

Network transitions



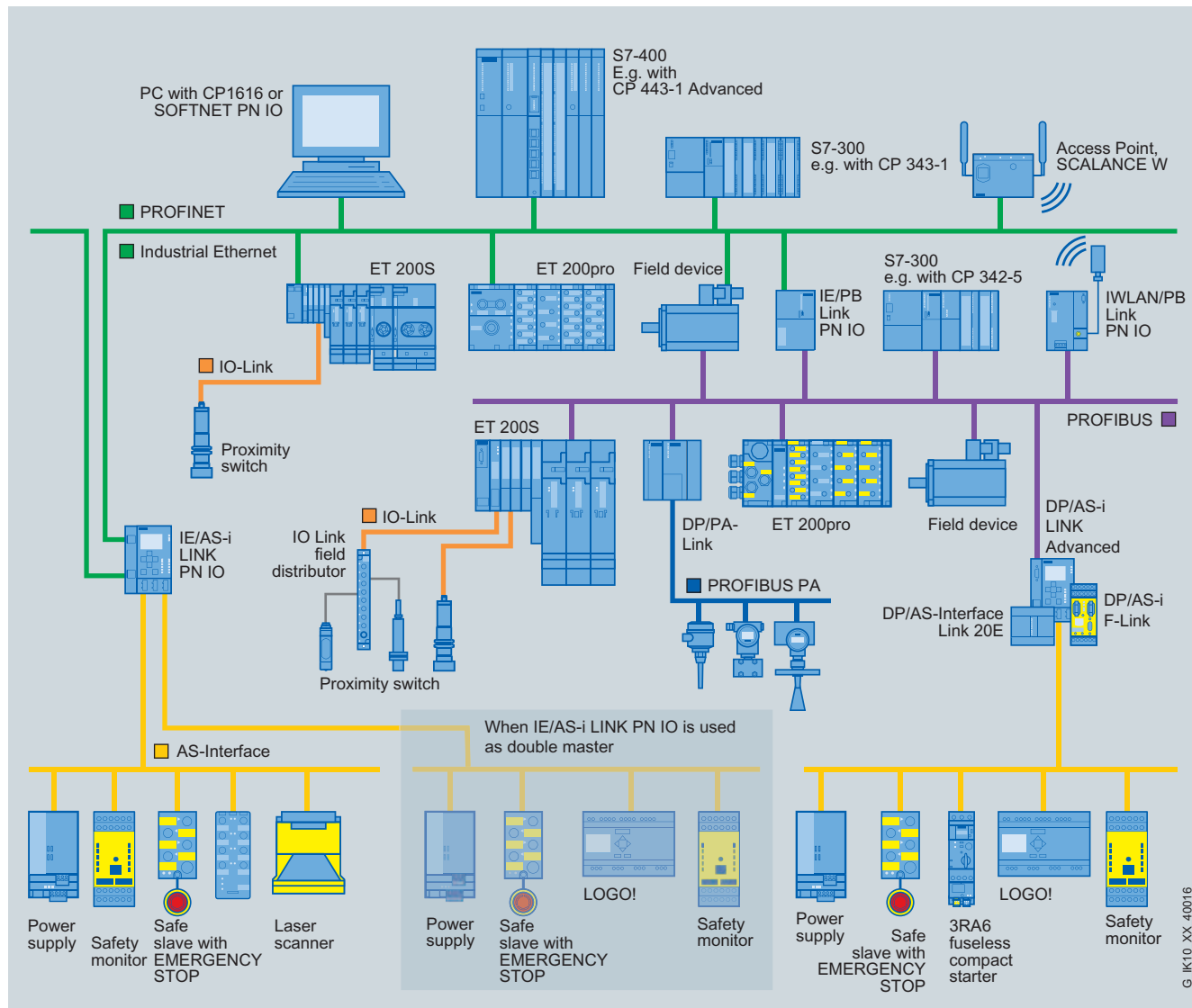
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Network transitions

Introduction

Overview

The advantages of Industrial Ethernet, PROFIBUS, EIB and AS-Interface can be utilized in a common bus system by means of special links.



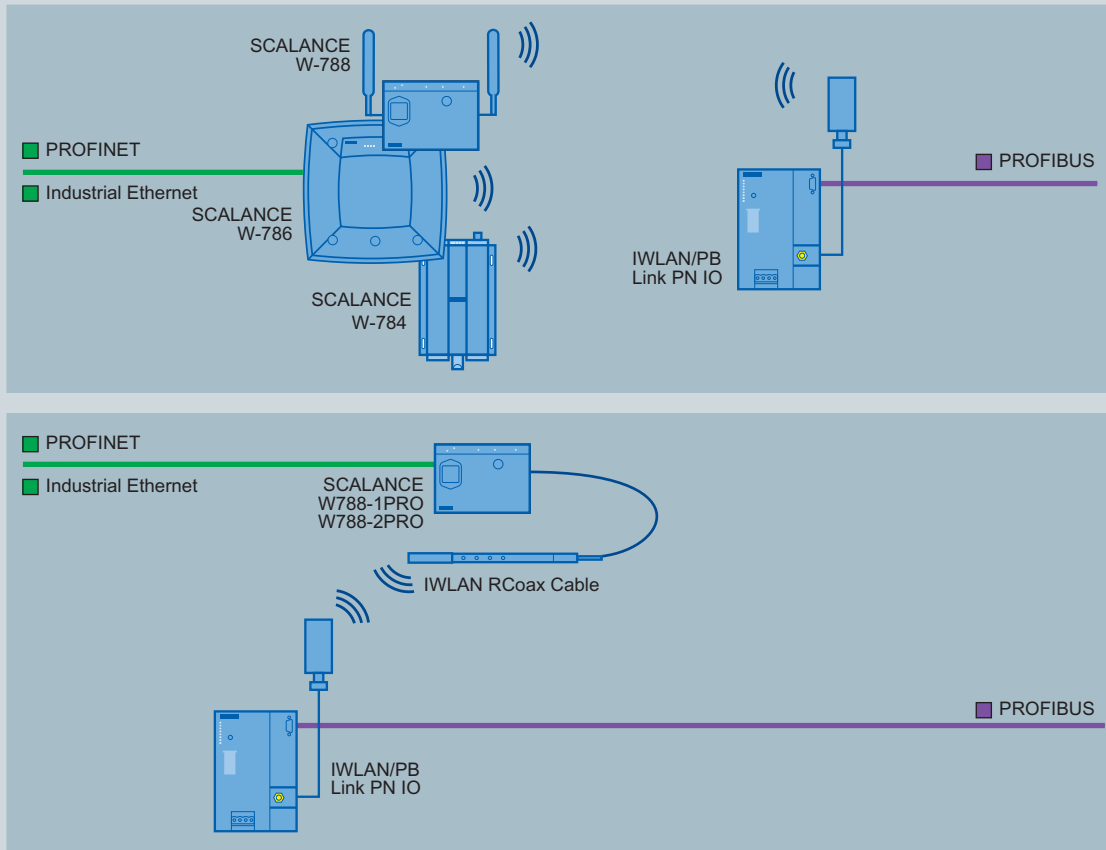
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Network transitions from one bus system to another are implemented using links, PLCs or PCs. In the case of PLCs or PCs, this can take place via integrated interfaces and communication processors (CPs). Links pass on the data autonomously from one network to the other.

The following links are available:

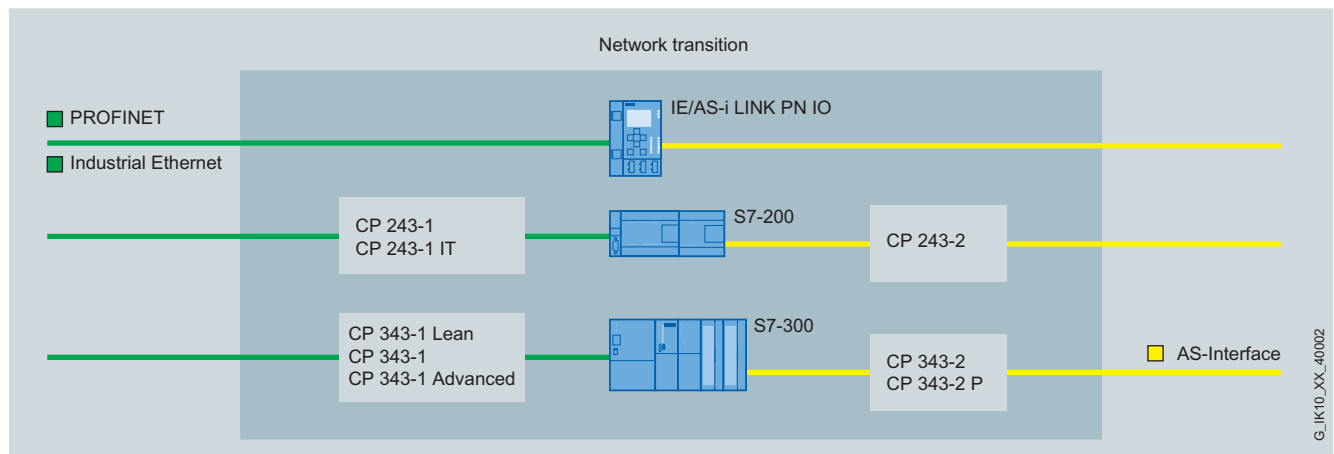
- IWLAN/PB Link PN IO for the gateway from IWLAN to PROFIBUS (also for safety-oriented communication)
- PN/PN coupler for data exchange between two PROFINET networks
- IE/PB Link PN IO for the transition from PROFINET/Industrial Ethernet to PROFIBUS (also for safety-oriented communication)
- IE/AS-i LINK PN IO for the transition from PROFINET/Industrial Ethernet to AS-Interface
- DP/DP coupler for the transition from PROFIBUS DP to PROFIBUS DP
- DP/PA Link and DP/PA coupler for the transition from PROFIBUS DP to PROFIBUS PA
- DP/AS-i LINK Advanced, DP/AS-Interface Link 20E and DP/AS-i F-Link (also for safety-oriented communication) for the transition from PROFIBUS to AS-Interface

Overview (continued)



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Network transitions for PROFINET and Industrial Ethernet – PROFIBUS via IWLAN



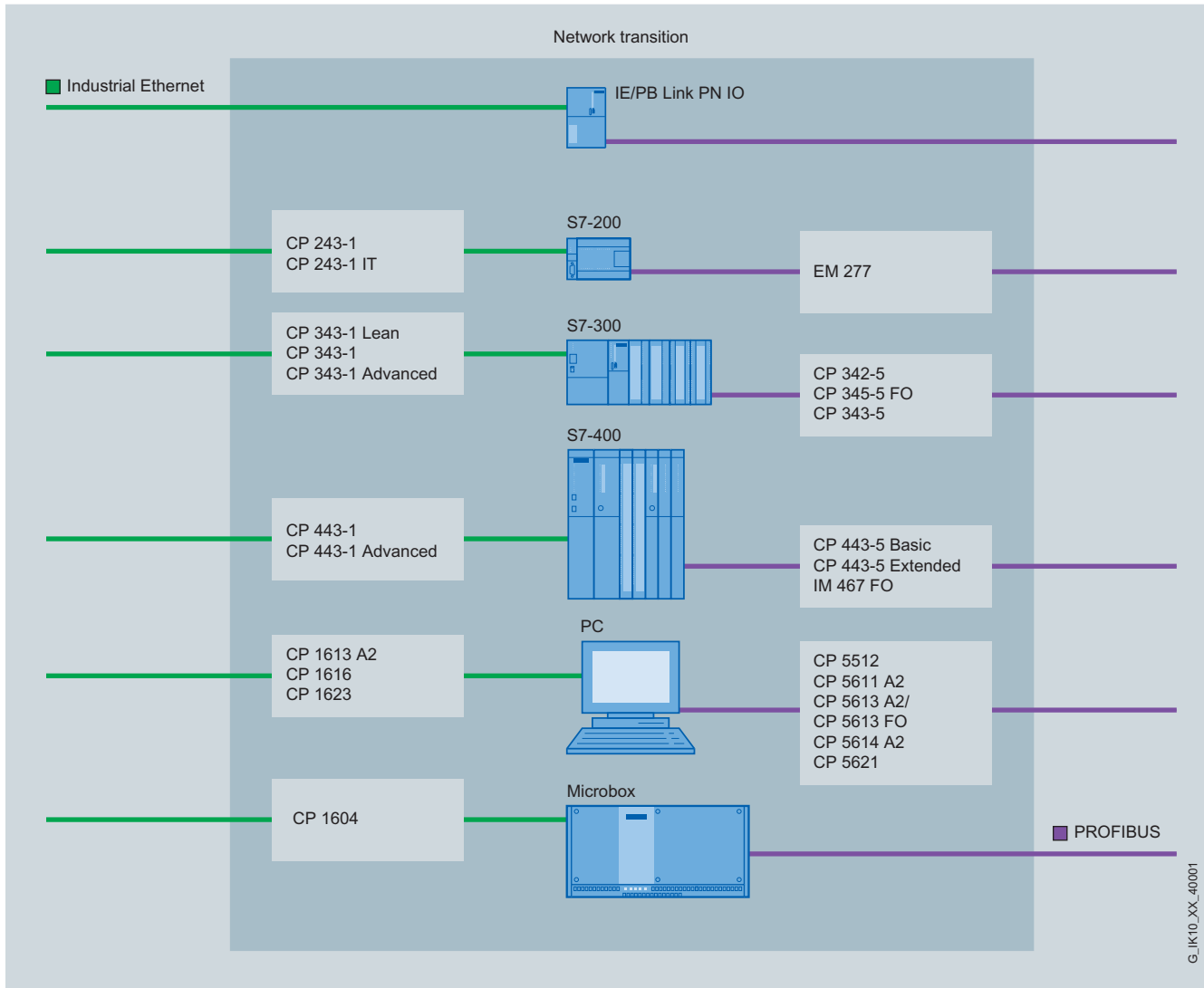
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Network transitions for Industrial Ethernet and AS-Interface

Network transitions

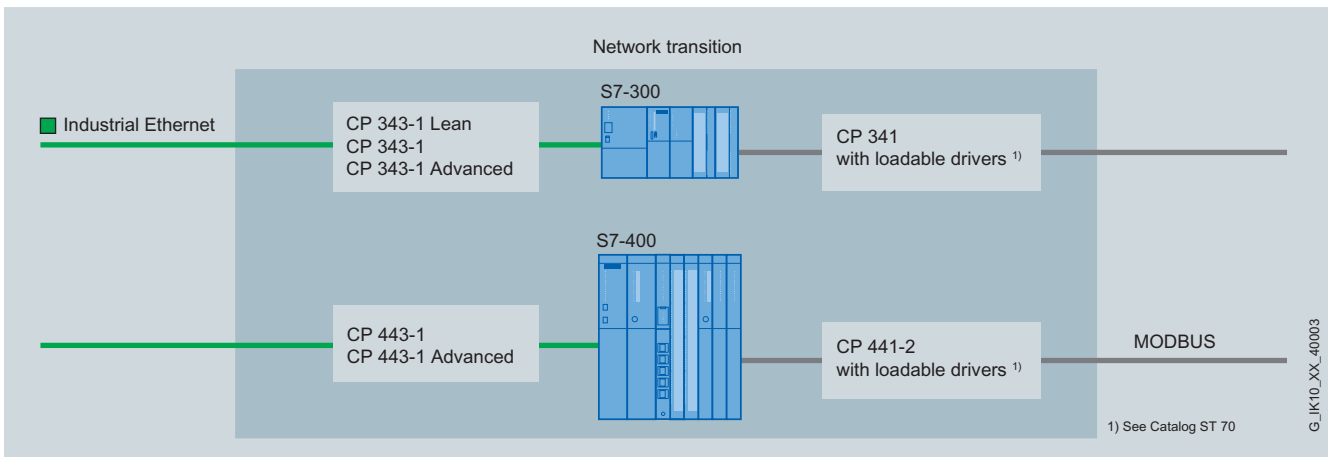
Introduction

Overview (continued)

