



# WirelessHART@ Siemens

— Innovative Technology and  
Products for Process Industry

Customer's name  
Place and Time  
Presenter

# Agenda

**Wireless Technology –At a glance**

**WirelessHART Product Summary**

**Initial Background and Technology**

**Product Features & Customer Benefits**

**Typical Applications**

**Use Cases and Industries**

**Summary**

## Customers current situation

**Customers continuous challenges in face to changing market and regulation situations:**

- **TCO reduction and productivity improvements** are the new keys in comprehensive business situation; competition pressure, fast changing product trend, environmental regulations ...
- Reduce commissioning and maintenance time and cost are the main issues to reduce customer's TCO (**commissioning and maintenance costs > 3 x HW costs –by ARC**)
- Increase productivity & decrease plant down time by **increasing plant transparency**, e.g. reduce black measurement points, asset management etc.

**Q: Why Wireless in your plant?**

**A: Wireless helps to realize your challenges!**

**SIEMENS**

■ **Do your plant running pretty well since many years, but ...**

- ☹ Legacy DCS does not support maintenance information, losing valuable information
- ☹ Information is only available per manual site checking, high cost & non-timely

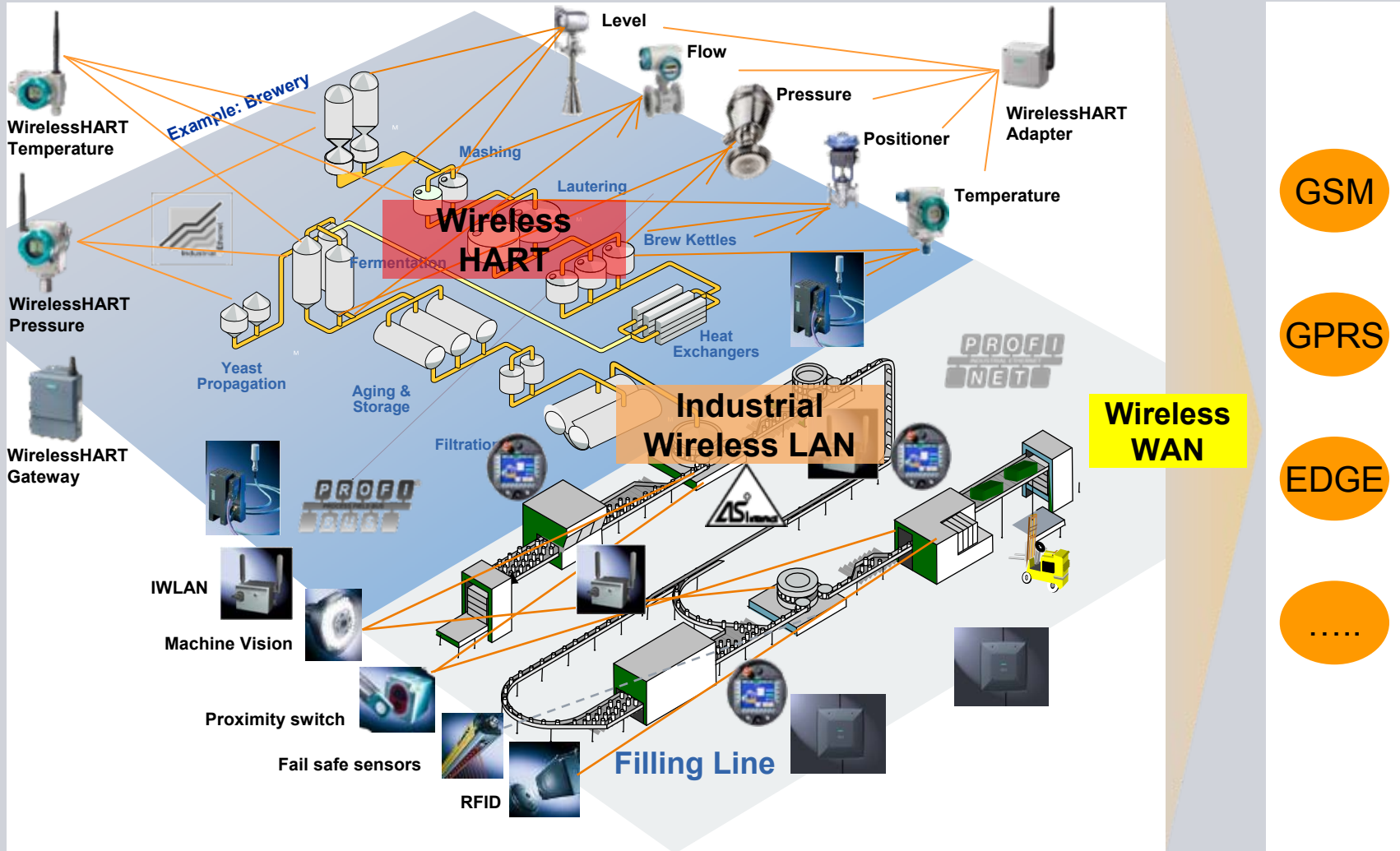
■ **You do enjoy the benefits of a modern automation system, but ...**

- ☹ There are necessary measurement points not implemented due to high cost or harsh environment issues
- ☹ Possible measures for process optimization e.g. temporarily measurements are always postponed due to high installation costs and efforts

