LITMUS

WHITE PAPER

REPURPOSING LEGACY SYSTEMS FOR IOT

THERE ARE THREE MAJOR CHALLENGES EVERY MANUFACTURER FACES AS THEY WORK TO MIGRATE TO INDUSTRY 4.0 – LEGACY SYSTEMS, LIMITED EXPERTISE AND LIMITED BUDGETS. THESE THREE CHALLENGES WORK TOGETHER TO KEEP FACTORIES FROM EMBRACING INDUSTRY 4.0 TO ENABLE REAL-TIME DATA AND BETTER BUSINESS DECISIONS. THE GOOD NEWS IS – THERE IS A SOLUTION.

Most factories have a large variety of legacy systems, PLCs and robotic systems. CNC machines, for example, may last 40 years or more. These varied legacy systems also have varied protocols. That's when the lack of expertise comes into play. Most manufacturers do not have an expert on hand familiar with all of the varied protocols who can piece together an Industrial Internet of Things (IoT) solution that will connect those legacy systems to extract valuable data, and then deliver it to the Cloud or an on- premise system for further use.

The next, and most common problem, is limited budget. Sure, with a massive budget for new equipment any factory could replace all of their legacy systems with new, connected, Industry 4.0 machines and they could migrate to Industry 4.0 in a much quicker manner. There are a few doing that. However, since efficiency and profitability on the factory floor is always a top priority, most factories need a better option.

The question is – how can legacy equipment be successfully and efficiently repurposed for IoT?

This paper will take a look at the problems with repurposing older technology for IoT and how to solve those problems to save money, shorten time to market, and realize a robust, scalable IoT solution.

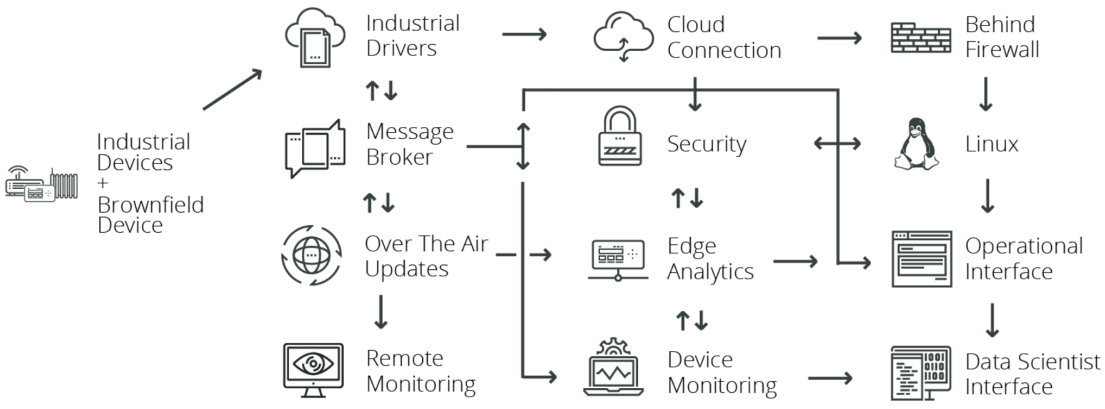

Figure 1: Limited legacy IoT system approach.

Why Legacy Systems are Limited for IoT

Some legacy providers are offering very basic IoT solutions on top of their equipment. They add Cloud protocols on top and call it “Industrial IoT”. However, repurposing legacy systems with a band-aid approach can be dangerous because they were not built for today’s challenges. Here are just some of the specific challenges in repurposing legacy industrial systems for IoT with the band-aid approach:

Security: Security is the biggest and most obvious problem with repurposing legacy equipment. Legacy systems were designed for offline security on the plant floor. They do not have any online security controls, proper authentication, access control, and limits on Internet activities. They might require a username and password and some sort of authentication. However, since they weren’t made for IoT there is no security for remote connectivity or remote data connection, there is no isolation, no access controls. Adding Cloud functionality opens the system up to security concerns immediately and most legacy vendors do not provide a solution. Legacy providers are touting Cloud connectivity because they want to keep selling new services, but there is a fundamental problem with adding Internet connectivity on a legacy product because they were never built for that purpose or with the proper security in place.

Connecting devices: Legacy systems are connected via one-to-one communication integrated into PLCs. Scalability was never a consideration, so if they show 100 values on the user interface, they will collect 100. The protocols are old and the systems were built for one purpose, not to provide the many data points that are needed in modern IoT projects. If you have a CNC system making bottles and throw a Cloud protocol on top – then maybe, at best, you can send data to the cloud about how many bottles are being made and how quickly. But what about scaling that project to several machines? What about trying to predict machine failure through additional data points such as temperature or friction?

Normalizing the data: Normalizing the data isn't even a consideration for legacy systems, because the goal is to make the data available to their own software. They didn't plan to use it for anything else, so they didn't consider the need. Therefore, having data in a usable format for applications to consume across various legacy vendors is a challenge.

Remote management: Remote management was not a consideration when legacy systems were built because the products were supposed to work right in front of you. If you are in front of the machine you can manage it, but in the Industry 4.0 era can you manage 1000s of connected machine deployments across 10 plants? No, they weren't made for that. Most legacy systems are built on a desktop application that can only be accessed on the computer on the factory floor.

Reporting: Legacy systems were purpose-built solutions and reporting wasn't a large consideration. They were created with pre-determined Excel-based reports and they are hard coded – they can't be changed. The problem is, ad hoc analysis is never possible so it doesn't matter how you try to add IoT connectivity on top of the system, the user interface isn't set up to provide additional data points and reports.