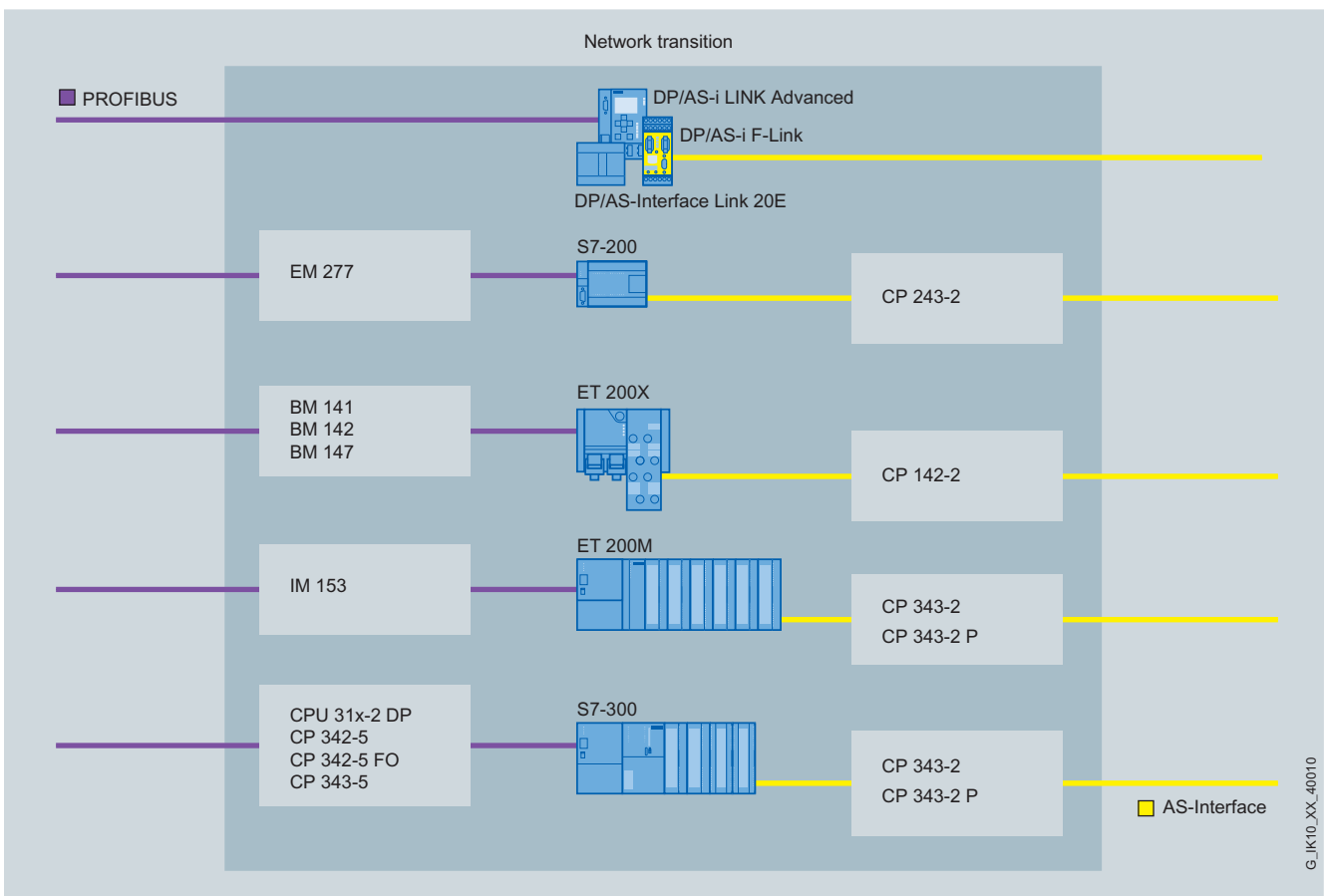


Network transitions for PROFINET and Industrial Ethernet – PROFIBUS

Overview (continued)



Network transitions for Industrial Ethernet and MODBUS

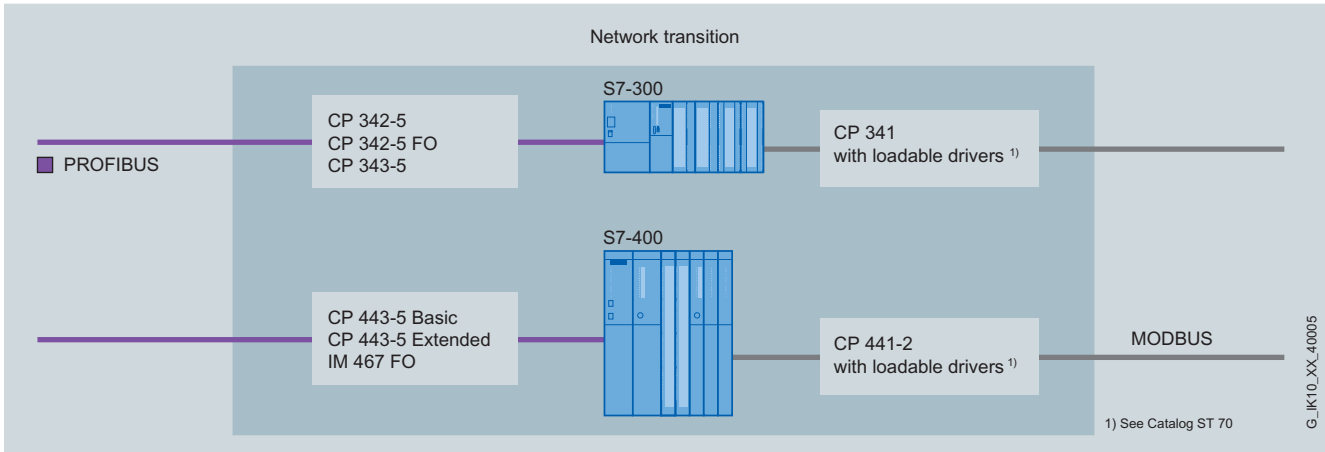


Network transitions for PROFIBUS and AS-Interface

Network transitions

Introduction

Overview (continued)



Network transitions for PROFIBUS and MODBUS

Overview



PN	DP-M	DP-S	ASi-M		
●	●				

- Compact router between Industrial Wireless LAN (IWLAN) and PROFIBUS
- Wireless connection to IWLAN (e.g. SCALANCE W Access Points) according to IEEE 802.11a/b/g/h with up to 54 Mbit/s at 2.4 GHz and 5 GHz
- PROFINET IO proxy; connection of PROFIBUS DP slaves to PROFINET IO controller according to PROFINET standard:
 - From the viewpoint of the IO-controller, all DP slaves are handled like I/O devices with Ethernet interface, i.e. the IWLAN/PB Link PN IO is their proxy.
 - From the viewpoint of the DP slaves, the IWLAN/PB Link PN IO is the DP master
- High, deterministic data throughput and very fast roaming through support of iPCF; the iPCF mechanism represents an extension of the IEEE 802.11 standard and must be available both on the station and on the access point, e.g. SCALANCE W788-1RR
- Full support of the security options defined in the IEEE 802.11i standard for authentication via WPA2 with TLS, TTLS, PEAP
- High degree of protection against unauthorized access thanks to 128-bit encoding (AES)
- Direct substitution of solutions with Power Rail Booster for PROFIBUS with non-contact data transmission technology; Advantages: No wear of sliding contacts
- Cross-network PG/OP communication by means of S7 routing, i.e. all S7 stations can be remotely programmed using the programming device on the Industrial Ethernet or PROFIBUS.
- Cross-network access to data of S7 stations for visualization by means of S7 OPC server and S7 routing; Via the IE/PB Link PN IO access can be made from the PC on the Industrial Ethernet (e.g. for HMI applications with OPC Client interface) by means of S7 OPC server, to all data of the S7 stations on the PROFIBUS.
- Module replacement without the need for a programming device, using the C-PLUG swap media for backing up the configuration data
- Configuring in STEP 7

Benefits



- High mobility; increased plant availability through wireless data transmission to mobile communication partners, e.g. to control an automated guided vehicle system (AGVS)
- Wear-free; contact-free technology with RCoax as a substitute for contact wires, e.g. for suspended monorails
- Protection of investment; Integration of PROFIBUS field devices into an IWLAN radio network
- Flexible use ensured by connecting the antenna best suited to the respective application (e.g. for operation on RCoax radiating cables)

Application

The IWLAN/PB Link PN IO supports the use of an IWLAN, for example with RCoax radiating cable, for wireless data transmission in the case of suspended monorails, storage and retrieval systems or other applications with mobile stations. Support of PROFINET means that the wide variety of PROFIBUS system services, such as diagnostics over the bus, can still be utilized.

- Suspended monorail; Vehicle controllers for suspended monorails can be implemented economically on the basis of SIMATIC components. High availability, short response times and easy expansion are achieved by using distributed controllers, such as SIMATIC ET 200S IM 151/CPU. Using the IWLAN/PB Link PN IO, the vehicle controllers can continue to be used without change. The user can also program them remotely with STEP 7 over IWLAN.
- Storage and retrieval systems; with these systems, data light barriers requiring intensive maintenance and offering no flexibility can be replaced by an IWLAN solution. This enhances plant availability.

Design

The IWLAN/PB Link PN IO is snapped onto a standard rail, and the outer dimensions correspond to the housing of the Power Rail Booster. The degree of protection IP20 ensures that the IWLAN/PB Link PN IO is suitable for installation in the control cabinet.

- Compact construction; the rugged plastic enclosure features the following on the front panel:
 - an R-SMA interface for connecting an antenna, e.g. for operation on the RCoax radiating cable
 - a 9-pin Sub-D socket for connection to PROFIBUS
 - a 4-pin terminal strip for connecting the external supply voltage of 24 V DC.
 - Diagnostic LEDs
- Can be operated without a fan
- Fast device replacement in the event of a fault by using the optional C-PLUG swap medium (not included in scope of supply)

Network transitions

IWLAN – PROFIBUS network transition

IWLAN/PB Link PN IO

Function

PROFINET

- PROFINET IO proxy; wireless connection of PROFIBUS DP slaves to PROFINET IO controller according to PROFINET standard

Vertical integration

- S7-routing; permits cross-network PG communication, i.e. all S7 stations on the IWLAN/Industrial Ethernet or PROFIBUS can be remotely programmed using the programming device. Access can be made to visualization data of S7 stations on the PROFIBUS from HMI stations on the IWLAN/Industrial Ethernet.
- Data record routing (PROFIBUS DP); Using this option, the IWLAN/PB Link PN IO can be used as a router for data records that are forwarded to field devices (DP slaves). SIMATIC PDM (Process Device Manager) is a tool that creates data sets of this type for parameterizing and diagnosing field devices. It is possible, for example, to use SIMATIC PDM (on the PC) to set parameters and perform diagnostics for a PA field device on the IWLAN/Industrial Ethernet over the IWLAN/PB Link PN IO and DP/PA Coupler/Link.

The additional functions for vertical integration can also be used in an existing PROFIBUS application without PROFINET for connection to a higher-level IWLAN/Industrial Ethernet. In this case, the IWLAN/PB Link PN IO is used as an additional DP-Master Class 2 on a PROFIBUS segment for linking to the IWLAN/Industrial Ethernet and offers the above functions.

Diagnosis

Extensive diagnostic options are available via STEP 7 or SNMP, including:

- Diagnostics of the assigned PROFINET field devices; using the IWLAN/PB Link PN IO as a proxy, the connected DP slaves can be diagnosed in the same manner as PROFINET IO devices (also in the user program of the PROFINET IO controller)
- General diagnostics and statistics functions
- Connection diagnostics
- Diagnostic buffer
- Integration into network management systems through the support of SNMP V1 MIB-II

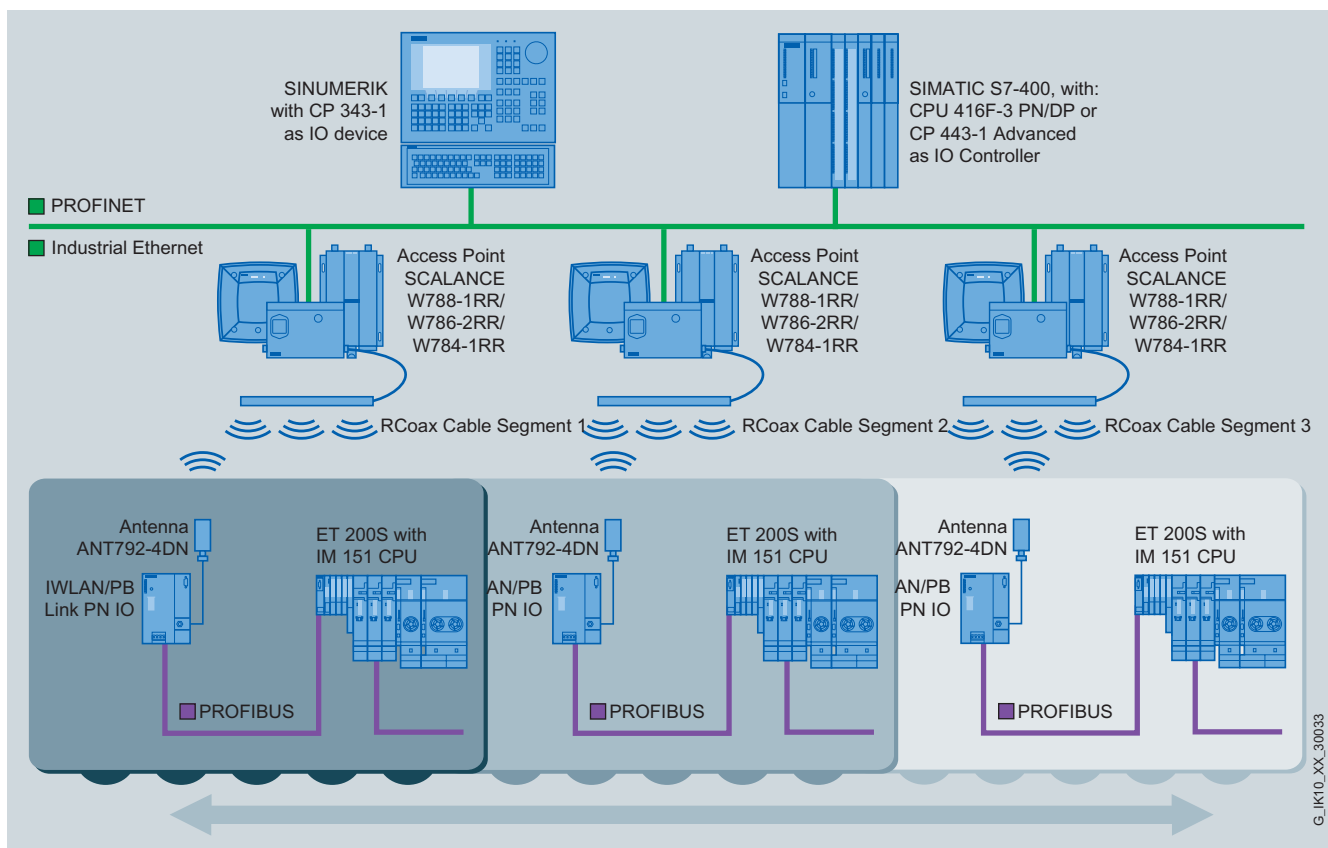
Configuration

STEP 7 V5.4 or higher is required for configuring the full functional scope of the IWLAN/PB LINK PN IO.

STEP 7 assigns the necessary parameters for the IWLAN/PB Link PN IO, such as the addresses, and generates all necessary routing information.

The configuration data for PROFINET IO created with STEP 7 is saved on the IO controller. Attention must however be paid to the memory capacity. The initialization data for the Ethernet interface is backed up on the C-PLUG (Configuration Plug) swap media. The IWLAN/PB Link PN IO can be swapped in the event of failure without a programming device, because the relevant user and configuration data is saved on the IO controller or on the C-PLUG.

Integration



System solution with IWLAN/PB Link PN IO using example of suspended monorail

Network transitions

IWLAN – PROFIBUS network transition

IWLAN/PB Link PN IO

Technical specifications

Product type description	IWLAN/PB Link PN IO
Transfer rates	
• Radio	1 to 54 Mbit/s
- standards supported	IEEE 802.11a, 802.11b, 802.11g, 802.11h, 802.11i
• PROFIBUS	9.6 kbit/s to 12 Mbit/s incl. 45.45 kbit/s (PROFIBUS PA)
Interfaces	
• Connection to Industrial Wireless LAN	RSMA antenna socket
• Connection to PROFIBUS	9-pin Sub-D socket
- maximum segment length for PROFIBUS ¹⁾	20 m
- maximum current consumption at the PROFIBUS interface with connection of network components (for example, optical network components)	100 mA at 5 V
• Connection for power supply	4-pin terminal block
Power supply ²⁾	2 supplies for 20.4 V DC to 28.8 V DC
Current consumption (at rated voltage)	
• external from 24 V DC, max.	300 mA
Power loss	approx. 6.5 W
Perm. ambient conditions	
• Operating temperature	0 °C to + 60 °C
• Transport/storage temperature	- 40 °C to + 70 °C
• Relative humidity, max.	95 % at +25 °C
Design	
• Module format	Power Rail Booster enclosure
• Dimensions (W x H x D) in mm	90 x 132 x 75
• Weight	approx. 300 g
Degree of protection	IP20
Configuration	
Configuration software	STEP 7/NCM S7 with V5.3 SP2 or later plus Hardware Support Package for IWLAN/PB Link PN IO

¹⁾ A repeater is required if the specified length is exceeded

²⁾ The power supply is electrically isolated; a high-impedance connection (>700 kΩ) exists to the contact spring for mounting of the enclosure on the DIN rail).

