A UNIVERSAL MACHINE

FOR THE INDUSTRIAL

INTERNET OF THINGS

MULTITECH®
CREATE • CONNECT • COMMUNICATE
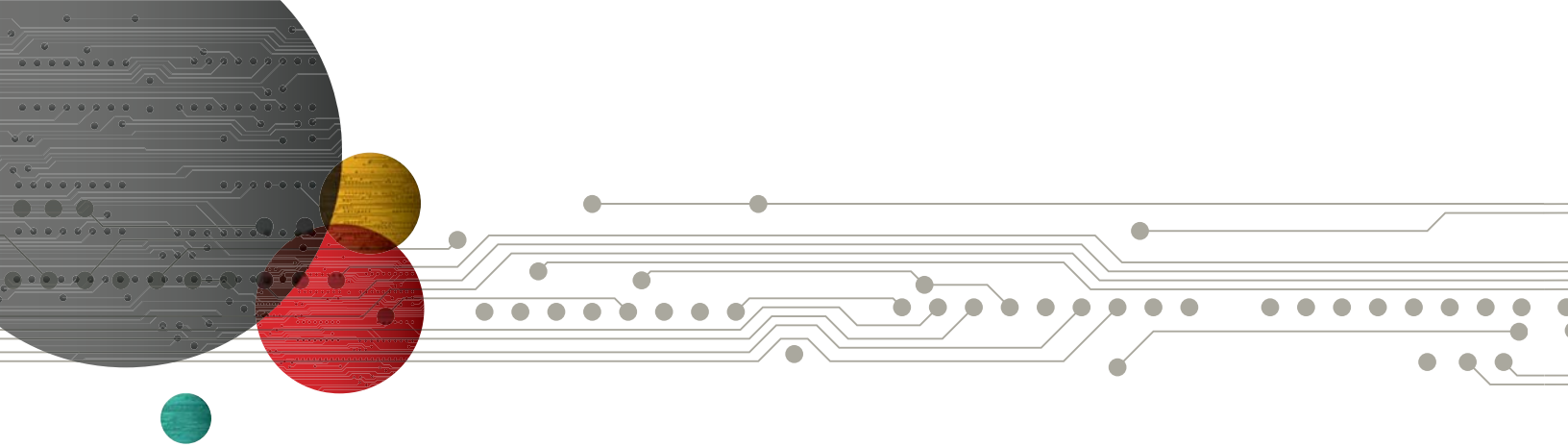
MultiConnect® Conduit

A Universal Machine for the Industrial Internet of Things

The term "Universal Machine", introduced in 1936 by the mathematician and computer pioneer Alan Turing, is the theoretical basis for all modern computers. Today's smartphones epitomize that visionary concept. MultiTech is employing the universal machine idea to encapsulate the functionality and flexible performance of the MultiConnect® Conduit, a visionary platform specifically designed to enable the industrial Internet of Things (IoT).

The industrial IoT should not be confused with the many billions of consumer devices that are predicted to emerge in the future - it is a separate market, also with enormous potential, which will be realized by overcoming the significant barriers that exist today.

In hardware terms, the Conduit is a gateway that is fully certified and carrier-approved as an end-device. What distinguishes it from other gateway products is the platform architecture, which was developed to meet the following industrial IoT criteria:

Advanced Wireless Connectivity: To enable machine-to-machine (M2M) connectivity using various wireless interfaces, including technologies such as long-range, low-power RF, to connect sensors and machines to the gateway. In turn, the gateway employs a cellular modem to deliver data to the preferred data center.

