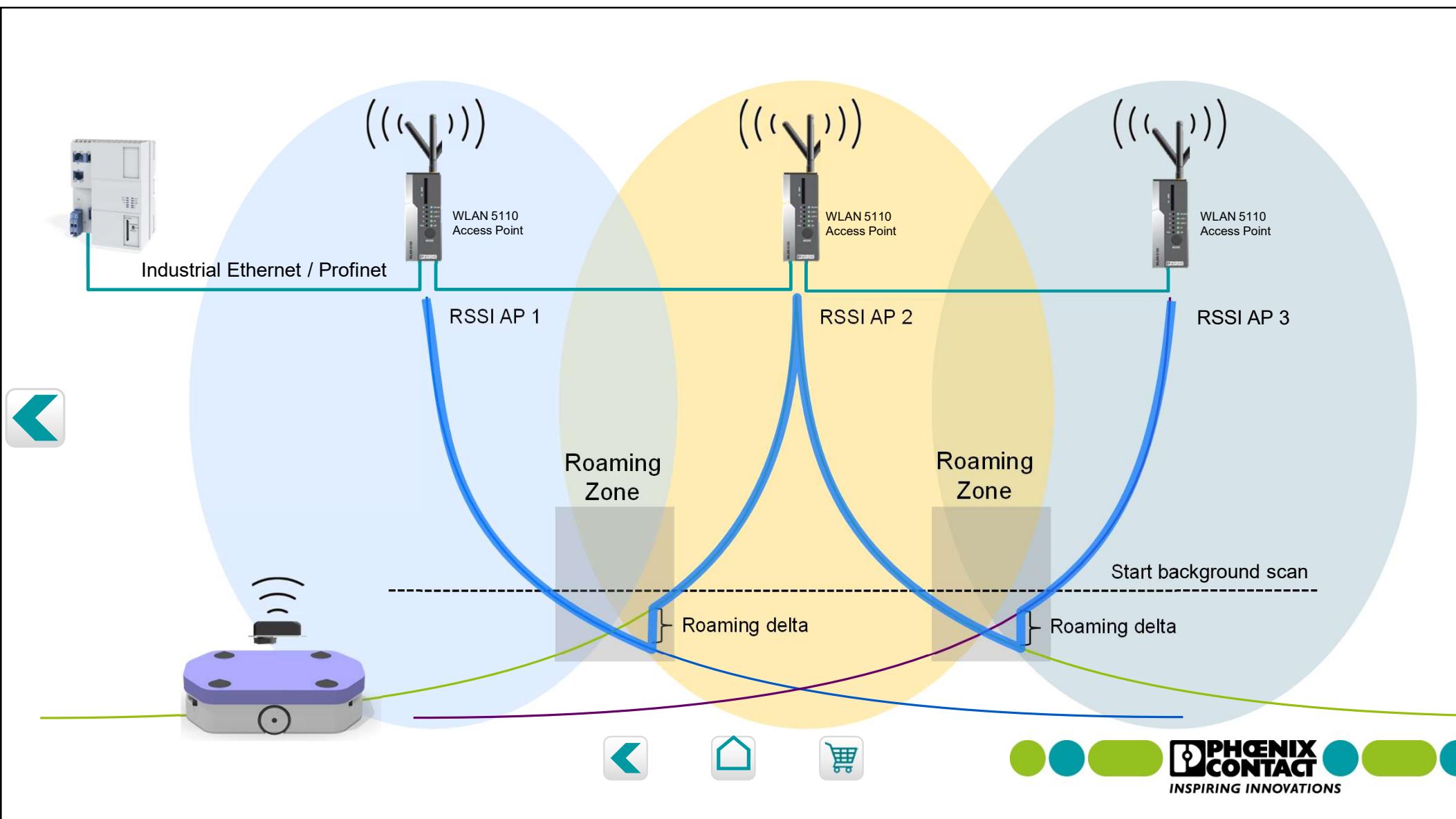


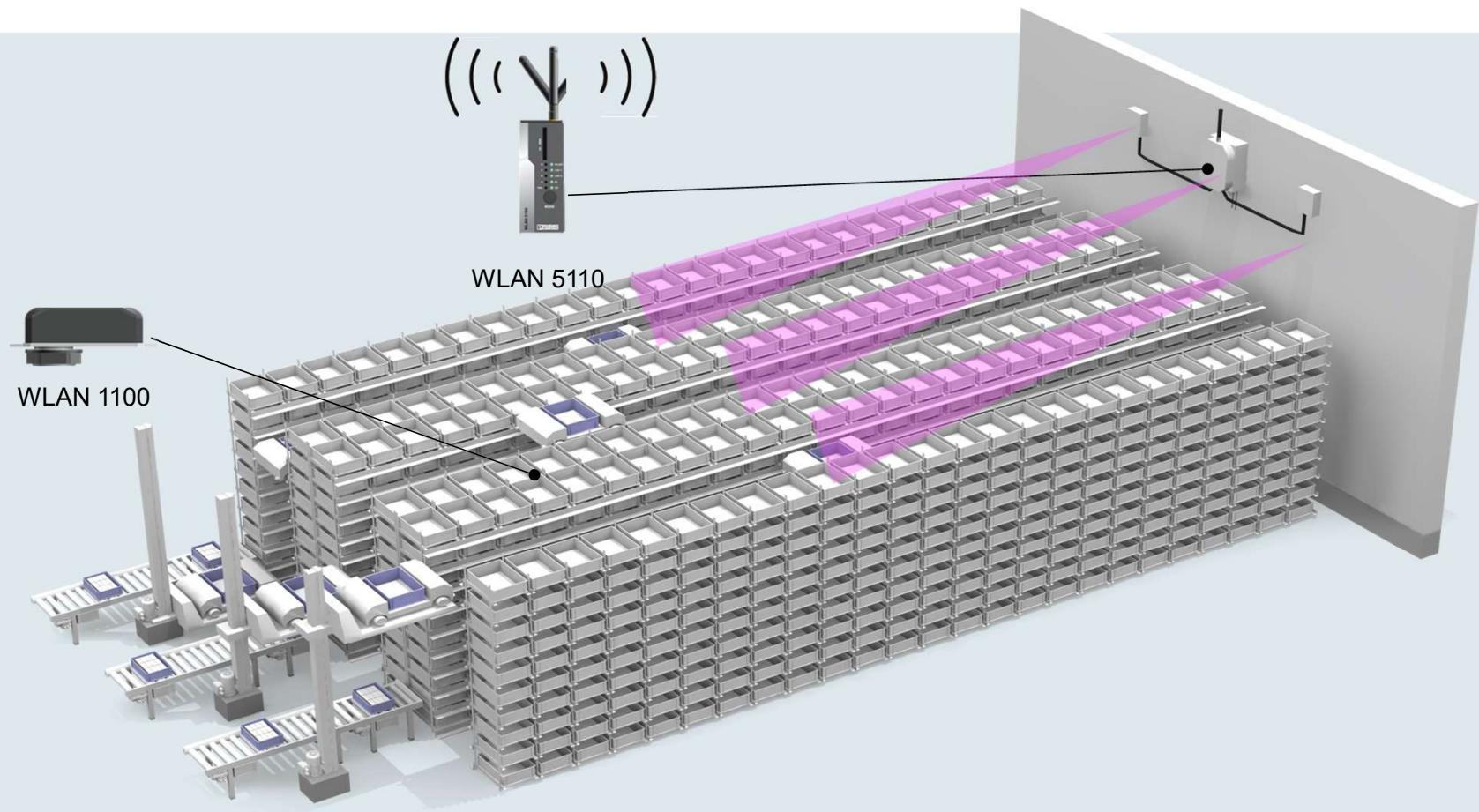
Technical details



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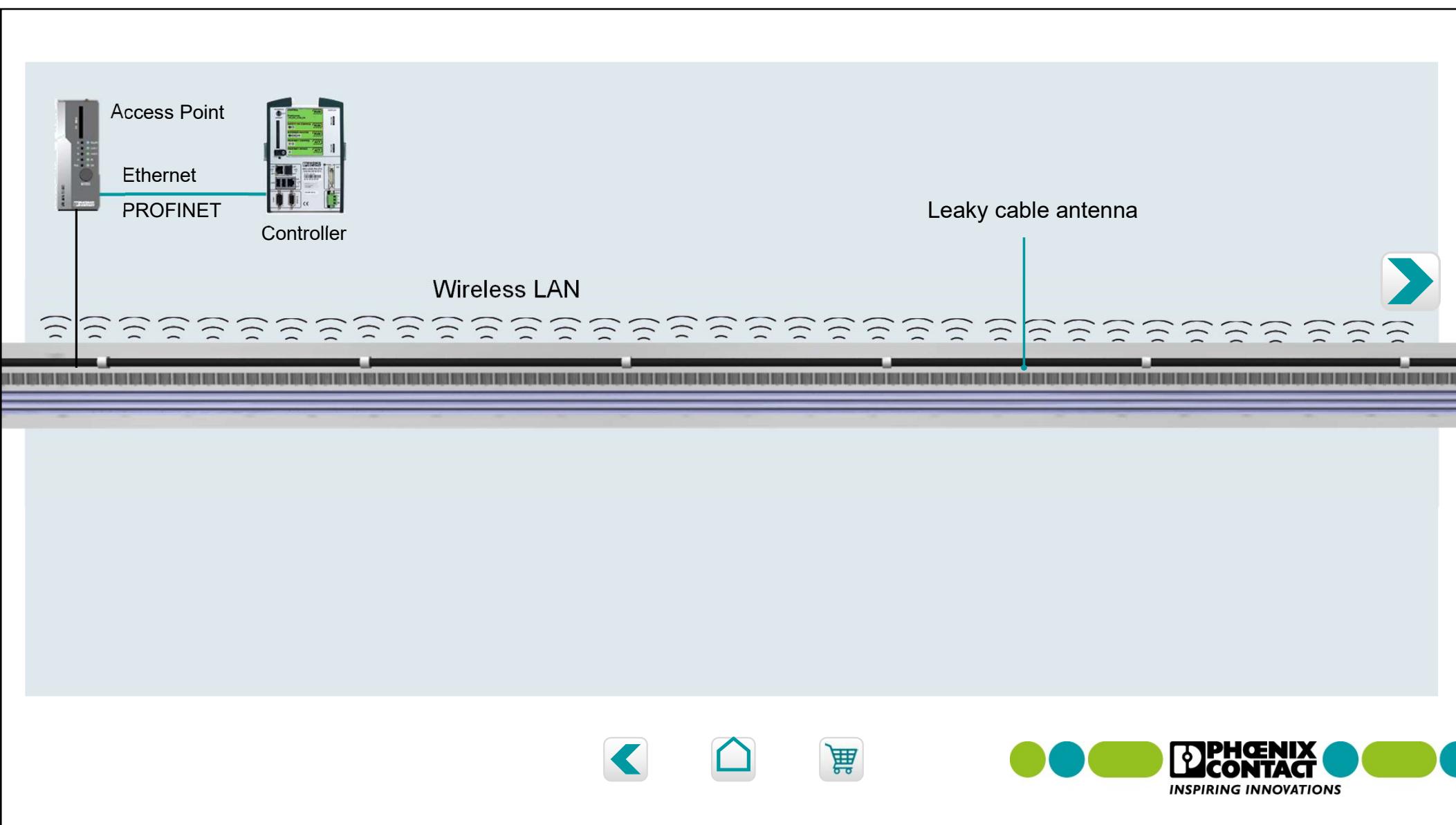






INSPIRING INNOVATIONS

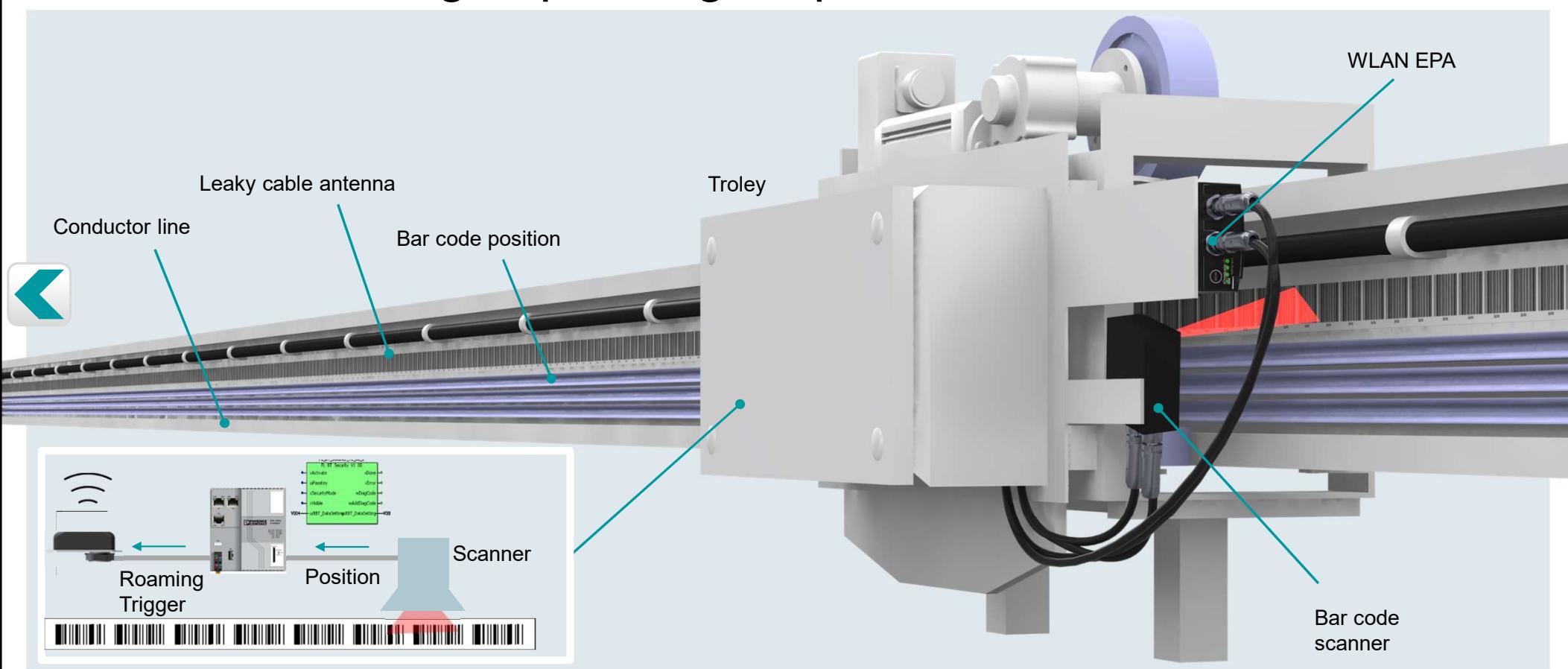


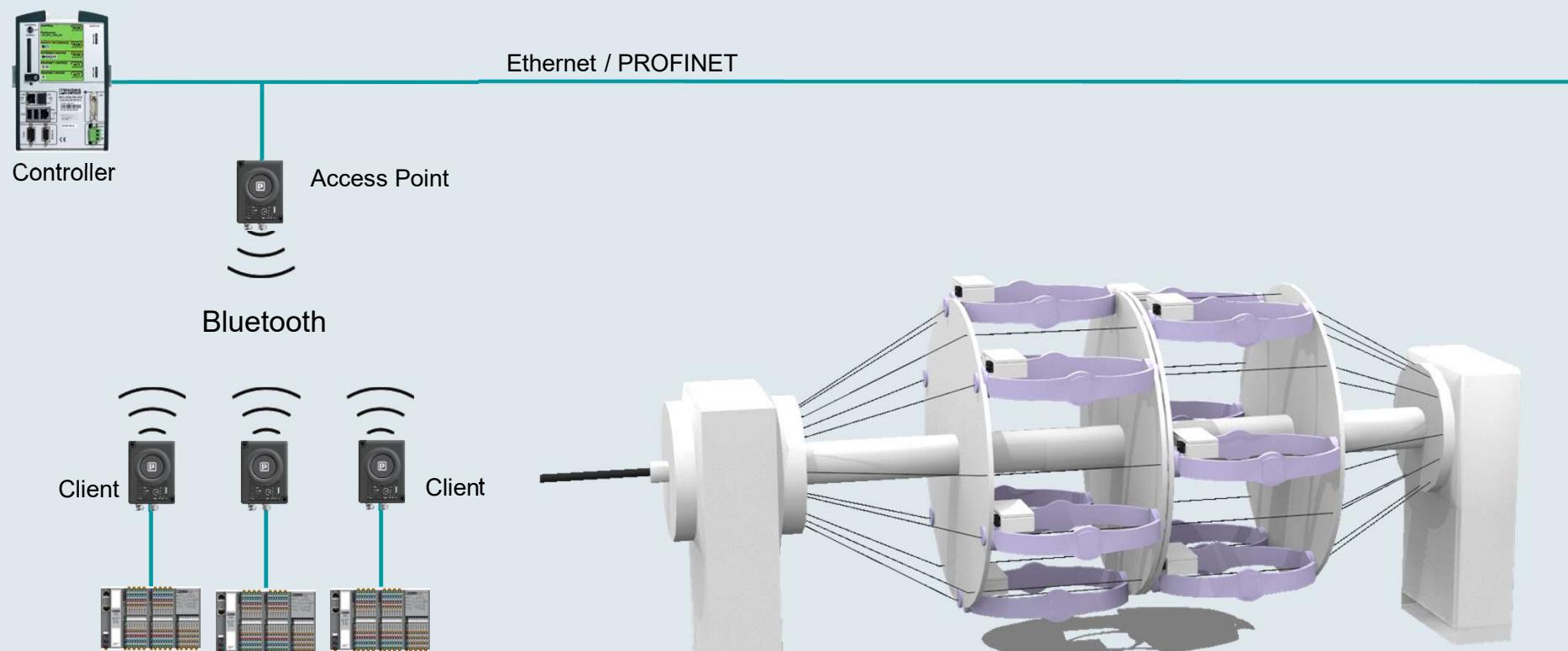


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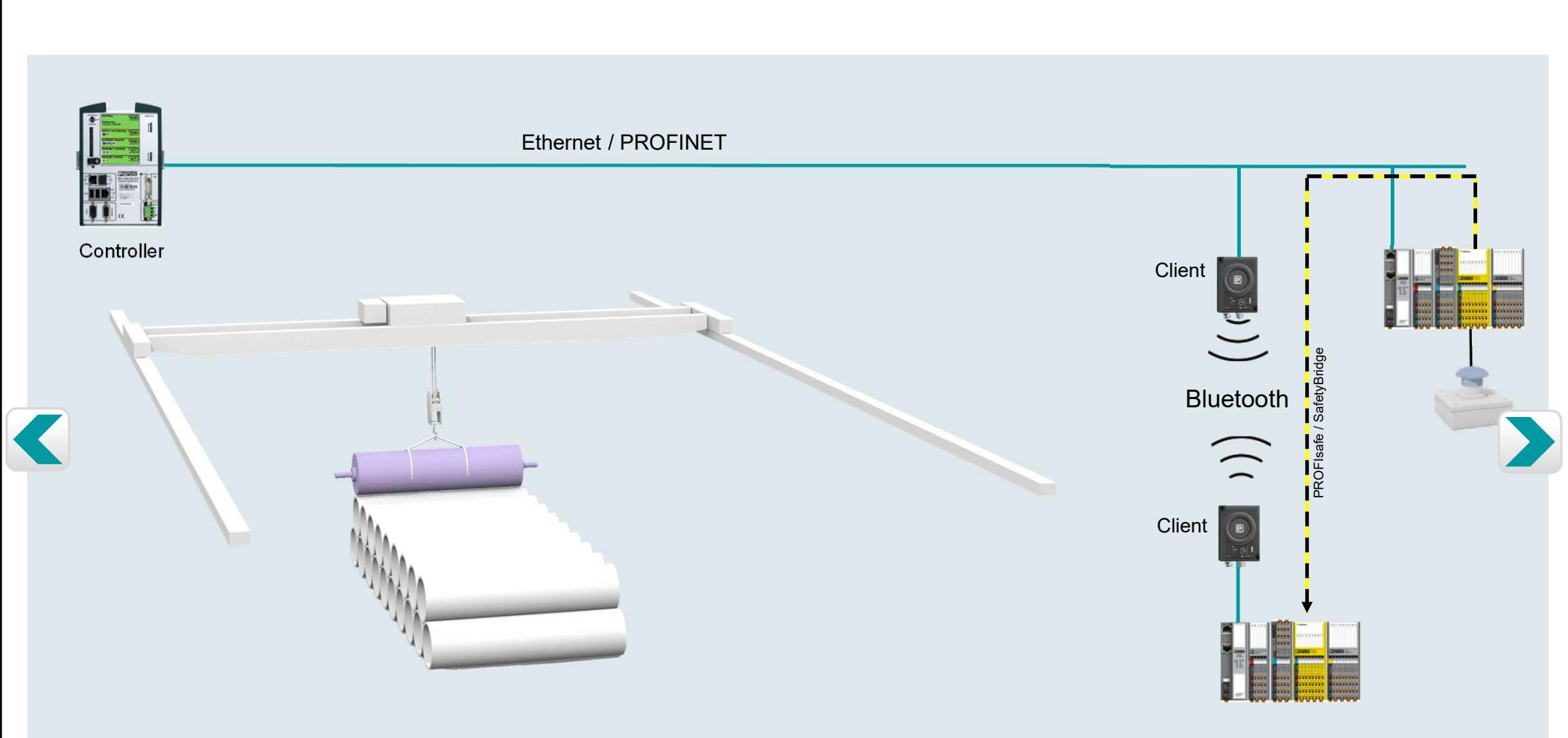


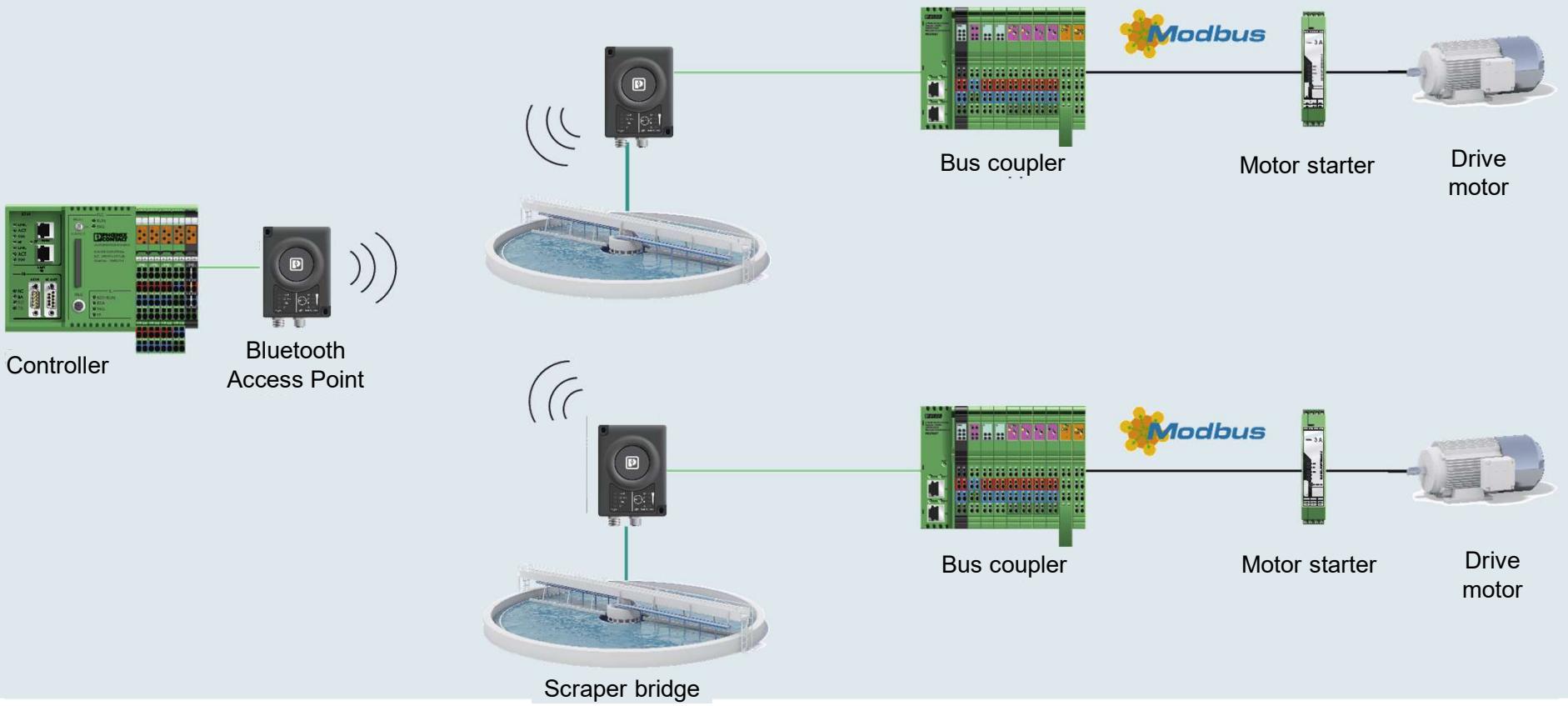
# Controlled roaming depending on position



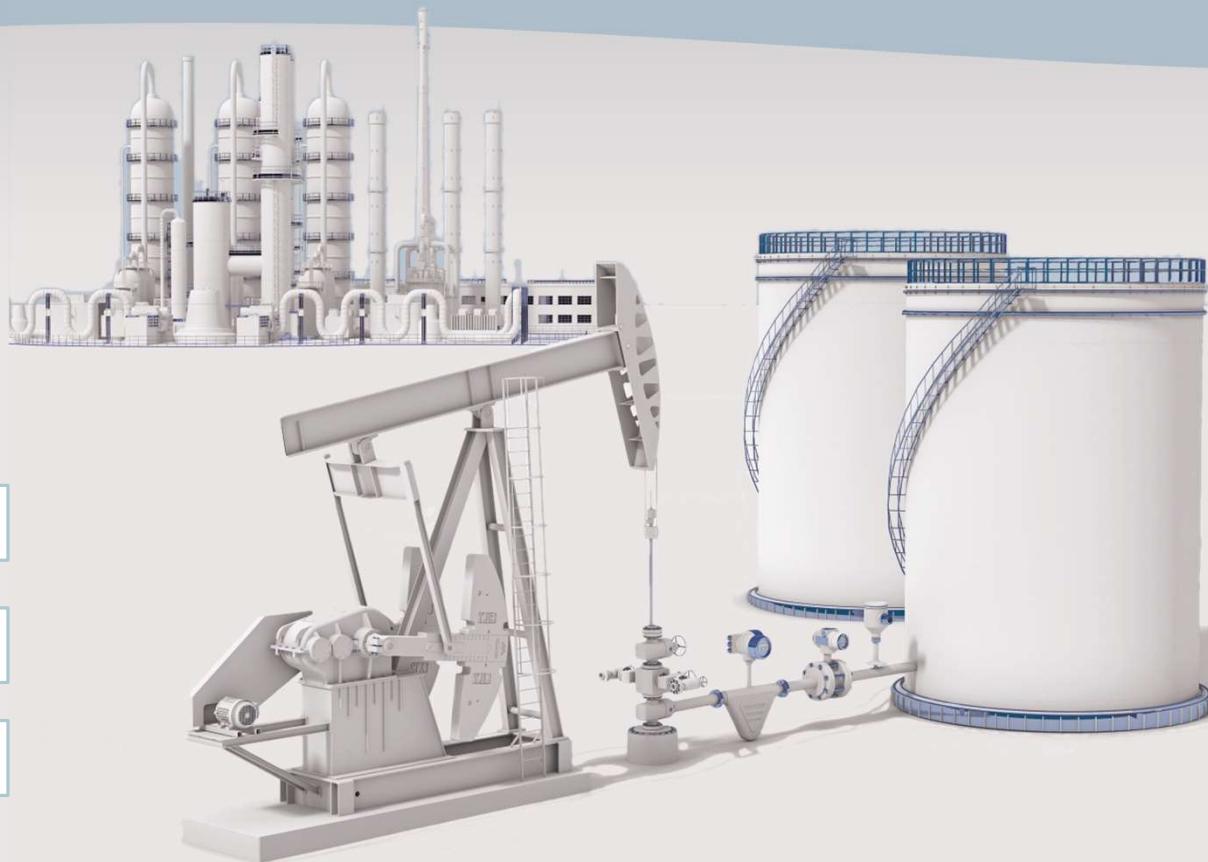


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# Process Industry



**i** Network security

**i** Remote communication

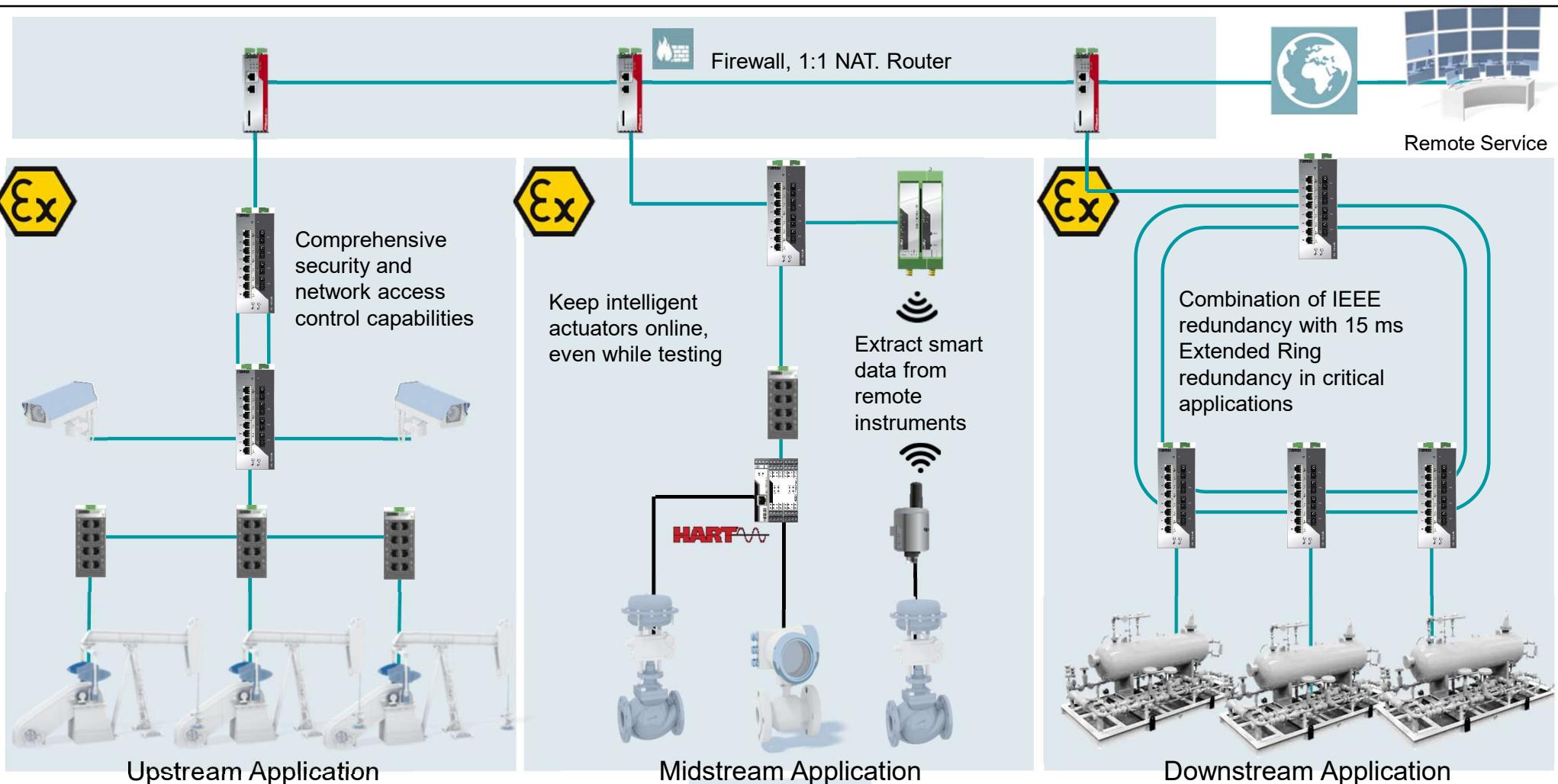
**i** Typical network structure

**i** Availability

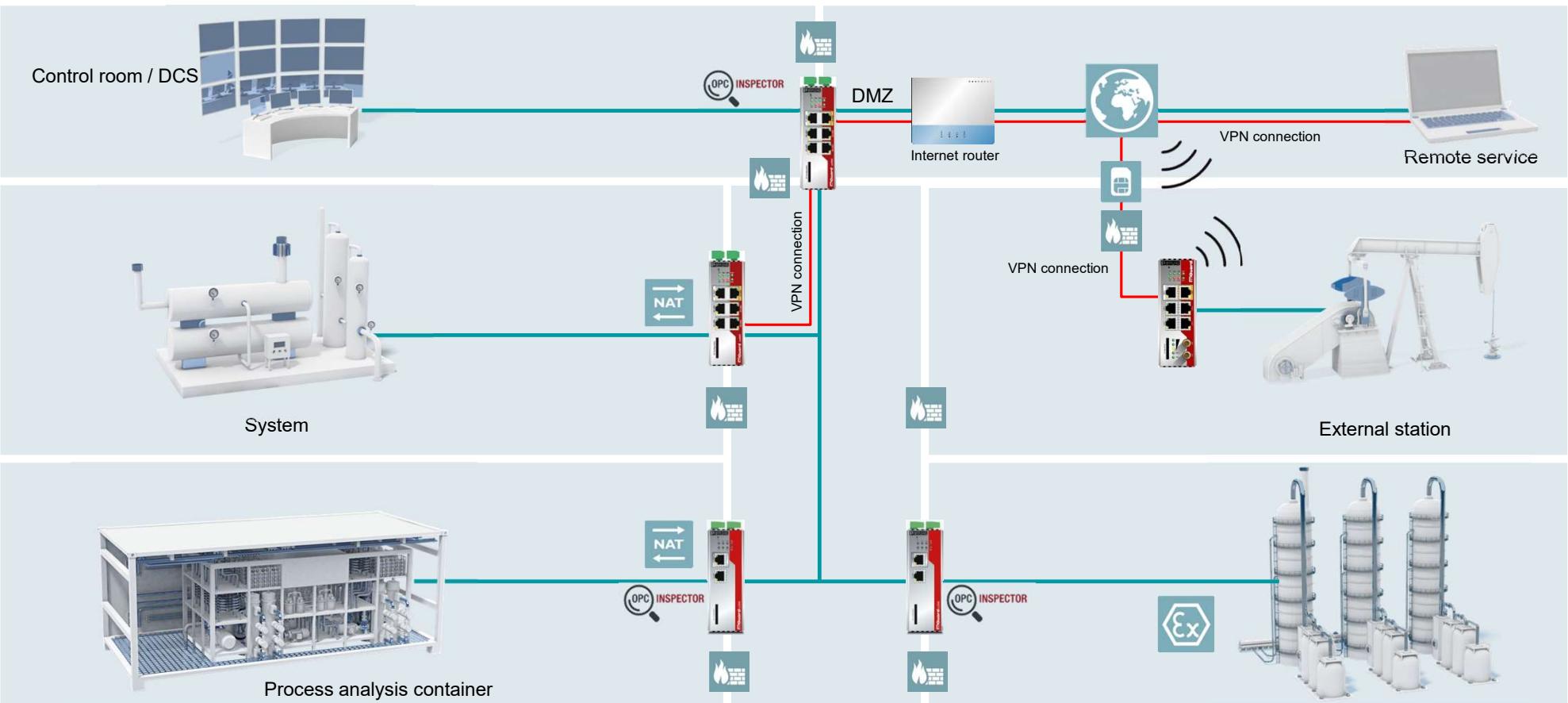
**i** Secure OPC connection

**i** Station integration

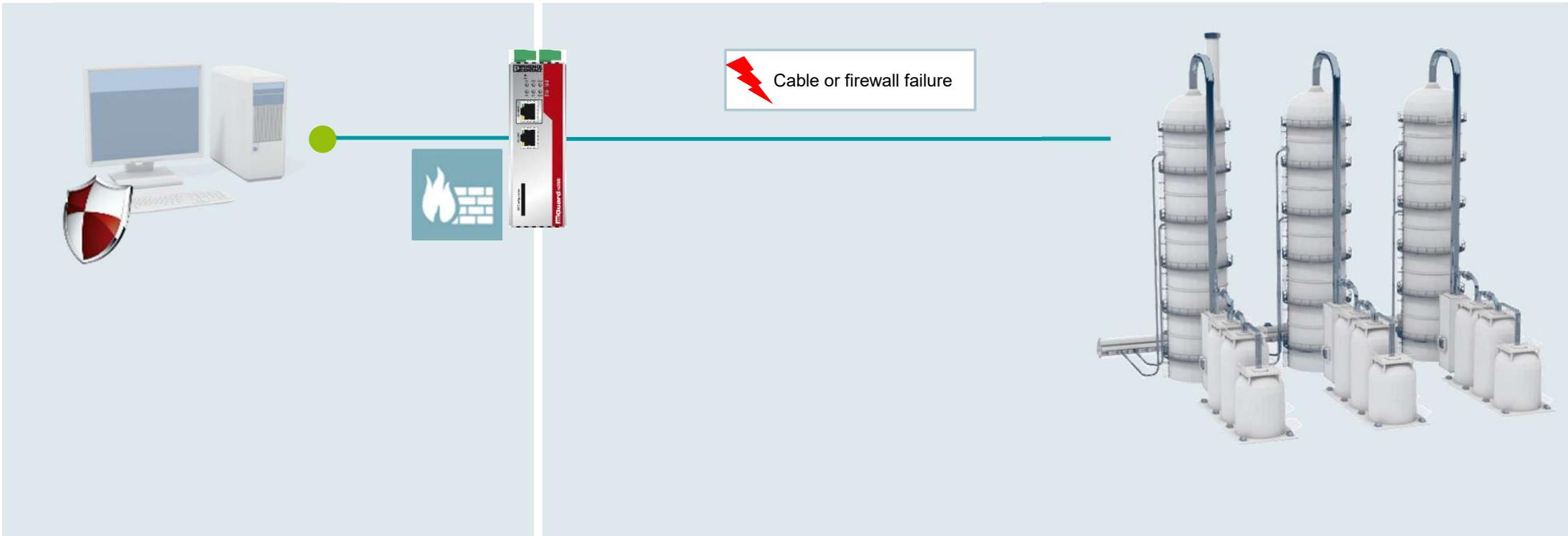




# Secure network structure



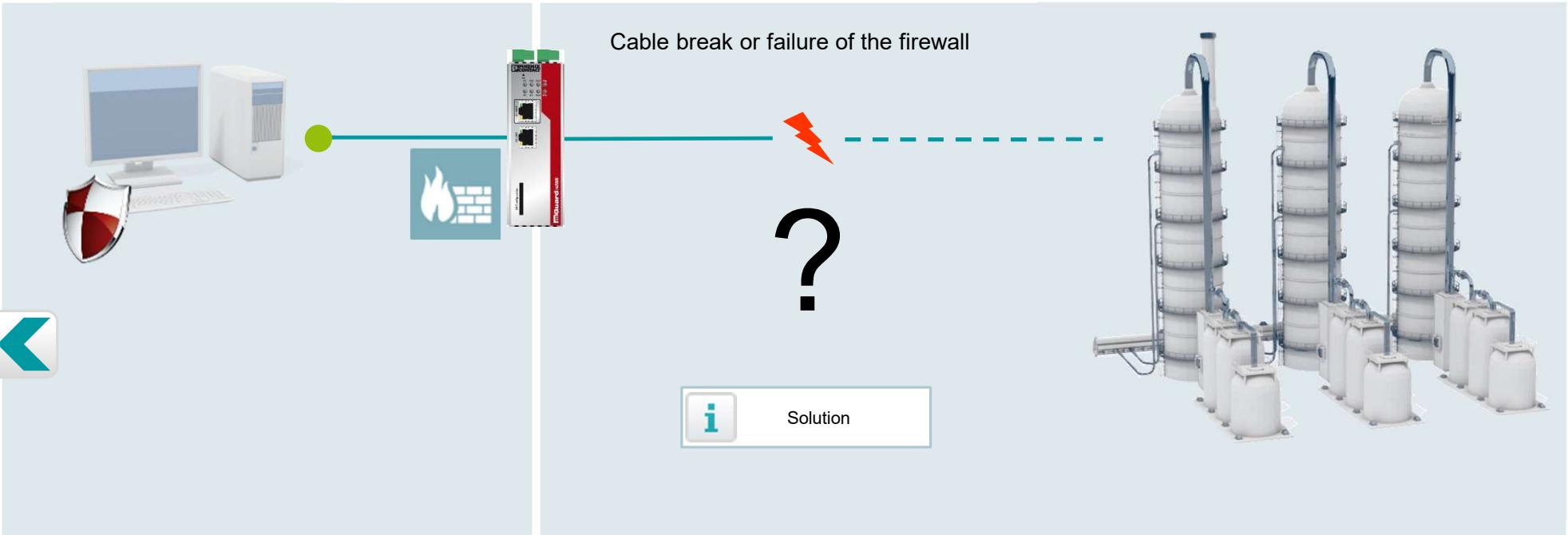
# Availability



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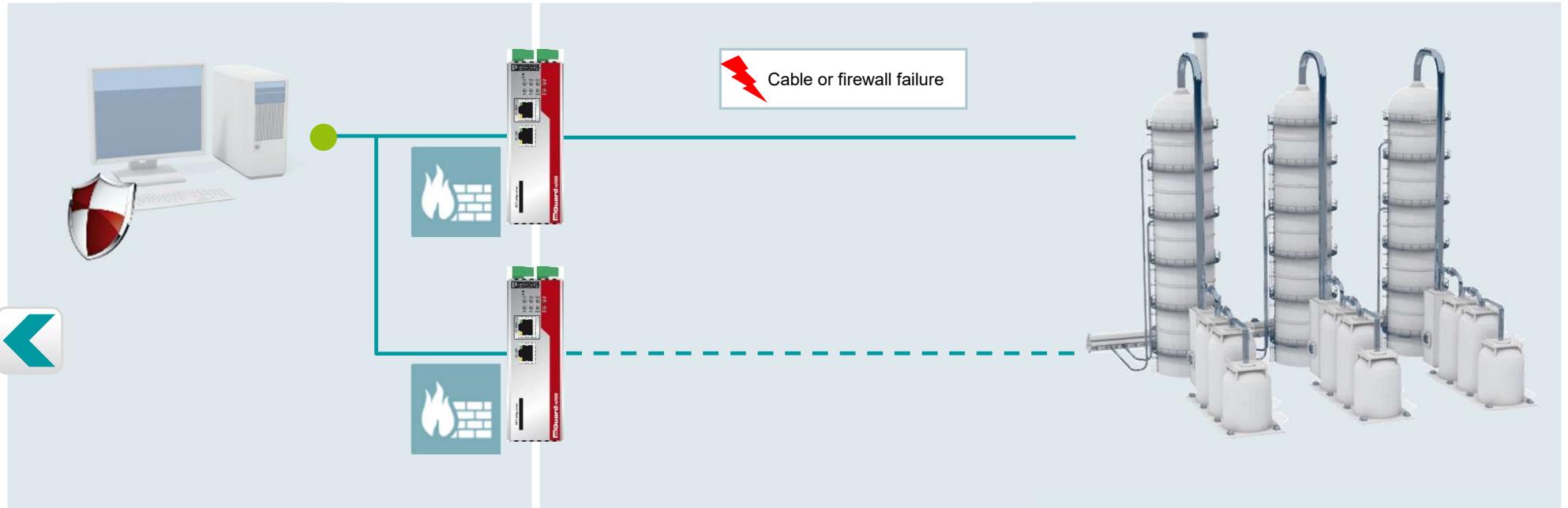
# Availability



**PHOENIX CONTACT**  
INSPIRING INNOVATIONS



# Availability

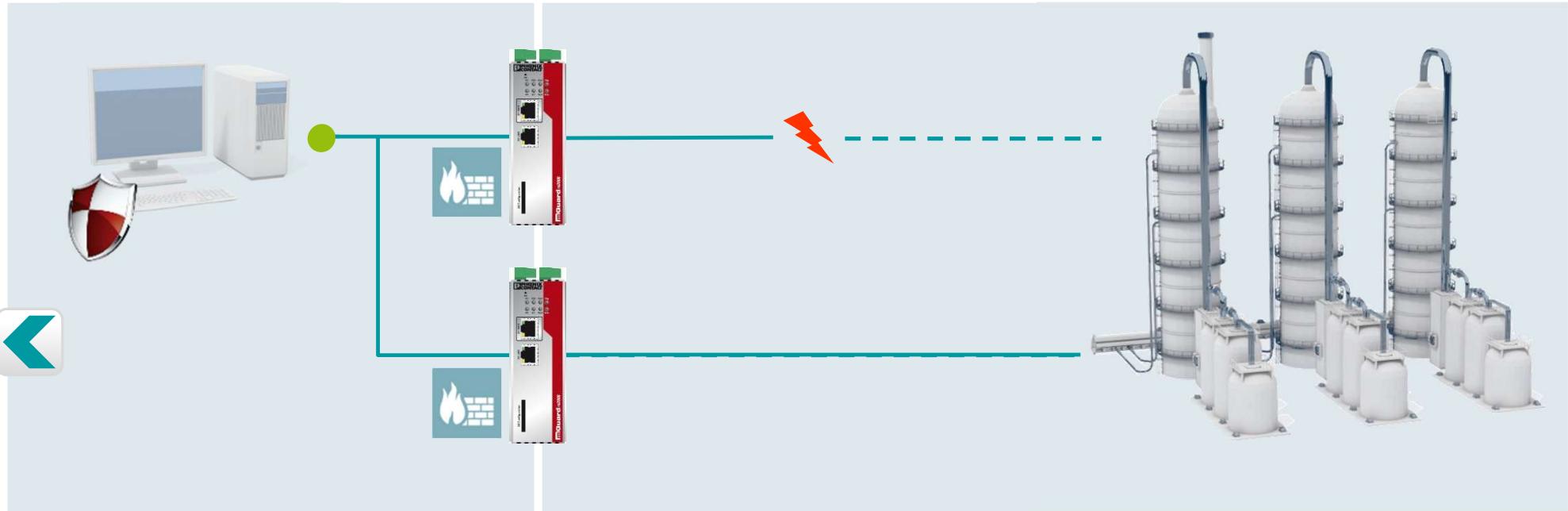


## Redundant firewall

for increased security and availability: Use an additional FL MGUARD as a redundant firewall without having to configure a second default gateway.



