Machine on Man: Wearable Technology

4th Quarter 2013 Vol. 1/Number 4

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Editorial Offices: 203-852-6800
Customer Service: For all customer service matters, call 203-852-6800.

SUBSCRIPTIONS

Circulation Director, Steph Thompson, ext. 157 (sthompson@tmcnet.com)
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River Park, 800 Connecticut Ave., 1st Fl.
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by Paula Bernier

M2M's Chicken-and-Egg Problem

I met recently with Michael Thomas, CEO of iSonea, who showed me a device and related services that can help moms and dads assess the likelihood that their children will have an asthma attack, and take steps to try to prevent that possibility. The publicly-traded company out of Australia recently launched its mobile health chronic disease management solutions down under and expects to bring them the U.S. in the first half of 2014.

The iSonea solution works like this: The patient puts the AirSonea wheeze monitoring device, which is sold online and through retail locations like pharmacies, on his or her neck by the trachea to get a reading on the frequency of his or her wheezing. AirSonea connects to the user's smartphone via Bluetooth, and the AsthmaSense app (available on Google Play and iTunes) on that smartphone sends the data it collects to the AsthmaSense Cloud cloud where algorithms reside. The cloud then pushes the reading back to the user's smartphone app.

Sounds useful, right? But here's where I became skeptical, at least until I thought more about it. When I inquired as to who sets benchmarks as to what is an unacceptable frequency of wheezing, Thomas said: nobody. The concept of monitoring asthmatics in this way is a new one, he said, so there are no benchmarks – at least not yet – about how much is too much wheezing. In any case, wheezing on a given day is just one data point, he said.

The point is that you can take these readings and over time assess what kind of activities and environmental factors make the specific patient with which you are concerned wheeze more, so the patient can modify his or her behavior or change locations in an effort to lower the chance of an attack. And, over time, data from multiple patients can be collected and analyzed – along with environmental and other factors – to help parents, patients and the health care community reach more wide-ranging conclusions.

The idea that someone would invest in a device and service to get basic data that doesn't really suggest a particular course of action seems a bit strange. Without benchmarks in place, it would seem at least some of these devices would have limited value. But you can only create benchmarks when you have the data available to create them; thus, the chick-and-egg problem.

That said, for a parent with an asthmatic child whose life is at risk in the event of an attack, a tool like this might be seen as invaluable. Looking more broadly at solutions like this, I think there is a real willingness by early adopters and the younger generation in general to give new technologies that can make them healthier and/or happier a go.

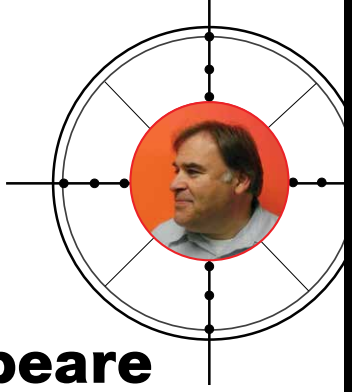
In light of the ubiquitous nature of communications technology, even older people are growing more comfortable using connected devices, and may want to leverage them to live longer and healthier lives – that's not to mention the potential for health care cost savings that might be realized in the process.

All this would seem to point to a good opportunity for consumer medical devices.

Indeed, IMS Research in October released a report indicating the consumer medical devices market will be worth $10.6 billion by 2017.

CAUGHT IN THE CROSSFIRE

by Carl Ford



Finding Shakespeare

When Bob Newhart first started as a comedian with his album "The Button Down Mind of Bob Newhart", one of his routines was about the math book speculation that given enough monkeys in front of a typewriter, they would eventually write Shakespeare. Bob then takes on the role of being the security guard at the facility where the monkeys are typing and reads one of the papers that reads "To Be or Not to Be. That is the Gazorninplat".

I bring up this routine with the hope that I give people some perspective on my rant this month, because I am truly excited by what is going on. At the same time, I have to be like Bob and have patience and perspective.

What I am excited by is all the innovation taking place in M2M. Raspberry Pi, Arduino, and M2M apps in the app stores all point to fantastic growth and opportunity. However, like the early days of the Apple App Store, we are going to see what Dave Jodoin of CafeX and I agree was App Dreck – or, as Bob Newhart would say, gazorninplat.

I am not saying that the level of development is not up to speed. The reality is that the tools that can create M2M Shakespeare are cheap enough that everyone can play. Our friend Jesse Cravens from frog teaches HTML5 to public school kids with a text editor and a browser. He has now expanded his teaching to include some software development with Arduino boards.

Raspberry Pi, Arduino and Lego's Mindstorms all have great communities behind them, as does the software development community. Gemalto, for example, has developed concept board interfaces for Arduino and Raspberry Pi to its boards so that the more than 6 million Java developers can map out the relationship of hardware to software.

At the last ITEXPO, I was able to ask Steve Wozniak what he meant when he said that good software engineers come from good hardware engineers (which was a quote from the Steve Jobs biography by Walter Isaacson). Woz explained that seeking hardware efficiency makes for elegant strategies and the software should also have elegance.

Right now we are in a tremendous growth period. HTML5 has given rise to a way of using JavaScript that brings elegance between the browser and the server we have never had. That is the reason Douglas Crockford calls JavaScript our new warlord. If you go on GitHub you will find more than 1,400 repositories of M2M programs lead by Java but inclusive of many other languages.

The app stores have hundreds of M2M apps, many of which seem to be hard-wired to a specific purpose (and perhaps sensor).

All of this innovation, but at the same time my general sense is that finding the gems in all these repositories is like Bob Newhart wading through reams of monkey pages looking for Shakespeare.

GitHub has a bit of a meritocracy to it, as repositories with branches indicate a community has gathered; but as we have seen with PhoneGap and other frameworks, the community can be fickle.

Open source is a great aid in development, and it is definitely the cheapest way to do quality assurance, but often the lack of interest in the community can be misinterpreted as tested code and a version release can include code as GA that has never been used. Crowdsourcing in theory can be an answer, but once again the meritocracy can be thwarted by apathy.

Carl Ford is partner, CEO and community developer for Crossfire Media (www.crossfiremedia.com), which stages the M2M Evolution Conference in collaboration with Technology Marketing Corp.

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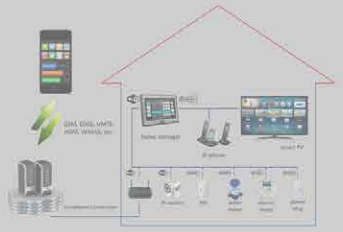

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by James Brehm

Reducing Friction to Enable a New Machine Economy

For the past year or so, we've been seeing advertisements from telecom giant and machine-to-machine communication market leader AT&T which state "Rethink Possible". And, at the same time, industrial mega-company GE, with the tag line of "Imagination at Work", started talking about the Industrial Internet.

What do these two behemoth companies have in common? What direction are they going? What is the Industrial Internet, and what does it mean? Is it truly time to Rethink Possible?

A couple of weeks ago, Jeff Immelt, CEO of industrial powerhouse GE, presented his vision for the Industrial Internet at a conference in Chicago. He talked at great length about how the physical world meets the analytical world. And he identified a paradigm shift where "material science, systems integration and products that can withstand harsh environments" become more intelligent and through the power of sensors and analytics come together to provide better performance and enhanced productivity gains for customers.

How is this possible?

As Immelt put it, there are three pieces to making this a reality. These three things are: smart machines (with sensing technology), advanced analytics, and mobility.

Imagine a world in which analytics become prescriptive and machines become self-healing.

Today, a light on a control panel or dashboard alerts an operator that something is wrong and that a machine is failing. The operator of that machine must still make a determination of what is wrong and whether or not he should shut down that machine. Most equipment sensors are still used reactively.

But imagine that the same machine described in the above paragraph was able to collect the information, communicate that information across the cloud, have the system perform analytics, and send a command back to the machine to reduce its work speed by 3 percent to prevent a catastrophic failure.

And that's the power of connectivity. AT&T (along with Intel and Cisco) is one of GE's partners in making this a reality. Why AT&T?

"Mobility has to be a key part of that and has to work globally to get the data into predictive software and change the way the service team is working," said Andy Geisse, CEO of AT&T Business Solutions.

Having reported more than 15.2 million net connected devices at the end of the second quarter of 2013, the AT&T team has built an incredibly complete ecosystem for industrial-grade applications. With a strong operational platform as its foundation, AT&T can leverage a global SIM to harness the power of the global network to connect, capture, and communicate data from millions of devices and deliver them to client-defined analytics platforms directly or via the secure AT&T cloud.

We're at a unique place in time in which Moore's Law is impacting Metcalf's Law in ways we could never have imagined. Smaller, cheaper, and faster computing devices have allowed us to move intelligence further out, extending the edge of the network. And with more intelligent endpoints, everything that is connected can now compute, and everything that can compute benefits from being connected, with benefits accruing exponentially.

Cheaper and elastic computing power made possible by the cloud, scalable storage, more intelligent endpoints, ubiquitous connectivity and sensor technology are now making it possible to not only gather but also to use big data.

But industries have different needs. Like GE, AT&T's M2M organization is focusing on adding value to several market solutions in such verticals as health care, energy and utilities (power and water), oil and gas, and transportation – all of which have very specific requirements. By combining domain expertise, technical excellence, the partnerships, and the scale each organization possesses, AT&T and GE are aligned to be incredible partners and add value to one another and to their customers.

Why GE and AT&T? And what's the promise of the Industrial Internet?

The Industrial Internet is about combining asset optimization and operations optimization. It's about how you make the asset run better and by doing that, make the enterprise run better and more productively. It's about eliminating unplanned downtime and having better asset utilization. It's about ensuring that assets don't fail by ensuring you're able to do predictive maintenance, have better scheduling of resources, better scheduling of workers, and more. All of these things improve an enterprise's efficiency and productivity, cut energy use and waste, and ultimately foster a new wave of innovation.

James Brehm is M2M practice lead at Compass Intelligence (www.compassintelligence.com).

by Tony Rizzo

Tattoo Goo

In case you haven't heard, back on Nov. 7, the United States Patent and Trademark Office announced that Motorola Mobility had filed a patent application back in May 2012 titled "Coupling an Electronic Skin Tattoo to a Mobile Communication Device", meaning some sort of electronic device that can be superficially attached to one's skin giving the appearance of a tattoo. We should note that calling such a thing a tattoo is strictly convenient – it isn't really a tattoo.

Nokia and MC10, among others, have also been working on electronic devices that are similar in nature.

