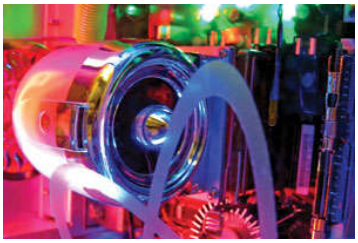
September/October 2012

Web Exclusive

Industrial Wireless Sensor Networks: Trends and developments

ON World's 2012 survey shows continued growth and new opportunities for wireless sensors

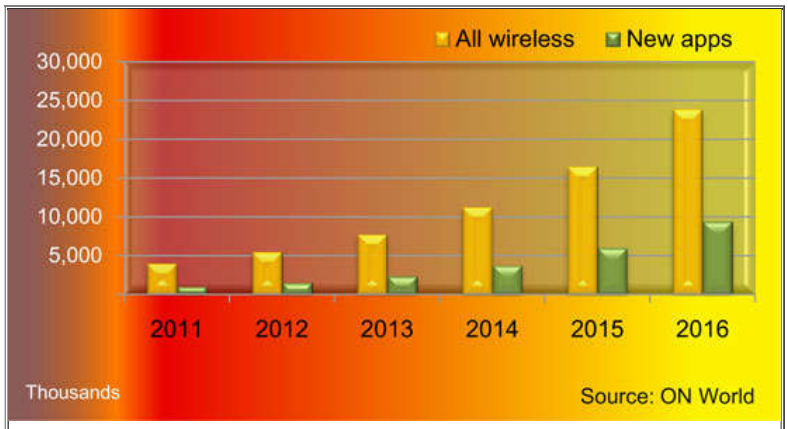
By Mareca Hatler



Despite a challenging economy, the industrial Wireless Sensor Network (WSN) market has doubled over the past two years. A recently completed ON World survey of 216 industrial automation professionals, in collaboration with ISA, HART Communication Foundation (HCF), and the Wireless Industrial Networking Alliance (WINA), points to increasing WSN adoption and expanding markets.

When ON World started researching industrial wireless sensing 10 years ago, deployments of more than 20 nodes were rare. Today, network densities are increasing, and several sites have deployments of more than 3,000 nodes. What is responsible for much of this growth? The 2012 survey indicates this is a result of increased education, reliability of today's WSN systems, maturing wireless mesh solutions, and a rapid migration to industry standards, such as WirelessHART and ISA100.11a.

Within the next five years, installed wireless industrial field devices will increase by 553% when there will be nearly 24 million wireless-enabled sensors and actuators, or sensing points, deployed worldwide. By 2016, 39% of deployed nodes will be used for new applications that are uniquely enabled by WSN technology. WSN is impacting industrial automation by disrupting wired automation, extending wired sensor networks, and driving new sensing and control solutions.

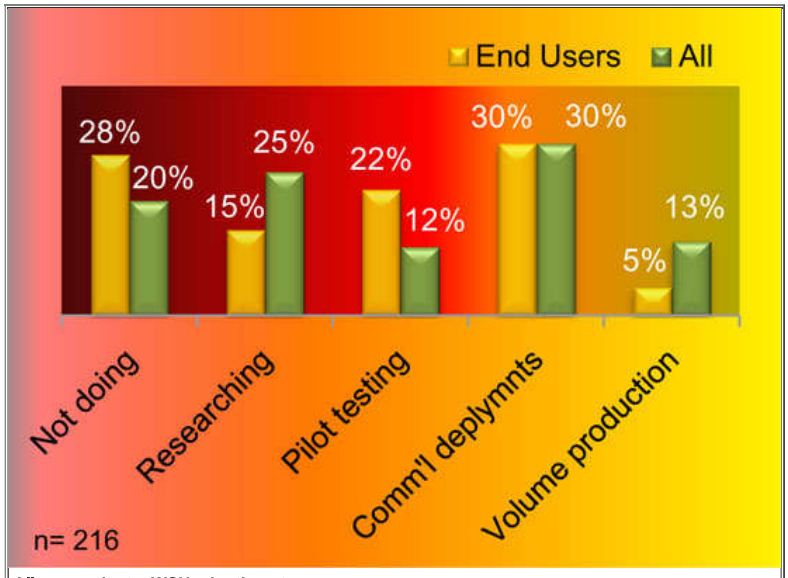


Global installed industrial Wireless Sensing Points (2011-2016)

