Antonio Gordillo IMA Enero 2021

Welcome

Panorama y guía de selección de switches

Inteligentes y switches

Administrables

PHOENIX CONTACT
INSPIRING INNOVATIONS

Webinars

Agenda

- Panorama de Productos
- Switches Inteligentes
- Switches Administrables
- Aplicaciones - Arquitecturas Ethernet

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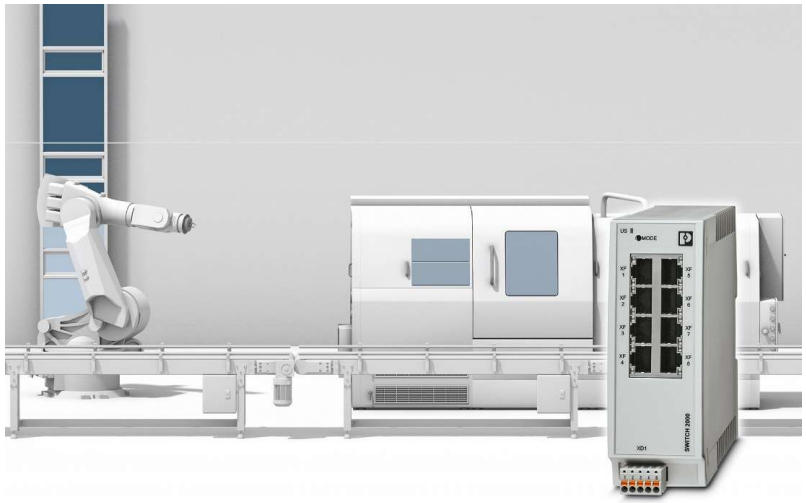
Webinar IMA Enero 2021

Panorama y guía de selección de switches inteligentes y switches administrables



Fecha	**7 Enero 2021**
Hora	9:00
Hora	
Duración	1 hora
Costo	gratuito

Conocer y saber seleccionar entre un switch inteligente de bajo costo así como un switch administrable y sus aplicaciones.

En esta sesión se brindarán las bases sobre toda nuestra oferta de la gama FL SWITCH 2000 que ha sido ya integrada en aplicaciones diversas de infraestructura de automatización en diversos campos de aplicación industrial. Conozca más a detalles la configuración, posibilidades y correcta elección de estos productos y sus recomendaciones de acuerdo a protocolos y arquitecturas de redundancia así como las características más relevantes en la configuración de los mismos y su utilización.

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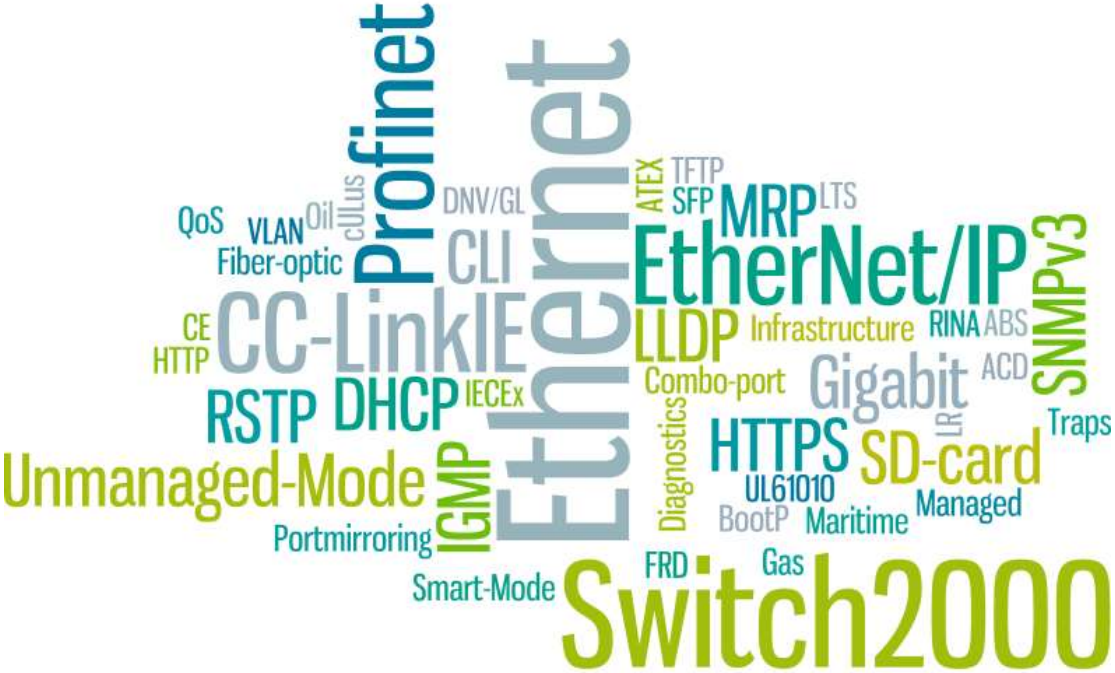
Network Technology

FL SWITCH 2000



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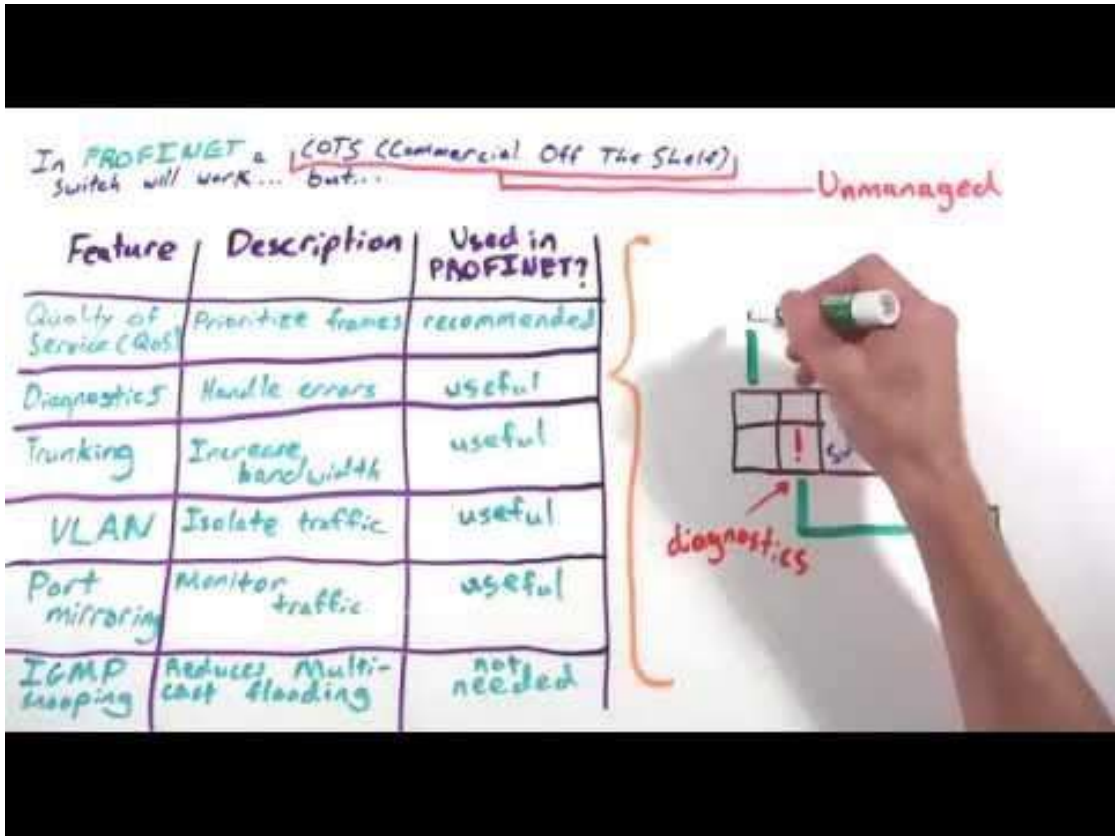

What switch to use it Unmanaged vs Managed on PROFINET

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FL SWITCH 2000

Portfolio overview

New

FL SWITCH 20xx/21xx	FL SWITCH 22xx/23xx	FL SWITCH 24xx/25xx
Basic functionality (e.g. for machine building)	+ Fiber optic variants + Full PROFINET support + Extended redundancy, security and management features	+ Flat design + Metal housing + Relay contact

Extended performance

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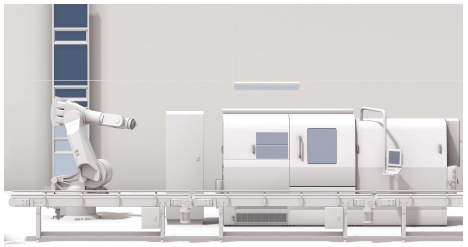
FL SWITCH 2000

Portfolio overview



Machine building

	FL SWITCH 20xx	FL SWITCH 21xx
Transmission speed	Fast Ethernet (100 Mbit/s)	Gigabit Ethernet (1000 Mbit/s)
Operating temperature	0°C - 60°C	
Supply voltage	18-32 V DC	
Approvals	CE c UL us LISTED	

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FL SWITCH 2000

Portfolio overview

	FL SWITCH 22xx	FL SWITCH 23xx
Transmission speed	Fast Ethernet (100 Mbit/s)	Gigabit Ethernet (1000 Mbit/s)
Operating temperature	-40°C - 70°C	
Supply voltage	12-57 V DC, redundant	
Alarm output	Digital alarm output	
Approvals	CE, cULus LISTED, DNV-GL, ABS, PROFINET, IECEx, Ex, ClassNK, Lloyd's Register	

Factory Automation

Marine and offshore

Process Technology

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INSPIRING INNOVATIONS

FL SWITCH 2000

Portfolio overview

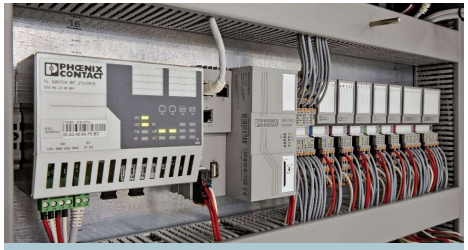
New

	FL SWITCH 24xx	FL SWITCH 25xx
Transmission speed	Fast Ethernet (100 Mbit/s)	Gigabit Ethernet (1000 Mbit/s)
Operating temperature	-40°C - 70°C	
Supply voltage	19.2-32 V DC, redundant	
Alarm output	Alarm relais output	
Approvals	CE, cULus LISTED, DNV·GL, ABS, Lloyd's Register, ClassNK, PROFINET	

Note: Not all maritime approvals will be available at market launch

Factory Automation

Marine and offshore



Flat cabinets

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FL SWITCH 2000

Overview product family – standard models

- No specific preconfiguration

Fast Ethernet (100 MBit/s)		Gigabit Ethernet (1000 MBit/s)	
FL SWITCH 20xx series		**FL SWITCH 21xx series**	
FL SWITCH 2005 (2702323) FL SWITCH 2008 (2702324)	FL SWITCH 2016 (2702903)	FL SWITCH 2105 (2702665) FL SWITCH 2108 (2702666)	FL SWITCH 2116 (2702908)
FL SWITCH 22xx series		**FL SWITCH 23xx series**	
FL SWITCH 2205 (2702326) FL SWITCH 2208 (2702327) FL SWITCH 2207-FX (2702328) FL SWITCH 2207-FX SM (2702329) FL SWITCH 2206-2FX (2702330) FL SWITCH 2206-2FX SM (2702331) FL SWITCH 2206-2FX ST (2702332) FL SWITCH 2206-2FX SM ST (2702333) FL SWITCH 2204-2TC-2SFX (2702334) FL SWITCH 2206-2SFX (2702969)	FL SWITCH 2216 (2702904) FL SWITCH 2214-2FX (2702905) FL SWITCH 2214-2FX SM (2702906) FL SWITCH 2214-2SFX (1006188) FL SWITCH 2212-2TC-2SFX (2702907)	FL SWITCH 2308 (2702652) FL SWITCH 2304-2GC-2SFP (2702653) FL SWITCH 2306-2SFP (2702970)	FL SWITCH 2316 (2702909) FL SWITCH 2314-2SFP (1006191) FL SWITCH 2312-2GC-2SFP (2702910)
FL SWITCH 24xx series	New	**FL SWITCH 25xx series**	New
1043412 FL SWITCH 2408 1043414 FL SWITCH 2406-2SFX 1088853 FL SWITCH 2404-2TC-2SFX	1043416 FL SWITCH 2416 1043423 FL SWITCH 2414-2SFX 1088875 FL SWITCH 2412-2TC-2SFX	1043484 FL SWITCH 2508 1043491 FL SWITCH 2506-2SFP 1088872 FL SWITCH 2504-2GC-2SFP	1043496 FL SWITCH 2516 1043499 FL SWITCH 2514-2SFP 1088856 FL SWITCH 2512-2GC-2SFP