In this particular case the idea is to create a communications device. Here is the abstract from the patent application itself: "A system and method provides auxiliary voice input to a mobile communication device (MCD). The system comprises an electronic skin tattoo capable of being applied to a throat region of a body. The electronic skin tattoo can include an embedded microphone; a transceiver for enabling wireless communication with the MCD; and a power supply configured to receive energizing signals from a personal area network associated with the MCD. A controller is communicatively coupled to the power supply. The controller can be configured to receive a signal from the MCD to initiate reception of an audio stream picked up from the throat region of the body for subsequent audio detection by the MCD under an improved signal-to-noise ratio than without the employment of the electronic skin tattoo."

As patent abstracts go, this one is actually admirably clear in its intentions. Essentially we're talking about a microphone that is capable of picking up an audio stream (right, your voice) and increasing the clarity of that voice stream (improved signal to noise ration).

It is interesting. Here is Act 1: The first thing one thinks of course is Google Glass. Maybe there is a next step in the overall Google Glass package that will provide an option for enhanced voice recognition. Perhaps there are interesting applications Google and Motorola have in mind that might require enhanced audio for use with Glass apps. Who knows what they are for – perhaps it is an NSA request!

Here is Act 2: Perhaps such a device might work with a Motorola smartwatch so that one might be able to speak to a smartphone through a smartwatch but without the need to speak all that loudly. Quite honestly, this is probably what we are looking at here. The tattoo is not meant to be permanent; it is meant to be applied more or less like a piece of tape and can be easily removed by the user.

The patent application does suggest that there might be security applications that can make use of such a device – again, keep in mind that we are speaking here about voice enhancement. Perhaps the tattoo is meant to communicate not with a smartphone, but with a powerful transmitter that someone might have in a pocket – secret agents, the FBI, SWAT teams, or perhaps just a retail employee walking around a store and reporting back to a stockroom on what shelves need to be restocked. From the nefarious to the mundane – the possibilities are endless.

Now we arrive at Act 3, and for this let's turn back to the patent application itself again: "Optionally, the electronic skin tattoo 200 can further include a galvanic skin response detector to detect skin resistance of a user. It is contemplated that a user that may be nervous or engaging in speaking falsehoods may exhibit different galvanic skin response than a more confident, truth telling individual."

What the above describes is essentially some sort of enhanced lie detector! We'll leave it to your imagination how such a device might be used. It may conceivably be put to use under friendly fire so to speak – perhaps it can be used with an agent someone doesn't trust to ensure they are not lying while out in the field. Perhaps a drug lord will want one to ensure his field workers aren't cheating on him. In any case, the lie detector use is clearly noted in the patent application so perhaps some company actually requested that Motorola work on such a device.

Tony Rizzo is senior editor at TMCnet, the online entity of M2M Evolution magazine parent TMC.

Mobeen Khan

A Word from the Advisory Board
In this, the forth issue of M2M Evolution magazine, we'd again like to recognize our advisory board. All advisory board members are listed on our masthead. But on the following pages we'll hear from a subset of these experts.

Intelligent Machines Make Businesses More Productive

When examining the evolution of machine-to-machine solutions over the last decade, we've seen some remarkable capabilities that have sparked rapid growth in the space. Similar to the way GPS navigation has revolutionized the way people travel, M2M is transforming the way companies run their operations. Businesses are turning to solution providers for the ability to track the location of assets, control their machines, and run remote diagnostics, thereby increasing productivity and improving performance.

Large enterprises are now searching for more robust solutions that can take their business processes and operations to the next level. For example, M2M solutions help make it possible for companies to collect information from a variety of assets such as trucks, vending machines, medical equipment, shipping containers, locomotives, jet engines and industrial control systems.

Take for example a construction company deploying cranes at various sites all over the world. M2M technology allows the company to not only map the physical location of these machines, but also gather information and evaluate performance based on environmental conditions. A construction manager might use these analytics to identify the specific times of year when a crane operates more effectively versus when it functions poorly. Based on the collected data, operators may be able to reduce downtimes by predicting failures before they happen and in their newer designs of these cranes deploy self-healing techniques. Ultimately, examining such data from connected machines can help a business become more efficient and cost-effective, or make available new streams of revenue based on value provided.

Let's take the concept of M2M a step further and look at the combined effort of GE working with multiple solution providers including AT&T to establish the first highly secure communications framework to support the Industrial Internet – an open ecosystem of intelligent machines that connect, communicate and cooperate with each other and people. This global initiative is under way to allow connectivity among various GE products including jet engines, locomotives, turbines, health care equipment and field engineers. As noted in a GE whitepaper titled Industrial Internet: Pushing the Boundaries of Minds and Machines, the company believes that a 1 percent savings in key sectors could result in billions of dollars of cost savings and improved efficiency. In addition, it could boost annual productivity growth by 1-1.5 percentage points and has a potential to raise average incomes by an impressive 25 percent. GE plans to focus on optimizing these types of connected machines while also helping human operators to create more efficiency, opportunity, and a new wave of productivity enhancements. This strategy also provides workers with the ability to remotely track, monitor, record, diagnose, and operate machines, virtually anywhere in the world.

If you think about the significant role machines play in the industrial arena today, it's easy to see the growing need for businesses to collect and analyze data. The aviation industry serves as prime example for how the Industrial Internet could help workers identify and circumvent issues even before they happen. For example, an airplane arriving at an airport can send information from the runway directly to engineers to determine if an engine needs maintenance. As a result, crews can be fully prepared on the tarmac with the correct tools by the time the pilot turns off the fasten seatbelts light. Having this type of predictive maintenance not only helps technicians determine whether or not deeper diagnostics need to be performed, but also reduces the amount of time the aircraft stays on the tarmac for repairs.

Mobeen Khan is executive director of product marketing for advanced mobility solutions at AT&T Business Solutions (www.att.com) and a member of the M2M Evolution magazine Advisory Board.

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Joseph Zaloker

Security for Intelligent Systems

Each and every day we learn of incidents where even the most sophisticated systems get compromised. Former National Security Agency systems analyst Edward Snowden exposed top secret documents, which lead to revelations about U.S. government surveillance on phones and Internet communications. It was also reported that the Syrian Electronic Army claims it hacked the Twitter and Facebook accounts of President Barack Obama. The hacktivist group, a collection of attackers that support Syrian President Bashar al-Assad, said it modified the links appearing in posts on Obama's social media accounts.

We are still very early on in the number of intelligent systems connections, and yet we see example after example of devices and systems being compromised every day either in an actual hack or in a proof-of-concept attack. The intelligent systems industry, which is experiencing exponential-paced growth, needs to move swiftly to put into place measures that will allow more secure M2M communications.

Here is a rundown of some of the most common security threats:

- viruses, worms, and Trojan horses;
- spyware and adware;
- zero-day attacks, also called zero-hour attacks;
- hacker attacks;
- denial of service attacks;
- data interception and theft;
- and identity theft.

When designing intelligent systems, it is important to note that no single solution protects you from all threats. You will need multiple layers of hardware and software security at all levels of the stack. There are intrusion points everywhere along the stack, and you should understand the risks at each point because it only takes a single weak entry point to compromise the whole infrastructure.

Intelligent systems security components include:

- anti-virus and anti-spyware;
- a firewall to block unauthorized access to your network;
- intrusion prevention systems to identify fast-spreading threats such as zero-day or zero-hour attacks;
- virtual private networks to provide secure remote access;
- hardware encryption on the main processor;
- secure embedded elements;
- operating systems;
- subscriber identity modules;
- platform integrity to detect platform anomalies and restore endpoints to known good configuration; and
- secure data and key store.

So why are intelligent systems different to protect than, say, a mobile handset? Intelligent systems are usually remotely deployed and operate alone, unchecked for long periods of time. The whole idea behind a remote connected device is for it to report in from an obscure location without a human being around. An example would be compromising a remote cellular system by stealing the SIM card and using it.

Intelligent systems edge devices are typically less sophisticated and less protected. By design they are using processing technology that is lean, seeking to maximize battery life and keep cost of the solution down. To keep the costs down, the use of sophisticated operating systems may not be deployed to minimize system memory. Lastly, smaller microcontrollers may not have the horsepower, or the battery budget isn't large enough, to perform encryption algorithms.

Unlike mobile devices where we receive updates to our computers and smartphones for security patches and updates, many intelligent systems are not designed with the necessary hardware to perform over-the-air updates and the mindset to send patches to remote devices really is in its infancy.

As we look ahead, the suppliers who build a solid solution leveraging security and their core strengths will be the big winners in the M2M space. ABI Research shows that the global market for M2M network security will be worth $752 million by the end of 2017. This includes revenues for transmission security, physical security, and service level agreements.

We are on the edge of an exciting time in which M2M has the potential to transform the way we live, work, communicate and interact and communications will be essential.

Joseph Zaloker is director of technical marketing at Arrow Electronics (www.arrow.com).

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Dan Murphy

Next-Gen M2M with Connected Medical Devices

The Internet of Things is exploding into new industries every day. But it's with one of the movement's oldest verticals – medical device manufacturers – where the most significant and innovative advances in machine-to-machine technology are being made.

Ventana Medical Systems Inc. , a member of the Roche Group, is one of those leading connected medical device manufacturers.

With more than 8 million patients relying on its products in more than 90 countries, the company is one of the world's largest providers of tissue-based cancer diagnostic solutions – and it knows first-hand the value of M2M connectivity in delivering a best-in-class customer experience and satisfaction rate, the criticality of machine uptime when patients' health is on the line, and the role M2M will play in shaping the industry's future.

Ventana first turned to M2M connectivity in 2006 to address a number of unsettling trends in the health care industry: a critical shortage of lab technicians, greater demand for faster turnarounds, increased regulatory pressure, and increasing test volumes coupled with rising cancer rates.

"We are passionate about discovering, developing and delivering medical diagnostic systems that shape the future of patient care," said Sean Casey, director of information technology at Ventana. "Our mission is to improve the lives of all patients afflicted with cancer. Ensuring our products are working properly is essential to achieving that."

To enable its support team to provider faster and more reliable service, Ventana developed and introduced Caregiver remote support – an M2M application built on the Axeda platform, which leverages connectivity to provide real-time remote instrument monitoring, troubleshooting, updating, and training.

Through the remote service capabilities provided by the CareGiver system, the Ventana service team is able to proactively monitor system health to intervene before failures occur; develop predictive failure models directly from machine data; leverage configuration data to create a personalized service experience; and provide over-the-shoulder training to keep lab technicians current without significant travel costs

Most importantly, CareGiver remote support allows labs to focus on delivering patient results, rather than worrying about the status of their equipment, or working through technical problems.

With CareGiver, the Ventana service team reaped immediate benefits – including proactive device notifications, greater uptime for connected products, lower average repair visit duration, and year-over-year service cost improvement. Naturally, it wasn't long before other groups within the organization began inquiring about how they could leverage M2M data. Marketing was interested in gathering intelligence on machine performance in the field, R&D wanted greater insight into device performance and failure modes to improve machine design, and sales was looking for a deeper understanding of how customers used machines.

