

# Midokura In Industrial IoT

## AT-A-GLANCE

### Industry 4.0 and Smart Factory Initiative

#### The Intent of Industrial IoT

The 4th Industrial Revolution is currently underway. As companies in the Industrial sector are faced with fierce global competition, they are looking to technology to update their aging factories. As part of the 'Smart Factory' initiative key areas of technology and data science are at the forefront of this revolution. Industries, like other market verticals, are using data and hence Industrial IoT (IIoT) to create a competitive advantage world-wide (United States, Germany, United Kingdom, Switzerland, and Japan being some of the strong manufacturing centers).

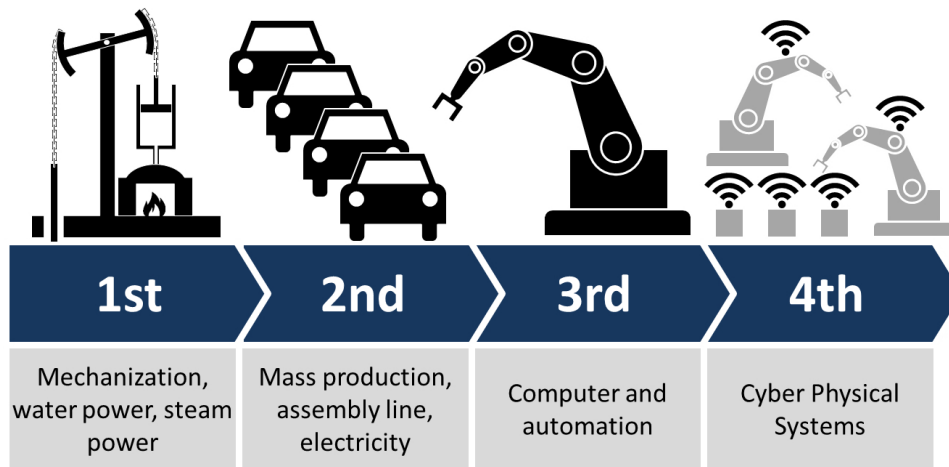


Figure 1: The 4 Industrial Revolutions (by Christoph Roser at AllAboutLean.com)

#### The Benefits of Industrial IoT

IIoT adoption greatly improves connectivity, efficiency, scalability, time savings, and cost savings for industrial organizations. The cost savings can be attributed to predictive maintenance, improved safety, and overall operational efficiencies. Intelligent devices allow industrial organizations to break open data silos. In turn, data allows organizations to connect their people, data, and processes from the factory floor to the IT organizations and ultimately to top executives. Business leaders use this data to get a full and accurate view of how their enterprise is doing, which in turn helps them make better business decisions. Ultimately, IIoT helps industries compete successfully in this environment.

#### The Barriers to Adoption of Industrial IoT

It is obvious that IIoT adoption has a huge positive business impact - data collection and analysis decreases cost and creates additional revenue opportunities. However, there are many issues that need to be addressed to enable faster adoption of IIoT. The ones that are relevant here are:

- Processes that enable distributed teams to work together effectively (IT/OT Convergence)
- Technology to manage and use vast amounts of disparate data collected from the factory floor
- Secure connectivity techniques to manage and process data at the edge and in the Cloud (edge to cloud security)
- Simplified management of devices and integration of the old and the new

# Midokura in the IIoT Stack

MidoNet’s intelligent, distributed architecture seamlessly integrates into various points in the IIoT stack. The illustration below shows the IIoT stack and the points in the stack where Midokura can help in removing some of the barriers to the adoption of IoT on the factory floor and in the data center.