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FL SWITCH 2000

Overview product family – PROFINET models

- PROFINET optimized variants
  - Gigabit and fiber optic variants
  - Additional status LEDs (BF, SF) for PN diagnosis
    - BF → Bus error, no connection with PLC
    - SF → System fault
  - Preconfigured in factory default
    - DCP activated
    - LLDP activated
    - PROFINET device activated

Fast Ethernet (100 MBit/s)	Gigabit Ethernet (1000 MBit/s)
FL SWITCH 22xx series	**FL SWITCH 23xx series**
FL SWITCH 2208 PN (1044024) FL SWITCH 2206-2SFX PN (1044028) FL SWITCH 2216 PN (1044029) FL SWITCH 2214-2SFX PN (1044030)	FL SWITCH 2308 PN (1009220) FL SWITCH 2306-2SFP PN (1009222) FL SWITCH 2316 PN (1031673) FL SWITCH 2314-2SFP PN (1031683)
FL SWITCH 24xx series New	**FL SWITCH 25xx series** New
1089133 FL SWITCH 2408 PN 1089126 FL SWITCH 2406-2SFX PN 1089150 FL SWITCH 2416 PN 1089139 FL SWITCH 2414-2SFX PN	1089134 FL SWITCH 2508 PN 1089135 FL SWITCH 2506-2SFP PN 1089205 FL SWITCH 2516 PN 1089154 FL SWITCH 2514-2SFP PN

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FL SWITCH 2000

Overview product family – Coated models

- Conformally coated PCBs
- Perfect for harsh environments with corrosive surrounding
- No specific preconfiguration

Process Technology

Fast Ethernet (100 MBit/s)
FL SWITCH 22xx series New FL SWITCH 2208C (1095627) FL SWITCH 2206C-2FX (1095628)

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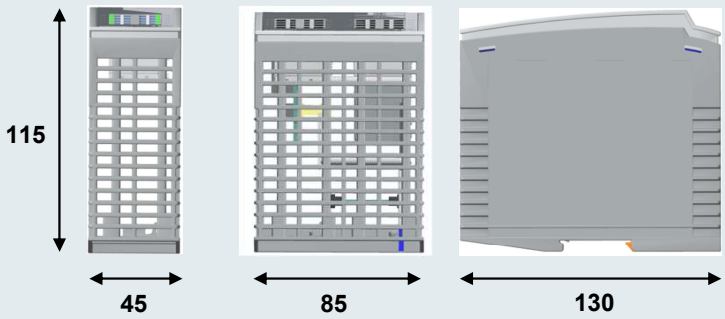
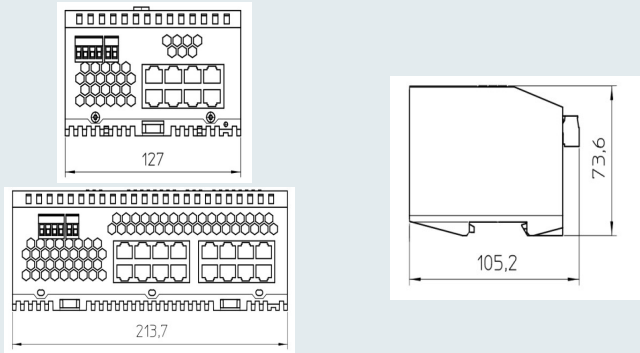
FL SWITCH 2000

Overview technical data

	FL SWITCH 20xx/21xx/22xx/23xx	FL SWITCH 24xx/25xx
Dimensions		
Operating Temperature	0°C - 60°C (FL SWITCH 20xx/21xx) -40°C - 70°C (FL SWITCH 22xx/23xx)	-40°C - 70°C
Supply voltage	18-32 V DC, non-redundant (FL SWITCH 20xx/21xx) 12-57 V DC, redundant (FL SWITCH 22xx/23xx)	19.2-32 V DC, redundant
Alarm output	Digital alarm output (FL SWITCH 22xx/23xx)	Alarm relais contact

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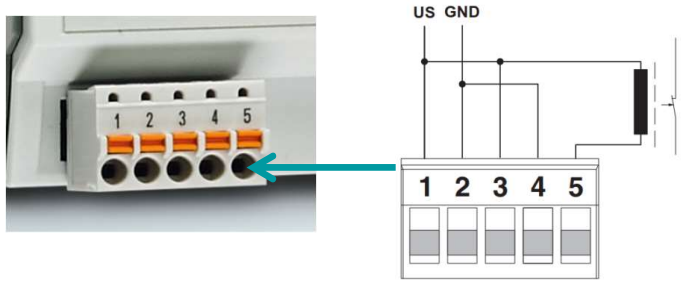
INSPIRING INNOVATIONS

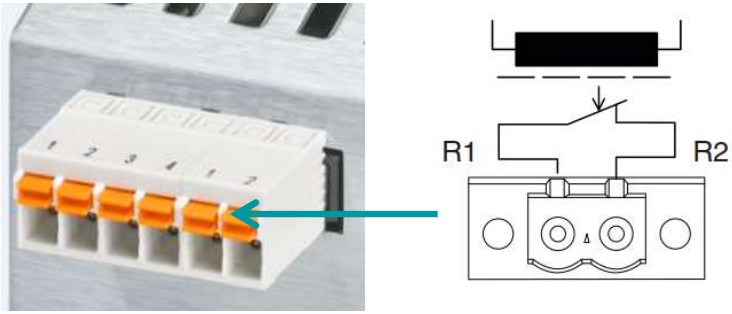
FL SWITCH 2000

Alarm output

- **FL SWITCH 22xx/23xx**
  - Digital alarm output (open drain output)
    - Normal mode → Output is connected to ground potential
    - Error/Alarm mode → Output is floated
    - External relais required
      - e. g. RIF-0-RPT-24DC/21 (2903370)



- **FL SWITCH 24xx/25xx**
  - Alarm relais contact

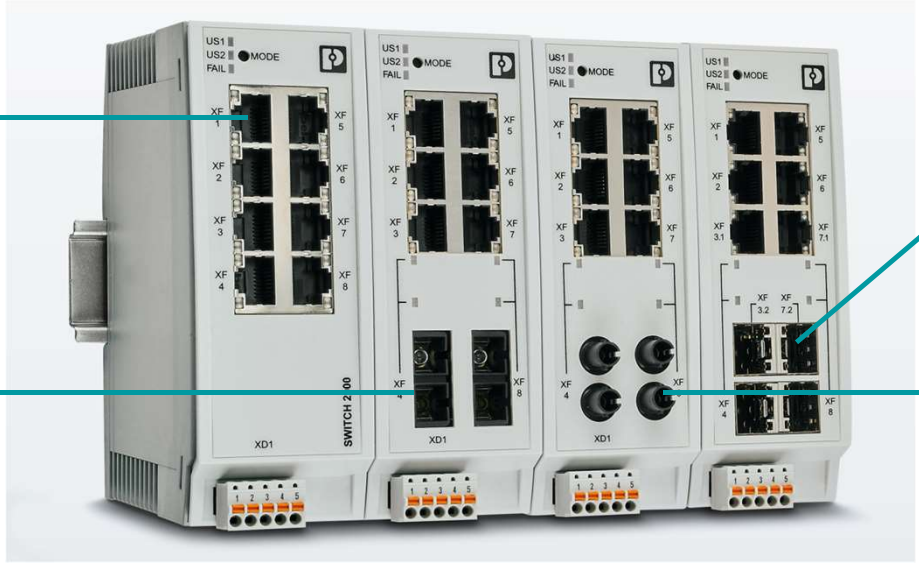


FL SWITCH 2000

Connections via copper and fiber

Copper connection (RJ45)

Fiber connection (SC-D)



Slot for SFP modules

Fiber connection (ST-D)

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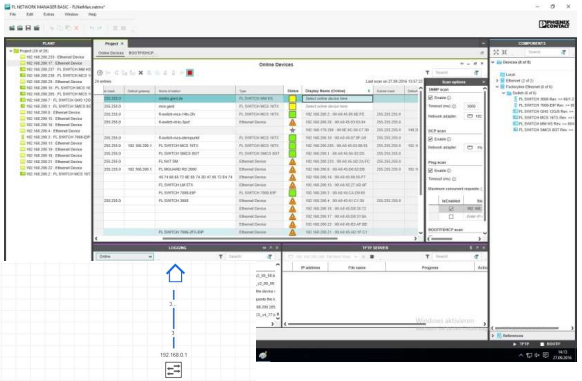
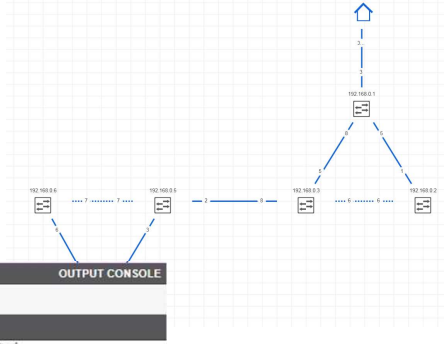
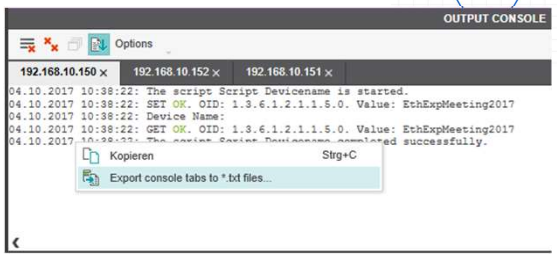
FL SWITCH 2000 – Feature Set

Configuration via FL NETWORK MANAGER

- With the FL NETWORK MANAGER you are able to get a quick and easy startup of your network. The software supports you with the following functions:
  - Network detection for unknown IP adresses
  - IP assignment
  - Sinlge/Multiple device configuration
  - Multiple Firmware Update
  - Comfortable up and download handling for configuration files
  - SNMP Scripting
  - Topology detection







Order Number: 2702889

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FL SWITCH 2000 – Feature Set

PROFINET support - Overview

- Prioritization of data packets (Quality of service)
- Topology information and neighbor detection via LLDP
- Ring redundancy via MRP as a client/manager (MRM functionality only on FL SWITCH 22xx/23xx/24xx/25xx) [Media Redundancy Manager-License on external SD-Card→ 2700270 FL SD FLASH/MRM]
- PROFINET device – Integration into PLC engineering (PC WORX, TIA Portal/Step 7)

Easy integration into PLC engineering

Diagnostics

PROFINET device

Configuration

- Device status
- MRP redundancy status
- LLDP

…

- Activate redundancy
- Change IP address

….