"We wanted to give our sales force the intelligence they need to create more value added business reviews with customers," said Casey.

The solution? Integrate machine data from the CareGiver remote support system with Salesforce.com – enabling that data to be easily disseminated throughout the organization.

"The first-hand, real-world insight into how our customers actually use our products is the strongest and most accurate feedback we could possibly have access to, and that value reaches every corner of our organization," Casey said. "Integrating our machine data with Salesforce.com provides our field with a real 360-degree view of our customers."

By integrating M2M data into Salesforce.com, Ventana has established a central repository of customer and machine information, where stakeholders can access the information they need to improve performance. Through continued Salesforce.com integration, Ventana plans to extend the value of its M2M initiative beyond remote service, including automating creation of customer complaint cases; integrating knowledge management with device alarms to speed time to resolution; and aggregating Salesforce.com service data and device metrics for better decision making.

"Efficiency is more important than ever in the health care industry today, and our connected product data is enabling our organization – and our customers' – to streamline and automate more processes and deliver more value," Casey said. "Even with the remarkable results we've already achieved, we know we've only begun to scratch the surface of what's possible."

Dan Murphy is vice president of marketing at Axeda (www.axeda.com) and member of the M2M Evolution magazine Advisory Board.

Alex Brisbourne

Creating Sustainable Profitability for the Internet of Things

Over the past several months we've seen an increase in hype around the Internet of Things, driven largely in my opinion by a mindset where people are asking, "what's that shiny thing over there" and trying to find a way to get in on the action. Trouble is, not all of these new applications come with a well-considered purpose and business model behind them, mainly because few have accounted for establishing long-term value proposition, or, as importantly, a viable distribution chain.

Much of the chatter has centered upon consumer-facing applications such as pet trackers, connected window blinds, remote car starters, or even automatic irrigation apps. All of these do sound fun at first blush, but in reality they have not got much traction. Even if we look at the connected car via brands like OnStar and Mercedes mBrace, there is still a big question regarding sustainable subscription renewals. Sure, the initial subscription is easy because it gets bundled into the purchase, but the renewal rates are disappointing for service beyond an initial term once users have to pay for the monthly recurring subscription themselves.

The real challenge here is that consumer-centric applications will always fight for a tightly squeezed share of disposable consumer income. There are some points of value to be sure, such as turning off a lamp if you forgot when you left home for the day, adjusting a thermostat from afar, or checking if you left the oven on. But has society really gotten to a place where we need our toaster to tell our iPhone that our toast is ready?

Consider this: Approximately 1 out of every 8 iPads today gets shipped with a 3G/4G cellular connection built in; but then, and this is the revealing part, only about 4 percent of those units maintain permanent subscriptions over time. If people aren't willing to keep their iPads connected, as this data suggests, can we really expect they'll pay to keep their cars or their household lamps connected? Ultimately, consumer-side applications are going to have to conjure a cannot-live-without sentiment among consumers in much the same way that cable television has done in most U.S. households. Can this be done?

We can be sure of one thing: The lion's share of IoT growth over the next three to five years is going to occur in market segments in which the value is tangible – and these are almost wholly seen in the business-centric marketplace. Returning again to the connected car concept, vehicle manufacturers and leasing companies are designing IoT applications into their vehicles to provide remote maintenance monitoring, fuel and mileage management, driver security, and other rich content. The car will be able to connect back to the dealership, say, when it senses that the catalytic convertor is about to fail. That way, the local service tech can contact the owner to make a pre-emptive appointment. That creates real value for the consumer and for the automaker. And, repurposing data in the cloud will become important. For example the same data collected for warranty can be critical for driver behavior monitoring in pay-as-you-drive insurance applications.

Probably the most interesting, and most pragmatic, use of the Internet of Things is in telemedicine, actively monitoring patients for specific conditions or for medicines usage, 24/7. All stakeholders win – money is saved, patient outcomes are improved, and managed care providers are more efficient. There's another curious opportunity for telemedicine in supporting the trend toward medical tourism. Many first-world patients are already going abroad for surgical procedures. (While counterintuitive, certain pockets of the Third World offer extremely high-quality, low-cost surgical specialties. India is renowned for heart and lung procedures, for example; Eastern Europe has a reputation for high-end orthopedics).

Telemedicine can help make this process more of a managed experience for patients and provide greater psychological comfort by connecting them with their actual doctors both pre- and post-procedure. Eventually, telemedicine may allow for data integration directly to the patients' primary care physicians.

The connected industry is certainly growing, transforming lives and businesses in discrete, bottom-up ways. But we must all keep in mind that as an industry, we must guard against making too big of a deal about applications that won't stick, and thus leaving the industry devoid of excitement. Instead, we need to measure the market through both a qualitative and a quantitative lens of substantial value-adding, life-improving applications that demonstrate ROI for both the application provider and the end user.

Alex Brisbourne is president and COO at KORE Telematics (www.koretelematics.com).

John Horn

Doctor M2M Will See You Now

Last year Vinod Khosla, renowned venture capitalist and thought leader in disruptive technology, wrote an article for CNN Money about the future of technology in health care. In this article, he claims that technology will eventually replace 80 percent of what doctors do. He argues that much of what physicians do (check ups, testing, diagnosis, prescription, behavior modification, etc.) can be done better by connected sensors, passive and active data collection, and analytics.

While this may be a sobering thought if you are employed as a physician, there could be major benefits for patient outcomes. A Johns Hopkins study found that as many as 40,500 patients die in an ICU in the U.S. each year due to misdiagnosis, while another study found that system-related factors such as poor processes, teamwork, and communication, were involved in 65 percent of studied diagnostic error cases.

M2M technology is the catalyst in this disruptive movement in health care. Connected machines and devices allow for infinitely higher levels of data collection, communication and interpretation of this data, and application in the form of patient-specific treatment.

This major paradigm shift will begin to emerge in the next 10 to 15 years as the number of connected devices enables new innovation. However there are a couple examples of applications that are being used currently and that could make an impact in a shorter time horizon.

Wearable Devices

One of the major drivers for this shift in health care is our ability to collect and interpret large amounts of data – referred to as big data. This is greatly enhanced through the wearable device trend, which has been receiving significant attention recently with the advent of devices like Fitbit's activity monitor, Samsung's Smart Watch, and Google's optical head-mounted display unit Google Glass. However, many analysts point to the sizable potential for wearable devices in health care. A report last year from ABI research estimated that by 2017, one in five wearable devices will be used in the medical field.

This army of wearable devices is connected through M2M capabilities to deliver vast amounts of rich data. That includes everything from clothing that can monitor a patient's vital signs, to wearable sensors that monitor a range of statistics, including blood glucose, sleep patterns, posture and even breaths taken per minute. These types of devices facilitate patient engagement and patient provider interaction, which are some of the major challenges in a traditional health care model. The model also puts more control in the hands of patients, so they can have more ownership of their health and can receive better information.

Networked Facilities

There is also massive potential for M2M to disrupt traditional health care facilities by networking every piece of equipment and monitoring device so they can deliver real-time patient information to providers. These connected devices could also be set up for automated care delivery, like precise medication administration, freeing up staff and only involving doctors when they are actually required.

Facilities enabled with this technology will not only reduce the potential for human error in treatment, but may also help improve care. The data collected from having patients constantly monitored can be aggregated into large data sets and analyzed to discover new trends, optimize workflows and improve treatment.

More Personalization

The good news is that most of the doctors themselves will not be replaced, but will be augmented by M2M technology to make better decisions and provide better care. Health care will actually become more personalized. Doctors will spend less time analyzing and diagnosing, and spend more time with patients administering care. Additionally, the treatment patients receive will be tailored to their specific case through the use of large amounts of data about similar cases – as opposed to the current guess-and-check system employed in much of medicine.

The potential for innovation in health care is enormous and exciting, and is just one more example of how M2M is changing the world.

John Horn is president of RACO Wireless (www.racowireless.com).

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by Paula Bernier

Reaching Peak Performance with M2M

Sprint Can Serve as Your Guide

Machine-to-machine is on the move – enabling organizations and individuals to save money, be more efficient, lead healthier and safer lives, and, hopefully, have more fun. Navigating the Internet of Things, however, can be a treacherous experience.

Rather than making the climb alone, organizations looking to explore the M2M opportunity should consider teaming up with a partner that's taken this path before. Sprint says it can be that partner, assisting companies in their efforts to traverse the IoT landscape and scale their efforts as needed.

Sprint helps organizations identify and combine the best of the fragmented M2M ecosystem – which includes a vast landscape of players offering a wide variety of hardware, software, applications, and services. Perhaps more importantly, Sprint offers guidance on how M2M can be used to meet the specific goals of each business, providing insight on what data should be collected; the best tools to aggregate, analyze and propagate that information; and assistance to enable businesses to operationalize what's learned in the process.

"The world could have 50 billion connected devices of all kinds by 2020, across the entire range of connectivity technology," said Mohamad Nasser, director of M2M product, platforms and marketing at Sprint. "We see Sprint as the guide through this maze of data. We are the network; we are the one that makes sense of all of this."

Innovation is part of the DNA at Sprint, which was the first in the industry to offer a GPS-enabled device; the first to provide location tracking on a handset; and the first to deliver a mobile wallet. Sprint was doing all this back in 2005, well before people were downloading apps to their phones.

"Before telematics was a sexy topic, we were handling it," added Nasser.