Robust Management: To provide an online application store for industrial things as a platform for both developers and IT personnel to provision, deploy, and manage their gateway and associated sensors and devices. The online application store model, on which this platform is based, has proved to be an efficient distribution and management process.
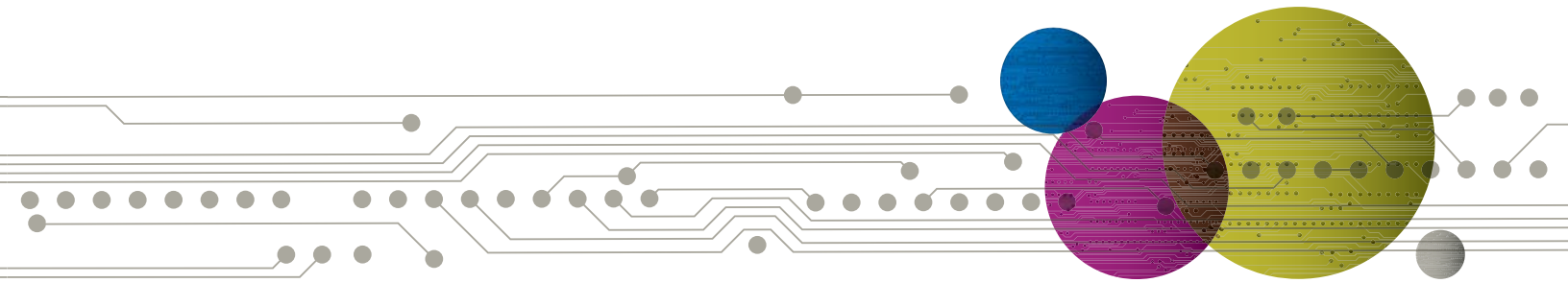
Advanced Configurability: To enable users to create applications quickly and easily using an intuitive graphical interface. This process does not require programming skill, rather it empowers individuals who are not practiced in software development to create complex IoT applications using drag-and-drop icons.

Open Development Environment: To provide a choice of development environments in order to meet the different requirements of various software development communities and the diversity of the application space. The more environments supported, the wider the potential adoption of the platform.

It's a tall order, but one that MultiTech has realized in the MultiConnect Conduit platform.

Advanced Wireless Connectivity

Machine-to-machine communication has traditionally employed Ethernet and other wired technologies. However, wireless technologies, such as RF cable-replacement, have become an attractive alternative for various reasons, including quick and cost-effective deployment. The Conduit gateway can be optimized for application connectivity by populating the gateway with the appropriate mCards. In plug-and-play fashion, mCards offer a variety of connectivity options, including both traditional wired connectivity such as Ethernet and serial cable, as well as advanced connectivity such as Semtech's LoRa™ long-range, low power RF technology.

LoRa has significant competitive benefits: robust performance even in noisy RF environments; deep penetration into buildings and industrial structures; and an extended battery life. The key advantages of deploying the Conduit with LoRa connectivity include duplex communication and intelligence in the end points, known as mDots.

Access to the mDot enables the ability to change the parameters of the device, update firmware, and confirm the device is fully operational. Intelligence in the mDots is provided to optimize data transmission, such as only sending exception data. A sensor might measure its parameter at short
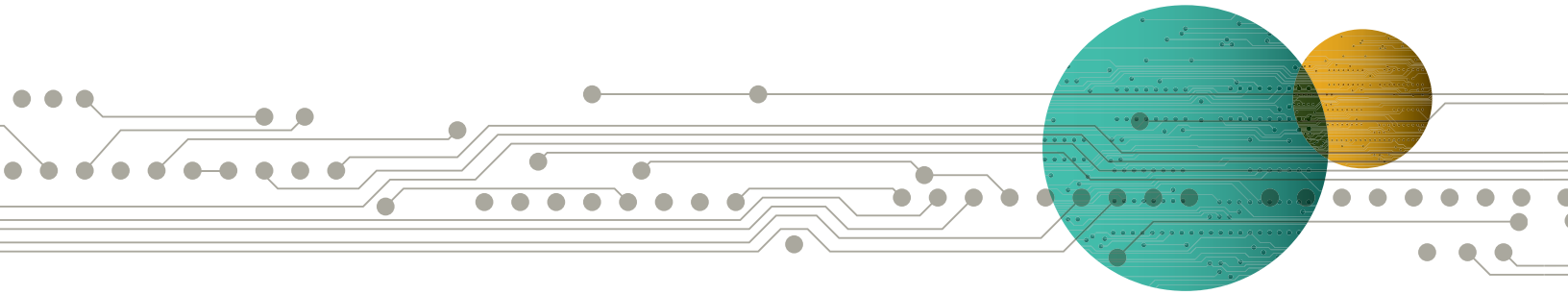
intervals, but there is no need to transmit the result if it is within the pre-defined performance limits, meaning that more end points can be deployed and battery life is further extended.

