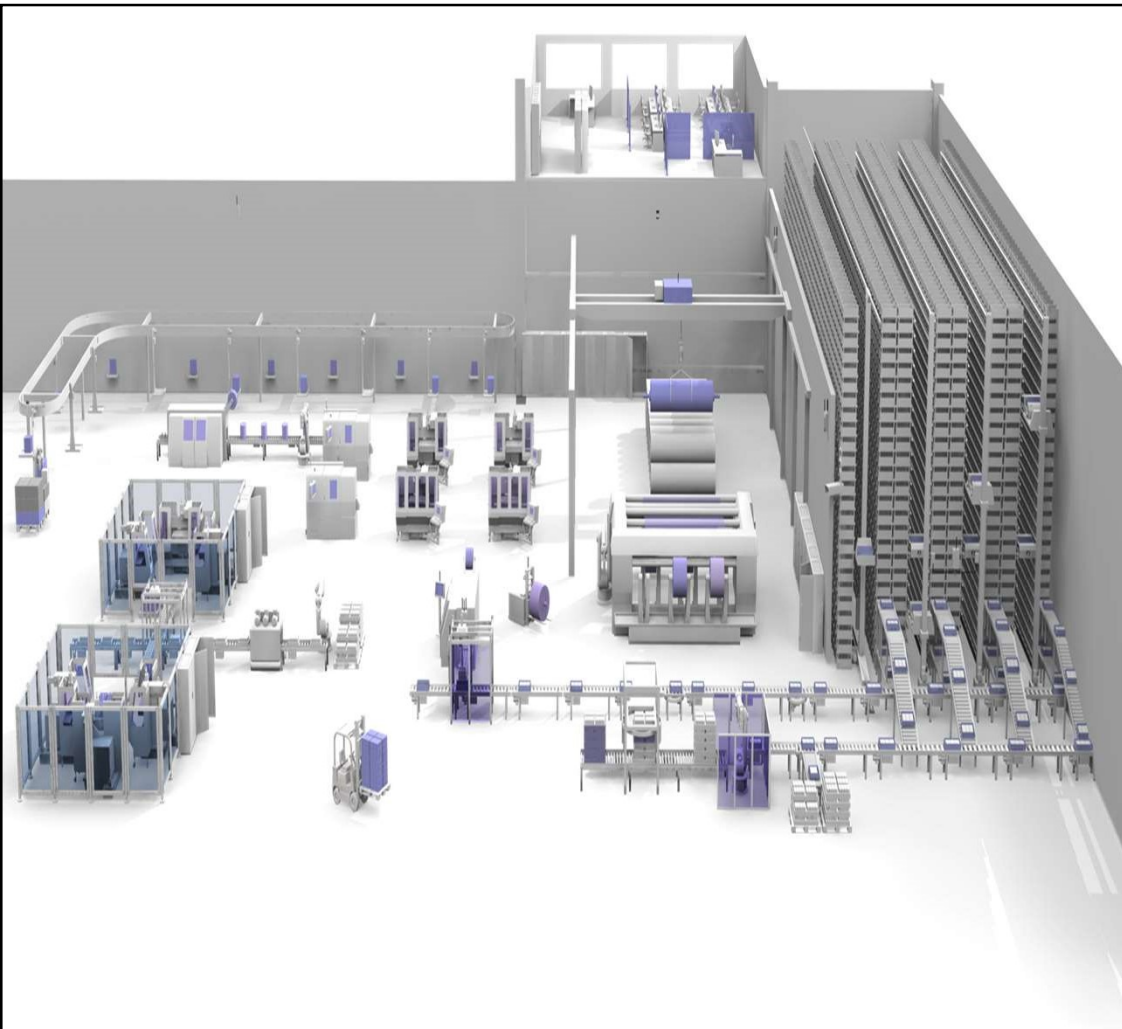




**Oferta en Protocolos
Ethernet de Automatización**

Modbus/TCP

EtherNet/IP

PROFINET

Agenda

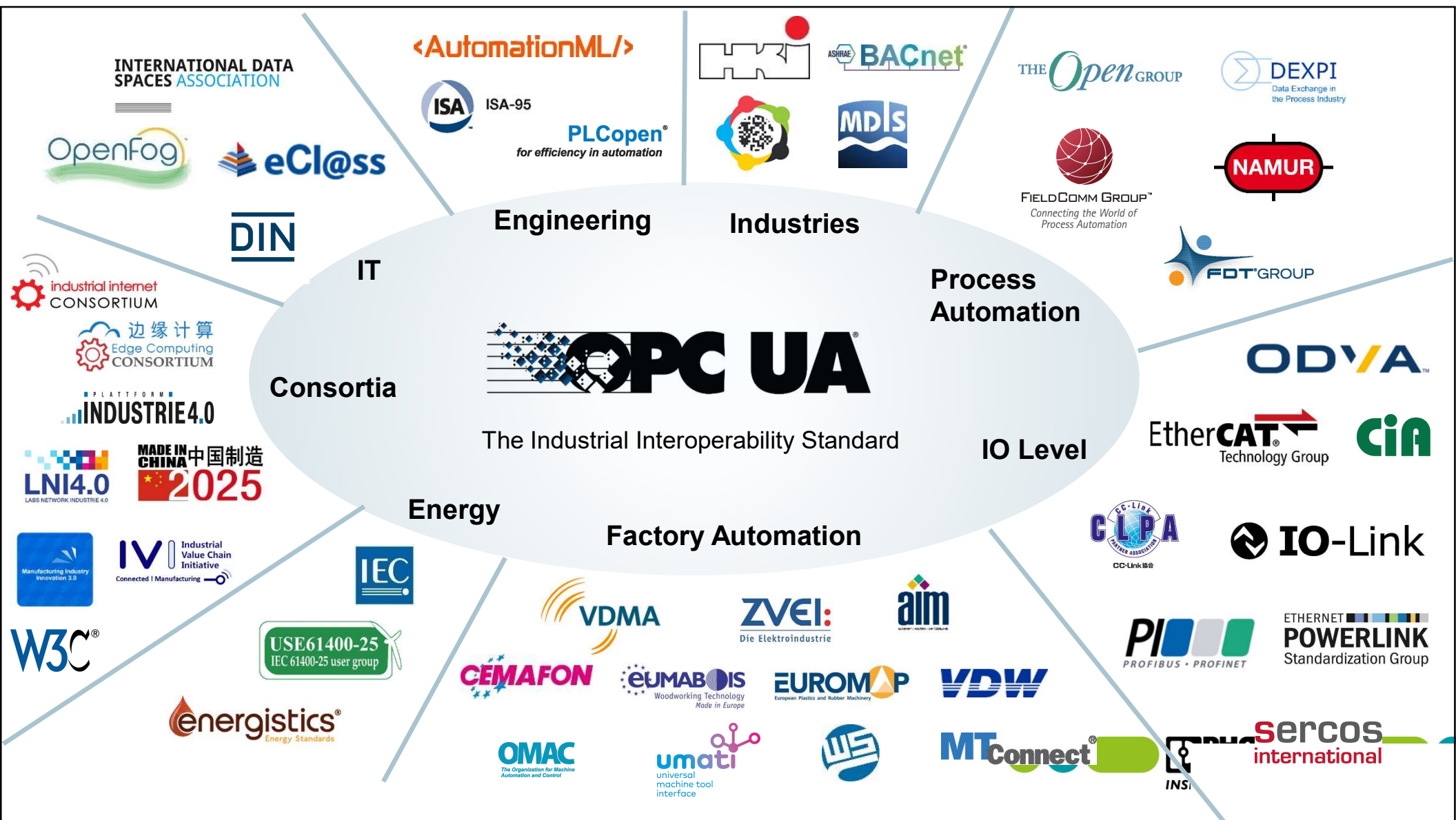
- Protocolos Ethernet Industriales
- Modbus/TCP
- EtherNet/IP
- PROFINET

Protocolos Ethernet Industriales

Ethernet

Protocolos Industriales

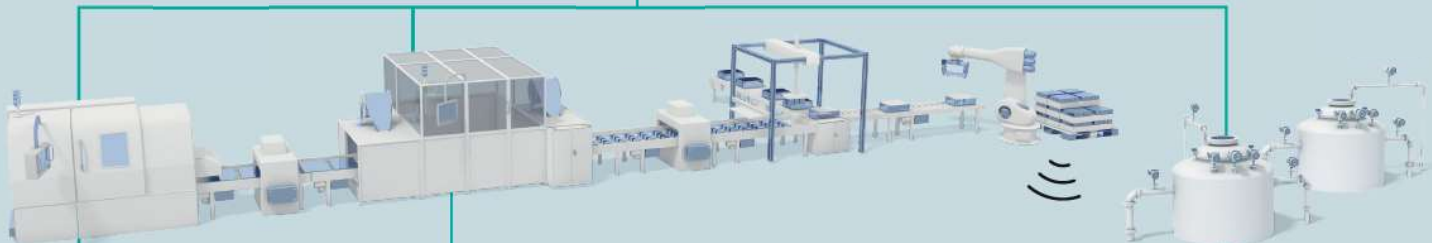


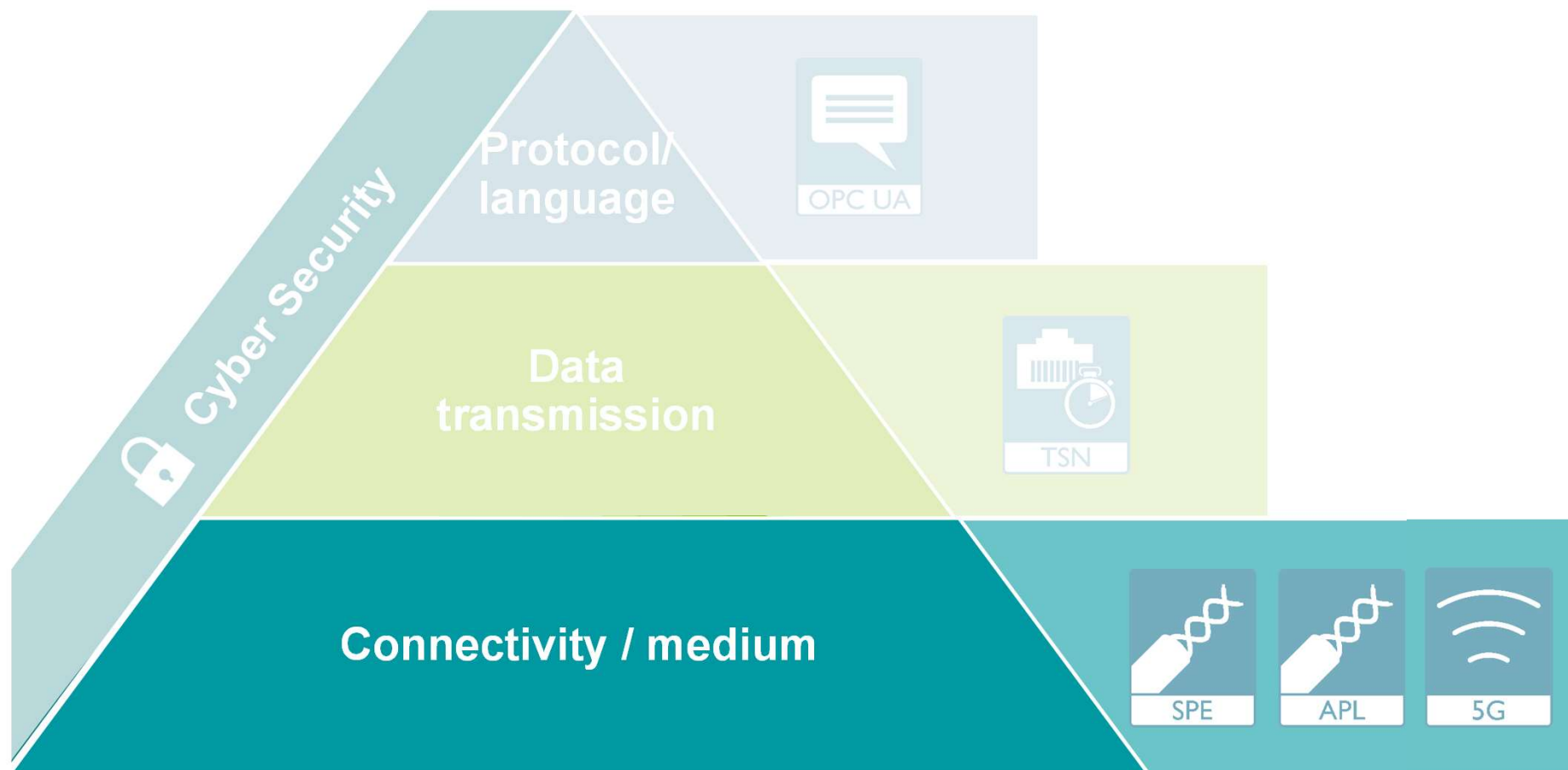


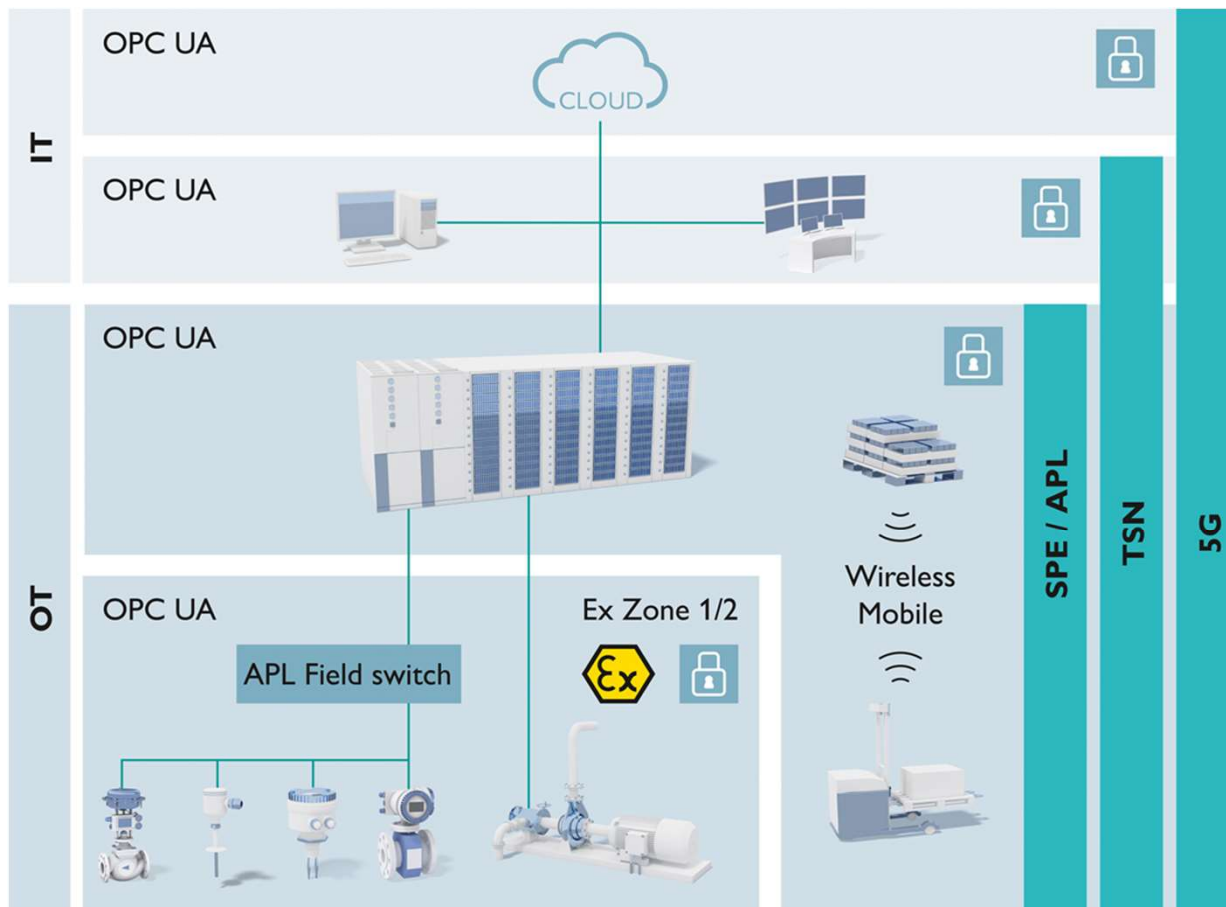
IT



OT







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

FL SWITCH 1000 Series
Prioritization of Automation Protocols (IEEE 802.1Q)

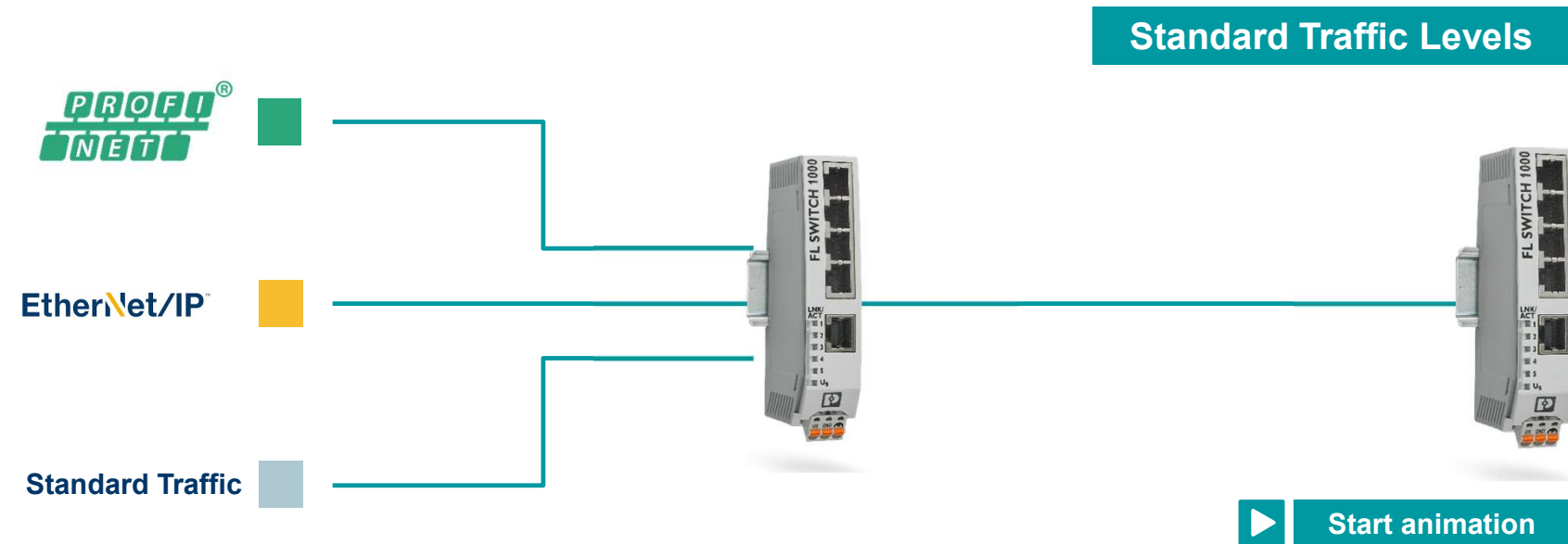


Automation protocols



FL SWITCH 1000 Series

Prioritization of Automation Protocols (IEEE 802.1Q)

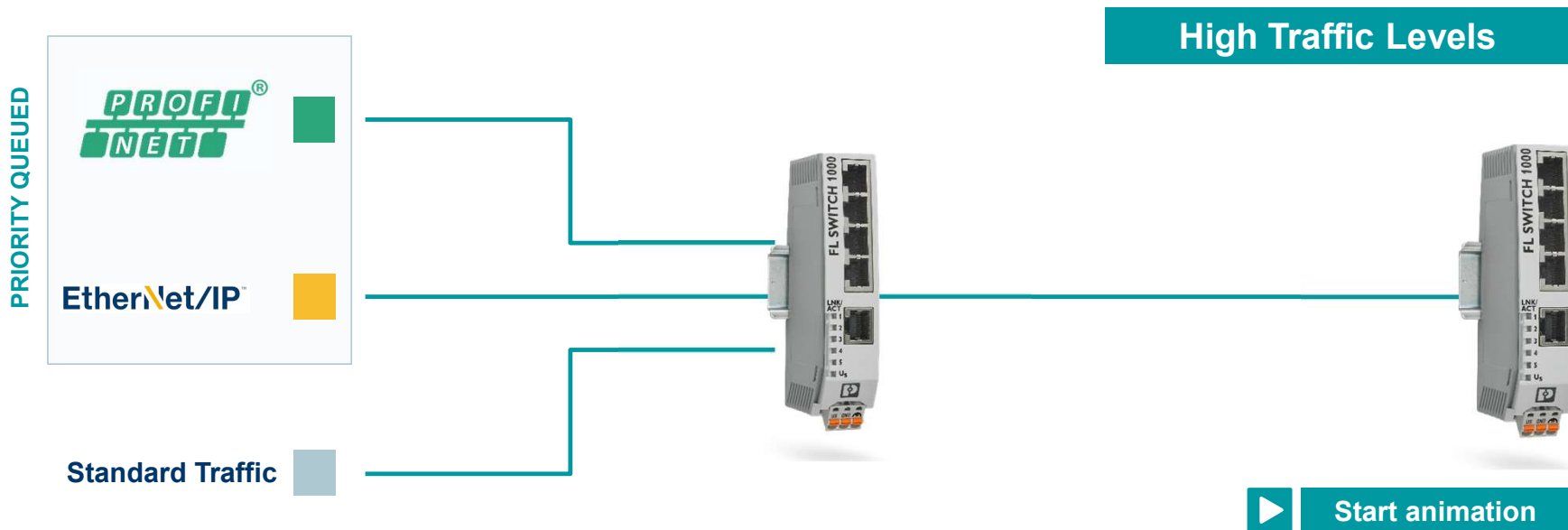


As traffic is received, it is transmitted as supplied



FL SWITCH 1000 Series

Prioritization of Automation Protocols (IEEE 802.1Q)



Prioritization of Traffic (IEEE 802.1Q)

PRIORITY QUEUED

PROFI[®]
NET

Modbus
TCP/IP

ASHRAE BACnet[®]

CC-Link IEF[®]

Ethernet/IP



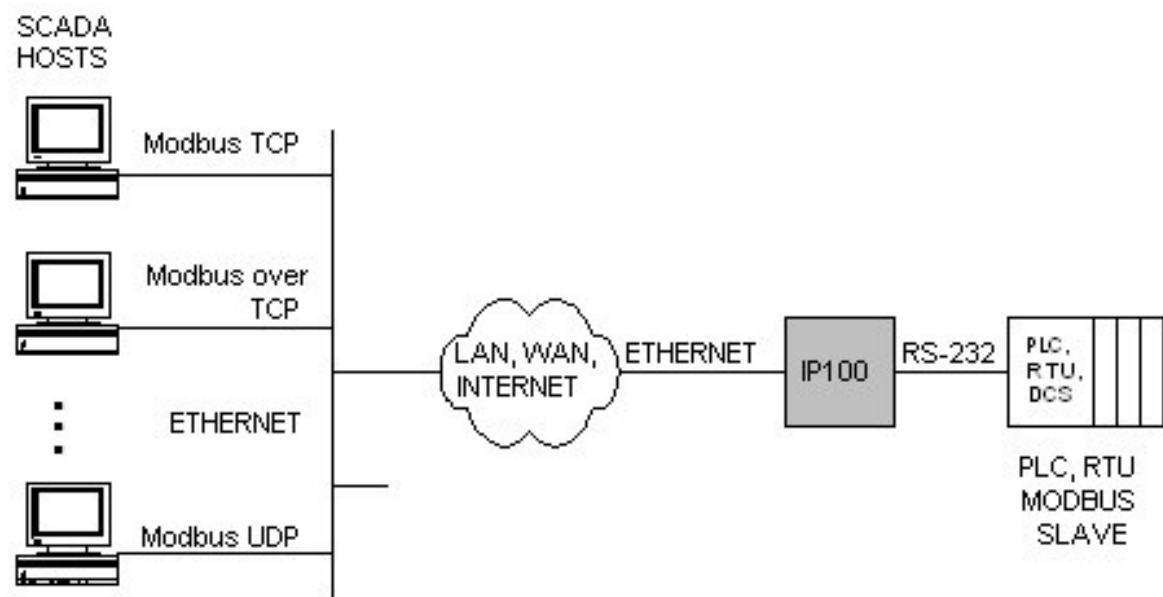
NON-PRIORITY QUEUED

Standard Traffic

Queues assigned in accordance with standard recommendations



Modbus TCP/IP



Principales protocolos

[editar]

De serie	Ethernet	Protocolo	Red	Normas
Modbus -RTU	Modbus -TCP	TCP / IP		IEC 61158 e IEC 61784
Profibus	PROFINET IO	protocolo de tiempo real isócrono (IRT), protocolo en tiempo real (RT), en tiempo real sobre UDP protocolo (RTU)	Switches , router y wireless , de 100 Mbit / s hasta 1 Gbit / s	IEC 61158 y IEC 61784
DeviceNet (CIP); ControlNet (CIP)	Ethernet / IP (CIP)	TCP / IP, UDP / IP	Switches , router y wireless , de 100 Mbit / s hasta 1 Gbit / s	IEC 61158 e IEC 61784; ODVA EtherNet / IP estándar
Foundation Fieldbus H1	Foundation Fieldbus Ethernet de alta velocidad (HSE)			
CANopen	Ethernet Powerlink		Ethernet de 100 Mbits / s	IEC 61158 , EPSG (Ethernet Powerlink Grupo de Normalización)
CANopen	EtherCAT	EtherCAT, EtherCAT / UDP	Ethernet de 100 Mbits / s	IEC 61158 , IEC / PAS 62407, IEC 61784-3, ISO 15745-4
	VARAN V ersatile Un Andom R utomatización A cceso N RED	VARAN, TCP / IP, Seguridad	Ethernet de 100 Mbits / s	VARAN-BUS GRUPO DE USUARIOS - VNO
SERCOS I / II	SERCOS III		Ethernet de 100 Mbits / s	IEC 61491, se fusionaron en la norma IEC 61158
	FL-Net (OPCN-2)	UDP / IP	Ethernet de 10 Mbit / s	por JEMA (Asociación de Fabricantes Japoneses de la Electricidad)

Products Modbus/TCP

- Gateways



PSR-M-GW-MODTCP-PI



GW PN/MODBUS 1E/2DB9

- IO-Link Master



IOL MA8 PN DI8

- IO-Link Master



AXL E ETH IOL8 DI4 M12 6P



AXL E ETH IOL8 DI4 M12 6M

Portfolio

Modbus/TCP

- Measuring Devices



EEM-EM375
EEM-EM377



EEM-MB371-24DC



EEM-MA370



EEM-MA771-24DC

Portfolio

Modbus/TCP

- Controllers



ILC 171 ETH 2TX



AXC 1050



AXC 3050

Portfolio

Modbus/TCP

- I/O Systems Buskoppler - Cabeceras



IL ETH BK DI8 DO4 2TX-PAC
IL ETH BK DI8 DO4 2TX-XC-PAC



AXL F BK ETH
AXL F BK ETH XC



AXL F BK ETH NET2

Portfolio

Modbus/TCP

- Energy and Power Measurement



EEM-MB370



EEM-MB370-EIP



EEM-MB370-24DC



EEM-MB371



EEM-MB371-PN



EEM-MB371-24DC

Portfolio

Modbus/TCP

- Energy and Power Measurement



EEM-MA370

EEM-MA371



EEM-MA370-R

EEM-MA371-R



EEM-MA370-24DC

EEM-MB371-24DC

Portfolio

Modbus/TCP

- Energy and Power Measurement



EEM-MA770
EEM-MA770-EIP
EEM-MA770-PN
EEM-MA770-R
EEM-MA770-24DC



EEM-MA771
EEM-MA771-EIP
EEM-MA771-PN
EEM-MA771-R
EEM-MA771-24DC

Portfolio

Modbus/TCP



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

Portfolio

Automation Systems



ILC 131 ETH

ILC 151 ETH

ILC 151 ETH XC

ILC 171 ETH 2TX

ILC 191 ETH 2TX

The Modbus/TCP (UDP) communication protocol can be used via the Ethernet interfaces of the Inline controller. The Inline controller can be used as a Modbus/TCP client and/or as a Modbus/TCP server (as of firmware version 4.40 and AUTOMATIONWORX Software Suite Version 1.82 AddOn V1). For additional information, please refer to the AH EN MODBUS TCP application note.

Portfolio

Automation Systems



AXC 1050
AXC 1050 XC

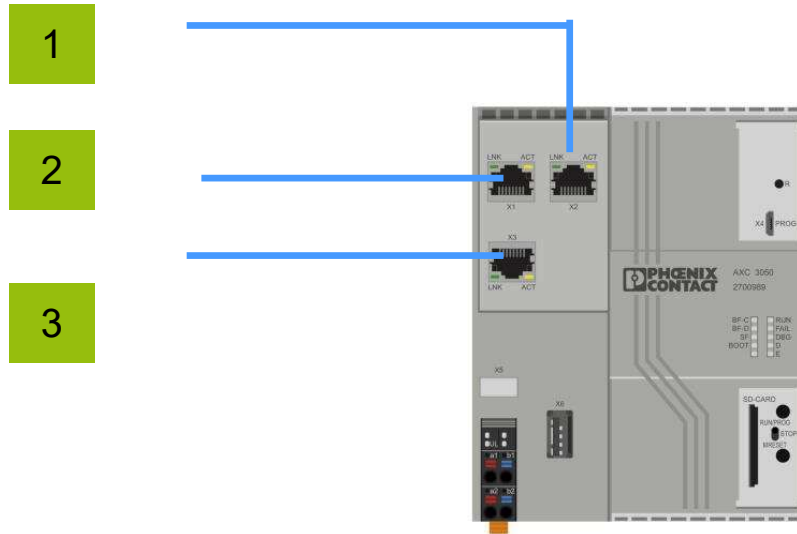
The Modbus TCP communication protocol can be used via the Ethernet interfaces of the controller. The controller can be used as a Modbus/TCP client and/or as a Modbus/TCP server (as of firmware version 3.00 and AUTOMATIONWORX Software Suite 2017 Version 1.84). For additional information, please refer to the AH EN MODBUS TCP application note

Portfolio

Automation Systems



AXC 3050



The Modbus TCP communication protocol can be used via the Ethernet interfaces of the AXC 3050 controller. In this case, the controller can be used as a Modbus client. For additional information, please refer to the AH EN MODBUS TCP application note. The controller can also be configured as a Modbus TCP server using functional blocks

Portfolio

Automation Systems



BTP 2043W
BTP 2070W
BTP 2102W



TP 3070W



TP 3070W/P



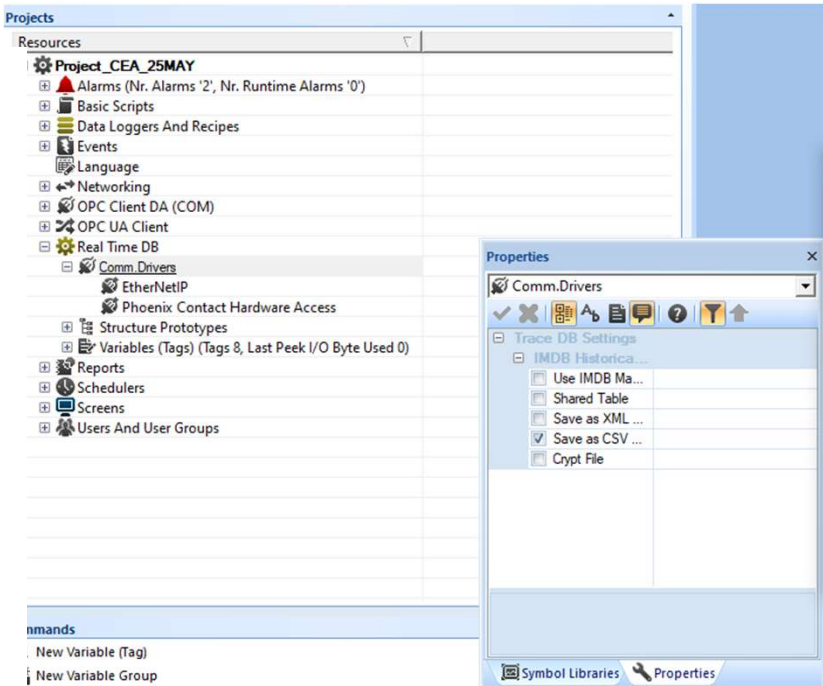
TP TP 6101-WXPS

Portfolio

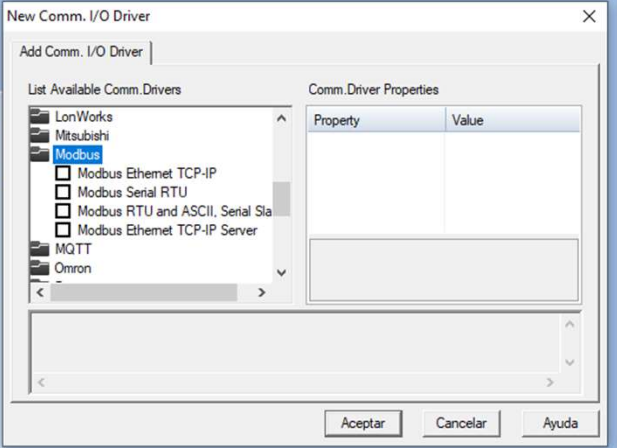
Automation Systems



VISU+ EXPRESS



VISU+



EtherNet/IP

Modbus TCP/IP, 1999	Velocidad: 10Mbit/s, 100 Mbits/s, 1Gbit/s; Topología física: generalmente estrellas basado; puede ser de bus, anillo, árbol o malla topología lógica: centralizado, maestro/esclavo; Longitud de la red: teóricamente ilimitado número de nodos y distancia, aunque realista limitada por la velocidad de actualización; Método de transmisión: Modbus IP utiliza estándar Ethernet sesgos: General. http://www.rtaautomation.com/modbustcp/
Ethernet/IP, 1990 by Rockwell Automation	Velocidad: 10Mbit/s, 100 Mbits/s, 1Gbit/s; Topología física: generalmente estrellas; puede ser autobús, árbol o malla; Topología lógica: centralizado, maestro/esclavo; Longitud de la red: teóricamente ilimitado, sin embargo tiempos de ciclo y rendimiento de la red será un factor limitante; Método de transmisión: utiliza Ethernet estándar; Sesgos de industria: maquinaria en General, las máquinas de la industria y la producción auto. http://en.wikipedia.org/wiki/EtherNet/IP
PROFINET,1989 (Process Field Bus), BMBF, Siemens	Velocidad: 100 Mbits/s y superior; Topología física: generalmente estrellas; puede ser autobús, árbol o malla; Topología lógica: centralizada; Número máximo de dispositivos: 200 puntos de la entrada-salida son posibles en una red PROFINET. Una de las principales ventajas de PROFINET comparado con PROFIBUS es que puedes tener más nodos de la red. Longitud de la red: la longitud, velocidad y topología dependen de los componentes de la red usted elige para su red. Con componentes externos fibra óptica distancias de hasta 26km son posibles dependiendo del tipo de fibra óptica se utiliza y los proveedores. En la red eléctrica la distancia máxima entre dos dispositivos cualesquiera es 100m. Método de transmisión: Ethernet basado con VLAN; Sesgos de la industria: automotriz. http://en.wikipedia.org/wiki/PROFINET



EtherNet/IP™ | How to connect your PLCnext Control to controllers from other manufacturers using EIP

Factory network



Remote Service

Machine network



Firewall, 1:1 NAT. Router



Advanced Managed Switches

Machine core network

EtherNet/IP DLR ring



Advanced Managed Switches

EtherNet/IP

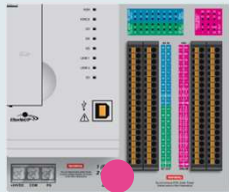
EtherNet/IP

Unmanaged Switches

Switch 2000

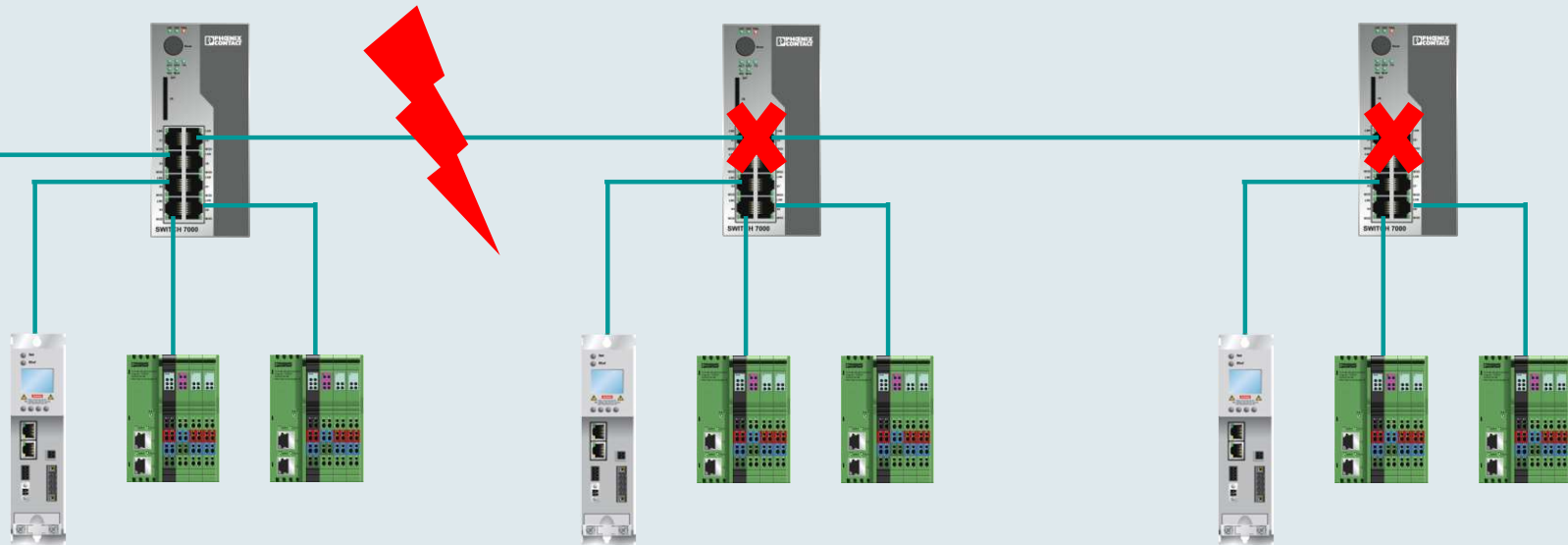
Unmanaged Switches



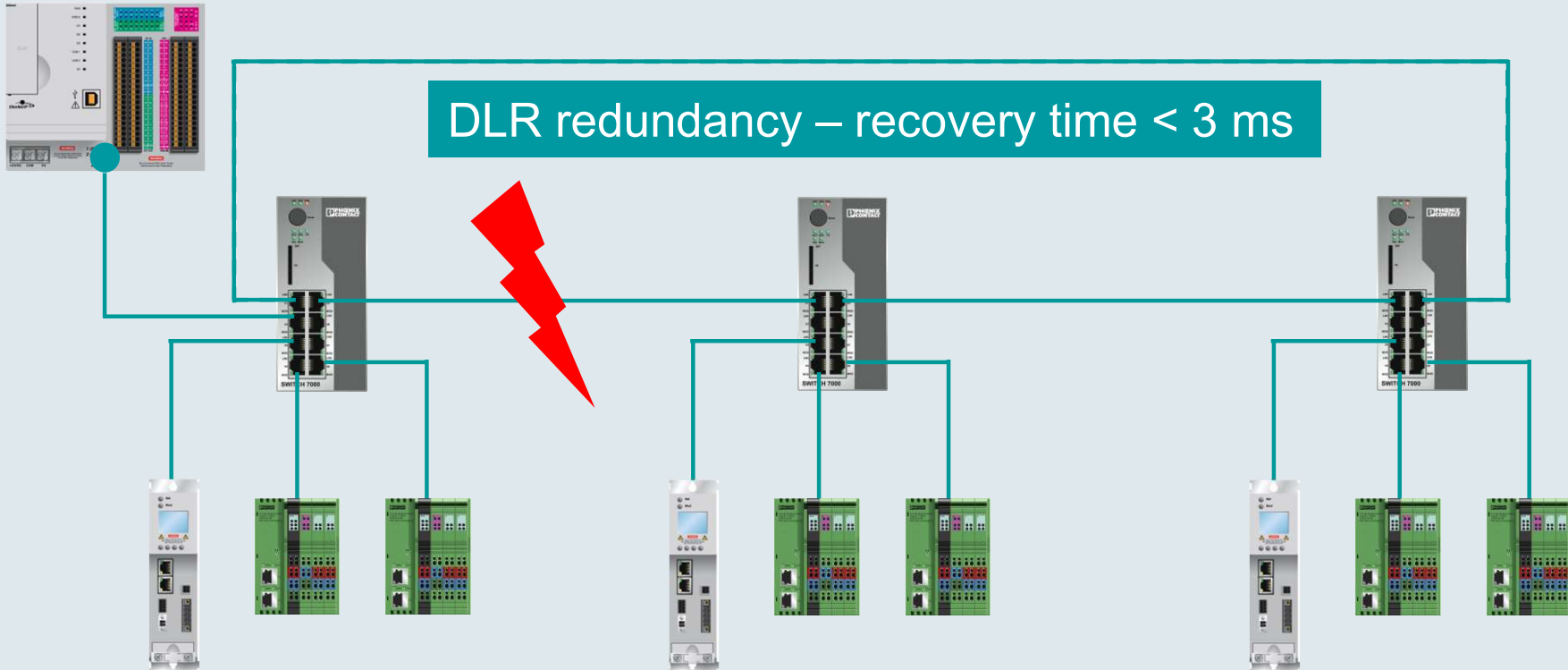


EtherNet/IP
Controller

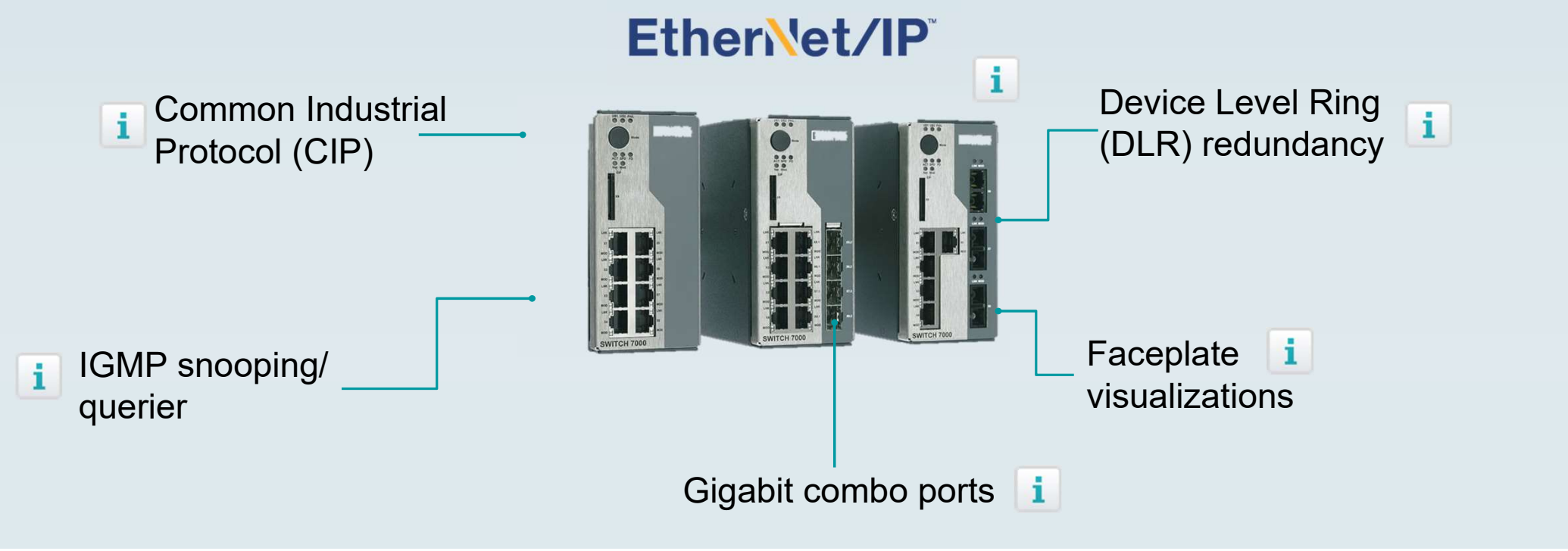
 Activate redundancy
mechanism



DLR redundancy – recovery time < 3 ms



Managed Switches 7000



Switch 7000

EtherNet/IP™

Common
Industrial
Protocol (CIP)



- Integration into EtherNet/IP control systems



Automation protocols





Diagnosis

EtherNet/IP™

Common Industrial Protocol
(CIP)

Configuration



Automation protocols



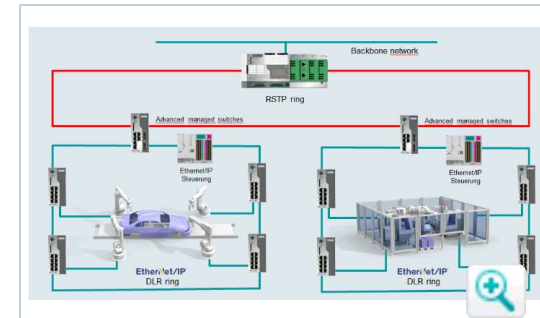
Switch 7000

EtherNet/IP™



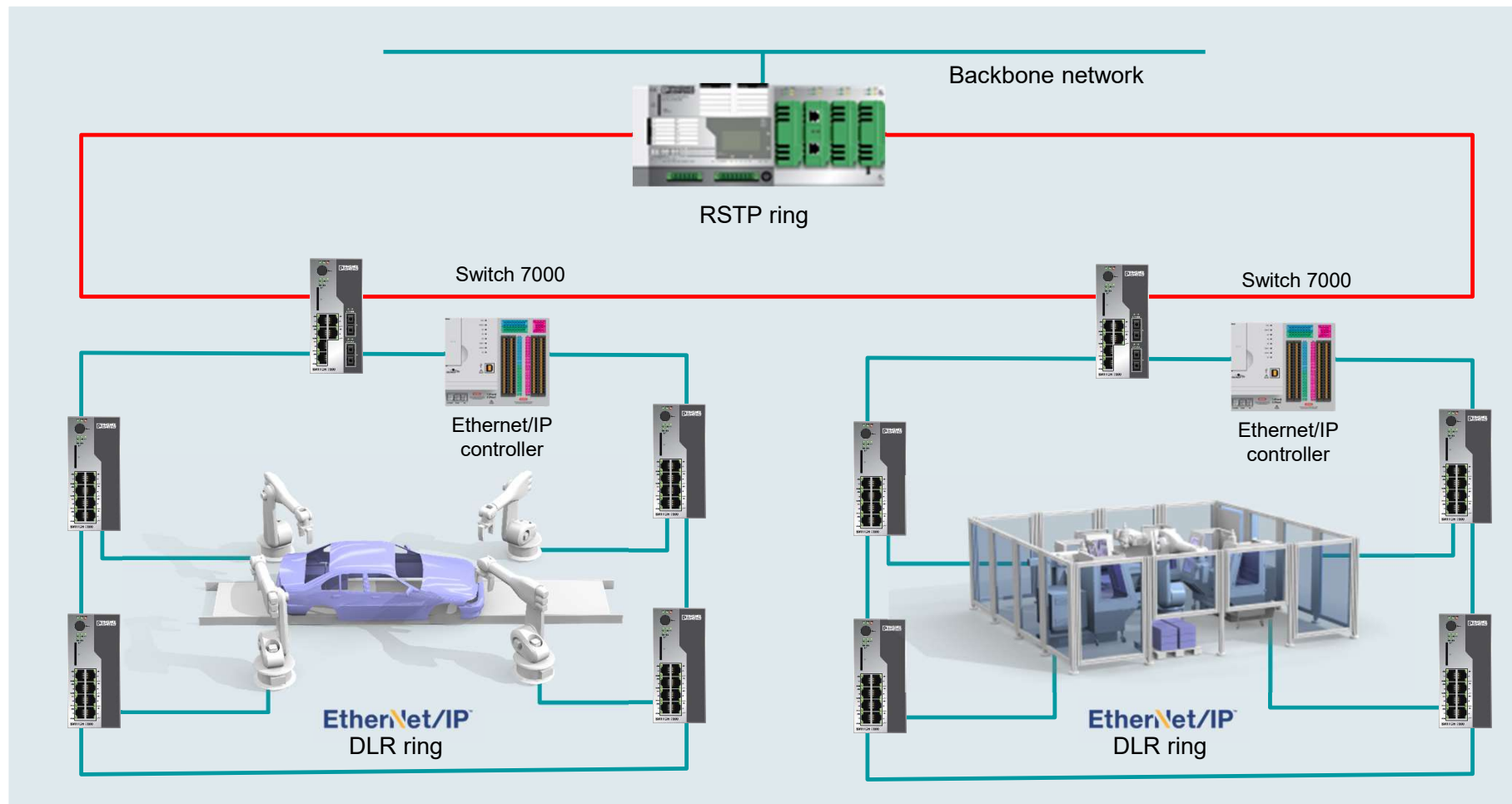
Device Level
Ring (DLR)
redundancy

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



Automation protocols





Switch 7000

EtherNet/IP™



Faceplate visualizations

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



Automation protocols

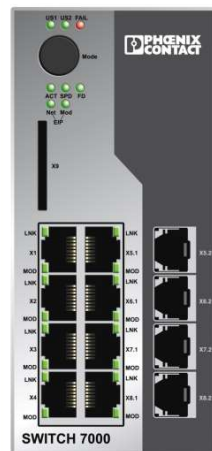




Device Status	DLR Status	Port Status	Port Configuration	CIP Status	X
---------------	------------	-------------	--------------------	------------	---

Device Type: FL SWITCH 7004-4GC-EIP
Device Name: FL SWITCH 7004-4GC-EIP

IP Address: 192.168.10.110
MAC Address: 00:A0:45:AA:16:6E



Node Status: Device Is Active Ring Supervisor
Ring Status: Ring Fault
Active Supervisor: 192.168.10.110
Active Precedence Value: 0
Ring Fault Count: 1
Clear Fault Counter: [Clear](#)
Verify Fault Location: [Start](#)
Last Node Port 1: 192.168.10.110
Last Node Port 2: 192.168.10.110

[DLR Node Table](#)



Automation protocols



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)



Automation protocols



Switch 7000

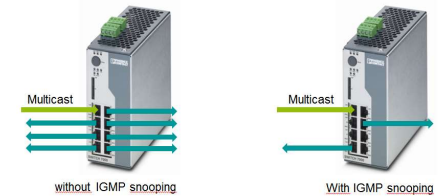
EtherNet/IP™



IGMP snooping/
querier

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

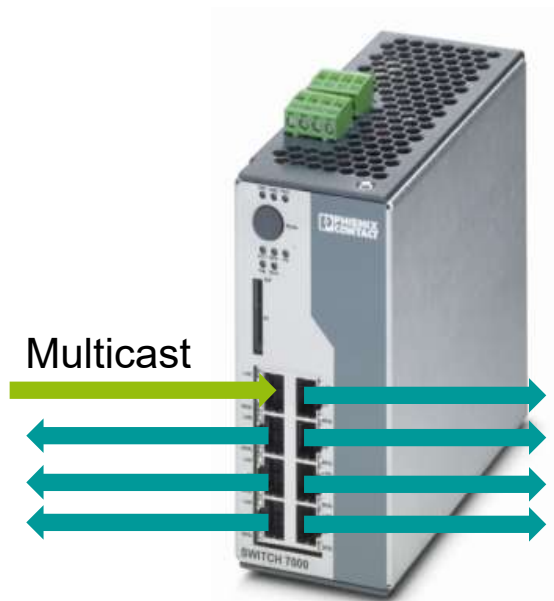
Reduction of network load: Multicast packages are only forwarded to those ports who need them



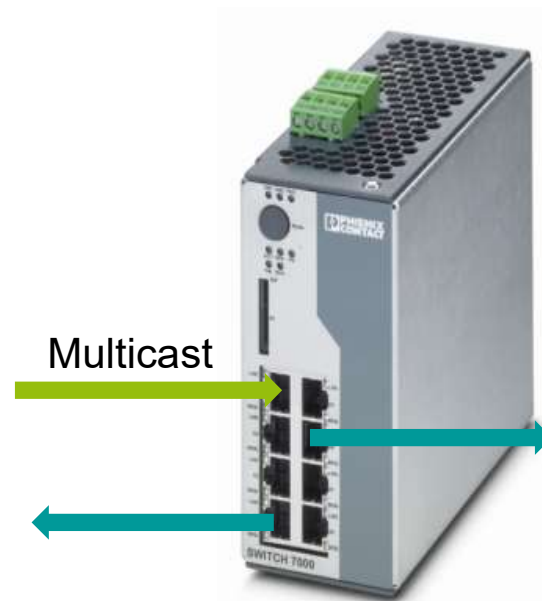
Automation protocols



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



without IGMP snooping

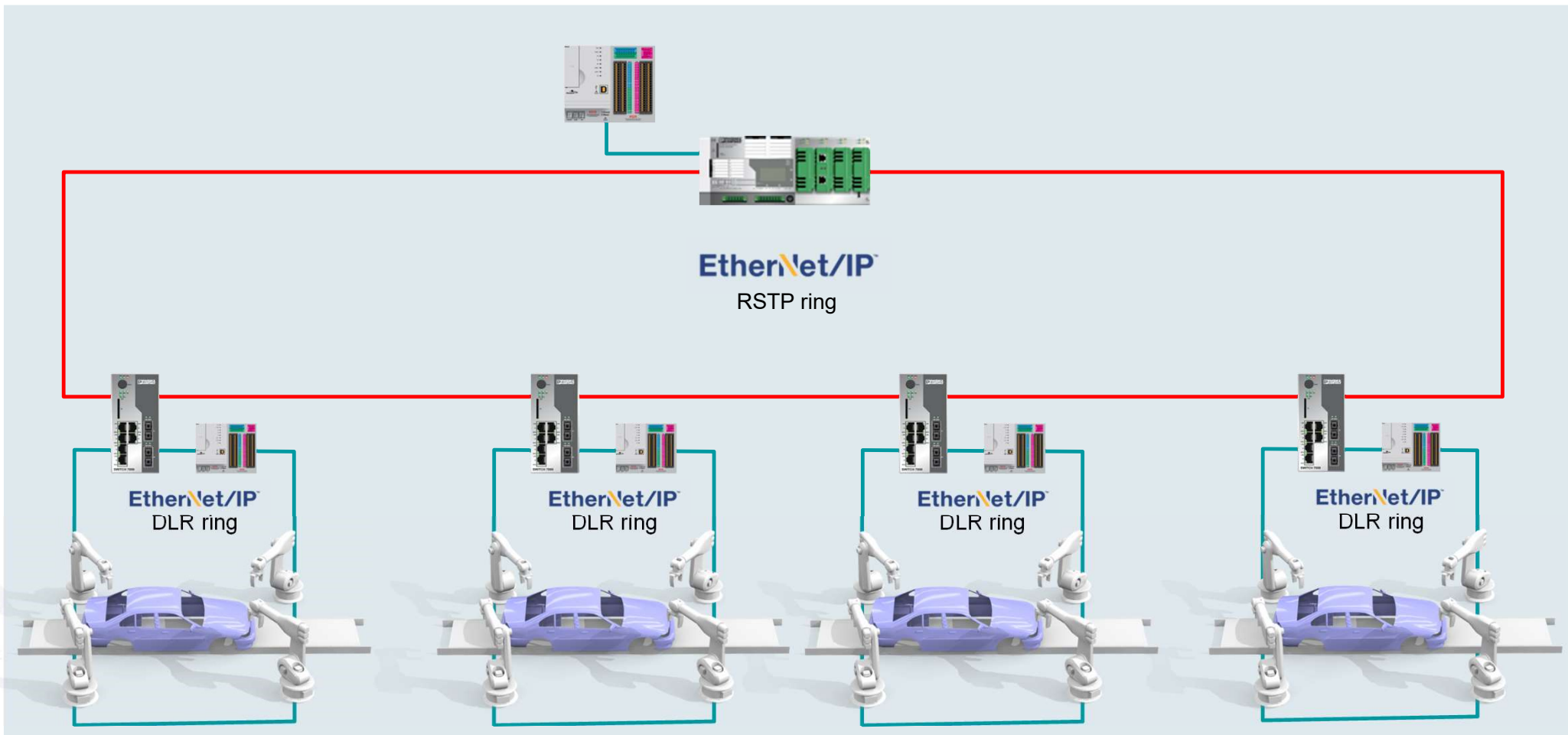


with IGMP snooping

Switch 7000



	FL SWITCH 7008-EIP	FL SWITCH 7006/2FX-EIP	FL SWITCH 7005/FX- 2FXSM-EIP	FL SWITCH 7006-2GC-EIP	FL SWITCH 7004-4GC-EIP	FL SWITCH 7004-2TC- 2GC-EIP
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





Ethernet IP Gateway Configuration PHOENIX CONTACT

Configuring Phoenix Contact's EtherNet/IP Gateway

PROFINET

Factory network



Remote Service

Machine network



Firewall, 1:1 NAT. Router



Machine core network

PROFI[®] NET MRP ring

Managed Switch 2000

Managed Switch 2000

IRT Switches

PROFI[®] NET

PROFI[®] NET

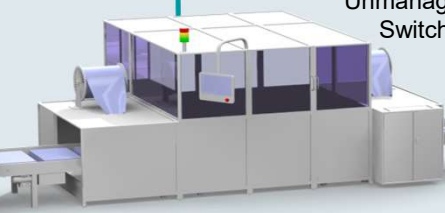
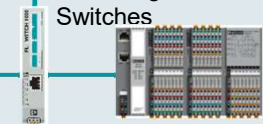
PROFI[®] NET

Unmanaged Switches

Managed Switch 2000

Unmanaged Switches

IRT Switches



PROFI[®] NET



Switches für PROFINET IRT

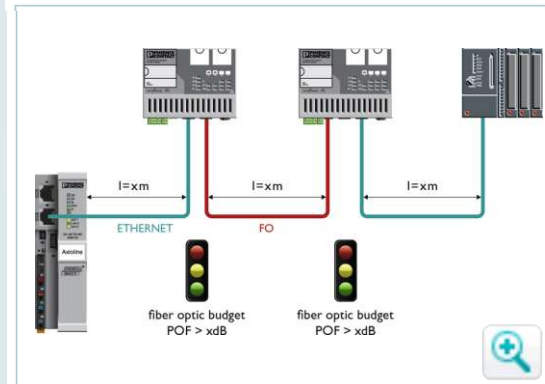


Switches für PROFINET IRT

Diagnostics
for fiber optic
paths

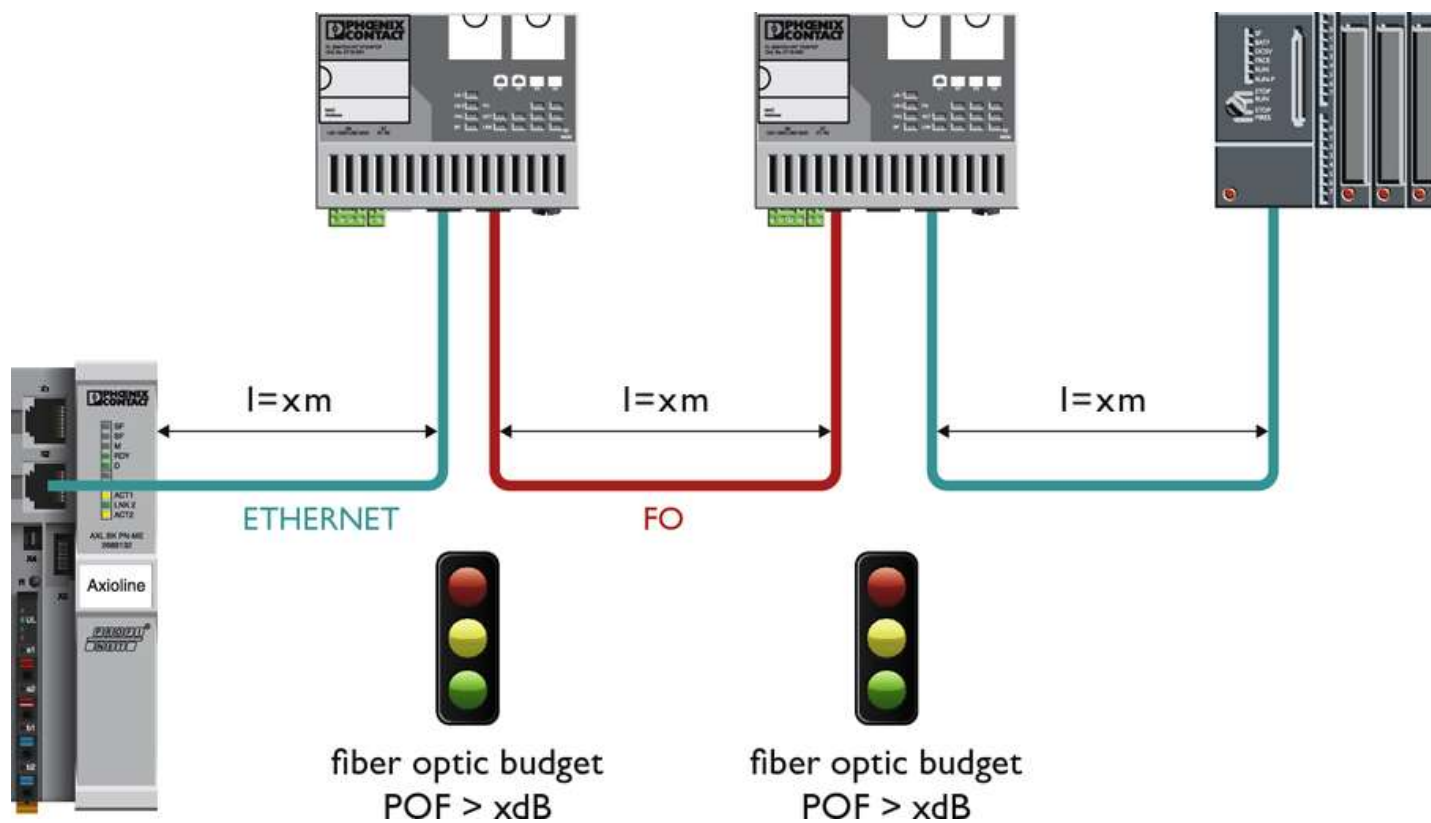


- Proactive maintenance for increased availability and less downtime
- Improved assessment of the path quality through simultaneous length measurement



Automation protocols





Switches für PROFINET IRT



FL SWITCH IRT 4TX



**FL SWITCH IRT 2TX
2POF**



**FL SWITCH IRT TX
3POF**



**FL SWITCH IRT IP
TX/3POF**

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

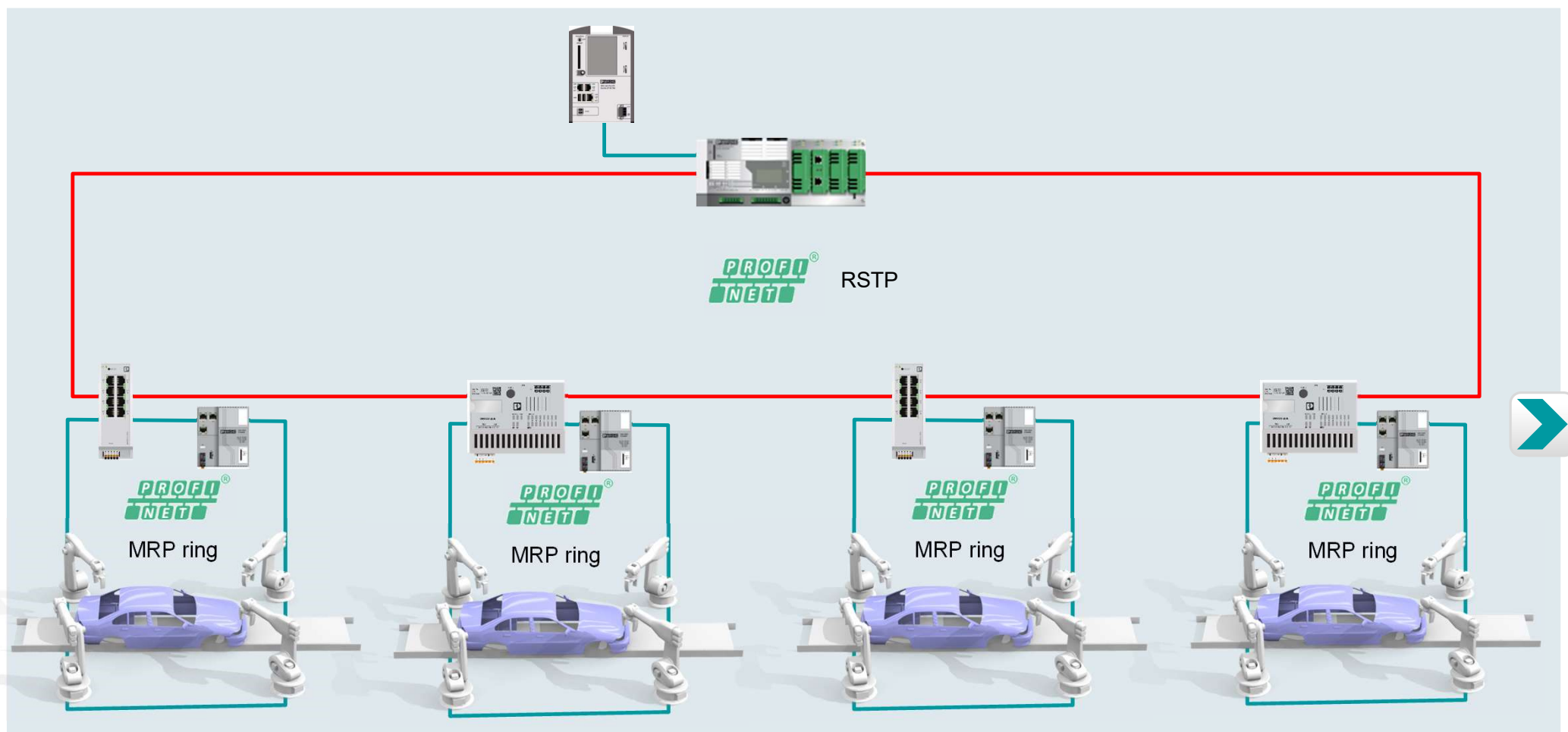
2700692

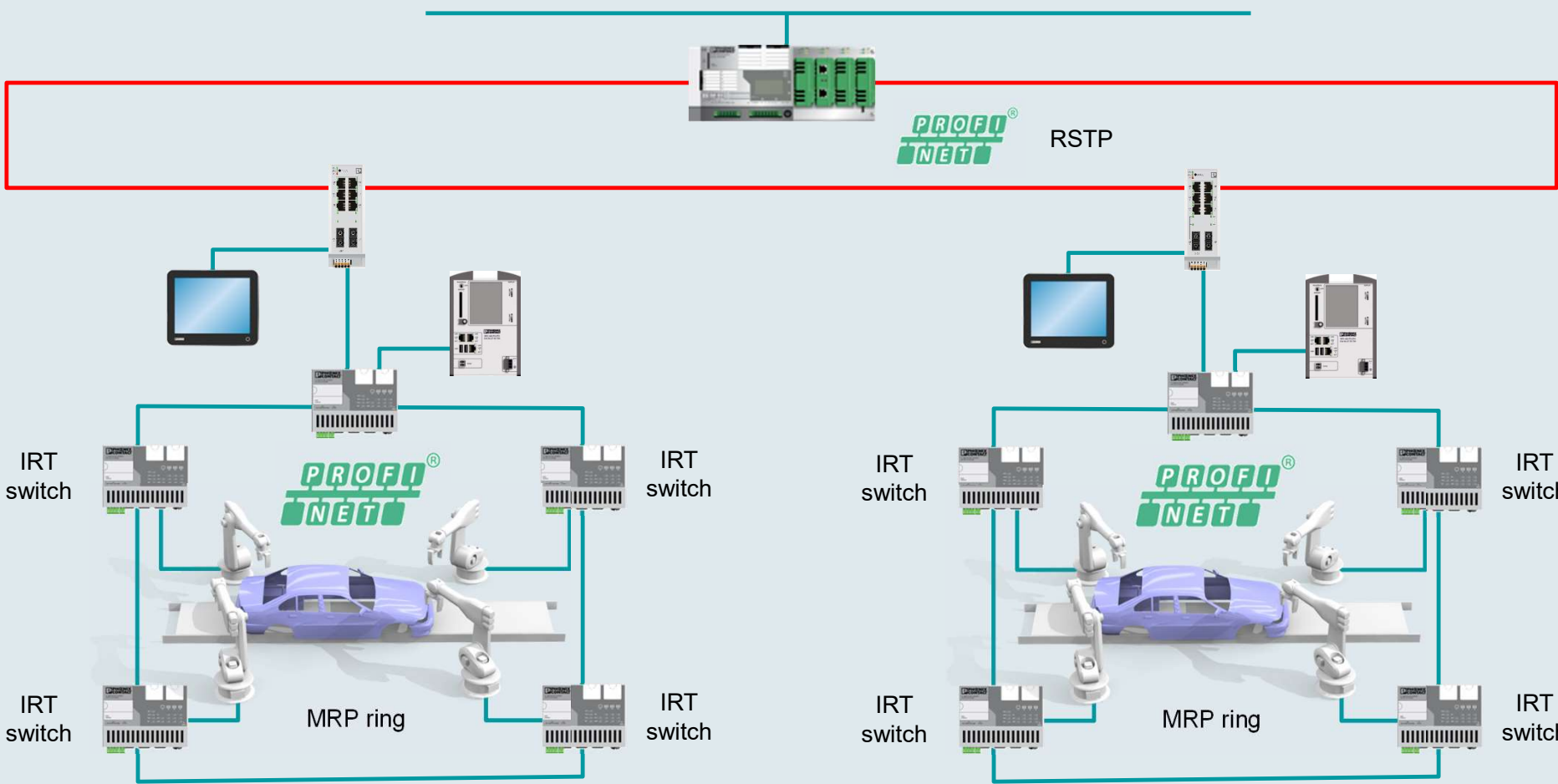
2700697



Automation protocols

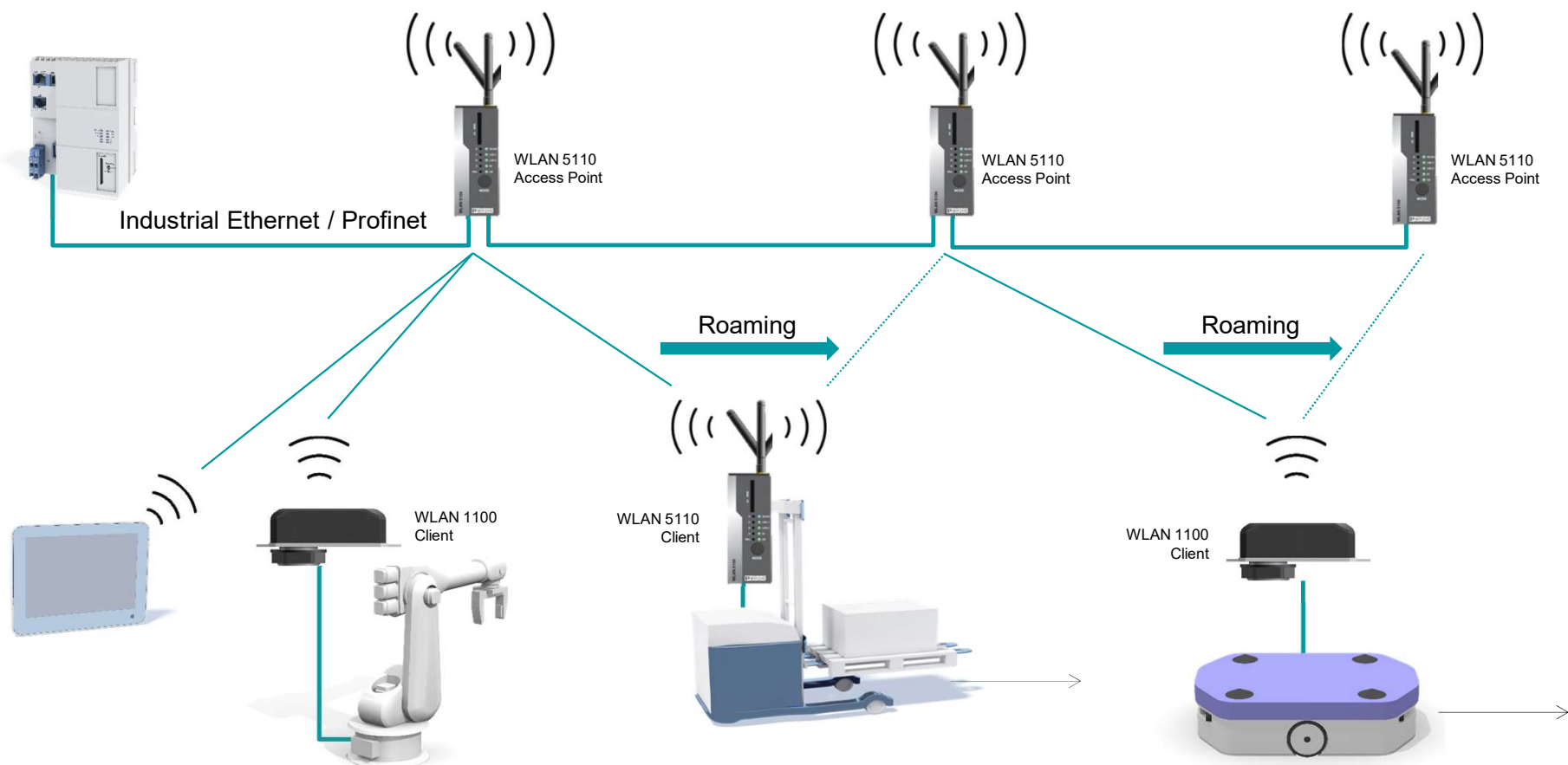


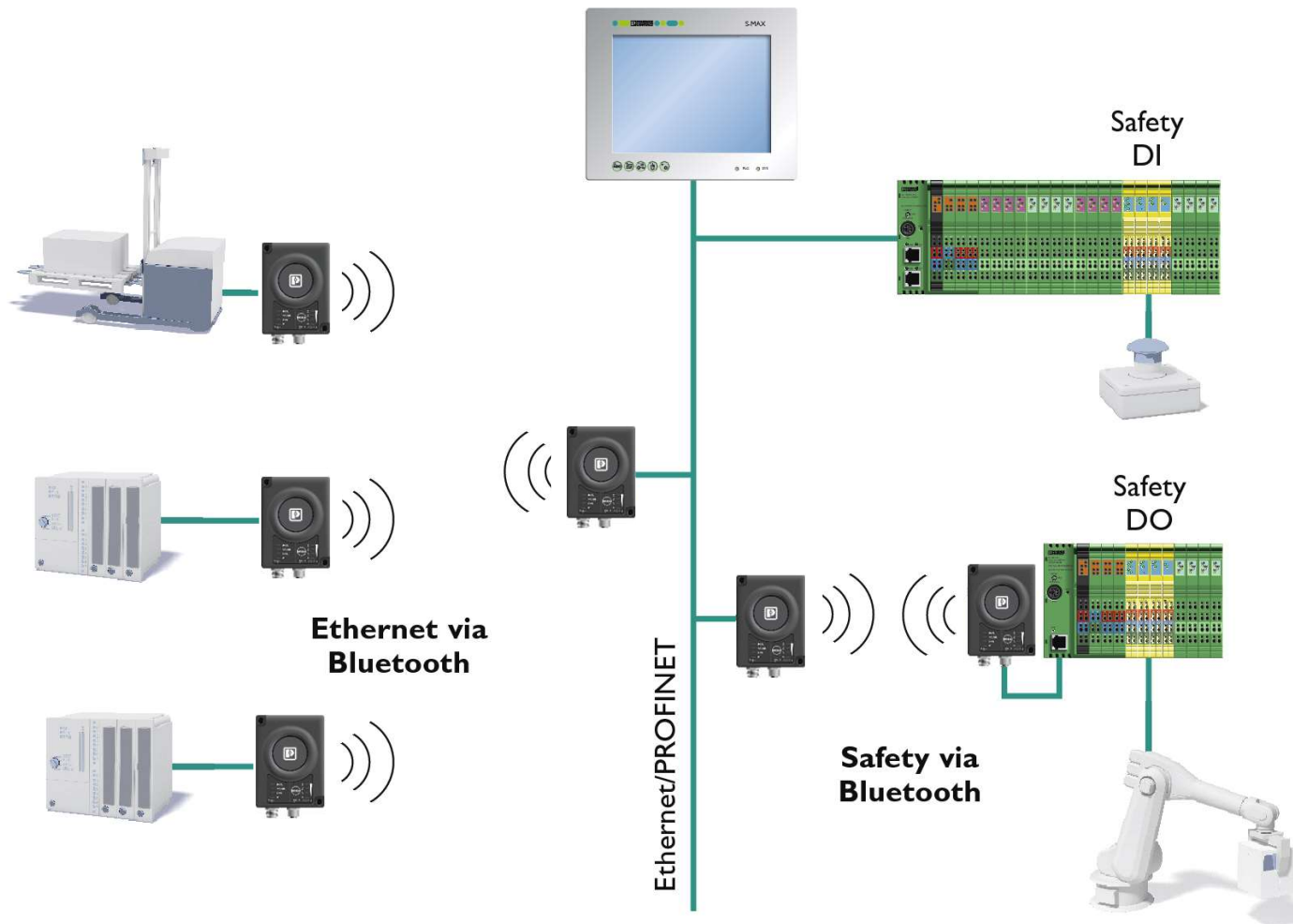




Modbus/TCP EtherNet/IP PROFINET

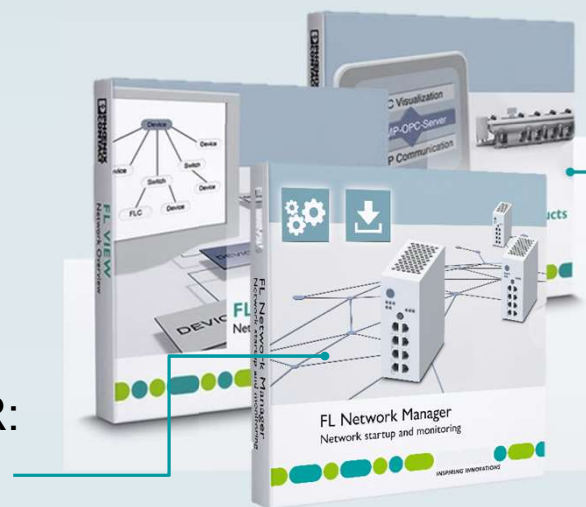
Wireless





Software

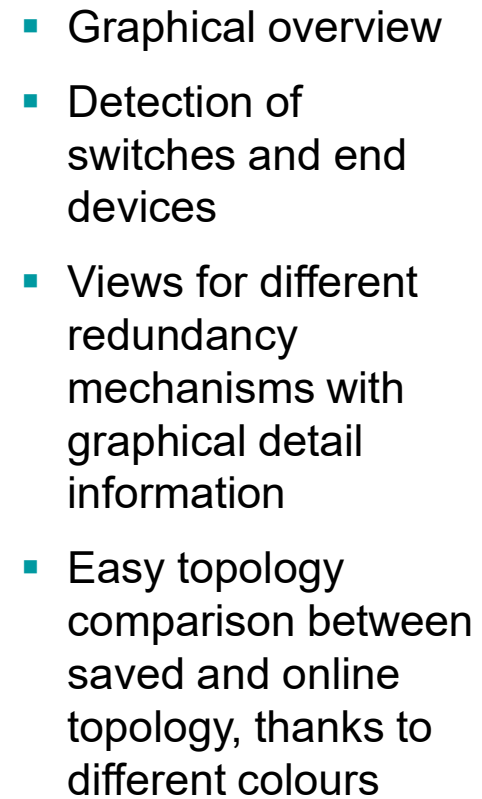
 **FL NETWORK MANAGER:**
Network startup and
monitoring



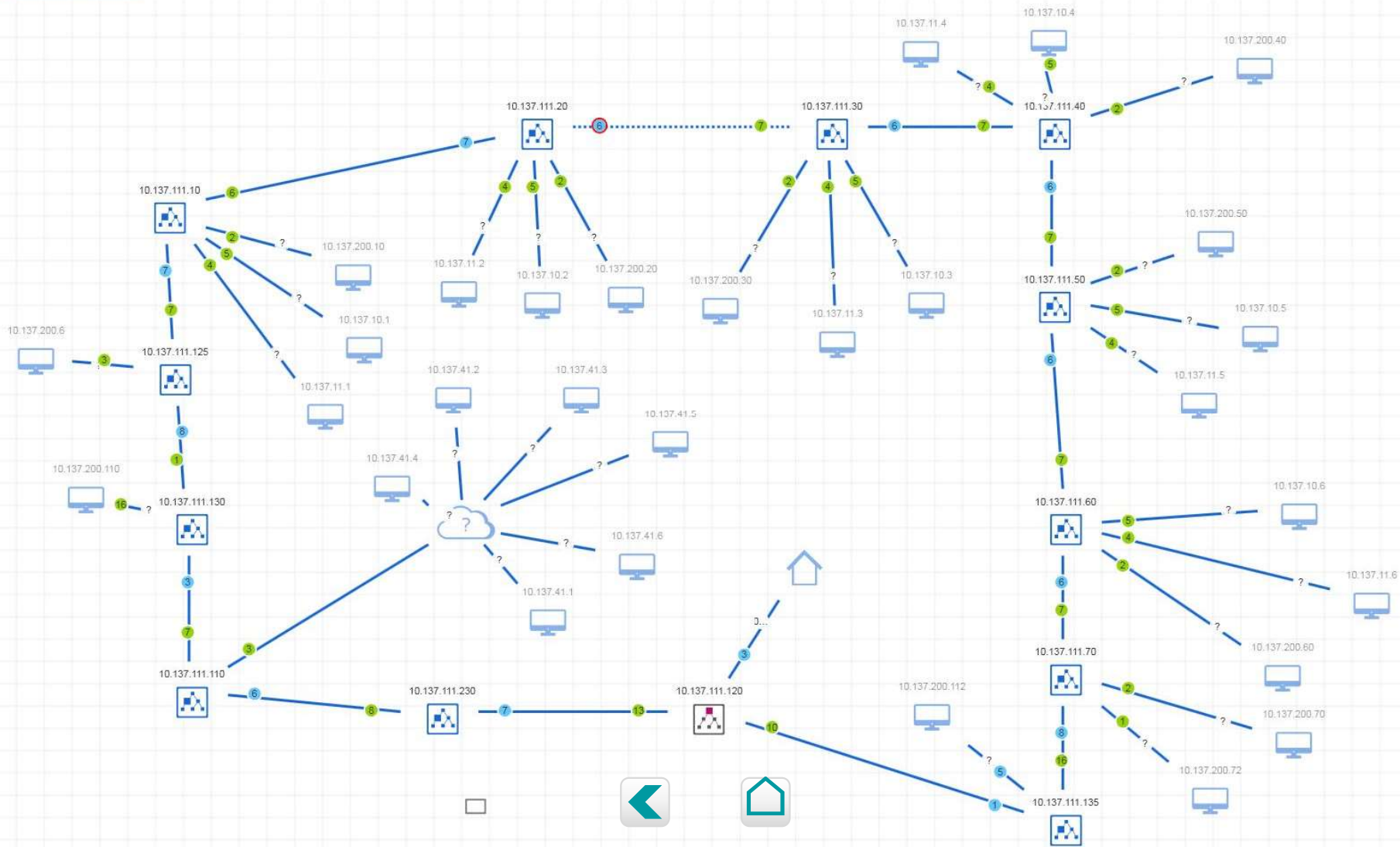
SNMP OPC Products: 
Linking of standardized
protocol types



Static Network Topology



~~Physikalische Topologie~~



FL NETWORK MANAGER BASIC - FLNetMan.netm*

File Edit Extras Window Help

PHOENIX CONTACT

PLANT

Project (20 of 20)

- 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 16TX
- 192.168.200.20 : Ethernet Device
- 192.168.200.10 : FL SWITCH MCS 16TX
- 192.168.200.205 : FL SWITCH MCS 16TX
- 192.168.200.7 : FL SWITCH GHS 12G
- 192.168.200.1 : FL SWITCH SMCS 8GT
- 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 16TX

Project X

Online Devices BOOTP/DHCP...