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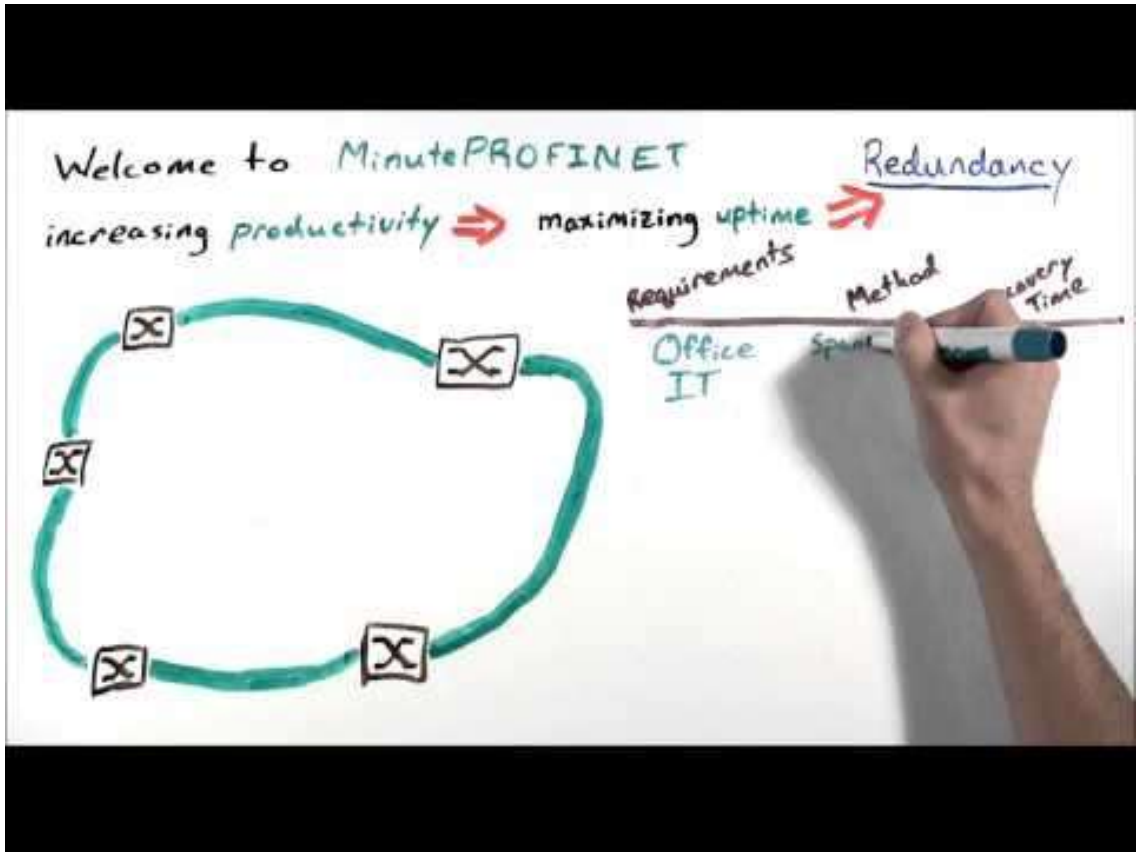
MRP

Media Redundancy Protocol

Manager **(one)**

Clients **(several)**



Media Redundancy Protocol **Media Redundancy for the Industry (with PROFINET media redundancy examples)**

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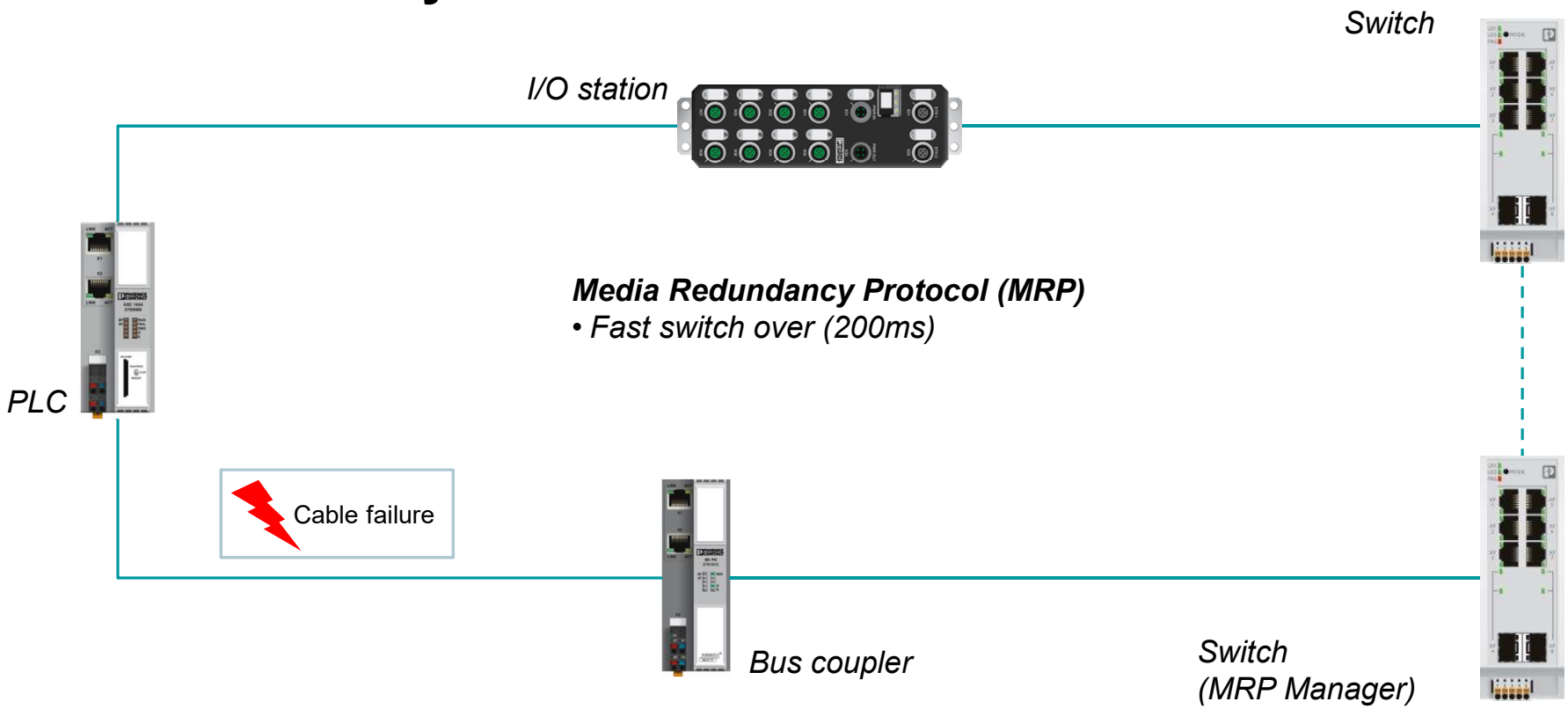
FL SWITCH 2000 – Feature Set

Media redundancy



Media Redundancy Protocol (MRP)

- *Fast switch over (200ms)*

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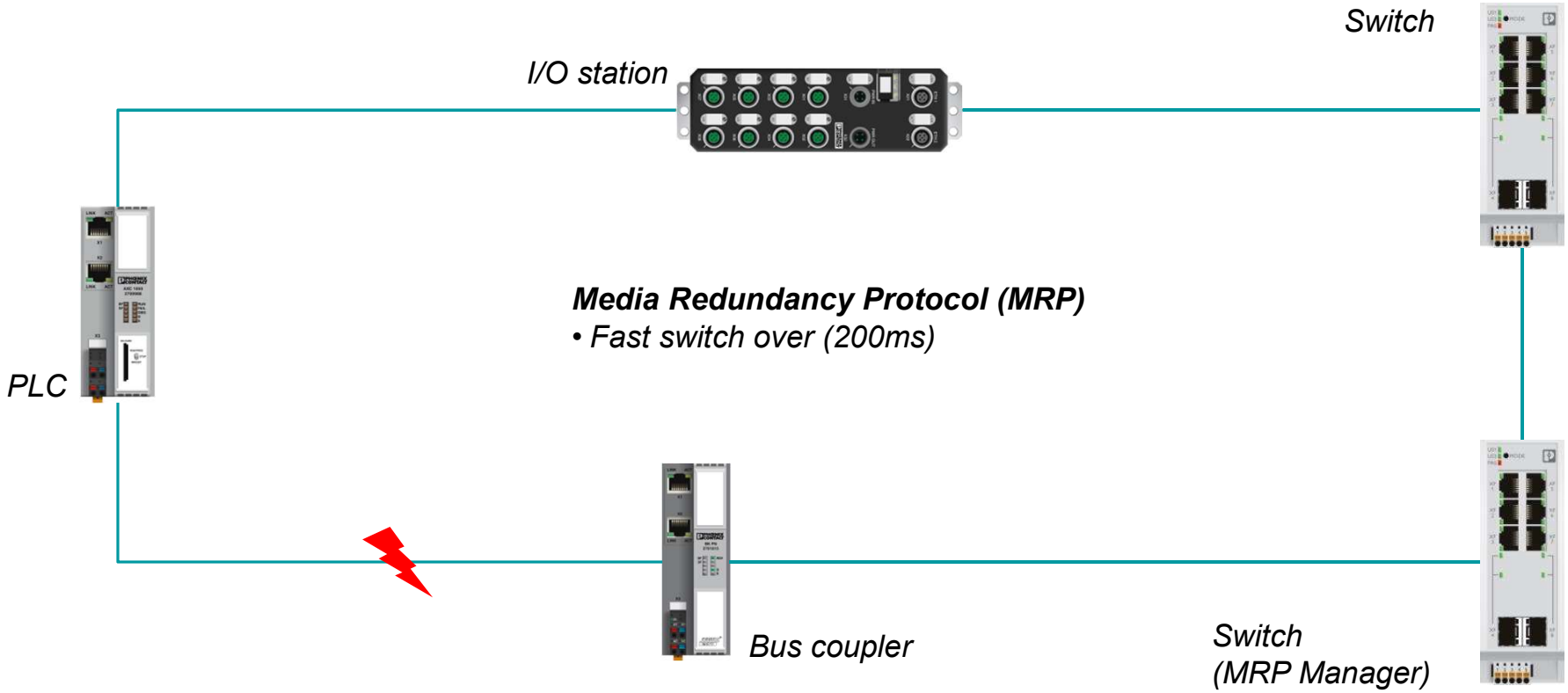
FL SWITCH 2000 – Feature Set

Media redundancy



Media Redundancy Protocol (MRP)

- *Fast switch over (200ms)*

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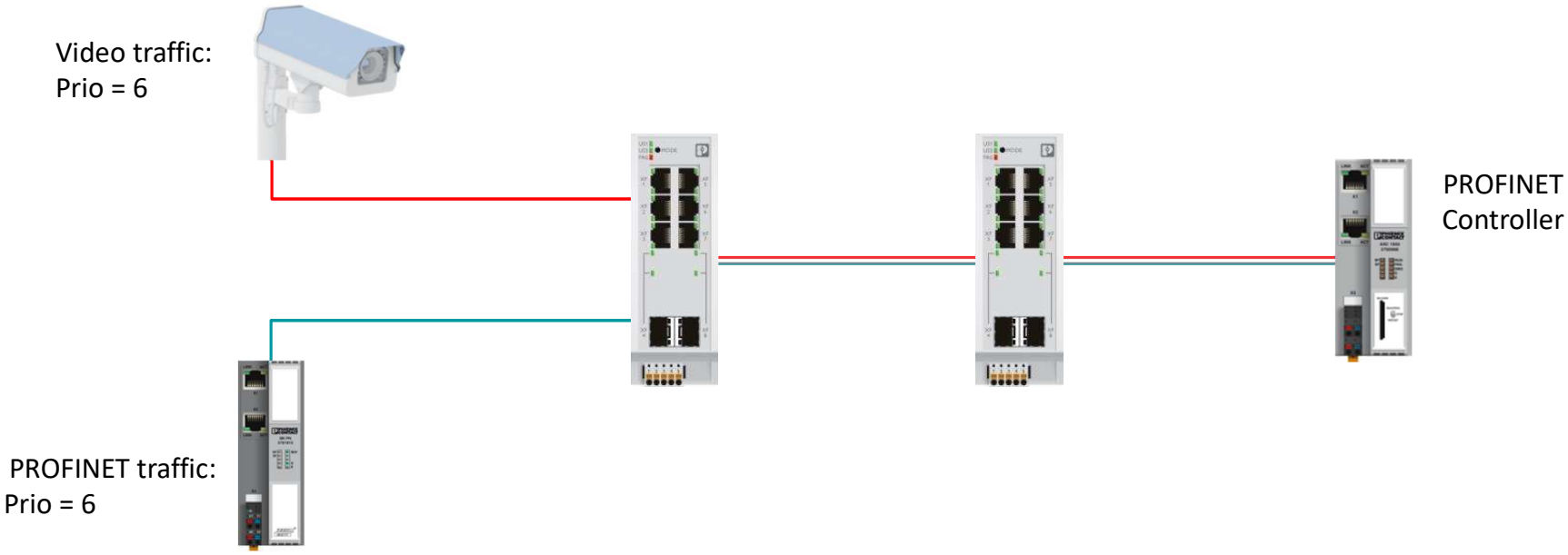
FL SWITCH 2000 – Feature Set

