



Advantages of a PROFINET switch

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This document explains the technical advantages when using a PROFINET switch in a PROFINET network. It is also principally possible to use standard unmanaged switches in a PROFINET network. However, this can result in disadvantages or functional limitations in machine usage.

PROFINET function overview

- Prioritization of PROFINET frames
- Allocation of a network configuration on the basis of the device name
- Neighborhood detection / topology
- Device exchange without programming device
- Finding the device (blinking LEDs)
- Ring redundancy (MRP client)
- Definition of transfer method and speed of each port
- Each port can be activated or deactivated
- Diagnostic messages for network problems
- Identification and maintenance data (I&M)

Prioritization of PROFINET frames / PROFINET RT

One of the most important functions of a PROFINET switch is the prioritization of PROFINET frame traffic in the machine network. Each Ethernet frame contains information about its function and meaning (Ether type).

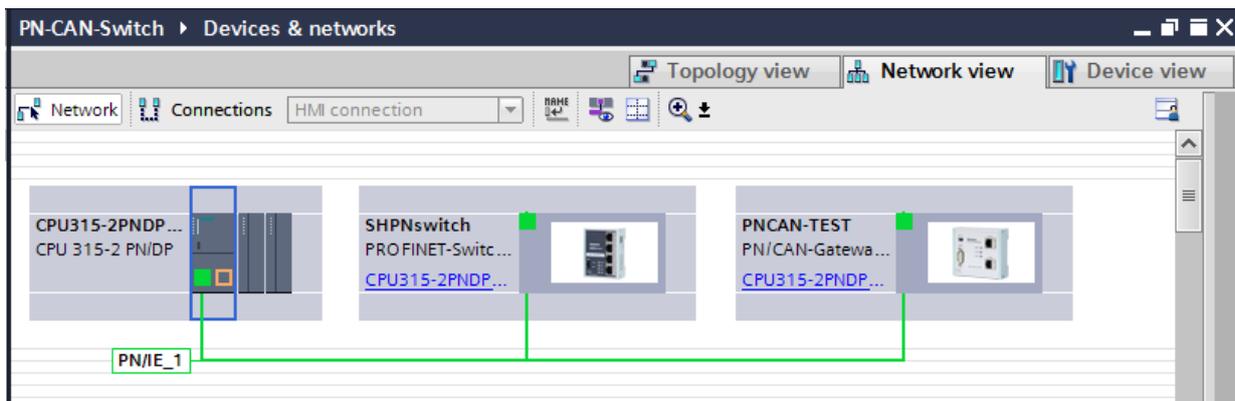
A PROFINET switch can thus differentiate between whether the frame is a web query, an FTP file transfer, a media stream or even a PROFINET frame. In the case of a large transmission load, a PROFINET switch can prioritize the important frames and ensure that PROFINET frames are given priority, and that frame losses don't occur (QoS = Quality of Service).

A PROFINET switch handles PROFINET frames with the highest priority and ensures that frame loss doesn't occur and that jitter in the transmission remains minor. That secures the PROFINET transmission and allows precise regulating in PROFINET systems.

An unmanaged switch doesn't prioritize PROFINET frames in relation to other frame traffic.

Network configuration on the basis of device names

PROFINET uses device names in the network for clear identification of PROFINET devices. This simplifies installation and troubleshooting in complex networks. Like all other PROFINET devices in the network, PROFINET switches also have a unique name and are thus visible in the project planning and can report errors.



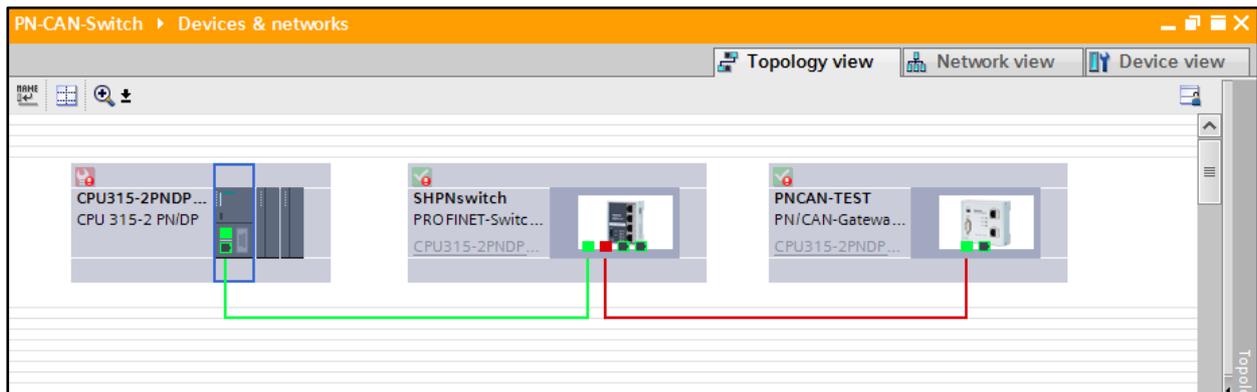
The IP addresses of the devices thus recede into the background and can be easily changed as needed.