Product type description	IWLAN/PB Link PN IO
<i>Performance data</i>	
PROFINET communication	
• Number of DP slaves on the IWLAN/PB Link PN IO (PROFINET IO-Devices for PROFINET IO)	max. 8
• Number of DP inputs	max. 256 byte
• Number of DP outputs	max. 256 byte
Additional functionality	
• Number of S7 connections	max. 8
• Number of DSGW connections	max. 8

Network transitions

IWLAN – PROFIBUS network transition

IWLAN/PB Link PN IO

Ordering data

Order No.

Order No.

IWLAN/PB Link PN IO

Network transition between Industrial Wireless LAN and PROFIBUS with PROFINET IO functionality, TCP/IP, S7 routing, IEEE 802.11 b/g/a at 2.4/5 GHz to 54 Mbit/s, 9.6 Kbit/s to 12 Mbit/s PROFIBUS;

including electronic manual on CD-ROM German, English, French, Spanish, Italian

- National approvals for operation outside the U.S.A.
- National approvals for operation in the U.S.A.

6GK1 417-5AB00

6GK1 417-5AB01

C-PLUG

Swap medium for simple replacement of devices in the event of a fault; for storing configuration or engineering and application data; can be used for SIMATIC NET products with C-PLUG slot

6GK1 900-0AB00

STEP 7 Version 5.4

Target system:

SIMATIC S7-300/-400, SIMATIC C7, SIMATIC WinAC

Requirement:

Windows 2000 Prof./XP Prof.

Delivery package:

German, English, French, Spanish, Italian; incl. 3.5" authorization diskette, without documentation

- Floating License on CD
- Rental license for 50 hours
- Software Update Service on CD (requires current software version)
- Upgrade Floating License 3.x/4.x/5.x to V5.4; on CD
- Trial License STEP 7 V5.4; on CD, runs for 14 days

6ES7 810-4CC08-0YA5

6ES7 810-4CC08-0YA6

6ES7 810-4BC01-0YX2

6ES7 810-4CC08-0YE5

6ES7 810-4CC08-0YA7

S7-300 PS 307 load power supply

24 V DC

6ES7 307-1BA00-0AA0

IWLAN RCoax cables

Radiating cable for complex radio environments as special antenna for SCALANCE W Access Points; for wider temperature range (-40 °C to +85 °C); sold by the meter (minimum order quantity 20 m)

- 2.4 GHz
- 5 GHz

6XV1 875-2A

6XV1 875-2D

IWLAN RCoax

N-Connect female antenna ANT792-4DN

RCoax helix antenna with circular polarization for RCoax systems; 2.4 GHz; connection N-Connect female connection; antenna gain at 2.4 GHz 1 dB; degree of protection IP67; ambient temperature -20 °C to +60 °C

6GK5 792-4DN00-0AA6

IWLAN RCoax

N-Connect female antenna ANT793-4MN

RCoax 5/8 omni-directional antenna with vertical polarization for RCoax systems; 5 GHz; N-Connect female connection; degree of protection IP67; ambient temperature -20 °C to +60 °C

6GK5 793-4MN00-0AA6

SCALANCE W-788 Access Points

IWLAN Access Points with built-in wireless interface; wireless networks IEEE 802.11b/g/a/h at 2.4/5 GHz to 54 Mbit/s; national approvals; WPA2/AES; Power over Ethernet (PoE), degree of protection IP65 (-20 °C to +60 °C); scope of delivery: 2 ANT795-4MR antennas, IP67 hybrid connector, installation material, manual on CD-ROM, German/English

SCALANCE W788-1PRO

IWLAN Access Point with one integral wireless interface

- National approvals for operation outside the U.S.A.
- National approvals for operation in the U.S.A.

6GK5 788-1AA60-2AA0

6GK5 788-1AA60-2AB0

SCALANCE W788-2PRO

IWLAN Dual Access Point with two integral wireless interfaces

- National approvals for operation outside the U.S.A.
- National approvals for operation in the U.S.A.

6GK5 788-2AA60-2AA0

6GK5 788-2AA60-2AB0

SCALANCE W788-1RR

IWLAN Access Point with one built-in radio interface for establishment of radio links with rapid roaming

- National approvals for operation outside the U.S.A.
- National approvals for operation in the U.S.A.

6GK5 788-1AA60-6AA0

6GK5 788-1AA60-6AB0

SCALANCE W788-2RR

IWLAN Dual Access Point with two built-in wireless interfaces for establishing wireless connections with rapid roaming or alternative operation on HiPath Wireless Controller

- National approvals for operation outside the U.S.A.
- National approvals for operation in the U.S.A.

6GK5 788-2AA60-6AA0

6GK5 788-2AA60-6AB0

SCALANCE W786-1PRO

IWLAN Access Points with one integrated radio interface RJ45 connection

- Two internal antennas
 - National approvals for operation outside the U.S.A.
 - National approvals for operation in the U.S.A.
- Connections for two external antennas
 - National approvals for operation outside the U.S.A.
 - National approvals for operation in the U.S.A.

6GK5 786-1BA60-2AA0

6GK5 786-1BA60-2AB0

6GK5 786-1AA60-2AA0

6GK5 786-1AA60-2AB0

SCALANCE W784-1

IWLAN Access Points with one built-in radio interface

- National approvals for operation outside the U.S.A.
- National approvals for operation in the U.S.A.

6GK5 784-1AA30-2AA0

6GK5 784-1AA30-2AB0

Network transitions

IWLAN – PROFIBUS network transition

IWLAN/PB Link PN IO

Ordering data	Order No.	Order No.
Accessories		Accessories (continued)
RCoax N-Connect male termination impedance Terminating resistance, 50 ohms	6GK5 795-1TN00-1AA0	PROFIBUS FC Standard Cable GP Standard type with special design for fast mounting, 2-core, shielded, 6XV1 830-0EH10
RCoax N-Connect female N-connector Connector for assembly in the field	6GK5 798-0CN00-0AA0	PROFIBUS FastConnect bus connector RS485 with 90° cable outlet With insulation displacement terminals, max. transmission rate 12 Mbit/s • without PG interface • with PG interface 6ES7 972-0BA51-0XA0 6ES7 972-0BB51-0XA0
RCoax N-Connect male/male Flexible connecting cable, for example, between two RCoax segments • 1 m • 5 m	6XV1 875-5AH10 6XV1 875-5AH50	PROFIBUS FastConnect RS485 bus connector with angled cable outlet (35°) With insulation displacement terminals, max. transmission rate 12 Mbit/s • without PG interface • with PG interface 6ES7 972-0BA60-0XA0 6ES7 972-0BB60-0XA0
RCoax N-Connect/R-SMA male/male Flexible connecting cable for components with R-SMA connection and RCoax N-Connect • 1 m • 5 m	6XV1 875-5CH10 6XV1 875-5CH50	PROFIBUS FastConnect bus connector RS485 Plug 180 with insulation displacement terminals, with 180° cable outlet, for industrial PC, SIMATIC HMI OP, OLM; max. transmission rate 12 Mbit/s 6GK1 500-0FC10
RCoax R-SMA/SMA male/male Flexible connection cable Flexible connecting cable for connecting an IWLAN/PB Link PN IO to components with R-SMA and SMA connection, for example, panel feedthrough; prepared with two R-SMA to N-male connections • 0.3 m	6XV1 875-5DE30	PROFIBUS FastConnect Stripping Tool Preadjusted stripping tool for fast stripping of PROFIBUS FastConnect bus cables 6GK1 905-6AA00
RCoax N-Connect/R-SMA female/female Panel feedthrough Panel feedthrough for panel widths up to 5.5 mm, R-SMA female and N-female connections	6GK5 798-0PT00-2AA0	
Preset-PLUG Swap medium for simple initial startup of IWLAN clients, e.g. IWLAN/PB Link PN IO	6GK5 798-8AB00	

Network transitions

Industrial Ethernet – Industrial Ethernet network transition

PN/PN Coupler

Overview



- Maximum data exchange of 256-byte input data and 256-byte output data between two PROFINET networks
- Maximum of 16 input/output ranges for the exchange of data
- Electrical isolation between the two PROFINET IO subnets
- Redundant power supply
- Supported Ethernet services
 - ping
 - arp
 - Network diagnostics (SNMP/MIB-2)
- Diagnostic interrupts
- ReturnOfSubmodule interrupts

Application

The PN/PN coupler is used to link two Ethernet subnets with one another and to exchange data. The maximum size of the data which can be transferred is 256 byte input data and 256 byte output data.

As a device, the PN/PN coupler has two PROFINET interfaces, each of which has two ports and each of which is linked to another subnet.

During configuring, two IO devices are produced from this one PN/PN coupler which means that there is one IO device for each station with its own subnet. The other part of the PN/PN coupler in each case is known as the bus node. Once configuring is complete, the two parts are joined.

Design

The PN/PN Coupler is located within a 120 mm enclosure. It is installed with a DIN rail (7.5 mm or 15 mm).

The coupler is connected to the PROFINET PN IO networks using RJ45 plug-in connectors.

Function

The PN/PN coupler continuously copies the output data of one network to the input data of the other network (and vice versa).

Parameterization

You either configure the PN/PN coupler using STEP 7 or a configuring tool which uses a GSD file to integrate the PN/PN coupler. You can use STEP 7 to set the required length of the input and output data. The output data of one side of the PN/PN coupler serve as input data for the other side, and vice versa.

You configure the I/O ranges using universal modules which are plugged into slots on the PN/PN coupler like real modules from the hardware catalog in the HW configuration. The universal modules span an I/O range over which data is exchanged between the two PROFINET subnets. The local CPU uses slot's configured inputs to read the values which the CPU of the other slot writes using the bus node's configured outputs. The local CPU uses slot's configured outputs to write values which the CPU of the other subnet receives using the bus node's configured inputs.

Network transitions

Industrial Ethernet – Industrial Ethernet network transition

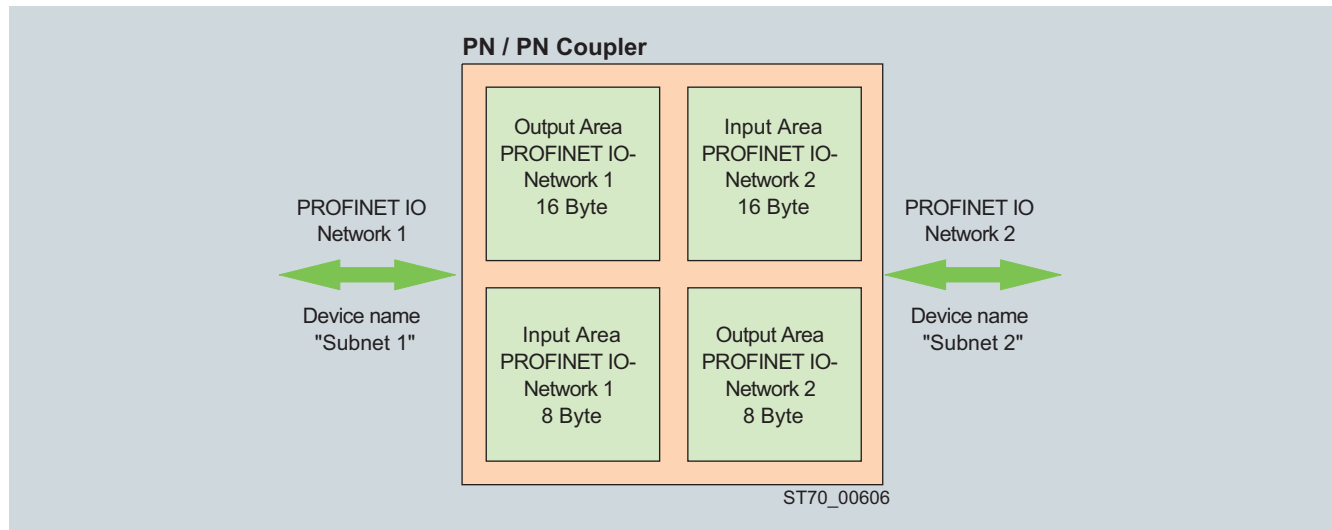
PN/PN Coupler

Function (continued)

Example

The following example shows that both networks are independent of one another. This means that the user gives each PROFINET I/O network its own device name.

In the following picture, you can see device name "Subnet1" in network 1 and "Subnet2" in network 2:



Main FC of the PN/PN coupler (example)

Ordering data

Order No.

PN/PN coupler

6ES7158-3AD00-0XA0

for connecting two PROFINET networks

Network transitions

Industrial Ethernet – PROFIBUS network transition

IE/PB Link PN IO

Overview



PN	DP-M	DP-S	ASi-M		
●	●				

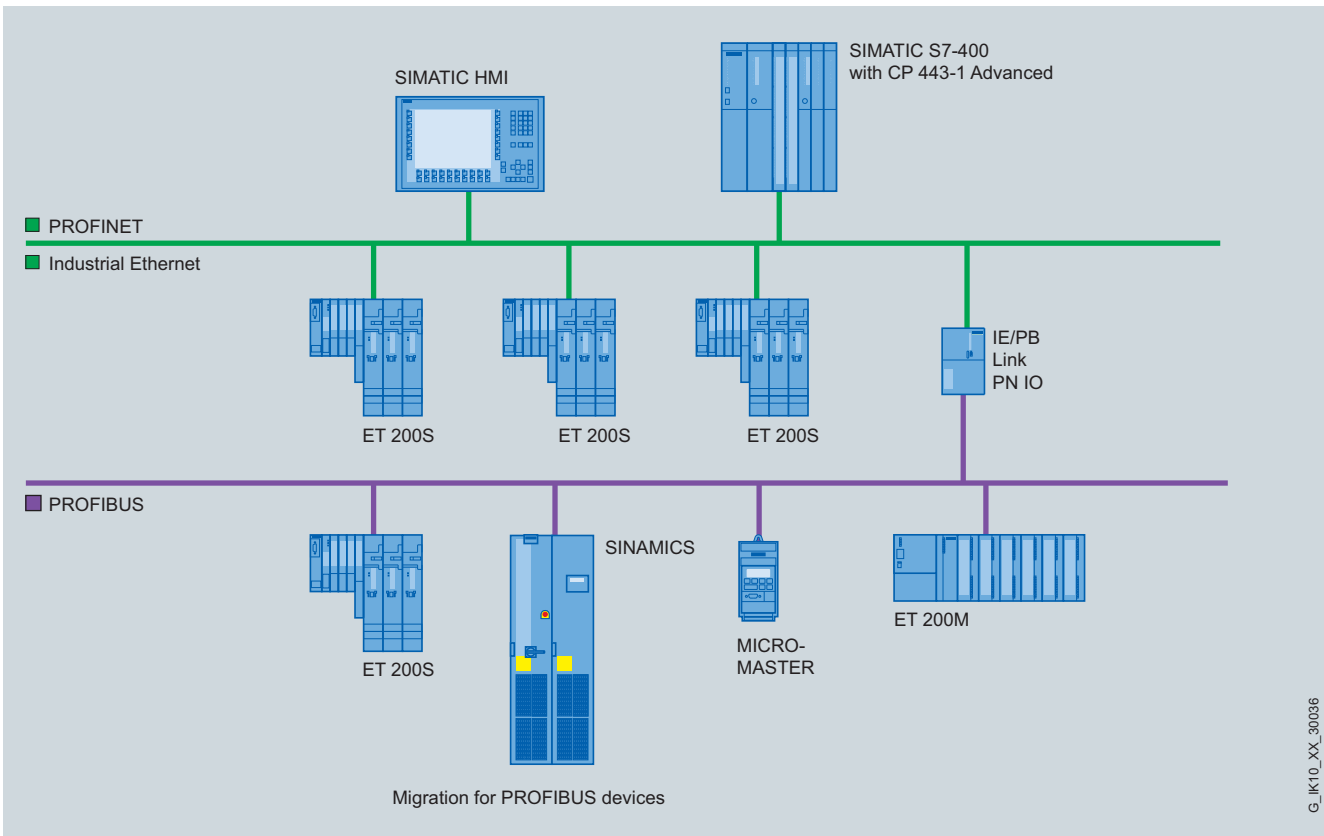
- Compact router between Industrial Ethernet and PROFIBUS
- Connection to Industrial Ethernet with 10/100 Mbit/s full/half duplex connection with autosensing for automatic switchover
- Connection to PROFIBUS with 9.6 kbit/s to 12 Mbit/s incl. 45.45 kbit/s for PROFIBUS PA
- PROFINET IO proxy; connection of PROFIBUS DP slaves to PROFINET IO controller according to PROFINET standard:
 - From the viewpoint of the I/O controller, all DP slaves are handled like I/O devices of the Ethernet interface, such as I/O devices with an Ethernet interface, i.e. the IE/PB Link PN IO is its proxy.
- Cross-network programming device/operator panel communication by S7 routing, i.e. all S7 stations can be remotely programmed by the programming device on the Industrial Ethernet or PROFIBUS.
- Cross-network access to data of S7 stations for visualization by means of S7 OPC server and S7 routing;
 - Via the IE/PB Link PN IO access can be made from the PC on the Industrial Ethernet (e.g. for HMI applications with OPC Client interface) by means of S7 OPC server, to all data of the S7 stations on the PROFIBUS.
- Module replacement without the need for a programming device, using the C-PLUG swap media for backing up the configuration data

Benefits



PROFINET applications

- Protection of investment due to simple connection of PROFIBUS DP slaves to PROFINET IO controller
- Independence from individual vendors through support of the PROFINET standard for distributed field devices



Configuration example of PROFIBUS and PROFINET
 PROFIBUS devices can be seamlessly integrated into PROFINET over the IE/PB Link PN IO as proxy.