Online Devices

24 entries

IP mask	Default gateway	Name of station	Type	Status	Display Name (Online)	Subnet mask	Default
255.255.0		mmhs.gerd.de	FL SWITCH MM HS		Select online device here		
255.255.0		mcs.gerd	FL SWITCH MCS 16TX		Select online device here		
255.255.0		fl-switch-mcs-14tx-2tx	FL SWITCH MCS 16TX		192.168.200.2 : 00:A0:45:05:6E:FE	255.255.255.0	
255.255.0		fl-switch-irt-tx-3pof	Ethernet Device		192.168.200.20 : 00:A0:45:03:03:04	255.255.255.0	
					192.168.178.200 : 00:0E:0C:50:C7:30	255.255.255.0	149.21
255.255.0		fl-switch-mcs-slernpunkt	FL SWITCH MCS 16TX		192.168.200.10 : 00:A0:45:07:8F:A9	255.255.255.0	
255.255.0	192.168.200.1	FL SWITCH MCS 16TX	FL SWITCH MCS 16TX		192.168.200.205 : 00:A0:45:03:89:55	255.255.255.0	192.11
255.255.0		FL SWITCH SMCS 8GT	FL SWITCH SMCS 8GT		192.168.200.1 : 00:A0:45:0A:02:D5	255.255.255.0	
255.255.0		FL NAT SM	Ethernet Device		192.168.200.233 : 00:A0:45:AD:2A:FC	255.255.255.0	
255.255.0	192.168.200.1	FL MGUARD RS 2000	Ethernet Device		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		192.168.200.16 : 00:A0:45:08:55:F7		
		FL SWITCH LM 5TX	Ethernet Device		192.168.200.15 : 00:A0:45:27:AD:6F		
		FL SWITCH 7008-EIP	FL SWITCH 7008-EIP		192.168.200.3 : 00:A0:45:CA:D9:65		
255.255.0		FL SWITCH 3008	Ethernet Device		192.168.200.4 : 00:A0:45:61:C1:59	255.255.255.0	
			Ethernet Device		192.168.200.18 : 00:A0:45:D8:35:72		
			Ethernet Device		192.168.200.17 : 00:A0:45:D8:31:9A		
			Ethernet Device		192.168.200.22 : 00:A0:45:B3:AF:BE		
		FL SWITCH 7006-2FX-EIP	Ethernet Device		192.168.200.21 : 00:A0:45:AD:1F:C1		

Scan options

SNMP scan

☒ Enable

Timeout (ms): 3000

Network adapter: 192

DGP scan

☒ Enable

Network adapter: FL

Ping scan

☒ Enable

Timeout (ms):

Maximum concurrent requests:

IsEnabled Sta

192.168.200.21

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	Successful firmware update on the device
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 Einstellungen

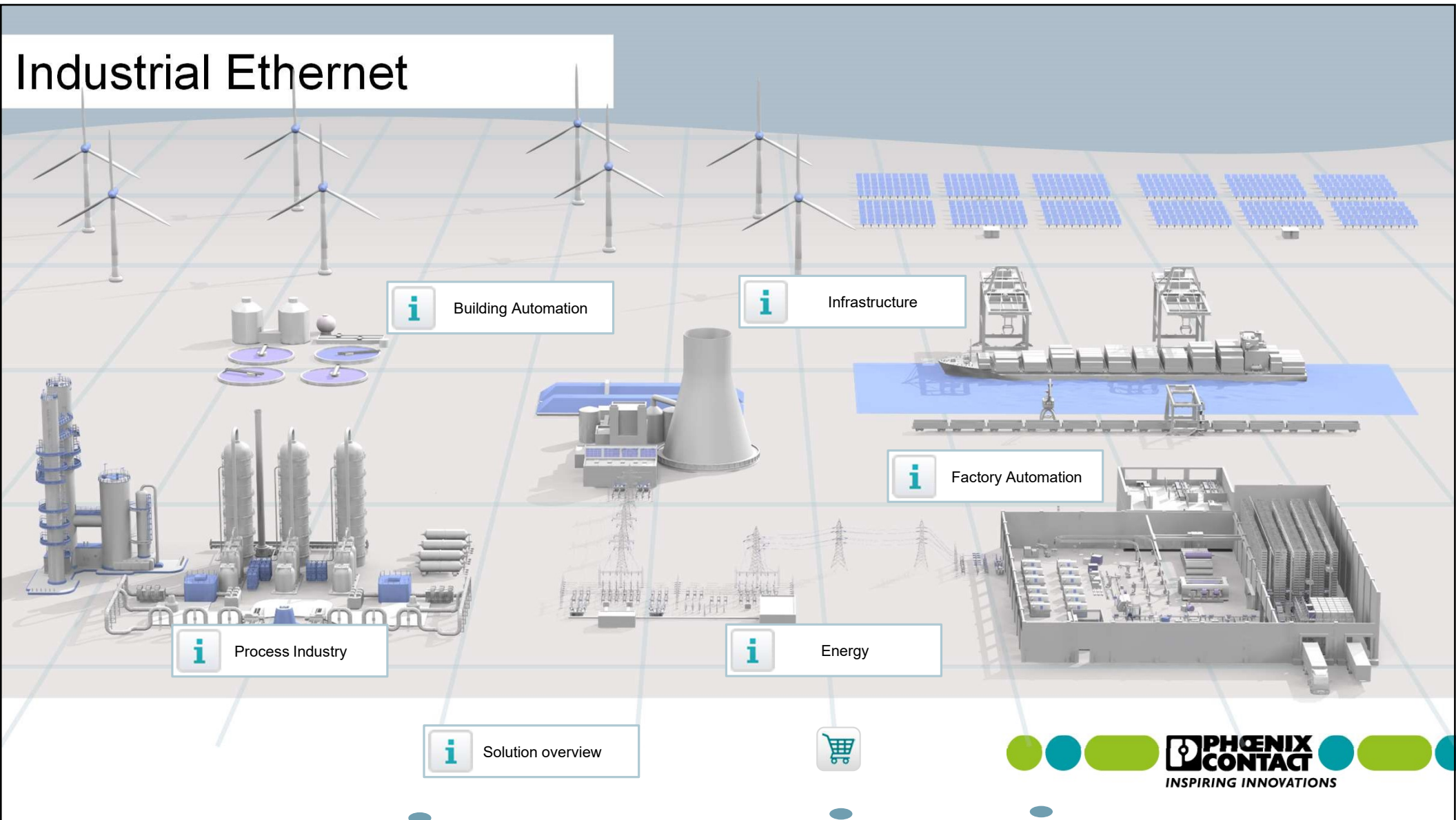
References

Web und Windows durchsuchen

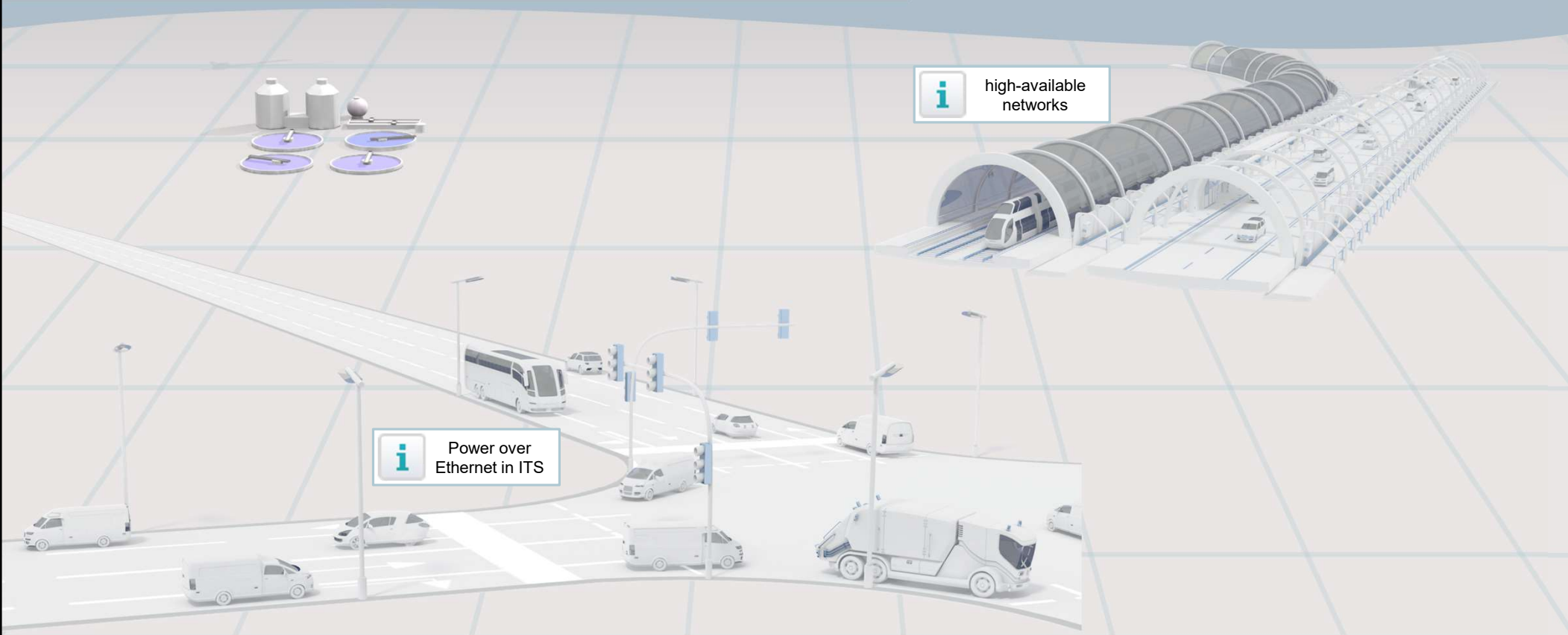
14:13 27.09.2016



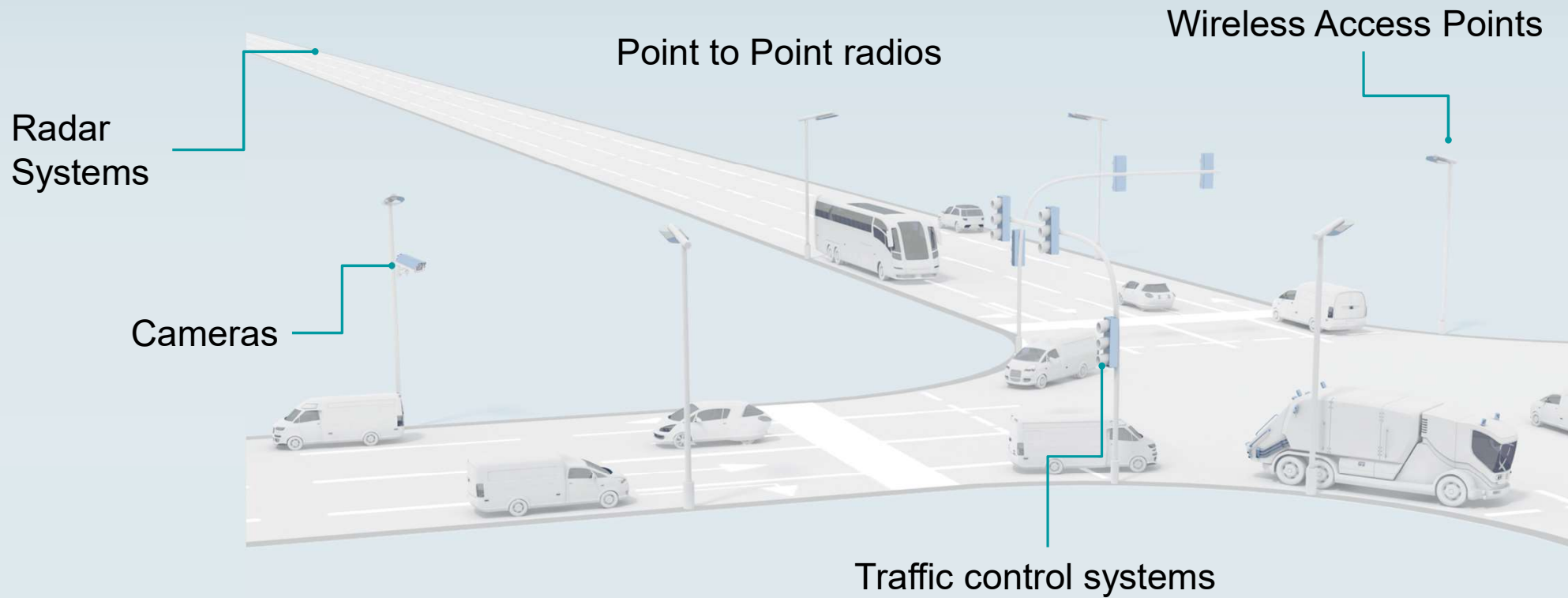
Industrial Ethernet



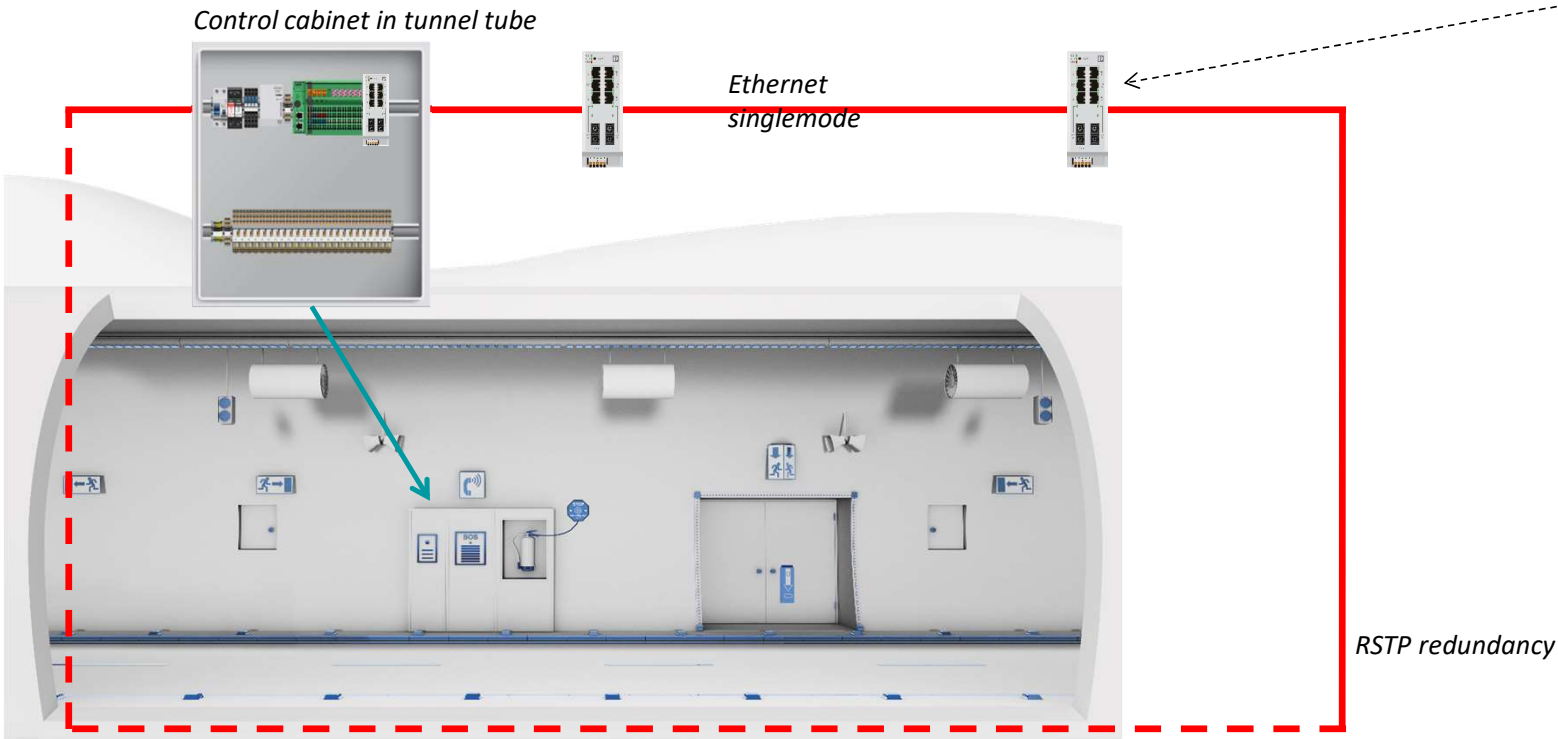
Infrastructure



ITS – Intelligent Transportation Systems



High-available infrastructure networks



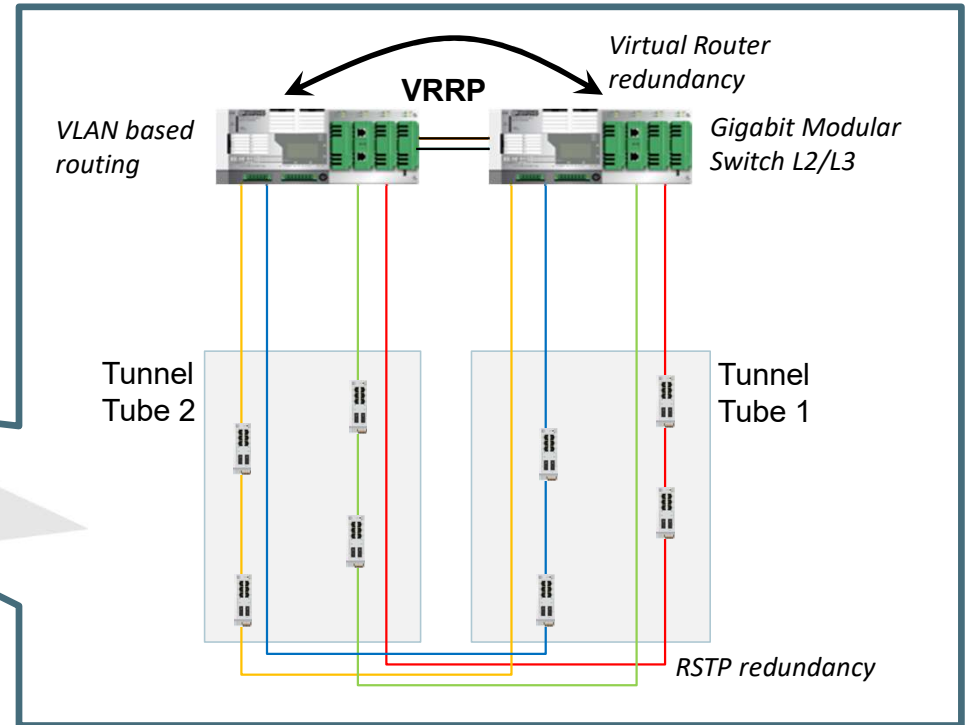
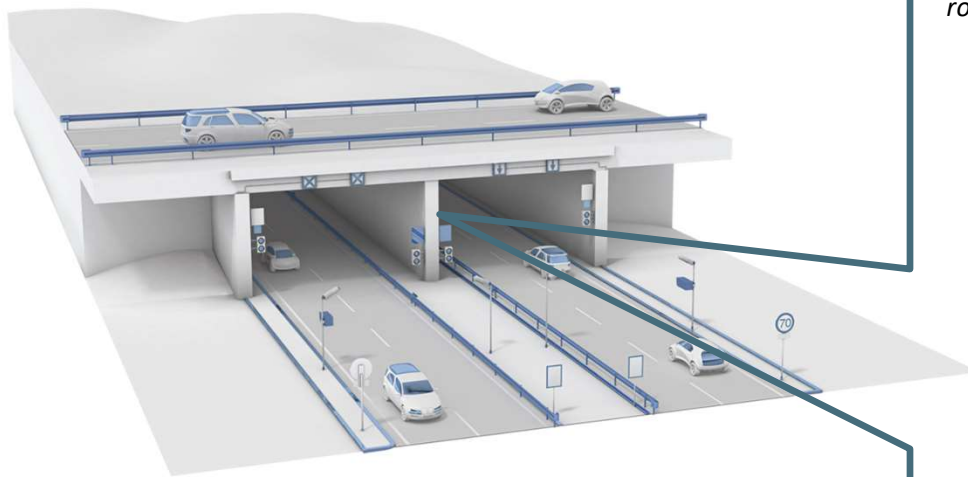
RX Power(dBm)	TX Power(dBm)
-16	-1.8
N/A	N/A

Integrated Fiber diagnostics

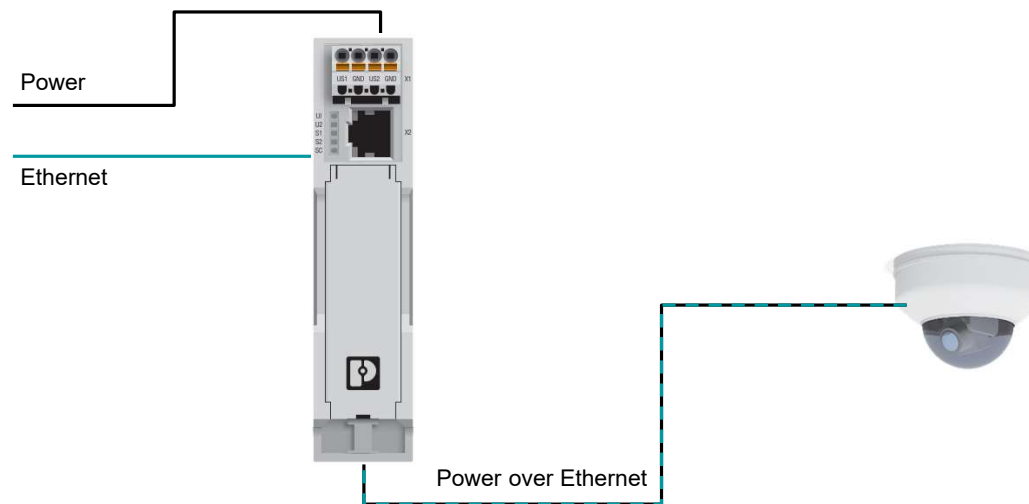


INSPIRING INNOVATIONS

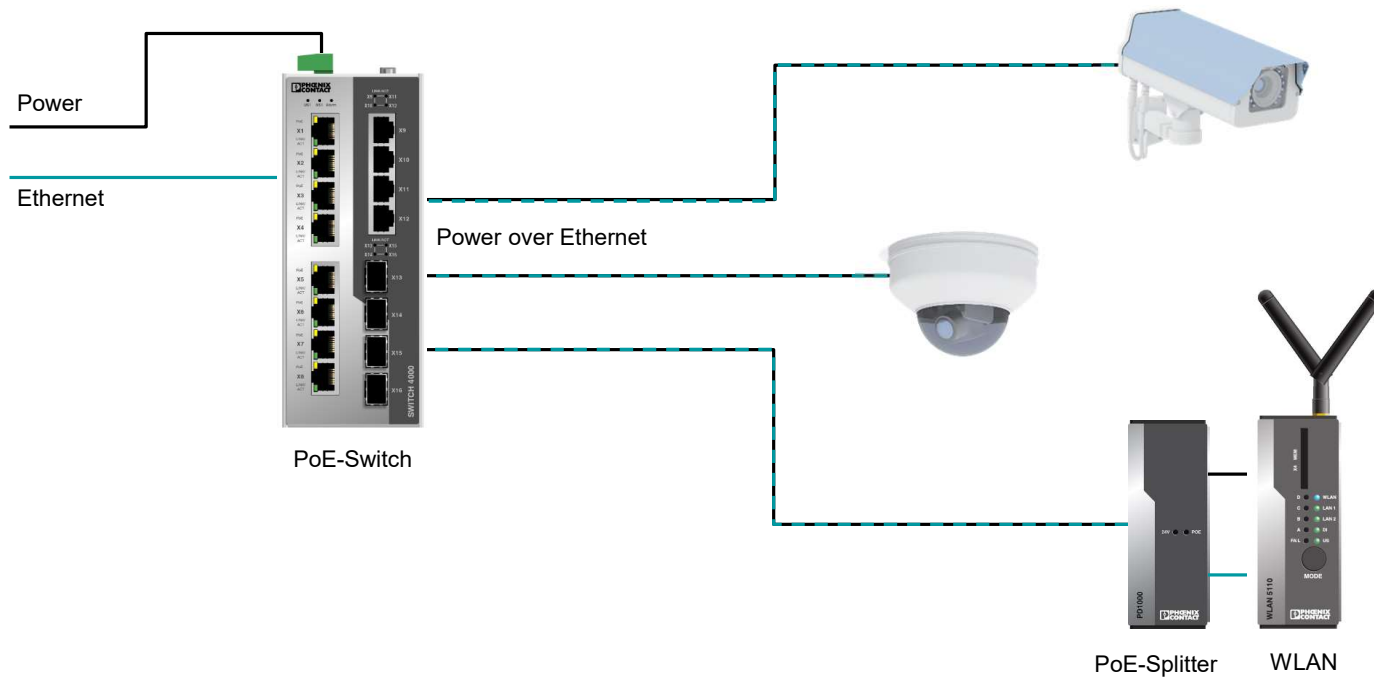
High-available infrastructure networks



Save installation costs with Power over Ethernet

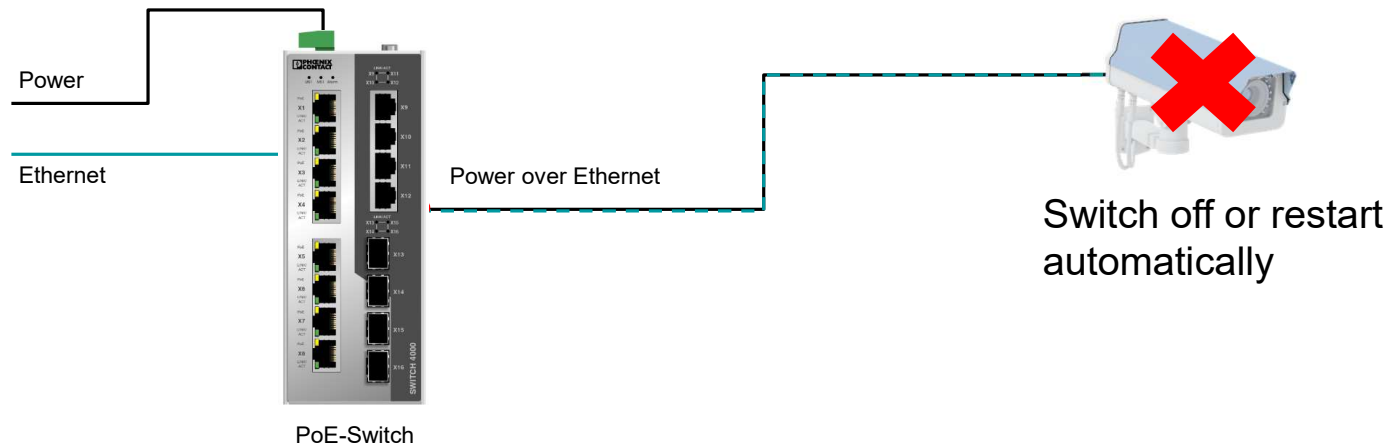


Save installation costs with Power over Ethernet



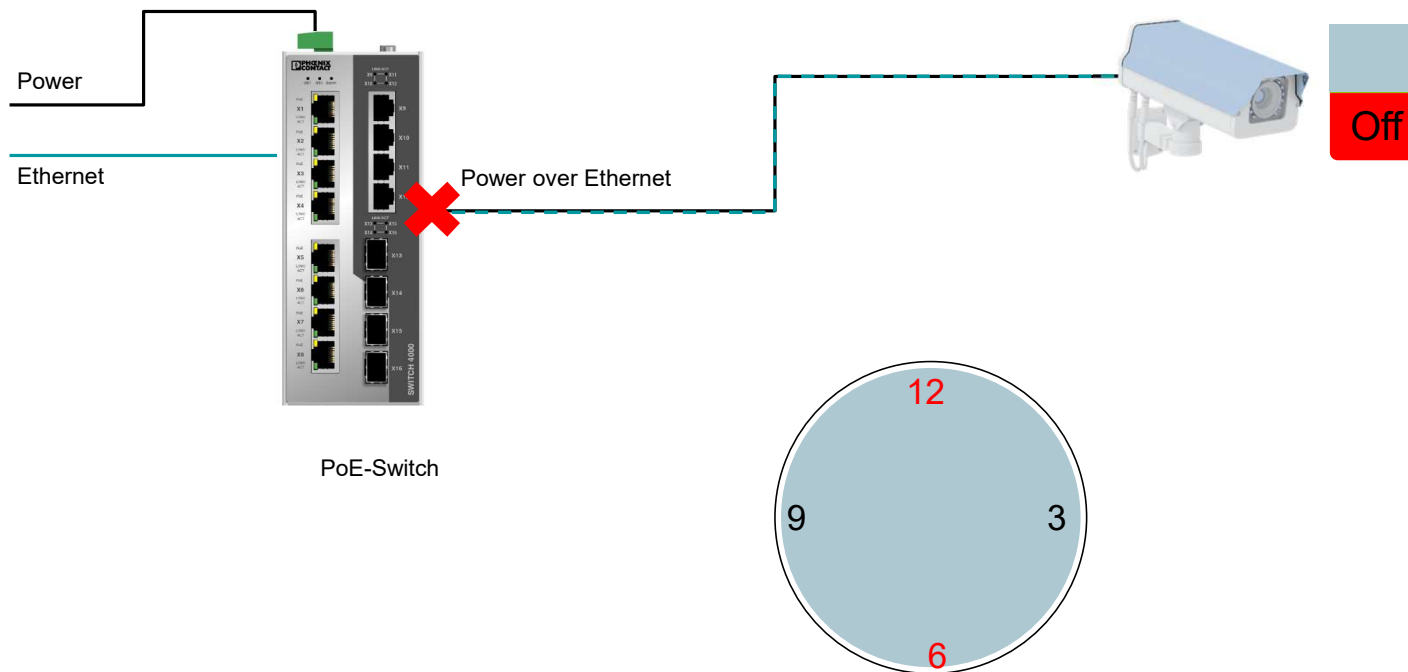
Save installation costs with Power over Ethernet

Watchdog function



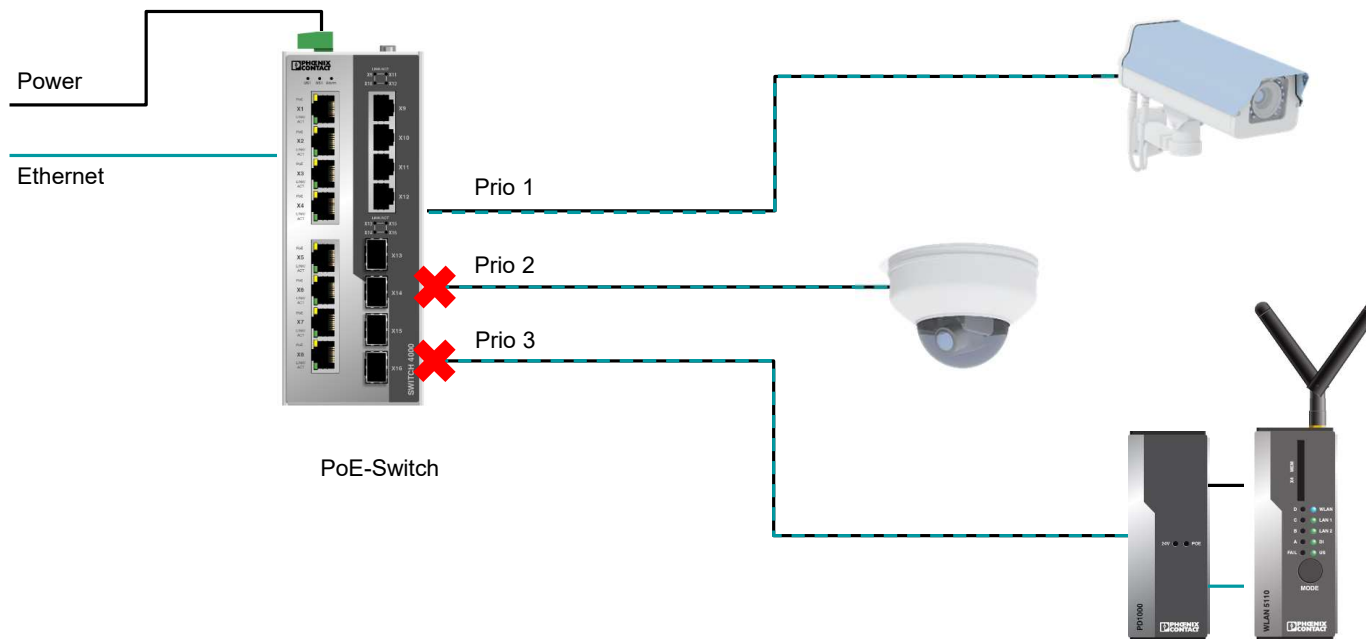
Save installation costs with Power over Ethernet

PoE Scheduler

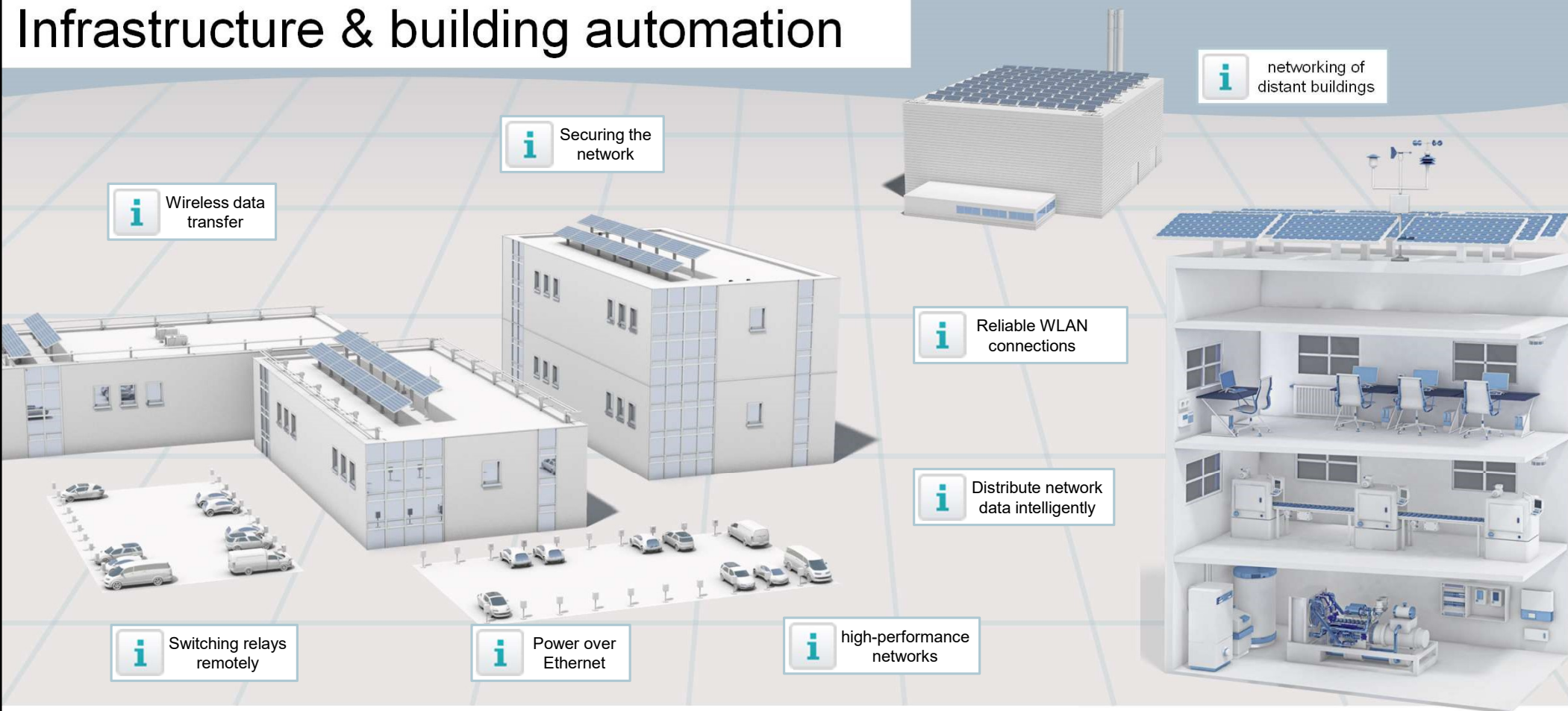


Save installation costs with Power over Ethernet

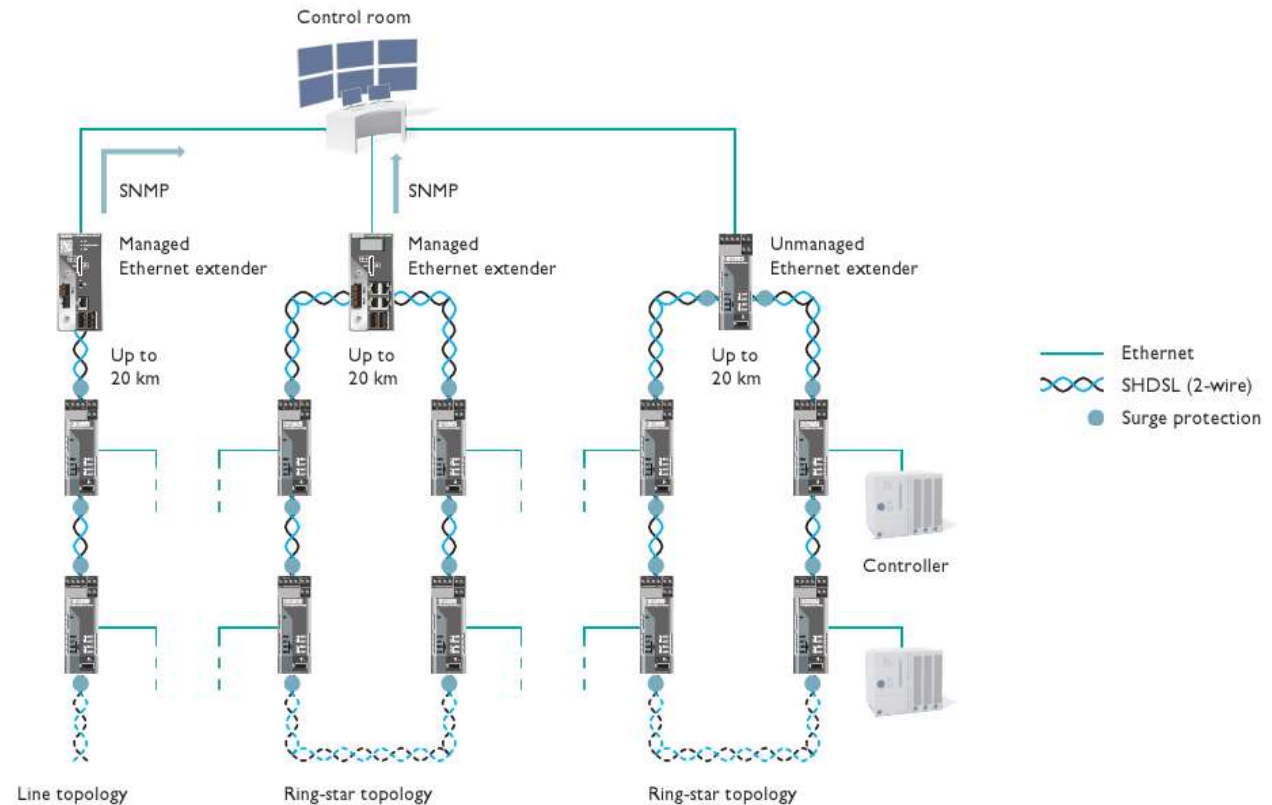
PoE Prioritization



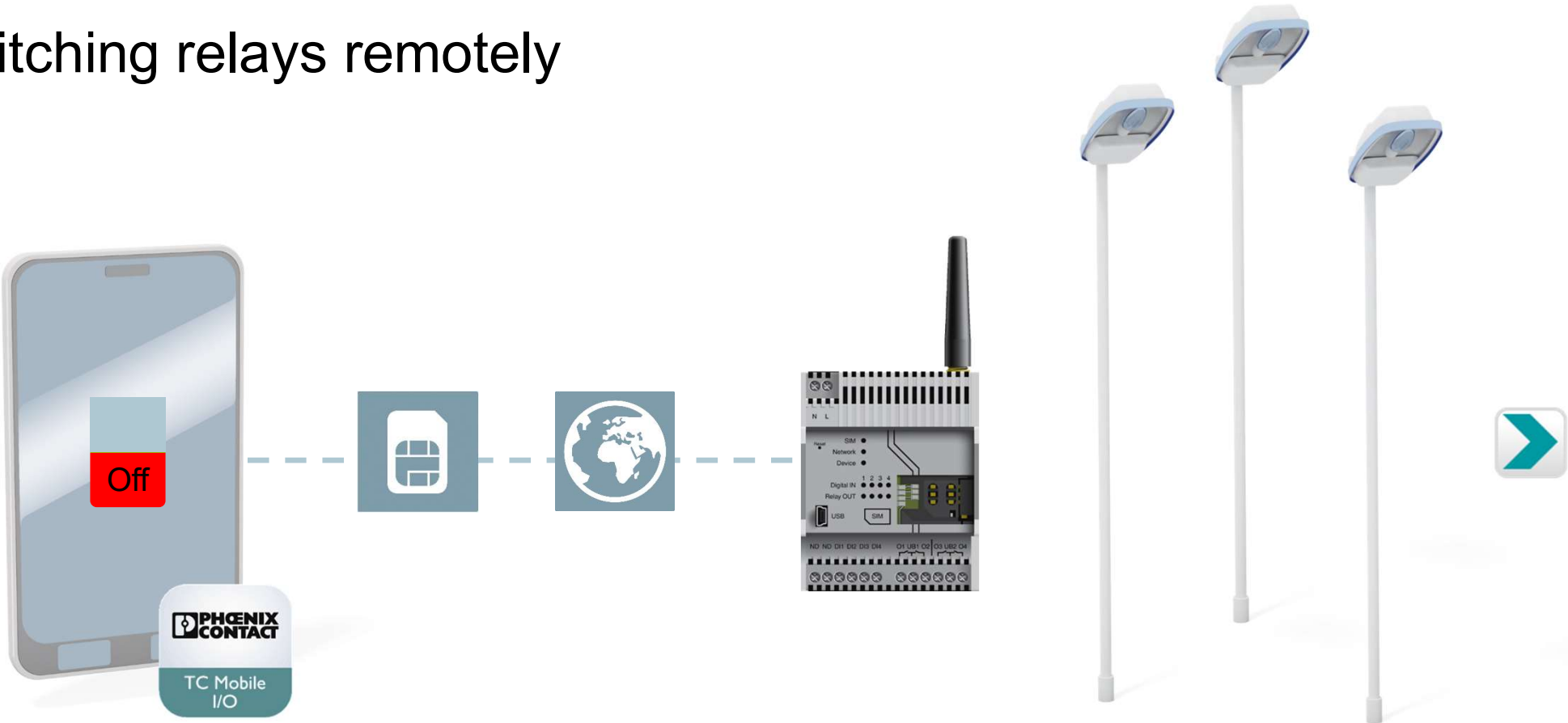
Infrastructure & building automation



Subsequent networking of distant buildings



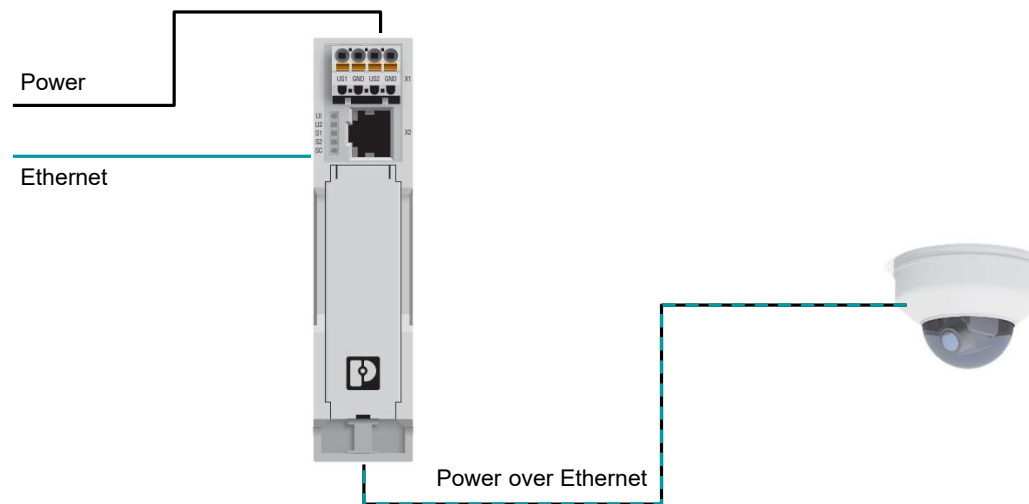
Switching relays remotely



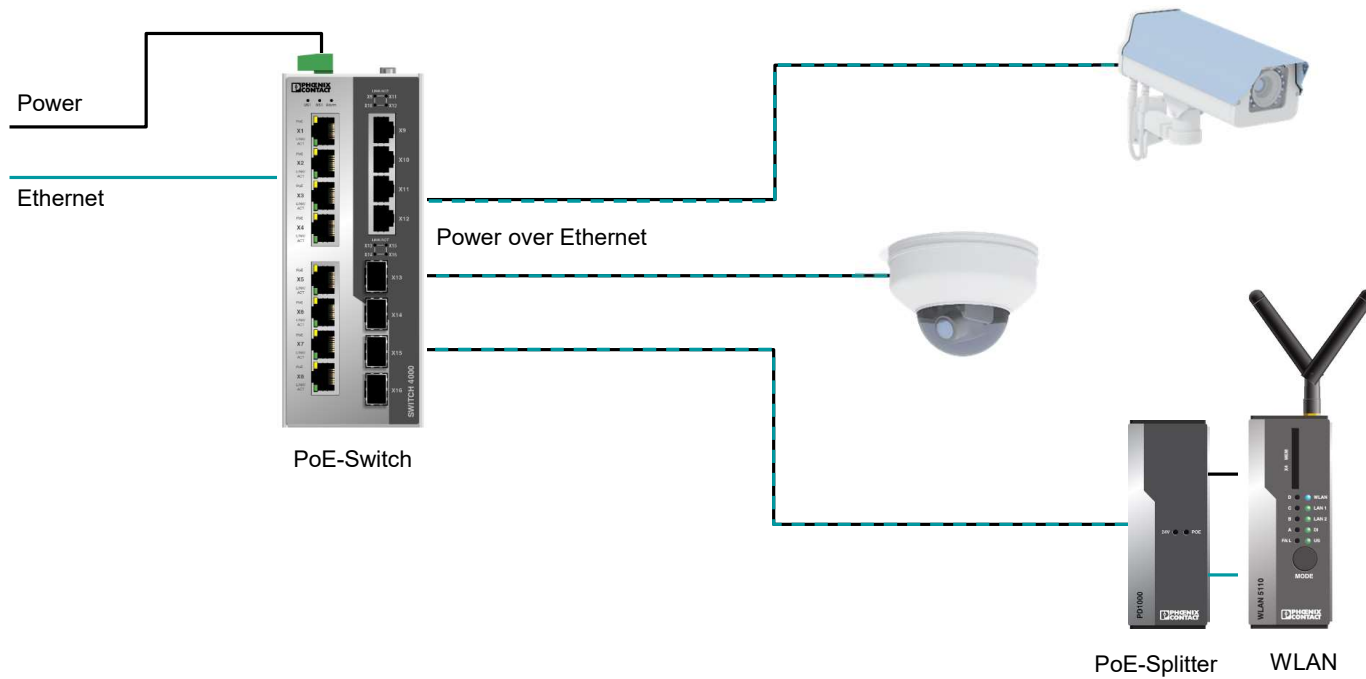
Switching relays remotely



Save installation costs with Power over Ethernet

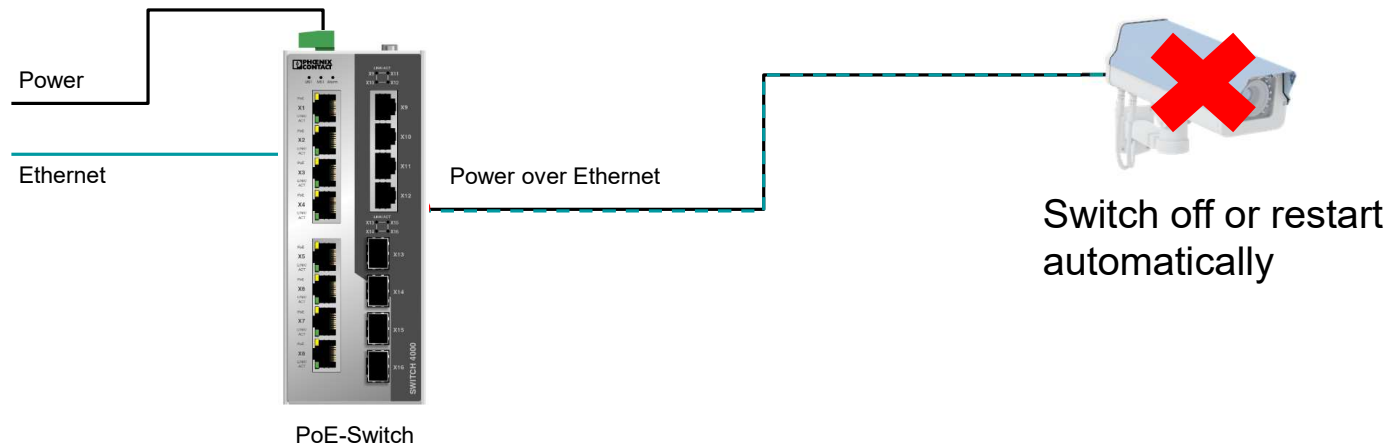


Save installation costs with Power over Ethernet



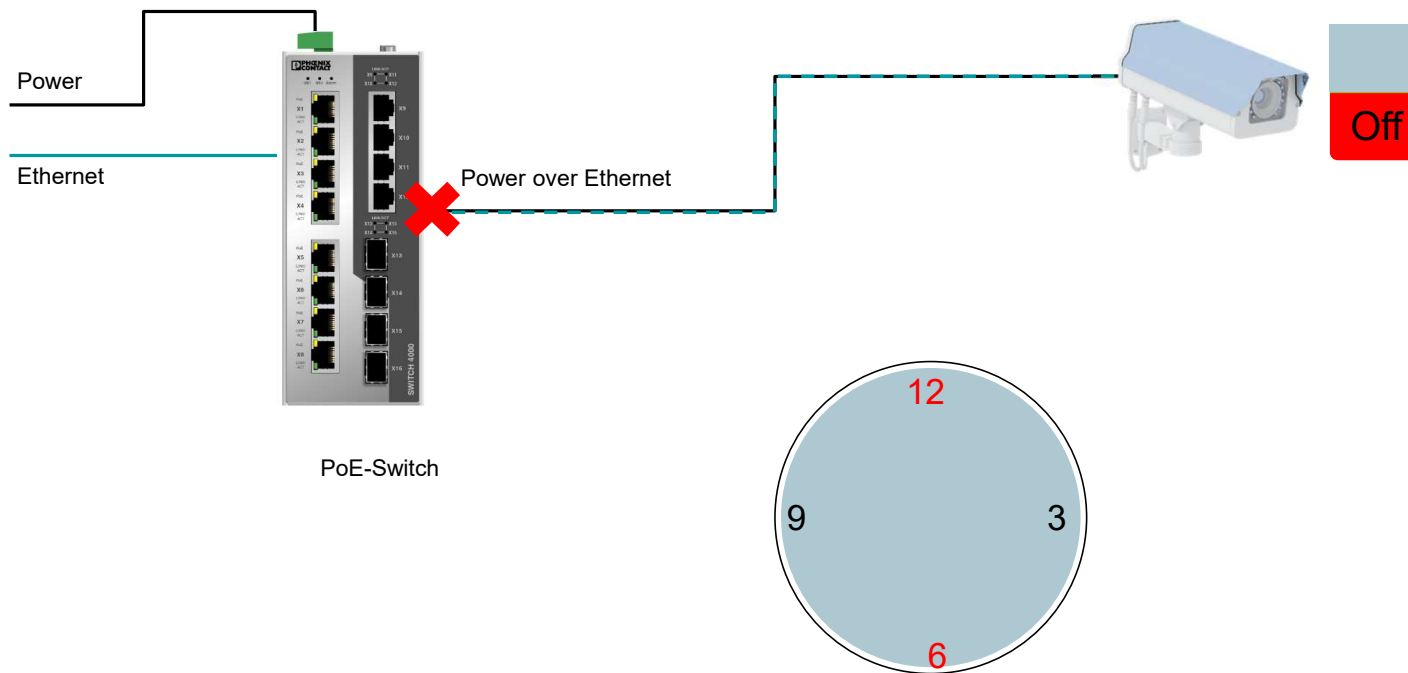
Save installation costs with Power over Ethernet

Watchdog function



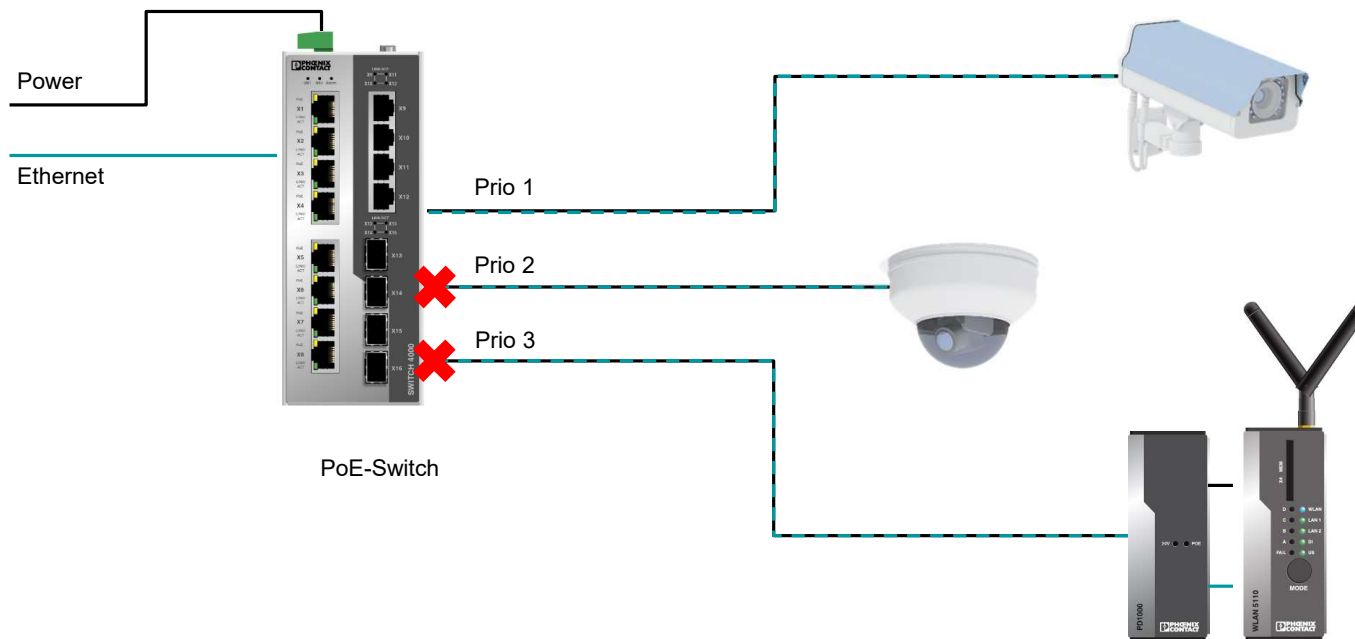
Save installation costs with Power over Ethernet

PoE Scheduler

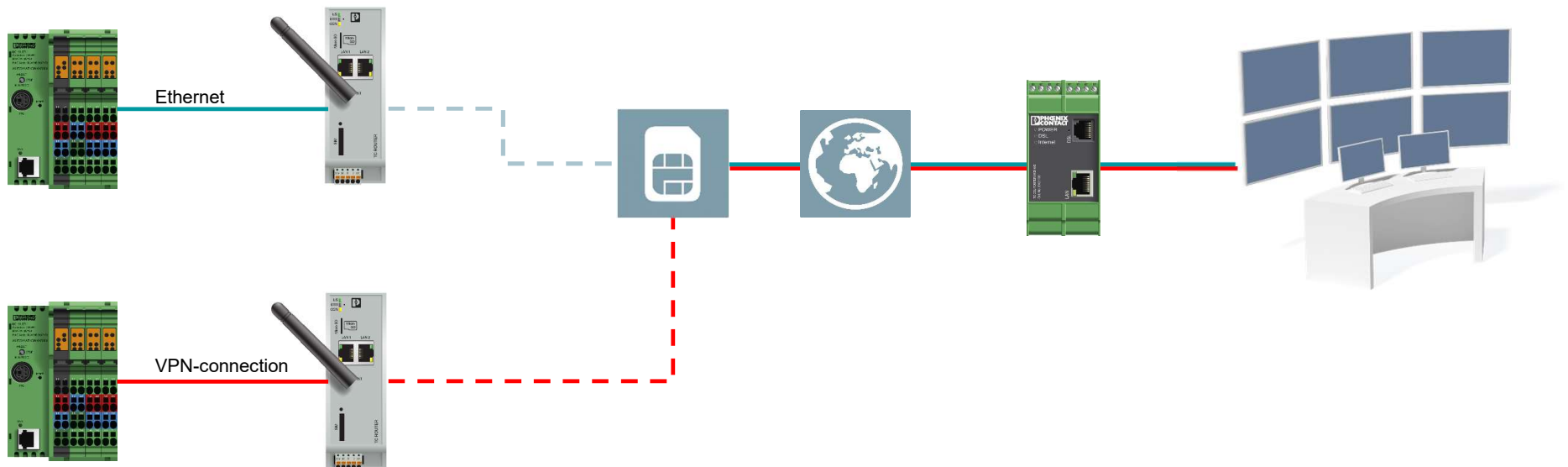


Save installation costs with Power over Ethernet

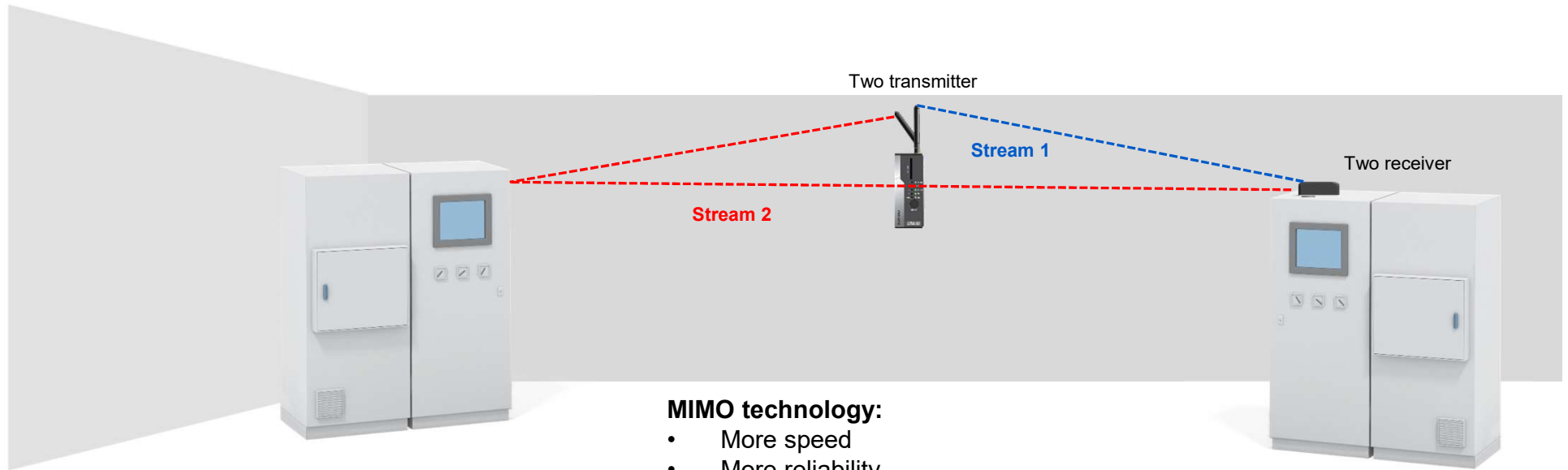
PoE Prioritization



Wireless data transfer from remote stations



Establishing reliable WLAN connections



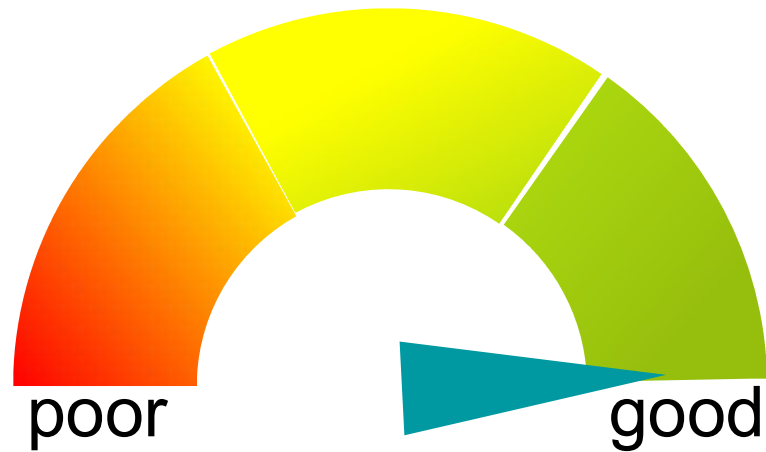
MIMO technology:

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



Distribute network data intelligently

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



Network stability

215 Network devices



⚡ High broad-and multicast-traffic in the network

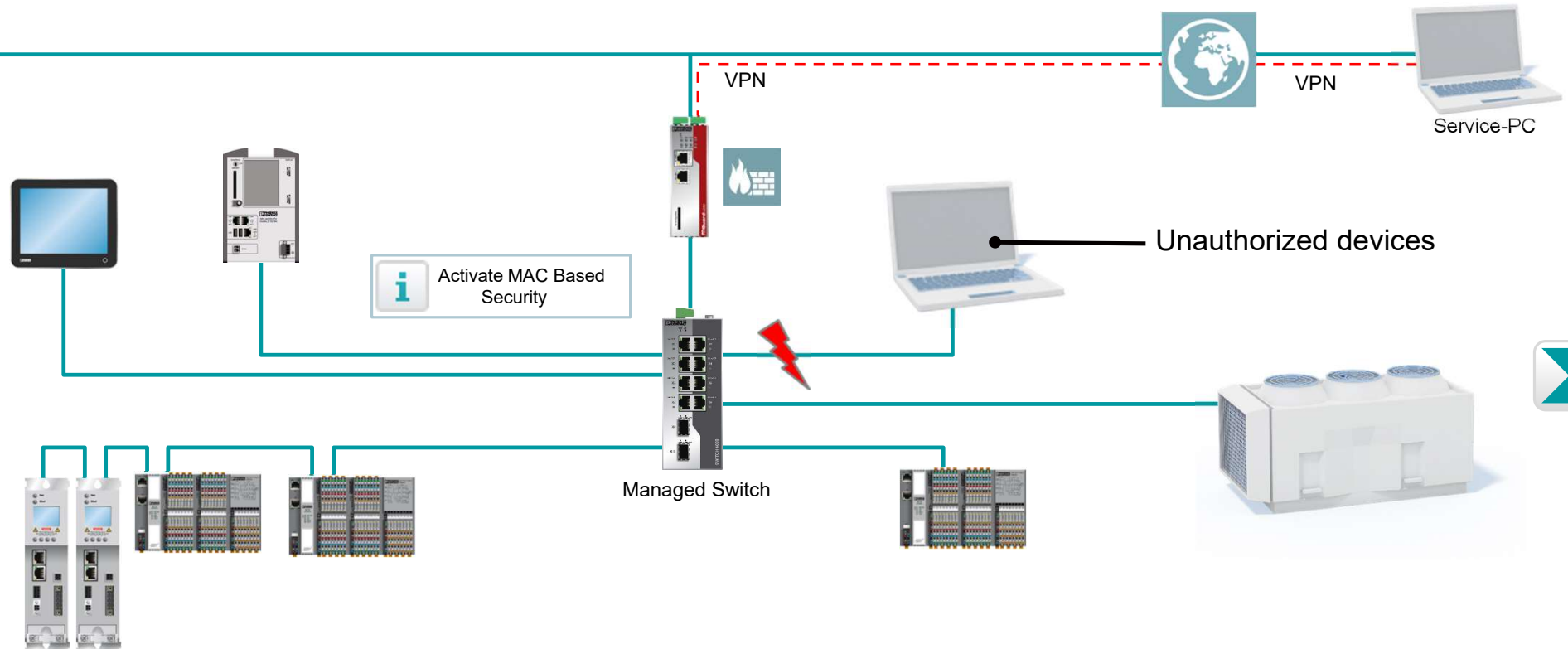
⚡ Unauthorized devices

⚡ Network loop

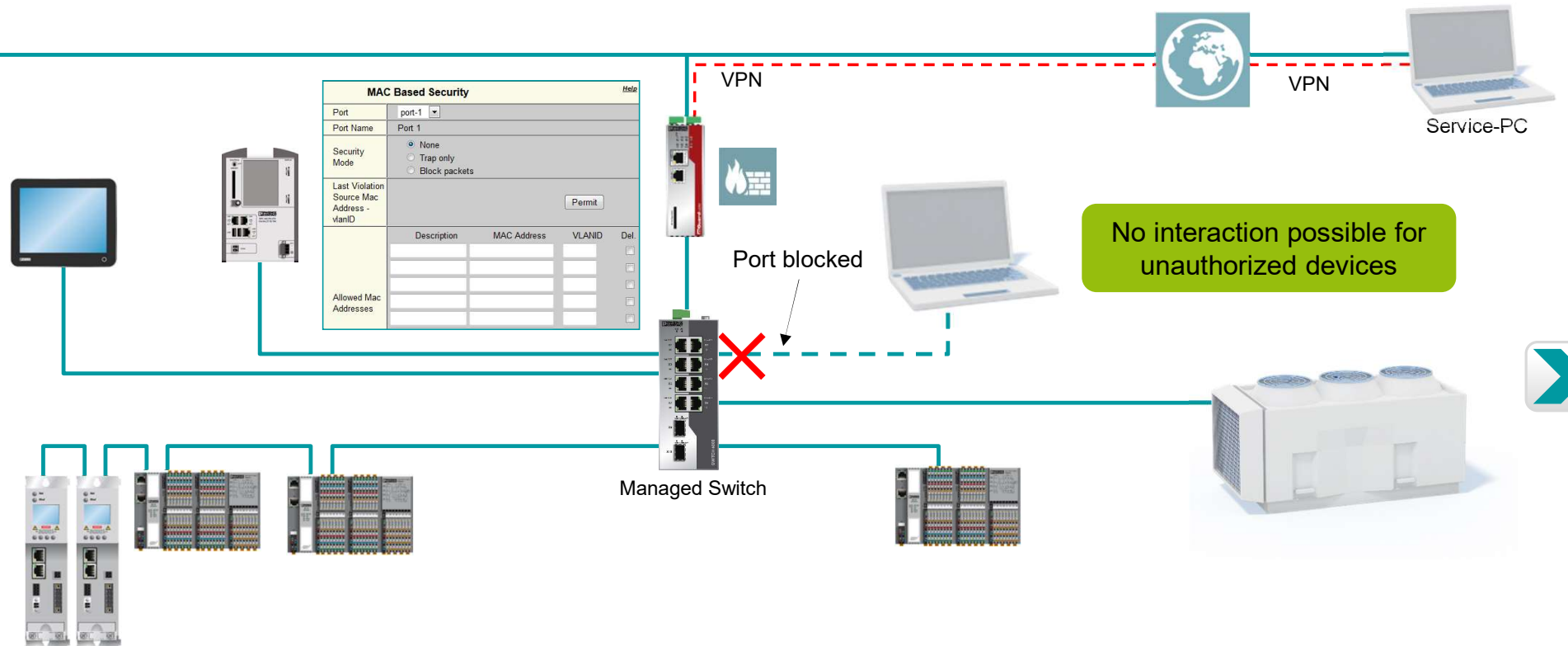
⚡ Cable and connector problems



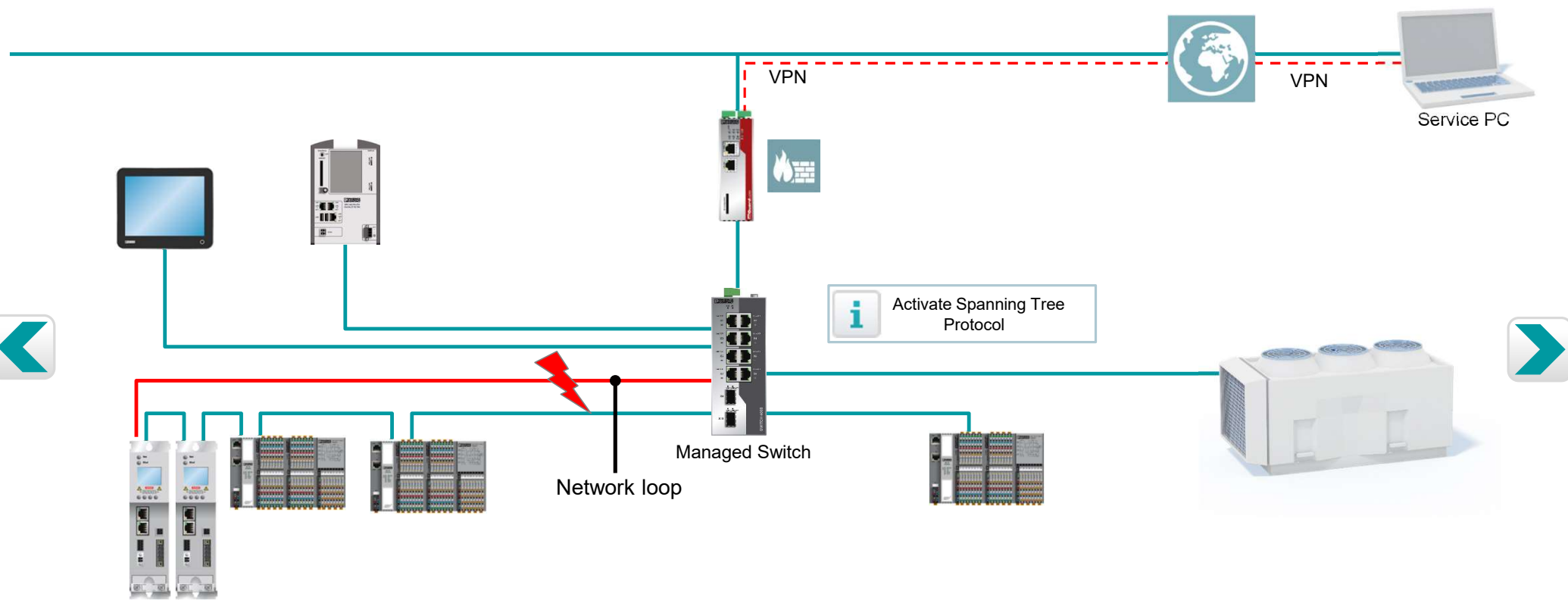
Unauthorized devices



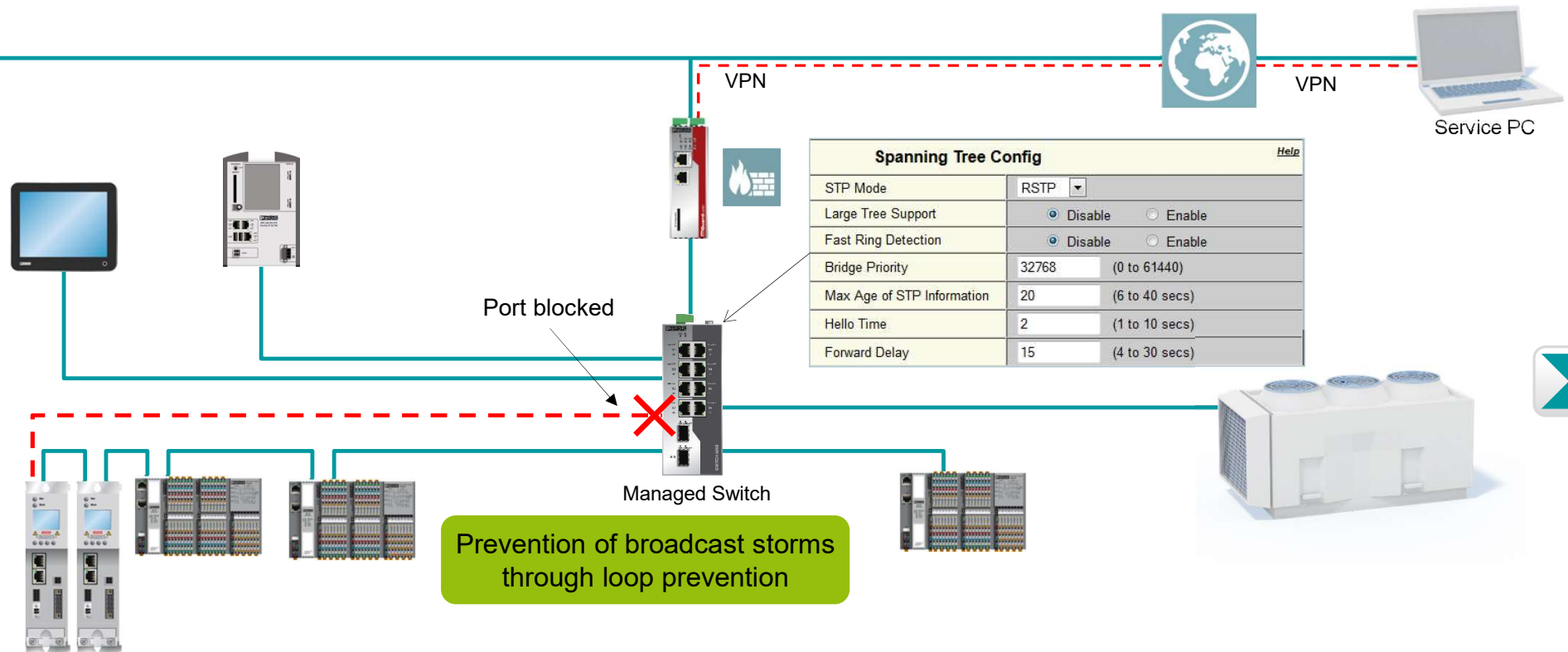
Our Solution: MAC Based Security



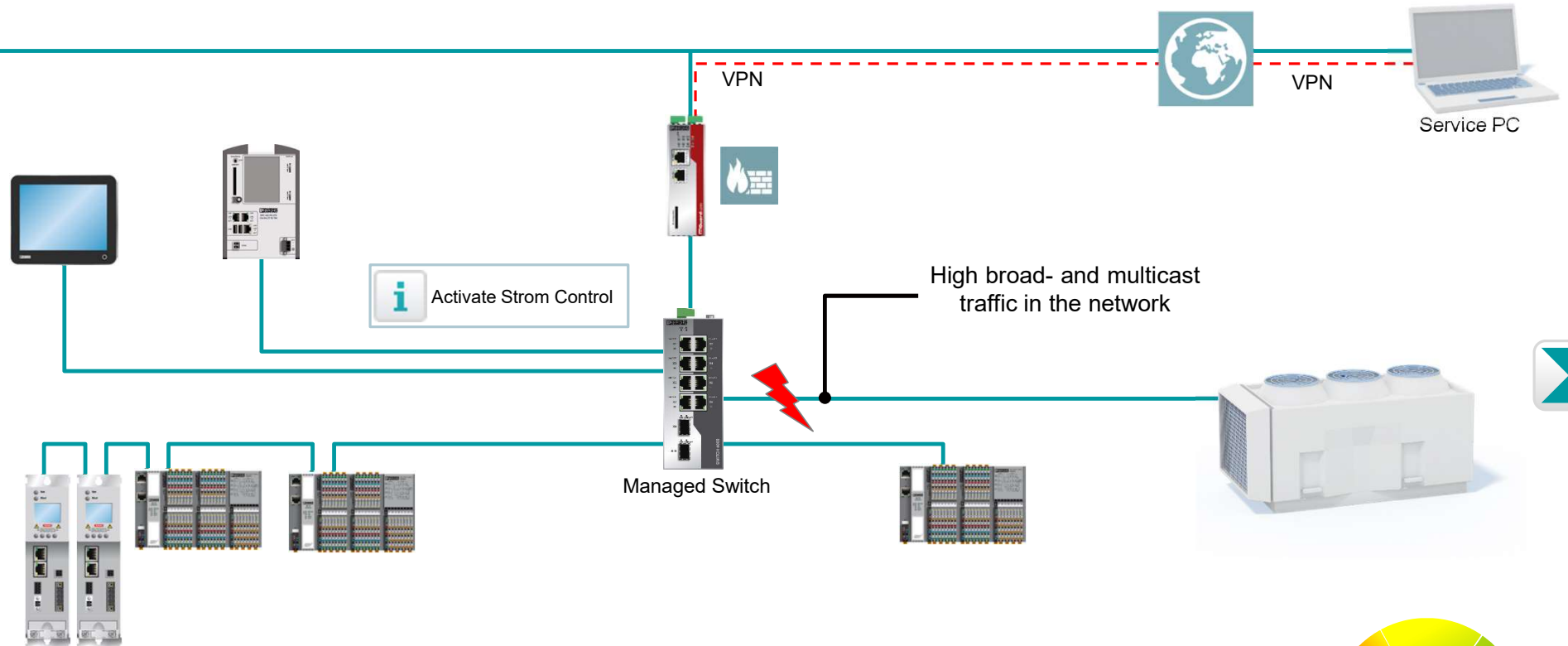
Network Loops



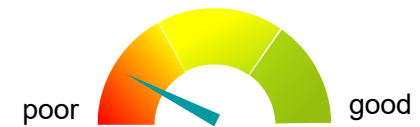
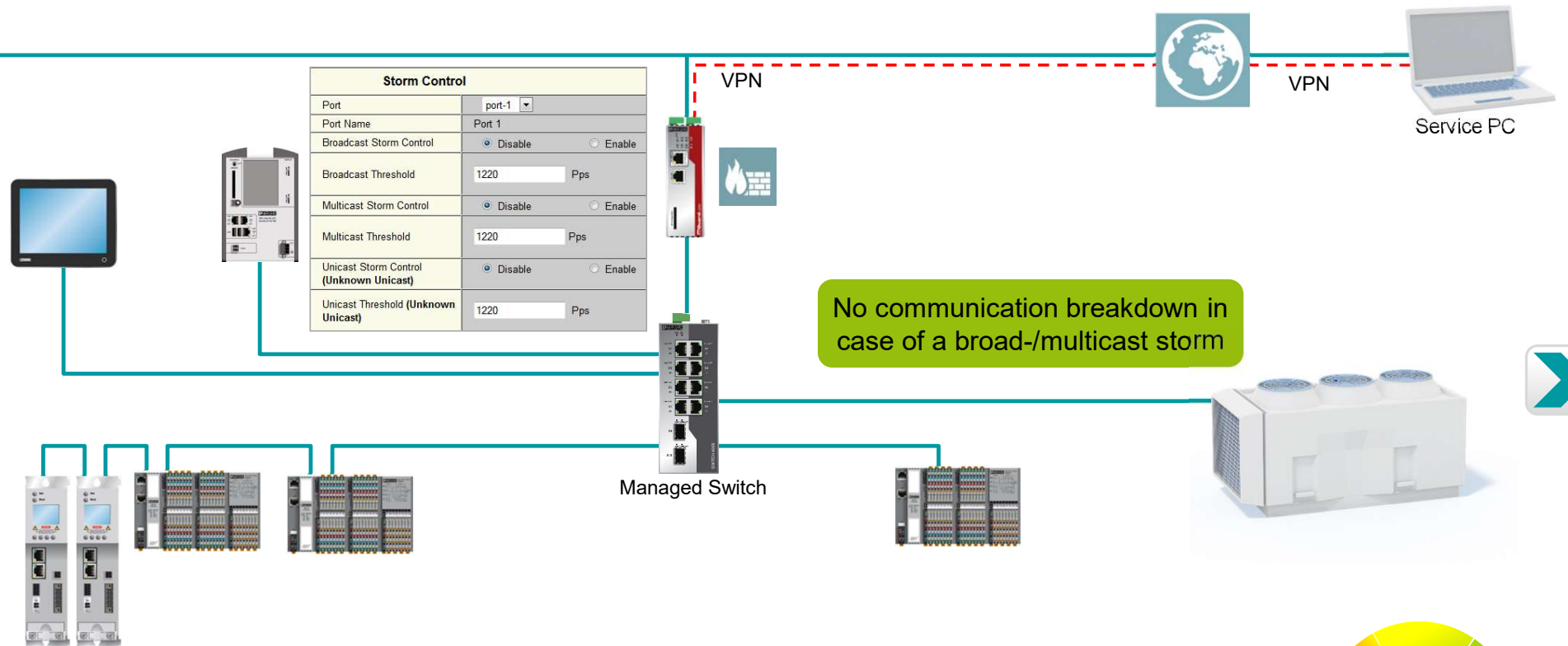
Our Solution: Spanning Tree Protocol



High broad- and multicast traffic



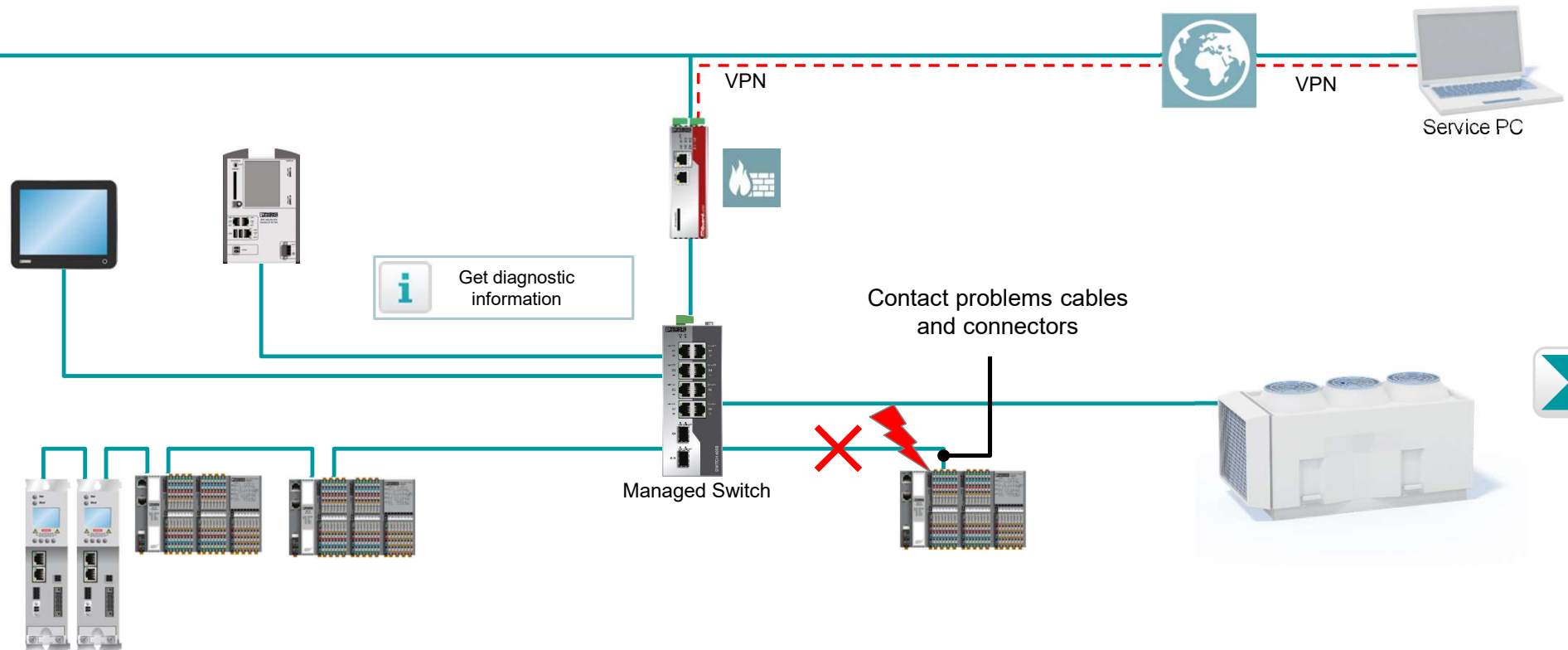
Our solution: Storm control



Realtime and availability

PHOENIX CONTACT
INSPIRING INNOVATIONS

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

Enter password: *****

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')