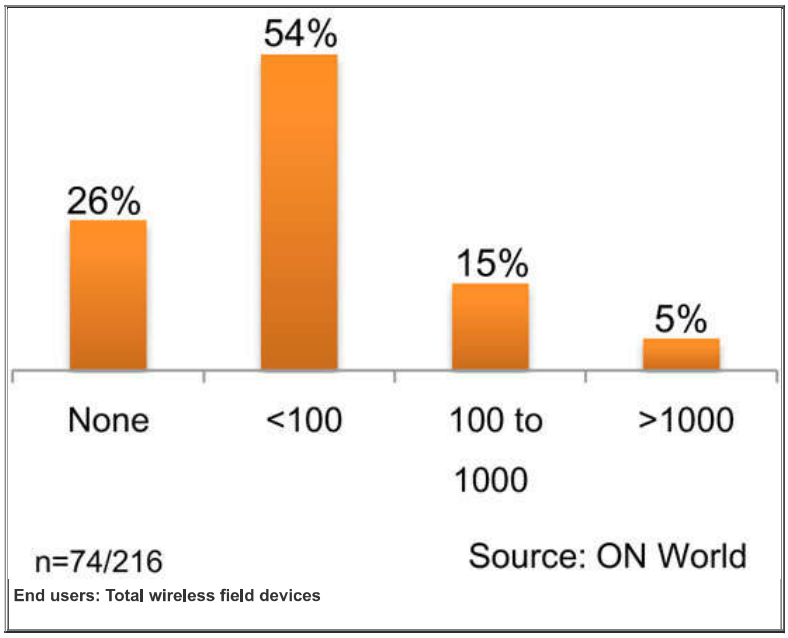
In 2016, there will be 24 million wireless-enabled sensing points. At this time, 39% will be new applications, uniquely enabled by WSN.

Industrial WSN drives production

Seventy percent of the surveyed industrial end users are planning WSN applications within the next 18 months, and most of these are planning a standards-based platform. Over half (57%) of the end-user respondents are currently using or pilot testing WSN systems, and 20% have deployed more than 100 wireless field devices. This is up from our previous survey from two years ago when only 7% of the end users had deployed over 100 wireless field devices. Five percent of the end users have installed at least 1,000 wireless field devices across multiple locations.



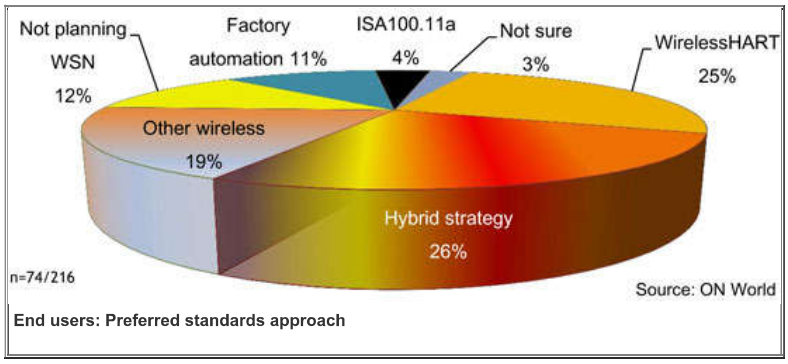
All respondents: WSN adoption stage



End users: Total wireless field devices

Standards migration

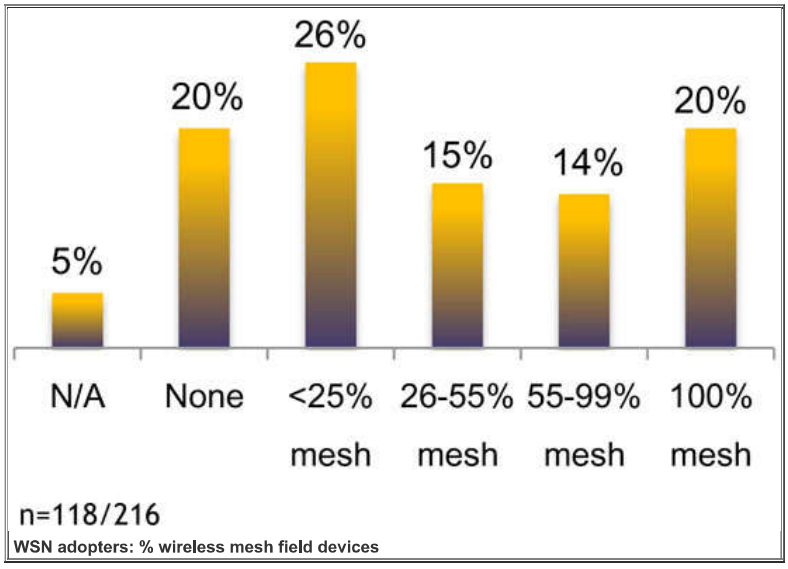
Over the past two to three years, there has been a rapid migration to wireless mesh standards. Nearly an equal number of industrial end users prefer WirelessHART or a hybrid strategy that combines WirelessHART and ISA100.11a.



