

Network transitions



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Transition from Industrial Ethernet to WirelessHART

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IE/WSN-PA LINK

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Overview

General data

HART (**H**ighway **A**ddressable **R**emote **T**ransducer) is the protocol for bus-addressed field devices. It is not a fieldbus, but a version of the digital field communication that contains many of the functionalities of fieldbuses.

WirelessHART is the wireless HART communication to fieldbuses in the process industry. The HART Communication Foundation (HCF) specified WirelessHART and published it as a component of the HART Standard V7.1. The radio transmission is based on the wireless communication standard IEEE 802.15.4. High availability is achieved based on the architecture of a "meshed networks" (each field device is simultaneously a repeater) with redundant communication paths and constantly changing frequency channels (channel hopping). 128-bit encryption in conjunction with authentication and validation of each data packet ensures secure data transfer and prevents unauthorized access to the field devices.

As a basic principle, a WirelessHART network consists of WirelessHART field devices and a WirelessHART gateway that receives the data from the field devices and forwards it to the automation system.

IE/WSN-PA LINK



- The IE/WSN-PA LINK is a gateway for the connection of WirelessHART field devices (HART V7.1) to Industrial Ethernet, as an alternative or supplement to the wired connection.
- Connection of up to 100 WirelessHART devices
- Approved for operation in hazardous areas in Zone 2
- Open TCP/IP communication and Modbus TCP via the Ethernet interface
- Can be used with HART-OPC servers of the HART Communication Foundation

Note:

A general introduction to WirelessHART and information on the WirelessHART adapter and the WirelessHART field devices can be found in Catalog FI 01 or on the Internet at www.siemens.com/wirelesshart

Benefits



- Extended possible solutions for connecting process industry field devices by means of alternative or supplementary WirelessHART communication
- Reliable data transmission using intermeshed network technology; the self-organizing network with alternative paths enables radio obstacles to be bypassed
- Reduction of cabling costs under difficult installation conditions, e.g. if the field devices are located on inaccessible plant components or are only required temporarily
- To improve process monitoring and for maintenance tasks, sensors can be retrofitted
- Existing transmitters can be integrated wirelessly into maintenance and diagnostics systems by means of WirelessHART adapters
- Without additional software, restricted monitoring is possible via web services and the integrated web server of the IE/WSN-PA LINK.

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Application

The IE/WSN-PA LINK connects wireless HART field devices by radio to the Ethernet. On the radio side, the IE/WSN-PA LINK supports the WirelessHART standard and on the Ethernet side the TCP/IP and Modbus TCP communication.

The IE/WSN-PA LINK thus enables wireless diagnostics, maintenance and process monitoring.

Monitoring

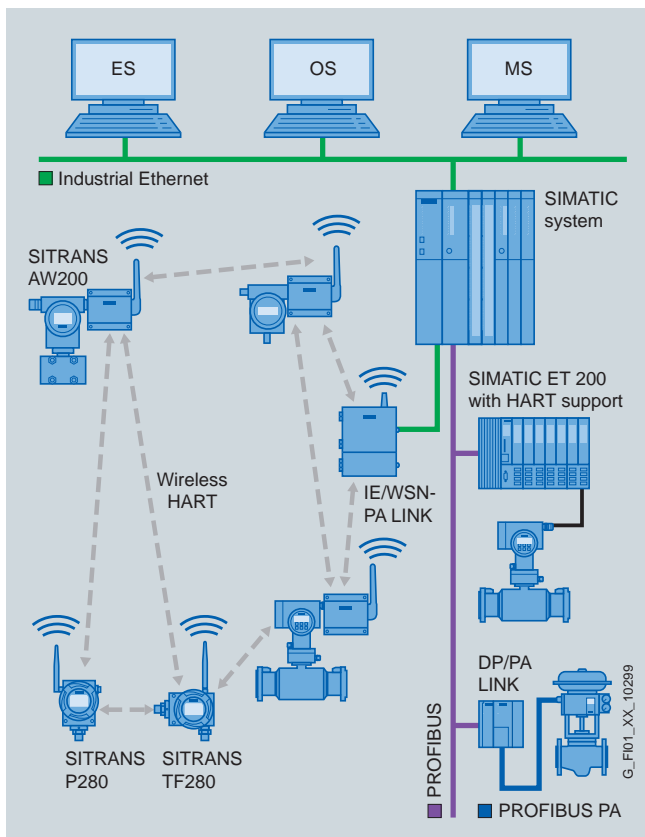
WirelessHART is particularly suitable for use in plant sections that are to be included in monitoring, but which do not have any existing MSR cabling, e.g. external tank stores or other installations where high cabling costs are anticipated. Data for the visualization can be retrieved from the IE/WSN-PA LINK via Industrial Ethernet or Modbus TCP.

