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Control Systems and Components

Webinar training for PCD3.M6860

Power CPU with 2 Ethernet interfaces

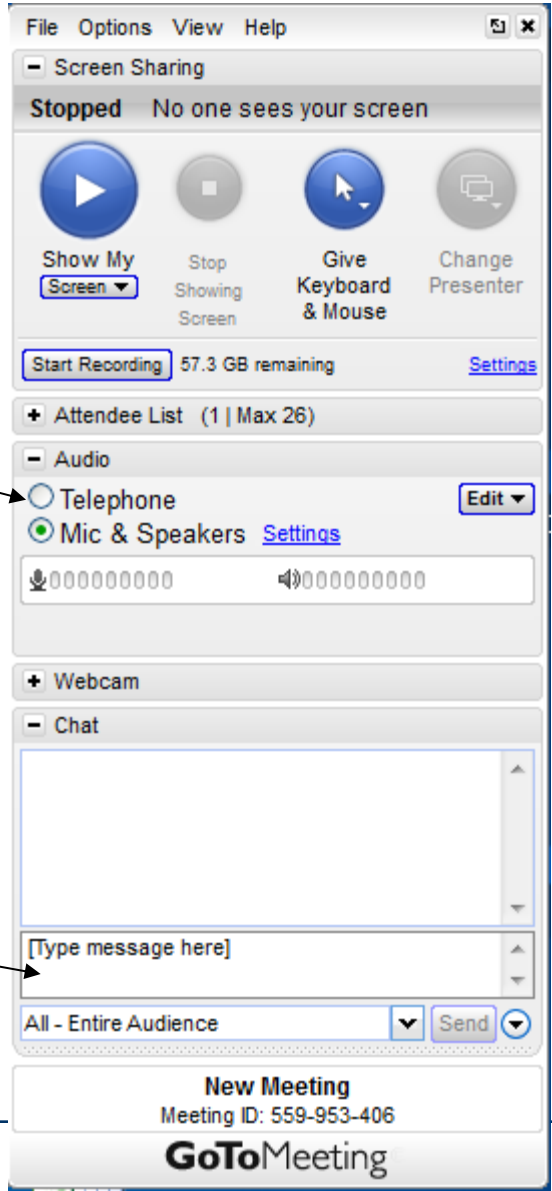
March 2013, U. Jäggi & M. Montani

How to use the webinar software?

The whole webinar session will be recorded and the video will be made available for download afterwards

In case of a bad voice quality click here and establish a phone call using the dial number sent by email.

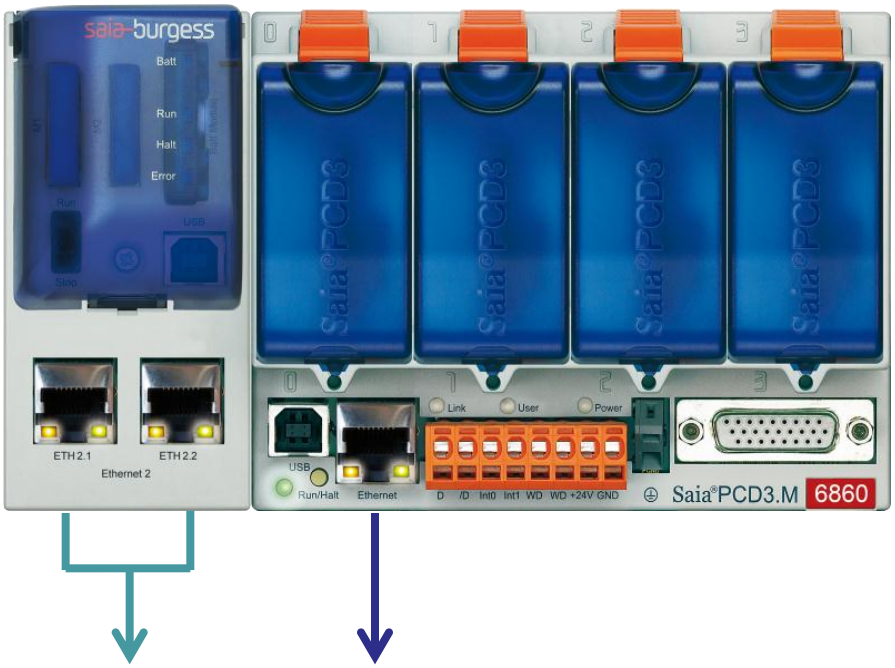
Questions can be asked using the chat function. During the session we will mute your microphone and cannot here you!



Program

- Introduction
- Actual status of PCD3.M6860
- Features and use cases
- IP addressing
- Life demonstration → Michael Montani
- Good to know
- Example of a pilot project

New application possibilities with CPU PCD3.M6860

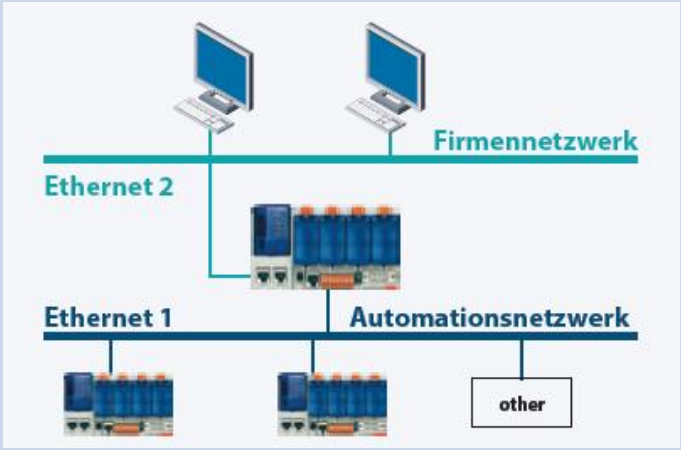


Ethernet 2
(2 port switch)

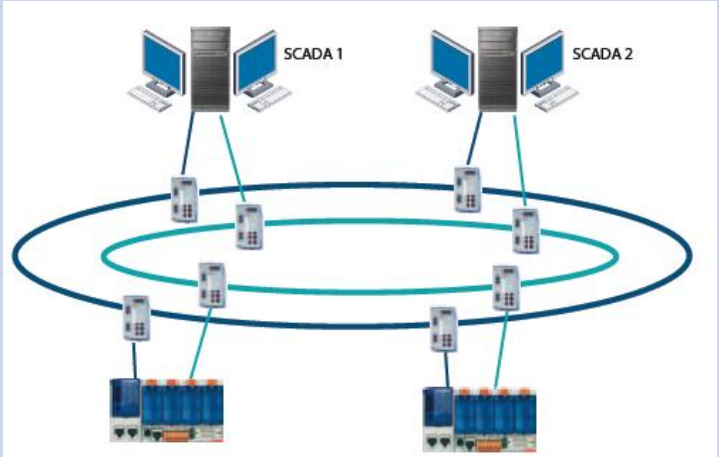
Ethernet 1

Based on PCD3.Mxx60 CPU platform
Technical data are identical to PCD3.M5560 apart from the second Ethernet interface (in place of the serial interfaces)

Separating Ethernet networks



Redundant Ethernet networks



CPU PCD3.M6860 actual status

Release for pilot customers: November 2012

Delivered to customers: 45 pcs by end of Febr. 2013

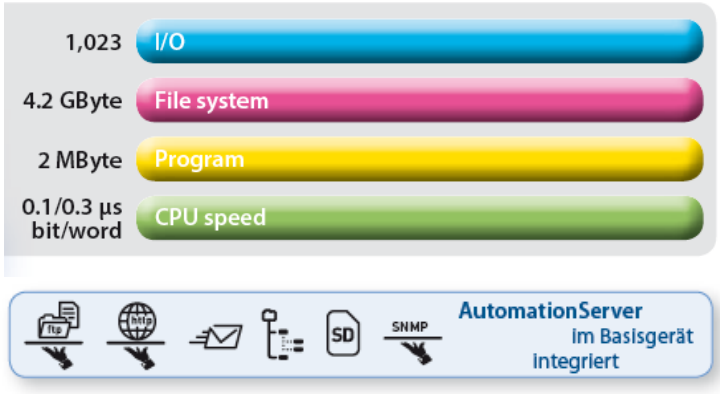
Pilot customers:
- Airbus, France / SI: Verdone (Building Automation)
- TEVA, Netherlands / SI: IHCS (Building Automation)
- Brunvoll, Norway (Ship truster control)
- Mecnafer, Italy (Grinding machines for railway tracks)
- Strabag, Germany (Facility management/building automation)
- Eurodiesel, Belgium (No-Break power system (UPS))
- Groupe E, CH (Power distribution)
- Alstom, CH (Power plants)