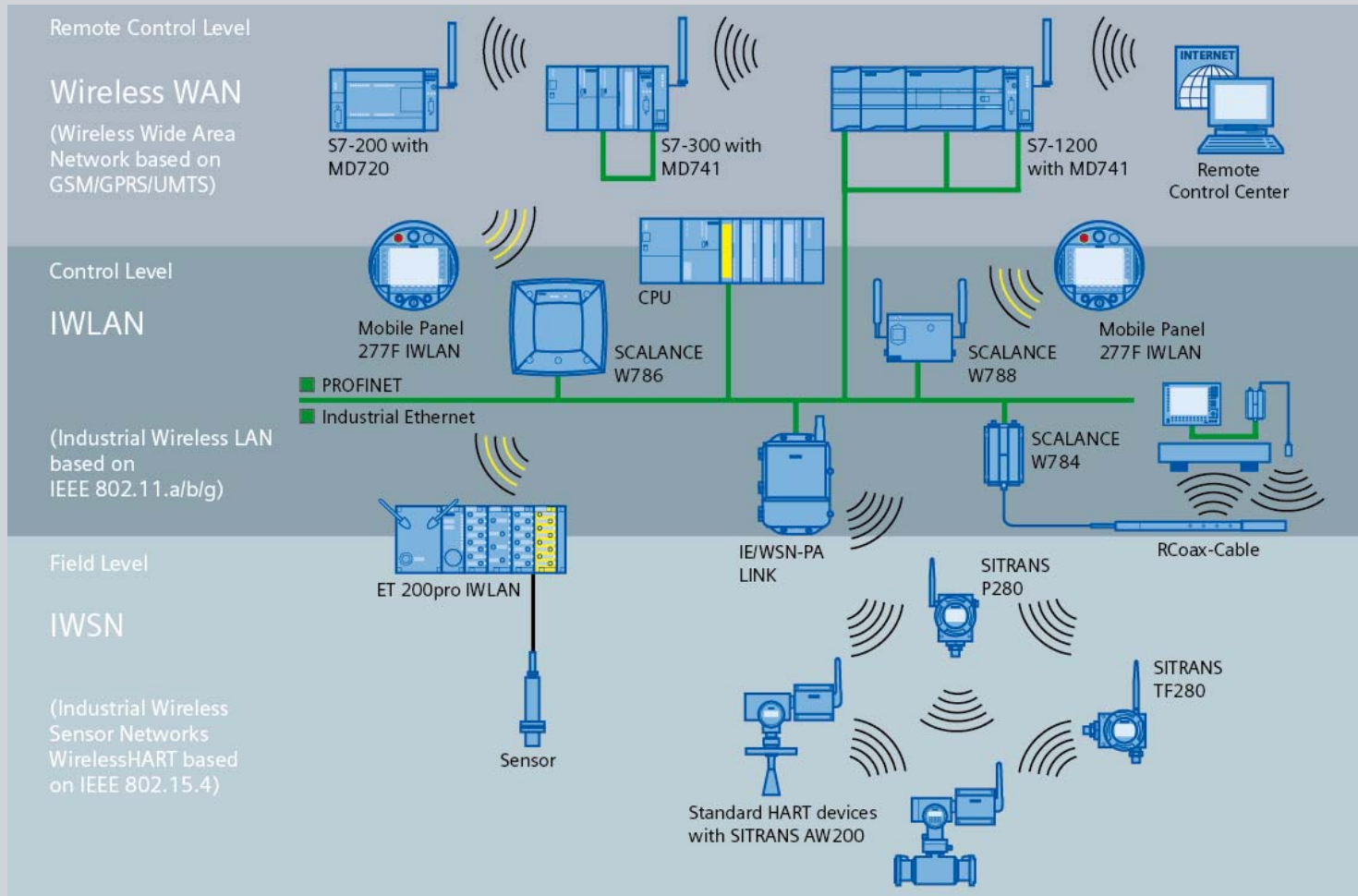


**In both cases: Wireless helps!  
Nothing more to lose, except wires!**

# Wireless technology today for process automation



## Siemens Industrial Wireless solution

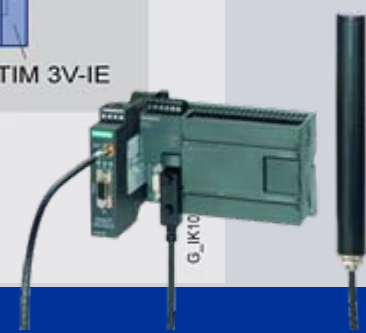
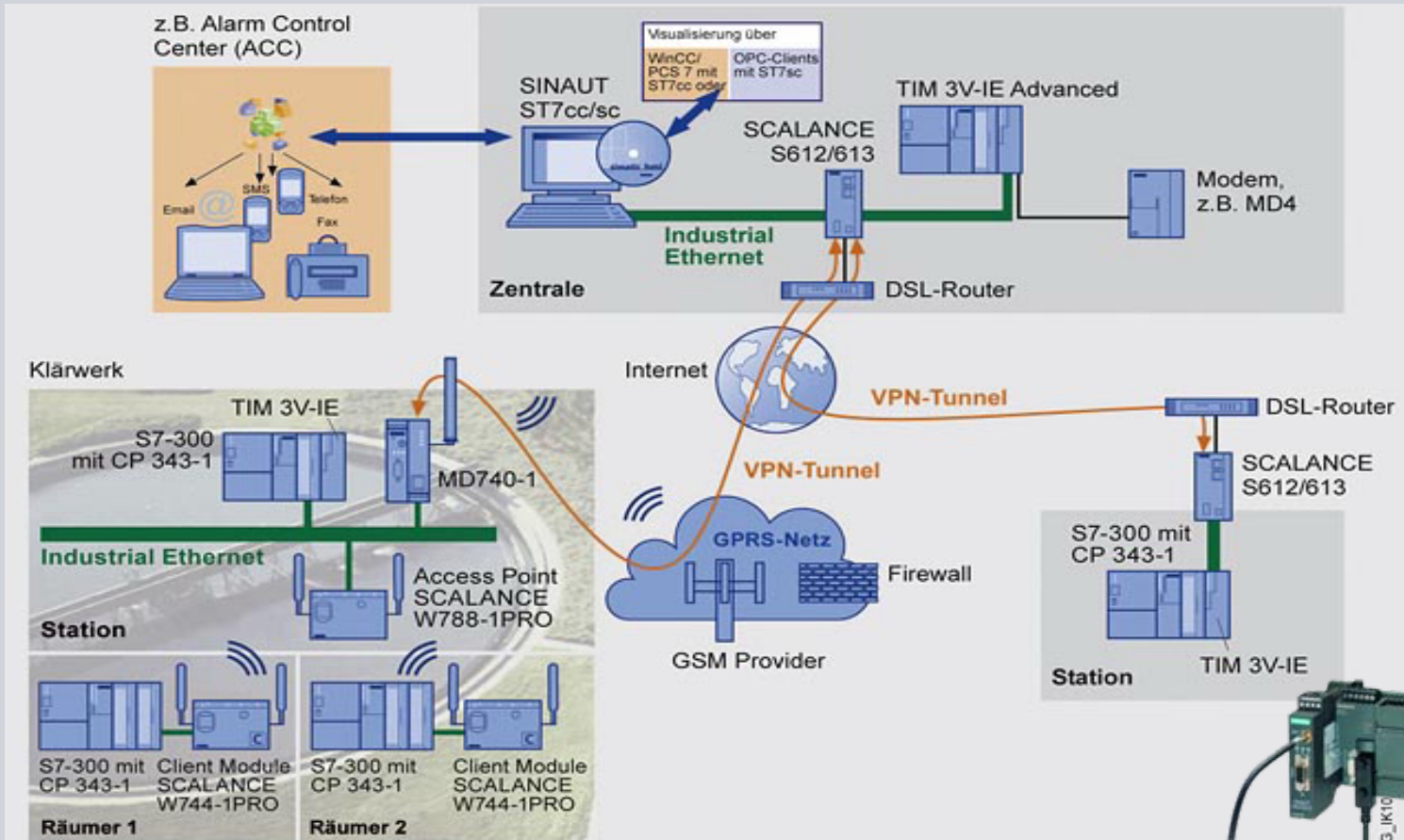


### WirelessHART closes gap in wireless product portfolio

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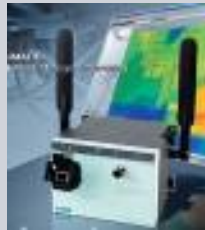
# Remote wireless communication Secure for widely distributed process station



**Security and wireless technology no contradiction**

# Industrial Wireless LAN

## Reliable, Ruggedness, Secure



### Reliability

Cycle data communication (deterministic)

Linking important stations (e.g. alarm messages) to critical data

Monitoring the radio connection

System detects if station is no longer accessible in the radio field

Controlled radio field (RCoax)

Reliable illumination in areas with a high level of interference emission

### Ruggedness

Metal enclosure with high degree of protection

Use in humid and dusty areas

Protected against vibration and shock

Low costs for maintenance and service

Extended temperature range

Suitable for indoor and outdoor use

### Data security

Simple configuration

Quick start-up

Access control (authentication)

Selection of access authorizations

**Complete and proven portfolio is ready to go**



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## WirelessHART product family

**SITRANS TF280  
WirelessHART  
Temperature Transmitter**



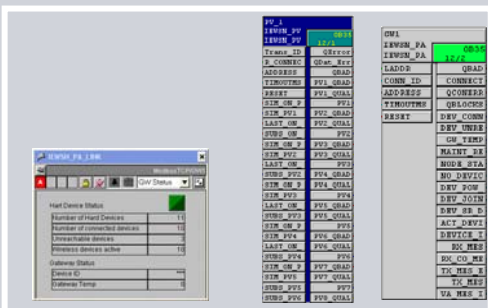
**SITRANS P280  
WirelessHART  
Pressure Transmitter**



**SITRANS AW200  
WirelessHART  
Adapter**



**Function Block Library  
Integration in PCS 7 / S7  
(Product owner: I IS)**



**IE/WSN-PA LINK  
WirelessHART Gateway**



**SITRANS MDS  
Maintenance Diagnostic  
Station**



## Product summary

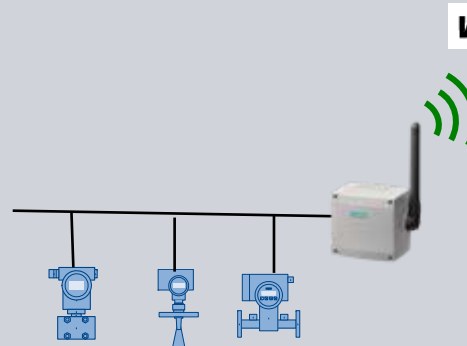
### WirelessHART transmitters SITRANS TF280, P280

- Battery powered, Radio integrated WirelessHART temperature and pressure transmitter
- High reliability, compact design, ultra-low power consumption, practical LUI and operating buttons etc.



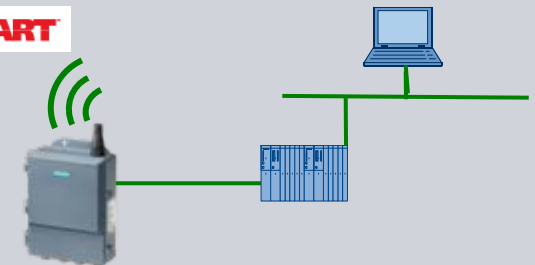
### WirelessHART Adapter SITRANS AW200

- Simply connect to existing 4-20mA/HART devices, enables measurement value and intelligent diagnostic data transmitted wirelessly
- Support up to 4 HART devices in multi drop mode
- Support burst mode, event notification, standard EDD etc.



