Forøg dit anlægs oppetid med en redundant SIMATIC S7-1500-løsning

Opnå sikker og kontinuerlig drift, selv hvis fejl opstår.

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Dagens værter

Michael Nielsen, Technology Specialist

Kim Meyer-Jacobsen, Technology Specialist

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Agenda

Redundante løsninger i TIA-portalen

- Hvilke applikationer kan løses?
- Hvordan virker redundans?
- Opbygning af et redundant system
- Hvad bringer fremtiden?
- Næste webinar

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TIA-portalen

MRP

S7-400 H

HF

Factory Automation

Bump less

System IP

S1

S2

H

Process

R1

R

RED

Open User Communication

PROFINET

Applicative redundancy

S7-400 FH

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Redundancy and High Available systems
Applications


Airport Logistics and Landing lights


Tunnel and Bridges


HVAC and Server Farms


Water, Wastewater and Pump stations

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Nuværende redundante controller løsning S7-400 FH

- S7-400 FH
- Store og komplekse løsninger
- Ekstremt mange I/O
- Benytter PROFINET, som det primære netværk
- PROFIBUS er en selvfølge
- Safety kan implementeres efter behov
- Synkronisering af CPU'er op til 10km

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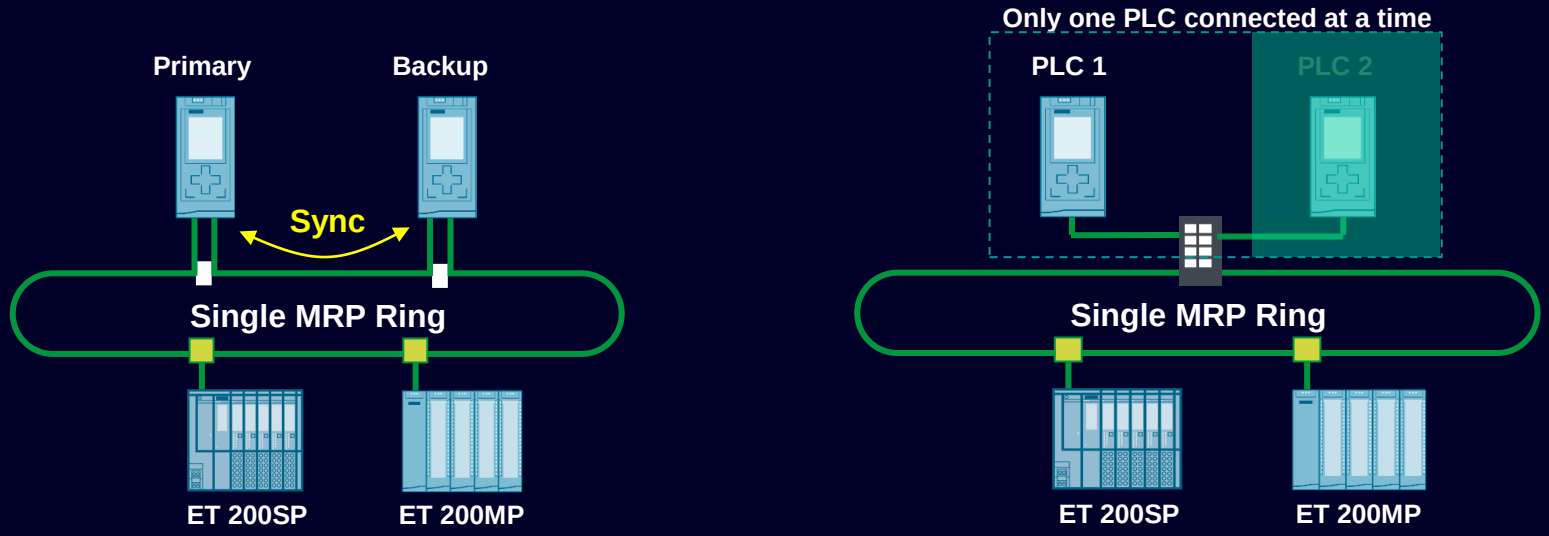
Redundant System vs. Applicative redundancy

Main differences



Switchover I/O	Bumpless	Not bumpless
System switchover time	< 1 sec	Minutes
Program consistency	Automatically	User must take care
Data consistency	Automatically	User must take care

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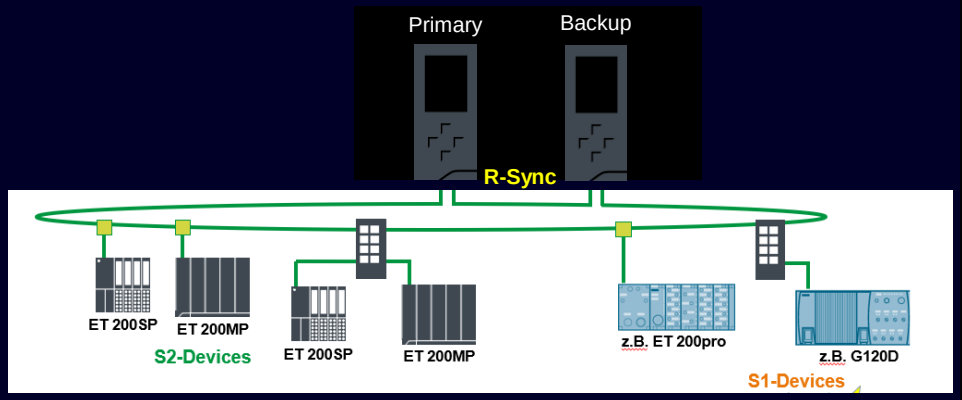
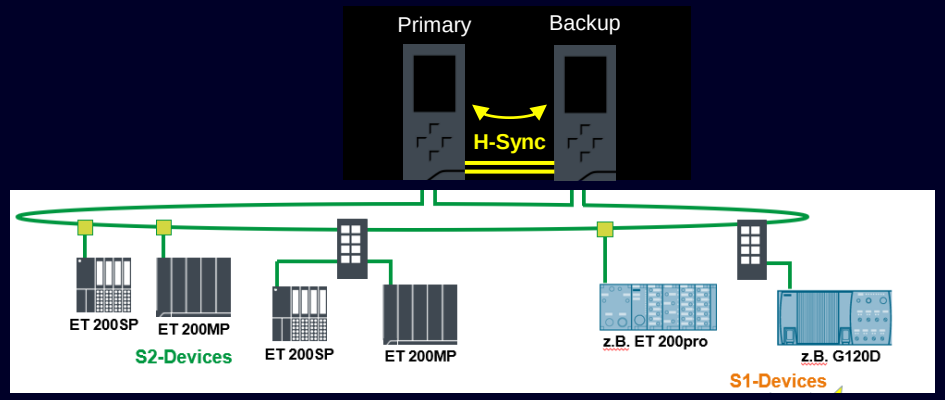
SIMATIC S7-1500R/H System overview

Redundant S7-1500R



High Available S7-1500H



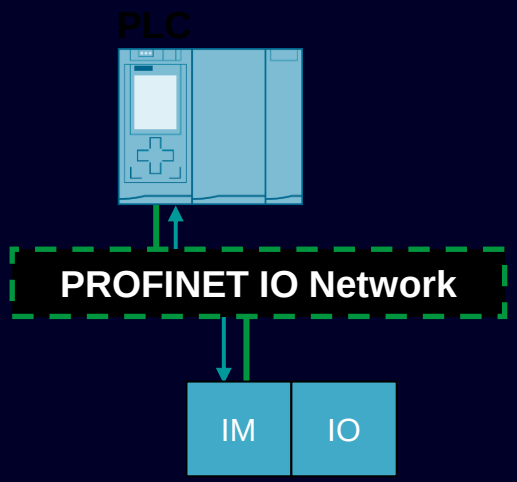
Universal Concept: Identical Synchronization Mechanism

Scaling of switchover performance through available bandwidth of the Sync-Connection

Redundant S7-1500R		High Available S7-1500H
CPU 1513R/CPU 1515R	**CPU-Type**	**CPU 1517H**
Via **Profinet-Ring (MRP)**	**Synchronization**	Via **Sync-Module**
300 ms	**Switchover time**	**50 ms**
Single PN-Ring	**PN-Network**	Single PN-Ring
Support of NAP S1 and S2	**PROFINET Devices**	Support of NAP S1 and S2