Retrofitting for diagnostics and maintenance

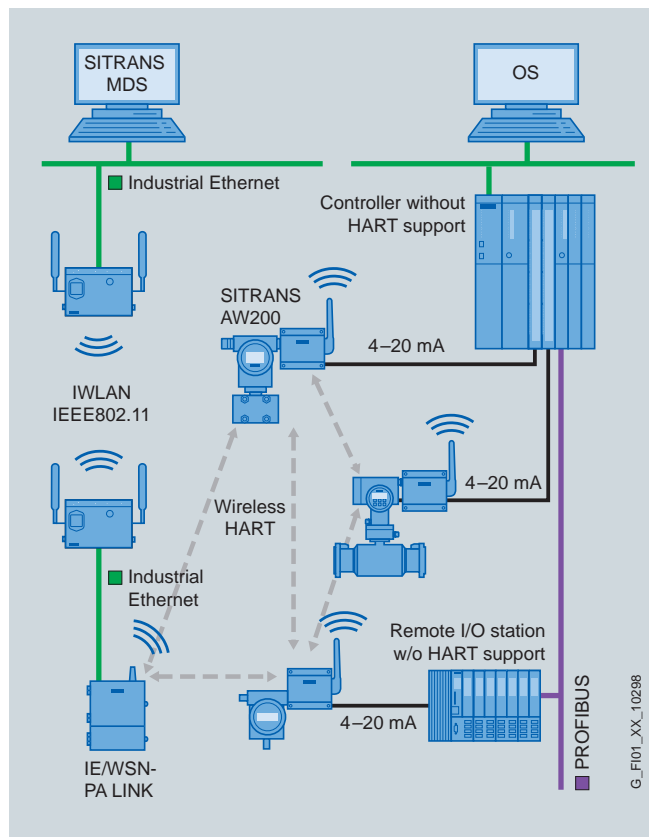
For this application, wireless adapters are looped into the 4-20 mA interface or screwed directly onto the HART device. The acyclic HART message frames are transmitted by radio between IE/WSN-PA LINK and a wireless adapter. Without affecting the operation of the plant, the wireless adapter modulates the acyclic HART message frames to the 4-20 mA interface or extracts them from the 4-20 mA interface.

The IE/WSN-PA LINK collects data from all the wireless adapters and transfers it via Industrial Ethernet to the diagnostics and maintenance station.

If greater distances between the IE/WSN-PA LINK and the monitoring station are to be spanned without cabling, this can be implemented by means of Industrial Wireless LAN with the access points and client modules of the SCALANCE W family.



Monitoring of process states via WirelessHART



Retrofitting of plants for diagnostics and maintenance

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Design

- 2 x 10/100/1000 Mbit/s RJ45 ports, electrical (no integral switch; interfaces can be used, for example, for continuous connection to the plant network as well as the temporary connection of a PC)
- 1 x screw terminal for connection to Modbus RTU via RS485
- 1 x screw terminal for the 24 V DC connection
- Rugged metal enclosure with degree of protection IP65 for use outdoors, also in hazardous zone 2
- Mounting: wall or mast mounting (vertical); U-bolts for mast mounting are included in the scope of delivery.

Product versions

- With integral, non-detachable antenna
- With N connector for connection of external antennas

Function

WirelessHART

The IE/WSN-PA LINK establishes on the radio side an inter-meshed wireless sensor network for communication with wireless field devices (e.g. transmitters). The data from the wireless field devices is received by the IE/WSN-PA LINK and transmitted via Industrial Ethernet to the connected systems. The supported wireless network is an open wireless network specified by the HART Communication Foundation (HCF) in accordance with the WirelessHART (HART V7.1) standard.

