GSMA: Driving Innovation in Connected Living

The US flags the future of M2M

FOREWORD

Machine-to-machine (M2M) connections accounted for 2.8% of all global mobile connections, or 189 million, at the end of 2013, according to GSMA Intelligence. That figure indicates that the sector is still at a relatively early stage in its development. In the longer term, M2M will have a fundamental impact on the way we live and work, reducing waste and inefficiencies and delivering major social and environmental benefits in security, healthcare, transportation and logistics, education and energy, amongst many other sectors of the economy.

The US is one of the largest M2M markets in the world with 35 million connections and 19% of all global M2M connections at the end of 2013. GSMA Intelligence expects that figure to rise to 41 million this year, or 10% of all mobile connections in the country. It is also one of the most advanced markets with M2M solutions and services used in many different sectors of the economy such as utilities, automotive, logistics and energy. There remains significant scope for growth in the US - it is still a nascent market and faces significant challenges around the need for nationwide standardization, regulatory clarity, the development of new business models and technology fragmentation.

The GSMA's Connected Living Programme is designed to help operators add value and accelerate the delivery of new connected devices and services in the M2M market. We believe close industry collaboration, appropriate regulation and network optimisation will be required to support the growth of M2M. To that end, we are working closely with operators in the US and elsewhere to deliver our vision of mobilising the Internet of Things that will bring numerous socio-economic benefits to citizens and businesses alike.

This report investigates why the US is at the vanguard of M2M, the opportunities for further expansion and crucially how the operators themselves are unlocking more value for M2M customers.

Graham Trickey
Head of Connected Living,
GSMA

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Executive summary

The US is one of the largest and most advanced Machine-to-Machine (M2M) markets in the world. M2M accounts for one in ten mobile connections in the US, compared with one in 20 in Oceania and Europe, and one in a hundred in Africa. In the US, M2M solutions and services are widely used in many different sectors of the economy. Utilities, automotive makers, logistics companies and the energy sector are all major users of M2M. GSMA Intelligence expects there to be 41 million M2M connections by the end of 2014 (up from 35 million a year earlier), driven in large part by growth in the automotive and connected home sectors.

The role of mobile operators

Home to many of the world's leading technology companies, the US is a far from typical M2M market. An array of start-ups, systems integrators, software companies and hardware vendors are very active in the US M2M sector, sometimes co-operating with mobile operators and sometimes competing with them. As they seek to address the specific needs of various vertical sectors, the US telcos are forming both strategic alliances and tactical partnerships with industry specialists.

Challenges

To fulfill its potential, the analysts and industry participants interviewed for this report said the M2M market in the U.S. will need to overcome a number of significant challenges, including:

- **Market fragmentation and complexity:** Some sectors, such as automotive, healthcare and smart homes, are adopting a wide range of proprietary solutions making it difficult for the industry to interoperate.

- **A lack of regulatory clarity:** In some sectors, such as healthcare, there is a need for greater clarity around liability.

- **More partnerships between the public and private sectors:** There is relatively little co-operation between the private and public sectors in many parts of the economy.

- **Specialist M2M modules:** There may be a need for more specialist M2M modules designed for specific vertical sectors.

- **Cost of LTE modules:** There is extensive LTE coverage in the US, but 4G modules are still significantly more expensive than 2G and 3G equivalents.

- **Network migration:** Many of the M2M solutions already deployed in the US will need to migrate to use 3G or 4G networks, as 2G networks become obsolete.

- **Need for new business models:** In some sectors, such as automotive and healthcare, analysts say the existing business models for M2M solutions are emerging and need to be strengthened in terms of suitability for deployment.

Growth drivers

Despite the challenges identified above, the US M2M market will continue to see strong growth. Here are some of the key growth drivers identified by the experts interviewed for this report:

- **Consumer demand:** As they become accustomed to digital commerce, consumers expect companies to offer personalised, real-time services enabled by M2M connections.

- **Semi-autonomous vehicles:** The US automotive and software industries are in the vanguard of efforts to develop vehicles that are less reliant on a human driver.

- **Health and wellness:** There is growing consumer interest in the use of wearable devices, such as wristbands and connected watches, to monitor activity levels and other health-related attributes.

- **International expansion:** US-based companies expanding abroad are likely to call on US-based operators to expand their M2M solutions to other markets.

- **New operating models:** As the benefits of M2M solutions become clearer, companies across the economy will increasingly adapt their operating models to incorporate M2M technology quickly and efficiently.

INTRODUCTION – THE RISE OF CONNECTED LIVING

Organisations and individuals can now use wireless networks to remotely monitor and control an array of machines, vehicles and devices. Mobile technologies are enabling continuous monitoring of chronic diseases, enhanced personal security, smart energy meters, in-vehicle navigation, freight tracking, anywhere learning, remote controlled irrigation systems and many other life-enhancing innovations.

As well as facilitating improvements in efficiency and effectiveness, the real-time information captured by connected devices is beginning to flow into an "Internet of Things" that promises to generate valuable insights for both private companies and public administrations. The Internet of Things describes the coordination of multiple machines, devices and appliances connected to the Internet through multiple networks. These devices include smartphones, tablets and consumer electronics, and other machines, such as vehicles, monitors and sensors equipped with machine-to-machine (M2M) communications that enable them to send and receive data using mobile connectivity.

Drawing on interviews with mobile operators, industry analysts and technology vendors, this report explores the development of M2M in the US market, which is now in the vanguard of mobile technologies and services. Many of the M2M solutions being deployed in the US involve sophisticated propositions combining the skills and assets of mobile operators with those of specialist platform and service providers.

The report also outlines which sectors of the US economy – the world's largest - are extracting the most value out of M2M solutions. It then describes the different strategies of the US mobile operators, while considering the importance of partnerships and the role of the public sector. Finally, the report considers the future of M2M in the US, signposting potential that need to be addressed as well as growth drivers.

The GSMA is actively supporting the deployment of M2M solutions in the US and elsewhere. The GSMA's Connected Living programme is helping mobile operators accelerate the delivery of new connected devices and services in four ways:

- **IoT Connection Efficiency:** The GSMA works with its ecosystem partners to establish guidelines for how machines should communicate via mobile networks in the most intelligent and efficient way.