Release for unconditional sales: planned for begin of April 2013

Webinar for Sales companies planned for 27th March 2013

PCD3.M68060 features and technical data

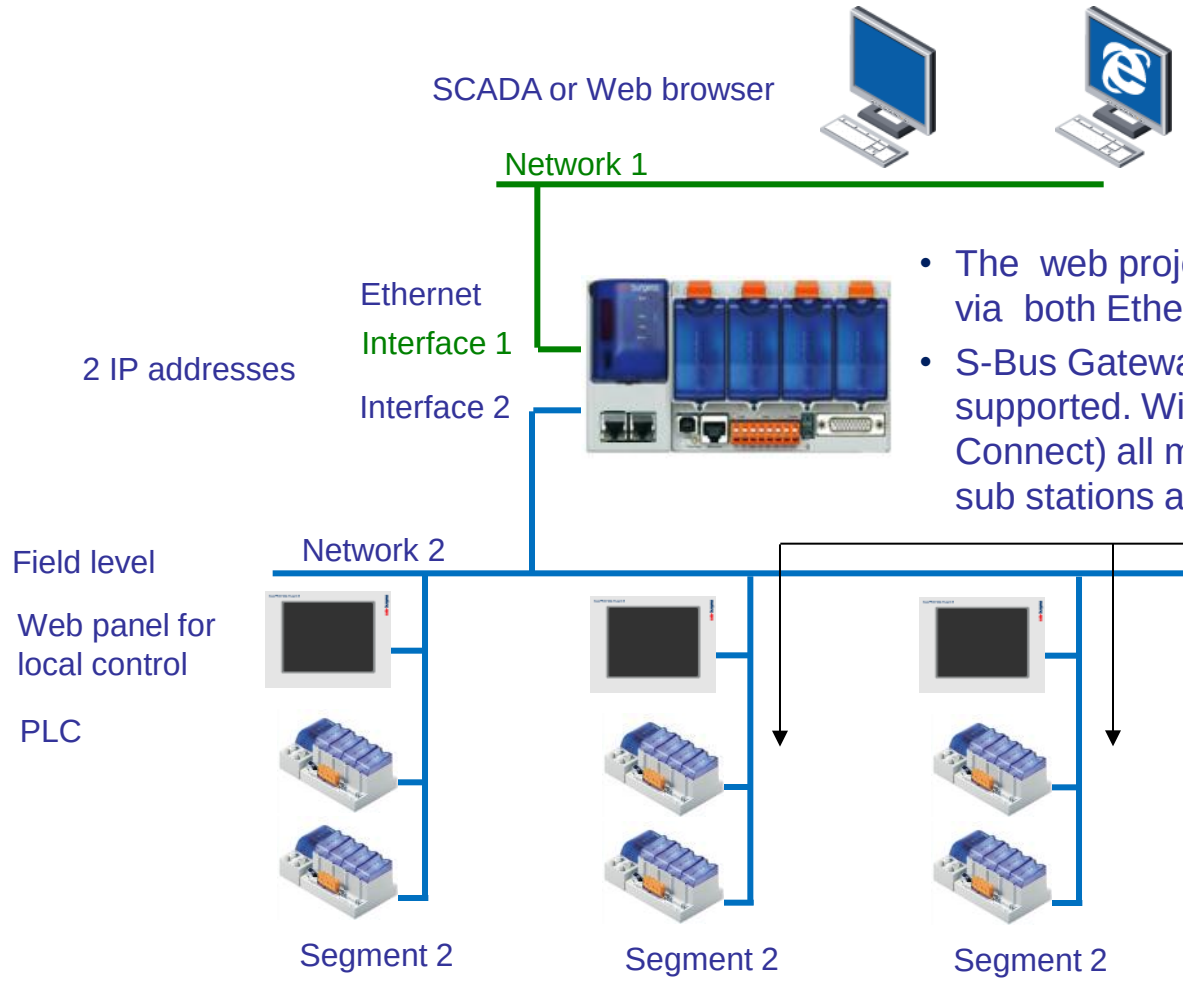
Based on PCD3.Mxx60 CPU platform



- Both Ethernet interfaces have independent IP configuration. The IP addresses must not be in the same subnet
- IP routing between the two interfaces is not supported
- S-Bus Gateway function between the two interfaces is supported
- BACnet and LonIP are supported on Ethernet interface 1 only !
- Other IP protocols (HTTP, SNMP, SNTP, SMTP, S-Bus, Modbus-IP, etc.) are supported on both interfaces simultaneously
- The AutomationServer and PCD data (R, F, DB/Text,…) are accessable via both interfaces simultaneously
- Access with PG5 programming tool via both interfaces

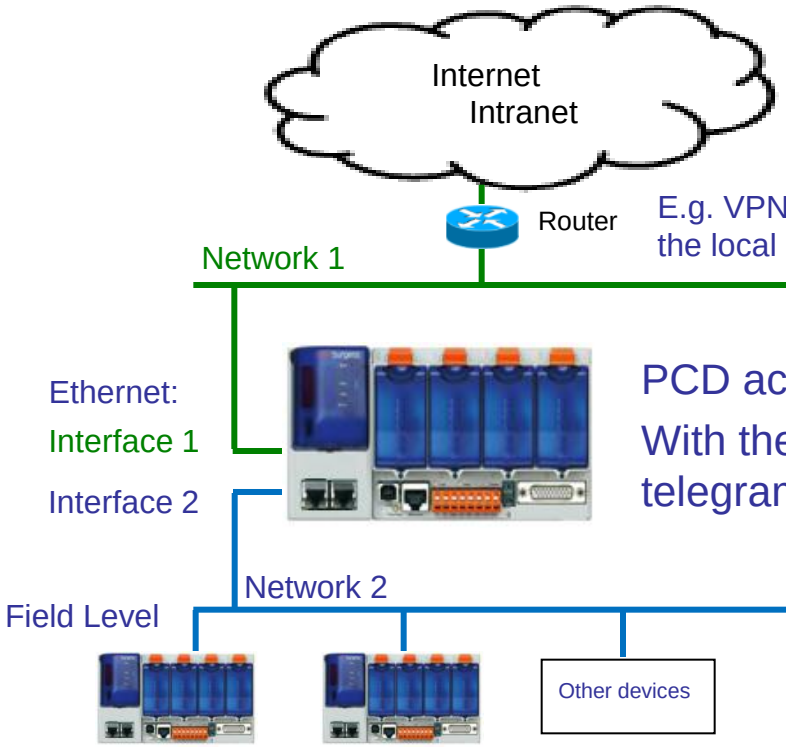
Use case A separate networks
1) 'Local' Access

Separate management network from "control" network.



- The web project on the PCD3.M6860 is accessible via both Ethernet interfaces
- S-Bus Gateway from one network to the other is supported. With http over S-Bus (requires Web-Connect) all media and files e.g. web pages of the sub stations are accessible.

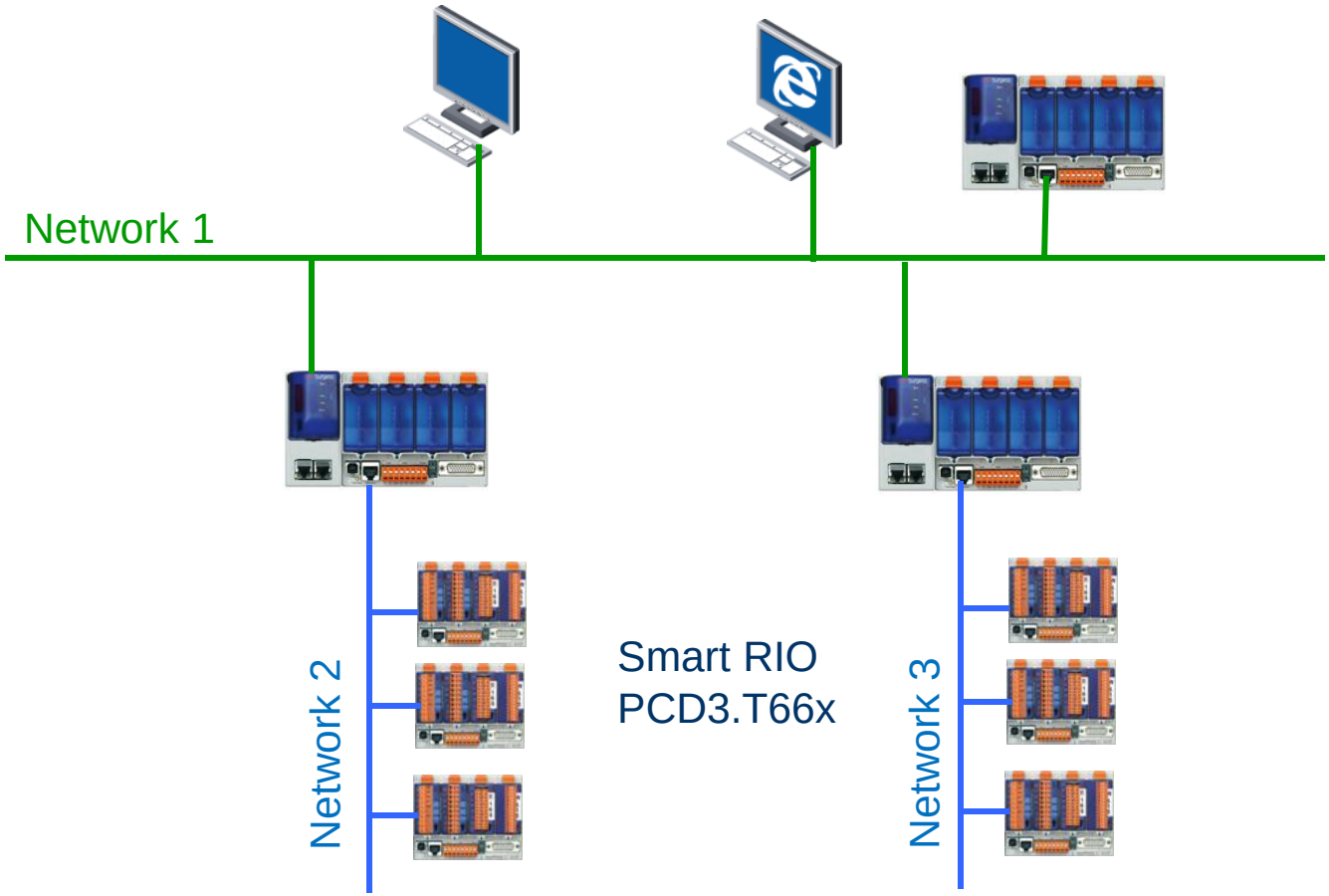
Use case A separate networks
2) Remote Access idem to A1)