PROFINET System Redundancy

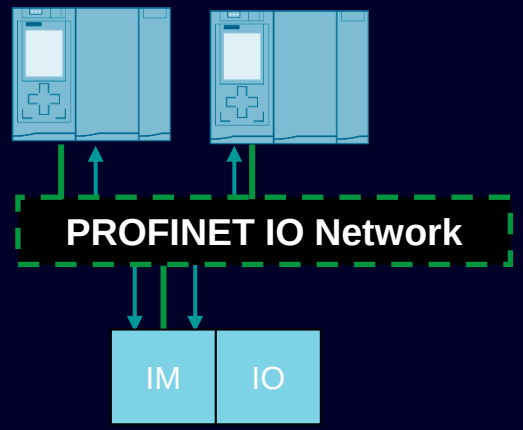
S1 Mode



S1 Device

S → Single interface
1 → One connection to one PLC

S2 Mode



S2 Device

S → Single interface
2 → Can switch between two connections

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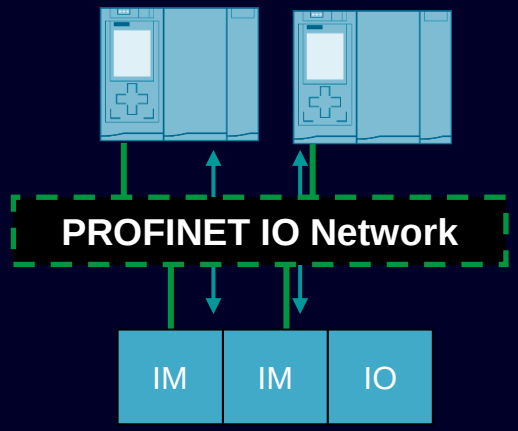
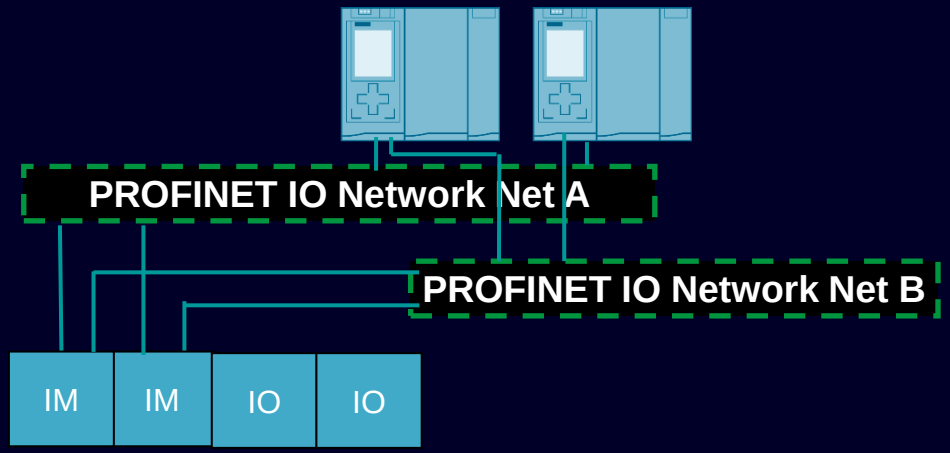
PROFINET System Redundancy

R1 Mode



R2 Mode



R1 Device

R → Redundant interface
1 → Each interface has one connection to one PLC

R2 Device

R → Redundant interface
2 → Each interface has two connections to each PLC

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PROFINET System Redundancy - Concept

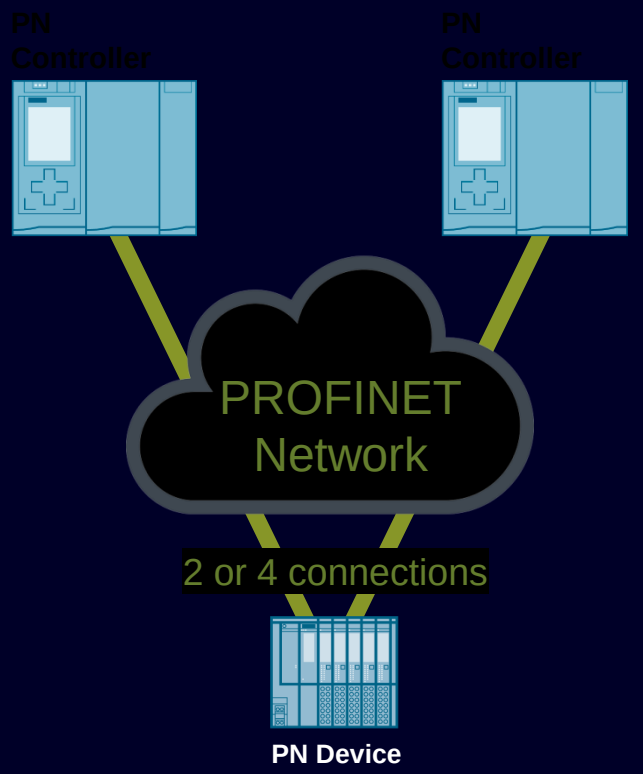
PROFINET System Redundancy

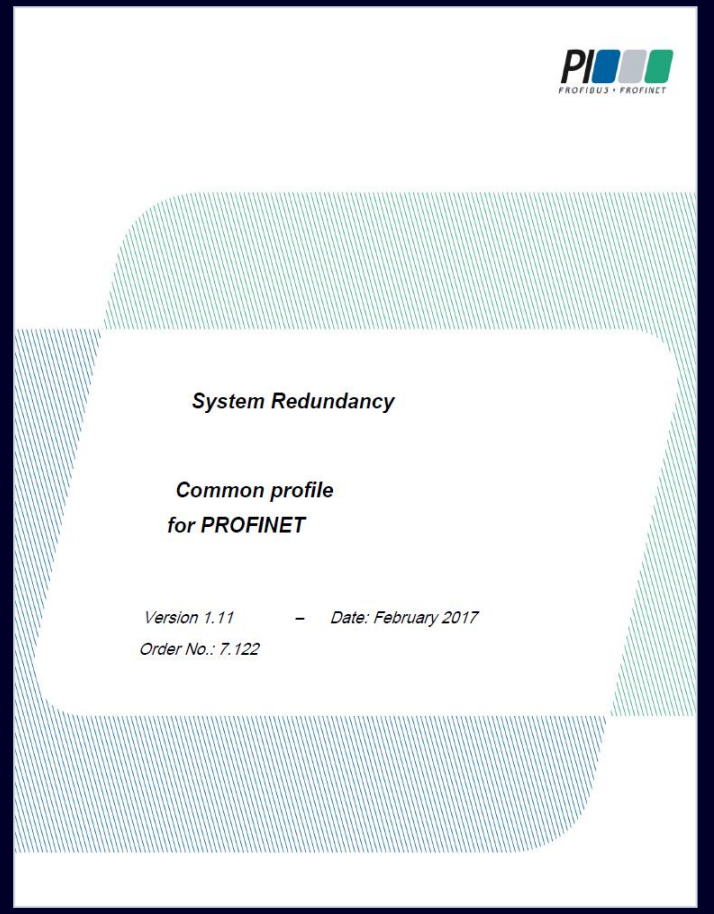
A System with redundant PN controllers and single or redundant PN devices.

Three levels:

1. PN Controller
2. PROFINET Network
3. PN Device

Redundancy at one level is independent of redundancy at each other level.





