INDUSTRIAL WIRELESS SENSOR NETWORKS

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Executive Summary

Industrial wireless sensor networks (WSN) continue to expand into new markets with multi-protocol devices, maturing standards and ubiquitous IoT cloud platforms. Unit shipments grew by 69% over the last two years due to a robust manufacturing sector and increased spending on oil and gas exploration and production.

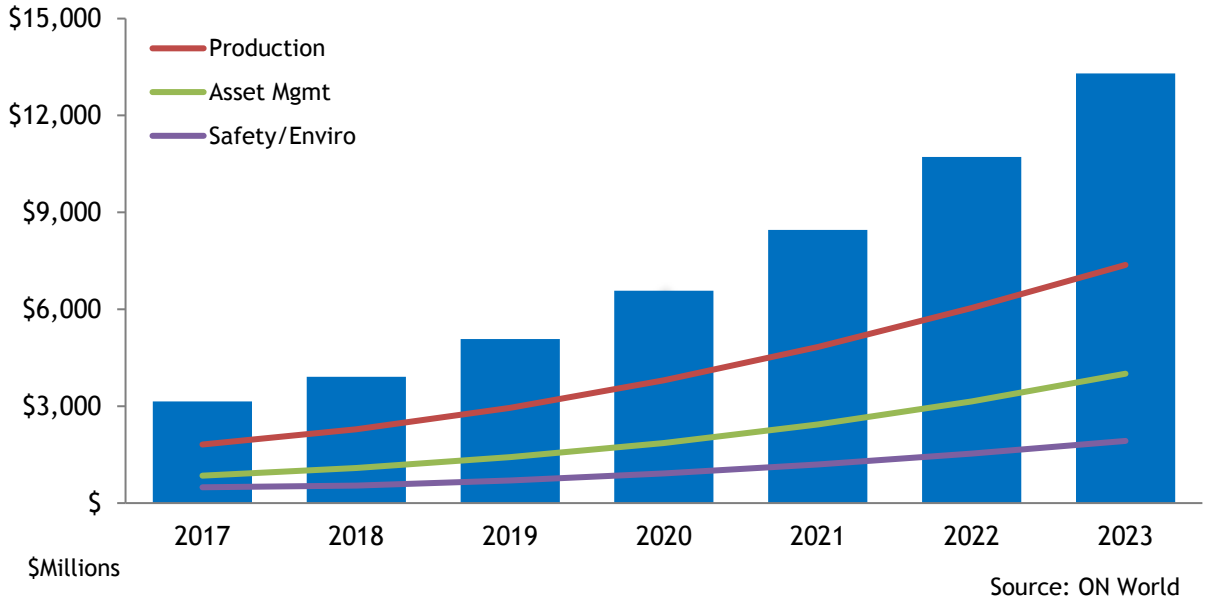
Based on an extensive 2018 survey completed by ON World with the International Society of Automation (ISA) and the LoRa Alliance™, there are three WSN technology areas that are driving industrial IoT growth today:

- Wireless mesh sensor networks
- Location based services
- Low power wide area networks

Applications for 802.15.4 and wireless mesh sensor networks continue to grow including equipment monitoring from offshore platforms, wireless gas detection, flood monitoring as well as solutions for agriculture, construction and factory automation. Location-based services is one of the fastest growing markets including low-cost proximity sensing with Bluetooth Low Energy, precision real-time location systems (RTLS) with ultra-wideband and a variety of remote monitoring and tracking of fixed and mobile assets using low power wide area networks (LPWAN).

In 2023, revenues for WSN equipment and associated services for industrial automation, agriculture and construction will surpass $13 billion up from $3 billion in 2017.

Figure 1: Global Industrial WSN Revenues (2017-2023)



Source: ON World

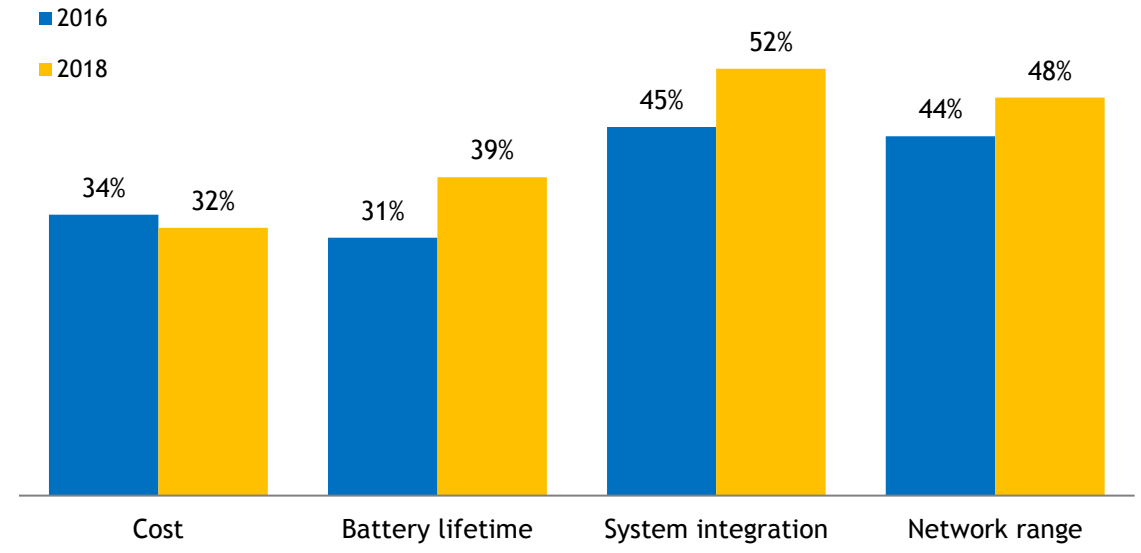
Expanding the Industrial IoT Landscape

Adoption of wireless mesh sensor standards such as WirelessHART, ISA100 Wireless and Wi-SUN are expanding to markets such as wireless gas detection, worker safety and smart water networks. However, the fastest growth over the last two years has come from IT technologies such as WiFi, Bluetooth Low Energy and LPWAN. By targeting new IoT applications, these emerging industrial WSN technologies are expanding industrial IoT opportunities.