Robust Management: An Online Application Store for Industrial Things

The ability to download an app to a smartphone or tablet and be able to use it right away has become something we take for granted. The application store model represents a very efficient distribution and deployment process. An online store allows the IoT application to be deployed by authorized parties in the same way that PC images are deployed to new PCs when they come onto the corporate network. Therefore, this is an automated process with which IT personnel in different locations are very familiar. It is not something most of us think about, but replicating that process for industrial IoT applications will enable the creation of an ecosystem having both public and private sections. Applications have the potential to be monetized in the public sector and proprietary programs feature secure access in the private sector.
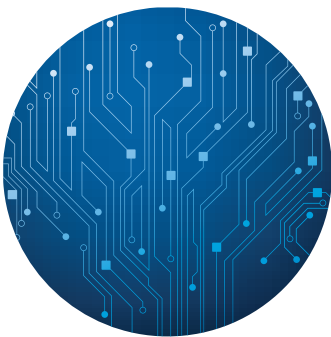
MultiTech enables standard applications to be obtained from the world's first online store for industrial things, a groundbreaking development that enables immediate out-of-the-box customization of the MultiConnect Conduit gateway.

4
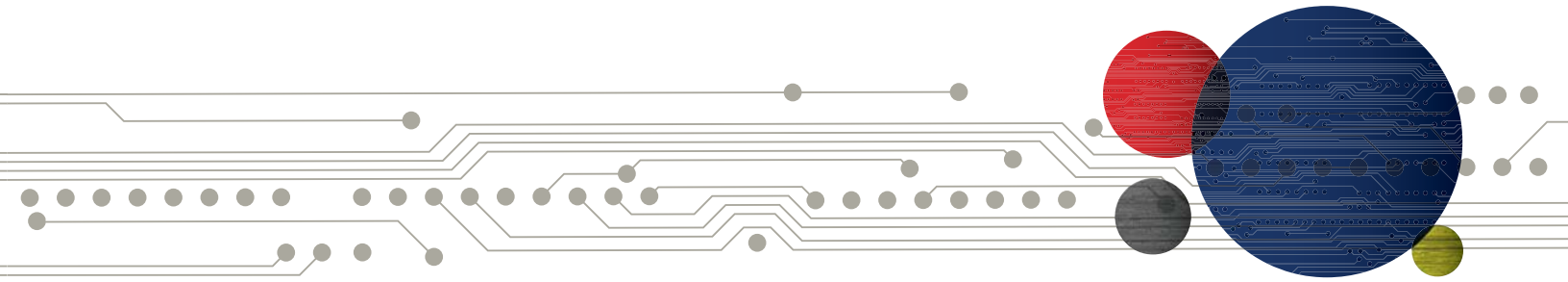
This model allows developers at companies with complementary products, such as sensors, to post applications that integrate their products with the Conduit gateway. Having these applications available increases the ease-of-use and likelihood-of-adoption for both the sensors and the Conduit platform. Once deployed, the gateway can be configured to check for updates, ensuring that the latest code version is distributed and deployed automatically.

Advanced Configurability

IT personnel are tasked with the rollout, management, and maintenance of IoT network deployments. They want to control the functionality that the application provides without the need to write code. Therefore, we have incorporated a graphical user interface that empowers individuals who are unfamiliar with developing software to create complex IoT applications using drag-and-drop icons. These IT individuals only need to know the requirements, such as the sensor should only send data when the measured parameter goes outside preset limits. With the requirements defined, they are able to develop the instructions using an interface that is fast, intuitive, and similar to the other tools they use to resolve networking issues; a visual design environment that incorporates IBM's Node-RED technology.