# Availability

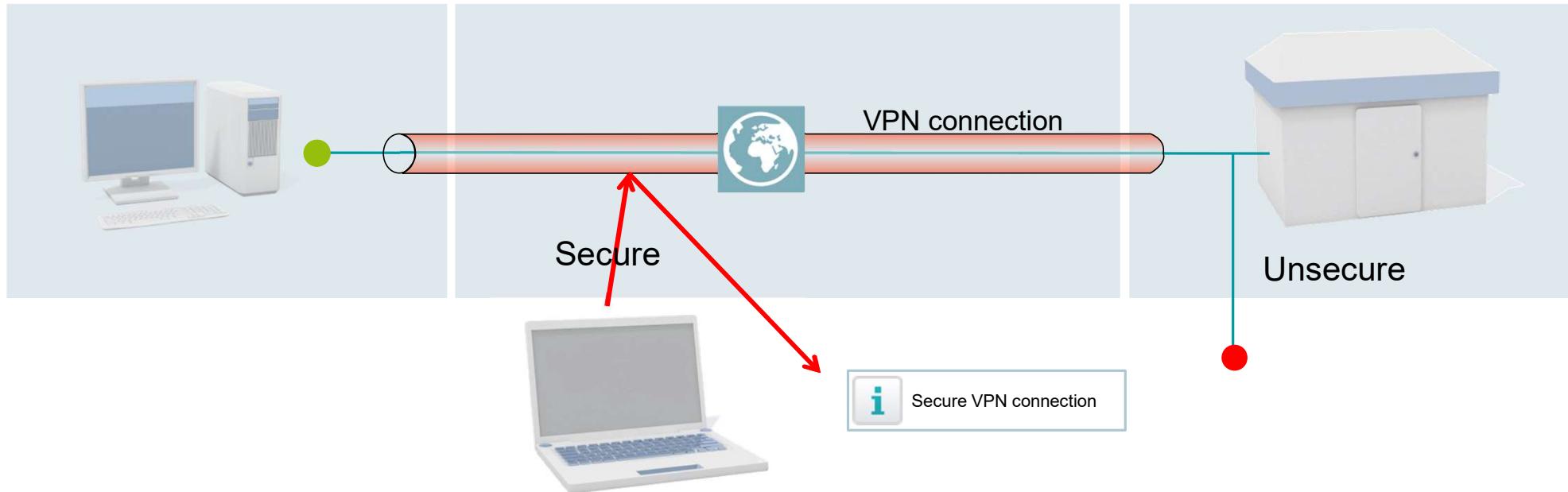


## Redundant firewall

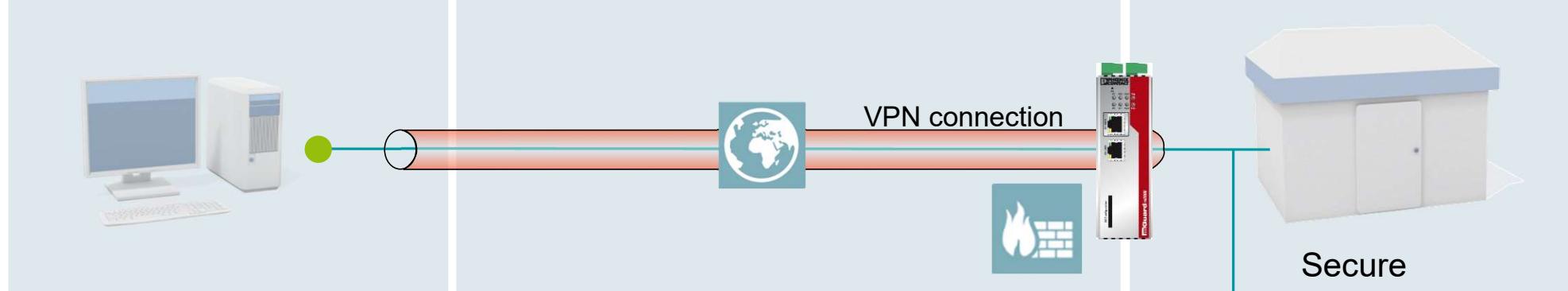
for increased security and availability: Use an additional FL MGUARD as a redundant firewall without having to configure a second default gateway.



# Secure remote communication



# mGuard firewall secures VPN connections

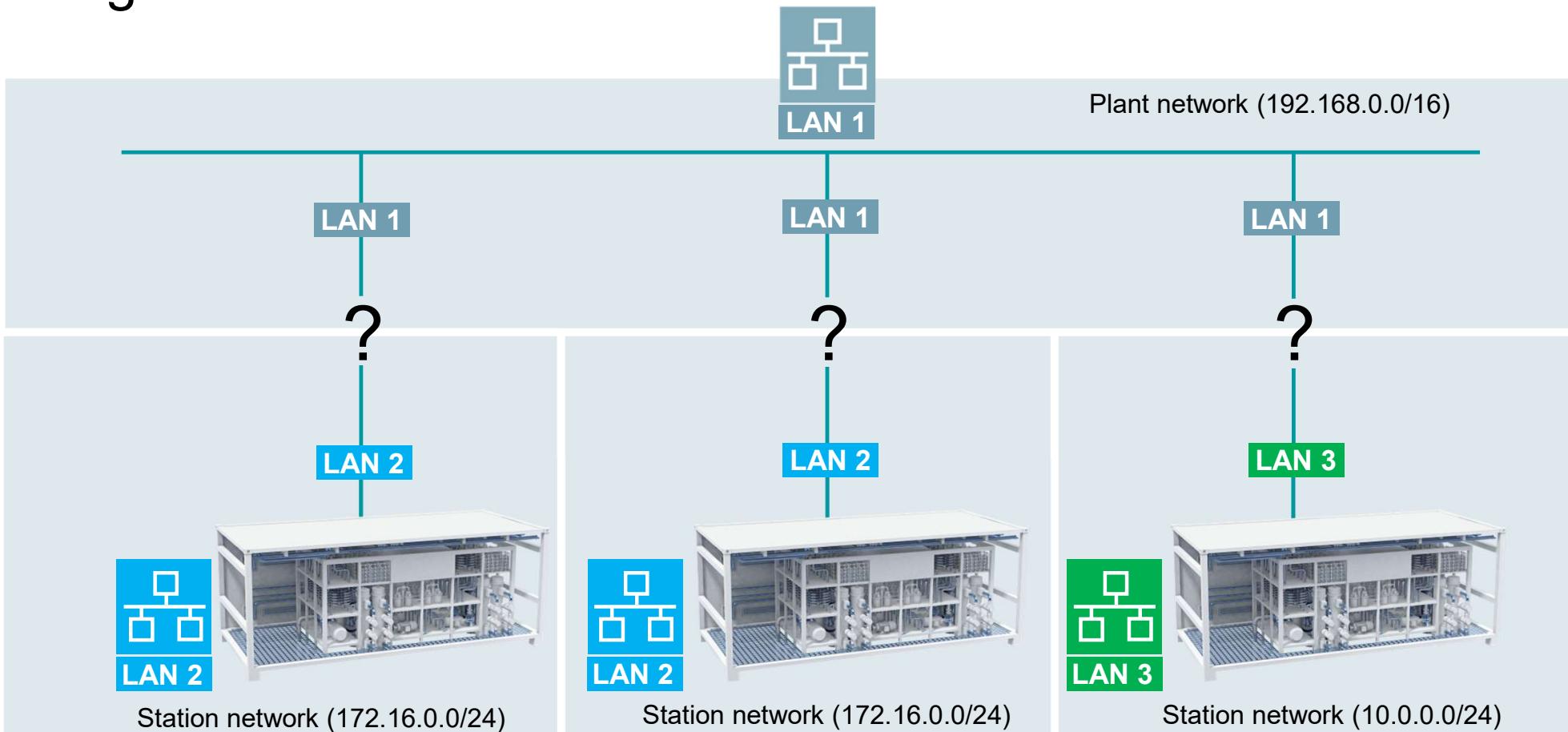


**mGuard firewall secures VPN connections**

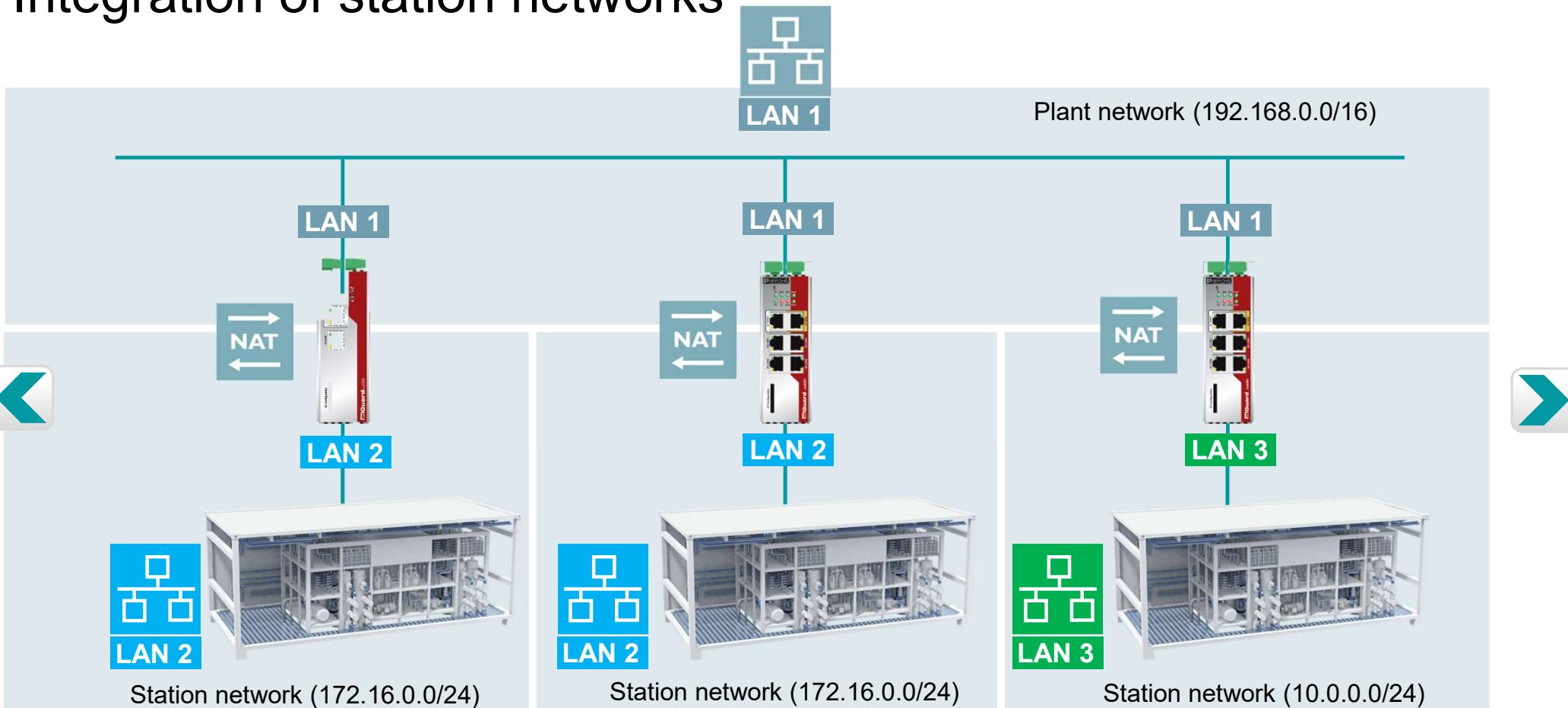
protects both communicating parties if one of them is attacked



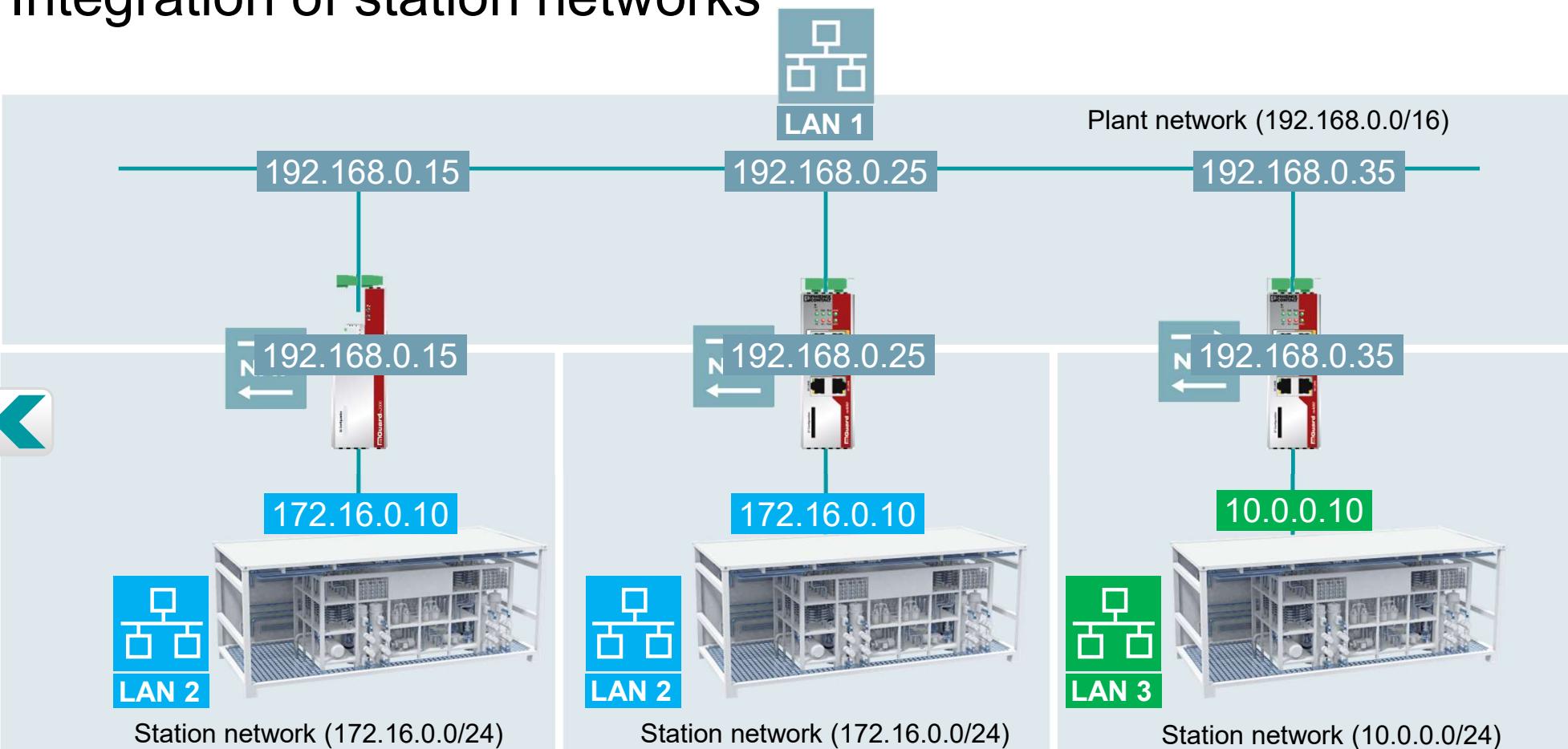
# Integration of station networks



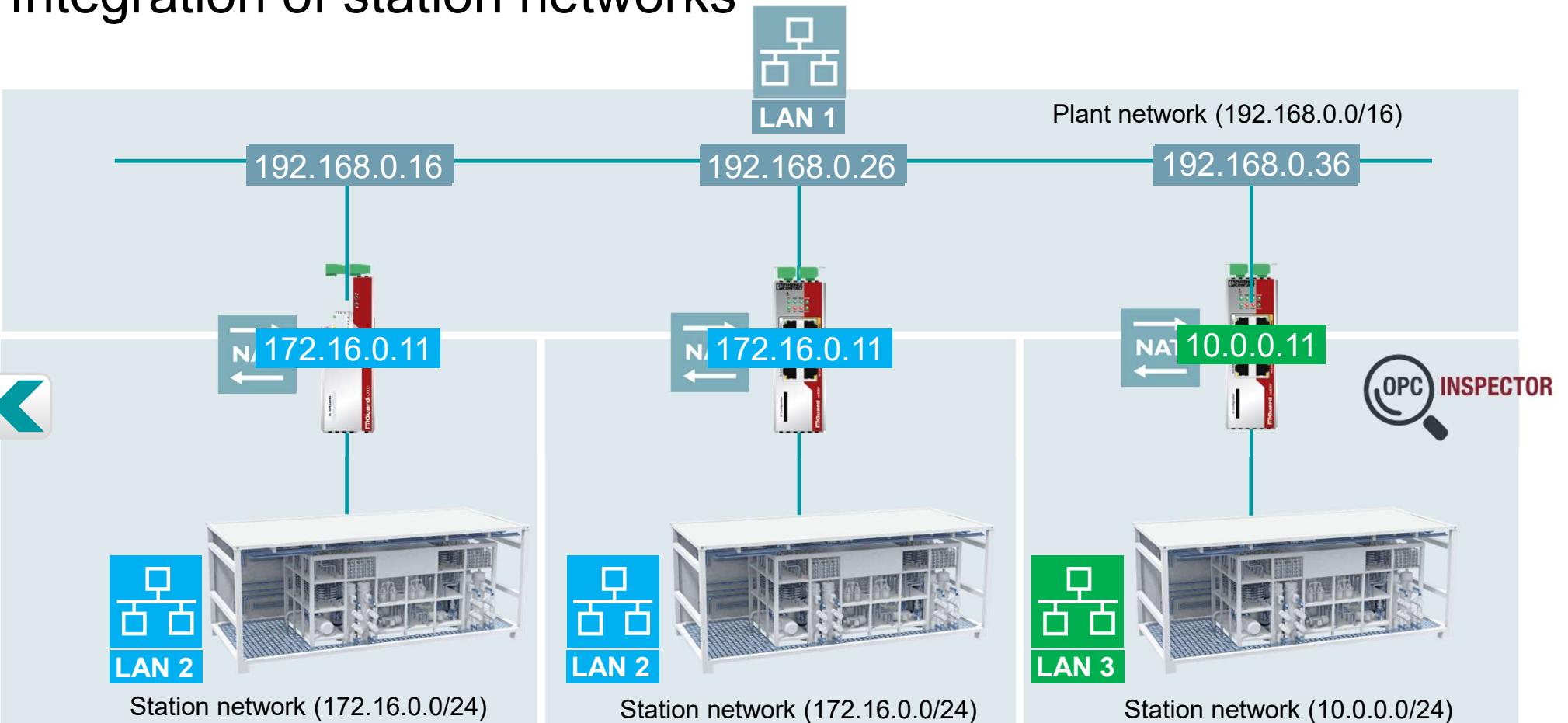
# Integration of station networks



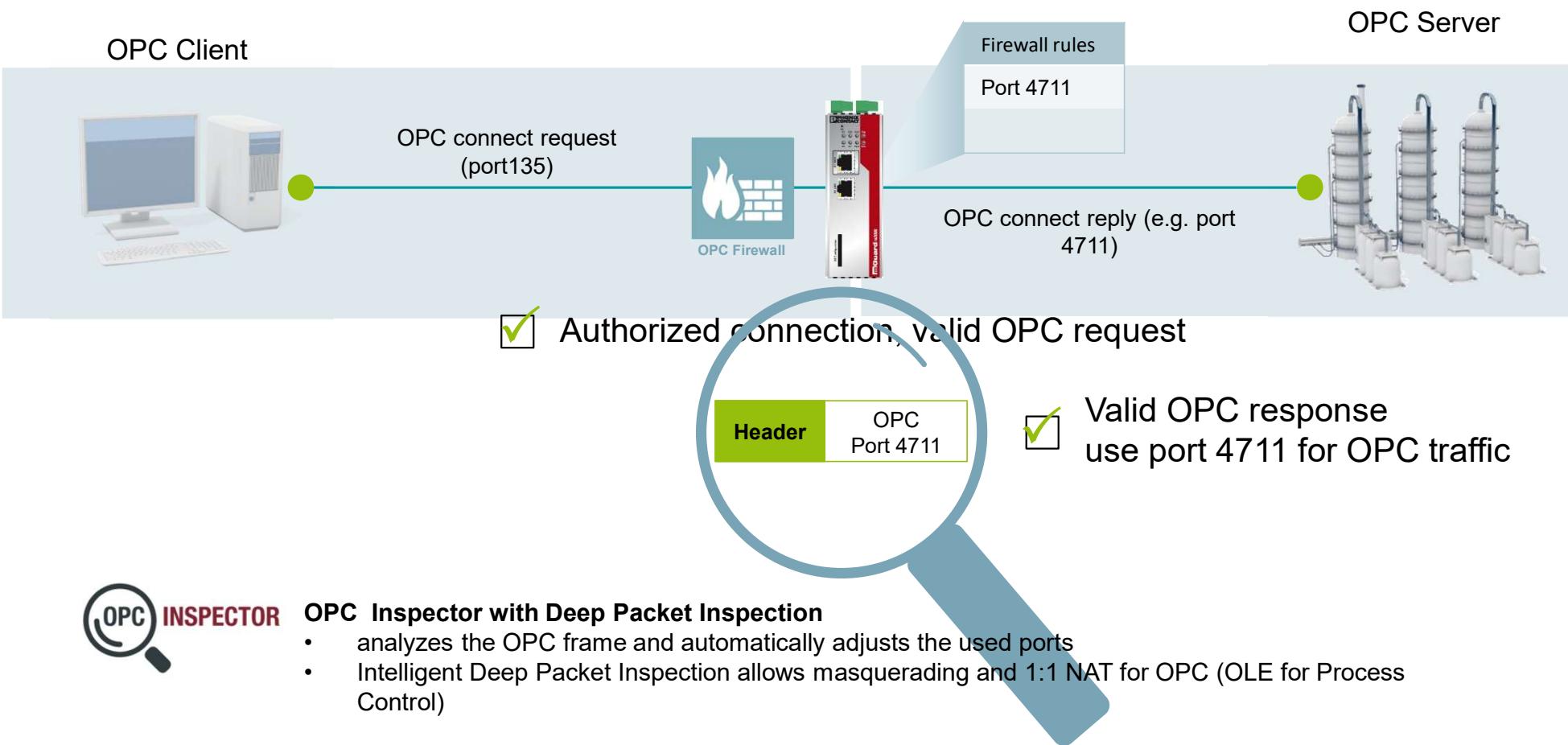
# Integration of station networks



# Integration of station networks



# Secure OPC connection



## OPC Inspector with Deep Packet Inspection

- analyzes the OPC frame and automatically adjusts the used ports
- Intelligent Deep Packet Inspection allows masquerading and 1:1 NAT for OPC (OLE for Process Control)



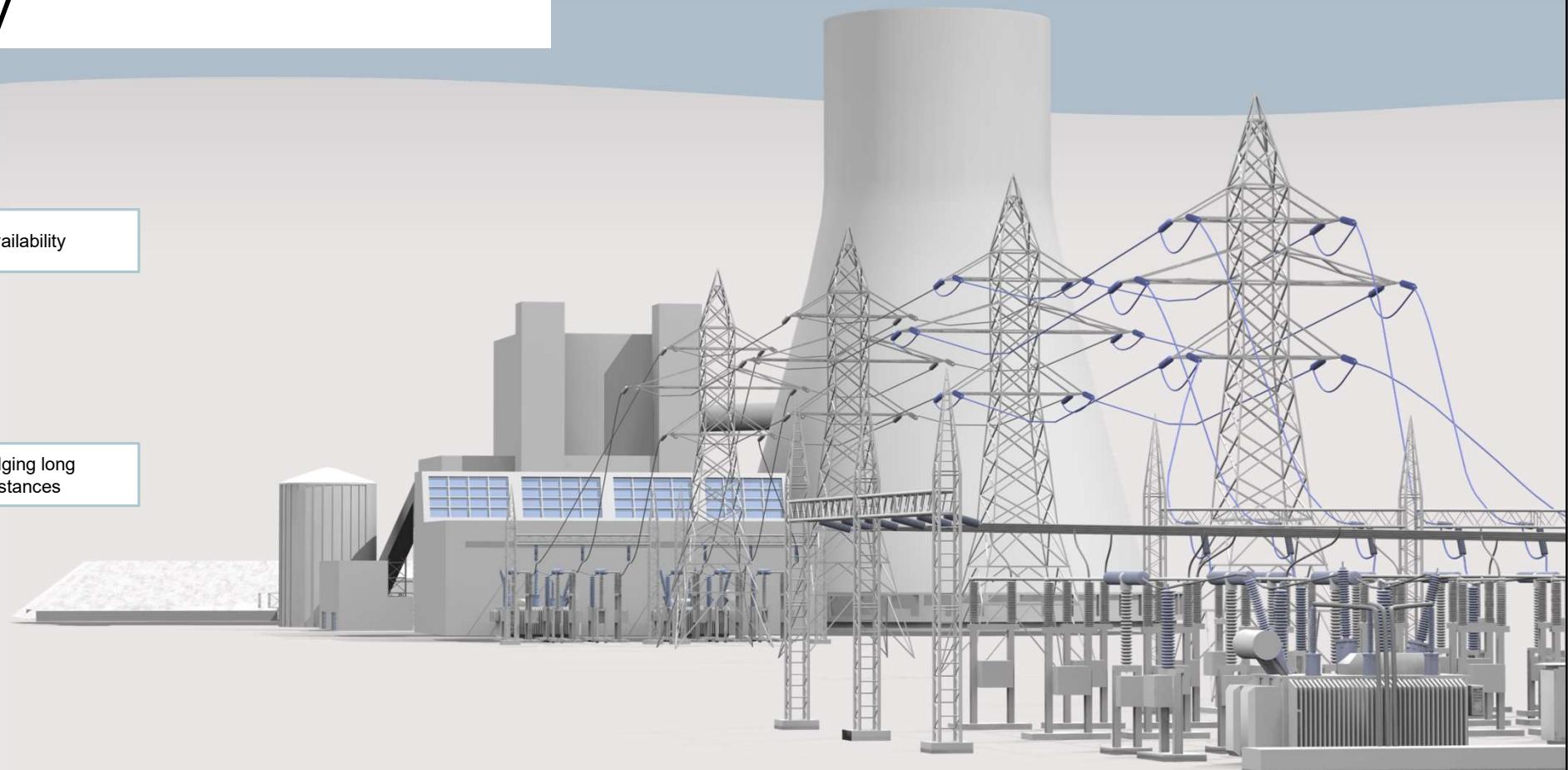
# Energy



Availability



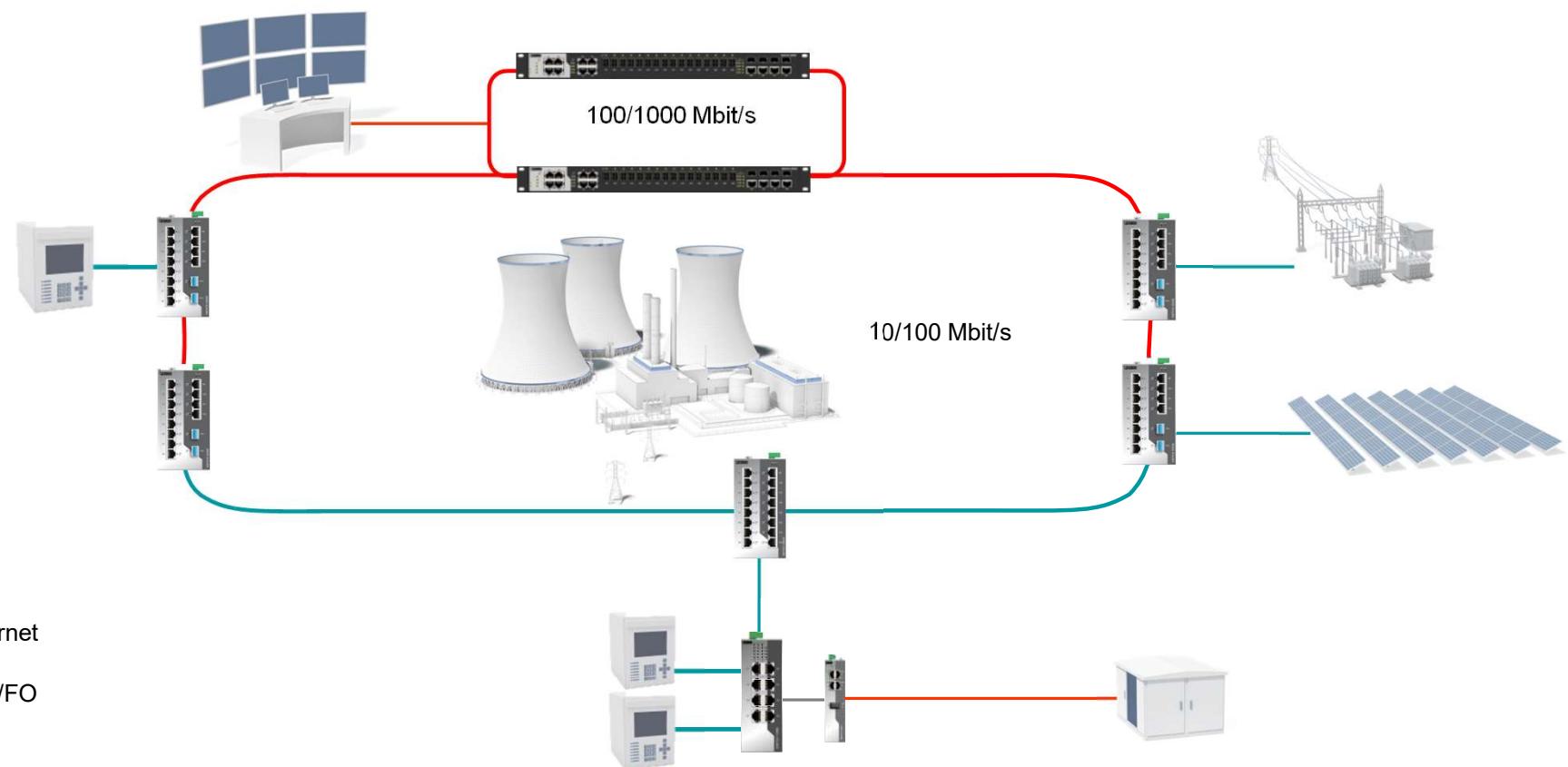
Bridging long distances



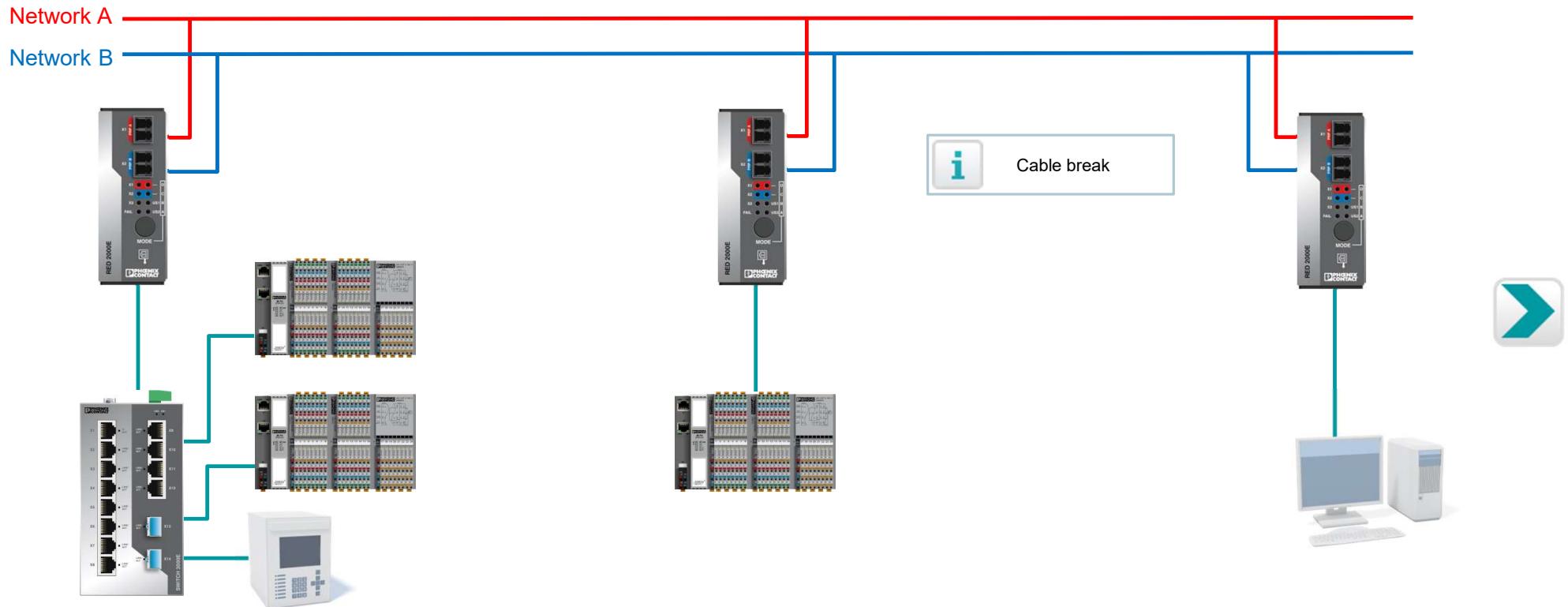
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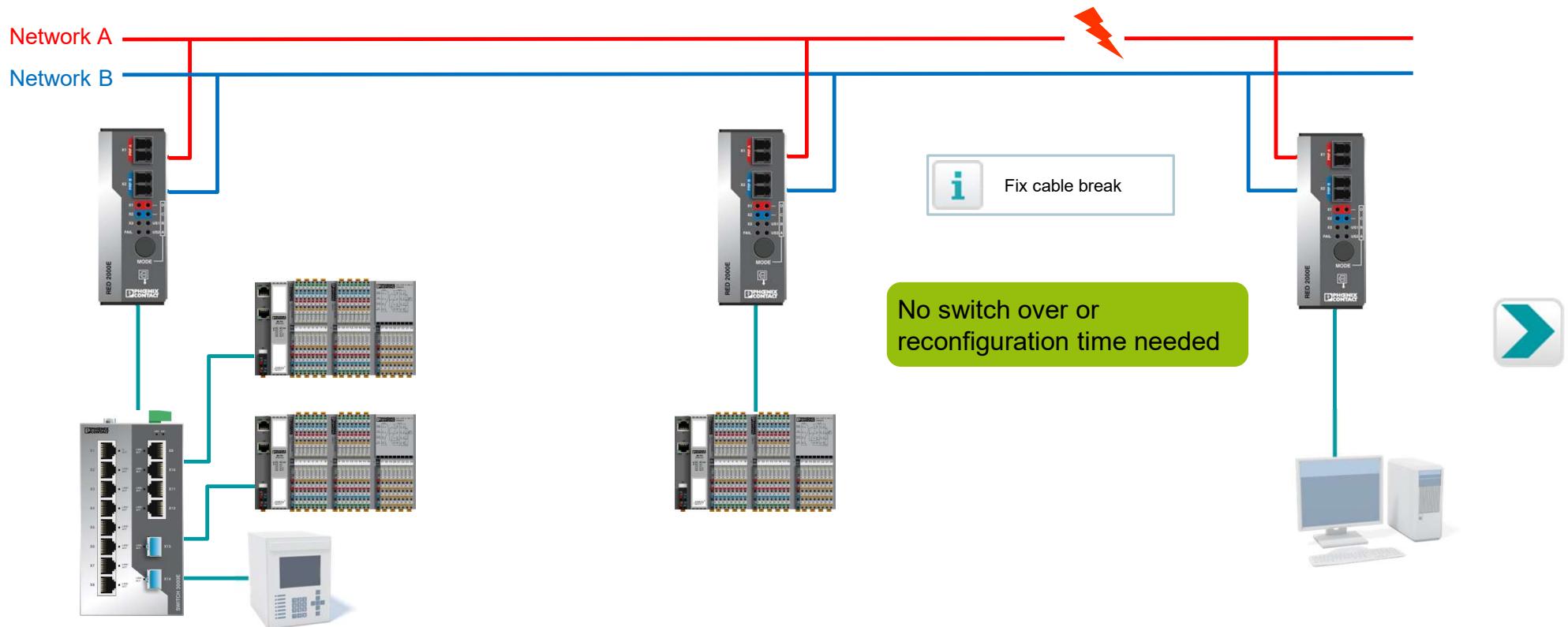
# Bridging long distances



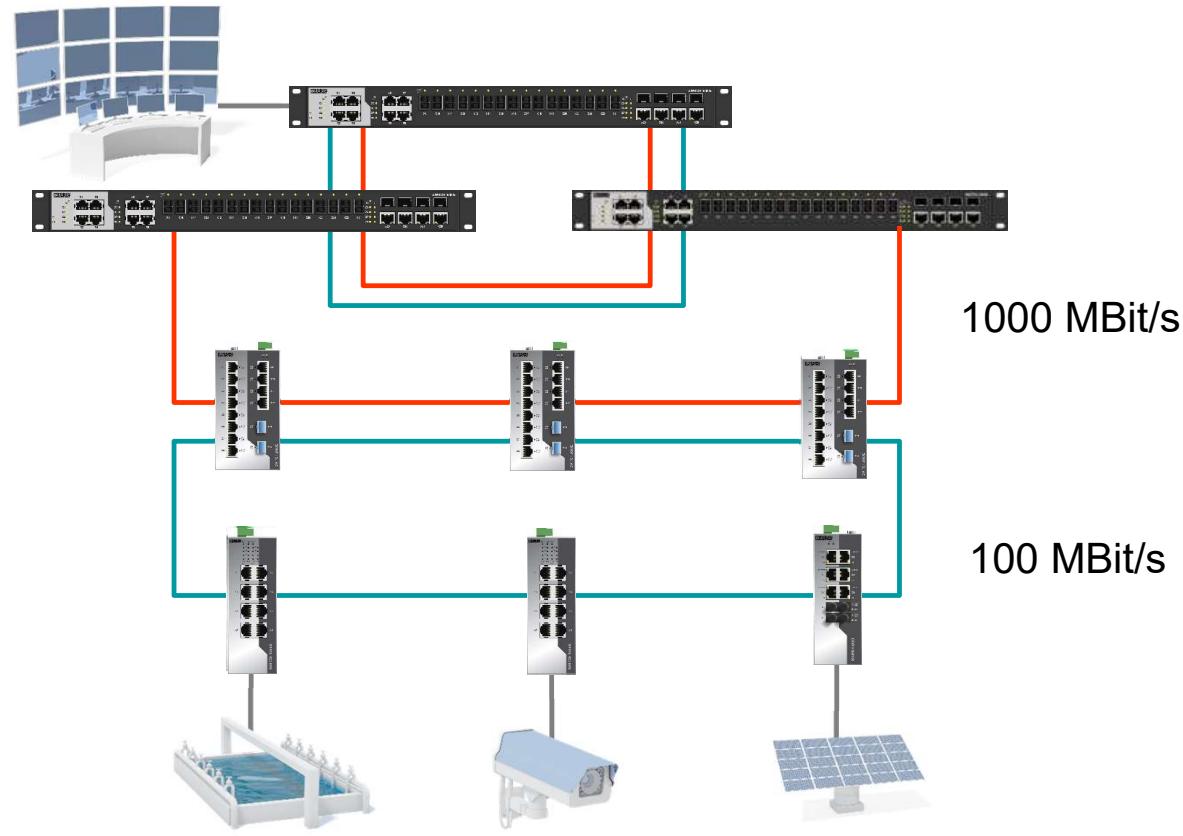
# Availability through Parallel Redundancy Protocol

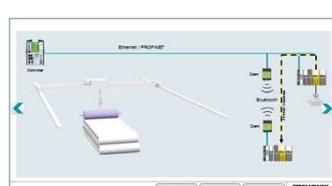
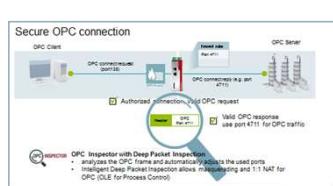
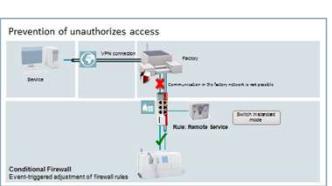
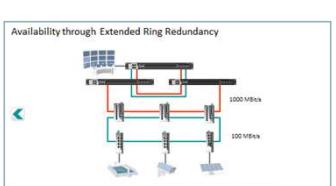
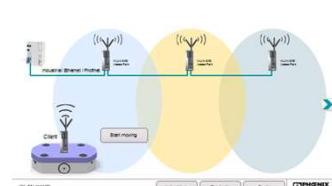
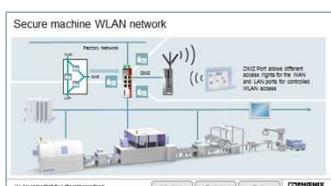
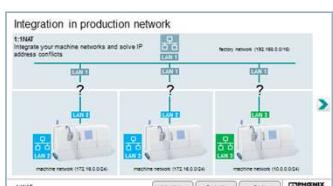
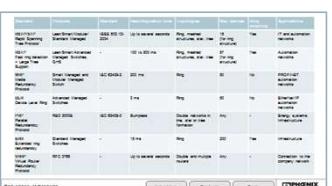
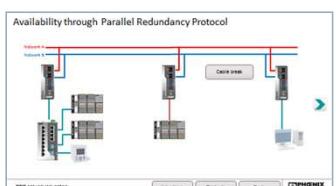
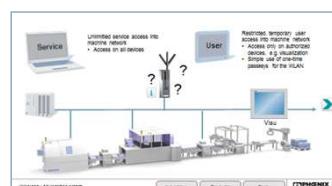
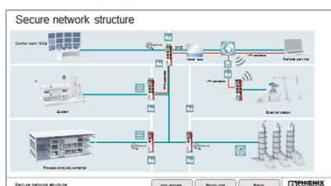
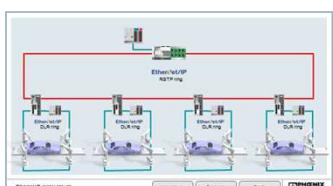
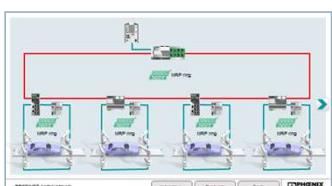
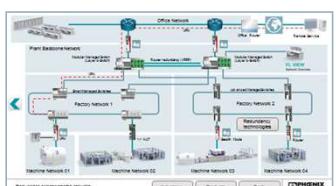
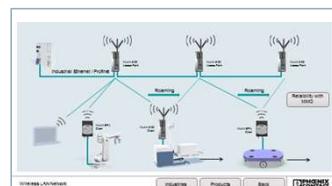
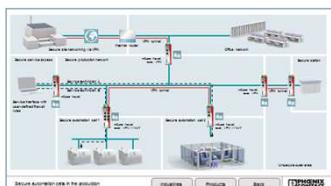
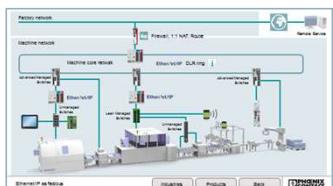
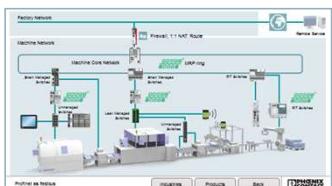
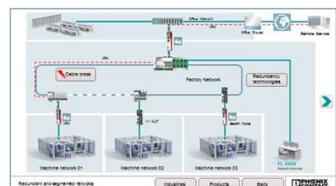


# Availability through Parallel Redundancy Protocol



# Availability through Extended Ring Redundancy





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# Our product portfolio



Managed  
Switches



Cyber  
Security



Power over  
Ethernet



Serial  
Device  
Server,  
Gateways



Unmanaged  
Switches



Remote  
communication



Network  
installation



Wireless  
Ethernet



Media  
conversion



Software



Video  
surveillance



# Our product portfolio



Managed  
Switches



Cyber  
Security



Power over  
Ethernet



Unmanaged  
Switches



Remote  
communication



Network  
installation



Wireless  
Ethernet



Media  
conversion



Software



Switch 2000



Switch 3000/4000



Switch 7000



Profinet IRT



Modular Managed



NAT-Switches



Automation protocols



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# Our product portfolio



Managed  
Switches



Cyber  
Security



Power over  
Ethernet



Unmanaged  
Switches



Remote  
communication



Network  
installation



Wireless  
Ethernet



Media  
conversion



Software



PoE Injectors



PoE Switches



PoE Splitters



Automation protocols



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# Our product portfolio



Managed  
Switches



Cyber  
Security



Power over  
Ethernet



Unmanaged  
Switches



Remote  
communication



Network  
installation



Wireless  
Ethernet



Media  
conversion



Software



Automation protocols



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# Our product portfolio



Managed  
Switches



Cyber  
Security



Power over  
Ethernet



Unmanaged  
Switches



Remote  
communication



Network  
installation



Wireless  
Ethernet



Media  
conversion



Secure remote control



Remote control via  
cloud



Remote access via  
internet and mobile  
phone network



Extension of complex  
IP networks



Automation protocols



INSPIRING INNOVATIONS

# Our product portfolio



Managed  
Switches



Cyber  
Security



Power over  
Ethernet



Unmanaged  
Switches



Remote  
communication



Wireless  
Ethernet



Media  
conversion



Network  
installation



Software



Copper-based  
network installation



Fiber optic-based  
network installation



Patch panels



PRP-redundancy  
modules



SFP modules



Memory media



Automation protocols



# Our product portfolio



Managed  
Switches



Cyber  
Security



Power over  
Ethernet



Unmanaged  
Switches



Remote  
communication



Network  
installation



Wireless  
Ethernet



Media  
conversion



Software



FL EPA



FL BLE 1300



FL WLAN 1100/2100



FL WLAN 5110



FL WLAN 1010/2010



Automation protocols



# Modular Managed Switches

External  
memory card

 Redundancy  
function

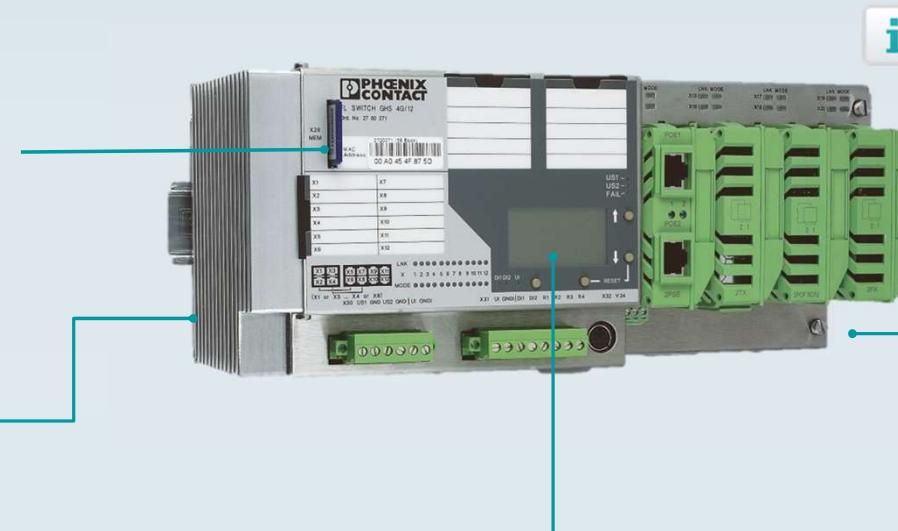
Large operator display



Wide range  
of media



 Layer 3 function



Automation protocols



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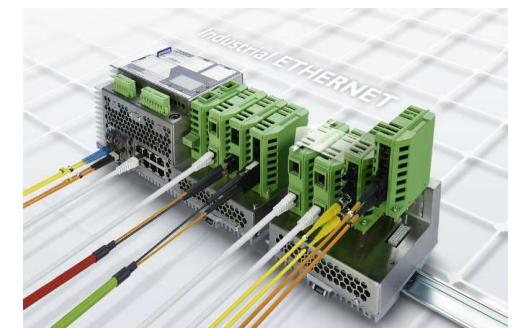


# Modular Managed Switches



Wide range of media

- Up to 12 integrated Gigabit ports
- 4 SFP Gigabit slots
- Different fiber optic connections (SC, ST, POF)
- Power over Ethernet



Automation protocols



# Modular Managed Switches



- Meshed structures with RSTP
- Media Redundancy protokoll (MRP) according to IEC 62439
- Large Tree Support
- Fast Ring Detection
- Router redundancy with VRRP



Automation protocols

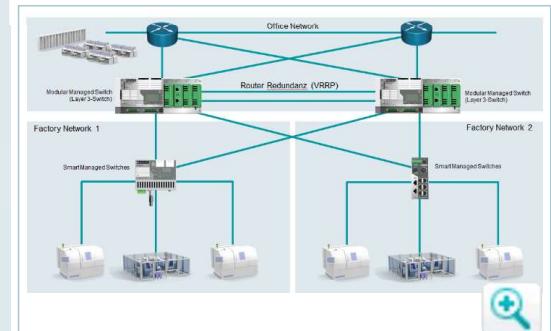


# Modular Managed Switches



Layer 3  
function

- Port-specific routing up to 28 times
- Static and dynamic routing
- Routing VLANs
- Run Several routers via VRRP