VPN

VPN

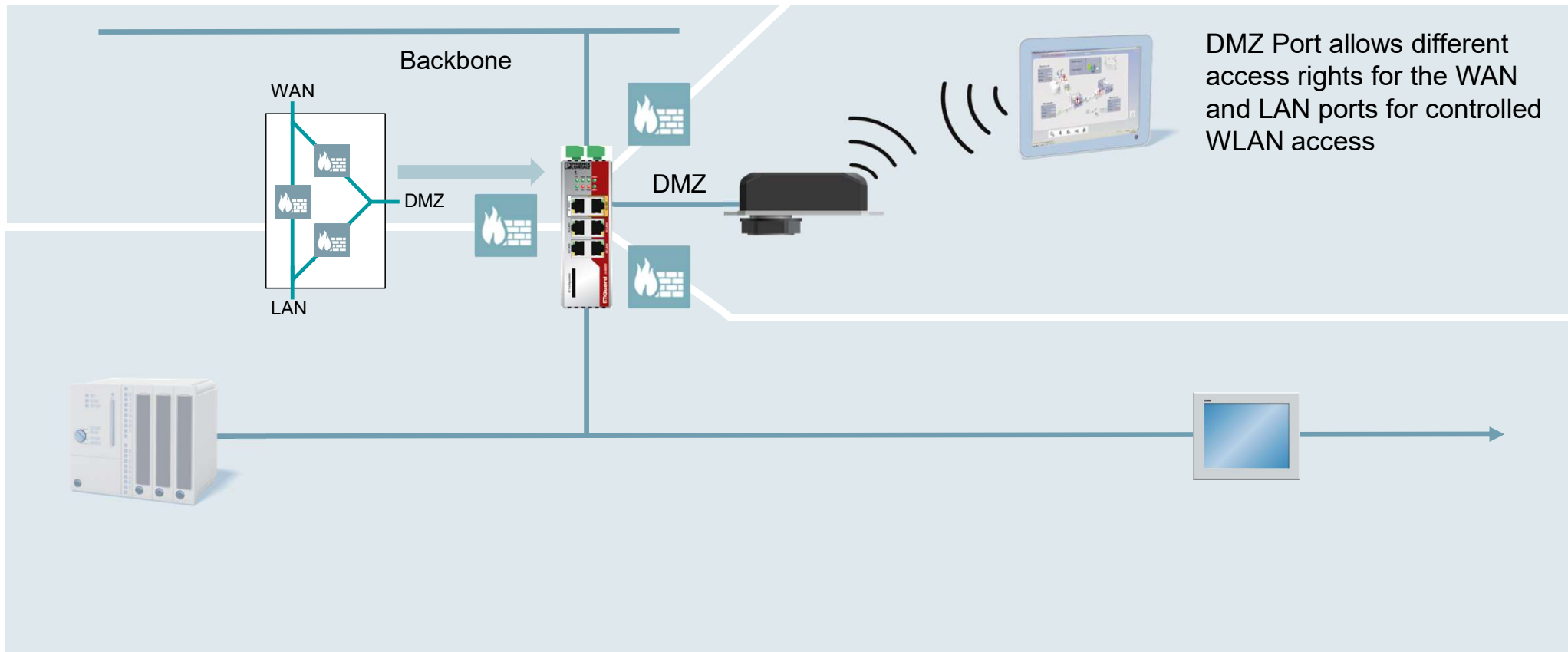
Service PC

Receive diagnostic information in case of problems with cables and connectors

Managed Switch



Secure WLAN machine network





Ethernet



CIFS Integrity Monitoring

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

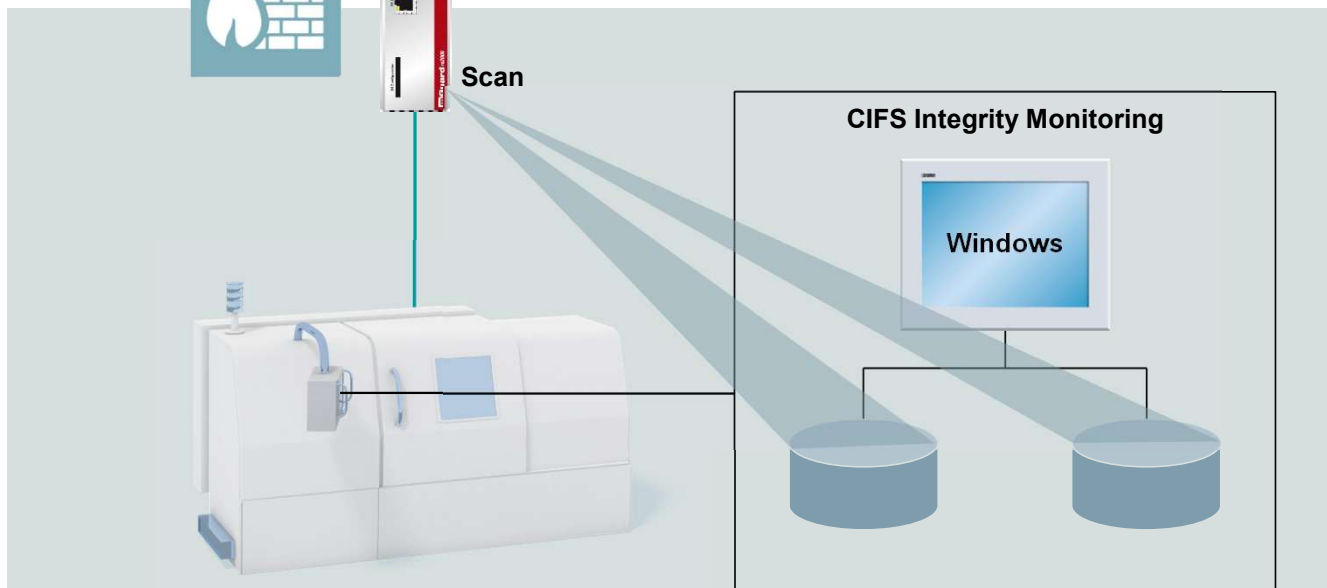


Firewall

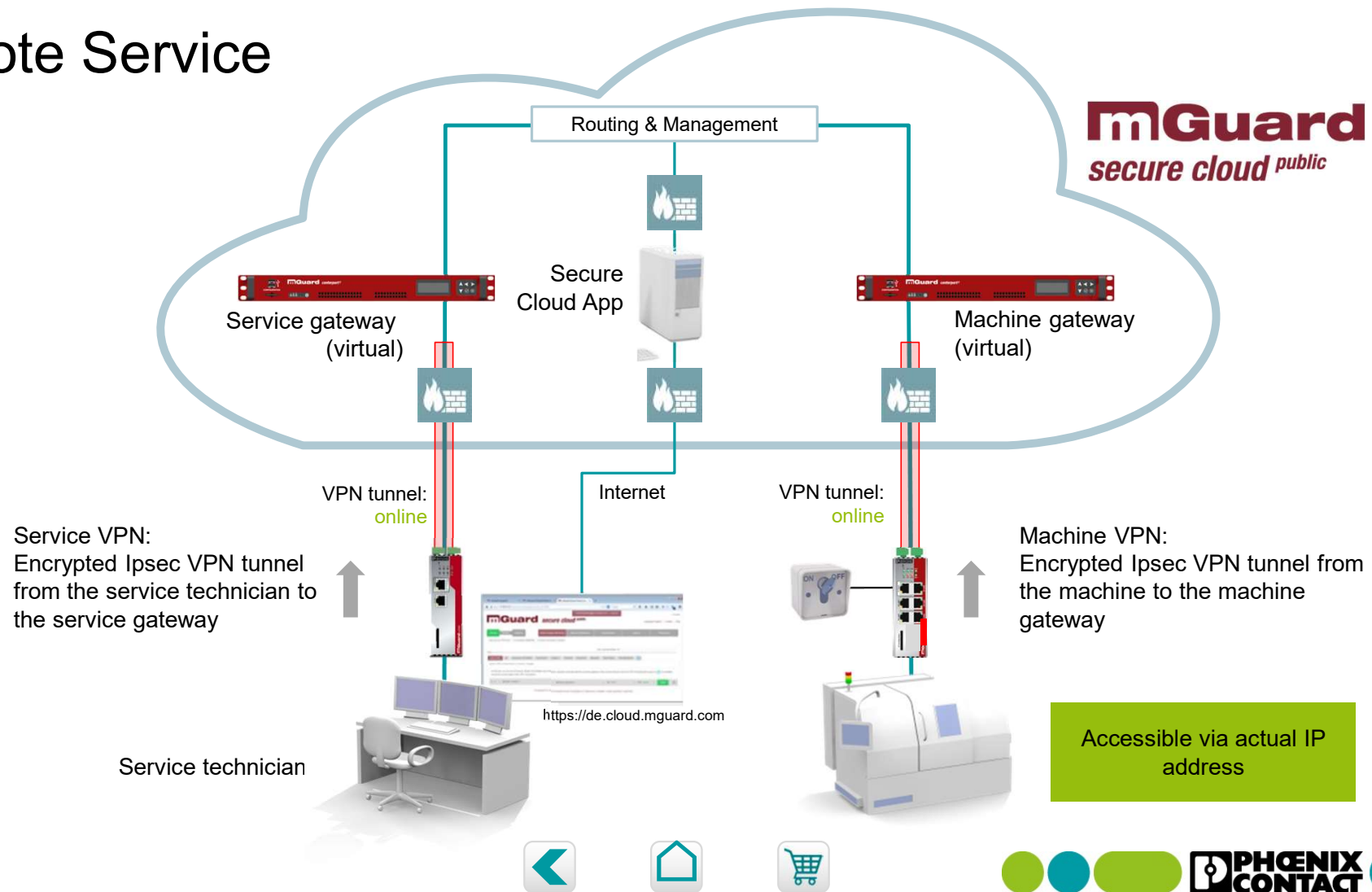
CIFS Integrity Monitoring



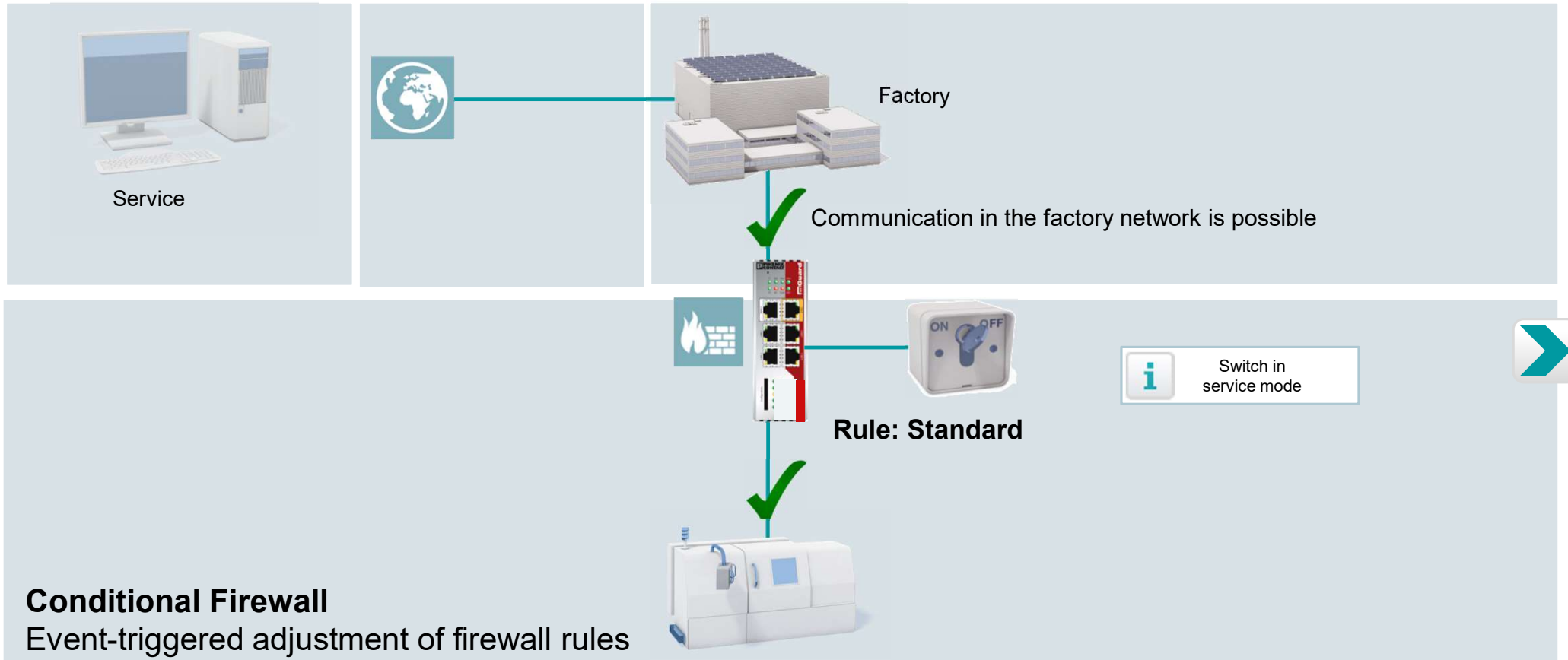
Scan



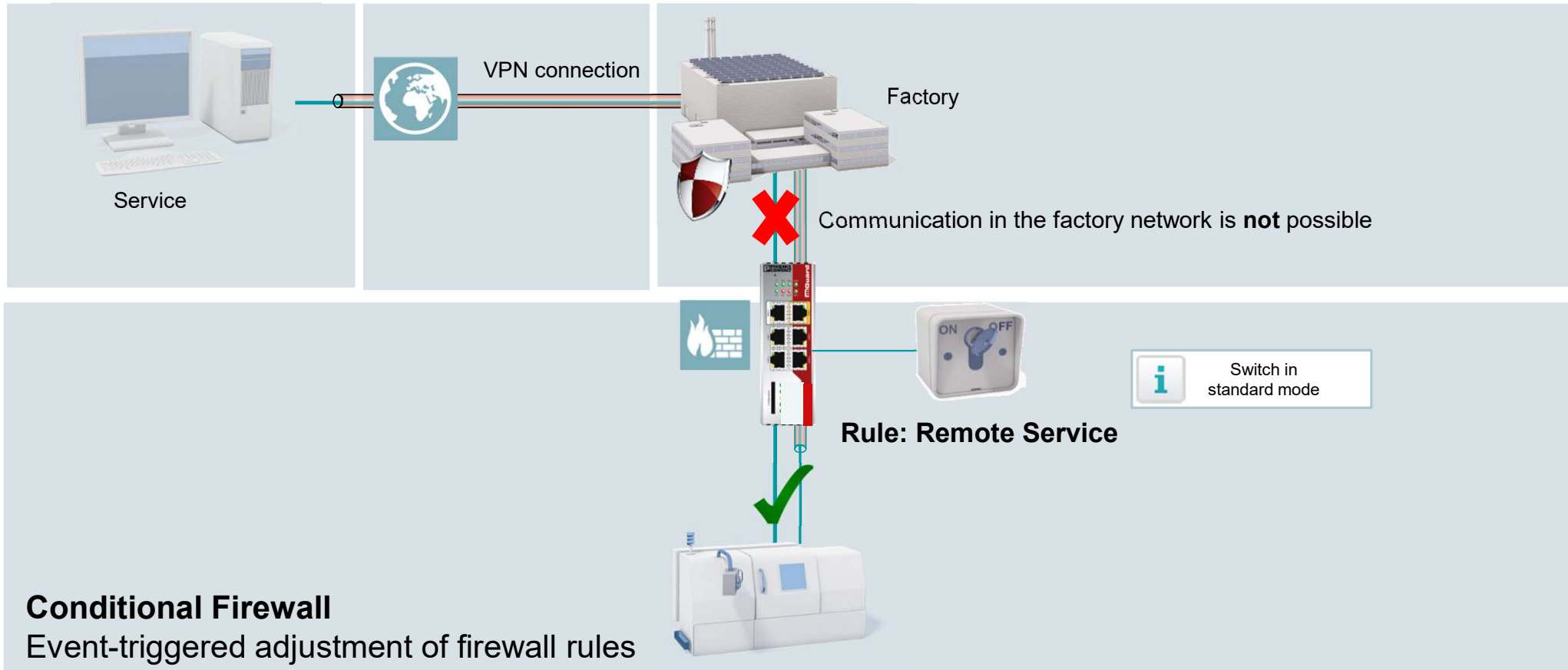
Remote Service



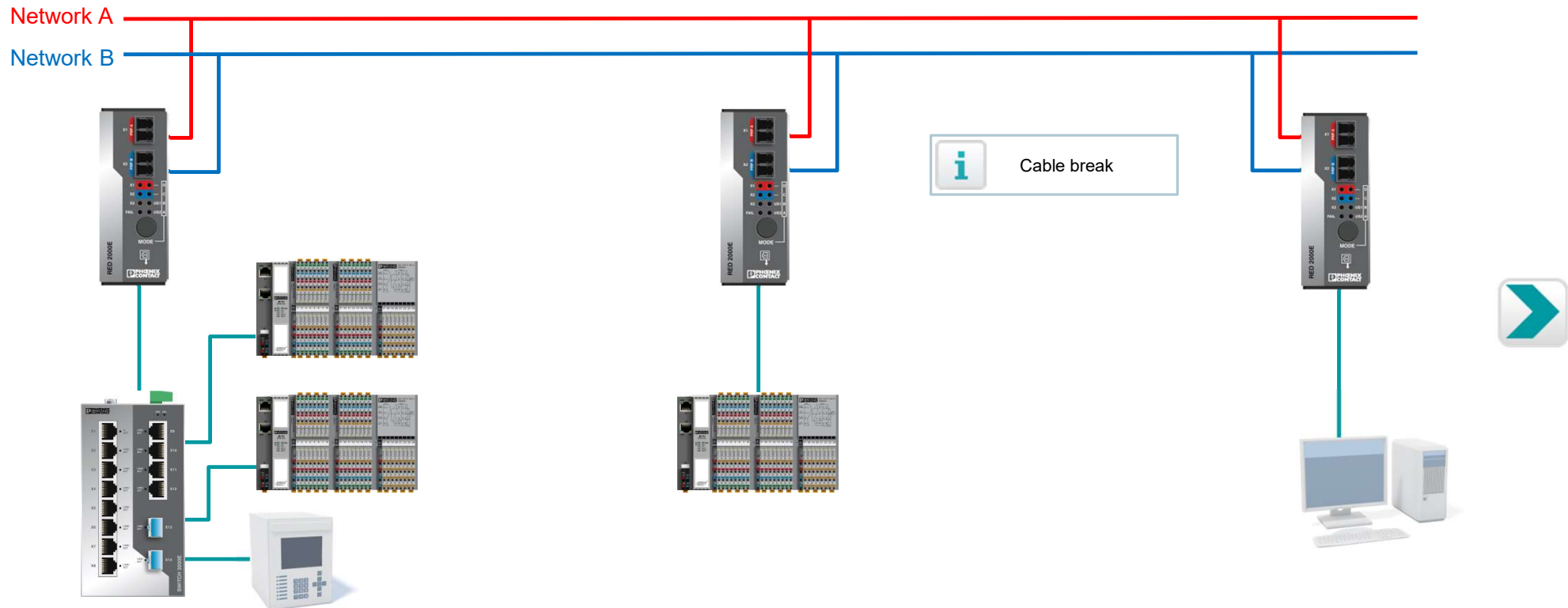
Prevention of unauthorized access



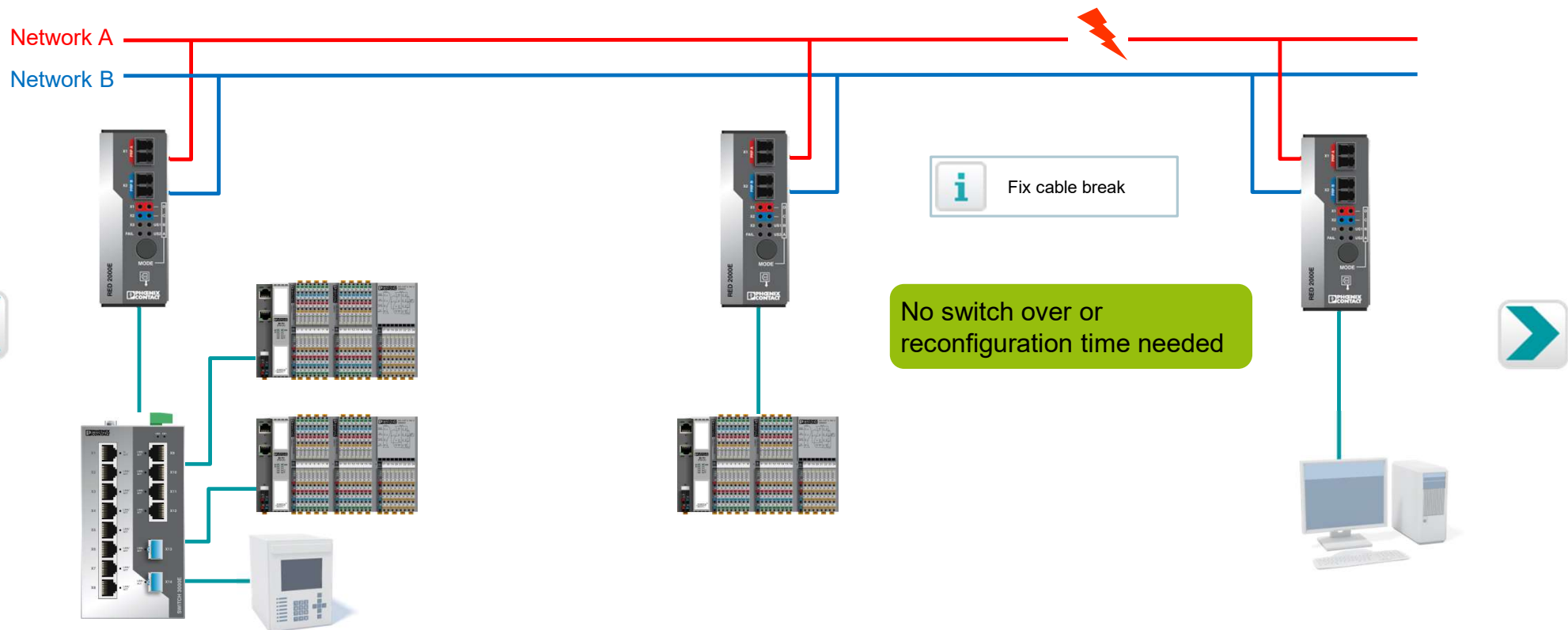
Prevention of unauthorized access

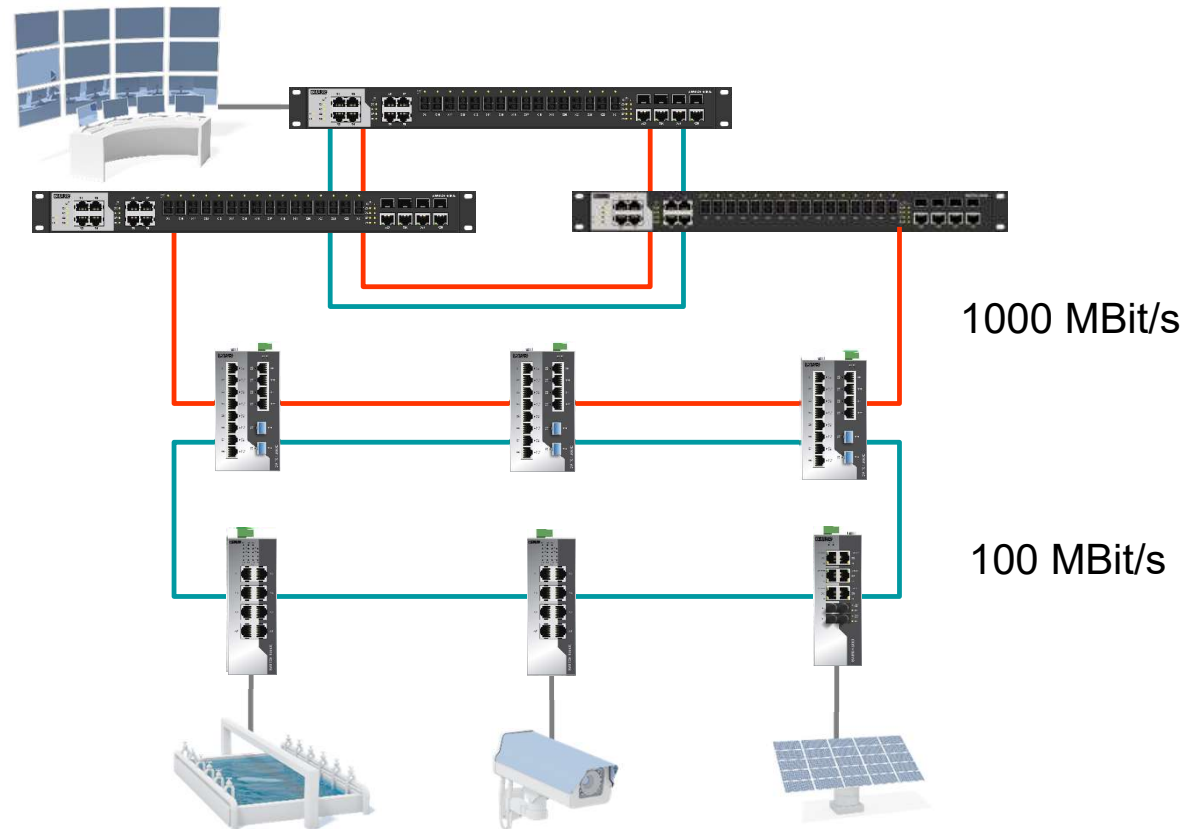


Availability through Parallel Redundancy Protocol

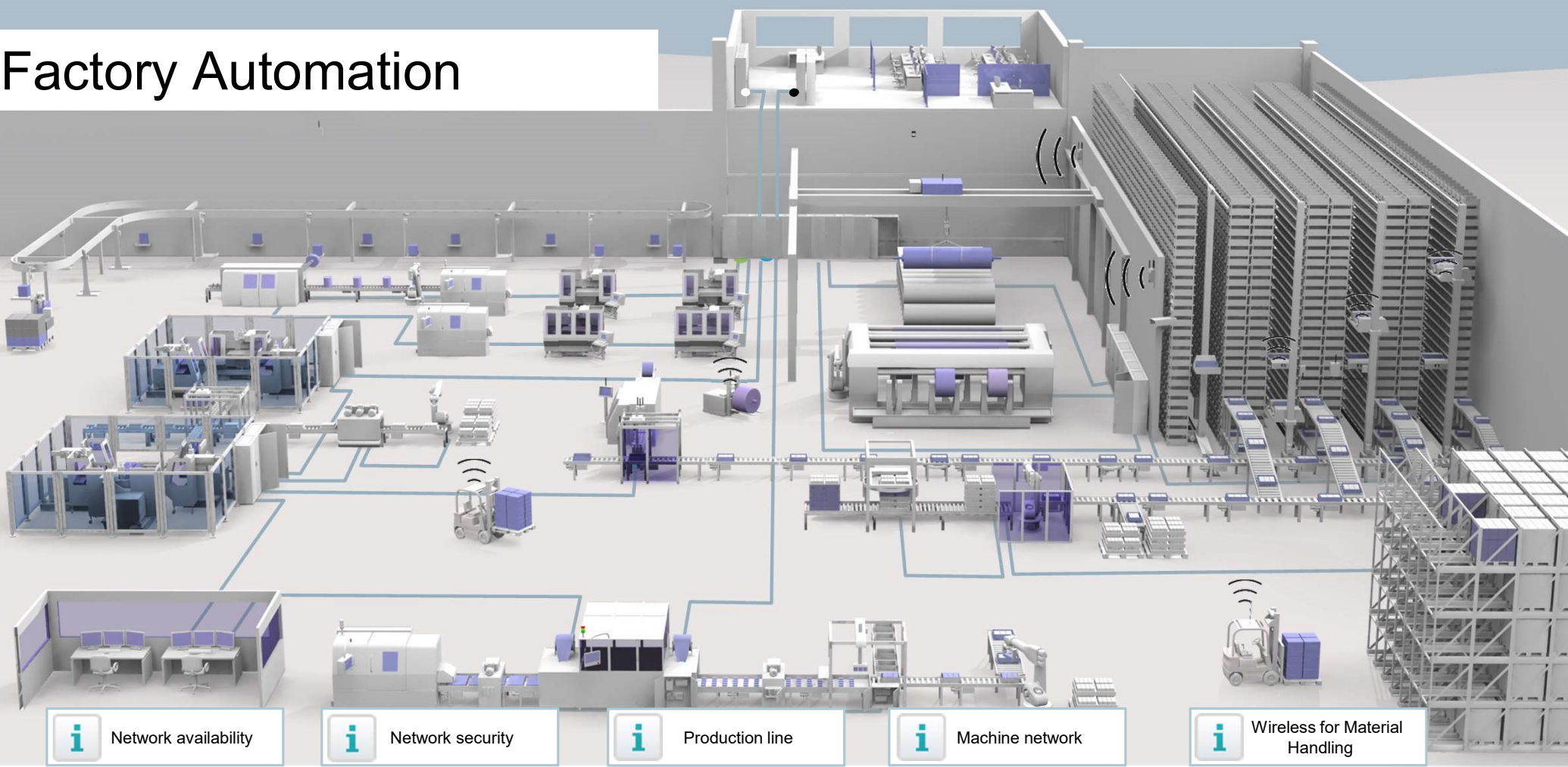


Availability through Parallel Redundancy Protocol





Factory Automation



 Network availability

 Network security

 Production line

 Machine network

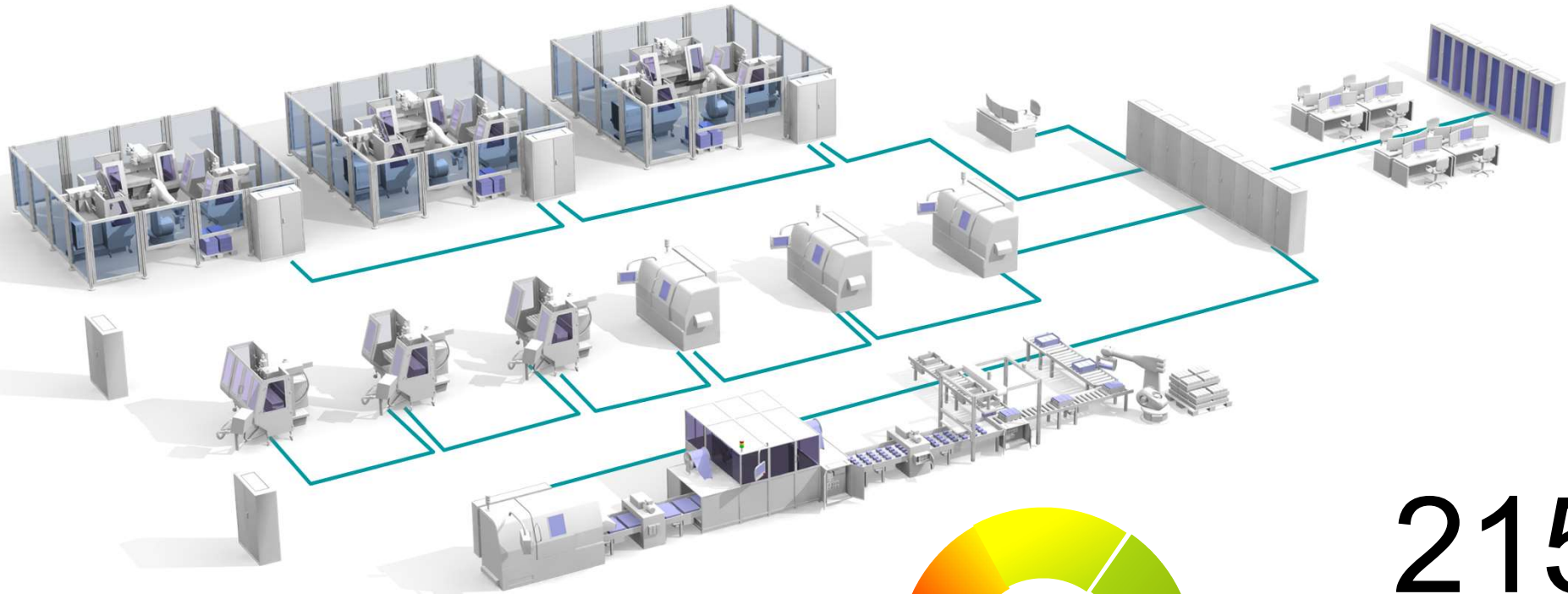
 Wireless for Material Handling

 Solution overview



Typical problems in unmanaged networks

As the network grows, network stability declines



poor



good

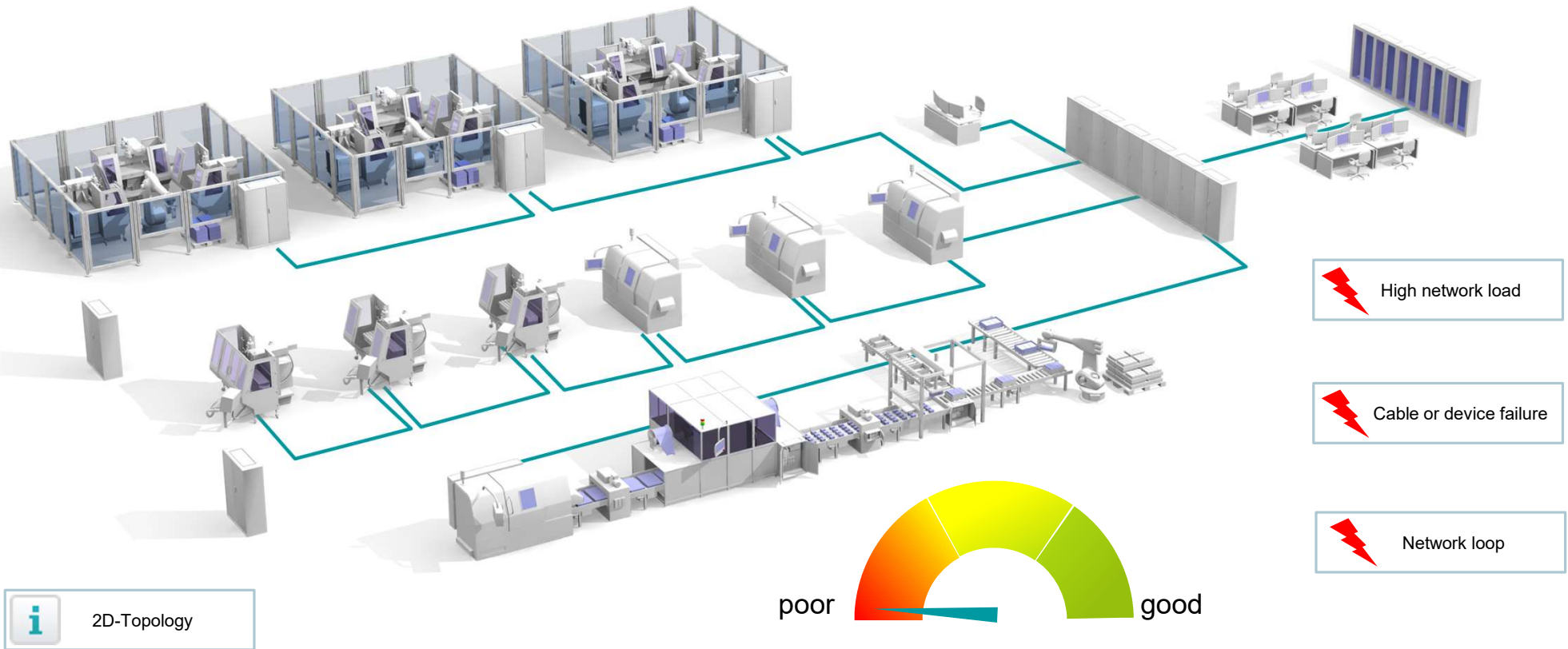
215

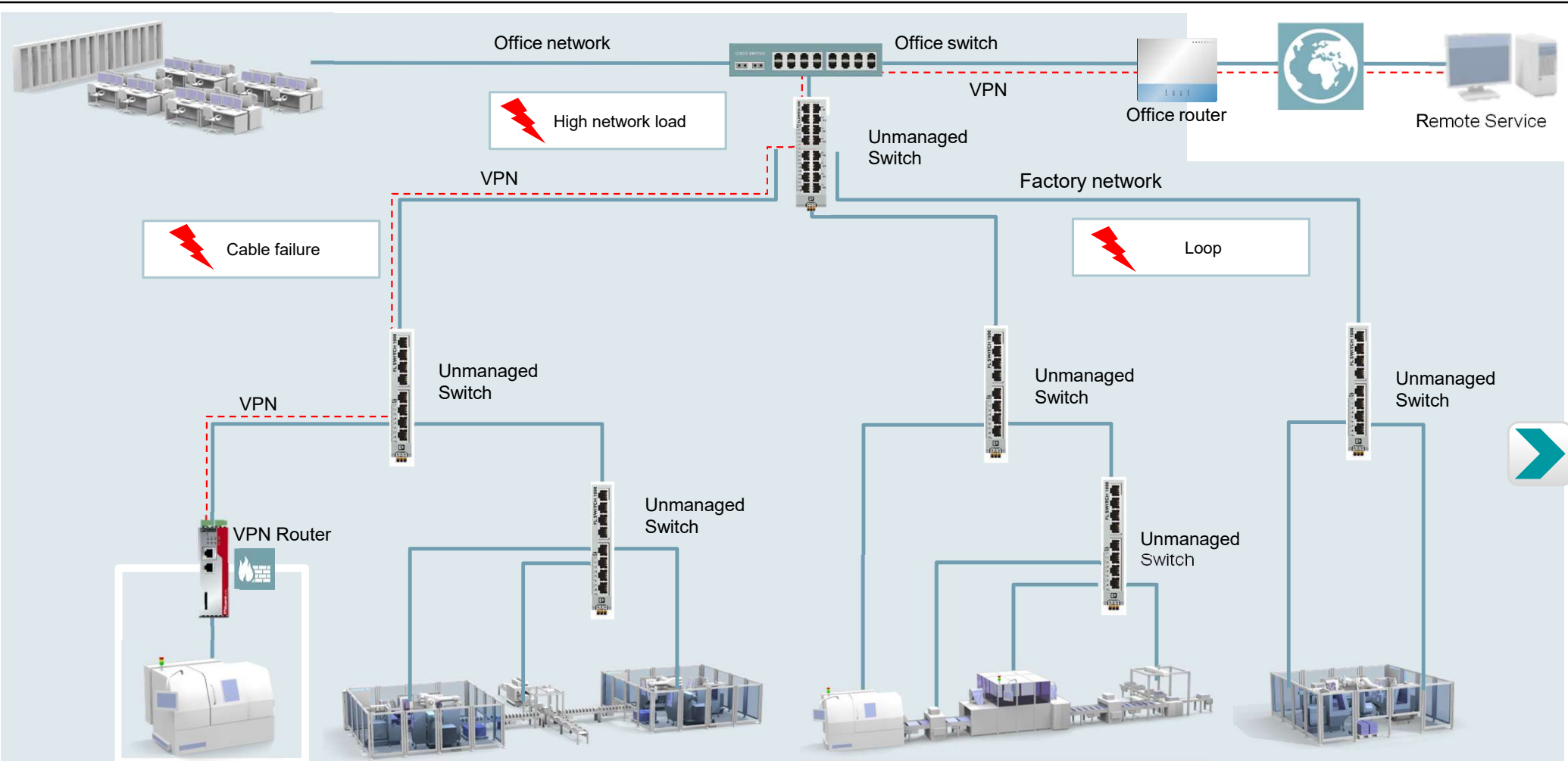
Network devices

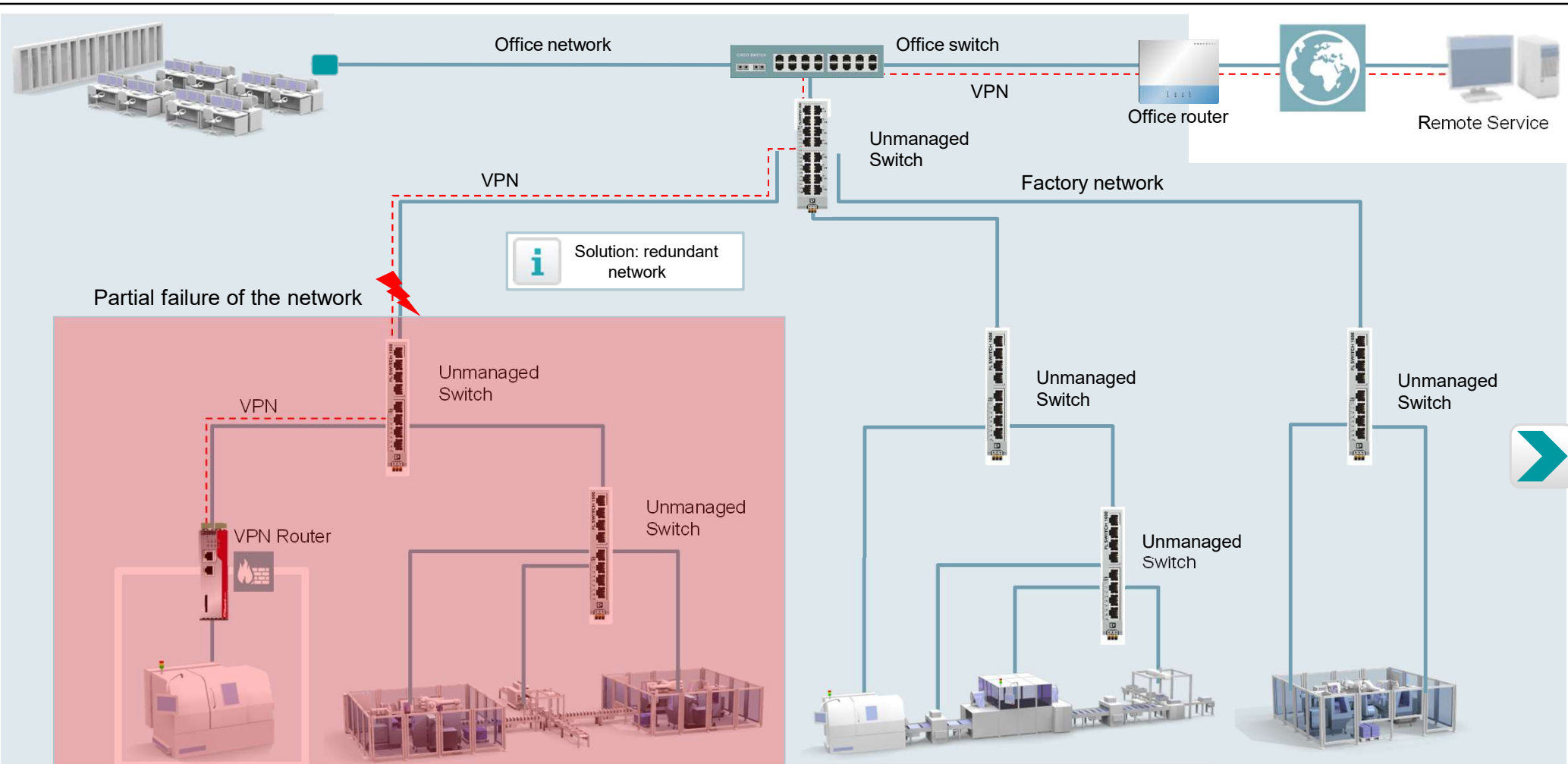


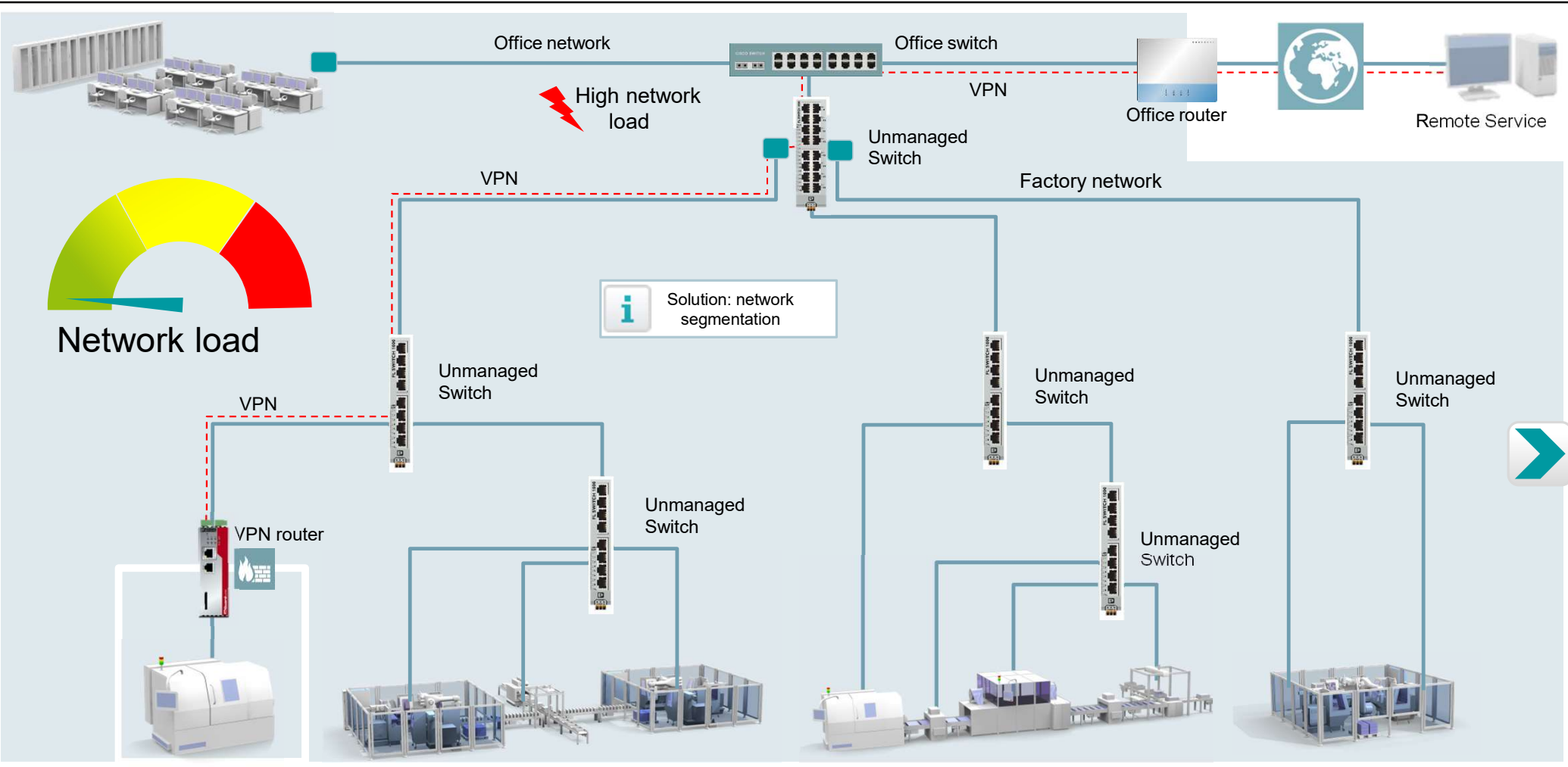
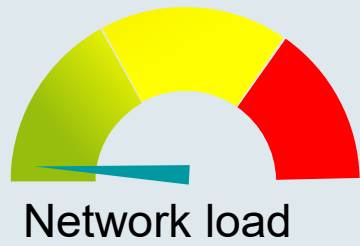
Typical problems in unmanaged networks

As the network grows, network stability declines



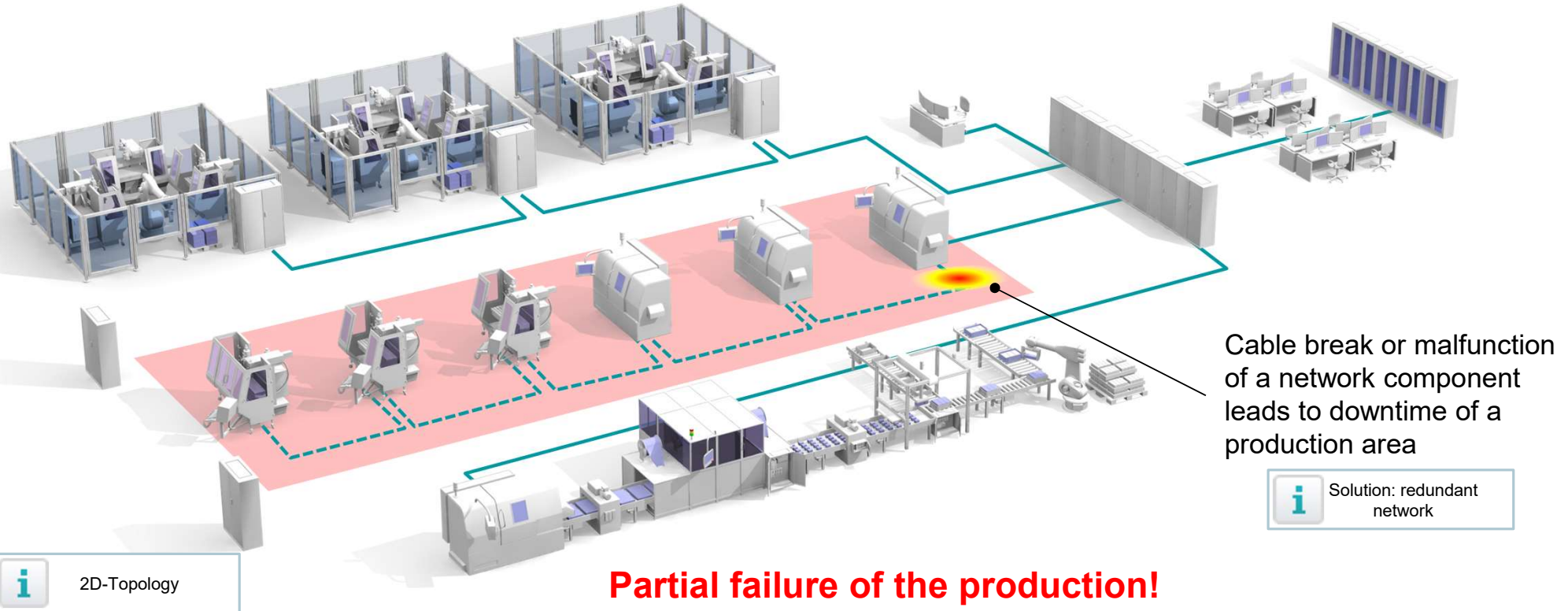






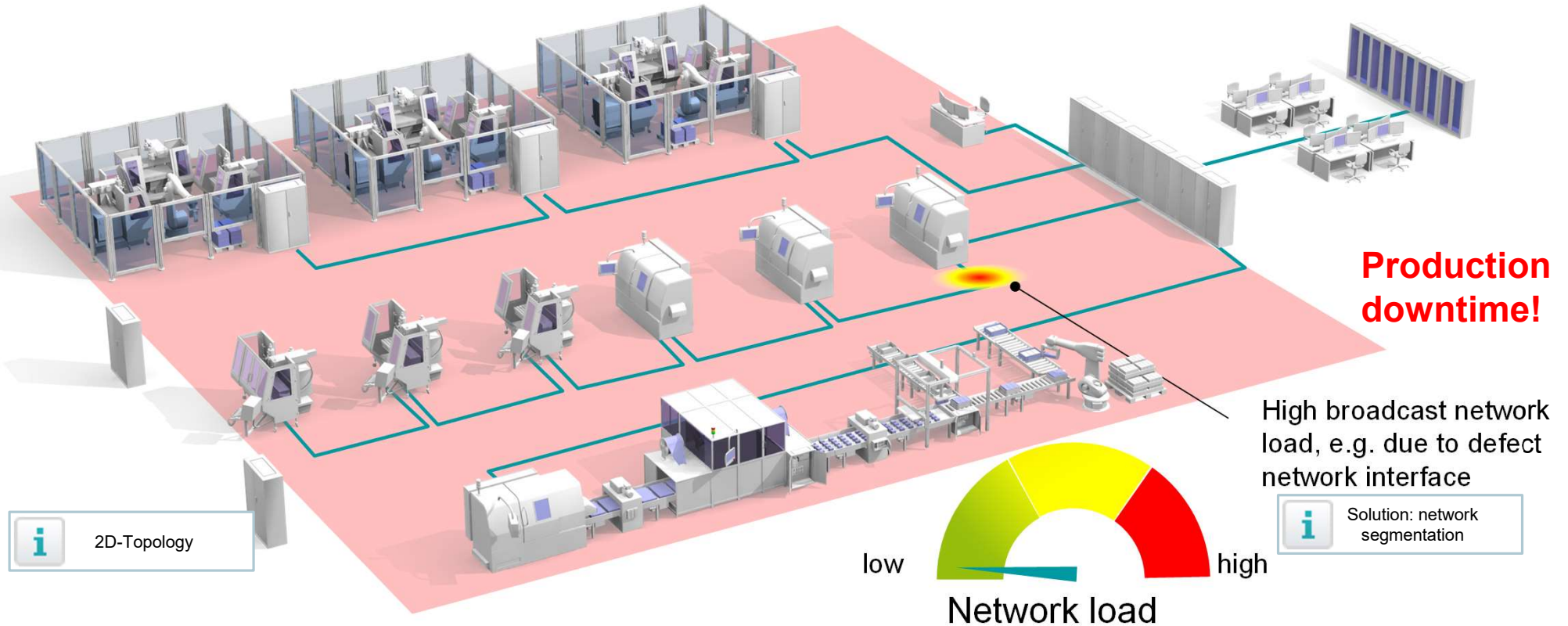
Typical problems in unmanaged networks

Cable or device faults



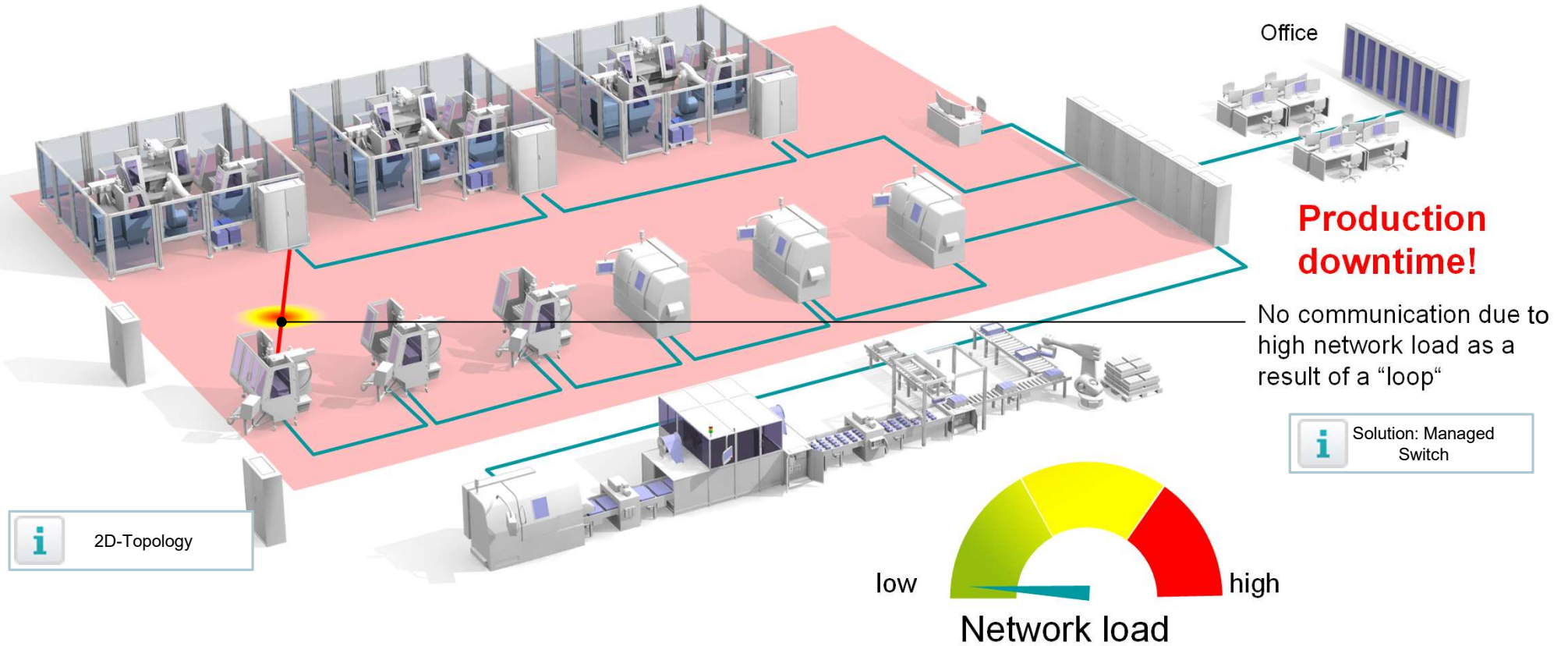
Typical problems in unmanaged networks

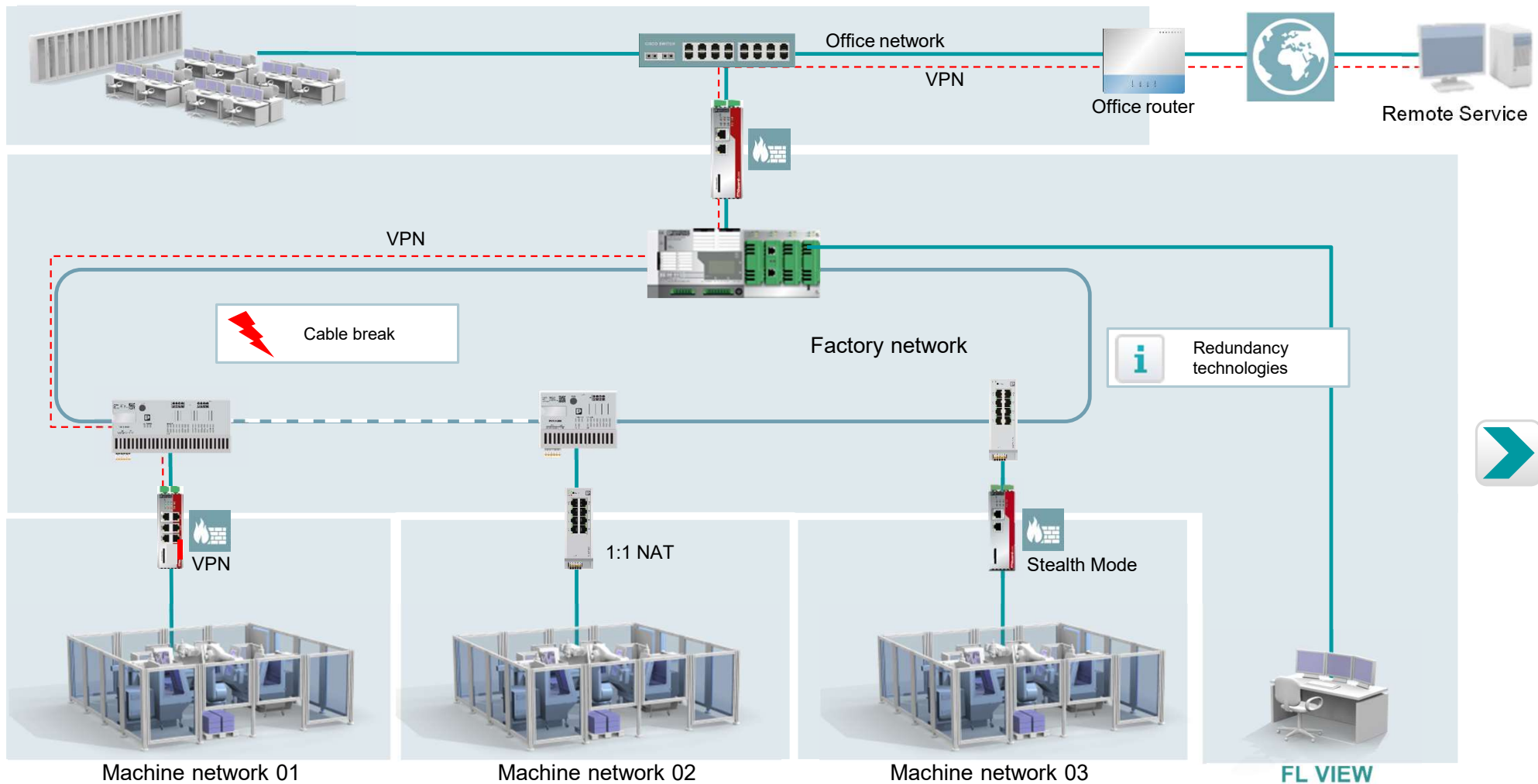
High network load

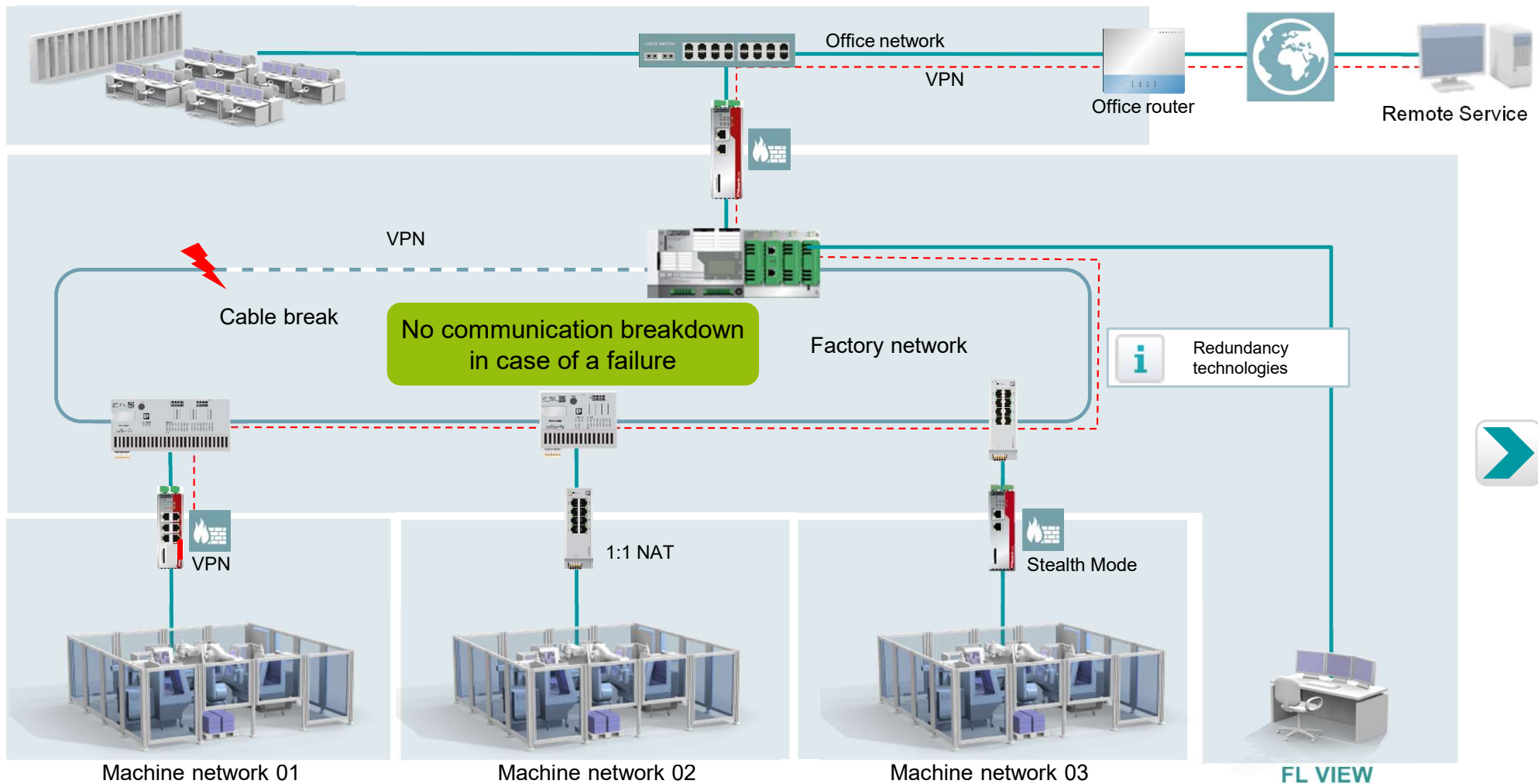


Typical problems in unmanaged networks

Network loop







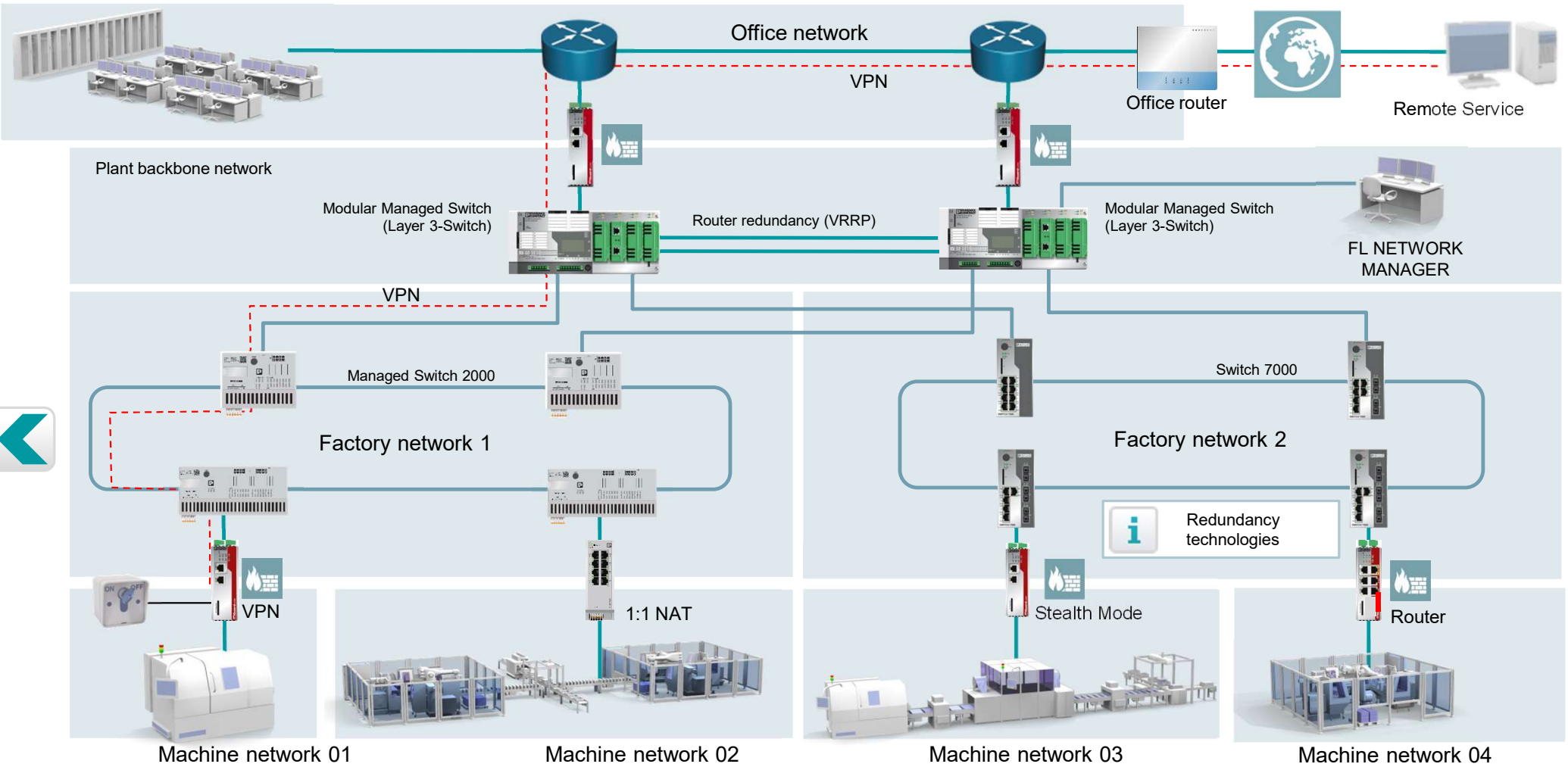
Machine network 01

Machine network 02

Machine network 03

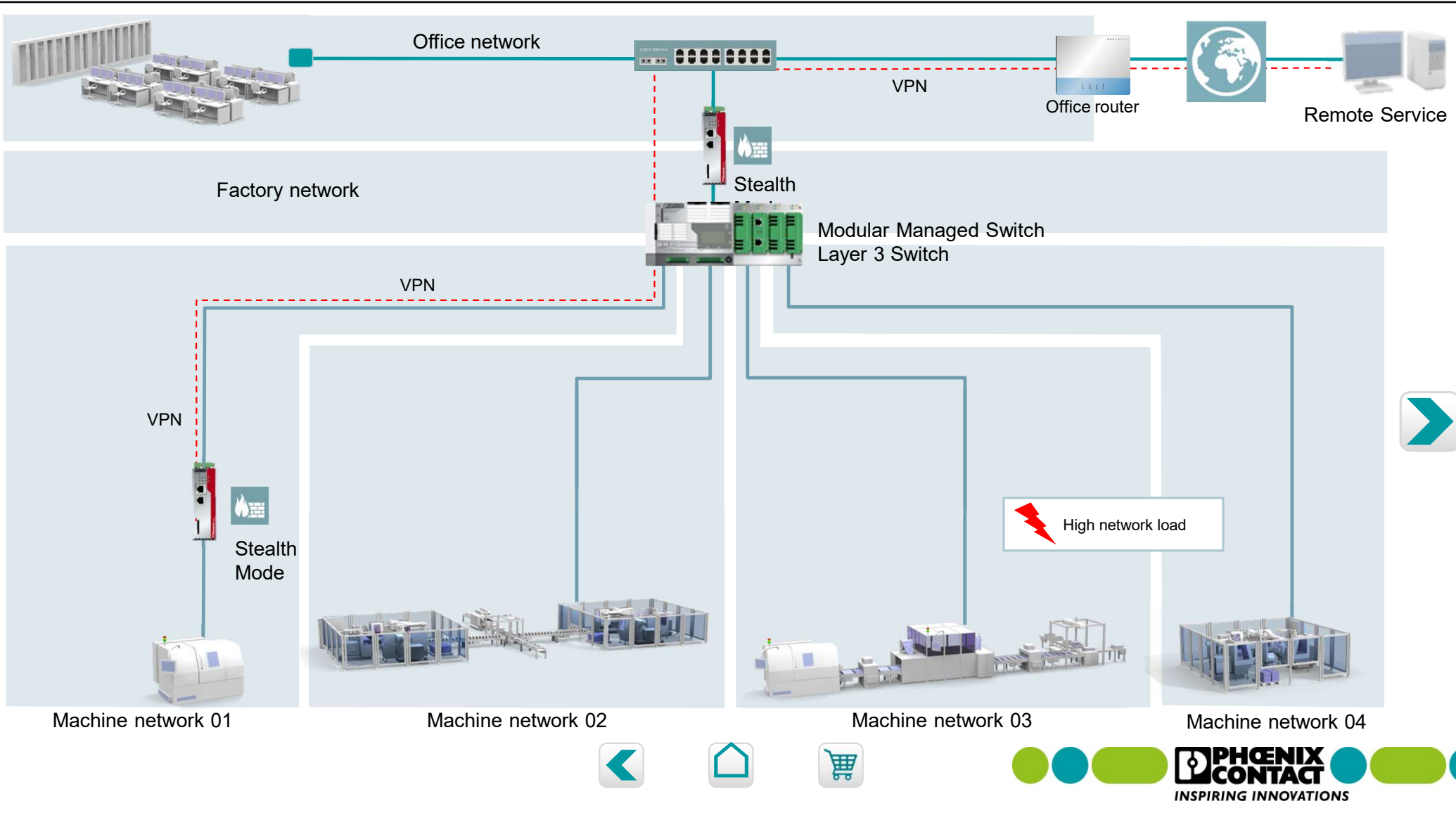
FL VIEW
Network Overview

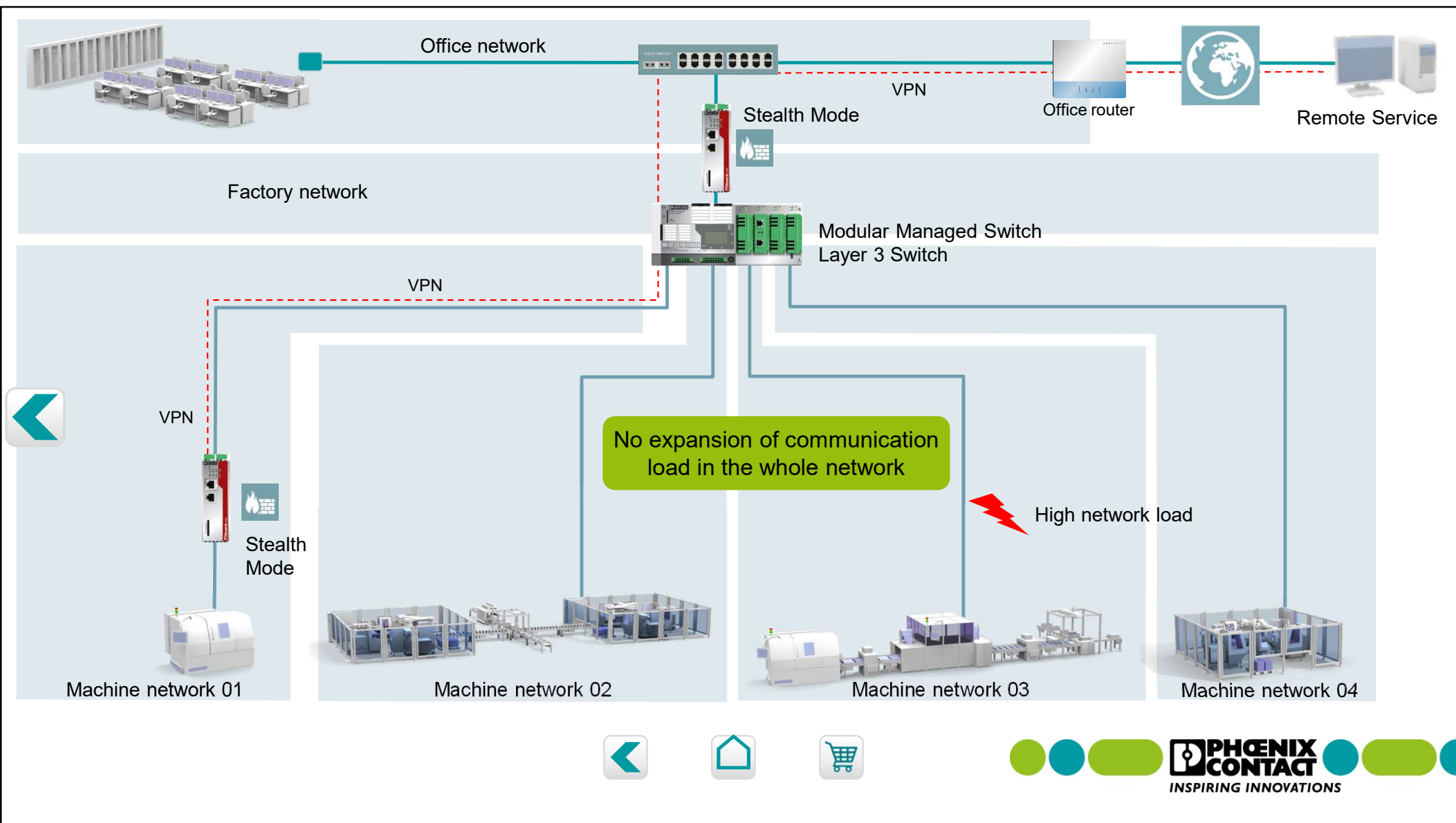


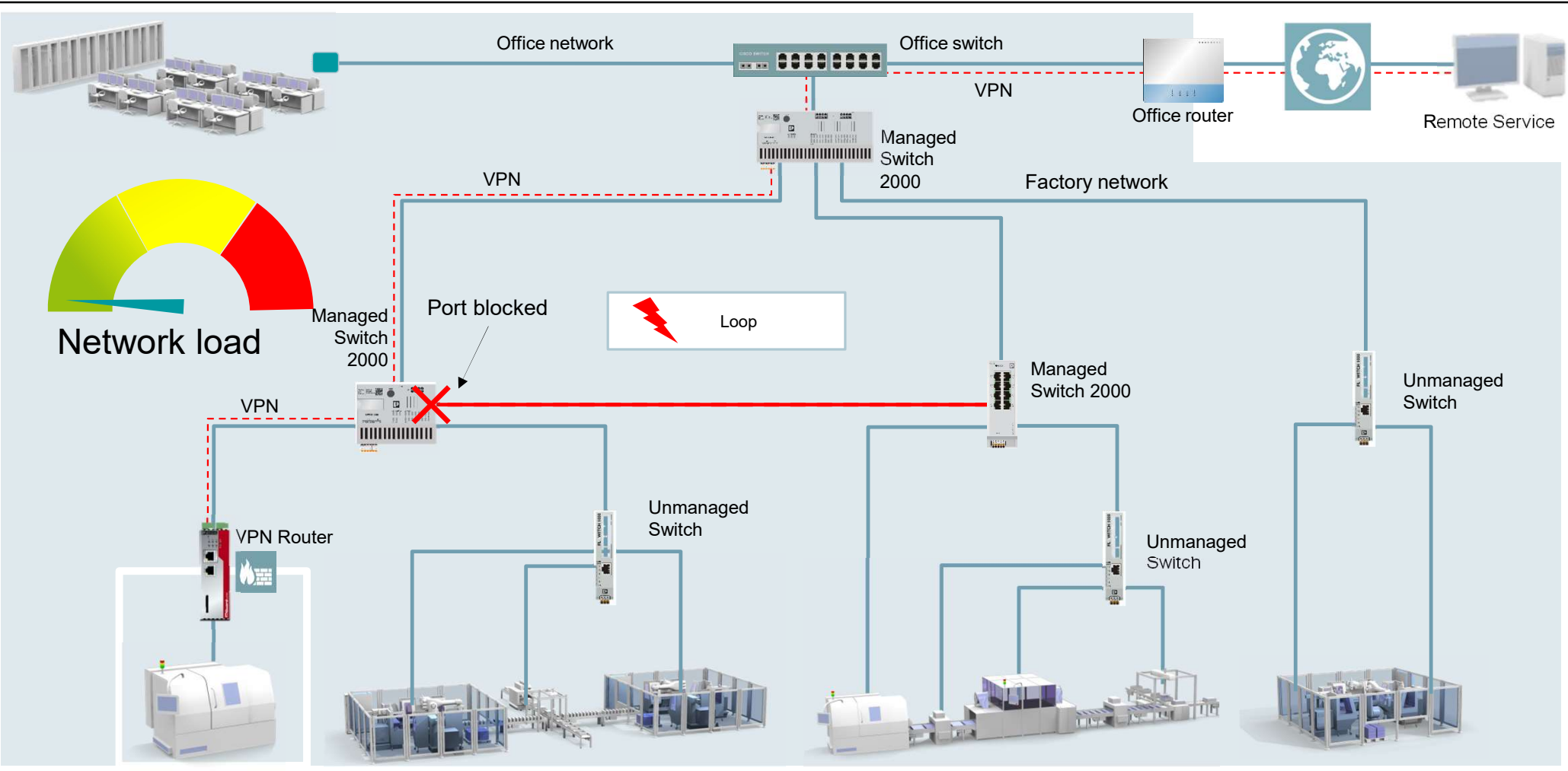


Standard	Products	Standard	Reconfiguration time	Topologies	Max. devices	Ring coupling	Applications
RSTP/STP Rapid Spanning Tree Protocol	Lean/Smart/Modular/Standard Managed	IEEE 802.1D-2004	Up to several seconds	Ring, meshed structures, star, tree	15 (for ring structure)	Yes	IT and automation networks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

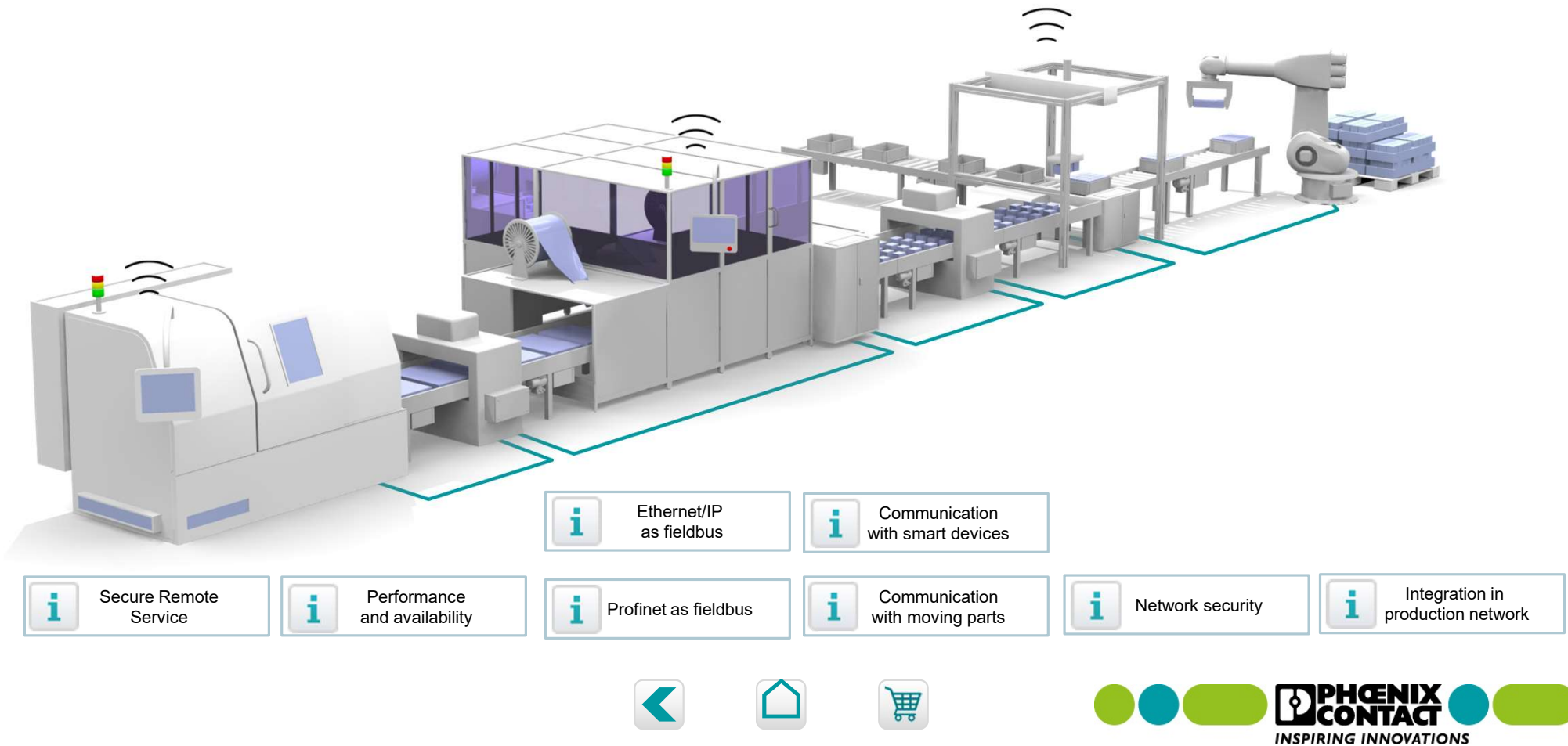








Typical problems in machine networks



Factory network



Remote Service

Machine network



Firewall, 1:1 NAT. Router



Machine core network

PROFI[®] NET MRP ring

Managed Switch 2000

Managed Switch 2000

IRT Switches

PROFI[®] NET

PROFI[®] NET

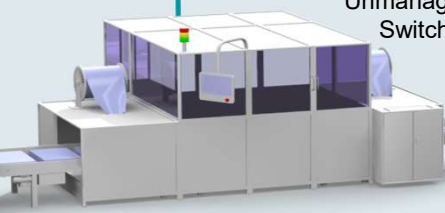
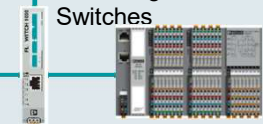
PROFI[®] NET

