White Paper

Delivering the benefits of Industrial IoT to customers faster

The Internet of Things (IoT) represents a tremendous opportunity to OEMs developing equipment for industrial environments. For example, the IoT enables OEMs to automate data capture of equipment operation at customer sites. OEMs can then aggregate data from all deployed equipment in the cloud and apply analytics to identify trends. This gives manufacturers the ability to remotely monitor equipment, predict operating failures and preempt issues through preventative maintenance to increase customer uptime.

While the benefits of IoT are clear, the path to implementing IoT technology effectively has not been so obvious. Industrial OEMs have focused their engineering efforts toward understanding their core market and delivering value. Typically, developing a reliable and secure IoT platform with end-to-end connectivity between devices and the cloud is beyond their expertise. While OEMs could invest in building IoT expertise in-house, such a delay to market would place them behind more agile competitors.

To enable OEMs to take advantage of the Internet of Things, an extensive ecosystem of technology companies have been developing solutions to support the entire IoT chain. These solutions include wireless sensors, gateways, cloud platforms and a full range of data collection and analytics applications. It is now possible for industrial OEMs to introduce IoT capabilities into their existing product lines quickly and with minimal development investment.

THE INTEGRATION CHALLENGE

With so many options, however, the final challenge remaining for OEMs is to integrate best-in-class solutions quickly and reliably. For example, there are a myriad of sensors that can track factors like temperature, pressure or strain. IoT systems need to be able to connect to a variety of devices employing proprietary protocols. Next, they need to be able to secure communications to these devices, especially for legacy equipment that was never intended to be connected to the internet. Finally, a reliable management system must be in place that can scale to potentially hundreds of thousands of devices throughout the world, depending upon the application.

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Litmus Automation simplifies the complexity of developing IoT systems with its Edge and Cloud platforms, LoopEdge and Loop. Loop enables OEMs to safely connect and manage any type of legacy or new hardware, sensor, device or machine to the internet and integrate the data collected with any software application, including ERP, Database, Big Data Analytics and Visualization tools, all in real time.

LoopEdge and Loop, and their accompanying ecosystem of applications provides a comprehensive Platform-as-a-Service (PaaS) that allows OEMs to leverage IoT in real business applications (see Figure 1). Loop also includes an extensive device management suite for deploying and monitoring IoT systems, as well as an Industrial IoT Marketplace at the Edge to seamlessly connect nearly all industrial devices and systems available today to a multitude of applications that can make sense of the data.

With the LoopEdge platform, OEMs can help customers run applications locally at the edge for quick and effective processing. LoopEdge not only provides edge device connectivity that runs on any IP network, but also gives OEMs and their customers access to an extensive marketplace of applications. This enables OEMs to connect systems to the services they need to provide greater value to their customers (see Figure 2).

Legacy Device Support: Connecting to the wide ecosystem of available legacy or IoT-enabled devices requires a wide ecosystem of available Legacy or IoT-based devices requires a device-agnostic/network-agnostic platform that can accommodate the different protocols, PLCs and ways of communicating in use today and in the future. Litmus Automation addresses this challenge by providing an extensive portfolio of drivers that enables out-of-the-box connectivity to a wide range of industrial systems. LoopEdge is able to act as a universal remote, so to speak: Administrators can point to a device and LoopEdge will make the proper connection.