Topology detection

A PROFINET switch supports the mechanisms for **neighborhood detection** (LLDP).

With this function it is possible to detect the **topology** of a PROFINET network or to prescribe it for the commissioning and to display wiring errors when checking for correct setup.

If a switch without a PROFINET stack is built into the network, the topology detection and inspection won't function.



Device exchange during operation

If the topology was prescribed in the configuration, neighboring devices can also be automatically assigned the PROFINET name in the event of the replacement of a device.

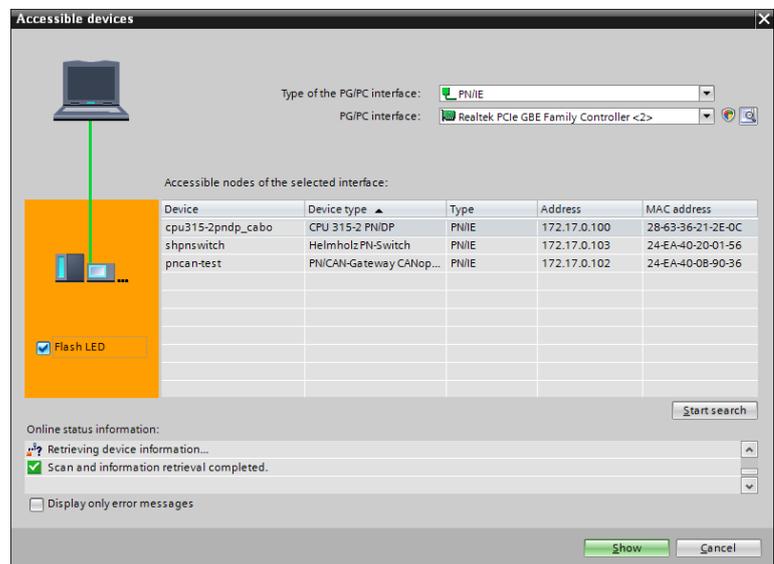
The exchange of a device in operation is thus possible without the use of commissioning tools.

If the new device has automatically received the name, the CPU will assign the planned IP address to the device and then configure and commission it.

If a switch without a PROFINET stack is built into the network, the exchange of the device with the neighboring PROFINET devices won't function.

Finding a device (blinking LEDs)

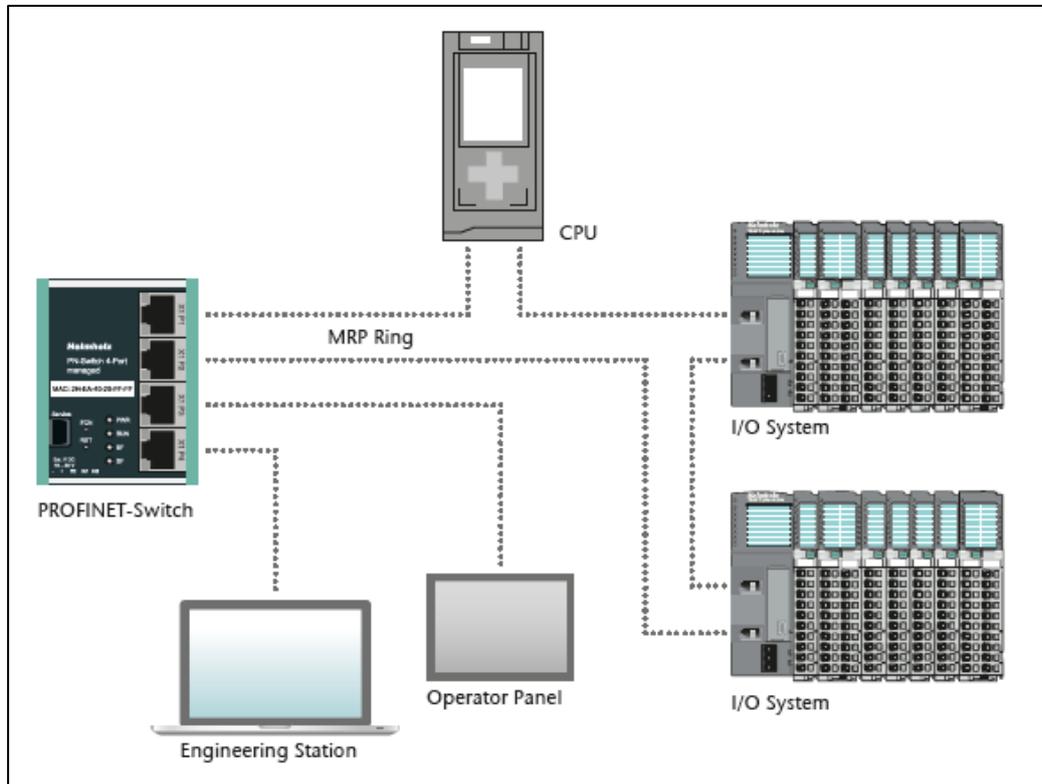
Many devices of the same type are found in local proximity in machine networks (e.g. drives). In order to be able to identify a certain device in the network, PROFINET devices support the function "LEDs blink", which can be triggered through the Engineering Tool.