- **Future IoT Networks:** The GSMA is working to establish common capabilities among mobile operators to enable a network that supports value creation for all stakeholders.

- **Remote SIM Provisioning for M2M:** The GSMA's vision is to unite all stakeholders behind a single, common and global specification to help accelerate the growing M2M market.

- **IoT Business Enablers:** The GSMA is working to create a sustainable M2M environment that enables operators to unlock the consumer and business benefits of the IoT.

MARKET OVERVIEW

The US is one of the largest and most advanced M2M markets in the world. M2M accounts for one in ten of all mobile connections in the US. By contrast, the ratio in Europe and Oceania is one in 20, and only one in a hundred in Africa. There were approximately 35 million M2M connections in the US at the end of 2013, second only to China (50 million), according to Sylwia Kechiche, Senior Analyst M2M, GSMA Intelligence. This number is expected to climb to 41 million by the end of 2014 driven in large part by growth in the automotive and connected home sectors, GSMA Intelligence predicts.

In the US, M2M solutions and services are widely used in many different sectors of the economy. Utilities, automotive makers, logistics companies and the energy sector are all major users of M2M.

Yet, the M2M market in the US (as elsewhere) is still immature in terms of standardization and interoperability. In some sectors, there is considerable technology fragmentation, limiting economies of scale and the rate of growth of the number of M2M cellular connections. Moreover, parts of the US economy, M2M solutions and services face significant barriers. For example, M2M has yet to gain significant traction in the enormous US healthcare sector, which accounts for almost 18% of national GDP. The use of M2M in healthcare has been held back by technology fragmentation and a lack of regulatory clarity. Potential service providers face concerns about the privacy and security of patient data, reimbursement and liability and the reliability of connectivity.

UTILITIES

The US is moving faster than most other countries to deploy smart grids that use connected smart meters to track energy consumption in real-time and enable a homeowner or business to remotely monitor their use of power. By the end of 2012, the 533 electric utilities in the US had installed more than 43 million smart meters of which 89% were in residential properties.

Typically large companies serving millions of households, utilities represent major customers for M2M service and technology providers and present an opportunity to generate economies of scale. There are approximately 115 million households in the US, according to the US Census Bureau, and millions more commercial buildings.

In many cases, smart meters may be integrated into a broader home automation system that enables the householder to use a gateway to remotely control heating, air conditioning, lighting and even individual appliances, such as security cameras or burglar alarms.

There were approximately 2.3 million smart home installations in North America in 2013, a 66% increase year-on-year, according to research firm Berg Insight, which has forecast that there will be 12.8 million smart home installations in North America per year by 2017. The European market for smart home systems is about three years behind North America in terms of penetration and market maturity, according to Berg.

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- Sylwia Kechiche, Senior Analyst M2M, GSMA Intelligence.

🚗 AUTOMOTIVE

There are more than **250 million motor vehicles** on US roads , reflecting both the size of the country and many Americans' preference for private cars over public transport.

There is growing demand from both consumers and businesses for vehicles to use connectivity to reduce fuel consumption, maintenance and insurance costs, while increasing safety. Connected cars can help drivers to avoid congestion and take advantage of pay-as-you-drive insurance subscriptions, which offer lower premiums to safety-conscious motorists. Similarly, connected cars can call emergency services in the event of an accident and help manufacturers maintain an ongoing relationship with customers, providing proactive maintenance, for example.

The US was one of the first countries in the world to deploy connected cars. General Motors' OnStar service, which connects vehicles to a range of services, was first launched in 1996 and has progressed to its ninth generation of hardware. Other automakers are also increasingly equipping mid-range and premium vehicles with connectivity.

"The US leads in terms of adoption of M2M in the automotive sector, especially in the embedded telematics segment," says Sylwia Kechiche of GSMA Intelligence. "Automotive is by far the largest opportunity. According to the OICA, in 2013, there were 15.9 million new passenger and commercial vehicles sold/registered. Even if a small percentage of those is connected using embedded telematics it gives an ample growth opportunity." Sara Kaufman, Research Analyst, Industry, Communications & Broadband at Ovum, adds: "There is a swelling interest among the insurance industry, as well as car manufacturers, to build M2M services around vehicles. Progressive Insurance has been most active in this area, but others are also looking to establish usage-based insurance plans for customers...For car manufacturers the interest is more around securing a service contract relationship with customers and the associated recurring revenues from those types of services."

🚚 FLEET MANAGEMENT

The US was one of the first markets in the world to see widespread use of fleet management systems, which enable logistics companies to track individual vehicles and their cargoes. A haulage company can use mobile connectivity to monitor when vehicles need to be serviced and check that drivers are obeying speed limits and following the optimum route. They can also help ensure drivers comply with new rules on how many hours they can spend on the road.

Research firm Berg Insight has forecast that the number of fleet management systems deployed in commercial vehicle fleets in North America will reach 6.8 million by 2017, up from 3.3 million at the end of 2012. Berg says the leading solution providers, including Omnitracs, Trimble, Fleetmatics, Zonar Systems and Telogis, have more than 200,000 active units each.

The fleet management sector encompasses both customised high-end systems (generally sold via consultative direct sales processes) and standardised solutions, which tend to be sold via resellers. Mobile operators have become an increasingly important sales channel in the Americas, according to Berg.

🛢 OIL AND GAS EXTRACTION

The US oil and gas industry is expanding rapidly as energy companies move to exploit reserves trapped in shale rock, as well as conventional reserves. The energy sector is increasingly turning to M2M solutions to help improve safety, address environmental concerns, comply with regulation and improve operational efficiency. M2M technologies and services are used to remotely monitor and control drills, wells and pipelines, detecting leaks and safety issues. "Booming production volumes of shale gas and tight oil in North America has increased the use of wireless M2M solutions in the upstream segment," says Johan Svanberg, senior analyst, Berg Insight, which describes North America as the most advanced market for M2M applications in the oil and gas sector.