Hardware based PROFINET prioritization

- Prioritized forwarding of PROFINET frames based on Ethertype



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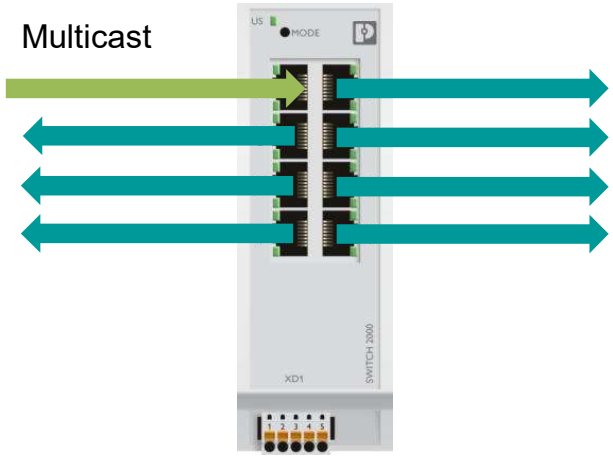
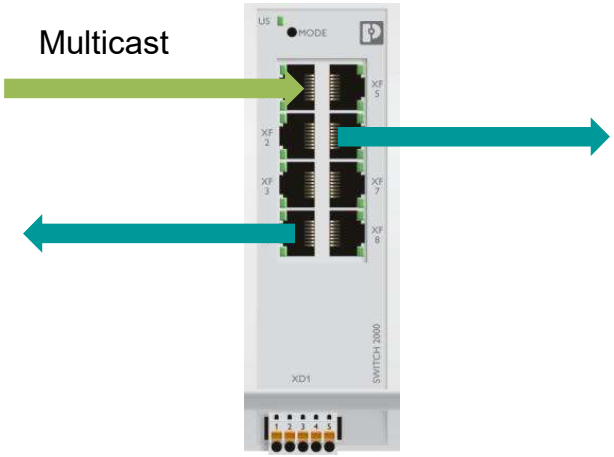
FL SWITCH 2000 – Feature Set

EtherNet/IP support - Overview

- Prioritization of data packets (Quality of Service via DSCP/DiffServ)
- IP-Address assignment via DHCP to connected participants
- Multicast traffic filter for EtherNet/IP (IGMP Snooping/Querier)



Without IGMP snooping



With IGMP snooping

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FL SWITCH 2000 – Feature Set

IP address assignment – DHCP server

- **Port-**based → IP address assignment to single ports
  - Easy start of connected devices
  - Easy replacement of connected devices

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

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FL SWITCH 2000 – Feature Set

IP address assignment – DHCP server

- **Pool**-based → IP address assignment **on all ports**
  - Available on FL SWITCH 2200/2300 series

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

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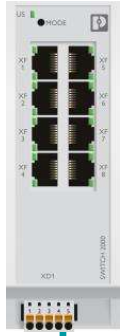
FL SWITCH 2000

MAC-based port security

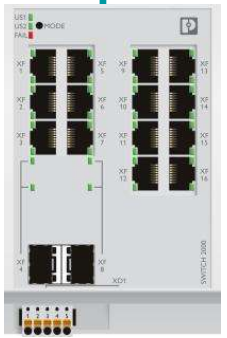
SNMP server

Allowed MAC Addresses (list per port)

Description	MAC Address	VLAN ID
Service Laptop 1	**00:A0:45:6C:D2:06**	**1**
Service Laptop 2	00:A0:45:6C:D2:10	1
…	…	…



Service Laptop 1
MAC Address: 00:A0:45:6C:D2:06



Switch

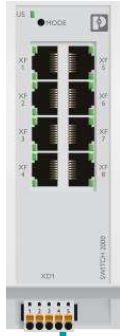
FL SWITCH 2000

MAC-based port security

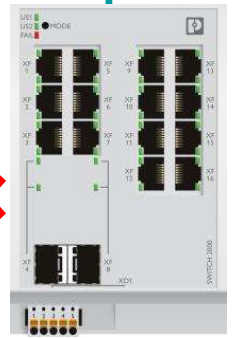
SNMP server

Allowed MAC Addresses (list per port)

Description	MAC Address	VLAN ID
Service Laptop 1	**00:A0:45:6C:D2:06**	**1**
Service Laptop 2	00:A0:45:6C:D2:10	1
…	…	…



Unauthorized device
MAC Address: 12:34:56:78:90:12

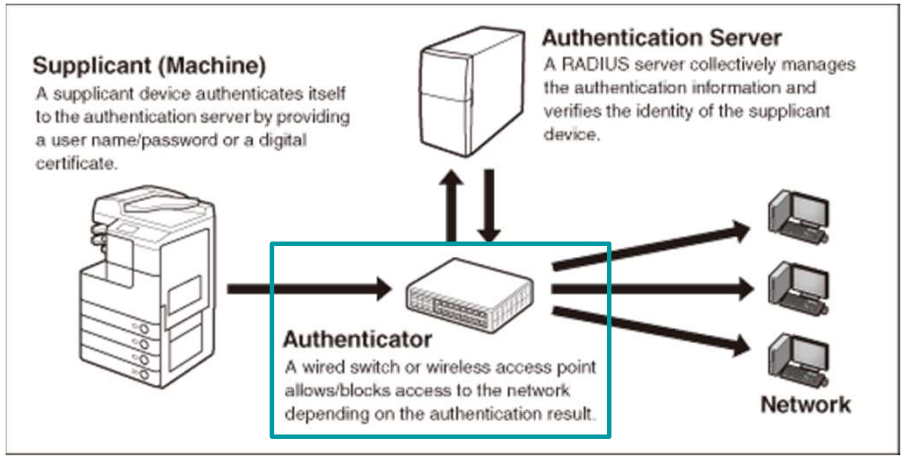


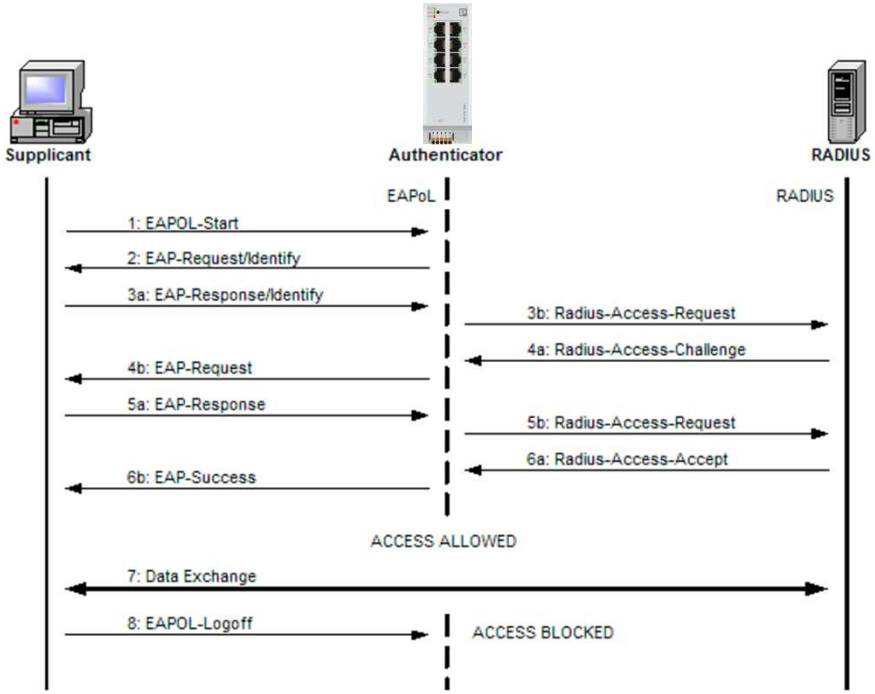
Switch

FL SWITCH 2000

RADIUS Authentication (802.1x)

The switches can act as authenticator and provide/block access of supplicants to a network

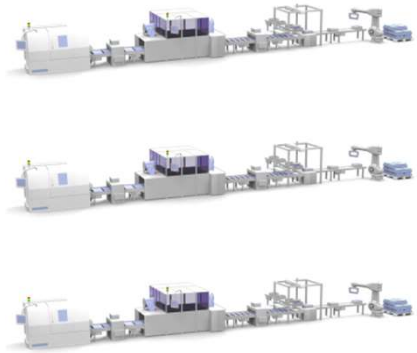


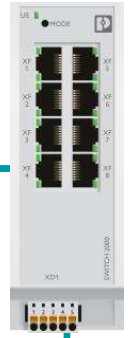


FL SWITCH 2000

RADIUS Authentication (802.1x)

Authentication Server



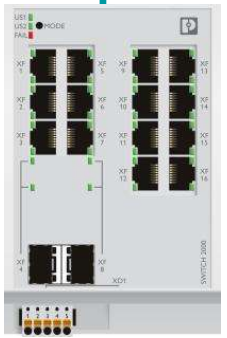


Network

Client (Supplicant)

Radius-Access-Request/Response

Identification



Switch (Authenticator)

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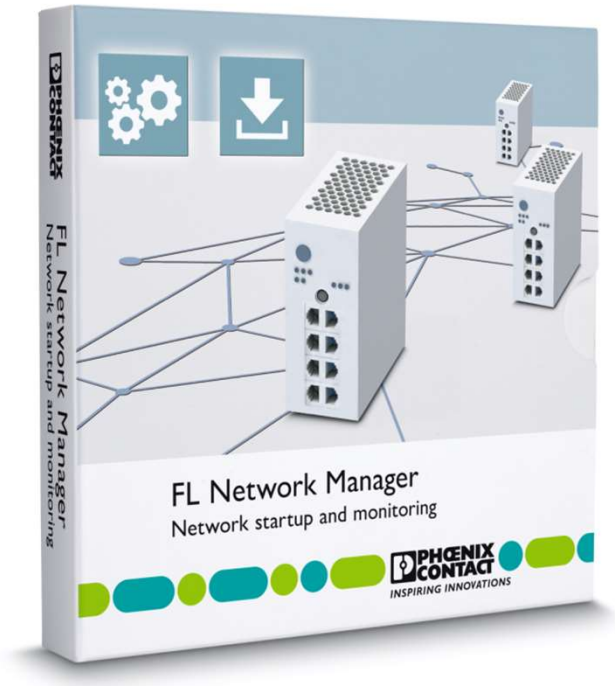
INSPIRING INNOVATIONS



FL Network Manager- Your easy way for network configuration

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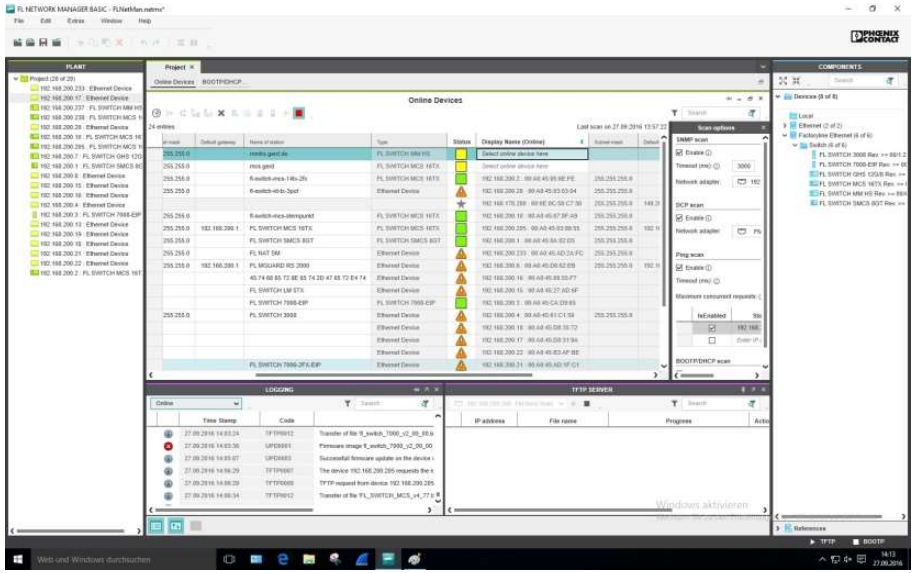
FL Network Manager

How can the Network Manager help you?



With the FL NETWORK MANAGER you are able to get a quick and easy startup of your network.

Therefore the software supports you with a lot of helpfull functions!