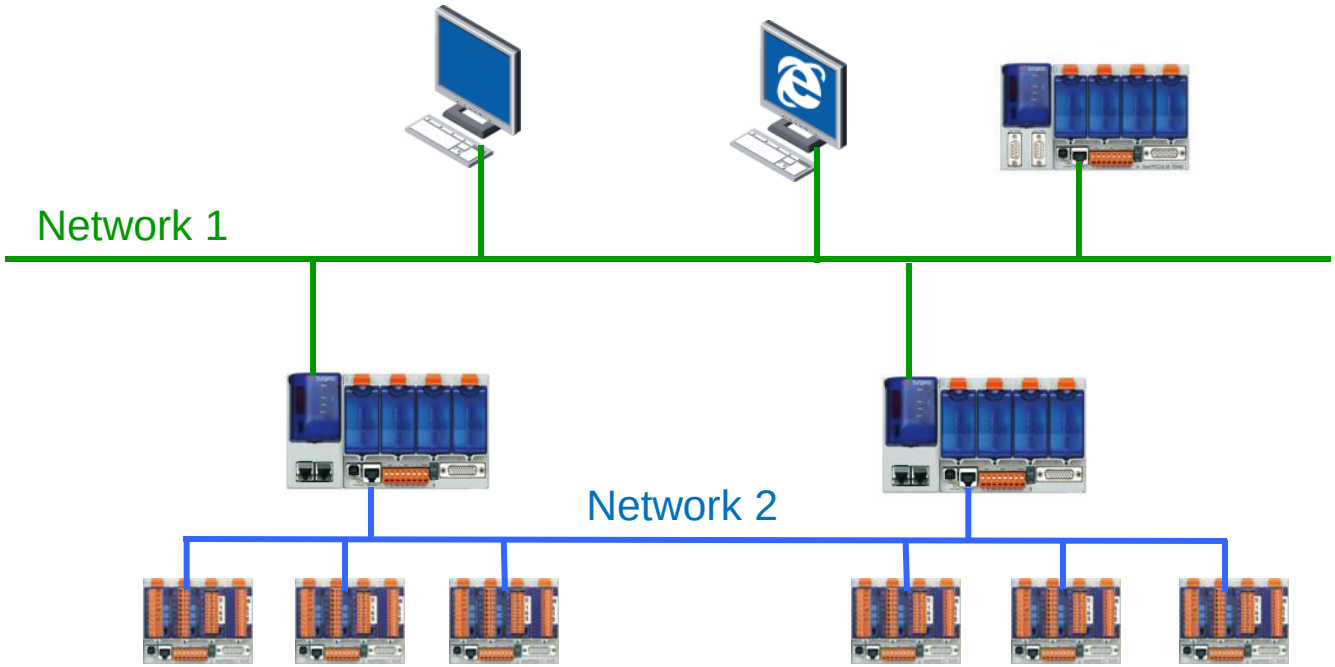
PCD acts like a firewall for IP protocols

With the gateway function only S-Bus telegrams are transferred from ETH1 to ETH2

Use case A separate networks
3) Smart RIOs on separate network for each CPU

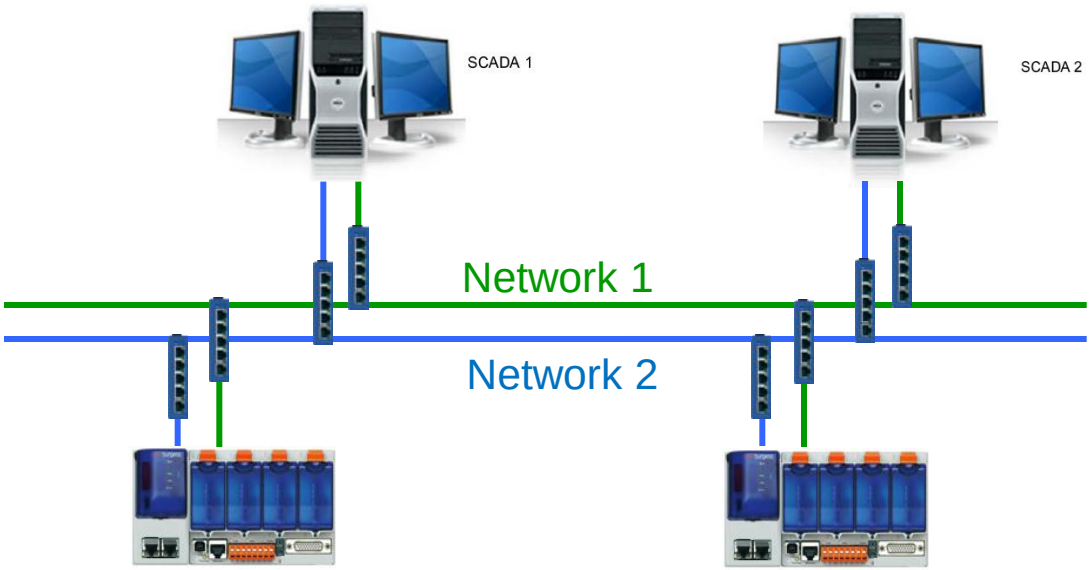


Use case A separate networks
4) Smart RIOs and CPU‘s on common network

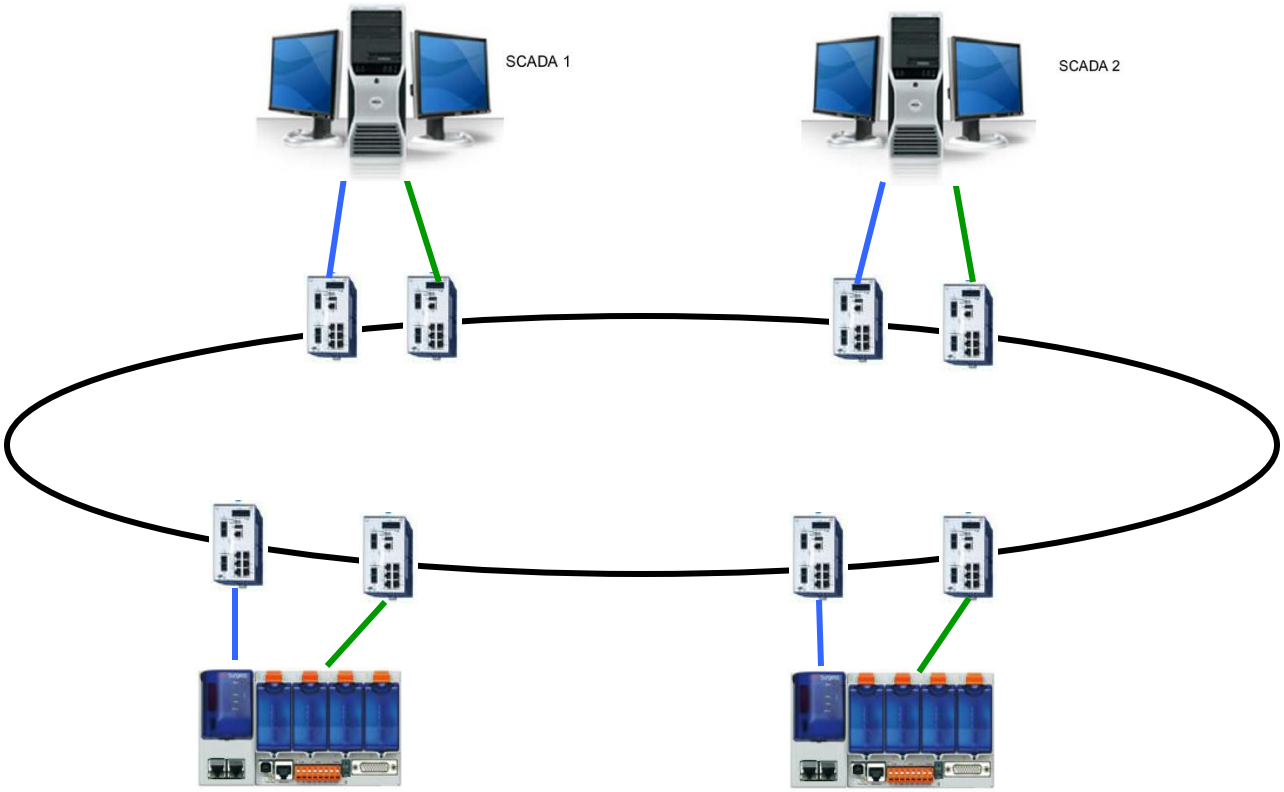


RIOs can be on the same physical network

Use case B: redundant communication on network
1) Line/Star topology using standard network components