Sierra Wireless, Digi International and Calamp are among the companies providing specialist M2M solutions to the energy sector. Global technology and automation companies, such as General Electric, Rockwell Automation and Schneider Electric, have also made substantial investments in SCADA and wireless M2M solutions aimed at the oil and gas market in recent years, according to Berg.

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OPERATOR FOCUS

The major US telcos have long recognised that they need to offer far more than connectivity if they are to fully realise the opportunities presented by growing demand for M2M. AT&T and Verizon, for example, have both worked with specialist companies to develop sophisticated M2M platforms supporting, a range of business models, data analytics, global roaming and other advanced features.

As highlighted in the global forecasts from research firm Ovum (see graphic), the majority of M2M revenues are likely to come from the provision of applications and systems integration built on top of the connectivity. The leading US telcos are pursuing these opportunities and the associated revenues, but the extent of the operator's role varies significantly depending on the application, how many partners are involved, and the value each of the parties provides.

Figure 1: M2M revenues by service layer 2013-19
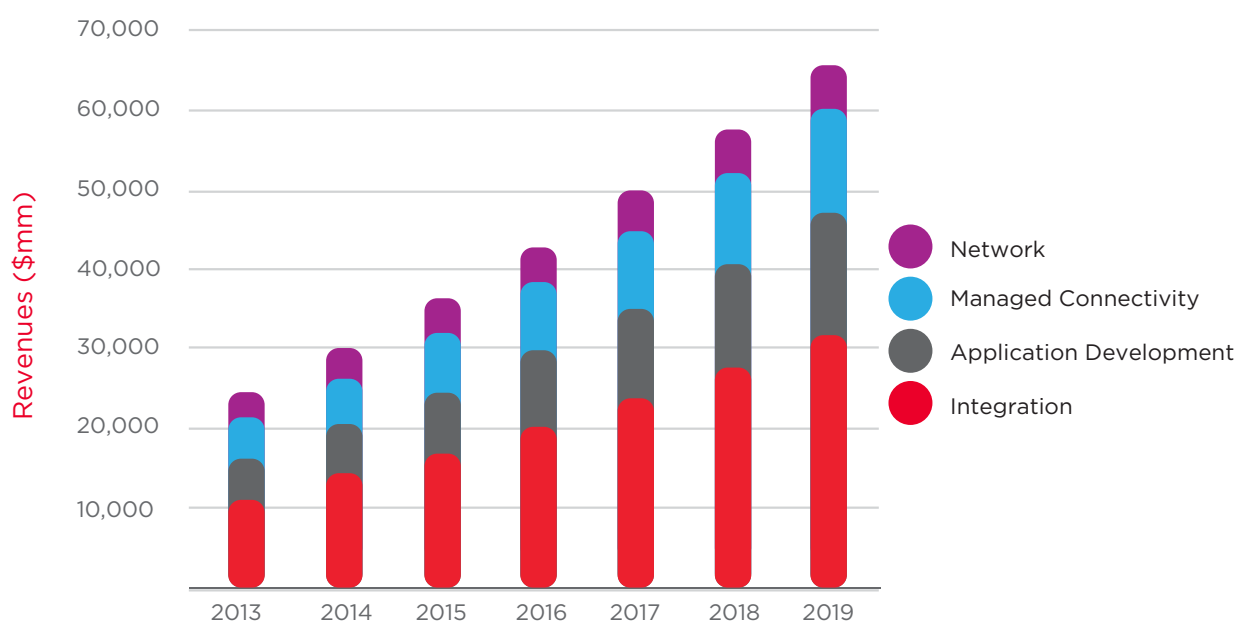
Source: Ovum

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AT&T

AT&T, the largest telco in the US in terms of revenue, has been developing and rolling out M2M solutions for more than a decade. Since 2005, AT&T has certified more than 1,450 connected devices for use on its network. The result is a large and growing M2M business. In a July 2014 interview with Mobile World Live, Sean Horan, Director of M2M Business Development at AT&T, said there are 17 million connected M2M devices on AT&T's network.

In 2009, the telco formed a pivotal multi-year strategic agreement with M2M specialist Jasper Wireless, establishing the AT&T M2M Control Centre (see the ecosystem section for more about Jasper). Through this control centre, AT&T offers global connectivity (coverage in more than 200 countries) with a single SIM, access to a cloud-based single SIM management portal, real-time provisioning, diagnostic and developer tools and the ability to remotely control devices deployed in the field.

Horan told Mobile World Live there is strong demand among multinationals for the M2M global SIM. "Enterprises can put business rules in place to deploy and automate those services throughout the world," he added. "It is not just about connectivity, it is about a platform that enables you to manage SIMs from one global portal, from one unified billing contract, in 500 plus carriers in over 200 countries."

AT&T has also progressively expanded its suite of tools designed to enable developers to create M2M applications. In 2010, for example, AT&T and Ericsson announced the AT&T Connection Kit for device developers, which enables apps to be integrated into AT&T's mobile network with emerging and machine-to-machine (M2M) devices. Moreover, in January 2014, AT&T unveiled a cloud-based M2M "developer sandbox," called the AT&T M2X Developer Kit, which enables application and device developers to connect, store and share data.

In February 2013, AT&T said it would make it easier for businesses to remotely manage and monitor their global M2M connections with a new central reporting wireless console available with the AT&T M2M Application Platform supplied by Axeda. The platform includes software agents, application programming interfaces (APIs) and development tool kits. Horan said it is designed to enable developers to reuse large amounts of code across different sectors. "We believe a platform approach will help avoid silo applications," he explained. "With an application development platform...then you are able to consolidate and quickly move to other verticals."

Moreover, AT&T is working with IT companies to enable the data collected by M2M solutions to be aggregated and analysed to generate valuable insights. For example, early in 2014, AT&T announced a partnership and global alliance agreement with IBM to develop processes and solutions to support the ''Internet of Things''. The companies aim to combine their cloud, security and analytics platforms to gain more insight from the data collected from machines.