### WirelessHART Gateway IE/WSN-PA LINK

- Connects a WirelessHART network to a plant host application, e.g. DCS, PLC etc.
- Build-in Network Manager manages network automatically (setup, security, availability, ...)
- Ease of use configuration with standard internet browsers



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## **Saving cable cost**

- No cable cost ( $\approx 20\$/\text{Meter}$  -by ARC survey)
- No cable wear, No constant maintenance cost



## **Easy & Flexible installation**

- Flexible place & replace the devices
- Possible to mount in environmentally difficult location
- Measurement points at movable locations



## **Maintenance friendly**

- Reduce time and work of installation, commissioning, engineering
- Provide valuable diagnostic information for efficient predictive maintenance



## Why WirelessHART for process industry?

### HART is the ideal basis for a wireless instrument network

- Proven in use protocol for process industry
- Approx. 30 million installed HART devices

### WirelessHART answers industrial requirement

- Reliable, Secure, Simple
- Built on standards (IEC61158, 61804-3, 61591e-1, IEEE802.15.4)

WirelessHART

### Low power consumption

- Designed specifically for low power operation (IEEE 802.15.4)

### Protect customers investments

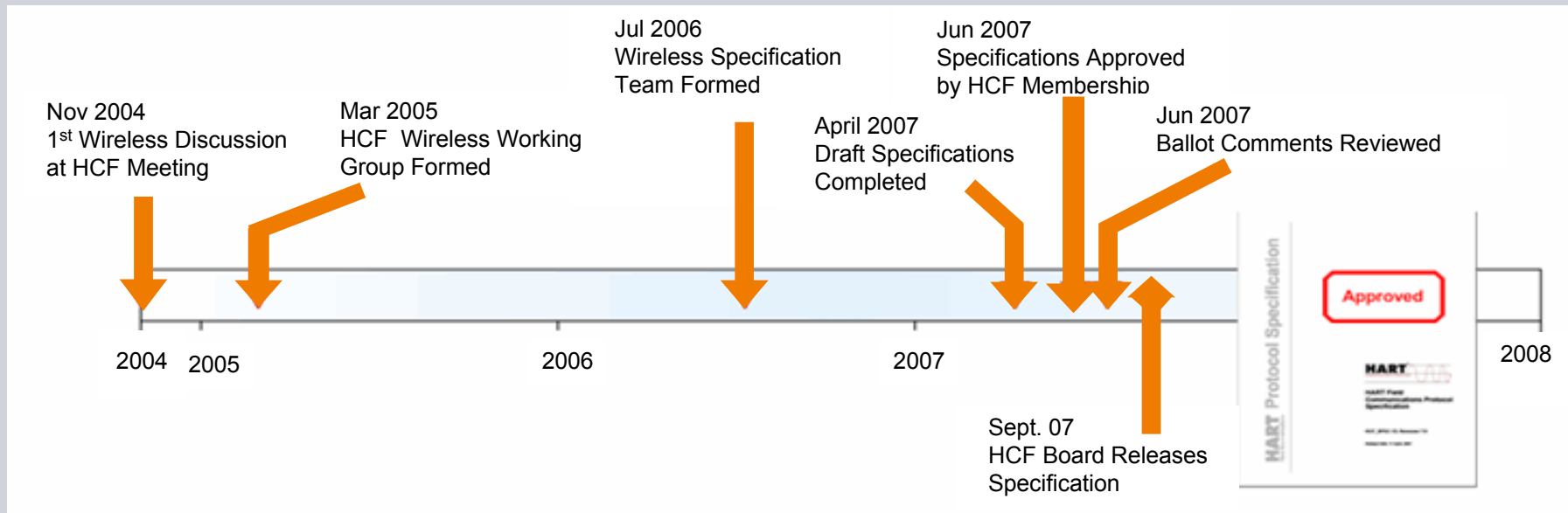
- Same Tools, Instruments, Know How as HART
- Interoperability between vendors devices



## Initial Background and Technology

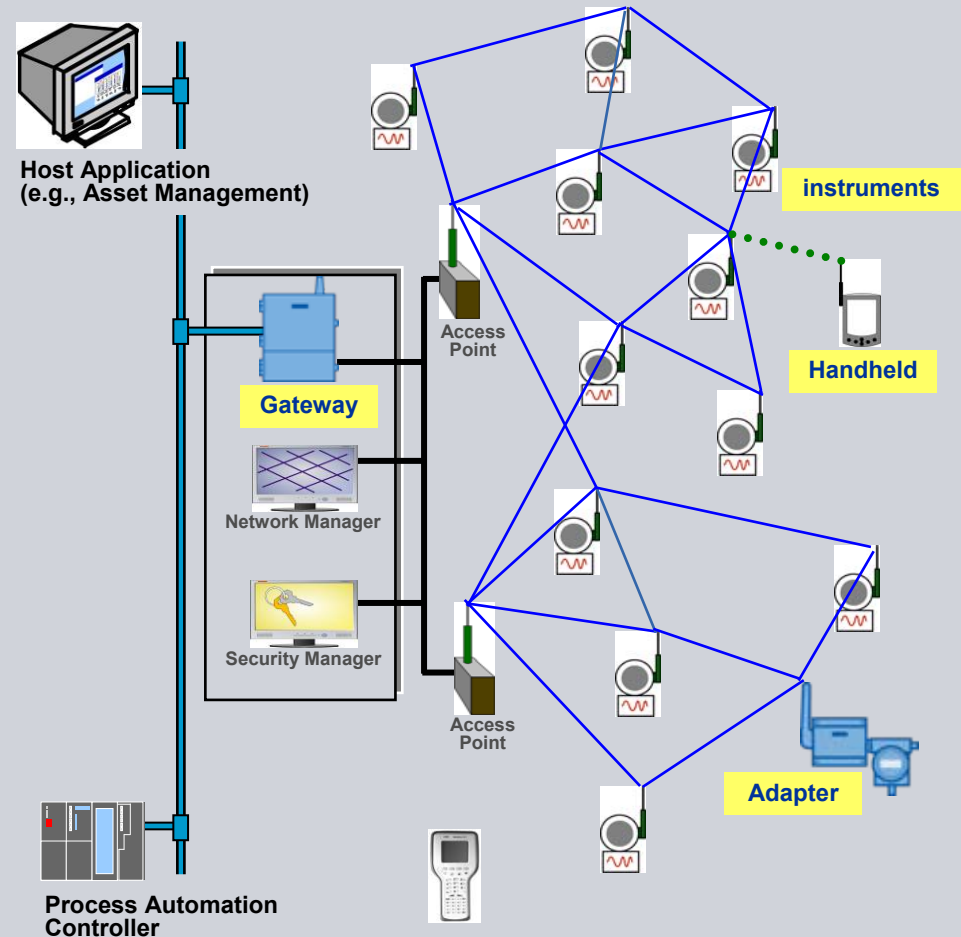
# The way to WirelessHART

- The first open wireless field communication standard, released on Sept. 2007
- An evolutionary extension to the proven HART technology
- Backing of major vendors, ABB, E+H, Emerson, P+F, Siemens, etc.



# WirelessHART Network overview and components

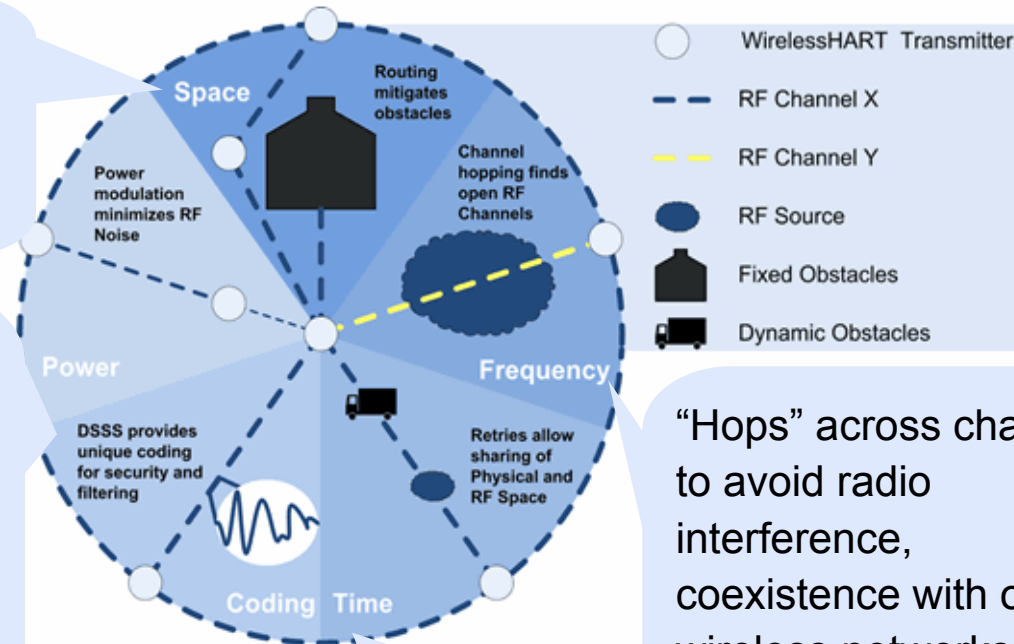
- **Instruments, T, P, L, ...**
  - Radio built in device
- **Adapter**
  - Add wireless capability to existing HART device
- **Repeater**
  - Extend the network
- **Handheld Terminal**
  - Join instruments to network
  - Reading PV or diagnostics
- **Gateway**
  - Builds network and provides Host connection
  - Built-in Network and Security manager