ON World's Q2 2018 survey with 160 industrial IoT professionals found that three-quarters believe that wireless sensor networking and IoT are important strategic investment areas. The fastest growing WSN applications are asset tracking, corrosion/structural monitoring, factory automation and machine health monitoring. Forty-eight percent (48%) more respondents are planning asset tracking compared with our previous survey in Q4 2016.

Users' satisfaction with WSN systems' battery lifetime, network range and system integration have had the most improvement over the last two years. Security, cost and complexity are rated the biggest WSN adoption inhibitors.

Figure 2: Satisfaction with WSN Systems by Select Feature



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Source: ON World

Threats, Challenges & Opportunities

Low power wide area network (LPWAN) technologies such as LoRaWAN™, Sigfox and NB-IoT are disrupting industrial IoT markets with cloud connected, battery-powered wireless sensors and asset trackers that can communicate up to 30 kilometers. Disposable smart tags are the latest LPWA trend illustrated by Sigfox's 20 cent tracker module prototype and Semtech's disposable LoRa® Nanotag using an ultra-thin printed battery. By using Time Difference on Arrival (TDOA) in geolocation-ready gateways, LoRaWAN™ enables location applications without GPS.

The availability of LPWANs has resulted in accelerating IoT adoption by nearly all major Telecom/mobile/cable operators as well as numerous dedicated IoT network operators such as 1NCE, Ingenu, Senet, Sigfox and Thinxtra. This has drawn hundreds of IoT platform providers dedicated to accelerating industrial IoT markets including network infrastructure vendors such as Cisco, Ericsson, Kerlink, Nokia, Huawei, Sagemcom and ZTE.

Competition is intensifying for short range wireless sensor network components and devices. Multi-protocol devices mitigate the risk for end users while increasing the performance and functionality of WSN systems. For example, Honeywell's latest gateways and access points feature a single 802.15.4 radio that simultaneously communicate ISA100 Wireless and Wireless HART. Many vendors are combining short-range radios such as Bluetooth and WiFi with LPWAN technologies illustrated by the multi-radio micro tracker and geolocation solution by Abeeway (Actility).

This report is based on input from 200+ individuals including in-depth phone interviews with industrial WSN vendors, suppliers and service providers as well as a global survey completed in collaboration with the International Society of Automation (ISA) and the LoRa Alliance™.

For the past 15 years, ON World has conducted market research on industrial wireless sensing and IoT markets based on thousands of in-depth phone interviews across the whole industrial IoT value chain. In this report, we cover the global market for industrial wireless sensing, tracking and control in 12 market segments including 5-year market size forecasts, analysis of 100+ companies, an extensive technology review, the results of our recently completed survey on industrial wireless and IoT adoption trends, the fastest growing applications, technologies, needed innovations and satisfaction with current systems.

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*LoRa Alliance™ and LoRaWAN™ are marks used under license from the LoRa Alliance.

Methodology/Scope

This report analyzes and quantifies the global market opportunity for industrial wireless sensing, tracking and control. Our research methodology is based on extensive phone interviews and surveys with 200+ individuals, an in-depth technology evaluation, weighted market drivers and a competitive analysis of 100+ companies with industrial WSN systems, platforms and components. The major components of our research include the following:

Data Collection/Investigation:

- Surveys/phone interviews with 200+ individuals representing industrial automation organizations worldwide.
- Secondary sources including third party reports, databases, financial reports, etc.

Segmentation:

Geographies:	North America, Western Europe, Asia Pacific, and Rest of World
Markets/ Segments:	**Process** (Oil & Gas; Refining/Petrochem/Chemicals; Electric Power; Primary Metals, Minerals and Mining; Water/wastewater; Paper); **Hybrid & Discrete** (Food & Beverage, Pharmaceuticals/Medical devices, Electronics/Semiconductor, Automotive/Transportation, Machinery and Electrical; Other discrete); **Other** (Agriculture, Construction and Others)
Solutions:	Process & Production; Asset management: Equipment health monitoring, Corrosion monitoring, Asset tracking/locating, tank monitoring and others; Health, safety and environmental monitoring
Product segments:	WSN equipment (End nodes, repeaters, gateways and associated software) and services (installation, maintenance and hosted/Web services); Chipsets/modules

Competitive Forces & Technology Dynamics:

- Product segmentation, value chain and business model analysis
- Distribution channels, product availability and vendor strength
- Standards developments, technology adoption and emerging technologies
- Analysis of products' performance, pricing, functionality and potential for disruption

Market Size Forecasts:

- **Primary Research:** Recent market data is collected from vendors and end users on unit sales, growth trends, applications, hardware/service pricing, distribution channels, etc.
- **Market drivers:** Analysis of the weighted driver impact for each solution/market.
- **Projections**: Using all the above, we create 6-year data models from a conservative, moderate and aggressive viewpoint. Breakdowns are provided by target market, application, new vs displaced application, sensor type, geography, technology and product segment. Revenues are for equipment and associated software/services.
- **Verification**: Forecasts are benchmarked with secondary sources and verified/confirmed with vendors/industry experts whenever possible.

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ON World provides global business intelligence on Internet of Things markets. Since 2003, our market research has been used by Fortune 1000 companies, investors and IoT developers worldwide.

If you have any questions on the report, please call us or send us an email at: research@onworld.com