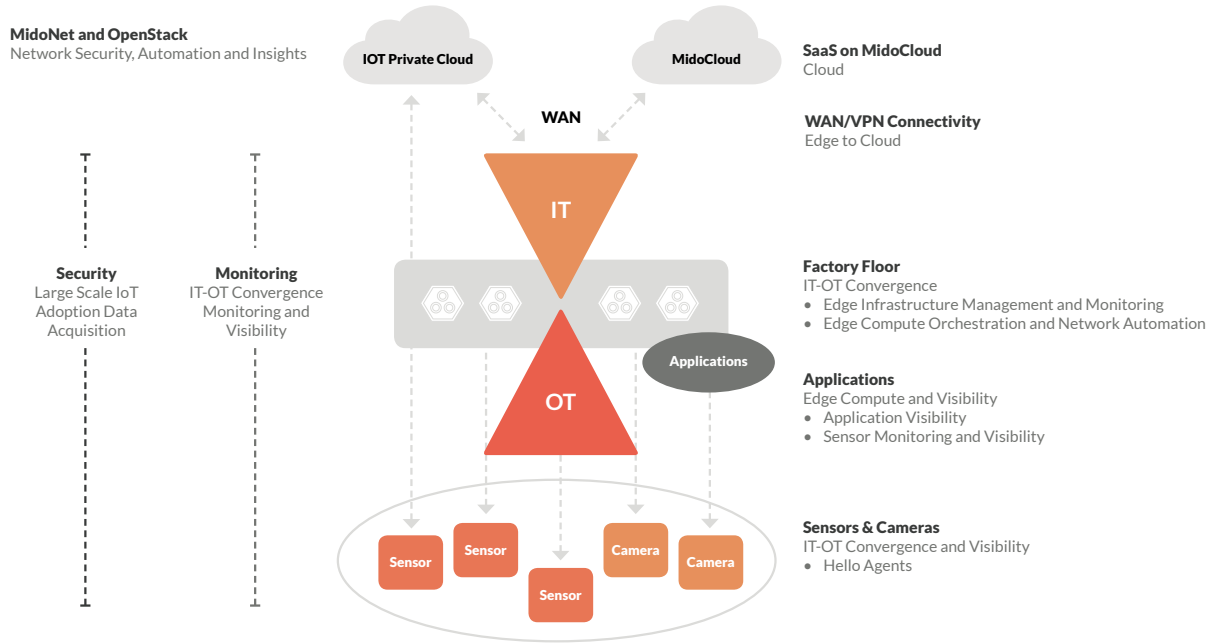


Figure 2: Midokura in the Industrial IoT Stack

The drivers for adoption of IIoT are efficient operations, reduced cost, and increased productivity. Machines and robots have been sources of data for many years now but it was an impossible feat to collect this data or use it in any meaningful way. With Cloud and data analytics, this is about to change. First, as factories adopt IIoT, there is a need for secure connectivity from the factory floor to the Cloud. Visibility of what is happening to the data is important i.e. stays on the factory floor, goes to local data center, transferred to a public or private Cloud, and so on.

Table below maps the IIoT drivers to the problems that need to be solved. This also shows a clear mapping of those drivers to the solution stack that Midokura can provide to alleviate these problems.

IIoT Driver	Problem Statement	Solution	Midokura Product or Capability
IT-OT Convergence <sup>1</sup>	Complex team interactions	Centralized Policy and end-to-end monitoring and visibility	Edge Infrastructure Management
Large Scale IoT Adoption	Increased attack surface	Security Policies and event correlation	Networking and Security Policies Monitoring and Analytics
Data Acquisition	Decisions for Edge or Cloud processing	Bandwidth management	Quality of Service
Edge Computation	Compute moves to the factory floor	Lightweight SDN	Edge Orchestration and Network Automation
Cloud	Connectivity back to a Cloud	SaaS	MidoCloud SaaS

Table 1: IIoT drivers and Midokura Solution Stack

<sup>1</sup> According to IDC, by 2018, 60% of Global 1000 Companies Will Integrate IT and OT at the Technology, Process, Security, and Organization Levels to Fully Realize the Value of Their IoT Investments. (source <https://www.idc.com/research/viewtoc.jsp?containerId=259856>)

1. **Complex team interactions:** There is a lack of a centralized view of all networking devices on the factory floor. This makes the interactions between IT and OT teams even more laborious and difficult.
2. **Increased attack surface:** Numerous sensors and cameras are being deployed at these facilities. This increases the potential for security breaches. Lack of end-to-end visibility in the networking stack is dangerous and makes attacks difficult to detect.
3. **Decisions for Edge or Cloud processing:** Sensors and robots have existed on the factory floor prior to the Industry 4.0 phenomenon. However, it is now easier than ever to extract and collect large amounts of data for further analysis and reporting<sup>2</sup>. Large amounts of data in the network causes congestion and latency issues especially for the data that needs to be analyzed and acted upon immediately.
4. **Compute moves to the factory floor:** The control data from sensors and robots require immediate response (low latency requirements of handling such data) and managing a local control loop. With increasing number of analytics applications, the need for Edge computing on the factory floor becomes more relevant.
5. **Connectivity back to a Cloud:** While certain data can be analyzed and acted upon locally, large amounts of data is sent back to the Cloud for further analysis and to maintain a historical record for the purposes of auditing and reporting. Connectivity to multiple Cloud environments is desired since each provides a different set of analytics applications (AWS, Azure, GE Predix, etc).

## Midokura Smart Factory Solution

The Midokura smart factory solution is an end-to-end solution that covers the entire spectrum from the factory floor to the Cloud.

### Data center SDN

Midokura's MidoNet product is a network virtualization platform for Infrastructure-as-a- service (IaaS) clouds. By decoupling the cloud from the network hardware, MidoNet creates an intelligent, software-based network abstraction layer between the hosts and the physical network providing network connectivity and network security in a multi-tenant environment. Midokura MidoNet's provides the following features and capabilities in the data center:

- Network Automation
- Security and Micro-segmentation
- Policy management and provisioning
- Gateway or hub management

### Traffic Isolation and Security

MidoEdge and MidoFabric exist as an agent on the access point and the switch respectively to provide networking and security policies, segmentation, traffic engineering (QoS), and encapsulation at the edge of the network.

### Managing and Tracking Large Number of Devices

On the factory floor, MidoNet is deployed inside the edge compute infrastructure and provides SDN capabilities for applications at the edge. Sensors and cameras provide metadata to MidoThing. The metadata provided depends on the sensor or camera type and this data can be used to correlate this to other events in the network such as Geolocation, UUID or IP address, Information regarding the application and Protocols supported. MidoEdge can secure end-point devices (authentication of devices).

