JAMES BREHM & ASSOCIATES

A Connected Conversation

Volume 5 / Issue 4 / April 2019

Spring Update: What's Going on in IoT?

Trends, Answers, Solutions, and More!

Managing Hardware Change in an Evolution of Technologies - The MultiTech Difference

What Challenges Does a Network Sunset Pose?

Nobody managing connected devices wants to go through a network sunset. When you speak with network engineers, the frustration of completing equipment changes to match new standards or protocols rings in unison. Hardware is not backward compatible. Software and Firmware upgrades are untested. Network Engineers need a partner that provides cutting edge technology and keeps up with the standards; while maintaining the continuity of their existing deployments.

Who can they choose when making hardware selections? Who can they trust to help them throughout the complicated and painful process?

Multitech's Leadership Qualities Make It Stand out in the Crowd--Here's Why:

An Extensive Portfolio Breadth

Through discussions with multiple companies who have made the transition and through evaluating solutions they considered, MultiTech stands out. The breadth of their product portfolio, their understanding of how to manage transition, and their success helping others navigate the transition are all factors to consider when making the selection. Additionally, all of MultiTech's products are internally and externally tested for standards and certified with Service Providers and governments as appropriate.

A Solid Reputation Backed up by Experience

Repetition is reputation and Multitech is known as one of the oldest most established companies in the industry.

Over the course of its fifty-year history, MultiTech has been at the forefront of making machines communicate. Starting with the days when Plain Old Telephone Service [POTS] was only analog and machines need a digital to analog converter up until today when digital communication requires connections from the edge to the cloud in milliseconds; MultiTech has delivered cost effective, reliable gear. Companies have deployed such as agriculture, energy, industrial, medical, and telecom with solutions such as building monitoring, connectivity for copy machines, demand response, environmental monitoring, patient monitoring, chronic disease management, compliance and wireless failover. Whether the opportunity is for custom designs or scalable off the shelf devices, MultiTech's offering fits most needs.

The Exceptional Quality of its Team Members

At the heart of any organization is the workforce. The MultiTech workforce includes current employees who have been there since the beginning of the company. In an age where employees change employers more frequently than changing automobiles, MultiTech's roster is filled with skilled long-term employees. Additionally, the MultiTech management team has literally hundreds of years of experience, with a knowledge base on everything from silica to rocket science. The management team leads over 200 employees in the US and Europe that design, develop, manufacture and test all their equipment on premise in Minnesota. MultiTech's workforce provides agile engineering and development services making them the partner for today's fast paced deployment cycles.

MultiTech's Rugged Devices Actually Live up to their Description

MultiTech builds durable rugged field devices that have been known to last long beyond the sunsetting of network technologies. MultiTech has 25+ million modules (including gateways, modems and routers) actively deployed worldwide. MultiTech's products include wired and cellular wireless solutions. As networks continue to sunset 2G/3G solutions, MultiTech has provided incentives, seminars and tools on how to migrate while maintaining services.

MultiTech's Devices Have Broad Applicability and Reflect the Company's Innovativeness

LPWAN and LoRaWAN

Additionally, low-power wide area network (LPWAN) devices are in demand to support massive, low-cost IoT solutions, MultiTech supports both licensed and unlicensed networks using a variety of LPWAN technologies including LTE CAT M1, LoRa, and NB-IOT. Benefitting from their modular approach MultiTech has led in a series of innovations including one of the smallest LTE CAT M1 modules.

In addition to its leadership in cellular IoT, MultiTech is a founding member of the long-range (LoRa) Alliance and has played an active role influencing not only the market adoption, but the standards and technology of LoRaWAN. Multiple members serve in active roles on LoRa Alliance committees, and MultiTech is a leader in LoRa Gateway deployments.