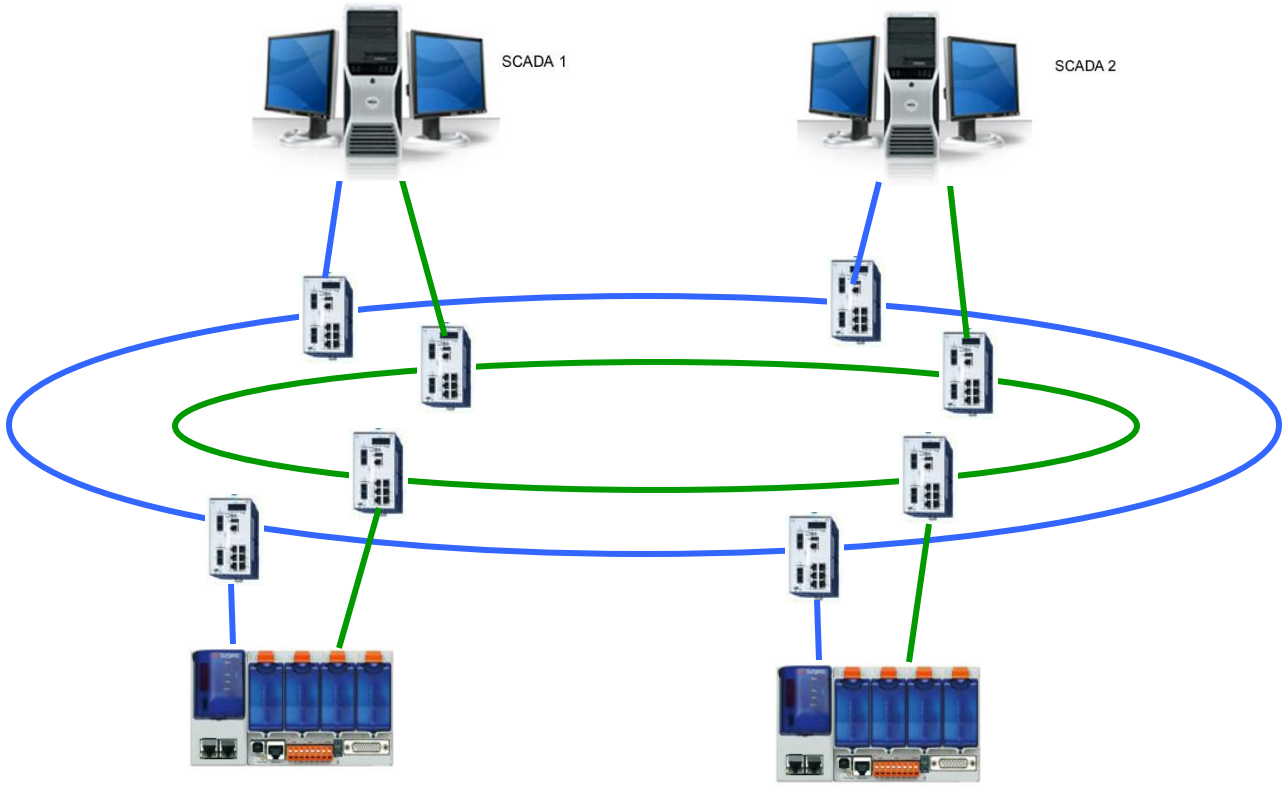


Use case B: redundant communication on network
1) one simpe ring



The Switches must support ring topology

Use case B: redundant communication on network
2) two seperate rings



IP addressing general rules

Ethernet 2
IP: 172.23.1.1
Subnet mask:
255.255.255.0
Default gateway:
0.0.0.0

Ethernet 1
IP: 172.23.2.1
Subnet mask:
255.255.255.0
Default gateway:
172.23.2.10

IP address	172	23	2	1
	10101100	00010111	00000010	00000001
AND				
Subnet mask	11111111	11111111	11111111	00000000
	255	255	255	0
=				
Net address	10101100	00010111	00000010	00000000
	172	23	2	0
	Net ID			Host ID

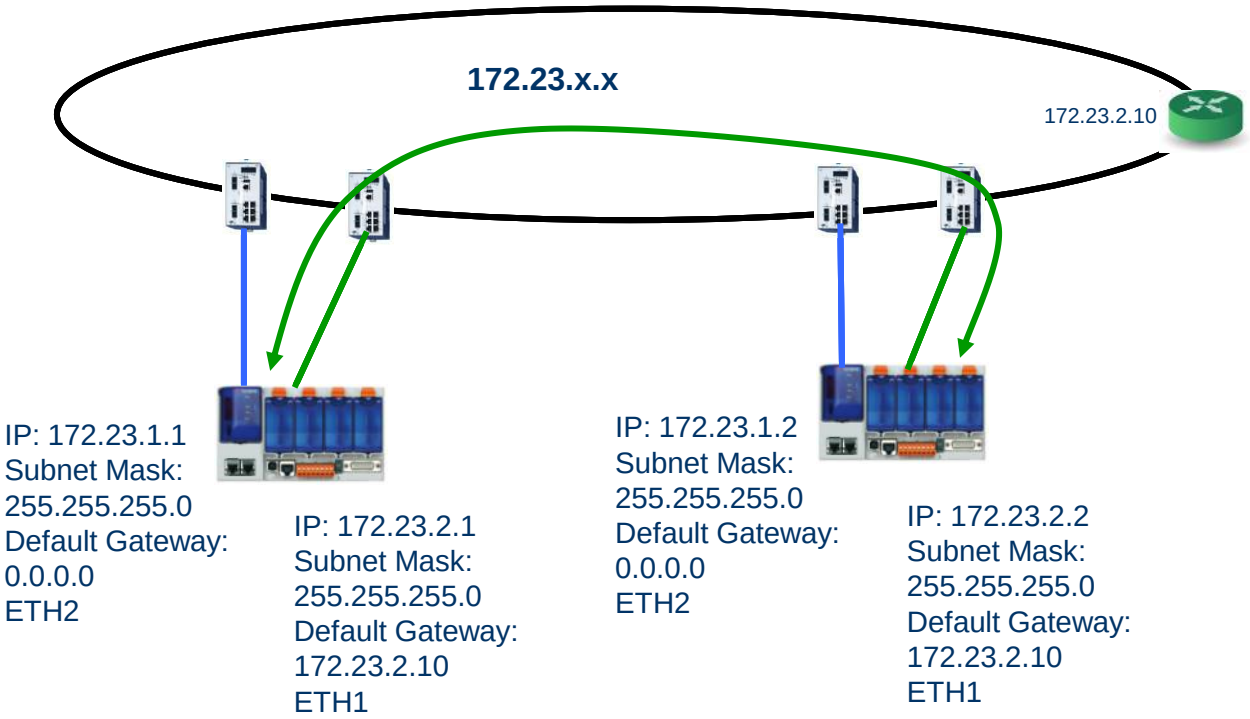
- Both interfaces are separate and have independent IP configuration
- The IP addresses must not be in the same subnet
- The selection of Ethernet interface 1 or 2 is done automatically according to the IP configuration
  More info http://de.wikipedia.org/wiki/Netzmaske
- If the destination station is neither in network 1 nor 2 then the telegram is always sent to the default gateway (router) of Ethernet interface 1. Static routes or metric is not supported
  More info http://de.wikipedia.org/wiki/Metrik_(Netzwerk)

Examples:
Destination station: 172.23.2.54
→ transmission via Ethernet 1

Destination station: 172.23.1.12
→ transmission via Ethernet 2

Destination station: 192.168.12.143
→ transmission via Ethernet 1 to the default gateway

IP addressing example for redundant communication programmed in the PG5 user application program