Unmanaged Switches

Managed Switch 2000

Unmanaged Switches

IRT Switches



Factory network



Remote Service

Machine network

Firewall, 1:1 NAT. Router

Machine core network

EtherNet/IP DLR ring



Advanced Managed Switches

Advanced Managed Switches

EtherNet/IP

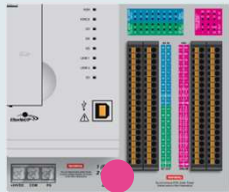
EtherNet/IP

Unmanaged Switches

Switch 2000

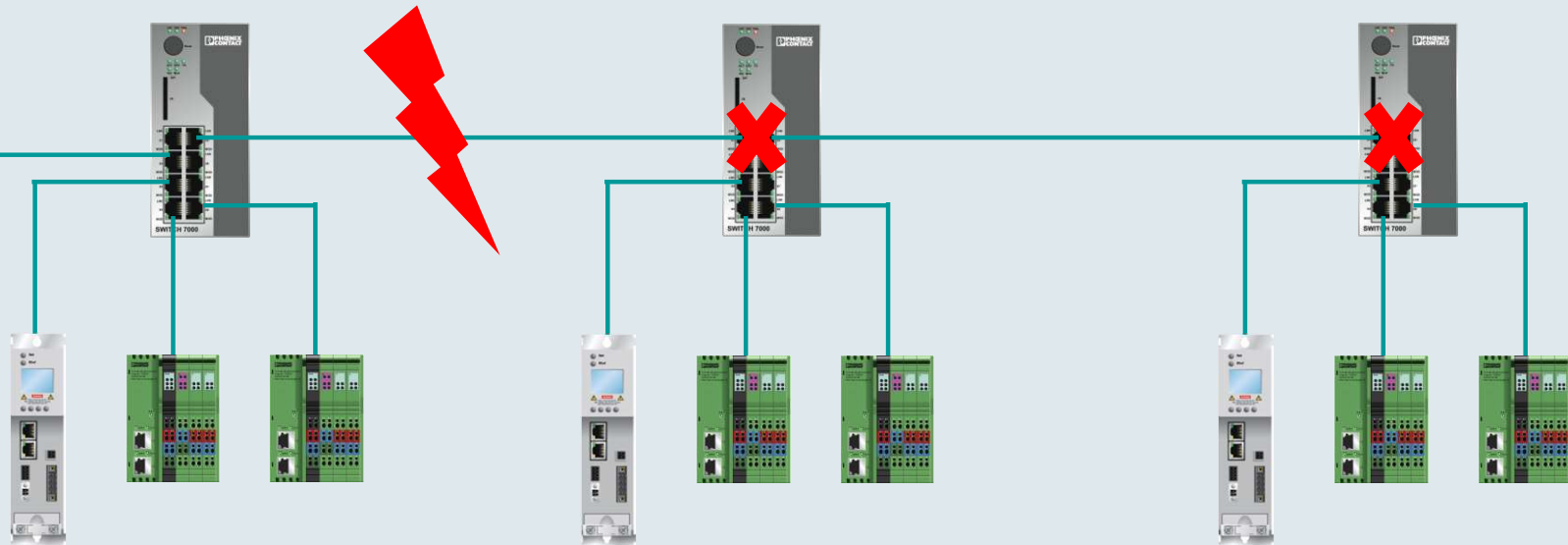
Unmanaged Switches



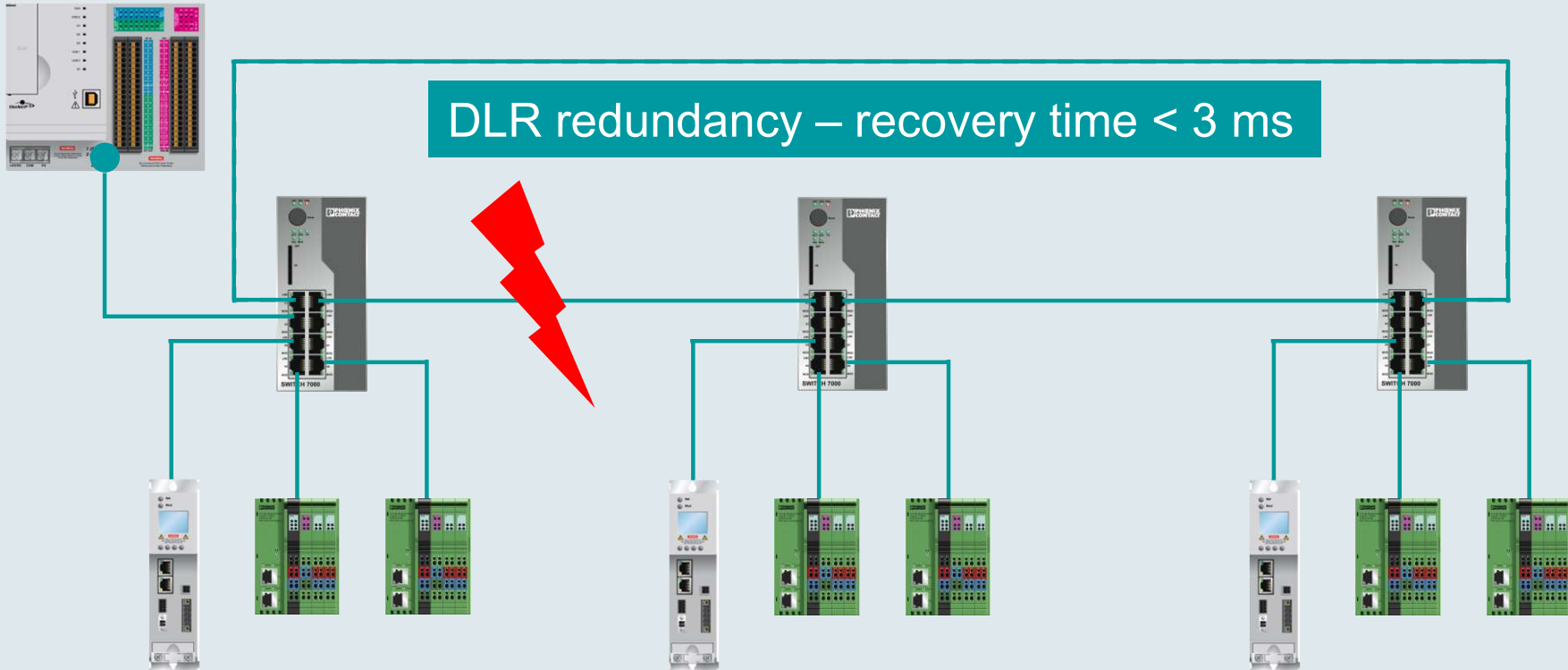


EtherNet/IP
Controller

 Activate redundancy
mechanism



DLR redundancy – recovery time < 3 ms





Controller

Ethernet / PROFINET



Access Point



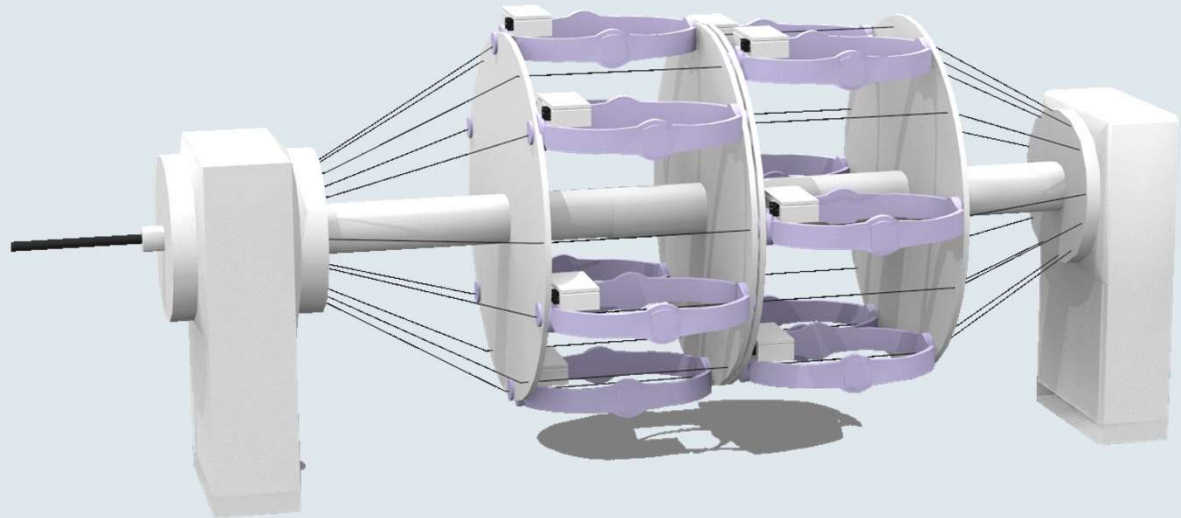
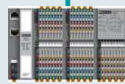
Bluetooth



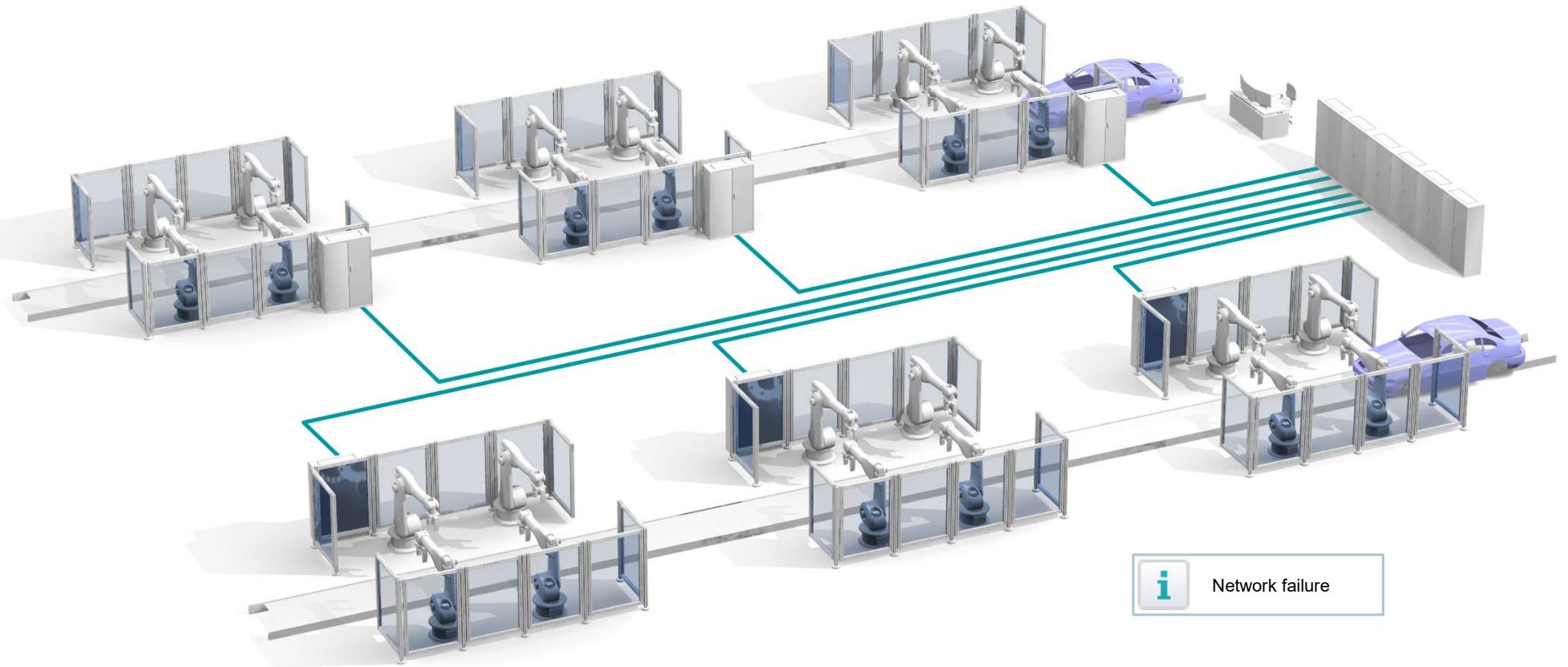
Client



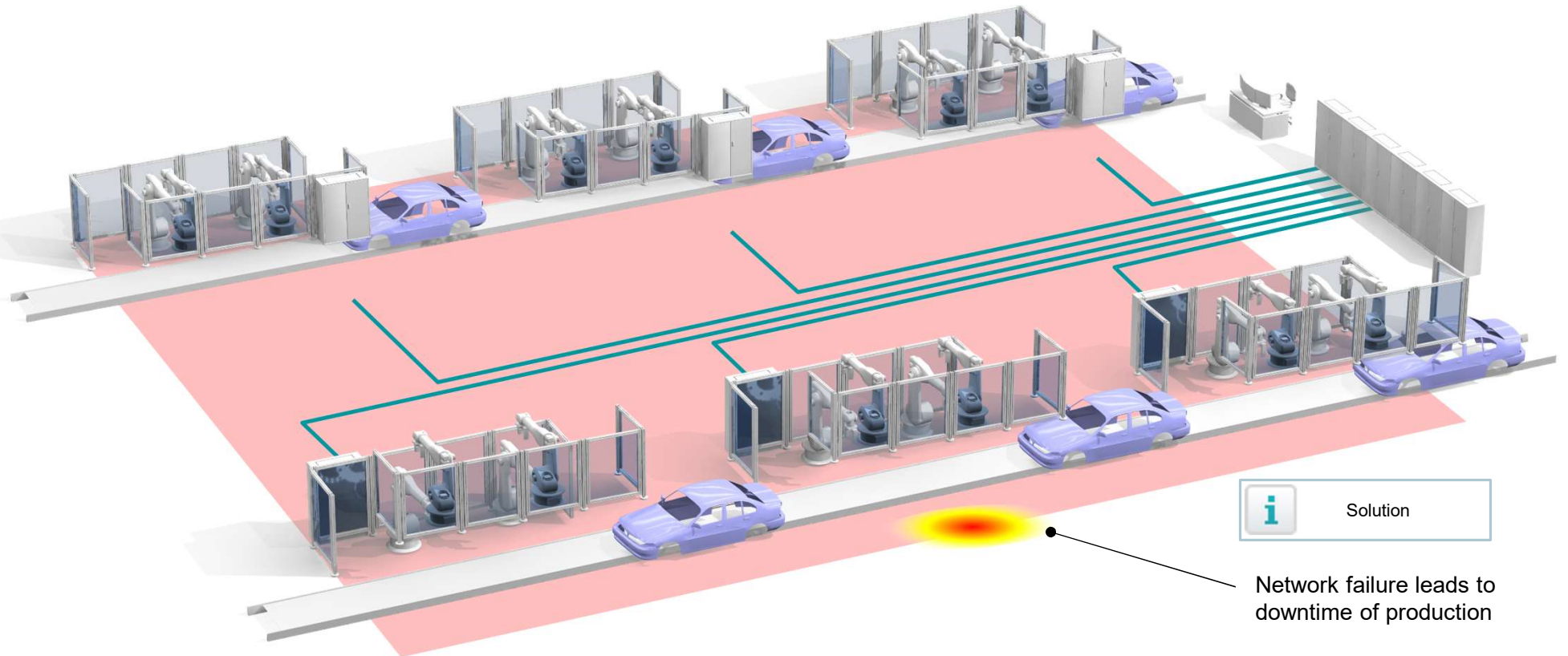
Client



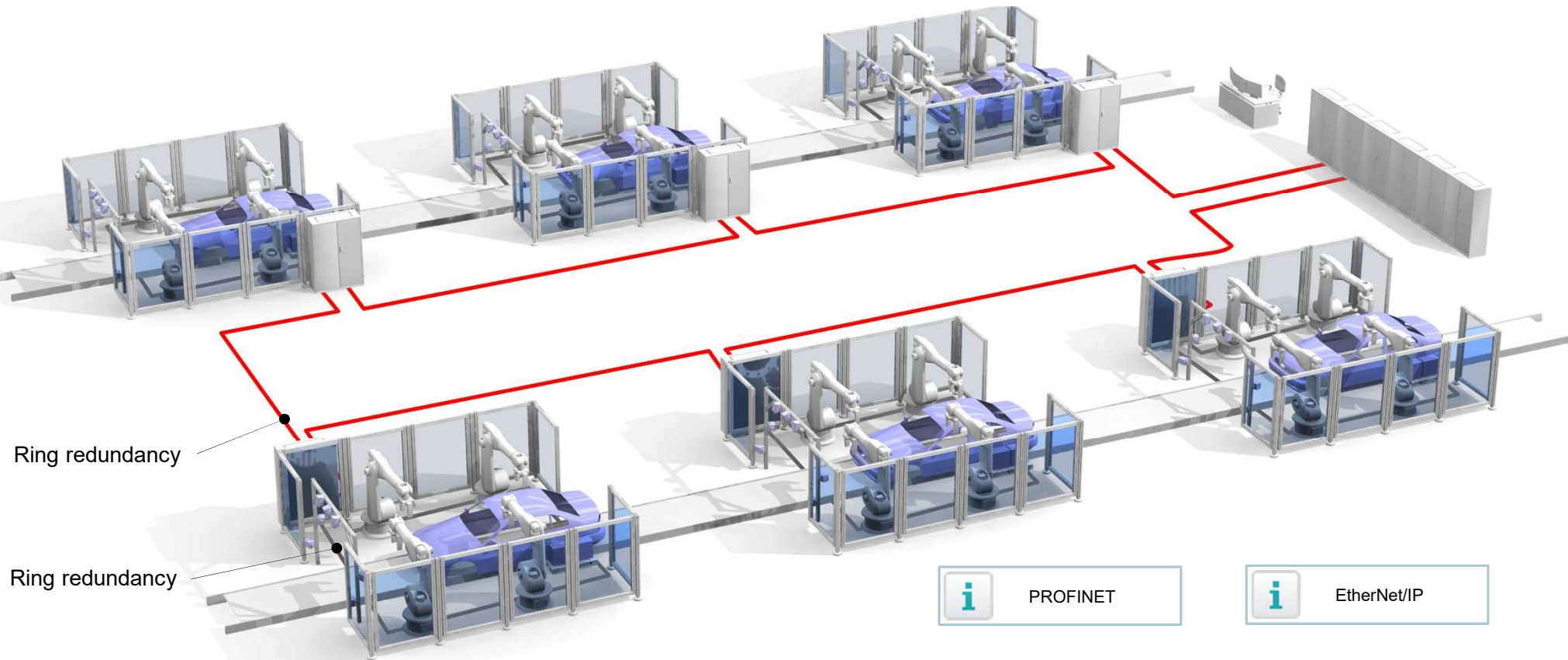
Production line

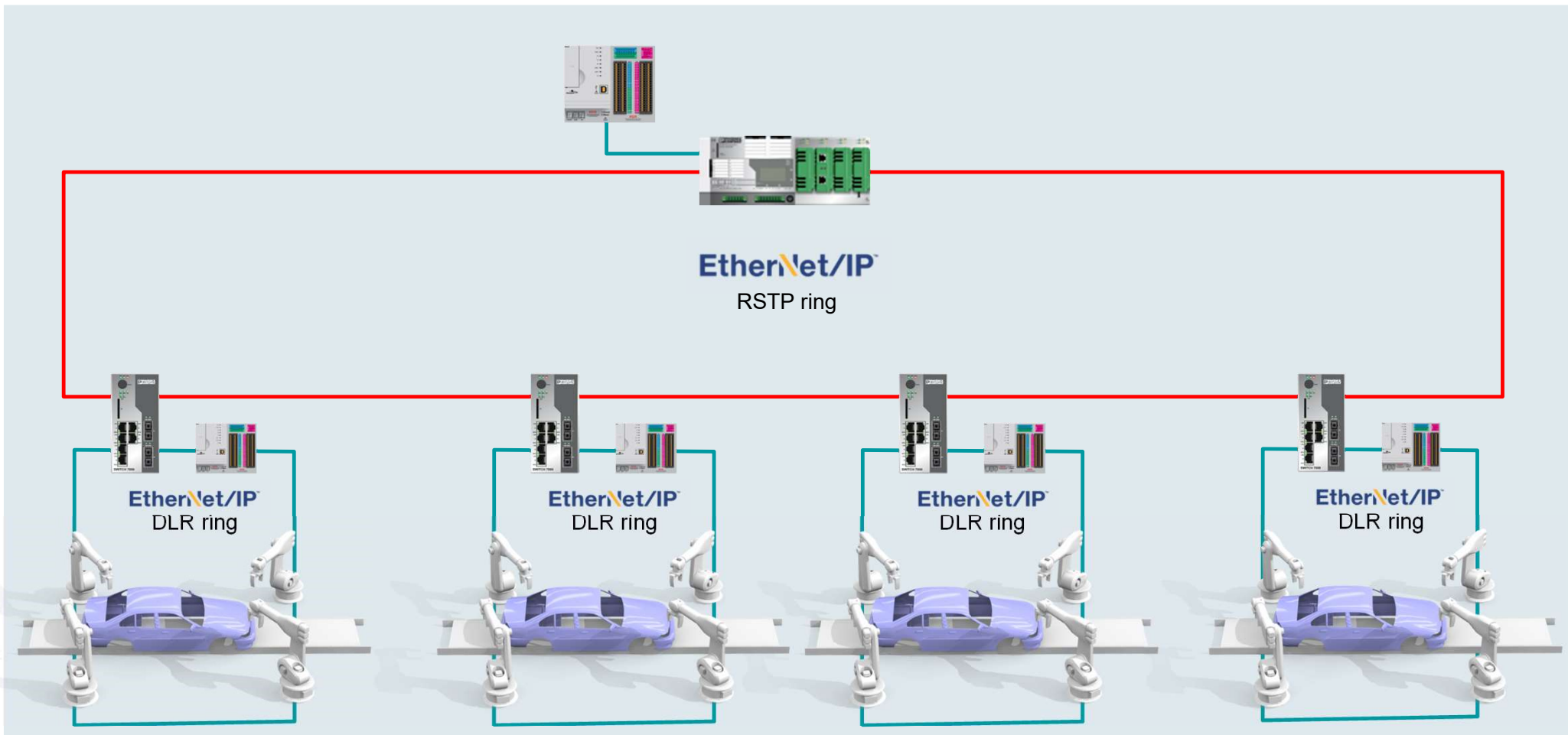


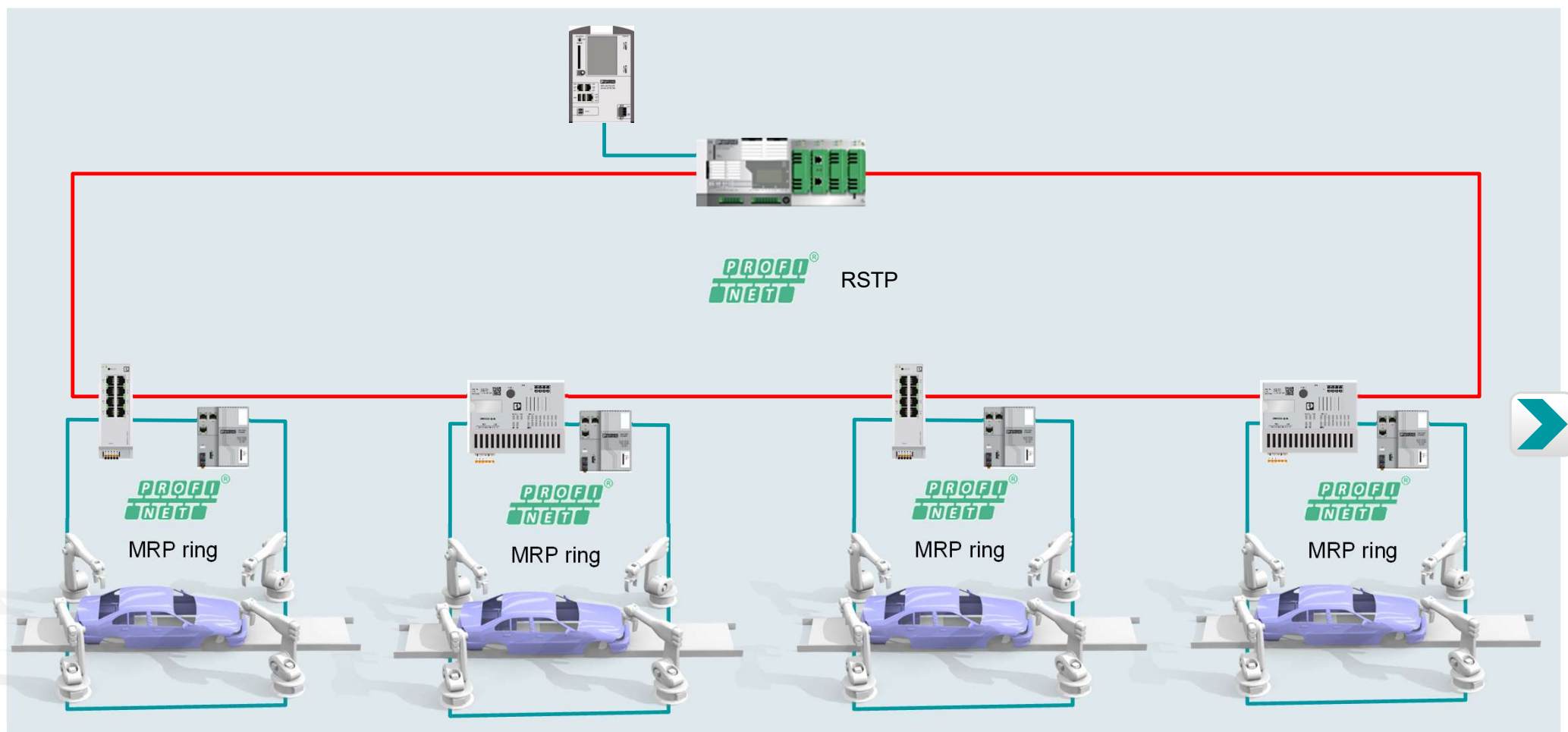
Production line

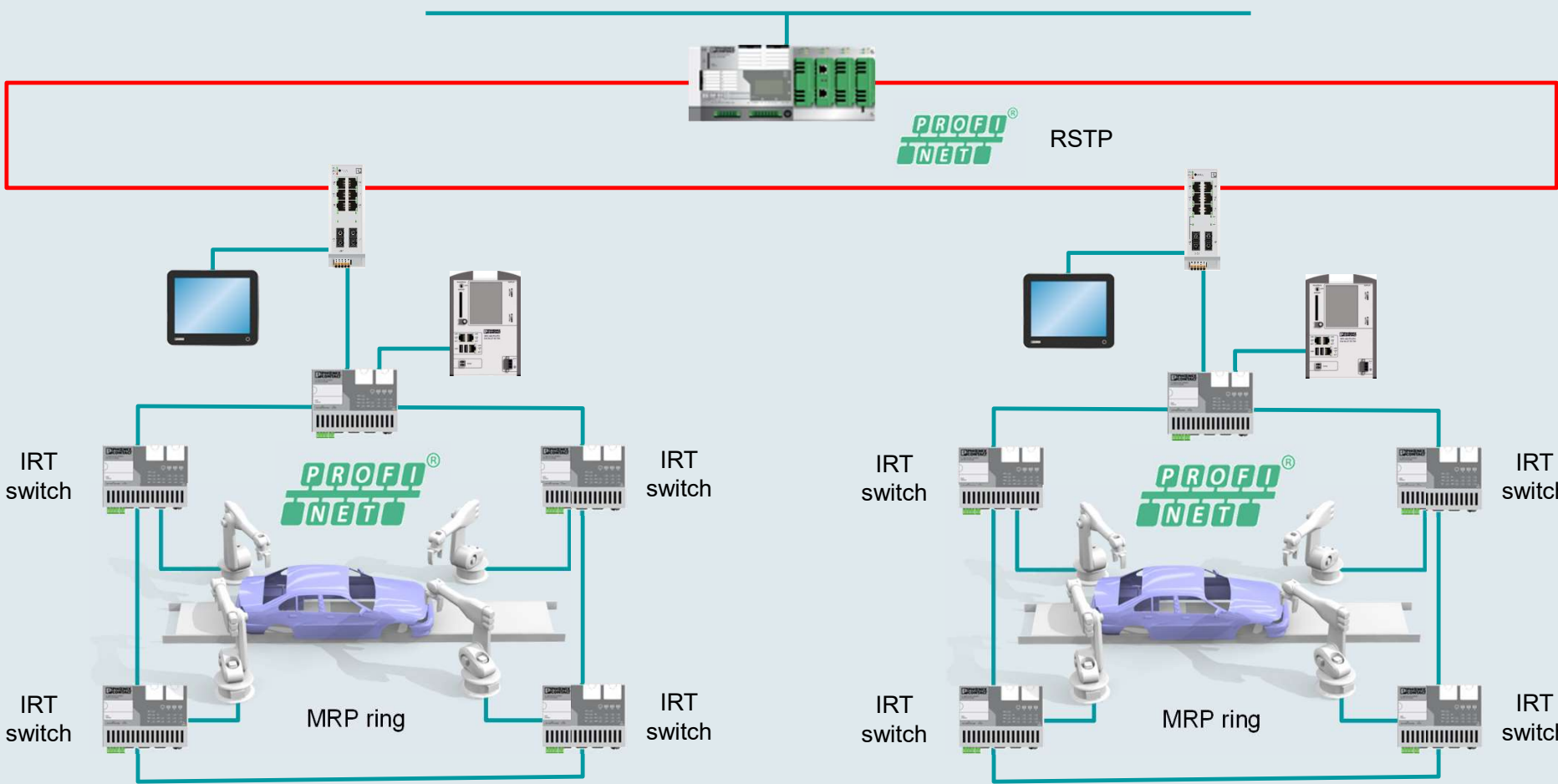


Reliable production line network structure



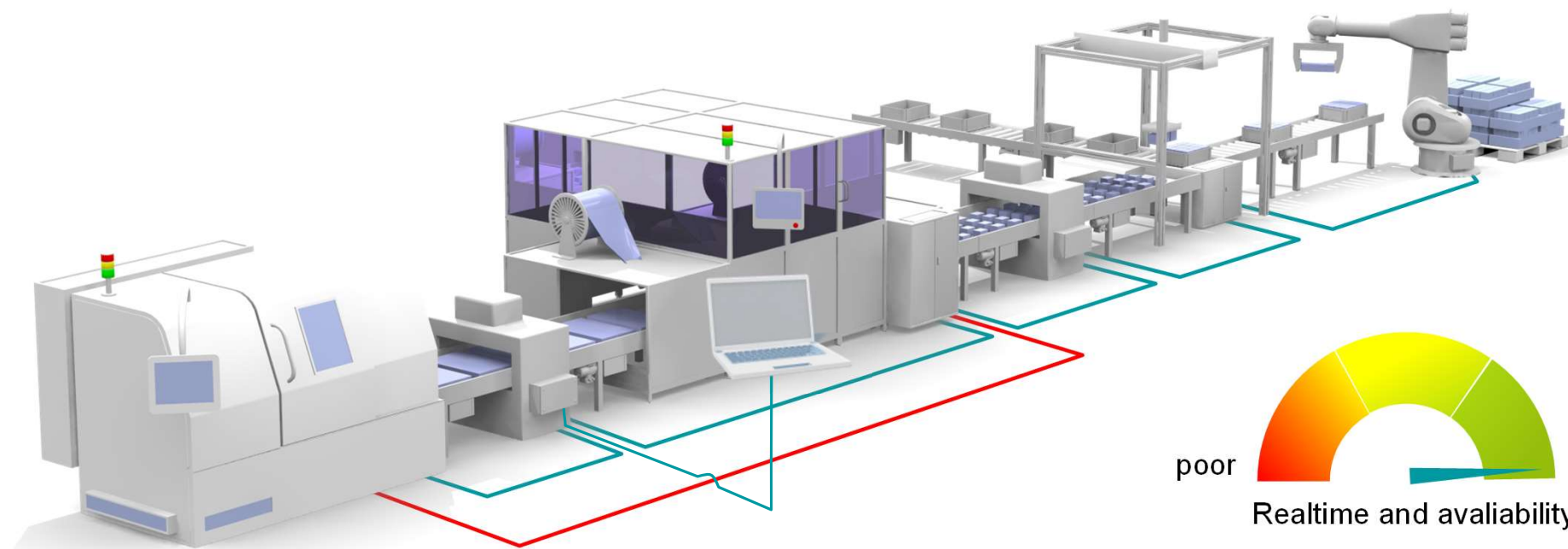






Typical problems in unmanaged machine networks

Performance and availability



⚡ High broad-and multicast-traffic in the network

⚡ Protocol issues

⚡ Unauthorized devices

⚡ Network loop

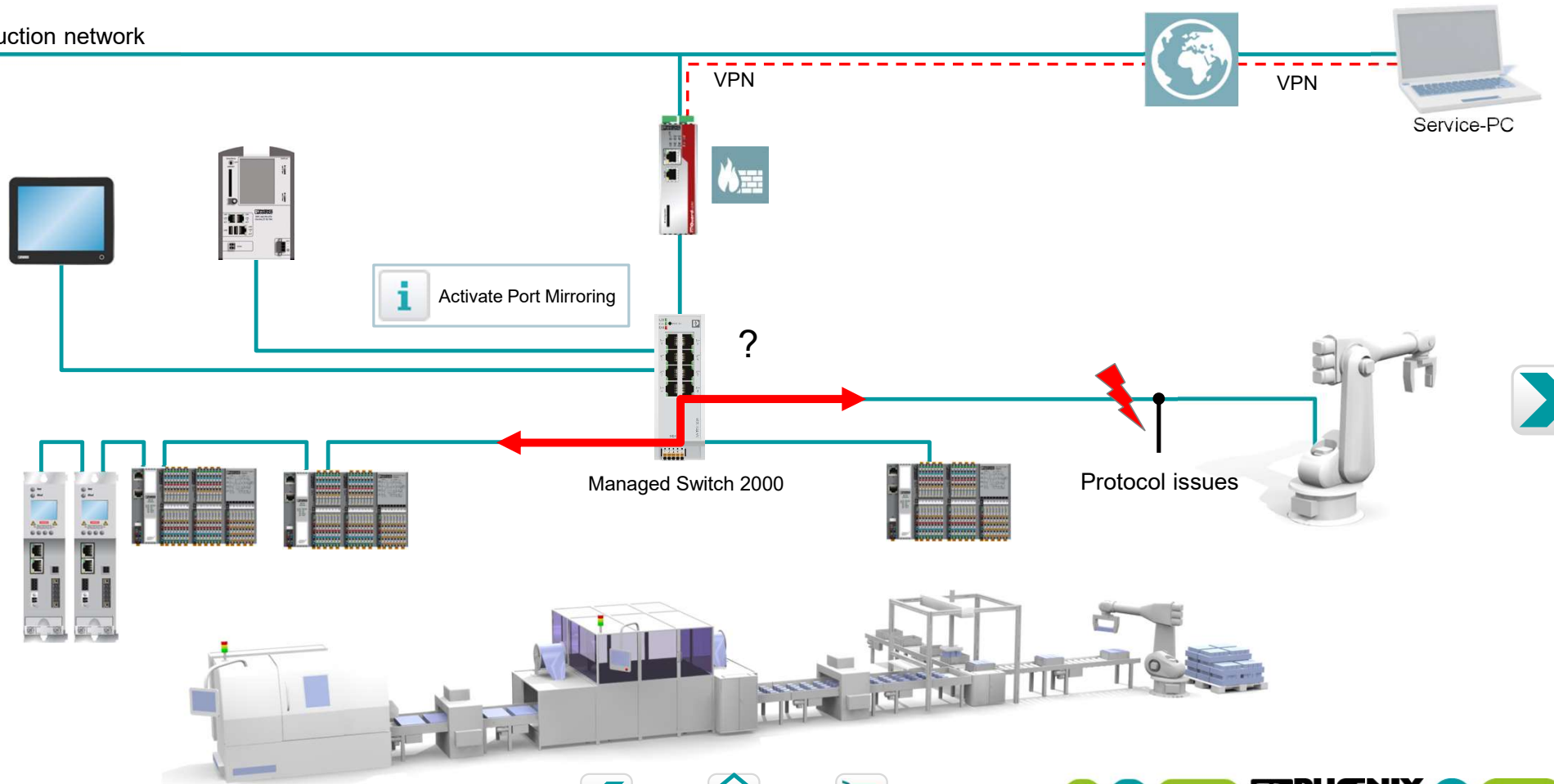
⚡ Cable and connector problems

⚡ Device failure



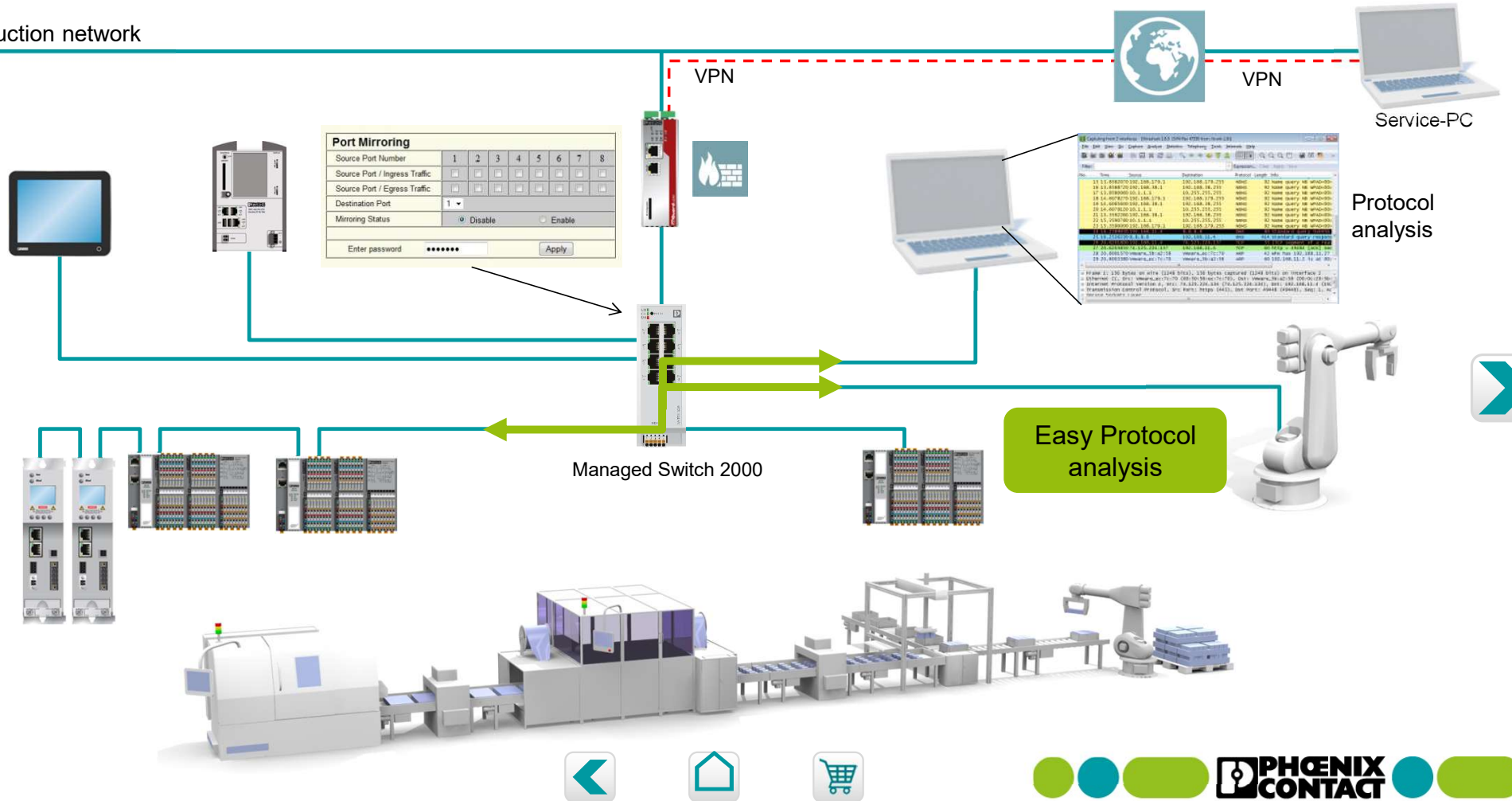
Protocol issues

Production network



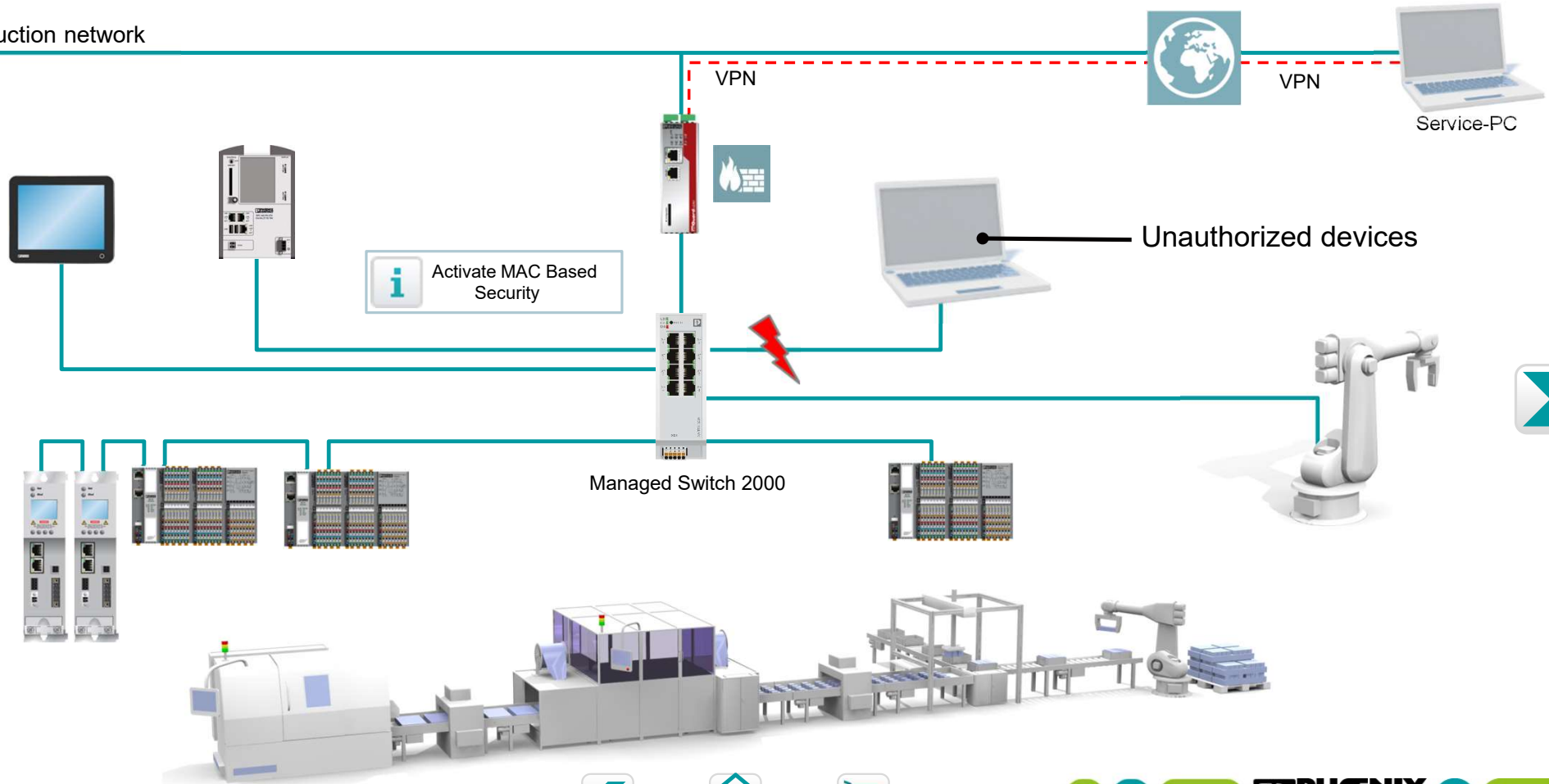
Our solution: Port Mirroring

Production network



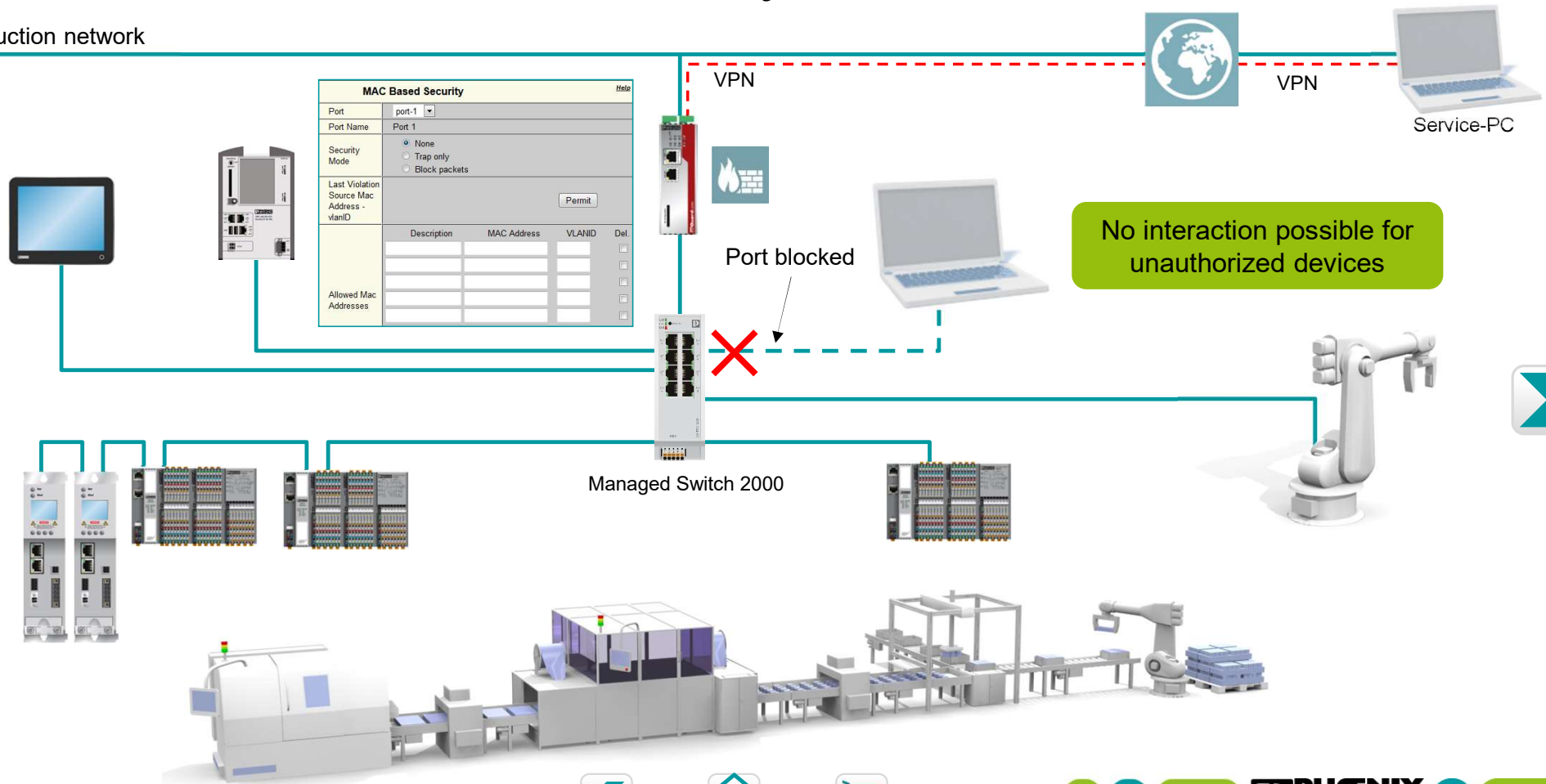
Unauthorized devices

Production network



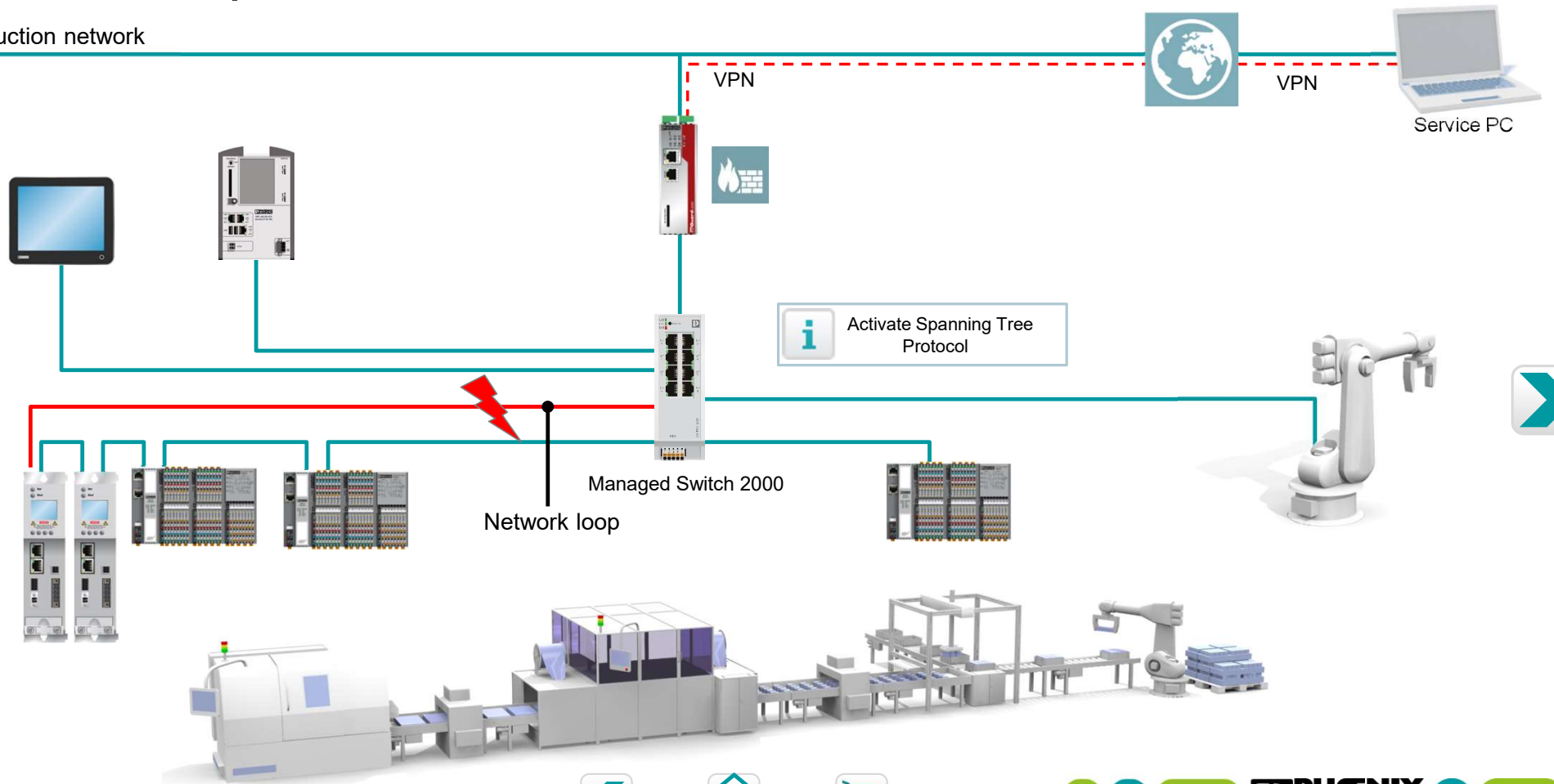
Our Solution: MAC Based Security

Production network



Network Loops

Production network



Our Solution: Spanning Tree Protocol

Production network

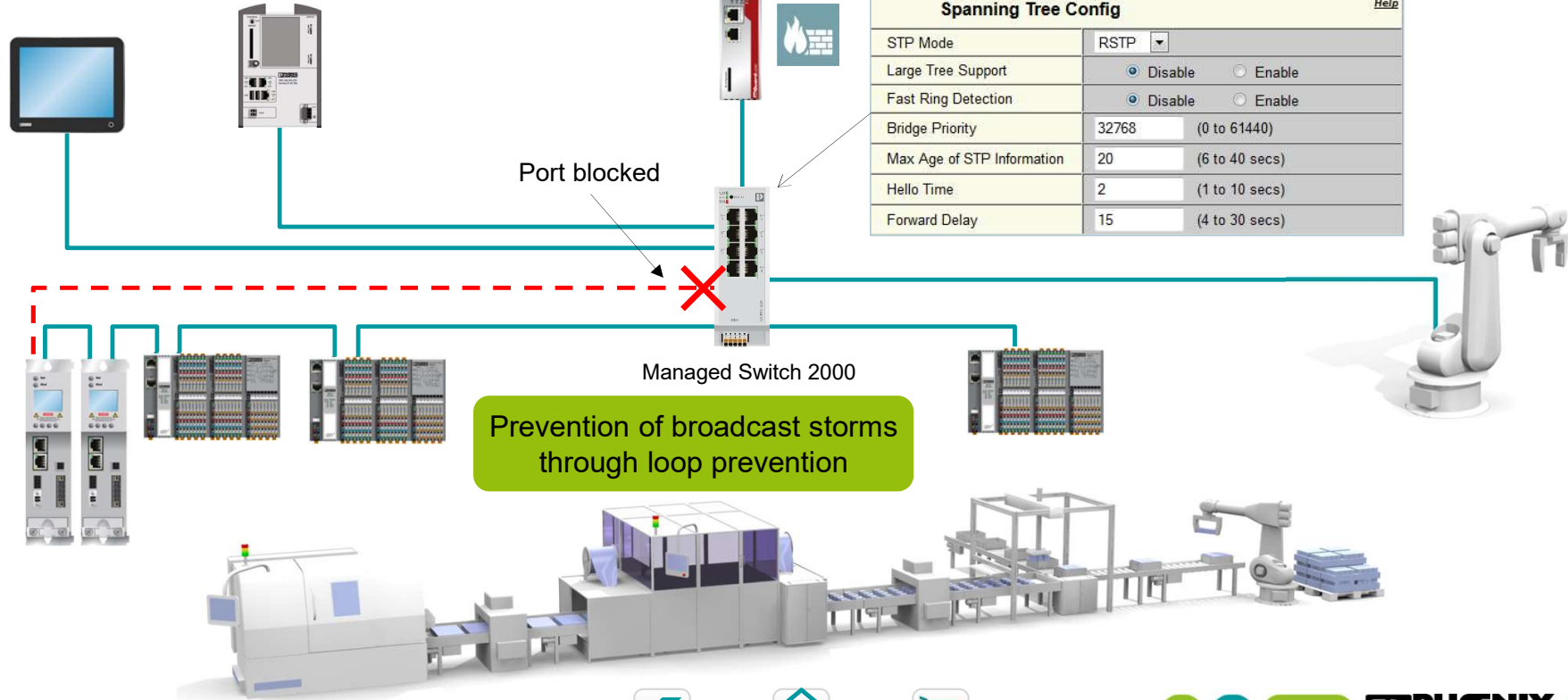


VPN

VPN



Service PC



Profinet simple device replacement

Production network

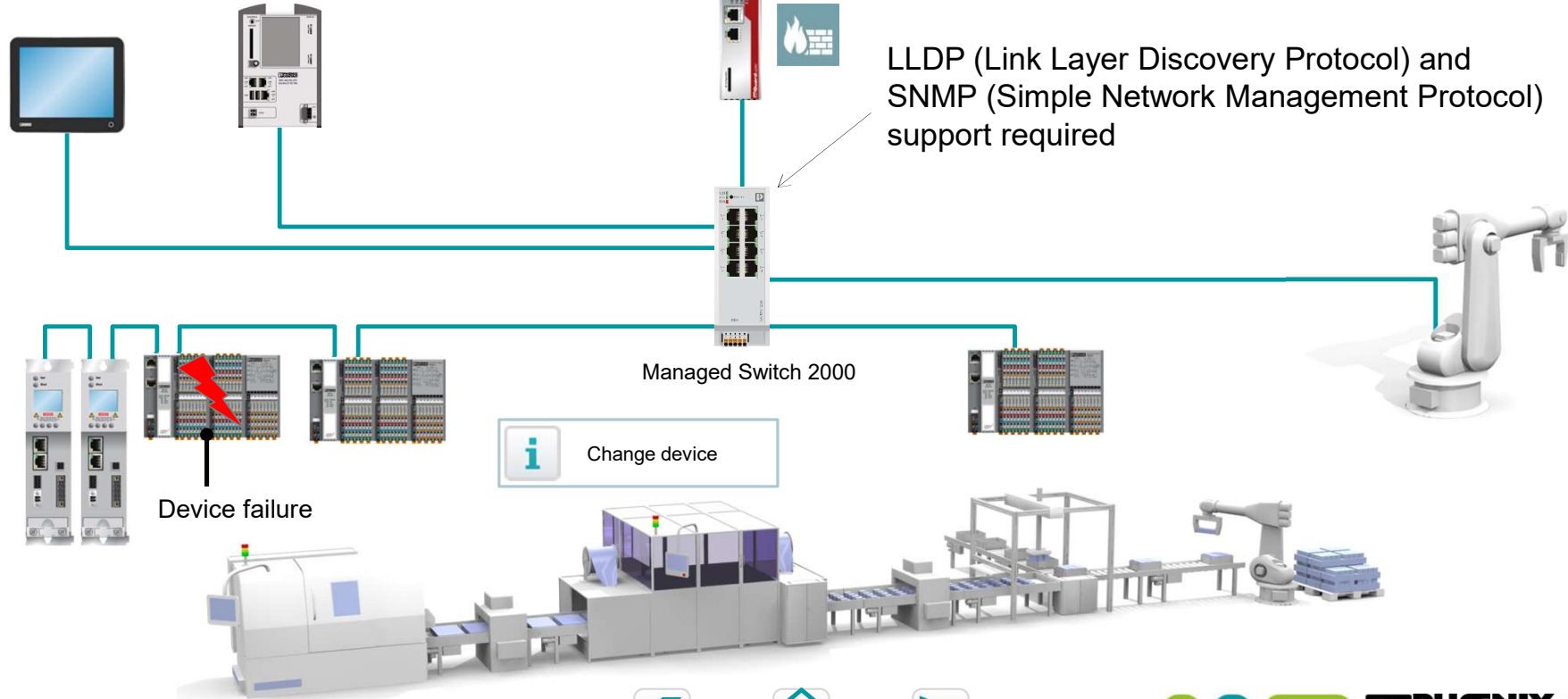


VPN

VPN

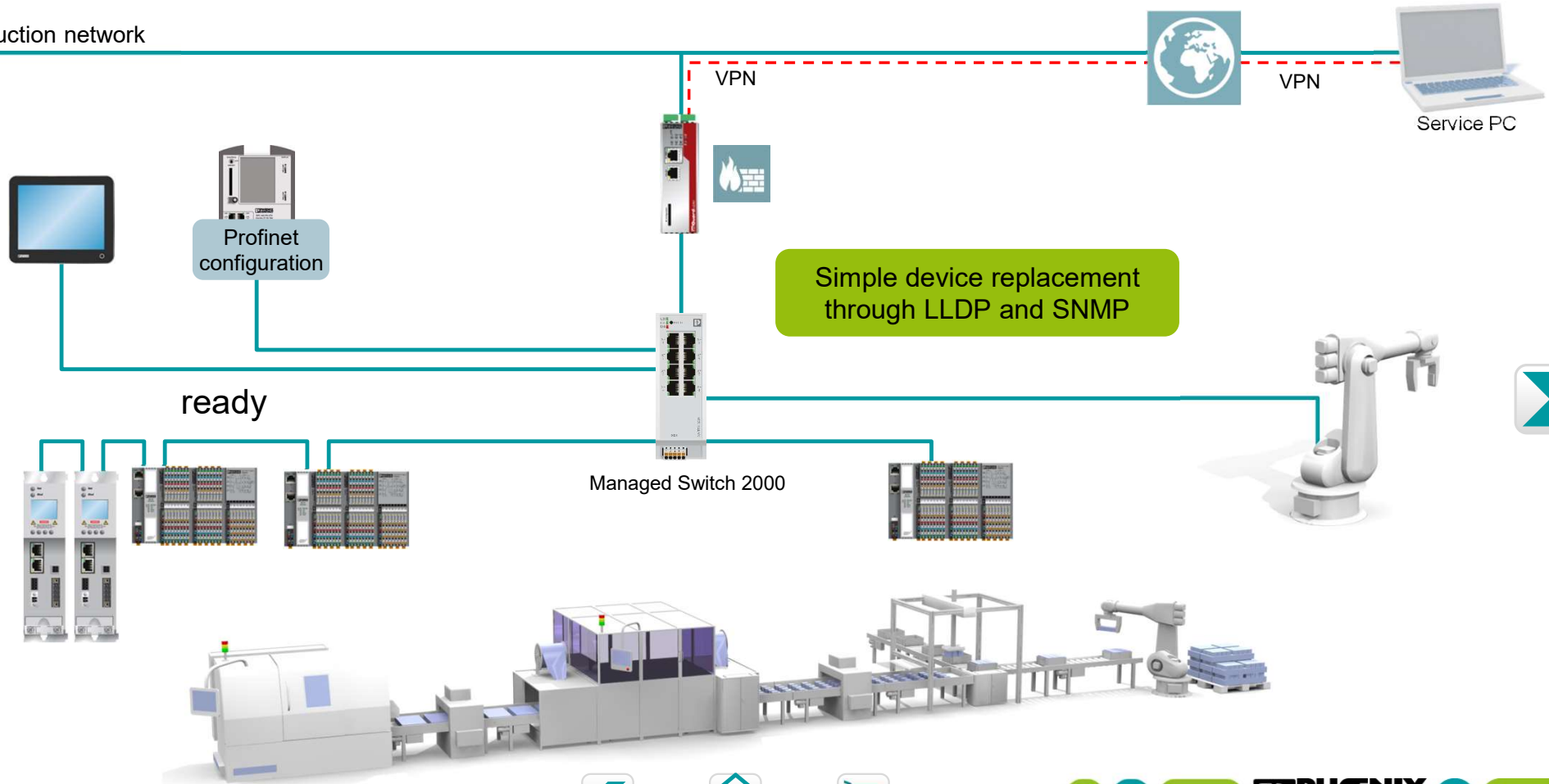


Service PC



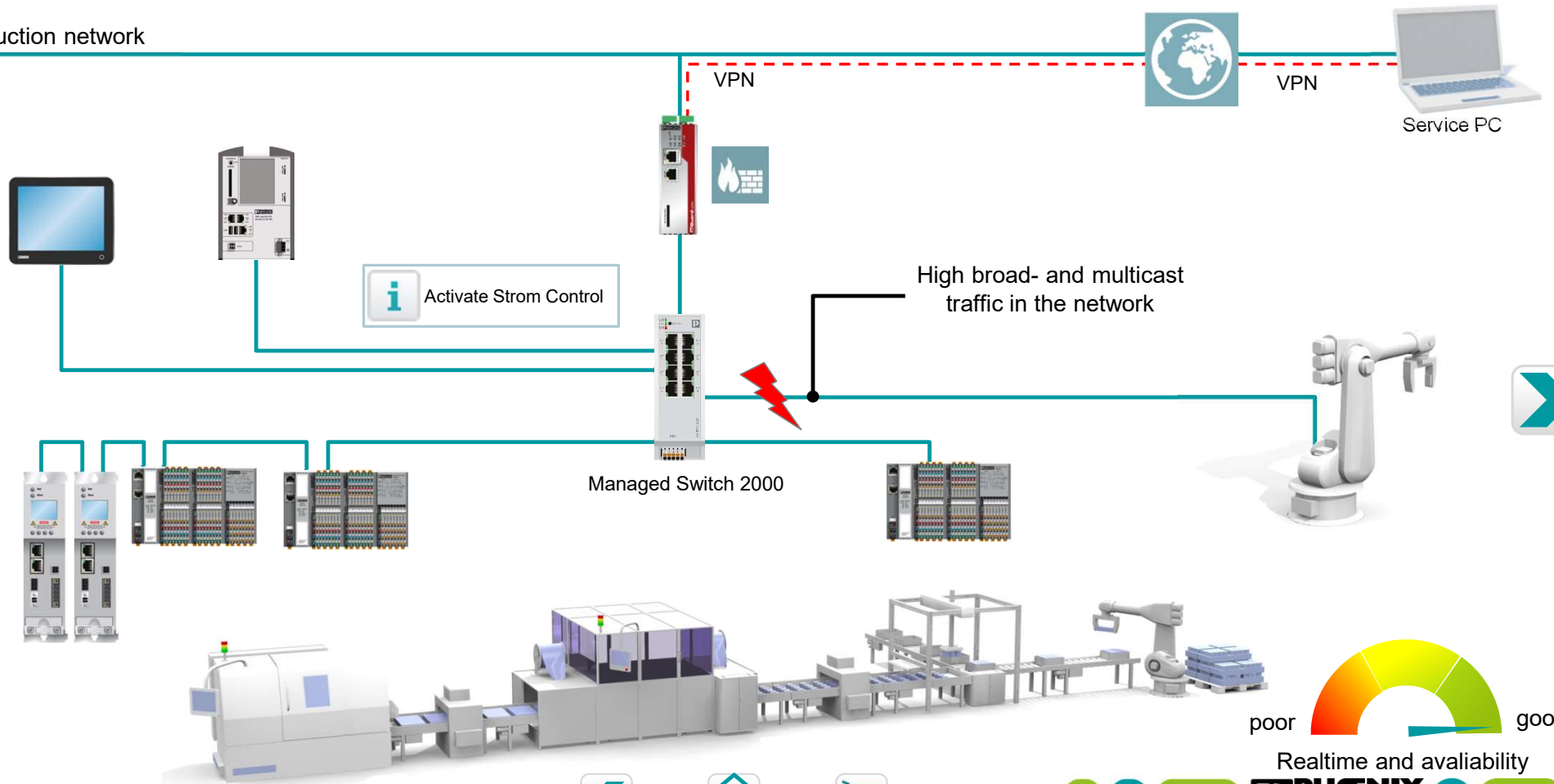
Profinet simple device replacement

Production network



High broad- and multicast traffic

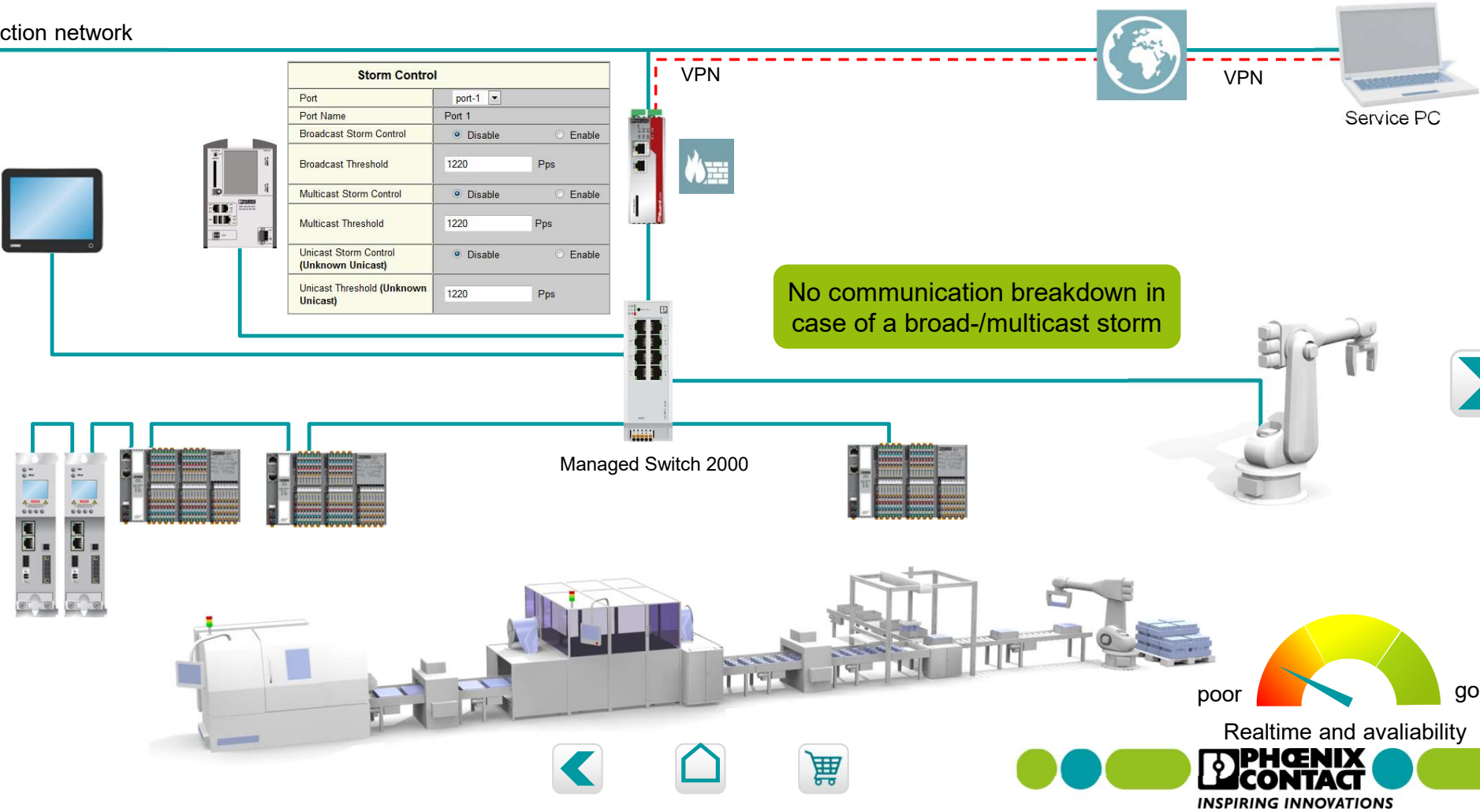
Production network



Realtime and availability

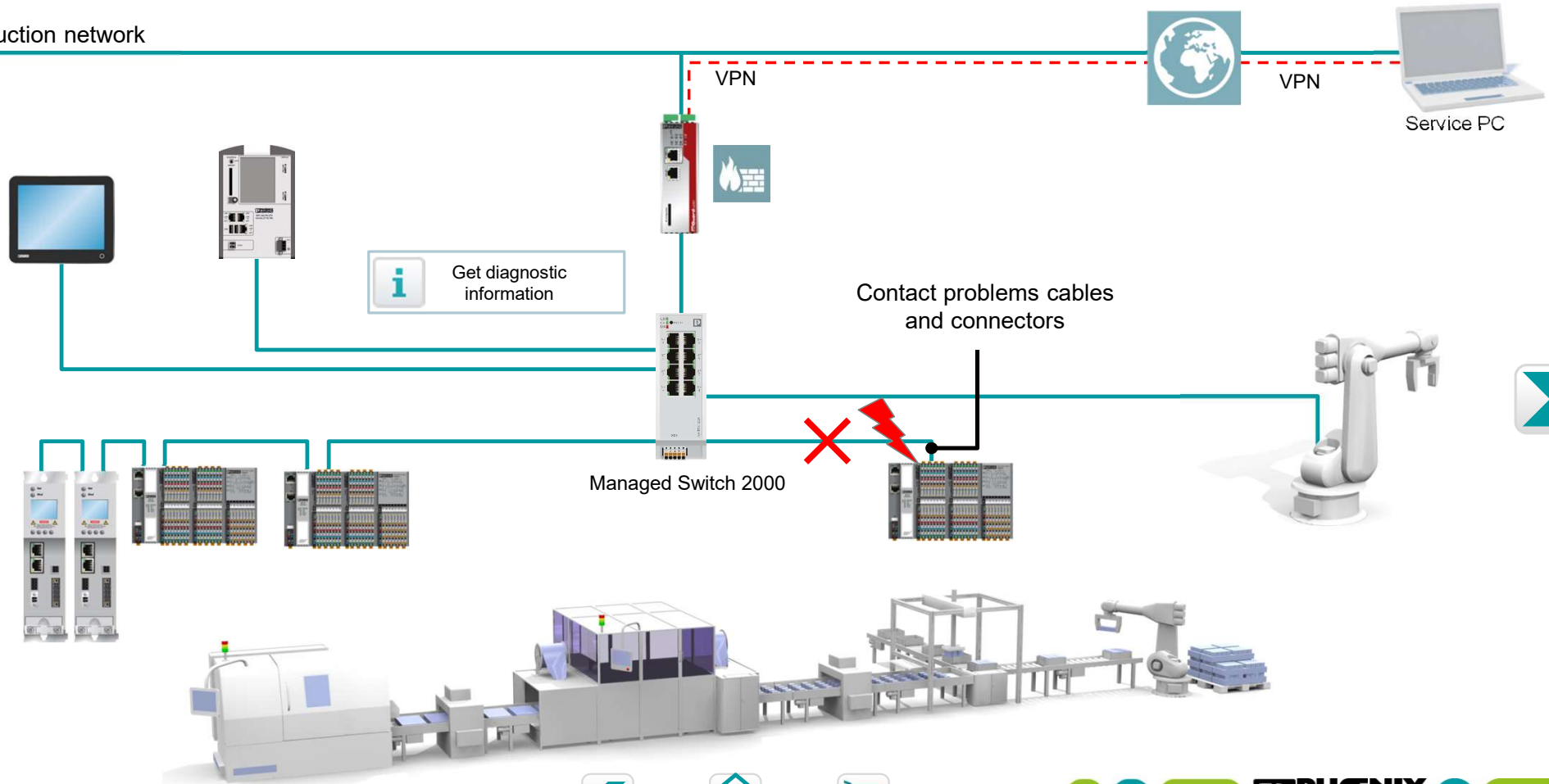
Our solution: Storm control

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

Enter password

Clear

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

Clear

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

VPN

VPN

Service PC

Receive diagnostic information in case of problems with cables and connectors





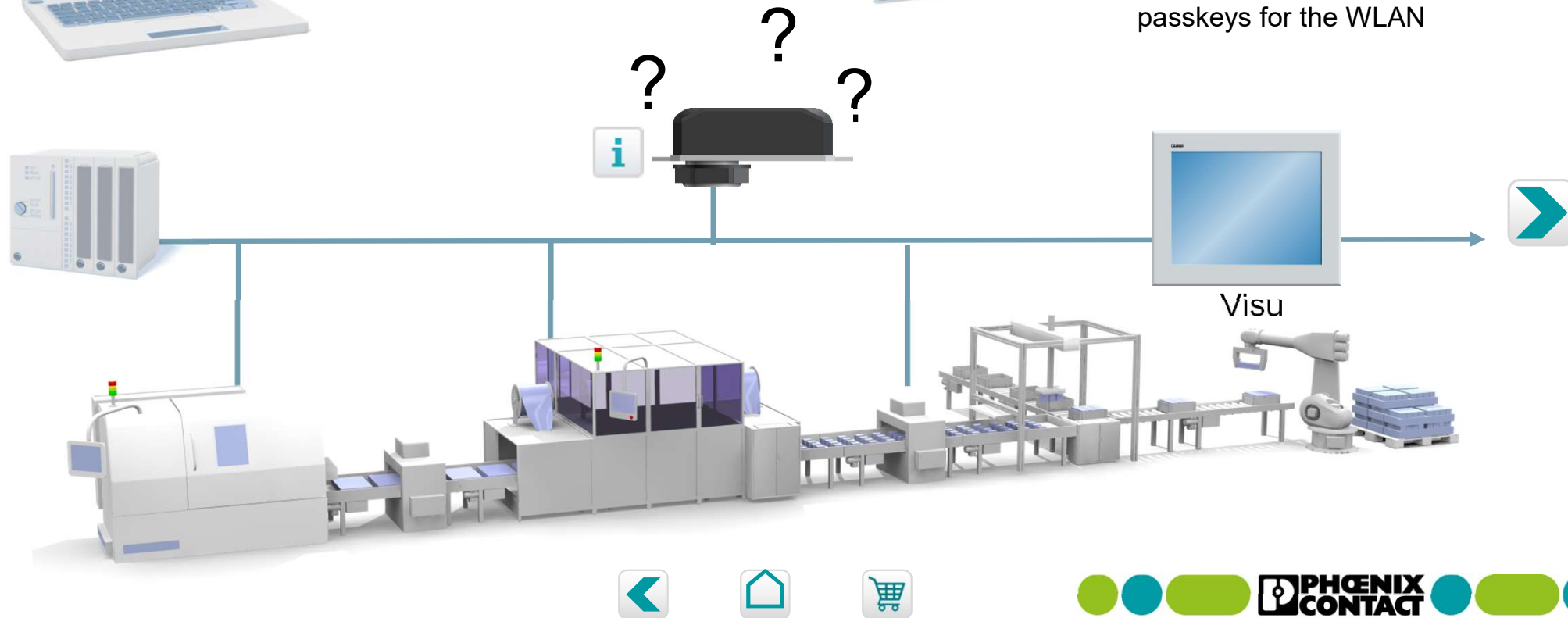
Unlimited service access into machine network

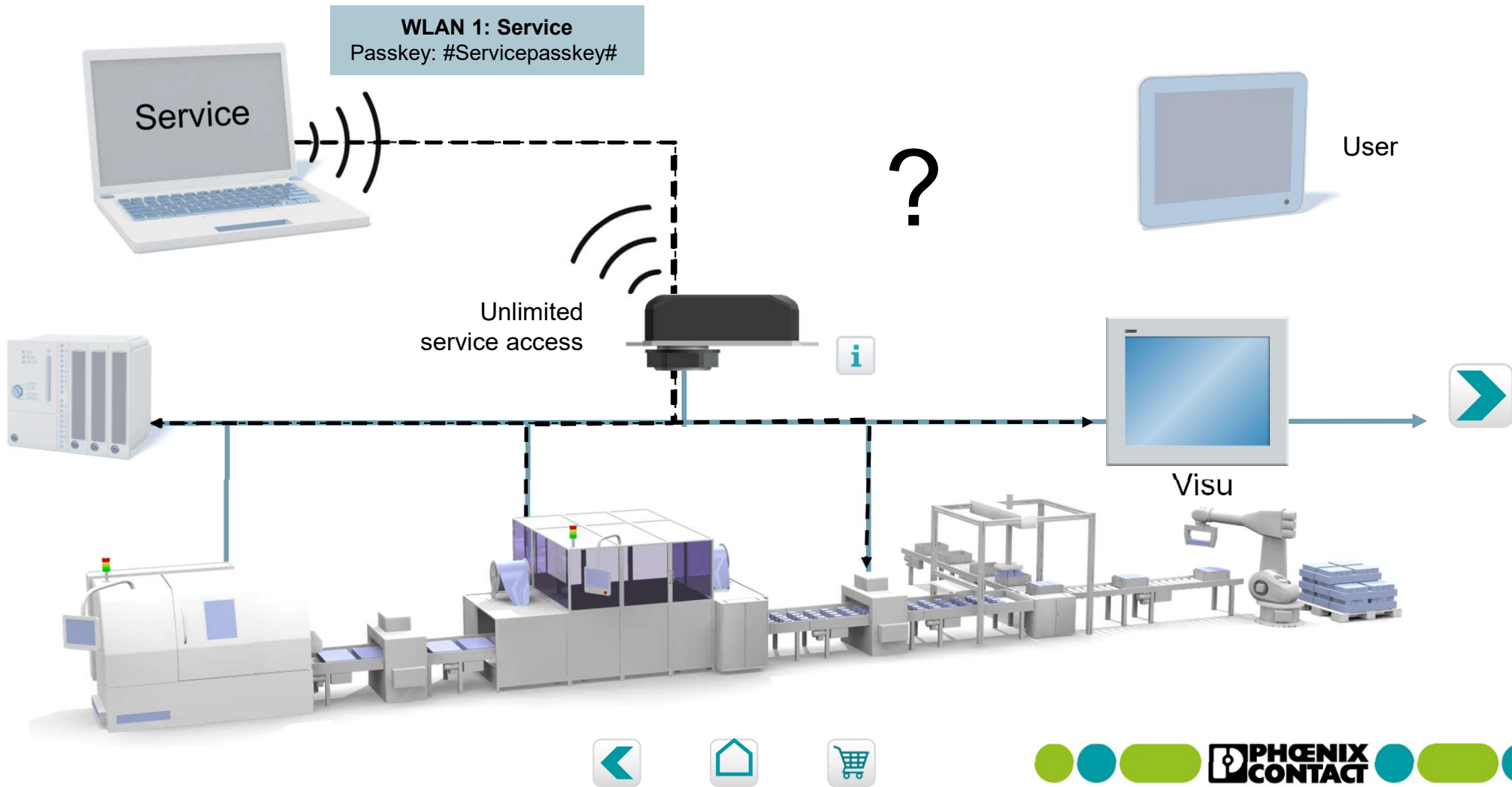
- Access on all devices

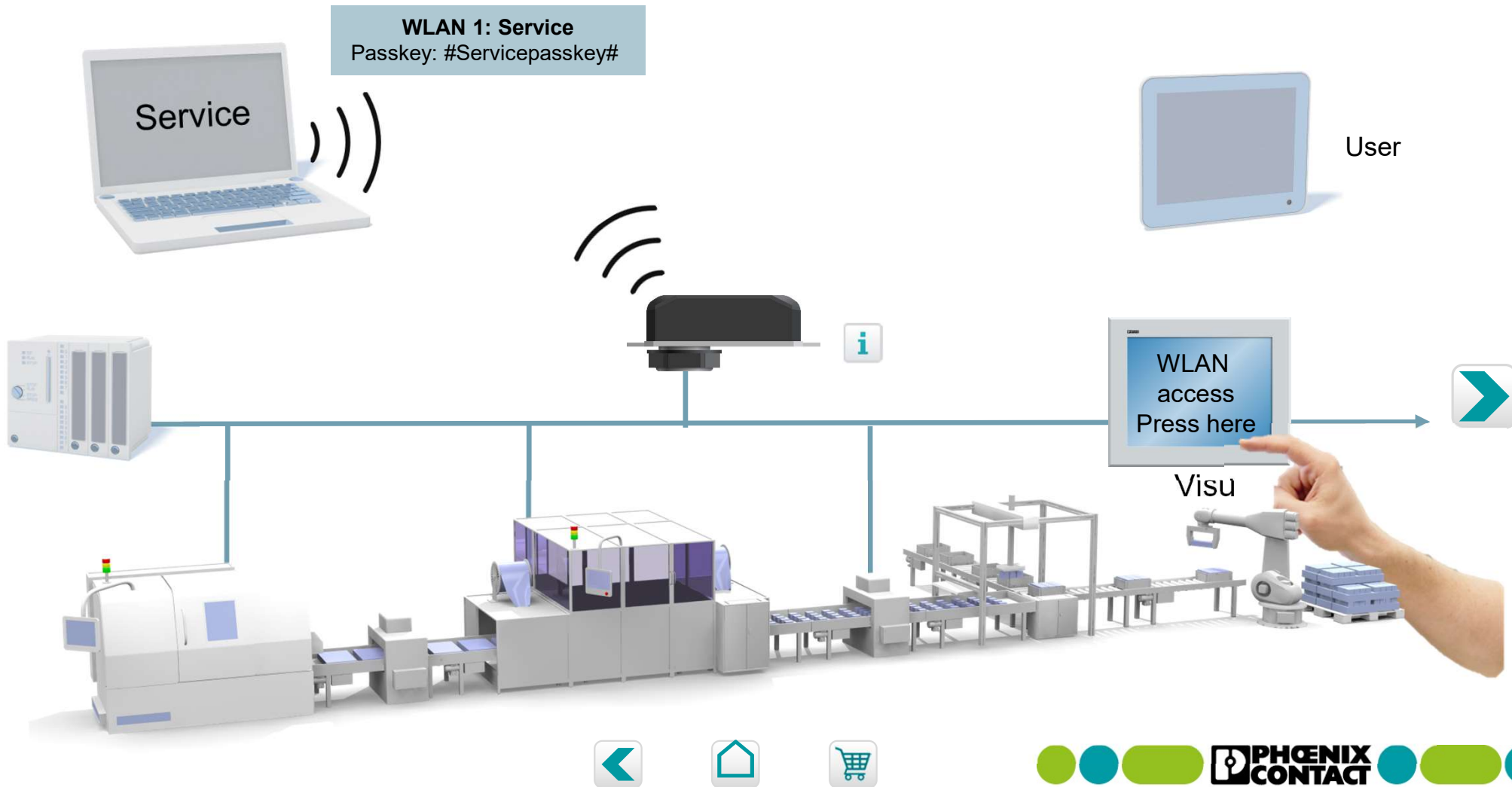


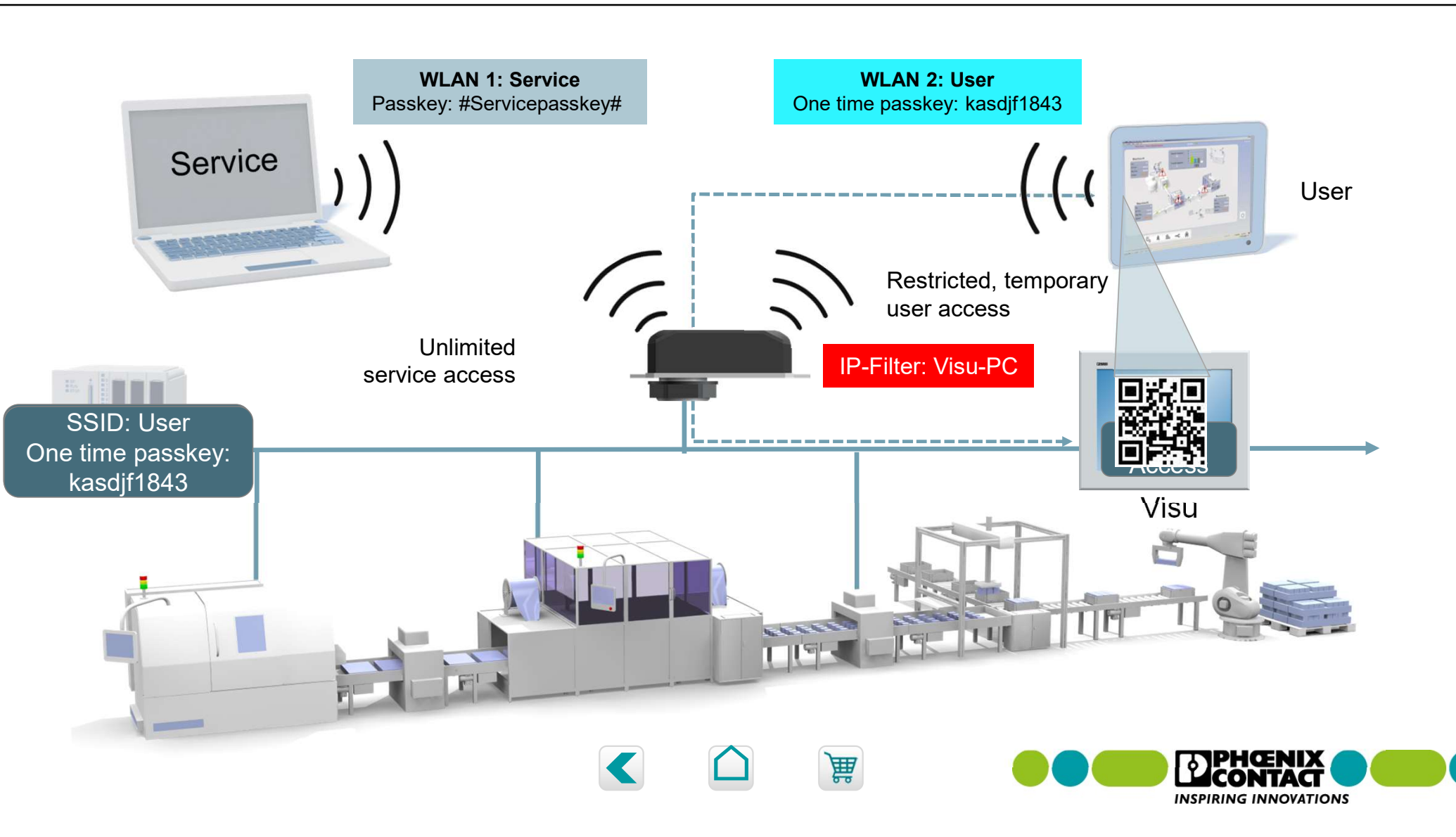
Restricted, temporary user access into machine network

