

## Solution Brief

# ISA100.11a Gateways and Backbone Routers Construct Hybrid Mesh for Distributed WSN



NEXCOM's ISA100.11a series equips WSNs with different levels of simplicity and flexibility in terms of implementation, scaling, and maintenance.

NEXCOM ISA100.11a gateways and backbone routers weave an intertwined wireless sensor network (WSN), enabling plant-wide monitoring of production efficiency, environmental compliance, and workplace safety.

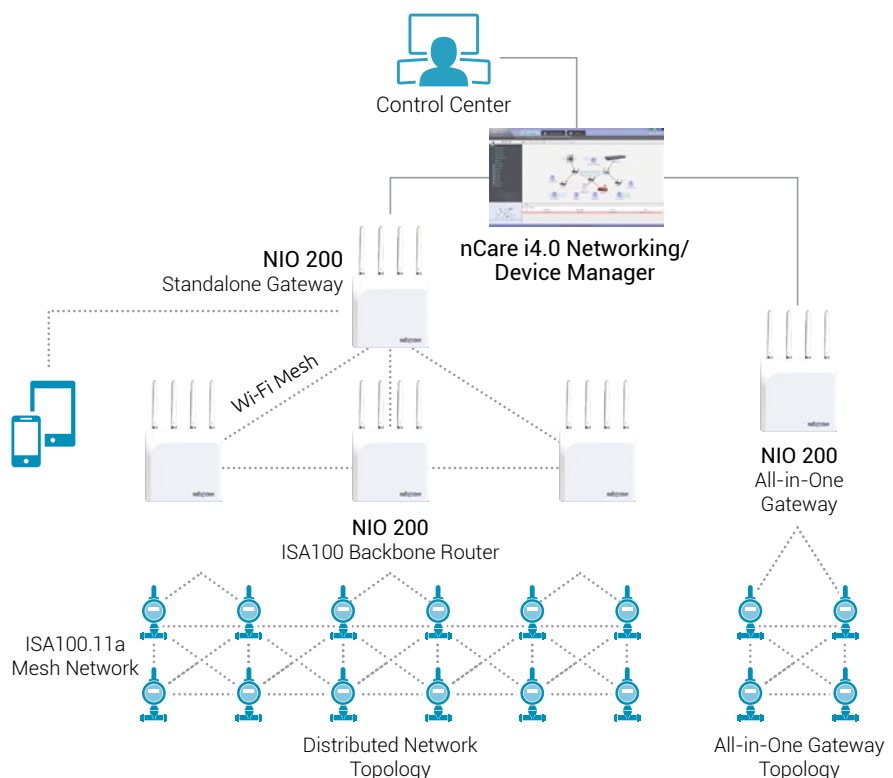
## Challenges

Scattered in every corner of industrial facilities, a plethora of sensors and instruments automate process control, detect field instrument status, generate safety-critical data and sensor readings, and therefore must be kept under a close watch at all times. Given the sheer size of industrial facilities and almost non-existent network infrastructure, constructing a large-scale WSN which connects field sensors and the back end can be a massive undertaking. If the need to accommodate new deployments or expansion of existing infrastructure arises, adapting a WSN, commonly with a centralized architecture, can incur tremendous costs and efforts.

Meanwhile, sensors and instruments are not the only devices that a WSN has to connect in the field; portable devices used by field inspection engineers also require network access. With copious amounts of data at stake, it is instrumental for users to be able to administer a WSN and be alerted to abnormal network events. Moreover, open-air industrial facilities are rife with pitfalls threatening to undermine the stability of network infrastructure and communication quality.

## NEXCOM's Strengths

As the adoption of WSN is gaining momentum in the process automation industry, NEXCOM's ISA100.11a series supports a distributed network architecture with a distributed gateway NIO 200IDG paired with backbone router NIO 200IDR, and a centralized network architecture with an all-in-one gateway—NIO 200IAG to provide different levels of simplicity and flexibility in terms of implementation, scaling, and maintenance.



NEXCOM's ISA100.11a series connects to backbone/back end over Wi-Fi mesh while providing Wi-Fi access for field inspection engineers.

### Distributed vs. Centralized Architecture

A distributed WSN formed by NIO 200IDG and NIO 200IDR is easy to scale. A distributed WSN can embody multiple connected ISA100.11a subnets—each federated by one NIO 200IDR which then connects to the back end through NIO 200IDG. To expand the coverage of a WSN, users can set up new subnets by adding new backbone routers without the need to deploy new distributed gateways, scaling a WSN in an easy and cost-effective manner. Also, NIO 200IDG and NIO 200IDR facilitate the enforcement of network segmentation and throughput optimization.