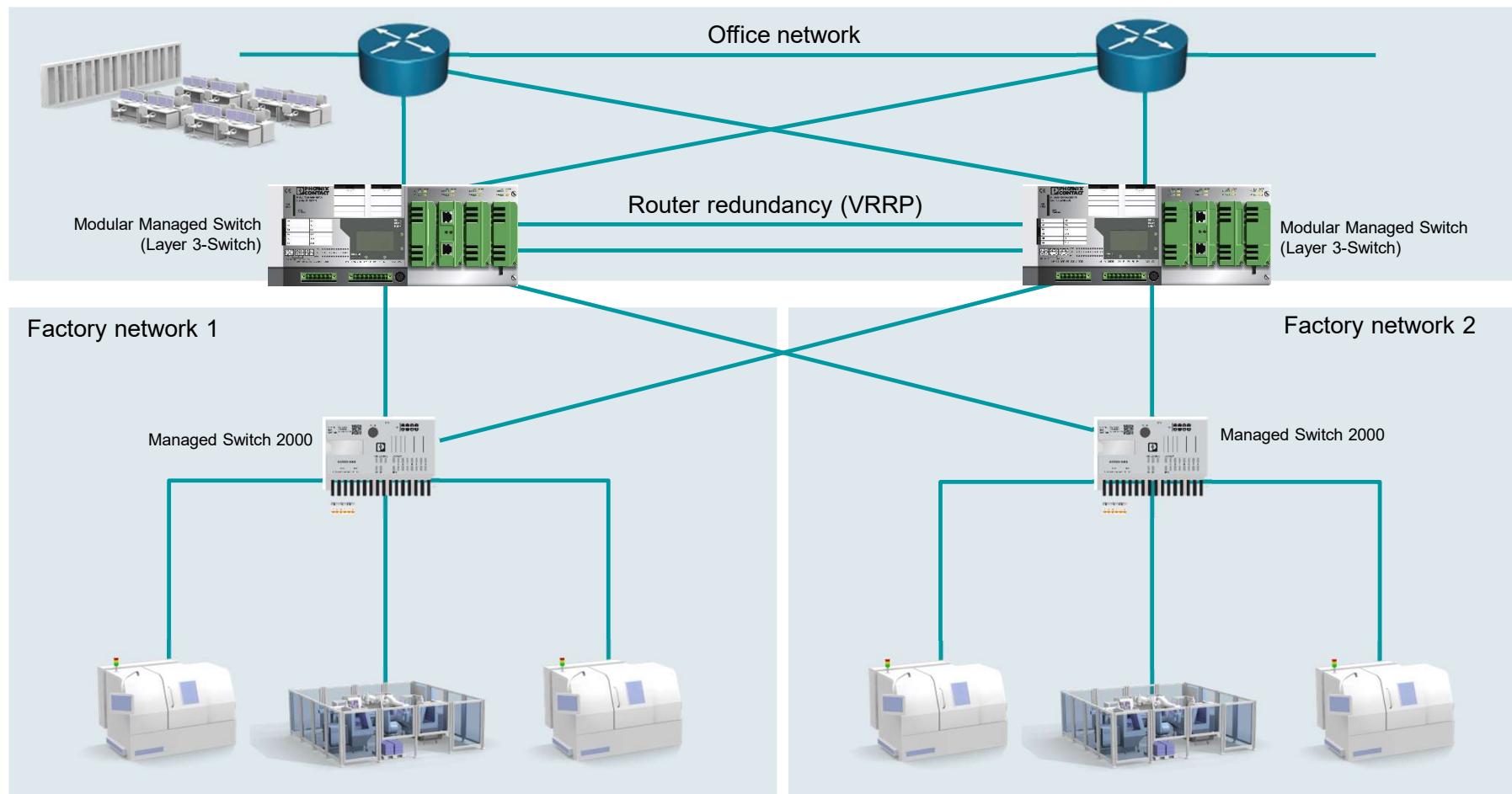


Automation protocols



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Automation protocols



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# Modular Managed Switches



	<b>FL SWITCH GHS 4G/12</b>	<b>FL SWITCH GHS 12G/8</b>	<b>FL SWITCH GHS 4G/12-L3</b>	<b>FL SWITCH GHS 12G/8-L3</b>	<b>FL FXT</b>
Ports	4x Combo ports 4x RJ45 ports Expandable up to 24 Ports	4x SFP Gigabit slots 8x RJ45 Gigabit ports Expandable up to 28 Ports	4x Combo ports 4x RJ45 ports Expandable up to 24 Ports	4x SFP Gigabit slots 8x RJ45 Gigabit ports Expandable up to 28 Ports	Extension module for up to 8 Ethernet ports
Layer 3 function	No	No	Yes	Yes	-
Order number	2700271	2989200	2700787	2700786	2989307



Automation protocols



# Media modules



	<b>FL IF 2TX VS-RJ-D</b>	<b>FL IF 2TX VS-RJ-F</b>	<b>FL IF 2PSE-F</b>	<b>FL IF 2FX SC-D</b>	<b>FL IF 2FX SC-F</b>	<b>FL IF 2FX SM SC-D</b>	<b>FL IF 2FX ST-D</b>	<b>FL IF 2POF SCRJ-D</b>
--	------------------------------	------------------------------	-------------------------	---------------------------	---------------------------	------------------------------	---------------------------	------------------------------

Ports	RJ45, connection direction downward	RJ45, connection direction forward	PoE- RJ45, connection direction forward	SC, connection direction downward	SC, connection direction forward	SC, connection direction downward	ST, connection direction downward	SC-RJ, connection direction downward
Fiber type	-	-	-	Multimode fiber optics (1300 nm)	Multimode fiber optics (1300 nm)	Singlemode fiber optics (1300 nm)	Multimode fiber optics (1300 nm)	POF/PCF fiber (650 nm)
Order number	2832357	2832344	2832904	2832425	2832412	2832205	2884033	2891084



Automation protocols



# Managed Switches 7000

EtherNet/IP™

 Common Industrial Protocol (CIP)

 IGMP snooping/querier



 Device Level Ring (DLR) redundancy

 Faceplate visualizations

Gigabit combo ports 

 Automation protocols



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# Switch 7000

Common  
Industrial  
Protocol (CIP)

EtherNet/IP™



- Integration into EtherNet/IP control systems





Diagnosis

EtherNet/IP™

Common Industrial Protocol  
(CIP)

Configuration



Automation protocols



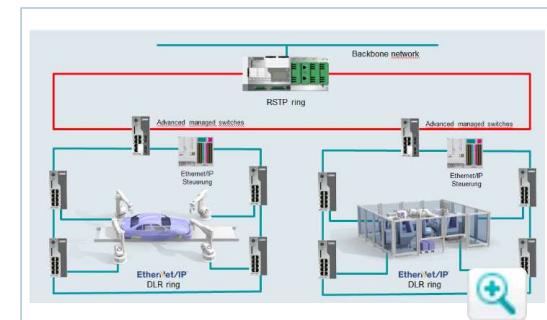
# Switch 7000

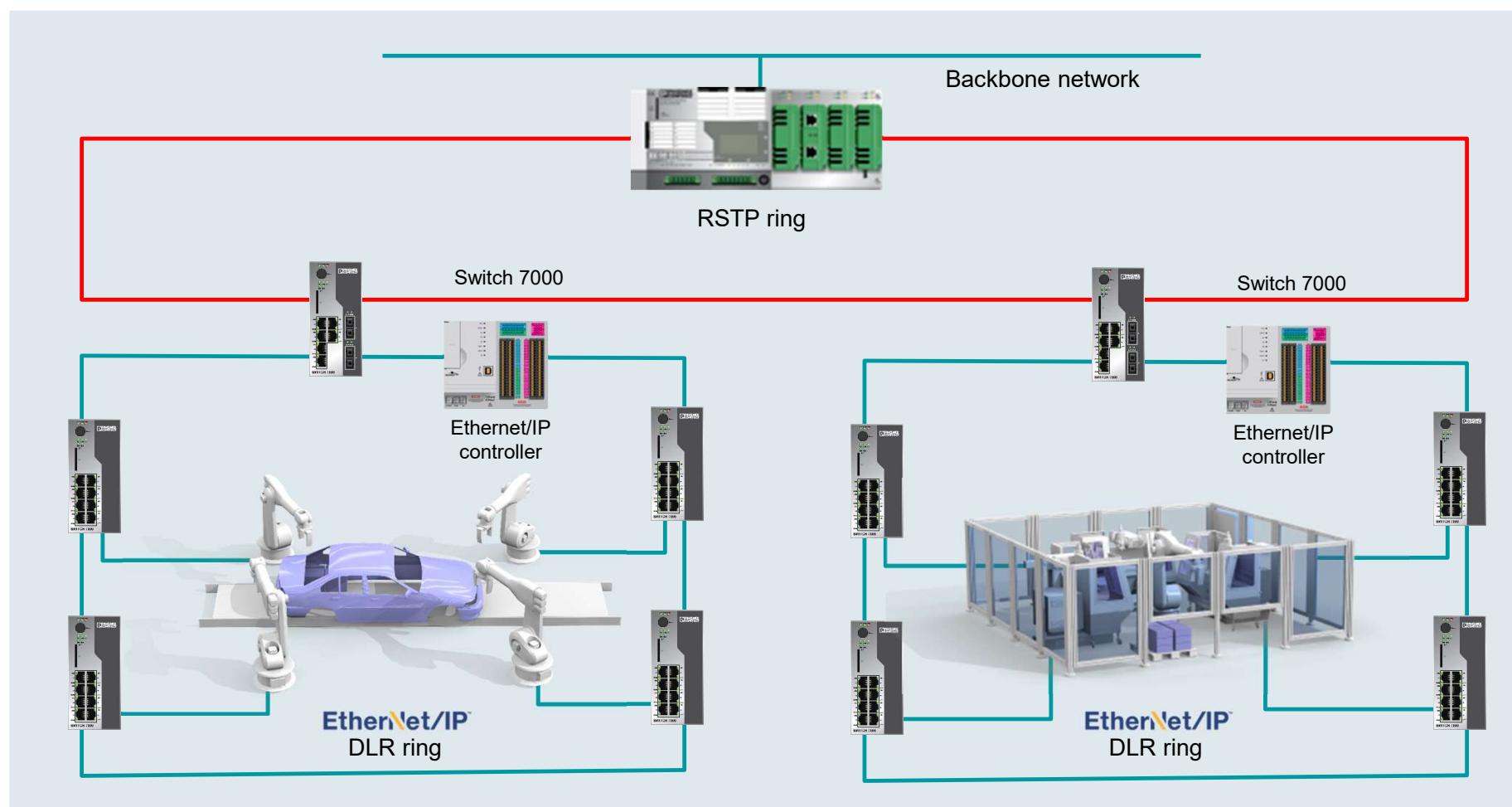
EtherNet/IP™



Device Level  
Ring (DLR)  
redundancy

- Multivendor redundancy mechanism for EtherNet/IP
- Recovery time < 3ms





# Switch 7000

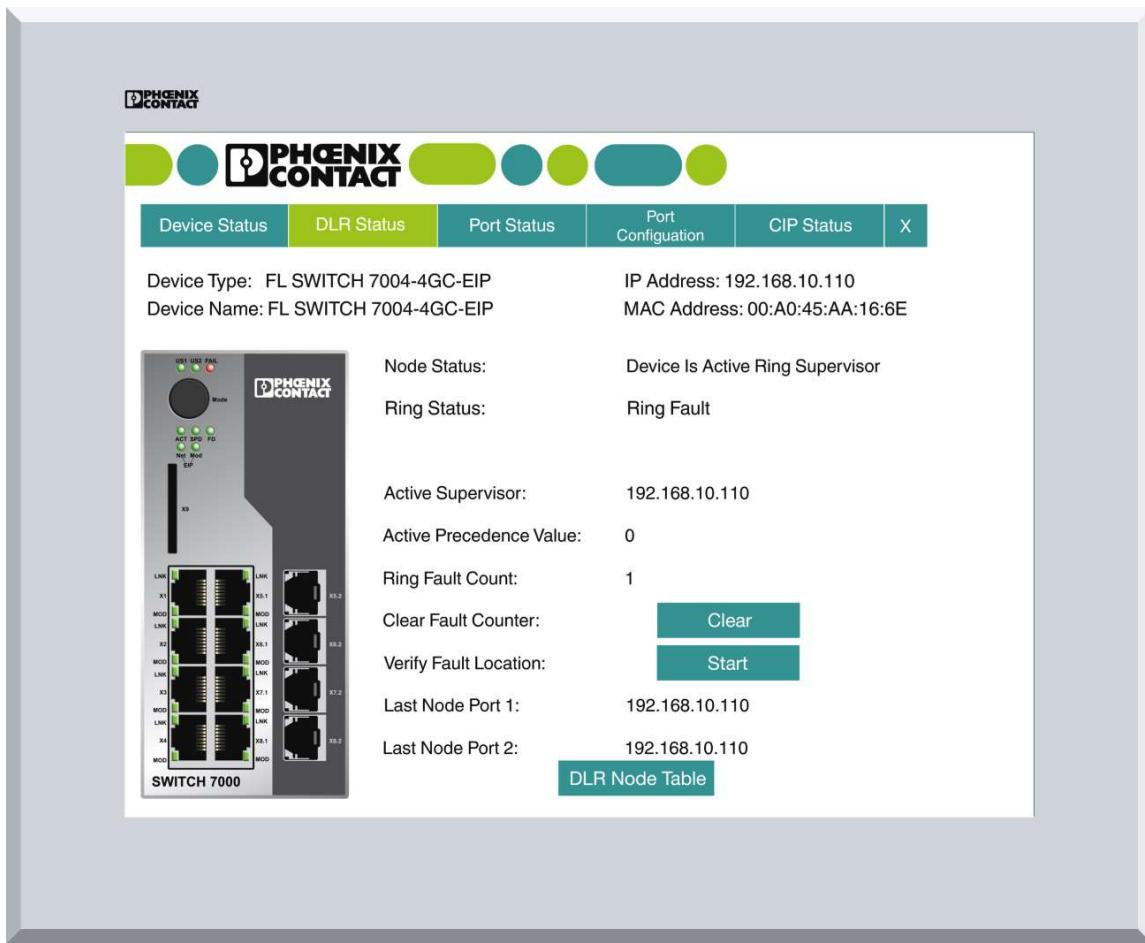
EtherNet/IP™



Faceplate  
visualizations

- Pre-configured visualization for Rockwell control systems
- Diagnostic information
- Port configuration





Automation protocols



**PHOENIX CONTACT**  
INSPIRING INNOVATIONS

# Switch 7000

EtherNet/IP™



Gigabit combo ports

- Flexible choice of the transmission medium (copper or fiber) and fiber (singlemode or multimode)
- Cable length up to 80km (depending on the SFP module)



# Switch 7000

EtherNet/IP™

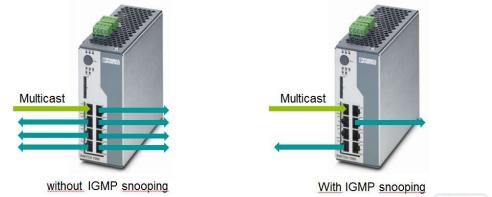


IGMP snooping/  
querier



- Analysis of incoming multicast packets
- Packet forwarding only to ports, who need them
- Reduction of the network traffic

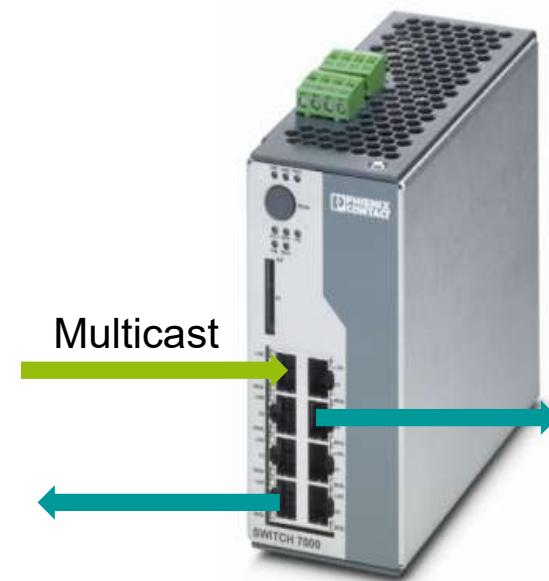
Reduction of network load: Multicast packages are only forwarded to those ports who need them



Reduction of network load: Multicast packages are only forwarded to those ports who need them



without IGMP snooping



with IGMP snooping



# Switch 7000



	<b>FL SWITCH 7008-EIP</b>	<b>FL SWITCH 7006/2FX-EIP</b>	<b>FL SWITCH 7005/FX- 2FXSM-EIP</b>	<b>FL SWITCH 7006-2GC-EIP</b>	<b>FL SWITCH 7004-4GC-EIP</b>	<b>FL SWITCH 7004-2TC- 2GC-EIP</b>
Ports	8x RJ45	6x RJ45 2x SC-MM	5x RJ45 1x SC-MM, 2x SC-SM	6x RJ45 2 x Gigabit combo	4x RJ45 4 x Gigabit combo	4x RJ45 2x Fast Ethernet combo 2 x Gigabit combo
Transmission speed	10/100 MBit/s	10/100 MBit/s	10/100 MBit/s	10/100/1000 MBit/s	10/100/1000 MBit/s	10/100/1000 MBit/s
Order number	2701418	2701419	2701420	2701554	2701553	2702175



Automation protocols



# Managed Switches 2000

**i** Easy configuration →



**i** Redundancy

Security **i**

Profinet and  
EtherNet/IP™ support **i**



Unmanaged  
mode

DHCP server **i**

**i** Automation protocols



# Managed Switches 2000

Easy configuration



- Several options for easy configuration



Automation protocols



### SD card

Easy replication of configuration



### Web based management

Configuration from the browser



### PROFINET device

Configuration from PLCnext Engineer or TIA Portal



### Smart mode button

Configuration on the device



### CLI and SNMP

Configuration from the PLC



### Management software

Configuration via FL NETWORK MANAGER



Automation protocols



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INSPIRING INNOVATIONS

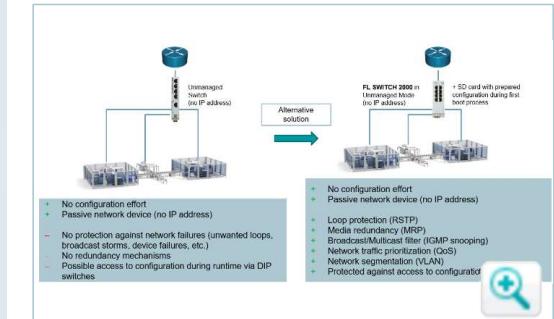


# Managed Switches 2000



Unmanaged mode

- Operation like unmanaged switch
- No IP configuration
- Enabled management features

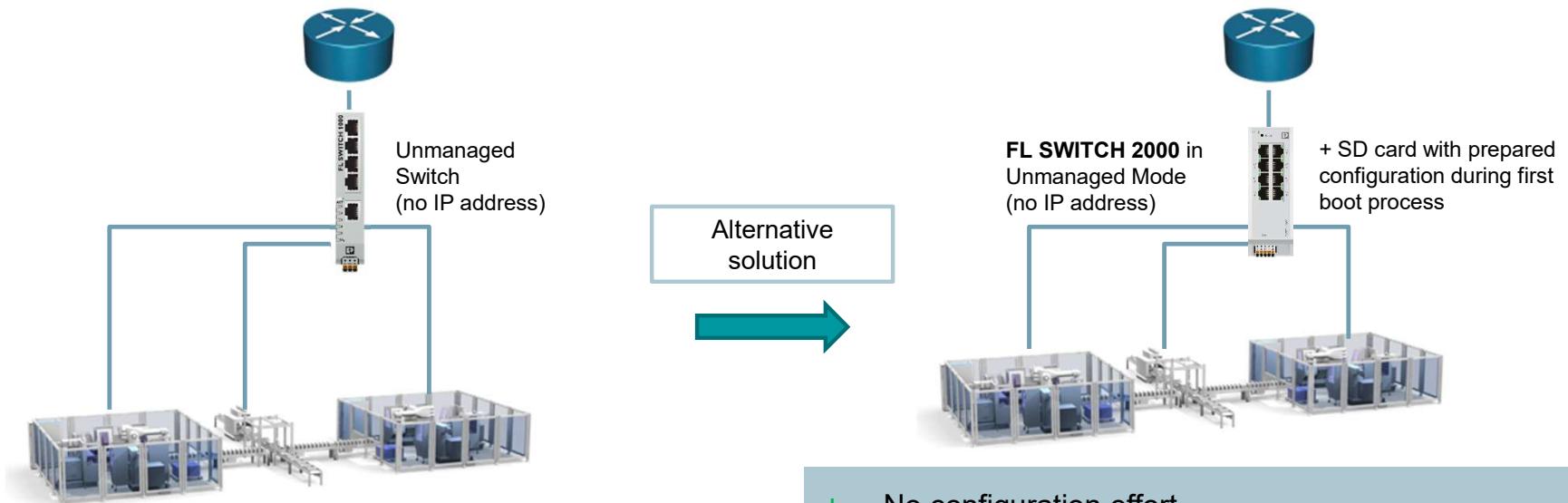


Automation protocols



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- + No configuration effort
- + Passive network device (no IP address)
- No protection against network failures (unwanted loops, broadcast storms, device failures, etc.)
- No redundancy mechanisms
- Possible access to configuration during runtime via DIP switches

- + No configuration effort
- + Passive network device (no IP address)
- + Loop protection (RSTP)
- + Media redundancy (MRP)
- + Broadcast/Multicast filter (IGMP snooping)
- + Network traffic prioritization (QoS)
- + Network segmentation (VLAN)
- + Protected against access to configuration during runtime



Automation protocols

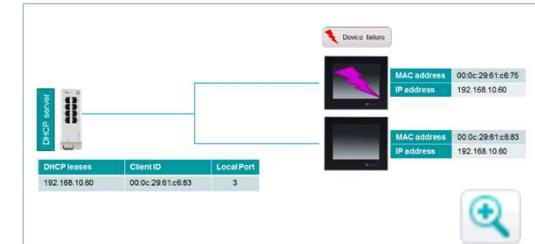


# Managed Switches 2000

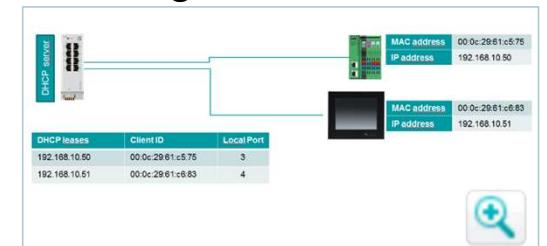


DHCP server

- Device replacement without IP reconfiguration of the network



- Easy IP address assignment\*



\*Only for models 22xx and 23xx

Automation protocols



## DHCP server



DHCP leases	Client ID	Local Port
192.168.10.60	00:0c:29:61:c6:83	3

 Device failure



MAC address 00:0c:29:61:c6:75

IP address 192.168.10.60



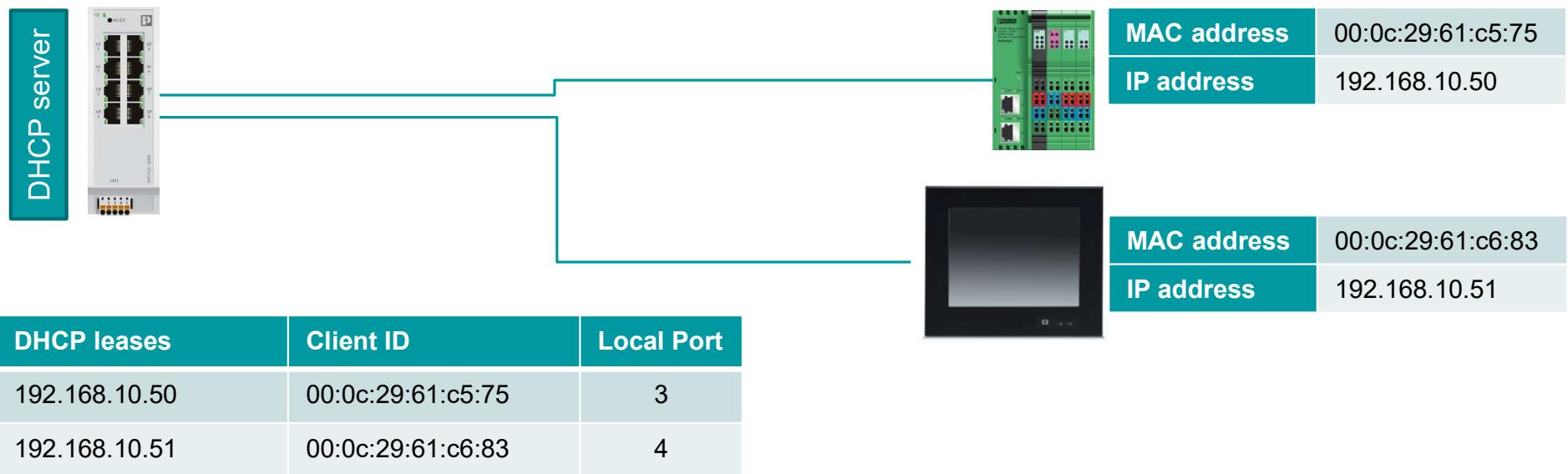
MAC address 00:0c:29:61:c6:83

IP address 192.168.10.60



Automation protocols

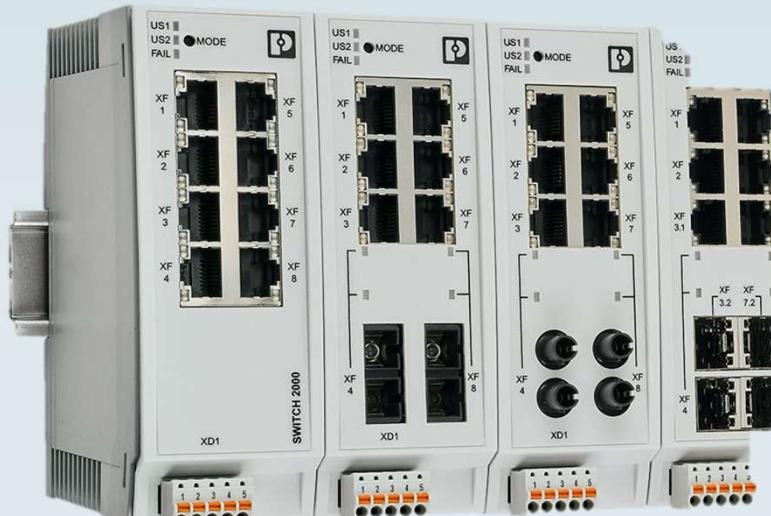




Automation protocols



# Managed Switches 2000

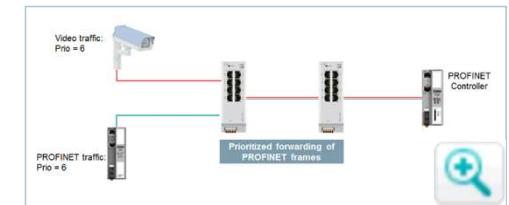


Profinet and  
EtherNet/IP™ support

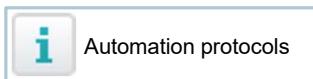
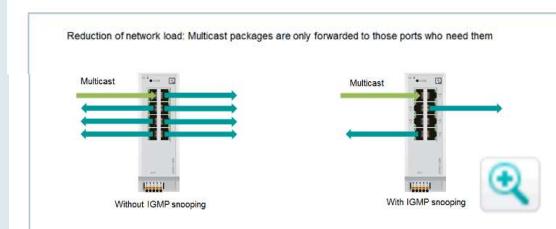


EtherNet/IP™

- PROFINET device
- Link Layer Discovery Protocol (LLDP)
- MRP redundancy
- PROFINET prioritization



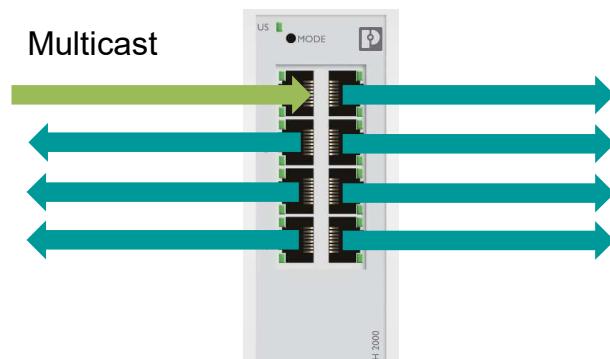
- Extended multicast filtering (IGMP snooping/querier)



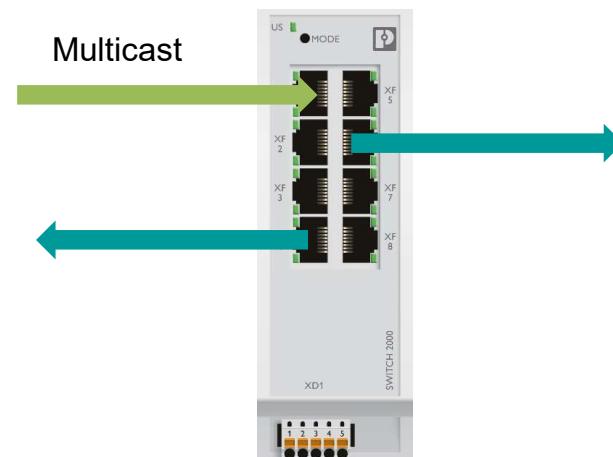
Automation protocols



Reduction of network load: Multicast packages are only forwarded to those ports who need them

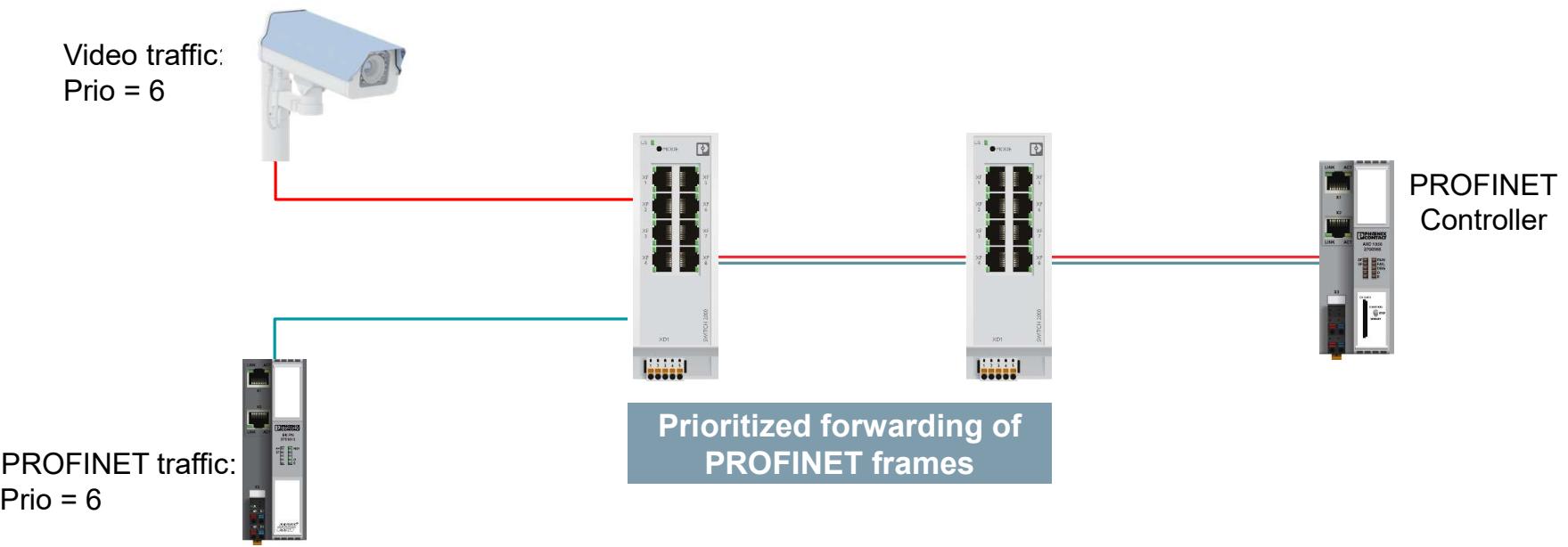


Without IGMP snooping



With IGMP snooping





# Managed Switches 2000



- Media Redundancy Protocol (MRP)
  - Client
  - Manager (optional)\*
- Rapid Spanning Tree Protocol (RSTP)
- RSTP Extensions\*
  - Fast Ring Detection
  - Large Tree Support

\*Only for models 22xx and 23xx



Automation protocols



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# Managed Switches 2000



Security

- Secure Interfaces
  - HTTPS
  - SSH
- MAC-based port security\*
- RADIUS authentication (IEEE 802.1x)\*

\*Only for models 22xx and 23xx



Automation protocols



# Managed Switches 2000

## FL SWITCH 20xx/21xx/22xx/23xx

*Variants in narrow design*



## FL SWITCH 24xx/25xx

*Variants in flat design*



## FL SWITCH 26xx/27xx

*Variants for field applications*



Automation protocols



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INSPIRING INNOVATIONS



# Managed Switches 2000



	<b>FL SWITCH 2005</b>	<b>FL SWITCH 2008</b>	<b>FL SWITCH 2016</b>	<b>FL SWITCH 2105</b>	<b>FL SWITCH 2108</b>	<b>FL SWITCH 2116</b>
Ports	5 x RJ45	8 x RJ45	16 x RJ45	5 x RJ45	8 x RJ45	16 x RJ45
Transmission speed	10/100 MBit/s	10/100 MBit/s	10/100 MBit/s	10/100/1000 MBit/s	10/100/1000 MBit/s	10/100/1000 MBit/s
Operating temperature	0 °C...60 °C					
Presetting	-	-	-	-	-	-
Order number	2702323	2702324	2702903	2702665	2702666	2702908



Automation protocols



**PHOENIX CONTACT**  
INSPIRING INNOVATIONS



# Managed Switches 2000



	<b>FL SWITCH 2205</b>	<b>FL SWITCH 2208</b>	<b>FL SWITCH 2208 PN</b>	<b>FL SWITCH 2207-FX</b>	<b>FL SWITCH 2207-FX SM</b>
--	---------------------------	---------------------------	------------------------------	------------------------------	---------------------------------

Ports	5 x RJ45	8 x RJ45	8 x RJ45	7 x RJ45 1 x SC-MM	7 x RJ45 1 x SC-SM
Transmission speed	10/100 MBit/s	10/100 MBit/s	10/100 MBit/s	10/100 MBit/s	10/100 MBit/s
Operating temperature	-40 °C...70 °C	-40 °C...70 °C	-40 °C...70 °C	-40 °C...70 °C	-40 °C...70 °C
Presetting	-	-	PROFINET	-	-
Order number	2702326	2702327	1044024	2702328	2702329



Automation protocols



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INSPIRING INNOVATIONS

# Managed Switches 2000



	<b>FL SWITCH 2206-2FX</b>	<b>FL SWITCH 2206-2FX</b>	<b>FL SWITCH 2206-2FX</b>	<b>FL SWITCH 2206-2FX</b>
	<b>SM</b>	<b>ST</b>	<b>SM</b>	<b>ST</b>

Ports	6 x RJ45 2 x SC-MM	6 x RJ45 2 x SC-SM	6 x RJ45 2 x ST-MM	6 x RJ45 2 x ST-SM
Transmission speed	10/100 MBit/s	10/100 MBit/s	10/100 MBit/s	10/100 MBit/s
Operating temperature	-40 °C...70 °C	-40 °C...70 °C	-40 °C...70 °C	-40 °C...70 °C
Presetting	-	-	-	-
Order number	2702330	2702331	2702332	2702333



Automation protocols



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INSPIRING INNOVATIONS



# Managed Switches 2000



**FL SWITCH  
2206-2SFX**

**FL SWITCH  
2206-2SFX PN**

**FL SWITCH 2204-2TC-  
2SFX**

**FL SWITCH  
2216**

**FL SWITCH  
2216 PN**

Ports

6 x RJ45  
2 x SFX

6 x RJ45  
2 x SFX

4 x RJ45  
2 x Fast Ethernet combo  
2 x SFX

16 x RJ45

16 x RJ45

Transmission speed

10/100 MBit/s

10/100 MBit/s

10/100 MBit/s

10/100 MBit/s

10/100 MBit/s

Operating temperature

-40 °C...70 °C

Presetting

-

PROFINET

-

-

PROFINET

Order number

2702969

1044028

2702334

2702904

1044029



# Managed Switches 2000



	<b>FL SWITCH 2214-2FX</b>	<b>FL SWITCH 2214-2SFX</b>	<b>FL SWITCH 2214-2SFX PN</b>	<b>FL SWITCH 2214-2FX SM</b>	<b>FL SWITCH 2212-2TC- 2SFX</b>
Ports	14 x RJ45 2 x SC MM	14 x RJ45 2 x SFX	14 x RJ45 2 x SFX	14 x RJ45 2 x SC SM	12 x RJ45 2 x SFX 2 x Fast Ethernet combo
Transmission speed	10/100 MBit/s	10/100 MBit/s	10/100 MBit/s	10/100 MBit/s	10/100 MBit/s
Operating temperature	-40 °C...70 °C	-40 °C...70 °C	-40 °C...70 °C	-40 °C...70 °C	-40 °C...70 °C
Presetting	-	-	PROFINET	-	-
Order number	2702905	1006188	1044030	2702906	2702907



Automation protocols



**PHOENIX CONTACT**  
INSPIRING INNOVATIONS



# Managed Switches 2000



**FL SWITCH  
2308**

**FL SWITCH  
2308 PN**

**FL SWITCH  
2304-2GC-2SFP**

**FL SWITCH  
2306-2SFP**

**FL SWITCH  
2306-2SFP PN**

Ports

8 x RJ45

8 x RJ45

4 x RJ45  
2 x Gigabit combo  
2 x SFP

6 x RJ45  
2 x SFP

6 x RJ45  
2 x SFP

Transmission speed

10/100/1000  
MBit/s

10/100/1000  
MBit/s

10/100/1000  
MBit/s

10/100/1000  
MBit/s

10/100/1000  
MBit/s

Operating temperature

-40 °C...70 °C

Presetting

-

PROFINET

-

PROFINET

Order number

2702652

1009220

2702653

2702970

1009222



# Managed Switches 2000



	<b>FL SWITCH 2316</b>	<b>FL SWITCH 2316 PN</b>	<b>FL SWITCH 2314-2SFP</b>	<b>FL SWITCH 2314-2SFP PN</b>	<b>FL SWITCH 2312-2GC-2SFP</b>
Ports	16 x RJ45	16 x RJ45	14 x RJ45 2 x SFP	14 x RJ45 2 x SFP	12 x RJ45 2 x Gigabit combo 2 x SFP
Transmission speed	10/100/1000 MBit/s	10/100/1000 MBit/s	10/100/1000 MBit/s	10/100/1000 MBit/s	10/100/1000 MBit/s
Operating temperature	-40 °C...70 °C	-40 °C...70 °C	-40 °C...70 °C	-40 °C...70 °C	-40 °C...70 °C
Presetting	-	PROFINET	-	PROFINET	-
Order number	2702909	1031673	1006191	1031683	2702910



Automation protocols



**PHOENIX CONTACT**  
INSPIRING INNOVATIONS

# Managed Switches 2000



	<b>FL SWITCH 2408</b>	<b>FL SWITCH 2406-2SFX</b>	<b>FL SWITCH 2404-2TC-2SFX</b>	<b>FL SWITCH 2408 PN</b>	<b>FL SWITCH 2406-2SFX PN</b>
Ports	8 x RJ45	6 x RJ45 2 x SFX	4 x RJ45 2 x Fast Ethernet Combo 2 x SFX	8 x RJ45	6 x RJ45 2 x SFX
Transmission speed	10/100 MBit/s	10/100 MBit/s	10/100 MBit/s	10/100 MBit/s	10/100 MBit/s
Operating temperature	-40°C – 70°C	-40°C – 70°C	-40°C – 70°C	-40°C – 70°C	-40°C – 70°C
Presetting	-	-	-	Profinet	Profinet
Order number	1043412	1043414	1088853	1089133	1089126



# Managed Switches 2000



FL SWITCH 2208C

FL SWITCH  
2206C-2FX

Ports	8 x RJ45	6 x RJ45 2 x SC-MM
Transmission speed	10/100 MBit/s	10/100 MBit/s
Special feature	Conformal Coating	Conformal Coating
Operating temperature	-40 °C...70 °C	-40 °C...70 °C
Presetting	-	-
Order number	?	?



