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Delivering Energy and
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Virtual Robots

CREATIVE M2M PARTNERSHIPS DRIVE
NEW VALUE FOR **WIRELESS CARRIERS**



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Machine-To-Machine (M2M) applications are a significant opportunity for Mobile Network Operators (MNOs). As traditional person-to-person (P2P) applications - voice, email and text - mature, carriers are searching for new growth. M2M device connection potential dwarfs P2P. However, numerous hurdles have constrained growth in the M2M arena for some time. To successfully develop this market, network operators will need to think and act differently. A renewed focus on developing M2M ecosystems and the critical relationships that will drive value are key to success. Pacific Controls is at the forefront of partner development with network operators for M2M solutions.

Pacific Controls Galaxy & Gbots

Table of contents

01. M2M Market Opportunity	06
Introduction	
Dimensioning The M2M Opportunity	
02. Structure, Forces & Trends In The M2M Marketplace	10
Market Drivers	
Next Generation Cellular M2M Systems Will Drive Growth	
03. M2M Opportunity For Wireless Carriers	16
Rapidly Evolving M2M Market Drives Challenges	
Evolving Market Roles - Carriers [Need To] Get Serious	
04. Key Success Requirements	23
Cellular Operators Need To Address M2M Challenges Head On	
M2M Success Factors For Wireless Carriers	
05. Pacific Controls Drives M2M Services Delivery Innovation	28
Designing A New M2M Partnership Model	
Creative Combinations Will Drive M2M Growth and Value	
Pacific Controls New Platform - Galaxy	
Automating Services Delivery For Smart Connected Things	
The Future of Smart Systems	
06. Conclusions.....	37



About Pacific Controls

This document has been produced by Pacific Controls to aid existing and potential partners in understanding the impact of Machine-to-Machine (M2M) systems and technology - the market potential, evolving application opportunities and

how by partnering with Pacific Controls, cellular network service providers can leverage the significant new opportunities enabled by M2M technology.

01. M2M Market Opportunity

Introduction

Our society is at the cusp of a "perfect storm" of network connectivity. With the rapid growth of wireless networks – from cellular to WiFi to sensor networks – connecting new smart devices to networks is poised for rapid growth. The types of devices being connected today extend far beyond the laptops and cell phones we have become so accustomed to. Today, virtually all products that use electricity possess inherent data processing capability and the potential to be networked:

- Manufacturing equipment, elevators and escalators, appliances and vehicles that know exactly when and why they will fail, and then alert you or your service organization before the failure occurs—or even, in some cases, fix themselves.
- Buildings and facilities with "digital nervous systems" that ensure occupant comfort and safety, and even enhance productivity.
- Retailers and distributors who know exactly where every piece of inventory is at any moment, and under what conditions it arrived.
- Industrial customers who save a fortune on energy by being able to see, in real time, exactly how they're using it.
- OEMs that are not "disintermediated" at the point of sale, but stay connected to end customers via a steady stream of status/usage/performance data.
- Healthcare facilities where accurate, up-to-the-minute patient information is always available because every piece of equipment, from digital thermometers to life-support machines, is networked and associated with a patient ID.

And on, and on, and on. Science fiction? Not anymore. The world's leading cellular network operators such as Verizon Wireless, Sprint,

ATT, Vodafone, Orange and China Mobile are all actively advancing the use of cellular wireless for Machine to Machine (M2M) communications. In many ways, cellular has become the network of choice for smart connected devices in a wide array of applications including automotive telematics, commercial transportation, mobile health, smart grid and consumer electronics -- all due to its pervasiveness and ever lower cost.

Because M2M solutions are very complex and often require many players to perform diverse roles, network service providers that choose to go at it alone will have a hard time solidifying their place in the M2M arena. It is vitally important that business leaders within the cellular network operator community understand this phenomenon, its effects on their business, and what they should do right now to position themselves for opportunities that are literally just around the corner.