# WirelessHART Reliability is a key feature

WirelessHART mesh topology with self-organizing and self-healing characteristics

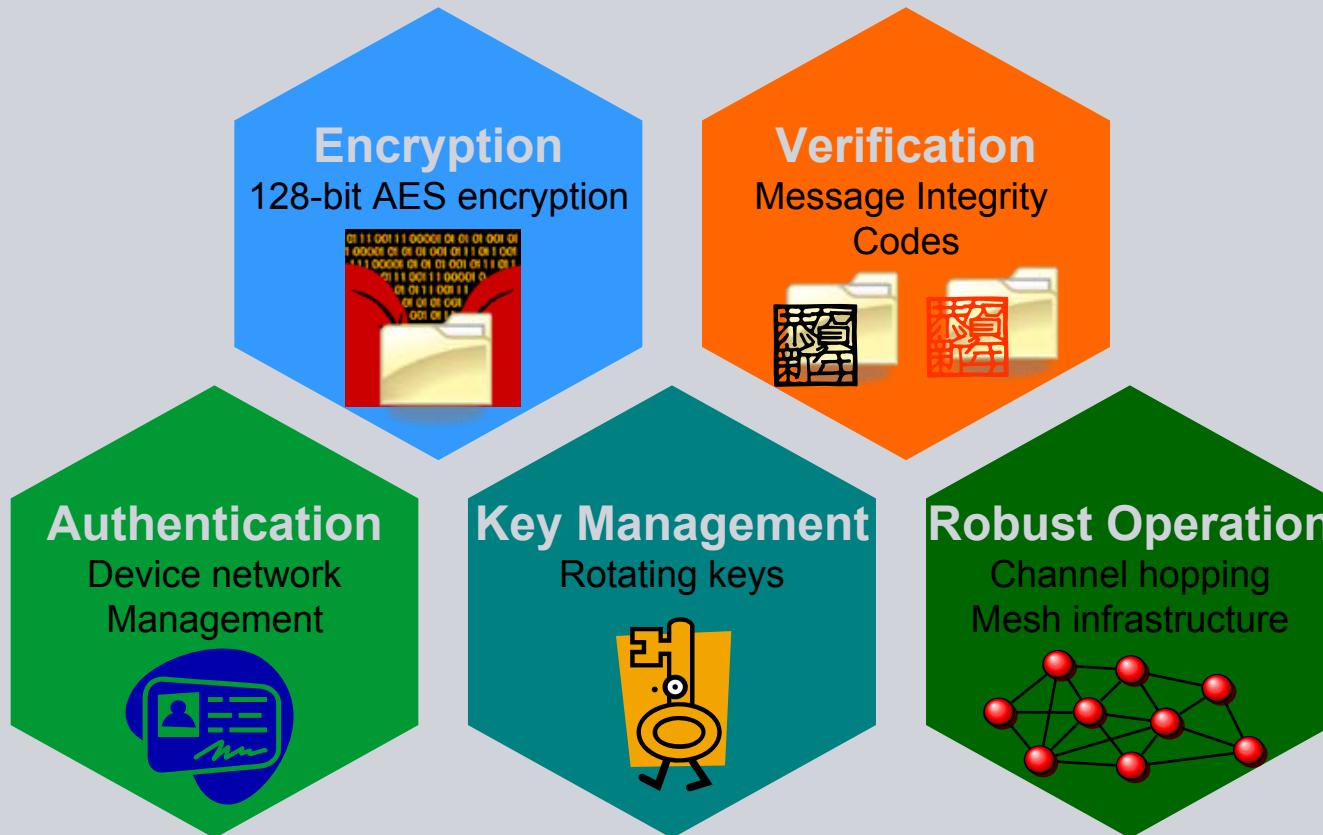
DSSS (Direct Sequence Spread Spectrum, coding diversity) technology and adjustable transmission power (power diversity) provide reliable communication



“Hops” across channels to avoid radio interference, coexistence with other wireless networks with black listing function

Adjusts communication paths (pre-scheduled time window) for optimal performance, which enables reliable, power-efficient, and scalable communication

# WirelessHART - Robust security and data privacy



**Security is not an option, it is built in!**

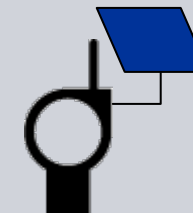
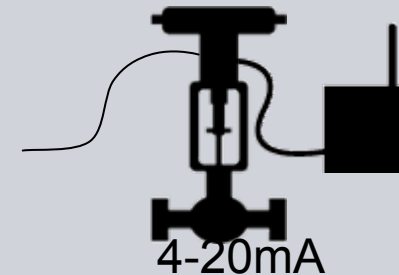
## WirelessHART - Smart Power Management

### ■ Low Power consumption

- Sitrans TF280 / P280:  
1mW with 1 measurement/min

### ■ Selectable power options

- Battery powered
- Line powered
- Loop powered
- Solar powered (future implementation)
- Energy scavenging (future implementation)



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**WirelessHART Temperature and Pressure transmitter**



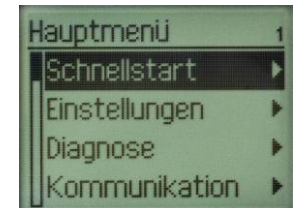
**SITRANS TF280**



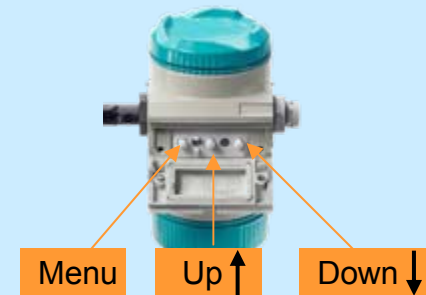
**SITRANS P280**

## Features of SITRANS TF280 and P280

- Local User Interface with functional display items and icons



- Push buttons for efficient setup and maintenance even without additional handheld devices or tools



- Back light function for friendly field maintenance



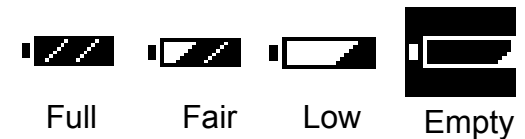
With back light



Without back light

## Features of SITRANS TF280 and P280

- Battery status** in LUI and life time per day unit indicates in network manager overview



HART Tag	HART status	Last update	PV	SV	TV
<a href="#">SITRANS_TF280</a>	<span style="color: green;">●</span>	08/19/09 15:29:34	23.747 DegC <span style="color: green;">●</span>		217.000 days <span style="color: green;">●</span>

- Sleep mode** for efficient battery life management



Active mode



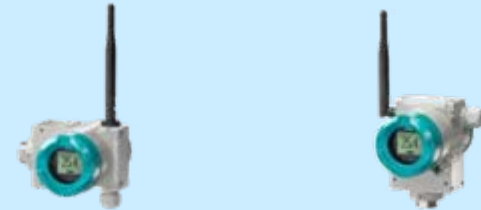
Sleep mode

- High measurement accuracy** for increased productivity



## Features of SITRANS TF280 and P280

- 90 degree / 180 degree Display mounting flexibility
- Antenna direction adjustable depends on mounting
- Physical HART maintenance port for commissioning
- Configurable with standard tools supporting EDD, e.g. SIMATIC PDM



Product Features & Customer Benefits

## WirelessHART Adapter SITRANS AW200

**SIEMENS**



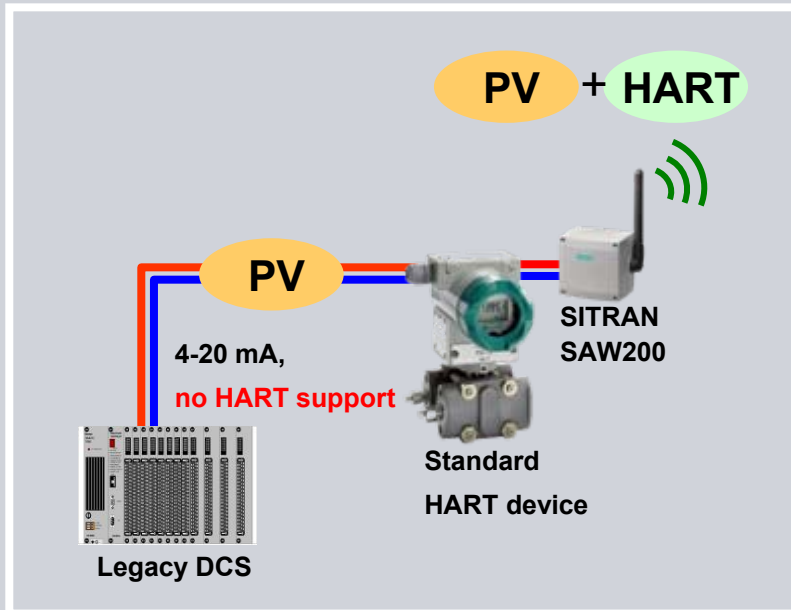
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# Product Features & Customer Benefits

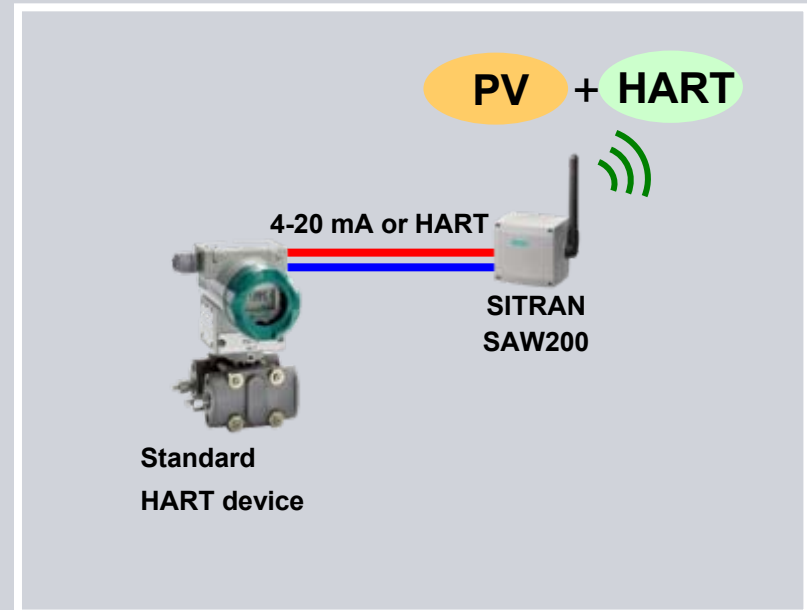
## How to use SITRANS AW200

Plug into standard wired HART/4-20mA instruments to pass the instrument data through a WirelessHART network to the gateway