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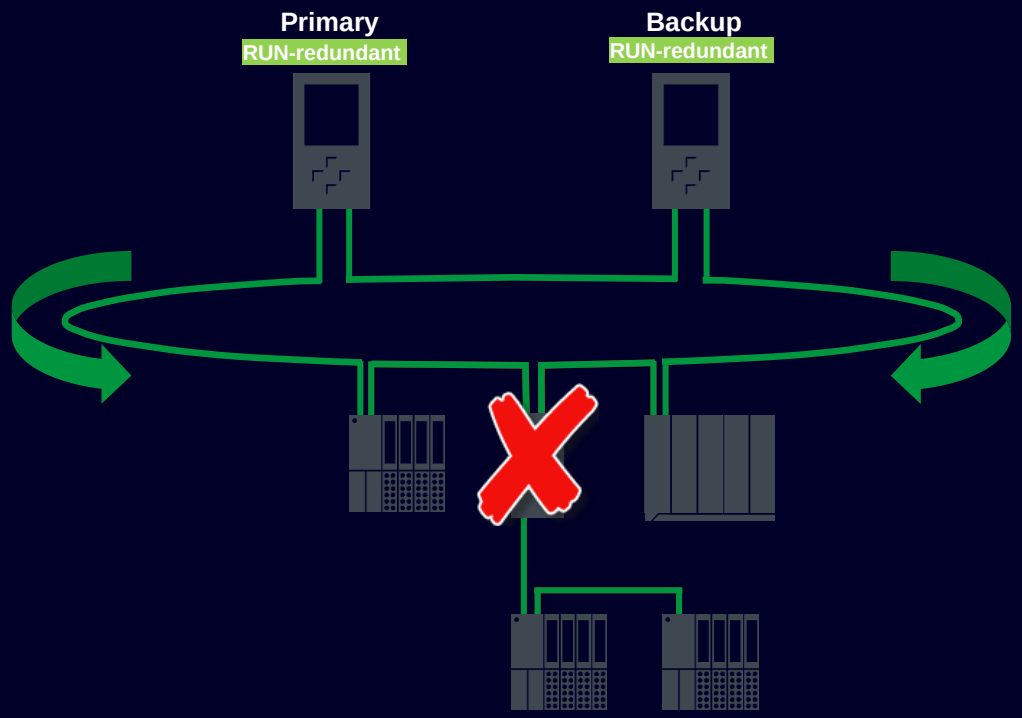
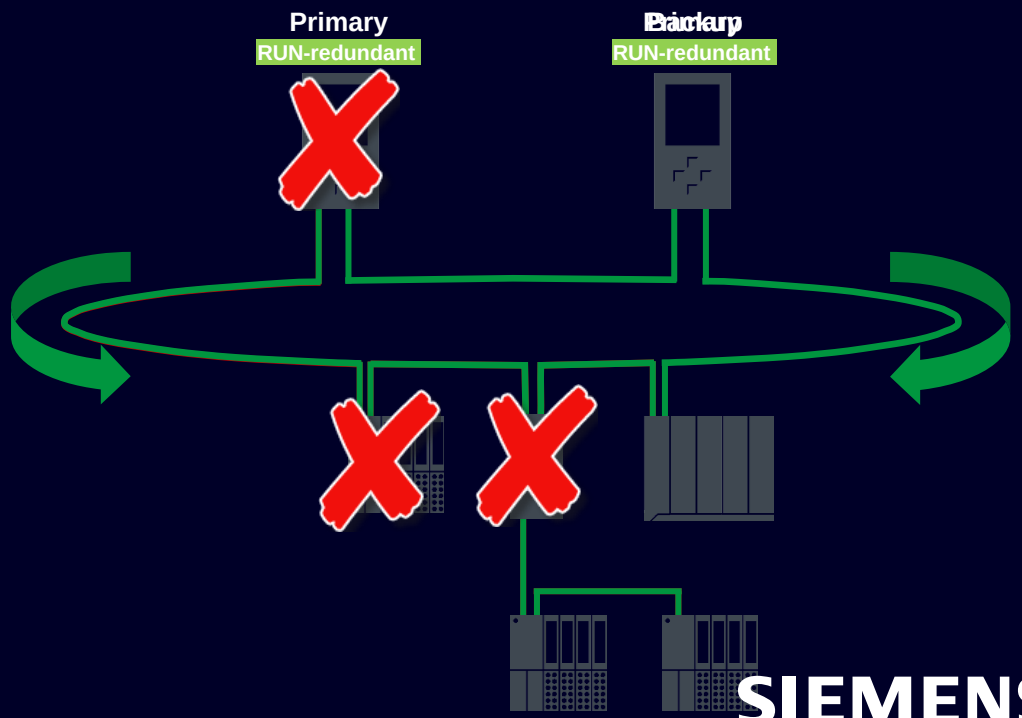
Failure scenarios for S7-1500R/H

Failure of a switch in the PROFINET ring (with line topology)



Failure of an IO device in the PROFINET ring AND of the Primary CPU



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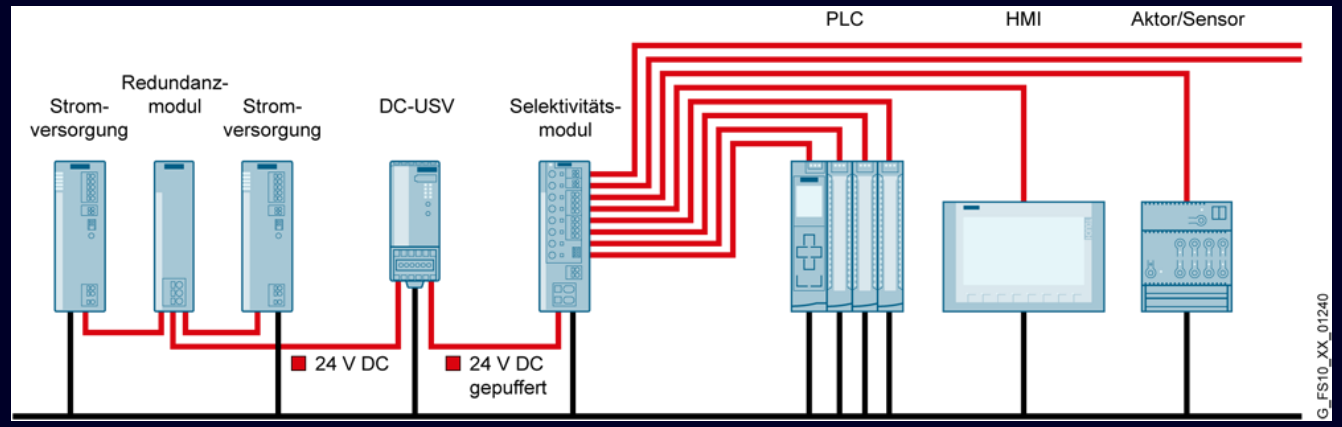
Redundancy modules SITOP RED1200

When the power supply unit fails

Redundant setup of power supply with SITOP redundancy modules



Individual configuration possible up to **complete all-round protection**

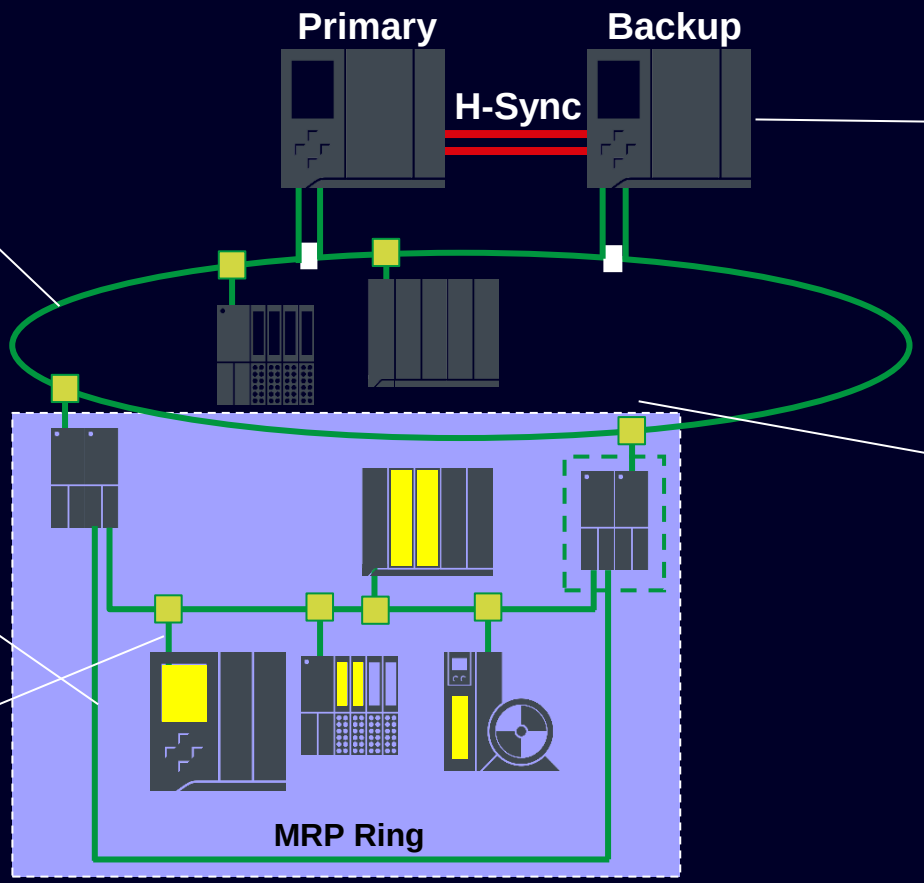
Network Configuration with S7-1500R/H

Safety Devices

(Non safe) Communication between RH and F-Controller via iDevice or Open User Communication