Automation protocols



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INSPIRING INNOVATIONS



# Managed Switches 2000



	FL SWITCH 2416	FL SWITCH 2414-2SFX	FL SWITCH 2412-2TC- 2SFX	FL SWITCH 2416 PN	FL SWITCH 2414-2SFX PN
Ports	16 x RJ45	14 x RJ45 2 x SFX	12 x RJ45 2 x Fast Ethernet Combo 2 x SFX	16 x RJ45	14 x RJ45 2 x SFX
Transmission speed	10/100 MBit/s	10/100 MBit/s	10/100 MBit/s	10/100 MBit/s	10/100 MBit/s
Operating temperature	-40°C – 70°C	-40°C – 70°C	-40°C – 70°C	-40°C – 70°C	-40°C – 70°C
Presetting	-	-	-	Profinet	Profinet
Order number	1043416	1043423	1088875	1089150	1089139



# Managed Switches 2000



	<b>FL SWITCH 2508</b>	<b>FL SWITCH 2506-2SFP</b>	<b>FL SWITCH 2504- 2GC-2SFP</b>	<b>FL SWITCH 2508 PN</b>	<b>FL SWITCH 2506-2SFP PN</b>
Ports	8 x RJ45	6 x RJ45 2 x SFP	4 x RJ45 2 x Gigabit Combo 2 x SFP	8 x RJ45	6 x RJ45 2 x SFP
Transmission speed	10/100/1000 MBit/s	10/100/1000 MBit/s	10/100/1000 MBit/s	10/100/1000 MBit/s	10/100/1000 MBit/s
Operating temperature	-40°C – 70°C	-40°C – 70°C	-40°C – 70°C	-40°C – 70°C	-40°C – 70°C
Presetting	-	-	-	Profinet	Profinet
Order number	1043484	1043491	1088872	1089134	1089135



Automation protocols



# Managed Switches 2000



	<b>FL SWITCH 2516</b>	<b>FL SWITCH 2514-2SFP</b>	<b>FL SWITCH 2512-2GC-2SFP</b>	<b>FL SWITCH 2516 PN</b>	<b>FL SWITCH 2514-2SFP PN</b>
Ports	16 x RJ45	14 x RJ45 2 x SFP	12 x RJ45 2 x Gigabit Combo 2 x SFP	16 x RJ45	14 x RJ45 2 x SFP
Transmission speed	10/100/1000 MBit/s	10/100/1000 MBit/s	10/100/1000 MBit/s	10/100/1000 MBit/s	10/100/1000 MBit/s
Operating temperature	-40°C – 70°C	-40°C – 70°C	-40°C – 70°C	-40°C – 70°C	-40°C – 70°C
Presetting	-	-	-	Profinet	Profinet
Order number	1043496	1043499	1088856	1089205	1089154

Automation protocols



**PHOENIX CONTACT**  
INSPIRING INNOVATIONS

# Managed Switches 2000



**FL SWITCH 2608**

**FL SWITCH  
2608 PN**

**FL SWITCH 2708**

**FL SWITCH 2708 PN**

Ports

8 x M12

Transmission speed

10/100 MBit/s

10/100 MBit/s

10/100/1000 MBit/s

10/1000 MBit/s

Operating temperature

-40°C – 70°C

-40°C – 70°C

-40°C – 70°C

-40°C – 70°C

Presetting

-

PROFINET  
preset and  
certified,  
status LEDs

PROFINET  
preset and certified,  
status LEDs

Order number

1106500

1106616

1106615

1106610



Automation protocols



**PHOENIX CONTACT**  
INSPIRING INNOVATIONS



# Switch 3000/4000

Easy configuration  
and diagnostics



Comprehensive  
security functions



Fast redundancy  
mechanisms for  
large networks

Variants for  
IEC 61850

Wide temperature  
range



# Switch 3000/4000



Fast redundancy mechanisms for large networks

- Combination of IEEE functions and extended ring redundancy
- Switch-over times of 15 ms with several hundred switches in the ring
- Coupling of multiple rings



# Switch 3000/4000



Variants for  
IEC 61850

- Particularly high immunity to electromagnetic and electrostatic interference
- Extended temperature range
- Extreme shock and vibration resistance
- Redundant, replaceable power supply and special operating voltages (optional)



Automation protocols



# Switch 3000/4000



Comprehensive  
security functions

- Secure interfaces
- SNMPv3
- HTTPS
- MAC-based port security
- RADIUS Authentication (802.1x)



# Switch 3000/4000



	<b>FL SWITCH 3005</b>	<b>FL SWITCH 3005T</b>	<b>FL SWITCH 3008</b>	<b>FL SWITCH 3008T</b>	<b>FL SWITCH 3016</b>	<b>FL SWITCH 3016T</b>	<b>FL SWITCH 3016E</b>
Ports (Transmission speed)	5x RJ45 (10/100 Mbit/s)	5x RJ45 (10/100 Mbit/s)	8x RJ45 (10/100 Mbit/s)	8x RJ45 (10/100 Mbit/s)	16x RJ45 (10/100 Mbit/s)	16x RJ45 (10/100 Mbit/s)	16x RJ45 (10/100 Mbit/s)
Temperature range	-10 °C ... +60 °C	-40 °C ... +75 °C	-10 °C ... +60 °C	-40 °C ... +75 °C	-10 °C ... +60 °C	-40 °C ... +75 °C	-40 °C ... +75 °C
IEC61850-3/ IEEE1613	No	No	No	No	No	No	Yes
Special features	-	-	-	ATEX approval	-	-	-
Order number	2891030	2891032	2891031	2891035	2891058	2891059	2891066



Automation protocols



**PHOENIX CONTACT**  
INSPIRING INNOVATIONS



# Switch 3000/4000



	<b>FL SWITCH 3004T-FX</b>	<b>FL SWITCH 3004T-FX ST</b>	<b>FL SWITCH 3006T-2FX</b>	<b>FL SWITCH 3006T-2FX ST</b>	<b>FL SWITCH 3006T-2FX SM</b>
Ports (Transmission speed)	4x RJ45 (10/100 Mbit/s) 1x FX-SC-Multimode	4x RJ45 (10/100 Mbit/s) 1x FX-ST-Multimode	6x RJ45 (10/100 Mbit/s) 2x FX-SC-Multimode	6x RJ45 (10/100 Mbit/s) 2x FX-ST-Multimode	6x RJ45 (10/100 Mbit/s) 2x FX-SC-Singlemode
Temperature range	-40 °C ... +75 °C	-40 °C ... +70 °C			
IEC61850-3/ IEEE1613	No	No	No	No	No
Special features	-	-	ATEX approval	-	-
Order number	2891033	2891034	2891036	2891037	2891060



Automation protocols



# Switch 3000/4000



	<b>FL SWITCH 3012E-2SFX</b>	<b>FL SWITCH 3012E-2SFX</b>	<b>FL SWITCH 3012E-2FX</b>	<b>FL SWITCH 3012E-2FX SM</b>
Ports (Transmission speed)	12x RJ45 (10/100 Mbit/s) 2x SFP slots (100MBit/s)	12x RJ45 (10/100 Mbit/s) 2x SFP (100 Mbit/s)	12x RJ45 (10/100 Mbit/s) 2x MM FX-SC (100 Mbit/s)	12x RJ45 (10/100 Mbit/s) 2x SM FX-SC (100 Mbit/s)
Temperature range	-40 °C ... +70 °C	-40 °C ... 70 °C	-40 °C ... 70 °C	-40 °C ... 70 °C
IEC61850-3/ IEEE1613	Yes	Yes	Yes	Yes
Special features	-	-	-	-
Order number	2891067	2891067	2891120	2891119



Automation protocols



**PHOENIX CONTACT**  
INSPIRING INNOVATIONS



# Switch 3000/4000



	<b>FL SWITCH 4008T-2SFP - SM</b>	<b>FL SWITCH 4008T-2GT-3FX SM</b>	<b>FL SWITCH 4008T-2GT-4FX SM</b>	<b>FL SWITCH 4012T-2GT-2FX</b>	<b>FL SWITCH 4012T-2GT-2FX ST</b>
Ports (Transmission speed)	8x RJ45 (10/100 Mbit/s) 2x SFP slots (1000 Mbit/s)	10x RJ45 (8x 10/100 Mbit/s und 2x 10/100/1000 MBit/s) 3x FX-SC-D (100 Mbit/s)	10x RJ45 (8x 10/100 Mbit/s und 2x 10/100/1000 MBit/s) 4x FX-SC-D (100 Mbit/s)	14x RJ45 (12x 10/100 Mbit/s und 2x 10/100/1000 MBit/s) 2x FX-SC-D (100 Mbit/s)	14x RJ45 (12x 10/100 Mbit/s und 2x 10/100/1000 MBit/s) 2x FX-ST (100 Mbit/s)
Temperature range	-40 °C ... +75 °C	-40 °C ... +75 °C	-40 °C ... +75 °C	-40 °C ... +75 °C	-40 °C ... +75 °C
IEC61850-3/ IEEE1613	No	No	No	No	No
Special features	ATEX approval				
Order number	2891062	2891160	2891061	2891063	2891161



Automation protocols



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# Switch 3000/4000



	<b>FL SWITCH 4808E-16FX LC- 4GC</b>	<b>FL SWITCH 4808E-16FX SM- 4GC</b>	<b>FL SWITCH 4808E-16FX-4GC</b>	<b>FL SWITCH 4808E-16FX SM LC-4GC</b>	<b>FL SWITCH 4824E-4GC</b>
Ports (Transmission speed)	8x RJ45 (10/100 Mbit/s) 16x LC-MM (100 Mbit/s) 4x Gigabit combo (1000MBit/s)	8x RJ45 (10/100 Mbit/s) 16x SC-D SM (100 Mbit/s) 4x Gigabit combo (1000MBit/s)	8x RJ45 (10/100 Mbit/s) 16x SC-D MM (100 Mbit/s) 4x Gigabit combo (1000MBit/s)	8x RJ45 (10/100 Mbit/s) 16x LC-SM (100 Mbit/s) 4x Gigabit combo (1000MBit/s)	24x RJ45 (10/100 Mbit/s)
Temperature range	-40 °C ... +70 °C	-40 °C ... +70 °C	-40 °C ... +70 °C	-40 °C ... +70 °C	-40 °C ... +70 °C
IEC61850-3/ IEEE1613	Yes	Yes	Yes	Yes	Yes
Special features					
Order number	2891073	2891080	2891079	2891074	2891072



Automation protocols



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# Switch 3000/4000



	<b>FL SWITCH 4808E-16FX ST- 4GC</b>	<b>FL SWITCH 4808E-16FX SM ST-4GC</b>	<b>FL SWITCH 4800E-24FX-4GC</b>	<b>FL SWITCH 4800E-24FX SM- 4GC</b>
--	---	---	-------------------------------------	---

Ports (Transmission speed)	8x RJ45 (10/100 Mbit/s) 16x ST-MM (100 Mbit/s) 4x Gigabit combo (1000MBit/s)	8x RJ45 (10/100 Mbit/s) 16x ST SM (100 Mbit/s) 4x Gigabit combo (1000MBit/s)	24x SC MM (100 Mbit/s) 4x Gigabit combo (1000MBit/s)	24x SC SM (100 Mbit/s) 4x Gigabit combo (1000MBit/s)
-------------------------------	---	---	---	---

Temperature range	-40 °C ... +70 °C			
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IEC61850-3/ IEEE1613	Yes	Yes	Yes	Yes
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Special features				
------------------	--	--	--	--

Order number	2891085	2891086	2891102	2891104
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Automation protocols

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# Switches für PROFINET IRT

 Diagnostics for fiber optic paths

MRP redundancy



 IP20 and IP67 protection class

Conformance Class C

Prioritized PROFINET communication

 Automation protocols



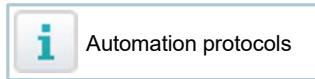
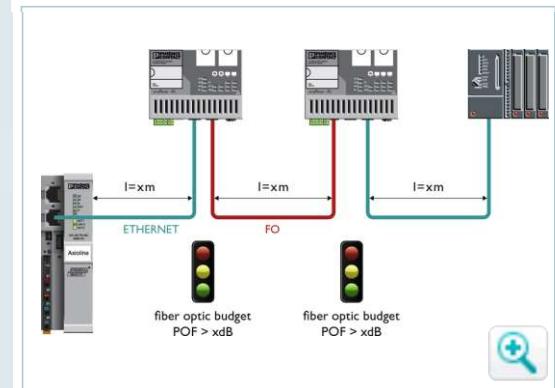
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# Switches für PROFINET IRT

Diagnostics  
for fiber optic  
paths

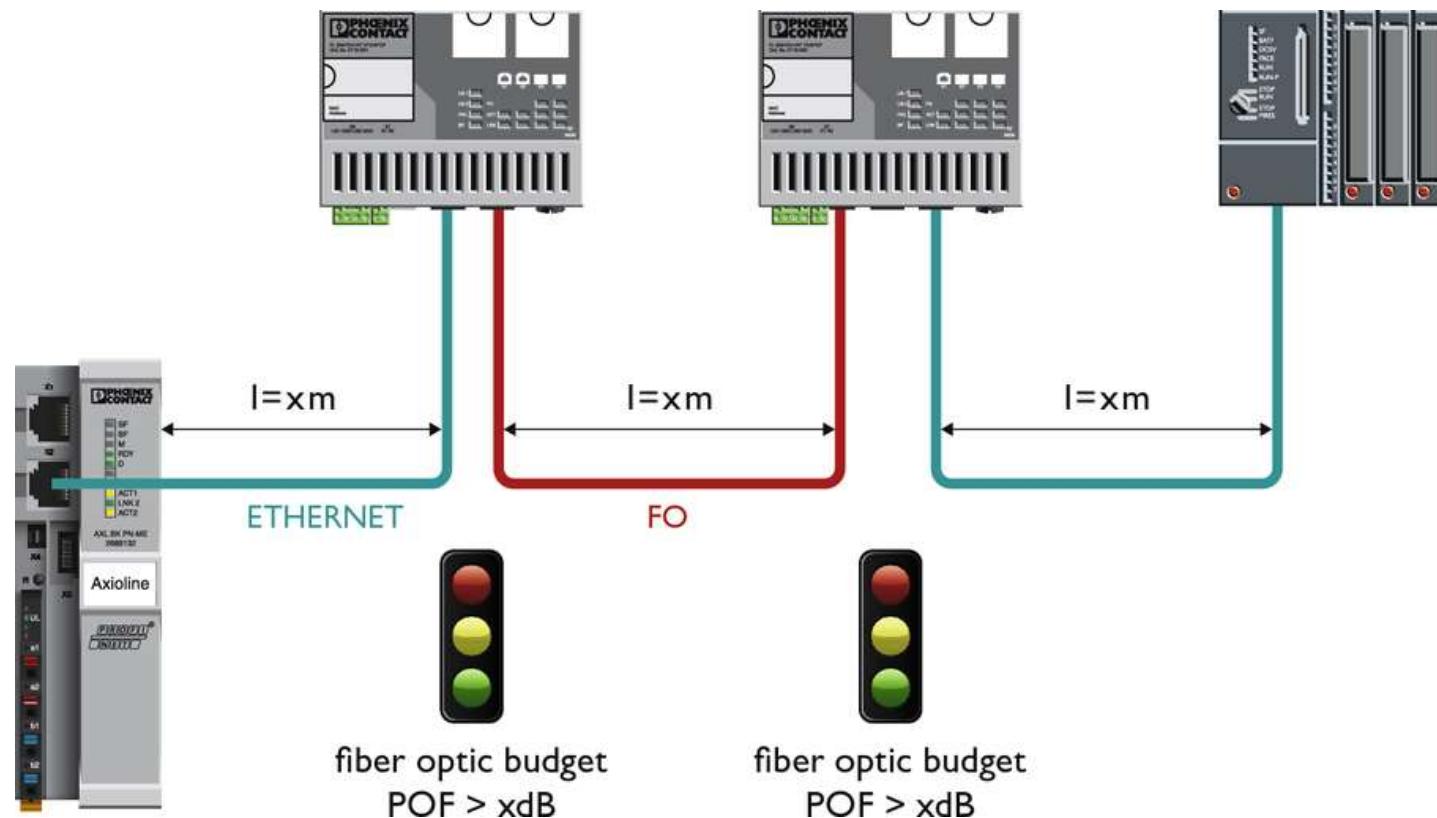


- Proactive maintenance for increased availability and less downtime
- Improved assessment of the path quality through simultaneous length measurement



Automation protocols





Automation protocols



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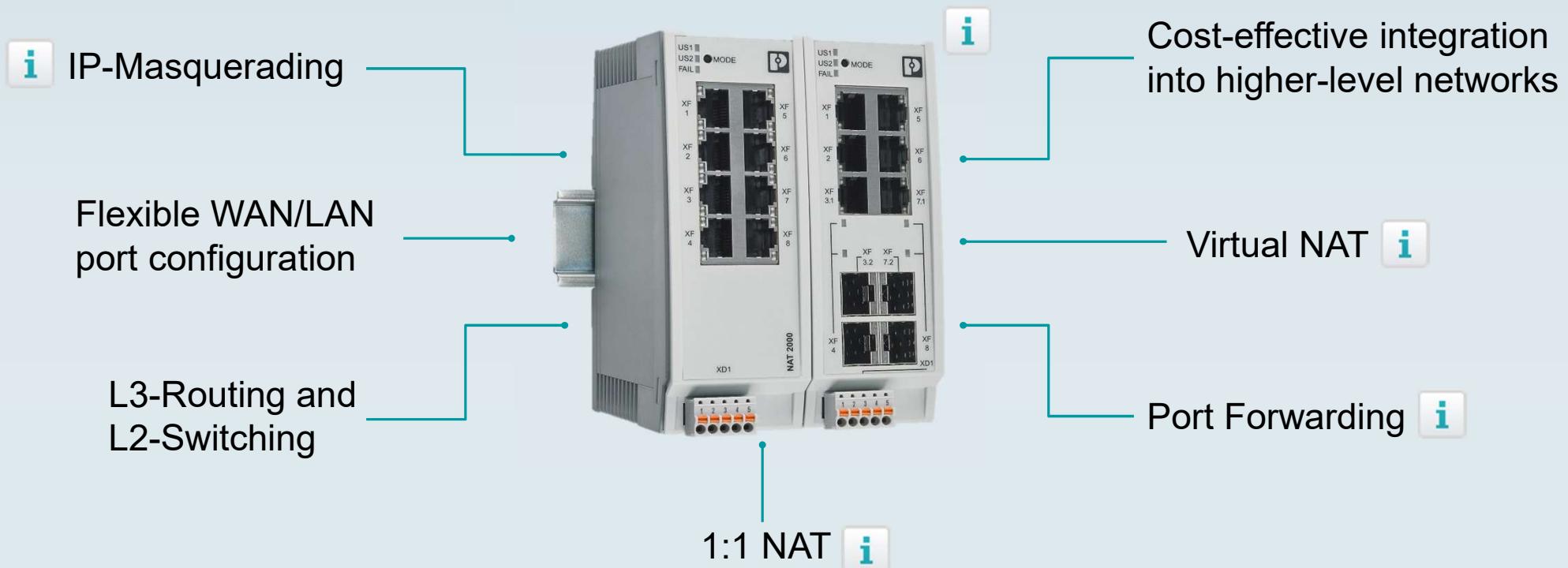
# Switches für PROFINET IRT



	<b>FL SWITCH IRT 4TX</b>	<b>FL SWITCH IRT 2TX 2POF</b>	<b>FL SWITCH IRT TX 3POF</b>	<b>FL SWITCH IRT IP TX/3POF</b>
Ports (Transmission speed)	4x RJ45 (10/100 Mbit/s)	2x RJ45 (10/100 Mbit/s) 2x POF SC-RJ (100 Mbit/s)	1x RJ45 (10/100 Mbit/s) 3x POF SC-RJ (100 Mbit/s)	1x RJ45 Push Pull (10/100 Mbit/s) 3x POF SC-RJ Push Pull (100 Mbit/s)
Degree of protection	IP20	IP20	IP20	IP67
Order number	2700689	2700691	2700692	2700697



# NAT Switch



Automation protocols



# NAT Switch



Virtual NAT

- Integration of machines with the same IP address into higher-level networks
- Thanks to a virtual intermediate level, only one IP address is needed in the higher-level network

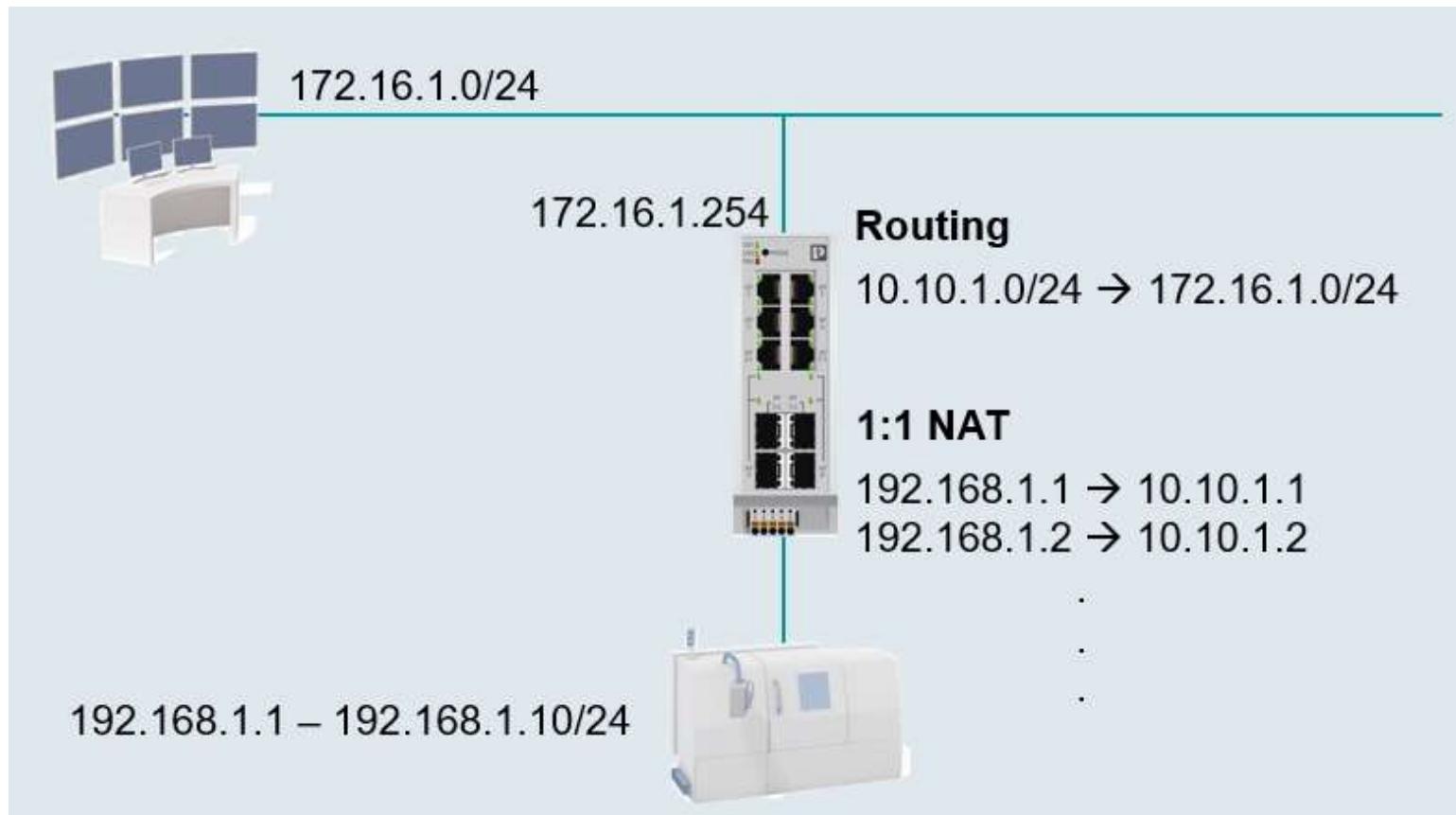


Automation protocols



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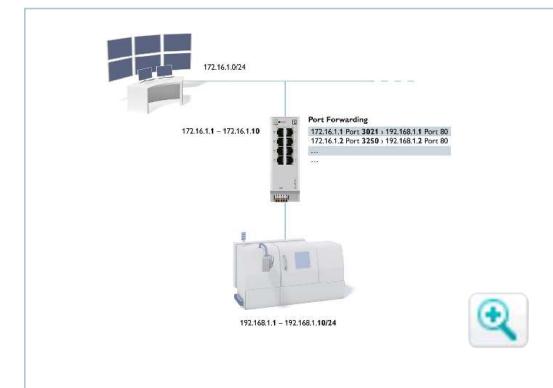


# NAT Switch



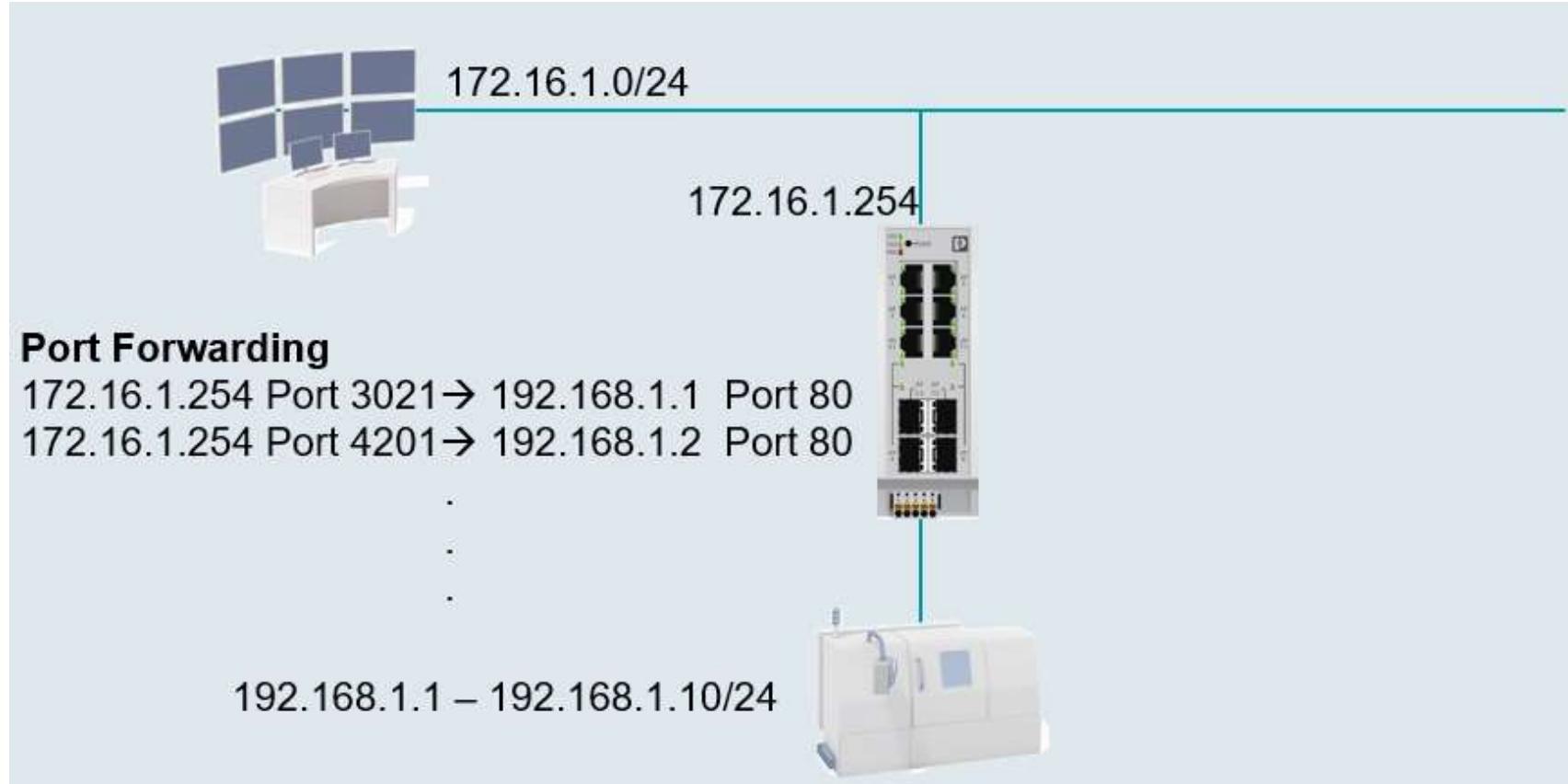
Port Forwarding

- Makes services of LAN devices reachable from WAN network



Automation protocols



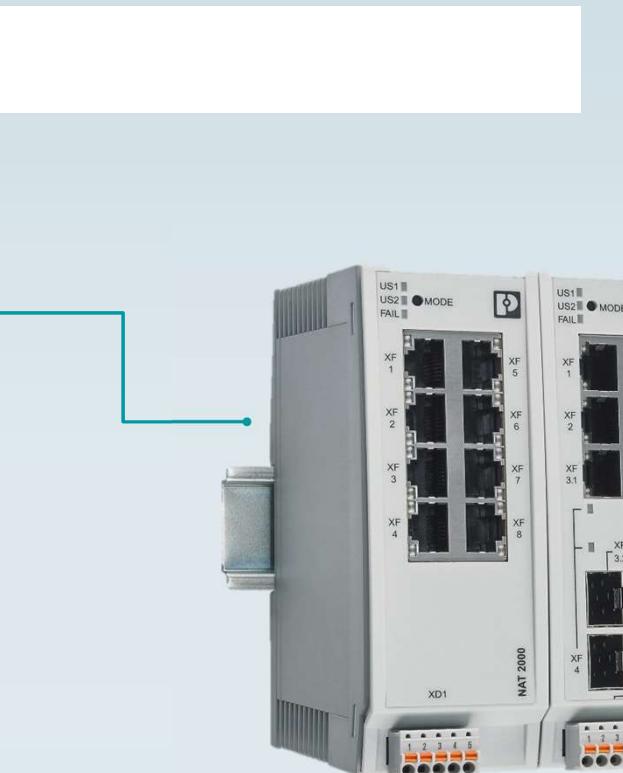


Automation protocols

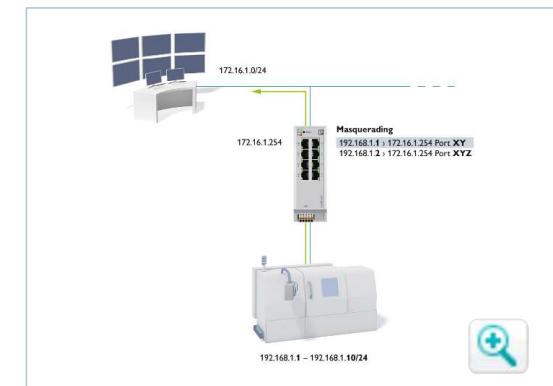


# NAT Switch

IP Masquerading



- NAT device works as a representative for LAN devices
- Differentiation of LAN members via different TCP/UDP ports

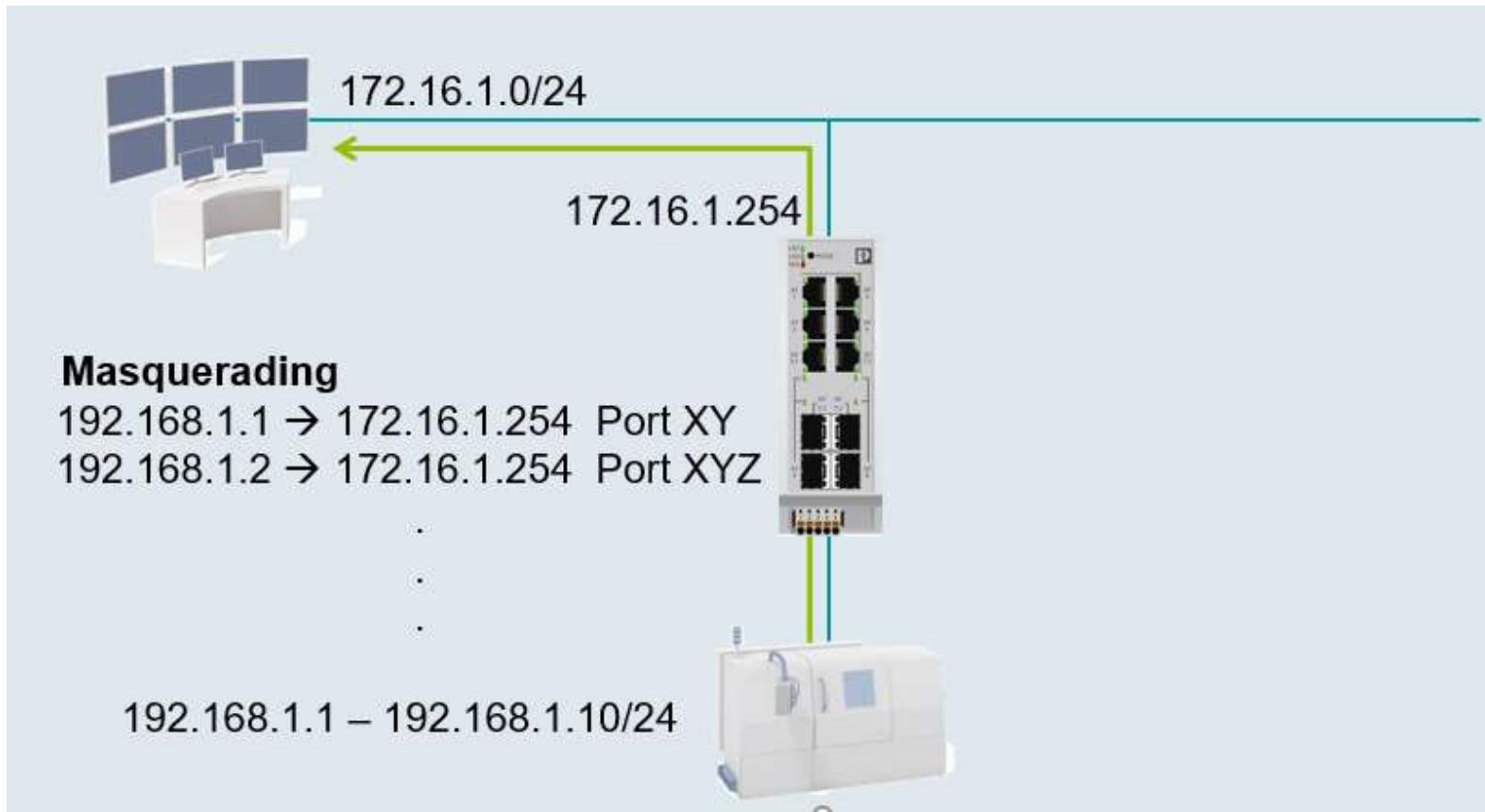


Automation protocols



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Automation protocols



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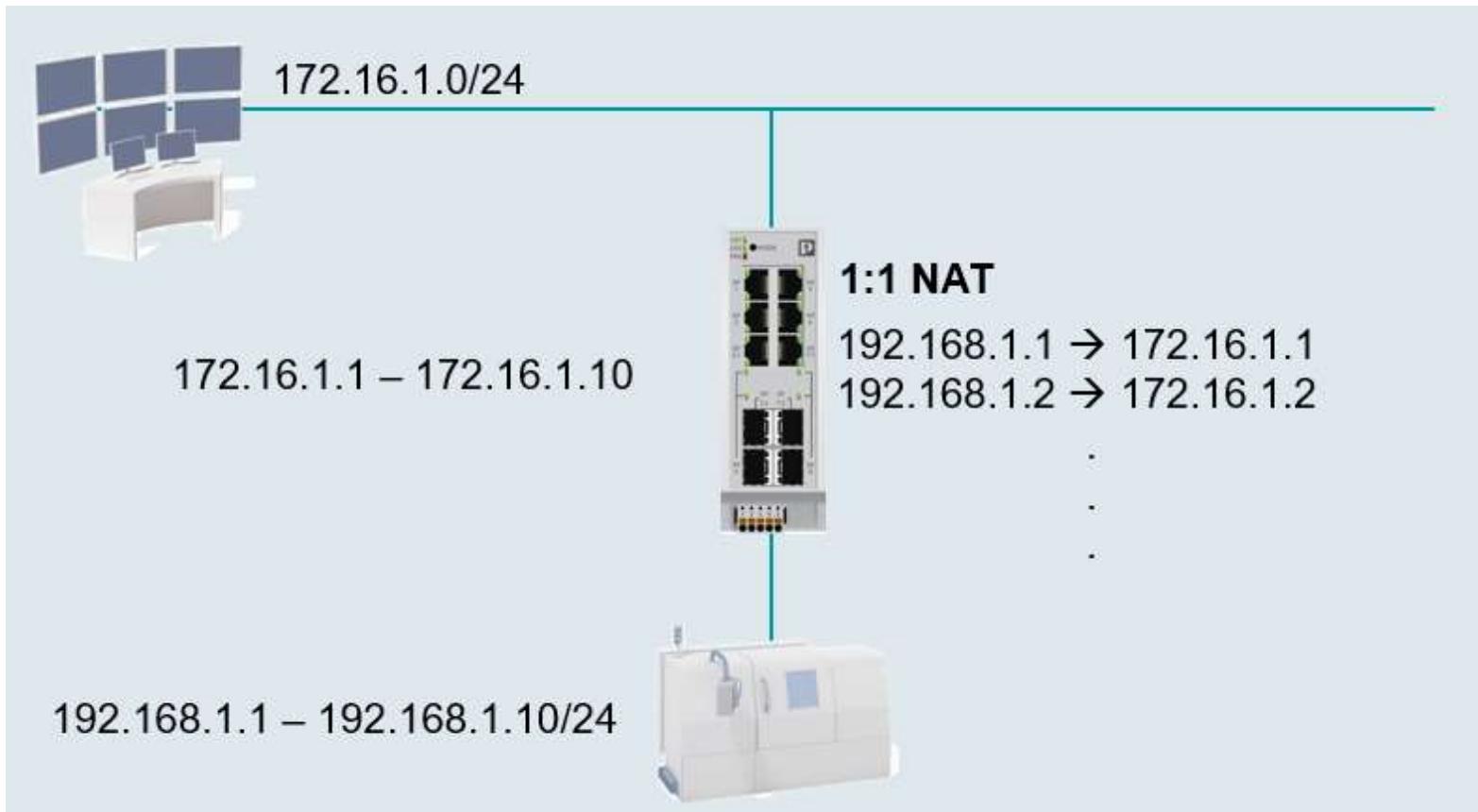
# NAT Switch



1:1 NAT

- Parallel operation of identical machines in one network
- Save configuration time





# NAT Switch



**FL NAT 2008**

**FL NAT 2208**

**FL NAT 2304-2GC-2SFP**

Ports	8 x RJ45	8 x RJ45	4 x RJ45 2 x Gigabit combo 2 x SFP
Transmission speed	10/100 MBit/s	10/100 MBit/s	10/100/1000 MBit/s
Operating temperature	0 °C...60 °C	-40 °C...70 °C	-40 °C...70 °C
Feature set	Basic	Extended	Extended
Order number	2702881	2702882	2702981

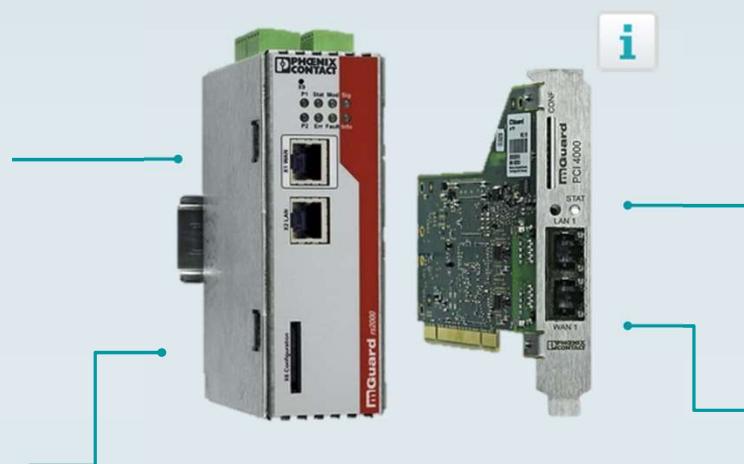


# Mounting rail devices and PCI cards

Optimized designs for different industrial applications



Quick and easy configuration



Firewall and VPN



Functions especially tailored to industrial applications



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# Mounting rail devices and PCI cards

Optimized designs  
for different  
industrial  
applications



- Slim



- Flat



- PCI(E)



# Mounting rail devices and PCI cards

Quick and easy configuration



- Web interface
- Optional configuration memory on SD card



# Mounting rail devices and PCI cards



Functions  
especially  
tailored to  
industrial  
applications

- Conditional firewall
- User firewall
- DPI (OPC Inspector)
- Firewall and VPN redundancy
- Switchable via I/Os



# mGuard 1100



Easy Protect Mode

Cost-effective  
security routers



Firewall Assistant



Network Address  
Translation (NAT) to  
efficiently adapt IP  
addresses



Test Mode: a  
straightforward test of  
the created firewall rules  
without limiting system  
availability



Automation protocols



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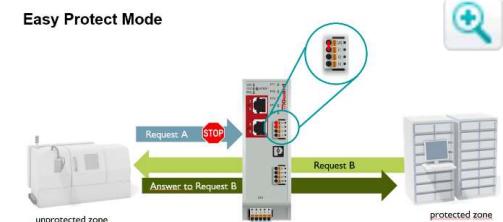


# mGuard 1100

Easy Protect Mode



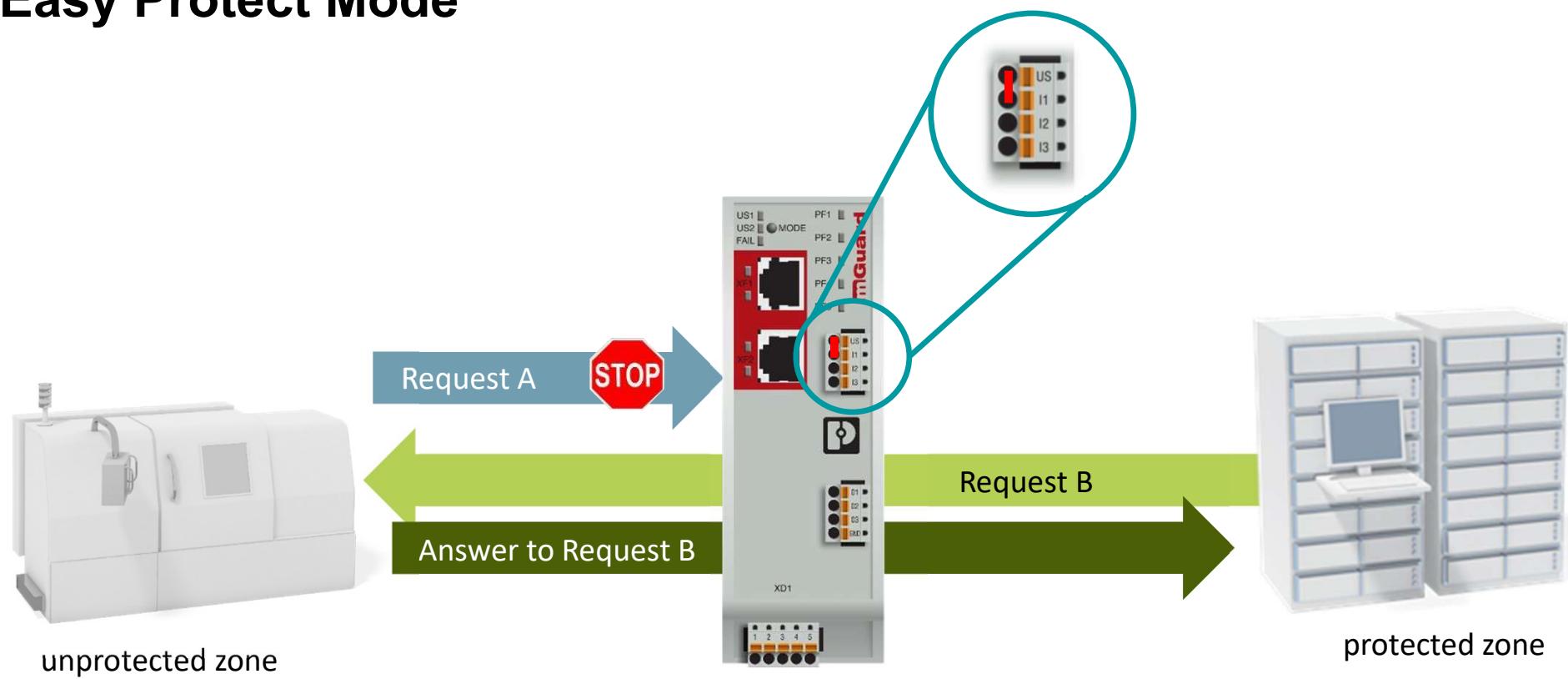
- Access is generally only permitted in one direction
- Network cells can be easily protected without having to assign an IP address or configure the device



Automation protocols



# Easy Protect Mode

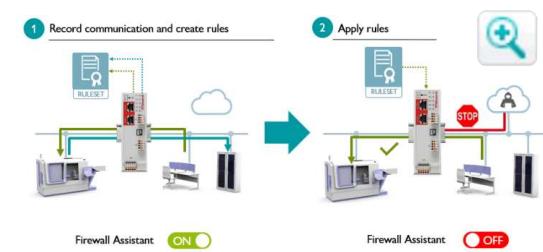


# mGuard 1100



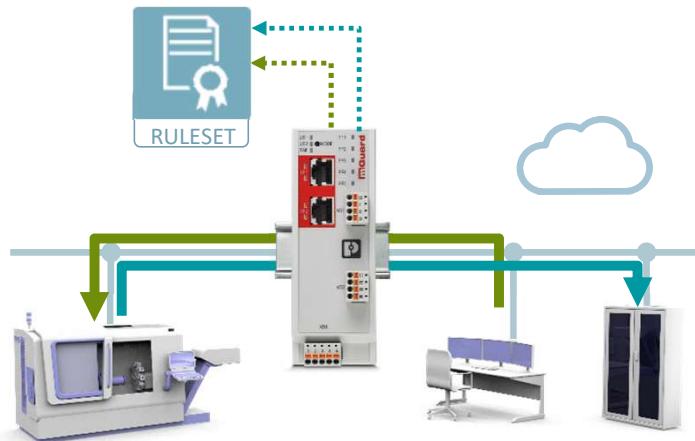
Firewall Assistant

- Record communication and create rules
- As soon as the Firewall Assistant is switched off, the rule set is active

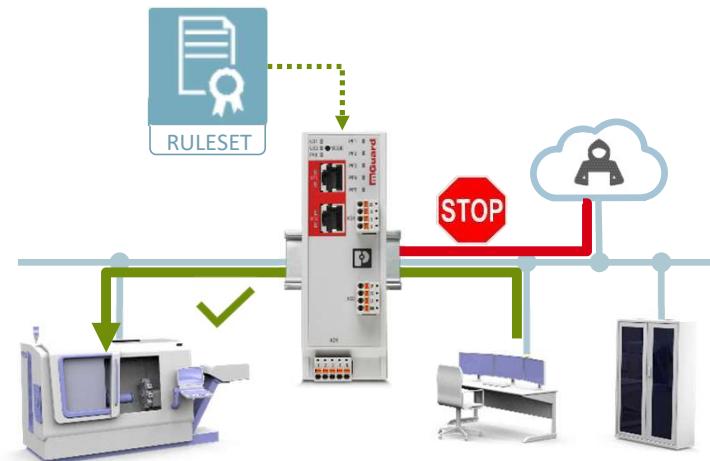


# Firewall Assistant: helps you create firewall rules

1 Record communication and create rules



2 Apply rules



Firewall Assistant

Firewall Assistant



# mGuard 1100



Network Address Translation (NAT) to efficiently adapt IP addresses

- Secure machine integration with NAT without having to change the IP address



Automation protocols



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# Mounting rail devices and PCI cards



	<b>FL MGUARD 1102</b>	<b>FL MGUARD RS2000 TX/TX-B</b>	<b>FL MGUARD RS2000 TX/TX VPN</b>	<b>FL MGUARD RS2005 TX VPN</b>	<b>TC MGUARD RS2000 3G VPN</b>
VPN tunnel optionally expandable	- -	- -	2 -	2 -	2 -
Firewall	Firewall Assistant	2-Click-Firewall	2-Click-Firewall	2-Click-Firewall	2-Click-Firewall
Integrated switch	-	-	-	5-Port unmanaged	4-Port unmanaged
Special features	-	-	-	-	Mobilfunk
Extended functionalities	No	No	No	No	No
Order number	1153079	2702139	2700642	2701875	2903441



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# Mounting rail devices and PCI cards



	<b>FL MGUARD RS4000 TX/TX</b>	<b>FL MGUARD RS4000 TX/TX VPN</b>	<b>FL MGUARD RS4000 TX/TX VPN-M</b>	<b>FL MGUARD RS4000 TX/TX-P</b>	<b>FL MGUARD RS4004 TX/ DTX</b>	<b>FL MGUARD RS4004 TX/ DTX VPN</b>	<b>TC MGUARD RS4000 3G VPN</b>
VPN tunnel optionally expandable	- up to 250	10 up to 250	10 up to 250	10 up to 250	- up to 250	10 up to 250	10 up to 250
Firewall	Multifunction firewall	Multifunction firewall	Multifunction firewall	Multifunction firewall	Multifunction firewall	Multifunction firewall	Multifunction firewall
Integrated switch	-	-	-	-	4-Port managed	4-Port managed	4-Port managed
Special features	-	-	Maritime approvals	ATEX, IECEx approvals	DMZ-Port	DMZ-Port	WAN, mobile phone network
Extended functionalities	Optional	Optional	Optional	Optional	Optional	Optional	Optional
Order number	2700634	2200515	2702465	2702259	2701876	2701877	2903440



# Mounting rail devices and PCI cards



	TC MGUARD RS4000 4G VPN	FL MGUARD GT/GT	FL MGUARD GT/GT VPN	FL MGUARD PCI4000 VPN	FL MGUARD PCIE4000 VPN
VPN tunnel optionally expandable	10 up to 250	- up to 250	10 up to 250	10 up to 250	10 up to 250
Firewall	Multifunction firewall	Multifunction firewall	Multifunction firewall	Multifunction firewall	Multifunction firewall
Integrated switch	4-Port managed	-	-	-	-
Special features	WAN, mobile phone network	Gigabit, SFP, maritime Zulassung	Gigabit, SFP, maritime Zulassung	PCI-Format	PCIE-Format
Extended functionalities	Optional	Optional	Optional	Optional	Optional
Order number	2903586	2700197	2700198	2701275	2701278



## Other Designs

 Optimized designs for different industrial applications



# Other Designs

Optimized designs for different industrial applications



- Portable units



- Desktop applications



- Installation in a 19" rack



## Other Designs



Quick and easy  
configuration

- Web interface
- Optional configuration memory on SD card



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## Other Designs



Functions  
especially tailored  
to industrial  
applications

- Conditional firewall
- User firewall
- DPI (OPC Inspector)
- Firewall and VPN redundancy



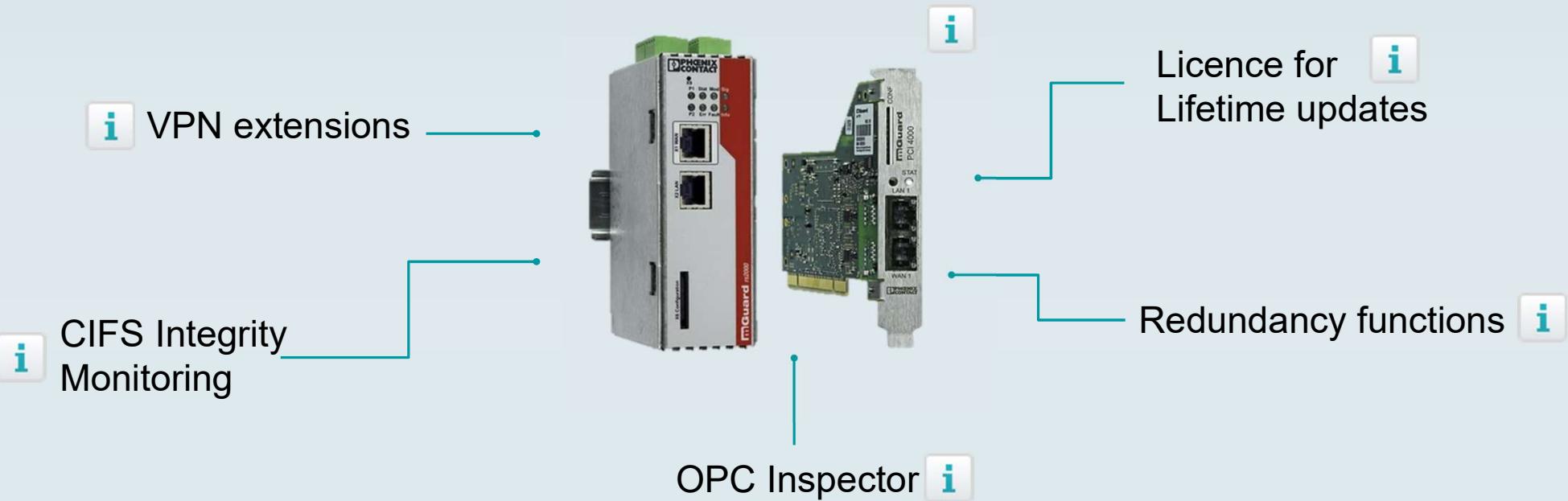
# Other Designs



	<b>FL MGUARD SMART2</b>	<b>FL MGUARD SMART2 VPN</b>	<b>FL MGUARD DELTA TX/TX</b>	<b>FL MGUARD DELTA TX/TX VPN</b>	<b>FL MGUARD CENTERPORT</b>
Application area	Mobile	Mobile	Desktop	Desktop	19“ rack
VPN-Tunnel optionally expandable	- up to 250	10 up to 250	- up to 250	10 up to 250	- up to 3000
Firewall	Multifunction firewall	Multifunction firewall	Multifunction firewall	Multifunction firewall	Multifunction firewall
Special features	USB	USB	230 V	230 V	High performance
Extended functionalities	Optional	Optional	Optional	Optional	Optional
Order number	2700640	2700639	2700967	2700968	2702547



# Extended functionalities



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## Extended functionalities



Licence for  
Lifetime  
updates

- Lifetime licence for actualization of the software
- Ideal protection for your network