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

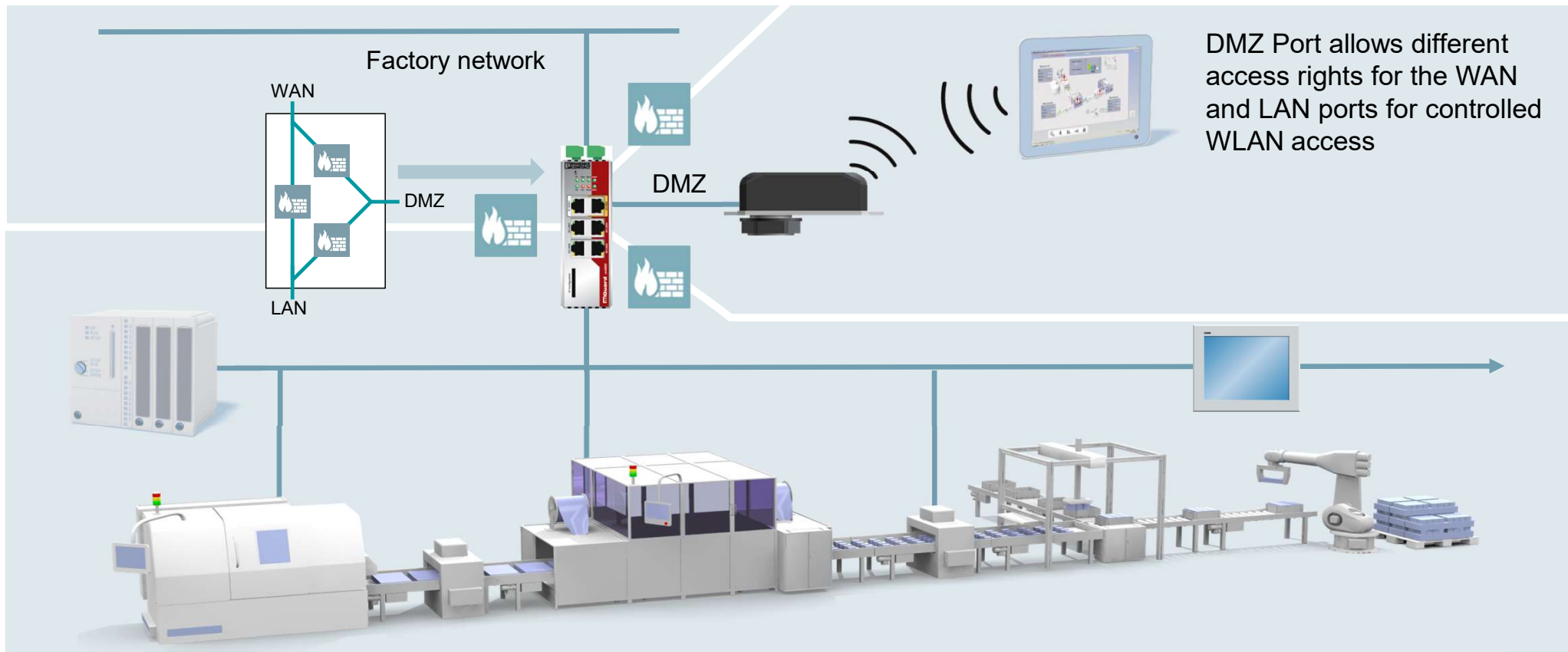








Secure WLAN machine network



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



Machine network (172.16.0.0/24)

Machine network (172.16.0.0/24)

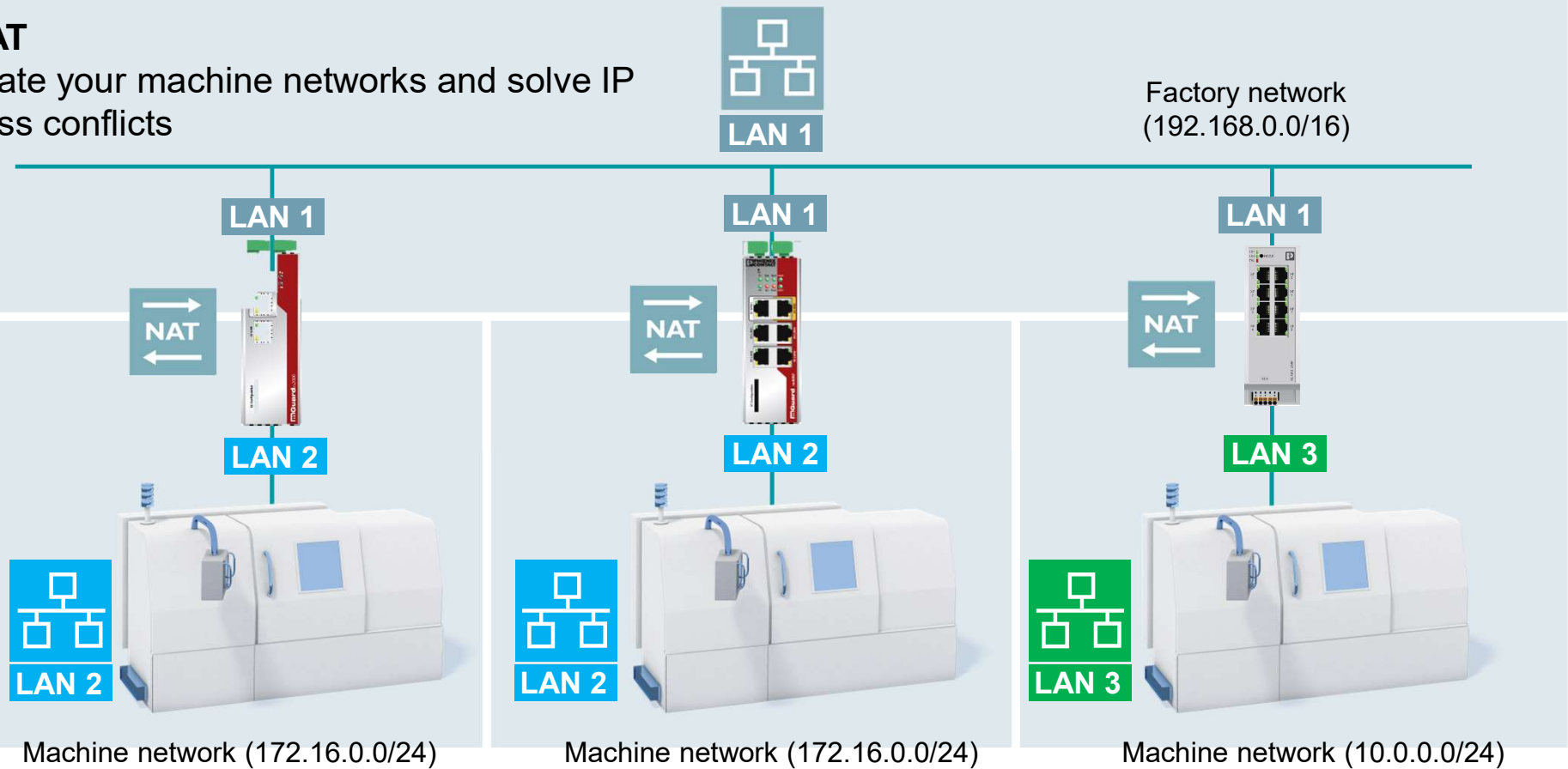
Machine network (10.0.0.0/24)



Integration in production network

1:1NAT

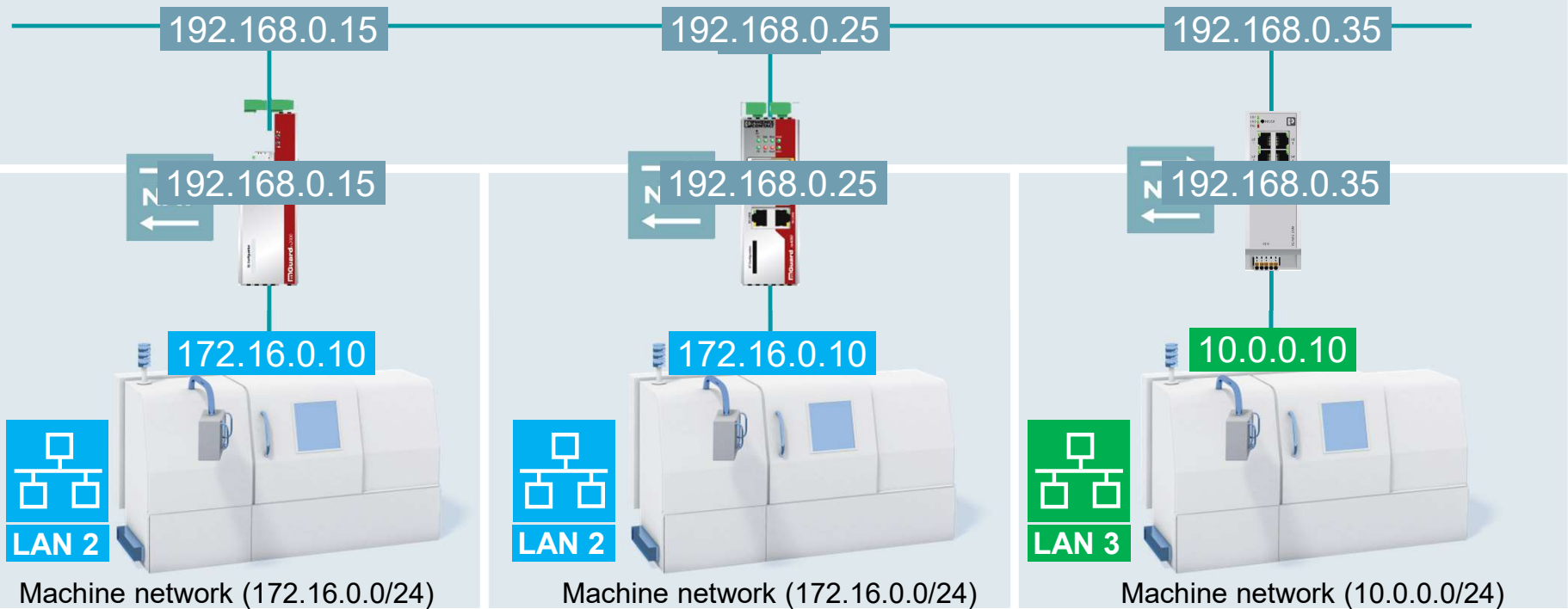
Integrate your machine networks and solve IP address conflicts



Integration in production network

1:1NAT

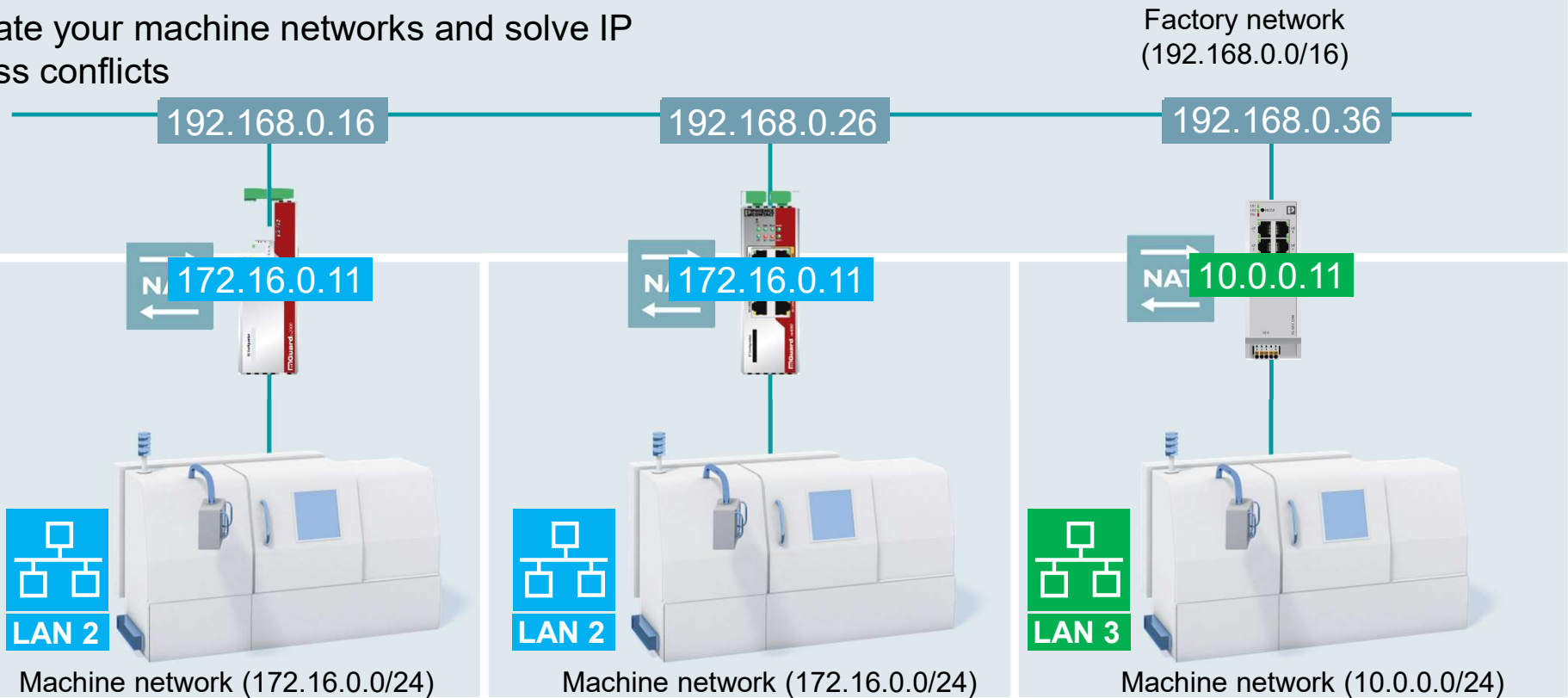
Integrate your machine networks and solve IP address conflicts



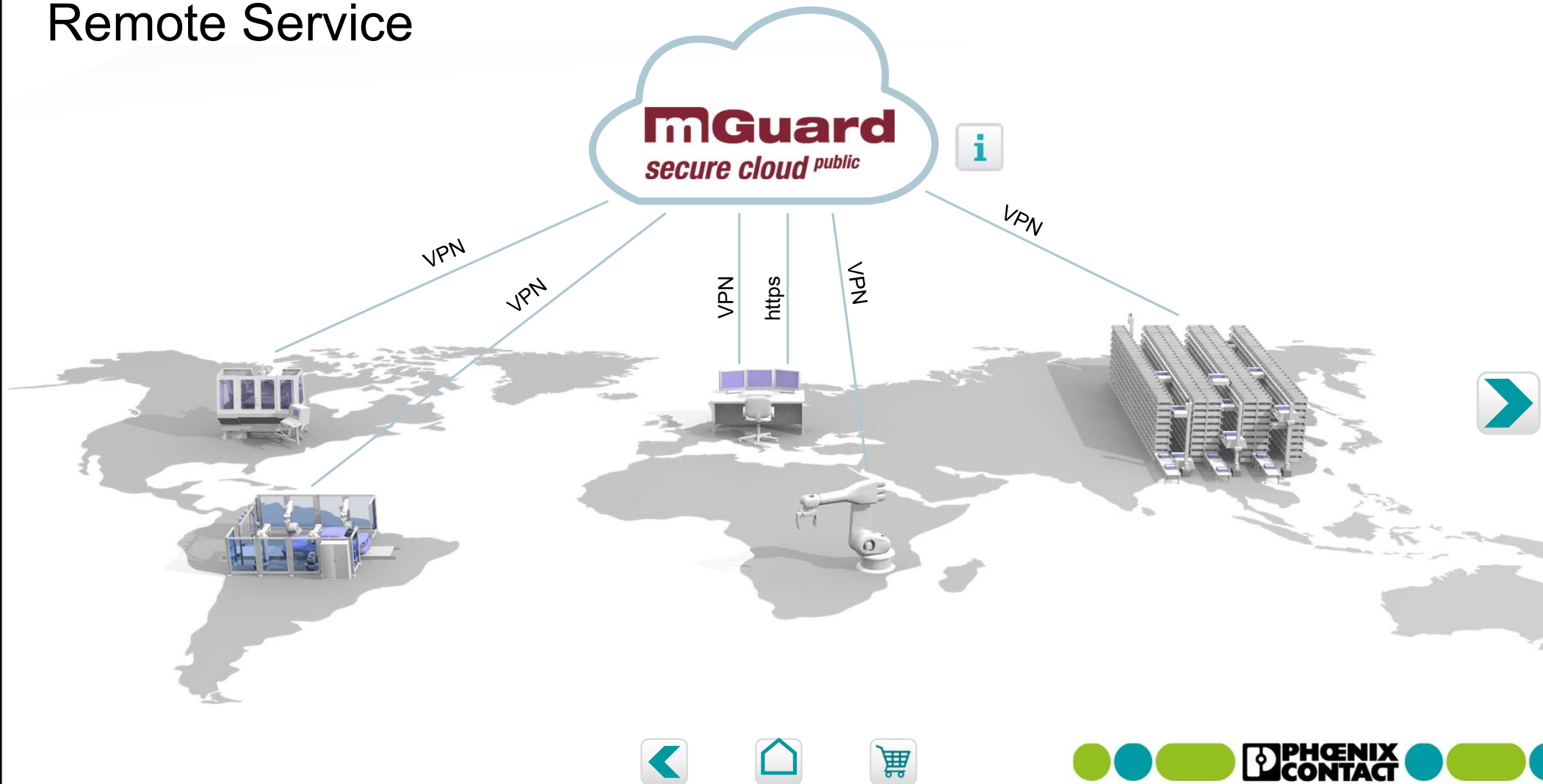
Integration in production network

1:1NAT

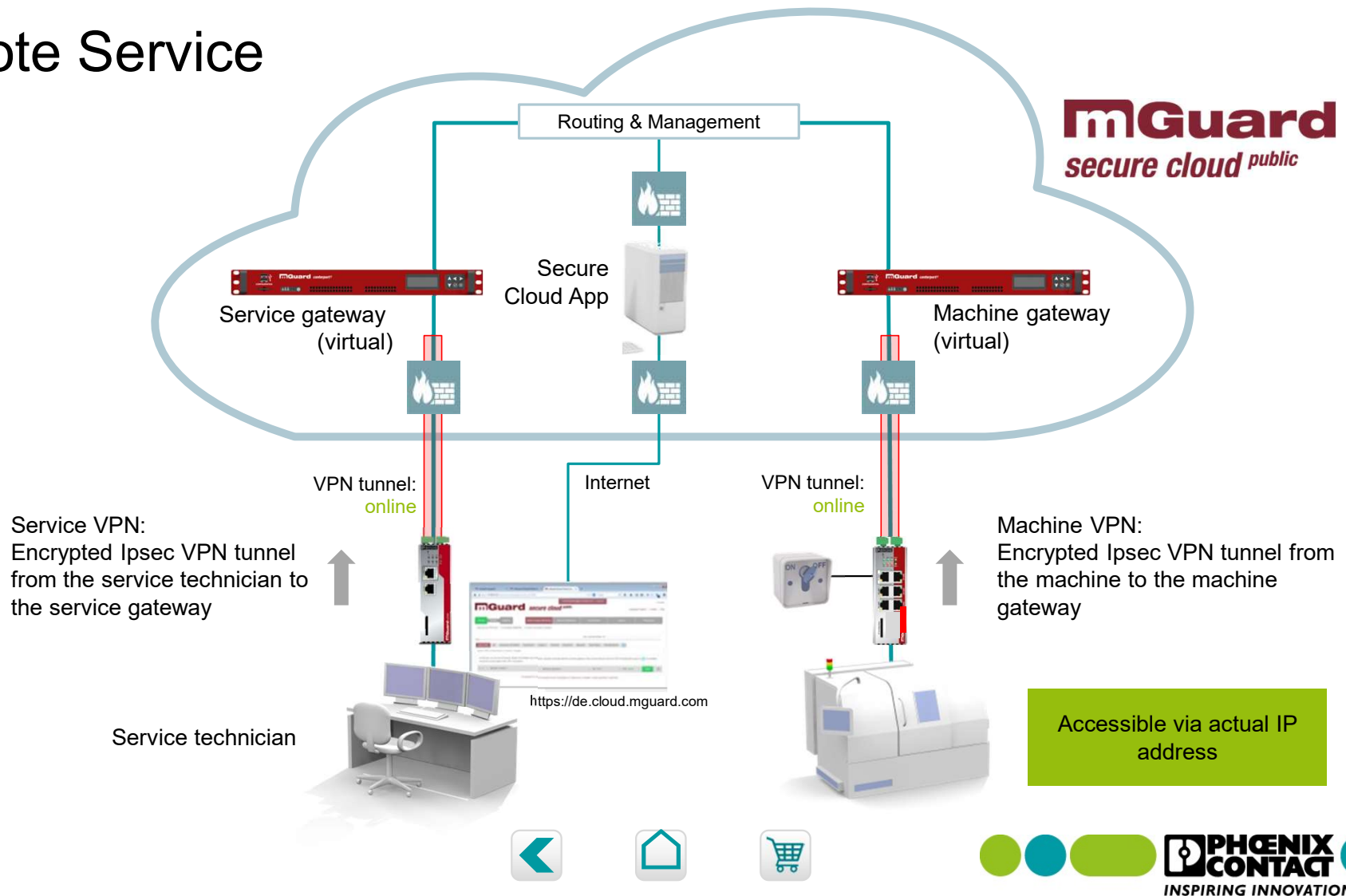
Integrate your machine networks and solve IP address conflicts



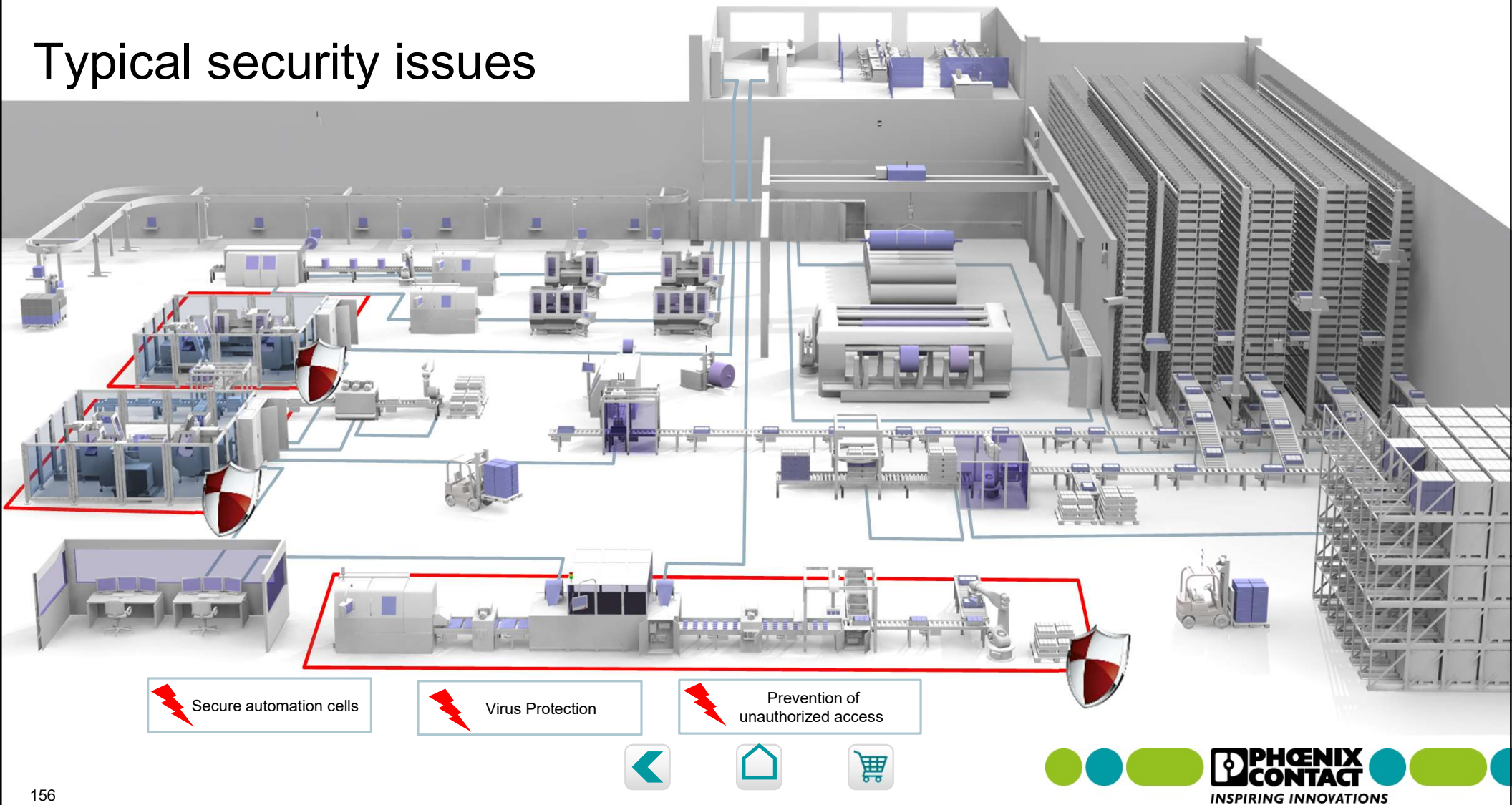
Remote Service

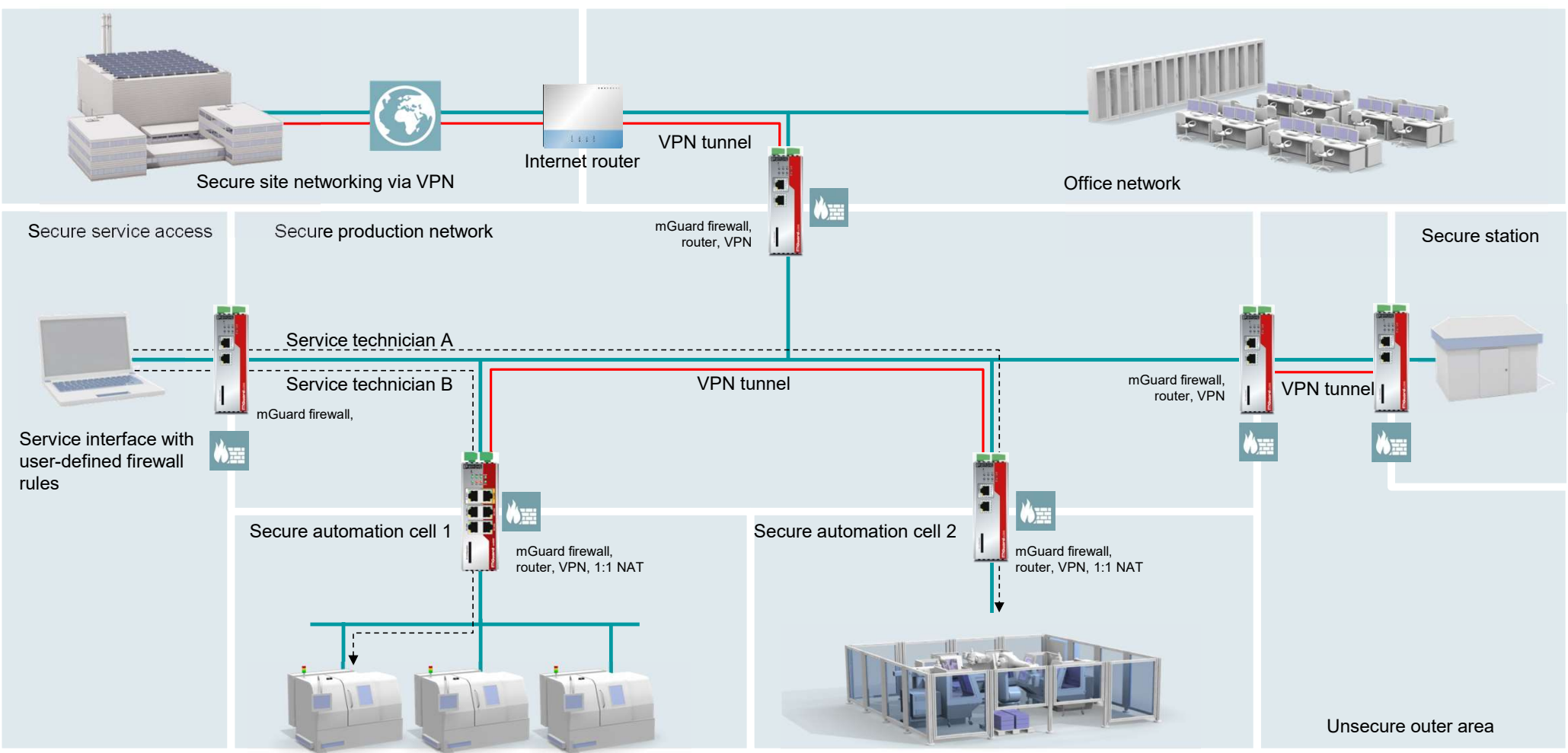


Remote Service



Typical security issues





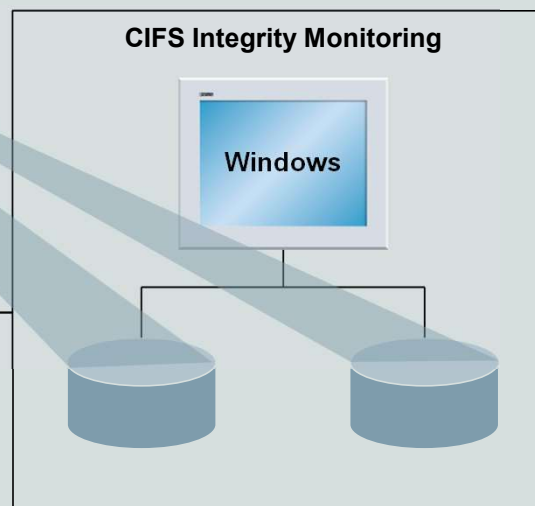
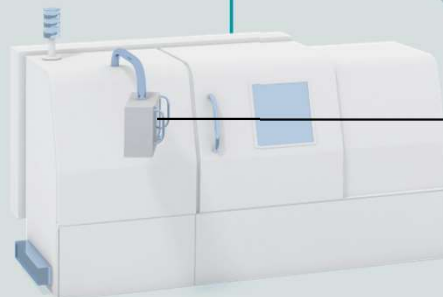


Ethernet



Firewall
CIFS Integrity Monitoring

Scan



CIFS Integrity Monitoring

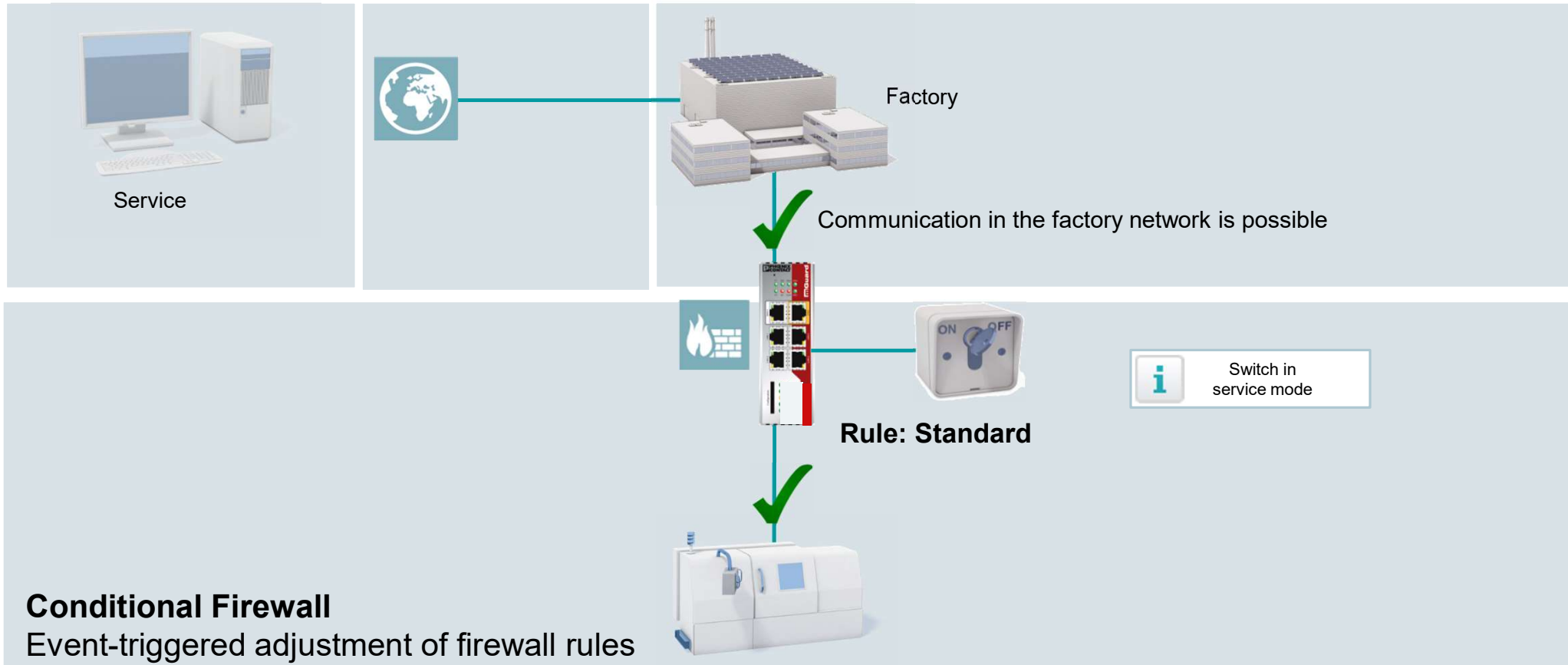
constantly monitors your file systems for unauthorized changes and alerts you if a change is detected



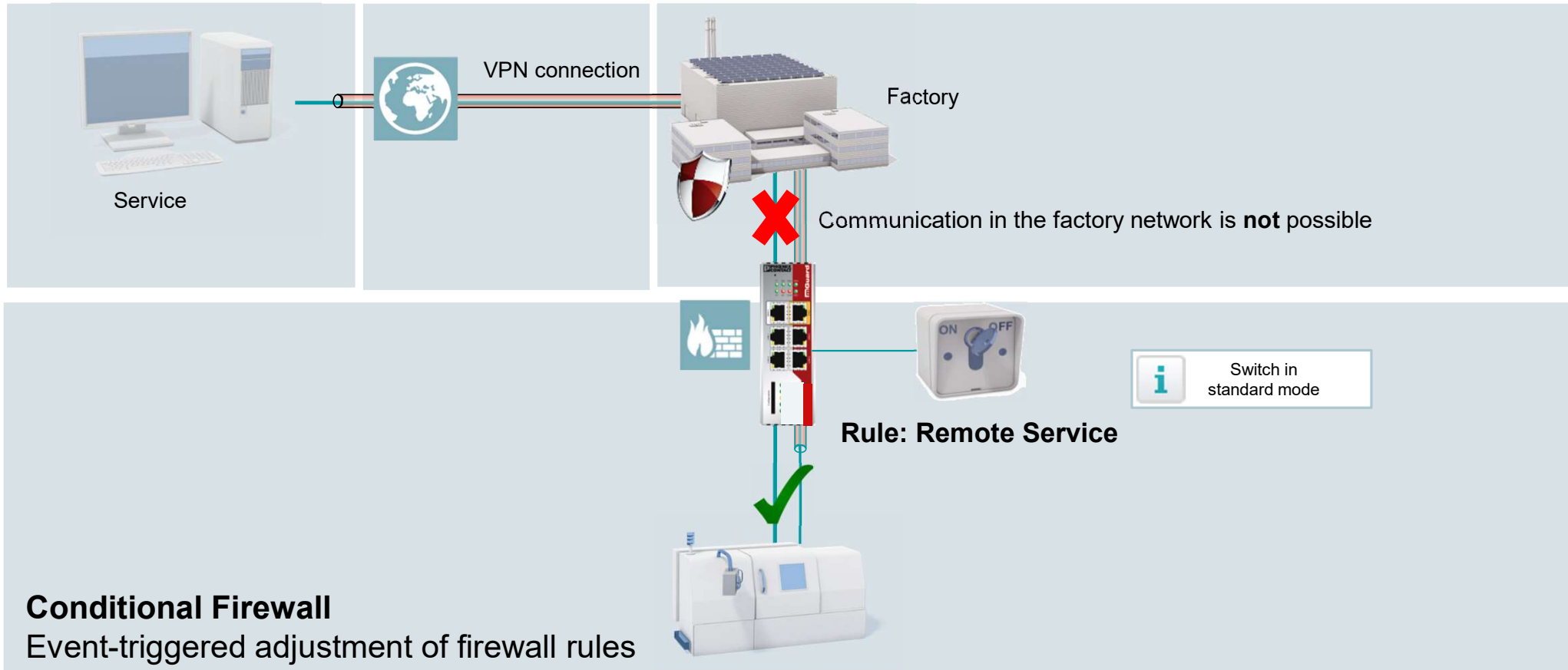
**PHOENIX
CONTACT**
INSPIRING INNOVATIONS



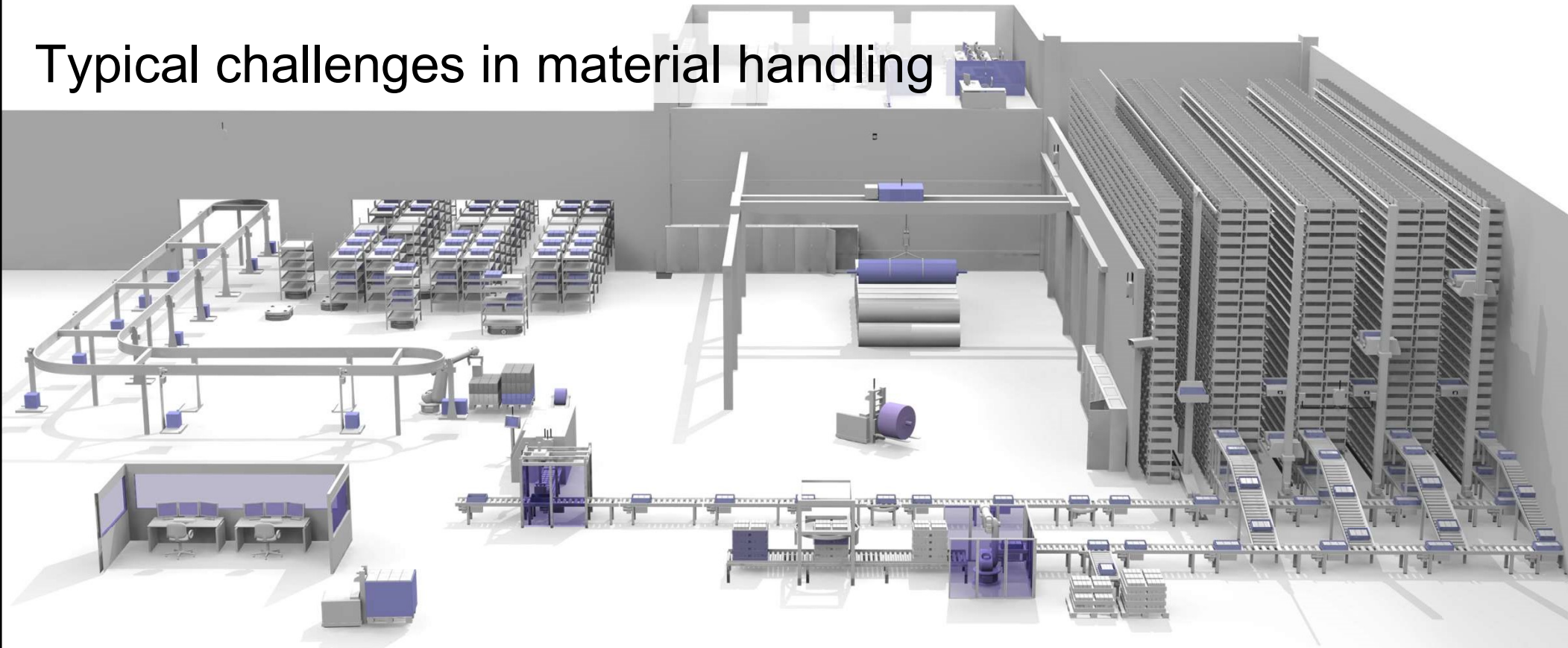
Prevention of unauthorized access



Prevention of unauthorized access



Typical challenges in material handling



Automated guided vehicle



Typical WLAN network structure



Electric monorail conveyor



Moving parts

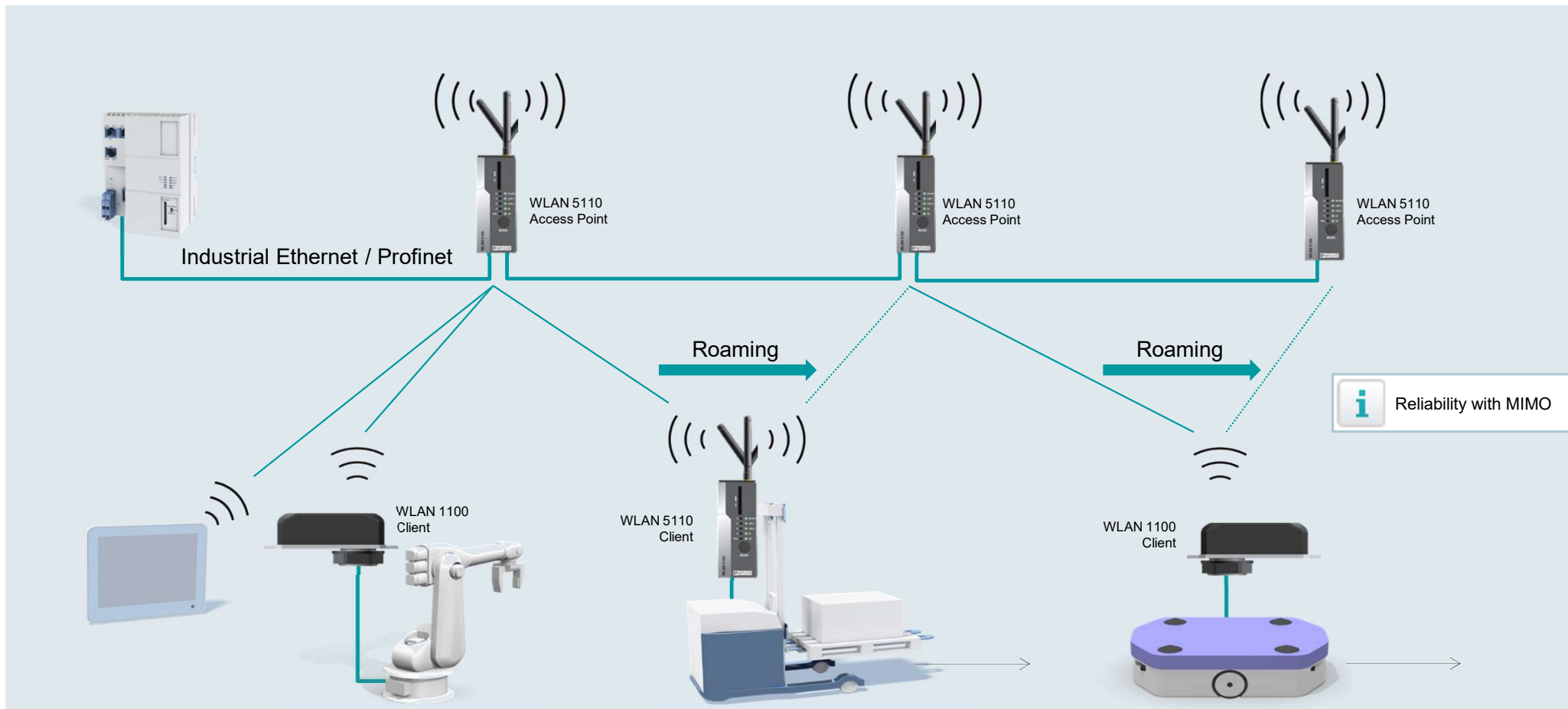


Automatic shuttle warehouse

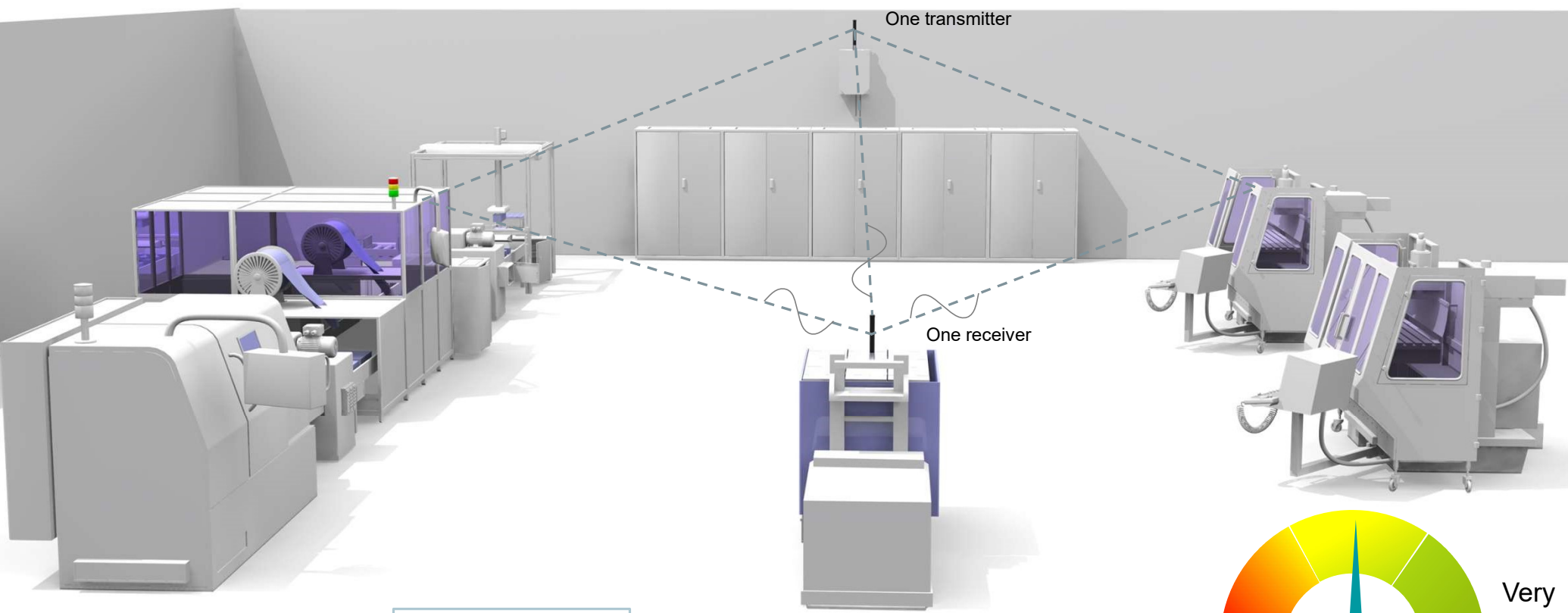


Wireless for cranes





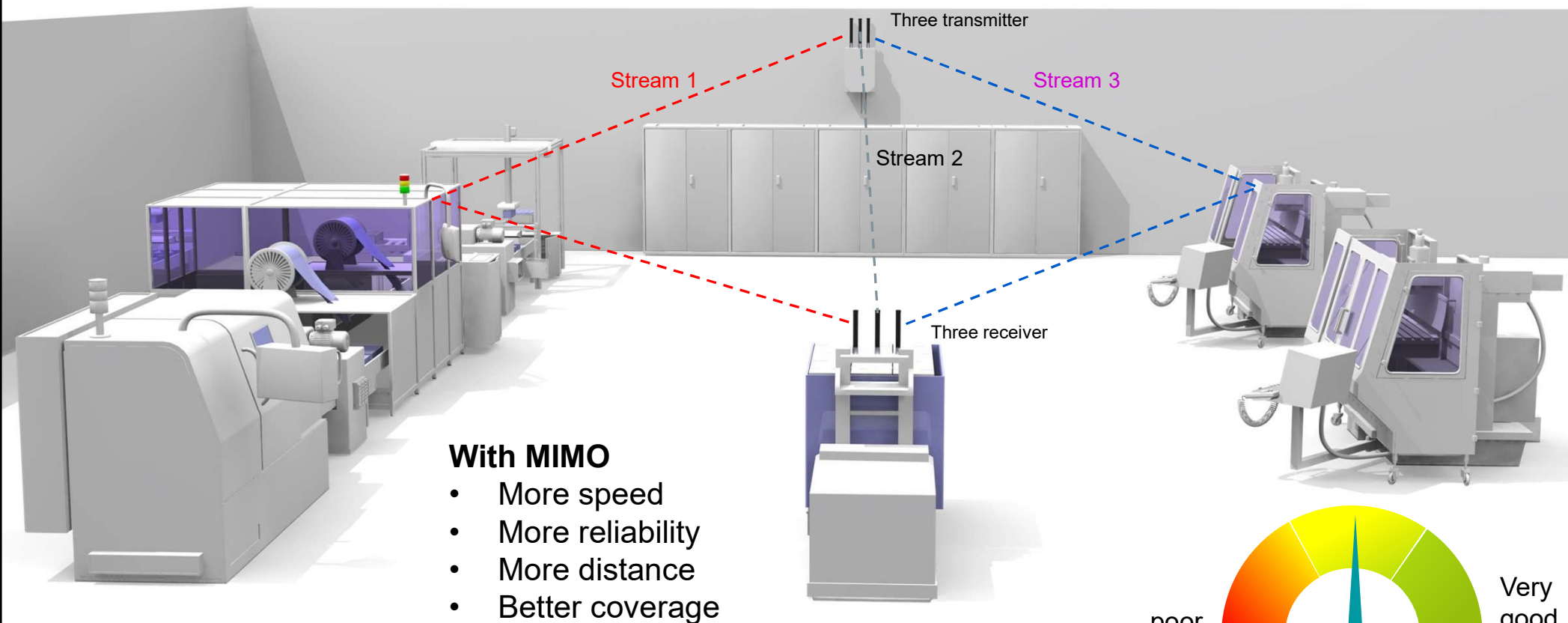
Standard antenna technology



 With MIMO

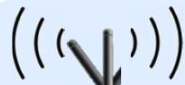


MIMO antenna technology





Industrial Ethernet / Profinet



WLAN 5110
Access Point



WLAN 5110
Access Point



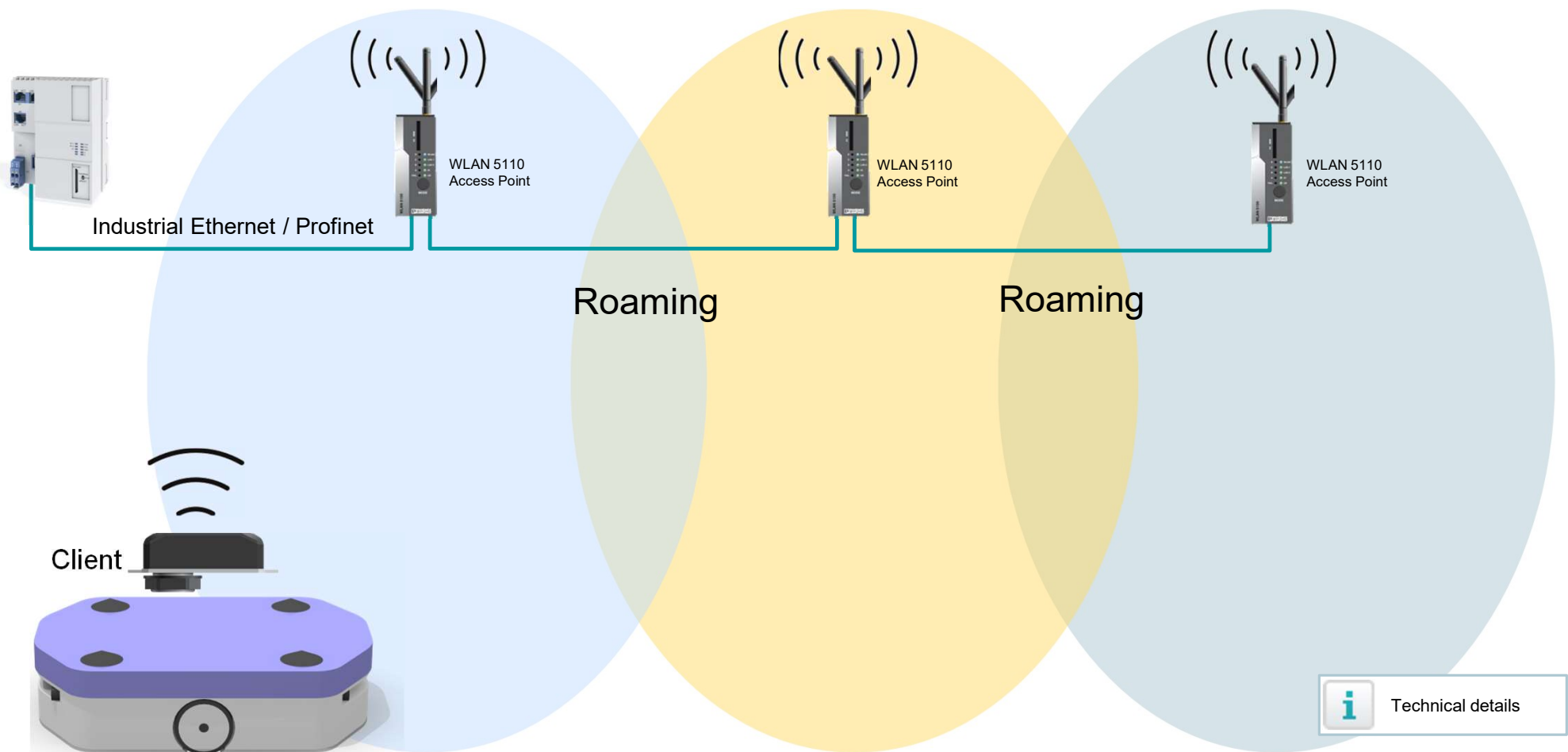
WLAN 5110
Access Point

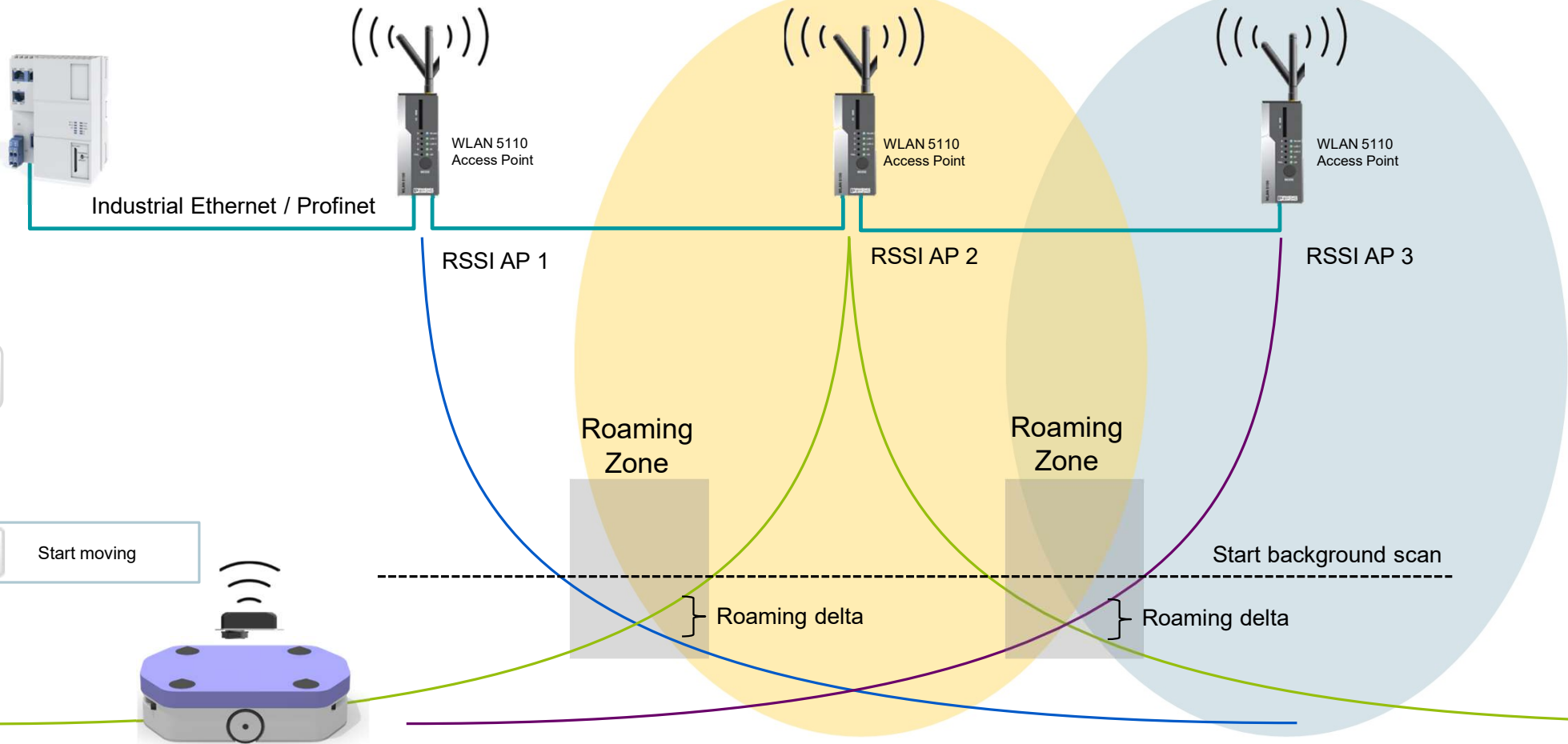
Client



Start moving









Industrial Ethernet / Profinet



WLAN 5110
Access Point

RSSI AP 1



WLAN 5110
Access Point

RSSI AP 2



WLAN 5110
Access Point

RSSI AP 3

Roaming
Zone

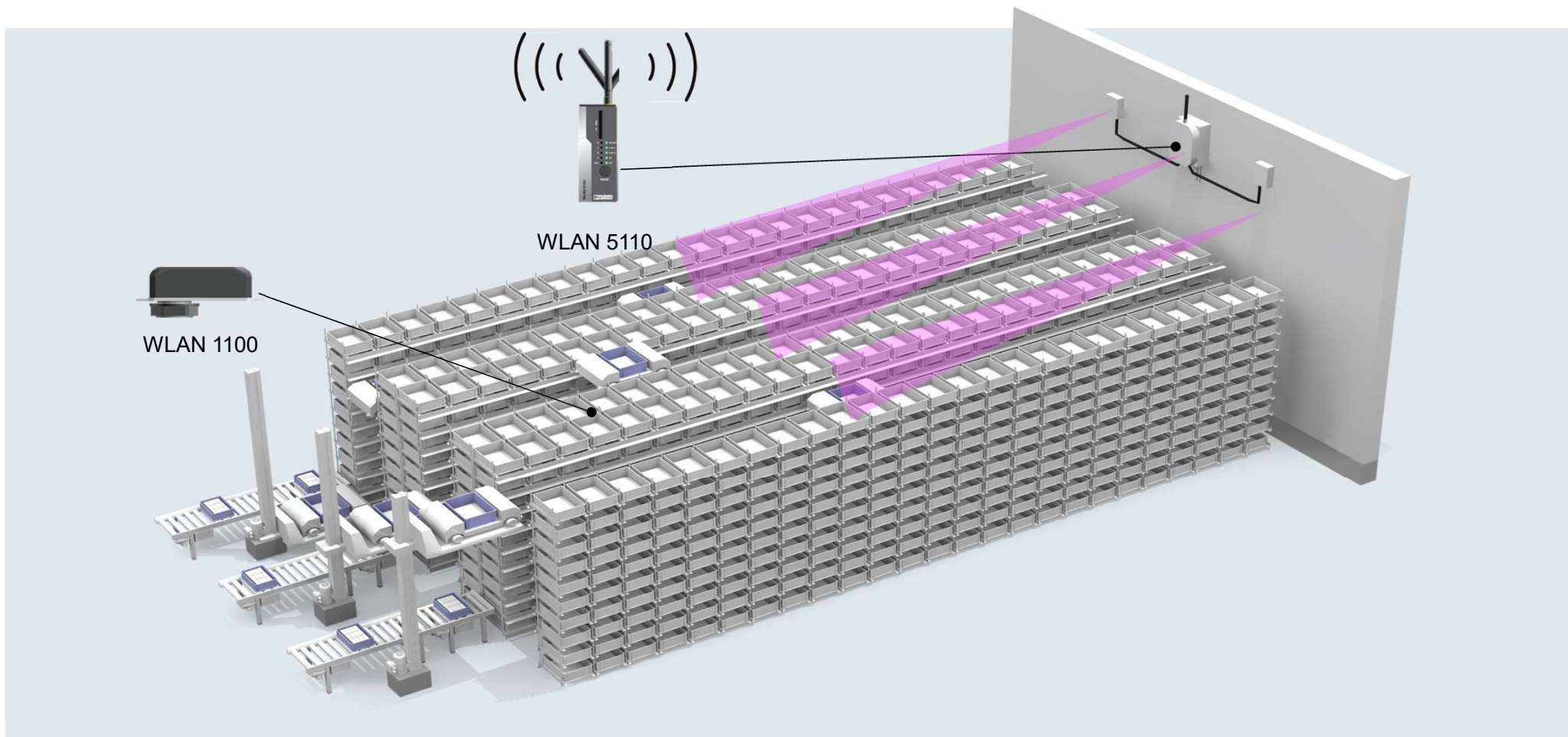
Roaming
Zone

Start background scan

Roaming delta

Roaming delta







Access Point



Controller

Ethernet

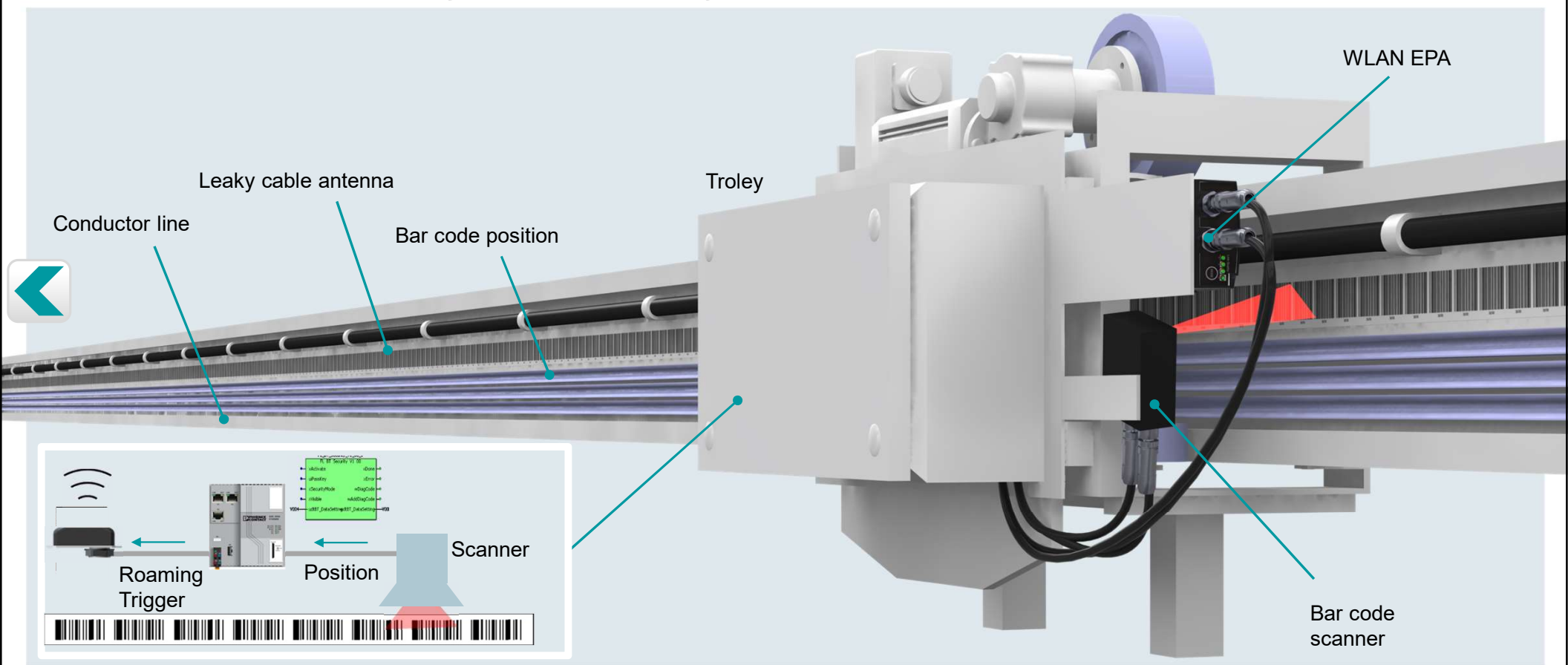
PROFINET

Wireless LAN

Leaky cable antenna



Controlled roaming depending on position





Controller

Ethernet / PROFINET



Access Point

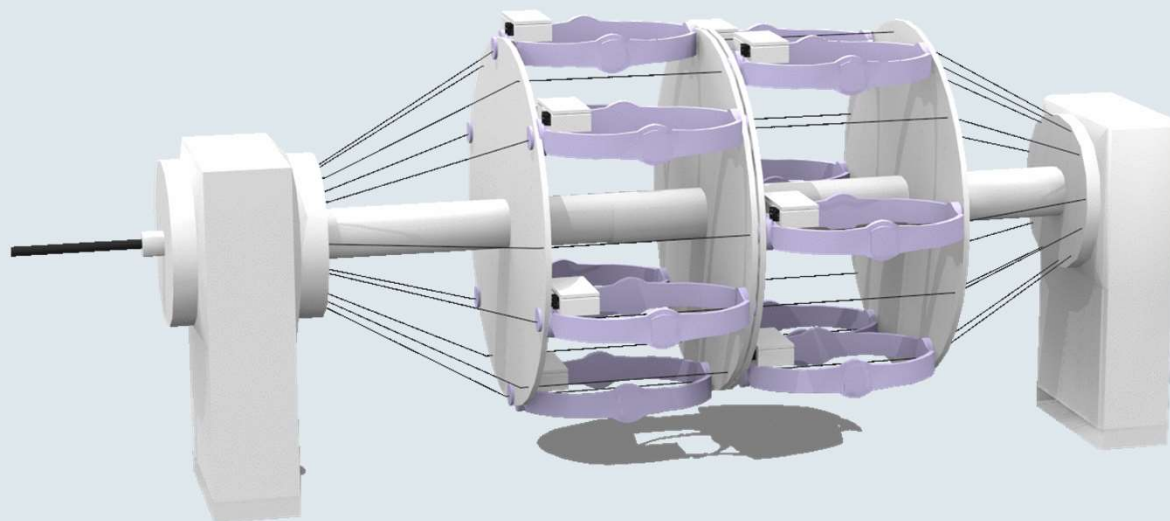
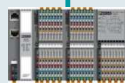
Bluetooth



Client



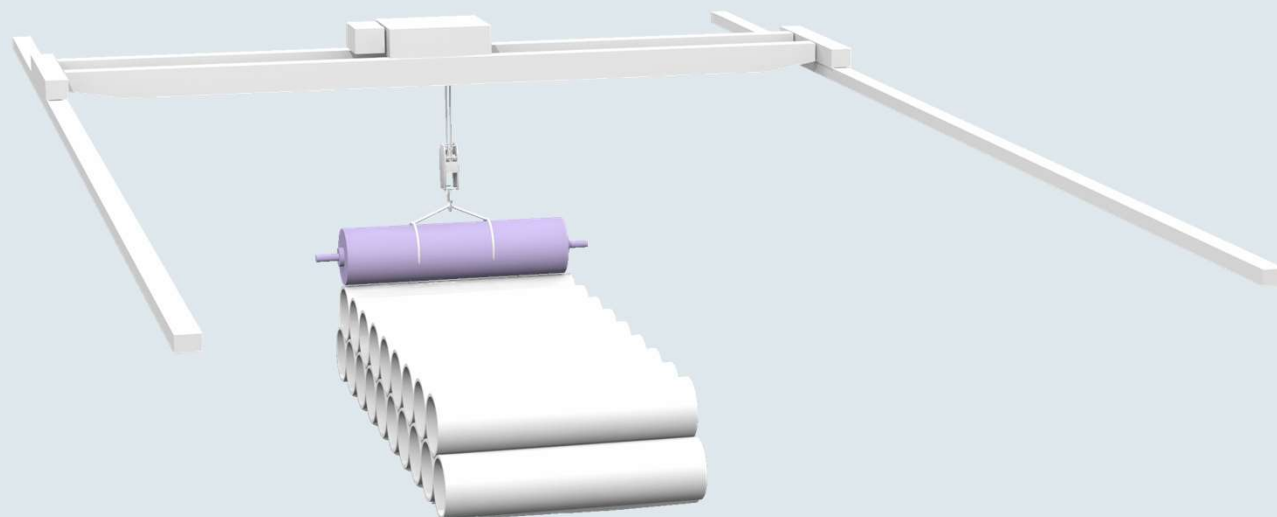
Client





Controller

Ethernet / PROFINET



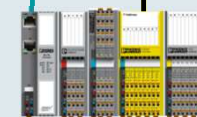
Client



Bluetooth

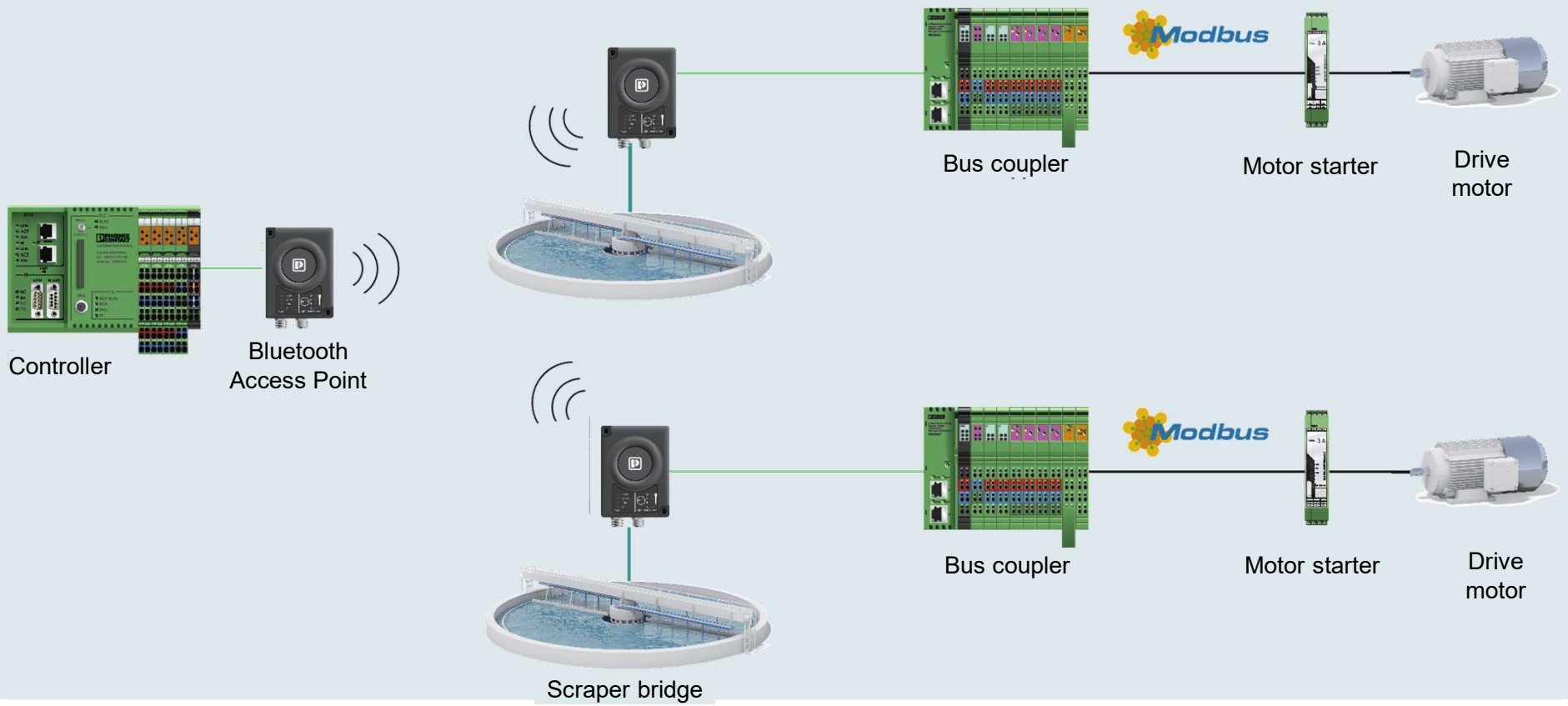


Client

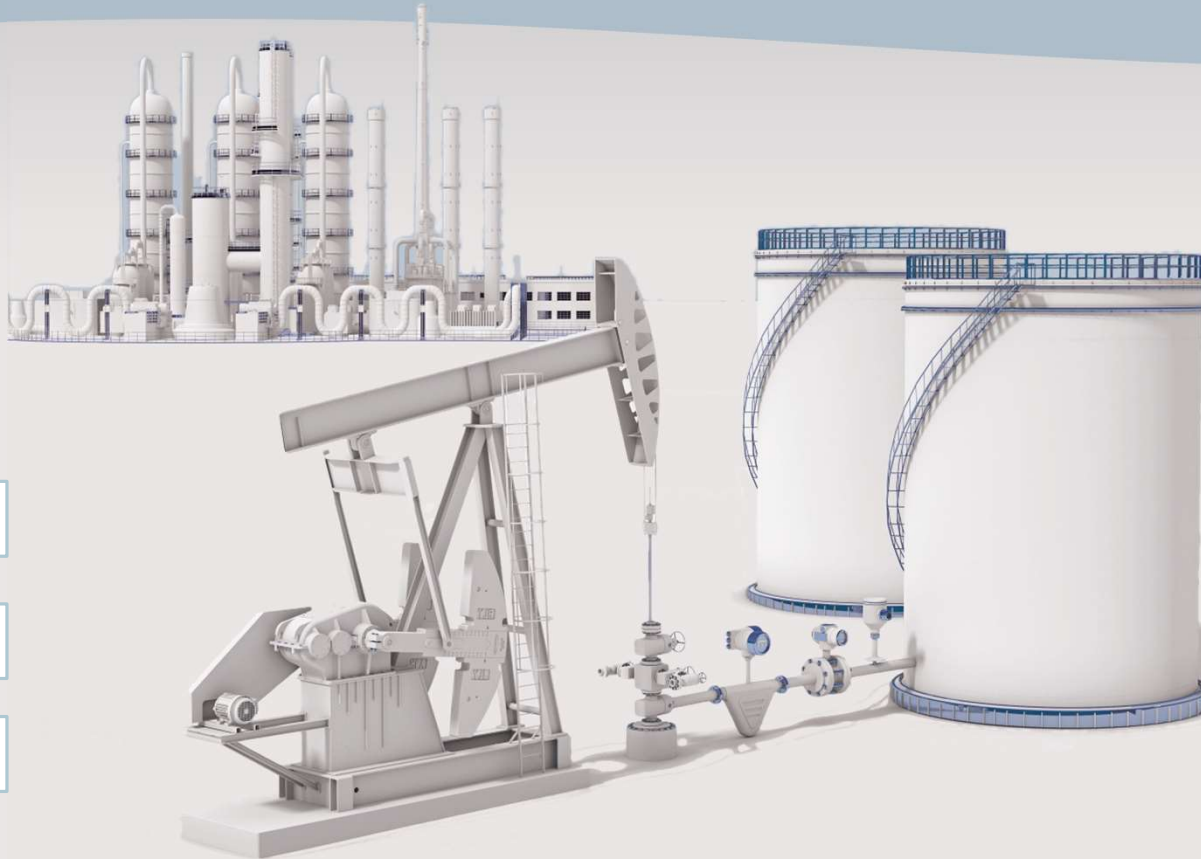


PROFIsafe / SafetyBridge





Process Industry



Network security



Remote communication



Typical network structure



Availability

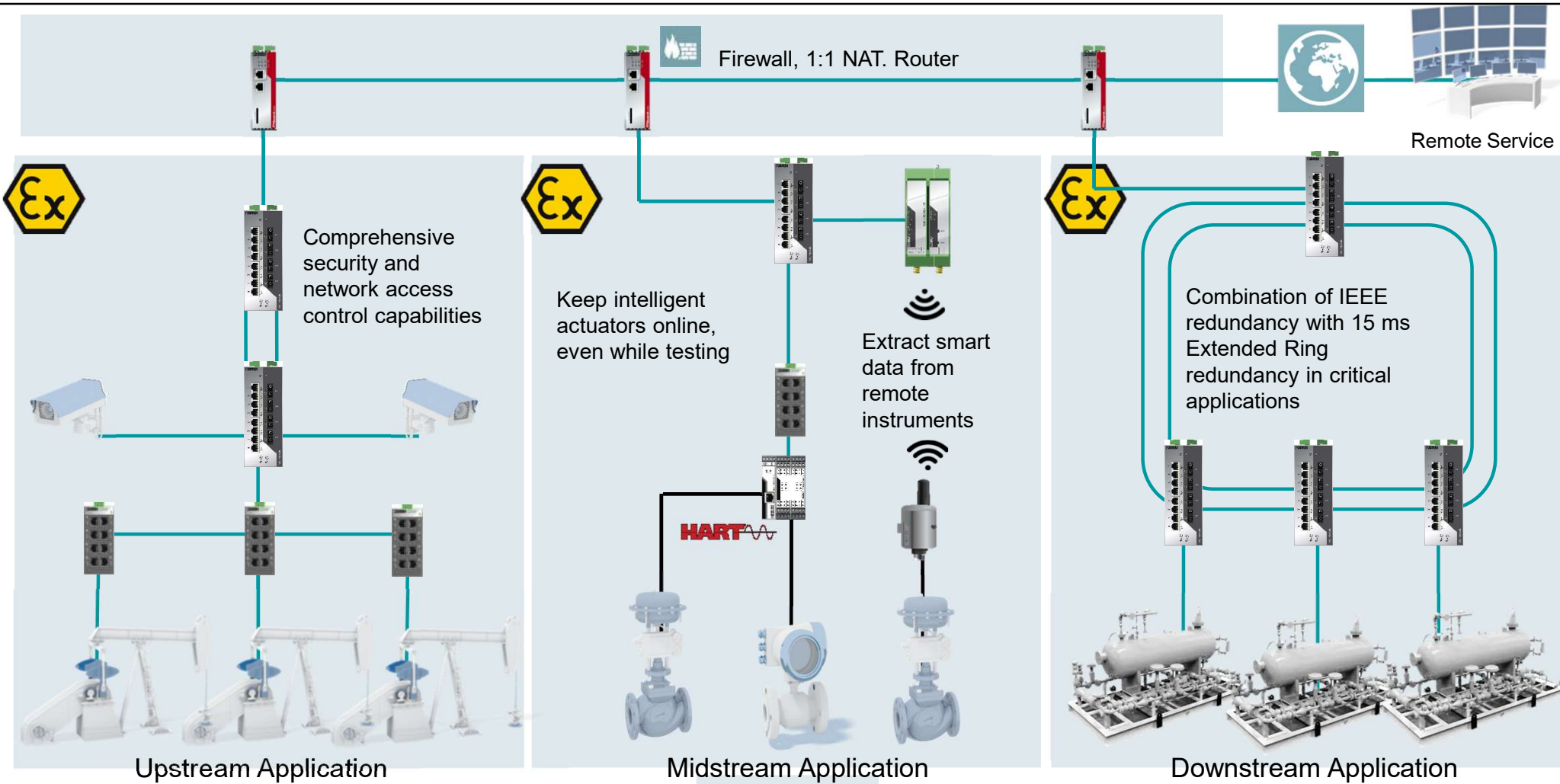


Secure OPC connection

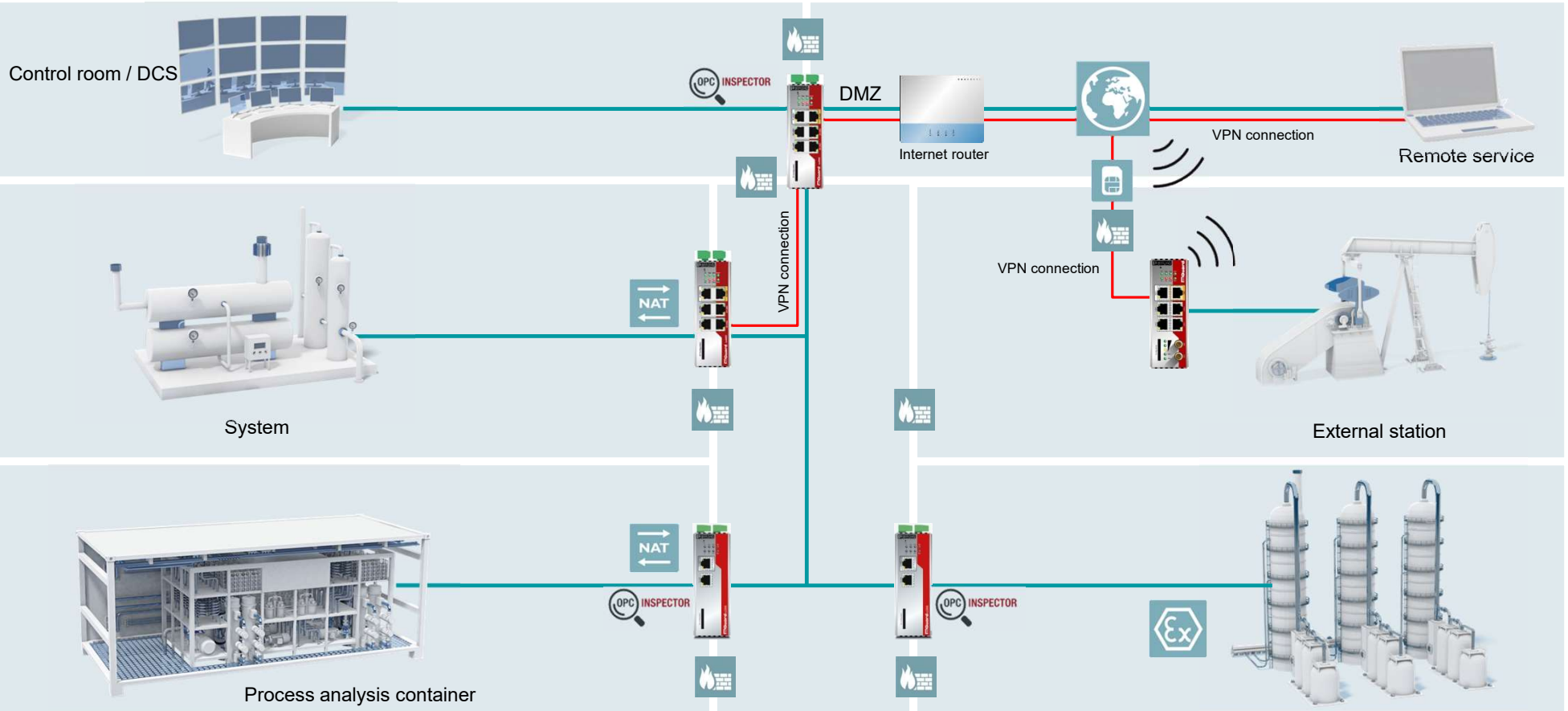


Station integration

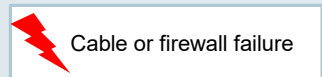
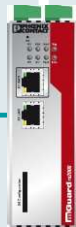




Secure network structure



Availability



Availability



Cable break or failure of the firewall



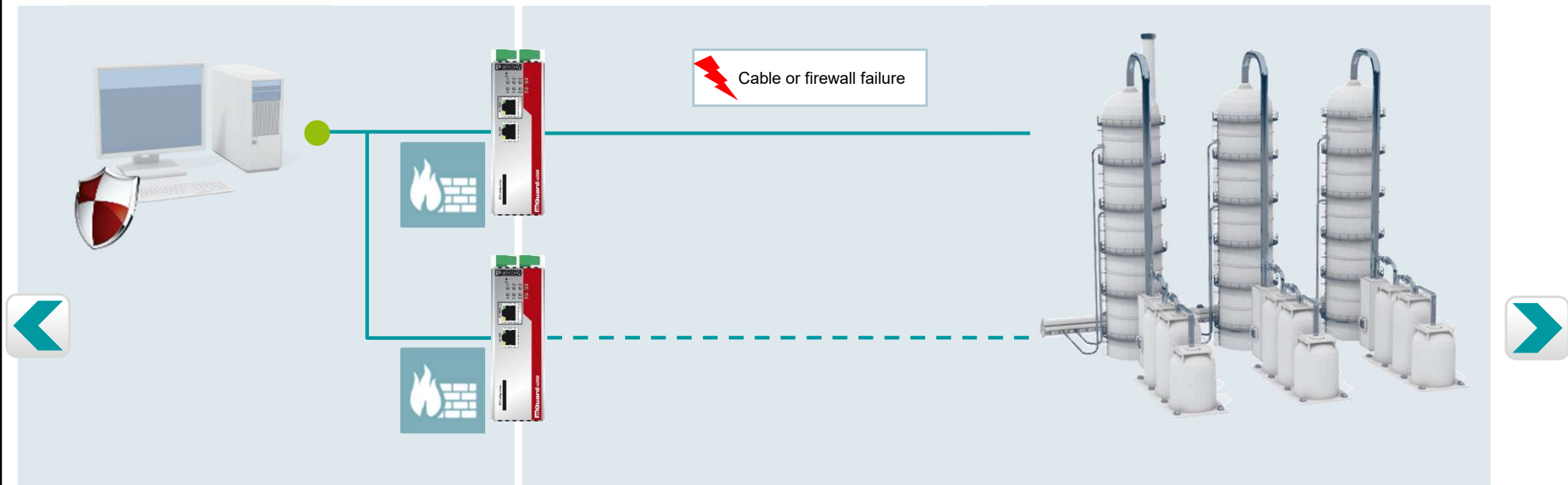
?