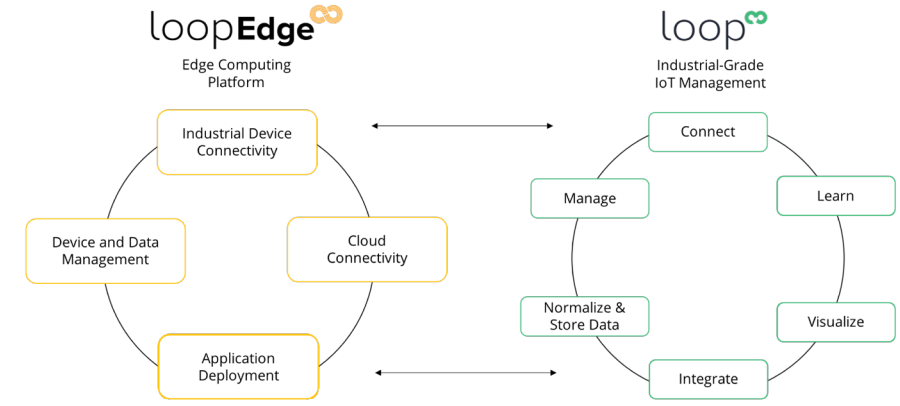


Figure 1: LoopEdge and Loop provide a comprehensive PaaS that allows OEMs to leverage IoT in real business applications.

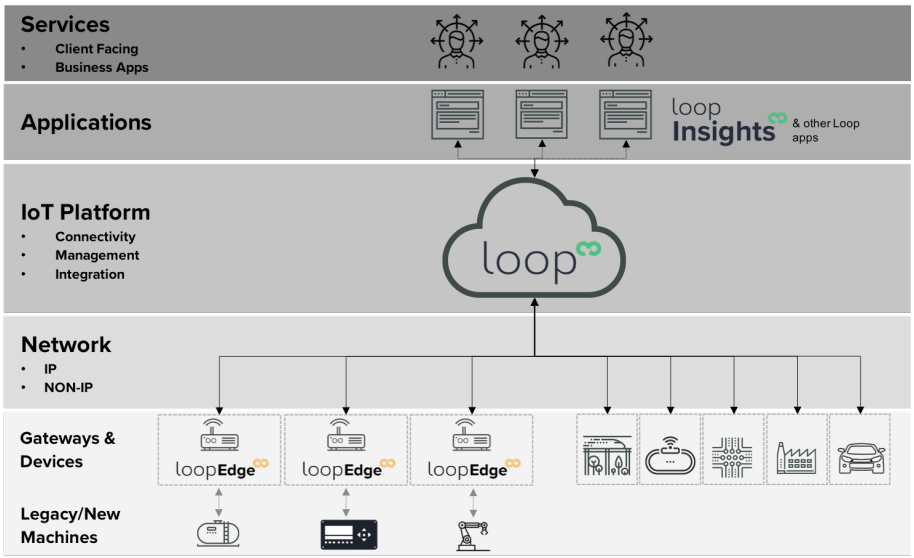


Figure 2: With Loop, OEMs can better connect systems to services to provide greater value to customers.

Industrial IoT requires this type of legacy device support and flexibility. Traditionally, industrial automation solutions have been implemented as vertical silos with application-specific and proprietary solutions that can't easily be scaled or replicated. With the LoopEdge platform, devices can be connected across all controllers. This enables OEMs to utilize nearly any sensor and protocol, allowing OEMs to take a global approach to implementing IoT in any industrial environment. In addition, LoopEdge and Loop are flexible enough to connect to both new and legacy devices so that every industrial system can be connected to the cloud.

Secure: Most industrial devices were never intended to be exposed over an open network link to the internet. As a consequence, they do not have the proper security in place to protect data from being stolen or equipment from being hacked. Many systems are also

not able to talk to the cloud or support bidirectional communications.

With Loop, data is secured using standardized, enterprise-class security protocols and mechanisms, including managing SSL certificates and keys for all connected devices. OEMs can authenticate devices and encrypt data transport end to end, from devices/assets all the way out to the cloud. They can also ensure that devices are kept up to date with the latest security enhancements. For the greatest flexibility, LoopEdge automatically adjusts connection speeds for legacy systems and enables systems to securely utilize over-the-air (OTA) update technology.

Manage: With the wide variety of sensors, devices and systems that make up an IoT-based environment, there are serious complexities associated with capturing data and implementing intelligence out at the edge. For example, temperature sensors from different vendors may have their own proprietary data structure and format. To facilitate analytics, LoopEdge automatically converts data coming from these various devices and sensors into a single standard data format based on OMA-IPSO standards.