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Network transitions

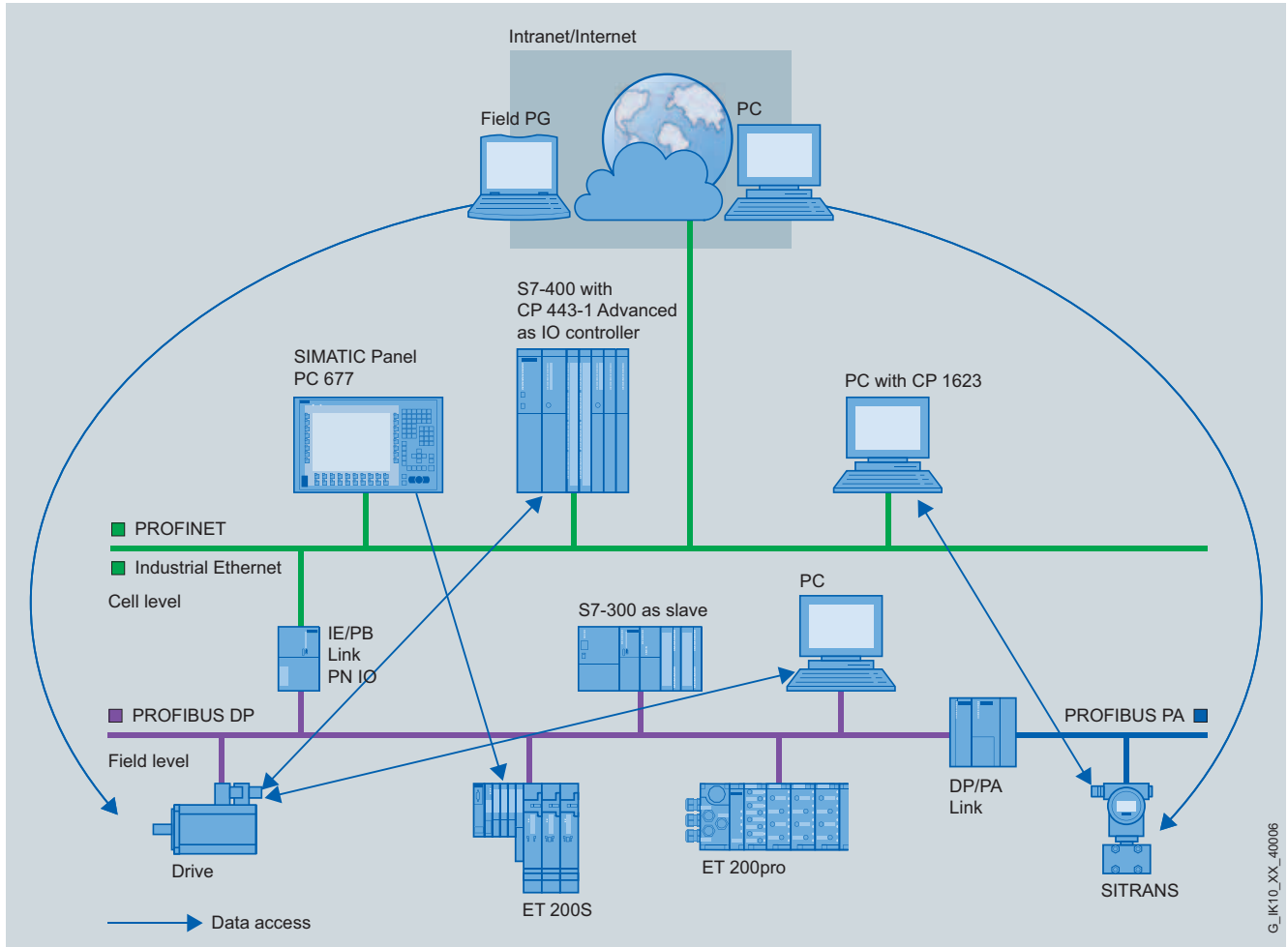
Industrial Ethernet – PROFIBUS network transition

IE/PB Link PN IO

Benefits (continued)

Applications in the case of vertical integration

- Worldwide access to data of the PROFIBUS stations via Industrial Ethernet and Internet for vertical integration
- Optimization of a plant from a central location
- Access to process data from all enterprise levels
- Loading of STEP 7 programs from a central location



Configuration example of IE/PB Link PN IO as network transition from Industrial Ethernet to PROFIBUS for vertical integration

Network transitions

Industrial Ethernet – PROFIBUS network transition

IE/PB Link PN IO

Application

As an independent component, the IE/PB Link PN IO forms the seamless transition between Industrial Ethernet and PROFIBUS.

By means of the IE/PB Link PN IO as proxy, the existing PROFIBUS devices can continue to be used and integrated into a PROFINET application.

The IE/PB Link PN IO also offers the following functions:

- S7 routing
 - cross-network programming device/operator panel communication, i.e. all S7 stations can be remotely programmed by the programming device on the Industrial Ethernet or PROFIBUS.
 - from the HMI stations on the Industrial Ethernet, access can be made to visualization data of the S7 stations on the PROFIBUS.
- Data record routing (PROFIBUS DP)
 - this makes it possible, for example to parametrize and diagnose a PROFIBUS field device using SIMATIC PDM (on the PC) on the Industrial Ethernet via the IE/PB Link PN IO.

Design

The IE/PB Link PN IO exhibits all the advantages of the SIMATIC design:

- Compact design; the rugged plastic casing features on the front:
 - one RJ45 port for connection to Industrial Ethernet.
 - one 9-pin Sub-D socket for connection to PROFIBUS
 - one 2-pin terminal strip for connecting the external supply voltage of 24 V DC.
 - Diagnostic LEDs
- Connection is by means of the IE FC RJ45 Plug 180 with 180° cable exit or by means of a standard patch cable
- Simple mounting; the IE/PB Link PN IO is mounted on an S7-300 DIN rail.
- Can be operated without a fan
- Fast device replacement in the event of a fault by using the optional C-PLUG swap medium (not included in scope of supply)

Function

PROFINET

- PROFINET IO proxy; connection of PROFIBUS DP slaves to PROFINET IO controller with real-time property, according to PROFINET standard

Additional functionality for vertical integration

- S7 routing
 - permits cross-network PG communication, i.e. all S7 stations on the Industrial Ethernet or PROFIBUS can be remotely programmed using the programming device.
 - Access can be made to visualization data of S7 stations on the PROFIBUS from HMI stations on the Industrial Ethernet.
- Data record routing (PROFIBUS DP)
 - Using this option, the IE/PB Link PN IO can be used as a router for data records that are forwarded to field devices (DP slaves). SIMATIC PDM (Process Device Manager) is a tool that creates data sets of this type for parameterizing and diagnosing field devices.
 - Application: It is possible, for example, to use SIMATIC PDM (on the PC) to set parameters and perform diagnostics for a PA field device on the Industrial Ethernet over the IE/PB Link PN IO and DP/PA Coupler/Link.

The additional functions for vertical integration can also be used in an existing PROFIBUS application without PROFINET for connection to a higher-level Industrial Ethernet.

In this case, the IE/PB Link PN IO is used as an additional DP-Master Class 2 on a PROFIBUS segment for linking to the Industrial Ethernet and offers the above functions.

Diagnosis

Extensive diagnostic options are available via STEP 7 or SNMP, including:

- Diagnosis of the assigned PROFIBUS field devices; using the IE/PB Link PN IO as a proxy, the connected DP slaves can be diagnosed in the same manner as PROFINET IO devices (even in the user program of the PROFINET IO controller)
- General diagnostics and statistics functions
- Connection diagnostics
- Diagnostic buffer
- Integration into network management systems through the support of SNMP V1 MIB-II

Configuration

STEP 7 V5.4 or higher is required for configuring the full functional scope of the IE/PB LINK PN IO.

STEP 7 assigns the necessary parameters for the IE/PB Link PN IO, such as the addresses, and generates all necessary routing information.

The configuration data for PROFINET IO created with STEP 7 is saved on the IO controller. Attention must however be paid to the memory capacity. The initialization data for the Ethernet interface is backed up on the C-PLUG (Configuration Plug) swap media. The IE/PB Link PN IO can be swapped in the event of failure without a programming device, because the relevant user and configuration data is saved on the IO controller or on the C-PLUG.

Network transitions

Industrial Ethernet – PROFIBUS network transition

IE/PB Link PN IO

Technical specifications		Ordering data	Order No.
Product type description	IE//PB Link PN IO	IE/PB Link PN IO	6GK1 411-5AB00
Data transmission rates		Network transition between Industrial Ethernet and PROFIBUS with PROFINET IO functionality, TCP/IP, S7 routing and data record routing, 10/100 Mbit/s Fast Ethernet, 9.6 to 12 Mbit/s PROFIBUS; including electronic manual on CD-ROM German, English, French, Spanish, Italian	
<ul style="list-style-type: none"> Industrial Ethernet PROFIBUS 	10/100 Mbit/s autosensing 9.6 kbit/s to 12 Mbit/s incl. 45.45 kbit/s (PROFIBUS PA)		
Interfaces		IE FC RJ45 Plug 180	
<ul style="list-style-type: none"> Connection to Industrial Ethernet <ul style="list-style-type: none"> - 10BaseT/100BaseT Connection to PROFIBUS Connection for power supply 	RJ45 9-pin Sub-D socket 2-pin terminal block	RJ45 plug connector for Industrial Ethernet with a rugged metal housing and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; with 180° cable outlet; for network components and CPs/CPU with Industrial Ethernet interface	
Voltage supply	24V DC (+/-5 %)	<ul style="list-style-type: none"> 1 pack = 1 unit 1 pack = 10 units 1 pack = 50 units 	6GK1 901-1BB10-2AA0 6GK1 901-1BB10-2AB0 6GK1 901-1BB10-2AE0
Current consumption (at rated voltage)		SCALANCE X204-2 Industrial Ethernet switch	6GK5 204-2BB10-2AA3
<ul style="list-style-type: none"> external from 24 V DC, max. 	600 mA	with four 10/100 Mbit/s RJ45 ports and two fiber-optic ports	
Power loss	approx. 10 W	Industrial Ethernet Switch SCALANCE X308-2	6GK5 308-2FL00-2AA3
Perm. ambient conditions		2 x 1000 Mbit/s multi-mode fiber-optic ports (SC sockets), 1 x 10/100/1000 Mbit/s RJ45 port, 7 x 10/100 Mbit/s RJ45 ports; for glass fiber-optic cables (multi-mode) up to a max. 750 m.	
<ul style="list-style-type: none"> Operating temperature Transport/storage temperature Relative humidity, max. 	0 °C ... + 60 °C - 40 °C ... + 70 °C 95 % at +25 °C	C-PLUG	6GK1 900-0AB00
Design		Swap medium for simple replacement of devices in the event of a fault; for storing configuration or engineering and application data; can be used for SIMATIC NET products with C-PLUG slot	
<ul style="list-style-type: none"> Module format Dimensions (W x H x D) in mm Weight 	S7-300 construction 80 x 125 x 120 approx. 600 g		
Degree of protection	IP20		
Configuration			
Configuration software for PROFINET and additional functions	STEP 7/NCM S7, V5.3 SP1 or higher		
Performance data			
PROFINET communication			
PROFINET IO performance data			
<ul style="list-style-type: none"> Number of DP slaves on the IE/PB Link PN IO (PROFINET IO-Devices for PROFINET IO) Number of DP inputs, max. Number of DP outputs, max. 	64 2048 byte 2048 byte		
Additional functionality			
<ul style="list-style-type: none"> Number of S7 connections Number of DSGW connections 	max. 32 max. 32		

Network transitions

Industrial Ethernet – PROFIBUS network transition

IE/PB Link PN IO

Ordering data	Order No.
PROFIBUS FC Standard Cable GP Standard type with special design for fast mounting, 2-core, shielded,	6XV1 830-0EH10
PROFIBUS FastConnect bus connector RS485 with 90° cable outlet With insulation displacement terminals, max. transmission rate 12 Mbit/s <ul style="list-style-type: none"> • without PG interface • with PG interface 	6ES7 972-0BA60-0XA0 6ES7 972-0BB51-0XA0
PROFIBUS FastConnect RS485 bus connector with angled cable outlet (35°) With insulation displacement terminals, max. transmission rate 12 Mbit/s <ul style="list-style-type: none"> • without PG interface • with PG interface 	6ES7 972-0BA60-0XA0 6ES7 972-0BB60-0XA0
PROFIBUS FastConnect bus connector RS485 Plug 180 with insulation displacement terminals, with 180° cable outlet, for industrial PC, SIMATIC HMI OP, OLM; max. transmission rate 12 Mbit/s	6GK1 500-0FC10
PROFIBUS FastConnect Stripping Tool Preadjusted stripping tool for fast stripping of PROFIBUS FastConnect bus cables	6GK1 905-6AA00
S7-300 mounting rail	6ES7 390-1AB60-0AA0
S7-300 PS 307 load power supply 24 V DC	6ES7 307-1BA00-0AA0
NCM S7 configuring software for Industrial Ethernet	Supplied with STEP 7 V5
Manual Twisted Pair and fiber-optic networks Paper version Network architecture, project management, network components, installation <ul style="list-style-type: none"> • German • English 	6GK1 970-1BA10-0AA0 6GK1 970-1BA10-0AA1
Manual for PROFIBUS networks Paper version Network architecture, project management, network components, installation <ul style="list-style-type: none"> • German • English 	6GK1 970-5CA20-0AA0 6GK1 970-5CA20-0AA1

More information

More information can be found at

<http://www.siemens.com/profinet>

Network transitions

Industrial Ethernet – AS-Interface network transition

IE/AS-i LINK PN IO

Overview



PN	DP-M	DP-S	ASi-M		
●			●		

- Compact network transition, between PROFINET/Industrial Ethernet (PROFINET IO Device) and AS-Interface
- Single and dual AS-Interface master (according to AS-Interface specification V3.0) for connecting 62 AS-Interface slaves each with integral analog-value transmission
- High-performance, integrated analog value transmission
- Integral earth-fault monitoring for the AS-Interface cable
- Simple diagnostics and startup on site using a pixel-graphics display and operator keys or Web interface with standard browser
- Optimum TIA integration via STEP 7, integration in engineering tools from other vendors through PROFINET type file (GSD)
- Vertical integration (standard Web interface) through Industrial Ethernet
- Power supply from the AS-Interface cable or alternatively with 24 V DC
- Module replacement without input of connection parameters (IP address etc.) when using the C-PLUG (optional)

Benefits

get Designed for Industry

- Short startup time due to simple configuration by pressing a button and testing of the AS-Interface segment on display or through Web interface
- Reduction in downtimes and servicing times on failure of slave due to convenient diagnostics on display or through Web interface
- Reduction of installation costs because the power can be supplied entirely from the AS-Interface cable, so an additional power supply is not required
- Reduced engineering overhead thanks to convenient configuration of Siemens slaves by means of Drag&Drop in HW-Config (STEP 7)