> "Traditional security and monitoring services will continue to grow as these systems become easier for consumers to use through connectivity with their smartphones and other devices,"
>
> - Cameron Coursey, Vice President, Product Development, AT&T.

Driving the digital life

AT&T is also developing M2M solutions aimed directly at consumers. In April 2013, AT&T launched its Digital Life offering – essentially a M2M home security and automation solution. Customers can choose from two base plans: Simple Security, a basic home security package; or Smart Security that includes enhanced security features and the option to add home automation. The package includes 24/7 home monitoring, 24-hour battery backup, a wireless keypad, keychain remote, recessed sensors and an indoor siren.

"Traditional security and monitoring services will continue to grow as these systems become easier for consumers to use through connectivity with their smartphones and other devices," says Cameron Coursey, Vice President, Product Development, AT&T. "Home automation will be layered on top of security and monitoring, as well as offered separately. Rules engines and smart sensors will make it easier for consumers to control their homes, and interoperable sensors and devices will become easier to self-install and use."

Kristin Paulin, Senior Analyst, Americas, Ovum, notes that AT&T is creating a smart home platform that developers can enhance with complementary applications. "Now, with their Digital Life home security and automation, they are again opening it up to third parties to innovate new applications to add to Digital Life," she notes.

AT&T also has an increasingly sophisticated connected car offering. AT&T Drive is a modular connected car platform that aims to package connectivity, billing, data analytics and infotainment for automakers and developers. The carrier has teamed up with QuickPlay Media to launch a live linear TV and video-on-demand streaming services to automakers collaborating with the operator in the AT&T Drive Studio. "Our studio enables automakers to come in and experiment with new applications for their customers," said Horan. "We have had take up from Tesla, BMW, Volvo and Nissan."

"The vehicle manufacturers have realized that they can offer better customer service, such as vehicle diagnostics and firmware updates, by connecting the vehicles," adds Cameron Coursey, Vice President, Product Development, AT&T. "They can also offer safety and security services through connectivity that makes customers "stickier" to the vehicle manufacturer and can be a source of additional recurring revenue. Finally, infotainment services provided in combination with mobile operators can differentiate vehicle manufacturers in the market."

AT&T also has vertical M2M solutions tailored to the needs of the transportation, logistics and energy sectors. Moreover, it has established M2M professional service teams that can provide architectural design services, deployment services and lifecycle management

Analysts say that AT&T's success in the M2M market is down to two factors: An early start and an ability to build exclusive and mutually-beneficial partnerships within the ecosystem. AT&T had a head start over other operators in developing a range of form factors, according to Sara Kaufman, Research Analyst, Industry, Communications & Broadband, Ovum. "Its early head start has also been fruitful in terms of developing the right relationships with partners – device partners. This has also given it more room to experiment with different relationships and business models. So it is the number and variety of devices, but also the experience it has gained in developing successful partnerships."

Daniel Ramos, senior consultant at Pyramid Research, attributes AT&T's success to its extensive roaming agreements, which has enabled it to gain a strong foothold in the cargo and air transportation sectors, and the fact it can work out revenue sharing agreements with third parties and get to market quickly.

VERIZON

Verizon, one of the largest telcos in the US, provides broadband and other wireless and wireline communications services to consumers, business, government and wholesale customers. As well as serving 104.6 million wireless retail connections in the US, Verizon provides converged communications, information and entertainment services over its fiber-optic network, and delivers integrated business solutions to customers in more than 150 countries. In January 2012, Verizon established Verizon Enterprise Solutions to offer industry-specific solutions and a range of global wholesale offerings via mobility, cloud, strategic networking and advanced communications platforms.

In 2009, Verizon and leading chip maker Qualcomm formed the nPhase joint venture to offer M2M solutions, as well as smart services, across multiple markets, including healthcare, manufacturing, utilities, distribution and consumer products. One year later, Vodafone, Verizon Wireless and nPhase announced a strategic alliance to provide global M2M solutions. And in 2012, Verizon purchased the remaining 50 percent of nPhase.

Today Verizon, together with its strategic provider ecosystem, offers end-to-end M2M solutions designed to make a wide variety of private and public sectors more efficient and more competitive. Verizon's M2M portfolio includes dedicated asset tracking, remote monitoring, fleet management, smart cities, peer-to-peer sharing, smart energy, automated retail, digital signage, intelligent rail, wireless ATMs, virtual health, security and telematics solutions.

For example, Verizon Telematics, formerly Hughes Telematics Inc., delivers connected services through a flexible telematics platform designed to enable the quick adoption of new services and products. Verizon's telematics division offers services tailored to different industries through three primary portfolio offerings:

- ■ White label Products (OEM) – Verizon Telematics provides a suite of telematics services for automotive manufacturers, including Mercedes-Benz and Volkswagen.

- ■ In-Drive – an aftermarket solution offering safety and diagnostic telematics services for vehicles, including those enrolled in State Farm's Drive Safe and Save program.

- ■ Networkfleet – provides fleet management solutions designed to enable government agencies, businesses, and enterprise fleets to control costs, boost productivity, and operate their fleets more efficiently.

In a September 2014 speech to the Intelligent Transport Systems (ITS) World Congress Detroit, Lowell C. McAdam, Chairman & CEO of Verizon, described how the telco is working with its partner network to offer smart parking solutions in US cities, such as Indianapolis, Washington DC, New Brunswick and Ellicott City, Maryland. "These systems use sensors connected to a wireless gateway to help drivers find parking spaces, pay for them with their wireless phones and reduce the wasteful circling that clogs city streets and frustrates drivers," McAdam said. "We have a growing expertise in big data analytics – led by the former head scientist for NASA – to turn the data collected by the Internet of Things into intelligence that leads to smarter, more efficient systems," he added.

McAdam also told the Congress that Verizon is starting to embed connections into the public infrastructure itself, to help create smarter, greener public spaces and architecture. "We've partnered with a company called Big Belly Solar to put solar-powered trash compactors in cities around the country, with wireless connections that tell the city when the trash needs to be collected," he said. "In Boston, we teamed up with local entrepreneurs from the MIT Media Lab to install solar-powered smart benches, which charge your phone and monitor environmental conditions."

