



Madrid, 25 y 26 de mayo de 2015

ABB Automation Days Wireless Instrumentation

Wireless Instrumentation

Discovering the Unknown

Rising demand for monitoring of process values by

- Increasing efficiency, reducing waste (raw materials, energy, time)
- Better environmental protection
- Desire for higher product quality
- Improve process safety and availability
- Documentation and verification of process parameters

High costs for conventional technology by ...

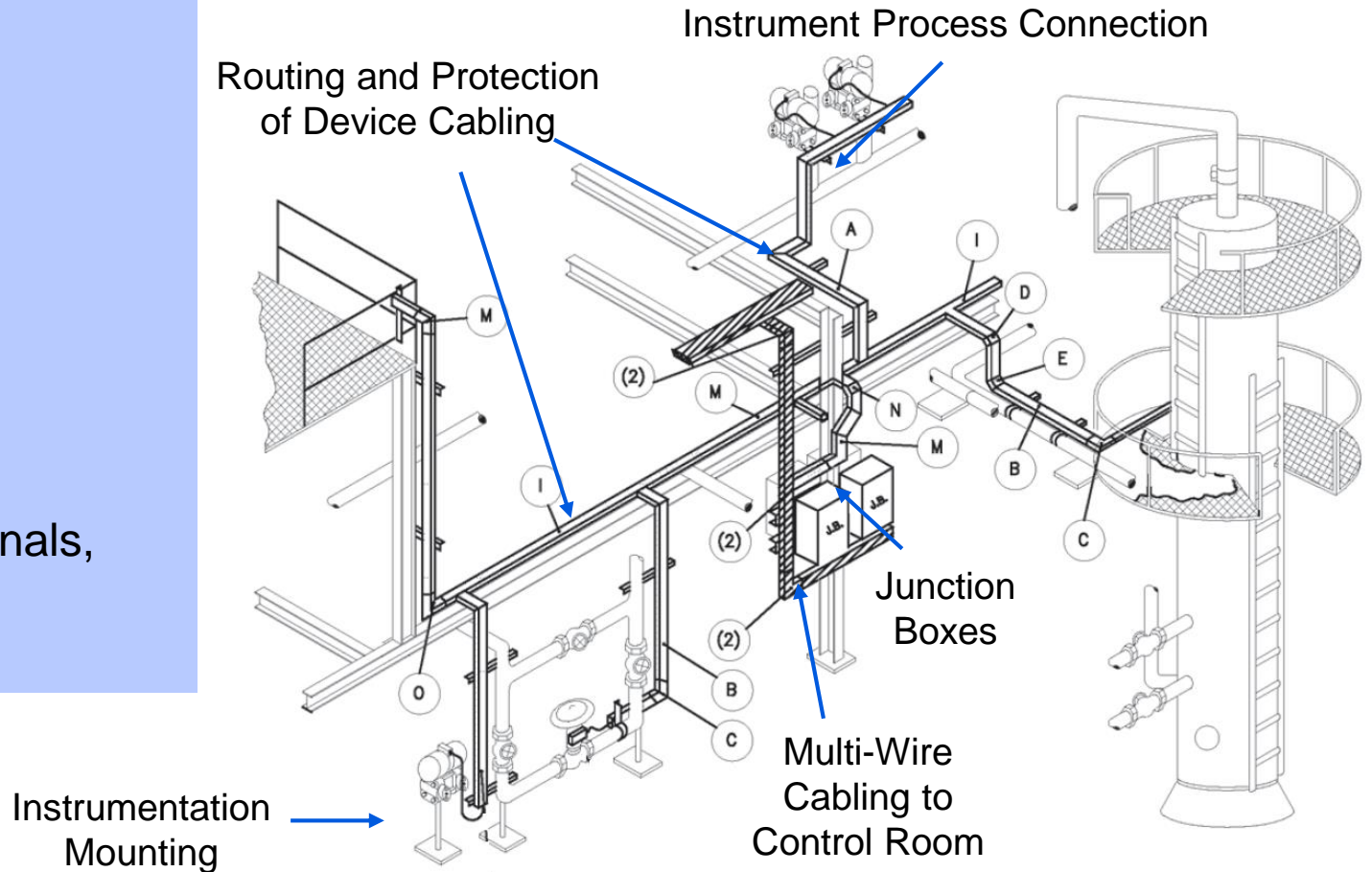
- Planning effort
- Cabling
- Ex-Interconnection
- Shut down of systems (parts) during installation
- Insufficient spare channels in the distributed control system (Remote I/O)