### Plug into legacy system



### Plug into **New** installation



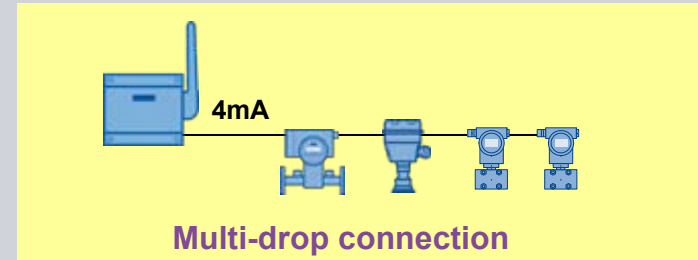
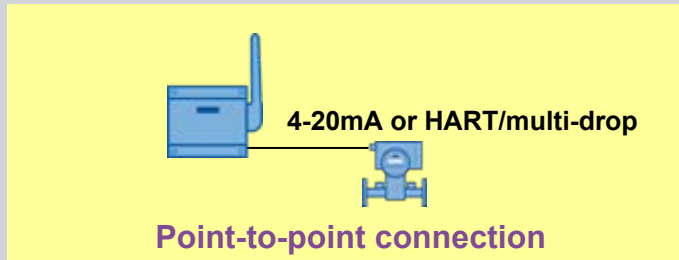


## Product Features & Customer Benefits

### SITRANS AW200 Features

SIEMENS

- Point-to-point connection, or connect up to 4 devices in **multi-drop mode**



- Configurable with standard tools **supporting EDD**, e.g. SIMATIC PDM, HART handheld communicator

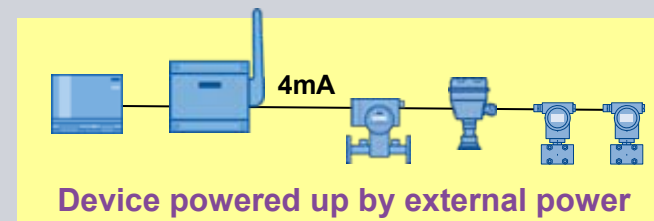
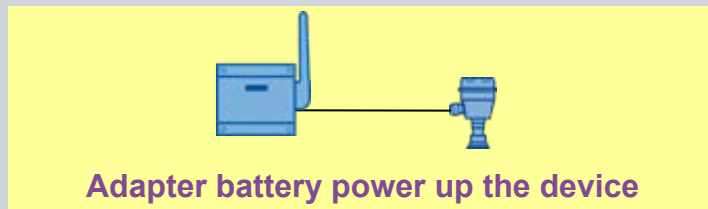


- Support **burst mode** and **event notification** for adapter and sub devices

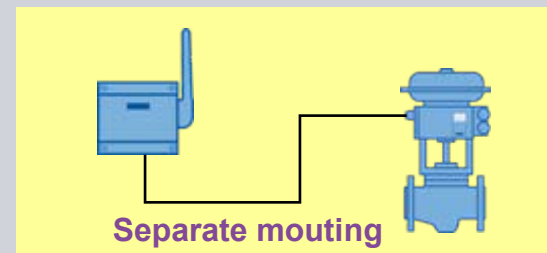
## Product Features & Customer Benefits

### SITRANS AW200 Features

- **Power** up single connected device with battery or devices can be powered externally



- **Antenna position** adjustable in vertical plane
- **Direct mounting** on the field device or **separate mounting** with mounting kit



# WirelessHART Gateway IE/WSN-PA LINK




- **Open TCP/IP** communication
- Open standardized user interface by using of **HART OPC server**
- **High security** level for the wireless data communication
- Easy network configuration and monitoring using **web interface**



HART Tag	HART status	Last update	PV	SV	TV	QV	Burst rate
<a href="#">Mote19</a>	●	04/23/09 11:11:11	22.096 DegC ●	NaN DegC ⚠	22.250 DegC ●	7.183 V ●	32
<a href="#">Mote23</a>	●	04/23/09 11:10:57	0.035 mbar ●	22.158 DegC ●	22.500 DegC ●	7.132 V ●	32

SW Rev: 3.8.6

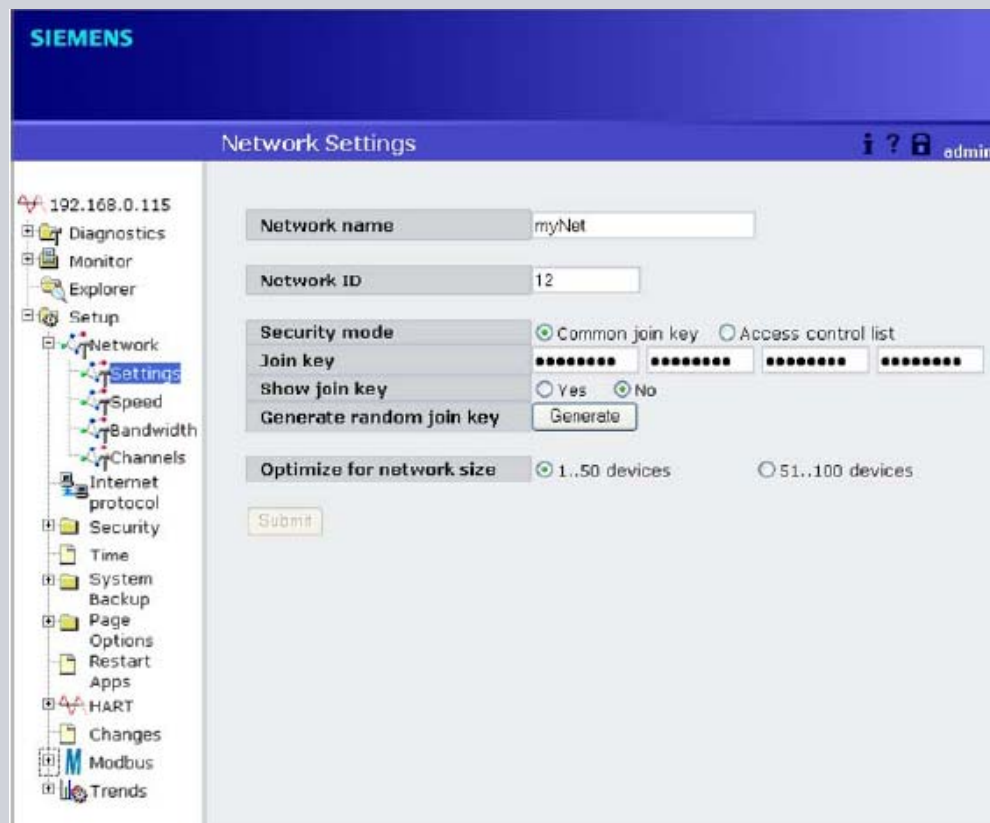
## IE/WSN PA LINK Features

- **Scalable connection** up to 100 WirelessHART devices
  - Max. 50 devices: up to 15 sec latency
  - Max. 100 devices: up to 60 sec latency
- **Simple host system connection** to Simatic system and 3rd party system
- **Coexistence** with other wireless technologies thanks to Black listing function
- **Remote antenna** option (Max.10 m)
- Installation in  Zone 2
- Housing in **IP 65**

## Product Features & Customer Benefits

### IE/WSN-PA LINK Web interface

- Build-in Network Manager setup and manages a WirelessHART network
- Web server to optimize network performance and security settings





# Product Features & Customer Benefits

## IE/WSN PA LINK Web interface features

The screenshot shows the 'Quick Points' section of the IE/WSN PA LINK Web interface. The interface includes a navigation tree on the left with options like 'Diagnostics', 'Monitor', 'Quick Point Data', 'Point Data', 'Trend', 'Explorer', and 'Setup'. The main area displays a table of monitoring points with columns for Device, Point, Value, Units, and Status. The status column uses red 'X' icons for failed points and green circles for active points.

Device	Point	Value	Units	Status
IE-WSN-PA	IE-WSN-PA.246	9.000	None	✘
IE-WSN-PA	IE-WSN-PA.PV	9.000	None	✘
LI111	LI111.246	-9.491	cm	●
LI111	LI111.PV	-9.491	cm	●
PIC111	PIC111.246	0.898	bar	●
PIC111	PIC111.PV	0.898	bar	●
TI111	TI111.246	172.040	DegC	●
TI111	TI111.PV	172.040	DegC	●
TI222	TI222.246	24.348	DegC	●
TI222	TI222.PV	24.348	DegC	●
TIC222	TIC222.246	230.320	DegC	●
TIC222	TIC222.PV	230.320	DegC	●

Diagnostics

Check the communication status, client/server parameters etc.