Optional Media Redundancy (MRP Ring) increases availability in case of network breakdown

Safety Application is located in a separated F-Controller



R/H-System (Non Safety) and connected I/O

Optional Usage of a second PN/PN Coupler to avoid a single point of failure

Safety Devices can be integrated via subordinated F-Controller and PN/PN Coupler

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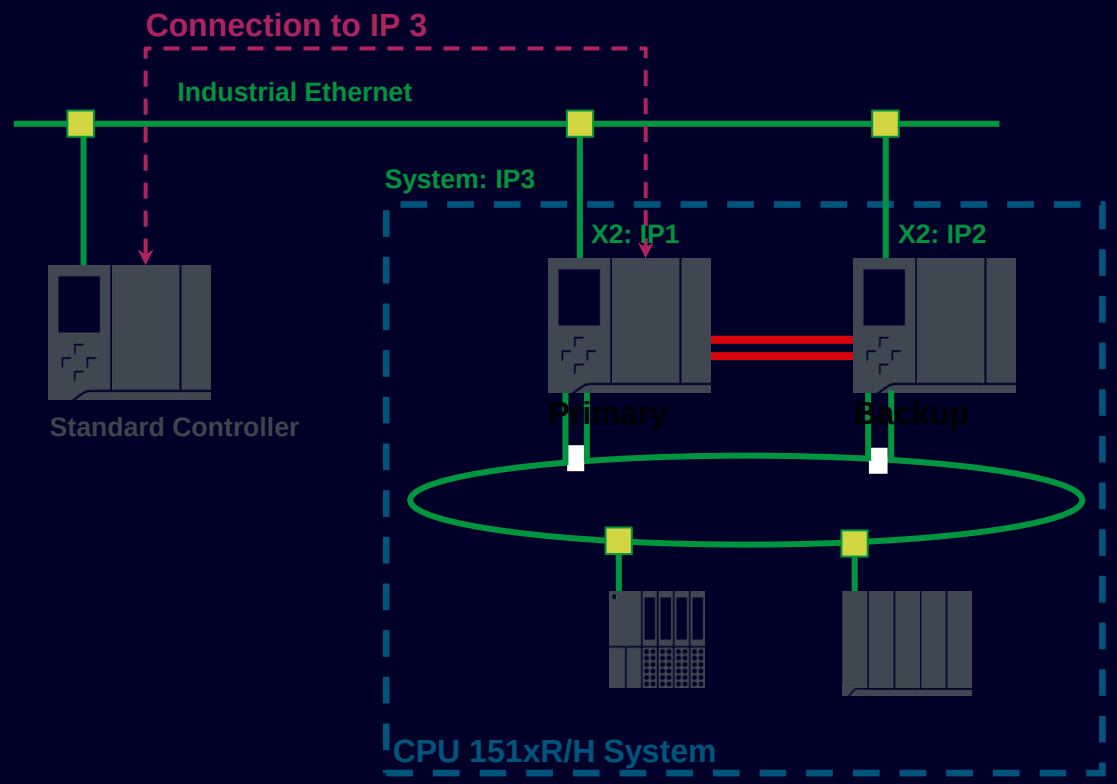
Communication System IP-Address

Using System IP instead of PLC interface IP

- Transparent communication between standard PLC and R/H-System
- The standard communication partner is automatically connected to the primary PLC



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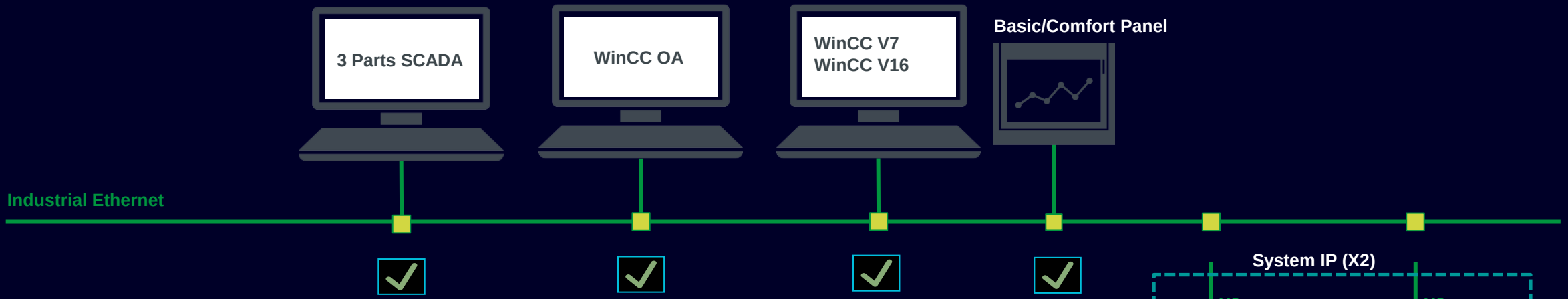
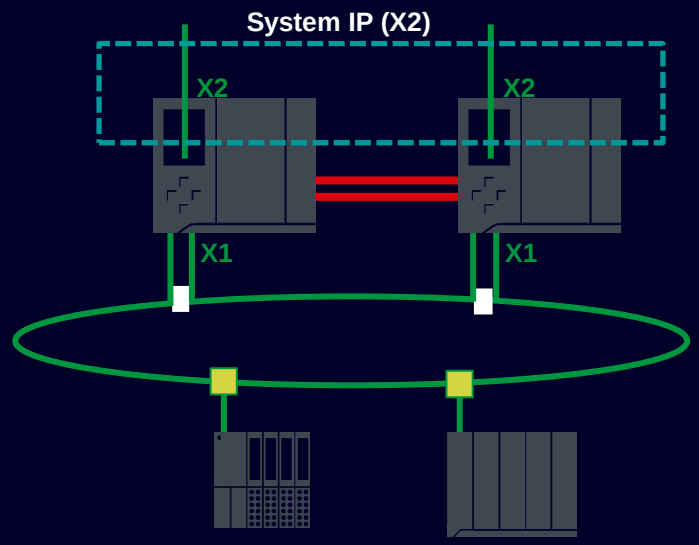
HMI Connection via 1 Network (Ring or Line)





Communication between S7-1500R/H and…	Via System-IP (One HMI-Connection)
WinCC Comfort V16 (Comfort Panels) WinCC Advanced V16 (RT Advanced)	OK
WinCC Basic V16 (Basic Panels)	OK
WinCC Professional V16	OK
WinCC V7.5	OK
WinCC OA V3.16	OK

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Redundante løsninger kan jo benyttes mange steder