Network transitions

Industrial Ethernet – AS-Interface network transition

IE/AS-i LINK PN IO

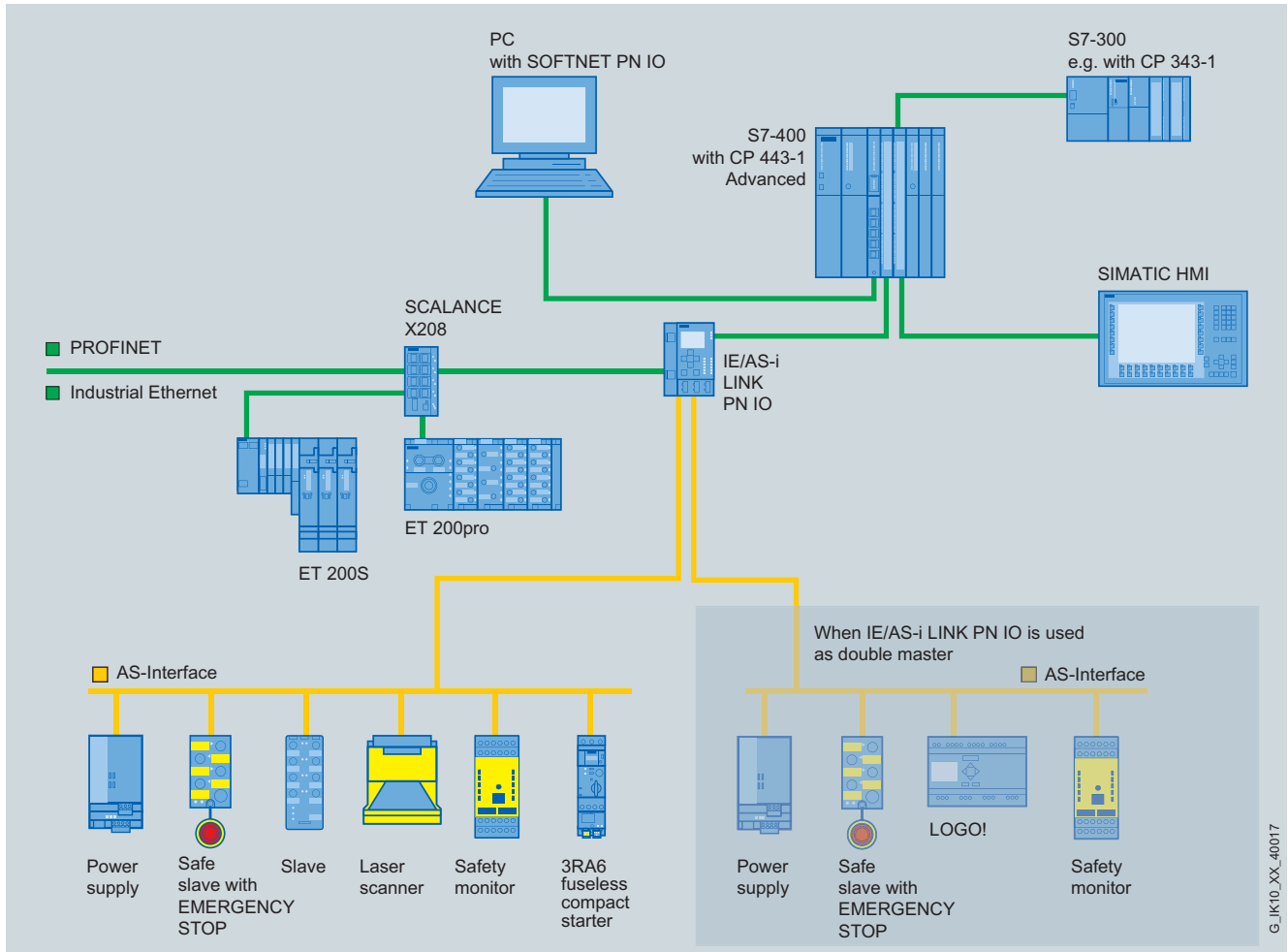
Application

The IE/AS-i LINK PN IO is a PROFINET IO-Device (according to IEC 61158) and AS-Interface master (according to AS-Interface specification V3.0 to EN 50 295), and enables transparent data access to the AS-Interface from Industrial Ethernet.

PROFINET IO-Controllers can exchange I/O data cyclically with the AS-Interface; with acyclic services AS-i master calls can also be carried out. The IE/AS-i LINK PN IO is thus ideally suitable for distributed configuration and for linking an underlying AS-Interface network.

The IE/AS-i LINK PN IO in the version as AS-i single master is sufficient for applications with typical quantity frameworks.

The IE/AS-i LINK PN IO in the version as AS-i dual master is used for applications with high quantity frameworks. In this case, twice the quantity frameworks can be used on two AS-i segments running independently of each other.



Linking of AS-Interface to PROFINET via IE/AS-i LINK PN IO as single/dual master

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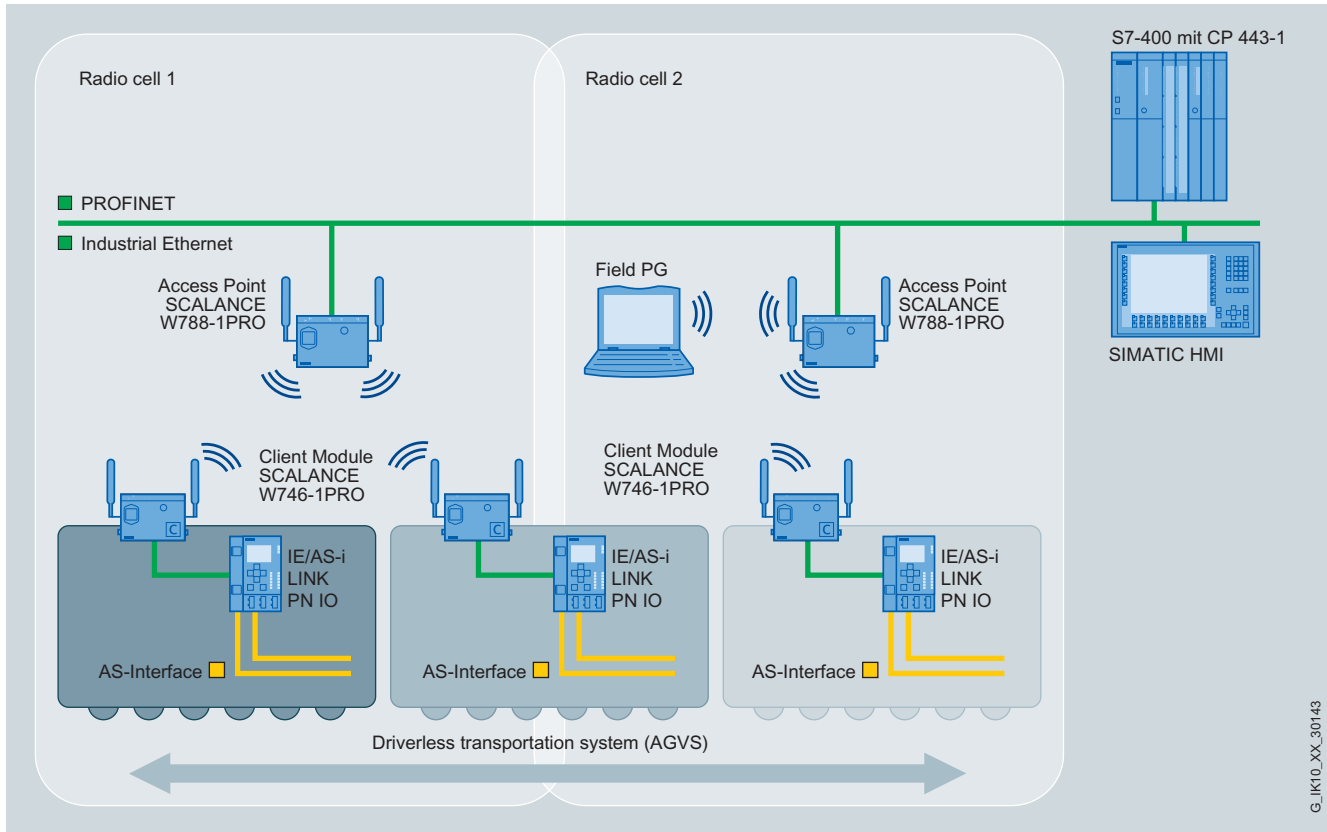
Network transitions

Industrial Ethernet – AS-Interface network transition

IE/AS-i LINK PN IO

Application (continued)

With an upstream IWLAN client module, e.g. SCALANCE W746-1PRO, an AS-Interface segment can be integrated wirelessly into the PROFINET world. Typical applications here are those solved with fault-prone festoon cables or contact conductor technology; maintenance costs are thus reduced.



Wireless communication between Industrial Ethernet and AS-Interface components

Network transitions

Industrial Ethernet – AS-Interface network transition

IE/AS-i LINK PN IO

Design

- Sturdy plastic enclosure with degree of protection IP20 for DIN rail mounting
- Compact design;
 - Display in front panel for exactly detailed indication of operating state and functional readiness of all connected and activated AS-Interface slaves
 - Six keys for commissioning and testing of the AS-Interface segment directly on the IE/AS-i LINK PN IO
 - LED display of operating state of PROFINET IO and AS-Interface
 - Integral 2-port switch (RJ45 socket) for connection to Industrial Ethernet supports the linear topology without external switch
 - Convenient startup, diagnostics and testing of the IE/AS-i LINK PN IO over a Web interface with standard browser
 - Power supply from the AS-Interface cable or alternatively with 24 V DC
 - Low mounting depth through recessed connector assembly
- Simple assembly on standard mounting rail
- Operation without fans or batteries
- Fast device replacement in the event of a fault by using the optional C-PLUG swap medium (not included in scope of supply)

Function

The IE/AS-i LINK PN IO allows a PROFINET IO controller to cyclically access the I/O data of all slaves of a subordinate AS-Interface segment. In line with the enhanced AS-Interface specification (V3.0), a maximum of 62 slaves - each with 4 digital inputs and 4 digital outputs - as well as analog slaves, can be connected per AS-Interface segment. The extended slave types according to the AS-i Specification V3.0 with higher I/O data volumes are also supported.

The IE/AS-i LINK PN IO occupies 62 input bytes and 62 output bytes in the IO controller as standard, in which the I/O data of the connected AS-Interface slaves of an AS-i segment are saved. The double master occupies twice the number of bytes. The input/output buffer can be compressed so that only the actually required I/O memory space is occupied in the system of the IO controller. Integral evaluation of analog signals is just as simple as the accessing of digital values.

PROFINET IO controllers are also able to trigger AS-Interface master calls (e.g. write parameters, modify addresses, read diagnostics values) by means of the acyclic PROFINET services.

The subordinate AS-i segment can be completely started up using an input display in the AS-Interface link. The IE/AS-i LINK PN IO is equipped with two switched Ethernet ports which additionally permit use of the integral Web server, making the input display already described even easier to use. Firmware updates are also available.

The optional C-PLUG supports module replacement without input of connection parameters (IP address etc.), ensuring that downtimes in the event of a fault are reduced to a minimum.

Diagnostics data

Extensive diagnostics options are available via the display and input keys, Web interface or STEP 7, including

- Operating status of the link
- Status of the link as PROFINET IO device
- Diagnostics of the AS-Interface network
- Frame statistics
- Standard diagnostics sites for rapid diagnostics access using standard browser

Configuration

STEP 7 V5.4 or higher is required for configuring the full functional scope of the IE/AS-i LINK PN IO.

Alternatively, the IE/AS-i LINK IO can be integrated in the engineering tool by means of the PROFINET type file (GSD):

- STEP 7 versions lower than V5.4 SP2
- Engineering tools from other vendors

With STEP 7 configuring, uploading of the AS-Interface configuration is possible in STEP 7 from V5.4 SP2 onwards. In addition, Siemens AS-i slaves can be conveniently configured in HW-Config (slave selection dialog).

Network transitions

Industrial Ethernet – AS-Interface network transition

IE/AS-i LINK PN IO

Technical specifications		Ordering data	Order No.
Product type description	IE/AS-i LINK PN IO	IE/AS-i LINK PN IO	
Transfer rates per AS-i segment		Network transition between Industrial Ethernet and AS-Interface; master profile M4, enhanced AS-Interface specification V3.0; degree of protection IP20; incl. manual on CD-ROM (German, English, French, Spanish, Italian)	
• AS-Interface bus cycle time	5 ms for 31 slaves; 10 ms for 62 slaves	• Single master with display	6GK1 411-2AB10
• Ethernet transfer rate	10/100 Mbit/s, autosensing	• Dual master with display	6GK1 411-2AB20
Interfaces		Accessories	
• AS-Interface connection		SCALANCE X204-2 Industrial Ethernet switch	6GK5 204-2BB10-2AA3
- with single master (1 AS-i segment)	Screw terminals (removable)	with four 10/100 Mbit/s RJ45 ports and two fiber-optic ports	
- With dual master (2 AS-i segments)	Screw terminals (removable)	Industrial Ethernet switch SCALANCE X308-2	6GK5 308-2FL00-2AA3
• Connection to Ethernet	2 x RJ45 sockets (switch ports)	2 x 1000 Mbit/s multi-mode fiber-optic ports (SC sockets), 1 x 10/100/1000 Mbit/s RJ45 port, 7 x 10/100 Mbit/s RJ45 ports; for glass fiber-optic cables (multi-mode) up to a max. 750 m.	
• Optional: 24 V DC supply voltage	Screw terminals (removable) incl. connection of the functional ground for integrated	C-PLUG	6GK1 900-0AB00
• Slot for the swap medium	C-PLUG	Swap medium for simple replacement of devices in the event of a fault; for storing configuration or engineering and application data; can be used for SIMATIC NET products with C-PLUG slot	
Display	128 x 64 pixels with backlighting	IE FC RJ45 Plug 90	
Keys	Membrane keyboard (6 keys)	RJ45 plug-in connector for Industrial Ethernet with a rugged metal housing and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; with 90° cable outlet; e.g. for ET 200S	6GK1 901-1BB20-2AA0 6GK1 901-1BB20-2AB0 6GK1 901-1BB20-2AE0
Supply voltage			
• From the AS-Interface cable (segment 1)	According to AS-Interface specification EN 50 295		
• Optional	24 V DC, functional ground		
Current consumption			
• from the AS-Interface shaped cable	max. 250 mA		
Loading capacity			
• Power loss	7.5 W		
Degree of protection	IP20		
Perm. ambient conditions			
• Operating temperature			
- Horizontal mounting	0 °C ... +60 °C		
- Vertical mounting	0 °C ... +45 °C		
• Transport/storage temperature	-30 °C ... +70 °C		
• Relative humidity	Max. 95 % at +25 °C		
• Operating altitude	3000 m above mean sea level		
Construction			
• Assembly	On standard DIN rail		
• Dimensions (W x H x D) in mm	90 x 132 x 88.5		
• Weight	Approx. 380 g		
Supported AS-Interface master profile	M4 (corresponding to AS-Interface Specification V3.0)		
Configuration of AS-Interface	by means of keys on front panel, with STEP 7 Version V5.4 SP2, through Web interface		

Network transitions

PROFIBUS DP – AS-Interface network transition

DP/AS-i LINK Advanced

Overview



PN	DP-M	DP-S	ASi-M		
		●	●		

- Compact router between PROFIBUS (DP slave) and AS-Interface
- Single and dual AS-Interface master (according to AS-Interface specification V3.0) for connecting 62 AS-Interface slaves each with integral analog-value transmission
- High-performance, integral earth-fault monitoring for the AS-Interface cable
- Simple diagnostics and startup on site using a pixel-graphics display and operator keys or Web interface with standard browser
- Optimum TIA integration through STEP 7, integration into engineering tools of other vendors through PROFIBUS type file (GSD)
- Vertical integration (standard Web interface) through Industrial Ethernet
- Power supply from the AS-Interface cable or alternatively with 24 V DC
- Module replacement without input of connection parameters (PROFIBUS address etc.) when using the C-PLUG (optional)

Benefits



- Short startup time through simple configuration by pressing a button and testing the AS-Interface segment via display or Web interface
- Reduction in downtimes and servicing times on failure of slave through convenient diagnostics on display or Web interface and by simple replacement of module with the C-PLUG swap medium
- Reduction of installation costs because the power can be supplied entirely from the AS-Interface cable, so an additional power supply is not required
- Reduced engineering overhead through convenient configuration of Siemens slaves per slave catalog in HW-Config (STEP 7)
- Lower costs for high quantity frameworks as result of the dual AS-Interface master

Application

The DP/AS-i LINK Advanced is PROFIBUS DPV1 slave (according to EN 50 170) and AS-Interface master (according to AS-Interface specification V3.0 to EN 50 295) and enables transparent data access to the AS-Interface from PROFIBUS DP.