Left PCD communicates with PCD on the right

- Default communication interface is Ethernet 1

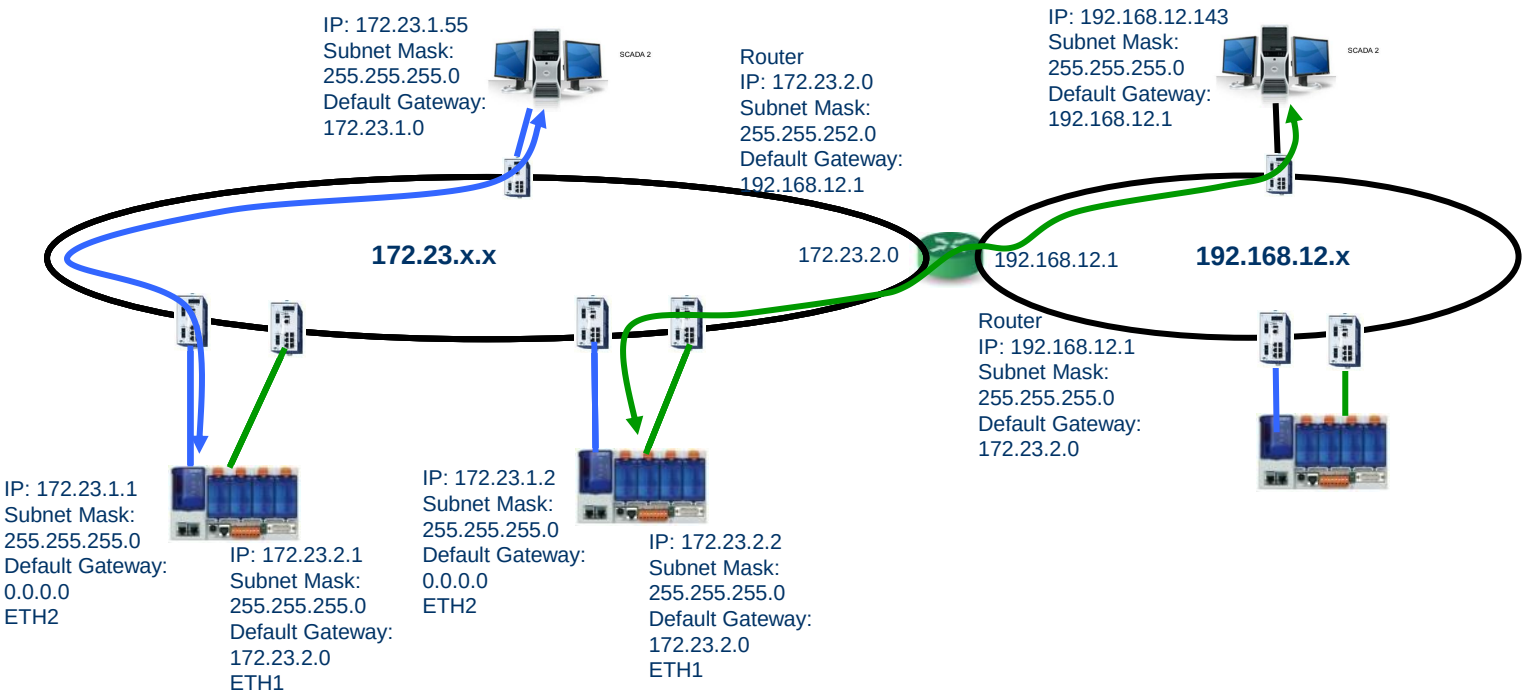
→ Destination station 172.23.2.2 → Ethernet 1 is used

In case this does not work destination station 172.23.1.2 has to be used

→ Ethernet 2 is used

For more details refer to the PG5 programming example

IP addressing example for redundant communication to remote stations via router



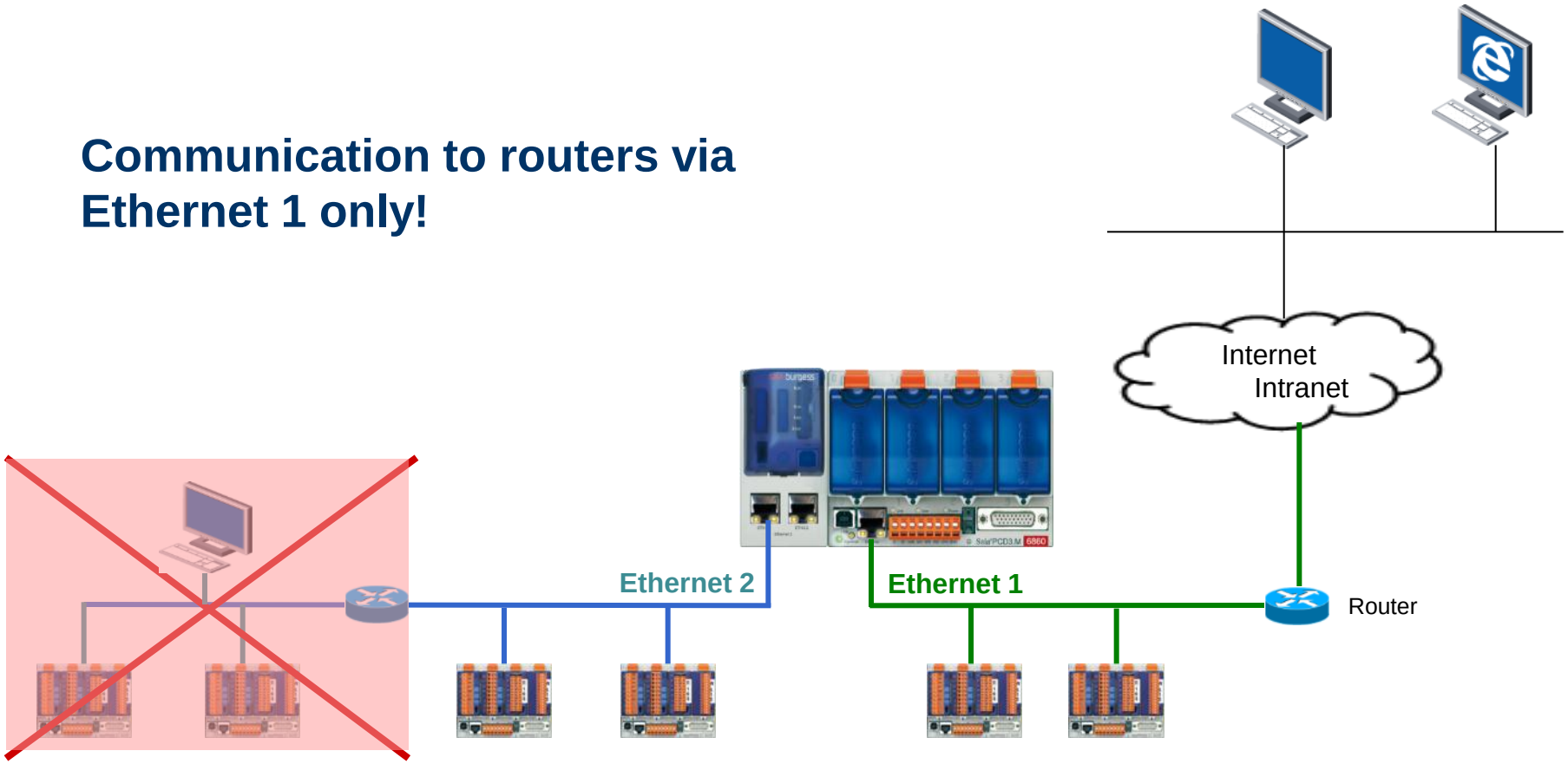
The PCD on the right communicates with the PC 192.168.12.143

→ PCD checks: 192.168.12.143 in the subnet as Ethernet 1? → NO
→ PCD checks: 192.168.12.143 in the subnet as Ethernet 2? → NO
→ PCD sends telegram to the default gateway 172.3.2.0 via Ethernet 1

The same scenario applies for the communication between two PCDs on different subnets
→ Since telegrams to a router are only transmitted via Ethernet 1, redundancy is not possible in routed networks

Communication via router

Communication to routers via Ethernet 1 only!