On the field device side, the IE/WSN-PA LINK requires field devices that support WirelessHART (HART). Existing field devices can be integrated by means of wireless adapters into the WirelessHART communication. To this end, the adapters are looped into the 4-20 mA interface. The HART message frames are transmitted from the HART device to a maintenance or diagnostics station device without affecting the 4-20 mA interface.

In addition, as many as four standard HART field devices can be connected directly to the adapter. In this case, the 4-20 mA cabling is omitted completely.

The adapter wirelessly transmits all data and process values of the connected devices. The advantage of this solution is that tried and tested devices can continue to be used.

Industrial Ethernet

Via the Ethernet interface the IE/WSN-PA LINK supports the use of the HART OPC server and the Modbus TCP protocol.

Configuration

The configuration is web-based, without additional software, and performed from the PC. By means of the web user interface it is also possible to display the device states and measured values of the WirelessHART devices.

Integration

Integration into automation systems

The IE/WSN-PA LINK can be integrated into automation systems via Ethernet or Modbus TCP. For connection of the IE/WSN-PA LINK to SIMATIC S7-300/400, communication modules (CP 343-1 oder CP 443-1) are required. You can obtain function blocks and technical support from the following address:

Siemens AG
Industrial Technologies
IT4Industry Customer Support
Werner-von-Siemens-Strasse 60
91052 Erlangen
Germany

Phone: +49 91 31 7-461 11

Fax: +49 91 31 7-447 57

E-mail: it4.industry@siemens.com

Integration in PCS 7

For integration of the IE/WSN-PA LINK into PCS 7 you can obtain function blocks and technical support from the following address:

Siemens AG
I IS IN E&C OC A KHE
Siemensallee 84
76187 Karlsruhe
Germany

Phone: +49 721 595-6380

E-mail: function.blocks.industry@siemens.com

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IE/WSN-PA LINK

Technical specifications

Order No.	6GK1 411-6CA40-0AA0	6GK1 411-6CA40-0BA0
Product type designation	IE/WSN-PA LINK	IE/WSN-PA LINK
Data transmission rate		
• at interface 1	10 ... 100 Mbit/s	10 ... 100 Mbit/s
• at interface 2	10 ... 100 Mbit/s	10 ... 100 Mbit/s
• at interface 3	9.6 to 57.6 kbit/s	9.6 to 57.6 kbit/s
Interfaces		
Number of electrical connections		
• at interface 1 in accordance with Industrial Ethernet	1	1
• at interface 2 in accordance with Industrial Ethernet	1	1
• at interface 3 in accordance with RS 485	1	1
• For power supply	1	1
Design of electrical connection		
• at interface 1 in accordance with Industrial Ethernet	RJ45 port	RJ45 port
• at interface 2 in accordance with Industrial Ethernet	RJ45 port	RJ45 port
• at interface 3 in accordance with RS 485	2-pin terminal strip	2-pin terminal strip
• For power supply	3-pin terminal strip	3-pin terminal strip
Interfaces Wireless		
Number of radio cards permanently installed	1	1
Number of internal antennas	1	0
Number of electrical connections for external antenna(s)	0	1
Design of electrical connection for external antenna(s)	-	N-Connector
Supply voltage, current consumption, power loss		
Type of power supply	DC	DC
Supply voltage, external	24 V	24 V
• Minimum	20 V	20 V
• Maximum	28 V	28 V
Current consumed from external power supply at 24 V DC, maximum	0.5 A	0.5 A
Effective power loss, maximum	12 W	12 W
Permissible ambient conditions		
Ambient temperature		
• During operating phase	-40 ... +60 °C	-40 ... +60 °C
• During storage	-40 ... +85 °C	-40 ... +85 °C
• During transport	-40 ... +85 °C	-40 ... +85 °C
Relative humidity at 25 °C without condensation during operating phase, maximum	90 %	90 %
IP degree of protection	IP65	IP65

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Technical specifications (continued)