ENABLING EASTERN MUNICIPAL WATER DISTRICT TO BECOME MORE EFFICIENT

Located in drought-stricken Riverside County, California, the Eastern Municipal Water District (EMWD) provides fresh and recycled water and wastewater services to a 555-square-mile area. Forced to establish mandatory water usage restrictions, EMWD needed to reduce operating and labor costs to make up for shrinking revenues from lower customer consumption.

One of the agency's initial goals was to make more efficient use of its 350-vehicle fleet. "When the district extended the criteria for vehicle life from 10 years/200,000 miles to 12 years/250,000 miles, we began a study that covered all aspects of fleet management and efficiency," says Mark Iverson, EMWD Maintenance Director.

EMWD installed Verizon's Networkfleet solution on all 1996 or newer vehicles. EMWD can now remotely monitor engine diagnostics, fault codes, and emissions control system status. For example, EMWD staff now receive an immediate alert when there is an engine problem, allowing them to proactively repair the vehicle before the problem worsens. "Networkfleet also automatically collects emissions data, which eliminates the need to bring vehicles in for biennial smog checks," Iverson says. "Proactive maintenance and automated smog checks save both time and money."

EMWD initially focused on drivers' habits, such as speed and idle time, which have a major impact on fuel usage. For example, supervisors receive alerts from Networkfleet if drivers exceed a certain speed limit. This measure has improved miles per gallon while reducing the risk of speed-related accidents.

Since supervisors can now log into Networkfleet to view a GPS-based map of vehicle locations, they can dispatch the vehicle closest to an emergency or other work not scheduled in advance. Within the first six months of operation, employees drove about 165,000 fewer miles, and fuel costs declined by about $79,000 year-on-year.

Improved routing has also resulted in less time behind the wheel, giving EMWD employees more time to focus on work-related tasks. The payoff has been a significant reduction in the backlog of work and productivity savings valued at nearly $354,000 in the six months alone. Reducing the fleet's total miles driven and idle time has also resulted in a reduction in greenhouse gases.

EMWD says its employees benefit as well. "GPS readings can prove drivers were not speeding at the time of an accident," Iverson adds. "Employees who go on remote service calls at all hours gain peace-of-mind by knowing that Networkfleet can pinpoint and track their location information."

SPRINT

Sprint, the third largest telco in the US, works with an extensive network of partners to offer M2M solutions to the automotive, insurance, retail, transportation, utility and healthcare industries, among others. Now serving more than six million connected devices in the M2M market, Sprint says it is seeing growth of 36% year-on-year in this sector.

"We were pioneers in the early development of telemetry solutions," says Mohammad Nassar, Director, M2M Product and Marketing, Sprint. "About four years ago, our ecosystem was huge with over 400 partners at one stage. However, about two years ago we retrenched a bit to focus on a more defined go-to-market strategy in M2M."

Sprint is now taking a "three-legged stool approach" in this sector: The first leg is 'enablement' - access and connectivity to the internet. The second leg is the provision of 'off-the-shelf' package solutions to security, utilities, healthcare and other sectors through partners. The third leg is the development of customised solutions for customers seeking differentiation.

"We have the Sprint Command Centre that we launched about four years ago that is used to connect and manage M2M solutions," says Nasser. "We are not going to become a dumb pipe - selling more than just access moves us up the value chain into priority segments - areas where we feel we can be successful.

"Our priority segments are firstly transportation, such as fleet management, commercial vehicles, vans, ambulances - essentially anything that moves on wheels. Secondly, the retail segment, where our customers include Vantiv, Mako and Spot Labs. We are involved in everything from beacons for loyalty programmes to digital signage to point-of-sale at check out, credit cards and access management: We develop true end-to-end solutions. Insurance is our third largest area, such as usage-based insurance and distracted driving solutions. Finally, the connected vehicle space, through Sprint Velocity."

Developed in conjunction with Chrysler and launched at the 2012 Los Angeles International Auto Show, Sprint Velocity is designed to be a global end-to-end telematics solution, supporting embedded connectivity, smartphones and hybrid solutions, as well as telematics control units, on-board diagnostic devices and embedded in-dash head units. Sprint says its Velocity platform enables this connectivity through an open, cloud-based architecture with standard M2M interfaces.

Sprint Velocity works with automakers to analyse usage trends and other connected services data, which can be used to steer product improvements, reduce operation costs, and potentially increase revenue opportunities. Sprint says it can customise solutions to each automaker's specific needs and then deploy those solutions either before or after a vehicle is sold. Automakers can use the Velocity platform for subscription management, storefront, policy management and billing.

M2M specialist CalAmp provides a Sprint Velocity-compatible connectivity device that plugs directly into a standard vehicle interface, while Rogers Communications provide end-to-end connectivity in Canada for the Sprint Velocity solution.

"Sprint is focused on growth markets that are cost effective," says Nasser. "We still see big opportunities in transportation as currently only 25% of the fleet is connected. There is also good growth in energy, but we are only focusing on it from an enablement perspective – we see the things that enable energy to connect the grid and operate and retackle that access."

In the energy sector, Sprint has teamed up with Metrum Technologies, LLC, Power Insight and Tollgrade Communications, Inc. to help electric utilities improve the efficiency of distribution and management systems. Metrum's smart meters are available with Sprint wireless connectivity, and Tollgrade offers Medium Voltage sensors with Sprint wireless connectivity to provide fault detection and location, asset management, load monitoring and power quality information for utilities in urban and rural locations.

"Partnerships are crucially important in growing the business," concludes Nasser. "It is one of our pillars. At Sprint, we value these partnerships so much."

T-MOBILE USA

T-Mobile USA, the fourth largest US mobile operator, works closely with specialist partners, such as RacoWireless, Wyless and Jazz, in the M2M market. While T-Mobile has dealt directly with some larger M2M customers, such as Audi, its partners interface with smaller M2M customers, providing them with T-Mobile SIM cards, rate plans, static and dynamic IP addresses, access to the T-Mobile network via an access point name (APN), and technical and customer support.

