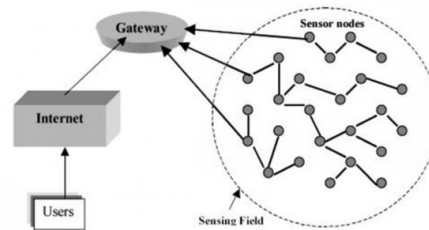


Evolution of industrial wireless sensor networks: Page 3 of 5

November 10, 2017 // By Mark Miller, L-com Global Connectivity, Wireless Product Manager



Industrial automation powered by wireless sensor networks (WSN) is heralding the Industrial Internet of Things and Industry (IoT) 4.0. Key enabling cloud and wireless mesh networking technologies promise to bring multi-year battery life, IP addressability to machines and sensors, cloud-based provisioning and management systems, as well as fieldbus tunneling.

Energy harvested through Microelectromechanical Systems (MEMS) or PV cells go through power conditioning in order to be stored in the secondary energy storage, through power management circuitry and finally to the load (sensor and radio). While there are many creative ways to autonomously generate energy to prevent the costly maintenance of replacing batteries, the unpredictability of the power source adds to challenge of the sensor node's reliability. Time sensitive information could be incorrectly transmitted or lost without the sensor node's replenishment of energy. Moreover, if a disproportionate amount of energy used up in transmission, sensors may not have enough power to detect the environment thereby degrading the potential determinism of a system [7].

Determinism and reliability

A survey composed by the International Society of Automation (ISA) and ON World at the end of 2014 revealed that data reliability, security, and easy access to sensor data tend to be the most important features of a WSN (Figure 2). Interestingly enough, the concerns for battery life decreased while the need for IP addressability increased [2]. Two factors mainly contribute to the reliability of a WSN: mesh networking and channel hopping. Network clusters in which every node can communicate with multiple neighboring nodes inherently have a higher reliability through self-healing algorithms than linear, point-to-point topologies where if one node is rendered nonfunctional, the chain for transmission is broken. Channel hopping is yet another failsafe for low power and lossy networks (LLNs) where nodes can use multiple channels within a given bandwidth in case there are transmission/reception challenges in select channels. This is defined in the media access control (MAC) layer within the IEEE 802.15.4e standard—the physical and data link defined basis for many WSN standards including WirelessHART, ZigBee, and ISA100.11a.

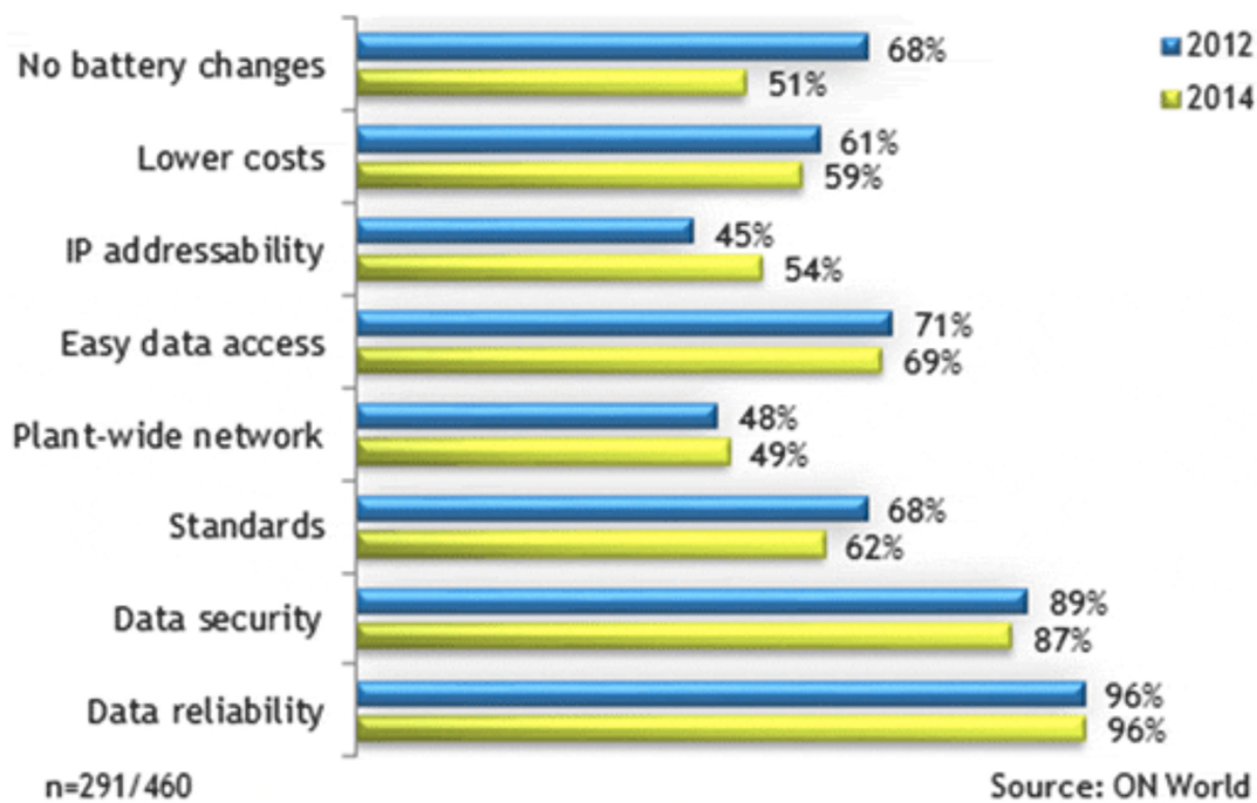


Figure 2: Most important features to WSN adopters based on ISA/ON World Survey done in 2012 and 2014 [2].

Design category:
Wireless Communications