## Extended functionalities



Redundancy  
functions

- Higher availability
- For Firewall or for Firewall & VPN

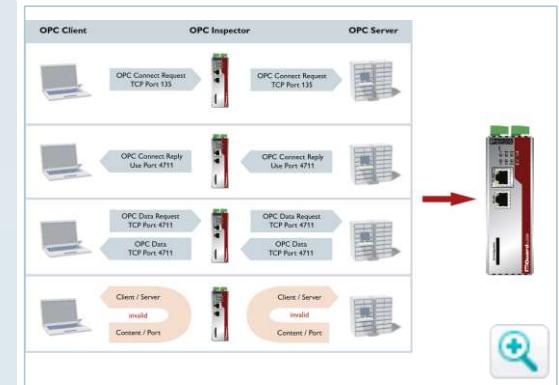


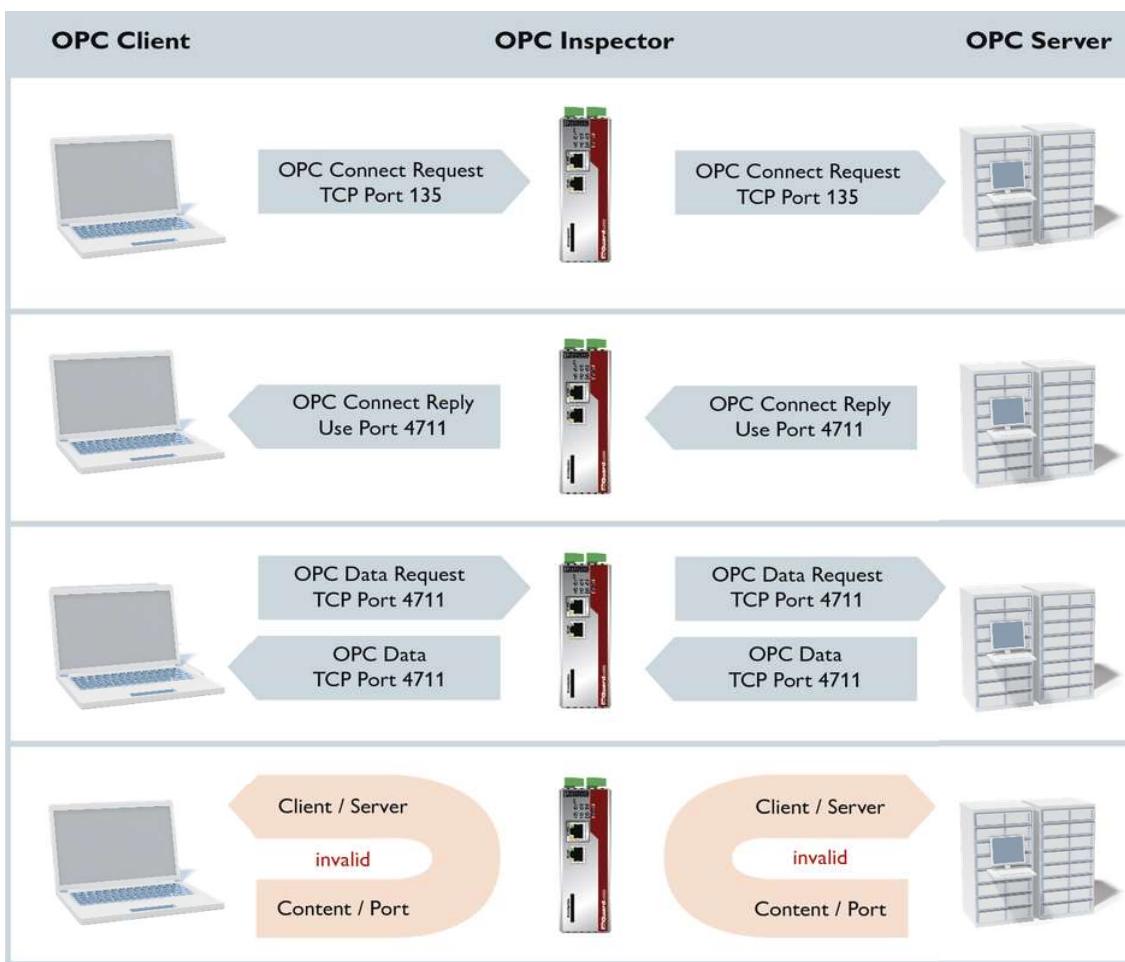
# Extended functionalities



OPC Inspector

- Deep Package Inspection for OPC Classic
- Stateful Inspection Firewall for OPC Classic

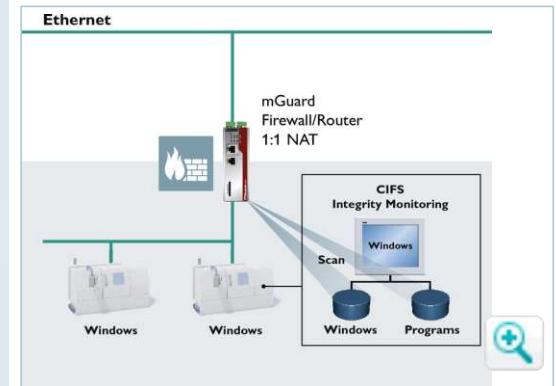




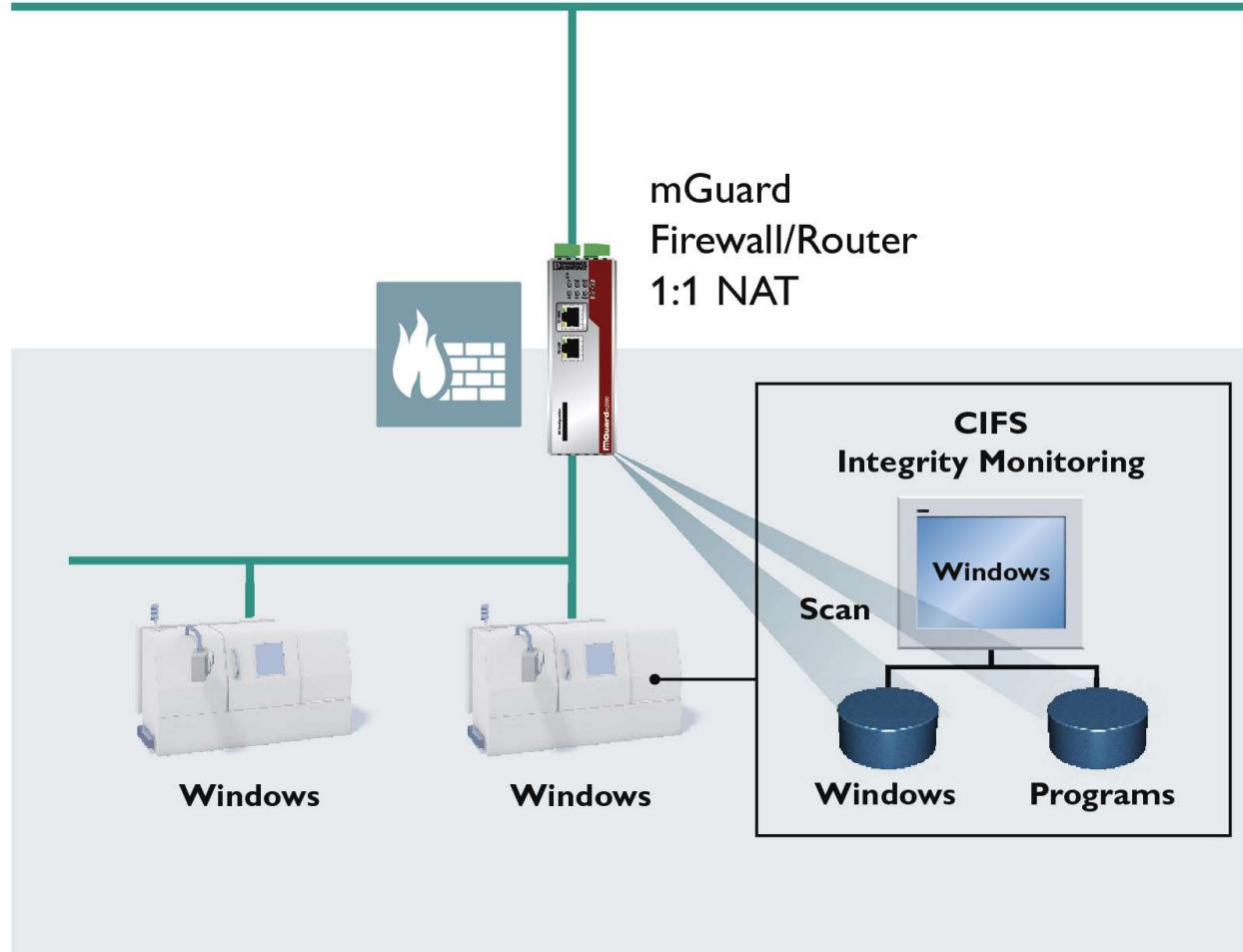
# Extended functionalities



- Ideal for non patchable systems
- Detection of system changes



Ethernet



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## Extended functionalities

VPN  
extensions



- For all mGuard security appliances
- Extension in steps of 10, 100 und 250 simultaneous connections



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# Extended functionalities

	<b>FL MGUARD LIC LIFETIME FW</b>	<b>FL MGUARD LIC FW RD</b>	<b>FL MGUARD FW/VPN RD</b>	<b>FL MGUARD LIC OPC INSP</b>	<b>FL MGUARD LIC CIM</b>
Function	Lifetime software update	Firewall/router redundancy function	Firewall/router and VPN redundancy function	OPC-Inspector function	CIFS Integrity Monitoring (CIM)
Order number	2700184	2701356	2702193	2702191	2701083

	<b>FL MGUARD LIC VPN-10</b>	<b>FL MGUARD LIC VPN-100</b>	<b>FL MGUARD LIC VPN-250</b>
Function	up to 10 additional VPN online connections	Up to 100 additional VPN online connections	Up to 250 additional VPN online connections
Order number	2700194	2702546	2700193



# Central device management software



# Central device management software



Efficient  
device  
management

- Central creation and administration of all mGuard settings
- Selective or overall transmission on all remote mGuards
- Roll-out of firmware upgrades and licence extensions



# Central device management software

Free start-up support

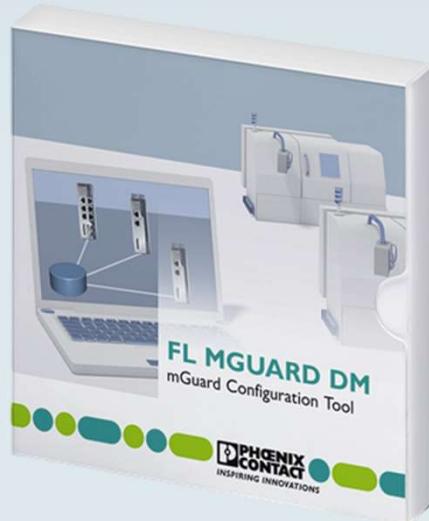


- For an easy start-up of the software, a remote support with a Phoenix Contact employee is included



# Central device management software

Flexibly  
upgradeable



- Scalable up to several thousand devices



# Central device management software



## FL MGUARD DM UNLIMITED

Function	Central device management software for any number of MGUARDs
Order number	2981974



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# Power over Ethernet Injectors

Surge protection  
and shield current  
monitoring on the  
field cable side



Multiple connection  
technologies and  
covered wiring space

Different performance  
standards and electrical  
isolation

Tool-free shield  
connection



# Power over Ethernet Injectors



Different performance standards and electrical isolation

- IEEE 802.3 at
- IEEE 802.3 af up to 30 watts
- IEEE 802.3 bt Up to 60 watts will be supported
- supply voltage and Power over Ethernet port are electrically isolated in certain versions



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# Power over Ethernet Injectors

Surge protection  
and shield current  
monitoring on the  
field cable side



- integrated surge protection protects devices and application against sudden high voltages in the data cables
- An LED indicates differences in potential or other shield currents caused by the effects of EMC



# Power over Ethernet Injectors

Multiple connection technologies and covered wiring space



- IDC, Push-in, screw, and RJ45 connections.
- Covered cable wiring space



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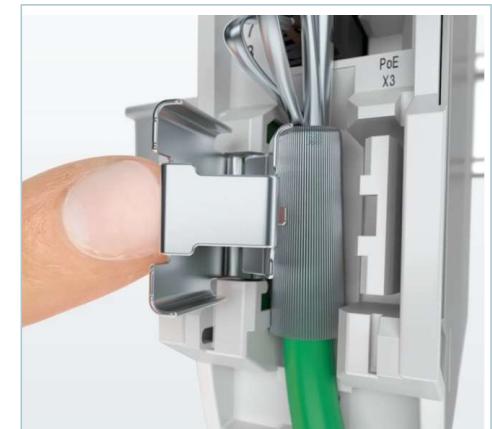


# Power over Ethernet Injectors



Tool-free shield  
connection

- Quick and easy connection of the cable shielding without tools
- strain relief is assured
- Simply lay the cable in the shaft provided and close the shroud



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# Power over Ethernet Injectors



	<b>INJ 1000 INJ 1010</b>	<b>INJ 1000-T INJ 1010-T</b>	<b>INJ 1100-T INJ 1110-T</b>	<b>INJ 2102-T INJ 2112-T</b>	<b>INJ 2103-T INJ 2113-T</b>	<b>INJ 2101-T INJ 2111-T</b>	<b>FL PSE 2TX</b>
Connection technology	RJ45 / RJ45	RJ45 / RJ45	RJ45 / RJ45	RJ45 / IDC	RJ45 / Push-In	RJ45 / Screw	2 x RJ45/RJ45
Temperatur range	0°C ... +60°C	-40 °C ... +75 °C				0°C ... +55°C	
Galvanic isolation	No		Yes				
Overvoltage protection, shield current diagnosis	No		Yes				No
Order number PoE af*/at, 15*/30W	2703005	2703006	2703009	2703012	1004065	2703011	*2891013
Order number PoE bt, 60W	2703007	2703008	2703010	2703014	1004066	2703013	-



# Power over Ethernet Switches



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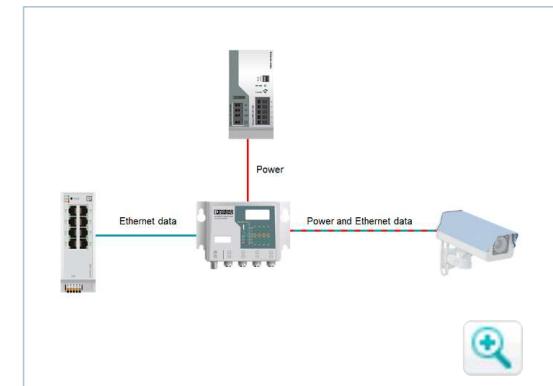


# Power over Ethernet Switches

Reduced  
cabling efforts

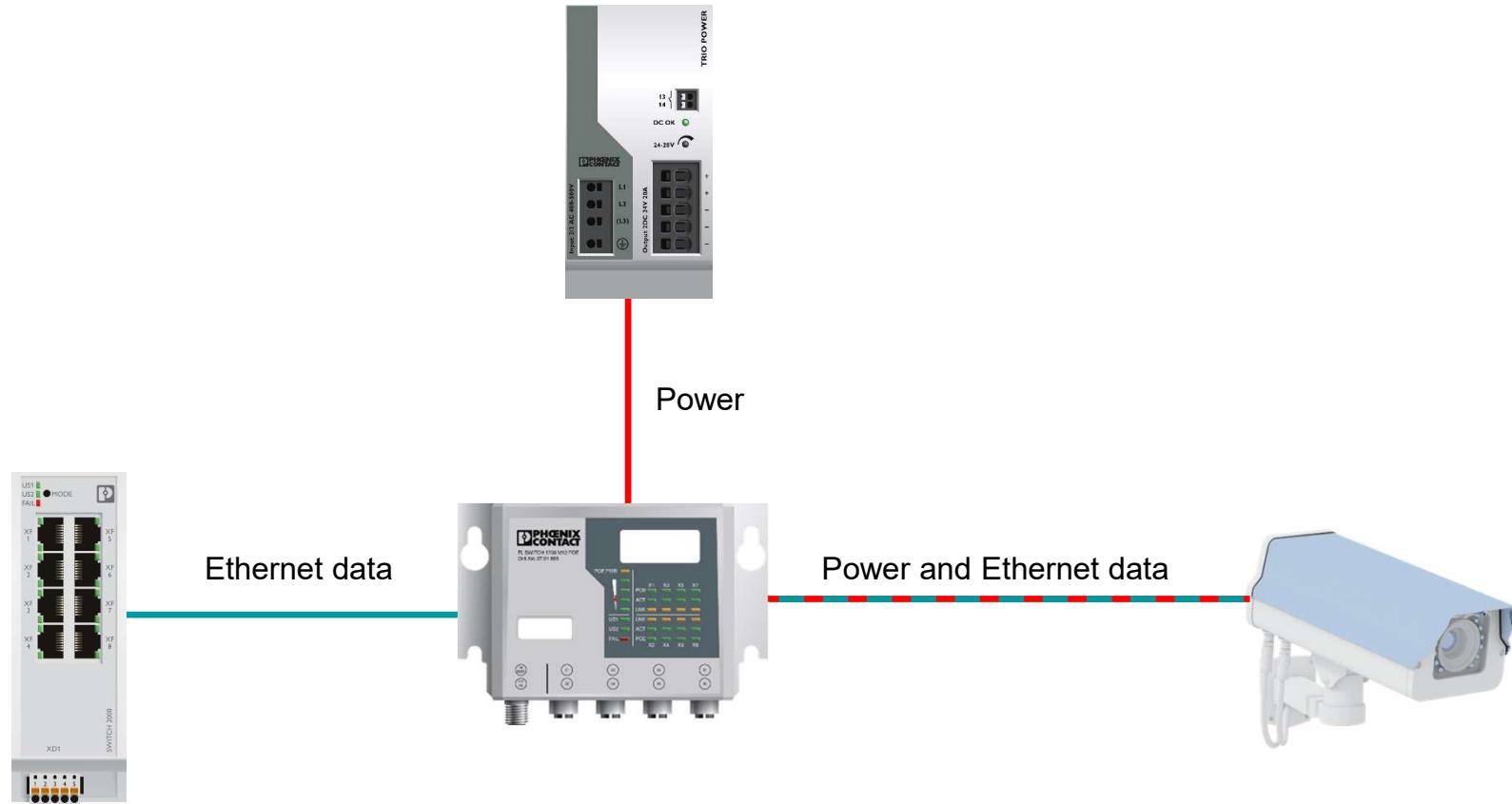


- Installation of cameras, IP phones or WLAN access points with only one cable
- Saving of power supply and related installation costs



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# Power over Ethernet Switches



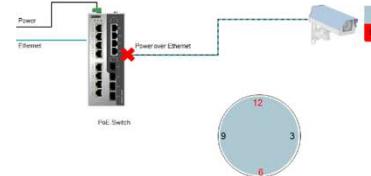
- Gigabit und Jumboframe support
- IEEE 802.3at (30W)
- Typically used in industrial image processing



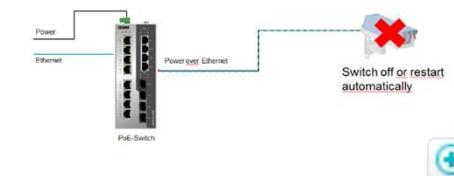
# Power over Ethernet Switches



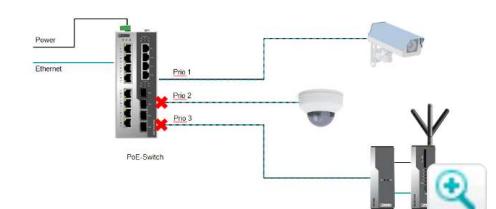
## ■ PoE Scheduling



## ■ PoE Watchdog

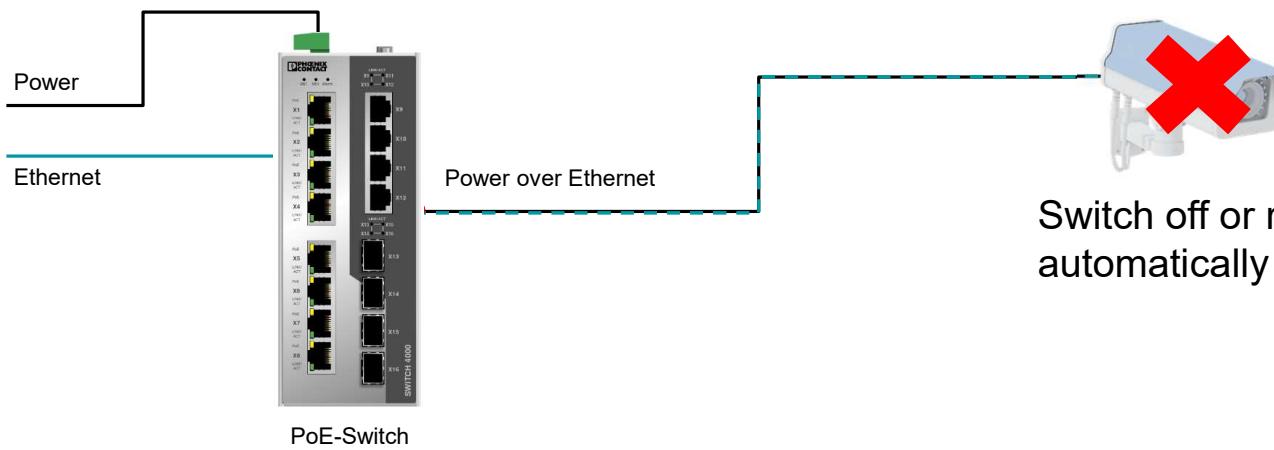


## ■ PoE Prioritization



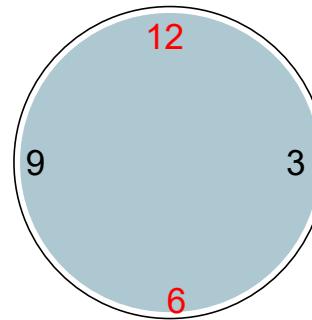
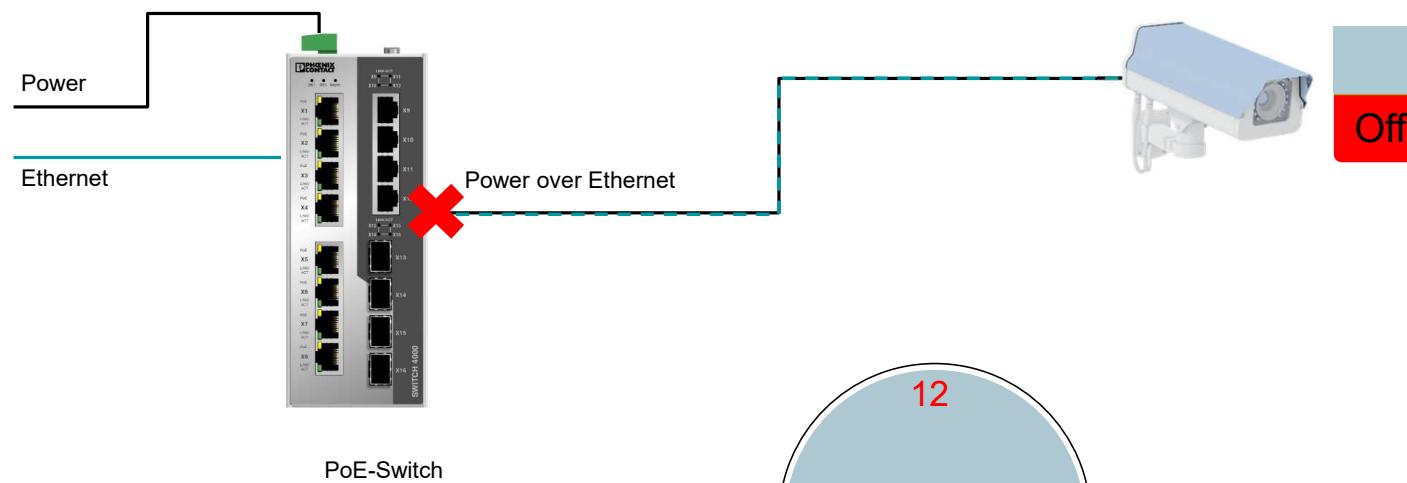
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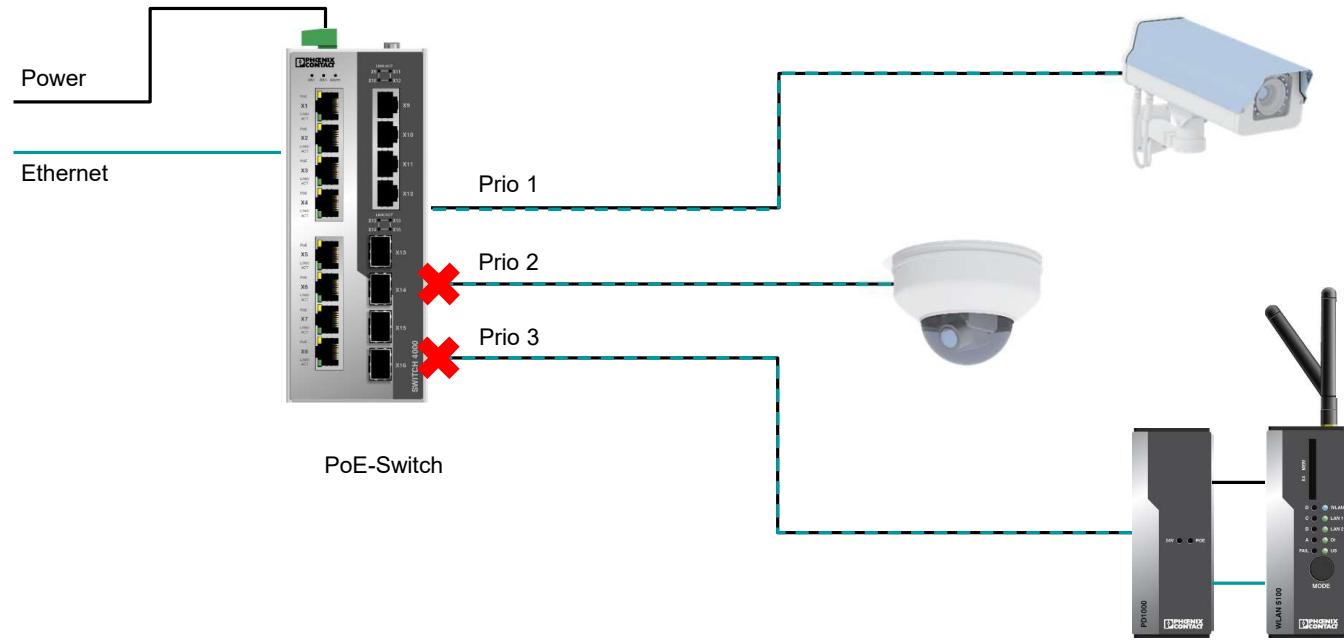




Switch off or restart  
automatically







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# Power over Ethernet Switches



Installation in  
control  
cabinet

- Easy integrable in control cabinet
- 24 V DC supply
- IEEE 802.3 af/at/bt (15 W/ 30 W/ 60 W)
- Endspan and Midspan



# Power over Ethernet Switches



	<b>FL SWITCH 1001T-4POE</b>	<b>FL SWITCH 1708 M12 POE</b>	<b>FL SWITCH 1000T-2POE- 2SFP</b>	<b>FL SWITCH 1001T-4POE- GT-SFP</b>	<b>FL SWITCH 1001T-4POE-GT</b>	<b>FL SWITCH 1000T-8POE-GT- 2SFP</b>
Function	Unmanaged Switch					
Ports	4x RJ45 1x RJ45	8x M12	2 x RJ45 2 x SFP	4 x RJ45 1 x RJ45 1 x SFP	4 x RJ45 1 x RJ45	8 x RJ45 2 x SFP
Transmission speed	10/100 Mbit/s					
Power budget	30 W per port, max. 120 W	30 W per port, max. 200 W	30 W per port max. 60 W	30 W per port max. 120 W		
PoE-Standard	IEEE 802.3 af/at (PoE+)					
Order nr.	2891064	2701883	1026765	1026932	1026937	1026929



# Power over Ethernet Switches



	<b>FL SWITCH 4000T-4POE-SFP</b>	<b>FL SWITCH 4000T-8POE- 2SFP</b>	<b>FL SWITCH 4004T-8POE- 4SFP</b>	<b>FL IF 2PSE-F</b>
Function	Managed Switch		Media module for Modular Managed Switch	
Ports	4 x RJ45 1 x SFP	8 x RJ45 2 x SPF	8 x RJ45 4 x RJ45, 4 x SFP	2 x RJ45
Transmission Speed	10 /100 / MBit/s (RJ45) 1000 MBit/s (SFP)		10/100/1000 MBit/s	10/100 Mbit/s
Power budget	60 W per port, max. 180 W		60 W per port, max. 240 W	15 W
Standard	IEEE 802.3 af/at (PoE+), prepared for PoE bt (PoE ++)			IEEE 802.3af (PoE)
Order number	1026924	1026923	1026922	2832904



# Power over Ethernet Splitter

Robust metal housing  
and extended  
temperature range

Output power  
up to 21 W

24 V DC output voltage  
suitable for the control  
cabinet



Gigabit transmission

Compliant with  
IEEE 802.3af/at



# Power over Ethernet Splitter



**FL PD 1001 T GT**

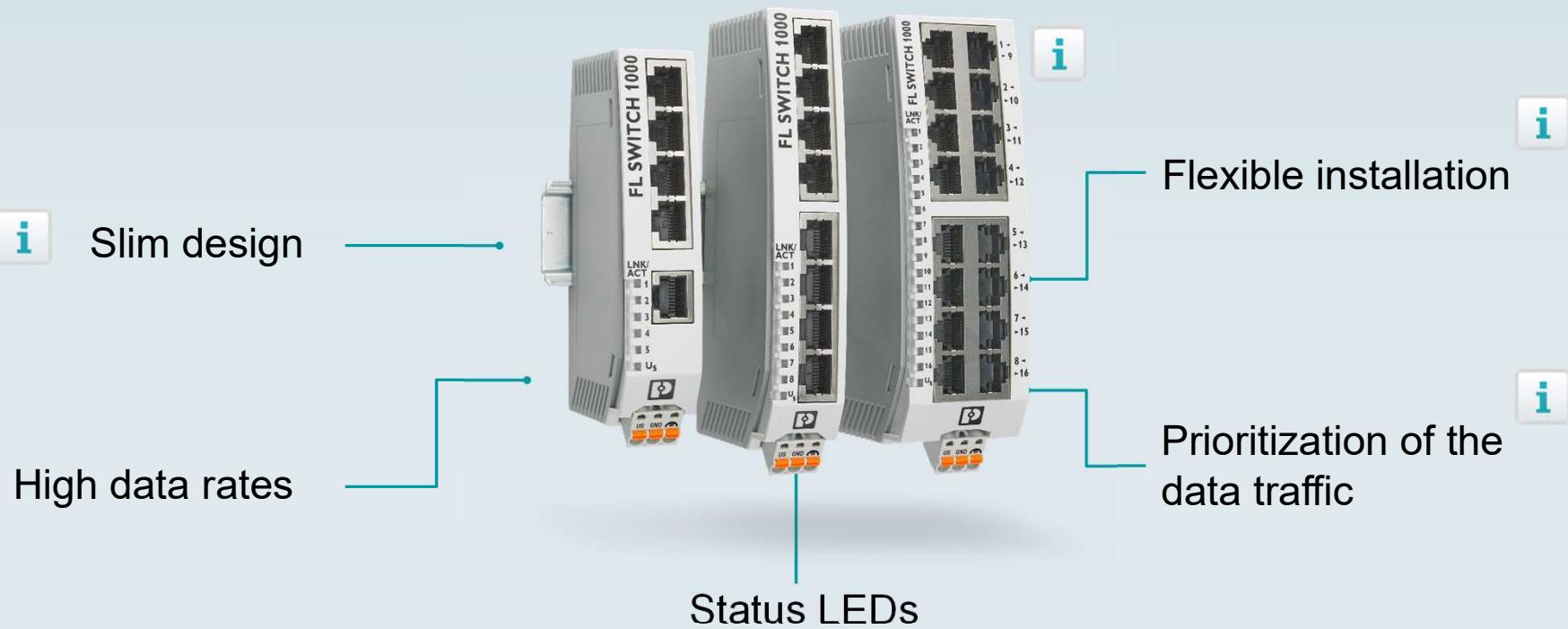
Function	PoE splitter
Ports	1x RJ45 PoE (output) 1x RJ45 (data input)
Transmission speed	10/100/1000 Mbit/s
Power budget	30 W
PoE-Standard	IEEE 802.3 af/at (PoE+)
Order number	2891042



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# Unmanaged Switches 1000



# Unmanaged Switches

Slim design



- particularly narrow at 2.25 cm (5 & 8 ports) and 4 cm (16 ports)
- can also be used in applications where space is limited

Ultra slim



Automation protocols





## Unmanaged Switches



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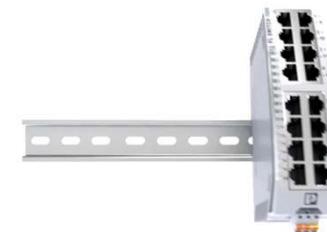


# Unmanaged Switches



Flexible installation

- Can be mounted flat on the mounting rail using mounting accessories
- The outgoing direction of the connections can be selected as required.



Flexible mounting options

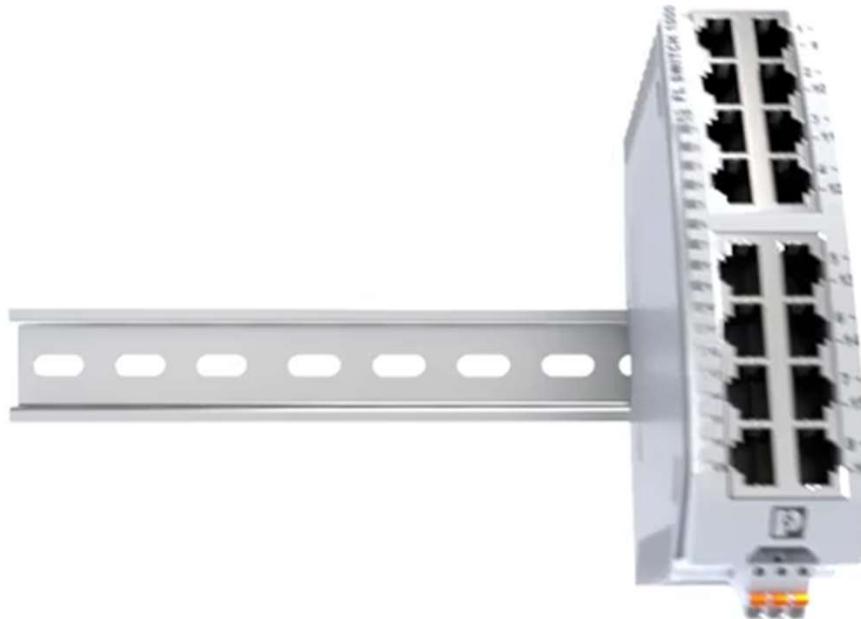


Automation protocols



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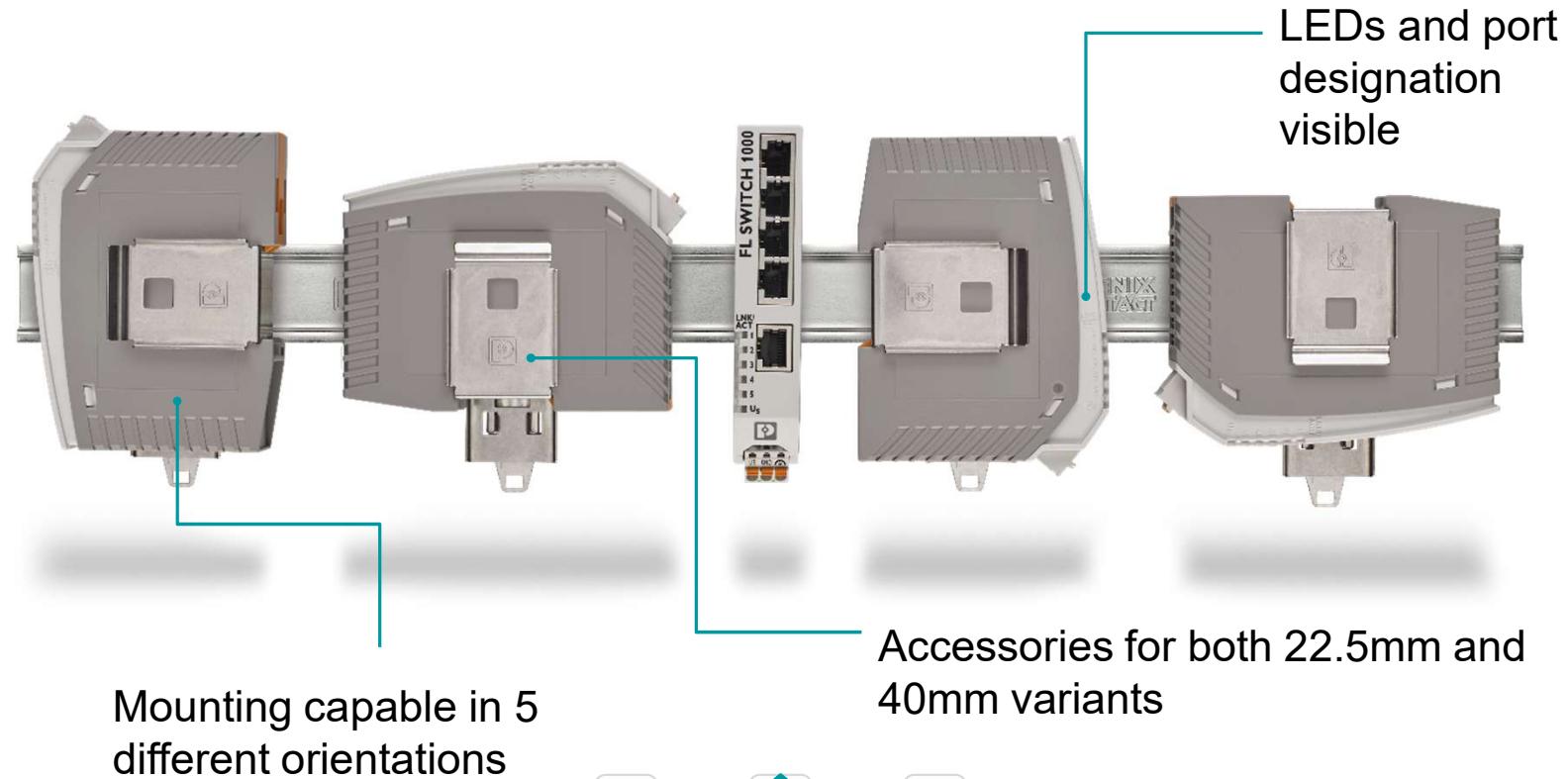
Flexible mounting options



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# Unmanaged Switches - Product Mounting

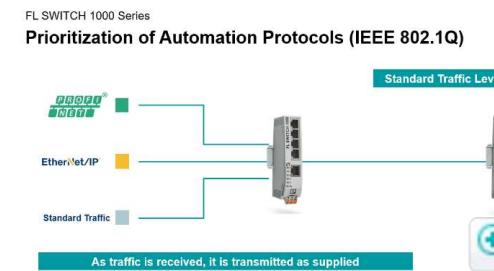


# Unmanaged Switches



Prioritization of the data traffic

- The real-time properties of PROFINET and EtherNet/IP™ automation networks are supported
- More stable networks and increased system availability



Automation protocols



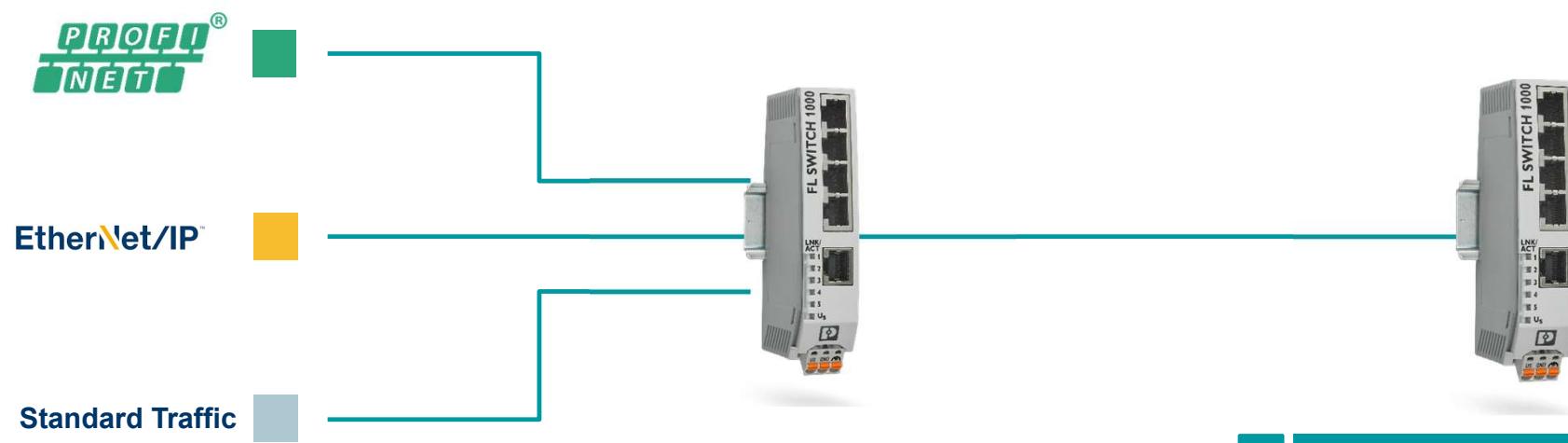
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FL SWITCH 1000 Series

## Prioritization of Automation Protocols (IEEE 802.1Q)

Standard Traffic Levels



As traffic is received, it is transmitted as supplied

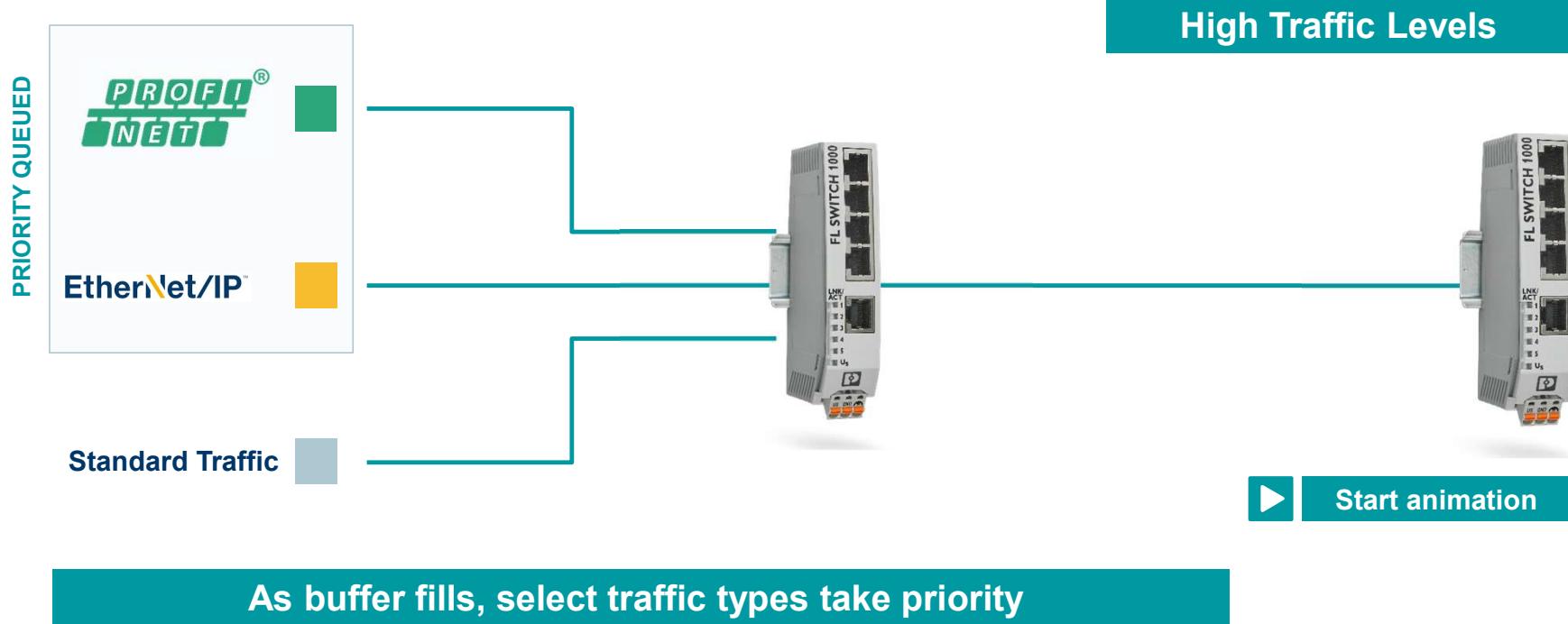


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FL SWITCH 1000 Series

## Prioritization of Automation Protocols (IEEE 802.1Q)



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# Prioritization of Traffic (IEEE 802.1Q)

## PRIORITY QUEUED



EtherNet/IP



## NON-PRIORITY QUEUED

Standard Traffic



# FL SWITCH 1000



	<b>FL SWITCH 1005N</b>	<b>FL SWITCH 1008N</b>	<b>FL SWITCH 1016N</b>	<b>FL SWITCH 1105N</b>	<b>FL SWITCH 1108N</b>
Application area	Basic	Basic	Basic	Basic	Basic
Design	Slim	Slim	Slim	Slim	Slim
Copper Ports	5x RJ45 (10/100 Mbit/s)	8x RJ45 (10/100 Mbit/s)	16x RJ45 (10/100 Mbit/s)	5x RJ45 (10/100/1000 Mbit/s)	8x RJ45 (10/100/1000 Mbit/s)
Fiber optic Ports	-	-	-	-	-
Quality of Service	No	No	No	No	No
Temperature range	-10 °C ... 60 °C	-10 °C ... 60 °C	-10 °C ... 60 °C	-10 °C ... 60 °C	-10 °C ... 60 °C
Special features	-	-	-	-	-
Order number	1085039	1085256	1085255	1085254	1085243



Automation protocols



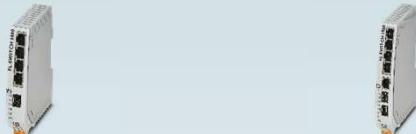
# FL SWITCH 1000



	<b>FL SWITCH 1004N-FX</b>	<b>FL SWITCH 1004N-FX ST</b>	<b>FL SWITCH 1004N-FX SM</b>	<b>FL SWITCH 1004N-SFX</b>	<b>FL SWITCH 1005N-2SFX</b>
Application area	Basic	Basic	Basic	Basic	Basic
Design	Slim	Slim	Slim	Slim	Slim
Copper Ports	4x RJ45 (10/100 Mbit/s)	4x RJ45 (10/100 Mbit/s)	4x RJ45 (10/100 Mbit/s)	4x RJ45 (10/100 Mbit/s)	5x RJ45 (10/100 Mbit/s)
Fiber optic Ports	1x FX	1x FX ST	1x FX SM	1x FX	2x SFX
Quality of Service	No	No	No	No	No
Temperature range	-10 °C ... 60 °C	-10 °C ... 60 °C	-10 °C ... 60 °C	-10 °C ... 60 °C	-10 °C ... 60 °C
Special features	-	-	-	-	-
Order number	1084159	1085179	1085214	1084159	1085176