In summary, the application is represented by a flow chart and the code that performs the various actions is embedded in an icon. These drag-and-drop icons are used to create associations between objects and invoke various types of actions. Clicking on an icon allows the action to be edited a variety of ways, including setting conditional statements; reporting data to a preferred cloud platform, Dropbox or Twitter; or sending simple SMS/text message confirmations. As well as enabling the easy creation of applications, the fact that IT has access to the development process allows extensions and modifications to be made at a later date.
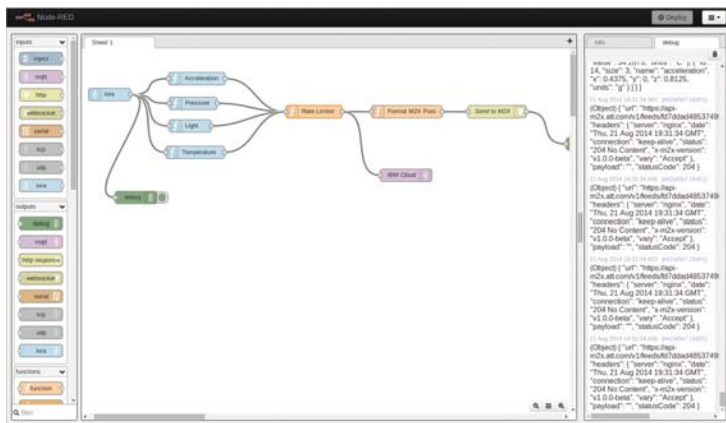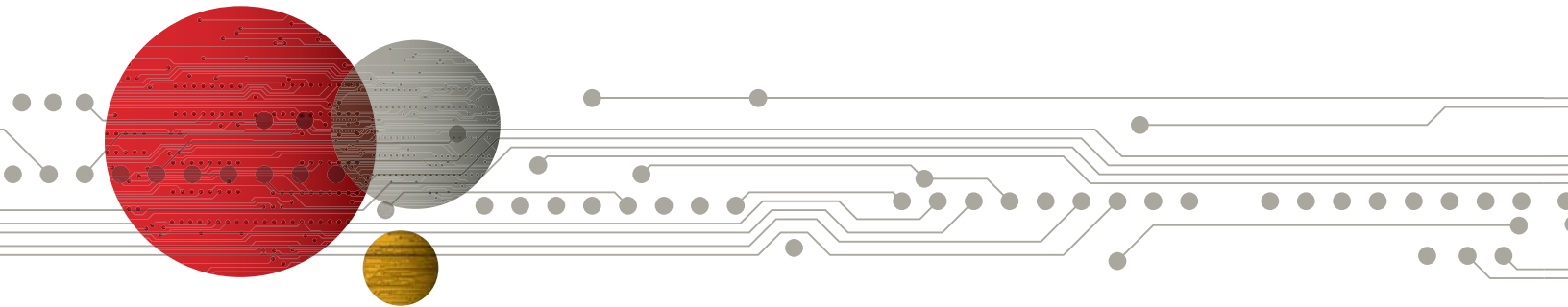
MultiTech employed the Node-RED visual development tool, shown here, and refined it for use in an industrial IoT environment. The interface makes it easy to wire together flows using the wide range of nodes in the palette. Flows are then immediately pushed to deployed hardware.

Open Development Environment

The platform is open not only on the hardware side, through the use of interchangeable mCards, but also from a software and configurability perspective. To meet the needs of a wide user group of software engineers with different skill sets and preferences, the MultiConnect Conduit platform features two main development paths (see figure 1) which trade off flexibility and simplicity:

Open Linux: The Open Linux environment encompasses a diverse group of IoT applications and software developers. This development path is extremely flexible to meet almost any application or developer need; however, it also requires significant knowledge and programming skill. The environment comprises core packages, utilities, and drivers; an OS distribution build and customization tools; and language support that includes C/C++, Python, Ruby, Pearl, C#, and a Java SDK. This environment is ideal if you are porting an existing Linux application to our hardware platform; have strong language preferences; or need access to advanced utilities, custom drivers, and open source applications. Applications developed in this environment can be pre-installed on the Conduit hardware as part of a MultiTech custom product variant program, featuring custom branding and kitting if desired.
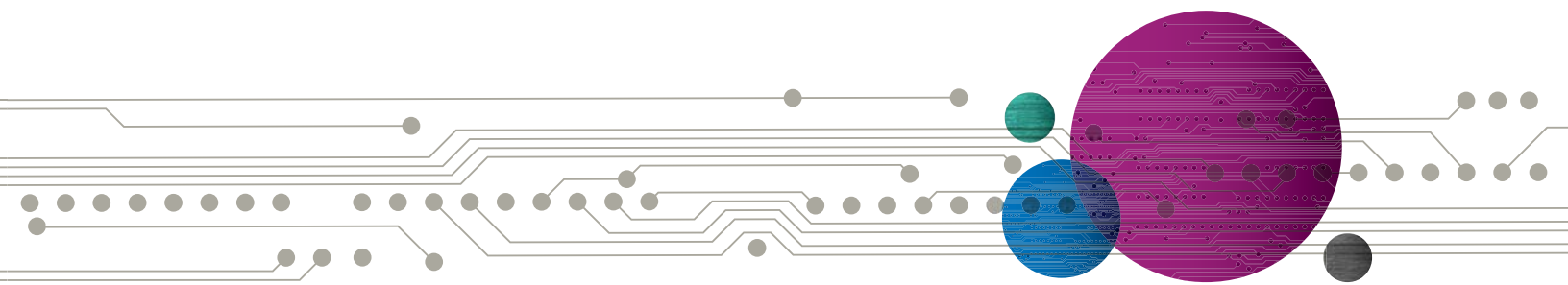
Web Developer/IT: This second environment is the simplest, from a development perspective, and it provides a significant amount of native functionality. Specifically, it contains core routing functions and features, browser-based configuration, remote management functionality, and a development sandbox for custom applications.

Figure 1 illustrates the two development paradigms

The development sandbox exposes core device functionality through a JavaScript API, along with the graphical development tools that were covered previously. This development environment is the quickest and most cost-effective way to develop a typical IoT monitoring and control application. IT professionals and web developers can use it to build a production-ready solution in a matter of days or even hours.
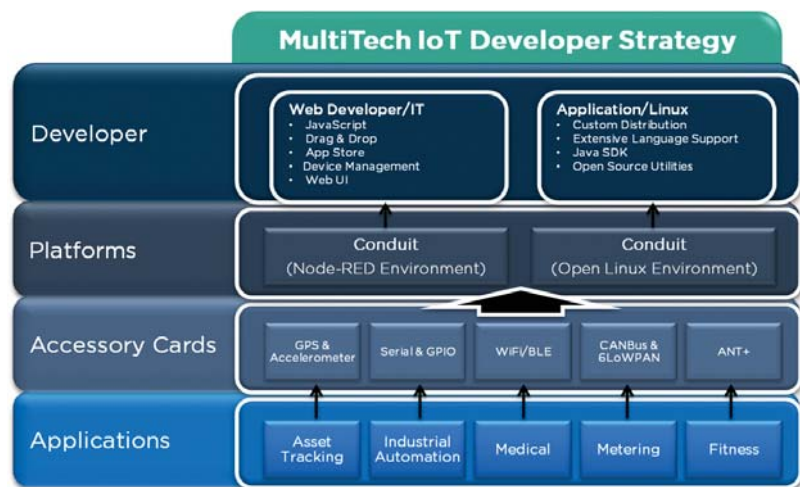
Summary