Monitor

Customized Web pages for monitoring the data of the field devices

Explorer

View of the values of the field devices

Setup

Configure the Link for operation, security and host system integration

## Maintenance and Diagnostic Station SITRANS MDS



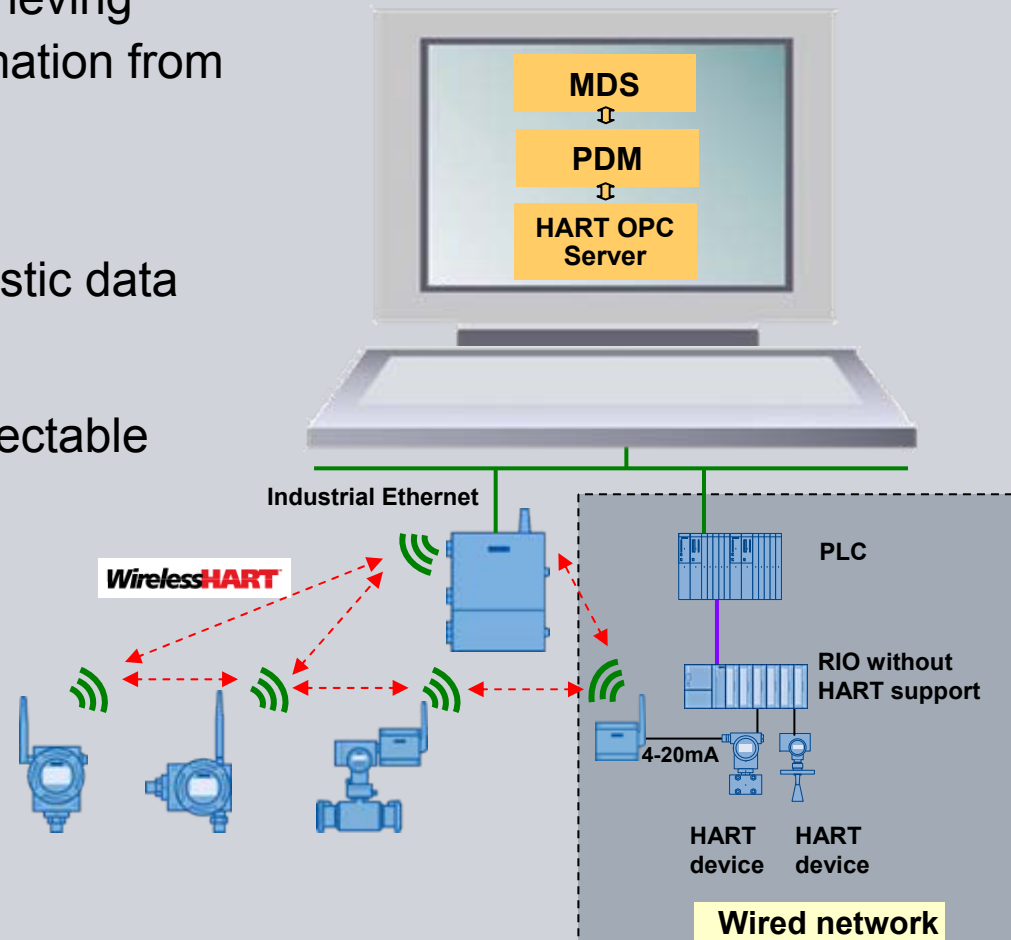
- 1) In market entry phase of WirelessHART products, it is free of charge for customers. Standard delivery with IE/WSN-PA Link, single purchase for promotion use under order number [7MP2910-0AA00-0AA0](#)

**Siemens Added value for WirelessHART Solution!**

## Product Features & Customer Benefits

### SITRANS MDS Functions

- Windows based application for retrieving and managing maintenance information from field devices
- Uses SIMATIC PDM to get diagnostic data
- English and German language selectable



# Product Features & Customer Benefits

## SITRANS MDS Features

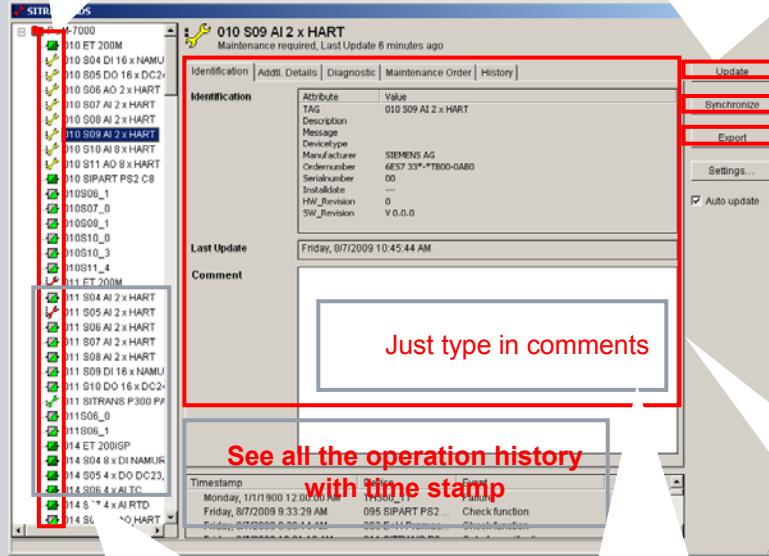


Maintenance icons compliance to NAMUR (NE 107)

Selectable update interval for all devices and / or an individual device

- Minutes, hours, days, months

Synchronize with project data



Opens a HTML file with the maintenance information

- Can be printed
- Can be sent by email
- Can be copied into any other application

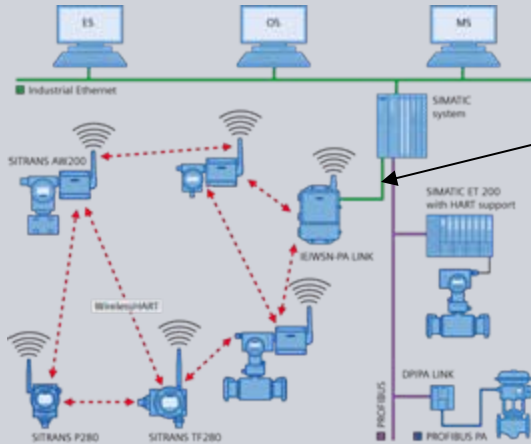
United tab columned Form view

- Identification
- Details
- Diagnostic
- Maintenance order
- History

Devices list shown in a tree-view

Easy and simple operation

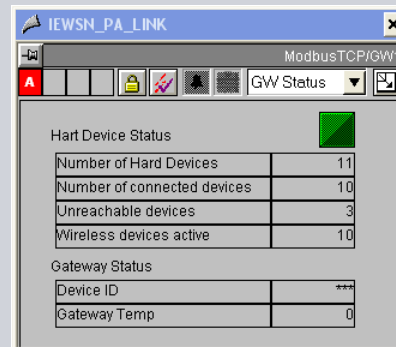
# Function Block Lib./Faceplates for Simatic PCS 7/S7



- Only one connection (cable or IWLAN) to IE/WSN-PA LINK for
  - Controller
  - SIMATIC PDM
  - Internet browser
- Function Block for CFC programming available
- Block icons and faceplates for Operator and Maintenance stations available

GW1	
IEWSN_PA	OB35
IEWSN_PA	12/2
LADDR	QBAD
CONN_ID	CONNECT
ADDRESS	QCONERR
TIMOUTMS	QBLOCKS
RESET	DEV_CONN
	DEV_UNRE
	GW_TEMP
	MAINT_RE
	NODE_STA
	NO_DEVIC
	DEV_POW
	DEV_JOIN
	DEV_SR_D
	ACT_DEVI
	DEVICE_I
	RX_MES
	RX_CO_ME
	TX_MES_E
	TX_MES
	VA_MES_I

PV_1	
IEWSN_PV	OB35
IEWSN_PV	12/1
Trans_ID	QError
R_CONNEC	QDat_Err
ADDRESS	QBAD
TIMOUTMS	PV1_QBAD
RESET	PV1_QUAL
SIM_ON_P	PV1
SIM_PV1	PV2_QBAD
LAST_ON	PV2_QUAL
SUBS_ON	PV2
SIM_ON_P	PV3_QBAD
SIM_PV2	PV3_QUAL
LAST_ON	PV3
SUBS_PV2	PV4_QBAD
SIM_ON_P	PV4_QUAL
SIM_PV3	PV4
LAST_ON	PV5_QBAD
SUBS_PV3	PV5_QUAL
SIM_ON_P	PV5
SIM_PV4	PV6_QBAD
LAST_ON	PV6_QUAL
SUBS_PV4	PV6
SIM_ON_P	PV7_QBAD
SIM_PV5	PV7_QUAL
SUBS_PV5	PV7
SUBS_PV6	PV8_QUAL



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## **WirelessHART typical applications**

### **Application 1**

Make central access to stranded information in field devices  
—without impact on the running system