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<sup>2</sup> By 2017, 60% of global manufacturers will use analytics to sense and analyze data from connected products and manufacturing and optimize increasingly complex portfolios of products.

## End-to-End Visibility, Operational Efficiency, Multi-location Monitoring

With MidoInsights, the operators and IT engineers have access to a platform that provides correlation of network and security events across the stack. This information gathered from the network stack can be correlated with the sensor or camera information such as geolocation, UUID, IP address, and so on.

## Services in the Cloud

MidoSaaS provides services in the Cloud especially MidoInsights for a multi-tenant operation that covers multiple factory sites located at different geographical sights.

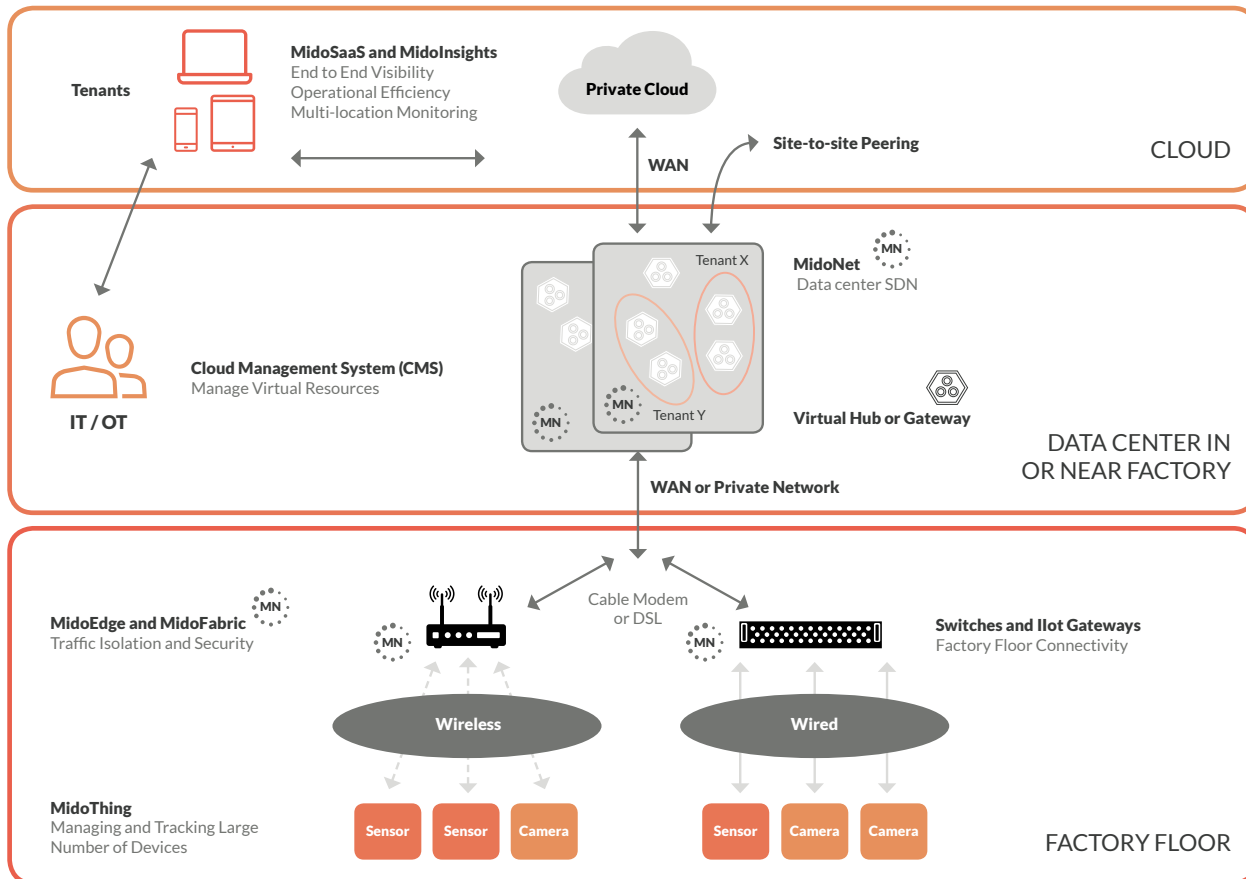


Figure 3: Smart Factory Solution

## Midokura for Industrial IoT

MidoNet provides a network virtualization platform for a private Cloud (data center) compute environments.

MidoInsights provides end-to-end visibility and telemetry in the private Cloud and factory floor. This provides powerful correlation capabilities for events for all points in the IIoT stack.

MidoEdge manages the factory floor edge network IIoT gateways and network switches to provide functionalities such as device registration and network and security policy management.

MidoFabric provides switch fabric monitoring and Quality of Service (QoS).

MidoThing lives on and near the sensors or cameras. It provides additional monitoring and valuable device and state information to correlate with the events happening in the network.

MidoSaaS is a multi-tenant SaaS that provides MidoInsights across geographically distributed factory floors.