T-Mobile says its T-Mobile M2M Hub enables customers to manage their M2M business through a single online portal, which supports customizable bill creation, API integration, SIM management, reports and customer care. The subsidiary of Deutsche Telekom also offers the eSIM – "the Uncarrier as as SIM solution that eliminates international roaming costs (on supported carriers) and simplifies inventory management", as well an Enhanced SIM made of rugged plastic that can withstand temperature fluctuations and an Embedded SIM "chip", designed for industrial requirements.

In December 2013, Deutsche Telekom and telematics provider Un-Blinking Technologies (a division of SkyTrace Inc.) launched a M2M solution with functionality tailored to the needs of car dealers and their customers. Deutsche Telekom said the solution enables car dealerships to offer value-added services, such as remote diagnostic information, to purchasers of any vehicle and maintain an active relationship with their clients on an on-going basis.

Deutsche Telekom provides both the telemetry hardware for the vehicles as well as the SIM-cards and data connections. Un-Blinking Technologies supplies Android and iPhone apps, along with a Web portal to give customers access to data generated by their vehicles. Deutsche Telekom and Un-Blinking plan to introduce the product to 300 additional car dealerships across the US

In May 2014, Deutsche Telekom and automotive supplier Continental launched a truck fleet management system in the US, Canada and Mexico. Fleet operators and haulage firms can use the system to track their trucks online and better coordinate their assignments. "RoadLog OnLine" connects trucks with Deutsche Telekom's Business2Car platform via the mobile network. An online user portal enables haulers and fleet operators to view vehicle-related data at any time, plan efficient vehicle routes, optimise fuel consumption and give customers more accurate forecasts of delivery times.

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- Mohammad Nassar, Director, M2M Product and Marketing, Sprint

THE US M2M ECOSYSTEM

The US is the home market of scores of M2M specialists. This section looks at the role of several of these specialists in the development of the US M2M market.

Jasper Technologies, Inc.

Mountain View, California-based Jasper provides cloud-based platforms to support the Internet of Things. Jasper says that more than 1,500 companies have chosen the Jasper platform to help them launch, manage and monetize their IoT service businesses. Some 21 mobile operator groups on six continents, representing more than 100 network affiliates, currently partner with Jasper.

In 2009, AT&T and Jasper announced a partnership to connect and support a variety of emerging consumer electronic and business devices on AT&T's mobile network.

The two companies have developed a platform for enterprises – the Control Center - to automate the delivery and management of mobile services to connected devices. The platform is designed to increase service reliability, lower operational costs and easily scale device deployments. It also enables instant activation and flexible rate plans aimed at device manufacturers and end-user customers, including consumers, small businesses and enterprises. Using real-time data, analytics and automation, manufacturers and service providers can gain insights into product performance on the mobile network, and then translate those insights into actions.

Jasper is also involved in the delivery of AT&T Drive, a modular, global automotive platform for developing LTE connected car services, including voice-controlled apps, infotainment and advanced diagnostics services. Jasper says its Connected Car Cloud enables automobile manufacturers to benefit from:

- Control center – built expressly for enterprises managing IoT services, providing operational automation, real-time diagnostics and innovative rate plan management.

- Global SIM – an end-to-end solution enabling manufacturers to manage a single SIM, while maintaining local service from local operators.

- Split billing – enabling differentiated service business models by deploying different services with different policies, rating and billing models through a single SIM and modem inside the vehicle.

- Third party rating – enabling third parties to be charged for data consumption inside the vehicle, relevant to the location and preferences of the car's occupants.

- Automated lifecycle management – managing services, policies and rate plans for all product lifecycle stages from manufacturing to dealer sales to resale and vehicle destruction.

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>
> - Larry Zibrik, Vice President of Market Development at Sierra Wireless

Aeris

Based in Santa Clara, California, Aeris is an M2M communications platform provider, offering customers a core network, billing platform, device management and application platform and portal. It works with a wide range of partners, including Sprint in the US. It sells a complete connectivity solution to enterprise customers, and packages its technology as platform-as-a-service (PaaS) for mobile network operators seeking to build an M2M and IoT business.

Aeris says it offers customers a unified solution, available globally, accessible via a single set of application programming interfaces (APIs) across any wireless technology, including CDMA, LTE, GSM. "The market response to this has been very strong, as this gives our customers the flexibility to choose different wireless technologies across different geographies while maintaining operational simplicity," says Raj Kanaya, Chief Marketing Officer. "To date, Aeris has signed over 50 customers to use our global service and the base continues to grow rapidly."

In February 2014, Aeris announced Aeris GSP - platform-as-a-service cloud platform for mobile operators' IoT/M2M businesses. Included within this offering is AerCloud, an application and analytics platform designed to enable mobile operators to move beyond data delivery and into data intelligence. Aeris claims to be the only vendor with a fully integrated stack from M2M core network through to the application platform.

"We see massive growth potential in automotive, fleet/transportation, health care, utilities, home security, and industrial control/monitoring," says Kanaya. "In some industries (such as the connected car), the M2M business model needs to change in order to reach its full potential, in many other industries, the value proposition and economic value are clear and compelling."

Sierra Wireless

Based in Vancouver, Sierra Wireless is a major provider of M2M devices and related cloud services. It claims to be the leading supplier of embedded M2M modules worldwide with a global market share of 34% in 2013 . All the leading US operators have certified its platforms, while Sierra's customers and partners include Cisco, Chrysler, Honeywell and General Electric. Sierra has also connected its AirVantage M2M cloud service into the infrastructure of leading operators.

"Mobile operators are driving the M2M market direction in the US by positioning specific technologies, whether they be 2G, 3G or 4G," says Larry Zibrik, Vice President of Market Development at Sierra Wireless. "Operators tend to drive areas where there is high scale. However, the vast majority of the M2M market is highly fragmented – operators tend to rely on ecosystem partners to handle the large number of small to medium sized M2M customers."