Additional Examples

MultiTech has one of the widest portfolios of products, providing solutions from embedded systems to cellular gateways. Beyond the devices themselves MultiTech provides several software development kits that support standard programming languages and open interfaces. Here are some examples of MultiTech's capabilities to provide a full suite of solutions:

- MultiTech Lens™ includes the software required for an enterprise network to use LoRa key management.
- MultiTech's DeviceHQ provides in the cloud the platform for remote management and configuration support.
- On the Edge MultiConnect Dragonfly™ provides a programming platform for rapid prototyping.

MultiTech also provides operations management the tools necessary to succeed.

Final Thoughts

Success breeds success and MultiTech's product support succeeds in providing accessible and reliable educational materials. MultiTech provides rich resources covering all their products with libraries of videos, webinars and workshops ensuring on-time and on-budget implementations. MultiTech's knowledge-base of International standards gives them the ability to be the single vendor of choice worldwide.

As Enterprises face the challenges of network transition. Working with MultiTech delivers the economies of scale when you are deploying one or a million devices. MultiTech solutions are ready today and prepared for tomorrow. How do you manage change in an evolving industry? Look towards MultiTech.

Era of the Sensing Application

What's in a Name?

Most articles that I read today on the topic of the Internet of Things (IoT) talk about a couple things: either connectivity and devices or platforms. It's no surprise. Making devices (things) connect to each other (using internet and cloud communications as means of transport) is a requirement. What's more, the term Platform can mean many things, depending on purview. It can mean things, connectivity, core IoT features, or applications (including analytics).

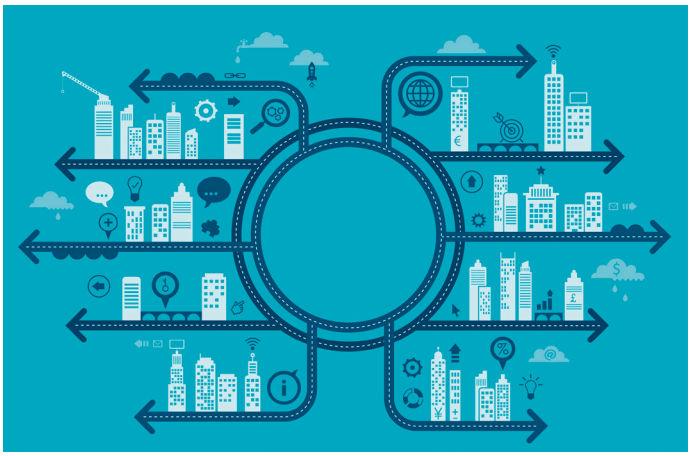
Getting Wireless Connectivity Is Key

But are we overlooking the most important piece of the pie here?

If we're to achieve real success in IoT, we are going to need to be able to collect data everywhere and everything. Devices are everywhere. They are cars and cameras, fitbits and washing machines, meters and medical devices. They start the journey to become "smart devices" once they are networked.

And the wireless connectivity needed for networking has become nearly ubiquitous. There are more access technologies today now than ever before. Satellite, both low earth and geostationary; short range that includes Wi-fi, zigbee, and Bluetooth; long-range in unlicensed spectrum, with LoRAWAN, Sigfox, Zigbee, Silverspring; and more types of cellular technologies than ever before, from 2G to 5G, with low power options NB-IoT and LTE-M and high speed/high throughput options like LTE Cat 18 and 5G.

But what's the key to making the device smart? It's in organizing things, applications, connectivity…all through the IoT stack.



The IoT Stack:

The stack is really five layers of technology enablers – of building blocks that add up to the sensor-application.

Sensor-applications bring brilliance to life. They allow the art of the possible to happen. Embed cameras on automobiles, include connectivity and applications and you get autonomous vehicles. Put accelerometers on bridges, connect them and do analytics and you can predict bridge failures. Add connectivity to a vending machine, and you can process credit card transactions, know when the bill changer is jammed, understand and predict best-selling inventory to stock and improve the owner and customer experiences alike.