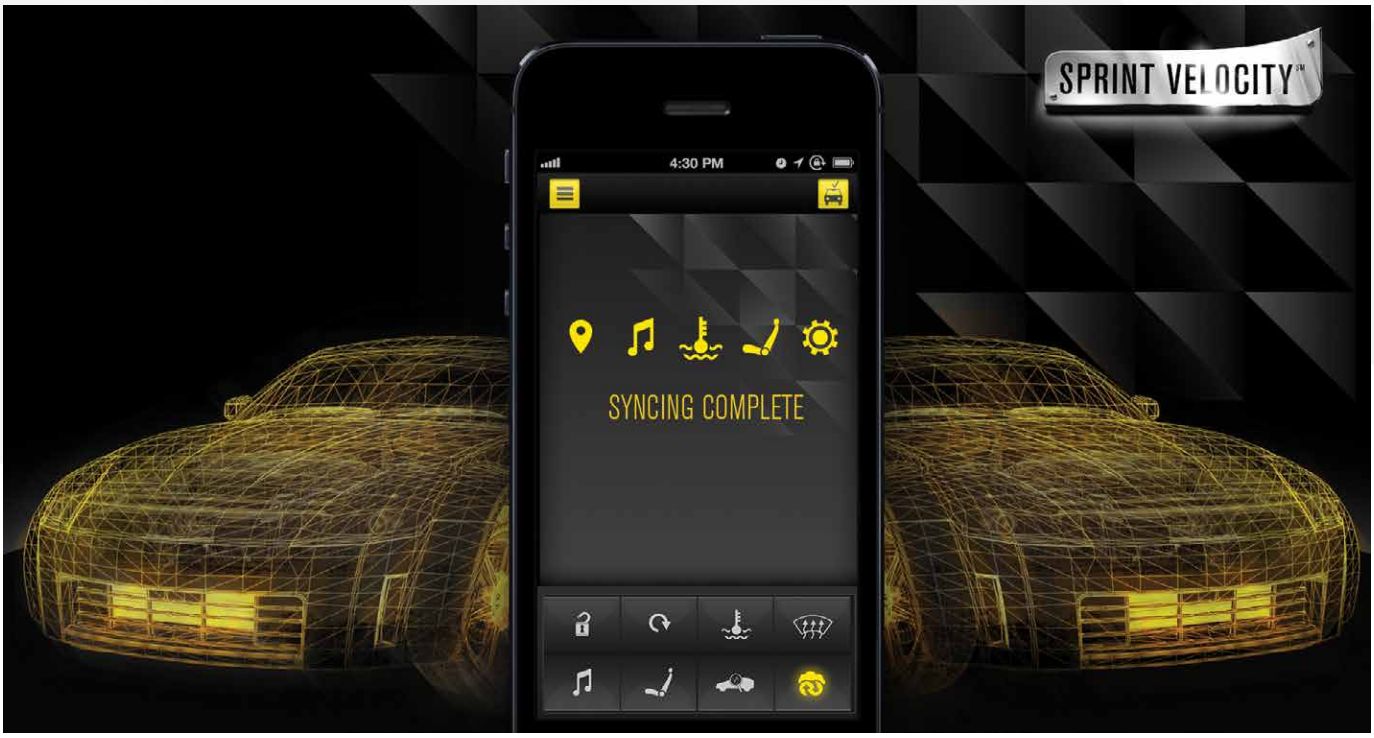
Initially, Sprint's Emerging Solutions group, which is focused on M2M, went after eight or nine different verticals. It had a lot of success and won some accolades, Nasser said. But Sprint felt that some areas were more successful than others, so it retrenched about a year and a half ago. That effort saw Sprint create what it calls priority segments and value segments. The priority segments address transportation, including fleet and insurance, as well as retail. Sprint also saw the unique needs of the auto OEMs and built Sprint Velocity from the ground up to addresses this market specifically. Meanwhile, Sprint has identified energy, health care and security as verticals within its value segment.

Sprint has moved beyond its carrier role to become a true mobile integrator, said Pat Watkins, global client management and business development director for Sprint Velocity, the company's connected vehicle solution. Customers in their vehicles are starting to look more like mobile users, Watkins said, so choosing Sprint to deliver a global end-to-end telematics solution that leverages our consumer insights makes perfect sense.

Mobile customers are becoming more and more dependent upon their wireless devices, she noted, adding that people look at them an average of 150 times a day. Mobile customers have the expectation that they can use apps while driving, and 38 percent of them do so, she said, adding that a large percentage of that activity involves navigation applications. Mobile customers also frequently want to leverage connectivity during commutes so they can listen to a podcast or relax with music or find the latest dining hot spot with rave reviews, said Watkins.

While much of this can be achieved today on mobile devices wherever they are, Watkins said the mobile experience in the car will be different because drivers need to pay attention to the road. So the challenge for Sprint and its automaker partners is to create a safe and seamless transition between those two experiences.

That's why Sprint Velocity goes beyond the connected vehicle to enable customers to customize their experience and enable automakers to change and upgrade their applications more easily. Watkins mentioned as an example a Sprint partner that created a service it wanted to alter after the initial rollout; Sprint helped this company make the change over the air and without requiring end users of the application to visit a dealership for the upgrade. Additionally, Sprint assisted the partner in communicating in an automated and scalable way to end users that this change had been made.



The Sprint Velocity strategy, Watkins said, is all about making the in-vehicle telematics solution simple and valuable for auto OEMs and the drivers who purchase their vehicles. It does that by leveraging its expertise in consumer subscription management, and by acting as a single point of contact for auto OEMs in managing partnerships throughout the ecosystem, including device manufacturers, content and infotainment providers, and insurance companies. Sprint also uses its expertise in big data to help organizations create and support new models that drive customer loyalty and create new revenue opportunities .

Sprint is the first wireless carrier to use IBM MessageSight, an appliance designed to enable organizations to manage and communicate with the billions of mobile devices and sensors found in automobiles, traffic management systems, smart buildings and household appliances. Based on IBM MessageSight, the Sprint Velocity Service Bus is a new communications architecture that lets smartphones, tablets and other devices communicate through the cloud.
The Sprint Velocity Service Bus can support automatic cabin temperature adjustments, for which temperature sensors in the car automatically make adjustments based on established driver preferences and stores them in the cloud; a location tracking smartphone app to help drivers more quickly find their cars; a mobile concierge service, which can see that a person is finishing a meal at a restaurant, search for a local coffee shop on his or her smartphone, and have those directions ready on the person's car navigation system when the motorist starts the engine; and the ability to offer preferred alternate routes via an internal navigation system that captures route and travel preferences in the cloud and is based on time of day and traffic alerts.

"With the highly competitive market for in-vehicle communications heating up, the demand is rising for rapid design and mobile integration of systems that the driving public will find compelling," said Ben Vos, general manager-Sprint Velocity and M2M. "Sprint Velocity transforms mobile integration into a service that can be comprehensive or specifically tailored to the individual manufacturer's need. Sprint Velocity is about letting automakers choose the type and level of service that best accelerates their connected services development, and helps translate that into increased sales of cars and passenger trucks."

Chrysler Group, for example, has a strategic relationship with Sprint that supports its suite of connected services called Uconnect Access. Chrysler Group's Uconnect Access services are available on the Dodge Durango, 2014 Jeep Cherokee, 2014 Jeep Grand Cherokee, 2013 Ram 1500 pickup and 2013 SRT Viper. Vehicle owners must register with Uconnect Access to take advantage of the six- or 12-month trial included with available services. Sprint contributes network, mobile integration and consumer market expertise for Uconnect Access.

Sprint Velocity also can support modular, a la carte solutions designed to address specific requirements of a particular automaker or vendor. For example, Sprint Velocity plays an integral role in providing connectivity support for solutions used by major auto manufacturers. American Honda relies on Sprint's network capabilities

Sprint has moved beyond its carrier role to become a true mobile integrator, said Pat Watkins, global client management and business development director for Sprint.

to support its new electric vehicle smartphone app, which is offered to customers of the Honda Fit EV.

In addition to the Sprint Velocity effort for auto OEMs, Sprint targets transportation via its recently launched distracted driving solution, which is closely coupled with its insurance solution, said Nasser.

"We want folks to focus on the driving," he said, adding that Sprint has several initiatives in support of Focus on Driving, including participation in the It Can Wait program, a national industry-wide campaign to discourage people from driving while texting.

Sprint caters to the insurance industry by delivering services and support for driver monitoring capabilities that leverage connected on-board diagnostic plugs. This enables insurance agencies to build programs that reward customers for safe driving, building customer loyalty in the process.

In the area of fleet, Sprint has partnered with Geotab Inc., which offers the GO6 device that plugs into a vehicle's OBDII port and relays information back to a web-based interface for fleet managers. This allows fleet managers to track and monitor vehicle locations and driver behaviors in an effort to dispatch and route drivers and vehicles in the most cost effective and safe manner. Hangers Cleaners of Kansas City has realized a 20 to 30 percent savings in fuel efficiency as a result of using this Sprint solution.

This November Sprint expanded the solution to automatically record driving time. Traditionally, drivers have kept written diaries of their hours on the road. The new Sprint solution, however, automates the entire process, creating an electronic log the moment a driver turns on the engine, recording miles without the need for driver intervention, and sending that data over the air to whatever agencies or companies that need it. This solution was created in part to help fleet operators address new U.S. Department of Transportation mandates requiring that long-haul drivers record and manage their time.

"We believe this area is going to expand dramatically," said Nasser.

The applications and customers with which Sprint is working on M2M initiatives are too extensive to list, but here are a couple of other interesting applications for which the company is offering solutions.

In November, Sprint launched a new tablet-based, cloud-connected point-of-sale system with Vantiv, the No. 1 PIN debit processor and third largest overall acquirer in the U.S. (according to the total number of transactions). This all-in-one solution includes the tablet, wireless connectivity, encrypted credit card reader, tablet stand, cash drawer and countertop receipt printer, making it easier and more affordable for businesses to transition away from traditional cash registers and manual processes to the latest integrated technology.

This isn't your run-of-the-mill PoS solution. It also offers the ability for retailers to connect data about shopper buying habits with their back office systems so they can create campaigns and offers to better serve individual customers. Sprint adds that it's also working with Mako Networks to provide PCI DSS compliant networks for PoS throughout the enterprise for retailers with multiple locations.

On the sports front, Sprint is delivering wireless coverage and Android tablet hardware to a Scottsdale, Ariz.-based business called Digital Caddies, which offers golf course owners and their customers a service called The Players Network. The service, which involves the installation of Sprint-connected tablets on golf carts, gives golfers access to instant and accurate yardages; real-time communication with the golf shop and staff; and news, sports scores and stock market updates. Course operators can also leverage it to promote merchandise, food and beverage specials, lessons, repeat rounds, or anything else they want to offer.

These examples illustrate just how broad the application of M2M can and will be.

Because of this broad variation in applications and requirements, it makes sense that so many organizations are turning to Sprint to help them put together the pieces and deliver the support and services to create the most effective M2M-enabled solutions.

"We understand that an evolution is taking place where sensors are going to be ubiquitous across the network," said Nasser. "We know all of these devices will send data back through the cloud and can offer some value add."

Sprint, he said, can help businesses build the smart strategies and solutions to enable them to realize that value.

"Think of Sprint as the central hub in the human body," he said. "Everything comes back to your brain, and your brain makes sense out of it."

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by Paula Bernier

Great Expectations

M2M Continues to Advance Optimization, Quality of Life

It's a time of early adoption and growing pains – but great advances and expectations – for machine-to-machine communications.

Global M2M cellular connections are forecast to hit the 374.9 million mark by 2017, expanding at a compound annual growth rate of 26.5 percent from 91.4 million in 2011, according to research firm IHS. Berg Insight, meanwhile, forecasts that M2M devices with cellular connectivity will increase by 22 percent this year to reach 164.5 million in emerging markets, and estimates that M2M connections will grow at a CAGR of 24.4 percent with 489.9 million connections in 2018. And Analysys Mason says the M2M market will be worth $88 billion in the next 10 years.