### **Application 2**

Usage of wireless instead of wired communication

## Current situation

Approx. 30 million HART devices installed worldwide,

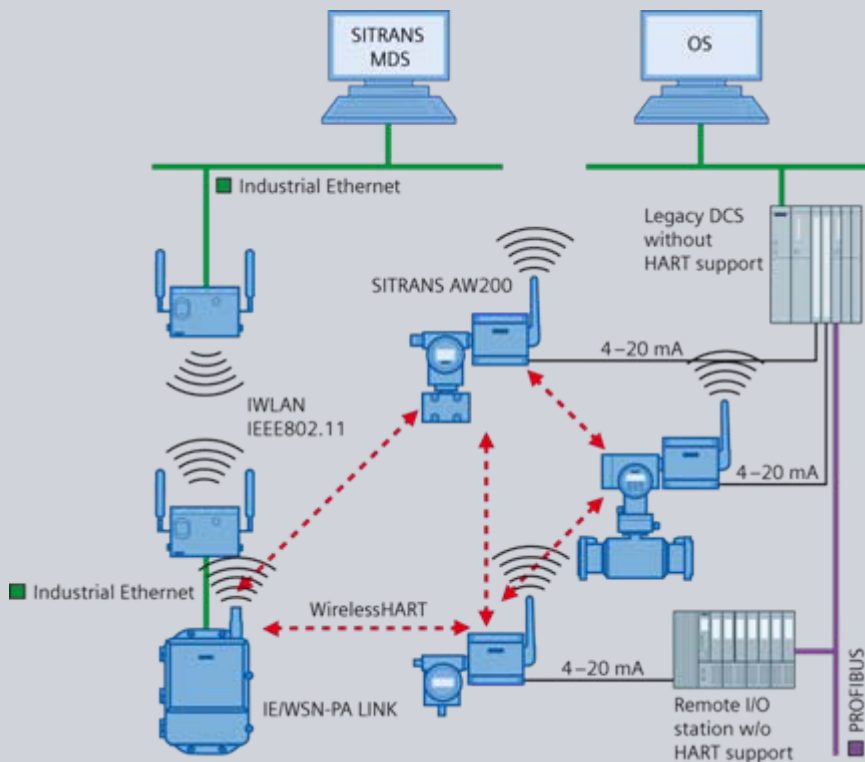
**But...**

- Only 10% of devices used HART information
- Diagnostics data on HART devices are stuck in the field
- Available only per costly on-site inspection
- Diagnostics data are needed for
  - Increase productivity
  - Increase availability
  - Increase quality
  - Decrease plant down time
  - Avoid unplanned shut-downs





## Wireless unleash stranded information!



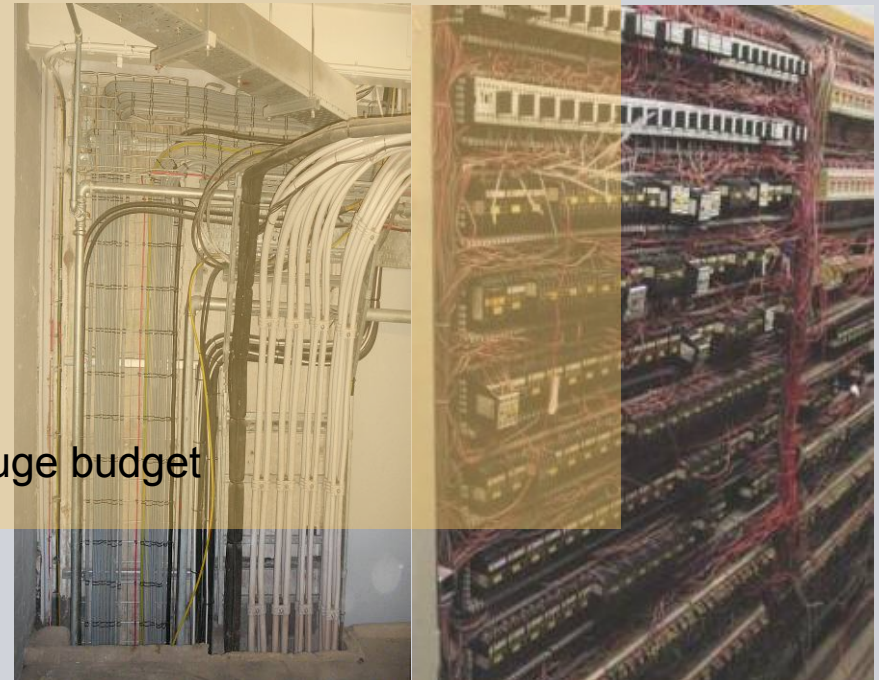
- Wireless communication in legacy system
- Valuable intelligent device information available in maintenance station
- No change, no risk on existing running system
- Utilize existing HART tools and experience
- Coexistent with IWLAN
- Diagnostic and configuration information realize new level of plant performance

## Customers benefit of Application 1

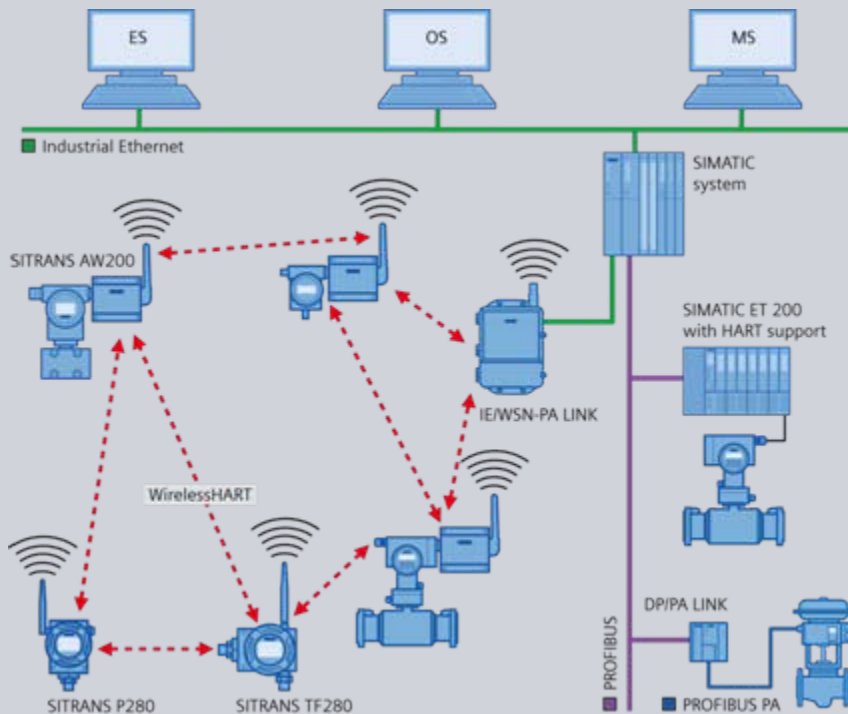
- No risk on existing running system to enjoy benefit of latest wireless technology
- Valuable intelligent device information helps predictive / preventive maintenance
- Saving man power due to reduced preventive maintenance efforts
- Protect existing capital investment and knowhow
- Increase productivity and plant availability
- Flexible in the comprehensive business situation by tie up with technology trend – be ahead!

### Current situation

- Wired system results in high Total Costs of Ownership (TCO)
  - Cabling
  - Commissioning
  - Maintenance
- Existing black measurement point
  - Environmentally difficult
  - Cost-efficiency
- Plant expansion and replacement require huge budget



## Wireless instead of wired communication!



- Additional or redundant measurement become cost-effective
- Interoperability with multi-vendor HART devices
- Reduce wiring cost ( $\approx 20\$/\text{Meter}$ , by ARC survey), commissioning and maintenance costs
- Easy installation, flexible mounting
- Simple integration to existing SIMATIC system or 3<sup>rd</sup> party system
- Best use of wired and wireless devices in one system

## Customers benefit of Application 2

- Best use of wired and wireless devices in one system depends on application
- Ad-hoc measurements become cost-effectively, simple, and easy
- Flexible in plant expansion and renewing
- Reduce TCO by saving total plant lifecycle costs, e.g. cable costs, commissioning and maintenance costs, man power, etc.
- Easy integration to host system, e.g. PCS 7, S7 system, other vendors DCS system
- Interoperability with multi-vendor WirelessHART devices

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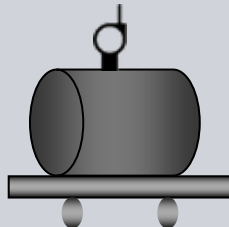
**Use Cases and Industries**

**Summary**

## Typical use cases

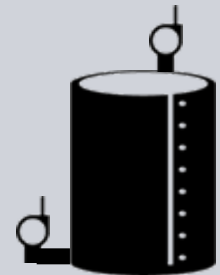
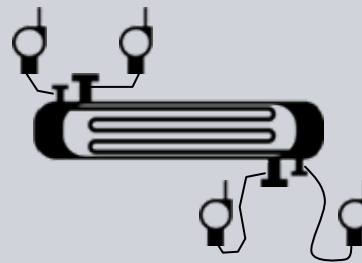
### Process Monitoring & Control

- Hard to reach locations
- Process efficiency calculations
- Better insight into process
- Ad-hoc measurements
- Additional measurements from multivariable devices
- Moving equipment measurements