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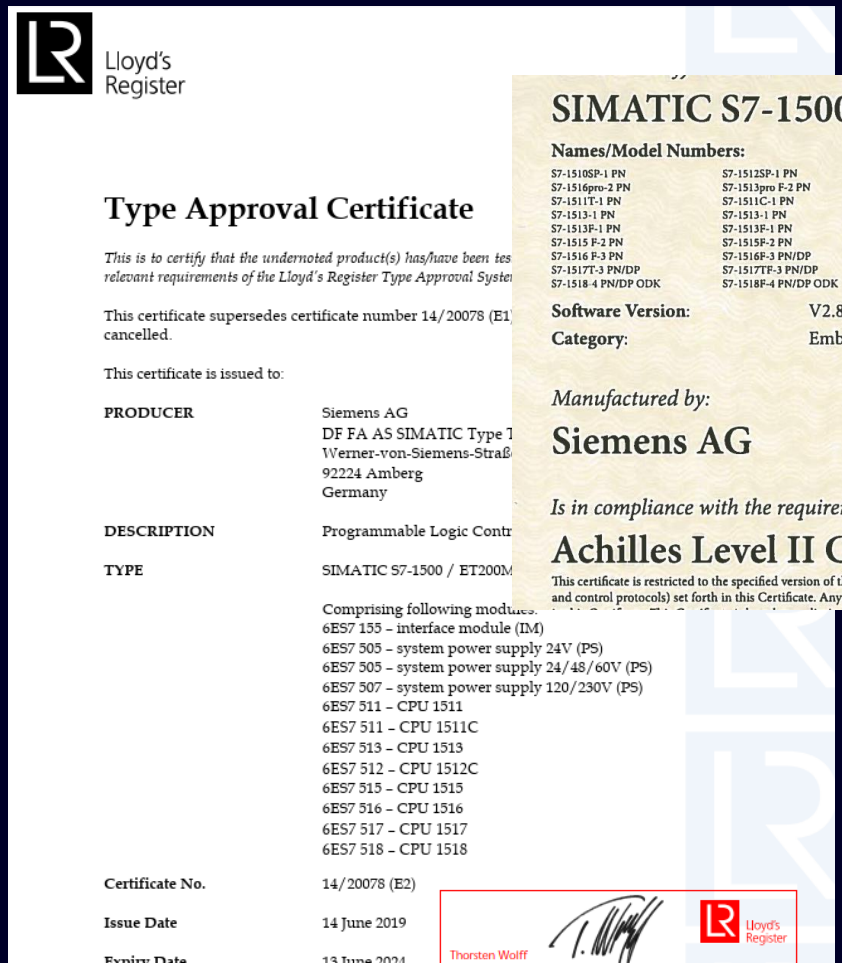
Certificates are already available



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Type Approval Certificate

This is to certify that the undernoted product(s) has/have been tes
relevant requirements of the Lloyd's Register Type Approval Syste

This certificate supersedes certificate number 14/20078 (E1
cancelled.

This certificate is issued to:

PRODUCER Siemens AG
DF FA AS SIMATIC Type T
Werner-von-Siemens-Straß
92224 Amberg
Germany

DESCRIPTION Programmable Logic Contr

TYPE SIMATIC S7-1500 / ET200M

Comprising following modules:
6ES7 155 – interface module (IM)
6ES7 505 – system power supply 24V (PS)
6ES7 505 – system power supply 24/48/60V (PS)
6ES7 507 – system power supply 120/230V (PS)
6ES7 511 – CPU 1511
6ES7 511 – CPU 1511C
6ES7 513 – CPU 1513
6ES7 512 – CPU 1512C
6ES7 515 – CPU 1515
6ES7 516 – CPU 1516
6ES7 517 – CPU 1517
6ES7 518 – CPU 1518

Certificate No. 14/20078 (E2)

Issue Date 14 June 2019

Expiry Date 13 June 2024

Thorsten Wolff

Lloyd's Register

SIMATIC S7-1500 CPU Device Series

Names/Model Numbers:

S7-1510SP-1 PN	S7-1512SP-1 PN	S7-1510SP F-1 PN	S7-1512SP F-1 PN	S7-1513pro-2 PN
S7-1516pro-2 PN	S7-1513pro F-2 PN	S7-1516pro F-2PN	S7-1511-1 PN	S7-1511-1 PN
S7-1511T-1 PN	S7-1511C-1 PN	S7-1511C-1 PN	S7-1512C-1 PN	S7-1512C-1 PN
S7-1513-1 PN	S7-1513-1 PN	S7-1511F-1 PN	S7-1511F-1 PN	S7-1511TF-1 PN
S7-1513F-1 PN	S7-1513F-1 PN	S7-1515-2 PN	S7-1515T-2 PN	S7-1515-2 PN
S7-1515 F-2 PN	S7-1515F-2 PN	S7-1515TF-2 PN	S7-1516-3 PN/DP	S7-1516-3 PN
S7-1516 F-3 PN	S7-1516F-3 PN/DP	S7-1516T-3 PN/DP	S7-1516TF-3 PN/DP	S7-1517-3 PN/DP
S7-1517T-3 PN/DP	S7-1517TF-3 PN/DP	S7-1517F-3 PN/DP	S7-1518-4 PN/DP	S7-1518F-4 PN/DP
S7-1518-4 PN/DP ODK	S7-1518F-4 PN/DP ODK	S7-1513R-1 PN	S7-1515R-2 PN	S7-1517H-3 PN/DP

Software Version: V2.8.x

Category: Embedded Devices

Manufactured by:

Siemens AG

Is in compliance with the requirements set forth by:

Achilles Level II Certification

This certificate is restricted to the specified version of the referenced Device (including model number, hardware/firmware/software version, and control protocols) set forth in this Certificate. Any change to the Device might impair the Device's ability to pass the standards referenced

CERTIFICATE OF COMPLIANCE

Certificate Number E222109
Report Reference E222109-20120626
Issue Date 2020-MAY-05

Issued to: Siemens AG
Simatic Type Test
Werner-von-Siemens-Strasse 50
92224 Amberg GERMANY

This certificate confirms that representative samples of PROGRAMMABLE CONTROLLERS FOR USE IN HAZARDOUS LOCATIONS
Refer addendum page for Models/Product

Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.

IEC IECEx

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification System for Explosive Atmospheres
for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.:	**IECEx DEK 13.0010X**	Page 1 of 4	Certificate history:
Status:	**Current**	Issue No: 26	Issue 25 (2019-11-18)
Date of Issue:	2020-03-03		Issue 24 (2019-10-07)
Applicant:	**Siemens AG** Werner-von-Siemens-Straße 50 92224 Amberg **Germany**		Issue 23 (2019-05-01) Issue 22 (2019-03-13) Issue 21 (2018-05-29) Issue 20 (2018-02-27) Issue 19 (2017-10-11) Issue 18 (2017-05-03) Issue 17 (2017-03-20) Issue 16 (2017-02-17)
Equipment:	**Programmable Logic Controller Systems SIMATIC ET 200MP and S7-1500, Modules Type 6ES7 ...**		
Optional accessory:			
Type of Protection:	**Ex nA**		
Marking:	Ex nA IIC T4 Gc		