Solution



Availability

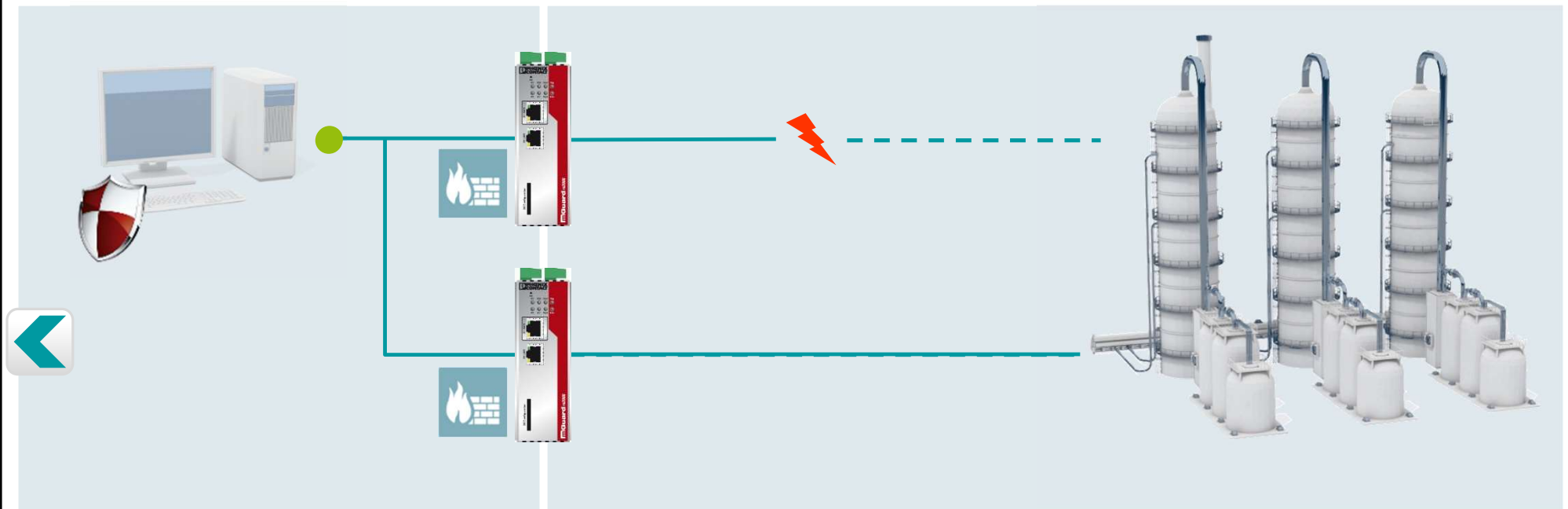


Redundant firewall

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



Availability

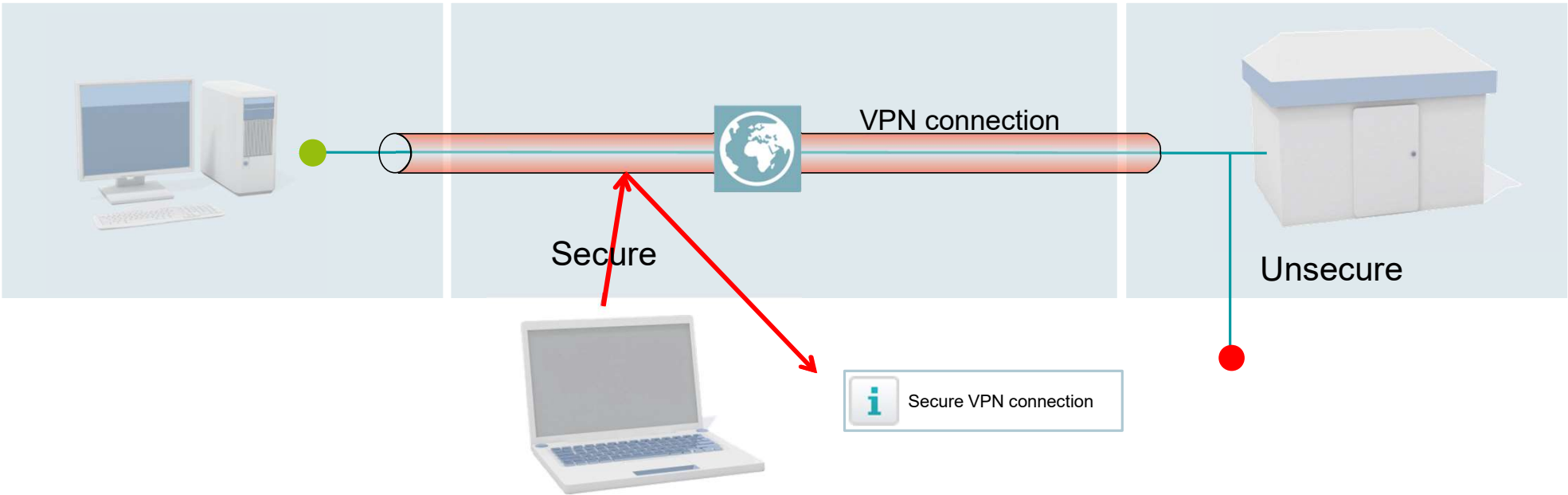


Redundant firewall

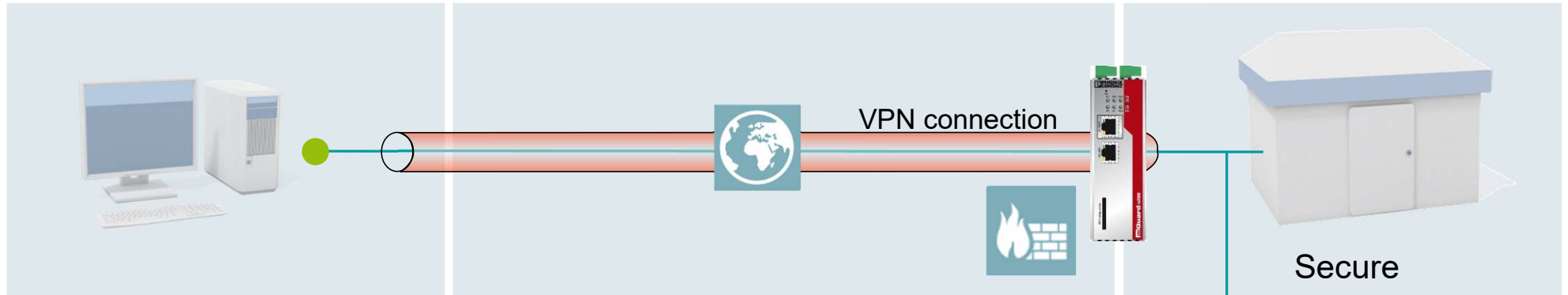
for increased security and availability: Use an additional FL MGuard as a redundant firewall without having to configure a second default gateway.



Secure remote communication



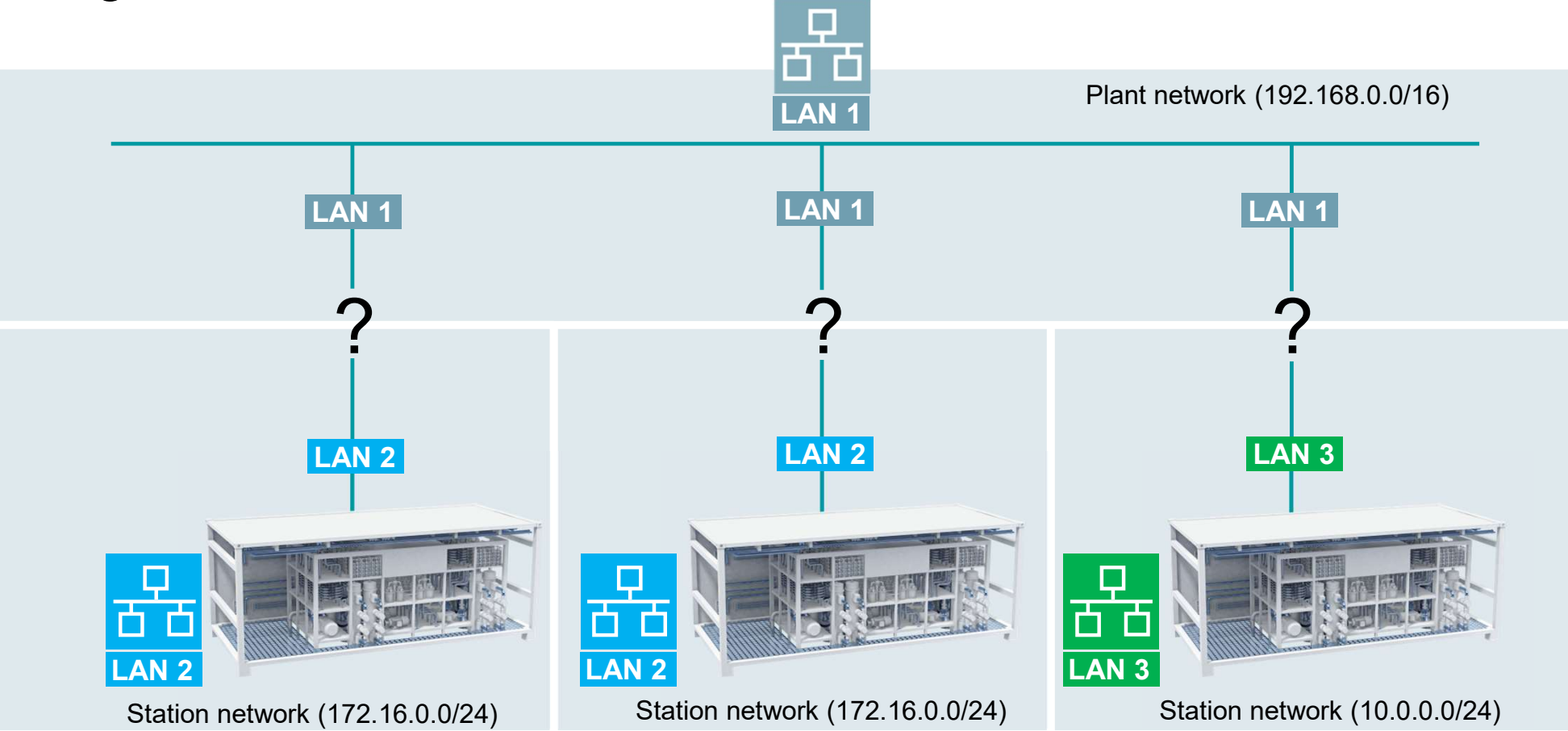
mGuard firewall secures VPN connections



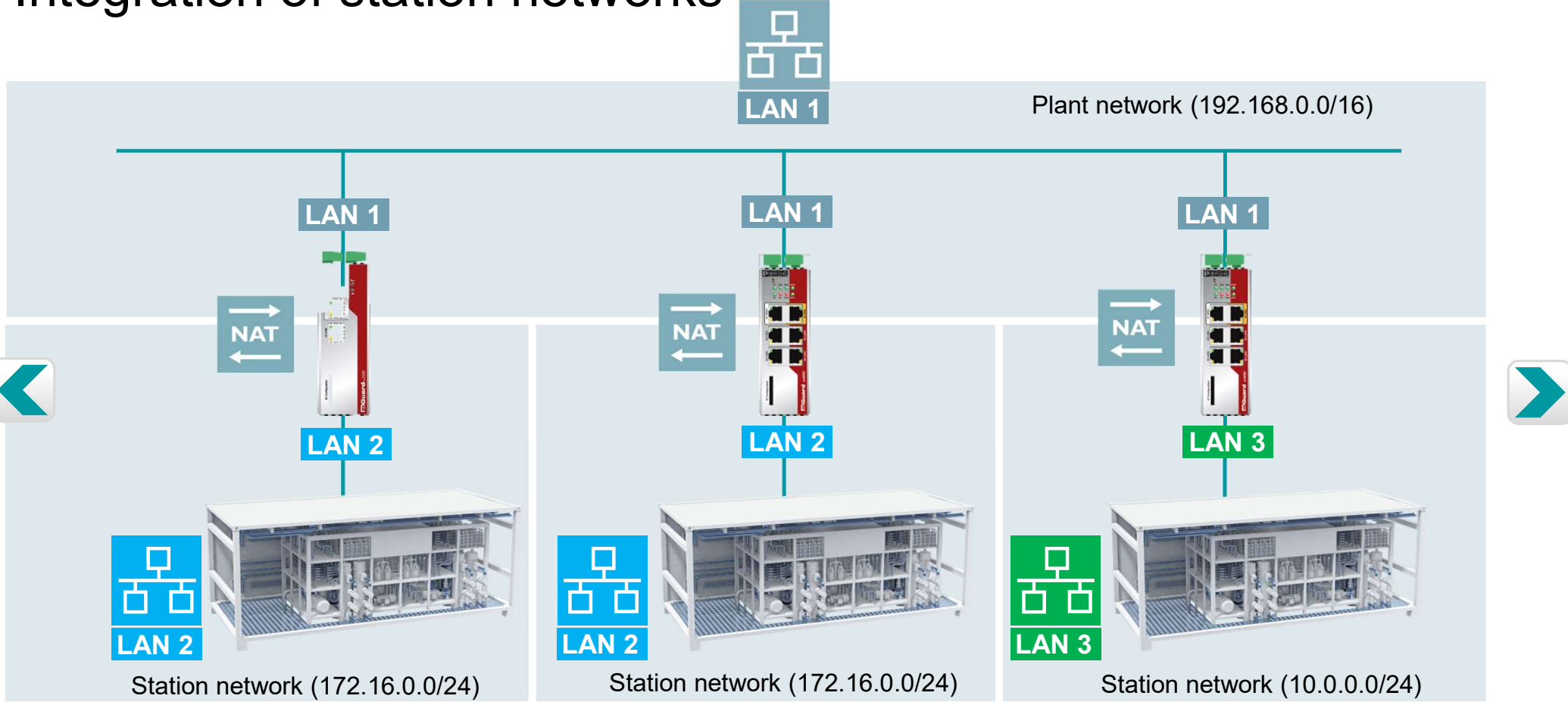
mGuard firewall secures VPN connections
protects both communicating parties if one of them is attacked



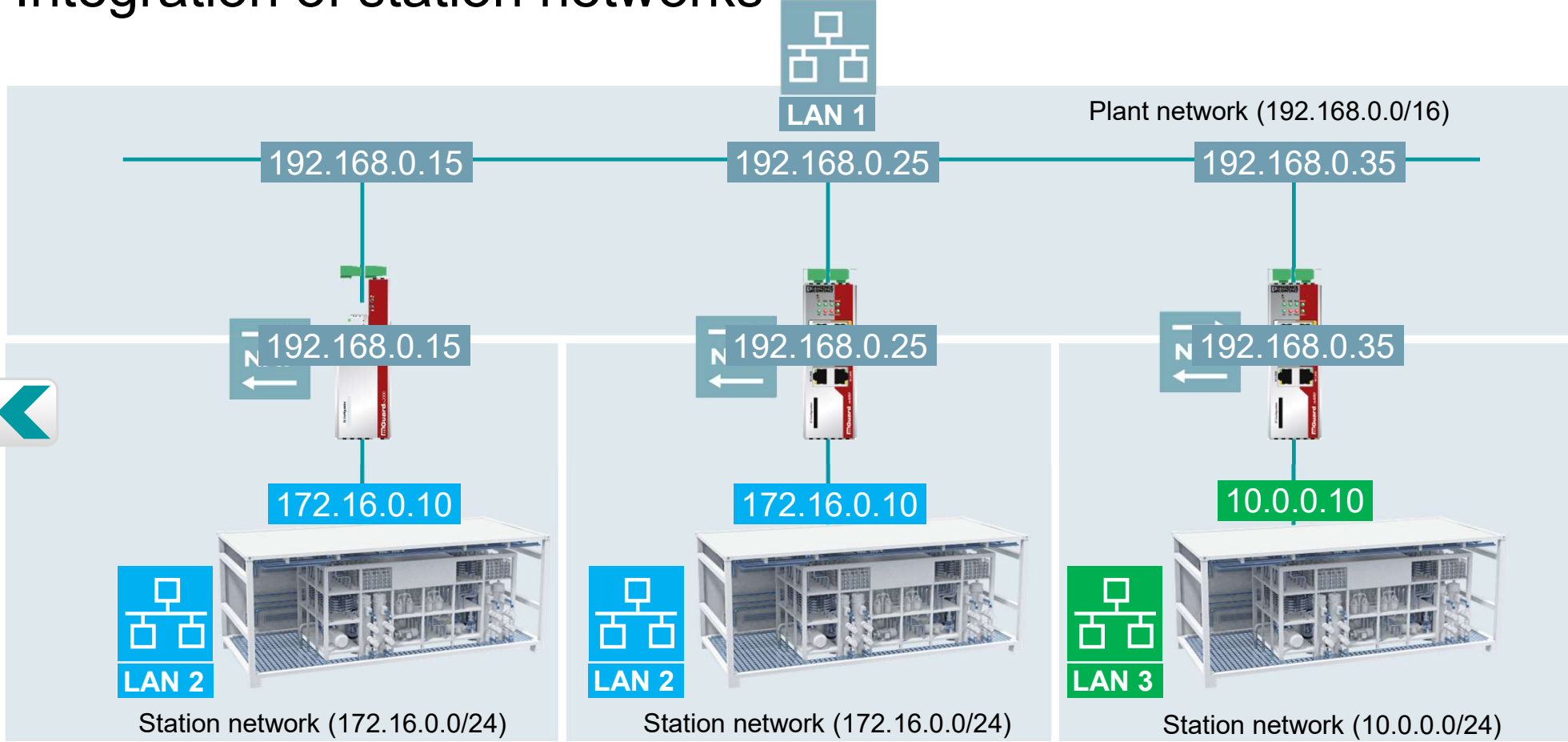
Integration of station networks



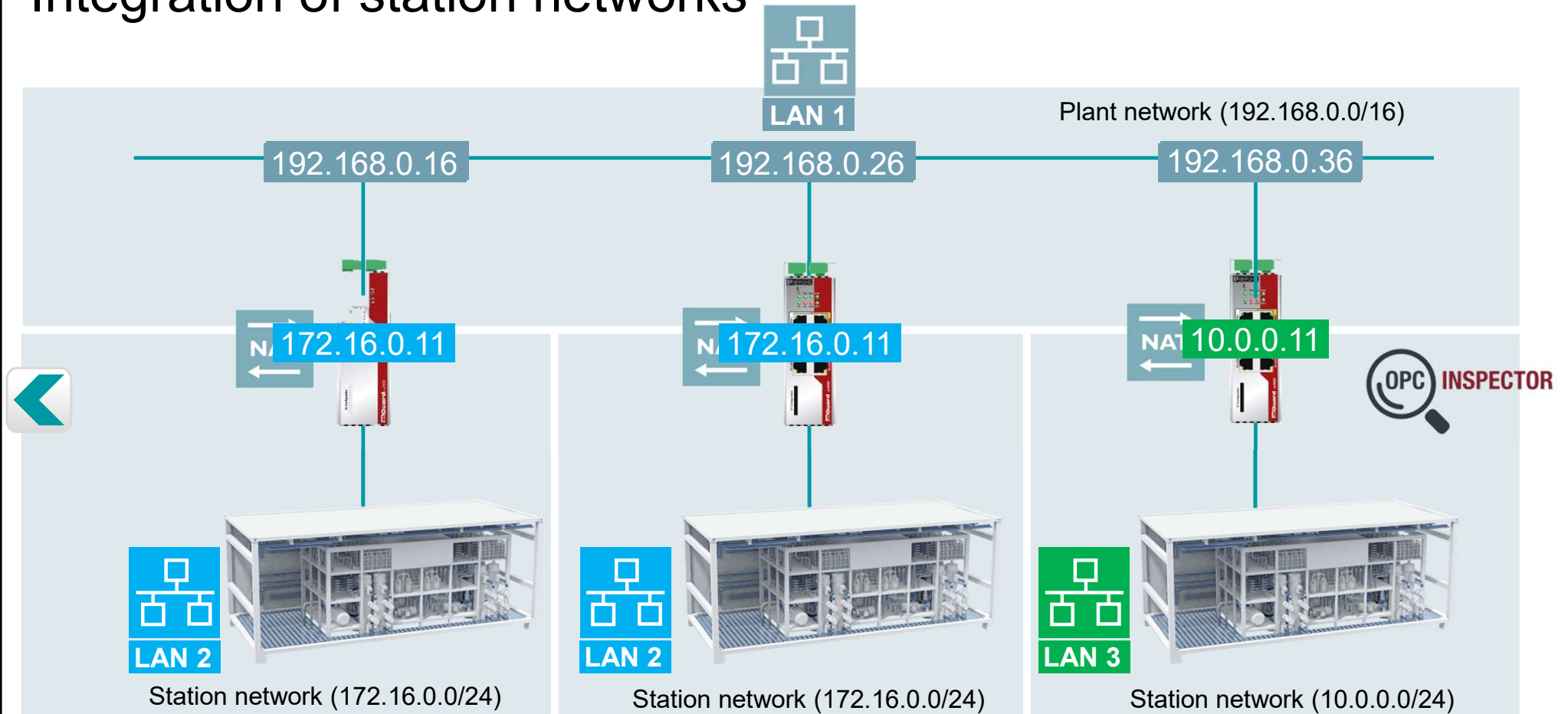
Integration of station networks



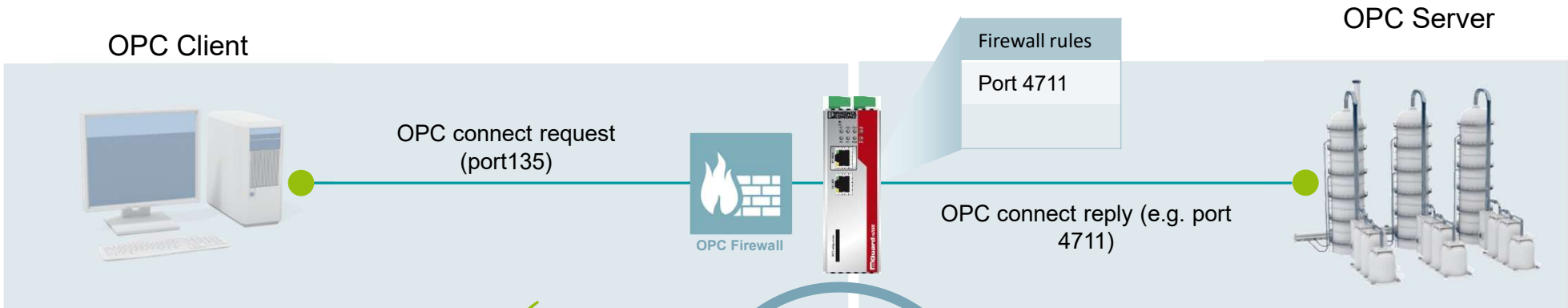
Integration of station networks



Integration of station networks



Secure OPC connection



✓ Authorized connection, valid OPC request

Header OPC
Port 4711

✓ Valid OPC response
use port 4711 for OPC traffic



INSPECTOR

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)



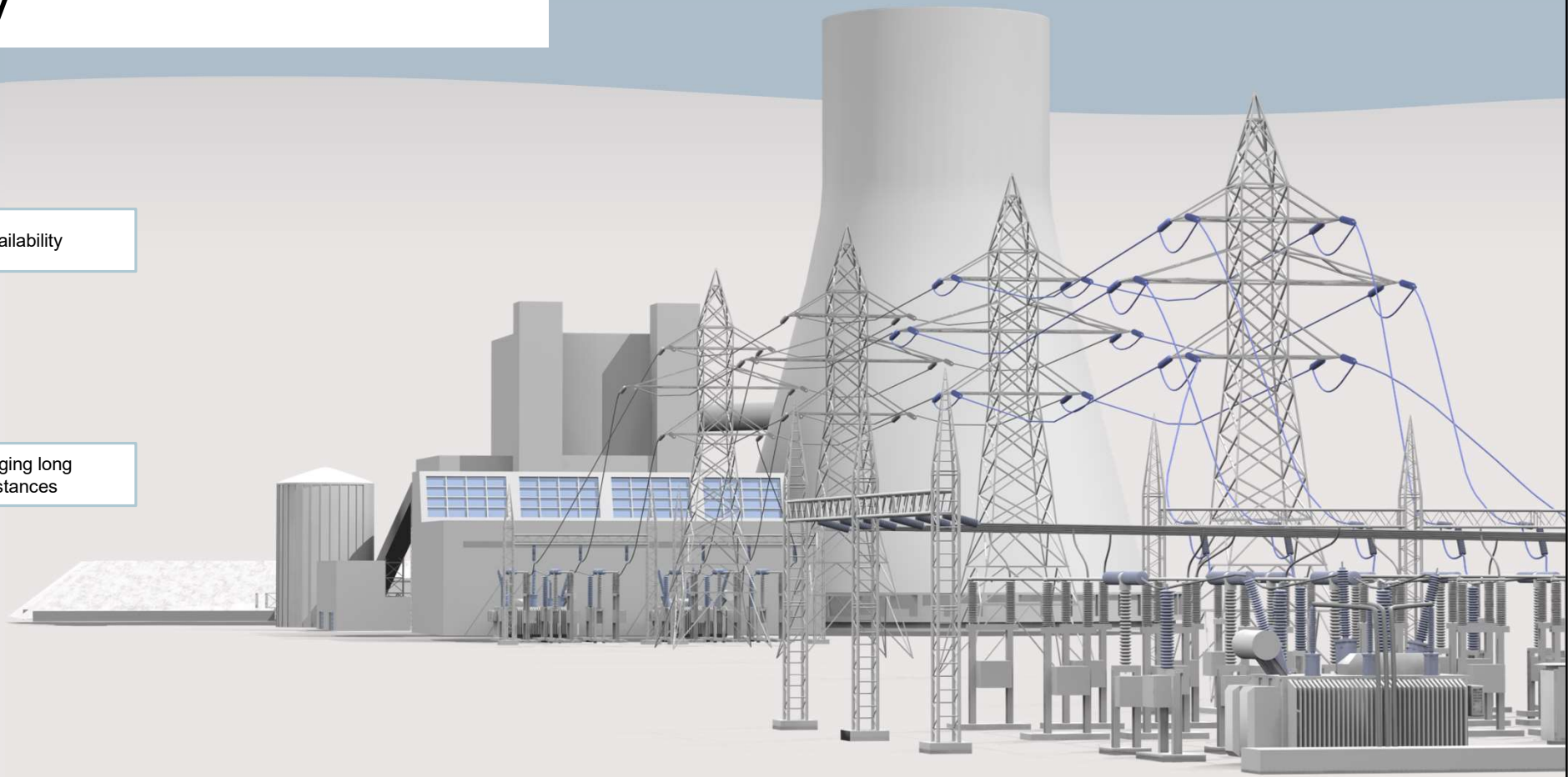
Energy



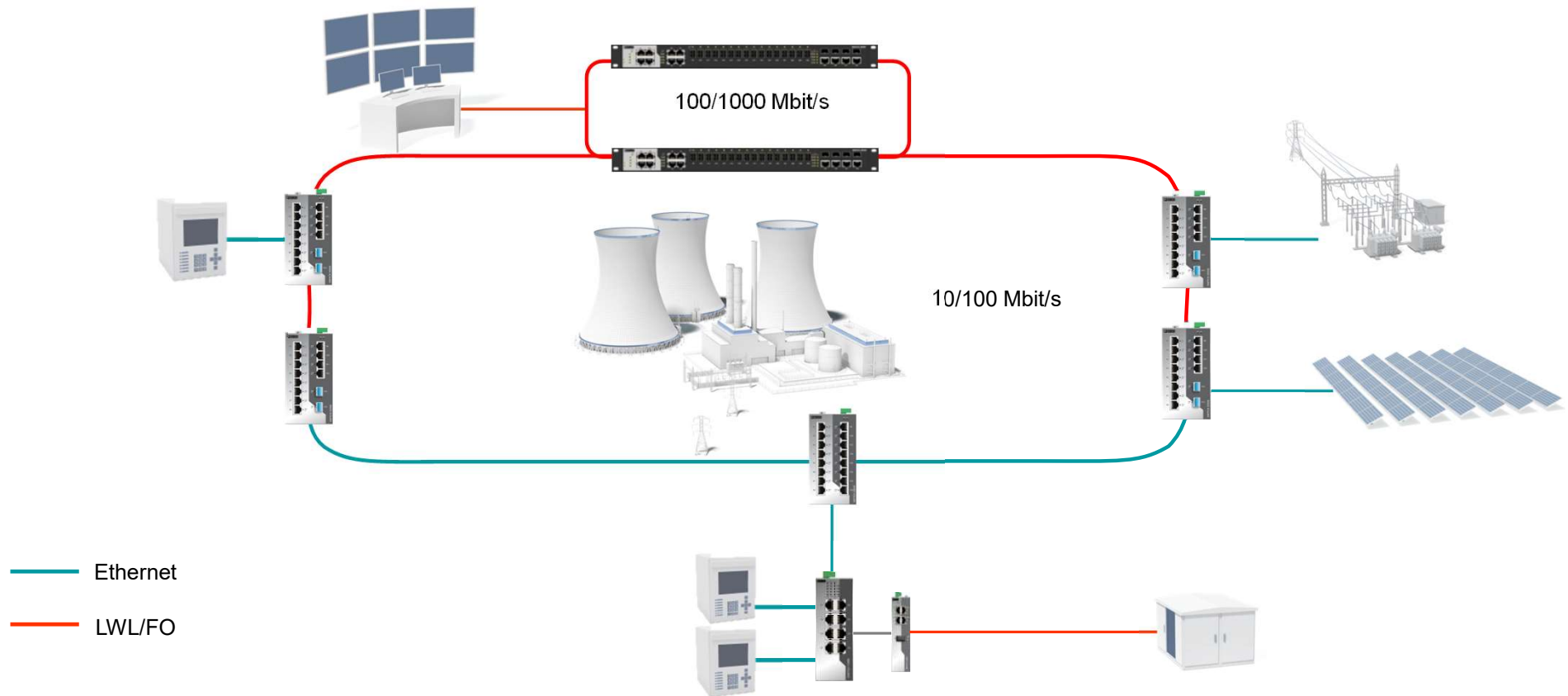
Availability



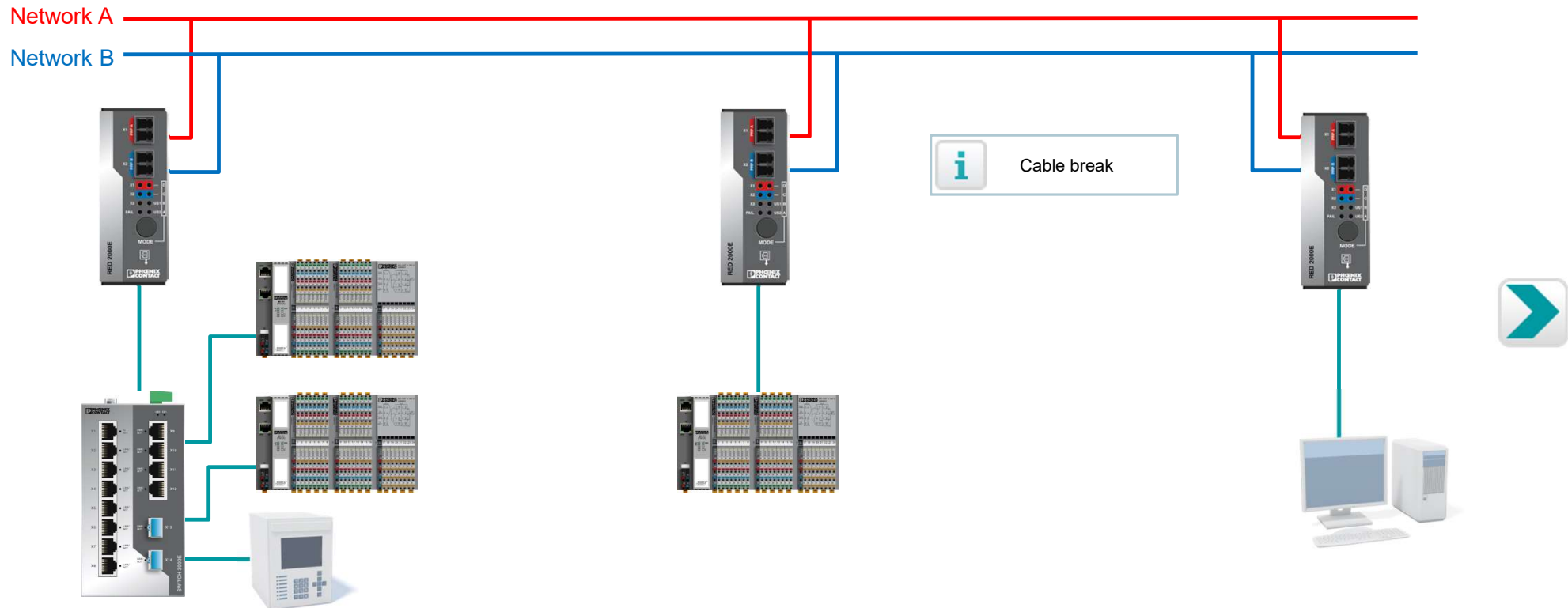
Bridging long
distances



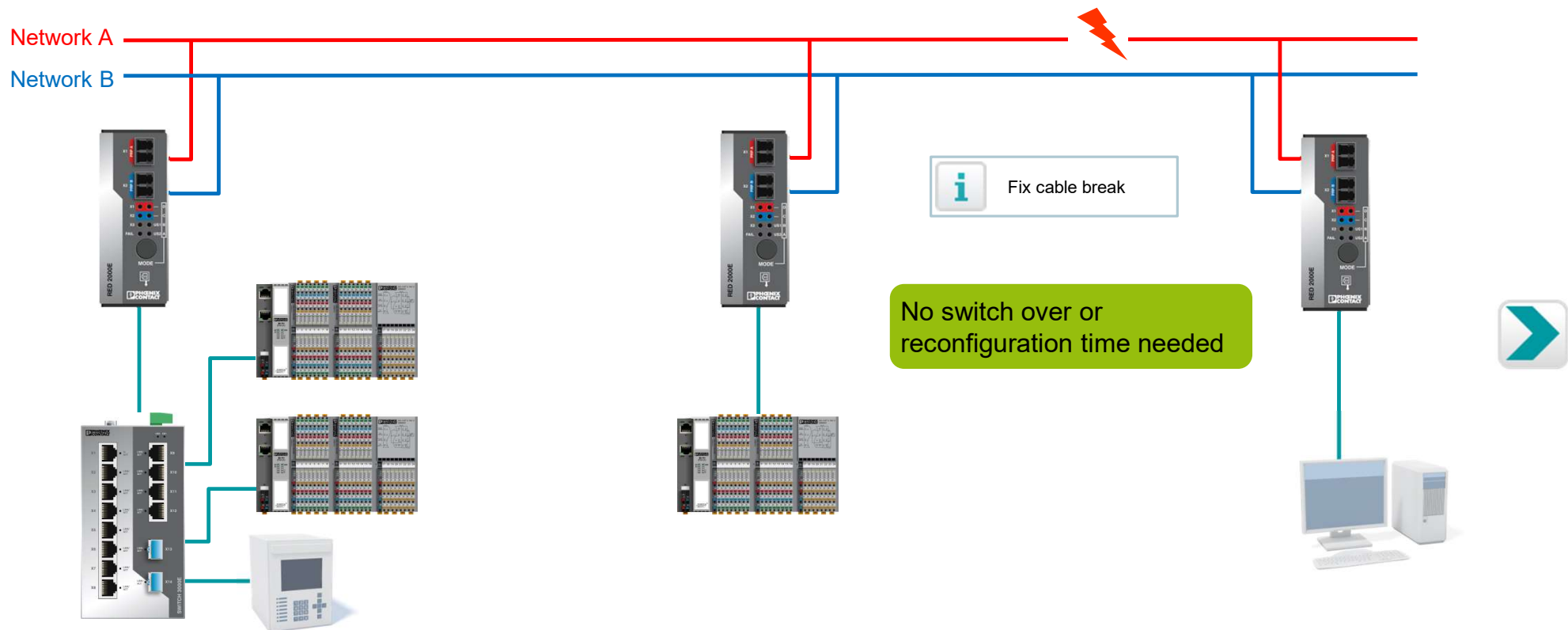
Bridging long distances



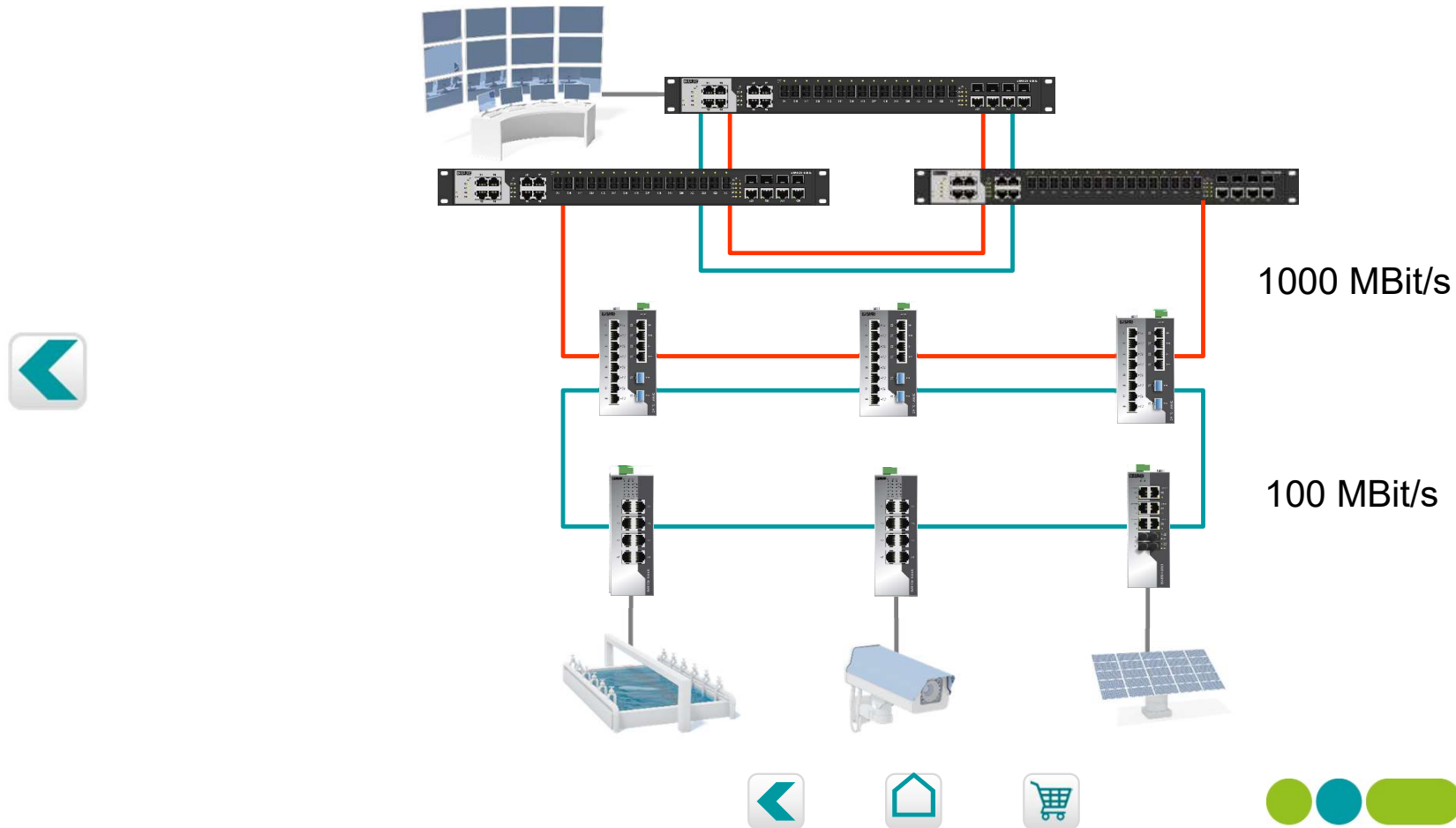
Availability through Parallel Redundancy Protocol

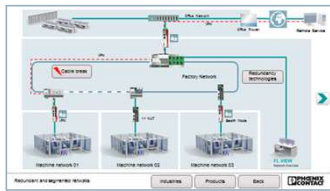


Availability through Parallel Redundancy Protocol

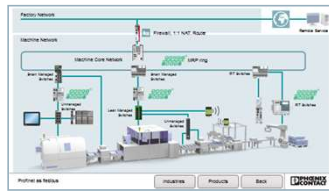


Availability through Extended Ring Redundancy

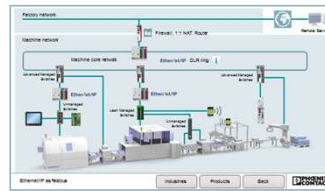




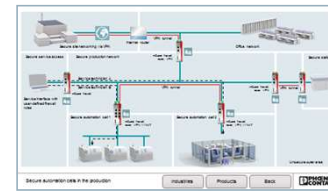
Redundancy



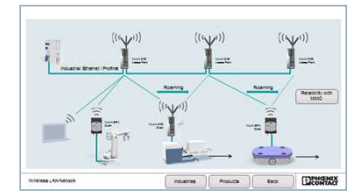
Profinet network



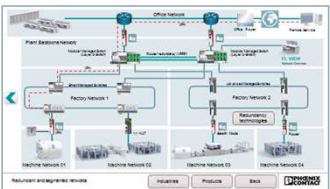
Ethernet/IP network



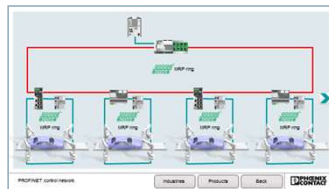
Secure network



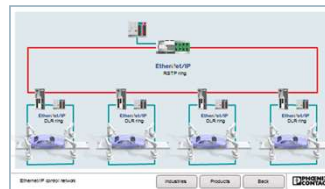
WLAN network



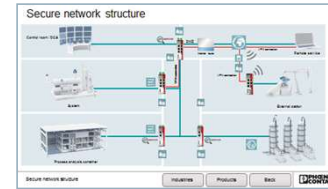
Factory network



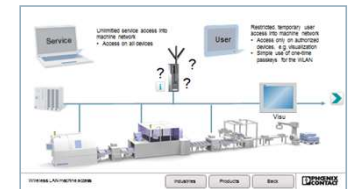
Profinet ring



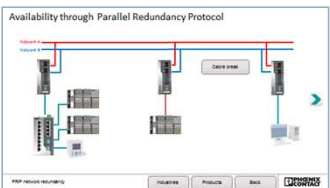
EtherNet/IP ring



Secure process network



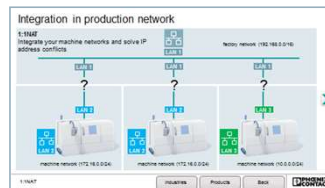
WLAN Access for machine



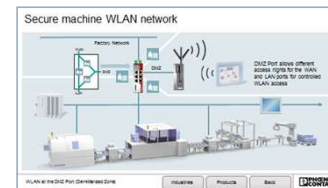
PRP redundancy

Network	Device	IP Address	Subnet	Gateway	Port	Protocol	Device
192.168.1.1	192.168.1.1	192.168.1.1	192.168.1.1	192.168.1.1	192.168.1.1	192.168.1.1	192.168.1.1
192.168.2.1	192.168.2.1	192.168.2.1	192.168.2.1	192.168.2.1	192.168.2.1	192.168.2.1	192.168.2.1
192.168.3.1	192.168.3.1	192.168.3.1	192.168.3.1	192.168.3.1	192.168.3.1	192.168.3.1	192.168.3.1
192.168.4.1	192.168.4.1	192.168.4.1	192.168.4.1	192.168.4.1	192.168.4.1	192.168.4.1	192.168.4.1
192.168.5.1	192.168.5.1	192.168.5.1	192.168.5.1	192.168.5.1	192.168.5.1	192.168.5.1	192.168.5.1
192.168.6.1	192.168.6.1	192.168.6.1	192.168.6.1	192.168.6.1	192.168.6.1	192.168.6.1	192.168.6.1
192.168.7.1	192.168.7.1	192.168.7.1	192.168.7.1	192.168.7.1	192.168.7.1	192.168.7.1	192.168.7.1
192.168.8.1	192.168.8.1	192.168.8.1	192.168.8.1	192.168.8.1	192.168.8.1	192.168.8.1	192.168.8.1
192.168.9.1	192.168.9.1	192.168.9.1	192.168.9.1	192.168.9.1	192.168.9.1	192.168.9.1	192.168.9.1
192.168.10.1	192.168.10.1	192.168.10.1	192.168.10.1	192.168.10.1	192.168.10.1	192.168.10.1	192.168.10.1

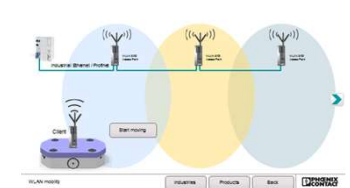
Redundancy overview



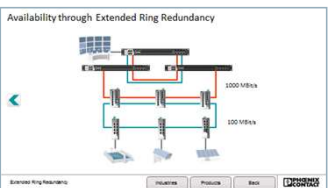
1:1 NAT



DMZ Port



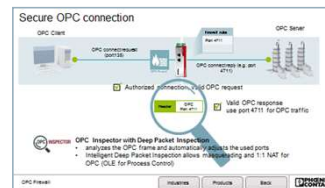
WLAN roaming



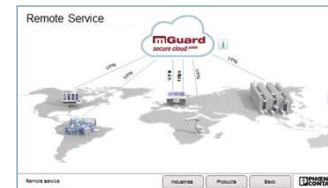
Infrastructure network



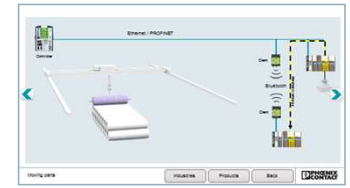
Conditional Firewall



OPC Firewall



Remote service



Safety over Bluetooth



Our product portfolio



Managed Switches



Cyber Security



Power over Ethernet



Serial Device Server, Gateways



Unmanaged Switches



Remote communication



Network installation



Timeserver



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



Our product portfolio

 Managed Switches	 Cyber Security	 Power over Ethernet
 Unmanaged Switches	 Remote communication	 Network installation
 Wireless Ethernet	 Media conversion	 Software

-  Mounting rail devices and PCI cards
-  mGuard 1100
-  Other designs
-  Extended functionalities
-  Central management software

 Automation protocols



Our product portfolio

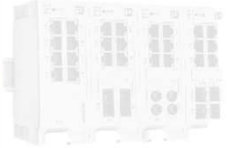
 Managed Switches	 Cyber Security	 Power over Ethernet
 Unmanaged Switches	 Remote communication	 Network installation
 Wireless Ethernet	 Media conversion	 Software

-  PoE Injectors
-  PoE Switches
-  PoE Splitters

 Automation protocols



Our product portfolio

 Managed Switches	 Cyber Security	 Power over Ethernet
 Unmanaged Switches	 Remote communication	 Network installation
 Wireless Ethernet	 Media conversion	 Software

-  Switch 1000
-  Switch SFNT
-  Switch 1800 & 1900
-  Switch 1605

 Automation protocols



Our product portfolio



Managed Switches



Cyber Security



Power over Ethernet



Unmanaged Switches



Remote communication



Network installation



Wireless Ethernet



Media conversion



Software



Secure remote control



Remote control via cloud



Remote access via internet and mobile phone network



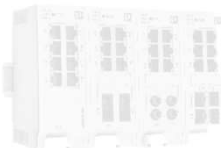
Extension of complex IP networks



Automation protocols



Our product portfolio

 Managed Switches	 Cyber Security	 Power over Ethernet
 Unmanaged Switches	 Remote communication	 Network installation
 Wireless Ethernet	 Media conversion	 Software

-  Copper-based network installation
-  Fiber optic-based network installation
-  Patch panels
-  PRP-redundancy modules
-  SFP modules
-  Memory media

 Automation protocols



Our product portfolio

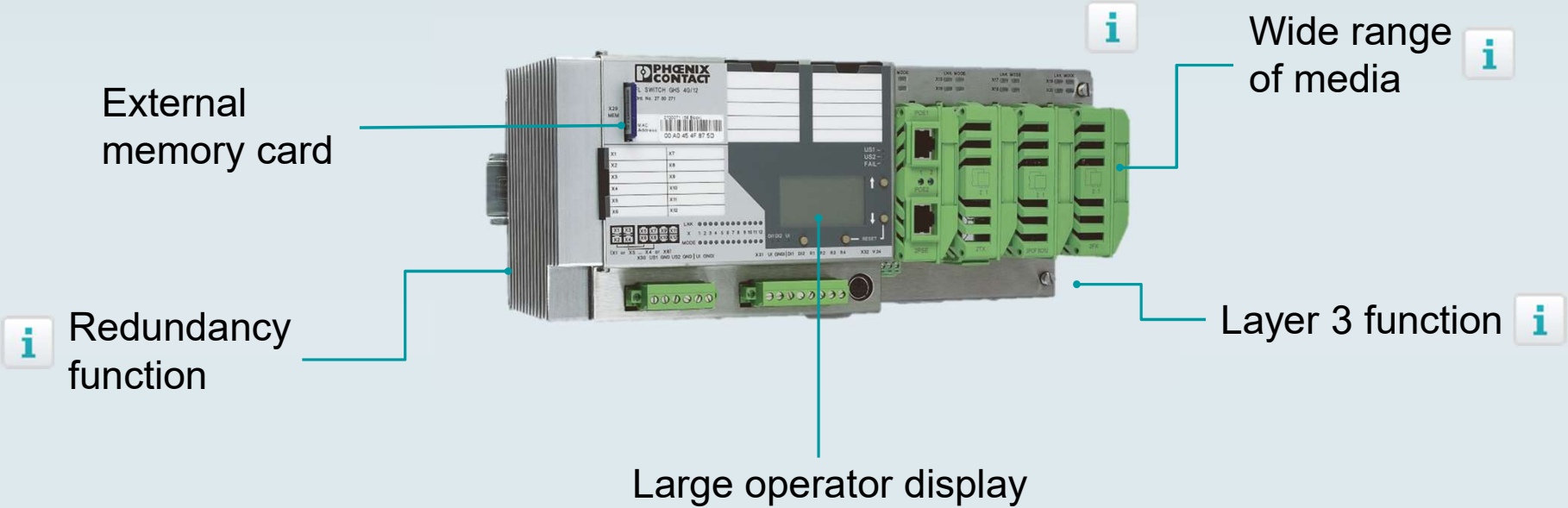
 Managed Switches	 Cyber Security	 Power over Ethernet
 Unmanaged Switches	 Remote communication	 Network installation
 Wireless Ethernet	 Media conversion	 Software

-  FL EPA
-  FL BLE 1300
-  FL WLAN 1100/2100
-  FL WLAN 5110
-  FL WLAN 1010/2010

 Automation protocols



Modular Managed Switches

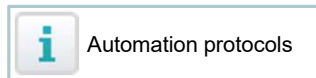


Modular Managed Switches



Wide range of media

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

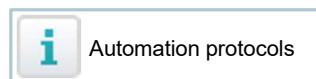


Modular Managed Switches



Redundancy
function

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



Automation protocols

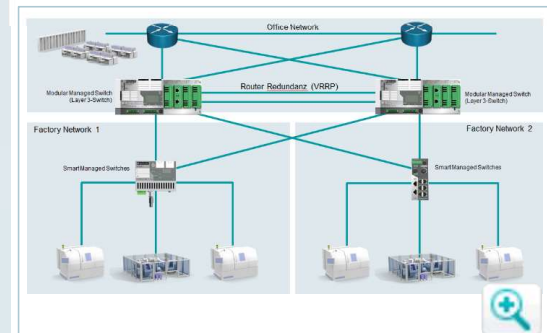


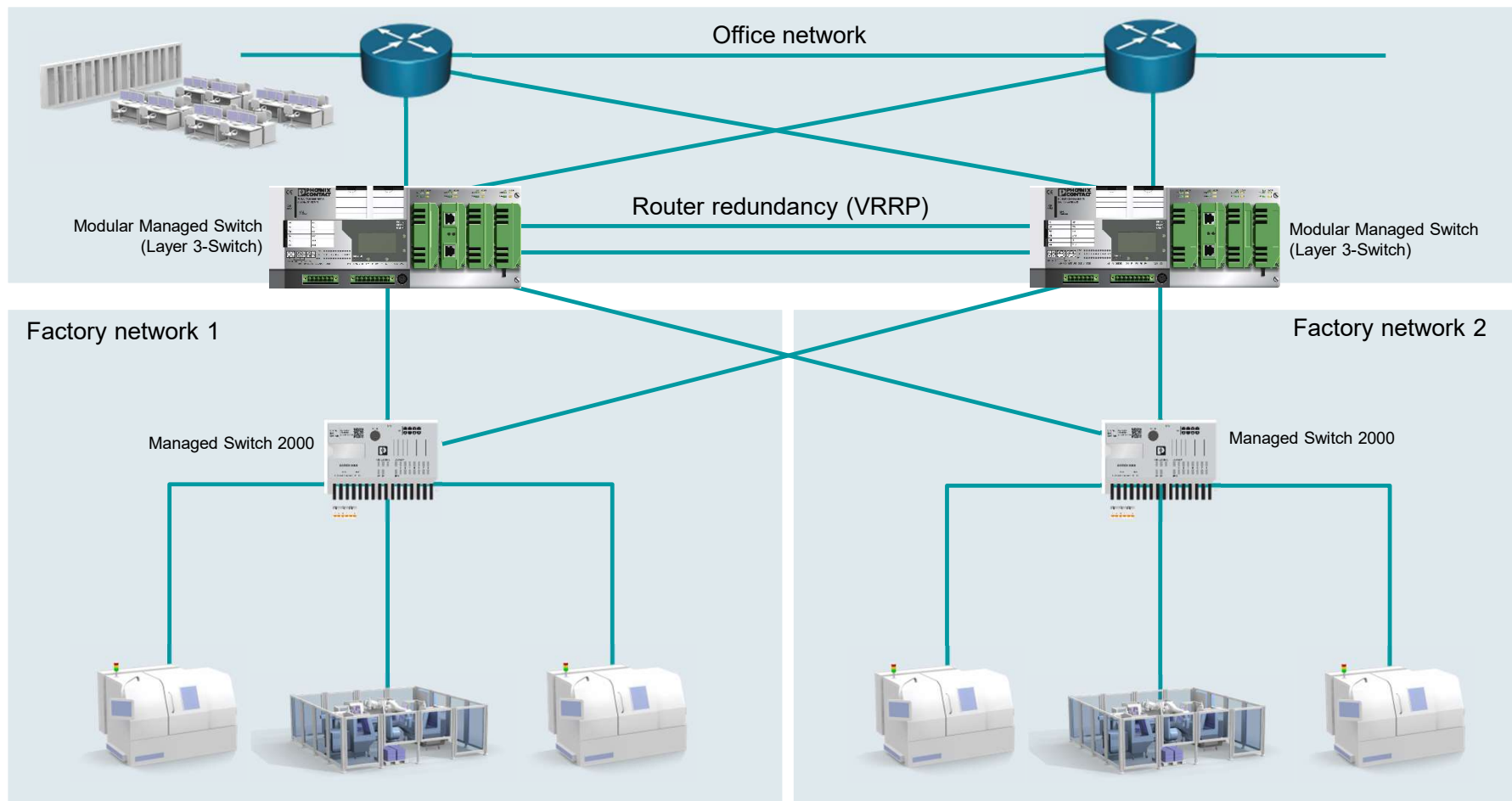
Modular Managed Switches



Layer 3
function

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





Modular Managed Switches



	FL SWITCH GHS 4G/12	FL SWITCH GHS 12G/8	FL SWITCH GHS 4G/12-L3	FL SWITCH GHS 12G/8-L3	FL FXT
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 4xRJ45 ports Expandable up to 24 Ports	4x SFP Gigabit slots 8x RJ45 Gigabit ports Expandable up to 28 Ports	Extension modulefor up to 8 Ethernet ports
Layer 3 fuction	No	No	Yes	Yes	-
Order number	2700271	2989200	2700787	2700786	2989307

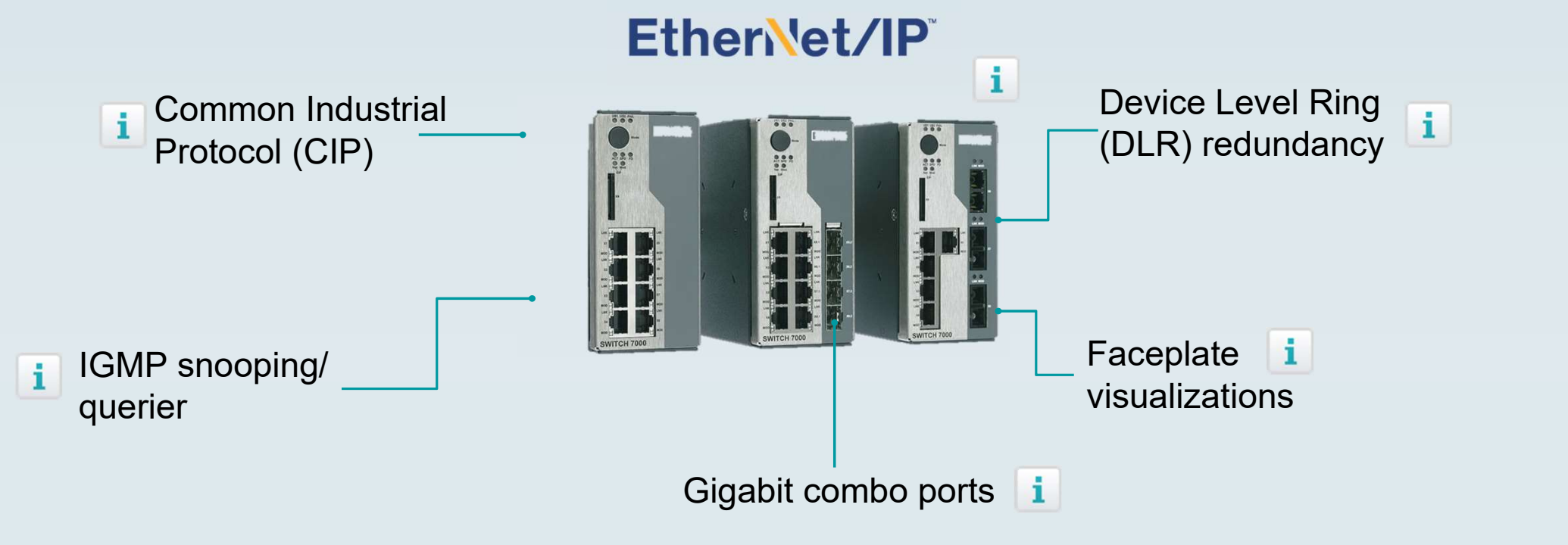


Media modules



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

Managed Switches 7000



Switch 7000

EtherNet/IP™

Common
Industrial
Protocol (CIP)



- Integration into EtherNet/IP control systems



Automation protocols





Diagnosis

EtherNet/IP™

Common Industrial Protocol
(CIP)

Configuration



Automation protocols



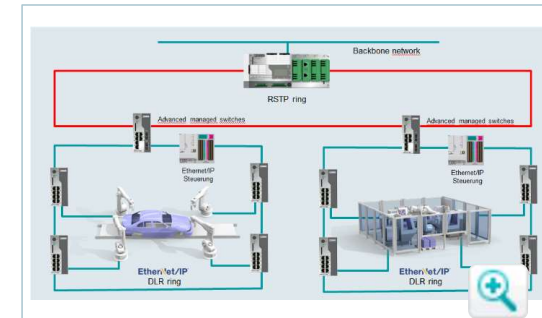
Switch 7000

EtherNet/IP™



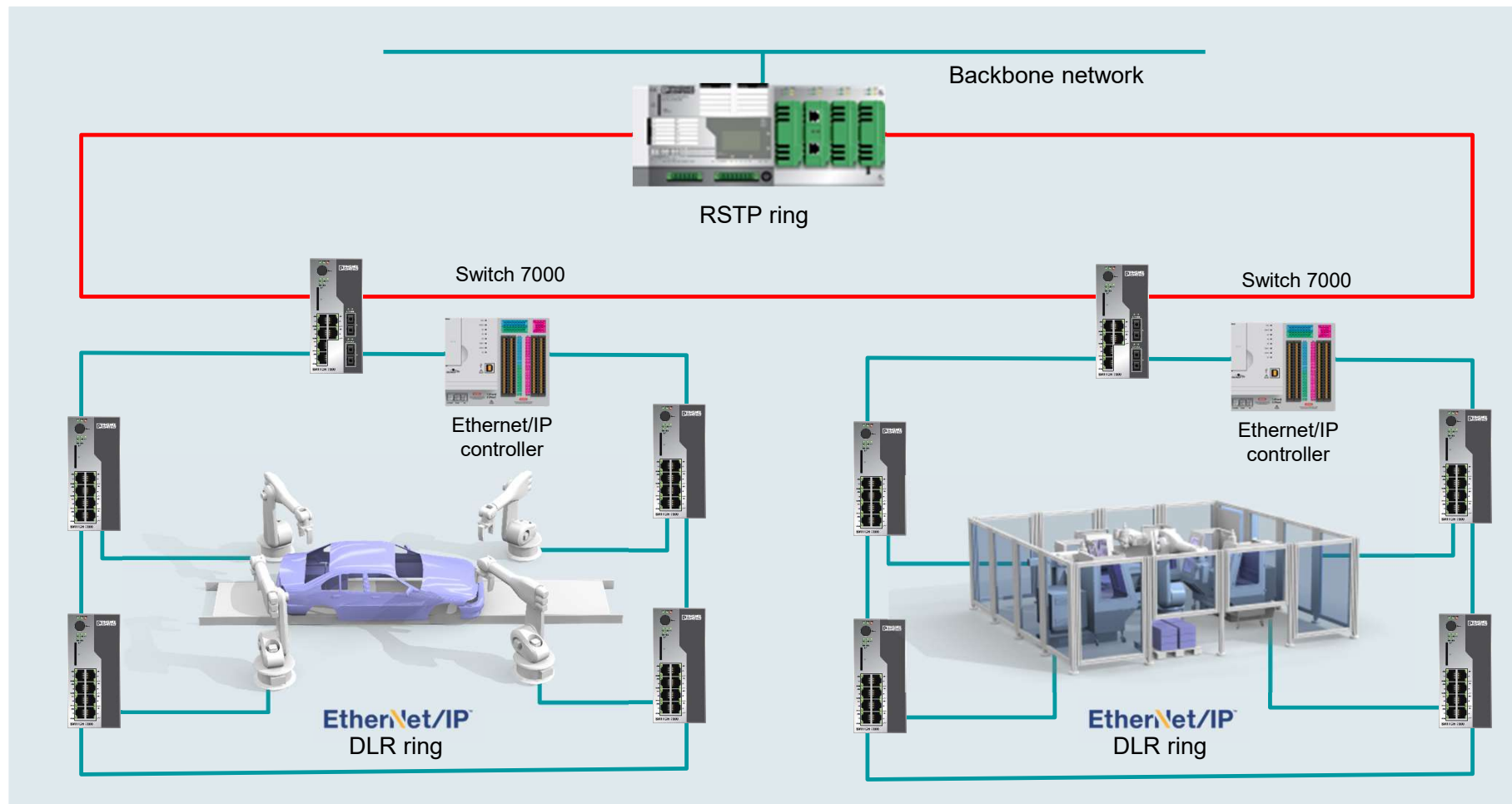
Device Level
Ring (DLR)
redundancy

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



Automation protocols





Switch 7000

EtherNet/IP™



Faceplate visualizations

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



Automation protocols

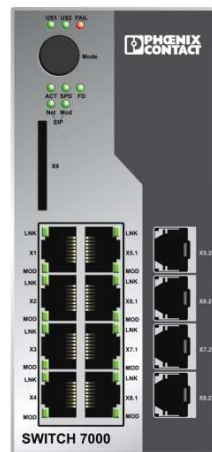




Device Status	DLR Status	Port Status	Port Configuration	CIP Status	X
---------------	------------	-------------	--------------------	------------	---

Device Type: FL SWITCH 7004-4GC-EIP
Device Name: FL SWITCH 7004-4GC-EIP

IP Address: 192.168.10.110
MAC Address: 00:A0:45:AA:16:6E



Node Status: Device Is Active Ring Supervisor
Ring Status: Ring Fault
Active Supervisor: 192.168.10.110
Active Precedence Value: 0
Ring Fault Count: 1
Clear Fault Counter: [Clear](#)
Verify Fault Location: [Start](#)
Last Node Port 1: 192.168.10.110
Last Node Port 2: 192.168.10.110

[DLR Node Table](#)



Automation protocols



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)



Automation protocols



Switch 7000

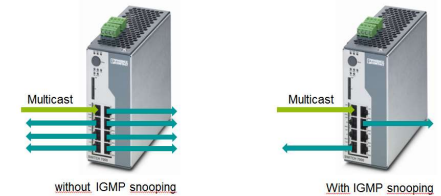
EtherNet/IP™



IGMP snooping/
querier

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

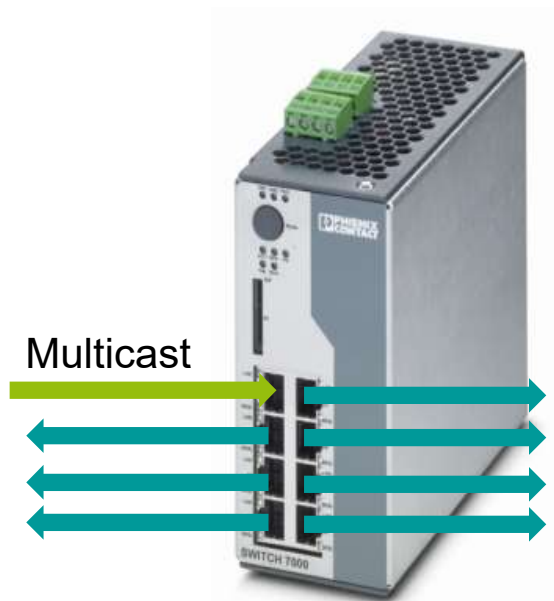
Reduction of network load: Multicast packages are only forwarded to those ports who need them



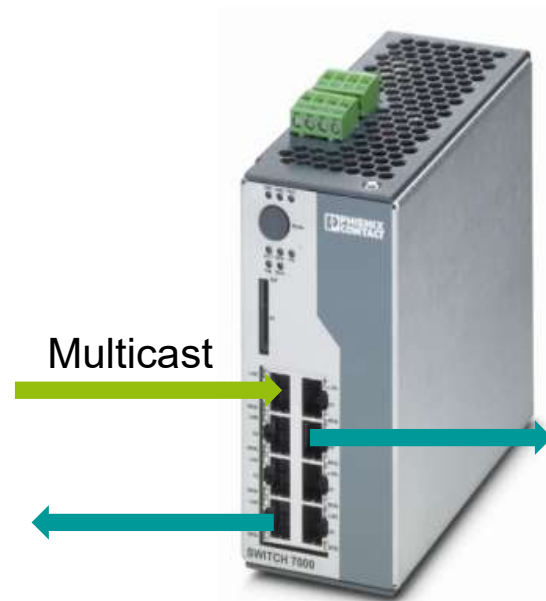
Automation protocols



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



without IGMP snooping



with IGMP snooping

Switch 7000



	FL SWITCH 7008-EIP	FL SWITCH 7006/2FX-EIP	FL SWITCH 7005/FX- 2FXSM-EIP	FL SWITCH 7006-2GC-EIP	FL SWITCH 7004-4GC-EIP	FL SWITCH 7004-2TC- 2GC-EIP
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

Managed Switches 2000

 Easy configuration

 Redundancy

Security



Profinet and
EtherNet/IP™ support



Unmanaged mode

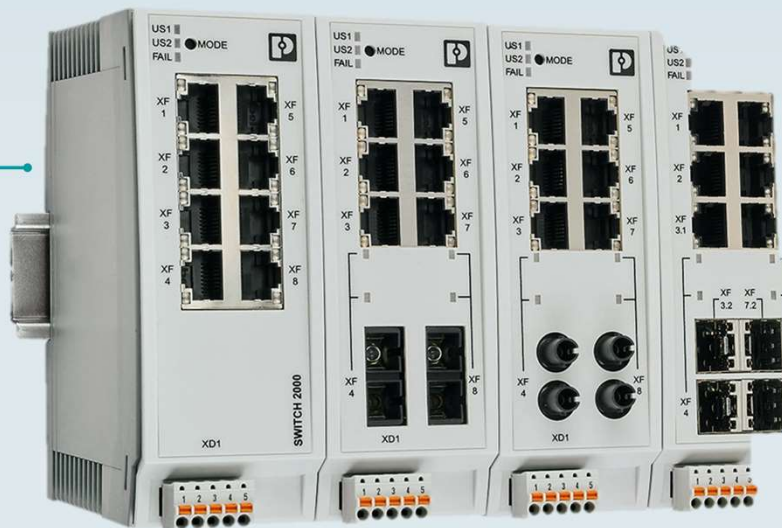
DHCP server

 Automation protocols

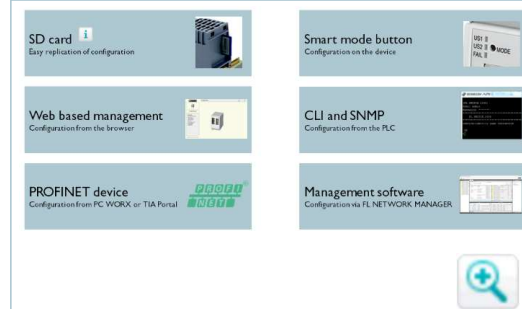


Managed Switches 2000

Easy configuration



- Several options for easy configuration



Automation protocols



SD card



Easy replication of configuration



Smart mode button

Configuration on the device



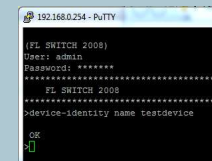
Web based management

Configuration from the browser



CLI and SNMP

Configuration from the PLC



PROFINET device

Configuration from PLCnext Engineer
or TIA Portal



Management software

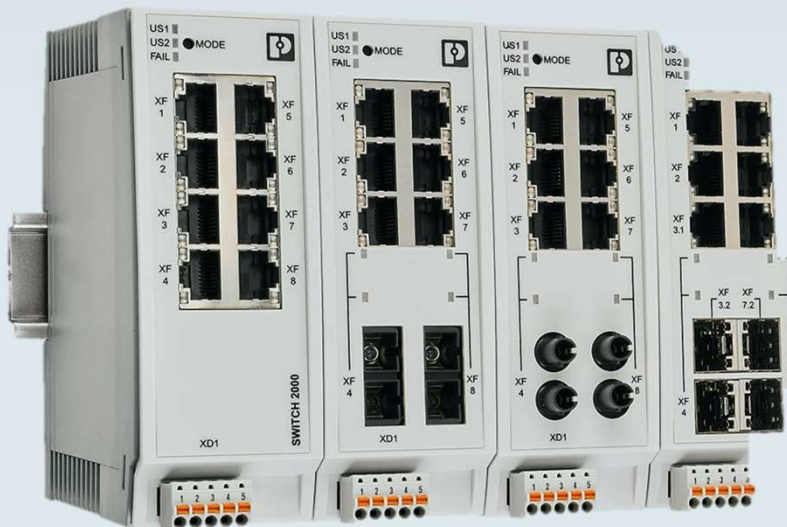
Configuration via FL NETWORK MANAGER



Automation protocols

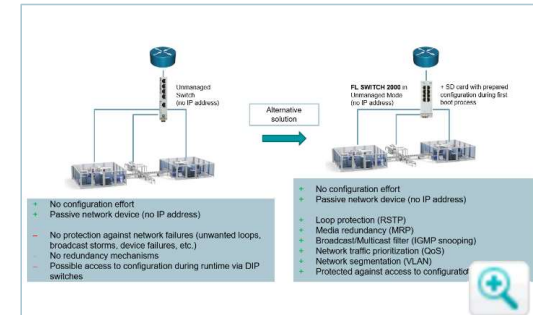


Managed Switches 2000



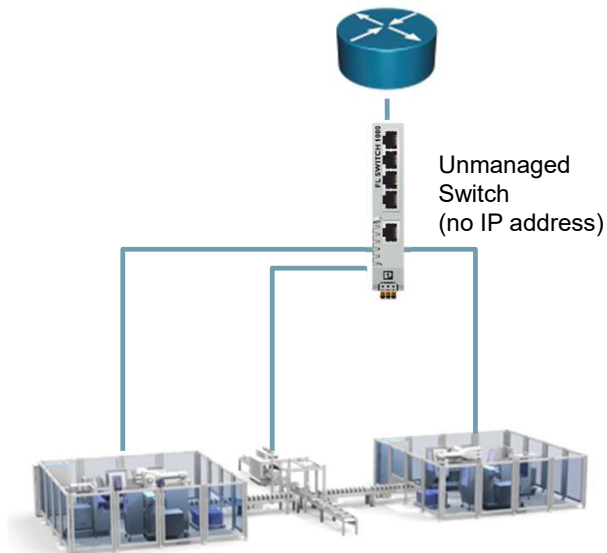
Unmanaged mode

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



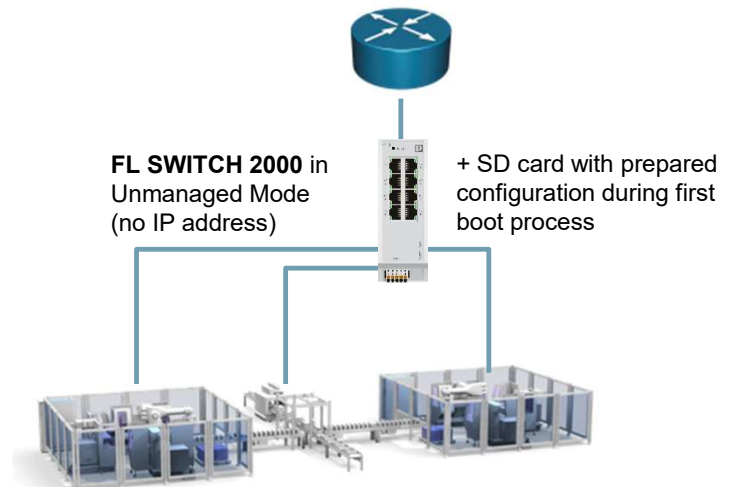
Automation protocols





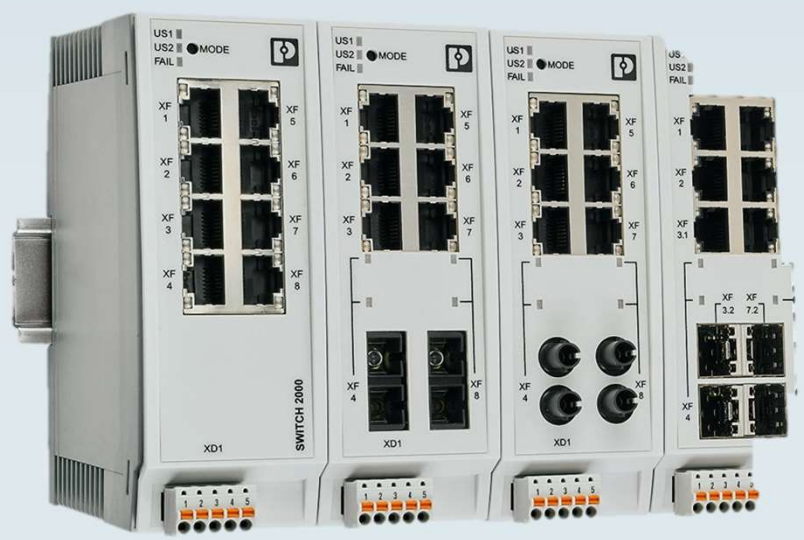
- + No configuration effort
- + Passive network device (no IP address)
- No protection against network failures (unwanted loops, broadcast storms, device failures, etc.)
- No redundancy mechanisms
- Possible access to configuration during runtime via DIP switches

Alternative solution



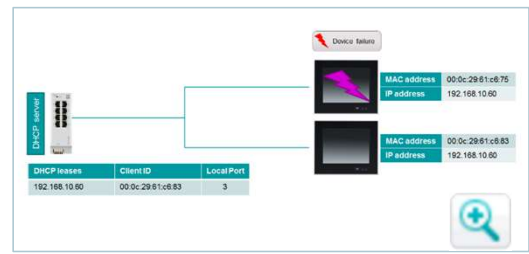
- + No configuration effort
- + Passive network device (no IP address)
- + Loop protection (RSTP)
- + Media redundancy (MRP)
- + Broadcast/Multicast filter (IGMP snooping)
- + Network traffic prioritization (QoS)
- + Network segmentation (VLAN)
- + Protected against access to configuration during runtime

Managed Switches 2000

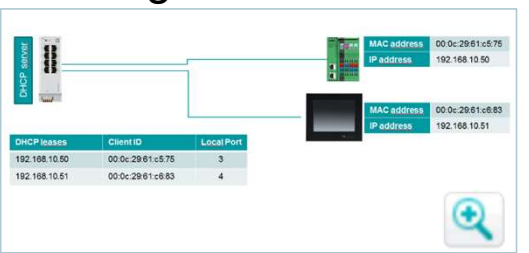


DHCP server

- Device replacement without IP reconfiguration of the network



- Easy IP address assignment*



*Only for models 22xx and 23xx

DHCP server



 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

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

 Automation protocols



DHCP server

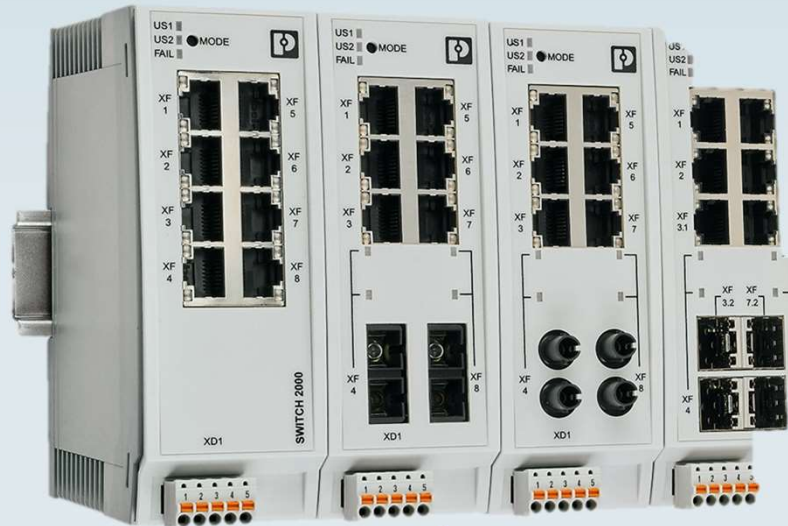


MAC address	00:0c:29:61:c5:75
IP address	192.168.10.50

MAC address	00:0c:29:61:c6:83
IP address	192.168.10.51

DHCP leases	Client ID	Local Port
192.168.10.50	00:0c:29:61:c5:75	3
192.168.10.51	00:0c:29:61:c6:83	4

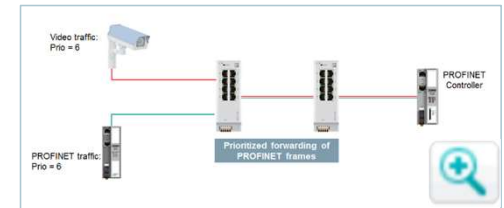
Managed Switches 2000



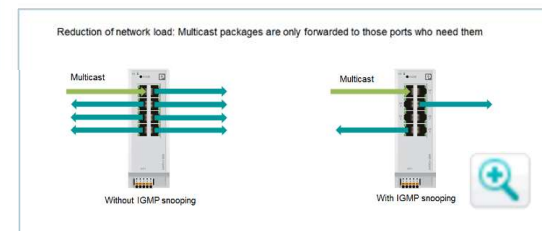
Profinet and
EtherNet/IP™ support



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



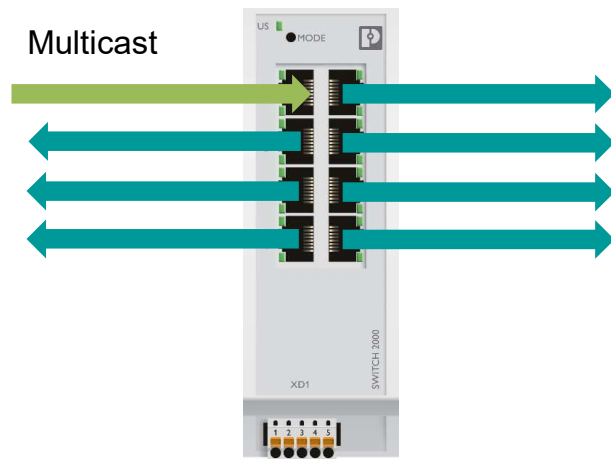
- Extended multicast filtering (IGMP snooping/querier)