Media Redundancy Protocol (MRP)

The Helmholz PROFINET switch supports media redundancy (MRP) via ports 1 + 2 as MRP client.

MRP stands for "media redundancy protocol". MRP enables ring wiring, which also makes operation of the PROFINET network possible in the event of the failure of a cable or of a participant.

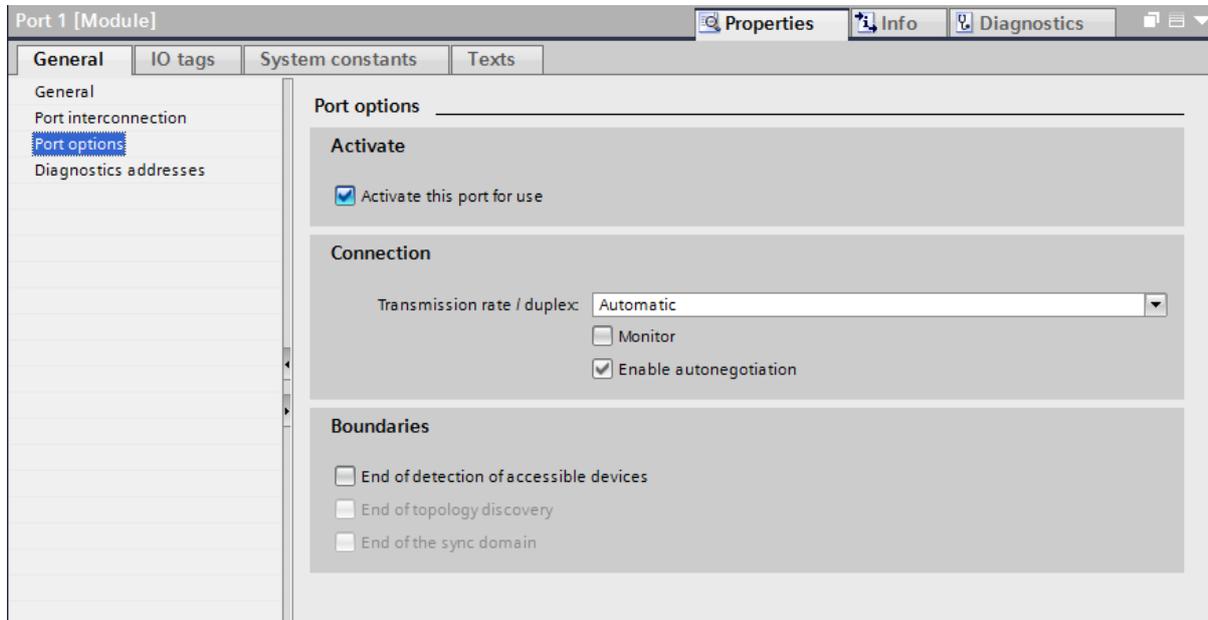


The MRP function can be completely planned in the hardware manager. In the event of connection interruptions, a PROFINET switch sends diagnostic messages to the PLC.

Unmanaged switches do not support this function.

