Internet of Things: What's the Hold Up?

Introduction

Author
Sara Brown
Marketing Director

Talk of the Internet of Things may still seem futuristic to most, but the fact is, today's technological transformation began in the middle of the last century. For those who have been involved for 30+ years, the predicted hockey stick growth in connected devices certainly seems elusive. At first, we blamed a fragmented ecosystem. Then, a lack of specific technological knowhow on the part of adopters. Next, it was the fault of inadequate software tools needed to transform bits and bytes of data into actionable intelligence.

Well, with all these obstacles conquered to one degree or another, and nearly every large enterprise on the planet, implementing some sort of connected solution, there must still be something holding us back. In fact, the remaining obstacles to achieving the predicted 50 billion+ connected devices by 2022 are threefold: cost, longevity and security.

A New Gateway to Address the Issue

MultiTech designs, develops and manufactures communications equipment for the industrial internet of things – connecting physical assets to business processes to deliver enhanced value. Our commitment to quality and service excellence means customers can count on MultiTech products and people to address their needs, while our history of innovation ensures they can stay ahead of the latest technology with a partner who will be there for the life of the solution.

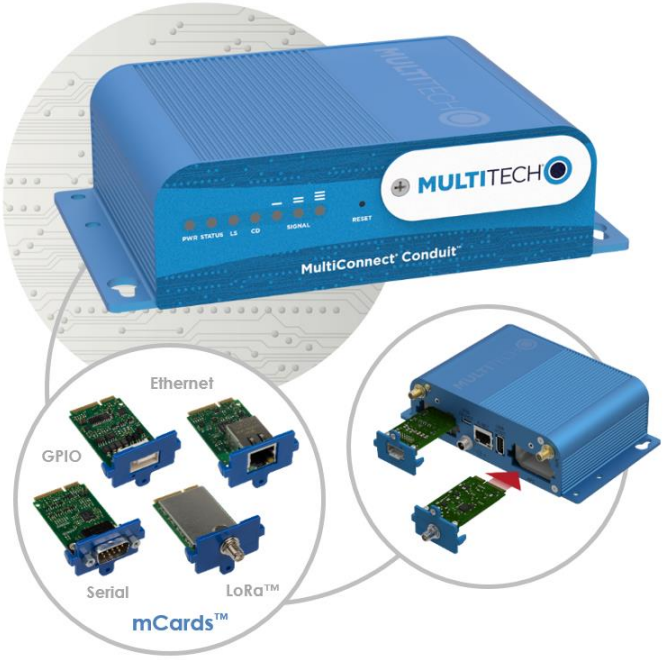
The term "Universal Machine", introduced in 1936 by the mathematician and computer pioneer Alan Turing, is the theoretical basis for all modern computers. Today's smartphones epitomize that visionary concept. MultiTech is employing the universal machine idea to encapsulate the modular functionality and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

The MultiConnect Conduit is the industry's most configurable, manageable, and scalable communications gateway for industrial IoT applications – offering a choice of connectivity options, such as Ethernet, cellular options to 4G-LTE as well as the latest low-power technology.

Customizable Hardware

MultiTech recently 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.

A diverse range of MultiConnect® mCard™ accessory cards provide the local wired or wireless field asset connectivity and plug directly into the rear of the Conduit gateway. Available options include a LoRaWAN™ Ready mCard capable of supporting thousands of MultiConnect® mDot™ long range RF modules connected to remote sensors or appliances.



Software Solutions for Any User

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.

Development environments to suit all users including IBM's Node-RED, a graphical, drag and drop interface or mLinux™ Open Embedded/Yocto.

Bases Covered

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:

1. *Advanced In-field Connectivity:* To enable machine-to-machine (M2M) connectivity using various wired or 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.

2. *Robust Management:* To provide an online application store for industrial things as a platform for both developers and IT personnel to provision, deploy in volume 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.

3. *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.

4. *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.

A New Gateway Technology: Low-Power, Wide-Area Networking

Many of the industry's leading research firms agree, nearly half of that 50 billion are likely to be connected using low-power, wide-area network technology like LoRaWAN, which addresses each of these three remaining issues neatly and is easily deployable in circumstances that cannot currently be served by existing technologies such as cellular or Wi-Fi®.

LoRaWAN is a low-power, wide-area network (LPWAN) specification intended for wireless, remotely located, often battery operated, Things in local, regional, national or global networks. LoRaWAN provides secure bi-directional communication, mobility and localization services and promises to provide seamless interoperability among smart things without the need of complex local installations. Better yet, thanks to its low power consumption, cost of pennies on the dollar compared to alternative technologies, and the ability for enterprises to deploy their own private networks for added security, LoRaWAN has an opportunity to launch the IoT space into the long-predicted huge growth well before 3GPP can even begin to roll out their first IoT-considered network for 5G, beginning in 2020.

What is LoRaWAN?

LoRaWAN network architecture is typically laid out in a star-of-stars topology in which distributed intelligence to the edge in the form of a local decision making, data manipulation and a network server in the gateway enables secure connectivity to end-devices. Or, gateways can act as a transparent bridge relaying messages between end-devices and a central network server on the backend ideal for public nationwide deployments, where gateways are connected to the network server via standard IP connections. In either deployment, end-devices use single-hop wireless communication to one or many gateways. All end-point communication is generally bi-directional, but also supports operation such as multicast enabling software upgrade over the air or other mass distribution messages to reduce the on air communication time.