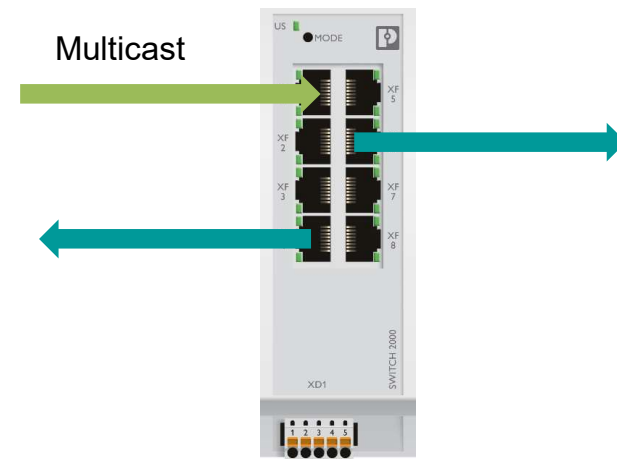
Automation protocols



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



Without IGMP snooping

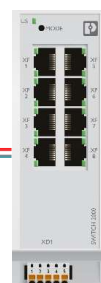


With IGMP snooping

Video traffic:
Prio = 6

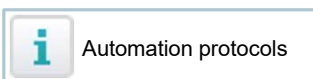


PROFINET traffic:
Prio = 6



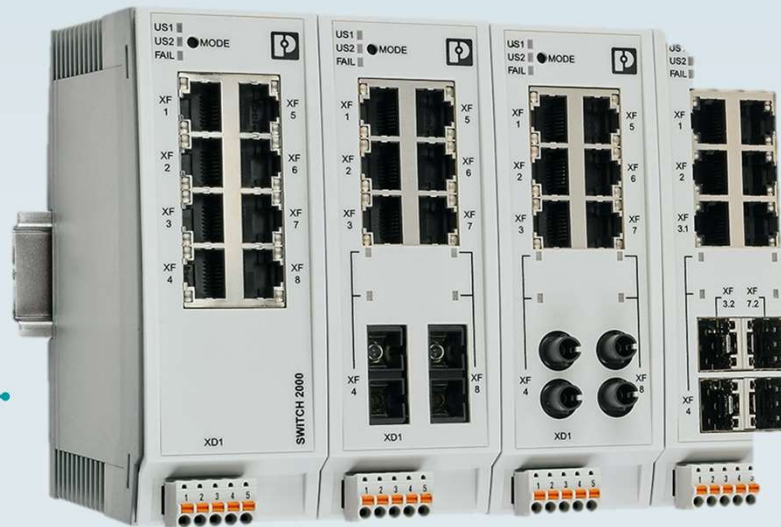
PROFINET
Controller

Prioritized forwarding of
PROFINET frames



Managed Switches 2000

Redundancy



- 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

Managed Switches 2000



Security

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

*Only for models 22xx and 23xx

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



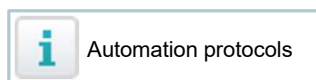
Automation protocols



Managed Switches 2000



	FL SWITCH 2005	FL SWITCH 2008	FL SWITCH 2016	FL SWITCH 2105	FL SWITCH 2108	FL SWITCH 2116
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	0 °C...60 °C	0 °C...60 °C	0 °C...60 °C	0 °C...60 °C	0 °C...60 °C
Presetting	-	-	-	-	-	-
Order number	2702323	2702324	2702903	2702665	2702666	2702908



Managed Switches 2000



	FL SWITCH 2205	FL SWITCH 2208	FL SWITCH 2208 PN	FL SWITCH 2207-FX	FL SWITCH 2207-FX SM
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

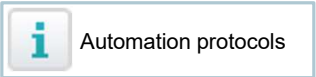
Automation protocols



Managed Switches 2000



	FL SWITCH 2206-2FX SM	FL SWITCH 2206-2FX SM	FL SWITCH 2206-2FX ST	FL SWITCH 2206-2FX SM ST
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



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

-40 °C...70 °C

-40 °C...70 °C

-40 °C...70 °C

-40 °C...70 °C

Presetting

-

PROFINET

-

-

PROFINET

Order number

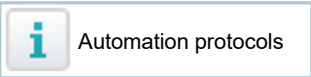
2702969

1044028

2702334

2702904

1044029



Managed Switches 2000



**FL SWITCH
2214-2FX**

**FL SWITCH
2214-2SFX**

**FL SWITCH
2214-2SFX PN**

**FL SWITCH
2214-2FX SM**

**FL SWITCH 2212-2TC-
2SFX**

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

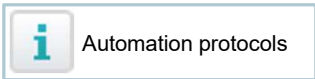
2702905

1006188

1044030

2702906

2702907



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

-40 °C...70 °C

-40 °C...70 °C

-40 °C...70 °C

-40 °C...70 °C

Presetting

-

PROFINET

-

-

PROFINET

Order number

2702652

1009220

2702653

2702970

1009222

Automation protocols



Managed Switches 2000



FL SWITCH 2316

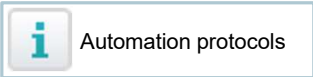
FL SWITCH 2316 PN

FL SWITCH 2314-2SFP

FL SWITCH 2314-2SFP PN

FL SWITCH 2312-2GC-2SFP

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



Managed Switches 2000



FL SWITCH 2408

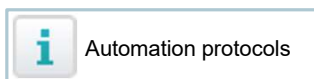
**FL SWITCH
2406-2SFX**

**FL SWITCH 2404-2TC-
2SFX**

**FL SWITCH
2408 PN**

**FL SWITCH
2406-2SFX PN**

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



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

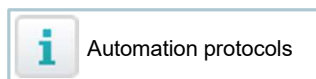


	FL SWITCH 2508	FL SWITCH 2506-2SFP	FL SWITCH 2504-2GC-2SFP	FL SWITCH 2508 PN	FL SWITCH 2506-2SFP PN
Ports	8 x RJ45	6 x RJ45 2 x SFP	4 x RJ45 2 x Gigabit Combo 2 x SFP	8 x RJ45	6 x RJ45 2 x SFP
Transmission speed	10/100/1000 MBit/s	10/100/1000 MBit/s	10/100/1000 MBit/s	10/100/1000 MBit/s	10/100/1000 MBit/s
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

Managed Switches 2000



	FL SWITCH 2516	FL SWITCH 2514-2SFP	FL SWITCH 2512-2GC-2SFP	FL SWITCH 2516 PN	FL SWITCH 2514-2SFP PN
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



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

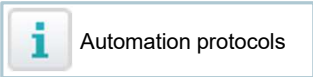
Order number

1106500

1106616

1106615

1106610



Switch 3000/4000



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



Automation protocols



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)



Automation protocols



Switch 3000/4000



	FL SWITCH 3005	FL SWITCH 3005T	FL SWITCH 3008	FL SWITCH 3008T	FL SWITCH 3016	FL SWITCH 3016T	FL SWITCH 3016E
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



Switch 3000/4000



	FL SWITCH 3004T-FX	FL SWITCH 3004T-FX ST	FL SWITCH 3006T-2FX	FL SWITCH 3006T-2FX ST	FL SWITCH 3006T-2FX SM
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 ... +75 °C	-40 °C ... +75 °C	-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

Switch 3000/4000



	FL SWITCH 3012E-2SFX	FL SWITCH 3012E-2SFX	FL SWITCH 3012E-2FX	FL SWITCH 3012E-2FX SM
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

Switch 3000/4000



	FL SWITCH 4008T-2SFP -	FL SWITCH 4008T-2GT-3FX SM	FL SWITCH 4008T-2GT-4FX SM	FL SWITCH 4012T-2GT-2FX	FL SWITCH 4012T-2GT-2FX ST
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



Switch 3000/4000



**FL SWITCH
4808E-16FX LC-
4GC**

**FL SWITCH
4808E-16FX SM-
4GC**

**FL SWITCH
4808E-16FX-4GC**

**FL SWITCH
4808E-16FX SM
LC-4GC**

**FL SWITCH
4824E-4GC**

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)

4x Gigabit combo
(1000MBit/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



**PHOENIX
CONTACT**
INSPIRING INNOVATIONS



Switch 3000/4000



	FL SWITCH 4808E-16FX ST- 4GC	FL SWITCH 4808E-16FX SM ST-4GC	FL SWITCH 4800E-24FX-4GC	FL SWITCH 4800E-24FX SM- 4GC
--	---	---	-------------------------------------	---



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	-40 °C ... +70 °C	-40 °C ... +70 °C	-40 °C ... +70 °C
IEC61850-3/ IEEE1613	Yes	Yes	Yes	Yes
Special features				
Order number	2891085	2891086	2891102	2891104

 Automation protocols



Switches für PROFINET IRT

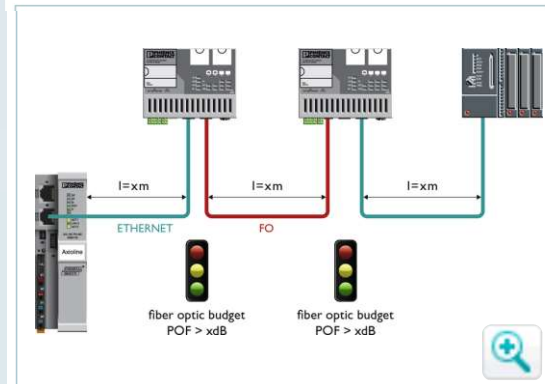


Switches für PROFINET IRT

Diagnostics
for fiber optic
paths

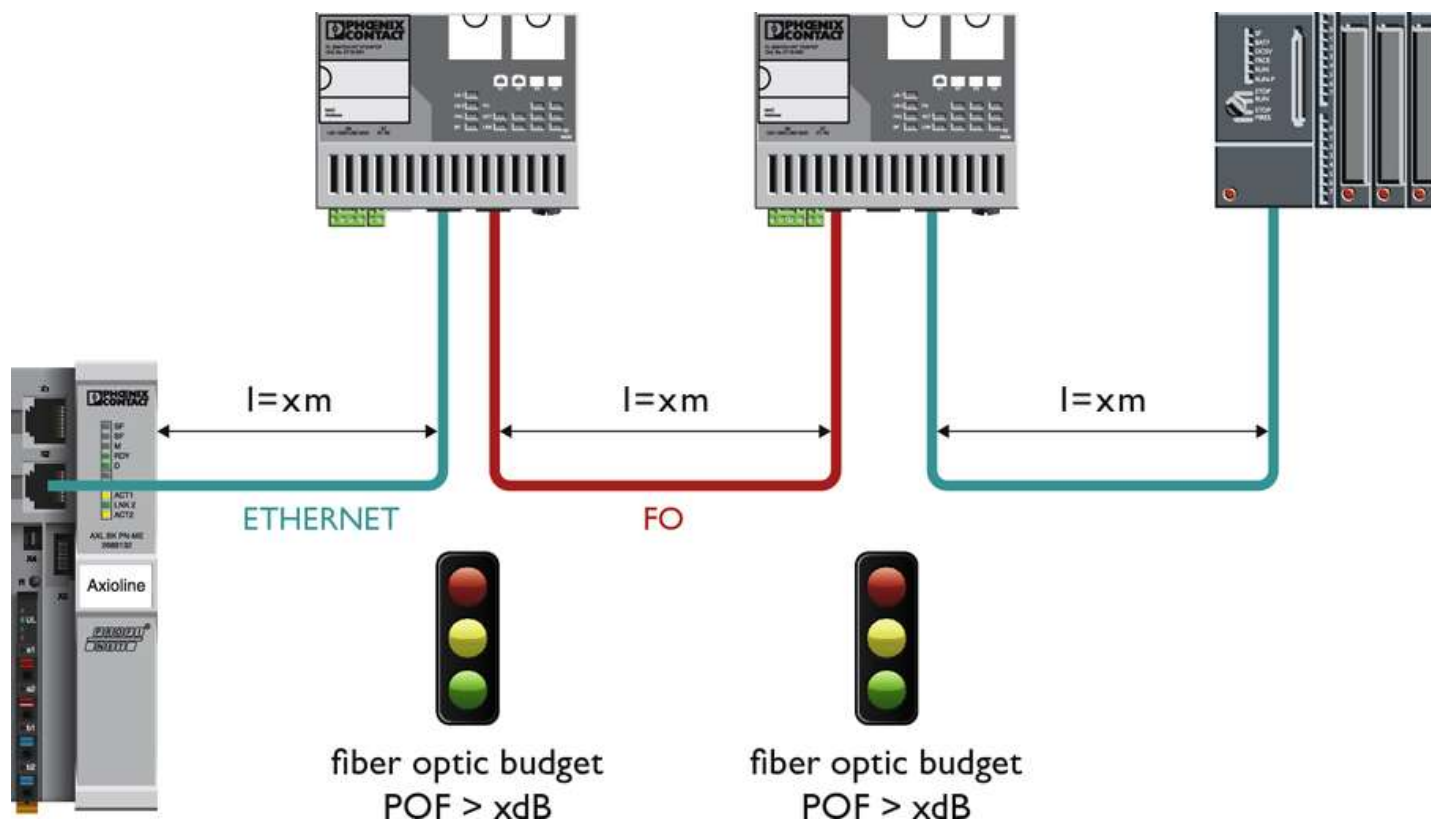


- Proactive maintenance for increased availability and less downtime
- Improved assessment of the path quality through simultaneous length measurement



Automation protocols





Switches für PROFINET IRT



FL SWITCH IRT 4TX



**FL SWITCH IRT 2TX
2POF**



**FL SWITCH IRT TX
3POF**



**FL SWITCH IRT IP
TX/3POF**

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

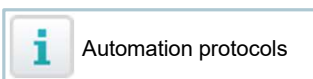
Order number

2700689

2700691

2700692

2700697



NAT Switch

 IP-Masquerading

Flexible WAN/LAN
port configuration

L3-Routing and
L2-Switching



1:1 NAT 

 Cost-effective integration
into higher-level networks

Virtual NAT 

Port Forwarding 

 Automation protocols

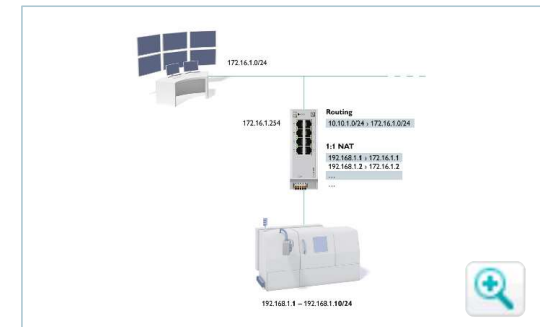


NAT Switch



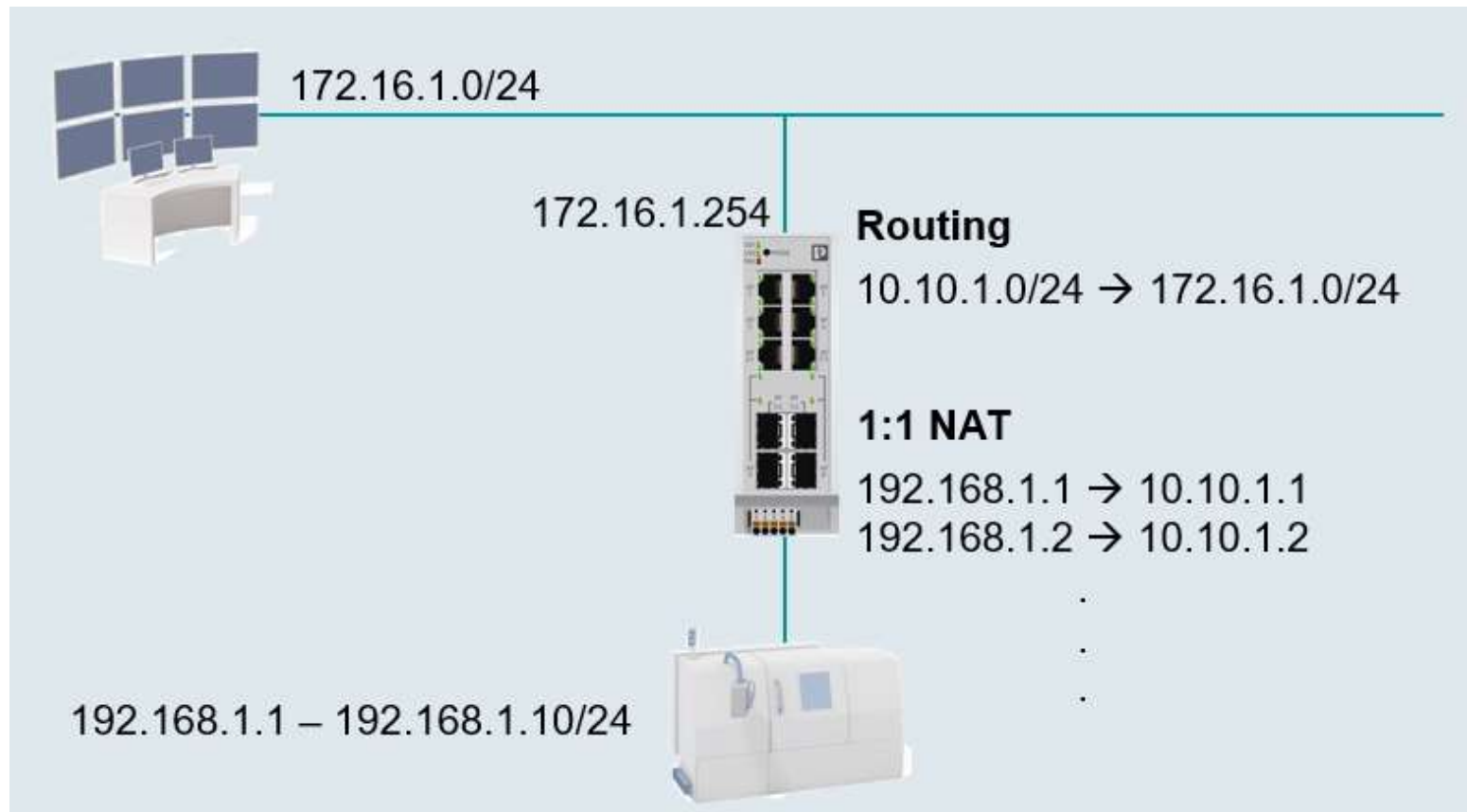
Virtual NAT

- 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



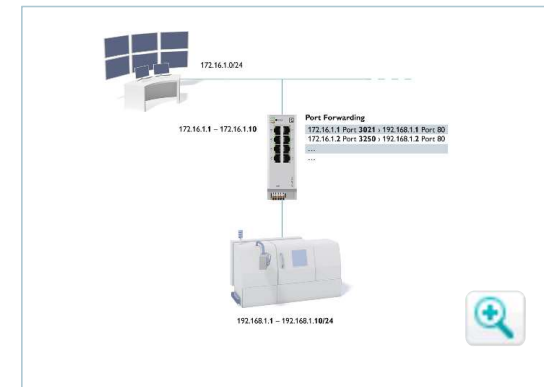


NAT Switch



Port Forwarding

- Makes services of LAN devices reachable from WAN network



Automation protocols





172.16.1.0/24

172.16.1.254

Port Forwarding

172.16.1.254 Port 3021 → 192.168.1.1 Port 80

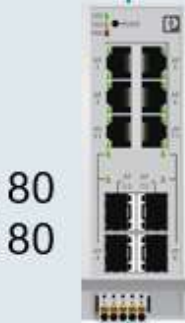
172.16.1.254 Port 4201 → 192.168.1.2 Port 80

.

.

.

192.168.1.1 – 192.168.1.10/24



Automation protocols



NAT Switch

IP Masquerading

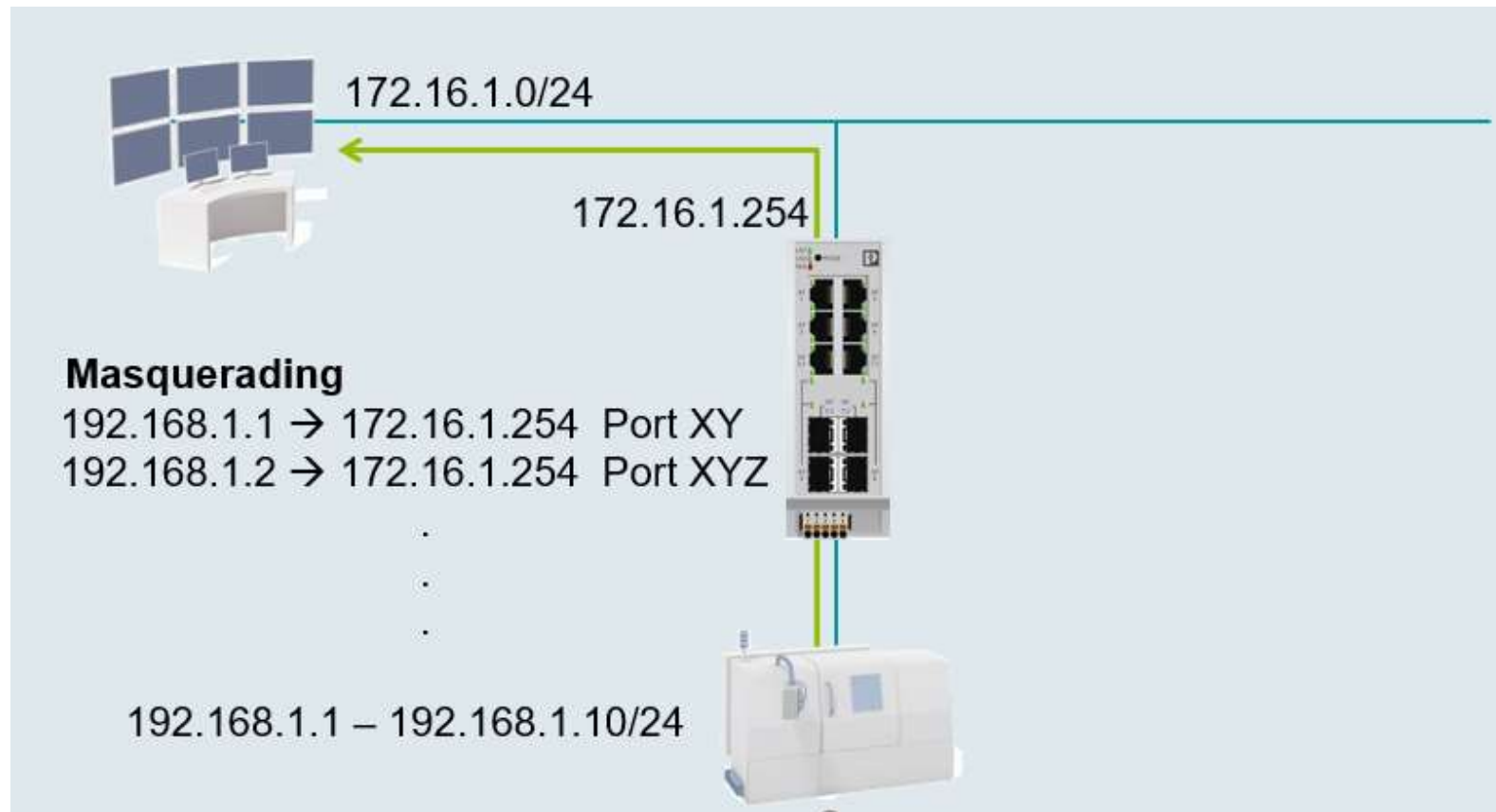


- NAT device works as a representative for LAN devices
- Differentiation of LAN members via different TCP/UDP ports



Automation protocols





NAT Switch



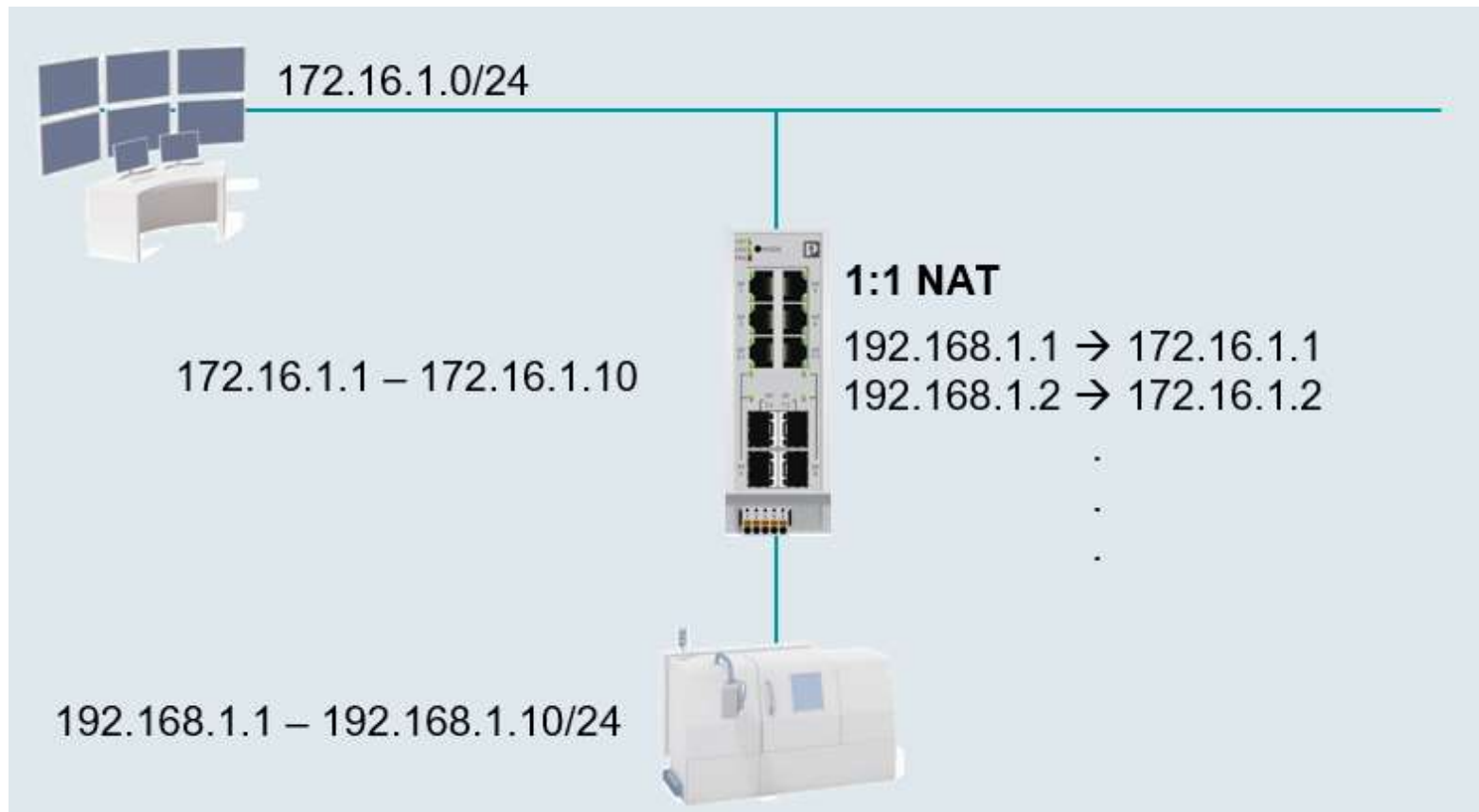
1:1 NAT

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



Automation protocols





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

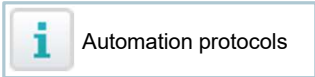
Extended

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 



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



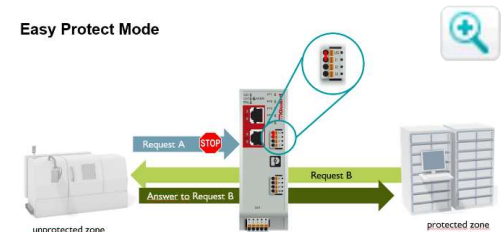
mGuard 1100

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

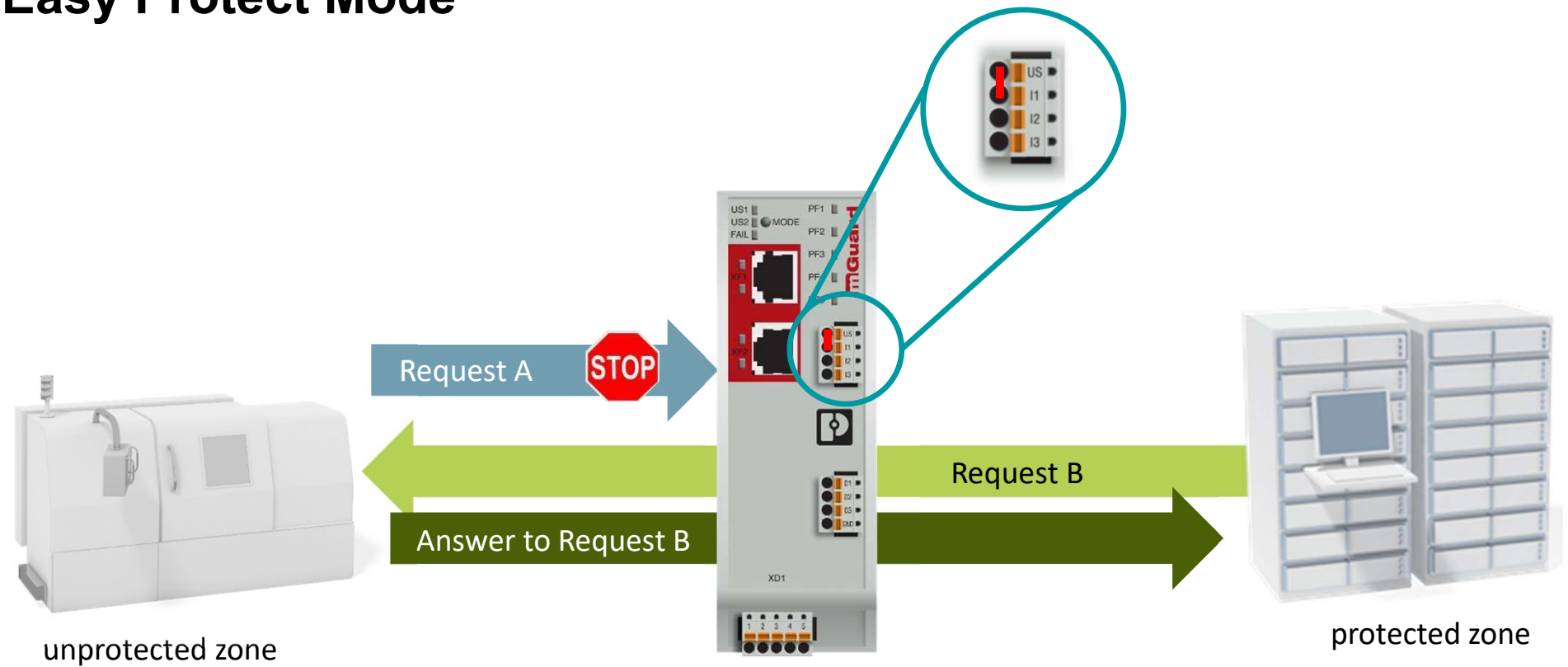
Easy Protect Mode



Automation protocols



Easy Protect Mode

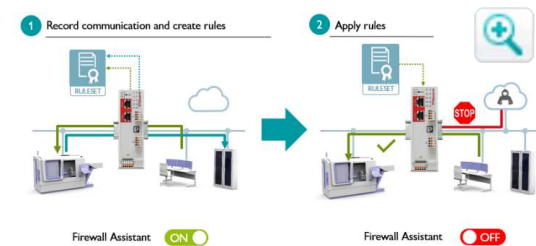


mGuard 1100



Firewall Assistant

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

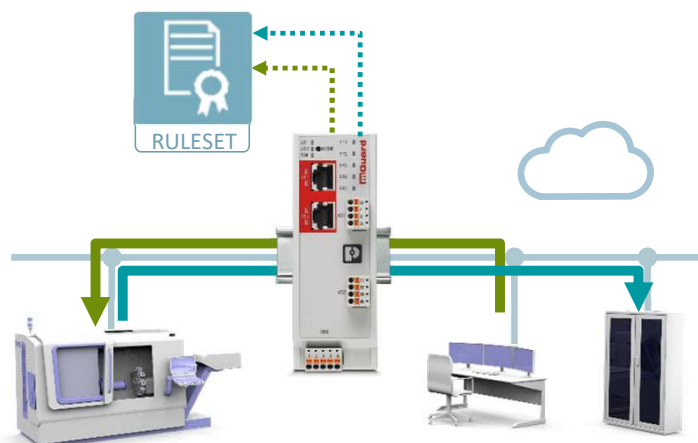


Automation protocols



Firewall Assistant: helps you create firewall rules

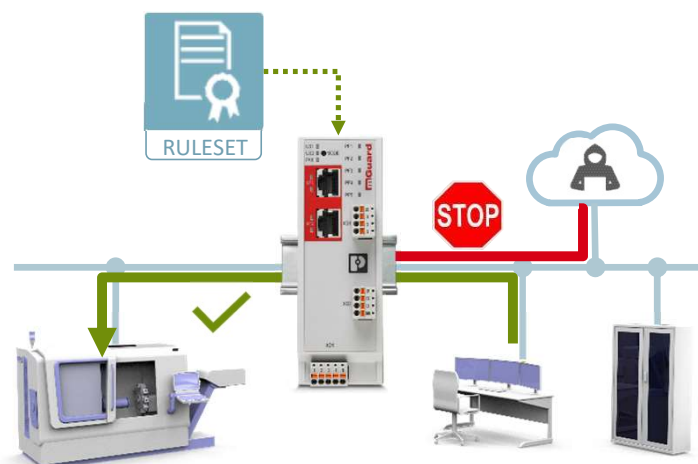
1 Record communication and create rules



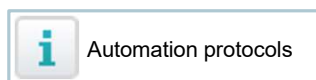
Firewall Assistant



2 Apply rules



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

Mounting rail devices and PCI cards



	FL MGuard 1102	FL MGuard RS2000 TX/TX-B	FL MGuard RS2000 TX/TX VPN	FL MGuard RS2005 TX VPN	TC MGuard RS2000 3G VPN
VPN tunnel optionally expandable	- -	- -	2 -	2 -	2 -
Firewall	Firewall Assistent	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



INSPIRING INNOVATIONS

Mounting rail devices and PCI cards



**FL MGuard
RS4000 TX/TX**

**FL MGuard
RS4000 TX/TX
VPN**

**FL MGuard
RS4000 TX/TX
VPN-M**

**FL MGuard
RS4000
TX/TX-P**

**FL MGuard
RS4004 TX/
DTX**

**FL MGuard
RS4004 TX/
DTX VPN**

**TC MGuard
RS4000 3G
VPN**

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



 Firewall and VPN

Functions especially tailored to industrial applications 

Quick and easy configuration 



Other Designs

Optimized
designs for
different
industrial
applications



- Portable use



- Desktop applications



- Installation in a 19" rack



Other Designs



Quick and easy
configuration

- Web interface
- Optional configuration memory on SD card



Other Designs



Functions
especially tailored
to industrial
applications

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



Other Designs



**FL MGuard
SMART2**



**FL MGuard
SMART2 VPN**



**FL MGuard
DELTA TX/TX**



**FL MGuard
DELTA TX/TX
VPN**

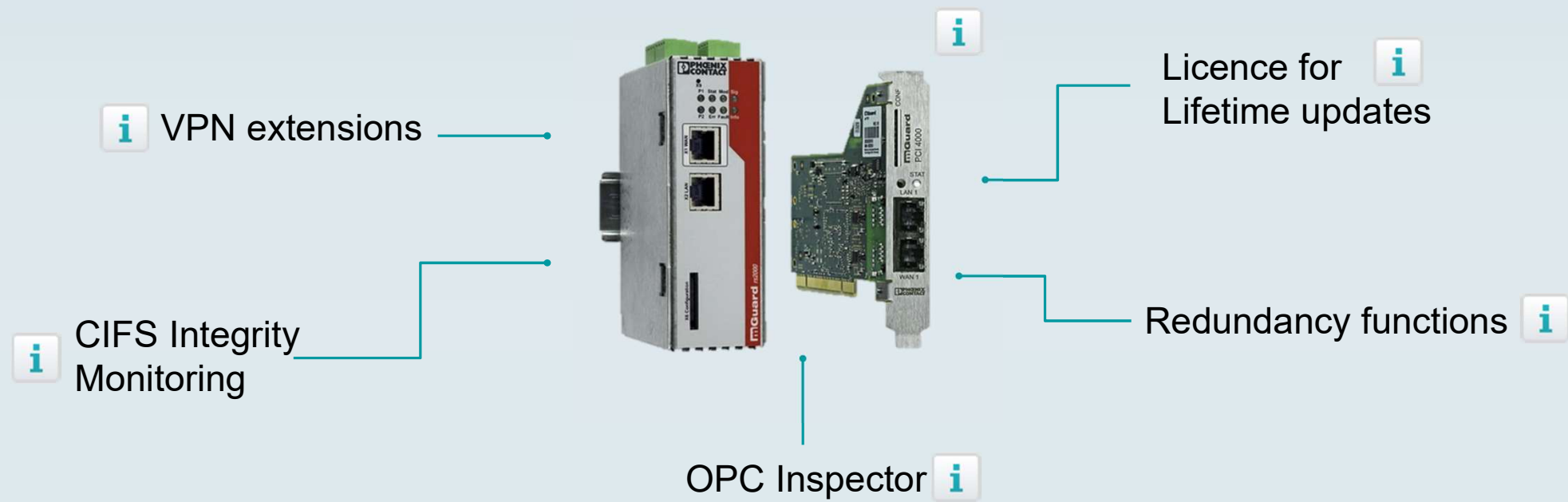


**FL MGuard
CENTERPORT**

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



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

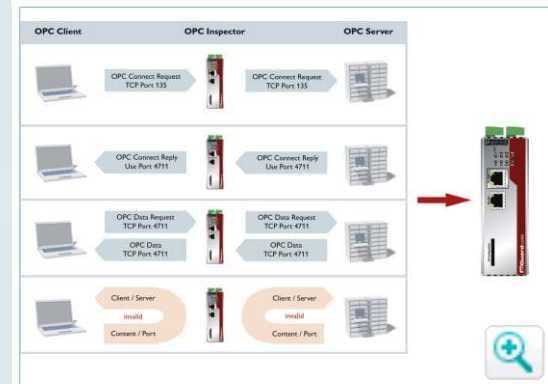


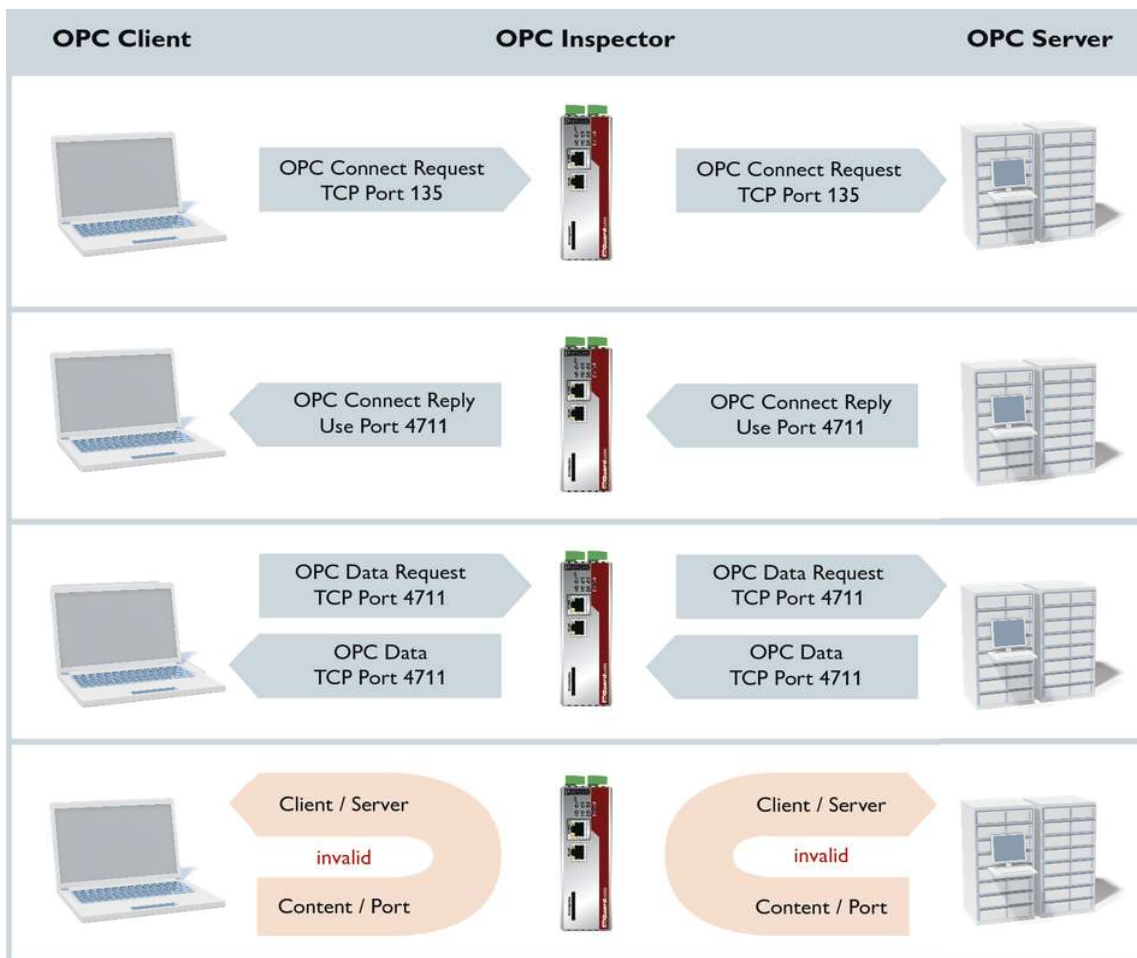
Extended functionalities



OPC Inspector

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



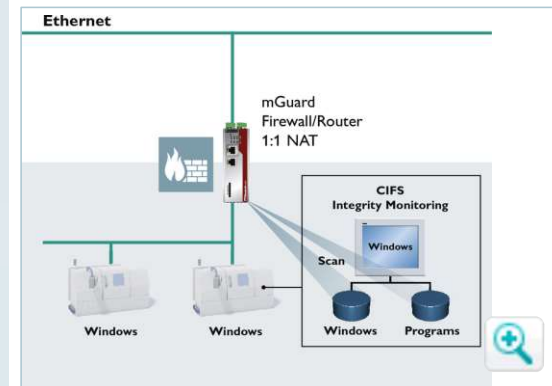


Extended functionalities

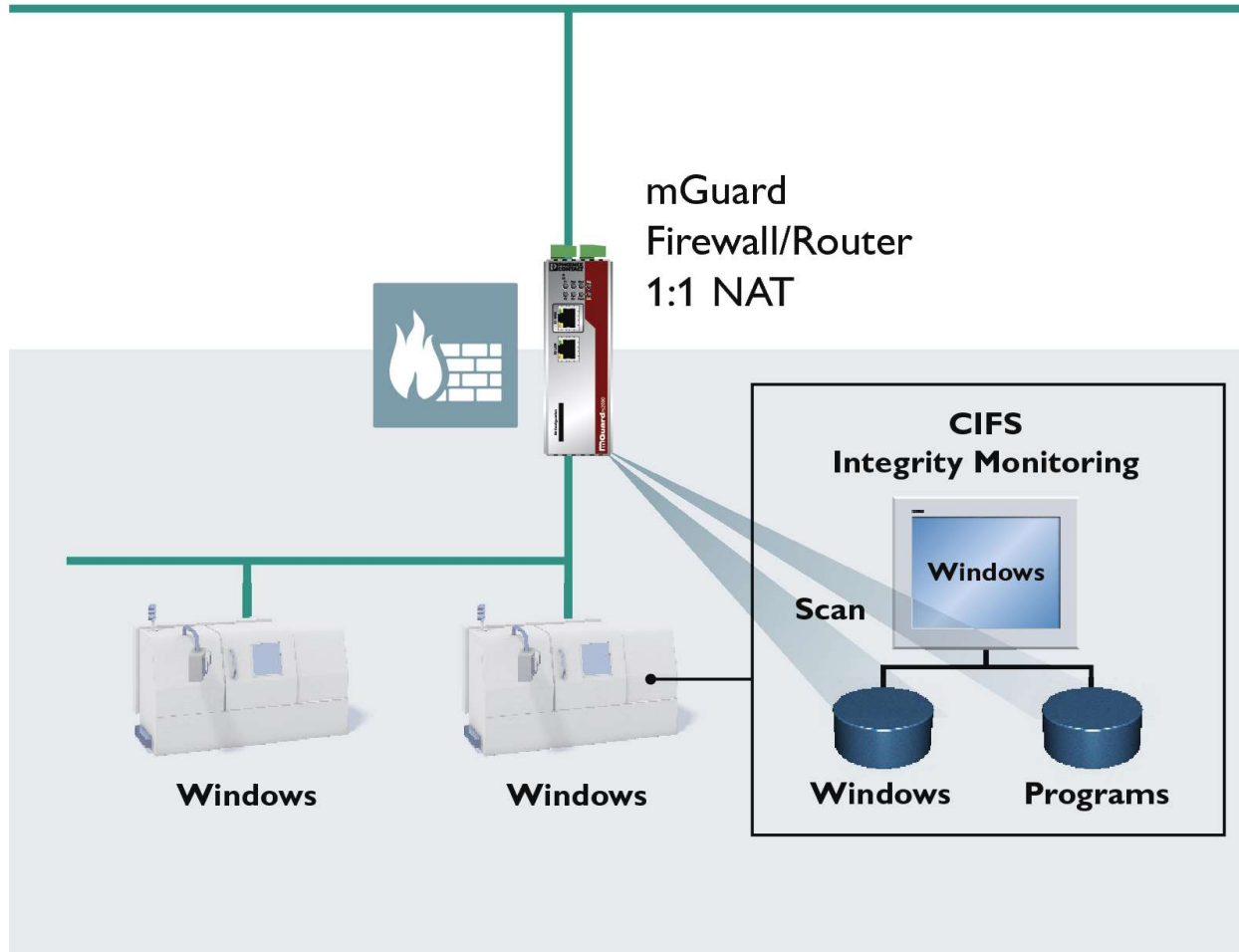
CIFS Integrity Monitoring



- Ideal for non patchable systems
- Detection of system changes



Ethernet



Extended functionalities

VPN
extensions



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



Extended functionalities

	FL MGuard LIC Lifetime FW	FL MGuard LIC FW RD	FL MGuard FW/VPN RD	FL MGuard LIC OPC INSP	FL MGuard LIC CIM
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

	FL MGuard LIC VPN-10	FL MGuard LIC VPN-100	FL MGuard LIC VPN-250
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

 Free start-up support

Flexibly
upgradeable 



Efficient device
management 



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



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



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

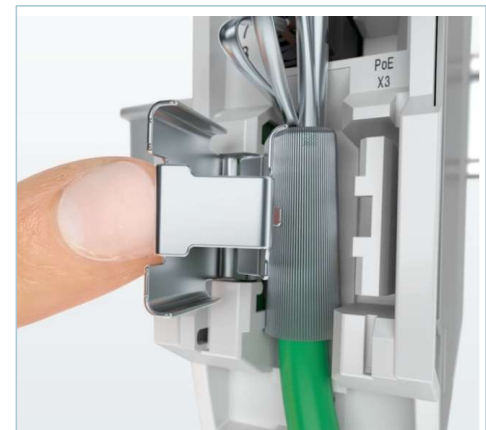


Power over Ethernet Injectors



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



Power over Ethernet Injectors



	INJ 1000 INJ 1010	INJ 1000-T INJ 1010-T	INJ 1100-T INJ 1110-T	INJ 2102-T INJ 2112-T	INJ 2103-T INJ 2113-T	INJ 2101-T INJ 2111-T	FL PSE 2TX
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

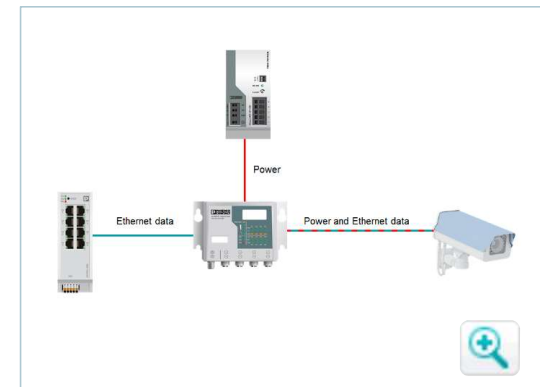


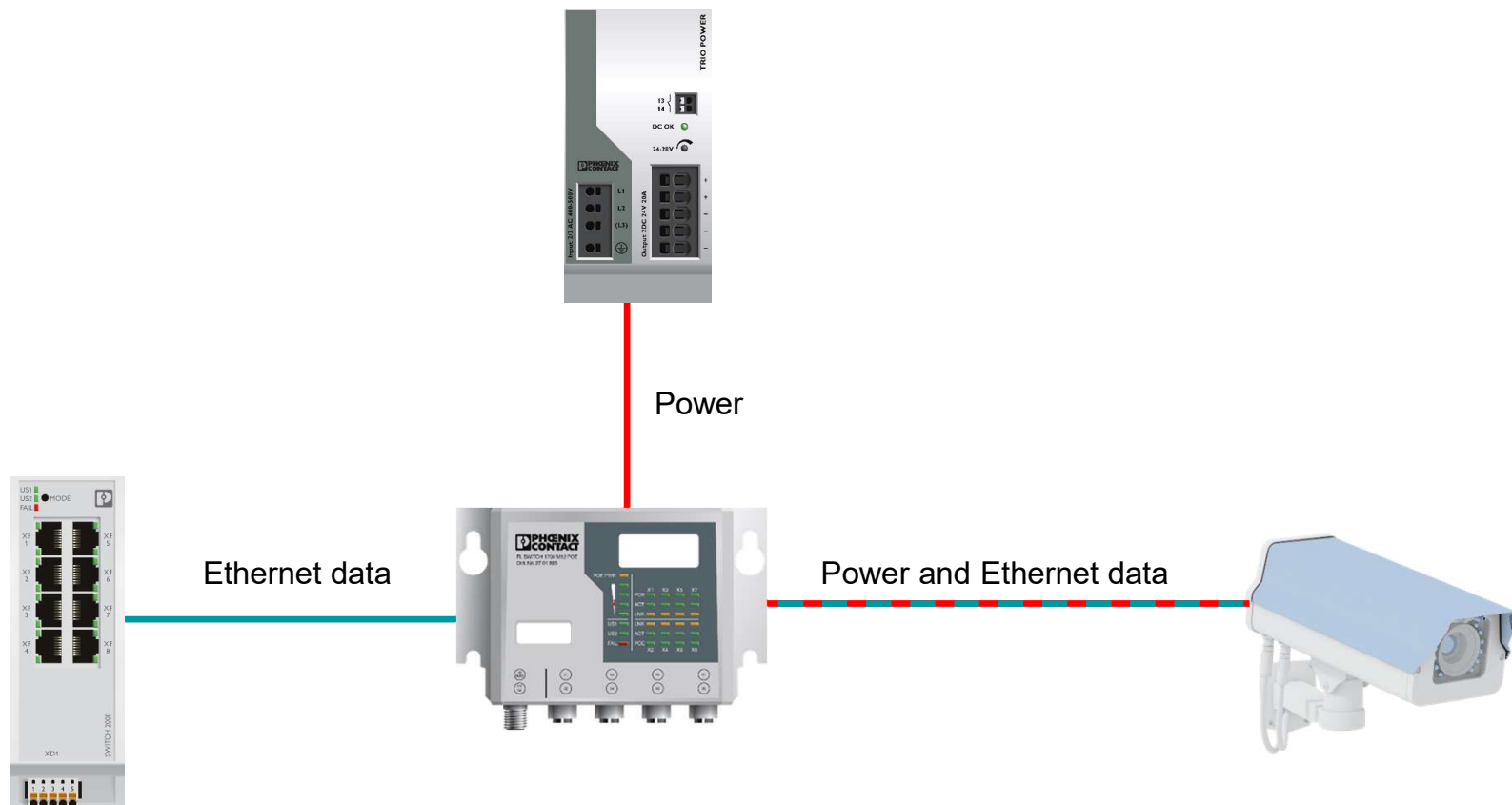
Power over Ethernet Switches

Reduced
cabling efforts



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





Power over Ethernet Switches

Installation
in field



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

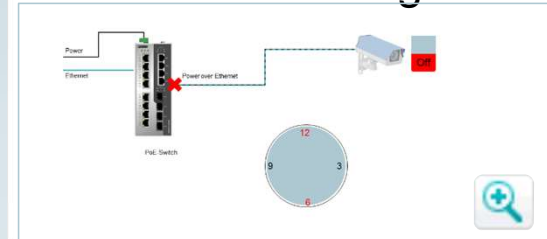


Power over Ethernet Switches

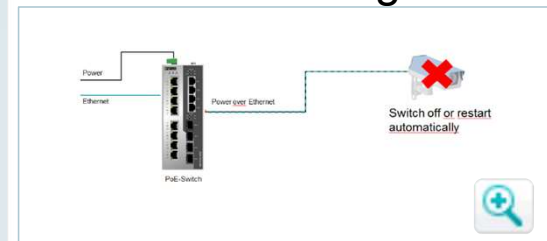


Managed features

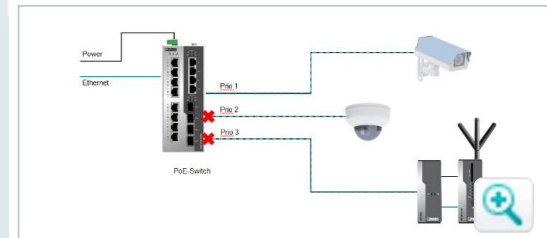
PoE Scheduling

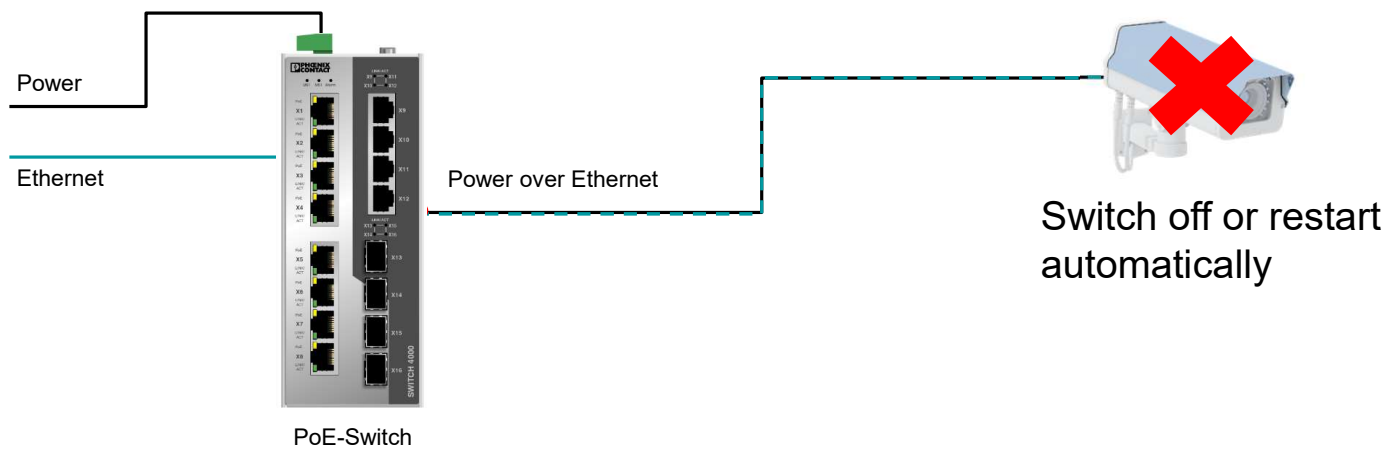


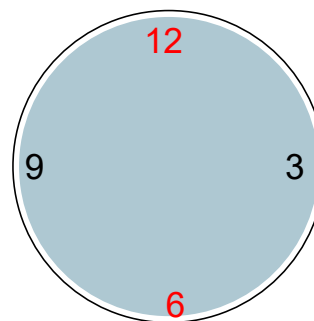
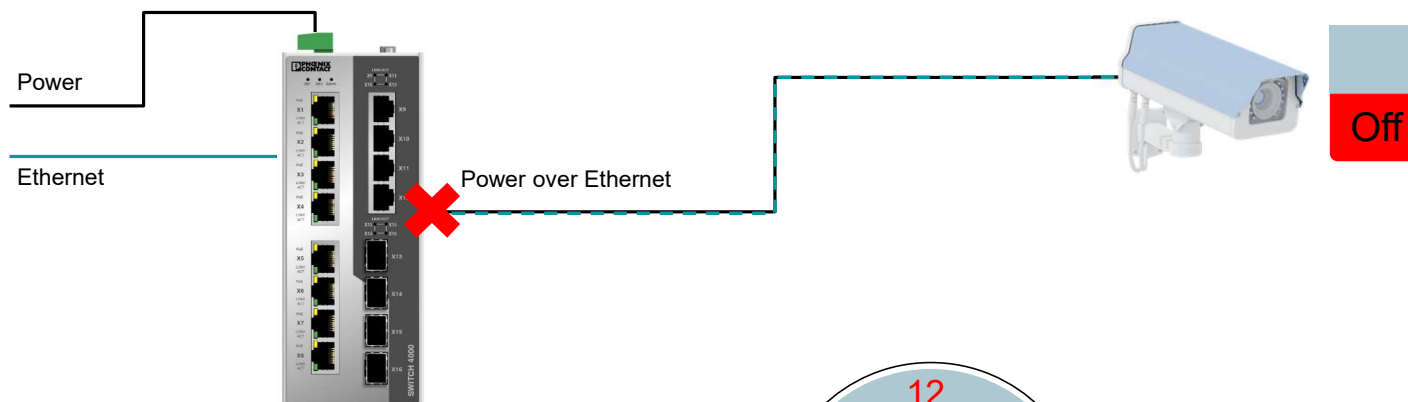
PoE Watchdog

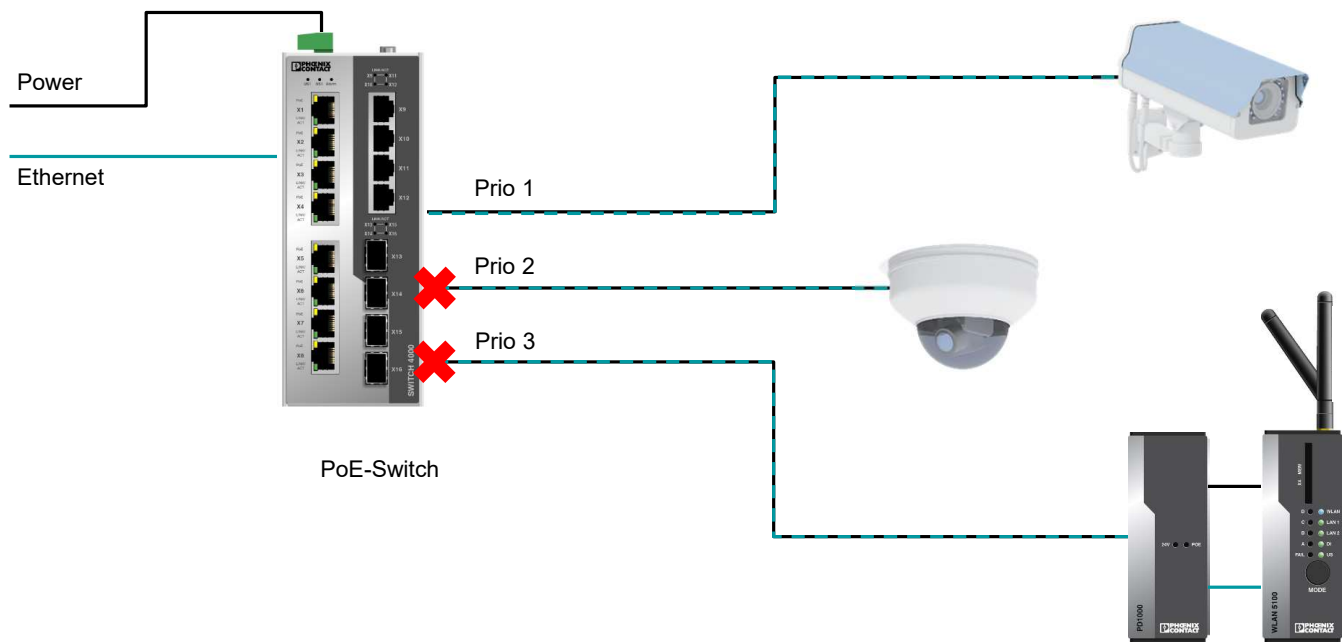


PoE Prioritization









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



	FL SWITCH 1001T-4POE	FL SWITCH 1708 M12 POE	FL SWITCH 1000T-2POE- 2SFP	FL SWITCH 1001T-4POE- GT-SFP	FL SWITCH 1001T-4POE-GT	FL SWITCH 1000T-8POE-GT- 2SFP
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	10/100/1000 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



**FL SWITCH
4000T-4POE-SFP**

**FL SWITCH
4000T-8POE-
2SFP**

**FL SWITCH
4004T-8POE-
4SFP**

FL IF 2PSE-F



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

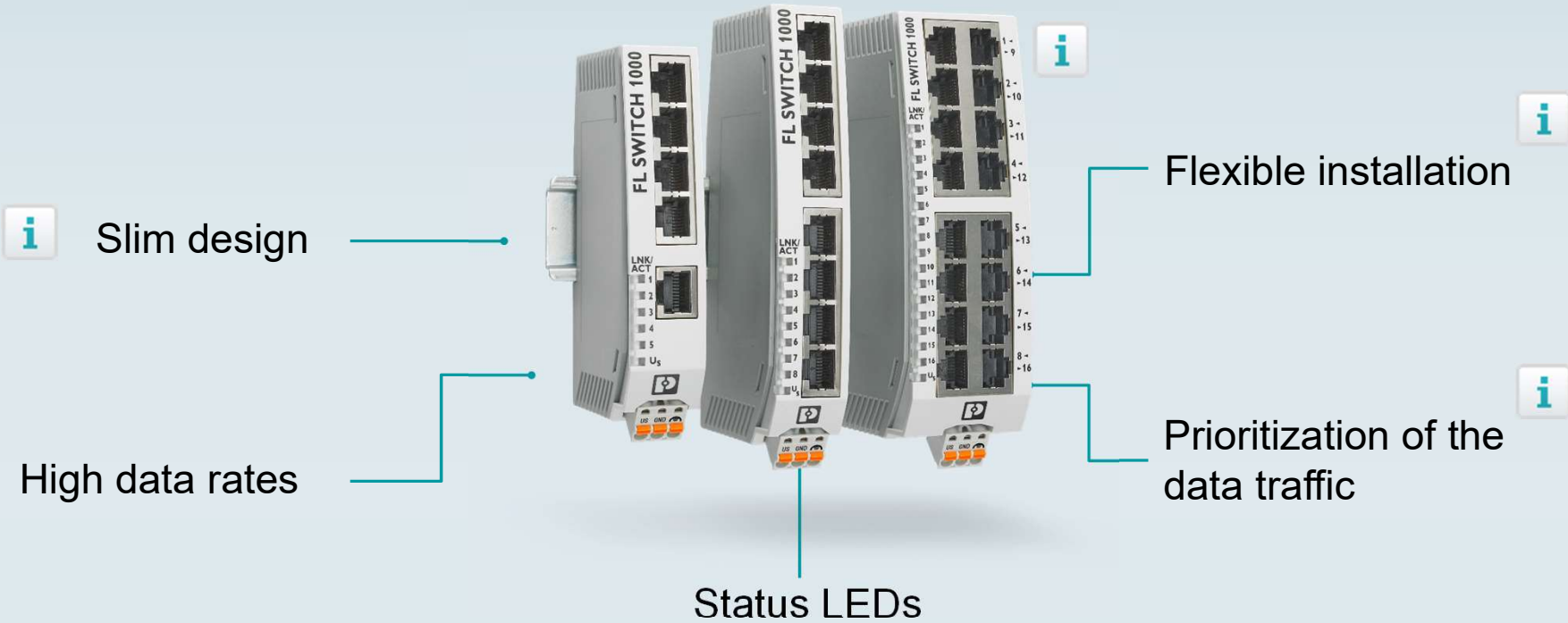


FL PD 1001 T GT

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



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

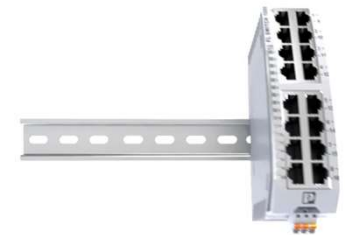


Unmanaged Switches



Flexible installation

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

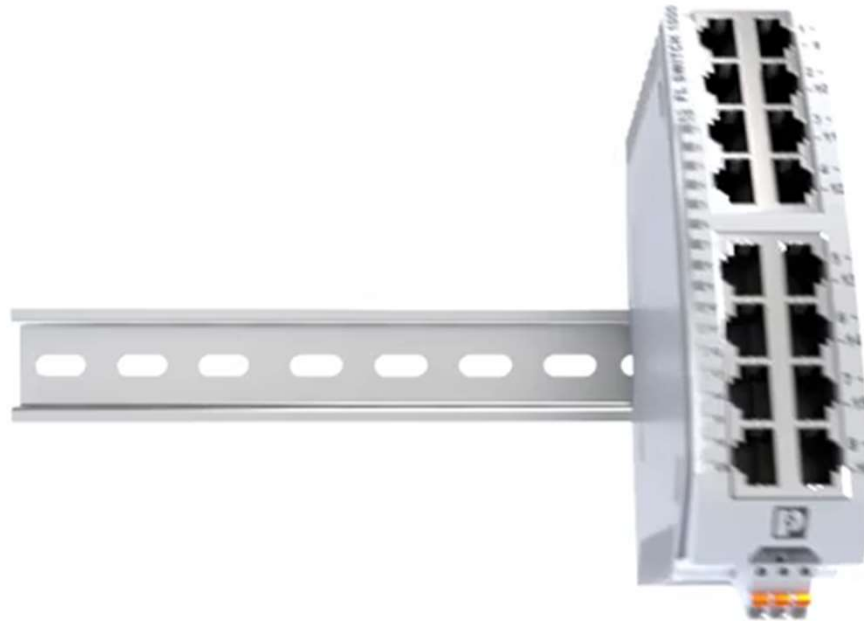


Flexible mounting options



Automation protocols

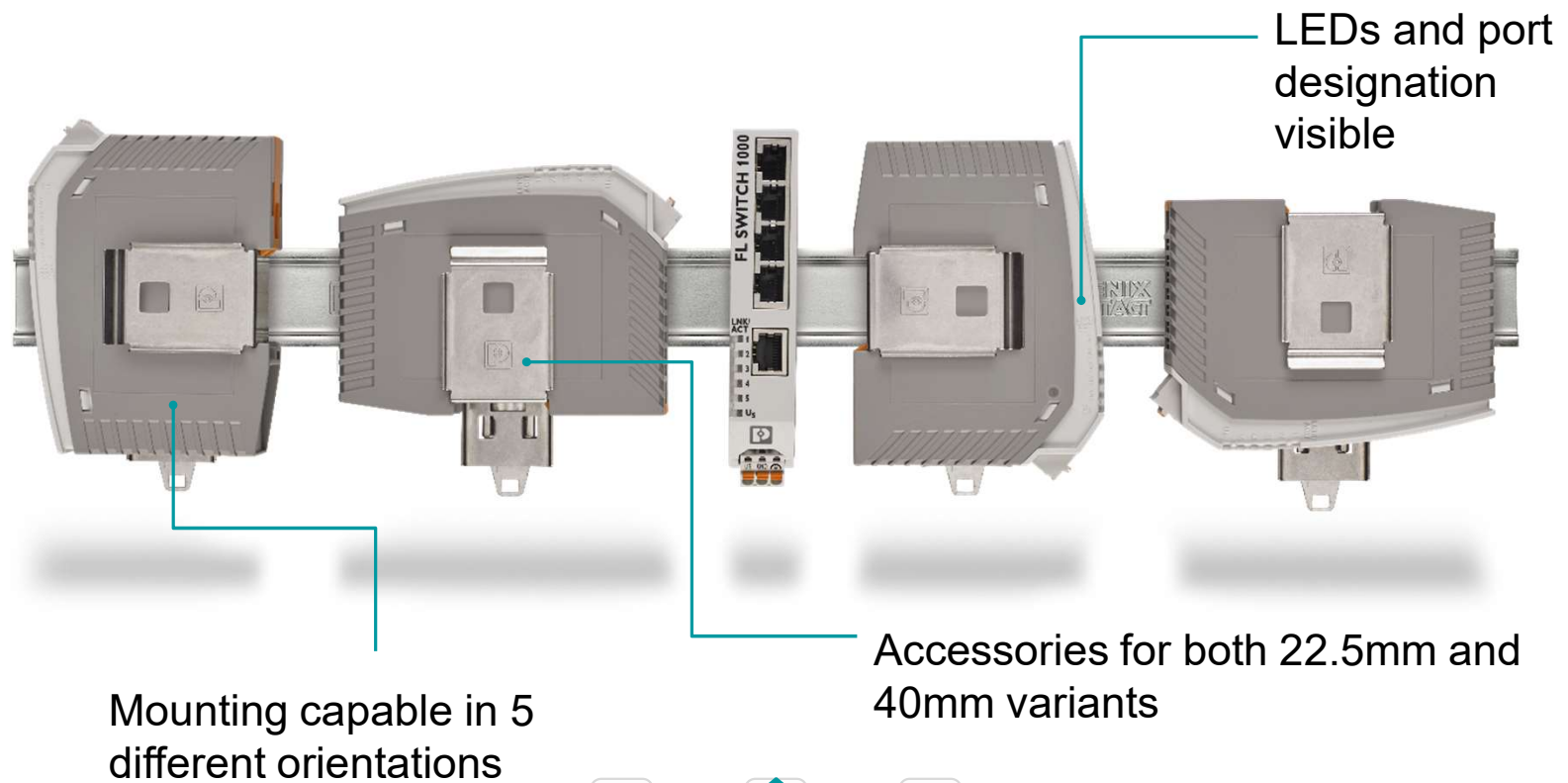




Flexible mounting options



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

FL SWITCH 1000 Series
Prioritization of Automation Protocols (IEEE 802.1Q)



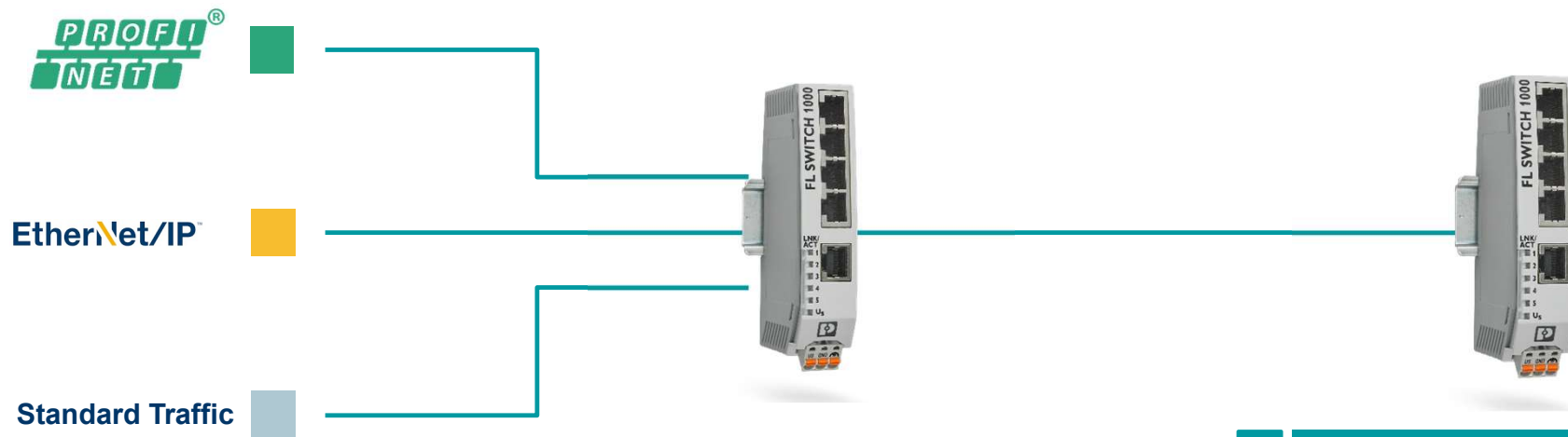
Automation protocols



FL SWITCH 1000 Series

Prioritization of Automation Protocols (IEEE 802.1Q)

Standard Traffic Levels



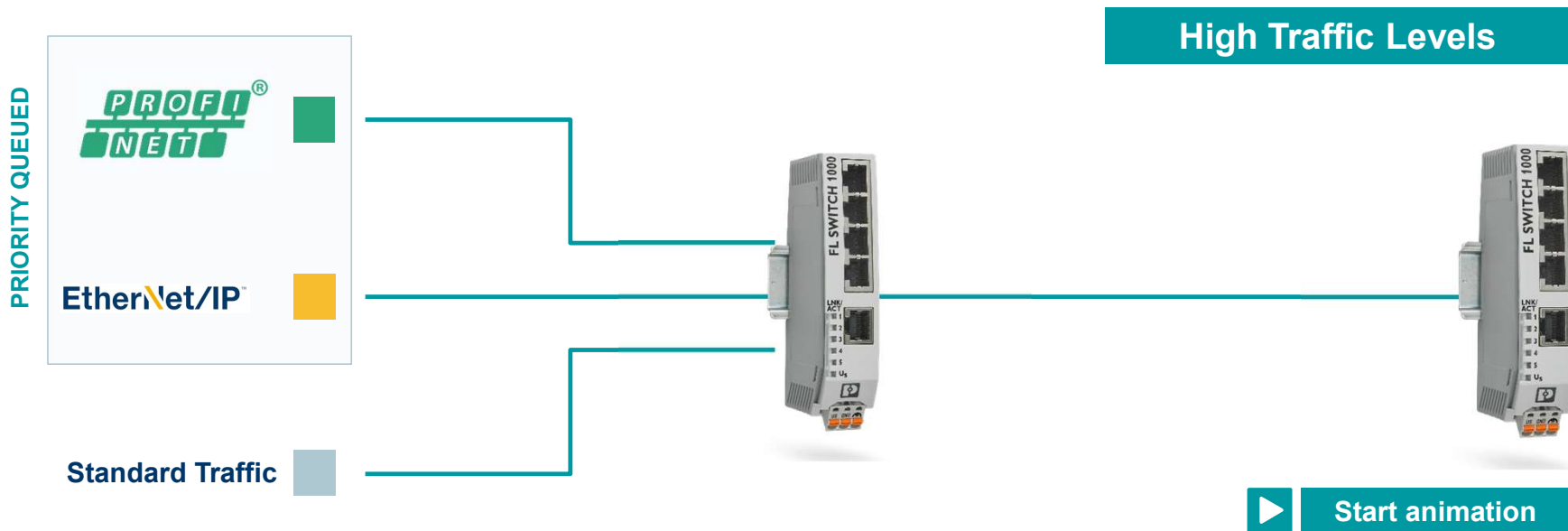
Start animation

As traffic is received, it is transmitted as supplied



FL SWITCH 1000 Series

Prioritization of Automation Protocols (IEEE 802.1Q)



As buffer fills, select traffic types take priority



Prioritization of Traffic (IEEE 802.1Q)

PRIORITY QUEUED

PROFI[®]
NET

Modbus
TCP/IP

ASHRAE
BACnet[®]

CC-Link **IE** **F**ield

Ethernet/IP



NON-PRIORITY QUEUED

Standard Traffic

Queues assigned in accordance with standard recommendations



FL SWITCH 1000



	FL SWITCH 1005N	FL SWITCH 1008N	FL SWITCH 1016N	FL SWITCH 1105N	FL SWITCH 1108N
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



**PHOENIX
CONTACT**
INSPIRING INNOVATIONS



FL SWITCH 1000



**FL SWITCH
1004N-FX**

**FL SWITCH
1004N-FX ST**

**FL SWITCH
1004N-FX SM**

**FL SWITCH
1004N-SFX**

**FL SWITCH
1005N-2SFX**

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



 Automation protocols



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 environmenr	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





Automation protocols



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

SFNB-Switches



	FL SWITCH SFNB 5TX	FL SWITCH SFNB 8TX	FL SWITCH SFNB 4TX/FX	FL SWITCH SFNB 4TX/FX ST	FL SWITCH SFNB 4TX/FX SM20
--	-----------------------	-----------------------	--------------------------	-----------------------------	----------------------------------

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



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



	FL SWITCH SF 8TX	FL SWITCH SF 16TX	FL SWITCH SF 7TX/FX	FL SWITCH SF 7TX/FX ST	FL SWITCH SF 15TX/FX
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



SF-Switches



	FL SWITCH SF 6TX/2FX	FL SWITCH SF 6TX/2FX ST	FL SWITCH SF 14TX/2FX	FL SWITCH SF 4TX/3FX ST
--	-------------------------	----------------------------	--------------------------	----------------------------

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



SFN-Switches



	FL SWITCH SFN 5TX	FL SWITCH SFN 5TX-PN	FL SWITCH SFN 5TX-24VAC	FL SWITCH SFN 8TX	FL SWITCH SFN 8TX-PN
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



SFN-Switches



	FL SWITCH SFN 8TX-24VAC	FL SWITCH SFN 16TX	FL SWITCH SFN 4TX/FX	FL SWITCH SFN 4TX/FX ST	FL SWITCH SFN 7TX/FX
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

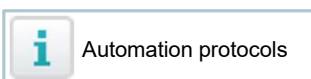

Automation protocols



SFN-Switches



	FL SWITCH SFN 7TX/FX-NF	FL SWITCH SFN 7TX/FX ST	FL SWITCH SFN 15TX/FX	FL SWITCH SFN 6TX/2FX	FL SWITCH SFN 6TX/2FX-NF
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



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



	FL SWITCH SFN 5GT	FL SWITCH SFN 8GT	FL SWITCH SFN 7GT/SX	FL SWITCH SFN 6GT/2SX	FL SWITCH SFN 6GT/2LX	FL SWITCH SFN 6GT/2LX-20
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



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



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



	FL SWITCH SFNT 5TX	FL SWITCH SFNT 5TX-C	FL SWITCH SFNT 8TX	FL SWITCH SFNT 8TX-C	FL SWITCH SFNT 16TX
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



	FL SWITCH SFNT 4TX/ FX	FL SWITCH SFNT 4TX/ FX- C	FL SWITCH SFNT 7TX/ FX	FL SWITCH SFNT 7TX/ FX- C	FL SWITCH SFNT 7TX/ FX ST	FL SWITCH SFNT 7TX/ FX ST-C
Application area	Harsh environment	Harsh environment	Harsh environment	Harsh environment	Harsh environment	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	-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	-	Conformal coating
Order number	2891004	2891044	2891006	2891046	2891007	2891047



Automation protocols



INSPIRING INNOVATIONS

SFNT-Switches



**FL SWITCH
SFNT
15TX/FX**

**FL SWITCH
SFNT 6TX/
2FX**

**FL SWITCH
SFNT
6TX/2FX-C**

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

**FL SWITCH
SFNT
6TX/2FX ST-C**

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

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



	FL SWITCH SFNT 5GT	FL SWITCH SFNT 5GT-C
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

Simple LED diagnosis



Power supply
adapted to the
mounting location



High port density



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



Switch 1605

Flexible choice of
mounting location



Protection class
IP67

Power supply
also possible as
line topology

Trouble-free use in
automation networks



Automation protocols



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



Switch 1605



Protection class
IP67

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



Automation protocols



Further variants



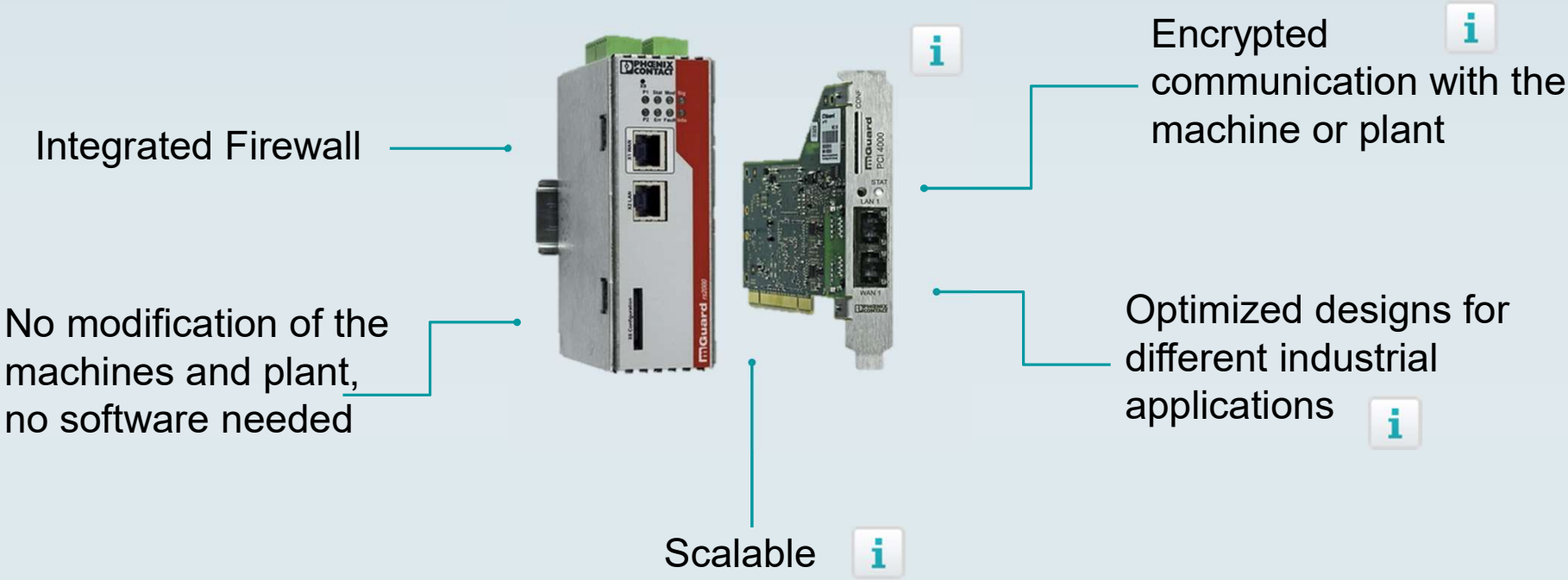
	FL SWITCH 1824	FL SWITCH 1924	FL SWITCH 1605 M12
--	----------------	----------------	--------------------

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



Secure remote maintenance



Secure remote maintenance



Encrypted communication with the machine or plant

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



Automation protocols



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



Automation protocols



Secure remote maintenance



	FL MGuard RS2000 TX/TX VPN	FL MGuard RS2005 TX VPN	TC MGuard RS2000 3G VPN	FL MGuard RS4000 TX/TX VPN	FL MGuard RS4000 TX/TX- P
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




Automation protocols



Secure remote maintenance



FL MGuard RS4004 TX/ DTX VPN

TC MGuard RS4000 3G VPN

FL MGuard GT/GT VPN

FL MGuard PCI4000 VPN

FL MGuard PCIE4000 VPN

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



**PHOENIX
CONTACT**

INSPIRING INNOVATIONS

Remote access via internet and mobile phone network



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



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, IPsec, OpenVPN SMS and e-mail transmission	Firewall, NAT, IPsec, OpenVPN 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



	TC ROUTER 3002T-4G VZN	TC ROUTER 3002T-4G ATT	TC ANT MOBILE WALL 5M
Function	Industrial 4G router USA For communication in Verizon Wireless mobile network	Industrial 4G router USA For communication in AT&T 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, IPsec, OpenVPN SMS and e-mail transmission	Firewall, NAT, IPsec, OpenVPN SMS and e-mail transmission	
Order number	2702532	2702533	2702273



Extension of complex IT networks

Status and diagnostics display

Remote diagnostics of all devices and paths

Replaceable surge protection



The image shows a Phoenix Contact TC Extender 6004 ETH-2S, a rack-mountable network extender. It features a status and diagnostics display at the top, a replaceable surge protection unit on the left, and four RJ45 ports labeled LAN 1, LAN 2, LAN 3, and LAN 4 on the right. The device is designed for industrial environments and provides a secure, managed connection between two Ethernet networks.