Through Loop, OEMs can quickly install, update and manage applications across a large number of LoopEdge nodes. Administrators have full control over the data that is collected and how it is stored. They can also optimize and manage complex analytics, anomaly detection and machine learning across all edge devices. Loop is flexible enough to support the use of custom data structures, including metadata, to enable OEMs to implement specialized data structures.

Scale: A key challenge in IoT deployments is operating at scale. For example, monitoring a single piece of equipment could entail communicating with tens or hundreds of sensors and other devices. This means that monitoring thousands of systems requires a platform that can handle hundreds of thousands of nodes and simplify their management.

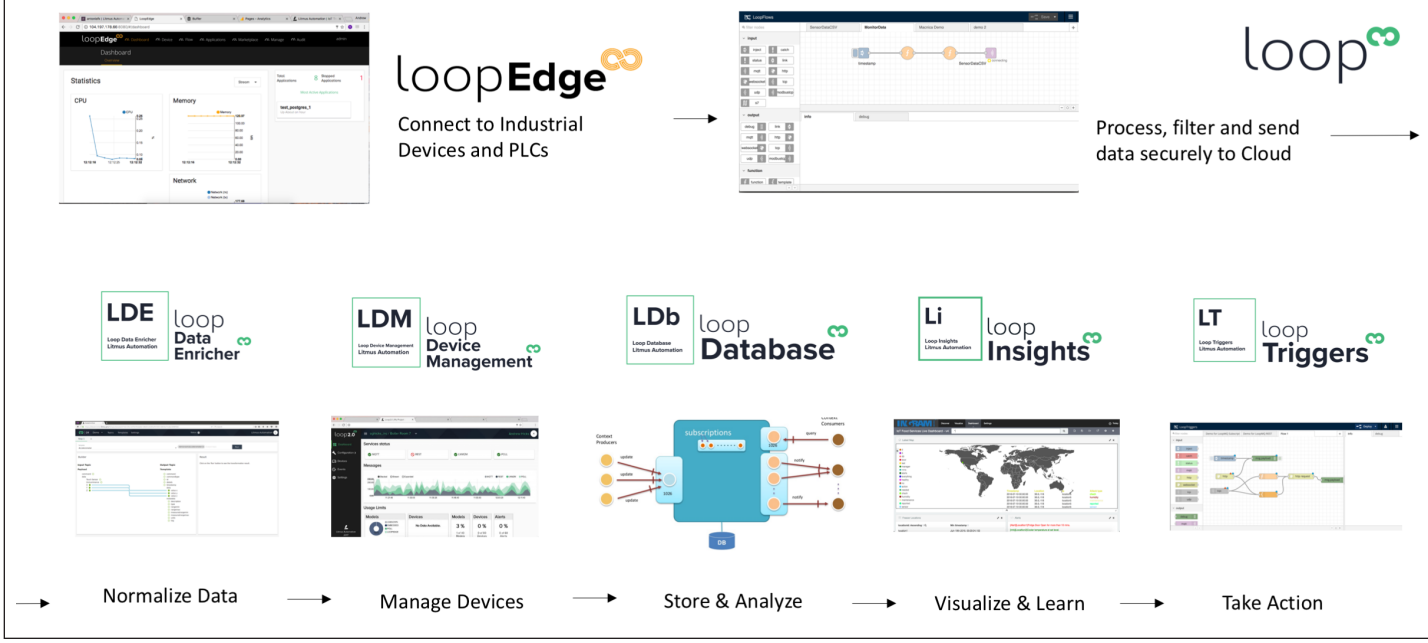
Consider the challenge of maintaining security. Each edge device needs its own SSL certificate and security keys. The platform also needs to have mechanisms in place to be able to update SSL certificates over time. Furthermore, updating needs to be automated to reduce the need for time-consuming manual updating.