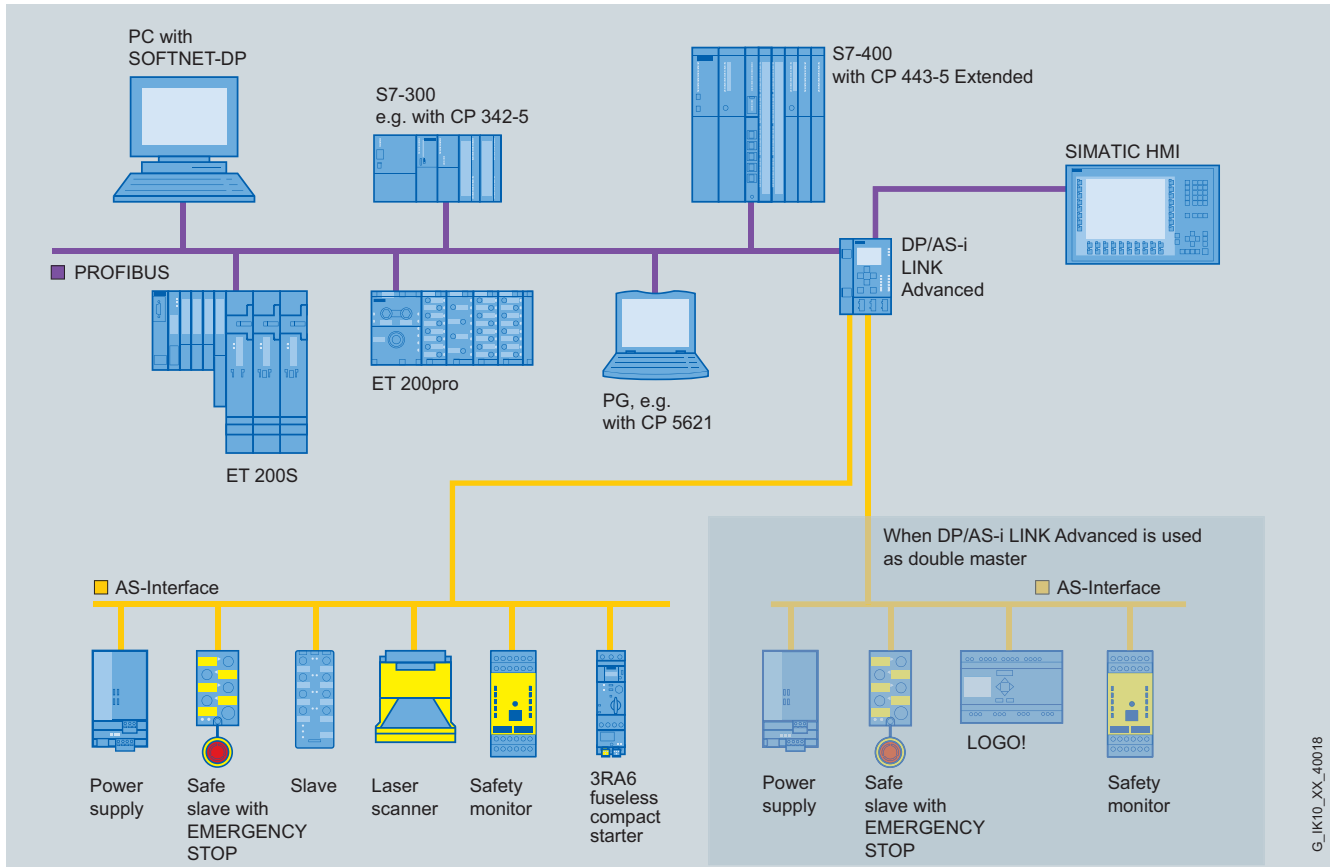
PROFIBUS DP masters can exchange I/O data cyclically with the AS-Interface; DP masters with acyclic services can additionally carry out AS-Interface master calls. The DP/AS-i LINK Advanced is thus particularly suitable for distributed configuration and for linking a subordinate AS-Interface network.

The DP/AS-i LINK Advanced in the version as AS-Interface single master is sufficient for applications with typical quantity frameworks.

The DP/AS-i LINK Advanced in the AS-Interface dual master version is used for applications with high quantity frameworks. In this case, twice the quantity frameworks can be used on two AS-Interface segments running independently of each other.

Network transitions

PROFIBUS DP – AS-Interface network transition

DP/AS-i LINK Advanced
Application


Linking of AS-Interface to PROFIBUS via DP/AS-i LINK Advanced as single/dual master

Design

- Stable plastic enclosure with degree of protection IP20 for DIN rail mounting
- Compact design;
 - Display in front panel for exactly detailed indication of operating state and functional readiness of all connected and activated AS-Interface slaves
 - 6 keys for startup and testing of the AS-Interface segment directly on the DP/AS-i LINK Advanced
 - LED display of operating state of PROFIBUS DP and AS-Interface
 - Integral Ethernet port (RJ45 socket) for convenient startup, diagnostics and testing of DP/AS-i LINK Advanced through a Web interface with standard browser
 - Power supply from the AS-Interface cable or alternatively with 24 V DC
 - Low mounting depth due to recessed connector assembly
- Simple assembly on standard mounting rail
- Operation without fans or batteries
- Fast device replacement in the event of a fault by using the optional C-PLUG swap medium (not included in scope of supply)

Network transitions

PROFIBUS DP – AS-Interface network transition

DP/AS-i LINK Advanced

Function

The DP/AS-i LINK Advanced allows a PROFIBUS DP master to cyclically access the I/O data of all slaves of a subordinate AS-Interface segment. In line with the enhanced AS-Interface specification (V3.0), a maximum of 62 slaves - each with 4 digital inputs and 4 digital outputs - as well as analog slaves, can be connected per AS-Interface segment. The extended slave types according to the AS-i Specification V3.0 with higher I/O data volumes are also supported.

The DP/AS-i LINK Advanced occupies 32 input byte and 32 output byte in the DP master as standard, in which the I/O data of the connected digital AS-Interface slaves of an AS-i segment are saved. The double master occupies twice the number of byte. The input/output buffer can be compressed so that only the actually required I/O memory space is occupied in the system of the DP master. Integral evaluation of analog signals is just as simple as the access to digital values; it is unnecessary to call communications blocks.

PROFIBUS DP V1 masters are also able to trigger AS-Interface master calls (e.g. write parameters, modify addresses, read diagnostics values) by means of the acyclic PROFIBUS services.

The subordinate AS-Interface segment can be completely started up using an input display in the AS-i link. The DP/AS-i LINK Advanced is equipped with an additional Ethernet port which permits use of the integral Web server and therefore additionally increases the convenience of the input display already described. Firmware updates are also available.

The optional C-PLUG supports module replacement without input of connection parameters (PROFIBUS address etc.), ensuring that downtimes in the event of a fault are reduced to a minimum.

Diagnostics data

Extensive diagnostics options are available via LEDs, the display and input keys, Web interface or STEP 7, including

- Operating status of the link
- Status of the link as PROFIBUS DP slave
- Diagnostics of the AS-Interface network
- Frame statistics
- Standard diagnostics sites for rapid diagnostics access using standard browser

Configuration

STEP 7 V5.4 or higher is required for configuring the full functional scope of the DP/AS-i LINK.

Alternatively, the DP/AS-i LINK Advanced can be integrated in the engineering tool by means of the PROFIBUS type file (GSD):

- COM PROFIBUS
- Older STEP 7 versions lower than V5.4
- Engineering tools from other vendors

With STEP 7 configuring, uploading of the AS-Interface configuration is possible in STEP 7 from V5.4 onwards. In addition, Siemens AS-Interface slaves can be conveniently configured in HW-Config (slave selection dialog).

Technical specifications

Product type description	DP/AS-i LINK Advanced
Transfer rates per AS-Interface segment	
• AS-Interface bus cycle time	5 ms for 31 slaves; 10 ms for 62 slaves
• PROFIBUS transfer rate	Up to 12 Mbit/s
• Ethernet transfer rate	10/100 Mbit/s, autosensing
Interfaces	
• AS-Interface connection	
- with single master (1 AS-i segment)	Screw terminals (removable)
- With dual master (2 AS-i segments)	Screw terminals (removable)
• Connection to PROFIBUS	1 x 9-pin Sub-D socket
• Connection to Ethernet	1 x RJ45 socket
• Optional: 24 V DC supply voltage	Screw terminals (removable) incl. connection of the functional ground for integrated
• Slot for the swap medium	C-PLUG
Display	128 x 64 pixels with backlighting
Keys	Membrane keyboard (6 keys)
Supply voltage	
• From the AS-Interface cable (AS-i segment 1)	According to AS-Interface specification EN 50 295
• Optional: 24 V DC	24 V DC, functional ground
Current consumption	
• from the AS-Interface cable	max. 250 mA
Loading capacity	
• 5 V DC on PROFIBUS connection	Max. 70 mA
• Power loss	7.5 W
Degree of protection	IP20
Perm. ambient conditions	
• Operating temperature	
- Horizontal mounting	0 °C ... +60 °C
- Vertical mounting	0 °C ... +45 °C
• Transport/storage temperature	-30 °C ... +70 °C
• Relative humidity	Max. 95 % at +25 °C
• Operating altitude	3000 m above mean sea level
Construction	
• Assembly	On standard DIN rail
• Dimensions (W x H x D) in mm	90 x 132 x 88.5
• Weight	Approx. 380 g
Supported AS-Interface master profile	M4 (corresponding to AS-Interface Specification V3.0)
Configuration of AS-Interface	by means of keys on front panel, with STEP 7 Version V5.4 and later, through Web interface

Network transitions

PROFIBUS DP – AS-Interface network transition

DP/AS-i LINK Advanced

Ordering data	Order No.	Ordering data	Order No.
DP/AS-i LINK Advanced Gateway between PROFIBUS DP and AS-Interface; master profile M4, enhanced AS-Interface specification V3.0; degree of protection IP20; incl. manual on CD-ROM (German, English, French, Spanish, Italian)		Accessories (continued)	
<ul style="list-style-type: none"> • Single master with display • Dual master with display 	6GK1 415-2BA10 6GK1 415-2BA20	C-PLUG Swap medium for simple replacement of devices in the event of a fault; for storing configuration or engineering and application data; can be used for SIMATIC NET products with C-PLUG slot	6GK1 900-0AB00
Accessories SCALANCE X204-2 Industrial Ethernet switch with four 10/100 Mbit/s RJ45 ports and two fiber-optic ports	6GK5 204-2BB10-2AA3	IE FC RJ45 Plug 90 RJ45 plug-in connector for Industrial Ethernet with a rugged metal housing and integrated insulation displacement contacts for connecting Industrial Ethernet FC installation cables; with 90° cable outlet	
Industrial Ethernet switch SCALANCE X308-2 2 x 1000 Mbit/s multi-mode fiber-optic ports (SC sockets), 1 x 10/100/1000 Mbit/s RJ45 port, 7 x 10/100 Mbit/s RJ45 ports; for glass fiber-optic cables (multi-mode) up to a max. 750 m.	6GK5 308-2FL00-2AA3	<ul style="list-style-type: none"> • 1 pack = 1 item • 1 pack = 10 items • 1 pack = 50 items 	6GK1 901-1BB20-2AA0 6GK1 901-1BB20-2AB0 6GK1 901-1BB20-2AE0
		PROFIBUS FastConnect bus connector RS485 with inclined cable outlet (35°); insulation displacement technology, max. transmission rate 12 Mbit/s	
		<ul style="list-style-type: none"> • Without PG interface • With PG interface 	6ES7 972-0BA60-0XA0 6ES7 972-0BB60-0XA0

Network transitions

PROFIBUS DP – AS-Interface network transition

DP/AS-Interface Link 20E

Overview



The DP/AS-Interface link 20E connects PROFIBUS DP with AS-Interface. It provides the following functions:

- PROFIBUS DP slave and AS-Interface master
- Up to 62 AS-Interface slaves can be connected and integrated analog value transfer (according to the extended AS-Interface specification V3.0).
- Supports all AS-Interface master functions in accordance with the extended AS-Interface specification V3.0, i.e. Master Profile M4.
- Supplied from the AS-Interface cable, so no additional power supply is necessary.
- Supports uploading of the AS-Interface configuration in STEP 7 from V5.2.

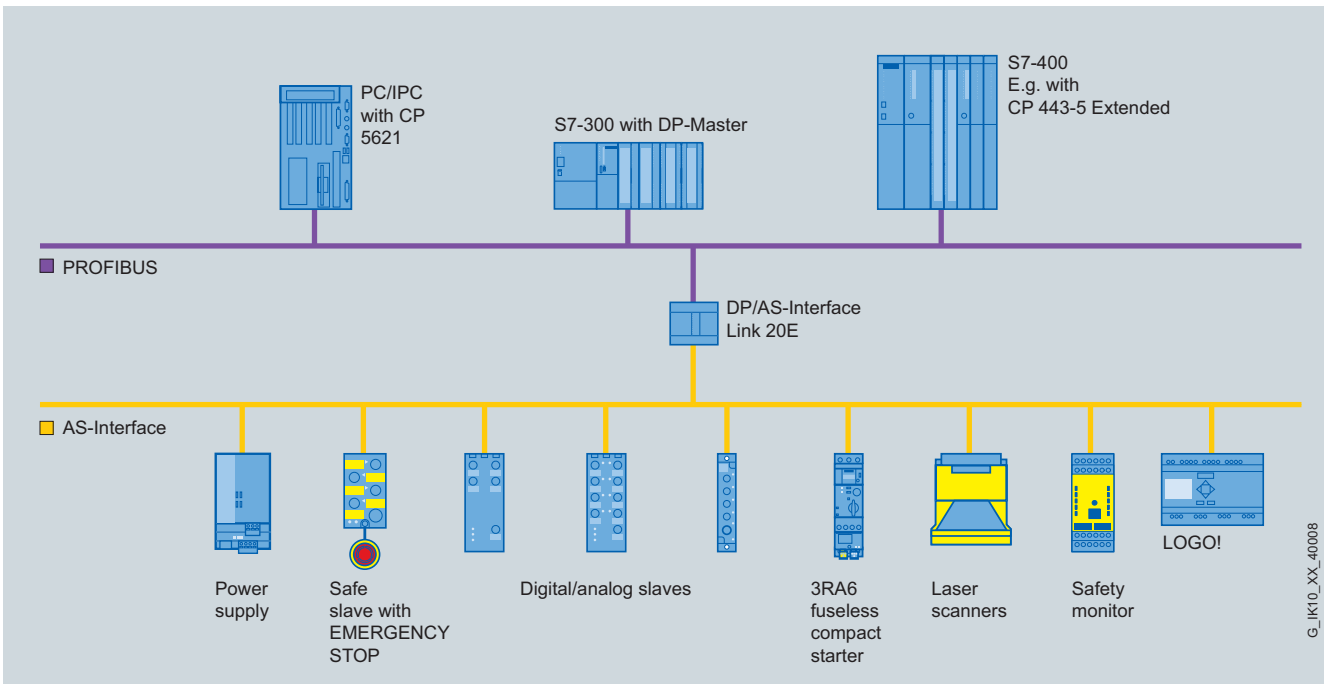
PN	DP-M	DP-S	ASi-M		
		●	●		

Benefits



- Reduced installation costs because the power is supplied entirely via the AS-Interface cable, which means that no additional power supply is required.

- Short commissioning times thanks to easy configuration at the touch of a button.
- The LED indicators help reduce downtime and service times if a slave fails.
- Quick and easy commissioning by reading the AS-Interface configuration



Transition from the PROFIBUS DP to the AS-Interface via DP/AS-Interface Link 20E

Network transitions

PROFIBUS DP – AS-Interface network transition

DP/AS-Interface Link 20E

Application

The DP/AS-Interface Link 20E is a PROFIBUS DP slave (according to EN 50 170) and AS-Interface master (according to EN 50 295) and enables the AS-Interface to be operated on PROFIBUS DP.

Simple PROFIBUS masters can exchange I/O data cyclically with AS-Interface; masters with acyclic services can exchange I/O data and perform master calls. DP/AS-Interface Link 20E cannot be used in conjunction with the extender.

Design

- Compact housing with degree of protection IP20 for mounting on DIN rails.
- LEDs on the front panel to indicate the operating status and the operational readiness of all connected and activated slaves.
- The PROFIBUS DP address can be set at the touch of a button.
- LED for the PROFIBUS DP slave address, DP bus error, and diagnosis.
- Two pushbuttons for switching operating mode and for accepting the current actual configuration as the preset configuration.
- The power is supplied via the AS-Interface shaped cable

Function

DP/AS-Interface Link 20E enables a DP master to access all the slaves in an AS-Interface segment. In accordance with the extended specification (V3.0) up to 62 slaves each with four digital inputs and four digital outputs as well as analog slaves can now be connected.

DP/AS-Interface Link 20E is normally assigned 32 byte of input data and 32 byte of output data in the DP master in which the I/O data for the connected AS-Interface slaves is stored. The input/output buffer can be compressed so that only the required memory in the DP master is used.

PROFIBUS DP masters can also trigger AS-Interface master calls via the acyclic PROFIBUS services (e.g. write parameters, change addresses, read diagnostic values).

Configuration

DP/AS-Interface Link 20E can be configured on the PROFIBUS with STEP 7.

The GSD files are also supplied with the manual, which means that configuration can even be carried out for versions in which DP/AS-Interface Link 20E is not yet available as standard.

The AS-Interface segment can be configured by means of STEP 7 or simply by adopting the actual configuration. Commissioning can also be performed without PROFIBUS.

When configuring with STEP 7, the AS-Interface configuration can be uploaded to STEP 7 with version V5.2 onwards.