Software/Firmware versions and documentation

PG5: from $2.1.030, recommended V2.1.100

Firmware main CPU: in production 1.20.25, recommended 1.20.29

Firmware Ethernet extension: 1.20.20

Booter Ethernet extension: 1.20.20

Firmware update: PCD3.M6860_FW_update_description.pdf

Quick start guide: GettingStarted_PCD3.M6860 E2.pdf

System Catalogue:

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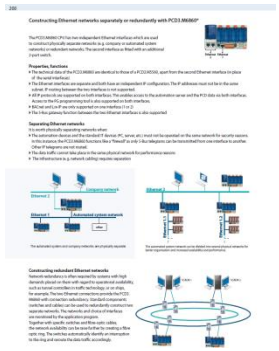
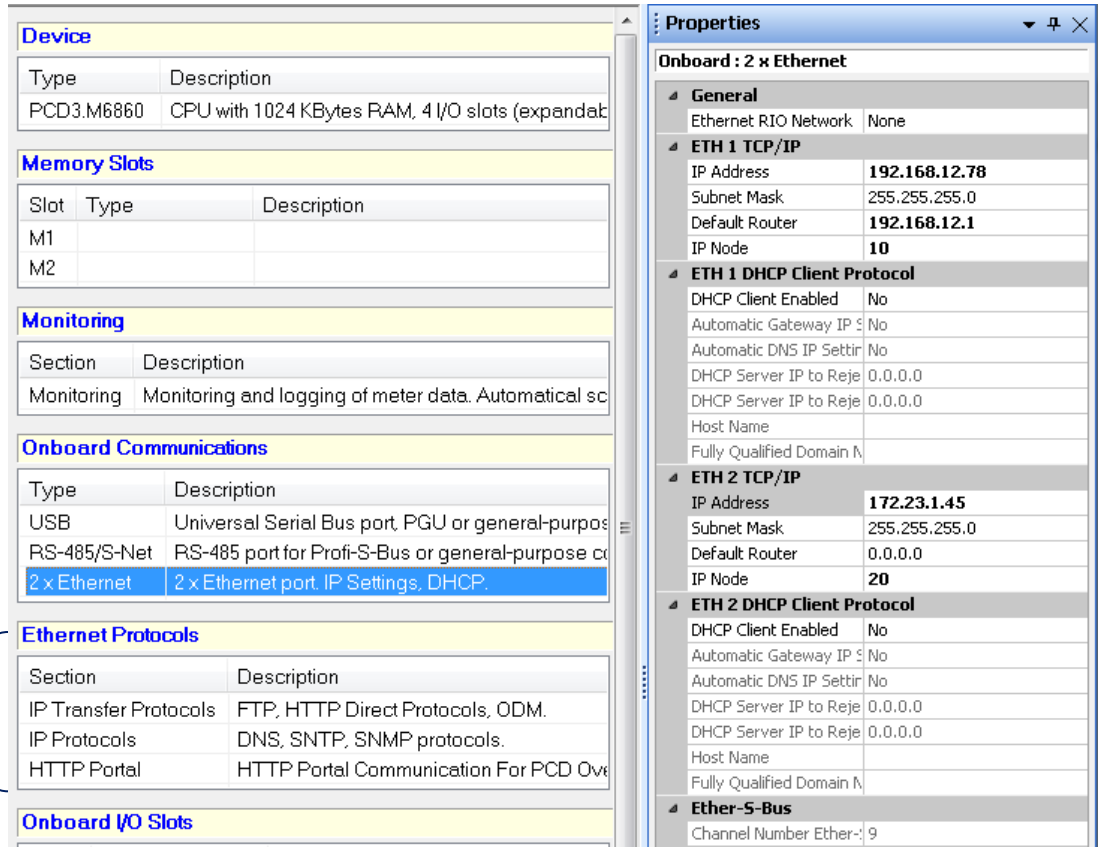