### Typical Industry

- Oil & Gas
- Chemical
- F & B
- W / WW
- Pharmacy
- Metal & Mining



## Typical use cases

### Health, Safety & Environmental

- Safety showers
- Gas detectors
- Steam traps
- Water / Discharge Treatment
  - Flow
  - pH
- Stack emissions
- Relief valves



### Typical Industry

- Refinery
- Oil & Gas
- Chemical
- W / WW
- Power





## Typical use cases

### Asset Management

- Maintenance
  - Calibration
  - Record valve signatures
  - Radar echo curves
- Diagnostics
  - Valve position feedback
  - Device health status



### Typical Industry

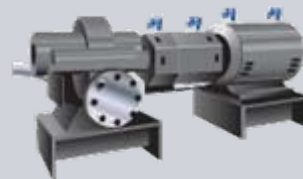
- |             |                  |
|-------------|------------------|
| ■ Chemical  | ■ Pharmacy       |
| ■ Refinery  | ■ F & B          |
| ■ Oil & Gas | ■ Cement & Glass |
| ■ W / WW    | ■ Metal & Mining |
| ■ Power     | ■ Pulp und Paper |



## Typical use cases

### Equipment Monitoring

- Vibration
- Corrosion
- Oil pressure
- Air flow
- Bearing temperatures



### Typical Industry

- Cement & Glass
- Metal & Mining
- Oil & Gas
- Chemical
- Pulp und Paper

## Typical use cases

### Temporary measurement

- Test measurement
- Ad-hoc measurements
- Redundant measurement

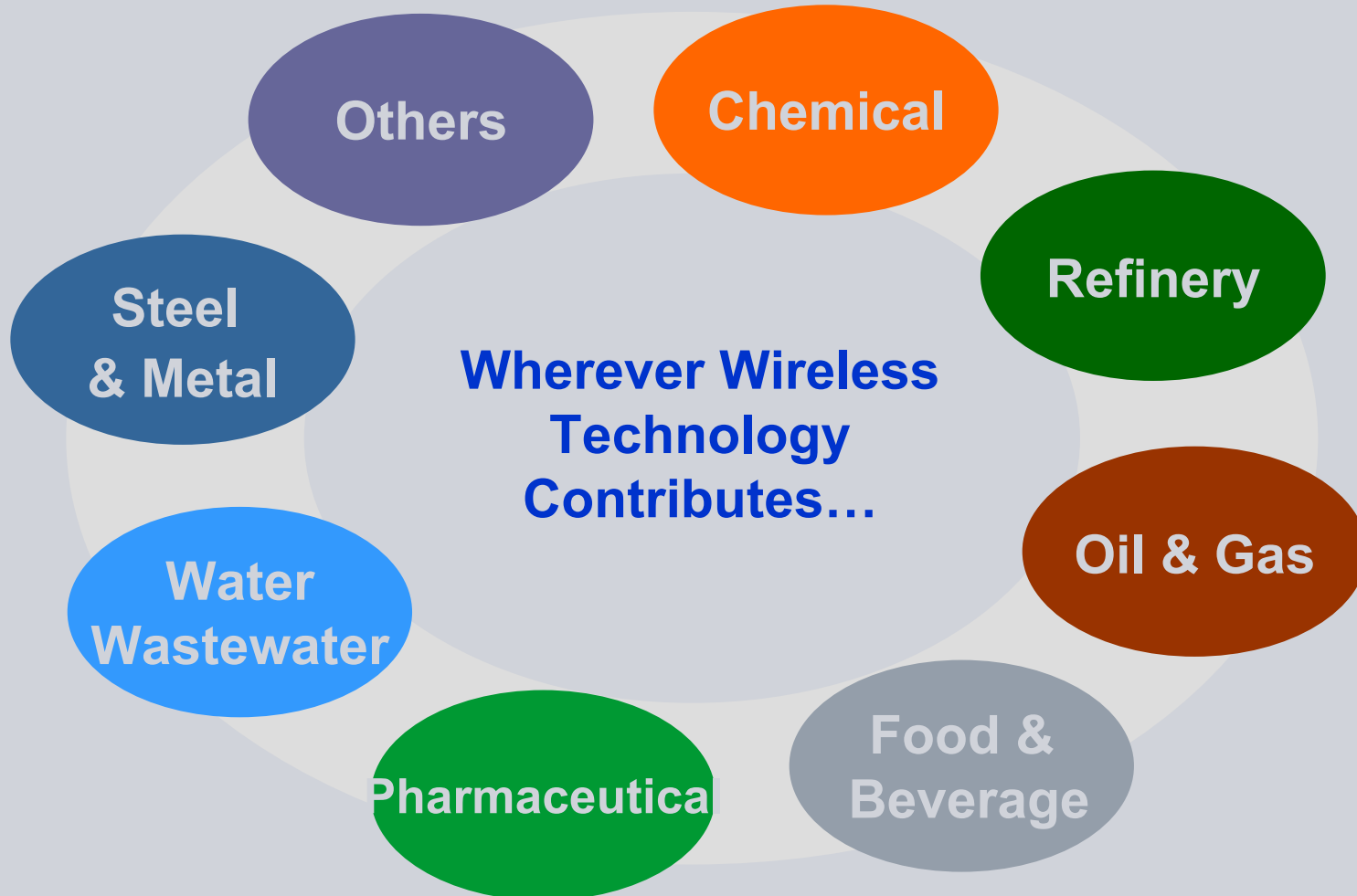


### Typical Industry

- Laboratory
- F & B
- Pharmacy
- Chemical
- O & G



**Target Industries**



## Defined classes of wireless applications

Category	Class	Application	Description
Safety	0	Emergency action	(always critical)
	1	Closed loop regulatory control	(often critical)
Control	2	Closed loop supervisory control	(usually non-critical)
	3	Open loop control	(human in the loop)
	4	Alerting	Short-term operational consequence (e.g. event-based maintenance)
Monitoring	5	Logging and downloading / uploading	No immediate operational consequence (e.g. history collection, sequence-of-events, preventive maintenance)

Source: ISA 100

OK

Maybe

Never

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# Agenda

**Wireless Technology –At a glance**

**WirelessHART Product Summary**

**Initial Background and Technology**

**Product Features & Customer Benefits**

**Typical Applications**

**Use Cases and Industries**

**Summary**

## Wireless benefits Customer's plant

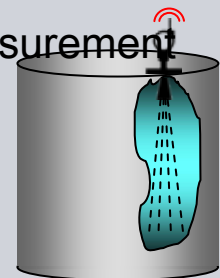
### 😊 Reduce TCO by saving initial costs and maintenance costs

- Saving time and cost in planning, engineering, commissioning, testing, repair and replacement of wires
- Reduce manpower on manual checking of status of field devices
- **One** Ethernet cable to the IE/WSN-PA LINK, using IWLAN components is possible



### 😊 Increase productivity and transparency

- Reduce plant down time by increased plant transparency
- Efficient collection and use of valuable diagnostic information
- Access to harsh environmental or previously uneconomical to reach measurement points

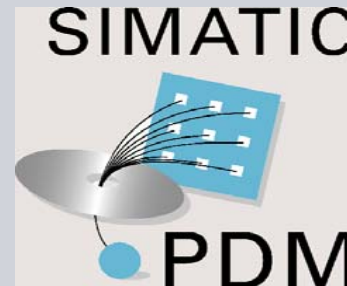


### 😊 Improved flexibility

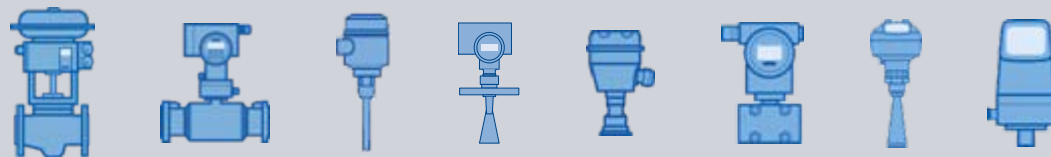
- Greater physical mobility in mounting
- Temporary measurements to increase performance or bug fixing of process
- Ease of replacement and expanding the plant

## Siemens added value+

- Total Automation Solution** with Siemens automation system SIMATIC PCS 7 and SIMATIC S7, various SITRANS HART field devices, engineering & software tools e.g. SIMATIC PDM, SITRANS MDS, Asset Management System, Function blocks for integration in control strategy etc.



### SITRANS Series HART Devices



...



## Siemens added value++

- Industrial Wireless Solution** with new WirelessHART products for field level, IWLAN SCALANCE W products family for entire plant communication, telecontrol system SINAUT, and other more wireless HMI, RFID, sensors...



## Siemens added value+++

- **Worldwide Customized Support** with leading technology, latest industrial trend, future oriented knowhow and experience in standardization activities...



## WirelessHART Highlights

**The right technology**



**at the right time!**

**Reliable, Robust, Secure**

**Based on IEEE 802.15.4**

**Open and interoperable standard**

**2.4 GHz frequency hopping, spread spectrum technology for coexistence in global applications**

**Self organizing, self healing, wireless mesh network**

**Proven in use protocol, easy set up, protect customers' investments on hardware, software, tools and knowhow**

**Thank you for your attention!**



**Thank you  
for your attention!**

For more information  
[www.siemens.com/wirelesshart](http://www.siemens.com/wirelesshart)