**Lord Kelvin: If you can not measure it,
You can not improve it!**

Wireless Instrumentation Cost Drivers

Cost drivers:

- Field Devices
- Planning and Engineering
- Installation
- Cables, Terminals, Cable Glands



Communication without borders

Costs of conventional technology

Cost of retrofitting = Cost of new installation x 2

Cost-sharing for new installing of temperature measuring points

- 40% Sensor with transmitter
- 40% Mounting and cabling
- 20% Cable & Terminals

Cost-sharing for retrofitting of temperature measuring points

- 20% Sensor with transmitter
- 50% Mounting and cabling
- 30% Cable & Terminals

Wireless installation is more flexible and more cost-effective for new installations and for retrofitting.

Wireless Instrumentation Go Wireless



- WirelessHART is the first open wireless standard to be certified for industrial applications.
- WirelessHART provides a backward compatibility with the widely used HART technology

Wireless Instrumentation Proven in Use



Daily wireless

- Handy, Laptop, Printer
- Internet ,Intranet, APPs
- Cloud Memory

Communication

- Smart Phone, GPS, Hands-free Communication Systems
- Smart Homes
- Emergency Service
- Alarm Systems

Data transmission via

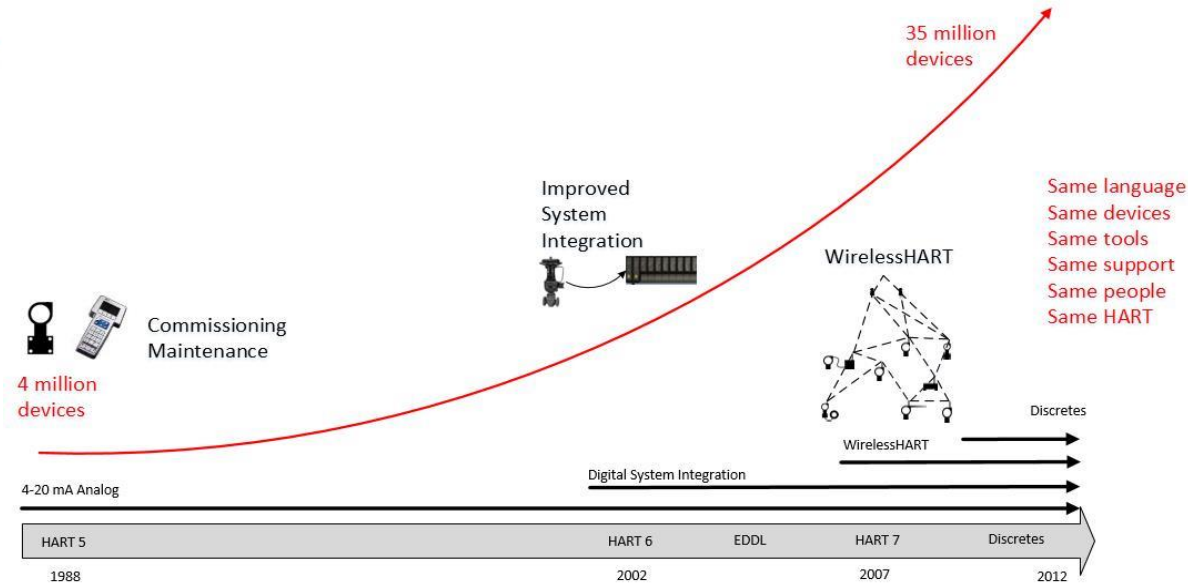
- GSM
- Satellite
- WLAN
- Bluetooth
- Wireless HART
- DECT

Industrial plants

- Distributed Control Systems DCS
- Remote Monitoring
- SCADA / Remote Control Technology
- **Device**
- **Wireless HART 7**