But finding off the shelf sensors is difficult. Case studies are a rarity. Reference designs are few and far between. Companies like Monnit and Libellium have lists of some of the solutions they enable on their websites. But creating an IoT solution is still like a science-experiment and making it repeatable and low-cost is years away without the major silicon providers working hand in hand with other members of the stack.

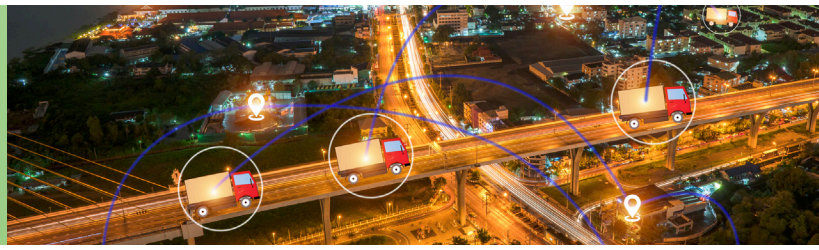
At Sensors Expo 2019 in San Jose, the team from James Brehm & Associates will be leading an educational track: IoT 101 – Digital Transformation University where we'll bring together all layers of the stack with end users to showcase best practices in solution development.

Companies like Capstone Metering will be sharing how they reduce water loss for municipalities and water districts. Companies like NXP will unveil some of their new reference designs. And industry experts will discuss and debate topics from sensor selection to business model development.

Join us and contribute your ideas, designs, and examples or just be there to get an understanding of the challenges and considerations others are taking when entering the era of the sensor-application and deploying an IoT solution.

Applications:	Alerting, Reporting, Rules Engine, Security, Analytics
Core:	Data Collection, Messaging, Identity Management, OTA, Communication
Connectivity:	Wi-fi, Bluetooth, Zigbee, Zwave, 2G, 3G, 4G, 5G, LoRA, Sigfox, Satellite, etc
Devices:	Cars, Routers, Gateways, Appliances, Wearables, Medical Devices, Kiosks, Meters, etc
Sensors:	Light, Temperature, Pressure, Accelerometer, Hydrometer, Camera, Sonar, Flow, etc

Geotab Bulks Up - Acquires BSM



Well, if you didn't need more proof, M&A is still alive and well in IoT.

This week, Geotab announced acquisition of BSM adding over 160,000 subscribers to the more than 1.5 million it currently has. Because BSM is publicly traded on the Toronto exchange, regulatory approval is necessary prior to closing the deal. But BSM and Geotab appear to be confident in the close. Geotab offered a 77% premium to BSM's 60 day moving average and BSM has put forth a $3.2M breakup fee if the deal goes south.

BSM is best noted for it's work with Government agencies and municipalities – offering solutions as a FirstNet partner among other offerings; and brings these capabilities, customers, and know-how in navigating government contracts to Geotab and it's channel partners.

In the press release announcing the acquisition, Neil Cawse, Chief Executive Officer at Geotab stated: "the government telematics markets are key opportunities for Geotab and the addition of BSM's existing activity, level of knowledge and experience will not only benefit Geotab's government customers but also our strong partner ecosystem that is focused on serving this vertical market…"

On top of improving Geotab's offering and growing its customer base, BSM brings with it a strong analytics offering and small company nimbleness. An injection of nimbleness might just be a catalyst for continued growth at Geotab. Maintaining high-growth rates is difficult as companies get to scale.

But what does BSM get from the deal? Well, in addition to the cash windfall for owners and investors, it gets two big things.

First, it gets the Geotab channel. Being a partner of Geotab provided some benefits. Being a part of Geotab gives them unfettered access to the marketing branding, and business development resources of Geotab's channel partners. Additionally, BSM customers will gain access to Geotab Marketplace, an online toolset for managing assets.

Second, it unencumbers them from the regulatory scrutiny and expenses of operating as a publicly traded entity. We believe that many small organizations fail to reach their potential because the cost of compliance can be restrictive. The acquisition provides BSM with the capital necessary to continue to develop and execute upon their vision.