Scalability: Industrial legacy systems can't handle 100,000 data points per second. They were designed to show one data point in the user interface, but nothing else. In order to scale they need distributed computing, more servers, and other expensive additions to the system. Even if the legacy system can analyze data, they would put that into a database and are not prepared to add additional devices to the system.

The Solution – Edge Computing

One common vein runs through all of the limitations on repurposing legacy systems for IoT – intelligence. Legacy systems were built for one purpose. They were not built to grow, to scale, to talk to the Cloud, or to provide new and exciting data points to enable new functions such as predictive maintenance or artificial intelligence. They were not built to grow in intelligence.

Legacy systems do have a place in the Industry 4.0 revolution – within the factory floor. They make the machines work but what they are not good at is data processing.

So, how do you capture that intelligence? How do you add it, without replacing all legacy systems with new, IoT-enabled machines? By moving data processing to the edge with IoT Gateways next to the legacy systems. By adopting a device and network-agnostic industrial edge computing platform that can fill the gap and accommodate the various protocols and PLCs. An industrial edge computing platform can solve all three of the challenges manufacturers face – legacy systems, limited expertise and limited funds.

There is intelligence at the edge. By running an edge computing device right next to the legacy system, you can enable all of the limitations of the old system – security, scalability, remote device management, reporting, and more. When you add an edge device right next to the asset, you take that machine that was purpose built for one function, and you provide intelligence to do more. The beauty of the edge is the single vendor we discussed before no longer exists – an edge computing device can work with five different vendors.

Let's look at an example. Say you have a legacy controller to check if the vibration of a motor is high or low. The controller calculates the vibration right at an instant. With edge computing, you can keep the legacy controller, add a layer of intelligence on top, collect the same inputs and outputs, and allow users to have customized analytics to improve their efficiency on assembly lines. Without disrupting the current system, we collect data from all of those endpoints, but on the backend we normalize it, integrate it, and put dedicated applications in place to run at the edge. None of the legacy systems can do that, but edge computing can bring intelligence to the existing data.

So – should you replace all of your legacy systems with new, IoT-enabled equipment? No, not unless you have the budget and expertise to do that and it makes logistical sense. If your factory floor is performing well, let it continue to do what it is supposed to be doing. Allow edge computing to bring intelligence in to help it run more efficiently, or to decrease energy consumption, to get alerts before machines fail, or after they fail to find out why it

happened. The key is it is possible to get more out of your existing legacy systems by bringing intelligence to the edge.

Litmus Edge for Edge Computing

Litmus Edge is a complete edge computing platform that allows you to collect data from industrial systems like PLC, DCS, sensors or historians and run applications locally on top of the data, such as event processing, Lambda functions, machine learning models, and more – all in an offline first deployment. You can quickly connect your legacy equipment to provide a holistic view of your entire local or world- wide operation Loop Edge Manager. Litmus Edge basically takes all of the limitations of repurposing legacy systems and fixes those problems – from security to scalability to remote management.

Litmus Edge runs on any IoT gateway, industrial PC or as a VM and lets Industry 4.0 teams quickly and easily collect data from anywhere. Litmus Edge is carefully designed to manage the complete edge lifecycle from secure edge device onboarding to device management to cloud connectivity. You can use it to manage edge devices locally and analyze data at the edge with an application marketplace.

Access devices remotely with Litmus Edge Manager, a secure Edge Computing gateway management platform. Litmus Edge Manager simplifies device lifecycle management of Litmus Edge with device configuration, over-the-air updates, mass device configurations, security management, and more to further solve the problems that exist when trying to digitally transform the factory floor.

As Litmus Edge evolves we have added more intelligence including a long running database and analytics tool to run locally, inside of Litmus Edge. Every data point we collect has integration into the local database, which allows us to store data at the edge for longer periods of time. We are moving away from the “collect and forward” method to a smarter, “collect, process, analyze, store, and then integrate” method. Customers can do some local real-time analytics at the edge, or batch long-term analysis.

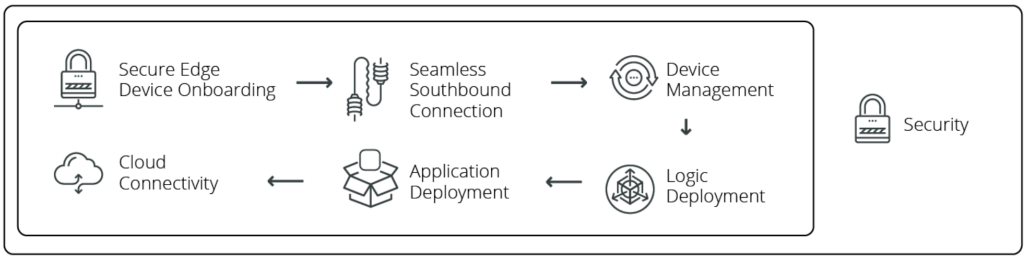

Figure 2: Using Litmus Edge

Litmus Edge is already proven – customers are using it to get their edge computing projects up and running quickly and on budget. It may sound too simple but in order to repurpose that legacy equipment, all you have to do is install an IoT gateway next to the legacy system, then install Litmus Edge and get started on your Industry 4.0 initiative.

Litmus enables out-of-the-box data collection, analytics, and management with an Intelligent Edge Computing Platform for IIoT. Litmus provides the solution to transform critical edge data into actionable intelligence that can power predictive maintenance, machine learning, and AI. Customers include 10+ Fortune 500 manufacturing companies, while partners like Siemens, HPE, Intel and SNC Lavalin expand the Company's path to market.

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