PG5 settings in device configurator



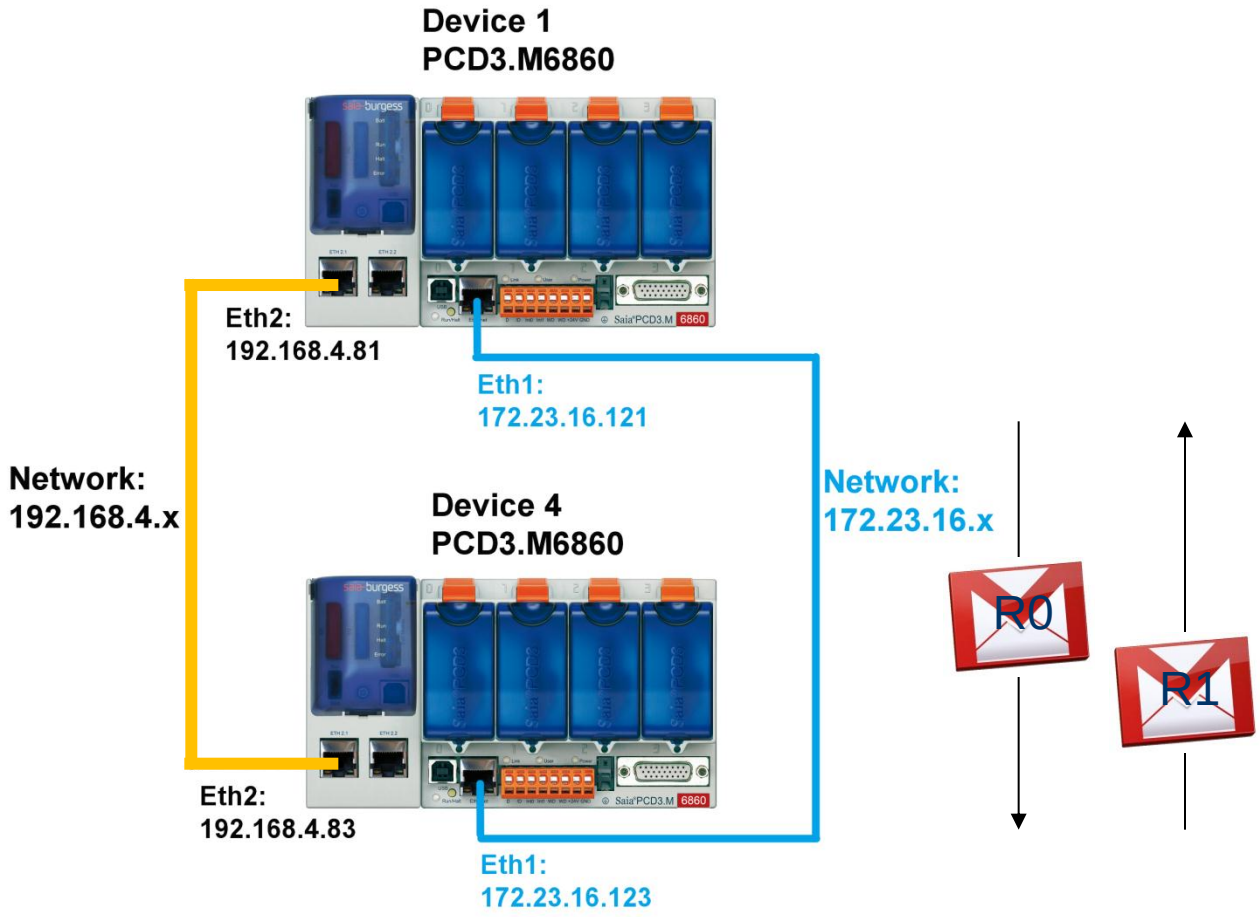
Common IP settings for ETH1 and ETH2

Separate IP settings for ETH1 and ETH2

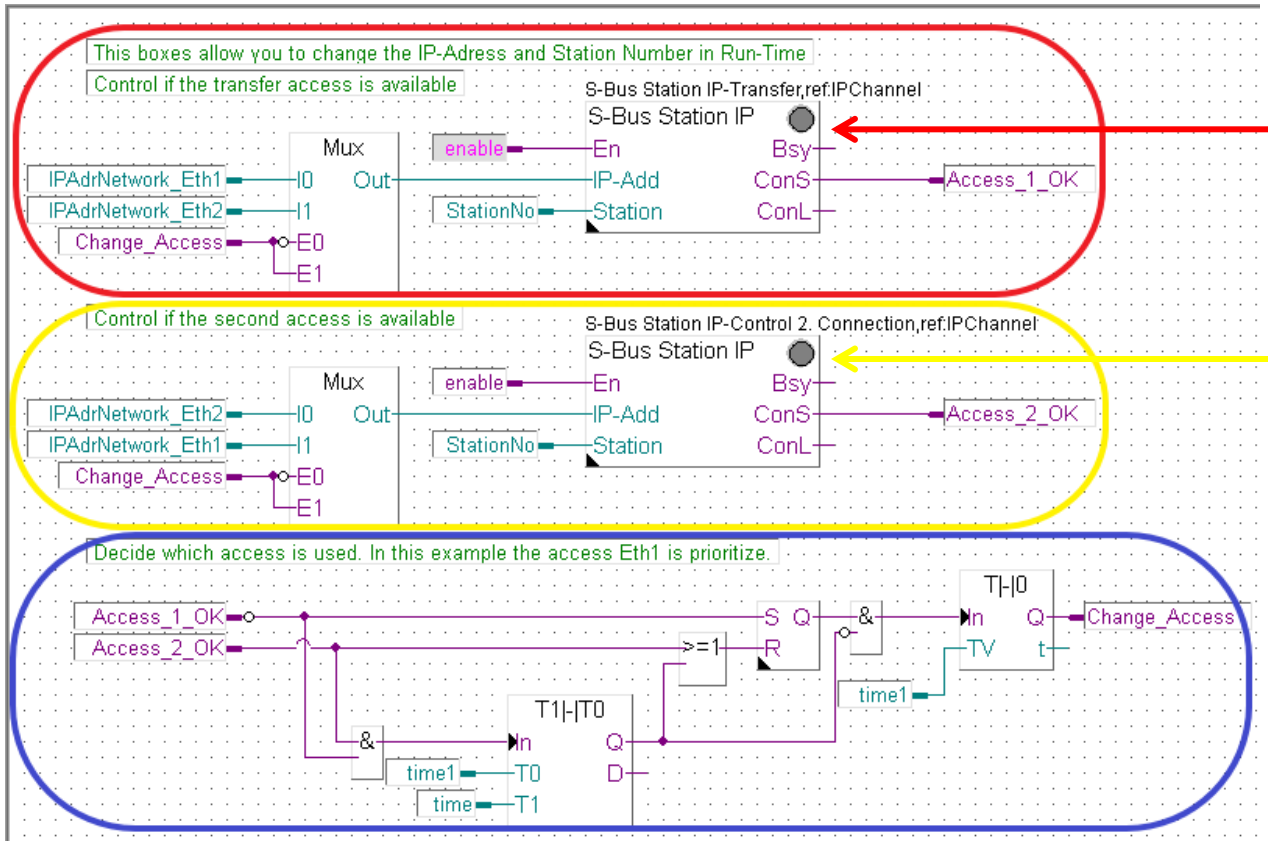
Life demonstration → Michael Montani

- PG5 project for redundant PCD-PCD communication
- Communication with OPC-Server

Redundant Network with two PCD3.M6860



Program explanation of the second page

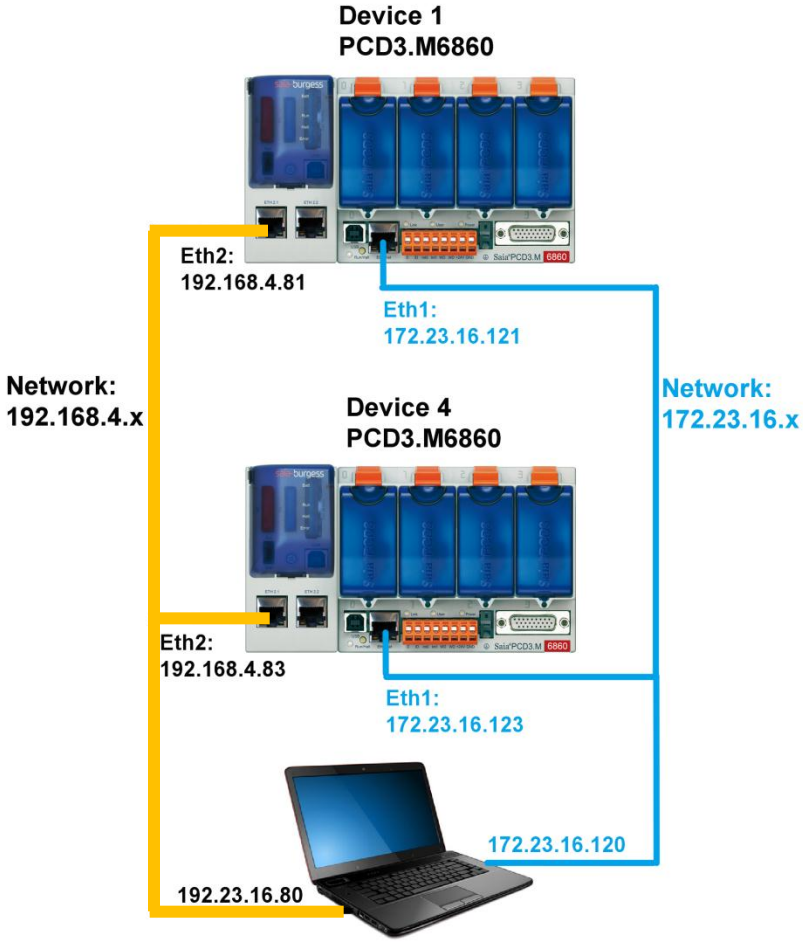


Reference Fbox over the Registers are send.

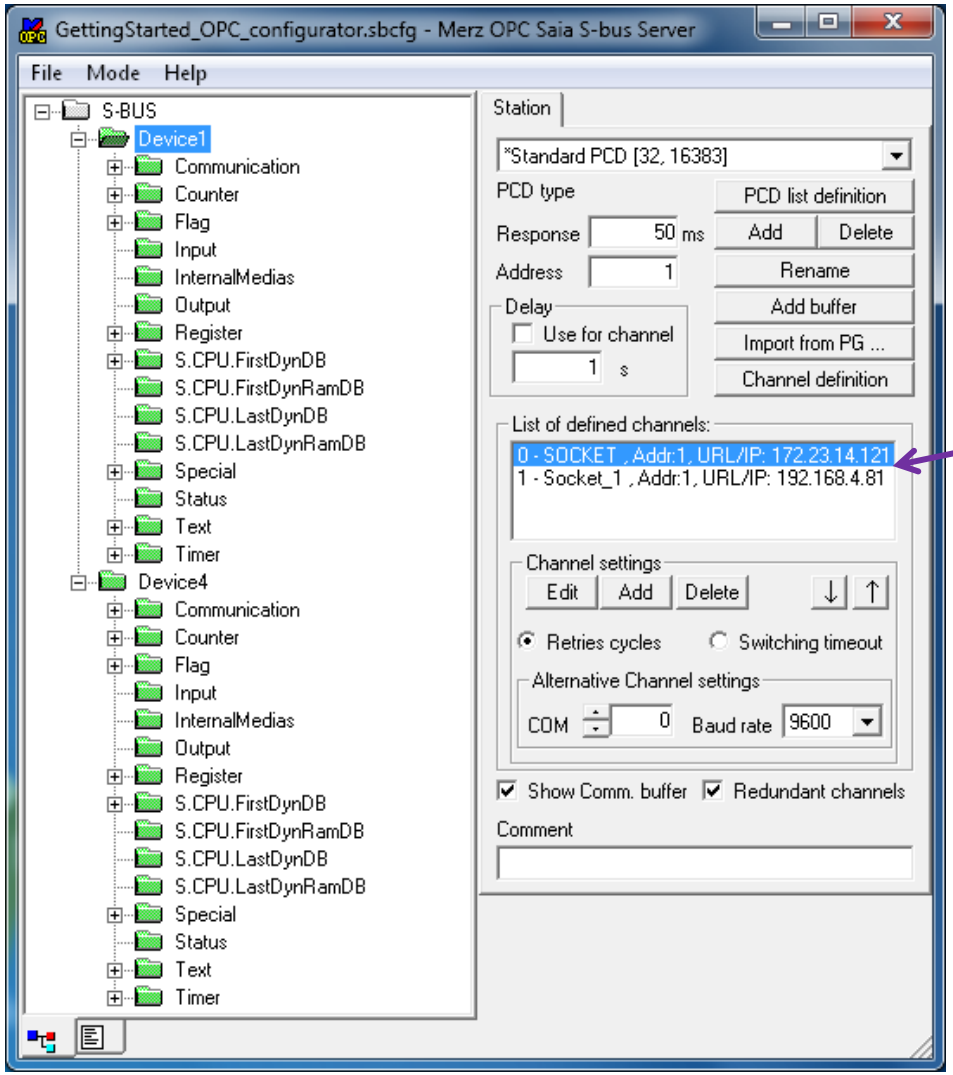
Reference Fbox which control the second IP-Address.