# FL SWITCH 1000



**FL SWITCH 1104N-SFP**    **FL SWITCH 1105N-2SFP**

Application area	Basic	Basic
Design	Slim	Slim
Copper Ports	4x RJ45 (10/100/1000 Mbit/s)	5x RJ45 (10/100/1000 Mbit/s)
Fiber optic Ports	1x SFP	2x SFP
Quality of Service	No	No
Temperature range	-10 °C ... 60 °C	-10 °C ... 60 °C
Special features	-	-
Order number	1085173	1085171



Automation protocols



# FL SWITCH 1000



**FL SWITCH  
1001T-POE**

**FL SWITCH  
1008E**

Application area	Harsh environment	Harsh environment
Design	Slim	Slim
Ports	4x PoE+ 1x RJ45 (10/100 Mbit/s)	8x RJ45 (10/100 Mbit/s)
Quality of Service	No	No
Temperature range	-40°C ... 75°C	-40°C ... 75°C
Special features	PoE IEEE802.3at	IEC61850-3 IEEE 1613
Order number	2891064	2891065



# FL SWITCHES 1000 equipment



**FL PANEL  
ADAPTER 22.5**



**FL PANEL  
ADAPTER 40**



**FL DIN-RAIL  
ADAPTER 22.5**



**FL DIN-RAIL  
ADAPTER 40**

Assembly	Wall mounting	Wall mounting	Rail mounting	Rail mounting
Width	22,5 mm	40 mm	22,5 mm	40 mm
Order number	1085488	1085486	1085485	1085484



Automation protocols



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# SFNB-Switches



	<b>FL SWITCH SFNB 5TX</b>	<b>FL SWITCH SFNB 8TX</b>	<b>FL SWITCH SFNB 4TX/FX</b>	<b>FL SWITCH SFNB 4TX/FX ST</b>	<b>FL SWITCH SFNB 4TX/FX SM20</b>
Application area	Basic	Basic	Basic	Basic	Basic
Design	Slim	Slim	Slim	Slim	Slim
Ports	5x TP-RJ45 (10/100 Mbit/s)	8x TP-RJ45 (10/100 Mbit/s)	4x TP-RJ45 (10/100 Mbit/s) 1x SC-D MM (100 Mbit/s)	4x TP-RJ45 (10/100 Mbit/s) 1x ST-D MM (100 Mbit/s)	4x TP-RJ45 (10/100 Mbit/s) 1x SC-D SM (100 Mbit/s)
Quality of Service	No	No	No	No	No
Temperature range	-10 °C ... 60 °C	-10 °C ... 60 °C	-10 °C ... 60 °C	-10 °C ... 60 °C	-10 °C ... 60 °C
Special features	-	-	-	-	-
Order number	2891001	2891002	2891027	2891028	2891029



Automation protocols



INSPIRING INNOVATIONS

# SFNB-Switches



**FL SWITCH  
SFNB 5TX-PNE**

**FL SWITCH  
SFNB 8TX-PNE**

Application area	Basic	Basic
Design	Slim	Slim
Ports	5x TP-RJ45 (10/100 Mbit/s)	8x TP-RJ45 (10/100 Mbit/s)
Quality of Service	Yes	Yes
Temperature range	-10 °C ... 60 °C	-10 °C ... 60 °C
Special features	PROFINET & EtherNet/IP prioritization, PTCP filtering	PROFINET & EtherNet/IP prioritization, PTCP filtering
Order number	1071801	1071800



Automation protocols



# SF-Switches



	<b>FL SWITCH SF 8TX</b>	<b>FL SWITCH SF 16TX</b>	<b>FL SWITCH SF 7TX/FX</b>	<b>FL SWITCH SF 7TX/FX ST</b>	<b>FL SWITCH SF 15TX/FX</b>
Application area	Standard	Standard	Standard	Standard	Standard
Design	Flat	Flat	Flat	Flat	Flat
Ports	8x TP-RJ45 (10/100 Mbit/s)	16x TP-RJ45 (10/100 Mbit/s)	7x TP-RJ45 (10/100 Mbit/s) 1x SC-D MM (100 Mbit/s)	7x TP-RJ45 (10/100 Mbit/s) 1x ST-D MM (100 Mbit/s)	15x TP-RJ45 (10/100 Mbit/s) 1x SC-D MM (100 Mbit/s)
Quality of Service	No	No	No	No	No
Temperature range	0°C ... 55°C	0°C ... 55°C	0°C ... 55°C	0°C ... 55°C	0°C ... 55°C
Special features	-	-	-	-	-
Order number	2832771	2832849	2832726	2832577	2832661



Automation protocols



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# SF-Switches



	<b>FL SWITCH SF 6TX/2FX</b>	<b>FL SWITCH SF 6TX/2FX ST</b>	<b>FL SWITCH SF 14TX/2FX</b>	<b>FL SWITCH SF 4TX/3FX ST</b>
Application area	Standard	Standard	Standard	Standard
Design	Flat	Flat	Flat	Flat
Ports	7x TP-RJ45 (10/100 Mbit/s) 2x SC-D MM (100 Mbit/s)	7x TP-RJ45 (10/100 Mbit/s) 2x ST-D MM (100 Mbit/s)	14x TP-RJ45 (10/100 Mbit/s) 2x SC-D MM (100 Mbit/s)	4x TP-RJ45 (10/100 Mbit/s) 3x ST-D MM (100 Mbit/s)
Quality of Service	No	No	No	No
Temperature range	0°C ... 55°C	0°C ... 55°C	0°C ... 55°C	0°C ... 55°C
Special features	-	-	-	-
Order number	2832933	2832674	2832593	2832603



Automation protocols



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# SFN-Switches



	<b>FL SWITCH SFN 5TX</b>	<b>FL SWITCH SFN 5TX-PN</b>	<b>FL SWITCH SFN 5TX-24VAC</b>	<b>FL SWITCH SFN 8TX</b>	<b>FL SWITCH SFN 8TX-PN</b>
Application area	Standard	Standard	Standard	Standard	Standard
Design	Slim	Slim	Slim	Slim	Slim
Ports	5x TP-RJ45 (10/100 Mbit/s)	5x TP-RJ45 (10/100 Mbit/s)	5x TP-RJ45 (10/100 Mbit/s)	8x TP-RJ45 (10/100 Mbit/s)	8x TP-RJ45 (10/100 Mbit/s)
Quality of Service	Yes	Yes	Yes	Yes	Yes
Temperature range	0°C ... 60 °C /	0°C ... 60 °C	0°C ... 60 °C	0°C ... 60 °C	0°C ... 60 °C
Special features	-	Optimized for PROFINET	24 V AC/DC supply voltage	-	Optimized for PROFINET
Order number	2891152	2891151	2891021	2891929	2891018



Automation protocols



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# SFN-Switches



	<b>FL SWITCH SFN 8TX-24VAC</b>	<b>FL SWITCH SFN 16TX</b>	<b>FL SWITCH SFN 4TX/FX</b>	<b>FL SWITCH SFN 4TX/FX ST</b>	<b>FL SWITCH SFN 7TX/FX</b>
Application area	Standard	Standard	Standard	Standard	Standard
Design	Slim	Slim	Slim	Slim	Slim
Ports	8x TP-RJ45 (10/100 Mbit/s)	16x TP-RJ45 (10/100 Mbit/s)	4x TP-RJ45 (10/100 Mbit/s) 1x SC-D MM (100 Mbit/s)	4x TP-RJ45 (10/100 Mbit/s) 1x ST-D MM (100 Mbit/s)	7x TP-RJ45 (10/100 Mbit/s) 1x SC-D MM (100 Mbit/s)
Quality of Service	Yes	No	Yes	Yes	Yes
Temperature range	0°C ... 60 °C	0°C ... 60 °C	0°C ... 60 °C/	0°C ... 60 °C	0°C ... 60 °C
Special features	24 V AC/DC supply voltage	-	-	-	-
Order number	2891020	2891933	2891851	2891453	2891097



Automation protocols



# SFN-Switches



	<b>FL SWITCH SFN 7TX/FX-NF</b>	<b>FL SWITCH SFN 7TX/FX ST</b>	<b>FL SWITCH SFN 15TX/FX</b>	<b>FL SWITCH SFN 6TX/2FX</b>	<b>FL SWITCH SFN 6TX/2FX-NF</b>
Application area	Standard	Standard	Standard	Standard	Standard
Design	Slim	Slim	Slim	Slim	Slim
Ports	7x TP-RJ45 (10/100 Mbit/s)  1x SC-D MM (100 Mbit/s)	7x TP-RJ45 (10/100 Mbit/s)  1x ST-D MM (100 Mbit/s)	15x TP-RJ45 (10/100 Mbit/s)  1x SC-D MM (100 Mbit/s)	6x TP-RJ45 (10/100 Mbit/s)  2x SC-D MM (100 Mbit/s)	6x TP-RJ45 (10/100 Mbit/s)  2x SC-D MM (100 Mbit/s)
Quality of Service	Yes	Yes	No	Yes	Yes
Temperature range	0°C ... 60 °C	0°C ... 60 °C	0°C ... 60 °C	0°C ... 60 °C	0°C ... 60 °C
Special features	flow control disabled	-	-	-	flow control disabled
Order number	2891023	2891110	2891934	2891314	2891024



Automation protocols



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# SFN-Switches



**FL SWITCH  
SFN 6TX/2FX  
ST**

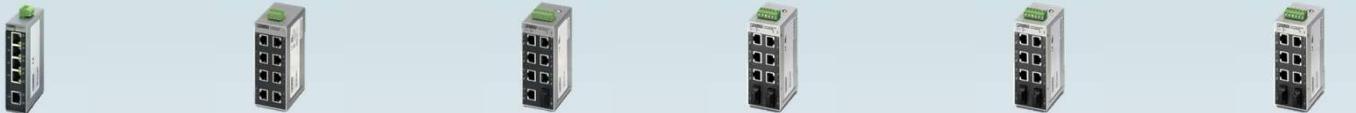
**FL SWITCH  
SFN 14TX/ 2FX**

Application area	Standard	Standard
Design	Slim	Slim
Ports	6x TP-RJ45 (10/100 Mbit/s) 2x ST-D MM (100 Mbit/s)	14x TP-RJ45 (10/100 Mbit/s) 2x SC-D MM (100 Mbit/s)
Quality of Service	Yes	No
Temperature range	0°C ... 60 °C	0°C ... 60 °C
Special features	-	-
Order number	2891411	2891935

Automation protocols



# SFN-Gigabit-Switches



	<b>FL SWITCH SFN 5GT</b>	<b>FL SWITCH SFN 8GT</b>	<b>FL SWITCH SFN 7GT/SX</b>	<b>FL SWITCH SFN 6GT/2SX</b>	<b>FL SWITCH SFN 6GT/2LX</b>	<b>FL SWITCH SFN 6GT/2LX-20</b>
Application area	Gigabit	Gigabit	Gigabit	Gigabit	Gigabit	Gigabit
Design	Slim	Slim	Slim	Slim	Slim	Slim
Ports	5x RJ45 (10/100/1000 Mbit/s)	8x RJ45 (10/100/1000 Mbit/s)	7x RJ45 1x SC-D MM (10/100/1000 Mbit/s)	7x RJ45 2x SC-D MM (10/100/1000 Mbit/s)	6x RJ45 2x SC-D SM, 10 km (10/100/ 1000 Mbit/s)	6x RJ45 2x SC-D SM, 20 km (10/100/ 1000 Mbit/s)
Quality of Service	Yes	Yes	Yes	Yes	Yes	Yes
Temperature range	-25 °C ... 75 °C	-25 °C ... 75 °C	-25 °C ... 75 °C	-25 °C ... 75 °C	-25 °C ... 75 °C	-25 °C ... 75 °C
Special features	-	-	-	-	-	-
Order number	2891444	2891673	2891518	2891398	2891987	2891563



Automation protocols



# SFNT-Switches



Optimized for the process industry



Protective coating for particularly harsh environments

Simple diagnosis of errors



Automation protocols



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# SFNT-Switches

Flexible installation



- wide temperature range from -40 °C to +75 °C
- Industry specific approvals ATEX, IECEx and UL Class 1 Div 2



Automation protocols

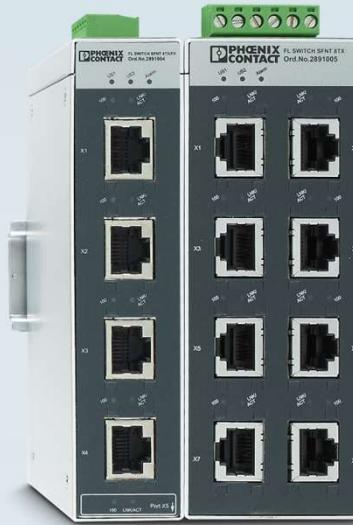


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# SFNT-Switches

Protective coating  
for particularly harsh  
environments



- Provides special protection against environmental failures and damage caused by external influences such as high humidity, dust or chemicals



Automation protocols



# SFNT-Switches



	<b>FL SWITCH SFNT 5TX</b>	<b>FL SWITCH SFNT 5TX-C</b>	<b>FL SWITCH SFNT 8TX</b>	<b>FL SWITCH SFNT 8TX-C</b>	<b>FL SWITCH SFNT 16TX</b>
Application area	Harsh environment	Harsh environment	Harsh environment	Harsh environment	Harsh environment
Design	Slim	Slim	Slim	Slim	Slim
Ports	5x TP-RJ45 (10/100 Mbit/s)	5x TP-RJ45 (10/100 Mbit/s)	8x TP-RJ45 (10/100 Mbit/s)	8x TP-RJ45 (10/100 Mbit/s)	16x TP-RJ45 (10/100 Mbit/s)
Quality of Service	Yes	Yes	Yes	Yes	No
Temperature range	-40°C ... 75°C	-40°C ... 75°C	-40°C ... 75°C	-40°C ... 75°C	-40°C ... 75°C
Special features	ATEX approval	Conformal coating	ATEX approval	Conformal coating	ATEX approval
Order number	2891003	2891043	2891005	2891045	2891952



Automation protocols



# SFNT-Switches



	<b>FL SWITCH SFNT 4TX/ FX</b>	<b>FL SWITCH SFNT 4TX/ FX- C</b>	<b>FL SWITCH SFNT 7TX/ FX</b>	<b>FL SWITCH SFNT 7TX/ FX- C</b>	<b>FL SWITCH SFNT 7TX/ FX ST</b>	<b>FL SWITCH SFNT 7TX/ FX ST-C</b>
Application area	Harsh environment					
Design	Slim	Slim	Slim	Slim	Slim	Slim
Ports	4x TP-RJ45 (10/100 Mbit/s) 1x SC-D MM (100 Mbit/s)	4x TP-RJ45 (10/100 Mbit/s) 1x SC-D MM (100 Mbit/s)	7x TP-RJ45 (10/100 Mbit/s) 1x SC-D MM (100 Mbit/s)	7x TP-RJ45 (10/100 Mbit/s) 1x SC-D MM (100 Mbit/s)	7x TP-RJ45 (10/100 Mbit/s) 1x ST-D MM (100 Mbit/s)	7x TP-RJ45 (10/100 Mbit/s) 1x ST-D MM (100 Mbit/s)
Quality of Service	Yes	Yes	Yes	Yes	Yes	Yes
Temperature range	-40°C ... 75°C					
Special features	ATEX approval	Conformal coating	ATEX approval	Conformal coating	-	Conformal coating
Order number	2891004	2891044	2891006	2891046	2891007	2891047



Automation protocols



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# SFNT-Switches



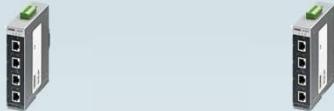
	<b>FL SWITCH SFNT 15TX/FX</b>	<b>FL SWITCH SFNT 6TX/ 2FX</b>	<b>FL SWITCH SFNT 6TX/2FX-C</b>	<b>FL SWITCH SFNT 6TX/ 2FX ST</b>	<b>FL SWITCH SFNT 6TX/2FX ST-C</b>	<b>FL SWITCH SFNT 14TX/2FX</b>
Application area	Harsh environment	Harsh environment	Harsh environment	Harsh environment	Harsh environment	Harsh environment
Design	Slim	Slim	Slim	Slim	Slim	Slim
Ports	15x TP-RJ45 (10/100 Mbit/s) 1x SC-D MM (100 Mbit/s)	6x TP-RJ45 (10/100 Mbit/s) 2x SC-D MM (100 Mbit/s)	6x TP-RJ45 (10/100 Mbit/s) 2x SC-D MM (100 Mbit/s)	6x TP-RJ45 (10/100 Mbit/s) 2x ST-D MM (100 Mbit/s)	6x TP-RJ45 (10/100 Mbit/s) 2x ST-D MM (100 Mbit/s)	14x TP-RJ45 (10/100 Mbit/s) 2x SC-D MM (100 Mbit/s)
Quality of Service	No	Yes	Yes	Yes	Yes	No
Temperature range	-40°C ... 75°C	-40°C ... 75°C	-40°C ... 75°C	-40°C ... 75°C	-40°C ... 75°C	-40°C ... 75°C
Special features	-	-	Conformal coating	-	Conformal coating	-
Order number	2891953	2891025	2891048	2891026	2891049	2891954



Automation protocols



# SFNT-Gigabit-Switches



	<b>FL SWITCH SFNT 5GT</b>	<b>FL SWITCH SFNT 5GT-C</b>
Application area	Harsh environment	Harsh environment
Design	Slim	Slim
Ports	5x TP-RJ45 (10/100/1000 Mbit/s)	5x TP-RJ45 (10/100/1000 Mbit/s)
Quality of Service	Yes	Yes
Temperature range	-40°C ... 75°C	-40°C ... 75°C
Special features	-	Conformal coating
Order number	2891390	2891391



Automation protocols



# Switch 1800 and 1900



# Switch 1800 and 1900

Power supply  
adapted to the  
mounting location



- Operated with alternating current (100 V AC ... 240 V AC) for use in 19" cabinets



Automation protocols



# Switch 1605

Flexible choice of mounting location



Power supply  
also possible as  
line topology

Protection class  
IP67

Trouble-free use in  
automation networks



Automation protocols



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# Switch 1605



Trouble-free use in  
automation networks

- Guarantees real-time capability, e.g. of time-sensitive process data, even with high data loads
- Support of automation protocols such as PROFINET



Automation protocols



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# Switch 1605



Protection class  
IP67

- IP67 protection rating makes the unmanaged switch resistant to external influences such as moisture or dust



Automation protocols



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## Further variants



	<b>FL SWITCH 1824</b>	<b>FL SWITCH 1924</b>	<b>FL SWITCH 1605 M12</b>
--	-----------------------	-----------------------	-------------------------------

Application area	Standard	Gigabit	Field
Design	19"	19"	Wall mounting
Ports	24x TP-RJ45 (10/100 Mbit/s)	24x RJ45 (10/100/1000 Mbit/s)	5x M12 (10/100 Mbit/s)
Quality of Service	Yes	Yes	Yes
Temperature range	0°C ... 55°C	-25 °C ... 75 °C	-40°C ... 70°C
Special features	-	-	Degree of protection IP67
Order number	2891041	2891057	2700200



Automation protocols



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# Secure remote maintenance

Integrated Firewall



No modification of the machines and plant,  
no software needed

Scalable

Encrypted communication with the machine or plant

Optimized designs for different industrial applications

Automation protocols



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## Secure remote maintenance



Encrypted communication with the machine or plant

- VPN connection
- Ipsec protocol
- Encryption according to Advanced Encryption Standard (AES)



Automation protocols



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# Secure remote maintenance



Optimized  
designs for  
different  
industrial  
applications

- Slim



- Flat



- PCI(E)



Automation protocols



# Secure remote maintenance



Scalable

- From one temporary VPN tunnel up to several thousand simultaneous VPN connections
- From a simple VPN router up to a professional security appliance with intelligent diagnose, alert and firewall functions



# Secure remote maintenance



	<b>FL MGUARD RS2000 TX/TX VPN</b>	<b>FL MGUARD RS2005 TX VPN</b>	<b>TC MGUARD RS2000 3G VPN</b>	<b>FL MGUARD RS4000 TX/TX VPN</b>	<b>FL MGUARD RS4000 TX/TX- P</b>
VPN tunnel optionally expandable	2 No	2 No	2 No	10 up to 250	10 up to 250
Firewall	2-Click-Firewall	2-Click-Firewall	2-Click-Firewall	Multifunction firewall	Multifunction firewall
Integrated switch		5-Port unmanaged	4-Port unmanaged	-	-
Special features	-	-	Mobilfunk	-	ATEX, IECEx approvals
Extended functionalities	No	No	No	Optional	Optional
Order number	2700642	2701875	2903441	2200515	2702259



# Secure remote maintenance



	<b>FL MGUARD RS4004 TX/ DTX VPN</b>	<b>TC MGUARD RS4000 3G VPN</b>	<b>FL MGUARD GT/GT VPN</b>	<b>FL MGUARD PCI4000 VPN</b>	<b>FL MGUARD PCIE4000 VPN</b>
VPN tunnel optionally expandable	10 up to 250	10 up to 250	10 up to 250	10 up to 250	10 up to 250
Firewall	Multifunction firewall	Multifunction firewall	Multifunction firewall	Multifunction firewall	Multifunction firewall
Integrated switch	4-Port managed	4-Port managed	-	-	-
Special features	DMZ-Port	WAN, mobile phone network	Gigabit, SFP, maritime approval	PCI format	PCIE format
Extended functionalities	Optional	Optional	Optional	Optional	Optional
Order number	2701877	2903440	2700198	2701275	2701278



Automation protocols



## Remote access via internet and mobile phone network



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## Remote access via internet and mobile phone network



Long range and  
high data  
throughput

- Mobile highspeed data links up to 150 Mbit/s via 4G LTE networks
- Mobile data links up to 21 Mbit/s via 3G networks
- Industrial ADSL broadband connections according to Annex A, B and J with up to 25 Mbit/s



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# TC Router



	TC ROUTER 3002T-4G	TC ROUTER 3002T-3G	TC ROUTER 2002T-4G	TC ROUTER 2002T-3G	TC ANT MOBILE WALL 5M
Function	Industrial 4G router European version	Industrial 3G router European version	Industrial 4G router European version	Industrial 3G router European version	Multiband mobile phone antenna with mounting bracket for outdoor installation, 5m antenna cable (SMA)
Mobile radio Interface	4G	3G	4G	3G	
Transmission speed	150 Mbit/s LTE Downlink	21 Mbit/s HSPA Downlink	150 Mbit/s LTE Downlink	21 Mbit/s HSPA Downlink	
Switching inputs and outputs	2 digital Inputs, 1 digital output	2 digital Inputs, 1 digital output	2 digital Inputs, 1 digital output	2 digital Inputs, 1 digital output	
General	Firewall, NAT, <b>IPsec, OpenVPN</b> SMS and e-mail transmission	Firewall, NAT, <b>IPsec, OpenVPN</b> SMS and e-mail transmission	Firewall, NAT SMS and e-mail transmission	Firewall, NAT SMS and e-mail transmission	
Order number	2702528	2702529	2702530	2702531	2702273



# TC Router



**verizon**



**AT&T**



	<b>TC ROUTER 3002T-4G VZN</b>	<b>TC ROUTER 3002T-4G ATT</b>	<b>TC ANT MOBILE WALL 5M</b>
Function	Industrial 4G router <b>USA</b> For communication in <b>Verizon</b> Wireless mobile network	Industrial 4G router <b>USA</b> For communication in <b>AT&amp;T</b> Wireless mobile network	Multiband mobile phone antenna with mounting bracket for outdoor installation, 5m antenna cable (SMA)
Mobile radio Interface	4G	4G	
Transmission speed	150 Mbit/s LTE Downlink	150 Mbit/s LTE Downlink	
Switching inputs and outputs	2 digital Inputs, 1 digital output	2 digital Inputs, 1 digital output	
General	Firewall, NAT, <b>IPsec, OpenVPN</b> SMS and e-mail transmission	Firewall, NAT, <b>IPsec, OpenVPN</b> SMS and e-mail transmission	
Order number	2702532	2702533	2702273



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# Extension of complex IT networks



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# Extension of complex IT networks



Economical  
Ethernet  
communication

- Distances up to 20 kilometers
- Using existing two-wire cables
- Expanding the system during operation



# Extension of complex IT networks



Managed and unmanaged extenders in one network

- Easy installation via Plug-and-Play
- Automatic topology and data rate recognition
- Diagnostics of all devices and paths via IP







- Multi-stage signaling and remote signaling of the protective devices via SNMP, e.g.
- Performance limit reached, replacement recommended
- Overloaded, replacement required



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# Extension of complex IT networks

Remote  
diagnostics of all  
devices and  
paths



- Automatic alarming via SNMP
- Point-to-point, line and ring topologies
- Data rates up to 30 Mbit/s



# Extension of complex IT networks



	<b>TC EXTENDER 2001 ETH-2S</b>	<b>TC EXTENDER 4001 ETH-1S</b>	<b>TC EXTENDER 6004 ETH-2S</b>
Function	Unmanaged Ethernet-Extender	Managed Ethernet-Extender	Managed Ethernet-Extender
Topologies	Ring, line, point-to-point	Point-to-point	Ring, line, point-to-point
Replaceable surge protection	No	Yes	Yes
Diagnostic indicators	LEDs	LEDs	Display
Ports	2x SHDSL, 1x Ethernet	1x SHDSL, 1x Ethernet	2x SHDSL, 4x Ethernet
Order number	2702409	2702253	2702255



# Industrial Bluetooth – FL EPA 2



**i** Interference-free parallel operation with WLAN networks

**i** Integrated special antennas for reliable wireless connections

Optimized for operation in PROFINET networks



**i** Various application areas



Quick and easy startup



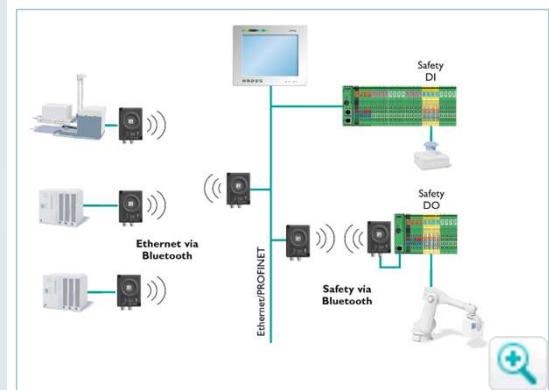
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# Industrial Bluetooth – FL EPA 2



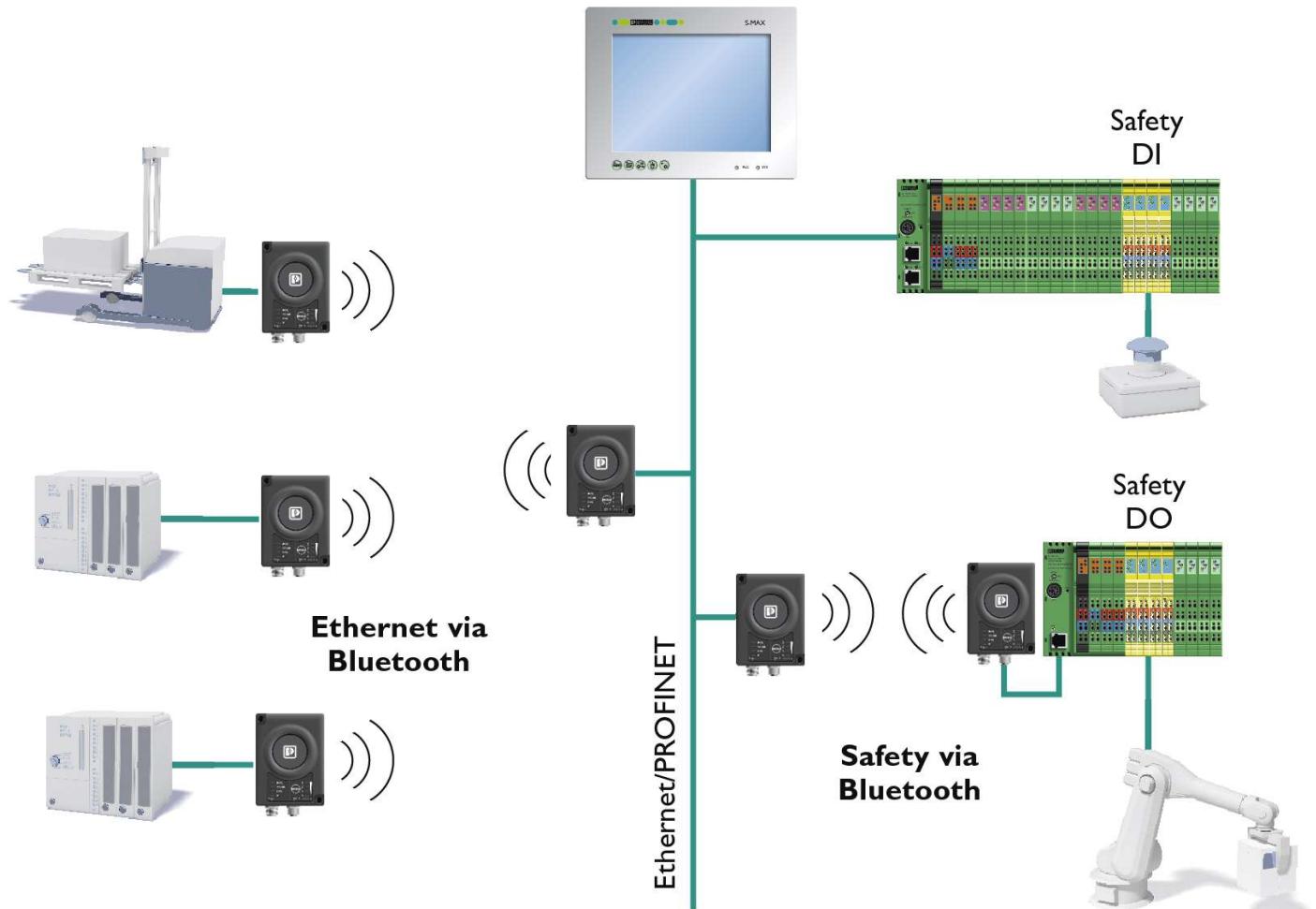
Various  
application areas

- Point-to-point connection (Cranes, traveling bridge collectors, robots)
- Multipoint connection (I/O components, scanners, PCs)



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# Industrial Bluetooth – FL EPA 2

Interference-free  
parallel operation with  
WLAN networks



- Adaptive frequency hopping (AFH)
- Low emission mode (LEM)
- Black channel list (BCL)



# Industrial Bluetooth – FL EPA 2

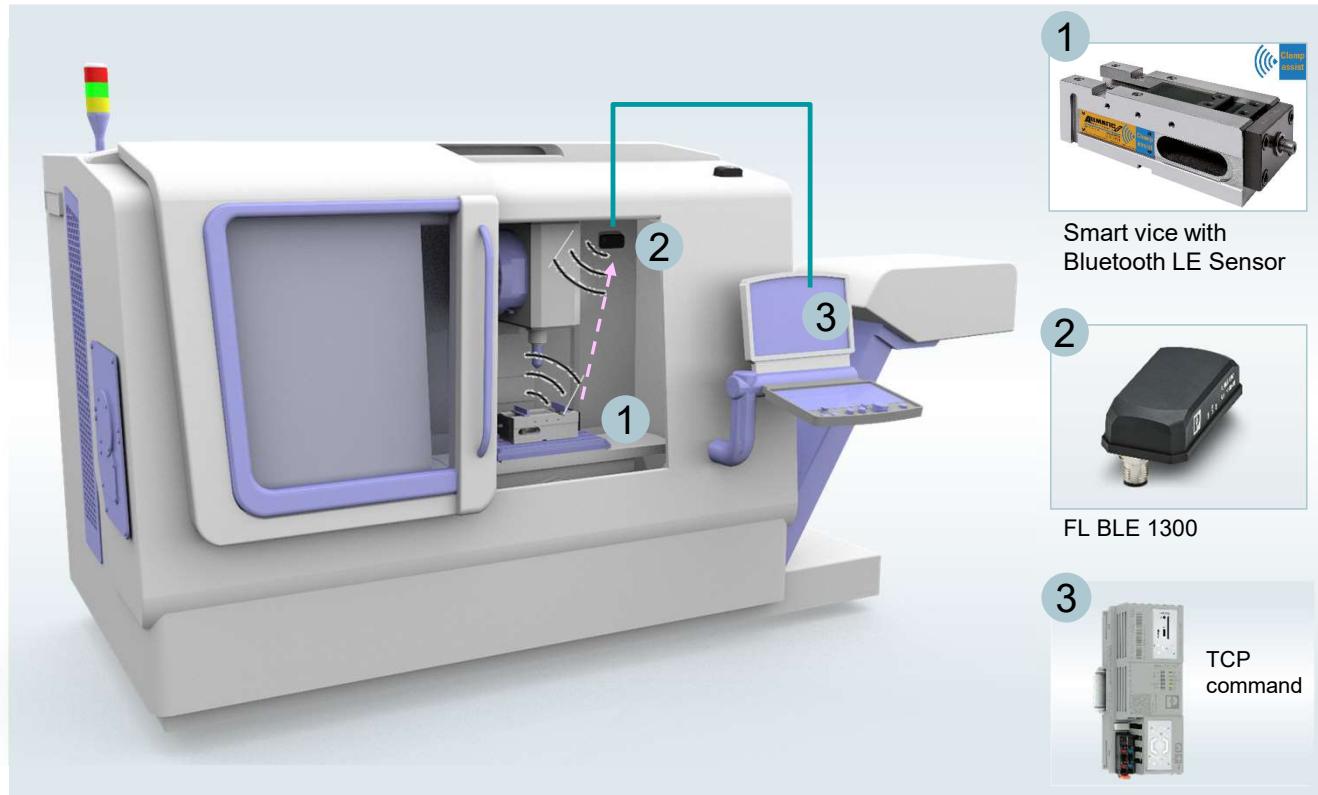


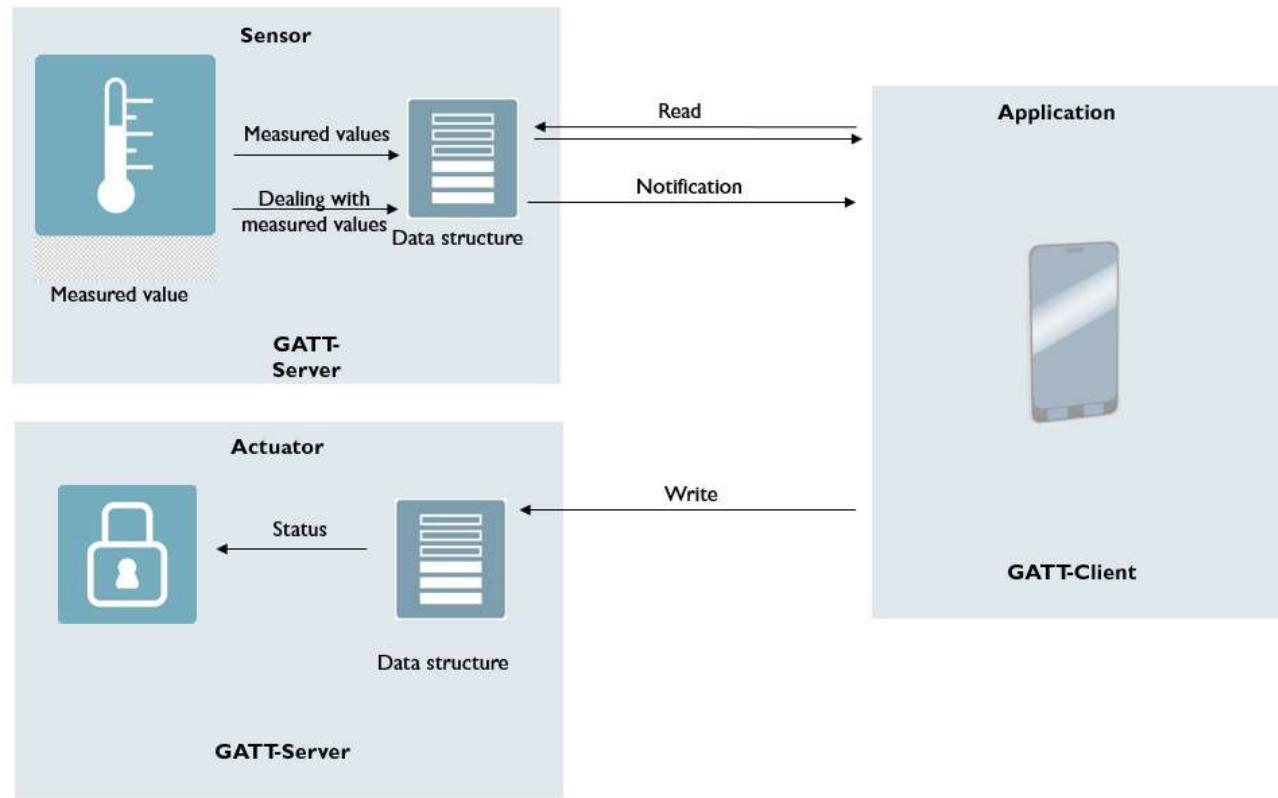
	FL EPA 2 (BT Mode)	FL EPA 2 RSMA (BT Mode)	FL BT EPA 2
Function	Bluetooth Ethernet Client Adapter	Bluetooth Access Point	Bluetooth Ethernet Client Adapter
Antenna	Internal panel antenna	Omnidirectional antenna supplied as standard	Internal panel antenna
Frequency band	2,4 GHz	2,4 GHz	2,4 GHz
Connection type	M12 connection	M12 connection	M12 connection
Degree of protection	IP65	IP65	IP65
Temperature range	-40 °C ... 65 °C	-40 °C ... 65 °C	-40 °C ... 65 °C
Order number	1005955	1005957	1005869



# Industrial Bluetooth – FL BLE 1300







# Industrial Bluetooth – FL BLE 1300



**FL BLE 1300**

Function      Bluetooth LE 5.0  
                wireless module

Antenna      Internal antenna

Frequency band      2,4 GHz

Degree of  
protection      IP65

Temperature  
range      -40 °C ... 65 °C

Order number      1118418



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# Industrial WLAN 1100 & 2100

Integrated antennas and wireless module in one single device



Reliable communication thanks to MIMO technology

Easy to mount

All-in-one-solution

Video

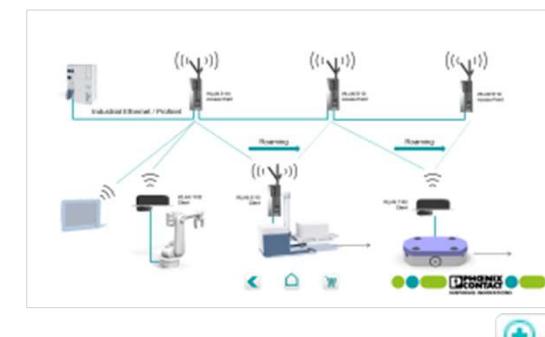


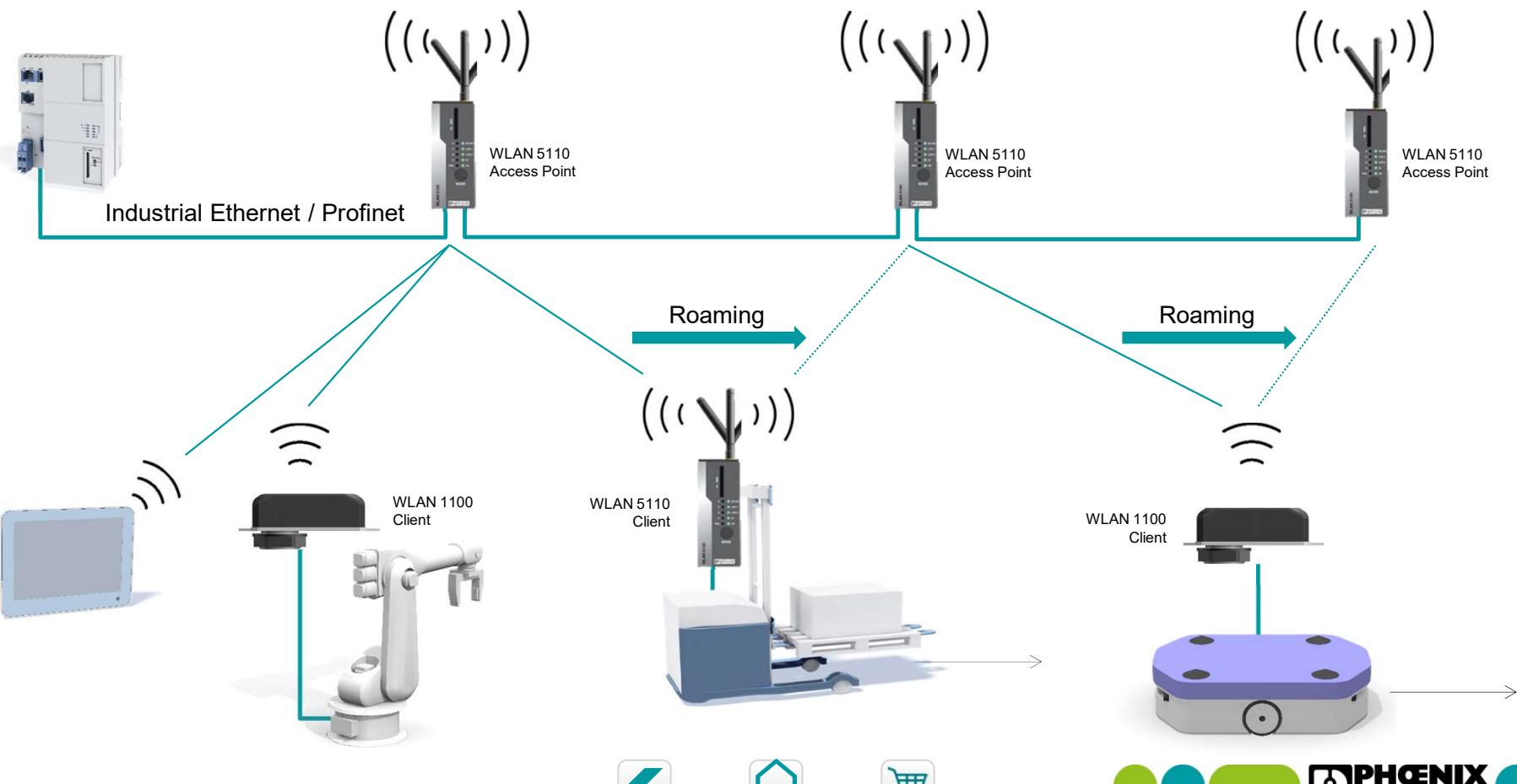
# Industrial WLAN 1100 & 2100

Reliable communication thanks to MIMO technology



- Interruption-free roaming





# Industrial WLAN 1100 & 2100

All-in-one-  
solution



- Integrated antennas and wireless module in one single device
- Single-hole mounting directly on machines, mobile vehicles or control cabinets
- Shockproof according to IK08