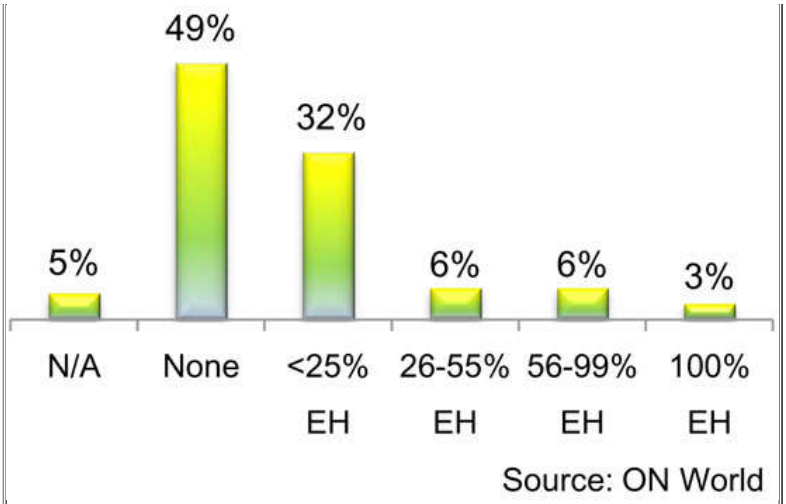
End users: Preferred standards approach

Increasing demand for wireless mesh, energy harvesting

Seventy-five percent of current WSN adopters-including vendors, suppliers and end users-indicate they are using a wireless mesh protocol for at least some of their wireless field devices, and 20% are only using wireless mesh systems. Over half of the WSN adopters are using energy harvesting for at least a few wireless sensor nodes, and 9% use energy harvesting to power the majority of their wireless field devices.



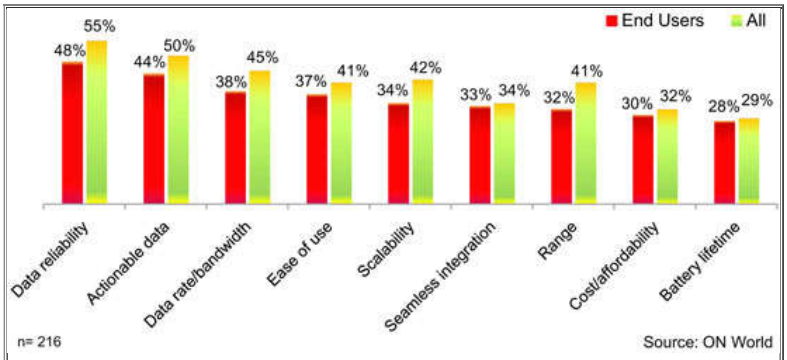
WSN adopters: % wireless mesh field devices



% powered with energy harvesting

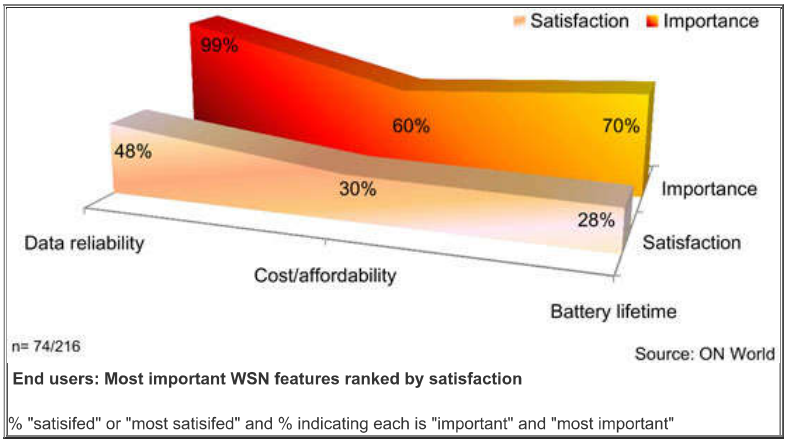
End user satisfaction with current WSN systems

Although they rank lower satisfaction compared with all respondents, end users are somewhat satisfied with today's WSN systems with about a third to half indicating they are satisfied with most features.