Loop simplifies management at scale by providing a central portal through which an administrator can access all deployed systems. From this single pane, an administrator can monitor the status of equipment, provision systems, push updates and even alert customers to potential issues. As Loop can handle hundreds of thousands of nodes, it can manage all of an OEM's equipment at customer sites around the world.

ACCELERATING DESIGN AND DEPLOYMENT

The Loop platform is designed to support OEMs across their entire IoT journey with a wide range of tools that enable administrators to connect to systems, capture data, make decisions and take preemptive action (see Figure 3). The LoopEdge marketplace provides immediate access to popular

Figure 3: The Loop platform offers a wide range of tools that enable administrators to connect to systems, capture data, make decisions and take preemptive action.



3rd party databases, CEP tools and data analytics applications, populated by Litmus Automation and partners.

Within the marketplace, OEMs can have their own private offerings. This allows OEMs to provide advanced functionality to their customers. Not only does this marketplace enable OEMs to deliver custom applications to scale, it provides a means for them to monetize functionality. For example, customers could purchase failure detection capabilities for specific systems, all without manual intervention by the OEM.

The extensive partner ecosystem built around the LoopEdge and Loop platforms enables Litmus Automation to deliver the additional services that OEMs need in order to achieve global reach with a local touch. It is worth pointing out, though, that there are some significant logistical challenges of provisioning equipment globally. Each customer wants to integrate different sensors, equipment and systems and needs to provision LoopEdge and Loop differently.

To address these challenges, Litmus Automation has partnered with Arrow to provide turnkey solutions on a global scale. Customers simply order the equipment of their choice from Litmus. The company then works with Arrow to obtain the hardware necessary to create the proposed IoT solution. Because of its relationships with the many equipment companies offering IoT-based systems, Arrow has developed a world-class logistics system that allows it to support companies like Litmus with provisioning devices before shipping them. It's a significant value-add that customers have immediate access to when partnering with Litmus Automation.

Also worth pointing out about this unique partnership: Litmus and Arrow are able to address a customer request to switch to different hardware or manage multiple hardware types down the line. What's more, the two companies work together to appropriately provision these new devices for the customer's existing IoT environment.

The IoT solutions offered by Litmus Automation and Arrow will allow industrial OEMs to bring better products to market faster while maximizing the efficiency and operating lifetime of deployed equipment. While building an IoT solution is not simple, there are many companies in the IoT ecosystem that can provide the hardware and software needed to take advantage of the cloud and data analytics. With the ability to connect, secure, manage and scale with the Loop IoT platform from Litmus Automation, OEMs can take advantage of best-in-class technology to accelerate building out their IoT environment and bringing more value to their customers faster.

Use Case: OEM Predictive Maintenance and Monitoring

A commercial industrial boiler manufacturer wanted to develop new after-sale revenue streams for equipment with a life span of 40+ years. Using a gateway running LoopEdge, data could be collected from all its various PLCs across different product lines, even those with legacy interfaces. The gateway then securely sent this data to the cloud using LoopCloud where all devices were managed and data and was normalized and stored to be analyzed over time.

With this infrastructure in place, the manufacturer could offer value-added services like predictive maintenance and advanced monitoring. This was achieved by setting data triggers at levels that were analyzed to indicate the machine was likely to fail. When a threshold was met, a lead was automatically generated in the company's Salesforce CRM to notify the customer that the machine needed service.

This service could be sold at a premium to customers, even for equipment that had been deployed decades ago. In addition, the data collected enabled the manufacturer to improve overall machine reliability and decrease failure costs while at the same time increasing brand awareness and customer loyalty.

Five Years Out

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About Arrow Electronics

Arrow guides innovation forward for over 150,000 of the world's leading manufacturers of technology used in homes, business and daily life. With 2017 sales of $26.6 billion, Arrow aggregates electronics and enterprise computing solutions for customers and suppliers in industrial and commercial markets. The company maintains a network of more than 345 locations serving over 80 countries. Learn more at FiveYearsOut.com.