TRANSFORMING BROWNFIELD TO GREENFIELD IN THE INTERNET OF THINGS

WHEN IT MATTERS, IT RUNS ON WIND RIVER
EXECUTIVE SUMMARY
Predictive maintenance and adaptive analytics—new business models enabled by the Internet of Things (IoT)—potentially represent a huge shift in markets from selling assets to selling services. But how can these new paradigms be implemented, given that a vast majority of the equipment infrastructure in energy generation, industrial automation, and many other brownfield markets is more than 30 years old? This paper describes strategies for transitioning brownfield devices to be ready for IoT.

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BROWNFIELD AND GREENFIELD

To define our key terms: “brownfield” describes the billions of devices and legacy software applications performing discrete functions in isolation. Some of these will require migration strategies to connect with and realize the benefits of IoT. “Greenfield,” on the other hand, describes devices built from the ground up to take advantage of IoT; they are connected, secure, and managed remotely.

There are a number of key elements in the transition from brownfield to greenfield, the most basic of which is the addition of a gateway. The gateway sends readings such as location or temperature up into the cloud of “Big Data,” where intelligent analysis can be performed. But when redesigning brownfield systems for IoT, many in the industry will take a more holistic approach than the simple addition of a gateway.

A HOLISTIC APPROACH

Such an approach begins with building a platform that can run applications in a more flexible way via different devices, systems, or layers in a network. This platform could be in the cloud, or on a network router or gateway, or at the device level. Many companies may choose to either open up their platform to external partners and application developers or, in the case of large companies, use it internally. Having one common platform adds huge value, enabling companies to write apps, move them between different layers, reduce costs, and also attract more value to the platform.

To meet this demand, Wind River® re-architected its VxWorks® real-time operating system (RTOS) and decoupled application development from the operating system’s core API, making it extremely modular and enabling customers to package their own applications and share them with others.

Figure 1: The infrastructure landscape in IoT
The next step in this holistic approach is virtualization, essentially separating software from the underlying platform hardware and allowing, for example, an unmodified guest OS such as Windows® or Linux to run alongside VxWorks. Virtualization breaks up the paradigm of a single-function device into systems that have multiple functions. Wind River real-time hypervisor technology enables the consolidation of many applications on one platform, thereby creating savings in space, weight, and power consumption.

The next step in migrating brownfield to greenfield is placing functions in specific locations. In networking markets, for example, previously discrete equipment has been consolidated, and functions run on central servers in a kind of cloud system. The IEEE 802.1 time-sensitive networking standard is being developed to enable the moving of functions from devices into the network, where significantly higher computing power may be available. Targeting this “service-oriented architecture” approach, Wind River Titanium Server is a fully integrated Network Functions Virtualization (NFV) platform based on open source and open industry standards that enables an NFV infrastructure to achieve near real-time performance and the six-nines (99.9999%) reliability necessary in telecom networks.

The final part of the story is the management layer that handles the chain down to the device and application level. In device networks that comprise millions of nodes or end points, attached to trusted systems and critical infrastructure, the management of devices at the edge will require intelligence throughout this system-of-systems. Wind River Helix™ Device Cloud can orchestrate device management with the necessary connectivity to move applications and functions to wherever they need to be in the network.

CONCLUSION

At every step in the process of connecting brownfield devices, the Wind River Helix portfolio provides the technology and expertise required for a holistic approach. By transforming brownfield to greenfield, even legacy devices and infrastructure can take advantage of the new business models of IoT that will be fundamental in unlocking the value hidden in data, improving real-time decision making, and enhancing productivity and efficiency.