This white paper is about a fundamentally different approach to M2M alliances. Pacific Controls is pioneering the convergence of information and communication technology (ICT) in M2M applications to improve efficiencies, reduce costs and improve business performance for customers.

The company is working with wireless carriers today to form partnerships to provide M2M solutions. For the cellular network operator, these new solutions are a critical service line extension to offset saturation in their handset businesses - they expand the scope of value the carrier can provide to customers.

By partnering with Pacific Controls, cellular operators can leverage the significant new capabilities informed by this technology and avoid the significant challenges of trying to offer M2M solutions on their own.



Dimensioning The M2M Opportunity

Smart connected devices are a global and economic phenomenon of unprecedented scale - potentially billions if not trillions of nodes. Soon, any device that is not networked will rapidly decrease in value, creating even greater pressure to be online. Devices will blend into every venue and vast opportunities will arise for companies delivering, managing and responding to the rich media and data being generated. Consider the following:

- Today the number of connected devices on the planet is approaching the number of people - 7 billion.
- Depending on your definition of a sensor, there are already more sensors on earth than people.
- In the long run, the potential number of smart connected devices could increase to a scale that is two orders of magnitude larger than the population - traditional IT and telephony

devices will become a very small portion of the connected world.

- Cellular M2M device shipments are predicted to grow from over 40 million in 2009 to as many as 200 million in 2015.
- Smart devices will enable new services such as status monitoring, usage tracking, consumable replenishment, automated repair, and new modes of entertainment whose value together could reach beyond \$500 billion in value-added revenues by 2015.

As Moore's law persists and the price of integrating intelligence and connectivity into products continues to fall, networked devices will push further and further into the mainstream. This process is self-reinforcing as low prices are driven by high quantities, and vice versa, making intelligent devices increasingly prevalent in our lives and businesses.



Defining M2M Can Be Challenging.....

M2M—also commonly called “ubiquitous” or “pervasive” computing—refers to digital microprocessors and sensors embedded in everyday objects and connected to networks. M2M most often refers to “machine-to-machine”, although mobile-to-machine or man-to-machine are also used to describe this evolving family of technologies.

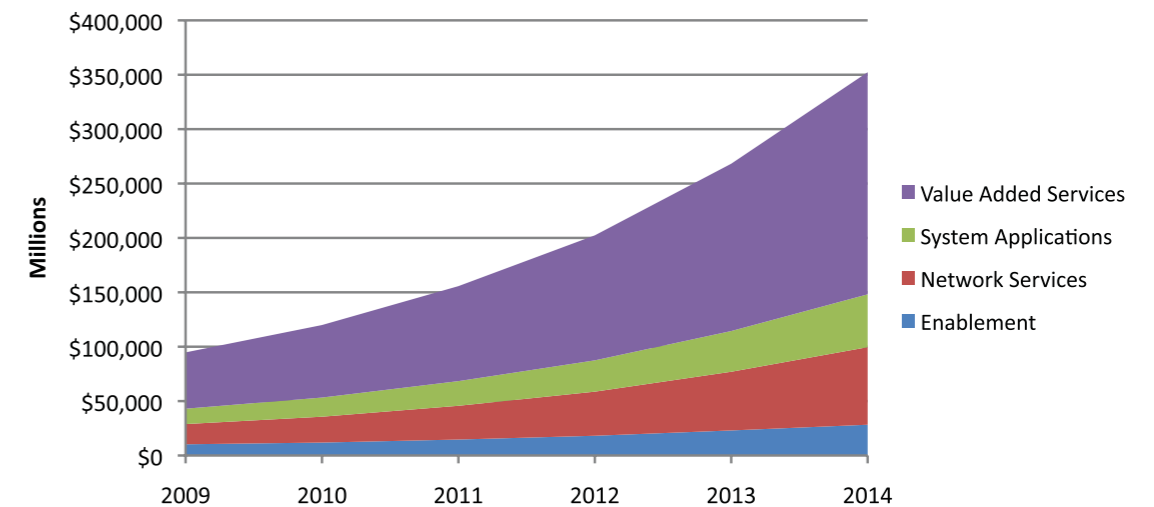
M2M allows information to be exchanged automatically without human intervention, and covers a broad range of technologies and applications which connect the physical world – whether machines or sensors monitoring physical conditions – to a back-end IT infrastructure.