Wireless Instrumentation

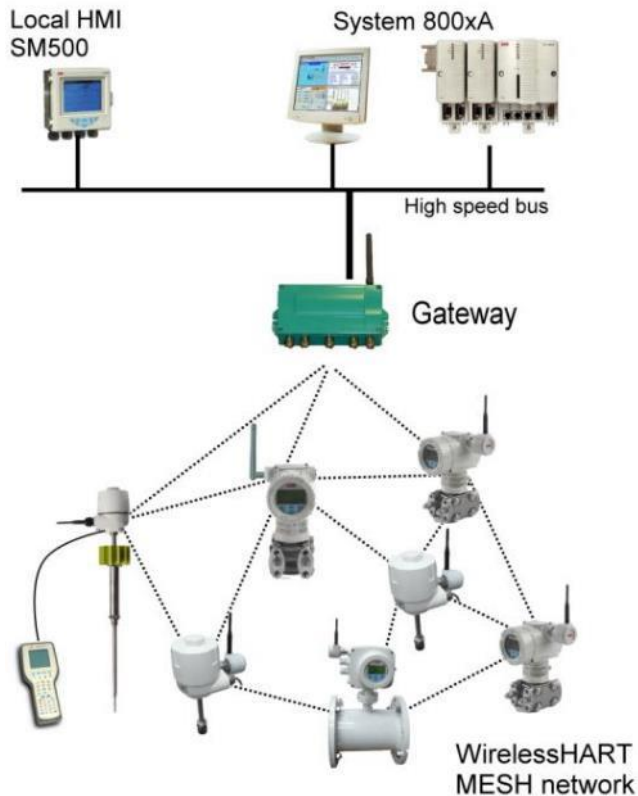
Wireless Concept Introduction



- The HART protocol has evolved from a 4–20mA based protocol to the current wired and wireless-based technology
- Includes extensive features supporting security, unsolicited communication of field device parameters and advanced diagnostics.
- Diagnostics now include information about the device and the equipment that is being monitored.

Wireless Instrumentation

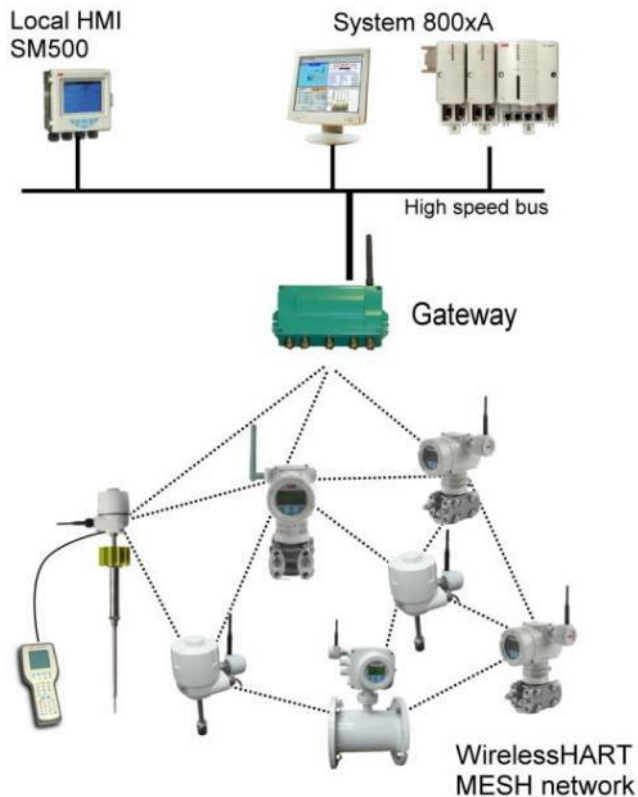
Wireless Concept Introduction



- A client does communicate via the gateway with the devices (Modbus, Ethernet, 485 interface, OPC)
- The gateway is the interface between the wireless network and the plant automation application host. It also contains the network manager that controls join, configuration, maintenance and all other network management duties.
- The security manager manages the keys used at both the network layer and the data link layer
- Wireless devices build a meshed network to allow different paths of data