PHOENIX CONTACT
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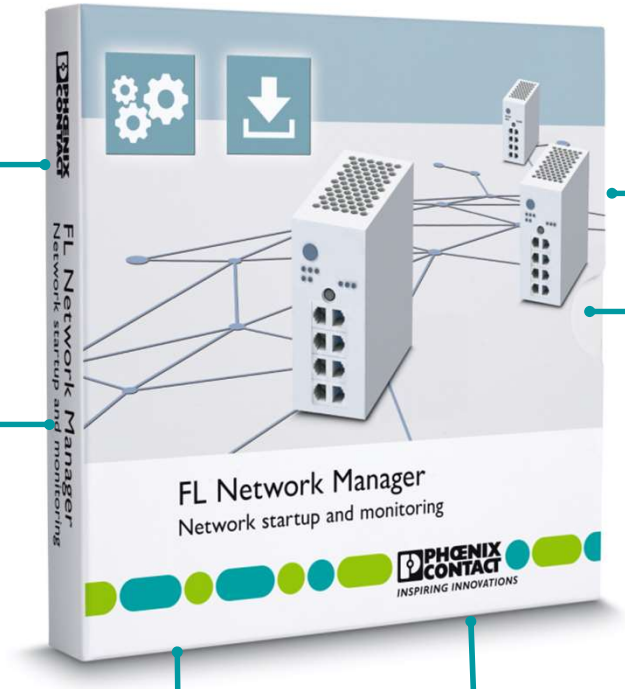
Initial IP assignment
Via BootP, DHCP, DCP

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

Multi Device Configuration
Quick configuration of same parameters for different devices in parallel

Topology overview
Physical topology overview with focus on redundancy systems (RSTP, MRP,…)

SNMP based Scripting
SNMP configuration and information independend of device vendor

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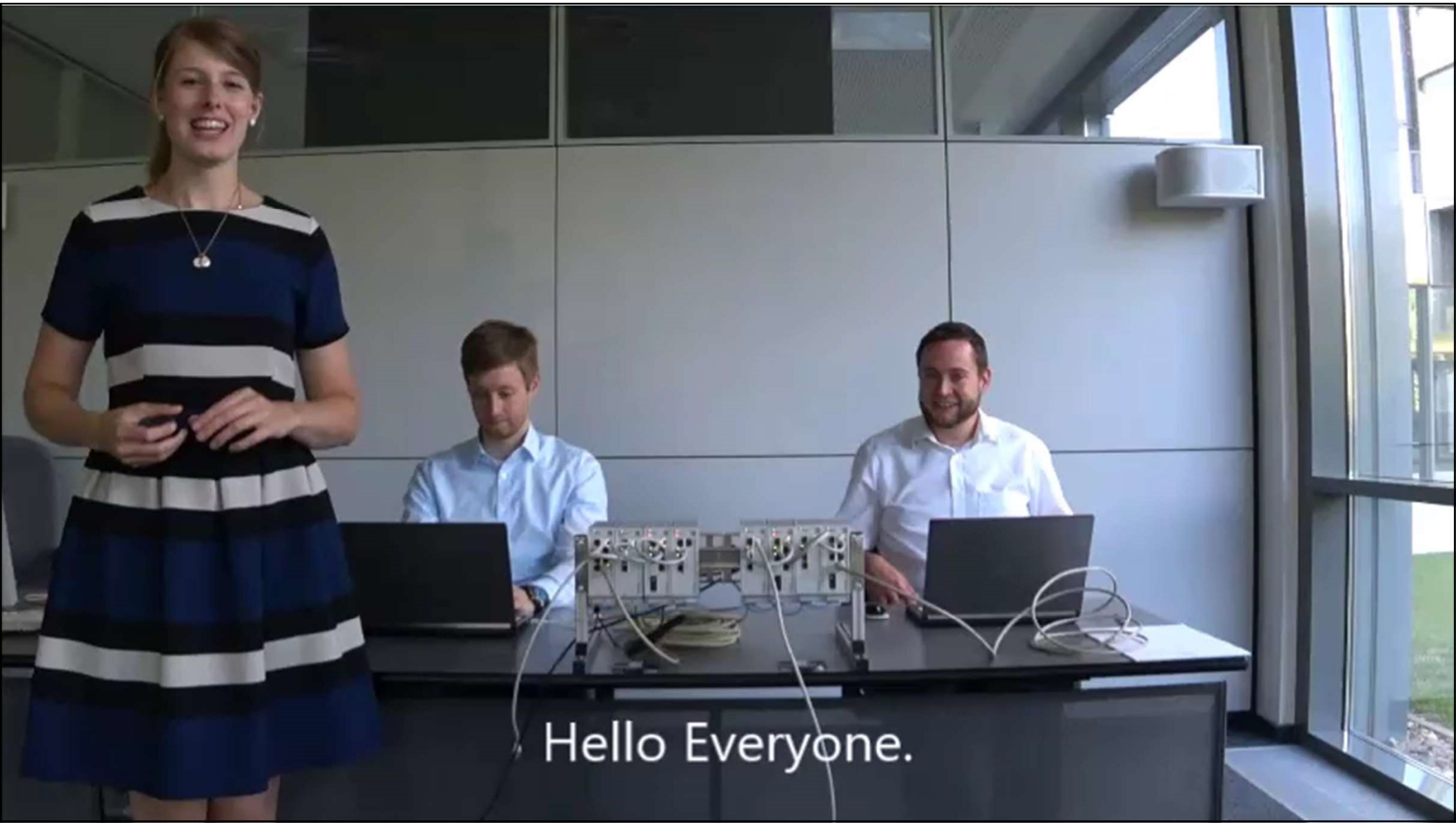
Hello Everyone.

FL Network Manager

Use case 1: Network start up

- Issues
  - No IP addresses on the devices
  - Switches often decentral placed
  - Unknown firmware status of devices

Solution

- Easy initial IP assignment via BootP, DHCP,…
- The network can be configured from a central position
- Thanks to the multi device configuration function, parameter can be cloned on all needed switches

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FL Network Manager

Use case 2: Maintenance firmware update

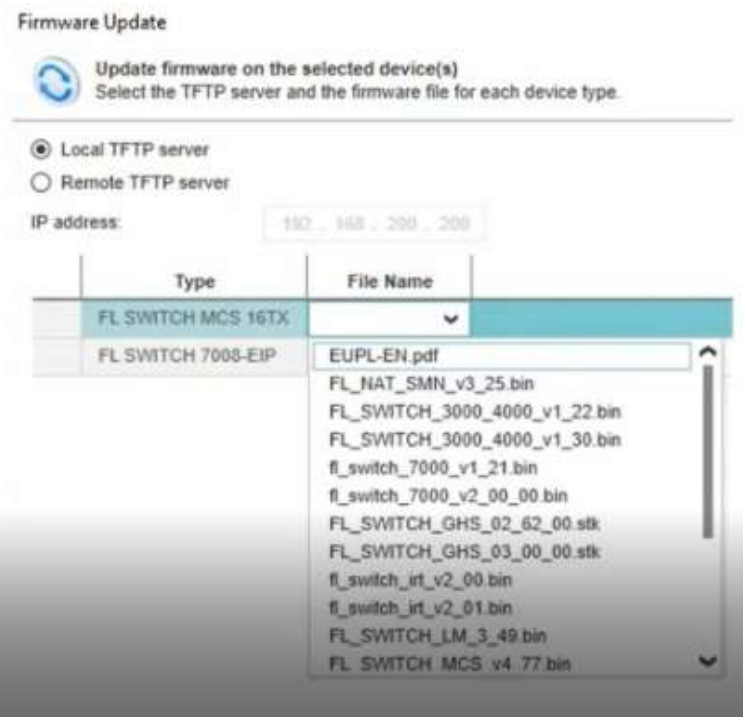
- Issues:
  - Exact IP addresses of devices are not clear
  - Unknown firmware state of the switches
  - Order of devices for update

Solution

With the IP range scan, it is enough to know the address range

Firmware status are listed for all scaned devices

The Network Manager can make a multi device firmware update



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FL Network Manager

Use case 3: Redundancy diagnostic

- Issues
  - Where to start the analysis
  - How does the redundancy configuration looks like
  - Identify single port states for redundancy mechanism

Solution

- The network topology is a good starting point to see, how the ring was built
- With the Multi Device configuration one parameter can be displayed for all devices
- With the detail view for redundancy

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FL Network Manager

Use case 4: Integration of third party devices

- Issues
  - No device description files available
  - Unknown SNMP structure of third-party devices
  - Nearly no diagnostic data in Network Manager

Solution

With SNMP scripting, it is possible to configure devices without description

The SNMP structure can be found in the MIB file of the device

A diagnostic script can be created and used for detail device diagnostic

Skriptcode

```
/* This script reads the Portspeed and Duplex Mode for each port
   The maximum port number can be changed with the definition for
   'portNumberMax'
*/

//variable declaration
VAR
   duplexModeOid : OID := '1.3.6.1.4.1.4346.11.11.4.2.2.1.4';
   duplexMode : INTEGER32 := -1;

   portSpeedOid : OID := '1.3.6.1.4.1.4346.11.11.4.2.2.1.3';
   portSpeed : GAUGE32 := GAUGE32#0;

   portNumber : INTEGER32;
   portNumberMax : INTEGER32 := 48;
END_VAR

WRITECONSOLE('=========================');
WRITECONSOLE('Read port informations');
WRITECONSOLE('=========================');

portNumber := 1;
duplexMode := GET(duplexModeOid + portNumber, TYPE_REF INTEGER32);
portSpeed := GET(portSpeedOid + portNumber, TYPE_REF GAUGE32);

while (duplexMode >= 0 & portNumber < portNumberMax) do

    WRITECONSOLE('=========================');
```

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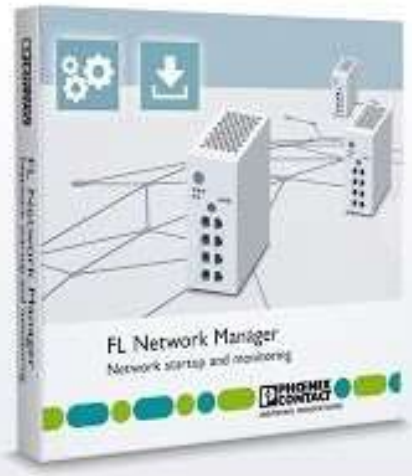


FL Network Manager

SNMP scripting
Read out and set
parameters easily via SNMP

FL Network Manager – SNMP scripting

INSPIRING INNOVATIONS

FL SWITCH 2000 – Firmware 2.80

New features

new

More data throughput and redundancy

- Link Aggregation/LACP

Supported only by:

- FL SWITCH 22xx/23xx
- FL SWITCH 24xx/25xx

- FL NAT 22xx/23xx

More diagnostics

- CRC-Surveillance
- Syslog
- Snapshot tool

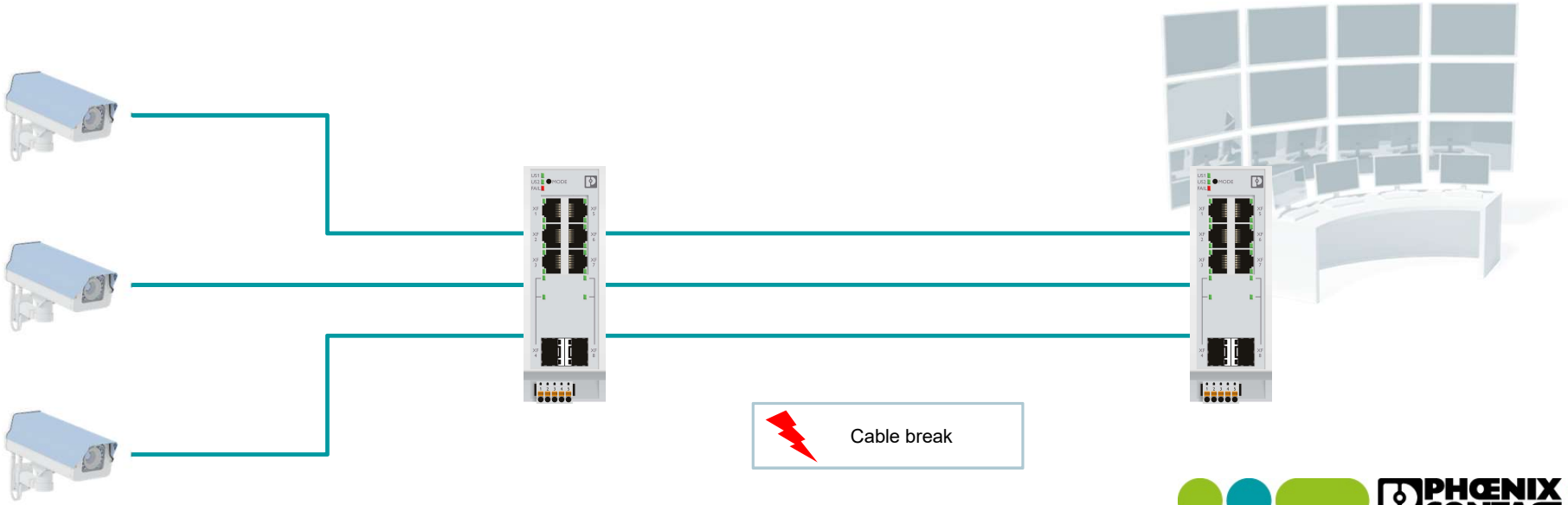
More security

- Deactivation of Smart Mode button
- Configurable login expire time
- Individual SNMPv3 password