On the other hand, NIO 200IAG offers a centralized network architecture that allows quick installation of a WSN. NIO 200IAG serves as not only a gateway that equips backbone connectivity to the back end but also a backbone router that manages single ISA100.11a subnet composed of ISA100.11a sensors and instruments. Therefore, NIO 200IAG is suited for industrial facilities running a small-scale WSN.

### Wi-Fi Mesh and Wi-Fi Access

The uplink connection to either backbone or back end, depending on whether NIO200 is a gateway or a backbone router, is carried out through Wi-Fi mesh. Built with self-forming, self-healing mesh capability, NEXCOM's ISA100.11a gateways and backbone routers can create an ad hoc path to another adjacent NIO 200 unit to relay data to its destination even from a remote corner of industrial facilities. WSN deployment and maintenance become simple because time and efforts associated with cable placement and repair that wired connections require are eliminated. Wi-Fi mesh represents a convenient alternative for complete plant coverage in this regard.

In addition, the NIO 200 series featuring dual radio frequencies (RFs) can dedicate one RF to providing Wi-Fi access so that field inspection engineers with tablets or other portable devices can query a database to verify instrument information or file inspection reports online, reducing paperwork and elevating operational efficiency.





## Vertical Markets



Energy



Chemical



Oil and gas



Metal



Mining



Pulp and paper



Water and  
wastewater

### C1D2 Explosion-Proof Design

The NIO 200 series is engineered to address tangible and intangible environmental factors. Fire and explosion risks in hazardous locations are taken into account as all NIO 200 units are UL-certified C1D2 equipment, and airborne particles and raindrops are shielded by an IP67-rated enclosure.

The ISA100.11a gateways and backbone routers—having passed rigorous tests including IEC 61000-4-2 Level 4 Electrostatic Discharge Immunity Test, IEC 61000-4-4 Level 4 Electrical Fast Transient Immunity Test, and IEC 61000-4-5 Level 4 Surge Immunity Test—are capable of self-recovering from temporary degradation or loss of function and performance in the event of electrostatic discharge which is common when the air is dry, transient electrical disturbances from power cords and I/O ports, and even lightning strikes in the vicinity. Meanwhile, these ISA100.11a gateways and backbone routers can survive temperature extremes from -40 to 75 degrees Celsius.

### Ease of Management

With NIO 200s installed in industrial facilities, managing a WSN could be an arduous task if not for nCare. After NIO 200s are in place, the remote network management tool can automatically scan and create a topology map, offering centralized configuration of Wi-Fi mesh and an overhead view of a WSN.

Network administrators can be certain that a WSN is reliable by remotely monitoring Wi-Fi signal quality, network links, and

traffic loading or opting to receive email, social media, or SMS alerts in case of network disruption. Also, nCare is available with a mobile app version to keep network administrators alert on the go.

NEXCOM's ISA100.11a gateways and backbone routers are validated by ISA100 Wireless Compliance Institute (WCI) to assure interoperability with ISA100.11a compliant sensors and instruments and under year-long evaluation by leading suppliers in the process automation industry.

## Main Features

- Robust wireless connectivity with hybrid mesh of ISA100.11a and Wi-Fi
- Explosion-proof designs based on UL C1D2 and ATEX C1Z2 standards
- ESD, EFT, and surge immunity based on IEC 61000-4-2, IEC 61000-4-4, and IEC 61000-4-5 Level 4 standards
- Extended temperature range and IP67 design
- Incorporates power redundancy (DC and PoE)
- Web-based GUI tool of nCare for network management with expansion support

## Ordering Information

**NIO 200IAG (P/N: 10T00021002X0)**

ISA100 all-in-one gateway

**NIO 200IDG (P/N: 10T00021003X0)**

ISA100 distributed gateway

**NIO 200IDR (P/N: 10T00021004X0)**

ISA100 backbone router



Founded in 1992, NEXCOM integrates its capabilities and operates six global businesses, which are IoT Automation Solutions, Intelligent Digital Security, Internet of Things, Intelligent Platform & Services, Mobile Computing Solutions, and Network and Communication Solutions. NEXCOM serves its customers worldwide through its subsidiaries in five major industrial countries. Under the IoT megatrend, NEXCOM expands its offerings with solutions in emerging applications including IoT, robot, connected cars, Industry 4.0, and industrial security.

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