Wireless Instrumentation

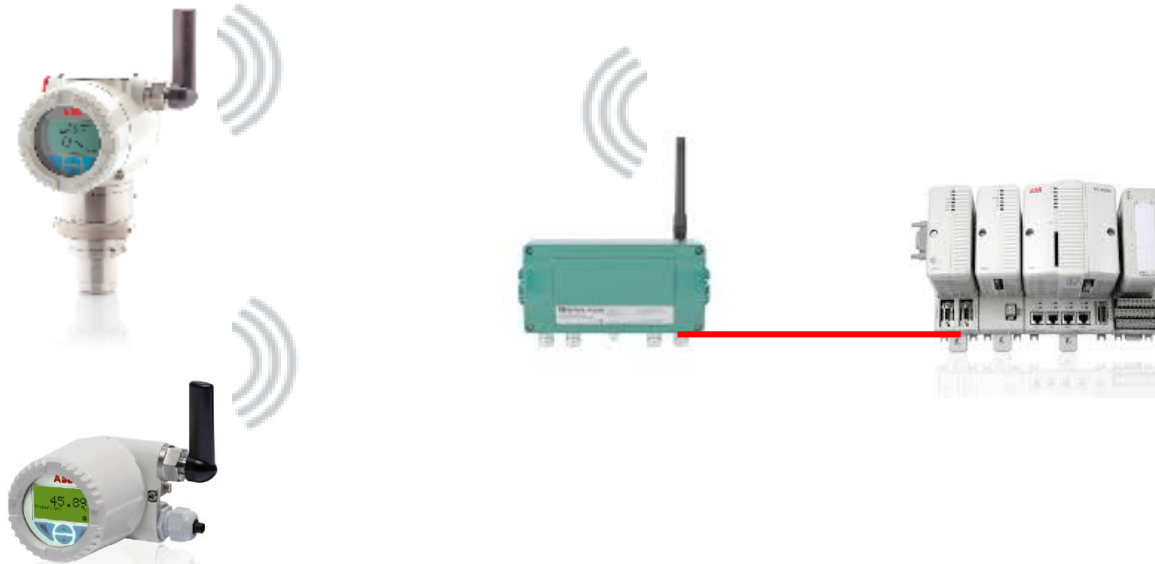
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Wireless Instrumentation

Wireless Concept Introduction



- To connect the device(s) to the network the device must be configured with exactly the same parameters (network ID and Joining keys). Once these parameters are set, the device will be connecting to the gateway.
- Any additional device in the network should be configured with the same Network ID and Joining keys

Wireless Instrumentation

Wireless Concept Introduction

OTHER EXISTING WIRELESS IN INDUSTRY



ZigBee:

- No Channel Hopping or Channel Blacklisting
- Susceptible to noises



Bluetooth

- Only support star type network topology
- Not scalable for large industrial control systems