Technical specifications

Product type description	DP/AS-Interface Link 20E
AS-Interface bus cycle time	5 ms for 31 slaves 10 ms for 62 slaves
PROFIBUS transfer rate	Max. 12 Mbits
Supported AS-Interface master profile	M4 (corresponding to AS-Interface Specification V3.0)
Configuration of AS-Interface	by means of pushbutton on the frontplate or with STEP 7 V5.1 SP2
Interfaces	
• AS-Interface connection	Screw terminals
• Connection to PROFIBUS	9-pin Sub-D socket
Supply voltage	
• From the AS-Interface cable	According to AS-Interface specification EN 50 295
Current consumption	
• From the AS-Interface cable	max. 200 mA
Loading capacity	
5 V DC on PROFIBUS connection	max. 90 mA
Power loss	4.5 W
Assembly	DIN rail or direct mounting
Degree of protection	IP20
Permissible ambient conditions	
• Operating temperature	
- Horizontal mounting	0 °C ... +60 °C
- Vertical mounting	0 °C ... +45 °C
• Transport/storage temperature	-40 °C ... +70 °C
• Relative humidity	Max. 95 % at +25 °C
Design	
• Module format	similar to S7-200 module
• Dimensions (W x H x D) in mm	90 x 80 x 60
• Weight	approx. 200 g

Network transitions

PROFIBUS DP – AS-Interface network transition

DP/AS-Interface Link 20E

Ordering data	Order No.		Order No.
DP/AS-Interface Link 20E Network transition between PROFIBUS DP and AS-Interface; degree of protection IP20; incl. manual on CD-ROM (German, English, French, Spanish, Italian)	6GK1 415-2AA10	PROFIBUS FastConnect bus connector RS485 with 90° cable outlet With insulation displacement terminals, max. transmission rate 12 Mbit/s	
PROFIBUS FC Standard Cable GP Standard type with special design for fast mounting, 2-core, shielded	6XV1 830-0EH10	<ul style="list-style-type: none"> • Without PG interface • With PG interface 	6ES7 972-0BA51-0XA0 6ES7 972-0BB51-0XA0
PROFIBUS FastConnect Stripping Tool Pre-adjusted stripping tool for fast stripping of PROFIBUS FastConnect bus cables	6GK1 905-6AA00	PROFIBUS FastConnect RS485 bus connector with angled cable outlet (35°) With insulation displacement terminals, max. transmission rate 12 Mbit/s	
		<ul style="list-style-type: none"> • Without PG interface • With PG interface 	6ES7 972-0BA60-0XA0 6ES7 972-0BB60-0XA0
		PROFIBUS FastConnect bus connector RS485 Plug 180 With insulation displacement terminals, with 180° cable outlet, for industrial PC, SIMATIC HMI OP, OLM; max. transmission rate 12 Mbit/s	6GK1 500-0FC10

Network transitions

PROFIBUS DP – AS-Interface network transition

DP/AS-i F-Link

Overview



PN	DP-M	DP-S	ASi-M		
		●	●		

- Compact, safety-oriented router between PROFIBUS (DP Slave) and AS-Interface
- Monitoring the inputs of safety-oriented digital AS-i slaves (ASIsafe slaves) and forwarding of data through PROFIsafe. No additional safety-oriented components required for the AS-Interface (e.g. safety monitor)
- AS-i master according to AS-Interface Specification V3.0, master profile M4, for connection of up to 62 AS-i slaves with integrated analog value transfer function
- Direct integration in PROFIBUS networks. Optional integration in PROFINET environments through PROFINET/PROFIBUS network transition (IE/PB Link PN IO) or through SIMATIC S7 315/317/319 F PN/DP or S7-416F-3 PN/DP
- Connection to ET 200S with IM-F-CPU using DP master module is possible
- Optimum TIA integration in STEP 7 using Object Manager, integration in non-Siemens engineering tools using PROFIBUS GSD file.
- Local diagnostics using LEDs and display with control keys

Benefits

get Designed for Industry

- Gaps in (bus-based) safety technology closed: safety-oriented signals (EMERGENCY STOP, door tumbler, light curtains etc.) collected with AS-i and transferred to higher-level F PLC. This enables:
 - quick installation, easy commissioning: use of AS-i virtues in the field now fully consistent for Safety Integrated
 - Cost-effective solution as ASIsafe is ideally suited for the collection of "fewer but more distributed failsafe bits".
- Price advantage: As a fully fledged AS-i master according to Specification V3.0, larger volumes of project data can be used on the AS-i network (496 inputs and outputs each, up to 62 digital or analog slaves)
- Investment protection:
 - Connection to PROFIBUS networks, such as DP/AS-i Link Advanced or DP/AS interface Link 20E
 - Downward compatibility to AS-Interface specification V2
 - Open for modern automation concepts with AS-i
- Teaching the code sequences of ASIsafe slaves is possible at the press of a button
- Reduced amount of engineering work thanks to user-friendly configuration of all AS-i slaves from Siemens using the slave selection dialog in HW-Config (STEP 7), including setting the F-parameter of the ASIsafe slaves modeled on PROFIsafe slaves
- Cost-savings thanks to programming of the safety logic with the familiar, powerful commands of the distributed safety packages from the failsafe SIMATIC PLC in F-FUP or F-FOP, incl. TÜV-certified function blocks for typical safety applications
- Use in machine-tools under SINUMERIK 840 D (p/s) possible
- Reduction of standstill and servicing times in the event of a slave failure thanks to user-friendly diagnostics using the display and through simple module exchange (only a few settings by control keys are required, without use of the configurator tool)

Network transitions

PROFIBUS DP – AS-Interface network transition

DP/AS-i F-Link

Application

Links between PROFIsafe and ASIsafe

The DP/AS-i F-Link is a PROFIBUS DP-V1 slave (according to EN 50170) and an AS-Interface master (based on AS-Interface Specification V3.0 according to EN 50296). It enables transparent data access to AS-Interface from PROFIBUS DP. The DP/AS-i F-Link is also the only AS-i master with which safety-oriented input data can be passed from ASIsafe slaves via the PROFIsafe protocol to a failsafe CPU with PROFIBUS DP master. No additional safety cabling or monitoring is required (in particular no AS-Interface safety monitor). The transmission of binary values or analog values is possible depending on the slave type. All slaves according to AS-Interface Specification V2.0, V2.1 or V3.0 can be used as AS-i slaves.

PROFIBUS DP masters according to DP-V0 or DP-V1 can exchange I/O data with lower-level AS-i slaves in cyclic mode. PROFIBUS DP masters with acyclic services according to DP-V1 are able in addition to initiate AS-i command calls (e.g. reading/writing the AS-i configuration during normal operation). In

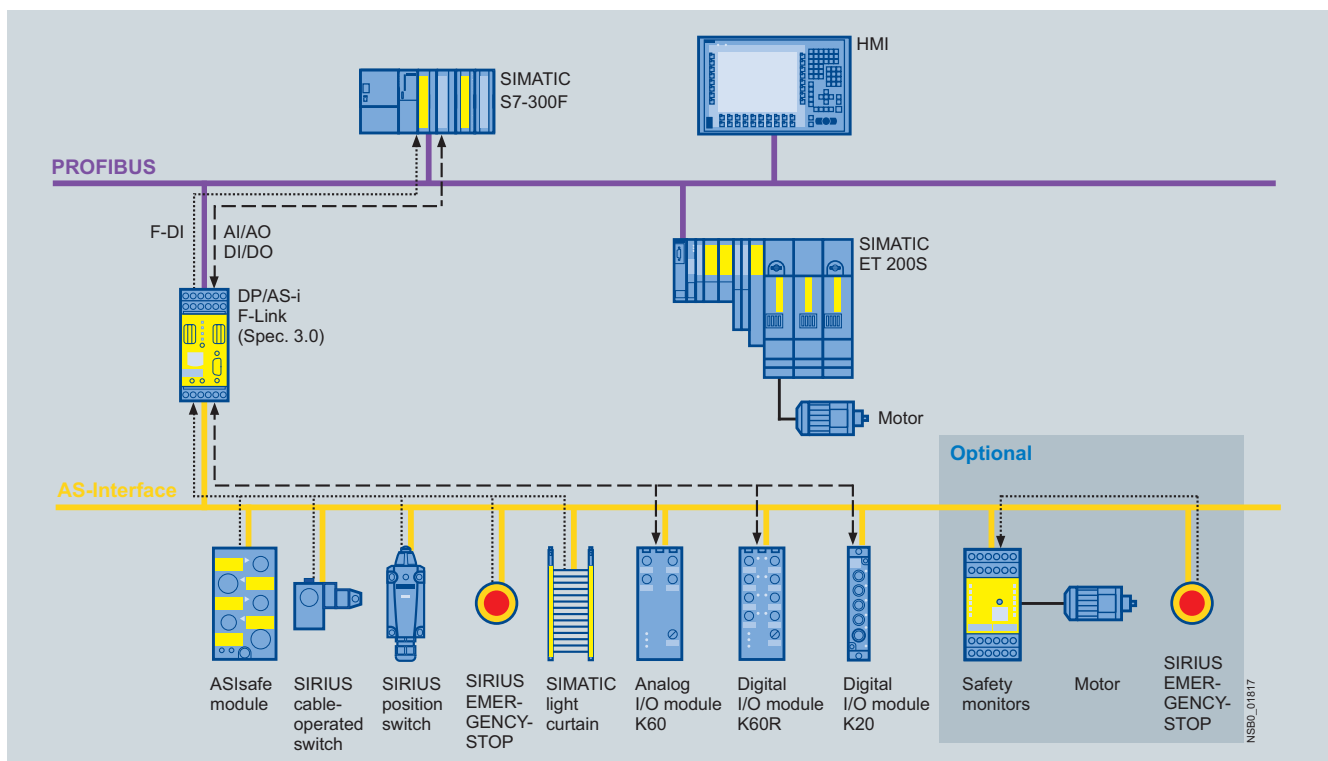
addition to digital I/O data, analog data can also be saved permanently in the cyclic periphery of a failsafe S7-300/S7-416 F-CPU.

In configuring mode the DP/AS-i F-Link reads in the configuration data of the peripherals on the AS-Interface. Slave addresses can be set using the display and the control keys, and the code sequences of safe AS-i slaves can be taught.

During operation, four display LEDs and the display provide detailed diagnostics information, which directly localizes the fault if required. Using the PLC user program it is possible to read out diagnostics data records and make them available to a higher-level operating and monitoring system (e.g. WinCC Flexible or TRANSLINE HMI).

Network connectivity

The DP/AS-i F-Link can be used in a variety of constellations.

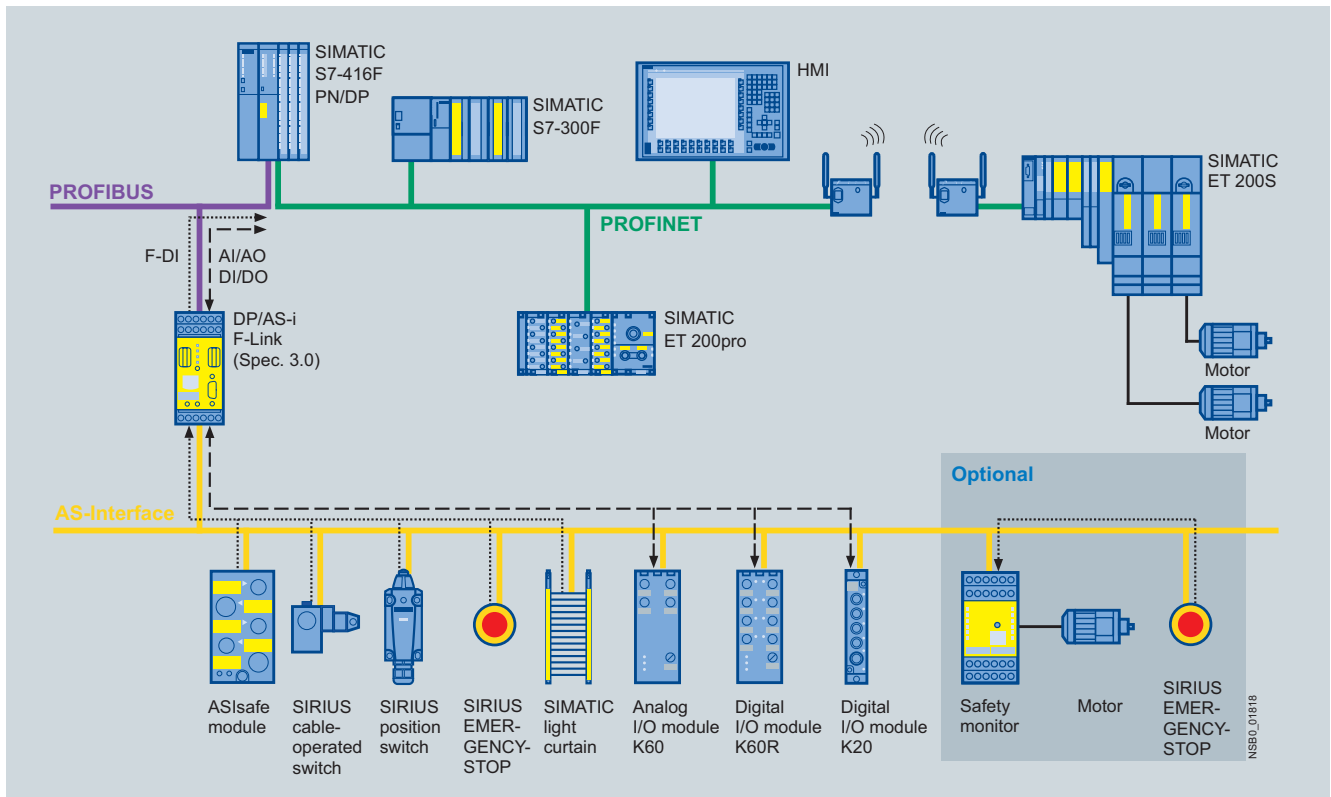


Constellation 1: Integration in PROFIBUS networks under SIMATIC F PLC

Network transitions PROFIBUS DP – AS-Interface network transition

DP/AS-i F-Link

Application (continued)



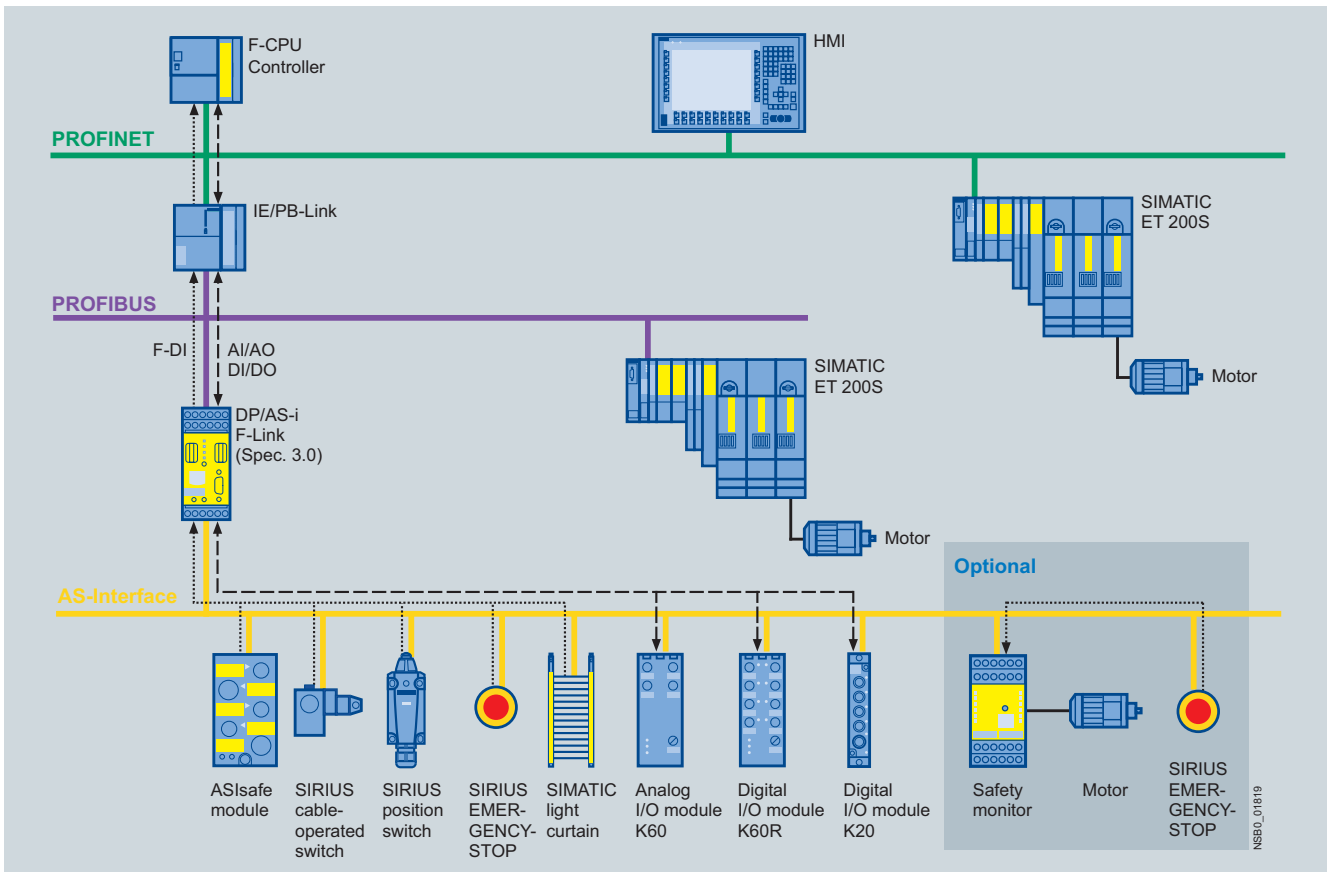
Constellation 2: Integration in PROFIBUS networks under SIMATIC F PLC

Network transitions

PROFIBUS DP – AS-Interface network transition

DP/AS-i F-Link

Application (continued)




Constellation 3: Alternatively integration in PROFINET networks under SIMATIC F PLC through IE/PB Link

Further network connectivity options:

- Integration in SINUMERIK Power Line and Solution Line
- Integration under non-Siemens failsafe control systems using PROFIBUS GSD file, available in the Internet at <http://support.automation.siemens.com/WW/view/de/113250>

Selection and ordering data

	Version	Order No.
	DP/AS-i F-Link Network transition between PROFIBUS DP and AS-Interface for failsafe data transmission from ASIsafe to PROFIBUS DP – PROFIsafe. Master profile M4 according to extended AS-i Specification 3.0, degree of protection IP20	3RK3 141-1CD10 3RK3 141-2CD10
	<ul style="list-style-type: none"> • Screw terminals • Spring-loaded terminals 	

More information

The manual DP/AS-i F-Link can be downloaded free of charge from the Internet at <http://support.automation.siemens.com/WW/view/de/24196041>.