To meet its potential, there's little doubt that M2M has to overcome some barriers. But there's been a good amount of forward momentum to date, and all signs point north.

Perhaps the biggest challenge M2M has faced to date is fragmentation within the marketplace.

"Today, there is a great deal of complexity involved in the development and implementation of M2M solutions that is directly related to there being a very large ecosystem of suppliers offering a wide mix of intermingled solution sets," explained Larry Zibrik, vice president of market development at Sierra Wireless. "There is an array of devices, management services, subscription services, application and cloud platforms. They are all essential in creating a customer solution that delivers value but can quickly overwhelm a customer."

Daniel Obodovski, author of the new book "The Silent Intelligence", also sees hardware as a big bottleneck to more widespread M2M adoption. The issue is that many companies have shied away from the hardware side of M2M because hardware tends to be low margin, so the hardware is not always available to do what people want to do, said Obodovski, a former Qualcomm guy who co-founded and is currently co-chair of M2M SIG at CommNexus San Diego. This is a great opportunity for investors who may want to consider pumping some funds into this under-appreciated but sorely needed piece of the M2M ecosystem, he indicated.

There's also an absence of established business models for M2M. Some believe M2M suffers from a lack of standards. And additional education of potential users on the benefits of machine-to-machine solutions wouldn't hurt either.

But, then, most new technologies face similar challenges.

The good news is that M2M appears to be poised for big things. Just look at the expanding adoption of these solutions, the decreasing costs of hardware, the growing array of products and businesses in the M2M space, and rising interest from investors in machine-to-machine companies.

And while there are too many players in the M2M market, at least by some accounts, consolidation has begun. At the same time, there's been a realization that businesses need M2M integrators to help them formulate strategies around M2M and then put together the pieces to meet those goals – and M2M companies are stepping up to fulfill this role.

A new report from IHS indicates the market for M2M-related value-added services will expand from $1.5 billion in 2012 to reach $10 billion by 2017. VAS includes business and technical services that complement managed cellular connectivity and application platform services to enable application developers, service providers and corporate adopters to create, deploy and manage cellular M2M applications.

"The next Internet wave will be the M2M revolution, where almost anything – from an automobile, to a shipping container, to a home electricity meter – can become a part of a vast network," said Sam Lucero, senior principal analyst for M2M & Internet of Things at IHS. "Cellular communications will play a key role in in this new era of the Internet of Things, serving as the glue that connects hundreds of millions of nodes together. However, the cost and complexity of developing, deploying and operating cellular M2M applications is daunting, leading increasing numbers of companies to outsource cellular M2M application development, deployment and – in many cases – operation, to VAS providers."

Lucero added that mobile network operators are increasingly helping their customers connect the dots among M2M ecosystem players, including suppliers and developers. Such efforts, he added, range from establishing module supply programs to developing partnerships with platform vendors and solution suppliers to reduce overall complexity in the value chain.

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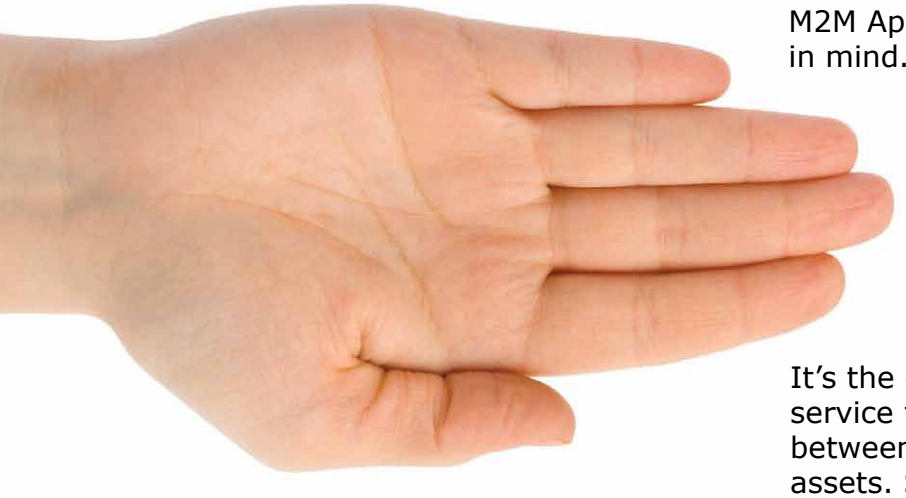

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2013: A Year of M2M Consolidation

by Paula Bernier

Telit has been on something of an acquisition spree in the past few years, and it's probably not done yet. So says Mike Ueland, senior vice president and general manager of Telit Americas.

The company snapped up application enablement platform provider ILS Technology this fall. That was Telit's second acquisition this year, as in January it bought CrossBridge Solutions and its U.S.-based engineering and sales staff. The deals this year are in addition to Telit's 2011 acquisitions of GPS module company Navman Wireless OEM Solutions for $3 million; and, earlier that year, of Motorola Solutions' M2M business, and Globalconect, an M2M services and connectivity business.

Ueland says Telit is keen to offer additional services and both hardware and software products as part of its portfolio. He declined to provide details as to which areas of M2M Telit might be most interested in making an additional acquisition. But the overarching aim, he says, is to help customers get to market more quickly, allowing for more integration. While Telit's growing body of solutions may position it as a one-stop shop, Ueland says customers can also come to Telit for various piece parts of their solutions.

Some sources in the M2M arena say Telit's acquisitive stance is likely an effort to provide end-to-end solutions in a highly fragmented industry in which customers are often required to put together their own solutions, at least to some extent. Others say this is simply a case of a company moving up the value chain – in some cases through the purchase of distressed assets – in an effort to sell higher margin products.

"Many of the organizations we've spoken to are looking for funding, some are looking for companies to partner with, several are looking for new investments, while a few are looking for companies to buy to improve their market position," says James Brehm, senior strategist at Compass Intelligence and an editorial board member for M2M Evolution magazine. "Most, if not all, ask us a similar question – when's the rollup going to happen?"

The rollup has begun.

And Telit is not the only M2M outfit looking to expand its horizons via acquisition.

In October, Sierra Wireless moved to acquire substantially all of the assets of AnyDATA's machine-to-machine embedded module and modem business, which generated approximately $10 million in revenue and a modest profit during the last 12 months. The acquired will become part of the Sierra Wireless OEM Solutions product line. That includes a team of 16 sales and engineering staff from AnyDATA's Korean subsidiary.

Jason Cohenour, president and CEO of Sierra Wireless, said: "This acquisition broadens our global reach, enhances our technical capabilities, and expands our market share leadership. We are very pleased to welcome the AnyDATA customers and employees to Sierra Wireless."

Shortly before that RACO Wireless announced it had purchased location-based services provider Position Logic.

And Verizon made a large M2M acquisition last year with its buy of Hughes Telematics.

This year also saw at least a couple M2M outfits get new investors.

In June, Axeda garnered a $5 million investment from Wipro, an IT services firm out of India.

"Wipro's investment in Axeda is driven by growing demand and interest for M2M solutions across verticals from global customers and partners alike. We find that customers prefer to work with mature partners like Wipro and Axeda who have the capability and experience to plan, build and integrate M2M solutions that are able to demonstrate quick business results," said Dr. Anurag Srivastava, CTO, Wipro.

A month later, On-Ramp Wireless announced it had raised an additional $15 million in its Series C funding round from new and existing investors. The new investor is Enbridge, which deals in the delivery of energy in North America. Existing investors include Third Wave Ventures and Energy Technology Ventures – a GE Venture, NRG Energy, ConocoPhillips joint venture.

In addition to cellular network operators, Lucero said others in the VAS space include enterprise IT vendors, MNOs, module vendors, platform providers and system integrators.

"It sounds cliché to say, but there is close to limitless potential for connected solutions in 2014," said Mark Bartolomeo, vice president of connected solutions at Verizon Enterprise Solutions. "We're entering a time when nearly everything can be connected to the Internet or to another computer system. Our responsibility is to work closely with our clients and show them how they can move across a continuum of M2M services to improve their business."

The businesses leveraging M2M technology are extremely wide ranging. Indeed, the verticals and applications in which M2M can have a positive impact seem limitless, and even those categories that have embraced M2M in a real way have plenty of runway.

"There are a lot of industries that are in low levels of penetration," said Mike Ueland, senior vice president and general manager of Telit Americas. "So there's lots of upside."

Best Buy, Coinstar, OnStar, Progressive and Redbox are examples of specific companies that have leveraged M2M to positively impact their businesses and move the industry forward, added James Brehm, senior strategist and consultant for Compass Intelligence.

David Dines, an analyst at ACG Research, said those who implemented SCADA solutions were the real pioneers of M2M 20 years ago. Home and business alarm services are also early examples of M2M, he said.

There's also a lot of excitement and activity in the M2M realm related to the connected car, the digital home, fleet, health and wellness, and smart buildings and cities.

Connected Car

"Automotive, or connected car, is a dominant M2M use case, especially here in the United States," John Horn, president of Raco Wireless, said. "Among the many promising subsets in this vertical are embedded systems such OnStar and Audi-Connect, usage-based insurance applications, and driving monitoring products that help parents keep their teens safe."

Horn believes that in 2014 removable modules will provide the ability to easily upgrade a vehicle's technology during a standard automobile service visit, and that will benefit both automakers and car owners.

A Vodafone report released in June indicates the automotive sector has adopted M2M the most widely (at 19 percent), due to the growth in connected cars. Second in line is the energy and utilities space at 13 percent. Transport and logistics, in which M2M aids in asset and fleet management, is at 12 percent. Manufacturing and consumer electronics is at 11 percent. And consumer goods and retail, which leverage M2M for supply chain management, is at 10 percent.

Teletrac and other companies of that ilk helped move forward M2M for vehicle track and trace, said Mike Sapien, principal analyst of the U.S. enterprise practice at Ovum. There's also big opportunity related to the automotive space in outfitting used car lots with the ability to track vehicles purchased by sub-prime buyers, said Brehm.

"It's a huge market worth millions – bigger than usage-based insurance," Brehm added.

Josh Builta, senior analyst at IHS Research, expects to see significant growth in the automotive sector for M2M in the next two to three years. He added that the idea of making the car a mobile hotspot is an interesting one.

Indeed, pretty much every major vehicle brand now has a connected car initiative, which tends to include in-car hotspots, dashboard-smartphone integration for safer and more efficient navigation and entertainment, and future plans to offer additional location-based services that could enable nearby businesses to provide special offers to motorists and their passengers based on their whereabouts.

Fleet

"Fleet management, one of the earliest use cases, is also poised for large growth over the coming years," according to Horn. "In the early years of M2M, companies found it was easy to establish a good ROI on fleet solutions even though module and carrier costs were much higher than they are today. The fuel savings alone could save a large fleet thousands, if not millions, of dollars. Now that M2M costs are lower, new solutions targeting smaller businesses and even consumers are being launched. As with the automotive sector, usage-based insurance is also a strong growth area for this segment. Pay as you drive and pay how you drive deliver significant cost savings to those managing fleets."

