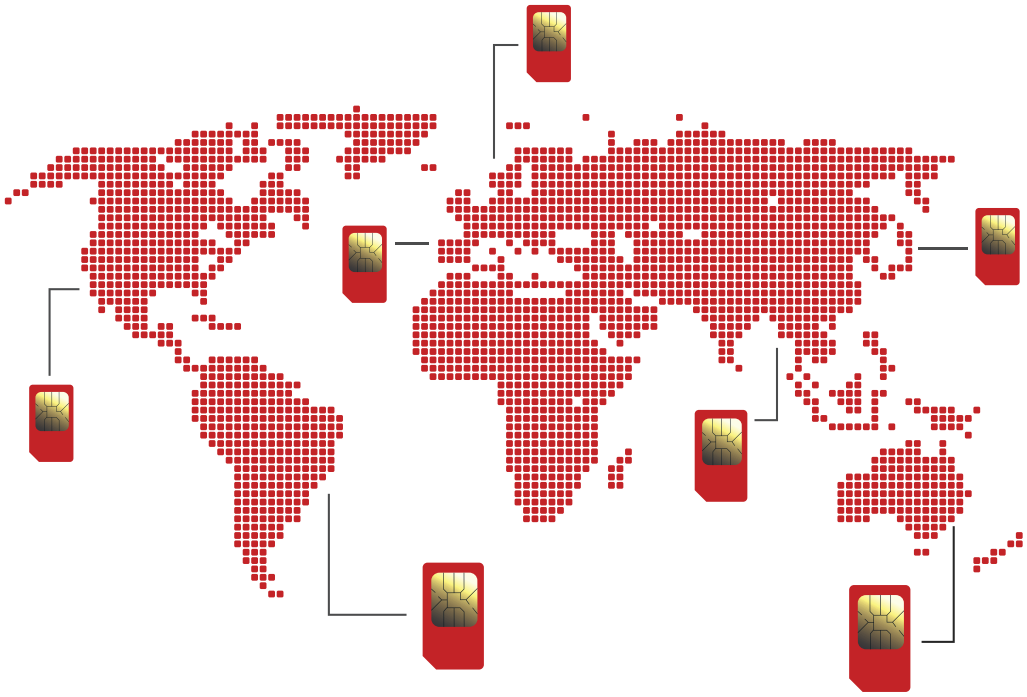
M2M without Borders

Why eSIM is a Game Changer for the International ‘Internet of Things’

wyless®



When hearing the term, "machine-to-machine," most people probably think of the ubiquitous cell phone … in one form or another. With a little more consideration, the average person might also decide to include laptops and notepads as additional actors in the modern world of mobile communications.

Another way of thinking about M2M is as a whole "Internet of Things" for which online connectivity is essential. This IoT is comprised of devices that transmit digital data via some type of network (wired, wireless, hybrid) to another device that then translates the communication into usable information. Today, we see M2M applications for such purposes as logistics, fleet management, car safety, healthcare and smart metering … and those are just the tip of a rapidly growing iceberg.

M2M interactions play out in ways that range from "strictly business" to highly personal. For example, a barcode reader used in a shipping department might send information to the company's computer network as part of a process to track inventory levels. In another scenario, M2M technology also makes it possible for a blood-sugar monitoring device to constantly send readings to the Cloud for storage. A comprehensive list of examples and possibilities would fill a very thick book.

The free flow of information, data or directives in the 21st Century is astonishing in comparison to where we were just a single generation ago. We've seen constant technological invention in communications conquer the natural obstacles of time and distance. Unfortunately, those are not the only barriers to sharing information between divergent points. Today, international borders represent a significant problem (and expense) for companies that seek to sell or use M2M devices outside their home countries. This white paper will examine how prevalent technology for M2M communications will need to be supplanted by an evolutionary new solution if device manufacturers—as well as their customers—hope to operate internationally in an efficient and cost-effective manner.