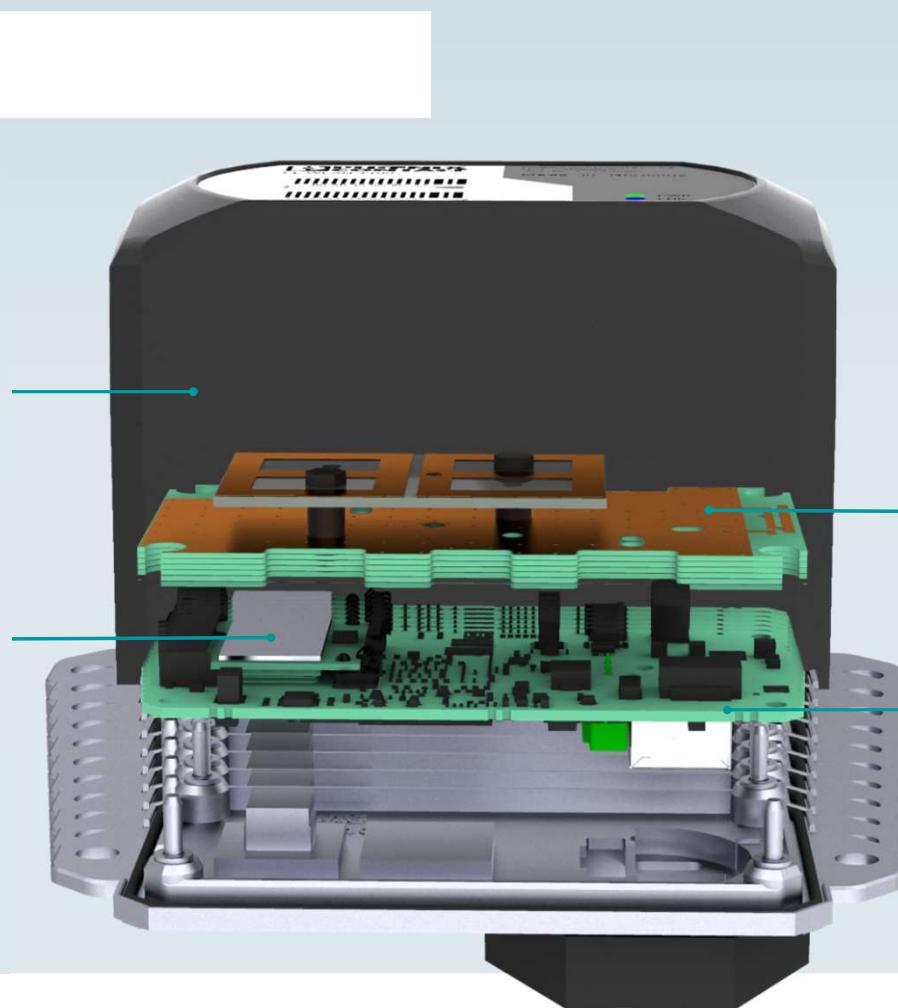


# Industrial WLAN

**Extremely robust housing**, shockproof in accordance with IK08, 7 Joule at -50°C

Protection Class IP 54  
**Powerful WLAN Board**

802.11a/b/g/n  
Dual band, 2,4 & 5 GHz

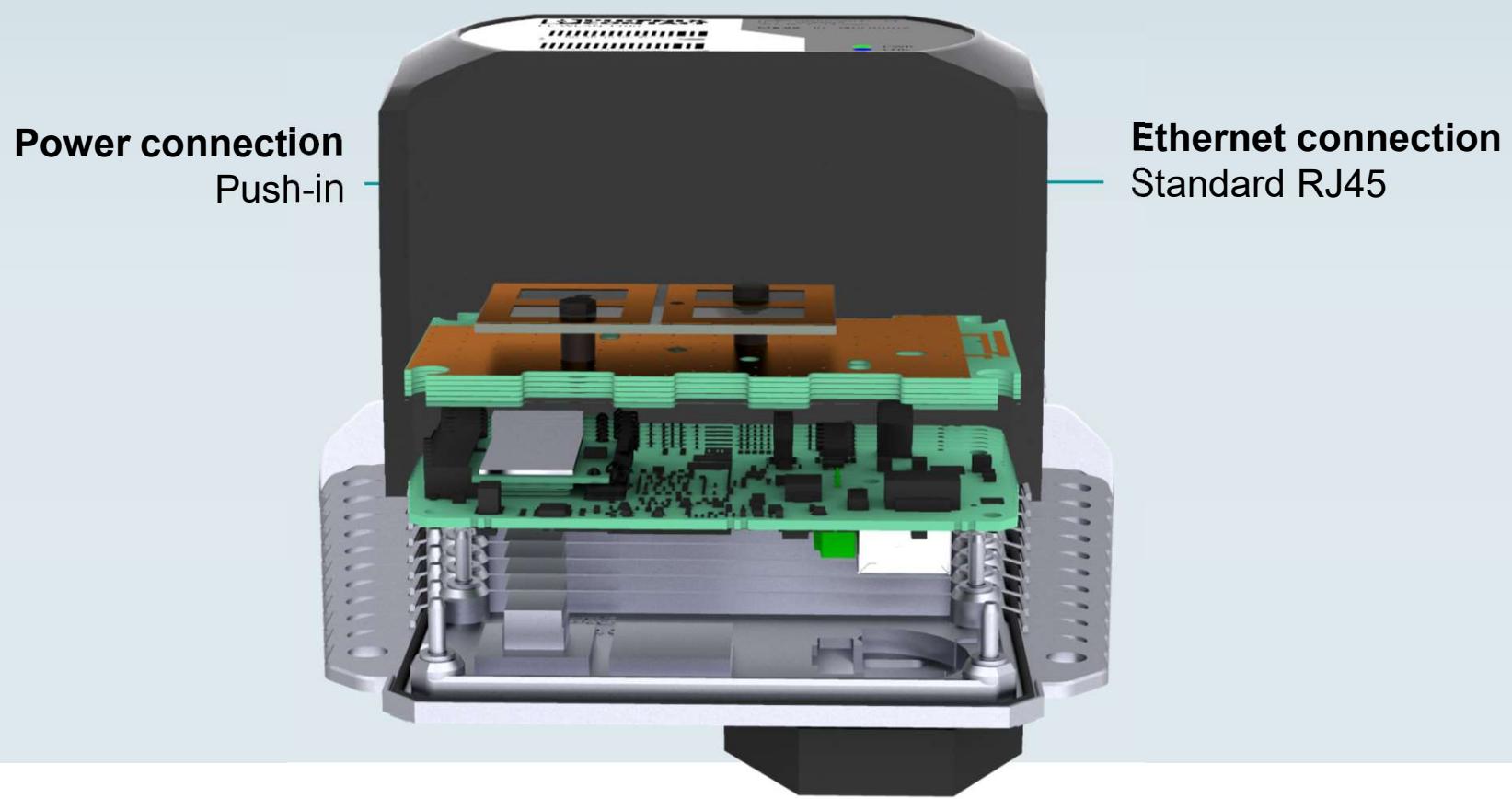


**Special antennas**  
For fast and reliable communication

**Powerful Access Point**  
Linux operating system

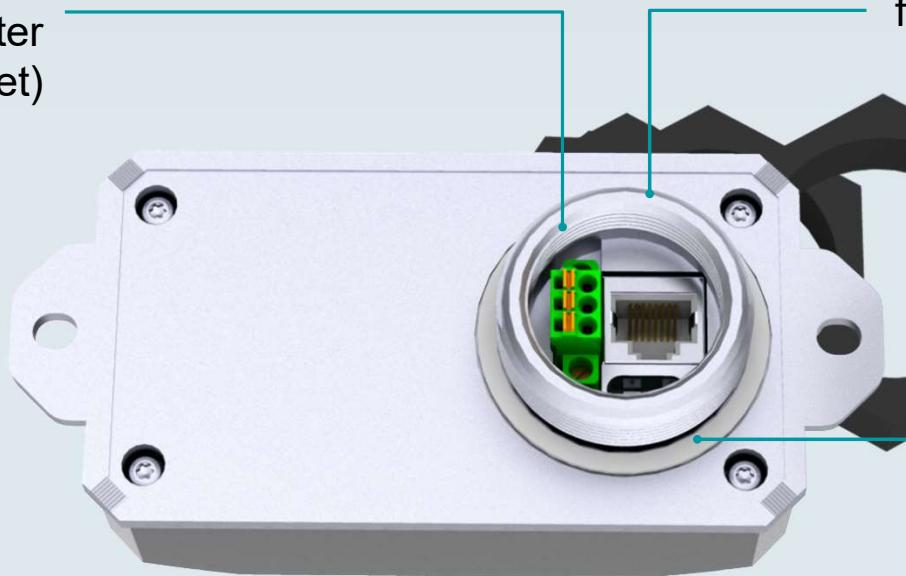


# Industrial WLAN



# Industrial WLAN

**M32 inside thread**  
For optional IP67-connection  
adapter  
(if not mounted on cabinet)



**M40 external thread**  
for mounting

Seal  
up to IP67



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# Industrial WLAN

**Fast and easy connection**  
thanks to single-hole  
mounting



# Industrial WLAN

**Fast and easy connection**  
thanks to single-hole  
mounting

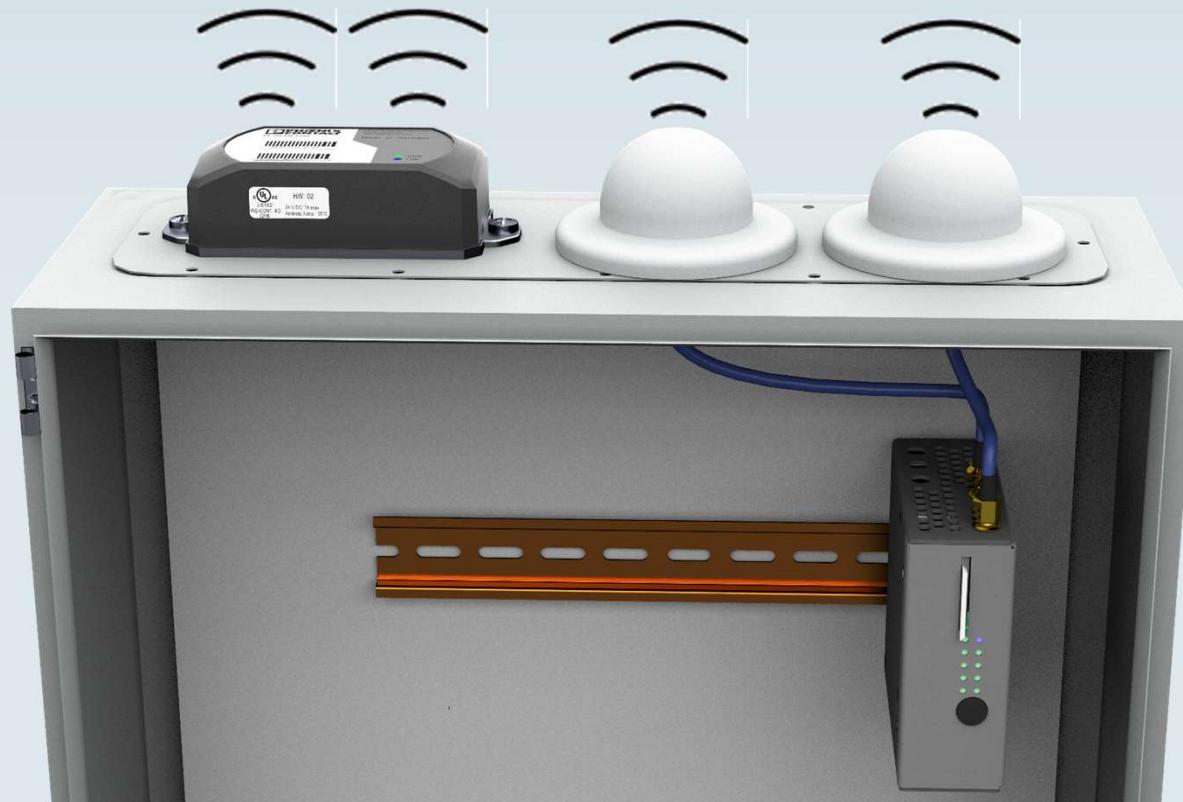
**Quick fastening**



# Industrial WLAN



# Industrial WLAN



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# Industrial WLAN 5010

Compact design – also suitable  
for control boxes in the field

Secure and compatible



External antenna connections  
for the flexible use of  
antennas

Cluster  
Management

Powerful WLAN  
IEEE 802.11n  
module for more  
range

Video



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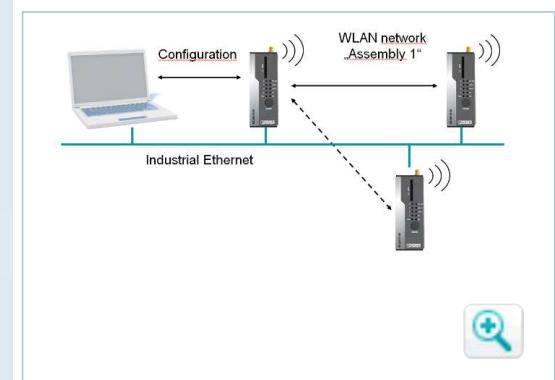
# Industrial WLAN 5100



Compatible with  
standards IEEE  
802.11 a/b/g/n

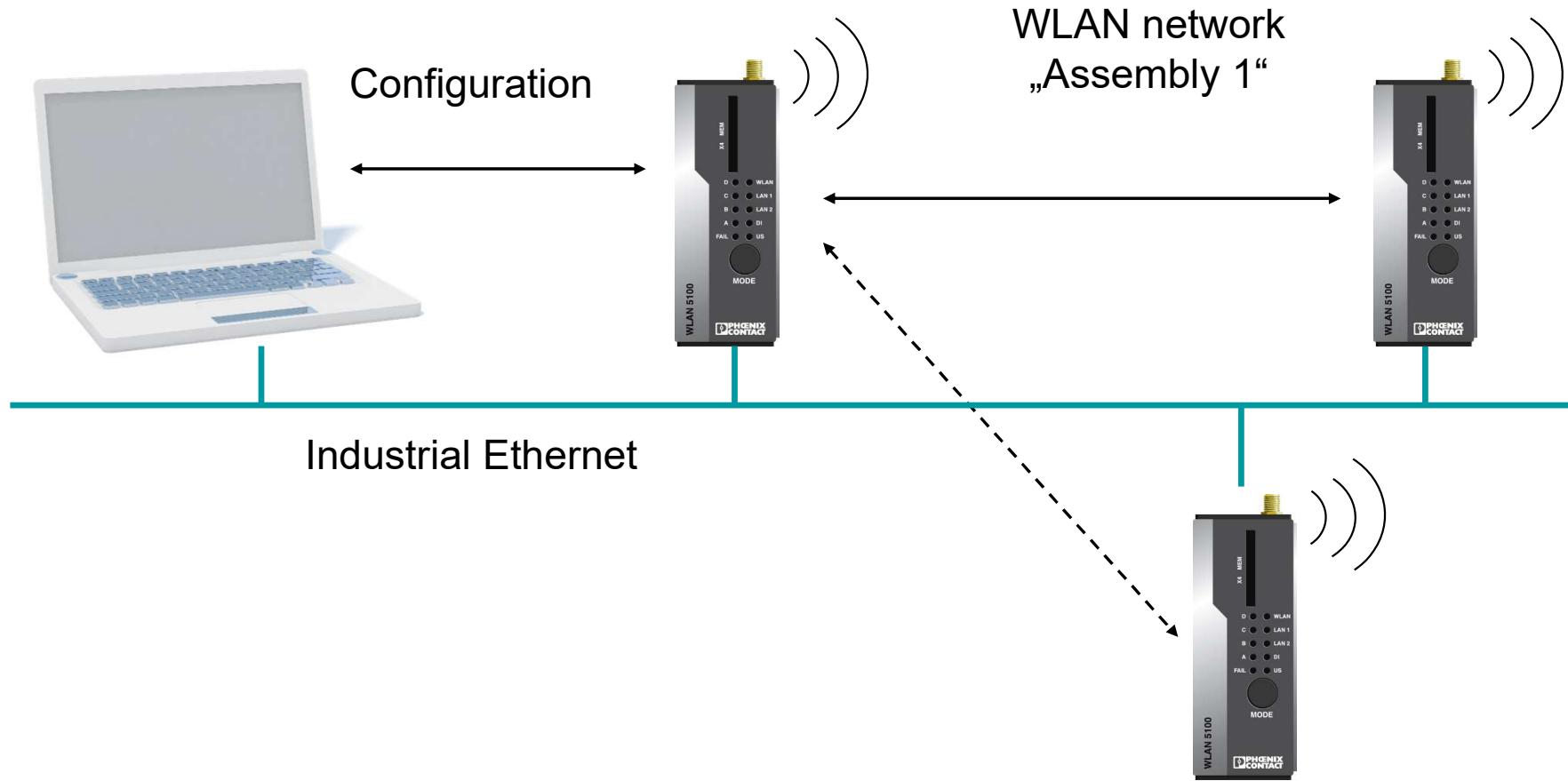
Quick and  
easy startup

- Cluster Management



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# Industrial WLAN 1010 & 2010



Easy control through the SPS



Temp 0°...60°C



Compact and flexible mounting



High security  
through two virtual  
access points and IP  
filters



Connection for  
external antennas



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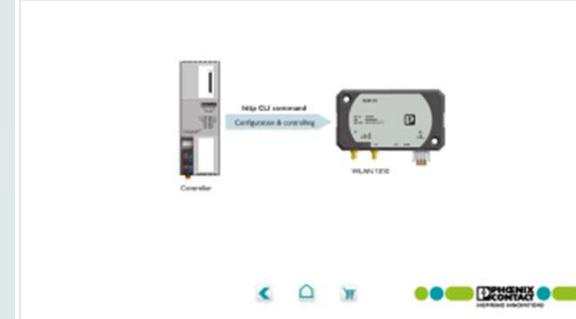


# Industrial WLAN 1010/2010

Easy control through the SPS



- Can be easily configured by a PC or PLC via a REST-API or controlled during runtime





Controller

http CLI command  
Configuration & controlling



WLAN 1010



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# Industrial WLAN



	<b>FL WLAN 1100 (Europe)</b>	<b>FL WLAN 1101 (USA, Canada)</b>	<b>FL WLAN 2100 (Europe)</b>	<b>FL WLAN 2101 (USA, Canada)</b>
Function	Wireless access point and client		Wireless access point and client	
Antenna	2 x integrated Antennas with MIMO technology		2 x integrated Antennas with MIMO technology	
Wireless standard	IEEE 802.11 a/b/g/n		IEEE 802.11 a/b/g/n	
Frequency band	2,4 and 5 GHz		2,4 and 5 GHz	
Connection type	RJ45		RJ45	
Degree of protection	IP54 above, IP20 below		IP66/68 above, IP20 below	
Temperature range	0 °C ... 60 °C		-40 °C ... 60 °C	
Order number	2702534	2702538	2702535	2702540



# Industrial WLAN

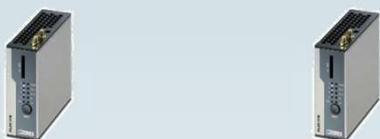


	<b>FL WLAN 1010 (Europe)</b>	<b>FL WLAN 1011 (USA, Canada)</b>	<b>FL WLAN 2010 (Europe)</b>	<b>FL WLAN 2011 (USA, Canada)</b>
--	----------------------------------	---------------------------------------	----------------------------------	---------------------------------------

Function	Wireless access point and client	Wireless access point and client	
Operating modes	Access Point, Client, 2 virtual Access Points	Access Point, Client, 2 virtual Access Points, Mesh	
Wireless standard	IEEE 802.11 a/b/g/n	IEEE 802.11 a/b/g/n	
Frequency band	2,4 and 5 GHz	2,4 and 5 GHz	
Max. Number of WLAN clients	10 Clients	60 Clients	
Degree of protection	IP20	IP20	
Temperature range	0 °C ... 60 °C	-40 °C ... 60 °C	
Order number	2702899	2702900	1119246
			1119248



# Industrial WLAN



**FL WLAN 5110  
(Europe)**

**FL WLAN 5111  
(USA, Canada)**

Function	Wireless access point and client
Antenna	2 x external Antennas (not included in scope of supply) with MIMO technology
Wireless standard	IEEE 802.11 a/b/g/n
Frequency band	2,4 and 5 GHz
Connection type	RJ45
Degree of protection	IP20
Temperature range	-40 °C ... 60 °C
Order number	1043193      1043201



# Industrial Bluetooth



**FL EPA 2 (WLAN Mode)**

**FL EPA 2 RSMA (WLAN Mode)**

Function	Bluetooth Ethernet Client Adapter	Bluetooth Access Point
Antenna	Internal antenna	Omnidirectional antenna supplied as standard
Frequency band	2,4 and 5 GHz	2,4 and 5 GHz
Connection type	M12 connection	M12 connection
Degree of protection	IP65	IP65
Temperature range	-40 °C ... 65 °C	-40 °C ... 65 °C
Order number	1005955	1005957



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## Media conversion



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## Media conversion



	<b>FL MC 1000 SC</b>	<b>FL MC 1000 ST</b>	<b>FL MC 2000T SC</b>	<b>FL MC 2000T ST</b>	<b>FL MC 2000T SM20 SC</b>	<b>FL MC 2000T SM40 SC</b>		
Transmission	Multimode fiberglass				Singlemode fiberglass			
Connection method	SC duplex	B-FOC (ST*)	SC duplex	B-FOC (ST*)	SC duplex			
Temperature range	0°C...+60°C		-40°C...+75°C					
Range	Up to 9.6 km			Up to 20 km		Up to 40 km		
Light wavelength	1310 nm							
Special features	Auto negotiation and MDI (x)		Store-and-forward or pass through mode can be selected via DIP switch with a short latency time of 835 ns. They can therefore be used for realtime Ethernet protocols					
Order number	2891320	2891321	2891315	2891316	2891317	2891318		



## Media conversion



	<b>FL MC EF 1300 MM SC</b>	<b>FL MC EF 1300 MM ST</b>	<b>FL MC EF 1300 SM SC</b>	<b>FL MC 2000E</b>	<b>FL MC 2000E SM40 LC</b>
Transmission	Multimode fiberglass		Singlemode fiberglass	Multimode fiberglass	Singlemode fiberglass
Connection method	SC duplex	B-FOC (ST*)	SC duplex	LC duplex	
Temperature range	-40°C...+65°C			-40°C...+75°C	
Range	Up to 10 km		Up to 36 km	Up to 9.6 km	Up to 40 km
Light wavelength	1310 nm				
Special features	LFPT and FEF diagnostic functions, auto negotiation and auto MDI (x), backplane bus for redundant or alternative power supply				Accordance to IEC 61850/IEEE1613 4 kV insulation voltage, high EMC protection
Order number	2902853	2902854	2902856	2891056	2891156



## Media conversion

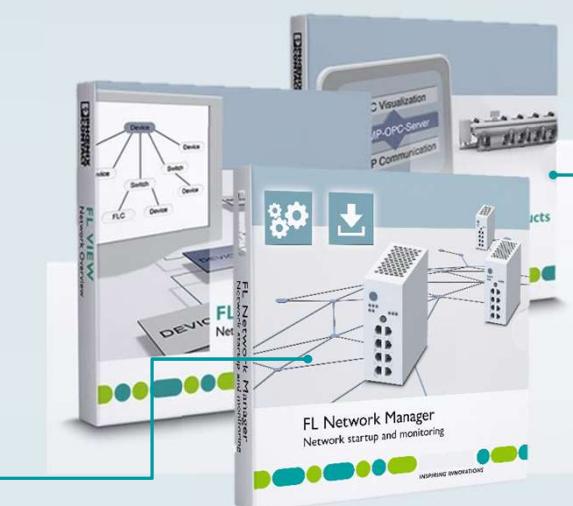


	<b>FL MC EF WDM-SET SC</b>	<b>FL MC EF WDM-A SC</b>	<b>FL MC EF WDM- B SC</b>	<b>FL MC ETH/FO 660 T</b>	<b>FL MC EF 660 SCRJ</b>
Transmission	Multimode and single mode fiberglass			Polymer fiber PCF	
Connection method	SC simplex			SC-RJ	
Temperature range	-40°C...+65°C			-20 °C ... 55 °C	
Range	Up to 38 km			Up to 100 m	
Light wavelength	1310/1550 nm			660 nm	
Special features	Converters A and B	Converter A	Converter B	T-coupler with two FO connections and two RJ45 sockets	Single-port media converter
Order number	2902660	2902658	2902659	2313164	2702944



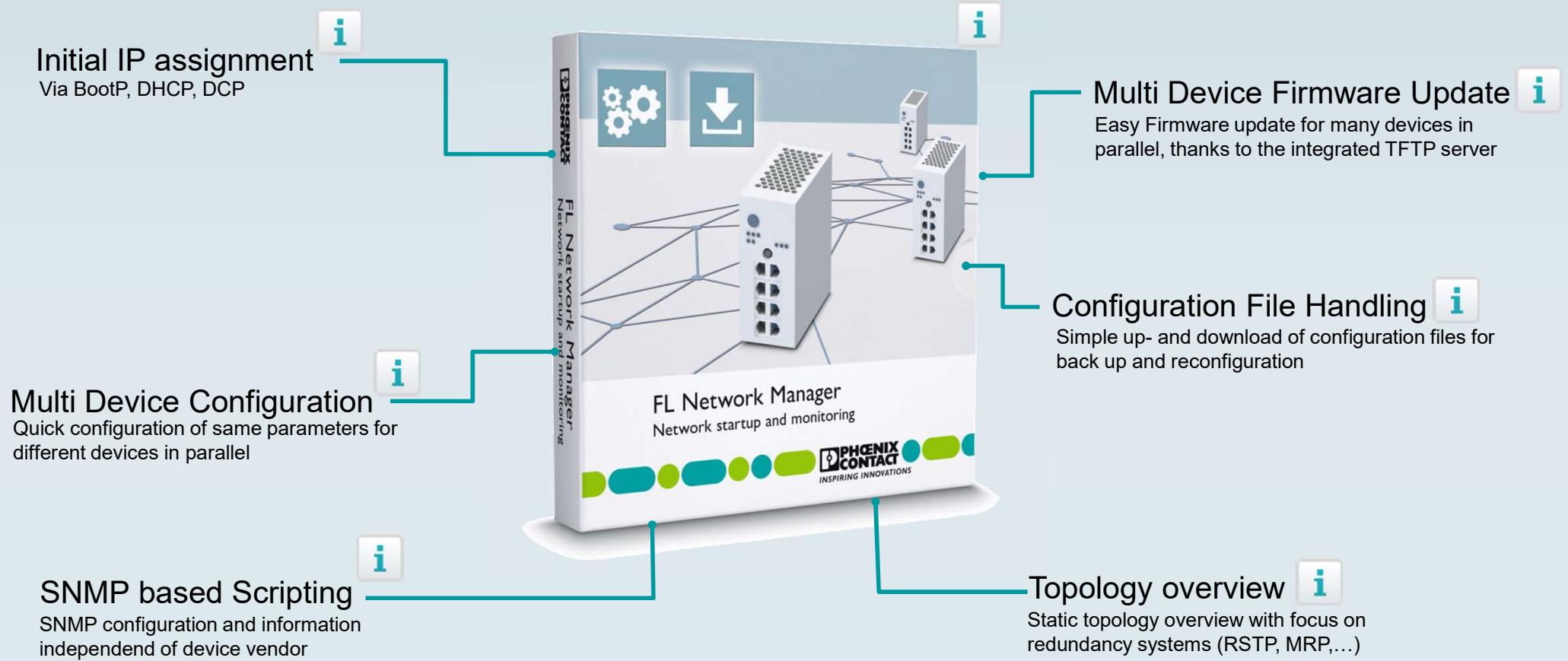
# Software

**i** FL NETWORK MANAGER:  
Network startup and  
monitoring

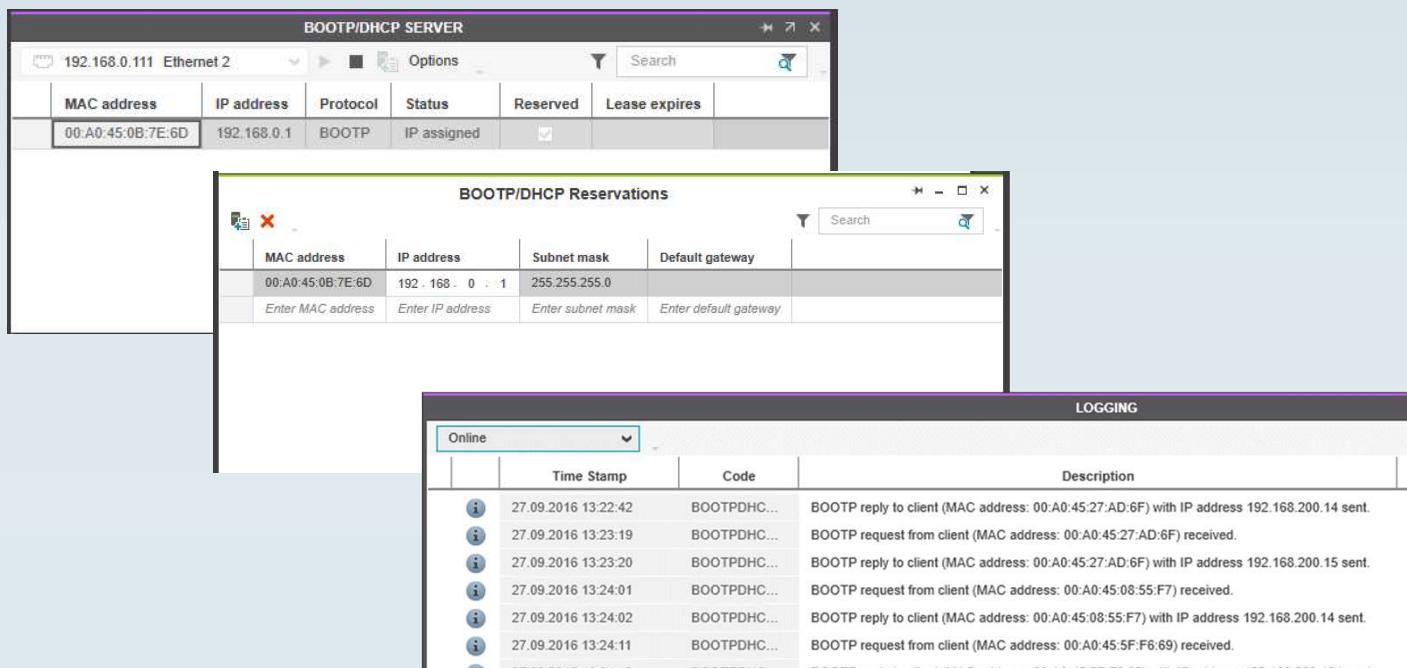


SNMP OPC Products: **i**  
Linking of standardized  
protocol types





# Initial IP assignment



Initial IP assignment via BootP/DHCP/DCP

- All needed server integrated
- IP address, subnet mask and gateway
- Detailed status information
- Detailed logging

# Multiple Firmware Update

The screenshot shows two windows. The top window is titled 'Firmware Update' and displays a list of devices and their corresponding firmware files. The bottom window is titled 'LOGGING' and shows a log of update activities.

**Firmware Update Window:**

- IP address: 192.168.200.200
- Type: FL SWITCH MCS 16TX
- File Name: EPL-EN.pdf
- File List:
  - FL\_NAT\_SMN\_v3\_25.bin
  - FL\_SWITCH\_3000\_4000\_v1\_22.bin
  - FL\_SWITCH\_3000\_4000\_v1\_30.bin
  - fl\_switch\_7000\_v1\_21.bin
  - fl\_switch\_7000\_v2\_00\_00.bin
  - FL\_SWITCH\_GHS\_02\_62\_00.stk
  - FL\_SWITCH\_GHS\_03\_00\_00.stk
  - fl\_switch\_ir\_v2\_00.bin
  - fl\_switch\_ir\_v2\_01.bin
  - FL\_SWITCH\_LM\_3\_49.bin
  - FL SWITCH MCS v4\_77.bin
- Buttons: Update, Cancel

**LOGGING Window:**

Time Stamp	Code	Description
27.09.2016 14:05:07	UPD0003	Successfull firmware update on the device with ip-address 192.168.200.205. Old version: 4.77. New version 4.90.
27.09.2016 14:06:29	TFTP0007	The device 192.168.200.205 requests the local TFTP server to write the file 'C:\Users\Public\Documents\FL NETWO...
27.09.2016 14:06:29	TFTP0009	TFTP request from device 192.168.200.205 accepted. TFTP server started to write the file to the device...
27.09.2016 14:06:34	TFTP0012	Transfer of file 'FL_SWITCH_MCS_v4_77.bin' completed.
27.09.2016 14:08:27	UPD0003	Successfull firmware update on the device with ip-address 192.168.200.205. Old version: 4.90. New version 4.77.

Easy update for different  
Switches at the same  
time

- Needed server integrated
- No need to think about topology
- Roll picker to choose the right firmware
- One click to start all updates
- Progress bar for firmware transmission



# Configuration file handling

The image shows two screenshots of software dialog boxes for configuration file handling:

- Read Configuration**: A dialog box with the title "Read Configuration". It contains a section for "Read configuration from the selected device(s)" with the sub-instruction "Select the TFTP server and start reading the configuration files." It has two radio button options: "Local TFTP server" (selected) and "Remote TFTP server". Below this is an "IP address:" field containing "192.168.0.111". At the bottom are "Read" and "Cancel" buttons.
- Write Configuration**: A dialog box with the title "Write Configuration". It contains a section for "Write configuration to the selected device(s)" with the sub-instruction "Select the TFTP server and the configuration file for each device." It has the same two radio button options and IP address field. Below these is a table with two columns: "Type" and "File name". The "Type" column lists device types: "192.168.1.9 (FL SWITCH 2005)", "192.168.1.7 (FL SWITCH 2206-2FX-ST)", "192.168.1.6 (FL SWITCH 2207-FX SM)", and "192.168.1.3 (FL SWITCH 2005)". The "File name" column lists configuration files, with the first item "192.168.1.3\_08-15\_102922.fcg" highlighted. At the bottom are "Write" and "Cancel" buttons.

Comfortable mechanism  
for up and download of  
configuration files

- Back up the configuration
- Timestamping
- The up or download will be executed with a few clicks



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# MDC for easy network start up

The image displays three separate windows of a configuration software, likely for networking devices. Each window shows a list of items with a 'Clone' option, indicating a cloning feature for multiple devices.

- Top Window:** Shows configuration for '(Rapid) Spanning Tree'. It lists 'activated' and 'deactivated' states. A context menu is open over the 'activated' row, showing 'Clone' and other options like 'Exit multi configuration mode'.
- Middle Window:** Shows configuration for 'Systemname'. It lists three entries: 'EthExpMeeting2017', 'EthExpMeeting2017', and 'EthExpMeeting2017'. A context menu is open over the first entry, showing 'Clone', 'Fill with prefix', 'Fill with suffix', and 'Exit multi configuration mode'.
- Bottom Window:** Shows configuration for 'Subnetmaske' (Subnet Mask). It lists three entries: '255.255.255.0', '255.255.255.0', and '255.255.255.0'. A context menu is open over the first entry, showing 'Clone', 'A 255.0.0.0', 'B 255.255.0.0', 'C 255.255.255.0', and 'Exit multi configuration mode'.

## Multi Device Configuration (MDC)

- Clearly arranged parameter categories
- Set of single parameters (e.g.. RSTP activation) for several devices at the same time
- Suffix and Preffix for easy naming
- Consequutive numbering for IP-parameter

# SNMP based Scripting for SNMP devices

The screenshot shows a software interface for managing scripts. At the top, there's a menu bar with 'Projekt' and 'Script Devicename X'. Below it is a tab labeled 'Script code'. The main area contains the following script code:

```
1 // writes the value systemname (administratively-assigned name) for the device
2 SET('1.3.6.1.2.1.1.5.0',OctetString, 'EthExpMeeting2017');
3
4 // writes a simple text into the output window
5 WRITECONSOLE('Device Name:');
6
7 // reads the value systemname (administratively-assigned name) for the device
8 GET('1.3.6.1.2.1.1.5.0',OctetString);
```

Below the code editor is an 'OUTPUT CONSOLE' window. It displays log entries from three tabs: 192.168.10.150 x, 192.168.10.152 x, and 192.168.10.151 x. The log entries are:

```
04.10.2017 10:38:22: The script Script Devicename is started.
04.10.2017 10:38:22: SET OK. OID: 1.3.6.1.2.1.1.5.0. Value: EthExpMeeting2017
04.10.2017 10:38:22: Device Name:
04.10.2017 10:38:22: GET OK. OID: 1.3.6.1.2.1.1.5.0. Value: EthExpMeeting2017
04.10.2017 10:38:22: The script Script Devicename completed successfully.
```

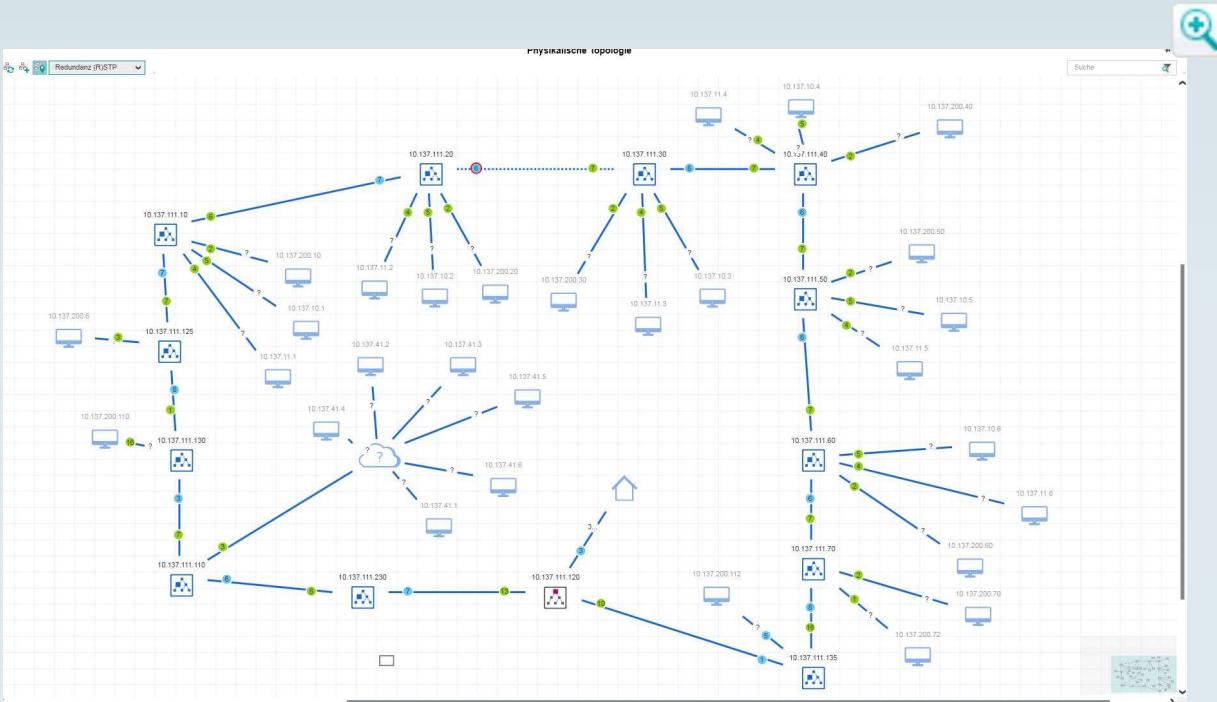
A context menu is open over the log entries, showing options 'Kopieren' (Copy) and 'Export console tabs to \*.txt files...'. A small arrow at the bottom left indicates the interface can be collapsed.

## Extensive functions

- Configuration and diagnostic for every SNMP device
- SET and GET command
- Loops and branches
- Call script in script command
- Command for structuring the output



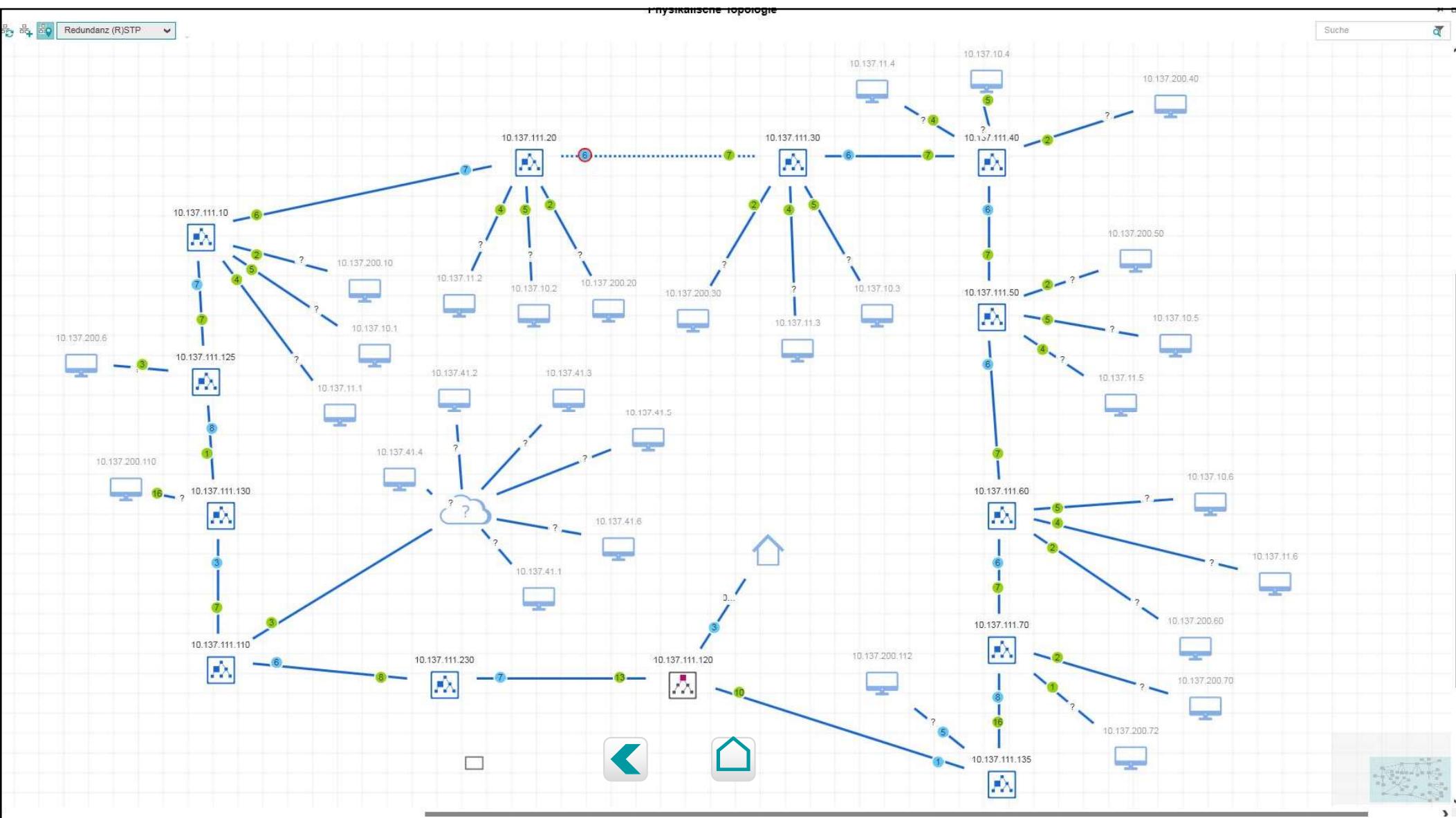
# Topology Overview



## Static Network Topology

- Graphical overview
- Detection of switches and end devices
- Views for different redundancy mechanisms with graphical detail information
- Easy topology comparison between saved and online topology, thanks to different colours





**FL NETWORK MANAGER BASIC - FLNetMan.netmx\***

File Edit Extras Window Help

Project X

Online Devices BOOTP/DHCP...

PLANT

Project (20 entries)

- 192.168.200.233 : Ethernet Device
- 192.168.200.17 : Ethernet Device
- 192.168.200.237 : FL SWITCH MM HS
- 192.168.200.238 : FL SWITCH MCS 16
- 192.168.200.20 : Ethernet Device
- 192.168.200.10 : FL SWITCH MCS 16
- 192.168.200.205 : FL SWITCH MCS 8G
- 192.168.200.7 : FL SWITCH GHS 12G
- 192.168.200.1 : FL SWITCH SMCS 8G
- 192.168.200.6 : Ethernet Device
- 192.168.200.15 : Ethernet Device
- 192.168.200.16 : Ethernet Device
- 192.168.200.4 : Ethernet Device
- 192.168.200.3 : FL SWITCH 7008-EIP
- 192.168.200.13 : Ethernet Device
- 192.168.200.19 : Ethernet Device
- 192.168.200.18 : Ethernet Device
- 192.168.200.21 : Ethernet Device
- 192.168.200.22 : Ethernet Device
- 192.168.200.2 : FL SWITCH MCS 16T

Online Devices

Last scan on 27.09.2016 13:57:22

Net mask	Default gateway	Name of station	Type	Status	Display Name (Online)	Subnet mask	Default
255.255.0		mmhs.gerd.de	FL SWITCH MM HS	Yellow	Select online device here	255.255.255.0	
255.255.0		mcs.gerd	FL SWITCH MCS 16TX	Green	Select online device here	255.255.255.0	
255.255.0		fl-switch-mcs-14tx-2xk	FL SWITCH MCS 16TX	Green	192.168.200.2 : 00:A0:45:05:6E:FE	255.255.255.0	
255.255.0		fl-switch-irf-b-3pof	Ethernet Device	Yellow	192.168.200.20 : 00:A0:45:03:03:04	255.255.255.0	149.21
255.255.0		fl-switch-mcs-sternpunkt	FL SWITCH MCS 16TX	Green	192.168.178.200 : 00:0E:0C:50:C7:30	255.255.255.0	
255.255.0	192.168.200.1	FL SWITCH MCS 16TX	FL SWITCH MCS 16TX	Green	192.168.200.10 : 00:A0:45:07:F9:A9	255.255.255.0	
255.255.0		FL SWITCH SMCS 8GT	FL SWITCH SMCS 8GT	Green	192.168.200.1 : 00:A0:45:0A:02:D5	255.255.255.0	192.11
255.255.0		FL NAT SM	Ethernet Device	Yellow	192.168.200.233 : 00:A0:45:AD:2A:FC	255.255.255.0	
255.255.0	192.168.200.1	M GUARD RS 2000	Ethernet Device	Yellow	192.168.200.6 : 00:A0:45:D6:62:EB	255.255.255.0	192.11
		45.74.68.65.72.6E.65.74.2D.47.65.72.E4.74	Ethernet Device	Yellow	192.168.200.16 : 00:A0:45:06:55:F7		
		FL SWITCH LM 5TX	Ethernet Device	Yellow	192.168.200.15 : 00:A0:45:27:AD:6F		
		FL SWITCH 7008-EIP	FL SWITCH 7008-EIP	Green	192.168.200.3 : 00:A0:45:CA:D9:85		
255.255.0		FL SWITCH 3008	Ethernet Device	Yellow	192.168.200.4 : 00:A0:45:61:C1:59	255.255.255.0	
			Ethernet Device	Yellow	192.168.200.18 : 00:A0:45:D8:35:72		
			Ethernet Device	Yellow	192.168.200.17 : 00:A0:45:D8:31:9A		
			Ethernet Device	Yellow	192.168.200.22 : 00:A0:45:B3:AF:BE		
				Yellow	192.168.200.21 : 00:A0:45:AD:1F:C1		

Scan options

SNMP scan

Enable (checked)

Timeout (ms): 3000

Network adapter: 192

DCCP scan

Enable (checked)

Network adapter: Fl

Ping scan

Enable (checked)

Timeout (ms):

Maximum concurrent requests: (1)

IsEnabled Status

Enter IP

BOOTP/DHCP scan

Logging

Online

Time Stamp

Code

27.09.2016 14:03:24 TFTP0012 Transfer of file 'fl\_switch\_7000\_v2\_00\_00.b'

27.09.2016 14:03:36 UPD0001 Firmware image fl\_switch\_7000\_v2\_00\_00.