FL SWITCH 2000 – Firmware 2.80

Link Aggregation Control Protocol (LACP) – IEEE802.1X

- Advantages of LACP:
  - Higher data througput thanks to multiple network connections (trunks)



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FL SWITCH 2000 – Firmware 2.80

Link Aggregation Control Protocol (LACP) – IEEE802.1X

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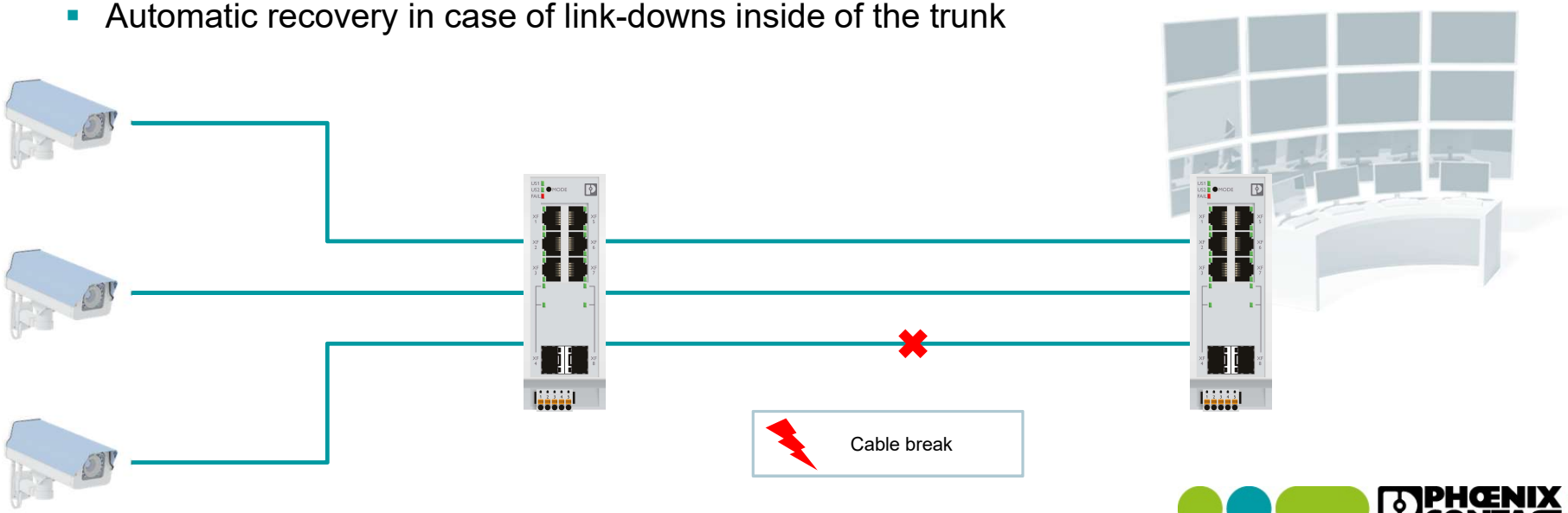
  - Higher availability thanks to redundancy mechanism within trunks
  - Automatic recovery in case of link-downs inside of the trunk



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FL SWITCH 2000 – Firmware 2.80

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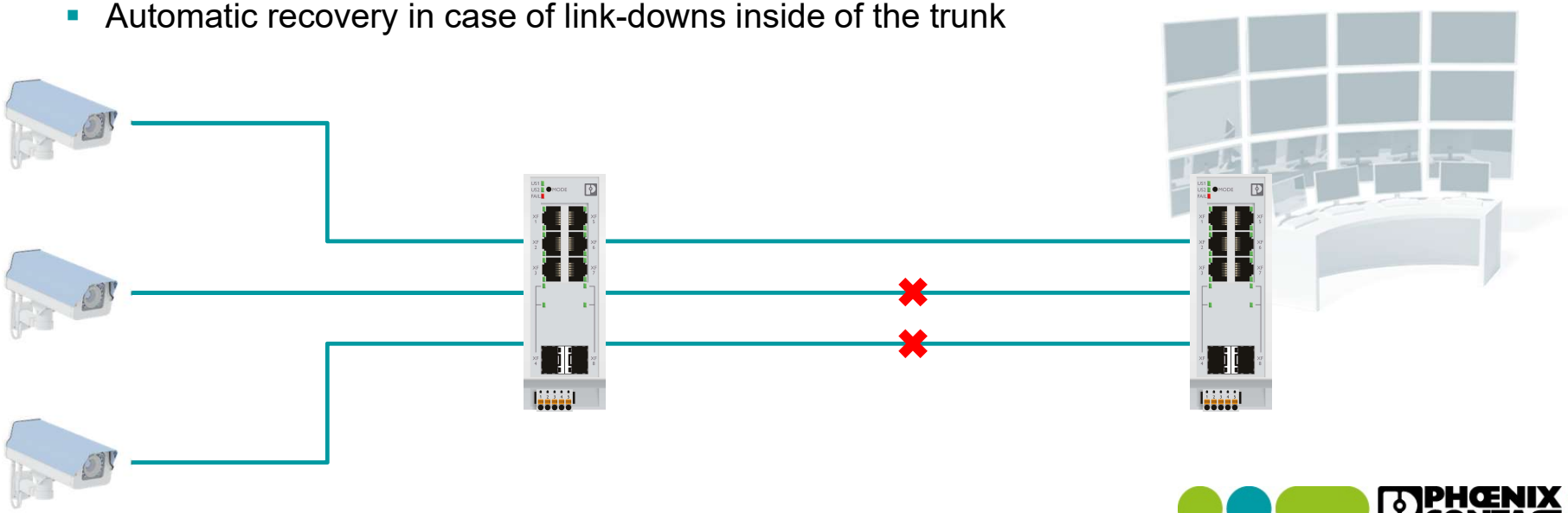

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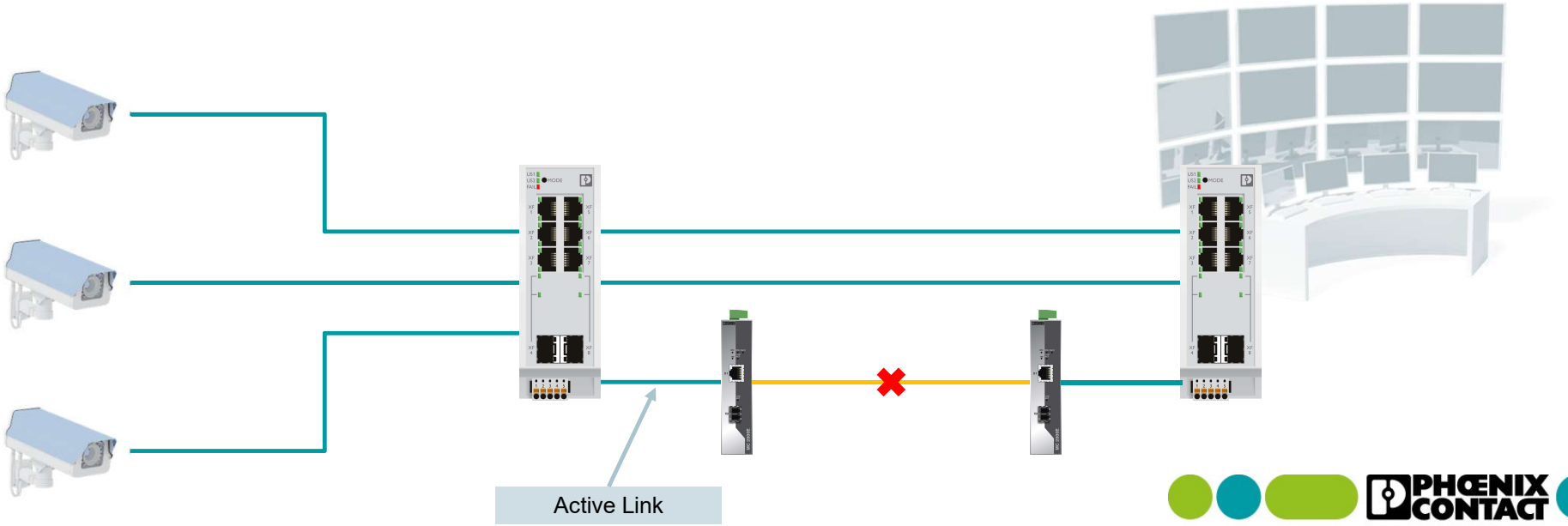
FL SWITCH 2000 – Firmware 2.80

Link Aggregation Control Protocol (LACP) – IEEE802.1X

- Detection of link-downs, even if point-to-point connection goes over a media converter and link-status on the switch stays active
- Confirmation of LAG configuration between two devices → Prevention of errors due to incorrect configuration or cabling



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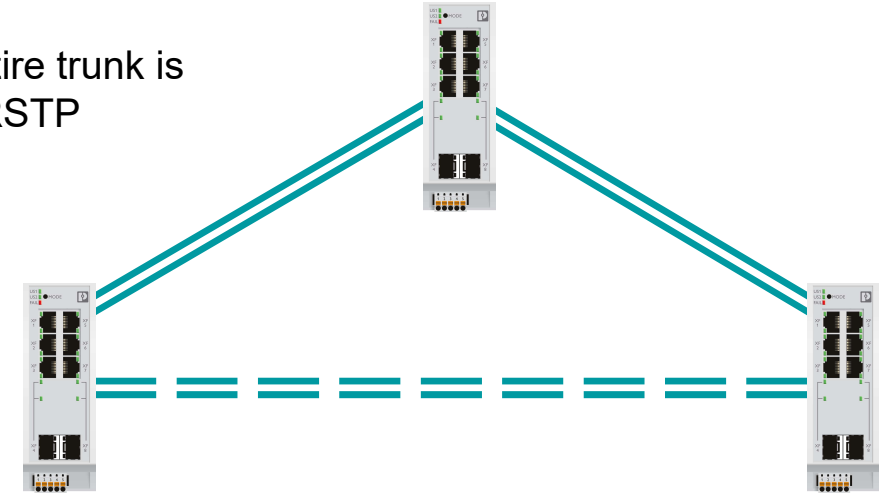
FL SWITCH 2000 – Firmware 2.80

Link Aggregation Control Protocol (LACP) – IEEE802.1X

- Combination of RSTP and LACP
  - LACP Trunks are handled as one logical port → entire trunk is being set to state blocked/forwarding/alternate by RSTP



- Flexibility of device configuration
  - Maximum of 6 trunks can be configured
  - Maximum of 4 ports per trunk can be configured

- Configuration via Web-based management, FL Network Manager and SNMP

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FL SWITCH 2000 – Firmware 2.80

Syslog

- Transmission of event messages to one or two Syslog servers
- Message groups for specific topics (e.g. Diagnosis, Security)

FL SWITCH 2000 – Firmware 2.80

Snapshot tool

- Snapshot of the entire device system

- ➢ Customers can download one file with all information and provide it to technical support
- ➢ Service technicians can download device information, e. g. via remote access

INSPIRING INNOVATIONS

FL SWITCH 2000 – Firmware 2.90

New features

April 2020

Improved management

- Role-based user management

Improved prioritization

- DiffServ/DSCP for EtherNet/IP traffic prioritization

Improved IP address commissioning

- Dynamic initial IP via Zeroconf

More diagnostics

- Extended event log and SNMP trap options

Improved security

- Deactivation of SD slot
- Configurable maximum of login attempts
- Access restriction to all websites

Note: Firmware 2.90 will **ONLY** be rolled out to FL NAT 2xxx. All FL SWITCH 2xxx have to be updated manually

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Technology Made Easy PROFINET