The SIM-card problem
(as related to international use)

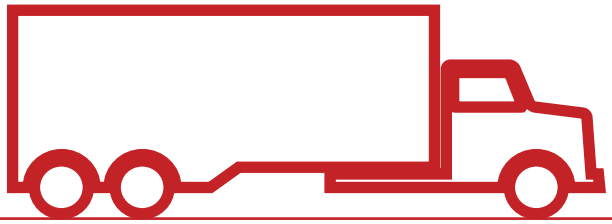
People who use mobile phones are generally familiar with SIM (subscriber identity module) cards. These tamper-resistant microprocessor cards are inserted into mobile phones in order to authenticate the device as properly credentialed to access a particular mobile network. Having its own operating system, storage capacity and built-in security features, the SIM card also contains a 64-bit field that provides the subscriber with an International Mobile Subscriber Identity (IMSI). When the user of a mobile phone connects to his or her network, the IMSI basically acts as a "password" that says it is okay for that device to access that network.

Mobile networks depend on user subscriptions for revenue, so it's not surprising that they take great pains to see that unauthorized persons cannot access, alter or copy IMSI information. Therefore the SIM card exists as a solid-state but self-contained component within the mobile device. Mobile phone SIM cards are removable which allows a user to transfer it from one phone to another—an activity familiar to anyone who has replaced a smartphone without changing mobile service providers.

SIM cards are also present in M2M devices, and as is the case with mobile phones, must be paired with a mobile network operator (MNO). Since mobile phones are usually sold with an MNO in mind, an IMSI profile is typically set for the SIM upon activation. This is a problem for M2M device manufacturers because there is usually no way for them to foresee where in the world (literally) their products will be put to work and the MNO will be unknown. Furthermore, SIMs for M2M devices are usually factory-installed and can be difficult to change. For these reasons, pre- or post-sale pairing of the device to an MNO becomes highly problematic.

Though connectivity may still be achieved, unless the M2M can connect to a contracted MNO, use of the device will likely incur very costly roaming charges—especially when crossing an international border. An article by M2M World News explains:

"Consider a trucking company that travels frequently between the U.S. and Canada as an example. Between mapping services, video monitoring, email, fleet tracking software and vehicle diagnostics, a single truck might easily use 100MB of data per month while traveling in Canada. The roaming cost for that single truck alone could be as much as $200 per month or nearly $2,400 per year1." – M2M World News, "New eSIM Eliminates Travel Costs for Machines, February 18, 2014.



The "work-around" options for the manufacturer of M2M devices are limited and each is fraught with critical shortcomings:

- Continue to use just one type of SIM. (Endure the high roaming fees that come from crossing a national border.)
- Stock multiple types of SIM cards for each country within which the company does business. (Suffer increased costs and an inventorial nightmare.)
- Reconfigure previously installed SIM cards each time a new carrier is added to the SIM profile. (Struggle with a labor-intensive solution that will probably prove impossible to continue in the long term.)
- Attempt to get agreements with many international roaming partners forming a patchwork" network. (Worry with agreements that would be subject to termination — with the added headaches of managing multiple agreements simultaneously.)

Though the challenge is daunting, what is a not an option is foregoing the business opportunities offered by international commerce. Trade agreements such as NAFTA, or the unprecedented melding of economies represented by the European Economic Community, have done much to encourage companies to operate across borders. According to a market research report by Hardware Components, Technologies & Applications, the total

M2M market is expected to reach $85.96 billion by 2017 at a CAGR of 26.1% from 2012 to 2017. A slice of this proverbial pie is too big to ignore.

