WirelessHART: The Top 10 Myths and the Truth Behind Them

Every new technology has its misconceptions and delusions. This also applies to WirelessHART technology. Thomas Hilz (photo), Product Manager at Softing Industrial Automation GmbH, reveals the truth about the top 10 myths.

1. WirelessHART is not a standard

WirelessHART is a standard defined by the HART Communication Foundation (HCF). It has been internationally standardized as IEC 62591 (Industrial communication networks - Wireless communication network and communication profiles - WirelessHART). At the European level, it is applied as European Standard EN 62591.

Further background: There are two similar standards: WIA PA and SP 100. Both are widespread in the Asian market, but of minor importance for the other markets. One of the advantages of using WirelessHART is that it provides maximum interoperability because it is the most widely used standard. In addition, there are a number of other radio standards, such as ZigBee, WLAN and Bluetooth, which are not directly comparable with WirelessHART anymore, however.

2. WirelessHART supports only one network topology

WirelessHART generally permits star topologies, mesh topologies and a combination of both. This allows taking advantage of the strengths of each: If the focus is on the network’s range, reliability or flexibility, a mesh network will usually be the best choice. If maximum battery life is desirable, a star topology or point-to-point communication is recommended. Both topologies are supported by WirelessHART.

3. WirelessHART field devices are always battery-powered

WirelessHART devices can be powered by battery or by cable. Power supply by "loop" is also possible. Loop means that the device or the adapter can be supplied with data (HART signal) and with power ("4 mA...20 mA" loop current) at the same time through a single current loop interface.

4. The battery life depends on the microcontroller used

In actual fact, the chip being used plays a minor role in power consumption and battery life. Other parameters have a much greater influence, for example, the topology of devices (network planning), the individual WirelessHART configuration in the Network Manager, the capacity of the specific battery, the current consumption of the device application, and the update cycles.

5. WirelessHART is too slow for control applications

The WirelessHART standard supports update rates of ≤1 sec. This is normally more than sufficient for process automation applications.

6. WirelessHART can only transmit process values

WirelessHART transmits the process values and additionally supports all the specified HART functionality including, in particular, diagnostic information.

7. WirelessHART provides shorter ranges than other IEEE 802.15.4 technologies

As WirelessHART uses the same type of radio chip as other wireless sensor technologies based on IEEE 802.15.4, the maximum transmission range is the same. It mainly depends on the sensitivity of the radio chip and the selected antenna. With the specified channel hopping functionality, WirelessHART can also cover long distances.

Further background: In practice, there are major differences between the maximum range achieved indoors and outdoors. Other factors also have an influence. At a rough estimate, a range of 30 m can be achieved indoors and 100 m outdoors at full power. But ranges will also greatly depend on obstructions.

8. WirelessHART is unreliable

By combining mechanisms like FHSS (Frequency Hopping Spread Spectrum) and DSSS (Direct Sequence Spread Spectrum), WirelessHART provides a very high, field-proven data transmission reliability (of more than 99%). The FHSS technology or channel hopping uses 15 channels in the 2.4 GHz radio band. The generated channel sequence for channel hopping ensures that disturbances on one or more channels will not prevent reliable communication. DSSS coding allows the modulation of transmissions with unique coding for encryption purposes or as filters. This form of coding increases the reception sensitivity by digital processing.

9. WirelessHART does not allow coexistence with other wireless standards

Practice has shown that WirelessHART has no problems with other wireless technologies such as WLAN. WirelessHART has been explicitly specified to meet the essential requirement for coexistence with other radio standards.

Further background from German NAMUR study for wireless sensor networks (translated excerpt): “Basically the responsibility for the coexistence of wireless automation applications must be taken by plant operators and manufacturers alike. While plant operators can only control utilization and load by taking appropriate measures within the framework of regionalization and frequency management process, manufacturers must clearly spe-
cify the resources required and consumed by the automation application. When looking at the implemented coexistence mechanisms of WirelessHART, it can be said that WirelessHART is a good wireless neighbor. Thanks to the tendency towards a low data load and due to combined mechanisms like time slot method and frequency hopping, the necessary measures and processes are implemented in the core protocol.”

10. **WirelessHART networks provide only small plant coverage**

WirelessHART supports networks with hundreds or even thousands of connected devices. The coverage is depends on the number of gateways used.

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