Setting the port properties

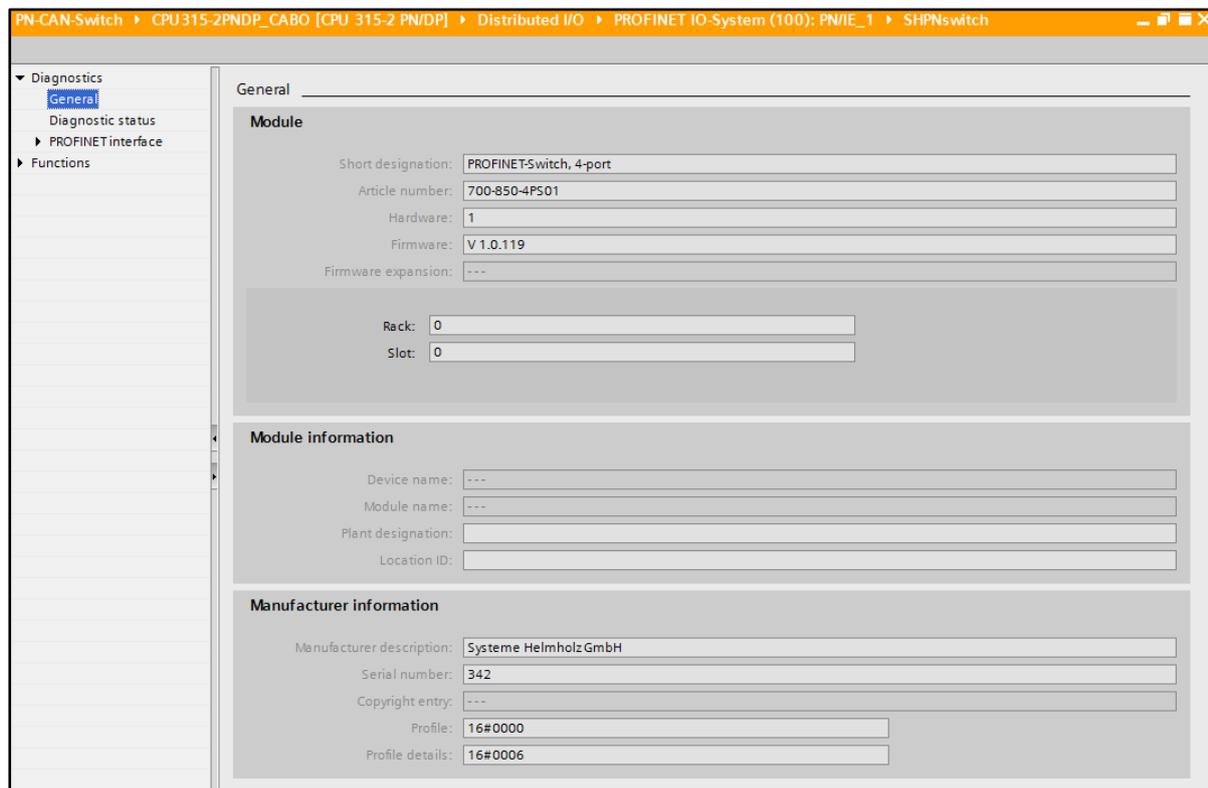
Each port of a PROFINET switch can be individually configured in the hardware manager.



Unmanaged switches do not support the configuration in the engineering tool.

Identification and maintenance (I&M)

The PROFINET identification and maintenance mechanisms provide information to the device, for example, the hardware and firmware version and the serial number. Additional information can also be stored in the device.



Diagnostics via PROFINET

A PROFINET switch can send diagnostic messages to the PLC and display them in the engineering tool in the case of connection interruptions in the network and in the event of wiring errors.

Diagnostics via the web interface

Extensive information and settings for the function of the switch are accessible in the Switch menu.

The screenshot shows the 'Switch' menu with a sidebar on the left containing options like Port Status, Port Mirroring, ARP Table, LLDP, DCP, CoS, and MAC Table. The main content area is titled 'Port Status' and contains a table with columns: Status, Speed, Phys. Status, and Link. Below the table is a 'Submit' button.

	Status	Speed	Phys. Status	Link
Port 1	Enabled	Autoneg	100 MB/FD	up
Port 2	Enabled	Autoneg	100 MB/FD	up
Port 3	Enabled	Autoneg		down
Port 4	Enabled	Autoneg	100 MB/FD	up

Statistics

Detailed statistics on the data transfer can be queried in the "Statistics" menu.

Among other things, the quality of the transmission can be monitored in the sub-menu "Statistics by error".

The screenshot shows the 'Statistics' menu with a sidebar on the left containing options like Statistics By Size, Statistics By Type, and Statistics By Error. The main content area is titled 'Received Packages By Size' and contains a table with columns: 64, 65-127, 128-255, 256-511, 512-1023, and 1024-max. Below the table are 'Refresh' and 'Reset Statistics' buttons.

	64	65-127	128-255	256-511	512-1023	1024-max.
Port 1	2628	1575741	625	8	3	1
Port 2	2593	1551554	3	622	1	0
Port 3	0	0	0	0	0	0
Port 4	204	74	401	7	52	0

Port mirroring

In order to be able to carry out frame analyses or recordings, port mirroring can be activated in the PROFINET switch. With port mirroring, the frame transfer from one port via another port is completely mirrored, on which an analysis PC can then record everything.

The screenshot shows the 'Switch' menu with a sidebar on the left containing options like Port Status, Port Mirroring, ARP Table, LLDP, and DCP. The main content area is titled 'Port Mirroring' and contains a checkbox for 'Mirroring Enabled' (checked), two dropdown menus for 'Mirrored Port' (set to 1) and 'Monitor Port' (set to 3), and a 'Submit' button.