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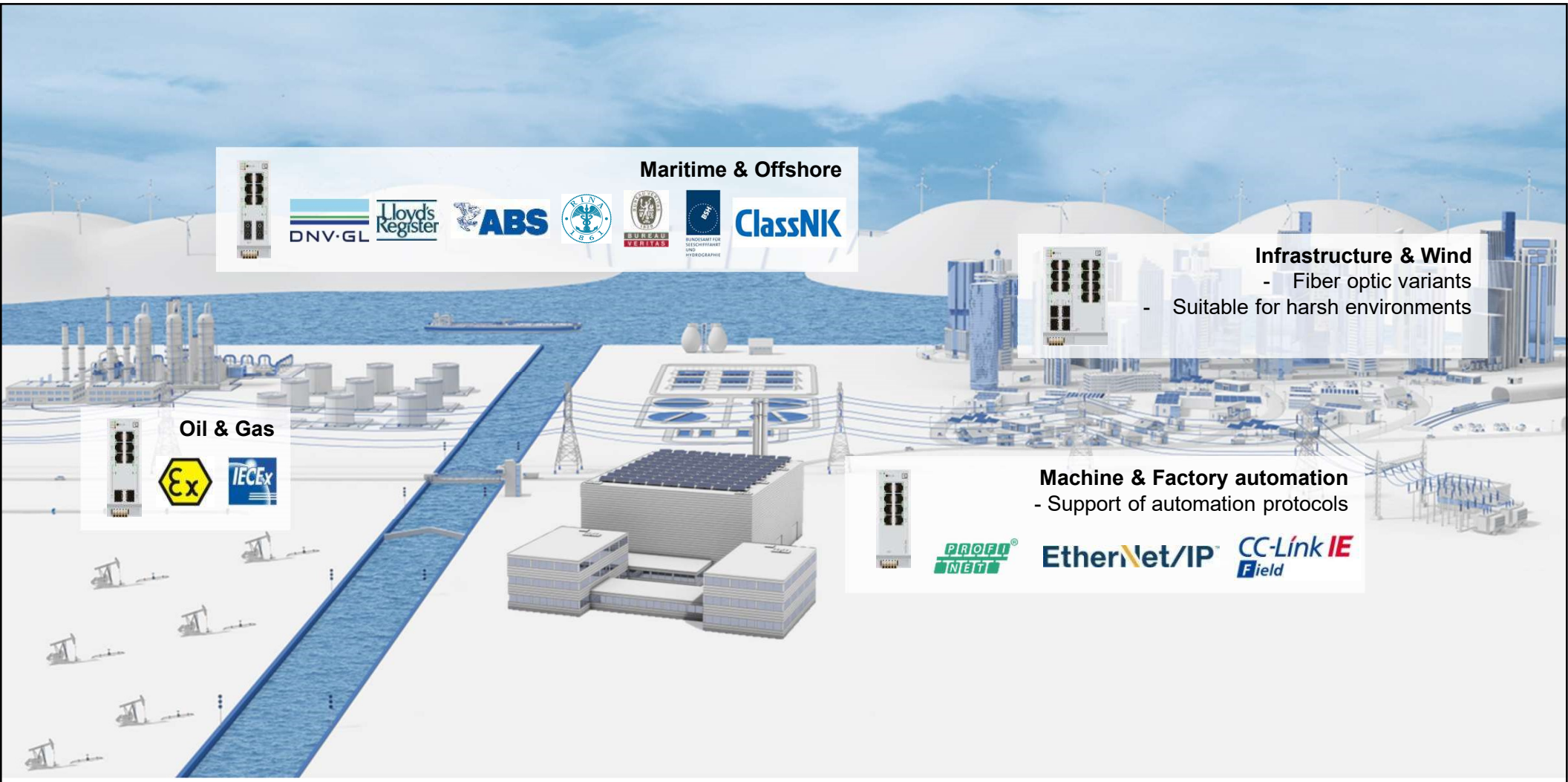

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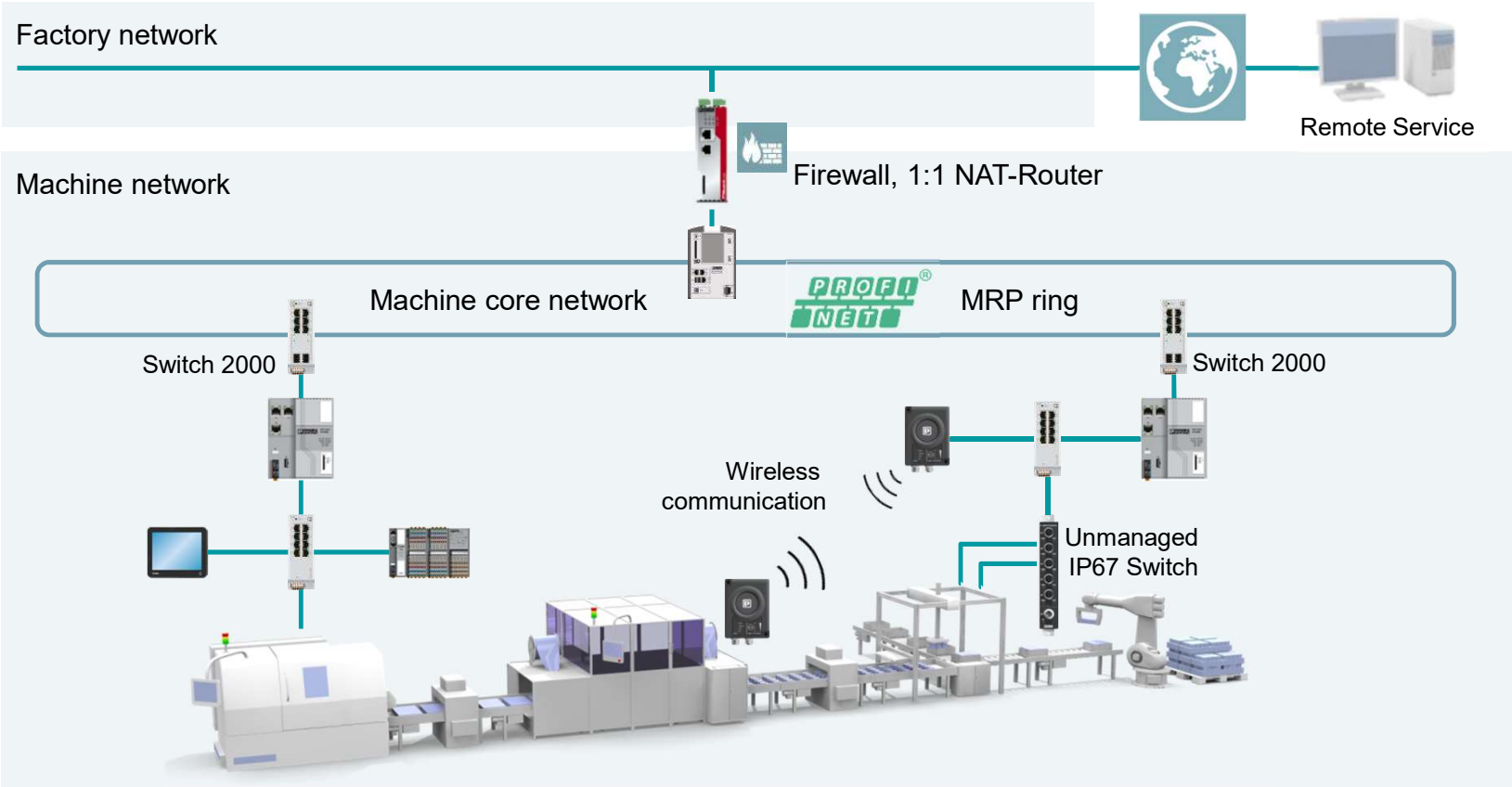
FL SWITCH 2000 – Factory Automation



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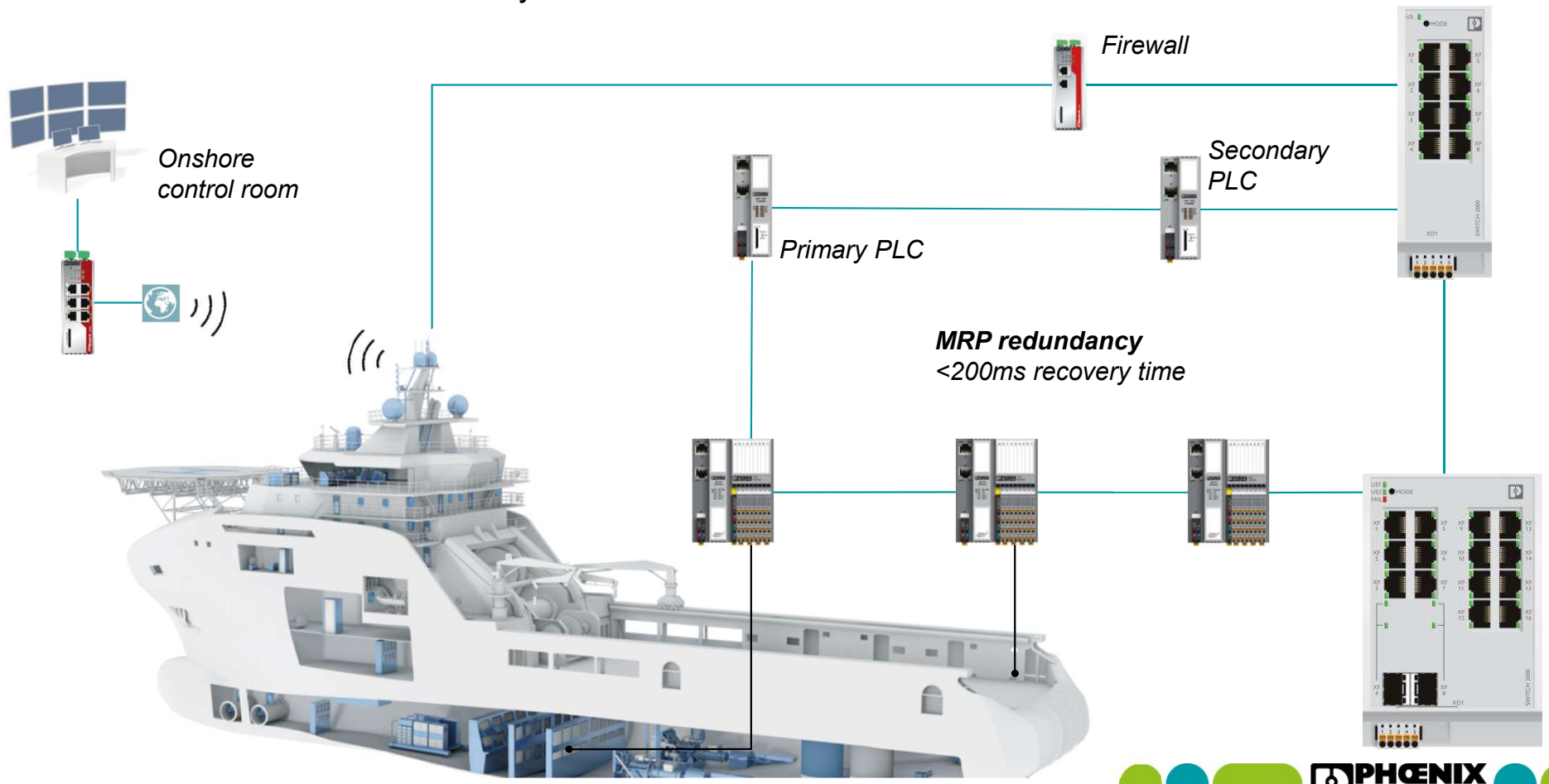
FL SWITCH 2000 – Maritime Industry