Alex Brisbourne, president and COO of KORE Telematics, said that although M2M fleet applications are getting a lot of lip service, growth in this area, in terms of devices deployed, is pretty flat.

But there are new business models developing around fleet.

For example, Andy Castonguay, principal analyst at Machina Research, points to Zipcar – a car-sharing service – as one example.

M2M could greatly expand people's ability to loan or rent anything, Dan Shey, an analyst at ABI Research, added.

"I think you'll see a lot more of that" enabled by M2M sensors and tracking, said Shey.

M2M as a whole is crossing the chasm to more widespread adoption, said Obodovski. Vehicle telematics – which includes both consumer offers like OnStar and commercial capabilities like truck and trailer tracking – crossed the chasm long ago. Usage-based insurance, led by Progressive, also has crossed the chasm, he said. Mobile health care as an M2M use case, however, has not yet crossed chasm, but Obodovski said that is likely to happen soon.

Health & Wellness

Health care has the potential to become the largest M2M vertical despite the fact that it is growing more slowly, due in part to regulatory challenges, said Horn.

Brisbourne of KORE is also bullish on the M2M opportunity in health care, and added that 20 percent of the devices on the KORE M2M network are used for medical or wellness applications.

The potential of machine-to-machine uptake in the health care space is "immense," according to Builta of IHS Research, who said that using M2M for telehealth could result in big savings.

Smart Home, Building & City

There's also a lot of excitement building around the areas of smart home, smart building and smart city, which are applications that can enable building owners and tenants to lower their energy costs, and city managements to do the same while improving citizens' quality of life.

On a global scale, companies invested something like $5.5 billion in intelligent building systems in 2012, and by 2017 that number is expected to reach $18.1 billion, according to IDC Energy Insights.

AT&T recently got into the smart home market with the introduction of its Digital Life offering, a move that signaled to many that this is now a ready-for-prime time opportunity. Digital Life allows subscribers to adjust their home climate control, check in on children and pets, and set their security systems, remotely from a smartphone or tablet.

In another recent move by AT&T that could mean big things for the smart home, building and city space, the carrier in October announced a partnership with GE. The two companies are working together to create M2M solutions that fall under the Industrial Internet category.

Orange is another company that's been active in the M2M space.

Nathalie Leboucher, head of Orange Business Services' Smart Cities strategic program, said the company has created a joint venture called M20 City with a French utility, with which it had deployed 700,000 smart meters in France as of early November.

Orange also has smart home and smart building initiatives to help its customers more efficiently handle climate control, reception and conference room setups, in existing buildings. It's also working on greenfield opportunities in quickly growing areas of the world like the Middle East. For example, KAFD and Orange are now creating a 10-year plan to build a new financial district in Riyadh, Saudi Arabia.

The wireless operator is also among the carriers working with Streetline to enable smart parking services. Orange and Streetline have formed a partnership to bring such services to a city in eastern France, a deal they're hoping to finalize with city politicians next year after elections in March.

While there's great potential for smart city implementations, Leboucher said it's also tricky given that cities tend to work in silos – with buildings, parking, schools, and other pieces of the puzzle under separate control. However, she said, some cities are now coming together to identify a global vision of what can be accomplished across the board with new IT and telecom technologies.

Two years ago, Leboucher told M2M Evolution magazine, she wasn't optimistic that the smart city concept would take off in a big way.

"Now I'm really convinced it's going to be megatrend," she said. "Why? You get a lot of optimization, and you get better quality of life."

The optimization that M2M delivers is attractive to many sectors, said Steve Hilton, principal analyst at Analysys Mason.

"Economies of scale combined with industry-tailored packages mean M2M adoption is set to undergo rapid acceleration in the coming years," Hilton said. "The impact of M2M on business efficiency can't be overstated – making it an essential ingredient for the future of most, if not all, industries. This means there is going to be a race to deploy to ensure competitive advantage."

And the more we learn about customer needs, M2M, and the data it allows us to collect and then analyze, the more interesting the possibilities become, Bartolomeo of Verizon Enterprise Solutions added.

"A year from now you will see more machines that have a social sharing component," said Bartolomeo. "Vending machines that promote their use through rewards programs for consumers, health monitoring devices that permit you to compare your results to individuals with similar profiles, traffic infrastructure that shares road conditions and parking availability with your car, and municipal transit systems that coordinate routes to move commuters more efficiently.

Erik Brenneis, director of M2M at Vodafone, added that the next two years will bring with them significant and positive change.

"Smaller companies will, for the first time, be able to reap the benefits of M2M. Adoption in Asia Pacific will challenge the current established players, and I think that we are clearly at a tipping point for many industry sectors. Overall, wherever you are in the M2M world this is an exciting time."

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by Steve Hudson

M2M Shouldn't Be DIY

It takes the right combination of hardware, software, networks and services to monitor a loved one with Alzheimer's, track mobile workers, pinpoint an offender's whereabouts, maintain visibility of goods in the supply chain or recover a stolen vehicle. Integrating all of those parts and delivering a complete solution is one of the machine-to-machine industry's biggest challenges – and opportunities.

Today, more than 62 million M2M devices are in use worldwide, and by 2020, there will be 2.1 billion, Analysys Mason estimates. Those numbers are impressive to the point that it's easy to assume M2M must be meeting customer requirements. But just because companies or consumers are using an M2M device doesn't mean they're completely satisfied with the process of configuring it, the services it provides or both.

In fact, although a wide variety of M2M services have been in commercial use for decades, the sector is still an adolescent in its lack of automation, standardization and integration. For example, there's no single, standard interface to connect to each operator's management platform. As a result, the service requires extensive custom work to support each operator's platform, increasing the service's development costs and time to market. The cost of custom work is particularly problematic because many M2M users are highly price-sensitive. But customizing an M2M solution for each operator's technology is unavoidable, especially for M2M companies that rely on operators as their sales channel.

There's also a daunting selection of technological choices. Which M2M module provides the right combination of coverage, throughput, performance, capex and opex? Should the application use cellular, a local-area or near field technology such as Wi-Fi or ZigBee? Is satellite fallback necessary? What kinds of sensors are necessary? What's the power source? What are the embedded code options? The list goes on and on.

On top of everything, each operator has a stringent certification process to ensure that the M2M device won't harm its network. But passing operator certification ensures that the device is only network-ready; it doesn't ensure that it's market-ready, too.

Suppose an elder-monitoring system includes motion sensors to monitor activity, or that it can connect to household medical devices such as pulse oximeters. Someone – the adult children, their parents or a third party such as a home health provider – has to be responsible for setting up those connections and ensuring that they're collecting and reporting information. Consider how M2M devices rarely have an intuitive, smartphone-like user interface, configuring them typically is challenging for laypeople.

Ideally, an M2M system would be entirely plug and play across all technology choices. Business applications and end user interfaces would not be so custom and could re-use platform software with 80 percent of the business logic pre-built. The devices would all be tested and potentially even pre-paired so that all someone has to do is open the box and plug in the power cord. That kind of out-of-the-box experience would significantly reduce costs, such as eliminating the need to pay a third party to set up the system, or staffing up a contact center to walk the adult children or their elderly parents through the configuration process. For the enterprise, plug and play means that the M2M components solve today's needs and are future-proofed to function years from now. That's a market-ready solution.

Today, achieving a market-ready solution takes extensive time – and in turn, money. For example, on one recent M2M project, the devices passed operator certification in November, but it took another six months of QA testing to ensure that the solution was market ready, too.

One reason why delivering a market-ready M2M product takes so much time and effort is because it needs to be an end-to-end solution: devices, software, services and network connectivity. A common pitfall is poor antenna design. In one case, a wearable device met carrier requirements but failed the FCC's SAR test. An experienced M2M solution provider would know that a simple wrist strap would keep it far enough away from the body to pass.

Market-ready also means that the device can change as the market changes. For example, device firmware and software should be upgradeable over the air – a form of future-proofing – instead of requiring an expensive truck roll.

Systems integrators have the skills to create market-ready solutions, but fragmentation makes that task expensive and time-consuming. As a result, although M2M is a revenue opportunity for them, every project is custom.

That's why systems integrators will continue to sit on the sidelines, waiting until standardization starts to replace fragmentation, making the work they do for one client repeatable for others – and thus faster and more profitable. In the meantime, the problem of fragmentation remains a major opportunity for other M2M players to fill the void by providing integration.

Steve Hudson is chief development officer with Omnilink (www.omnilink.com).

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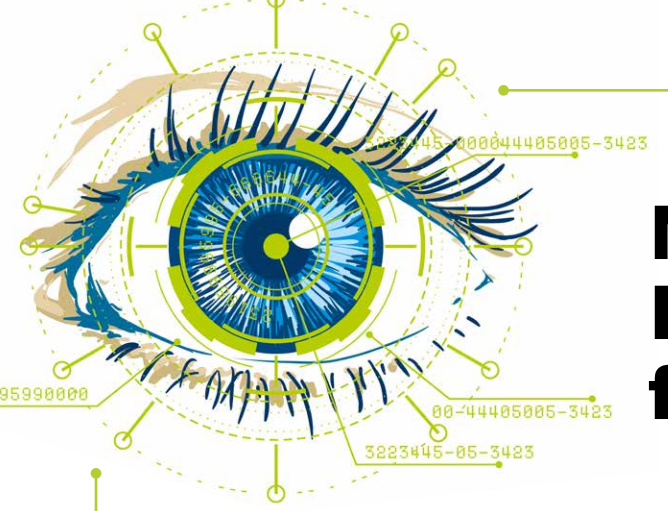


by Mike Fahrion

M2M Positives & Potential Pitfalls for 2014

Engineers at the University of Washington have developed a data communications system that requires no power source and needs no cables. Using a technique that the engineers call ambient backscatter, the new communication technology lets devices communicate with each other by reflecting the cellular and TV signals in the immediate environment, and to draw power from those signals at the same time. The technology is still in its infancy, and connection speeds are only about 1 kbps at a range of 2 feet. But the eventual implications for M2M are staggering.

Power harvesting wireless network nodes from the University of Washington won't be on the shelves in time for the holiday shopping season, but they do represent two of the most important trends in M2M networking: wireless communications and low power requirements. And as we head into the new year, we can expect to see the results of both those trends, as well as many other innovations, beginning to bear fruit.

On the Positive Side

Wi-Fi has come a long way over the last few years, and we'll see more and more applications that can take advantage of its improved capabilities. Wi-Fi is steadily becoming the dominant player in wireless M2M and sensing, thanks to its steadily falling costs, complete interoperability, low power chipsets, and the ability to support IP standards and security. When combined with power harvesting techniques like solar panels, Wi-Fi will let network engineers move entirely off the grid, creating wireless LANs that connect to the Internet via the cellular network.