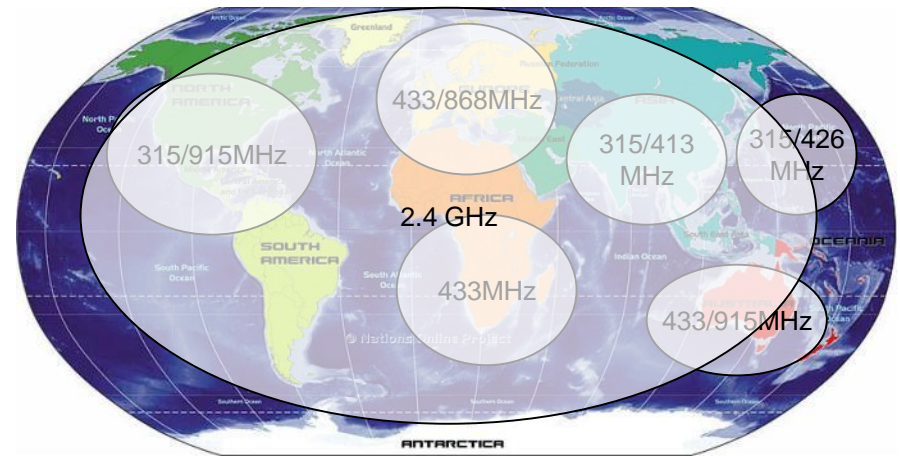
Wifi

- No channel hopping
- Power consumption

Wireless Instrumentation Frequency Bands

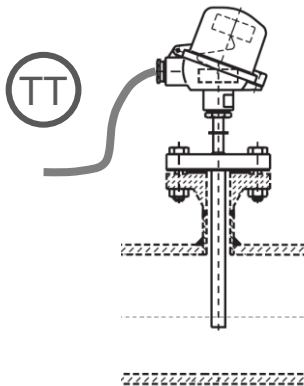
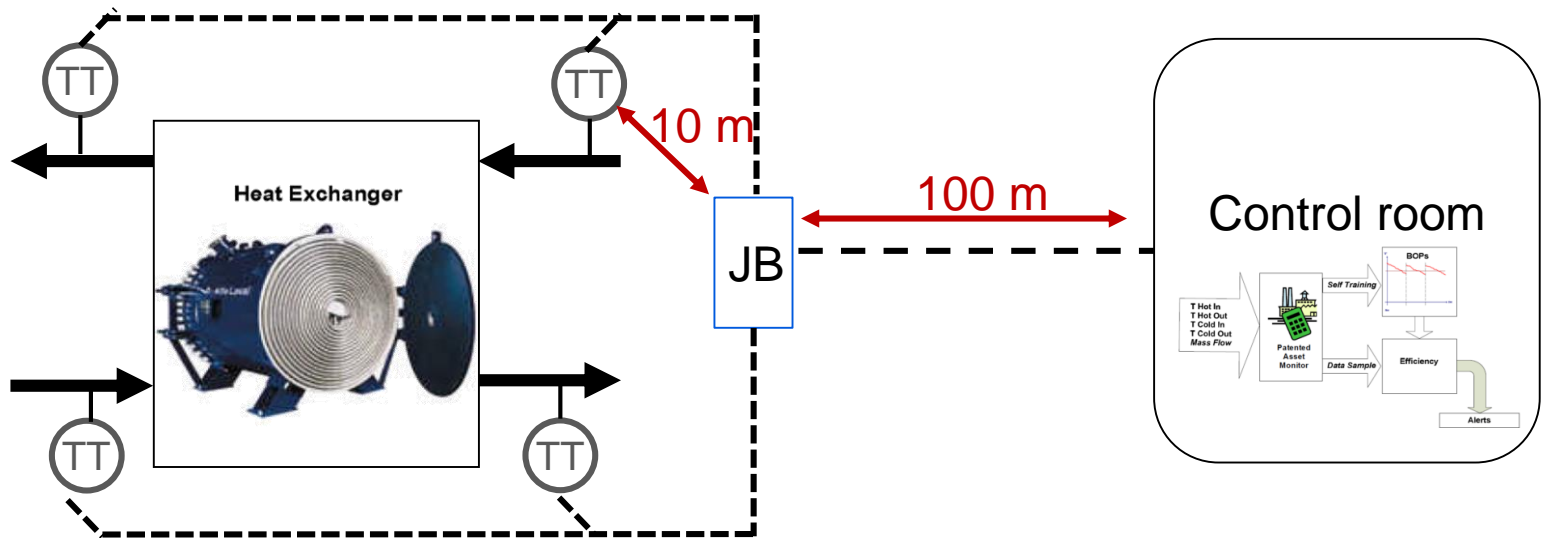
- Use ISM BAND (Instrument Scientific Medical)
 - License free
 - 200m range
 - IEEE 802.15.4 radio
 - Global coverage 2.4GHz

- This is a popular band
 - Used by WiFi and others
 - Coexistence is a requirement



