

# Wireless Sensor Adoption Expected to Grow Tenfold

According to a survey of industrial companies, 40 percent of respondents plan to deploy wireless solutions to monitor machine health.

By Beth Bacheldor

Sept. 25, 2007—The global market for wireless sensor network (WSN) systems and services is expected to skyrocket to about \$4.6 billion in 2011, up from approximately \$500 million today, according to a recent report from market research firm [ON World](#). Headquartered in San Diego, Calif., ON World focuses on emerging wireless technologies.

The market size was formulated based on ON World's recent survey of industrial end-user companies. The survey found that one in three companies is currently using wireless sensing and control technologies, and that nearly half intend to investigate or plan wireless solutions over the next 18 months.

As defined by ON World's report, "WSN For Smart Industries," WSN systems and services are two-way wireless communications between active (battery-powered) nodes, or a node and a gateway. One node within the network—either point-to-point, point-to-multipoint or mesh—consists of at least one transceiver, a microcontroller and a sensor that measures a physical stimulus, such as temperature, humidity or light. As with an active RFID tag, each node typically transmits its own unique identifying number.

Industrial companies will contribute a portion of the money spent on WSN systems and services, says Mareca Hatler, director of research at ON World, particularly to monitor machine health and conditions on the factory floor or out in the field. In fact, Hatler notes, 40 percent of survey respondents planning to deploy wireless solutions are targeting machine health.

"The traditional application of condition monitoring is to optimize production and to prevent unplanned failures, which can cost millions of dollars in production downtime," Hatler says. Companies are also adopting machine health monitoring to conduct predictive maintenance, save on equipment costs (by not replacing machines prematurely) and better manage energy usage. "Often, there is a relationship between healthy equipment and energy efficiency, and vice versa."

ON World identifies several companies with current WSN systems for machine-health monitoring, including [ABB](#), [Cooper Bussmann](#), [Coronis Systems](#), [Dust Networks](#), [Honeywell](#) and [Sensicast](#). Dust Networks, for instance, has teamed with [GE Sensing](#) to develop WSNs; the first such product is a wireless network designed to help pharmaceutical and life sciences companies monitor and validate environments, such as freezers and sterilization processes, for regulatory and quality compliance purposes (see [GE Sensing, Dust Networks to Develop Wireless Sensors](#)).

In addition, industrial companies are leveraging WSNs to monitor air quality, assets and fluid levels in tanks. A Houston refinery, for example, is using wireless sensors to monitor oil levels in groups of tanks. The

sensors could replace the costly manual checks that must be conducted in hazardous areas (see [Oil Refineries to Test Sensor Tags](#)).

WSNs can provide industrial companies an opportunity to monitor all—or, at least a majority—of their equipment around-the-clock, providing greater visibility of their operations than is currently available. According to the survey, about 29 percent of companies conducting any continuous monitoring today indicated that less than 5 percent of their equipment is currently monitored. And more than two-thirds, Hatler says, replied that less than a quarter of their equipment is monitored continuously.

The remaining 71 percent of respondents said they monitor equipment on a schedule, such as monthly (27 percent of those with scheduled monitoring), semi-annually (14 percent), quarterly (11 percent) and yearly (36 percent). For companies interested in WSNs, data reliability topped concerns about the technology, with 90 percent of interviewees ranking data reliability as the most important. Other top-ranked priorities included ease of use and long battery life.

Currently, the majority of installed industrial wireless networks use wireless networking technology that is proprietary rather than standards-based. However, ON World reports, that is changing. As with most emerging technologies, standards will play a key role in the growth of WSN, since standards-based technologies help ensure that vendors' systems and services can interoperate. Nearly half of the WSN nodes deployed this year will be based on IEEE 802.15.4, the specification forming the foundation for three WSN standards: WirelessHART, ISA 100 and ZigBee.

The WirelessHART standard, which is focused on process applications, has recently been ratified by the [HART Communication Foundation](#) (HCF), an independent, not-for-profit organization. The WirelessHART standard is based on HART (Highway Addressable Remote Transducer), a bidirectional protocol used to communicate between intelligent field instruments and host systems. WirelessHART-based products are expected to become commercially available in early 2008.

The second standard applicable to WSNs is the ISA 100 draft specification, which has a broader focus, including process, automation, RFID and facility management. The specification is being developed by [ISA](#), which prior to 2000 was known as the Instrument Society of America. The ZigBee specification, developed by the industry group [ZigBee Alliance](#), is also gaining traction, according to ON World.

While all three standards address the WSN market, the proposed ZigBee standard is a more broadly targeted specification for a range of RF applications requiring a low data rate, long battery life and secure networking. ZigBee operates in the industrial, scientific and medical (ISM) radio bands—868 MHz in Europe, 915 MHz in the United States and 2.4 GHz in most jurisdictions worldwide. The ISA 100 draft specification is more broadly focused but designed for industrial applications. It defines a complete industrial wireless sensing architecture and supports multiple industrial protocols via a single wireless infrastructure. The WirelessHART standard, created specifically to address the needs of the process industry, defines wireless communications capability using the 2.4 GHz band and is compatible with the more than 22 million HART-enabled devices installed in industrial plants worldwide.

RELATED\_ARTICLES ON World's WSN report is based on more than 275 phone interviews and surveys. Of those, 115 phone interviews were conducted with senior managers at North American industrial companies in numerous industries, including chemicals, food and beverage, pharmaceuticals, oil and gas, metals, and pulp and paper. Thirty-one percent of the companies had more than 300 employees at their locations, and 47 percent of those interviewed were in senior management positions, such as plant manager, VP of operations or engineering. The rest were primarily employed in engineering or operations.

ON World also surveyed 108 experts representing the leading industrial WSN OEMs, service providers,

systems integrators, module makers and component suppliers. Of these experts, 55 percent said they plan to include support for ISA 100 in their products, 40 percent reported plans to support WirelessHART and 32 percent indicated they would support ZigBee.

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