MultiTech identified that machine-to-machine communications platforms were approaching an inflection point. We recognized that for broad adoption, platforms had to be flexible and affordable, which we enabled through a comprehensive portfolio of plug-in mCards designed to integrate with the MultiConnect Conduit gateway. Additionally, it was important to meet the diverse needs of the software development community, while also enabling web developers and IT personnel to easily create or modify applications using a drag-and-drop interface. In doing so, we've created a process that provides end-to-end management of the edge network and its functionality. Finally, we implemented the first online application store for industrial things to accelerate IoT innovation, simplify deployment, and expand the connected world.
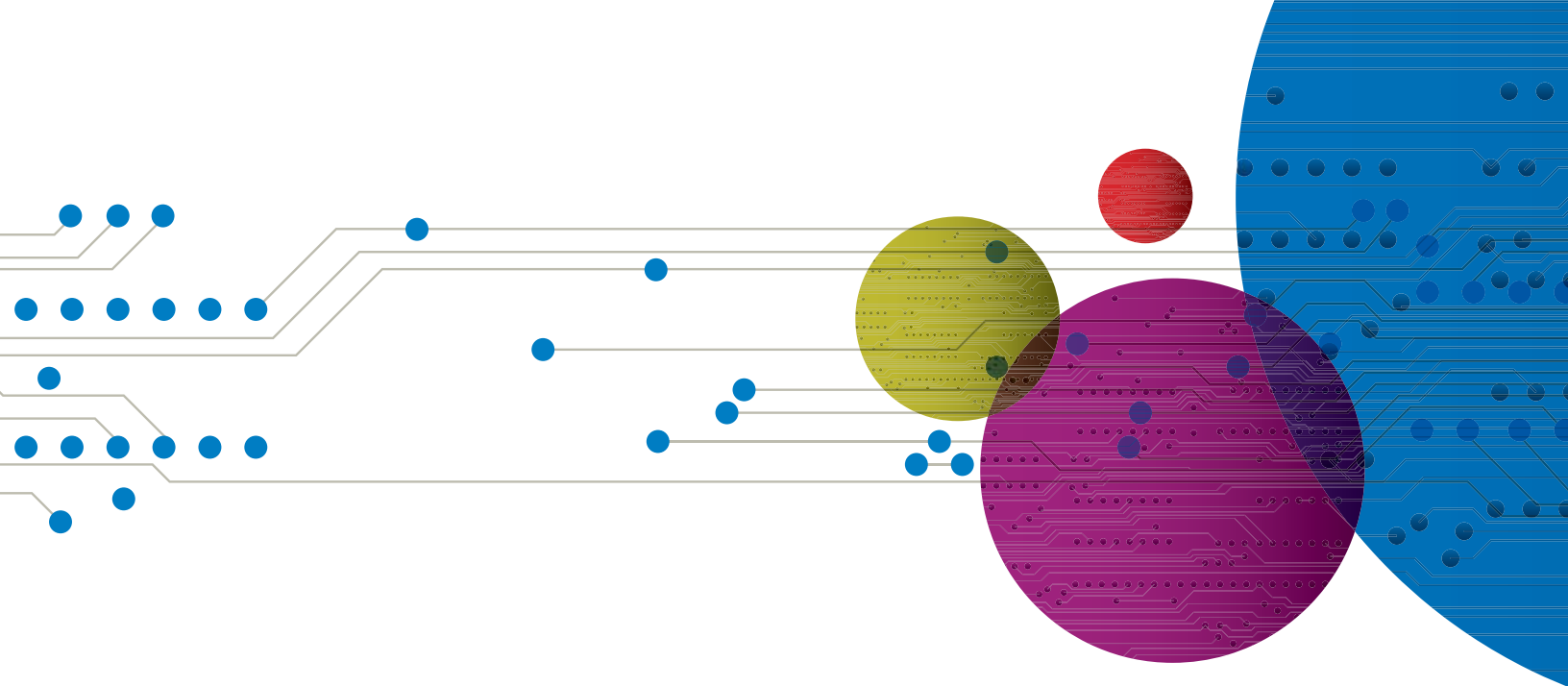
Learn more about MultiTech at **www.multitech.com**

World Headquarters - U.S.

Tel: 763-785-3500
Toll-Free: 800-328-9717
Email: sales@multitech.com

EMEA Headquarters

Tel: +(44) 118 959 7774
Email: sales@multitech.co.uk

Features are subject to change without notice.

Trademarks and Registered Trademarks: MultiTech and the MultiTech logo, MultiConnect: Multi-Tech Systems, Inc. All other products and technologies are the trademarks or registered trademarks of their respective holders.

MULTITECH®