Wireless Instrumentation

Example heat exchanger

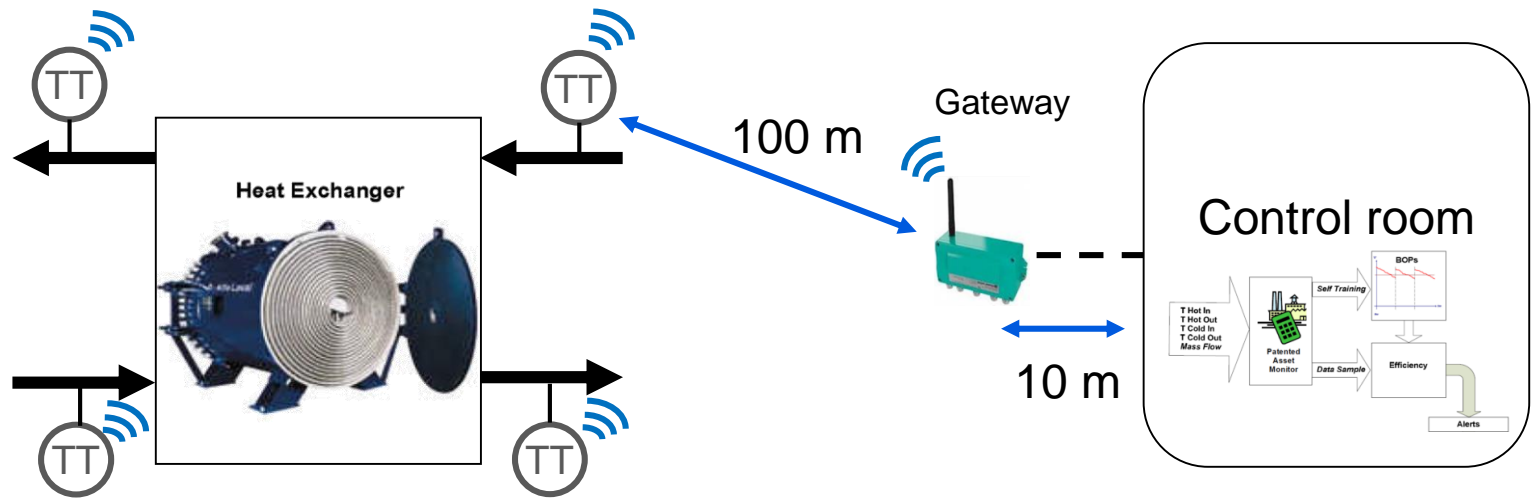


Cost of Installation \approx € 20.000

(Planning, Material, Installation & Cabling)