The cellular network is evolving as well. Cellular data networking, already incredibly useful in remote monitoring and control applications, will be able to take increasing advantage of the low latency and high bandwidth provided by the expanding 4G LTE coverage. By bringing enhanced capabilities and features like real-time video to applications ranging from remote diagnostics to security, high-bandwidth wireless sensor solutions will begin to replace less scalable legacy systems.

Mobile platforms will become an increasingly effective element in M2M networking, and we'll see HMIs being replaced in mass by smartphones and tablets. There are already a couple of different ways to go about it. One option is to equip industrial devices with internal or external M2M-focused Wi-Fi access points that allow mobile devices to connect with them wirelessly, much the way a laptop connects to a hotspot at your local coffee shop. But most mobile devices have a USB port as well. Using a USB On The Go cable, users can add a full-sized USB port to a mobile device. That allows them to make wired connections to equipment like serial converters, routers and switches. After that it's just a matter of running a terminal emulation app on your Android device. Until now, such apps didn't exist unless you lashed one together yourself. But you'll be able to download one from an Android app store in 2014.

Obstacles and Limitations

As always, there will be some teething issues with every new technology that comes on line.

For example, the increased use of wireless solutions will create security vulnerabilities.

As remote devices continue to become smaller, smarter, and less power hungry, there will be opportunities to distribute more local intelligence around the network and to collect more data. One result will be that the early adopters who deploy large-scale M2M solutions with smarter remote sensors will find themselves swimming in data. To turn data into useful information without overspending on data plans will require embedded intelligence at the edge of the network. And the current view that clouds are both infinite and free won't hold up in an era of big data.

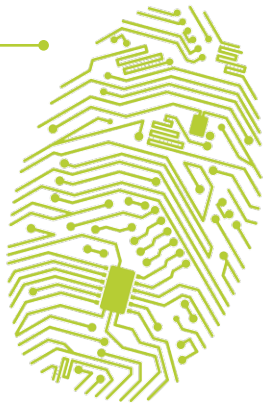
As more M2M connections take advantage of 4G LTE's reach and bandwidth, it will be important to develop applications that know when to turn themselves on and off. It won't always make sense, for example, to burn through a cellular data plan by maintaining a 24/7 connection for a video feed. There will be plenty of diagnostic and remote monitoring applications that should only transmit video when there is something of value to report.

So 2014 is going to be an interesting year. As always, having new tools at our disposal will be exciting. But – as always – we'll need to learn how to use them effectively.

Mike Fahrion is director of product management at B&B Electronics (www.bb-elec.com).

by Olivier Beaujard

The Right Security Solution for Your M2M Application



Security continues to be a hot topic in all areas of technology, including machine-to-machine applications. Today, most analysts agree that the security risk is relatively low, primarily because M2M is still a growing space and hasn't reached a critical mass that would draw significant attention from hackers. However, M2M is growing very quickly. Cisco estimates that there will be 25 billion connected devices by 2015 and 50 billion by 2020.

In fact, a September 2012 GigaOM Pro report on the subject stated, "As the volume of M2M devices and associated data increases, so too will the probability of hackers and malware writers targeting these systems to exploit networks, steal data, hijack systems, and compromise workflows."

The chart on this page details the types of threats in each element of the M2M application chain.

Enterprises and OEMs will use a variety of mechanisms and techniques to address threats in each segment of the M2M chain. Two key considerations for secure M2M deployments are trust and encryption.

Trust

The concept of trust in an M2M application is about verifying that commands or instructions coming in to a device or server are legitimate and coming from a verified source. The M2M cloud management platform, for example, must be able to verify that data coming from both deployed devices and enterprise applications can be trusted. The back-end enterprise application must use strong authentication to verify that it can trust data from the cloud management platform. And, the enterprise or M2M solution provider must be able to control access rights across all components of the system, and ensure that anyone accessing or configuring system settings is authorized to do so.

Embedded applications use the same concepts to assure trust as any other networked system: authentication and authorization. In an M2M application, these include:

- Open M2M protocols: Open protocols operate between the cloud management platform and the connected devices to provide secure, trusted communication. Open protocols provide stronger security than closed mechanisms, as their algorithms are tested and proven by a large community of users. With closed protocols, security is dependent upon obfuscating the algorithm. If a hacker is ever able to reverse engineer the protocol, it can easily be cracked.
- Two-factor authentication: This method requires the presentation of two authentication factors to reinforce the access control to the cloud service. The user is asked to present login credentials. The cloud server then sends a one-time password to the user's mobile phone, and that the user must enter to complete the login process. This authentication mechanism prevents unauthorized access with a stolen password and PIN code.
- OAuth: The OAuth open-source authorization standard protects communication between the M2M cloud management platform and the back-end enterprise application, assuring that both cloud and enterprise application elements are legitimate and authorized to send and receive data.

Encryption

A secure M2M application needs to protect the transmission of private and confidential data. To do so requires data encryption and secure transmission technologies across multiple segments of the M2M application – between deployed devices, the M2M cloud management platform, and the enterprise application.

If the M2M cloud management platform is operated by a third party, for example, an enterprise may wish to encrypt all data as it travels from device to cloud to enterprise application using a secure virtual private network. In other cases, however, part of the data from the device may be encrypted while other data are not. Some power monitoring applications, for example, may encrypt consumption data for a home or business but not encrypt other non-sensitive data reported by the meter, such as its wireless signal strength.

On the other hand, a payment application requires a more sophisticated M2M gateway that can support the strongest possible encryption and transmit that data via a secure VPN. For applications that require maximum security, enterprises may prefer to use a private access point name network that contains only authorized devices in the application (i.e., no other devices use the network), and that does not connect to the Internet but links only with the M2M cloud via a VPN.

Finally, enterprises should use HTTPS to assure a secure connection whenever communicating with the cloud management platform and the enterprise application.

Olivier Beaujard is vice president of business development at Sierra Wireless (www.sierrawireless.com).

by Carl Ford

Near Field Communications: The Point of Sale is Somewhere in Between

Our Hot List series makes for interesting compilations of specific M2M ecosystem solutions. Looking at near field communications can give you the feeling that the fad has faded, but like many technologies, the loss of the hype factor indicates that we are at the stage of practical application. The question is: When will we reach the tipping point where the technology can be assumed to be available? According to Berg Insight, in-store transactions are going to increase to $44 billion by 2017 with more than 29 million users.

While the financial industry sees the value, Apple's decision not to join the NFC market has made it hard to get the cool factor in the mind of the consumer. It can also be said NFC has a lot of alternatives like QR codes, 3D barcodes and over-the-top services embedded in apps. We also have the adapted devices from Square and Intuit. However, NFC has the ability to be embedded in the device in a way that makes the transaction a simple sweep without the adoption of an app. The transaction is, in effect, contactless and is better known to consumers as contactless payments.

NFC has the ability to be embedded in the device in a way that makes the transaction a simple sweep without the adoption of an app.

Jason Oxman, CEO of the Electronic Transaction Association, explains: "Mobile payments marry two ubiquitous consumer preferences – using electronic payments at retail, and carrying a mobile device. Mobile payments can also enhance the security, reliability, and functionality (with loyalty and location-based offers) of a payment transaction. Many mobile payment technologies are widely available today, and NFC is one of the great platforms consumers can choose. With NFC, the phone becomes a souped-up credit card, allowing a tap of the phone to not only pay, but also track loyalty rewards, automatically apply a coupon, secure geo-fenced offers, and much more in a secure transaction. Dozens of phone models on the market have NFC chips, and NFC is compatible with the EMV chip card standard that is being deployed across the U.S."

NFC implementations, however, need to connect the human impulse with the transaction. When it comes to NFC, following the money sounds like the right strategy, but the reality is that the excitement is not in the technology, but in how it's applied.

Near field communications does not have to involve transfer of monies. It can be used to deliver data transfers of apps, information, music, social communications and video. However, the key to NFC is the proximity and, like the racks by the checkout counter at your grocery store, the goal is to make the impulse easy to follow through.

Looking at Google Play you can find more than 200 apps that have incorporated NFC technology; however, very little of it has any real transaction value. So we have a situation where NFC's best asset is being a frictionless secure technology that enables two-way communication at the app level and is pretty much a closed system where NFC touchpoints are being used to make tags to enact control. Many of the apps enable turning on and off settings on the phone. However, marketing with tags has been embedded in many forms of media, including magazines, in-store signage, out-of-home advertising, and product tags. All of this points to the desire to make an impulse into action that engages the user.

Perhaps capitalizing on the comradery of sports, many marketing campaigns working to spur the adoption of NFC solutions are associated with sporting events. Samsung and Visa Europe supported NFC at the London Olympic games, and SK Planet enables a smart stadium at Munhak Baseball Stadium in Incheon, South Korea, where NFC enables visitors to purchase tickets, play interactive games, access offers within the stadium and at nearby merchants, communicates with the team, and enables other features.

The bottom line is this Hot List has a mix of marketing consultants, technology enablers, and of course and most importantly financial companies.

1) Mastercard (www.mastercard.com) has enabled MasterCard PayPass, which looks like the most ambitious implementation in terms of overall reach. It is not an alliance with a specific carrier or device, but does support Google Wallet.

2) Visa (http://usa.visa.com) and more specifically VisaEurope, refers to NFC as contactless payments. The rest of the credit card industry is following the lead of these two companies.

3) Google (www.google.com/wallet/shop-in-stores) may be the 800-pound gorilla in the room as it enables faster check out and charges no fees when you use the system. Purchases can be funded with your Wallet Balance or with your preferred credit or debit card.

4) SK Planet (www.skplanet.com/eng/) is a wholly owned subsidiary of South Korea Telecom and its goal is to be a platform to that leads the revolution of online and mobile service platform with its Digital Contents, Integrated Commerce and Advertising & Marketing Businesses. The affiliate program with OK Cashbag (www.okcashbag.com) is extensive.

5) Samsung (www.samsung.com/us/article/near-field-communication-a-simple-exchange-of-information) understands that usage is the key to trust, and its marketing of NFC goes beyond the goal of getting a wallet used, and into the mainstream of all exchanges of information and other social sharing. It's not that it doesn't see the opportunity; rather, the company sees it as the way to break the obstacle of unfamiliarity.

6) Nokia (http://developer.nokia.com/Develop/NFC/) and Microsoft are well aware of the opportunity here and should not be counted out of the market. As Wall Street points out, Microsoft is already a bank with the amount of cash it has. It just needs to figure out what kind of transactions it wants to enable.