Order No.	6GK1 411-6CA40-0AA0	6GK1 411-6CA40-0BA0
Product type designation	IE/WSN-PA LINK	IE/WSN-PA LINK
Design, dimensions and weights		
Housing width	229 mm	229 mm
Housing height		
• Without antenna	306 mm	306 mm
• With antenna	354 mm	354 mm
Housing depth	89 mm	89 mm
Net weight	4.54 kg	4.54 kg
Type of mounting		
• Wall mounting	Yes	Yes
• Mast mounting	Yes	Yes
Type of mounting	Material for mast mounting included in scope of delivery	Material for mast mounting included in scope of delivery
Radio frequencies		
Radio frequency with WirelessHART in the 2.4 GHz frequency band		
• Start value	2.4 GHz	2.4 GHz
• Full-scale value	2.5 GHz	2.5 GHz
Performance data WirelessHART		
Number of WirelessHART devices which can be operated	100	100
Network latency		
• Maximum with 100 field devices and WirelessHART network	10 s	10 s
• Maximum with 50 field devices and WirelessHART network	5 s	5 s
Transition link between two devices with WirelessHART network		
• Maximum	100 m	100 m
• Note	The values may deviate if obstacles affecting radio transmission are present	The values may deviate if obstacles affecting radio transmission are present
HART protocol is supported	Yes	Yes
Product properties, functions, components, general		
Protocol is supported		
• Address Resolution Protocol (ARP)	Yes	Yes
• HTTP	Yes	Yes
• HTTPS	Yes	Yes
• Modbus TCP	Yes	Yes
• Modbus TCP secure	Yes	Yes
• Modbus RTU	Yes	Yes
Product functions Management, configuration, programming		
Product function		
• Web-based management	Yes	Yes
• DHCP client	Yes	Yes
Product functions Diagnostics		
Product function		
• Web-based diagnostics	Yes	Yes
• WirelessHART diagnostics via Modbus	Yes	Yes

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Technical specifications (continued)

Order No.	6GK1 411-6CA40-0AA0	6GK1 411-6CA40-0BA0
Product type designation	IE/WSN-PA LINK	IE/WSN-PA LINK
Product functions Security		
Product function		
• Password protection - multilevel	Yes	Yes
• WirelessHART join key	Yes	Yes
• ACL - MAC-based	Yes	Yes
• WirelessHART network ID	Yes	Yes
SSL protocol is supported	Yes	Yes
Encryption principle	AES 128 bit	AES 128 bit
Product functions Time		
NTP protocol is supported	Yes	Yes
Standards, specifications, approvals		
Standard for WirelessHART	HART V 7.1	HART V 7.1
Standard for wireless communication IEEE 802.15.4	Yes	Yes
Certificate of suitability		
• CE mark	Yes	Yes
• Referred to CSA	CSA Division 2 & Dust Ignitionproof, Suitable for Class I, Division 2, Groups A, B, C, and D. Dust Ignitionproof for Class II, Groups E, F, and G / Suitable for Class III Hazardous Locations. / Install per Siemens drawing A5E02467236A. Temperature Code: T4 (-40 °C < Ta < 60 °C) CSA Enclosure Type 4X	CSA Division 2 & Dust Ignitionproof, Suitable for Class I, Division 2, Groups A, B, C, and D. Dust Ignitionproof for Class II, Groups E, F, and G / Suitable for Class III Hazardous Locations. / Install per Siemens drawing A5E02467236A. Temperature Code: T4 (-40 °C < Ta < 60 °C) CSA Enclosure Type 4X
• Referred to FM	FM Division 2 (Non-Incendive), Non-Incendive for Class I, Division 2, Groups A, B, C, and D. Dust Ignition-proof for Class II, III, Division 1, Groups E, F, and G / Indoors/outdoor locations / NEMA Type 4X Temperature Code: T4 (-40°C < TBaB < 60°C)	FM Division 2 (Non-Incendive), Non-Incendive for Class I, Division 2, Groups A, B, C, and D. Dust Ignition-proof for Class II, III, Division 1, Groups E, F, and G / Indoors/outdoor locations / NEMA Type 4X Temperature Code: T4 (-40°C < TBaB < 60°C)
• Referred to ATEX	ATEX Type n see note: Ex II 3 G EEx nA NI IIC T4 (-40 °C < Ta < 60 °C), ATEX Dust Ignition-proof, EX tD A 22 IP66 T135 (-40 °C < Ta < 60 °C) EEx nA nL IIC T4 (-40 °C < Ta < 60 °C) II 3D Vmax = 28 V Note for type n: The device does not satisfy the 500 V insulation test according to paragraph 9.4 EN 60079-15:2005. This has to be considered when mounting the device.	ATEX Type n see note: Ex II 3 G EEx nA NI IIC T4 (-40 °C < Ta < 60 °C), ATEX Dust Ignition-proof, EX tD A 22 IP66 T135 (-40 °C < Ta < 60 °C) EEx nA nL IIC T4 (-40 °C < Ta < 60 °C) II 3D Vmax = 28 V Note for type n: The device does not satisfy the 500 V insulation test according to paragraph 9.4 EN 60079-15:2005. This has to be considered when mounting the device.
• Referred to IECEx	IECEx Type n see note Ex nC IIC T4 (-40 °C =< Ta <= 60 °C) rated voltage: 28 V, IECEx dust explosion protection Ex tD A22 IP66 T135 (-40 °C < Ta < 60 °C) Vmax = 28 V, Note for type n: The device does not satisfy the 500 V insulation test according to paragraph 9.4 EN 60079-15:2005. This has to be considered when mounting the device.	IECEx Type n see note Ex nC IIC T4 (-40 °C =< Ta <= 60 °C) rated voltage: 28 V, IECEx dust explosion protection Ex tD A22 IP66 T135 (-40 °C < Ta < 60 °C) Vmax = 28 V, Note for type n: The device does not satisfy the 500 V insulation test according to paragraph 9.4 EN 60079-15:2005. This has to be considered when mounting the device.
• Referred to NEMA		
Wireless approval	FCC and IC approval	IC approval