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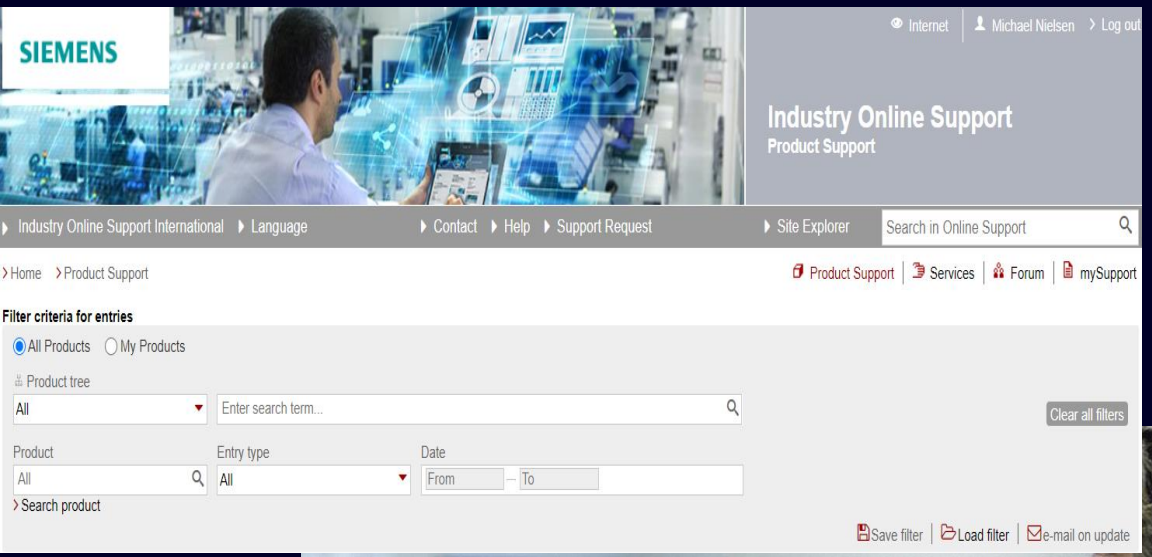
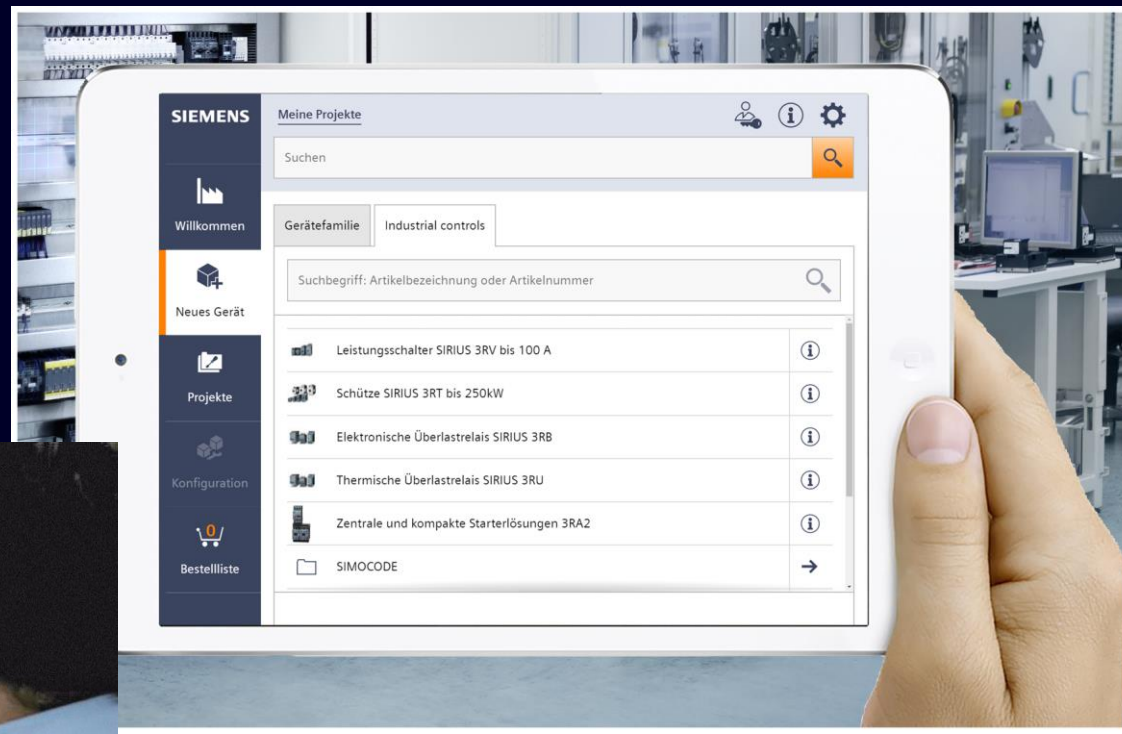
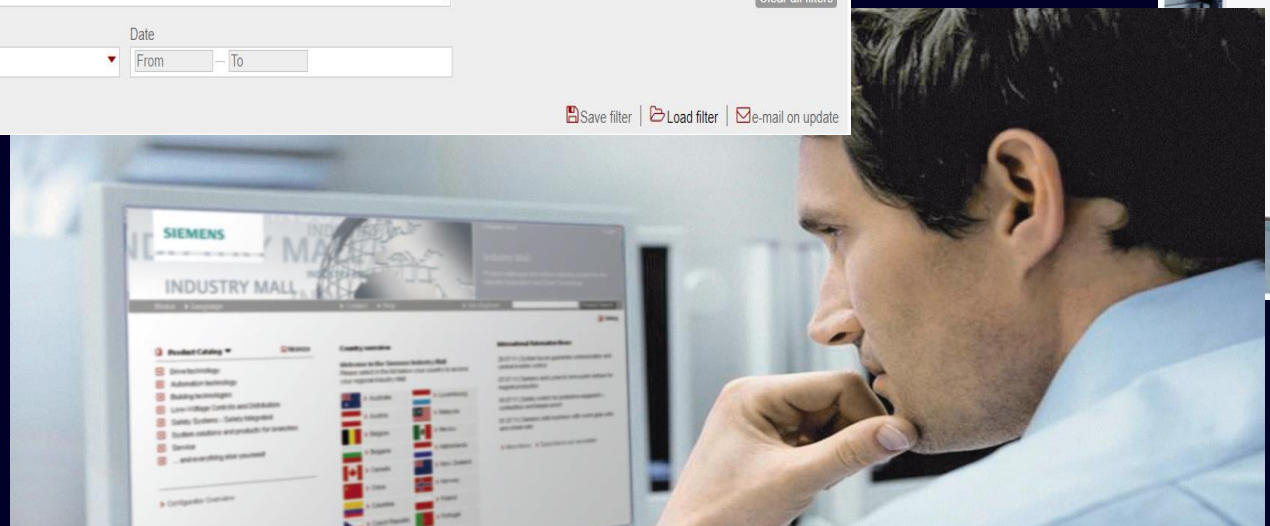
TIA Selection Tool, Mall og Siemens Industry Online Support

www.siemens.com/tst







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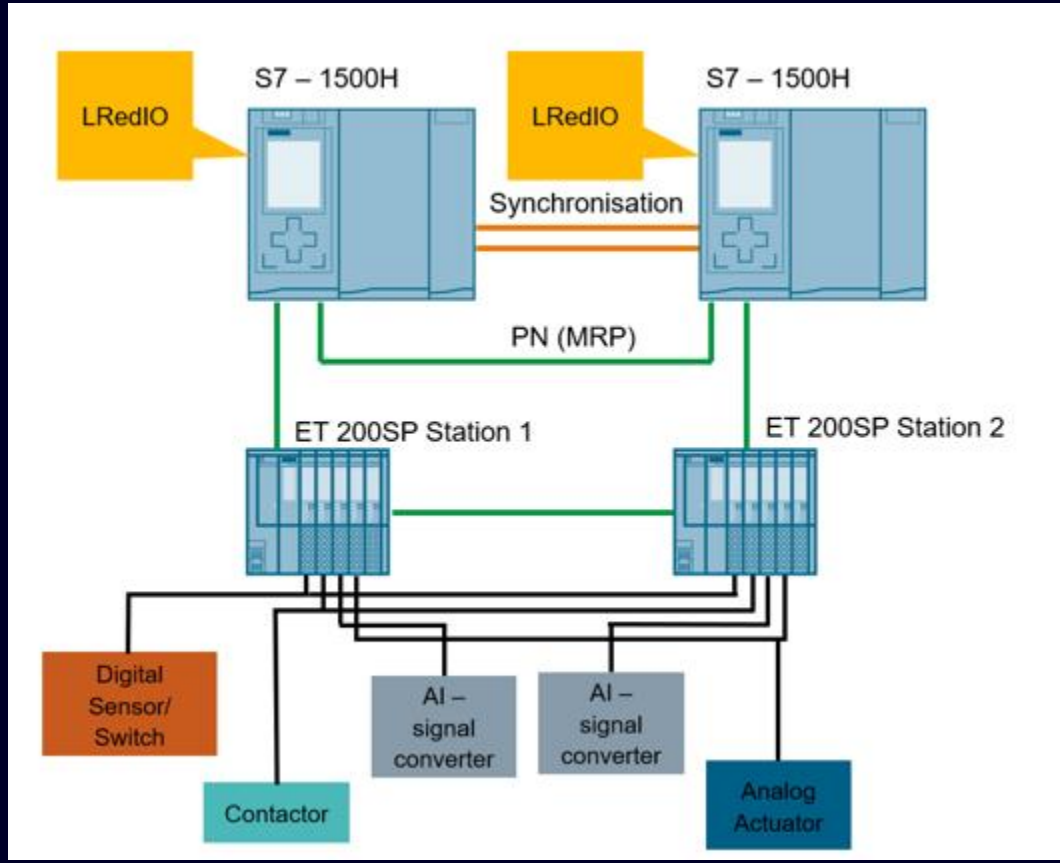
Application example