7) Proxama's (www.proxama.com) mobile commerce platform offers Tap Transact for mobile wallet services and Tap Point for mobile marketing solutions. It has enabled mall kiosks and outdoor solutions with CBS Outdoor and Westfield.

8) Thinaire (www.thinaire.net) is all about the experience and works with brands, agencies and other media companies looking to deliver mobile engagement experiences with secure cloud-based transactions.

9) Gemalto (www.gemalto.com) has a focus on the Internet of Things and delivers NFC solutions in its platform to a wide range of secure devices already in the hands of billions of people all around the world. The mission is to bring trust to the digital world with a solution comprised of software to be embedded in a wide variety of devices, plus platforms and services for managing them in the field.

10) Bluebite (www.bluebite.com) integrates marketing campaigns with mobile commerce to deliver services on college campuses, taxis and movie releases. If you are a brand manager looking for some out of the box thinking, this company should be one of your first visits.

11) Tapit (www.tapitww.com) offers an NFC platform that delivers analytics on marketing campaigns in real time, enabling the transactions to be more effectively reported. It has worked with major brands such as Coke and Nike.

12) Broadcom's (www.broadcom.com/products/NFC/NFC-Solutions) Maestro middleware is not to be confused with MasterCard's European brand name (but should be a concern if you are searching the name). Broadcom is a chip supplier and has been an advocate and agnostic as to how NFC is implemented. Its NFC controllers are platform agnostic with support for multiple secure elements or SIM cards – or both at the same time. In addition, Broadcom's advanced Maestro middleware allows new NFC applications to utilize Bluetooth and Wi-Fi capabilities in the device to spur new innovations in user interface and media sharing.

13) Commbank of Australia (www.commbank.com.au/personal/online-banking/commbank-app/coming-soon) is heavily involved in the financial ecosystem's adoption of the NFC and related technologies throughout Australia.

14) Sequent (www.sequent.com) offers Sequent Software, which combines expertise in the payments industry with innovation in the mobile ecosystem to offer next-generation credential management solutions. As we get more transactions, fraud will become more of a concern.

15) Watchdata Technologies (www.watchdata.com) provides daily convenience and security to more than 1 billion mobile subscribers, 80 million e-banking customers, and 50 million commuters.

The issue of security is a hard discussion. It seems like trusted parties are finding themselves compromised internally and externally. Credit card companies recognize that fraud is a cost of business. When it comes to mobile phones, the mentality may have to change. After all, it is rare we let our credit cards out of sight. However, people still have a tendency to lend out their phones.

Canalys suggested that one of the more interesting benefits of smart watches, which are on track to grow to 5 million by the end of 2014, will be the use of NFC.

Mobile commerce has come along way from the days when your neighbors (or perhaps you yourself) said: "I would never use my credit card on the Internet." Apple has shown that mobile phone transactions can be considered not only trustworthy but primary to a service. However, the point of NFC is not to emphasize the service but minimize the impact of the transaction. Like the racks at the check out counter, the customer is assumed to be ready to pay. The question is: How much more can be sold thanks to the simple convenience?

Credit cards feel safe because the creditor minimizes the impact on the customer leaving the vendor/seller with the liability. For the banker, credit card fraud represents a loss of more than $5 billion annually. Taking out your phone seems not much different than pulling your credit card from your wallet, so it's not surprising that Canalys suggested that one of the more interesting benefits of smart watches, which are on track to grow to 5 million by the end of 2014, will be the use of NFC.

For point-of-sale opportunities, the Hot List above is a good place to start, but it's clear that we are going to see a lot more innovation in the next year. In the meantime, however you chose to buy something at the point of sale, ask yourself if you see an opportunity.

Carl Ford is partner, CEO and community developer for Crossfire Media (www.crossfiremedia.com), which stages the M2M Evolution Conference in collaboration with Technology Marketing Corp., the publisher of this magazine.

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by Carl Ford

GE's Impact on Everyone's Boardroom

The commercials grab our attention. Michael J. Fox talking about 88 'JigaWatz', The Lost in Space Robot and every other automaton running around. They catch our eye and make us associate GE with M2M. However, the words don't connect us with the value.

However, unlike so many commercials, which are as good as it gets, GE has substance behind its commercial. At the heart of the GE strategy is the emphasis that big data comes from the intelligence of connecting devices and discerning patterns.

This vision is not about e-readers, smartphones and the Internet of Things, it's about the Internet of Making – or, as GE says, the Industrial Internet. GE's Peter Evans, director of global strategy and analytics, and Marco Annunziata, chief economist and executive director of Market Insight, wrote a white paper that is a worthwhile read.

In the paper they say the Industrial Revolution and the Internet Revolution are the precursors to the Industrial Internet. This third wave focuses on delivering efficiency and cost savings that are real and have direct impact on the bottom line. The metrics are about optimization, and GE finds that in its ability to manage machines. This augments its existing services and gives the company the opportunity to increase revenue and differentiate its products. Even if the improvement is around 1 percent in aviation, health care, oil and gas, power and rail, the total value of savings is nearly $2 billion annually for over 15 years.

If you are not impressed with that number, GE makes the point that when you categorize business under the Industrial Internet umbrella it represents $32.3 trillion, or 46 percent of the $70 trillion global economy. In other words, if you are in business, GE's perspective is that the Industrial Internet impacts you. As a company that focuses on things that spin like turbines and jet engines and rail, the company predicts that the Industrial Internet will impact 100 percent of energy production and more than 40 percent of energy consumption.

GE has now allied with AT&T, Cisco and Intel. In some ways this is an extension of some or GE's existing partnerships, particularly the GE Intel health care initiative Care Innovations.

However, the company's white paper analysis focuses on the big machines and the big opportunities that networking these devices represent. In the announcement of this alliance the quotes point to the global opportunity.

"Imagine a world where an airline, for example, can remotely monitor, diagnose and resolve issues with its fleet engines virtually anywhere in the world," AT&T Business Solutions Unit Chief Andy Geisse said in a statement.

GE said the AT&T partnership will allow workers to better keep tabs on its gear, which it said will improve productivity.

"By connecting machines to the network and the cloud, we are taking an important step to enable workers all around the world to track, monitor, and operate our machinery wirelessly and remotely through highly secure and machine-to-machine communications," GE Vice President Bill Ruh said in a statement.

The bottom line is that GE is going to make a big wake in its efforts, and the result will have lots of derivative results. As the white paper concludes: "The compounding effects of even relatively small changes in efficiency across industries of massive global scale should not be ignored. As we have noted, even a one percent reduction in costs can lead to significant dollar savings when rolled up across industries and geographies. If the cost savings and efficiency gains of the Industrial Internet can boost U.S. productivity growth by 1 to 1.5 percentage points, the benefit in terms of economic growth could be substantial, potentially translating to a gain of 25 to 40 percent of current per capita GDP."

Company boards need to keep focused on the strategies GE puts in place because its best practices will lead the way for many other solutions.

Carl Ford is partner, CEO and community developer for Crossfire Media (www.crossfiremedia.com), which stages the M2M Evolution Conference in collaboration with Technology Marketing Corp.

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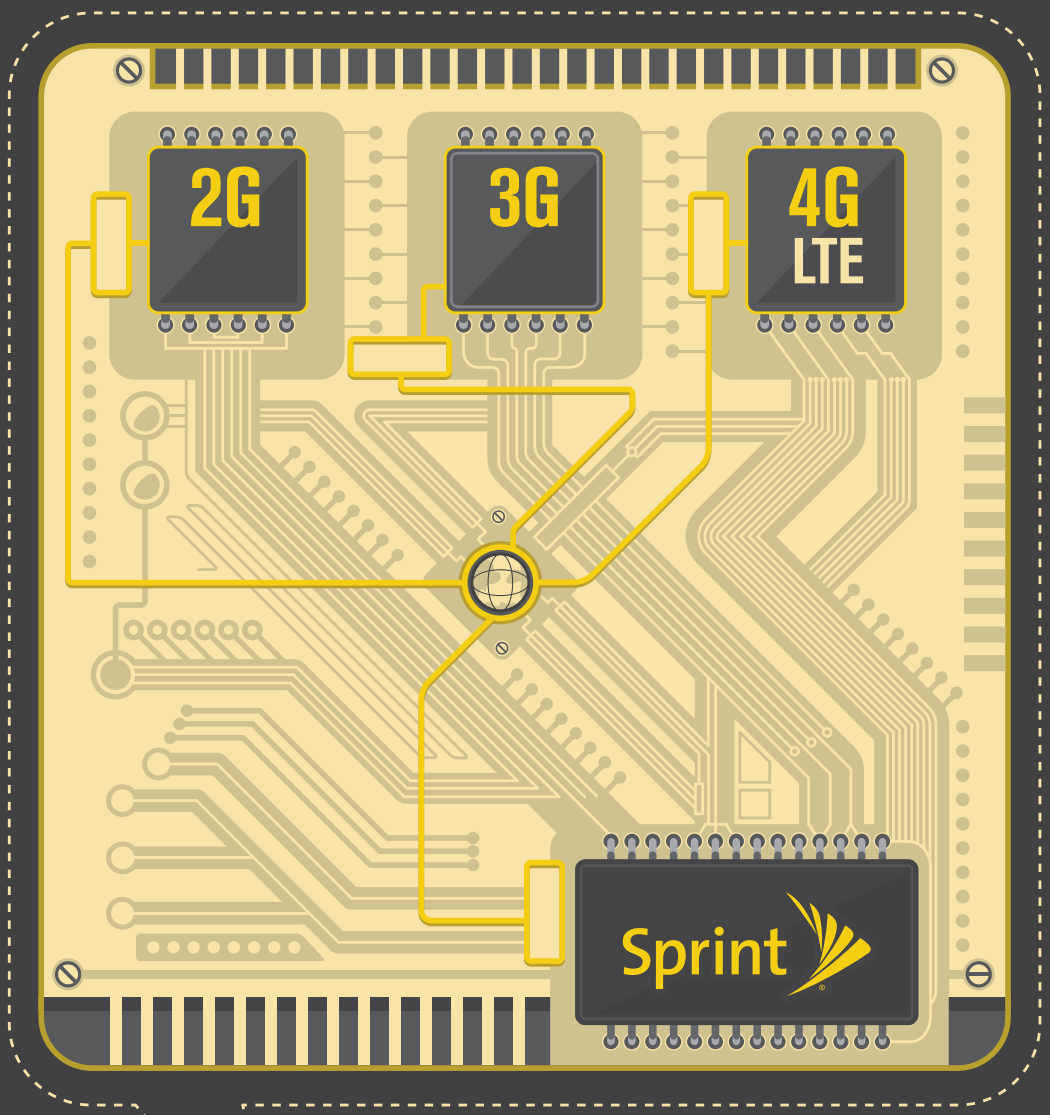

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