Cellular M2M applications include a SIM card albeit slightly different to the one you have in

your mobile device) that is able to receive and transmit data wirelessly to a central server where it can be analyzed and acted upon. Wireless communications technologies used to enable this connectivity include GSM, GPRS, CDMA, 3G, LTE, or WiFi and WiMAX. Some of these connections occur over a relatively short range, some over a distance of many miles.

Many observers use terms like “mobile connected devices” to include not only M2M, but also new categories of mobile devices such as e-book readers, digital pictures & signage and connected GPS-based tracking devices. These data centric consumer devices, as well as the more traditional machine-to-machine connections, are expected to experience strong growth in the coming years.

Figure 1: Global Smart Connected Device & Value Added Services Opportunity



02. Structure, Forces & Trends In The M2M Marketplace

Market Drivers

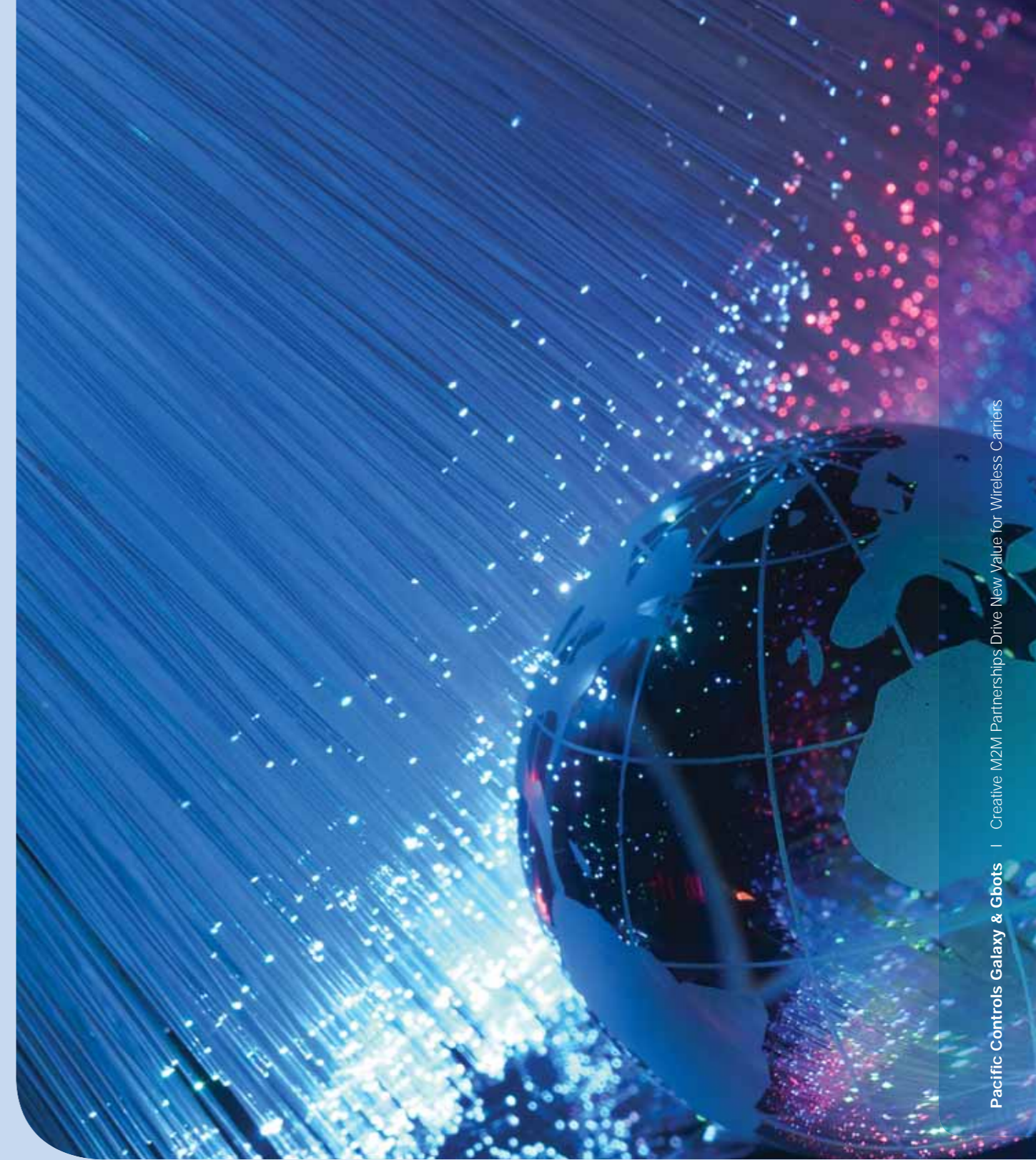
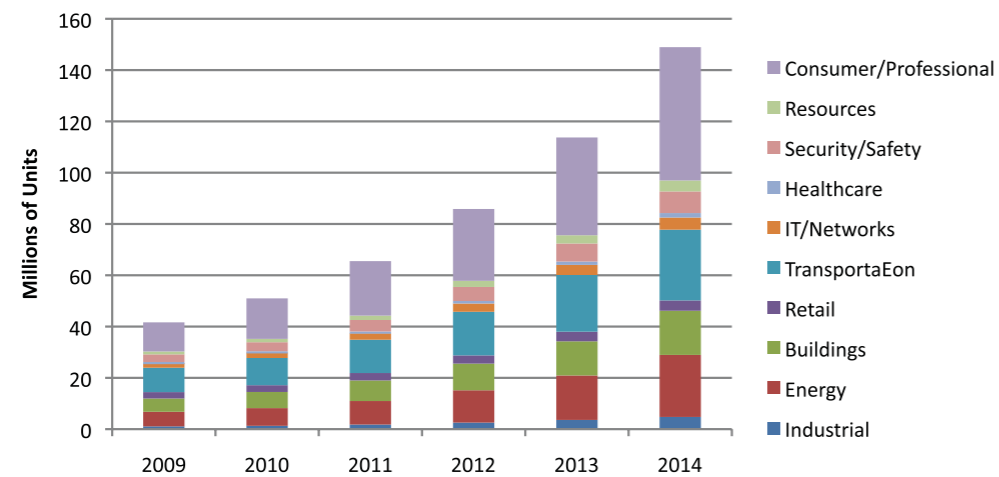
We have now entered the age when everyday objects will communicate with, and control, other objects over networks—24/7/365. This growth in cellular connectivity to machines is being driven by a number of factors on a global basis:

- Mobile network coverage is aggressively being expanded worldwide.
- Telematics and telemetry are increasingly viewed as sources of greater operational efficiency and increased incremental revenue.
- M2M applications are benefiting from R&D and the scale of the mobile handset industry.
- Technical advances in air interface standards are enabling new 3G M2M applications.

- Mobile network operators (MNOs) and Mobile Virtual Network Operators (MVNOs) are seeking to expand their data service offerings.
- Government mandates such as those in the smart grid, healthcare and security are increasingly driving mandates that require the use of wireless M2M technology.

The smart connected device opportunity is reaching a new level of maturity. There is now substantially greater recognition of the technological capabilities and the potential benefits of connecting smart devices than there was even 2 years ago. The immense growth that is just now beginning will continue to accelerate, creating new strains on existing capabilities, technologies and skills.

Figure 2: Global Cellular M2M Opportunity





The Next Generation of cellular M2M systems Will Drive growth

The next cycle of technology and systems development in the M2M arena will set the stage for a multi-year wave of growth based on the convergence of innovations in software architectures; back-room Data Center operations; wireless and broadband communications; and smaller, more powerful client devices connected to personal, local and wide-area networks. These technologies will work together in unprecedented ways to solve more complex business problems than previous generations of intelligent device networking technology.