Communication between end-devices and gateways is spread out on different frequency channels and data rates. The selection of the data rate is a trade-off between communication range and message duration. Due to the spread-spectrum technology, communications with different data rates do not interfere with each other and create a set of "virtual" channels increasing the capacity and reach of the gateway. LoRaWAN data rates range from 0.3 kbps to 50 kbps. To maximize both battery life of the end-devices and overall network capacity, the LoRaWAN network server is managing the data rate and RF output for each end-device individually by means of an adaptive data rate (ADR) scheme.

Nation-wide networks targeting Internet of Things, such as critical infrastructure, confidential personal data or critical functions for the society has a special need for secure communication. This has been solved by several layer of encryption:

- Unique Network key (EUI64) and ensure security on network level
- Unique Application key (EUI64) ensure end to end security on application level
- Device specific key (EUI128).

The LoRa technology allows public or private multi-tenant networks to connect multiple applications in the same space – coexisting to enable new IoT, M2M, smart-city, sensor-network and industrial-automation applications. Device manufacturers and developers are proposing LoRa technology-based solutions at a lower total cost of ownership (TCO) with longer battery lifetime that often do not need a powerful cellular connection. The LoRa Alliance, with its highly efficient LoRaWAN protocol, enables new business models and makes the IoT more attractive to both developers and end users. The projected IoT volumes can only be reached with a global approach to driving TCO lower. LoRaWAN technology satisfies the requirements of many applications that need to go beyond the reach of cell-phone towers and Wi-Fi networks. For additional information, visit www.lora-alliance.org.

Who's it For?

Naturally, it would be difficult to find any business or consumer that didn't want to save money, improve longevity and feel more secure, but there are, among the many vertical markets touched by the Internet of Things, a few industries for which LoRaWAN edge device and gateway(s) is particularly well-suited.

Oil & Gas

Whether monitoring a well, a pipeline or a refinery, governments around the world are in agreement that understanding exactly what's happening in the production and distribution of fossil fuels is of paramount importance both for global continuity of energy production as well as for environmental protection. Moreover, as critical infrastructure, it is exceedingly important to protect this process from digital interference from those with technical know-how and malicious intent. Finally, many, if not most, of the production and transportation facilities exist outside traditional cellular coverage areas.

Until now, expensive satellite communications or difficult-to-deploy wired infrastructure has been the only means of monitoring much of the high-value assets in the oil and gas industry. More costly than cellular communications and with troubling latency issues, satellite communications has been the only way to reach these unreachable assets. In addition to cost, satellite modems require intensive power to operate effectively, creating issues in polar locals, for example, which lack adequate sunlight to operate on solar power for nearly six month of the year.

LoRaWAN provides and outstanding alternative for this market. Oil and gas companies can easily deploy their own, cost-effective, private networks on site – easily covering end-points up to ten miles, while taking an added step to prevent intrusion. Moreover, once the installation is completed, they can relax for up to five years without worrying about replacing batteries in far-away, distant places. And, they get all this for fractions of a cent compared to what they currently pay to communicate with their far-flung assets.

Agriculture

It is only natural that some of the globe's best places to grow crops and raise livestock are also the least likely to have complete cellular coverage. Still the Internet of Things holds a great deal of promise for agriculture, whether it's irrigation, soil management or ripeness: yield optimization for both horticulture and livestock is paramount to the farmers' success – and feeding the world for the next hundred years.

LoRaWAN technology offers a quick, affordable opportunity to network farms like never before. A single gateway covering endpoints within a ten-mile radius can monitor thousands of end points attached to things like tractors, irrigators, even animals. As a result, large agri-business, as well as small farmers, can improve efficiency and crop yield, while also improving their ability to respond to emergencies, whether overheated animals or injured workers.

Environment

Water availability, air quality, weather, natural disasters, industrial emissions, and more are capable of impacting our day-to-day lives in ways the industrial world often takes for granted. LoRaWAN technology is an affordable way to implement resource management in and around parks, reservoirs, production plants and busy intersections – all to provide the information we need to manage our environment and continue to sustain our post-modern lifestyles.

Smart Cities

Today's so called "smart city" consists of a set of unrelated, purpose-built applications. Parking, traffic signaling, ambulance or police car location monitoring, public utilities, HVAC at schools and government buildings, etc. The list goes on and on. LoRaWAN offers a unique opportunity for municipalities to unify their countless machine-to-machine/IoT applications for the first time – and at prices often-cash-strapped townships can afford. Savvy city managers need more than local interest groups to inform them about how to spend and how to save, and the Internet of Things promises to provide the cross-departmental knowledge they need to optimize taxpayer spend as well as public services.

MultiTech and LoRa

As a founding member and a committee chair in the LoRa Alliance, MultiTech has been deeply involved in the development of LoRa standards and technology from the very beginning. In fact, MultiTech is among the first to market with a commercially deployable LoRa gateway and related end-points for both North America 915 MHz and European 868 MHz – which are available today from your Arrow representative.

Nearly There

From the earliest analog systems, to the cellular heart of today's industrial Internet of things to the latest low-power wireless technology, MultiTech has consistently connected businesses in ways previously unimaginable – and has been doing so for more than 40 years. We have no intention of slowing down. We're continuing our legacy of firsts with our latest LoRA-based suite of communications devices.

The Internet of Things is creating new customer experiences and unparalleled economic value, while improving quality of life for countless people around the globe. By providing products and services to connect "things" to the Internet, MultiTech delivers deeper understanding to businesses, governments, organizations and individuals, which will in turn transform the way we live and work.

Contact Us Today!

Call **1-800-833-3557** to speak with your local Arrow M2M business development manager, or email us at m2m@arrow.com for more information.

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Arrow Electronics, Inc.
Intelligent Systems
9201 E Dry Creek Rd.
Englewood, CO 80112