The eSIM Solution

Clearly, companies that contend with the challenge of securing IoT connections across international borders needed a simple and cost-efficient alternative to standard SIM-card technology. In conjunction with the mobile communications company, T-Mobile, two other companies—Gemalto (a digital security company) and Wyless (a provider of global, wireless M2M solutions)—came together to create an efficient, cost-effective way to deploy international IoT connections. Cooperatively, the three companies set their sights on a solution that would:

- Maintain the convenience of using a single SIM while travelling through different countries
- Keep pricing competitive with local rates and ensure that billing is as simple as if it originated from a single, native network
- See that making updates is easily accomplished through over-the-air programmability in a secure environment
- Provide for full visibility of the network and associated systems to enable timely and effective support

The solution that the companies settled on was the "eSIM"—a programmable electronic SIM card that could be used in certified IoT devices and would work across international borders. Gemalto took on the task of ensuring security in flexible subscription management. T-Mobile would handle programming and updating the eSIMs and that company would also see to all customer support issues. For its part, Wyless was focused on further developing and refining existing eSIM technologies—a responsibility that meshed well with the company's "open architecture" philosophy of an open platform and open connectivity. Ultimately, the eSIM project provided for:

- Remote management (changing/updating) operator credentials
- A set of interfaces that allowed the operator to transmit to the physical circuit card
- The security necessary to all parties within the M2M ecosystem

The eSIM offers a scalable and robust multi IMSI solution for use with multiple MNOs. The user can download a "local" profile that—by pre-arranged agreement—will be accepted by the MNO in a foreign country. Anytime a new IMSI might be required, it can be easily added. The eSIM automatically changes to the correct IMSI when it detects a new country. The company then receives all charges in a single bill. Wyless also integrated the eSIM's functionality into Porthos, their management platform for M2M connections and white-labeled it for T-Mobile as the M2M Hub. A Web-based platform, Porthos:

- Provides granular control over network configurations, VPNs and device settings including IP addresses and credentials
- Delivers tools to activate and deactivate devices as required, eliminating recurring charges for inactive devices
- Generates usage reports, by connection, IP address, account or device, that may be customized to any level of detail
- Offers event-based alert and monitoring that can be configured to provide advance warning of approaching data usage limits or to identify suspicious activity
- Includes a transparent and flexible billing system, offering detailed usage and cost data for individual connections

Fully configured and pre-built to the specifications required of the M2M device, the eSIM ships as an out-of-the-box solution to simplify inventory management. For companies that are already operating with international IoT connections, eSIM offers a cheaper, more convenient alternative for operating this area of their business. Corporations that have not yet deployed an international IoT solution, should feel encouraged to move forward knowing that there is now a method for doing so in an affordable and efficient manner.
T-Mobile presented the eSIM for M2M devices in February 2014—initially for the U.S. and Canada and is in the process of securing network relationships with carriers around the world for a global eSIM.

Ahead for the M2M … and the eSIM

As the problem of international roaming charges is made a thing of the past by eSIM technology, opportunities for M2M technology to audiences across the world will only continue to expand. Just consider some of the groundbreaking consumer goods that have recently arrived in the market or are on the immediate horizon—mobile wearables for example. These products include smart watches which can be used to track fitness and measure exertion levels, or eyeglasses with virtual reality screens as well as products that are more imaginative. In 2014 for instance, the giant Japanese electronics company Sony applied for a U.S. patent on a "SmartWig." The product will have sensors for monitoring blood pressure and brain activity and might even help the blind find their way around.

Whether or not Sony's SmartWig has a viable future remains to be seen but it's a virtual certainty that some mobile wearables will become as common and popular as Smartphones are today. ABI Research estimates that the number wearable wireless devices for sports and healthcare will grow to 169.5 million devices by 2017. By and large, these will also be the kinds of devices people will wish to take along when they travel. In order to conveniently (and inexpensively) enjoy a full range of smart mobile functionalities, eSIM may be the most viable solution available today.

As the example of mobile wearables demonstrates, imagination may be the only limit to how M2M technology might be manifested. And just as smart devices will proliferate for personal usage, completely different M2M incarnations will become common in varied industrial and business settings. In anticipating tomorrow's smart devices, we see the rapid transition from SIM to eSIM as inevitable.

www.wyless.com