Economical Ethernet communication

Managed and unmanaged extenders in one network



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



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



	TC EXTENDER 2001 ETH-2S	TC EXTENDER 4001 ETH-1S	TC EXTENDER 6004 ETH-2S
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



Interference-free parallel operation with WLAN networks

Integrated special antennas for reliable wireless connections



Optimized for operation in PROFINET networks



Various application areas



Quick and easy startup

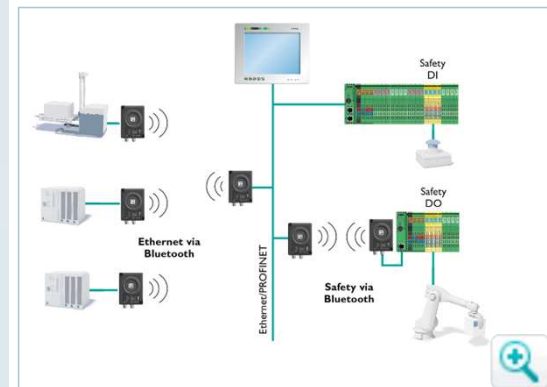


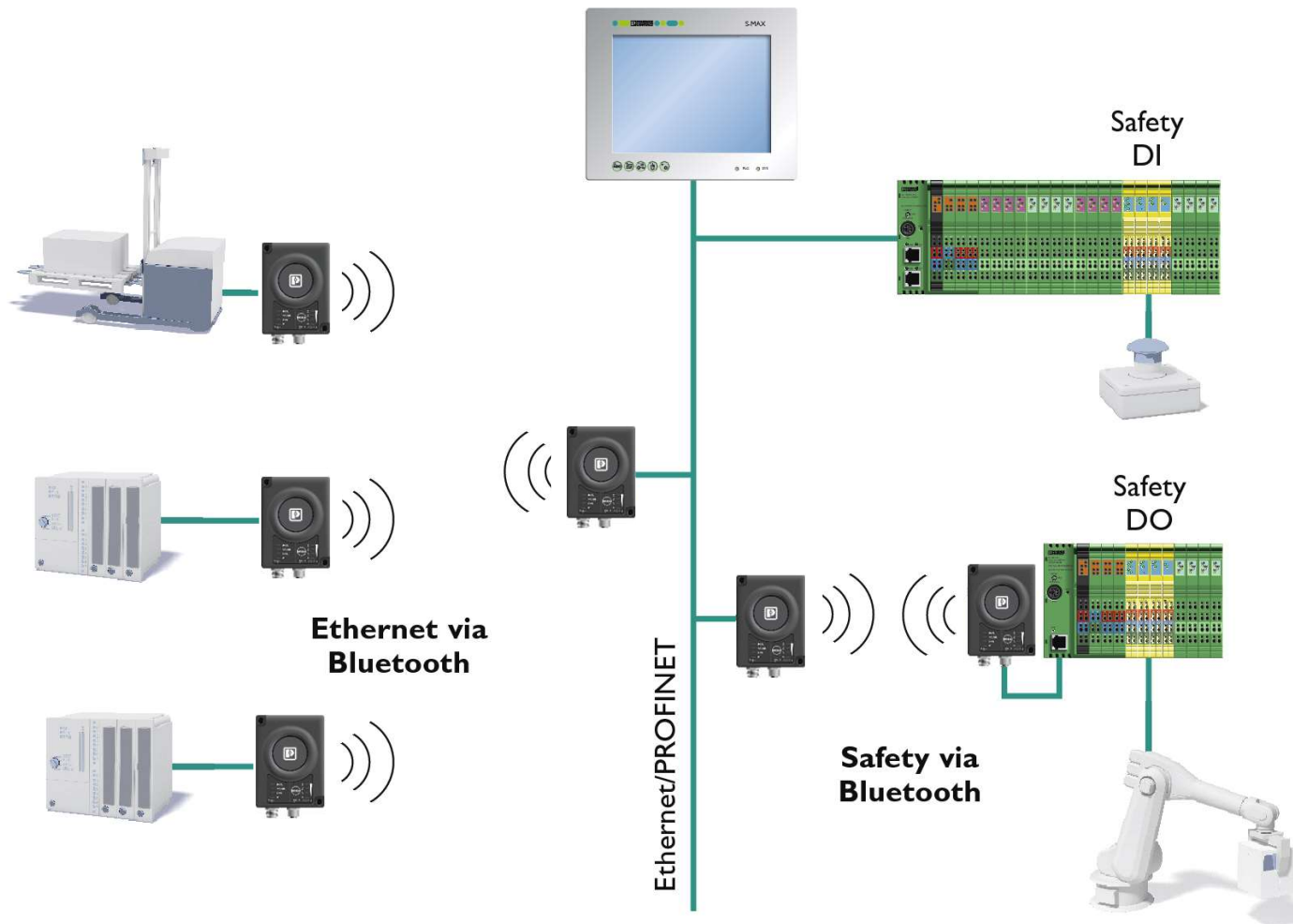
Industrial Bluetooth – FL EPA 2



Various
application areas

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





Industrial Bluetooth – FL EPA 2

Interference-free
parallel operation with
WLAN networks



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



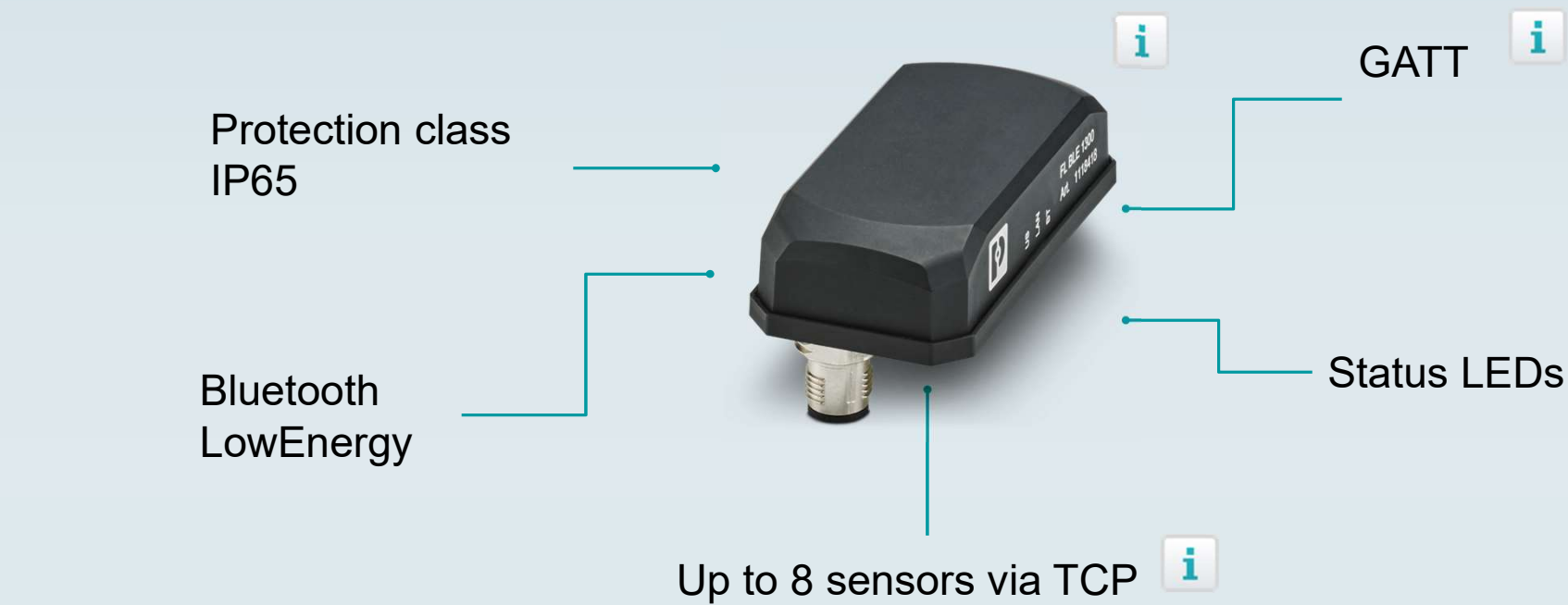
Industrial Bluetooth – FL EPA 2

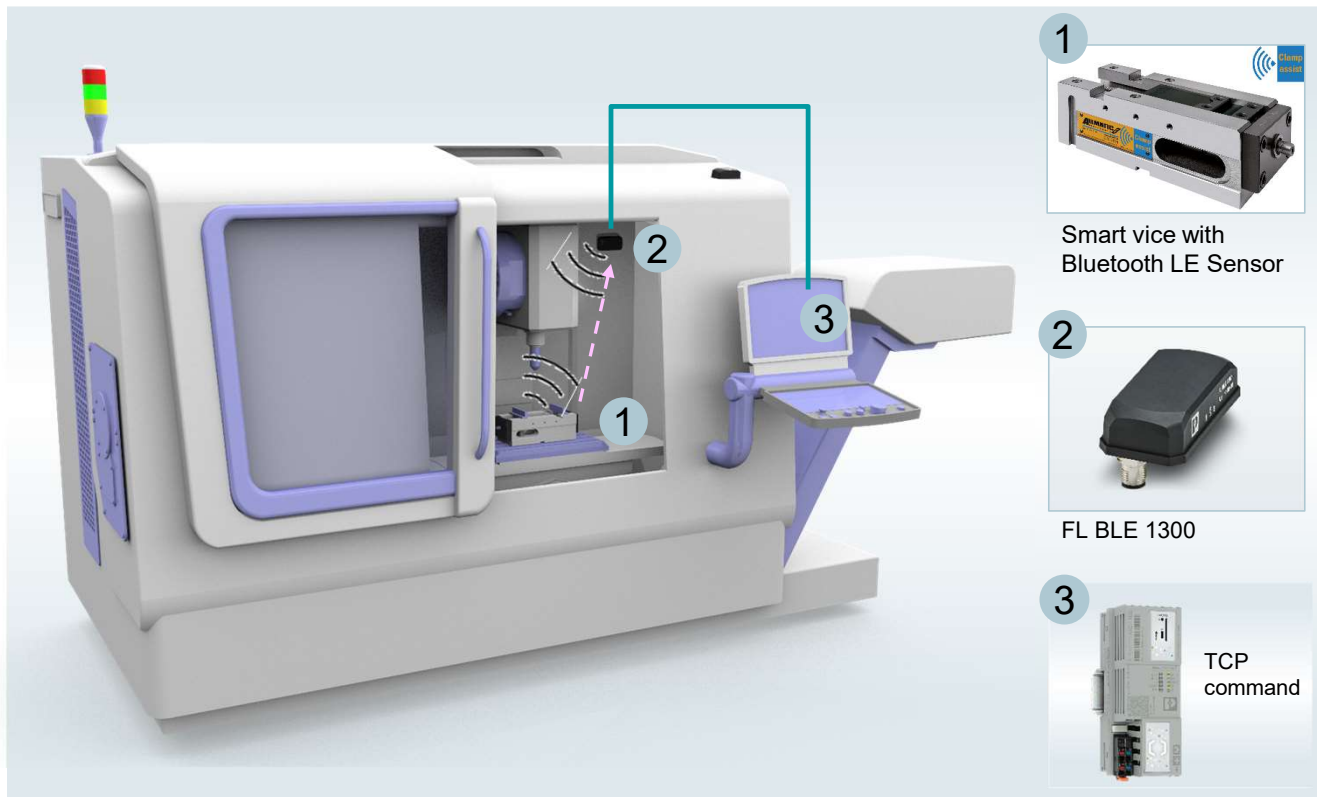


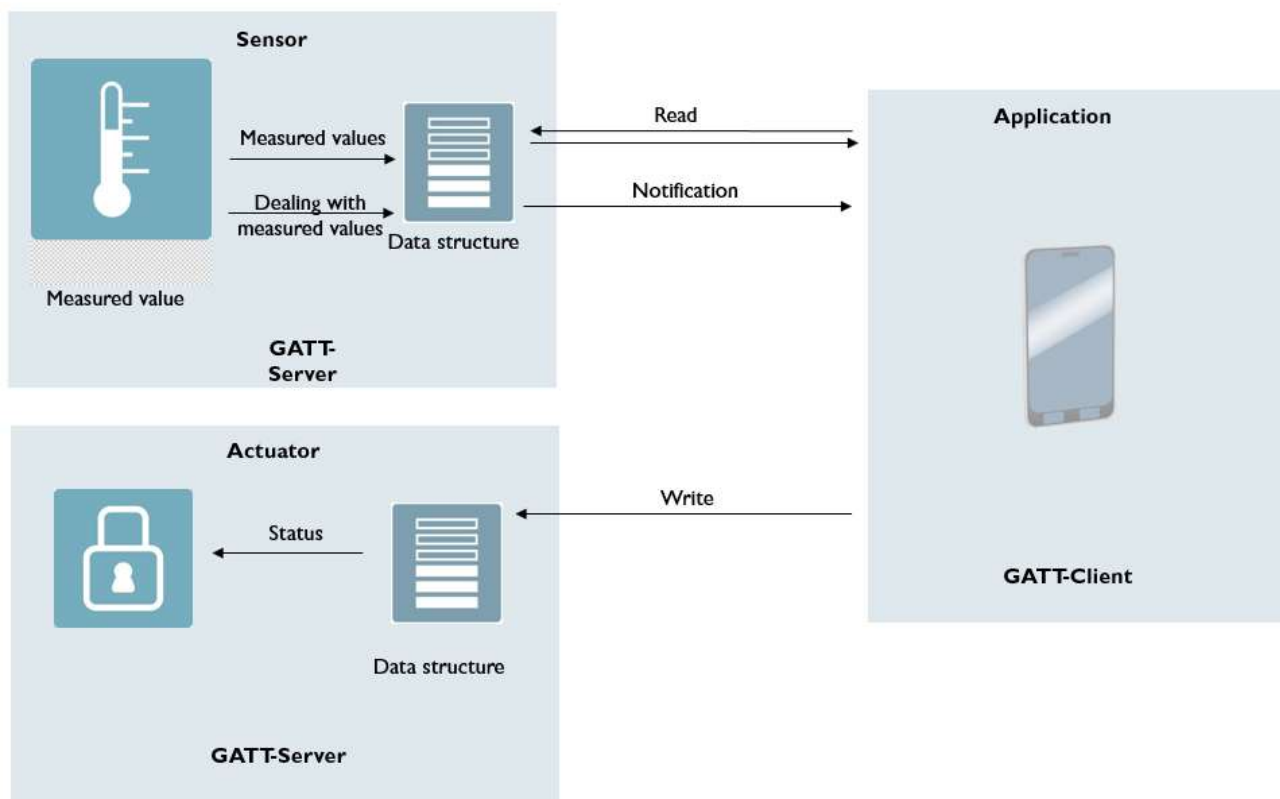
	FL EPA 2 (BT Mode)	FL EPA 2 RSMA (BT Mode)	FL BT EPA 2
Function	Bluetooth Ethernet Client Adapter	Bluetooth Access Point	Bluetooth Ethernet Client Adapter
Antenna	Internal panel antenna	Omnidirectional antenna supplied as standard	Internal panel antenna
Frequency band	2,4 GHz	2,4 GHz	2,4 GHz
Connection 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



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

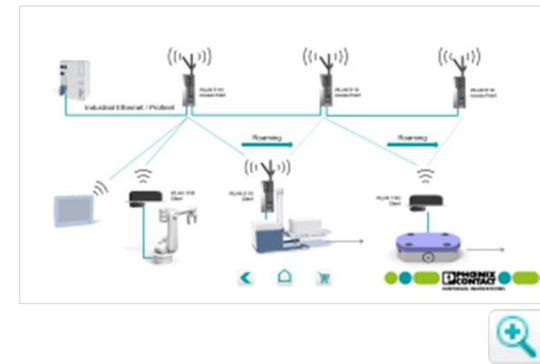


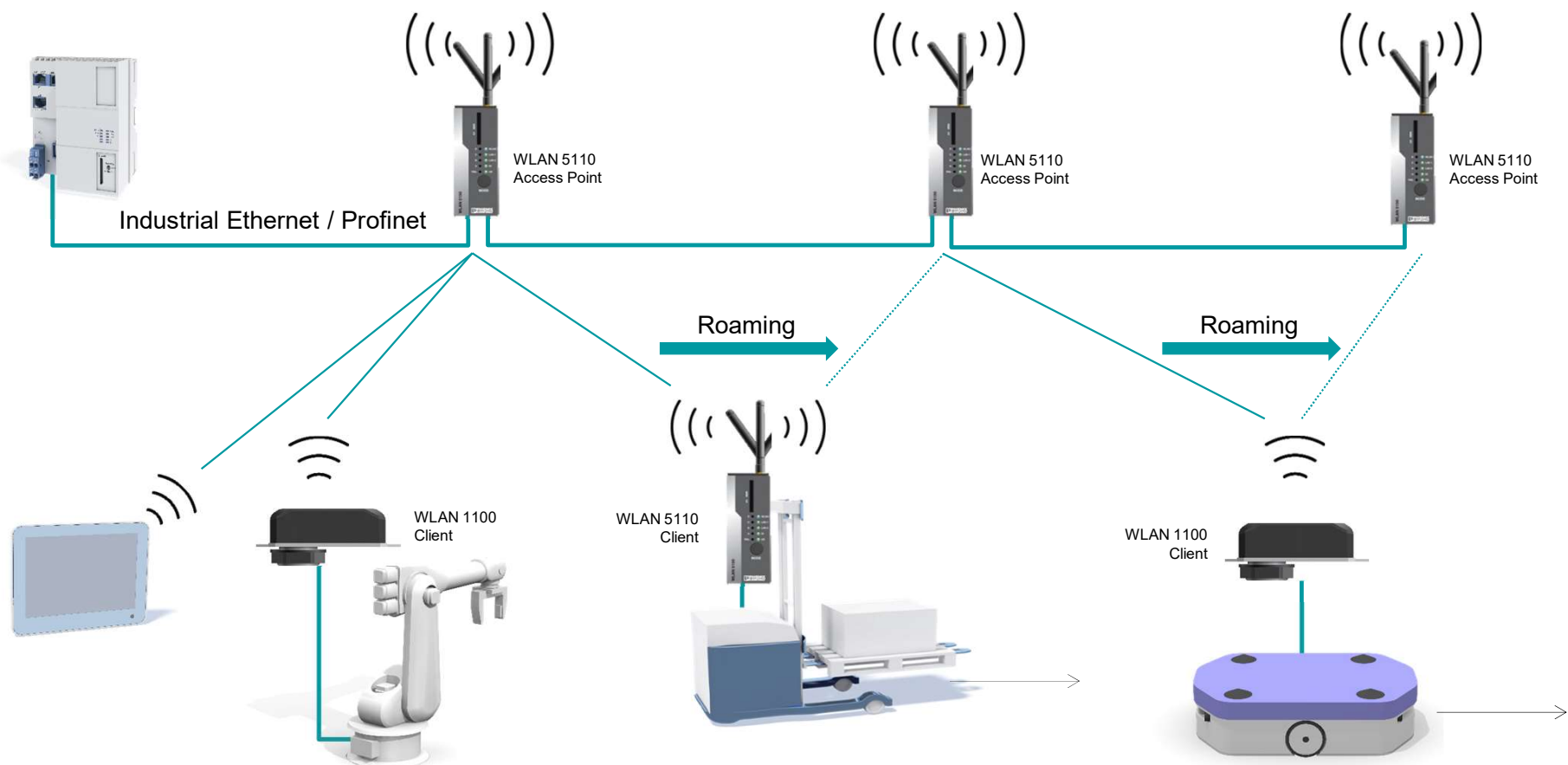
Industrial WLAN 1100 & 2100

Reliable
communication
thanks to MIMO
technology



- Interruption-free roaming



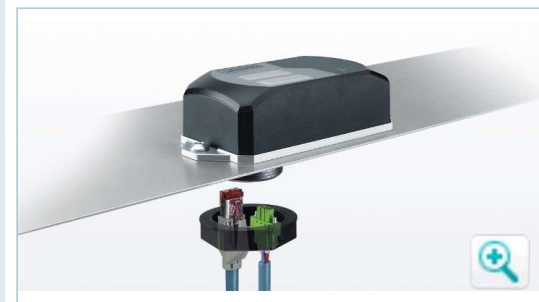


Industrial WLAN 1100 & 2100

All-in-one-
solution

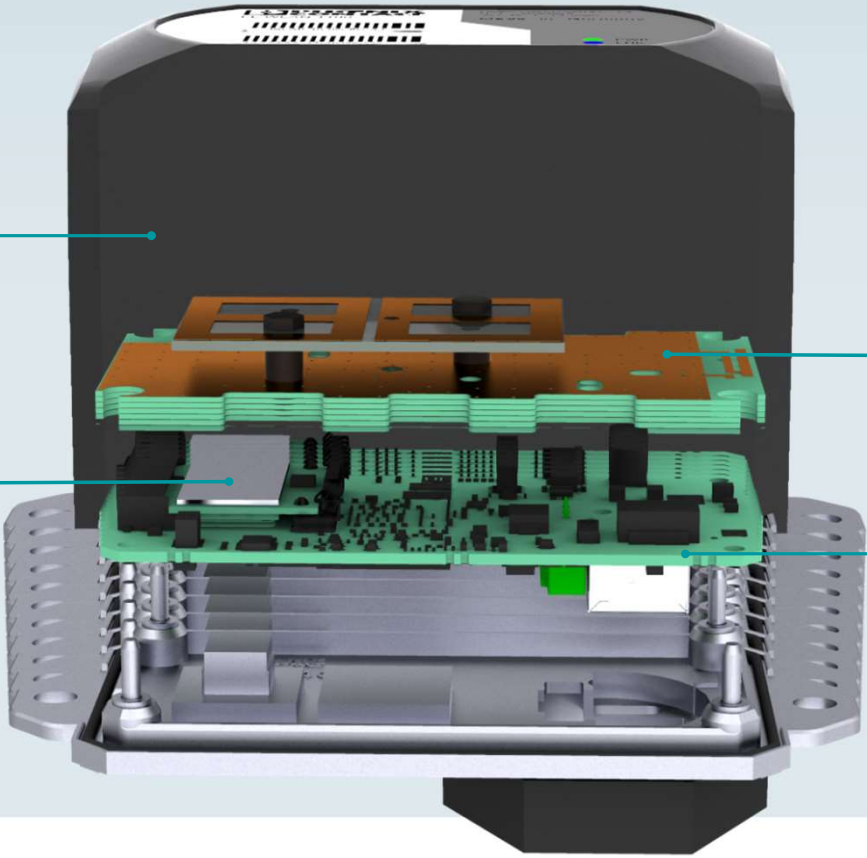


- Integrated antennas and wireless module in one single device
- Single-hole mounting directly on machines, mobile vehicles or control cabinets
- Shockproof according to IK08



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

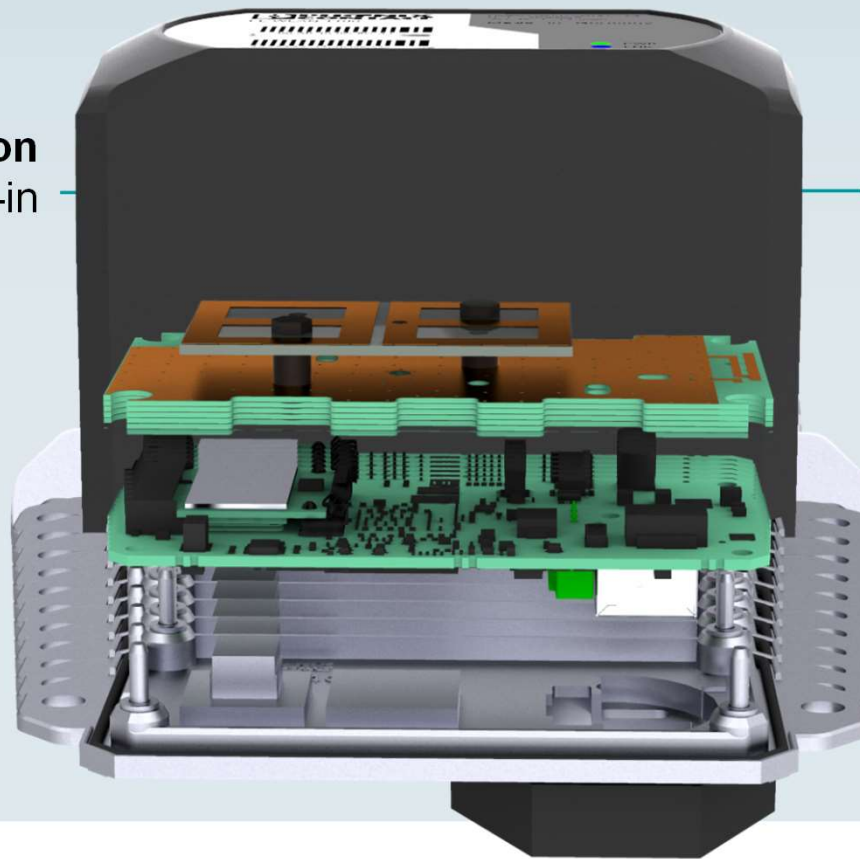
Powerful Access Point
Linux operating system



Industrial WLAN

Power connection
Push-in

Ethernet connection
Standard RJ45



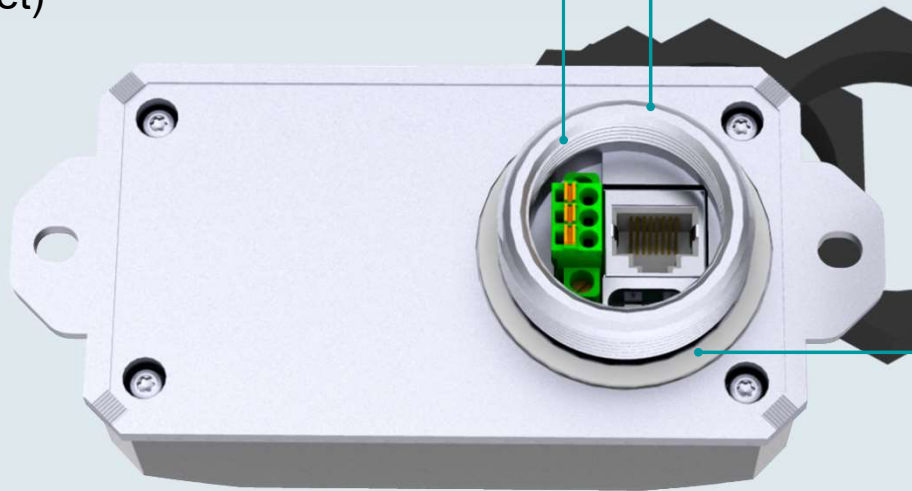
Industrial WLAN

M32 inside thread

For optional IP67-connection
adapter
(if not mounted on cabinet)



M40 external thread for mounting



Seal
up to IP67



Industrial WLAN

Fast and easy connection
thanks to single-hole
mounting



Industrial WLAN

Fast and easy connection
thanks to single-hole
mounting

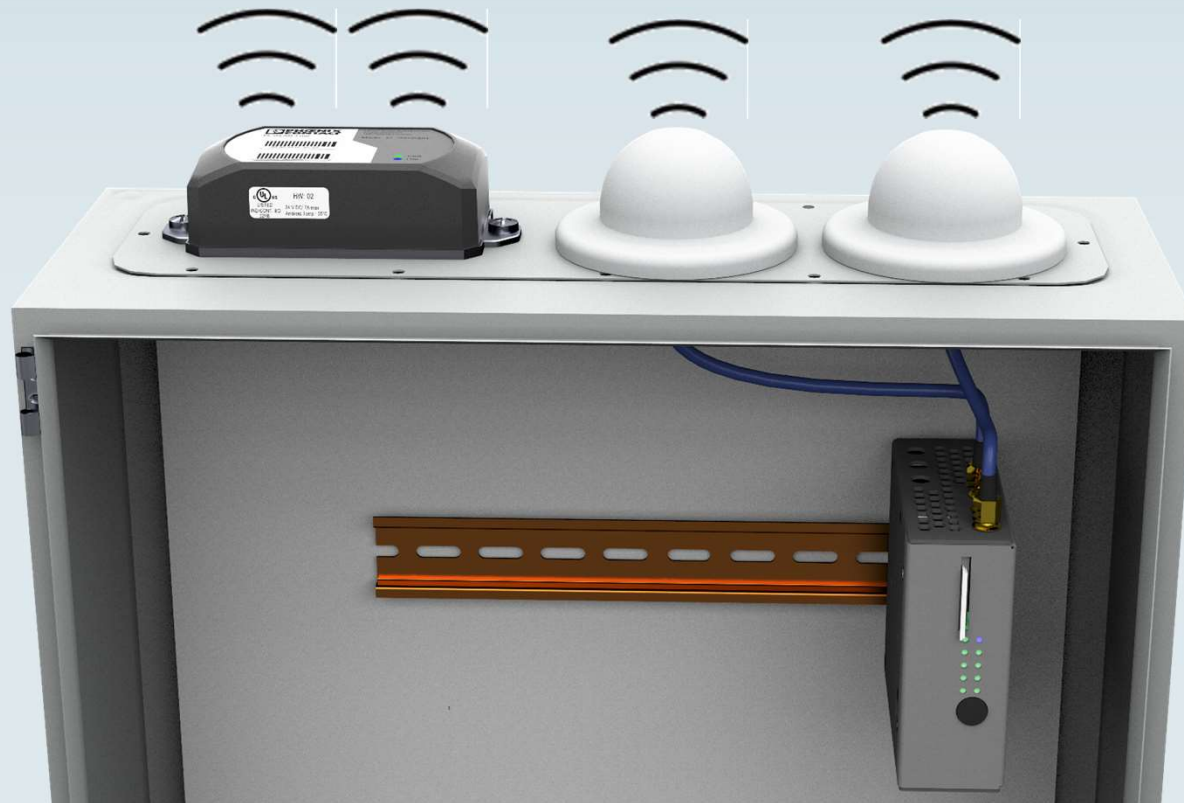
Quick fastening



Industrial WLAN



Industrial WLAN



Industrial WLAN 5010

Compact design – also suitable for control boxes in the field

Secure and compatible

Cluster Management

External antenna connections for the flexible use of antennas

Powerful WLAN IEEE 802.11n module for more range



Video



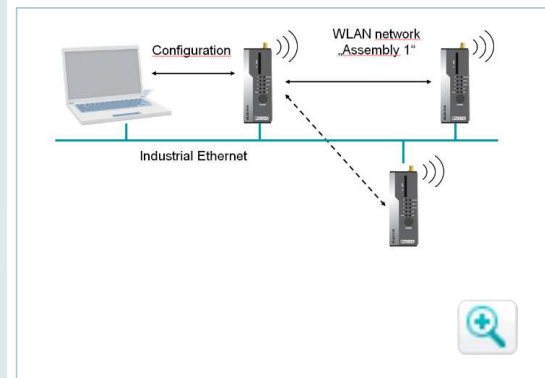
Industrial WLAN 5100

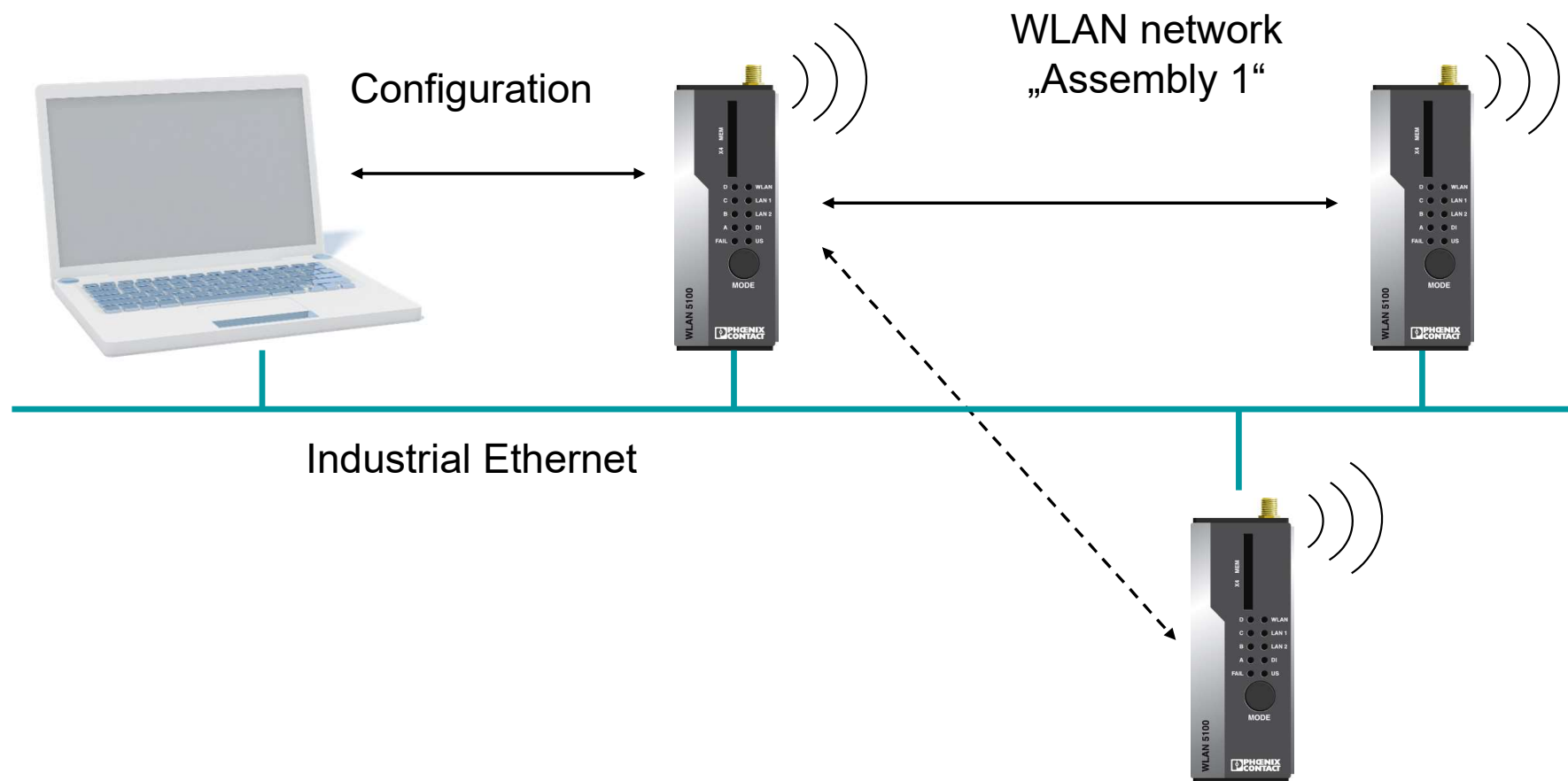


Compatible with
standards IEEE
802.11 a/b/g/n

Quick and
easy startup

Cluster Management





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



The image shows a black and silver Industrial WLAN 1010 module. It has a label with the following information: 'WLAN 1010', 'Ord. No. 0001088872', 'S/N 2034564650', 'MAC Adr. A8:74:1D:8C:12:11', and a QR code. Below the label, there are several ports and labels: 'TF1', 'US', 'RSSI', 'LAN', 'WLAN', 'TF2', 'XF1', 'MODE', 'XD1', 'US', 'GND', and 'FE'. The module is shown with two gold-colored SMA connectors for external antennas and a three-pin connector for the XD1 port. A wireless signal icon is shown above the module.

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



Industrial WLAN



	FL WLAN 1100 (Europe)	FL WLAN 1101 (USA, Canada)	FL WLAN 2100 (Europe)	FL WLAN 2101 (USA, Canada)
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



	FL WLAN 1010 (Europe)	FL WLAN 1011 (USA, Canada)	FL WLAN 2010 (Europe)	FL WLAN 2011 (USA, Canada)
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



**PHOENIX
CONTACT**
INSPIRING INNOVATIONS



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



Media conversion

Maximum interference immunity,



The image shows a Phoenix Contact MC 2000T MM media converter. It is a vertical, grey metal device. On the left side, there is a circular component, likely a filter or connector. The front panel features two RJ45 ports labeled X1 and X2. Above X1, there are status LEDs for '10/100' and 'ACT'. Above X2, there is a 'LINK ACT' LED. At the top, there are labels for 'USB', 'USB Alarm', and '10/100'. The model number 'MC 2000T MM' is printed at the bottom right of the front panel. A small blue 'i' icon is positioned above the device.

Link-fault-pass-through function:
constant connection monitoring

FOT: Maximum transmission distances with an extremely high data rate

approved for zone 2



Media conversion



	FL MC 1000 SC	FL MC 1000 ST	FL MC 2000T SC	FL MC 2000T ST	FL MC 2000T SM20 SC	FL MC 2000T SM40 SC
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



	FL MC EF 1300 MM SC	FL MC EF 1300 MM ST	FL MC EF 1300 SM SC	FL MC 2000E	FL MC 2000E SM40 LC
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



**PHOENIX
CONTACT**
INSPIRING INNOVATIONS



Media conversion



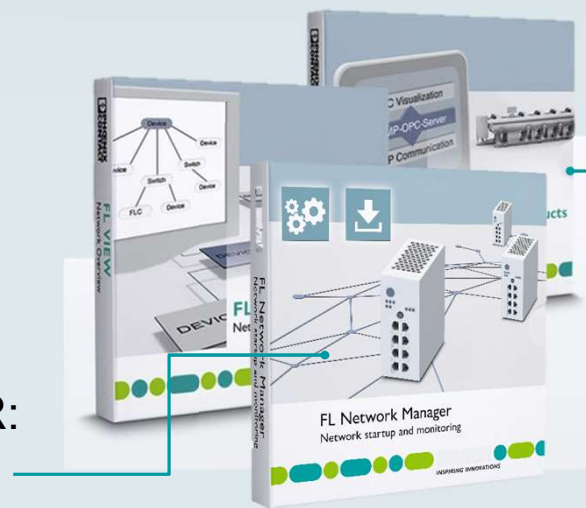
	FL MC EF WDM-SET SC		FL MC EF WDM-A SC	FL MC EF WDM-B SC	FL MC ETH/FO 660 T	FL MC EF 660 SCRJ
Transmission	Multimode and single mode fiberglass				Polymer fiber PCF	
Connection method	SC simplex				SC-RJ	
Temperature range	-40°C...+65°C				-20 °C ... 55 °C	
Range	Up to 38 km				Up to 100 m	
Light wavelength	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



FL NETWORK MANAGER:
Network startup and
monitoring



SNMP OPC Products: 
Linking of standardized
protocol types



Initial IP assignment

Via BootP, DHCP, DCP

Multi Device Configuration

Quick configuration of same parameters for different devices in parallel

SNMP based Scripting

SNMP configuration and information independent of device vendor

Multi Device Firmware Update

Easy Firmware update for many devices in parallel, thanks to the integrated TFTP server

Configuration File Handling

Simple up- and download of configuration files for back up and reconfiguration

Topology overview

Static topology overview with focus on redundancy systems (RSTP, MRP,...)



Initial IP assignment

BOOTP/DHCP SERVER

MAC address	IP address	Protocol	Status	Reserved	Lease expires
00:A0:45:0B:7E:6D	192.168.0.1	BOOTP	IP assigned	☒	

BOOTP/DHCP Reservations

MAC address	IP address	Subnet mask	Default gateway
00:A0:45:0B:7E:6D	192.168.0.1	255.255.255.0	
Enter MAC address	Enter IP address	Enter subnet mask	Enter default gateway

LOGGING

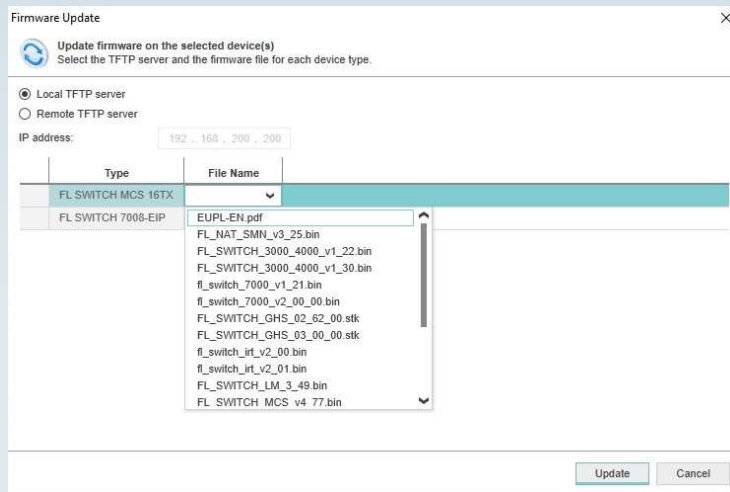
Time Stamp	Code	Description
27.09.2016 13:22:42	BOOTPDHC...	BOOTP reply to client (MAC address: 00:A0:45:27:AD:6F) with IP address 192.168.200.14 sent.
27.09.2016 13:23:19	BOOTPDHC...	BOOTP request from client (MAC address: 00:A0:45:27:AD:6F) received.
27.09.2016 13:23:20	BOOTPDHC...	BOOTP reply to client (MAC address: 00:A0:45:27:AD:6F) with IP address 192.168.200.15 sent.
27.09.2016 13:24:01	BOOTPDHC...	BOOTP request from client (MAC address: 00:A0:45:08:55:F7) received.
27.09.2016 13:24:02	BOOTPDHC...	BOOTP reply to client (MAC address: 00:A0:45:08:55:F7) with IP address 192.168.200.14 sent.
27.09.2016 13:24:11	BOOTPDHC...	BOOTP request from client (MAC address: 00:A0:45:5F:F6:69) received.
27.09.2016 13:24:12	BOOTPDHC...	BOOTP reply to client (MAC address: 00:A0:45:5F:F6:69) with IP address 192.168.200.191 sent.

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 a 'LOGGING' window with a table of events. The table has four columns: 'Time Stamp', 'Code', and 'Description'. The 'Time Stamp' column shows dates and times. The 'Code' column shows event codes. The 'Description' column shows details of the events. The events are as follows:

Time Stamp	Code	Description
27.09.2016 14:05:07	UPD0003	Successful 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	Successful 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

Read Configuration

Read configuration from the selected device(s)
Select the TFTP server and start reading the configuration files.

☒ Local TFTP server
☐ Remote TFTP server

IP address: 192.168.0.111

Read Cancel

Write Configuration

Write configuration to the selected device(s)
Select the TFTP server and the configuration file for each device.

☒ Local TFTP server
☐ Remote TFTP server

IP address: 192.168.1.111

Type	File name
192.168.1.9 (FL SWITCH 2005)	
192.168.1.7 (FL SWITCH 2206-2FX-ST)	192.168.1.3_08-15_102922.fcg
192.168.1.6 (FL SWITCH 2207-FX SM)	192.168.1.4_08-15_102922.fcg
192.168.1.3 (FL SWITCH 2005)	192.168.1.6_08-15_102922.fcg
	192.168.4.3_09-19_092213.fcg
	192.168.4.4_09-19_092213.fcg
	192.168.10.150_01-11_135256.fcg
	192.168.10.150_06-20_105721.fcg
	192.168.10.151_01-11_135256.fcg
	192.168.10.151_06-20_105721.fcg
	192.168.10.152_06-20_105721.fcg
	FL_SWITCH_2000_v2_01_withBL110.bin
	FL_SWITCH_GHS_03_30_00.stk

Write Cancel

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



MDC for easy network start up

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 Prefix for easy naming
- Consecutive numbering for IP-parameter

(Rapid) Spanning Tree	Fast Ring Detection	Large Tree Support	Status
activated			
activated			
activated			

Category
Default
Alarm Contacts
Network Redundancy
SNMP trap settings

Systemname	Typ	Status	Anzeigename
EthExpMeeting2017	EL SWITCH 2005		102.168.10.15
EthExpMeeting2017			
EthExpMeeting2017			

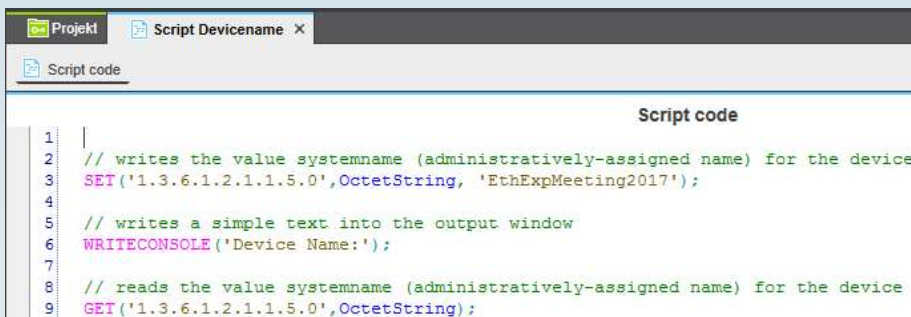
Subnetzmaske	Standard-Gateway	Systemname	Typ
255.255.255.0			
255.255.255.0	A 255.0.0.0		
255.255.255.0	B 255.255.0.0		
	C 255.255.255.0		



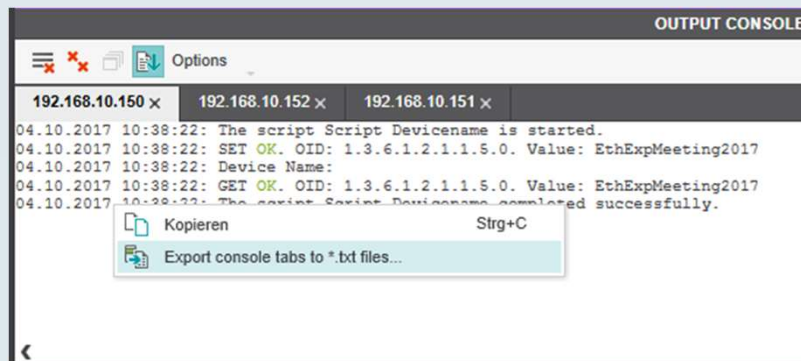
SNMP based Scripting for SNMP devices

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



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



OUTPUT CONSOLE

Options

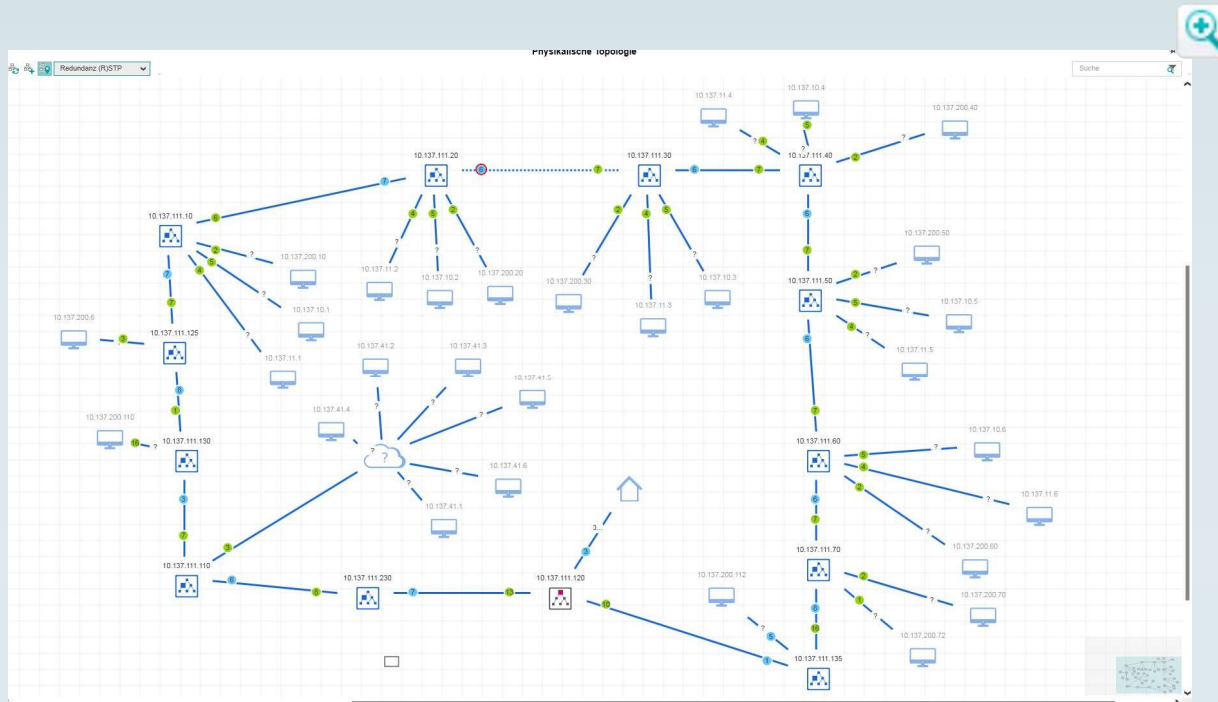
192.168.10.150 x 192.168.10.152 x 192.168.10.151 x

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.

Kopieren Strg+C
Export console tabs to *.txt files...



Topology Overview

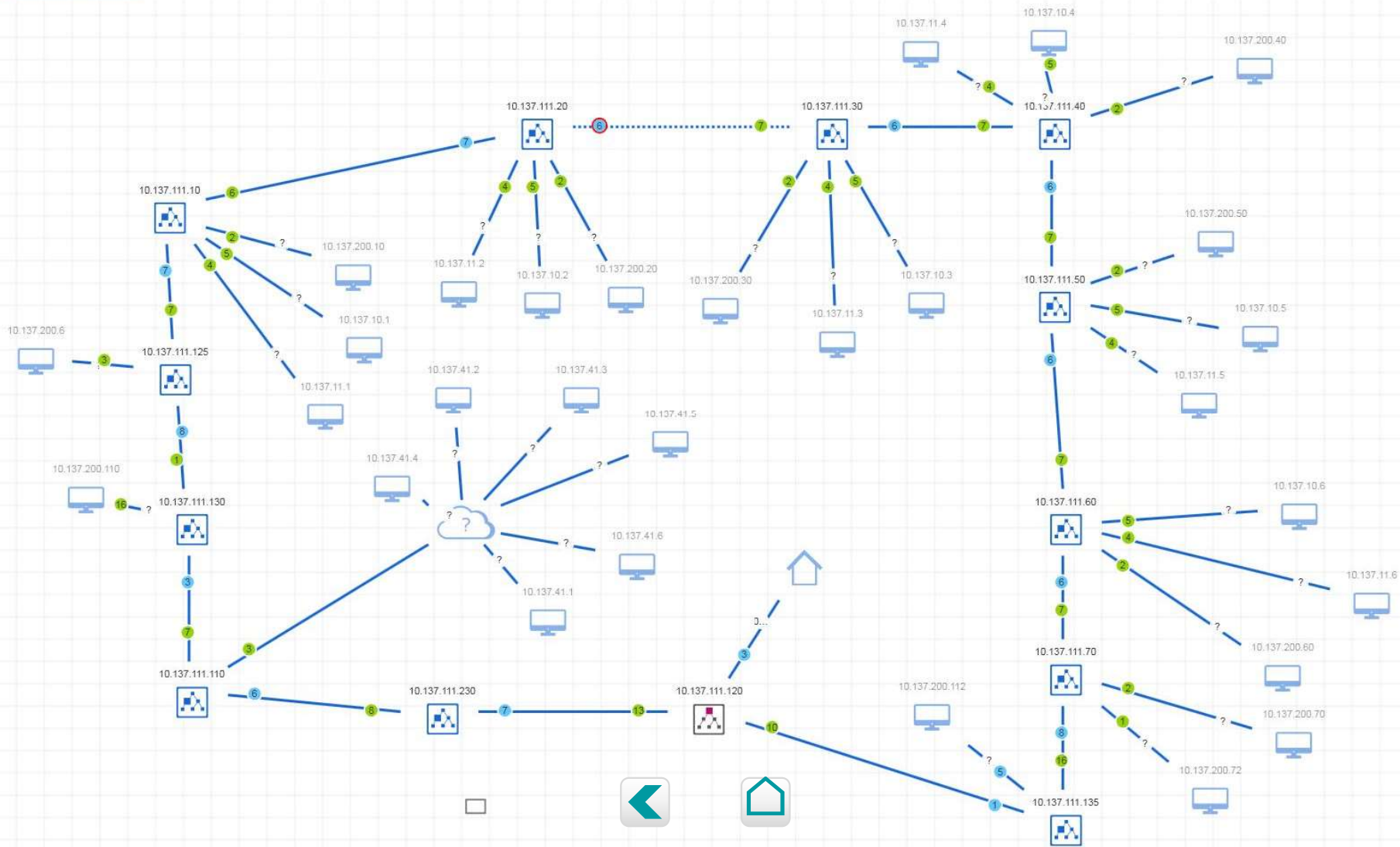


Static Network Topology

- 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



~~Physikalische Topologie~~



FL NETWORK MANAGER BASIC - FLNetMan.netmxx

File Edit Extras Window Help

Project X

Online Devices BOOTP/DHCP...

Online Devices

24 entries

IP mask	Default gateway	Name of station	Type	Status	Display Name (Online)	Subnet mask	Default
255.255.0		mmhs.gerd.de	FL SWITCH MM HS		Select online device here		
255.255.0		mcs.gerd	FL SWITCH MCS 16TX		Select online device here		
255.255.0		fl-switch-mcs-14tx-2tx	FL SWITCH MCS 16TX		192.168.200.2 : 00:A0:45:05:6E:FE	255.255.255.0	
255.255.0		fl-switch-irt-tx-3pof	Ethernet Device		192.168.200.20 : 00:A0:45:03:03:04	255.255.255.0	
255.255.0					192.168.178.200 : 00:0E:0C:50:C7:30	255.255.255.0	149.21
255.255.0		fl-switch-mcs-slernpunkt	FL SWITCH MCS 16TX		192.168.200.10 : 00:A0:45:07:8F:A9	255.255.255.0	
255.255.0	192.168.200.1	FL SWITCH MCS 16TX	FL SWITCH MCS 16TX		192.168.200.205 : 00:A0:45:03:89:55	255.255.255.0	192.11
255.255.0		FL SWITCH SMCS 8GT	FL SWITCH SMCS 8GT		192.168.200.1 : 00:A0:45:0A:02:D5	255.255.255.0	
255.255.0		FL NAT SM	Ethernet Device		192.168.200.233 : 00:A0:45:AD:2A:FC	255.255.255.0	
255.255.0	192.168.200.1	FL MGUARD RS 2000	Ethernet Device		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		192.168.200.16 : 00:A0:45:08:55:F7		
		FL SWITCH LM 5TX	Ethernet Device		192.168.200.15 : 00:A0:45:27:AD:6F		
		FL SWITCH 7008-EIP	FL SWITCH 7008-EIP		192.168.200.3 : 00:A0:45:CA:D9:65		
255.255.0		FL SWITCH 3008	Ethernet Device		192.168.200.4 : 00:A0:45:61:C1:59	255.255.255.0	
			Ethernet Device		192.168.200.18 : 00:A0:45:D8:35:72		
			Ethernet Device		192.168.200.17 : 00:A0:45:D8:31:9A		
			Ethernet Device		192.168.200.22 : 00:A0:45:B3:AF:BE		
		FL SWITCH 7006-2FX-EIP	Ethernet Device		192.168.200.21 : 00:A0:45:AD:1F:C1		

Scan options

SNMP scan

Enable ☒

Timeout (ms): 3000

Network adapter: 192

DCP scan

Enable ☒

Network adapter: FL

Ping scan

Enable ☒

Timeout (ms):

Maximum concurrent requests:

IsEnabled Sta

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	Successful firmware update on the device
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

Web und Windows durchsuchen

14:13 27.09.2016



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





SNMP-OPC-Server



Software



FL Network Manager Basic

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



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



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



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
Modbus/RTU to Modbus/TCP						RAW, ASCII to Modbus/TCP			
1x RJ45		1x RJ45		2x RJ45		1x RJ45		2x RJ45	
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
ATEX, UL (Class I, Divisssion 2)		ATEX, IECEx, UL (Class I, Division 2)							
2313452	2904817	2702764	2702765	2702766	2702767	2702768	2702769	2702770	2702771



Gateways



	GW PN/ASCII 1E/1DB9	GW PN/ASCII 1E/2DB9	GW PN/ASCII 2E/2DB9	GW PN/ASCII 2E/4DB9	GW EIP/ASCII 1E/1DB9	GW EIP/ASCII 1E/2DB9	GW EIP/ASCII 2E/2DB9	GW EIP/ASCII 2E/4DB9
Protocol	RAW, ASCII to PROFINET				RAW, ASCII to EtherNet/IP			
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 



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



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

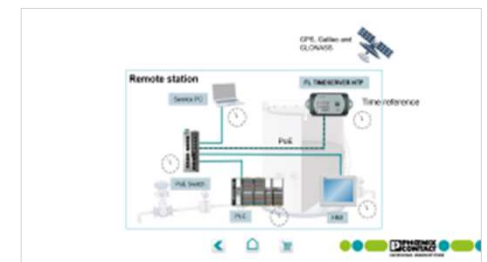


TIMESERVER NTP



Time synchronisation

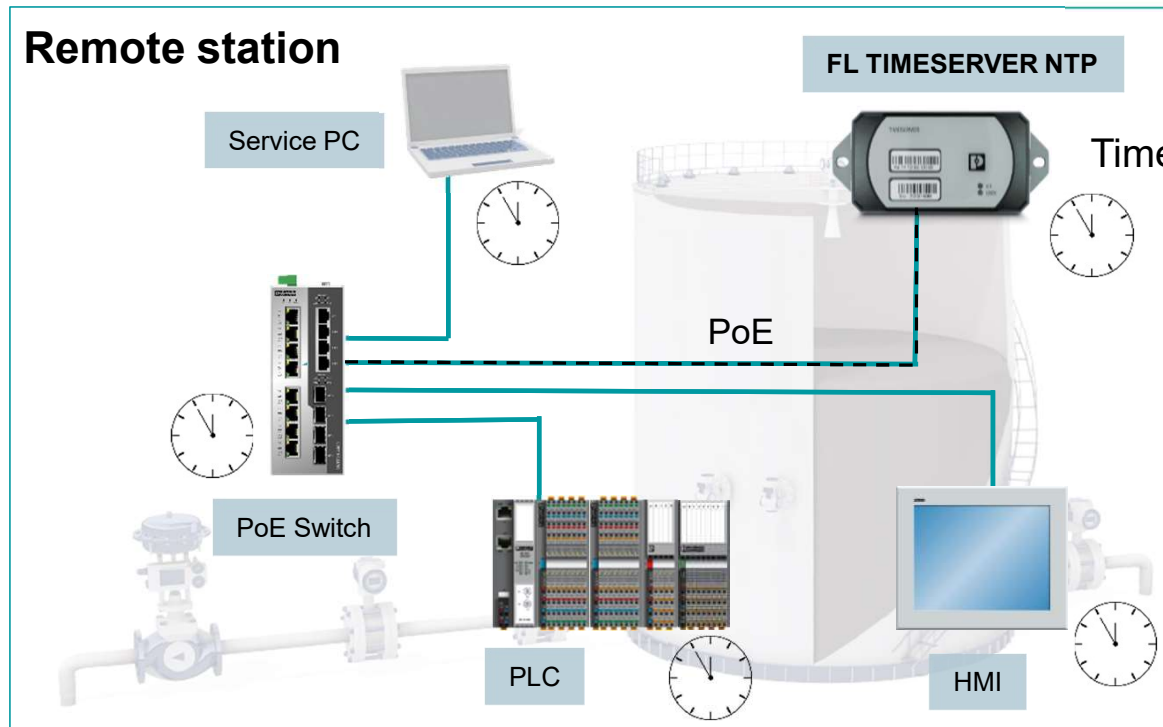
- Accurate time synchronization of Ethernet devices in a network via NTP protocol
- No Internet access necessary for more security



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

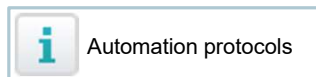


Smart Camera Box

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

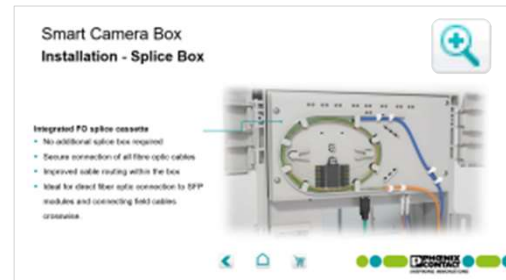


Smart Camera Box

Integrated fiber
optic splice
cassette



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

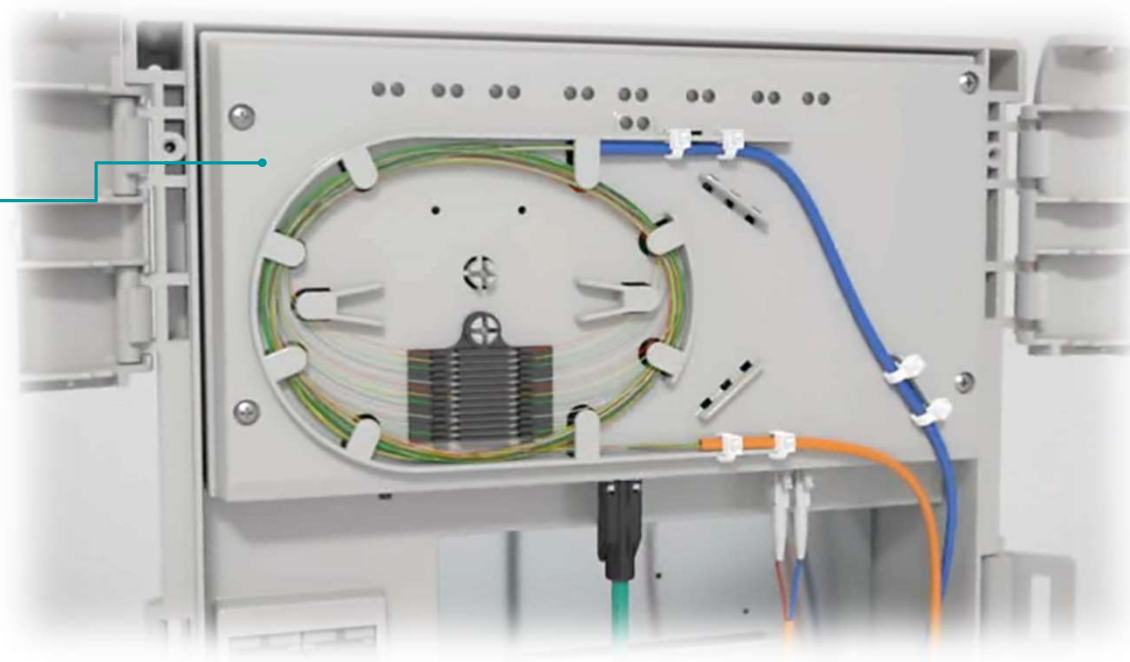


Smart Camera Box

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 crosswise.



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

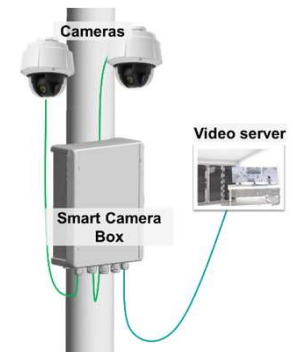


Smart Camera Box

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



Smart Camera Box



	SCX 4POE 2LX	SCX 2POE 2LX	SCX 4POE 2T	SCX 2POE 2T
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



Modular Ethernet HART multiplexer

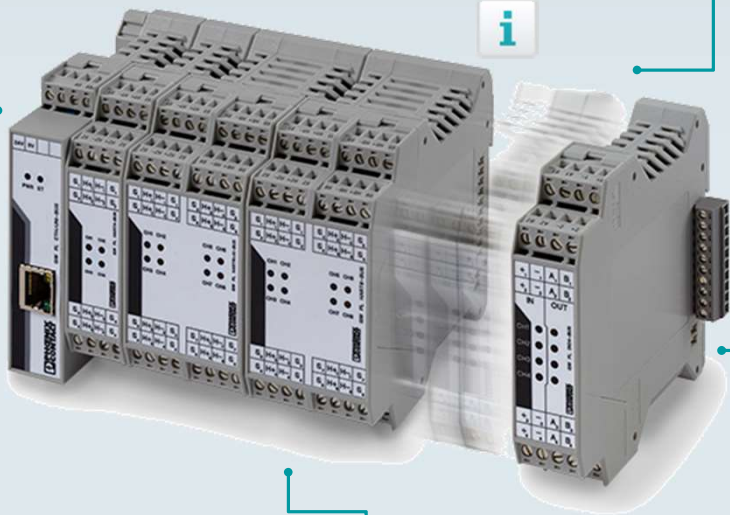
Transmit critical HART
process data over
Ethernet

Environmental 

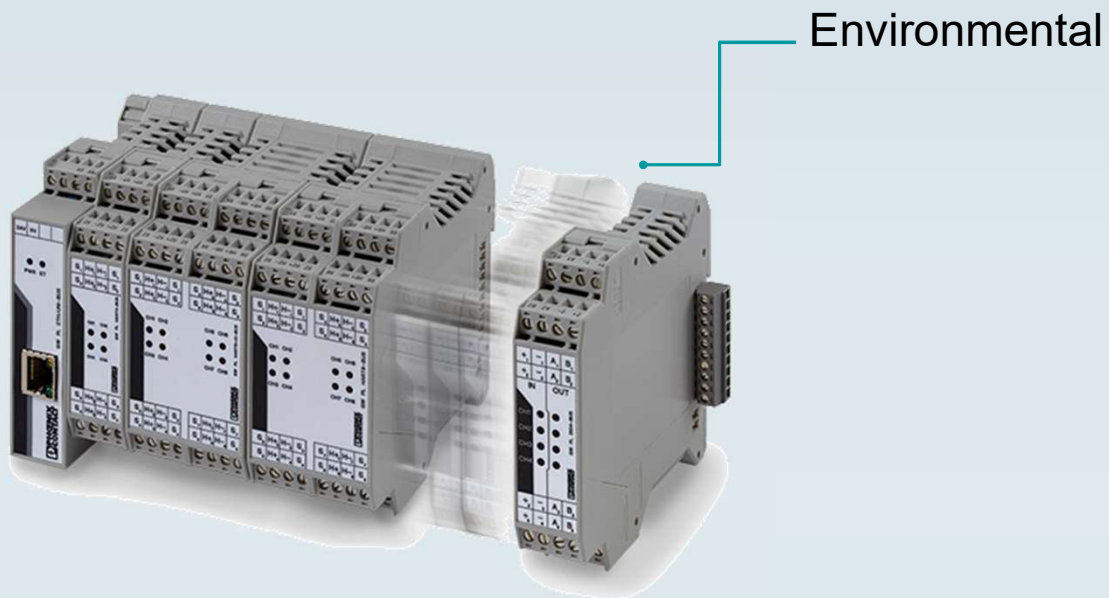
1 HART master per
channel ensures
maximum update rate

Connect expansion
 modules

Access process data via 



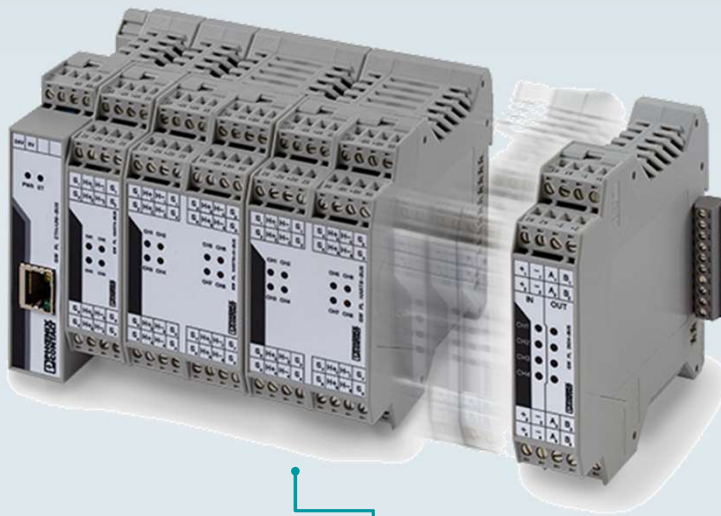
Modular Ethernet HART multiplexer



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



Modular Ethernet HART multiplexer

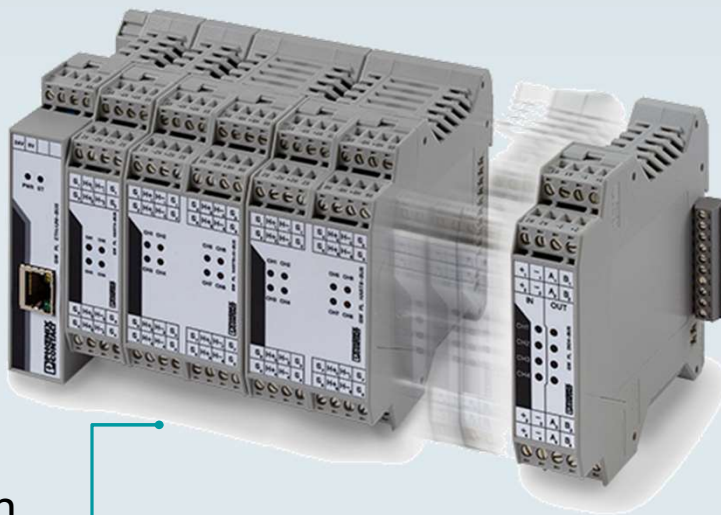


Access process data via

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



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



Remote control via Cloud



verizon



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	Device configuration in mGuard secure remote service, simplified Web-Interface			
Firewall	No	No	No	No
VPN Tunnel	1 VPN tunnel to the mGuard Secure remote service			
Order number	2702886	2702885	2702887	2702888

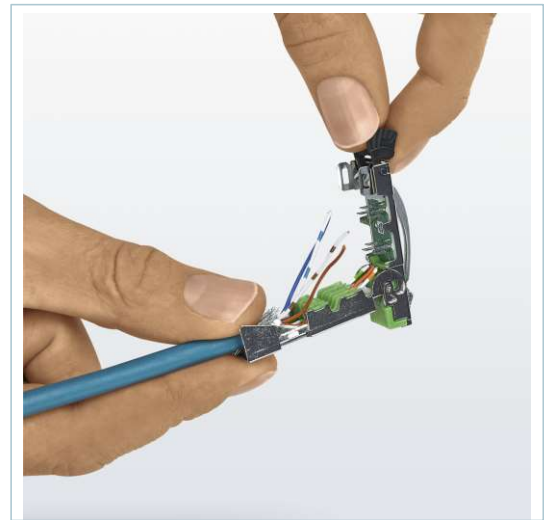


Copper-based network installation



Copper-based network installation

- No special tools needed
- IDC und pierce fast connection



Copper-based network installation



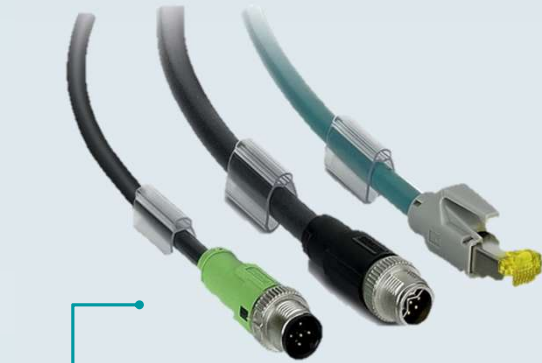
Wide range of
plugs

- From RJ45 to M12

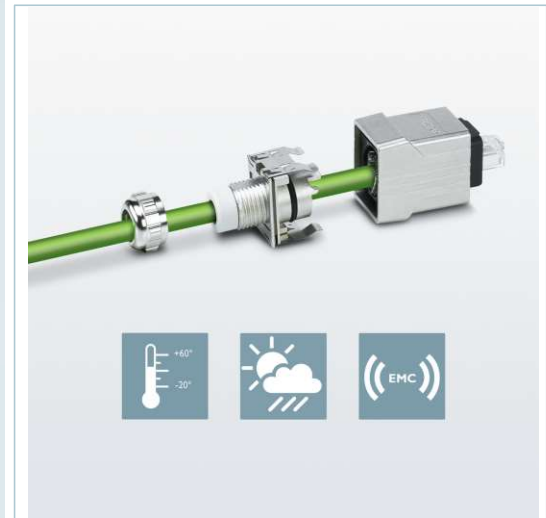


Copper-based network installation

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_A standard



Fiber optic-based network installation



Fiber optic-based network installation



Wide choice of versions

Connection types:

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

Fiber types:

- POF
- PCF
- GOF

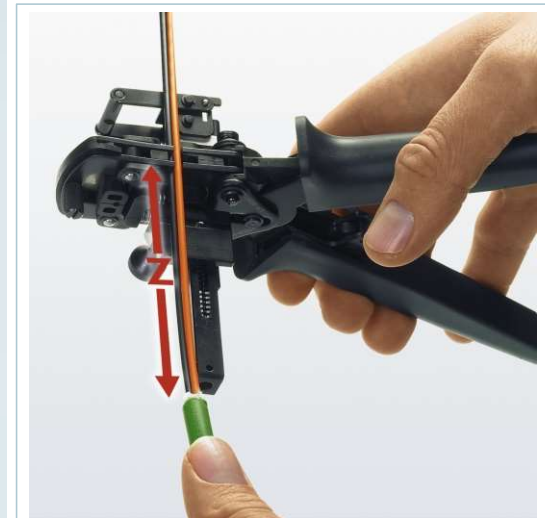


Fiber optic-based network installation

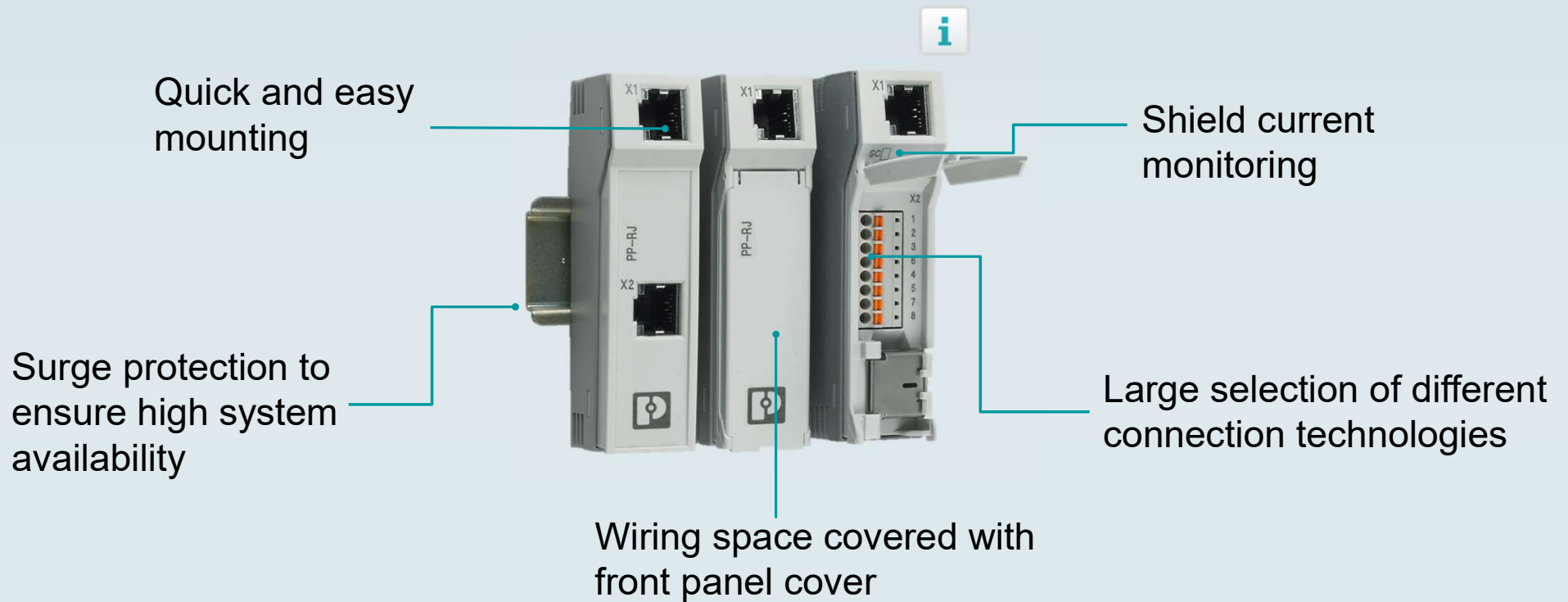


Fast assembly in the field

- Professional tools



Patch panels



Patch panels



	PP-RJ-RJ(-F)	PP-RJ-SC(-F)	PP-RJ-SCC(-F)	PP-RJ-IDC(-F)
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



**PHOENIX
CONTACT**
INSPIRING INNOVATIONS



Patch panels



	FL CAT5 TERMINAL BOX	FL-PP-RJ45-SC	FL-PP-RJ45-SCC	FL-PP-RJ45-LSA
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



	FL-PP-RJ45/RJ45	FL-PP-RJ45/RJ45-B	FL-PP-RJ45-SCC/SC041	FL-PP-RJ45-SCC/SC045
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

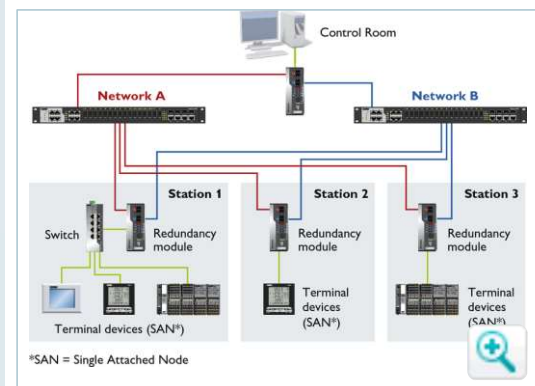


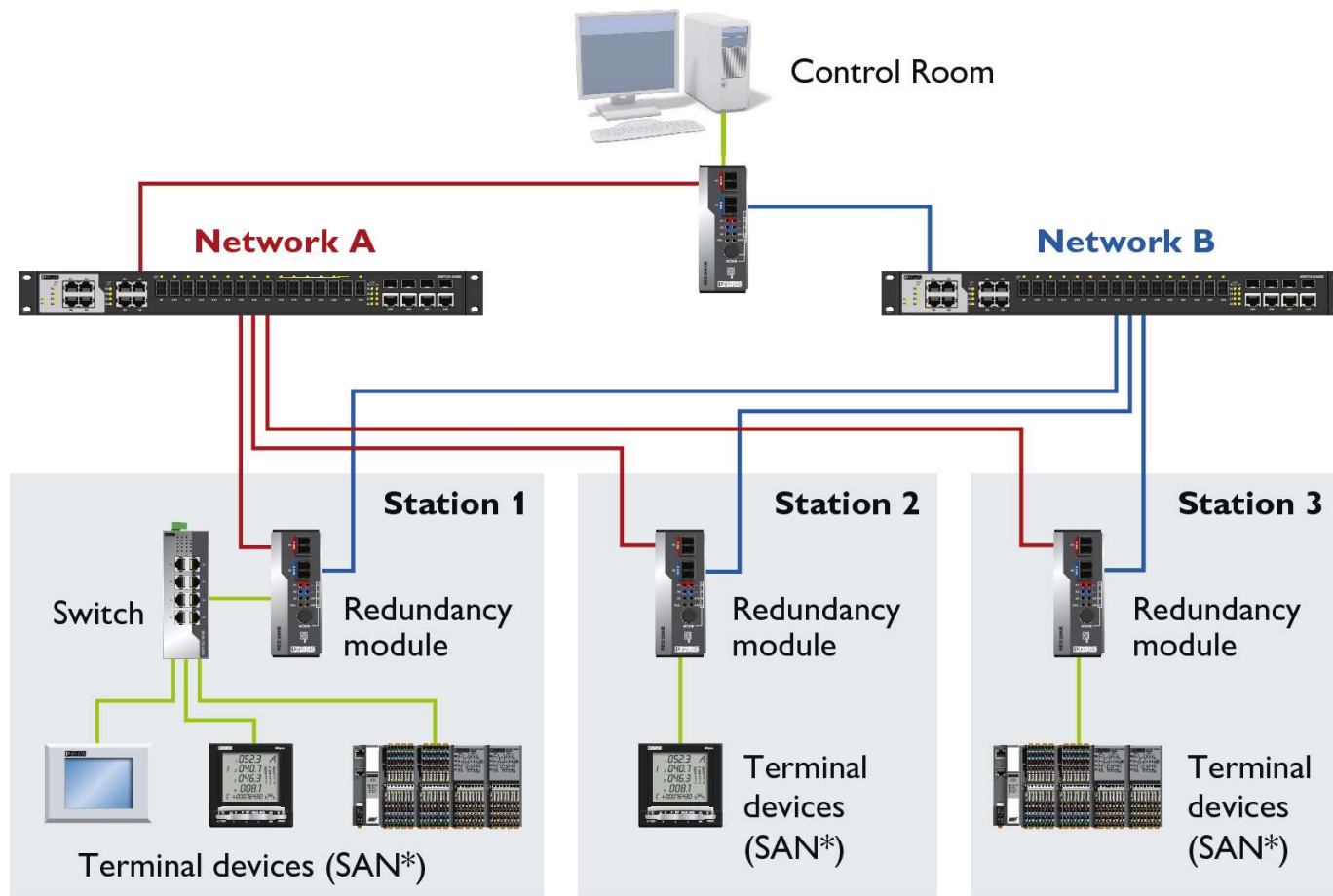
PRP redundancy modules



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





*SAN = Single Attached Node



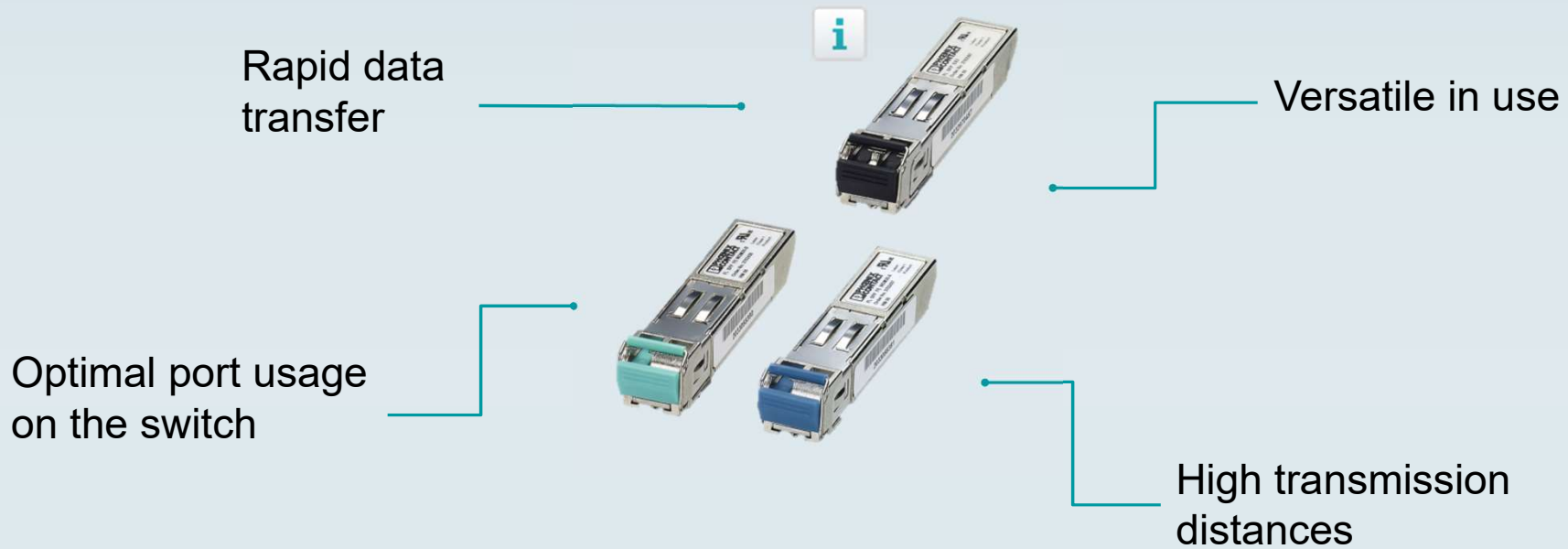
PRP redundancy modules



	FL RED 2003E PRP	FL RED 2001E PRP 2LC
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



SFP modules



	FL SFP SX	FL SFP FX	FL SFP LX10-B	FL SFP LX	FL SFP FX SM
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



INSPIRING INNOVATIONS

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



	FL SFP FE WDM20-B	FL SFP WDM10-SET	FL SFP FE WDM20-SET	FL SFP GT
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



Memory media



	FL MEM PLUG	FL MEM PLUG/MRM	SD FLASH 512MB	SD FLASH 2GB	FL SD FLASH/MRM	FL SD FLASH/L3/MRM
Function	Exchangeable Configuration memory	Configuration memory	Program and configuration memory	Program and configuration memory	Program and 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
PROFINET									
Class A Quality of Service, PTCP filter	(•)	(•)	•	•	•	•	•	•	•
Class B Quality of Service, LLDP topology detection, Profinet device, redundancy (MRP), DCP	-	-	(•) (only 22xx-27xx variants)	-	-	•	-	(•) (only 22xx-23xx variants)	•
Class C Quality of Service, LLDP topology detection, Profinet device, redundancy (MRP), DCP, IRT (ERTEC) technology for prioritized Profinet data transmission, diagnostics for fiber optic paths	-	-	-	-	-	•	-	-	-
EtherNet/IP									
Basic IGMP snooping, IGMP querier, Multicast source detection	-	-	•	•	•	-	•	•	•
Basic plus IGMP snooping, IGMP querier, Multicast source detection, DLR, CIP	-	-	-	-	-	-	•	-	-

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

