LPWAN compared to WirelessHART

The concept of Industry 4.0 includes both Internet of Things (IoT) and local (short-range) networks. Adoption of wireless sensor network (WSN) technologies is driving growth for the industrial Internet of Things (IIoT). Short range systems make up for the majority of connected devices however, the long-range systems like LPWAN (Low Power Wide Area Network) is are expected to increase rapidly.

Short range systems like WirelessHART or ISA100 are often used for real-time tasks and are focused on the needs for process automation like low and deterministic latency.
Long range systems like LPWAN are used to increase datapoints by deploying a large number of connected devices and focus on scalability, long range and low cost.

WirelessHART uses the 2.4 GHz frequency and most LPWAN technologies like LoRaWAN or DASH7 use the 868 MHz frequency in Europe (920 MHz in the US). Due to the lower frequency (and data rate), LPWAN has a much longer range.


To cope with the smaller range while still limiting the number of gateways and to improve network reliability, WirelessHART uses a multi-hop mesh network, whereas LPWAN uses a star or star-of-stars network.

A mesh network routes data over neighboring devices to reach a gateway, which significantly increases battery usage for devices in a WirelessHART network.
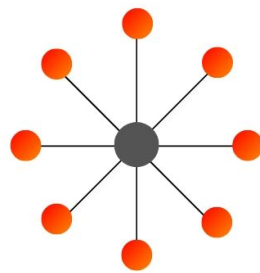
Star Topology
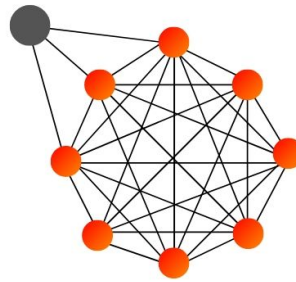
Mesh Topology

Mesh networks require constant synchronization between the nodes to ensure correct timing and routing and need a central network manager which adds complexity and cost to the implementation of WirelessHART. An LPWAN network on the other hand is asynchronous which is less complex but is not able to give hard real-time or throughput guarantees.

Energy consumption is higher for WirelessHART compared to LPWAN devices and to meet the industry standards related to battery lifetime, the WirelessHART transmitters need large batteries resulting in large and costly devices. The transmitter is often separated from the measurement devices, whereas IoT devices generally consist of the sensor, battery and radio transmitter in one, which reduces the cost of devices significantly.

IoT is inherently an ecosystem where no single technology alone can provide a complete solution. Interoperability between devices of different vendors and even different network protocols function within one IIoT platform.

In today's short-range networks there are a few dominant players were a system is often built up using one brand.

To summarize WirelessHART is ideal for low latency and continuous measurements whereas LPWAN is ideal for scalability, low cost and volume. Both are part of the continuous efforts to increase automation and will increase safety and efficiency on the long term, serving different application needs.