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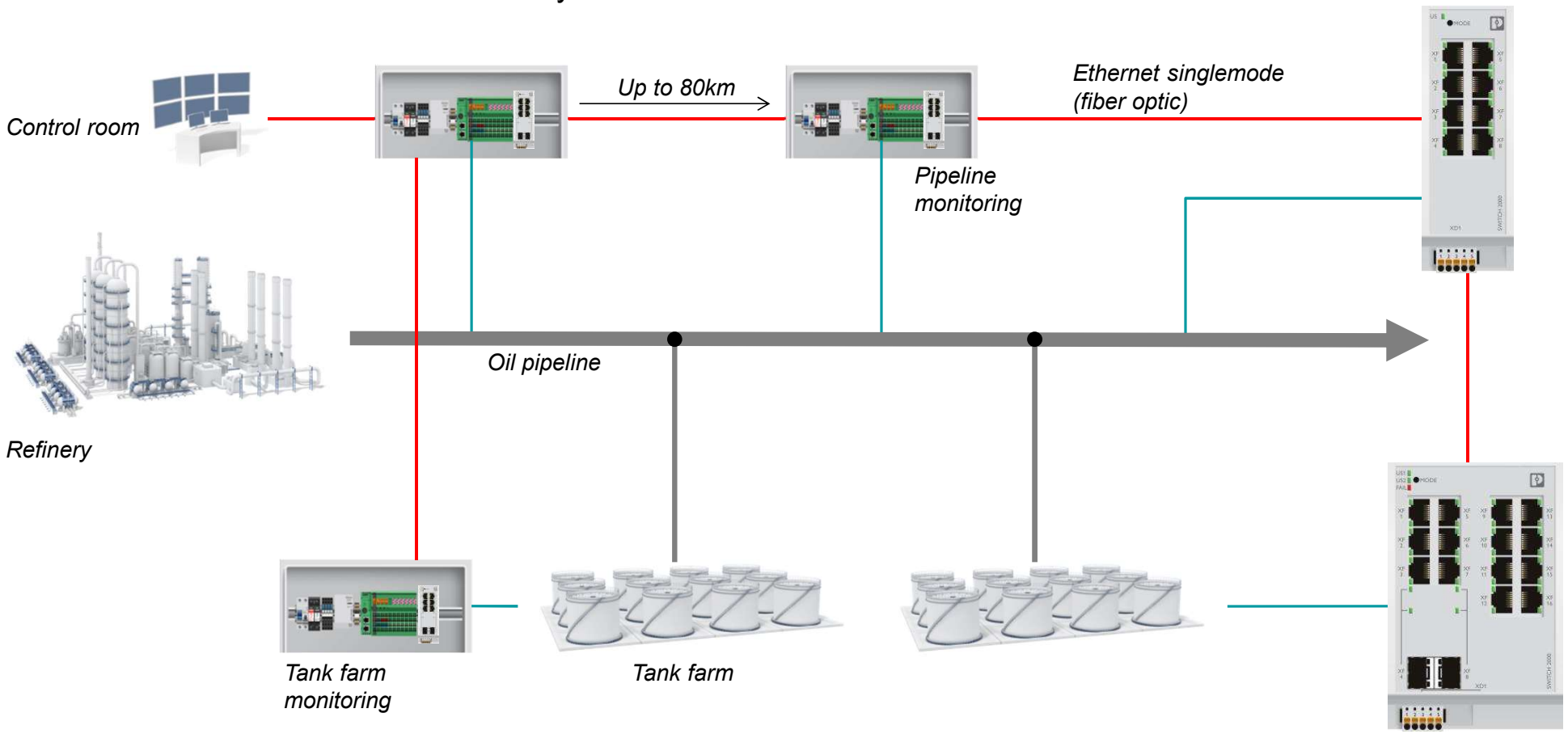
FL SWITCH 2000 – Process Industry



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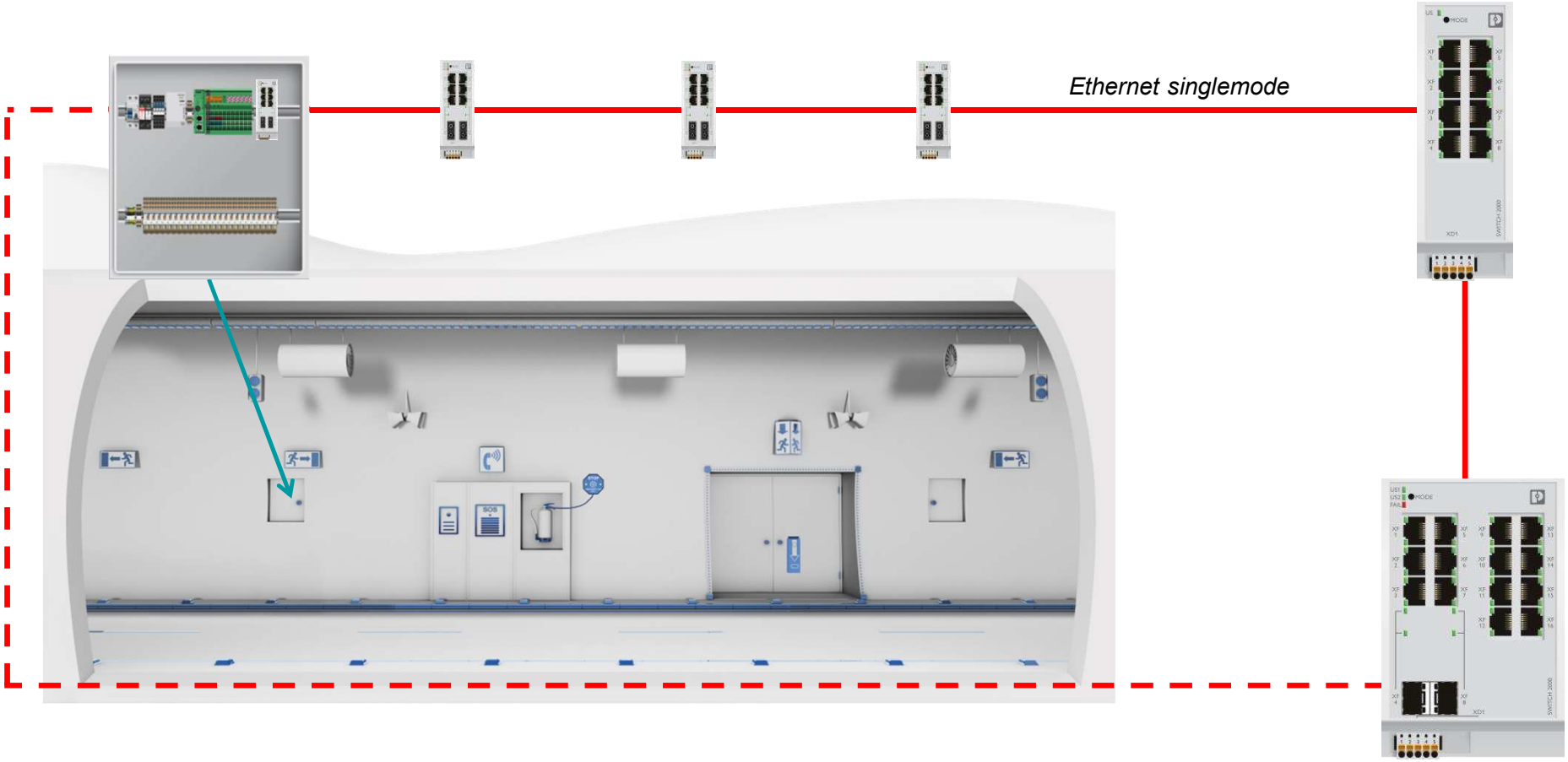
FL SWITCH 2000 – Infrastructure



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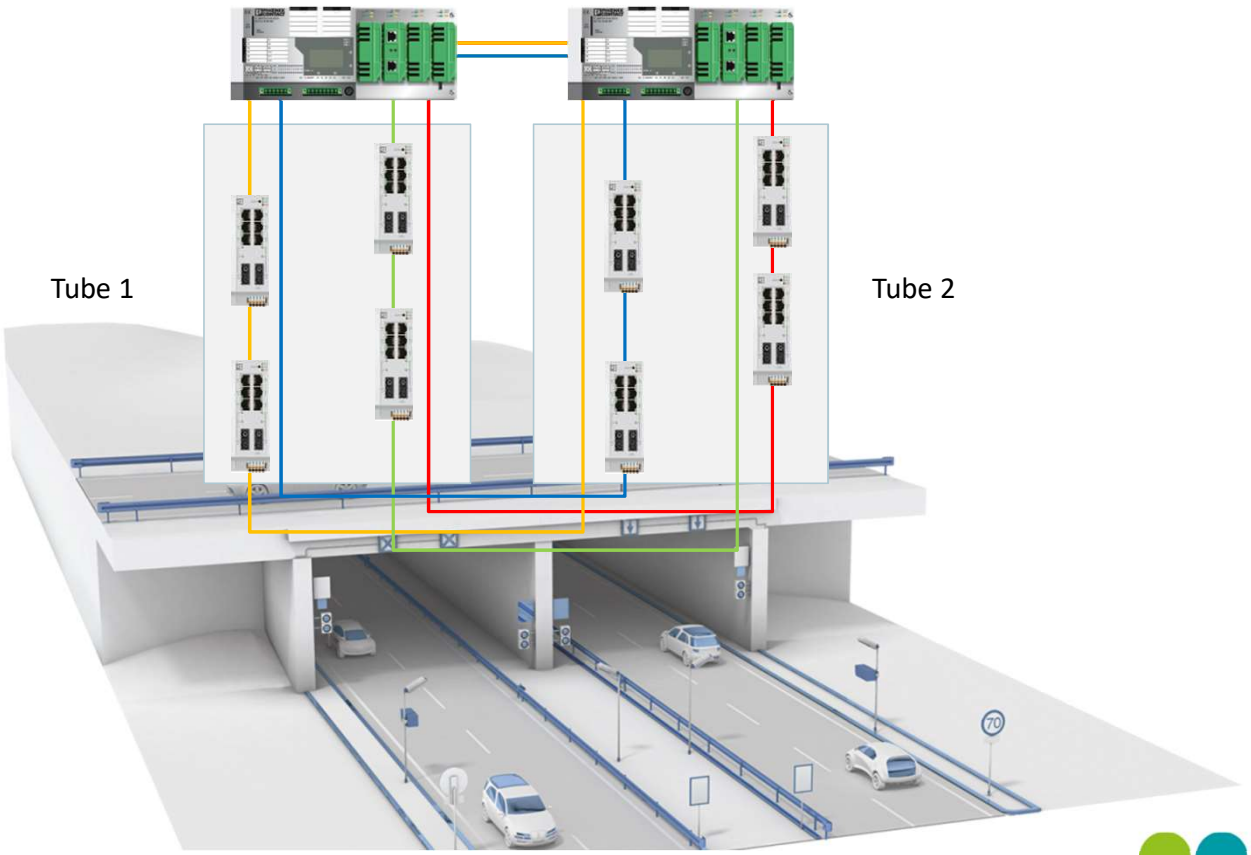
FL SWITCH 2000 – Infrastructure



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FL SWITCH 2000 – Wind Industry

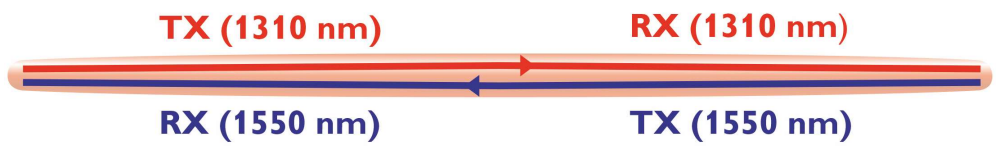
WDM-Technology

Wavelength-division multiplexing (WDM):

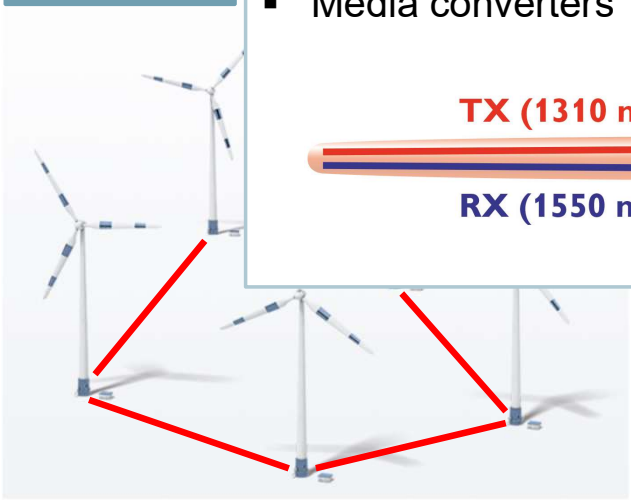
- Full duplex communication via one fiber

Available products:

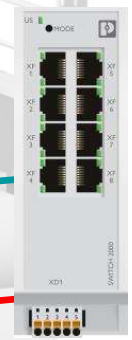
- WDM SFP modules for managed switches
- Media converters



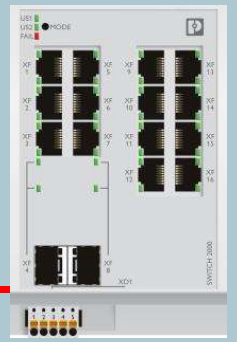
Wind park



Nacelle switch



Bottom box switch (connection to wind park)



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Webinar IMA 2020

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