Redundante I/O med FAQ: 109767576

- Redundant Digital Inputs
- Redundant Analoque Input
- In one station
- In several stations
- Can also be used in standard controller solutions
- Library and documentation is free of charge



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What will we see in the future

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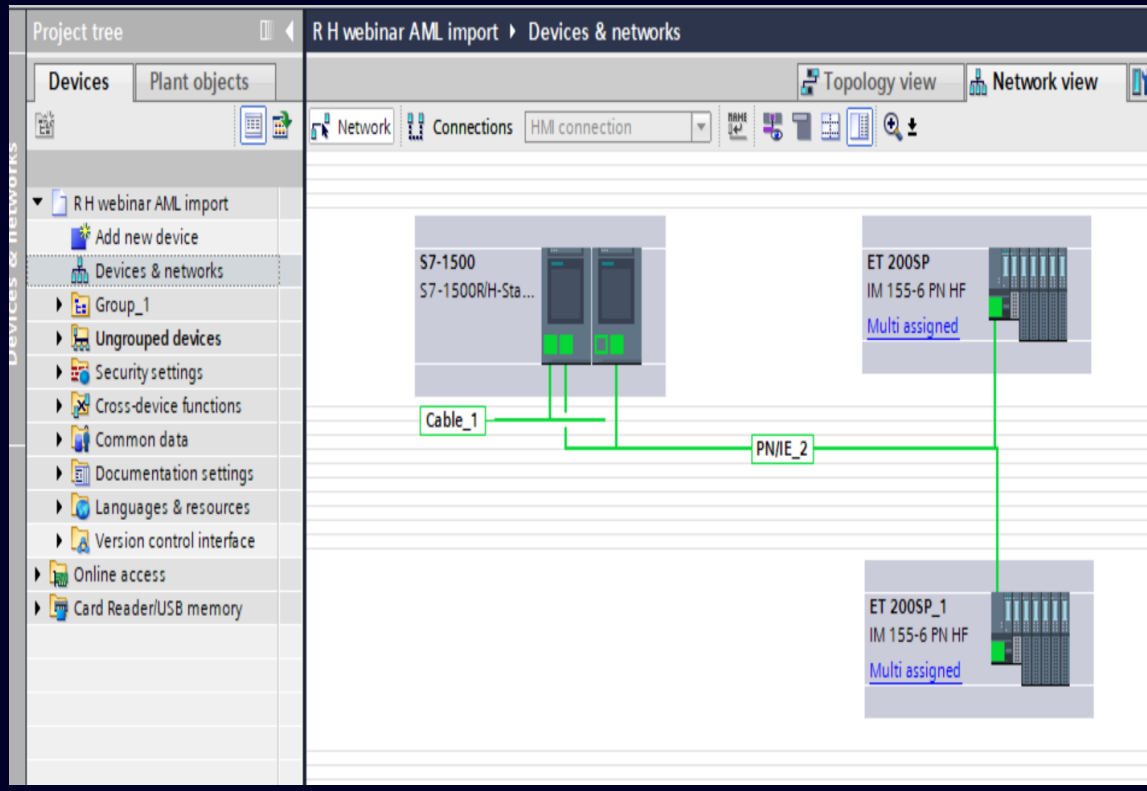
Wrap up…

- Kan benyttes af alle med kendskab til TIA-portalen
- Tilgængelig for alle
- Ingen yderligere software er nødvendig
- Bestående projekter kan genbruges
- Prisen passer til applikationen
- Alle PROFINET devices kan benyttes
- Fleksibilitet
- Security er indbygget fra start af



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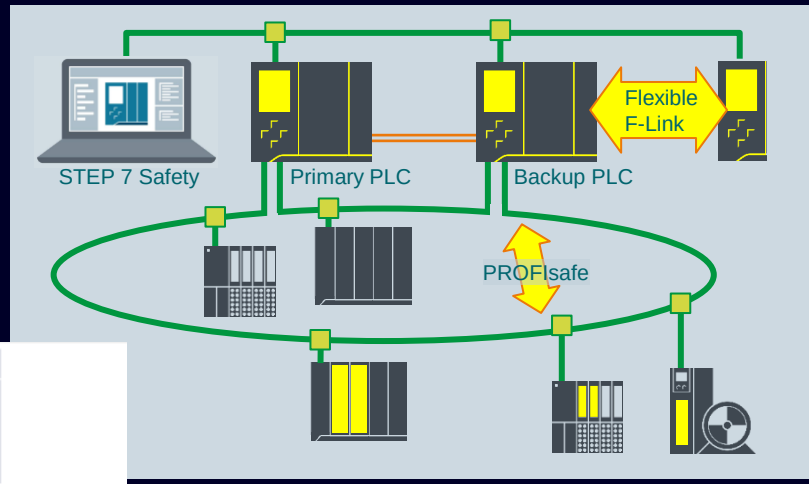
New in V17

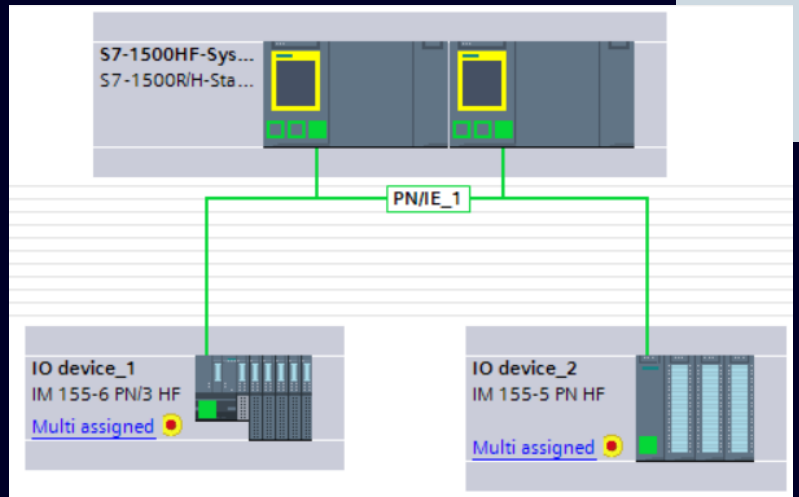
Safety for redundant systems

Safety applications also for the redundant controllers

High availability + Failsafe = CPU HF

- Engineering in STEP 7 Professional (TIA Portal) V17 and STEP 7 Safety
- Safety programming just as easy as the standard Fail-safe PLC
- Support PROFIsafe communication
- Support Flexible F-Link (Secure failsafe Controller/Controller communication)
- Fast- commisioning for decreasing change over time





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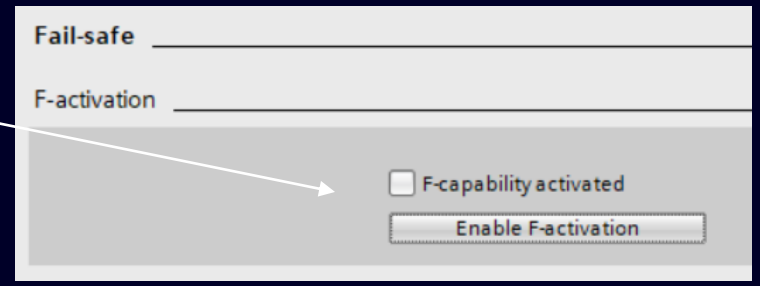
New in V17