The rate of investment in M2M is expected to be measurably higher than in maturing IT infrastructure and occur in four key areas:

- **Core Technology & New Application Delivery Platforms:**

Next generation foundation technologies for unified communications, embedded systems/processors and network enablement tools, virtualization technologies, and software infrastructure will be the foundation elements of M2M. Beyond these core technologies, new platform capabilities will revolve around real-time situational awareness and automated analysis. As result, technology moves beyond just proposing task solutions — such as executing a work order or a sales order — to sensing what is happening in the world around it, analyzing that new information for risks and possibilities, presenting alternatives, and taking actions.

- **Purpose-Built Device & Hardware Innovation:** Innovations in new mobile terminals, information appliances and the integration of a broad range of sensing capabilities into intelligent devices will continue to provide an ever broader variety of features that support the integration of digital information and sensory inputs from the physical world. This will broaden the range of possible applications available and also improve the user experience.

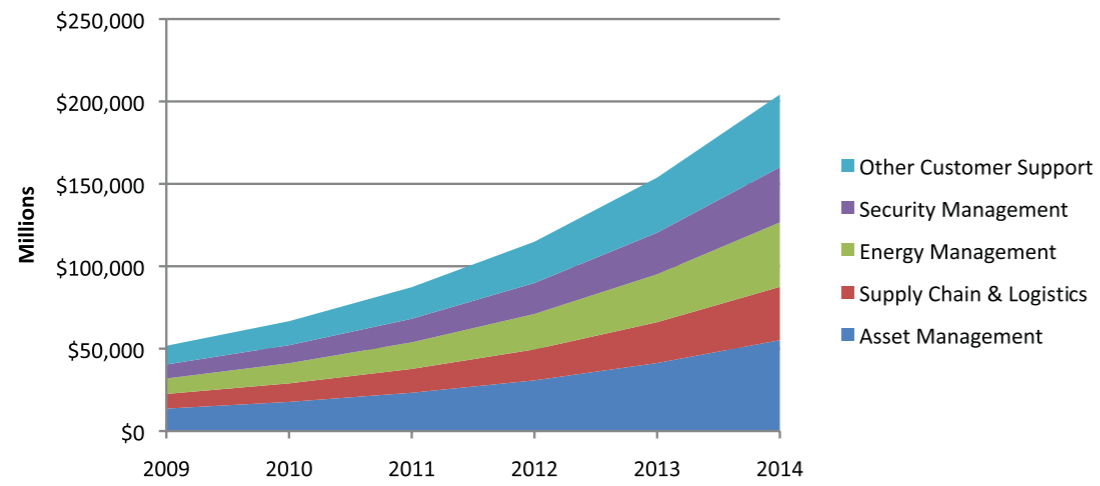
- **Business Process Integration:**

New software products will continue to automate business processes (asset management, CRM, contract administration etc.), but more importantly, drive integration across business processes and systems (demand management systems within supply chains for example).