Wireless Instrumentation

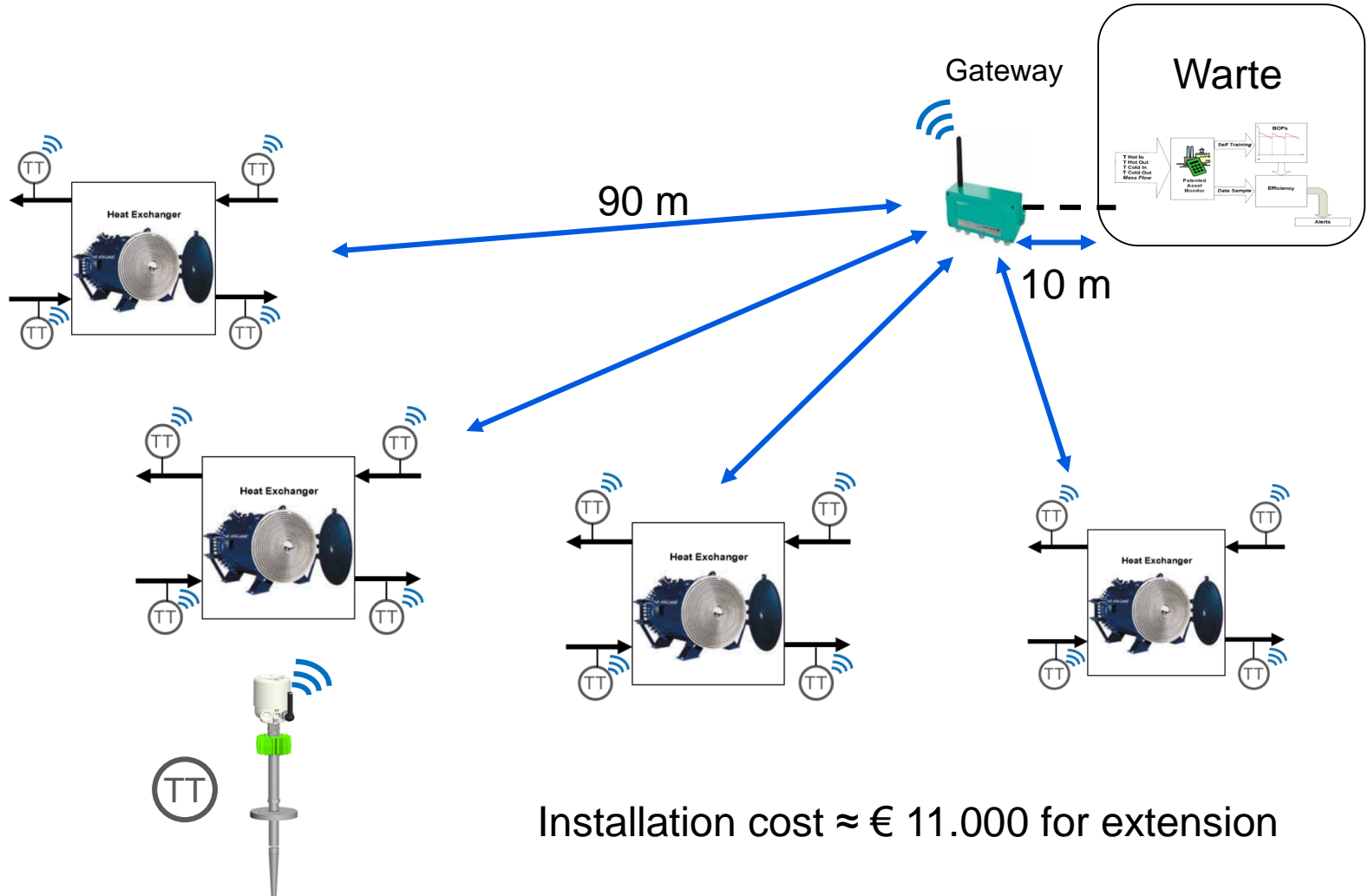
Example heat exchanger



Cost of Installation \approx € 15.000 (**~25% Reduction**)
(Planning, Material, Installation & Cabling)

Application of wireless communication

Duplicate applications



Installation cost \approx € 11.000 for extension

Wireless instrumentation

Where wireless has maximum benefits



Oil & Gas
Upstream

Where cable is difficult or expensive to run (well head monitor)



Oil & Gas
Chemical

For slow processes distant from main plant (Tank farm)



Mining &
Metals

For rotating equipment

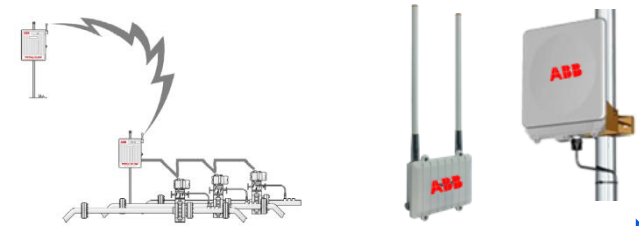
Wireless instrumentation

ABB has a complete wireless offering

Wireless Field Instrumentation



Wireless I/O and IP networks



Condition monitoring

Wireless upgrade

Battery powered Wireless Transmitters

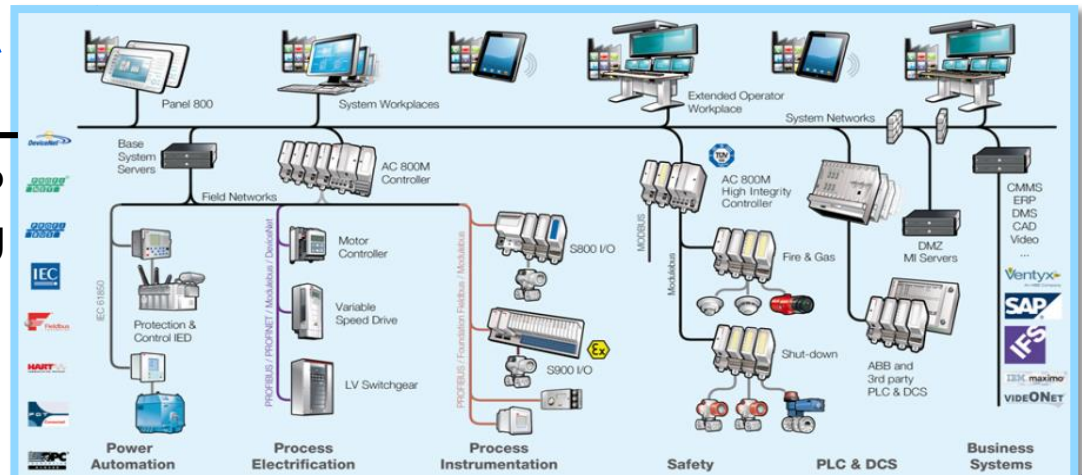
Energy Harvesting Wireless Transmitters

Long range Wireless RTU's

Industrial Wireless IP Networks



Modbus-TCP
Modbus-RTU
HART-IP
OPC



Project execution and system integration expertise

Wireless instrumentation

Diagnosis, maintenance and expansion with ABB



- Fits with manageable installation effort
- Easy expansion with additional field devices
- In inaccessible places and harsh environment
- Device installation without external power supply
- Supply by battery or autonomously with energy harvesting
- Measurement in the environment of moving parts (robots, mills, rotary oven etc.)
- Experience in discrete automation

Temperature, Pressure, DP-Flow, Level, Density, Vibration

Power and productivity
for a better world™