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Ordering data	Order No.	Order No.
IE/WSN-PA LINK Network transition between WirelessHART and Industrial Ethernet; transmission frequency: 2.4 GHz <ul style="list-style-type: none"> • with integral, non-detachable antenna • N connector for connection of external antennas 	6GK1 411-6CA40-0AA0 6GK1 411-6CA40-0BA0	
Antennas Antennas with omni-directional characteristics; country permits, compact instructions (hard copy), German/English <u>Wall or mast-mounting</u> <ul style="list-style-type: none"> • Antenna ANT792-6MN Antenna gain including N-Connect connector 6 dBi, 2.4 GHz <u>Roof mounting</u> <ul style="list-style-type: none"> • ANT795-6MN antenna Antenna gain incl. N-Connect connector 6/8 dBi, 2.4/5 GHz • Antenna mounting tool (ANT795-6MN) Mounting tool for installation of ANT795-6MN under a roof 	6GK5 792-6MN00-0AA6 6GK5 795-6MN00-0AA6 6GK5 795-6MN01-0AA6	
LP798-1N Lightning Protector Lightning protector with N/N female/female connector, IP65 (-40 ... +100 °C)	6GK5 798-2LP00-2AA6	
		Antenna cables IWLAN N-Connect male/male flexible connection cable Flexible connecting cable for connecting an external antenna; assembled with two N-Connect male connectors <ul style="list-style-type: none"> • 1 m • 2 m • 5 m • 10 m
		HF coupling N-Connect male/male connector for connecting the LP798-1N lightning protector 6GK5 798-0CP00-1AA0
		Accessories IE FC M12 Plug PRO M12 plug-in connector suitable for on-site assembly (D-coded, IP65/IP67), metal housing, FastConnect connection system, for connecting HARTING adapter cables to the Industrial Ethernet <ul style="list-style-type: none"> • 1 unit
		IE FC TP Standard Cable GP 2 x 2 (Type A) 4-core, shielded TP installation cable for connection to IE FC RJ45 outlet / IE FC RJ45 plug; PROFINET-compliant; UL approved; <u>Sold by the meter</u> Max. quantity 1000 m, minimum order 20 m
		Network components for IWLAN HARTING adapter cable ¹⁾ M12 female NPT 1/2 thread to RJ45 11cm, (minimum order quantity: 10); The adapter is provided for easy connection of the link to the Industrial Ethernet
		6XV1 875-5AH10 6XV1 875-5AH20 6XV1 875-5AH50 6XV1 875-5AN10 6GK1 901-0DB20-6AA0 6XV1 840-2AH10 see "Industrial Wireless Communication" 21 03 683 6420 Not included in the scope of delivery of the IE/WSN-PA link; You can find ordering information in the Internet at: http://www.harting.com/en/kontakt/adressen/

¹⁾ When using the Harting adapter cable for the Ethernet connection, the requirements for intrinsic safety approval are not applicable. When used in an application relevant to intrinsic safety guidelines, it requires acceptance by the appropriate approval agency.