Satisfaction with current WSN systems by respondent type

There is still a significant gap between end users' satisfaction level compared with their rank on the importance of key features such as data reliability, cost, and battery lifetime.

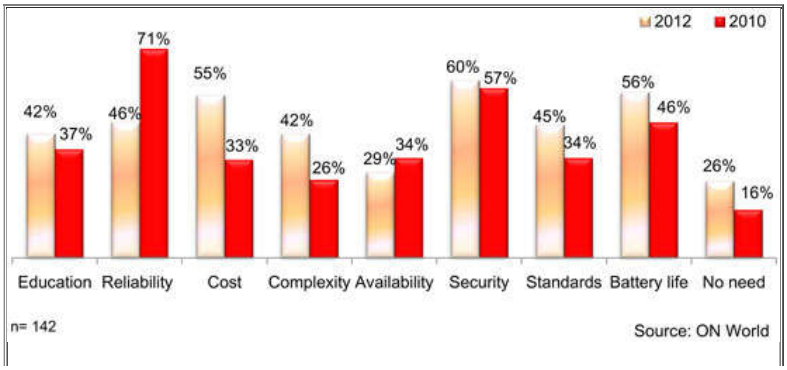


End users: Most important WSN features ranked by satisfaction

% "satisifed" or "most satisifed" and % indicating each is "important" and "most important"

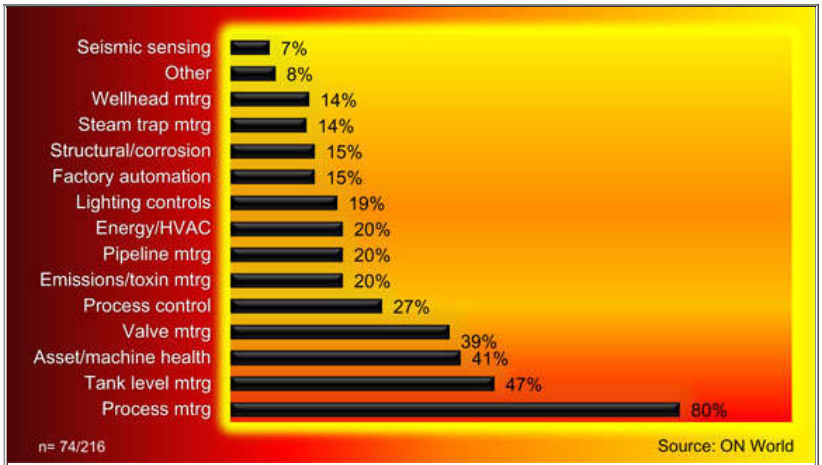
Adoption drivers and inhibitors

Compared with ON World's previous survey in 2010, data reliability has dropped to only about two-thirds as much of a concern compared with the previous 2010 survey. Costs, battery life, and standards confusion are ranked slightly higher as inhibitors in our current survey compared with the previous survey.



End users: WSN inhibitors

Seventy percent of end users indicate they are planning WSN or additional applications.



Industrial end users: Planned WSN applications

Future of industrial wireless sensing

Looking forward, there will be many more wireless sensing applications and technology variations for industrial automation. In addition to wireless mesh systems, non-mesh products based on IEEE 802.15.4 are emerging, targeted at the process and discrete industries. Adoption for point-to-point and point-to-multipoint wireless sensor systems is accelerating for oil and gas exploration and production. In addition, interest in simpler, lower-cost wireless sensors, such as "passive wireless sensors," is a growing innovation area.

The survey respondents from ISA, HART, and WINA believe most WSN technology advances over the next 5-10 years will be focused on reducing equipment costs, improving communications, and finding better power source solutions such as energy harvesting. One thing that is certain is wireless sensing solutions will continue to play a pivotal role for industrial automation.

ABOUT THE AUTHOR

Mareca Hatler is the director of research for ON World, a global research firm that focuses on smart technology markets. For more information and free executive summaries of ON World's recently published reports, go to: http://www.onworld.com/smartindustries/set/.