Sierra says it aligns its product roadmaps to those of the US carriers and works with their corporate and field teams to develop the broader market. For smaller deployments, Sierra offers its AirLink router and gateway solutions, which are designed to enable rapid deployment with low development costs.

Although there are frequent calls for Sierra and other module suppliers to lower their prices to accelerate M2M uptake, Zibrik says there may not be sufficient price elasticity in the market to justify such moves. "The gut reaction is that lower module pricing will result in increased volumes – this is misleading and people follow it too quickly," he says. "Volume and pricing need to be closely coupled to ensure a healthy ecosystem that can provide the appropriate amount of support to ensure successful deployments."

Sierra sees systems integrators playing a pivotal role in driving demand for M2M among US enterprises. "We need to expand system integrator relationships," says Zibrik. "Tell customers of the solution value add offered by wireless connectivity, and it's potential impact on your business. And we need to work with the business information and IT systems already in place as we deploy IoT solutions for enterprises."

GOVERNMENT/REGULATORY SUPPORT

As a general rule, the U.S. government has allowed market forces to shape the emerging M2M sector and deliver new innovations. "Free enterprise is the key driver to success in the M2M space, and the biggest role governments have to play is allocating enough spectrum for the growing demands of wireless connectivity," says Cameron Coursey, Vice President, Product Development, AT&T.

For example, utilities, rather than regulators, have driven the deployment of smart meters, according to Sylwia Kechiche, Senior Analyst M2M, GSMA Intelligence. Although she notes that a few states, such as California, Texas and Ontario, have regulations relating to smart meters in place.

Indeed, state legislators are likely to be important actors in certain M2M sectors. The US Federal system means that key regulations, such as security and surveillance or green initiatives, such as energy savings targets, are often implemented at state level.

Some federal regulations are also having an impact on the M2M sector. For example, analysts say the Hours-of-Service Safety Regulations to Reduce Truck Driver Fatigue introduced in July 2013 have fuelled further sales of fleet management systems. Similarly, environmental and safety regulations in the energy sector are driving the deployment of M2M solutions to support oil and gas extraction.

"There are some areas that are causing us to see an uplift, especially high scale areas, such as regulation in credit card compliance due to FCC mandating and also recording hours of service in trucking," says Mohammad Nassar, Director, M2M Product and Marketing, Sprint.

In the healthcare sector, some analysts say uncertainty around liability and fear of litigation has held back the use of M2M solutions by U.S. healthcare providers. To help innovative solutions reach the market quicker, experts argue there is a need for greater clarity on how medical device regulation applies to mHealth solutions, underpinned by a broad regulatory approach that reflects the level of risk. "Healthcare is another area that has a lot of red tape and suffers a level of cautiousness due to liability and the litigious nature of the U.S.," says Nassar at Sprint.

Still, the US government's ongoing push to extend healthcare provisions may generate the political will to overcome these obstacles. "We could see growth in the healthcare vertical from certain government initiatives such as the US Affordable Care Act, which is about getting all Americans healthcare coverage and lowering costs and improving quality of healthcare," says Kristin Paulin, Senior Analyst, Americas, Ovum. For example, the use of remote monitoring in the US is gaining momentum due to a recent regulatory ruling (part of the Affordable Care Act legislation) that calls for a hospital to pay a fine if a patient who has been discharged from hospital is readmitted in less than 30 days.

"Free enterprise is the key driver to success in the M2M space, and the biggest role governments have to play is allocating enough spectrum for the growing demands of wireless connectivity"

- Cameron Coursey, Vice President, Product Development, AT&T.

THE ROLE OF THE GSMA EMBEDDED SIM SPECIFICATION

The GSMA's Embedded SIM delivers a technical specification to enable the "over the air" provisioning of an initial operator subscription and the subsequent change of subscription from one operator to another. In the M2M market the SIM may not easily be changed via physical access to the device or may be used in an environment that requires a soldered connection, thus there is a need for 'over the air' provisioning of the SIM with the same level of security as achieved today with traditional "pluggable" SIM. It is not the intention for the Embedded SIM to replace the removable SIM currently used as the removable SIM still offers many benefits to users and operators in a number of different ways – for example, the familiarity of the form factor, easy of portability, an established ecosystem and proven security model.

All parties in the M2M ecosystem will struggle if we remain solely dependent upon the traditional SIM card, which is predicated on only associating with one network operator. This is because changing SIM cards is problematical for many business-to-business (B2B) customers, when noting that many M2M devices are remotely located, often hermetically sealed, their after sale location is not known during production and furthermore their product life cycles are lengthy. Many of the interfaces and processes needed to make the remote provisioning of SIMs work are virtually identical to current SIM personalization processes and interfaces used by mobile network operators today.

Without a standardised subscription management architecture each Network Operator may develop proprietary technical solutions for the remote personalization of their SIMs. Difficulties would then arise when trying to switch a device which contains a remotely provisionable SIM between two operators who had implemented fundamentally different technical solutions based upon their proprietary requirements.

Developing a standardised subscription management architecture based upon common requirements would resolve such issues whilst at the same time reducing cost and complexity. A standardised solution will also drive the necessary 'economies of scale' to ensure the successful deployment of this type of SIM to the market.

The GSMA has worked with operators and SIM suppliers from around the world to create a common, secure, interoperable architecture to facilitate the commercial deployment of systems that enable remote over the air provisioning and management of this new SIM. AT&T recently became one of the first global operators to launch an enhanced Global SIM designed to meet the GSMA specifications for M2M and Connected device manufacturers.

"AT&T recently became one of the first global operators to launch an enhanced Global SIM designed to meet the GSMA specifications for M2M and Connected device manufacturers."

THE FUTURE OF M2M IN THE US

Challenges

To fulfill its potential, the M2M market in the US will need to overcome a number of significant challenges. Here is an overview of the key obstacles identified by the analysts and industry participants interviewed for this report:

- **Market fragmentation and complexity:** In some sectors, such as healthcare, automotive and smart homes, there is a wide range of proprietary solutions in use, which can make interoperability difficult to achieve. A lack of standards encourages the creation of applications that are highly customer-specific to a vertical sector, often involving labor-intensive development by highly specialized integrators and developers with deep vertical knowledge. A scarcity of these developers and the high cost of using them is a drag on the market

- **A lack of regulatory clarity:** In some sectors, such as healthcare, there is a need for greater clarity around liability. Regulators need to find the right balance between safeguarding patient safety and encouraging innovation that could improve the effectiveness of healthcare.