CPU 1518HF-4 PN
Safety, More memory, 3. PN interface

CPU 1518HF-4 PN

- For Safety- and Standard applications
- 3 Ethernet-interfaces for communication
  - X1 (2 Ports): Profinet RT
  - X2 (1 Port): Profinet basicfunctions, 100MBit/s
  - X3 (1 Port): Profinet basisfunctions, 1 Gbit/s
- 9 MB memory for Code
- 60 MB memory for data
- Can also be used as Non-Safety H-Controller
  Extra IP Adresse
- Same cabinet as CPU 1517H
- Same optional modules as CPU 1517H



Aktivierung / Deaktivierung der F-Funktionen

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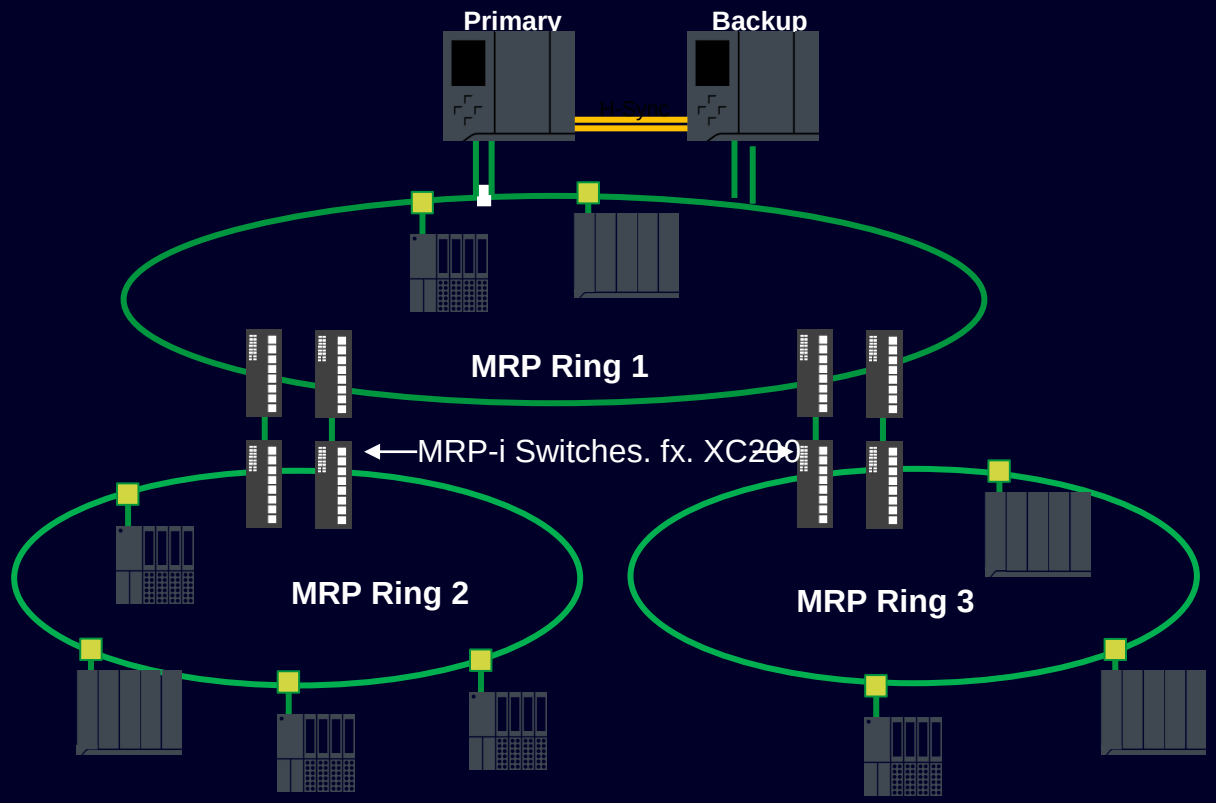
New in V17

MRP Interconnect
Connections of several MRP rings



- MRP-Interconnect switches gives til possibilty to connect several MRP rings.
- Because of the redundante Switch-Architecture will the communication lines be on-line even if a failure happen with a switch.
- Each Ring can be used with up-to 50 devices
- Can be used with these SCALANCE Switches:
  XR500, XM400, XC200, XF204 and XP2000, XM400, XC200, XF204-2BA, XP200

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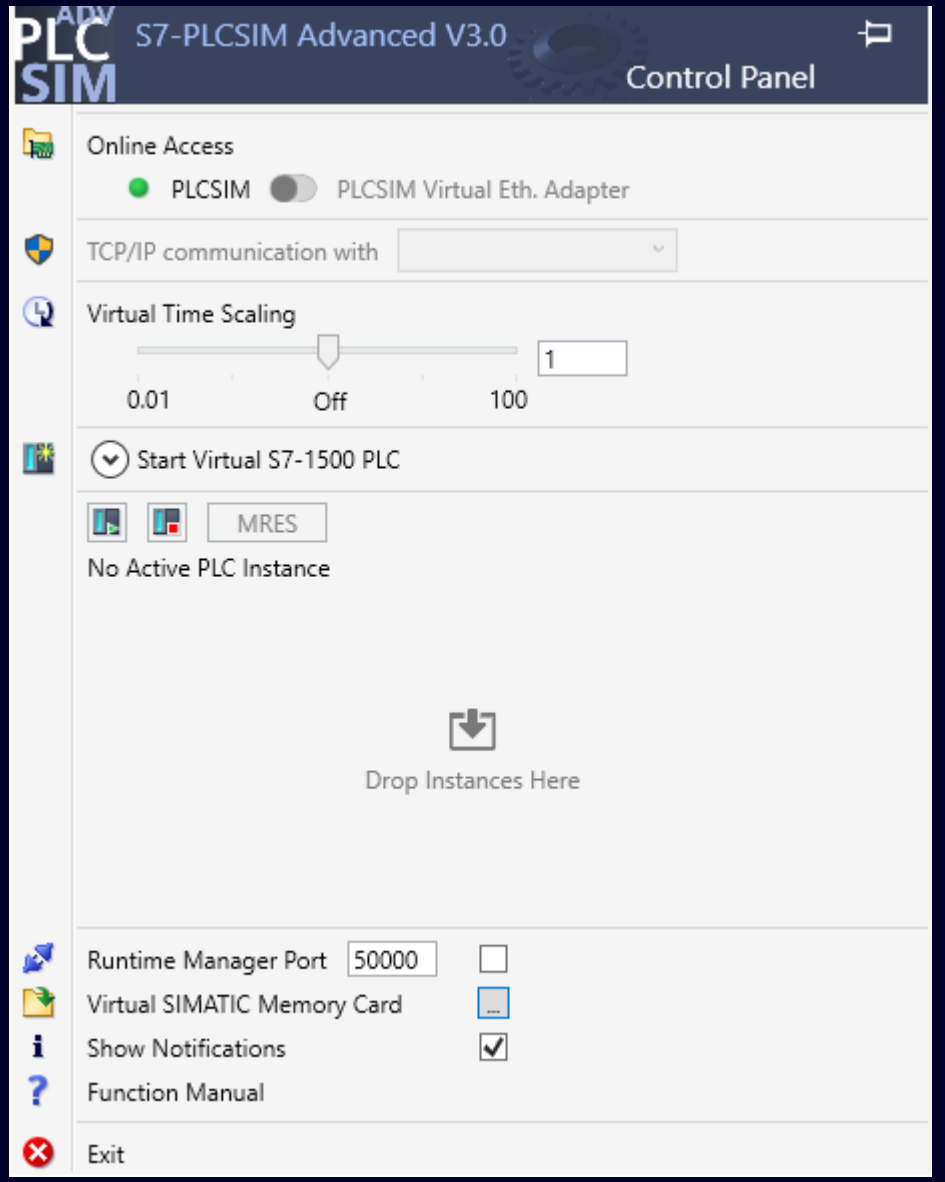
New in V17

Support of S7-1500R/H in PLCSIM Advanced
Simulation of the R/H-Program in Solo-Mode

- With PLCSIM Advanced V4.0 is it also possible to test the user program for R/H CPUs in the simulated world.
- The Simulation is in the RUN-Solo Mode of the system
- The instruction for the redundant status (fx. SYNCUP controlling) will be updated, but not has no impact on the simulation



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