While satisfying regulatory requirements and integration of the two companies may take some time, it will be interesting to see what things look like in a few months. We see this as a bold and strategic move at an interesting time in the market. We're months away from legacy CDMA, 2G, and 3G networks sunsetting. And there are millions – maybe tens of millions of vehicles and subscribers that will need to deploy new solutions. This acquisition strengthens both companies in the fight for customers.

What do you think? We want to know.

Got IoT Challenges? Test Equipment, to the Rescue!

By Olga Yashkova

Internet of Things (IoT) carries transformative potential and is creating an enormous impact on every part of everyday life. Currently we have smart TVs, smart ovens, refrigerators, traffic lights, washing machines, health monitors, watches, cars—you just name the item, and there's probably a smart(er) version of it out there somewhere being pitched or developed as we speak. Customers expect IoT devices to work perfectly, irrespective of the standards they were built on and no matter how dense the wireless environment may be. How exactly do we achieve that?

With IoT, there is no homogenous way to connect. Some applications need global coverage, so many rely on cellular technologies, which include LTE, LTE-M, NB-IoT and ultimately, 5G. Other applications are expected to count on on low-power wide area network (LPWAN) technologies that operate in the unlicensed bands, such as Sigfox or Long-Range wide area network (LoRaWAN). The majority, however, are expected to use short-range or midrange wireless technologies such as Bluetooth®, Wi-Fi, Zigbee, Thread and others.

The adoption of IoT has not been as easy and fast as originally predicted due to several challenges. Here are a few of them:

- Coexistence
- Interoperability
- Security
- Connectivity
- Power Consumption
- Absence of established business models
- Lack of industry standards
- And a dearth of talent

I would like to talk about a few of the challenges and the ways to address them in this article.

IoT Coexistence Testing

Coexistence is crucial for stable and reliable communication in IoT. Without coexistence, IoT devices cannot be trusted to perform properly in crowded wireless settings. A device may not be able to spot other IoT devices or share frequency bands and may behave in unpredictable ways. In addition, a device can lose data, voice quality, operating range, and battery life. Numerous wireless standards make it challenging to allot distinct frequency spectrum to each. Moreover, various standards share the same frequency bands leading to interference with new applications. These are technical challenges related to coexistence that impede the adoption of IoT. IoT device coexistence is one of the top IoT challenges. This is where test equipment industry comes to rescue. Coexistence testing helps determine the device's tolerance to other radio signals by evaluating its behavior in the presence of other radio protocols.

IoT Interoperability Testing

Many IoT manufacturers have proprietary protocols which makes it tough for IoT end-products to work together in their intended environments. Moreover, IoT manufacturers are responsible for upcoming updates and security patches, device upgrades, and user experience and expectations. Another significant, if not the most important challenge for IoT-enabled products and solutions, is the absence of standards to ensure interoperability. With the absence of such standards, risk assessment and testing to insure their IoT devices work properly, falls into the hands of individual manufacturers.

As mentioned earlier, IoT has products supporting a wide range of standards as Zigbee, Zwave, Bluetooth, GSM, LTE, 5G and others. IoT interoperability testing becomes challenging in such an environment and the test specifications must be cautiously developed to make IoT projects successful.

Because of their nature, IoT-enabled devices may encounter numerous risks. Here are a few of them:

- Vulnerabilities in the software running on other devices that are connected to the networks
- Access control via the network and other devices

- Possible eco-system disruptions
- Vulnerabilities in default and/or hard-coded credentials
- No clear pathway to upgrade legacy firmware
- Sending data in unencrypted text
- Open ports vulnerable to data breaches
- Interference from other products
- Cybersecurity concerns of other devices and networks

Conducting device interoperability testing to make sure that products work together securely, without sacrificing performance, is necessary in order to succeed in this challenging world of IoT.