- **Net neutrality and managed connectivity regulations:** There is an ongoing debate in the U.S. about the extent to which telcos should be allowed to manage traffic on their networks. Mobile operators will need the flexibility to efficiently manage the rising number of devices on their networks, while also being able to manage traffic in accordance with specific M2M service requirements. For example, connected medical devices will have very different traffic management requirements to a supply chain solution. Stringent net neutrality rules may limit the use of M2M solutions for "mission-critical" applications, such as the monitoring of heart conditions.

- **More partnerships between the public and private sectors:** There is relatively little co-operation between the private and public sectors in many parts of the economy.

- **Specialist M2M modules:** There may be a need for more specialist M2M modules designed for specific vertical sectors. "We have to play a balancing game where we see different verticals needing different access," says Mohammad Nassar, Director, M2M Product and Marketing, Sprint. "For example, in transportation 1900MHz and 2.5G works outdoors but for smart metering and energy indoors you need 800MHz because of penetration."

- **Cost of LTE modules:** Cameron Coursey, Vice President, Product Development, AT&T, says: "In the US, consumers have come to expect LTE speeds for certain wireless services and would not accept slower speeds, such as for infotainment in a vehicle. LTE will need to ride the cost curves that 2G has and that 3G is doing in order to be more affordable. There are various ways to make LTE less expensive, including LTE-only modules and Machine Type Communications." At the same time, some industry players argue the cost of certifying modules on operators' networks also needs to fall to allow the market to develop.

- **Network migration:** Many of the M2M solutions already deployed in the US will need to migrate to use 3G or 4G networks as 2G networks become obsolete. AT&T plans to switch off its GSM network by 2017, which will force some M2M users to make a decision on whether to continue with 2G GSM with another operator, migrate to CDMA, or migrate to 3G or LTE. However, some operators plan to maintain their 2G networks. "2G is still important – we will keep the 2G network beyond 2020," says Nassar at Sprint. "More of our customers are moving to 3G, but 4G is a little way off for now. M2M works in all the 'Gs', but 2G is still king."

- **Need for new business models:** In some sectors, such as automotive and healthcare, analysts say the existing business models for M2M solutions are immature and need strengthening.

DRIVERS OF GROWTH

Despite the challenges identified above, the US M2M market will continue to see strong growth, according to the analysts and industry participants interviewed for this report. Here are some of the key growth drivers they identified:

- **Consumer demand:** As they become accustomed to digital commerce, consumers expect companies to offer personalised, real-time services. Increasingly, telcos are taking a professional services role helping enterprise customers use M2M to provide new services to consumers in a B2B2C model. For example, an automaker might provide an ongoing maintenance contact with variable pricing based on the customers' driving style and distance travelled. The telco's role here is in enabling the enterprise to change its business model so it can become a service provider in its own right.

- **Semi-autonomous vehicles:** The US automotive and software industries are in the vanguard of efforts to develop vehicles that are less reliant on a human driver. Sylwia Kechiche, Senior Analyst M2M, GSMA Intelligence, says: "Opportunities lie beyond connected car in vehicle-to-vehicle and vehicle-to-infrastructure applications whereby the car is seamlessly talking to traffic lights and parking, changing route if necessary. In Feb 2014, The US Department of Transportation's National Highway Traffic Safety Administration announced that it will begin taking steps to enable vehicle-to-vehicle communication technology for light vehicles."

- **Health and wellness:** There is growing interest in the use of wearable devices, such as wristbands, to monitor activity levels and other health-related attributes. Cameron Coursey, Vice President, Product Development, AT&T, says: "Wearables and mHealth could be on the cusp of significant growth as barriers of size, cost, and usefullness are overcome and consumers see tangible benefits for embracing them."

- **International expansion:** US-based companies expanding abroad are likely to call on US-based operators to expand their M2M solutions to other markets. In some cases, the US telcos may set up new operations to address this demand. For example, in Mexico, a major regulatory transformation is allowing international operators to go into the market and offer services.

- **New operating models:** As the benefits of M2M solutions become clearer, companies across the economy will increasingly adapt their operating models to be able to incorporate M2M technology quickly and efficiently.

The GSMA Connected Living Programme

The GSMA Connected Living Programme is an initiative to help operators add value and accelerate the delivery of new connected devices and services in the M2M market. This is to be achieved by industry collaboration, appropriate regulation, optimising networks as well as developing key enablers to support the growth of M2M in the immediate future and the Internet of Things (IoT) in the longer term.

Our vision

To enable the IoT, a world in which consumers and businesses enjoy rich new services, connected by an intelligent and secure mobile network.

Our Programme:

1 IoT Connection Efficiency: The GSMA works with its ecosystem partners to establish guidelines for how machines should communicate via the mobile network in the most intelligent and efficient way.

2 Future IoT Networks: The GSMA is working to establish common capabilities among mobile operators to enable a network that supports value creation for all stakeholders.

3 Remote SIM Provisioning for M2M: The GSMA's vision is to unite all stakeholders behind a single, common and global specification to help accelerate the growing machine-to-machine (M2M) market.

4   IoT Business Enablers: The GSMA is working to create a sustainable M2M environment that enables operators to unlock the consumer and business benefits of the IoT.

Please visit **www.gsma.com/connectedliving** or email **connectedliving@gsma.com** for further information

About the GSMA

The GSMA represents the interests of mobile operators worldwide. Spanning more than 220 countries, the GSMA unites nearly 800 of the world's mobile operators with 250 companies in the broader mobile ecosystem, including handset and device makers, software companies, equipment providers and Internet companies, as well as organisations in industry sectors such as financial services, healthcare, media, transport and utilities. The GSMA also produces industry-leading events such as Mobile World Congress and Mobile Asia Expo.