More presales information can be found at <http://www.siemens.com/as-interface/master>.

The F-Link Object Manager must be installed for configuring HW-Config (STEP 7). The Object Manager can be downloaded free of charge from the Internet at <http://support.automation.siemens.com/WW/view/de/24724923>

Network transitions

PROFIBUS DP – PROFIBUS PA network transition

DP/PA link and DP/PA coupler

Overview



To create a smooth network transition between PROFIBUS DP and PROFIBUS PA, the SIMATIC product range offers two versions: the DP/PA coupler and the DP/PA link.

The following criteria can be applied when choosing the network transition:

- DP/PA coupler:
For small quantity frameworks (volumes of data) and low timing requirements; limiting of data transfer rate on the PROFIBUS DP to 45.45 kbit/s
- DP/PA link:
For large number of stations and high cycle time requirements; data transfer rate on the PROFIBUS DP up to 12 Mbit/s

Application

The two DP/PA network transitions are based on two versions of the DP/PA coupler:

- Ex [i] DP/PA coupler (max. output current 110 mA) for implementation of PROFIBUS PA networks with a line or tree topology in environments up to Ex zone 1, not for redundant architectures (coupler redundancy, ring)
- FDC 157-0 DP/PA coupler (max. output current 1000 mA) for implementation of PROFIBUS PA networks with a line, tree or ring topology in environments up to Ex zone 2; can be used for the redundant architectures "Ring" and "Coupler redundancy"

DP/PA couplers are also integral components of the DP/PA link (see design). The DP/PA link connects PROFIBUS DP and PROFIBUS PA together, and decouples the transmission rates. In contrast to the DP/PA coupler which limits the data transmission rate on the PROFIBUS DP to 45.45 kbit/s, the DP/PA link does not influence the performance of the PROFIBUS DP.

The DP/PA link functions as a slave on the PROFIBUS DP and as a master on the PROFIBUS PA. From the viewpoint of the host PROFIBUS DP master, the DP/PA link is a modular slave whose modules are the devices connected on the PROFIBUS PA. Addressing of these devices is carried out indirectly via the DP/PA link which itself only requires one node address. The host PROFIBUS master can scan devices connected to the DP/PA link all at once.

If the network transition is a DP/PA coupler, the nodes on the PROFIBUS PA are directly addressed by the PROFIBUS DP master (controller). The DP/PA coupler is an electrical node, but is transparent for communication between the master and PA field devices; it therefore does not require setting of parameters or addresses (exception: FDC 157-0 DP/PA coupler used as PROFIBUS diagnostics slave).

PROFIBUS diagnostics with FDC 157-0 DP/PA coupler, configured as PROFIBUS diagnostics slave

FDC 157-0 DP/PA couplers configured as PROFIBUS diagnostics slaves supply extensive diagnostic and status information via PROFIBUS for swift location and clearance of faults:

- I&M data (Identification & Maintenance)
- Current and voltage values on the main cable
- Redundancy status
- Wire breakage
- Short-circuit
- Signal level

For this purpose, each FDC 157-0 DP/PA coupler requires its own PROFIBUS address. This applies independent of use in a DP/PA link or as a DP/PA router.

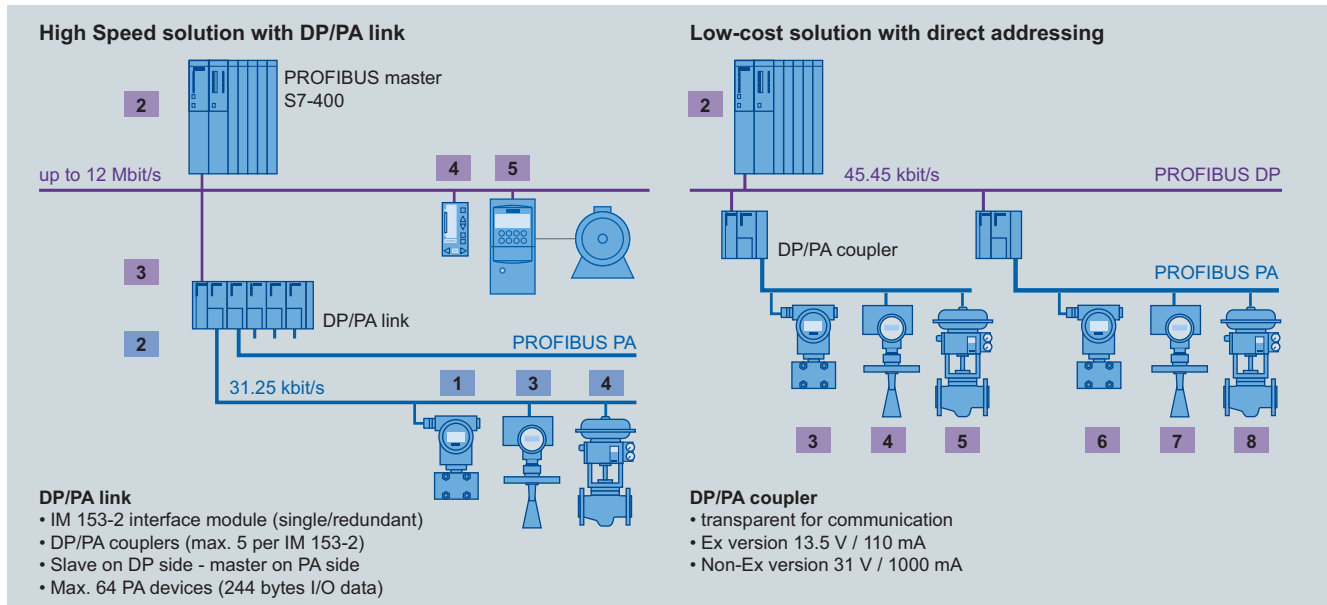
The DP/PA link and DP/PA couplers as DP/PA routers can be mounted on an S7-300 profile rail. They are operated with 24 V DC, and can be installed in environments up to Ex zone 2 with extended temperature range.

Network transitions

PROFIBUS DP – PROFIBUS PA network transition

DP/PA link and DP/PA coupler

Design



Configuration examples with DP/PA link and DP/PA coupler

DP/PA link

The DP/PA link is a modular combination consisting of the IM 153-2 High Feature PROFIBUS DP interface module (with optional redundancy) and up to 5 DP/PA couplers (Ex [i] or FDC 157-0) packaged in an S7-300 design.

All components of the DP/PA link are interconnected through the S7 backplane bus. Use of active bus modules on the backplane allows hot swapping of individual modules and redundancy of the IM 153-2 High Feature PROFIBUS DP interface modules and the FDC 157-0 DP/PA coupler.

The PS 307 or PS 305 load power supply can be used for the 24 V DC. With a redundant IM 153-2 High Feature interface module for PROFIBUS DP, it is also recommendable to have a redundant 24 V DC supply, e.g. with two PS 307/PS 305 load power supplies.

The PROFIBUS PA lines/rings designed with the DP/PA couplers are physically separated as regards current input, but form one bus system in communication terms. A PROFIBUS PA ring or a PROFIBUS PA line with coupler redundancy can be operated on each DP/PA link. Further PROFIBUS PA lines can be operated on this DP/PA link using individual couplers. The FDC 157-0 DP/PA couplers provided for the ring coupling or coupler redundancy must always be located at the right-hand end of a sequence of up to 5 couplers.

The following basic components are available to configure the DP/PA link:

- IM 153-2 High Feature interface module for extended temperature range
- DP/PA coupler (Ex [i] and FDC 157-0)
- Components for redundant design and for hot swapping
 - DIN rail for hot swapping (as an alternative to the standard DIN rail)
 - BM PS/IM for one load power supply and one IM 153-2 High Feature module
 - IM/IM (IM 157) bus module for two IM 153-2 High Feature modules, for redundant and non-redundant design and for extended temperature range
 - DP/PA bus module for one DP/PA coupler Ex [i] or FDC 157-0, for extended temperature range (up to 5 DP/PA couplers possible per DP/PA link)
 - DP/PA but module for 2 DP/PA coupler FDC 157-0, for extended temperature range

Additive option:

- PS 307 load power supply for 120/230 V AC; 24 V DC, version in 2, 5 or 10 A, or PS 305 load power supply for 24/48/60/110 V DC; 24 V DC, 2 A

Network transitions

PROFIBUS DP – PROFIBUS PA network transition

DP/PA link and DP/PA coupler

Technical specifications

Product type description	DP/PA coupler
Connection for PROFIBUS PA	
• DP/PA coupler Ex [i]	2 terminals of a 4-pole screw-type terminal, integral terminating resistor
• DP/PA coupler FDC 157-0	4-pole screw-type terminal for connection and looping through, selectable terminating resistor
Connection for PROFIBUS DP	9-pin Sub-D plug, contact assignment as described in IEC 61158/EN 50170
Backplane bus	Connection through S7 backplane bus connector (only necessary for DP/PA link); non-floating The active BM DP/PA bus modules are required for the hot swapping function
Diagnostic displays	
• DP/PA coupler Ex [i] and DP/PA coupler FDC 157-0	Bus activity "DP" (yellow) Bus activity "PA" (yellow) 24 V DC "ON" (green)
• Additive with DP/PA coupler FDC 157-0	Group fault "SF" (red) Bus fault "BF" (rot) DP/PA coupler activated, feeding/transmitting "ACT" (yellow), only with PA redundancy
Power supply	24 V DC (20.4 V ... 28.8 V)
Current consumption	
• DP/PA coupler Ex [i]	Max. 400 mA
• DP/PA coupler FDC 157-0	Max. 2300 mA
Voltage at coupler output	
• DP/PA coupler Ex [i]	13 V ... 14 V DC
• DP/PA coupler FDC 157-0	31 ± 1 V DC
Max. current at coupler output	
• DP/PA coupler Ex [i]	110 mA
• DP/PA coupler FDC 157-0	1 A (up to 50 °C), 0.8 A (up to 60 °C)
Power loss	
• DP/PA coupler Ex [i]	Approx. 7 W
• DP/PA coupler FDC 157-0	Approx. 13.4 W
Operating temperature	
• DP/PA coupler Ex [i] and DP/PA coupler FDC 157-0	
- horizontal installation	-25 ... +60 °C
- vertical installation	-25 ... +40 °C
Dimensions	
Dimensions (W x H x D) in mm	80 x 125 x 130
Weight	Approx. 515 g

Product type description	IM 153-2 High Feature (for extended temperature range)
Function	Linking of PROFIBUS DP (9.6 kbit/s to 12 Mbit/s, slave functionality) and PROFIBUS PA with support of the "Configuration in Run" function The DP/PA link function is only implemented by extending the IM 153-2 High Feature with one or more DP/PA couplers. Stand-alone operation of the IM 153-2 High Feature is not possible. 1 Y coupler, up to 5 DP/PA couplers or up to 64 slaves can be connected Isolation from the higher-level DP master system
Interfaces	
• Connection for PROFIBUS DP	9-pin Sub-D plug, contact assignment as described in IEC 61158/EN 50170, Vol. 2
• Backplane bus	Connection through S7 backplane bus connector, non-floating Bus modules and profile rails for hot swapping are required for the hot swapping function and for a redundant PROFIBUS DP interface module.
Diagnostic displays	Group fault "SF" (red) Bus fault DP "BF 1" (red) Bus fault PA "BF 2" (red) IM active "ACT" (yellow) 24 V DC "ON" (green)
Power supply	24 V DC
Current consumption	
• in DP/PA link	Max. 100 mA
• in Y-link	Max. 200 mA
Power loss	
• in DP/PA link	Approx. 2 W
• in Y-link	Approx. 4 W
Voltage failure bridging	20 ms
Mechanical design of power supply	4-pin screw terminal, short-circuiting link between PE and M24; the short-circuiting link must be removed for floating operation (independent of this, the DP interface is always floating)
Permissible operating temperature	
• horizontal installation	-25 ... +60 °C
• vertical installation	-25 ... +40 °C
Dimensions	
Dimensions (W x H x D) in mm	40 x 125 x 130
Weight	Approx. 350 g

Network transitions

PROFIBUS DP – PROFIBUS PA network transition

DP/PA link and DP/PA coupler

Ordering data	Order No.	Order No.
DP/PA coupler For transition from RS 485 to MBP		
<ul style="list-style-type: none"> DP/PA coupler Ex [i] 	6ES7 157-0AD82-0XA0	
<ul style="list-style-type: none"> DP/PA coupler FDC 157-0, redundant design possible 	6ES7 157-0AC83-0XA0	
IM 153-2 High Feature Interface module for DP/PA Link and Y-Link; for extended temperature range	6ES7 153-2BA82-0XB0	
Accessories		
PS 307 load power supply Including connection assembly; 120/230 V AC; 24 V DC		
<ul style="list-style-type: none"> 2 A; 50 mm wide 	6ES7 307-1BA00-0AA0	
<ul style="list-style-type: none"> 5 A; 80 mm wide 	6ES7 307-1EA00-0AA0	
<ul style="list-style-type: none"> 5 A, extended temperature range; 80 mm wide 	6ES7 307-1EA80-0AA0	
<ul style="list-style-type: none"> 10 A, 200 mm wide 	6ES7 307-1KA01-0AA0	
PS 305 load power supply 24/48/60/110 V DC; 24 V DC		
<ul style="list-style-type: none"> 2 A, extended temperature range; 80 mm wide 	6ES7 305-1BA80-0AA0	
Standard profile rails (without hot swapping function)		
<ul style="list-style-type: none"> 482 mm wide (19 inches) 	6ES7 390-1AE80-0AA0	
<ul style="list-style-type: none"> 530 mm wide 	6ES7 390-1AF30-0AA0	
Components for hot swapping and for redundant design		
Active bus modules for hot swapping		
<ul style="list-style-type: none"> BM PS/IM for one load power supply and one IM 153-2 High Feature module 		6ES7 195-7HA00-0XA0
<ul style="list-style-type: none"> BM IM 157 for two IM 153-2 High Feature modules, for redundant and non-redundant configuration, for extended temperature range, for hot swapping function, permissible operating temperature -25...+60 °C 		6ES7 195-7HD80-0XA0
<ul style="list-style-type: none"> BM DP/PA for one DP/PA coupler Ex [i] or FDC 157-0, for extended temperature range, for hot swapping function, permissible operating temperature -25 to +60 °C 		6ES7 195-7HF80-0XA0
<ul style="list-style-type: none"> BM DP/PA for two DP/PA couplers FDC 157-0, for extended temperature range, for hot swapping function, permissible operating temperature -25 to +60 °C 		6ES7 195-7HG80-0XA0
Profile rail for hot swapping		
For max. 5 active bus modules		
<ul style="list-style-type: none"> 482 mm wide (19 inches) 		6ES7 195-1GA00-0XA0
<ul style="list-style-type: none"> 530 mm wide 		6ES7 195-1GF30-0XA0
<ul style="list-style-type: none"> 620 mm wide 		6ES7 195-1GG30-0XA0