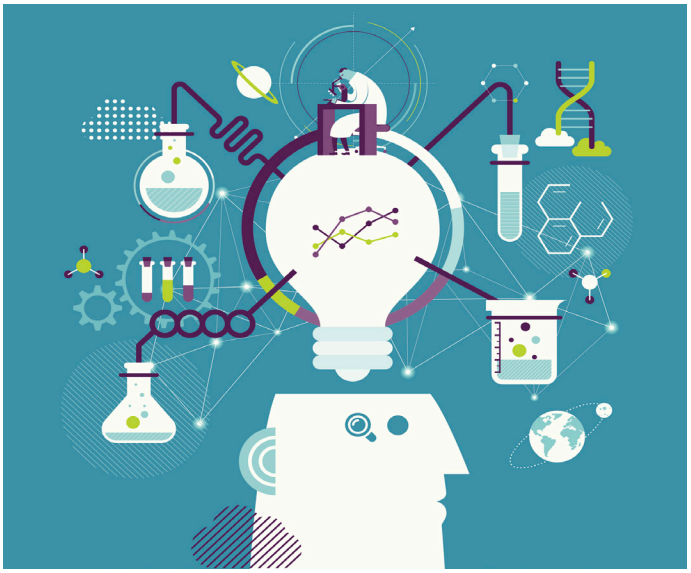
IoT Security Testing

Privacy and security are major concerns in using IoT, because most of the devices have minimal human interaction, so there is a potential risk of security breaches or malfunctioning devices that may cause catastrophic failures in the IoT ecosystem. Continuous testing of devices is required to avoid security breaches and guard the systems from major damage from attacks. Data breaches are a constant concern with connected products. IoT devices can be susceptible to cybersecurity problems as well as issues rising from software defects, open ports, and unencrypted communications, among others. ANSI/ UL 2900 standard was introduced in 2017 to address the software security issues. This standard emphasizes testing for vulnerabilities, software weakness, and malware in networked components. This standard relates to the following products:

- ATMs
- Fire alarm controls
- Network-connected locking devices
- Smoke and gas detectors
- Burglar alarms and others

Power Consumption Testing

With the IoT space rapidly growing into various areas such as smart meters, wearables, fleet management, and more, battery life is a key factor for an IoT product's success. It is absolutely critical to have a predictable battery life in a device.



A typical IoT device has one or more sensors, a microprocessor, and a radio chip that can send and receive signals at a typical operating voltage of +3.0 to +3.5 V dc. Nevertheless, it can also wait in a standby mode for an activating signal from a user checking on the IoT device with a cellphone. Often, the IoT sensors are devices intended to run for long times on small batteries at low voltages and currents. This should be part of every IoT device intended for remote sensing and control. Power consumption testing entails series of measurements that characterizes an IoT device's power consumption under different operating modes. Moreover, the power consumption testing is capable of identifying the type of test equipment that can simulate the IoT device under real conditions at very low levels of voltage and current.

Currently, not all the players in the IoT ecosystem fully understand the importance of test solutions and are hesitant to invest in them. However, the times are changing and it has become critical to do so. The times of very expensive hardware-based test systems are going away as software-based instrumentation is rapidly entering the market.

My advice to IoT vendors: the earlier you test your solutions, the better off you'll be! You will reap the benefits and justify your ROI! IoT is inevitable, however, not all of the current players will make it due to challenges I mentioned earlier. IoT is a very exciting and changing world that offers numerous opportunities for all the player in the ecosystem. Do not miss it by neglecting to invest in test equipment!

If you have questions as to where to turn in your T&M journey, reach out to us at Olga@jbrehm.com or Info@jbrehm.com . We'd love to help you get started on your IoT journey.

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Santa Clara, CA

CiscoLive!
June 9-13, 2019
San Diego Convention Center
111 W. Harbor Drive,
San Diego, CA

LiveWorx
June 10-13, 2019
The Boston Convention & Exhibition Center
415 Summer St,
Boston, MA

Sensors Expo & Conference 2019
June 25-27 2019
McEnery Convention Center
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San Jose, CA

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