Decide which IP-Address should be used

Communication with OPC Server

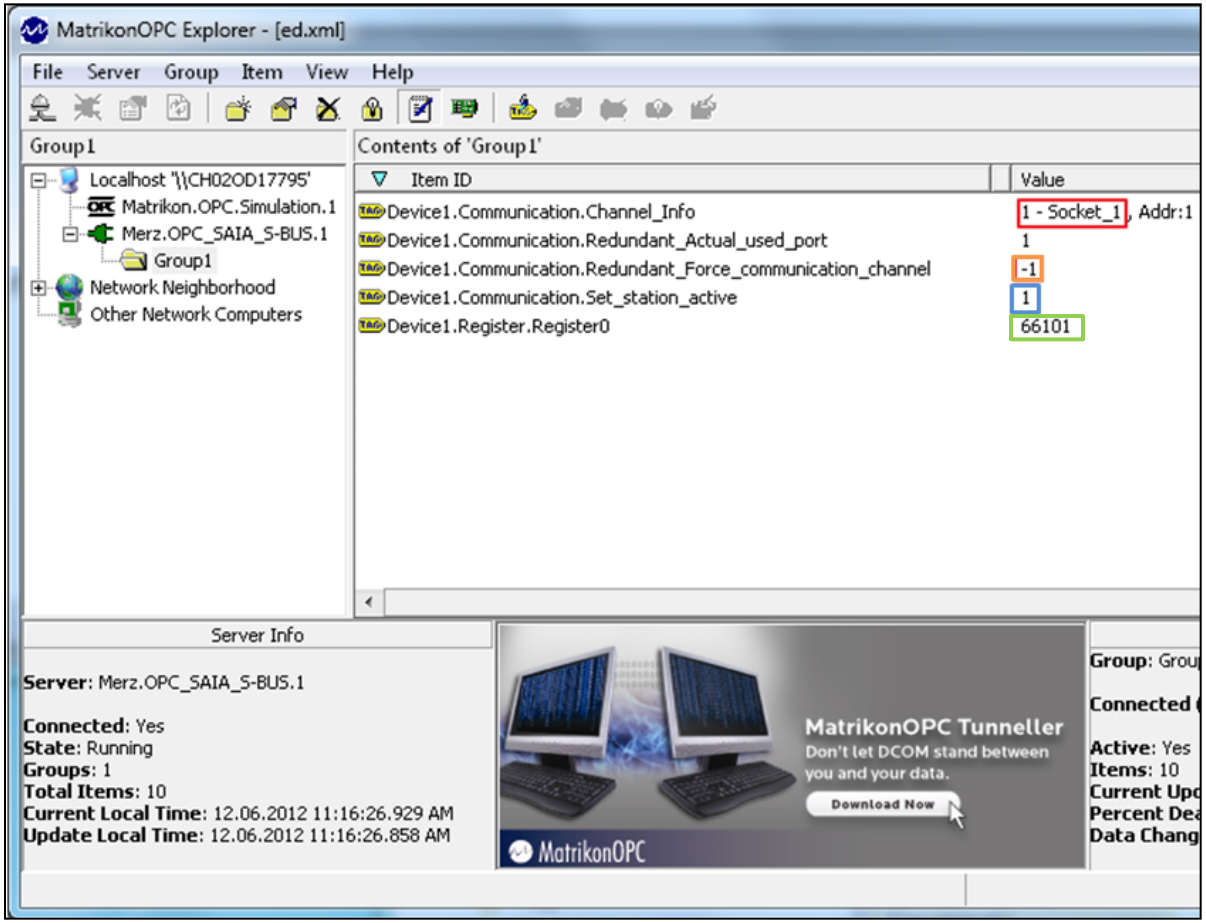


Merz OPC-Server



Set both IP-Addresses

Matrikon OPC Explorer



IP-Address which is used
0 = blue network
1 = yellow network

Force which IP-Address should be used
0 = blue network
1 = yellow network
-1= automatic mode

set device active

value of Register

Good to know

USB connector on extension is not used. Can only be used for FW download if there is no FW (Booter only). FW download normally goes via USB 1 and Ethernet (1 or 2).

Performance

- There are 2 Ethernet interfaces but only one CPU which processes the communication → communication performance is not increased
- Communication via Ethernet 2 uses (about 2x) more CPU power than communication via Ethernet 1
- Communication via Ethernet 2 is slower (about 2x) than via Ethernet 1
- If there is heavy communication on both Ethernet interfaces the user program execution is slowed down correspondingly

Reference project
TEVA Pharmaceutical Industries Ltd., Netherlands

End user/operator: TEVA Pharmaceutical Industries Ltd.

Systemintegrator: IHCS Industrial HVAC Control Solutions B.V.

Task:

- Renovation of HEVAC installations for Office, Logistics and Production buildings
- The exisiting old Johnson Controls Systems have been replaced by Saia PCD
- HEVAC control for clean room production with high requirements for control of air pressure, temperature and humidity as well as high availability of the IT network

Commissioning: December 2012

Reference project
TEVA Pharmaceutical Industries Ltd., Netherlands

Tasks and Objectives:

- Iconics Building Management System with BACnet/IP communication to the PCD HEVAC controller. IT network is built with redundant fibre optical ring
- Because of lack of IP addresses a separate Ethernet automation network for the communication (Modbus-TCP) with frequency converter drives
- BACnet Trend logs on PCD3.R600 SD-Flash memory modules
- HEVAC control application with PG5 DDC-Suite application library
- 5.7'' Micro-Browser Web panel for local operation
- PCD3 I/O modules with manual operation and separated 24VDC power supply (UPS powered)

Implementation:

6 x PCD3.M6860 with 2 x Ethernet, BACnet PCD7.R561 modules, PCD3.R600 SD-Flash, Manual override I/O modules

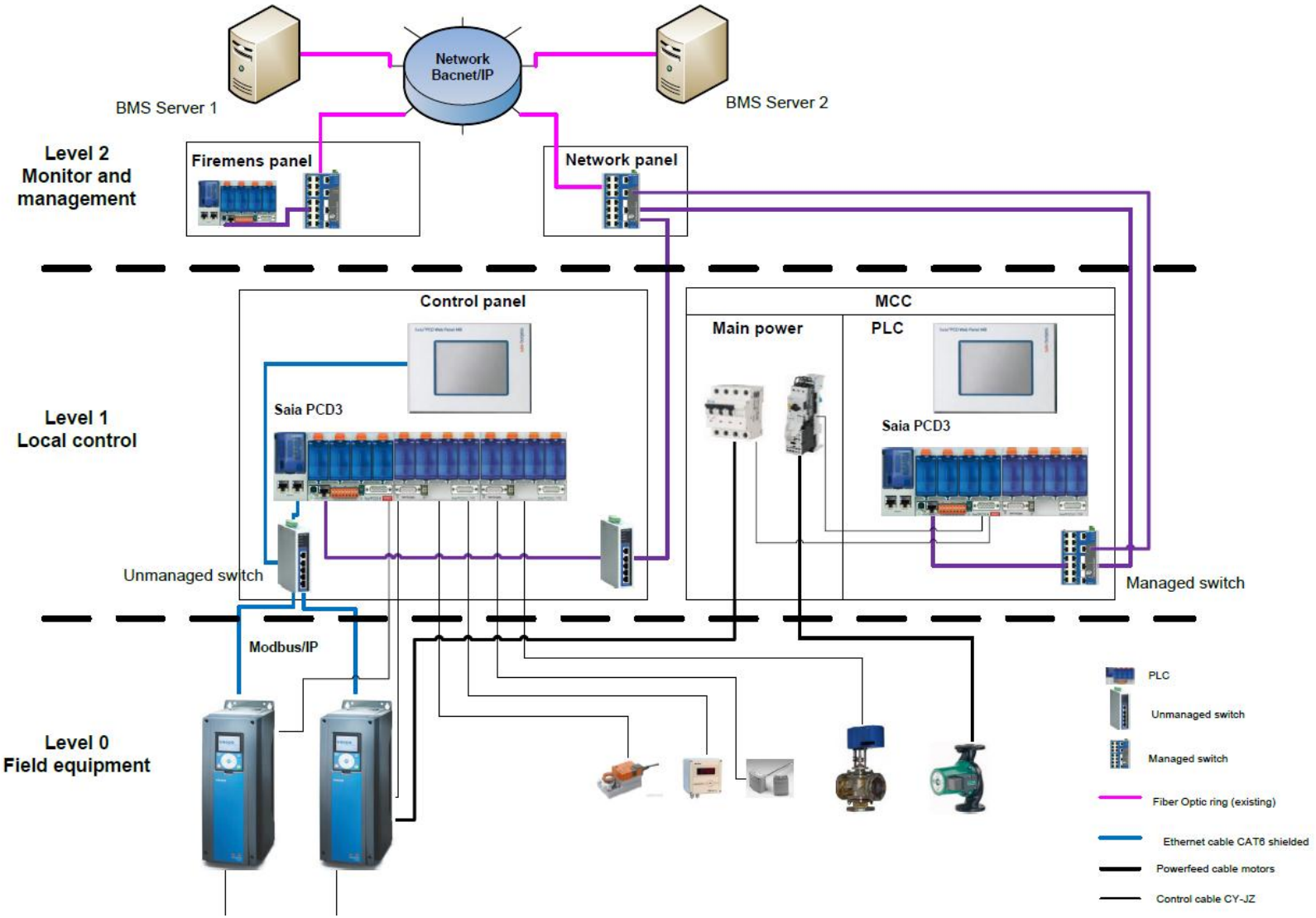
6 x PCD3.M5560, BACnet PCD7.R561 modules PCD3.R600 SD-Flash, Manual override I/O modules

12 x PCD7.D457 5.7'' Micro-Browser web panel

View to the ventilation installations

PCD3.M6860 with 2 x Ethernet, BACnet PCD7.R561, PCD3.R600 SD-Flash, Manual override I/O modules

Reference project TEVA Pharmaceutical Industries Ltd. Network topology



Reference project TEVA Pharmaceutical Industries Ltd more impressions…

Control cabinet with PCD3.M6860 and 5.7'' Micro-Browser Panel

Frequency converter with Ethernet Modbus-TCP interface

Jurgen Kroon from system integrator IHCS

Questions ?

Feedback is welcome → urs.jaeggi@saia-burgess.com