27.09.2016 14:05:07 UPD0003 Successfull firmware update on the device 1

27.09.2016 14:06:29 TFTP0007 The device 192.168.200.205 requests the k

27.09.2016 14:06:29 TFTP0009 TFTP request from device 192.168.200.205

27.09.2016 14:06:34 TFTP0012 Transfer of file 'FL\_SWITCH\_MCS\_v4\_77.b'

TFTP SERVER

192.168.200.200 : FM Next Testin

IP address File name Progress Action

Windows aktivieren Wechseln Sie zu den Einzelheiten

References

14:13 27.09.2016

Web und Windows durchsuchen

File Edit Extras Window Help

PHOENIX CONTACT

COMPONENTS

Devices (8 of 8)

Local

Ethernet (2 of 2)

Factoryline Ethernet (6 of 6)

Switch (6 of 6)

- FL SWITCH 3008 Rev. >= 00/1.2
- FL SWITCH 7008-EIP Rev. >= 00/1.2
- FL SWITCH GHS 12G/8 Rev. >= 00/1.2
- FL SWITCH MCS 16TX Rev. >= 00/1.2
- FL SWITCH MM HS Rev. >= 00/4
- FL SWITCH SMCS 8GT Rev. >= 00/1.2

INSPIRING INNOVATIONS



# Software



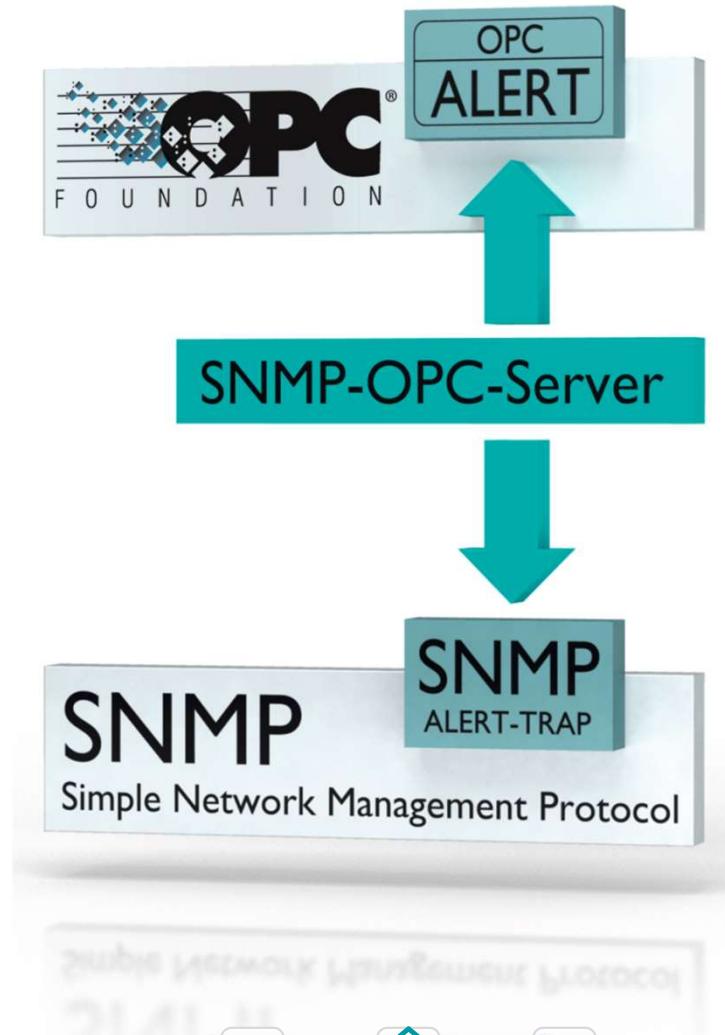
Linking of  
standardized protocol  
types

- Easy converting of SNMP in OPC
- Converting of SNMP variables and alarms
- Easy start-up thanks to preconfigured profiles



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# Software



## FL Network Manager Basic

Function	Configuration and monitoring of network components
Language	English
Base	SNMP
Order number	2702889



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# Software



**FL SNMP OPC SERVER V3 -**

**FL SNMP OPC SERVER V3 LIC 100**

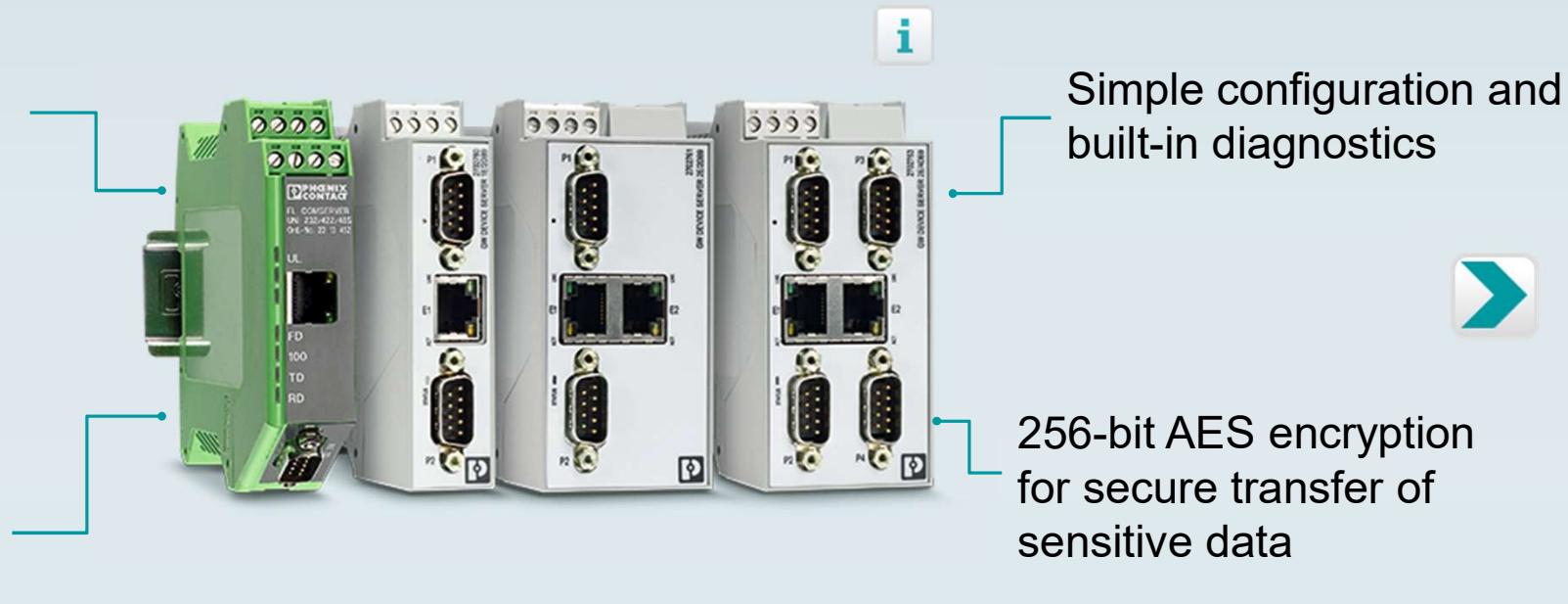
Function	Monitoring and configuration of SNMP-capable equipment in HMI and SCADA systems	Extension license for 100 devices for the SNMP OPC server
Language	German and English	-
Base	Conversion of SNMP in OPC	-
Order number	2701139	2701138



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# Device server

Connects devices with an RS-232, RS-422 or RS-485 serial interface to a LAN



User authentication to prevent unauthorized access



Simple configuration and built-in diagnostics



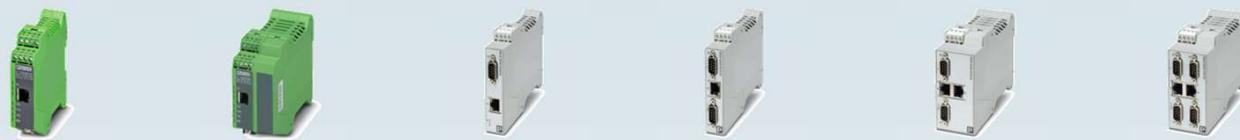
256-bit AES encryption for secure transfer of sensitive data



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# Serial Device Server



	FL COMSERVER BASIC	FL COMSERVER BASIC-T	GW DEVICE SERVER 1E/1DB9	GW DEVICE SERVER 1E/2DB9	GW DEVICE SERVER 2E/2DB9	GW DEVICE SERVER 2E/4DB9
Protocol	Protocol transparent					
Ethernet interface	1x RJ45		1x RJ45		2x RJ45	
Serial interface (RS-232/422/485)	1x D-SUB 9		1x D-SUB 9	2x D-SUB 9		4x D-SUB 9
Special features	ATEX, UL (Class I, Division 2)		ATEX, IECEx, UL (Class I, Division 2)			
Order number	2313478	2904681	2702758	2702760	2702761	2702763



# Gateways



	FL COMSERVER UNI	FL COMSERVE R UNI-T	GW MODBUS TCP/RTU 1E/1DB9	GW MODBUS TCP/RTU 1E/2DB9	GW MODBUS TCP/RTU 2E/2DB9	GW MODBUS TCP/RTU 2E/4DB9	GW MODBUS TCP/ASCII 1E/1DB9	GW MODBUS TCP/ASCII 1E/2DB9	GW MODBUS TCP/ASCII 2E/2DB9	GW MODBUS TCP/ASCII 2E/4DB9
--	------------------------	---------------------------	------------------------------------	------------------------------------	------------------------------------	------------------------------------	--------------------------------------	--------------------------------------	--------------------------------------	--------------------------------------

Protocol	Modbus/RTU to Modbus/TCP						RAW, ASCII to Modbus/TCP			
Ethernet interface	1x RJ45		1x RJ45		2x RJ45		1x RJ45		2x RJ45	
Serial interface (RS-232/422/485)	1x D-SUB 9		1x D-SUB 9	2x D-SUB 9		4x D-SUB 9	1x D-SUB 9	1x D-SUB 9		4x D-SUB 9
Special features	ATEX, UL (Class I, Division 2)		ATEX, IECEx, UL (Class I, Division 2)							
Order number	2313452	2904817	2702764	2702765	2702766	2702767	2702768	2702769	2702770	2702771



# Gateways



	<b>GW PN/ASCII 1E/1DB9</b>	<b>GW PN/ASCII 1E/2DB9</b>	<b>GW PN/ASCII 2E/2DB9</b>	<b>GW PN/ASCII 2E/4DB9</b>	<b>GW EIP/ASCII 1E/1DB9</b>	<b>GW EIP/ASCII 1E/2DB9</b>	<b>GW EIP/ASCII 2E/2DB9</b>	<b>GW EIP/ASCII 2E/4DB9</b>
Protocol	<b>RAW, ASCII to PROFINET</b>				<b>RAW, ASCII to EtherNet/IP</b>			
Ethernet interface	1x RJ45		2x RJ45		1x RJ45		2x RJ45	
Serial interface (RS-232/422/485)	1x D-SUB 9	2x D-SUB 9	2x D-SUB 9	4x D-SUB 9	1x D-SUB 9	2x D-SUB 9	2x D-SUB 9	4x D-SUB 9
Special features	ATEX, IECEx, UL (Class I, Division 2)							
Order number	1021080	1021058	1021056	1020882	2702772	2702773	2702774	2702776



# Gateways

EtherNet/IP Modbus



	GW PN/ASCII 1E/1DB9	GW PN/ASCII 1E/2DB9	GW PN/ASCII 2E/2DB9	GW PN/ASCII 2E/4DB9
Protocol	Modbus to Ethernet/IP			
Ethernet interface	1x RJ45		2x RJ45	
Serial interface (RS- 232/422/485)	1x D-SUB 9	2x D-SUB 9	2x D-SUB 9	4x D-SUB 9
Special features	ATEX, IECEx, UL (Class I, Division 2)			
Order no.	1062540	1062423	1062380	1062388



# TIMESERVER NTP

**i** Receives accurate geo-location information

**i** Supports Power over Ethernet for one cable operation

**i** Time synchronisation

IP67/68 outdoor housing with integrated antenna



# TIMESERVER NTP

Receives accurate geo-location information



- GNSS receiver for GPS, Galileo and GLONASS
- NTP time server for Ethernet networks
- Precise position determination via web-based management, SNMP, NMEA or JSON streaming



# TIME SERVER NTP



- Accurate time synchronization of Ethernet devices in a network via NTP protocol
- No Internet access necessary for more security



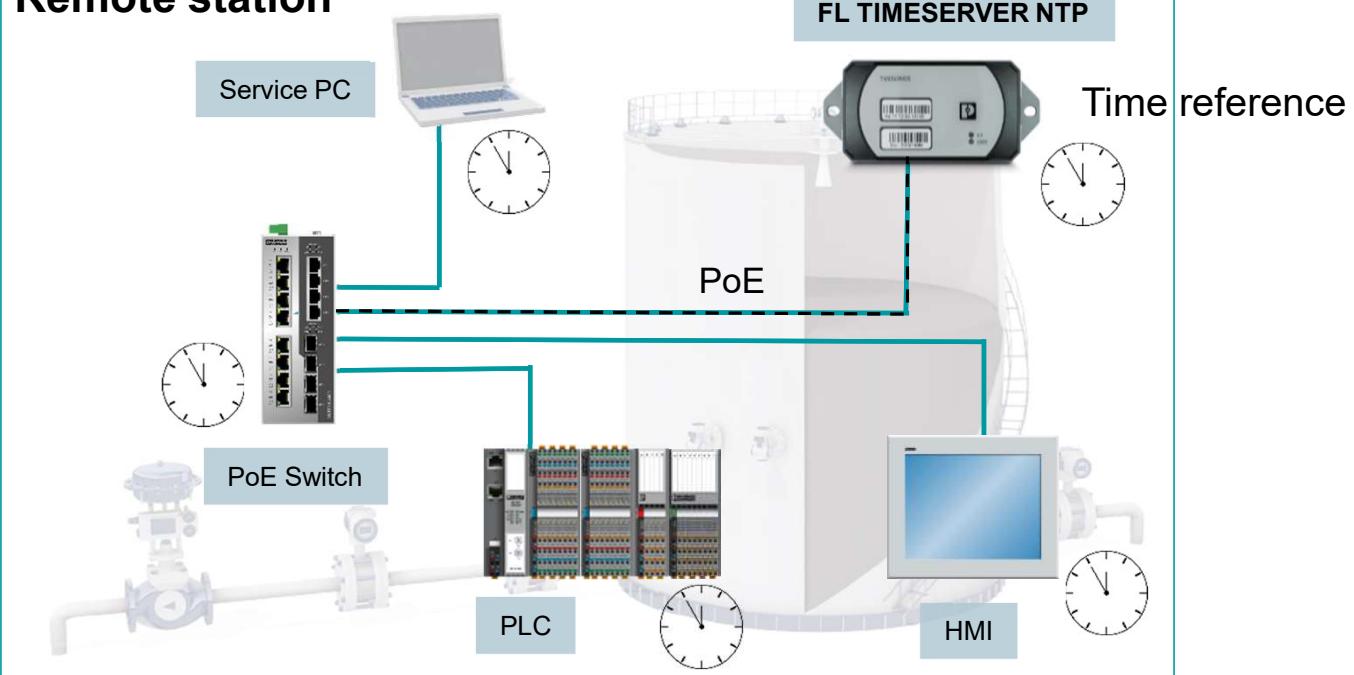
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GPS, Galileo and  
GLONASS



## Remote station



# TIMESERVER NTP



## TIMESERVER NTP

Type FL TIMESERVER NTP

Temperature range -40°C...+70°C

Order number 1107132

Description NTP timeserver with GNSS receiver



# Smart Camera Box



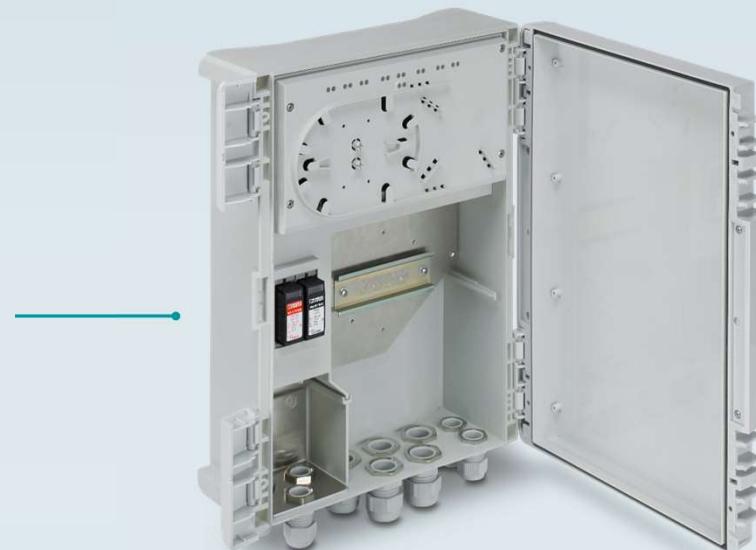
 Automation protocols



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# Smart Camera Box

Enhanced PoE  
functionalities

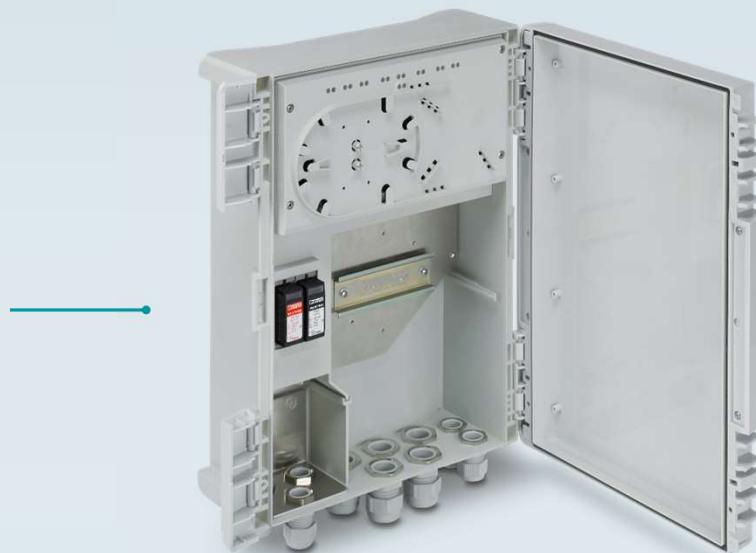


- **Full control and monitoring** through PoE management functionalities
- **Automatic restart** of malfunctioning cameras
- Prevent overload through **power budget information**
- **Alarm message** when temperature or power budget is exceeded



# Smart Camera Box

Integrated fiber  
optic splice  
cassette



- No additional splice box needed
- Secure connection of all fiber optic cables
- Enhanced cable routing inside the box

Smart Camera Box  
Installation - Splice Box

Integrated FO splice cassette

- No additional splice box required
- Secure connection of all fibre optic cables
- Improved cable routing within the box
- Ideal for direct fiber optic connection to SFP modules and connecting field cables/cameras



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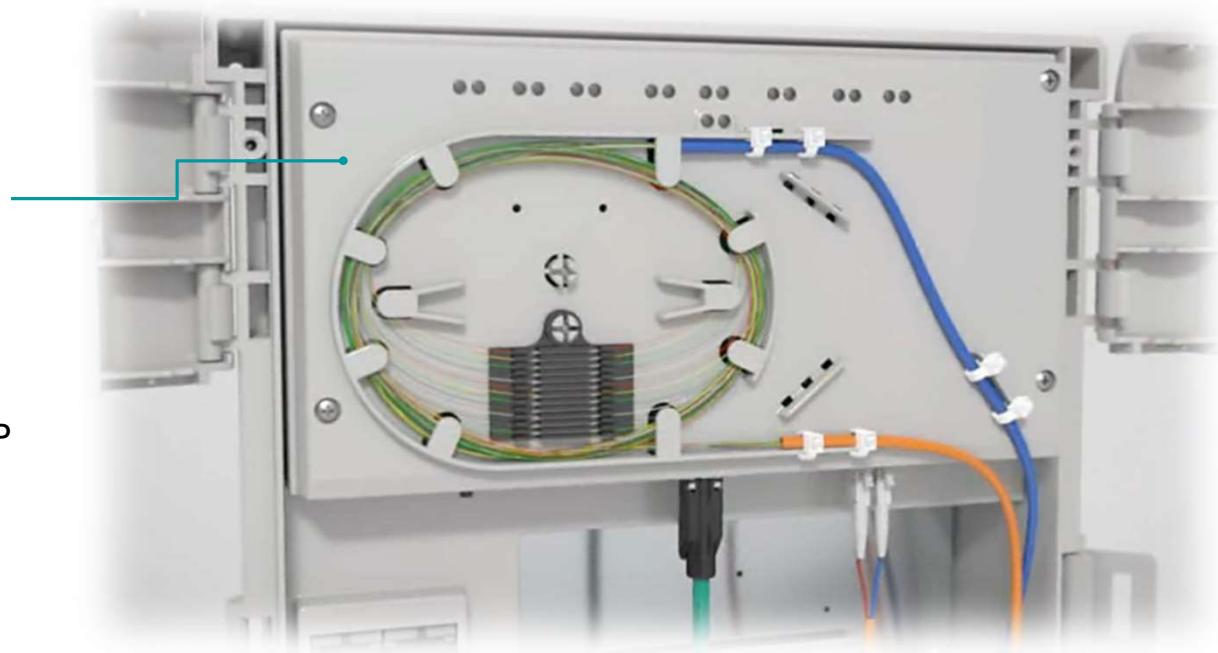


# Smart Camera Box

## Installation - Splice Box

### Integrated FO splice cassette

- No additional splice box required
- Secure connection of all fibre optic cables
- Improved cable routing within the box
- Ideal for direct fiber optic connection to SFP modules and connecting field cables crosswise.

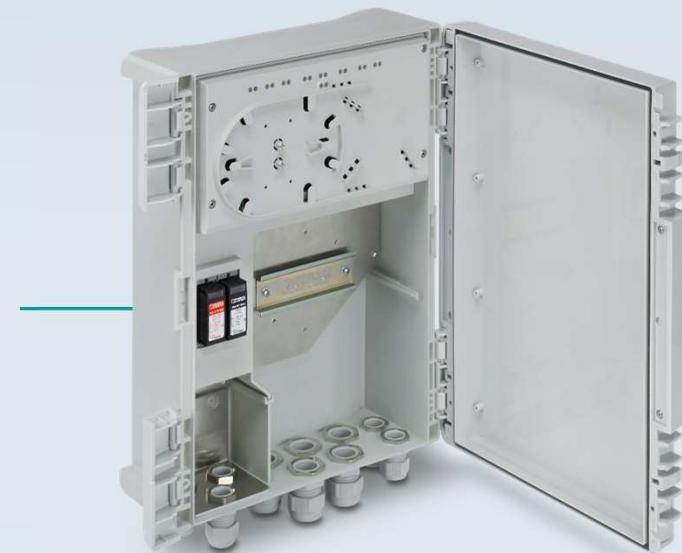


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# Smart Camera Box

Management functionality:  
Network management  
PoE management



- **Reliable networks**  
Redundancy with RSTP
- **Power over Ethernet:**  
Flexible power management on all ports
- **Flexible configuration options:**  
Web interface in responsive design, FL NETWORK MANAGER support, SNMP, CLI



# Smart Camera Box

Sabotage alarm



- **Integrated sensor** detects whether the door is open or closed
- **Alarm message** via Ethernet as soon as the door gets opened
- No additional equipment needed

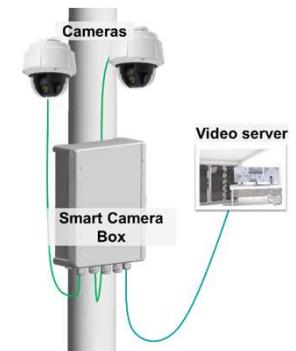


# Smart Camera Box

All-in-one device



- **All-in-one device** replaces modular control cabinet and saves time during planning and installation
- Connects installed cameras with the local network to transmit camera images to the video server



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# Smart Camera Box



	<b>SCX 4POE 2LX</b>	<b>SCX 2POE 2LX</b>	<b>SCX 4POE 2T</b>	<b>SCX 2POE 2T</b>
Uplink ports	2x fibre optic cable	2x fibre optic cable	2x Ethernet copper	2x Ethernet copper
PoE ports	4	2	4	2
Order number	1102626	1108543	1108542	1108544

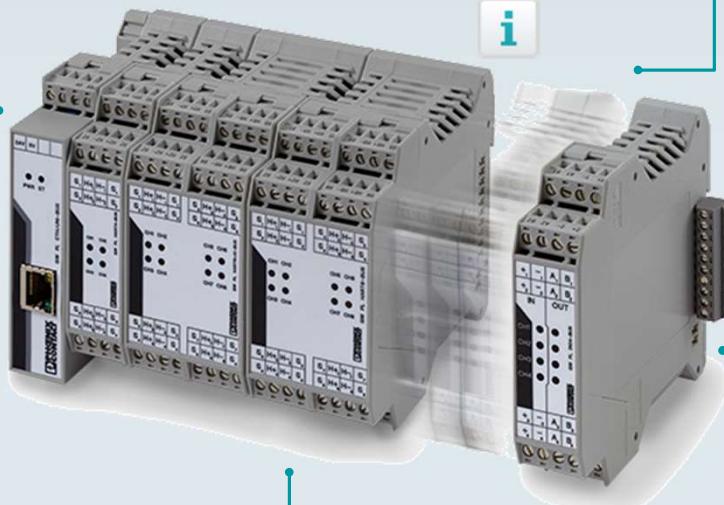


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# Modular Ethernet HART multiplexer

Transmit critical HART  
process data over  
Ethernet

Connect expansion  
 modules



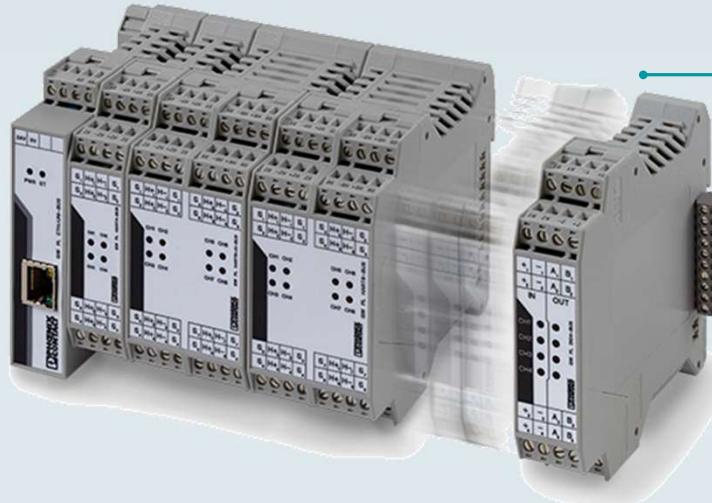
Access process data via 

Environmental 

1 HART master per  
channel ensures  
maximum update rate



# Modular Ethernet HART multiplexer



Environmental

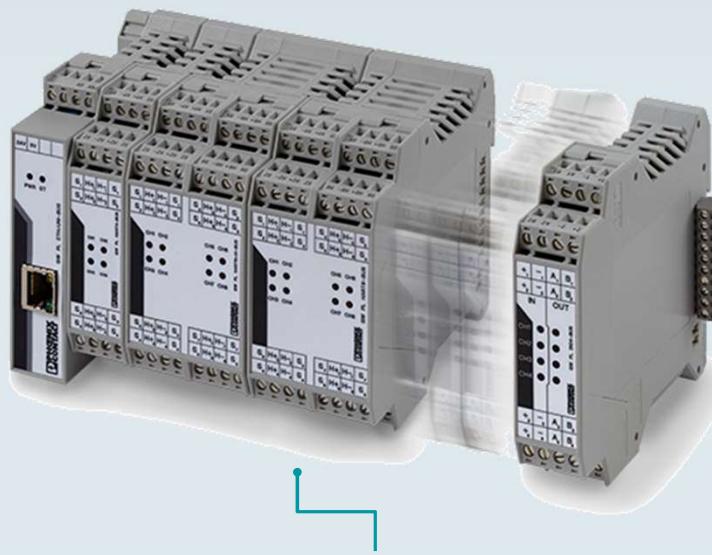
- -40...+70°C
- ATEX, IECEx,  
UL Zone 2



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# Modular Ethernet HART multiplexer



Access process data via

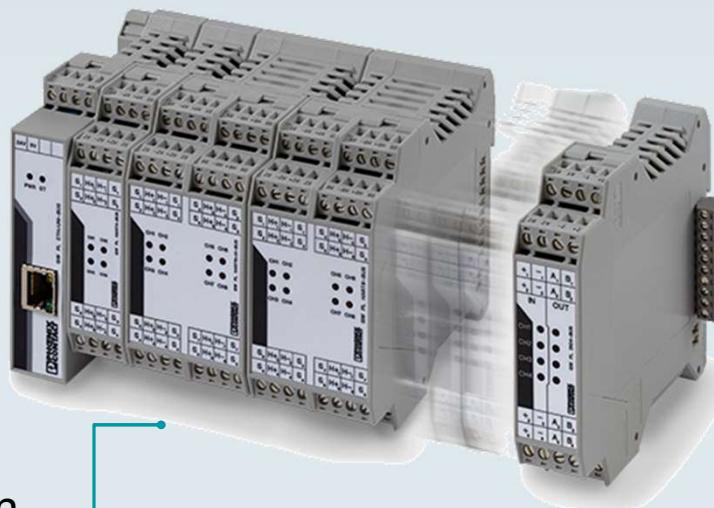
- Modbus TCP
- HART/IP
- Profinet
- FDT/DTM configure with a web browser



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# Modular Ethernet HART multiplexer



Connect expansion  
modules

- 4 channel HART
- 8 channel HART
- 8 channel HART with loop supply
- 4 channel digital in/ 4channel digital out



# Modular Ethernet HART multiplexer



	Modular gateway Ethernet head station		Expansion modules			
Type	GW PL ETH/BASIC- BUS	GW PL ETH/UNI- BUS	GW PL HART8- BUS	GW PL HART4- BUS	GW PL HART8+AI-BUS	GW PL DIO4- BUS
Order number	2702321	2702233	2702235	2702234	2702236	2702237
Description	Head station with Modbus TCP, HART IP, FDT/DTM	Head station with Profinet, Modbus TCP, HART IP, FDT/DTM	8 channel HART module	4 channel HART module	8 channel HART module with analog loop supply	4 channel digital I/O



# Remote control via Cloud

Cost-effective entry into  
cloud-based remote  
maintenance

Simple startup due to  
configuration assistants in  
the mGuard secure  
remote service



Intuitive operation of  
web interface

Flexible communication with the  
cloud via operator or 4G LTE  
networks



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# Remote control via Cloud



verizon<sup>®</sup>

AT&T

	TC CLOUD CLIENT 1002-4G	TC CLOUD CLIENT 1002-TX/TX	TC CLOUD CLIENT 1002-4G VZW	TC CLOUD CLIENT 1002-4G ATT
Transmission medium	4G LTE	Operator's network	4G LTE Verizon, US	4G LTE AT&T, US
Description	Industrial VPN gateway for mGuard Secure remote service, Cloud communication via 4G LTE, European version	Industrial VPN gateway for mGuard Secure remote service, cloud communication via operator network,	Industrial VPN gateway for mGuard Secure remote service, cloud communication via 4G LTE, Verizon (US)	Industrial VPN gateway for mGuard Secure remote service, cloud communication via 4G LTE, AT&T (US)
Special features	<b>Device configuration in mGuard secure remote service, simplified Web-Interface</b>			
Firewall	No	No	No	No
VPN Tunnel	1 VPN tunnel to the mGuard Secure remote service			
Order number	2702886	2702885	2702887	2702888



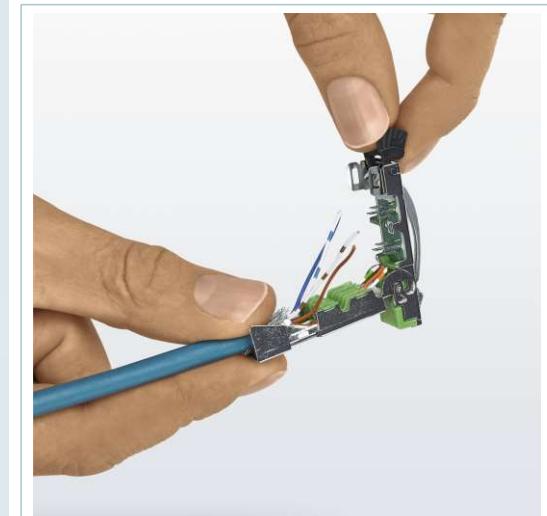
# Copper-based network installation



# Copper-based network installation



- No special tools needed
- IDC und pierce fast connection



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# Copper-based network installation



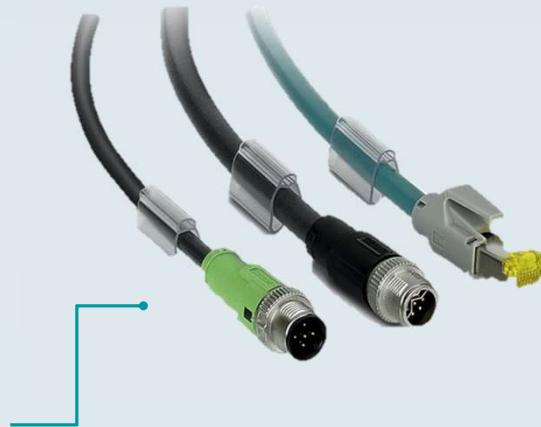
Wide range of  
plugs

- From RJ45 to M12



# Copper-based network installation

360° shielding  
concepts



- 360° EMC shielding
- High level of resistance to EMI and ESD



# Copper-based network installation

Fast data transmission



- Data rates up to 10 Gbps
- Components that meet the CAT6<sub>A</sub> standard



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# Fiber optic-based network installation



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# Fiber optic-based network installation



Wide choice of  
versions

Connection types:

- SC-RJ
- LC
- SC
- FSMA
- ST

Fiber types:

- POF
- PCF
- GOF



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# Fiber optic-based network installation



Fast assembly in  
the field

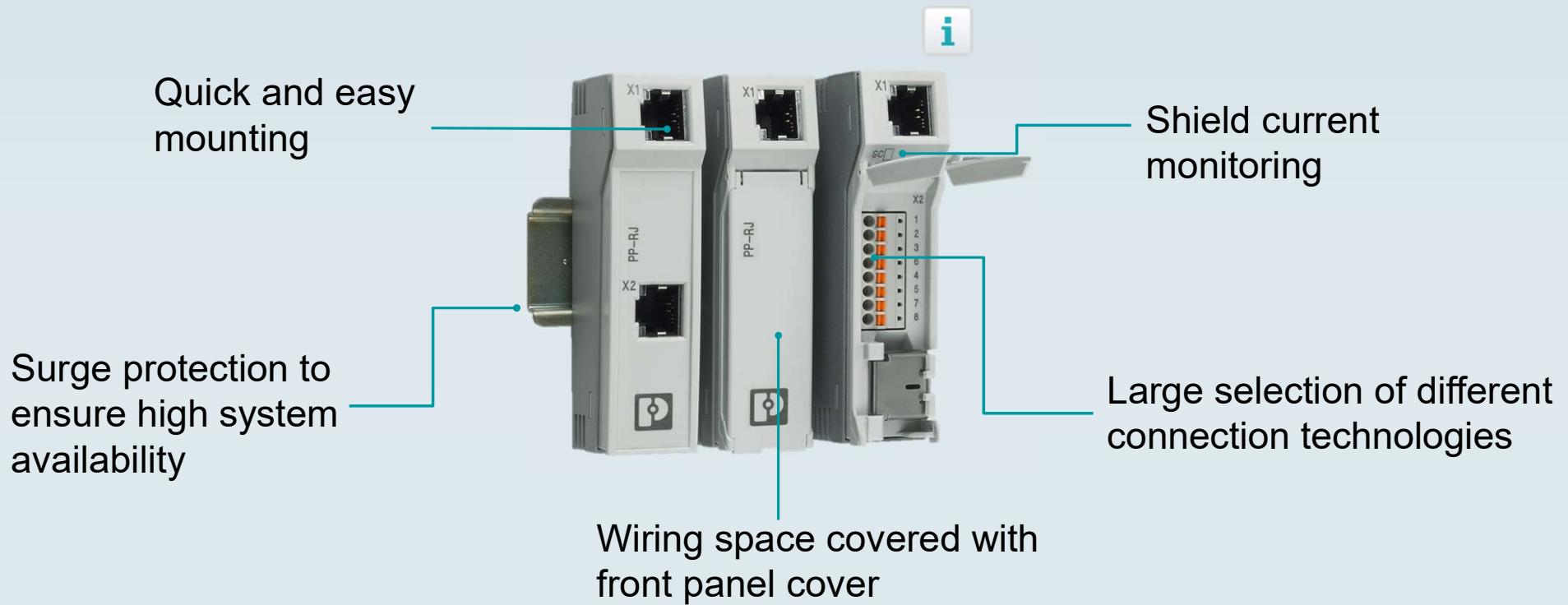
- Professional tools



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# Patch panels



# Patch panels



	<b>PP-RJ-RJ(-F)</b>	<b>PP-RJ-SC(-F)</b>	<b>PP-RJ-SCC(-F)</b>	<b>PP-RJ-IDC(-F)</b>
Connection type	RJ45/RJ45	RJ45/Screw	RJ45/Push-In	RJ45/IDC
Description	8-pole, 10/100/1000 MBit/s			
Shielding	Directly on the DIN-rail			
Shield connection	Via RJ45 socket	Tool-free via shield current contact		
Order number	2703015	2703016	2703018	2703019
With Surge protection and Shield current diagnosis	2703020	2703021	2703022	2703023



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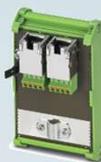
# Patch panels



	<b>FL CAT5 TERMINAL BOX</b>	<b>FL-PP-RJ45-SC</b>	<b>FL-PP-RJ45-SCC</b>	<b>FL-PP-RJ45-LSA</b>
Connection type	RJ45/Screw	RJ45/Screw	spring-cage connection	LSA-connection
Description	4-pole, 10/100 MBit/s		8-pole, 10/100/1000 MBit/s	
Shielding	Directly on the DIN-rail		directly on the DIN rail or optionally via RC combination	
Shield connection		Bracket clamp with screws		
Order number	2744610	2901643	2901642	2901645



# Patch panels



	<b>FL-PP-RJ45/RJ45</b>	<b>FL-PP-RJ45/RJ45-B</b>	<b>FL-PP-RJ45-SCC/SC041</b>	<b>FL-PP-RJ45-SCC/SC045</b>
Connection type	RJ45/Screw	RJ45/Screw	spring-cage connection	LSA-connection
Description	8-pole, 10/100/1000 MBit/s	Extended temperature range -40 °C ... 85 °C, narrow width	Cable sharing module with cable outlet to the front	Cable sharing module with cable outlet upwards
Shielding	Directly on the DIN rail or optionally via RC combination	Continuous shield	Directly on the DIN rail or optionally via RC combination	
Shield connection	Via RJ45 port			Bracket clamp with screws
Order number	2901646	2904933	2903532	2904577



# PRP redundancy modules

Easy setup of high-availability network infrastructure without configuration

No switching times for uninterrupted operation in the event of an error

No loss of packets in the event of network failure



Integration of non-PRP-capable devices in parallel networks for maximum availability

according to IEC 61850-3 and IEEE 1613

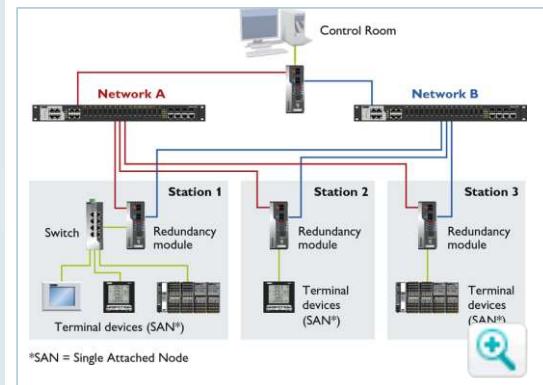


# PRP redundancy modules



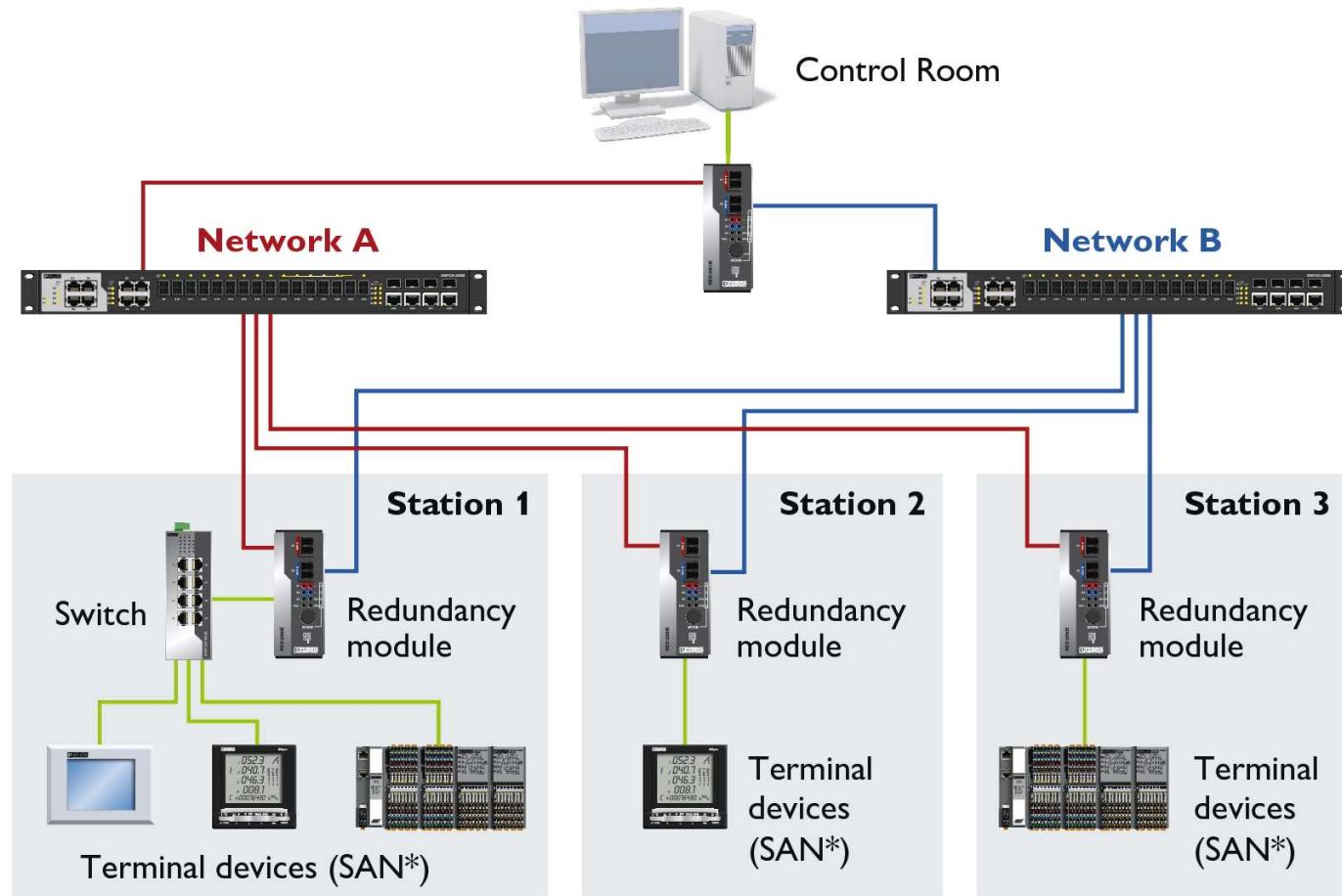
Integration of  
non-PRP-  
capable  
devices in  
parallel  
networks for  
maximum  
availability

- Parallel Network Redundancy Protocol (PRP)
- Standardized according to IEC62439-3
- No switch-over time



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\*SAN = Single Attached Node



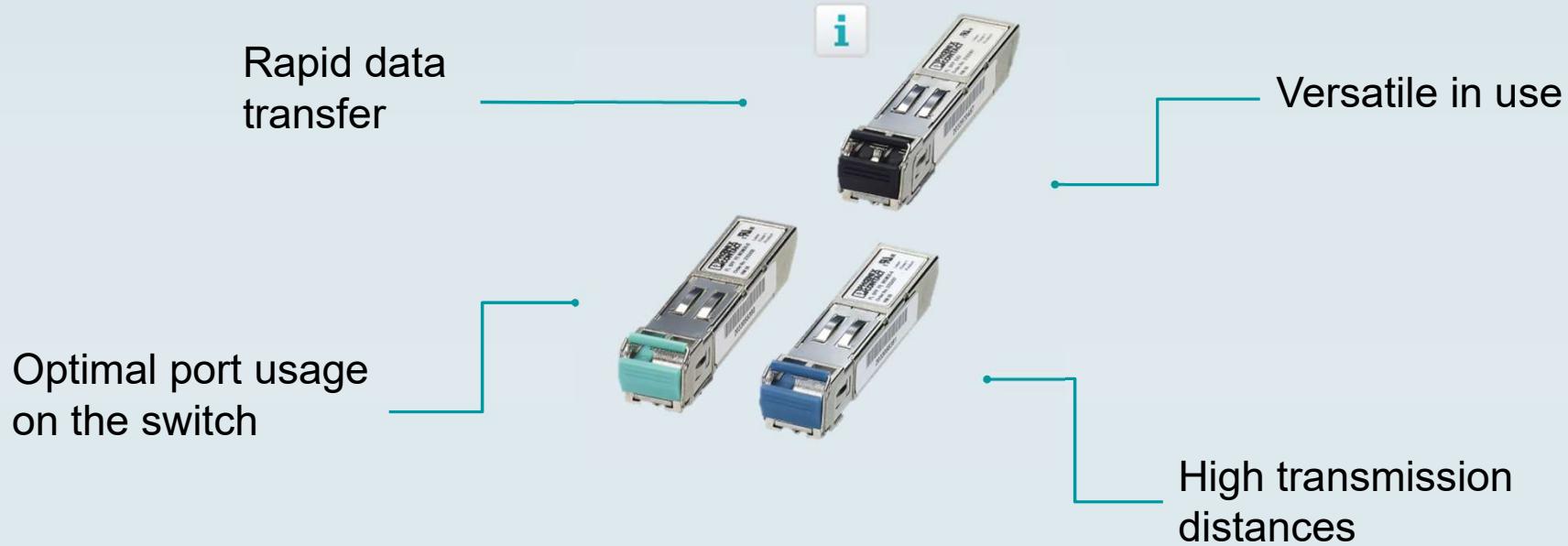
# PRP redundancy modules



	<b>FL RED 2003E PRP</b>	<b>FL RED 2001E PRP 2LC</b>
Function	Redundancy module	Redundancy module
Design	Slim	Slim
Ports (Transmission speed)	3x RJ45 (10/100 Mbit/s)	1x RJ45 (10/100 Mbit/s) 2x LC MM (100 Mbit/s)
Special features	-	-
Temperature range	-40 °C ... 70 °C	-40 °C ... 70 °C
Order number	2701863	2701864



# SFP modules



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# SFP modules



	<b>FL SFP SX</b>	<b>FL SFP FX</b>	<b>FL SFP LX10-B</b>	<b>FL SFP LX</b>	<b>FL SFP FX SM</b>
Function	SFP module	SFP module	SFP module	SFP module	SFP module
Connection type (Transmission speed)	LC Multimode (1000 Mbit/s)	LC Multimode (100 Mbit/s)	LC Singlemode (1000 Mbit/s)	LC Singlemode (1000 Mbit/s)	LC Singlemode (100 Mbit/s)
Max. transmission length	1 km	2 km	10 km	30 km	40 km
Wavelength	850 nm	1310 nm	1310 nm	1310 nm	1300 nm
Temperature range	-40 °C ... 75 °C	-40 °C ... 85 °C	0 °C ... 60 °C	-40 °C ... 85 °C	-40 °C ... 85 °C
Order number	2891754	2891081	1025401	2891767	2891082



# SFP modules



	FL SFP LH	FL SFP SX2	FL SFP WDM10-A	FL SFP FE WDM20-A	FL SFP WDM10-B
Function	SFP module	SFP module	SFP module	SFP module	SFP module
Connection type (Transmission speed)	LC Singlemode (1000 Mbit/s)	LC Multimode (1000 Mbit/s)	LC Singlemode (1000 Mbit/s)	LC Singlemode (100 Mbit/s)	LC SM (1000 Mbit/s)
Max. transmission length	80 km	2 km	10 km	20 km	10 km
Wavelength	1550 nm	1310 nm	1310/1550 nm	1310/1550 nm	1550/1310 nm
Temperature range	-40 °C ... 85 °C	-40 °C ... 75 °C	-40 °C ... 75 °C	-40 °C ... 75 °C	-40 °C ... 75 °C
Order number	2989912	2702397	2702440	2702437	2702441



# SFP modules



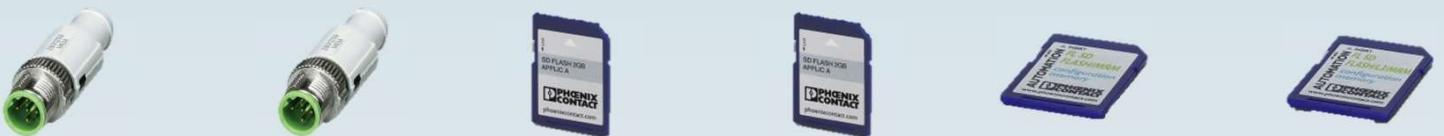
	<b>FL SFP FE WDM20-B</b>	<b>FL SFP WDM10-SET</b>	<b>FL SFP FE WDM20-SET</b>	<b>FL SFP GT</b>
Function	SFP module	SFP module	SFP module	SFP module
Connection type (Transmission speed)	LC SM (100 Mbit/s)	LC Singlemode (1000 Mbit/s)	LC Singlemode (100 Mbit/s)	RJ45 (1000 Mbit/s)
Max. transmission length	20 km	10 km	20 km	100 m
Wavelength	1550/1310 nm	1310/1550 nm	1310/1550 nm	-
Temperature range	-40 °C ... 75 °C	-40 °C ... 75 °C	-40 °C ... 75 °C	-40 °C ... 85 °C
Order number	2702438	2702442	2702439	2989420



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# Memory media



	FL MEM PLUG	FL MEM PLUG/MRM	SD FLASH 512MB	SD FLASH 2GB	FL SD FLASH/MRM	FL SD FLASH/L3/MR M
Function	Exchangeable Configuration memory	Configuration memory	Program and configuration memory			
Special features	-	MRM functionality	-	-	MRM functionality	MRM and Layer 3 functionality
Order number	2891259	2891275	2988146	2988162	2700270	2700607



# Switches for PROFINET and EtherNet/IP

	Unmanaged Switches		Managed Switches						
	Switch 1000/1100	Switch SFNT	Switch 2000	Switch 3000	Switch 4000/4800	Switch IRT	Switch 7000	NAT 2000	Modular Switch GHS
<b>PROFINET</b>									
<b>Class A</b> Quality of Service, PTCP filter	(•)	(•)	•	•	•	•	•	•	•
<b>Class B</b> Quality of Service, LLDP topology detection, Profinet device, redundancy (MRP), DCP	-	-	(•) (only 22xx-27xx variants)	-	-	•	-	(•) (only 22xx-23xx variants)	•
<b>Class C</b> Quality of Service, LLDP topology detection, Profinet device, redundancy (MRP), DCP, IRT (ERTEC) technology for prioritized Profinet data transmission, diagnostics for fiber optic paths	-	-	-	-	-	•	-	-	-
<b>EtherNet/IP</b>									
<b>Basic</b> IGMP snooping, IGMP querier, Multicast source detection	-	-	•	•	•	-	•	•	•
<b>Basic plus</b> IGMP snooping, IGMP querier, Multicast source detection, DLR, CIP	-	-	-	-	-	-	•	-	-

- not available, • available, (•) available in selected models