- **Value-Added Application Services:**

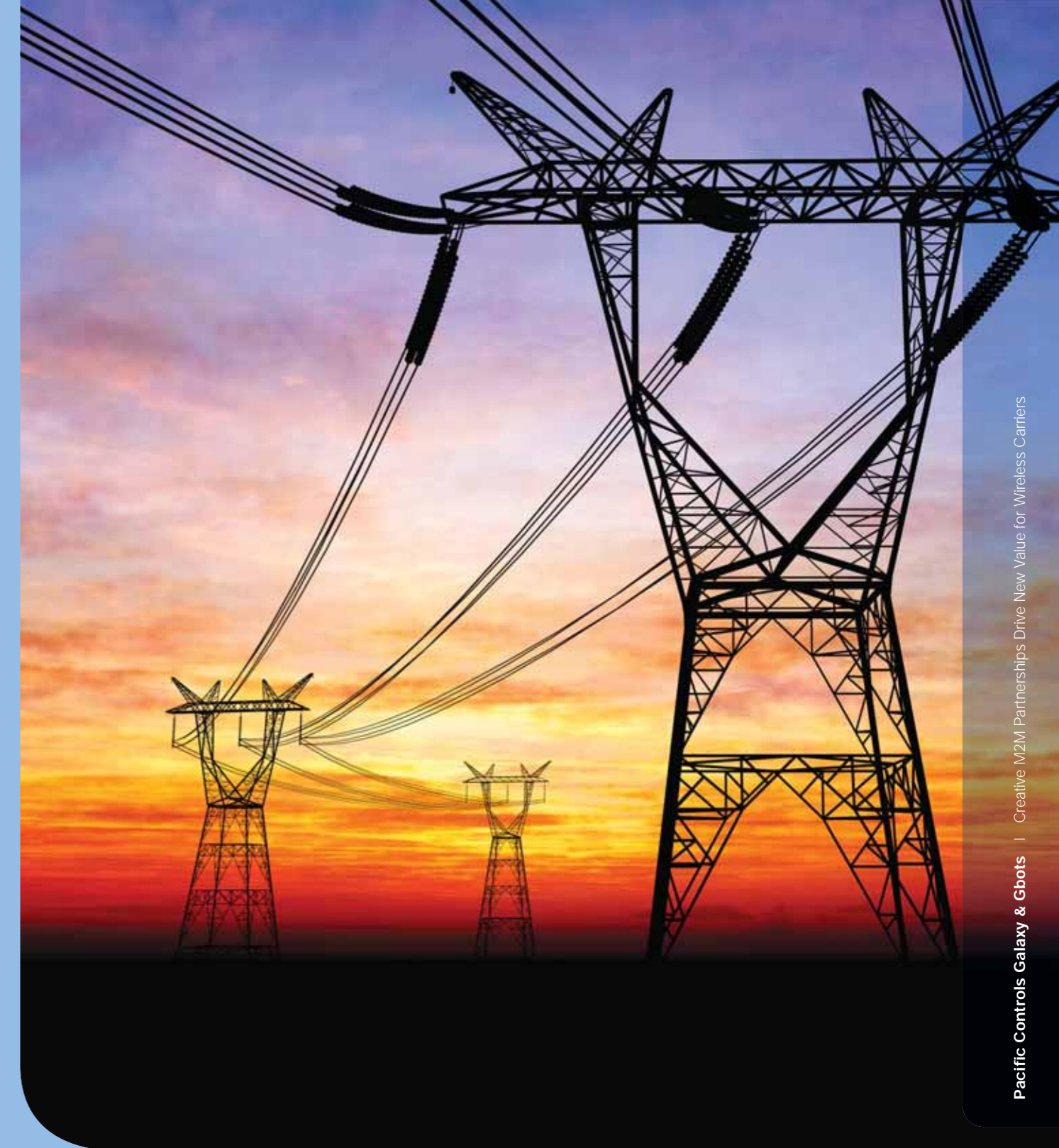
Vertically focused solutions that increasingly integrate all the people and assets a company has or serves -- systems that allow for realtime energy management; health systems delivery and intelligent transportation systems management to name a few.

Figure 3: Global M2M Value Added Application Services Opportunity



M2M technologies and applications will help organizations address the key challenge of optimizing the value of their balance sheets, allowing them to move beyond financial assets and liabilities to their physical assets and liabilities (like electric grids or hospitals) and then to their

intangible assets and liabilities (like a skilled workforce or brand). The task of optimizing the value of these assets and liabilities is vertically focused because requirements and goals vary dramatically from industry to industry.



Utilities and Energy Services



03. M2M Opportunity For Wireless Carriers

Rapidly Evolving M2M Market Drives Challenges

Strategists in a wide range of IT and network service provider companies across the globe are finally waking up to the fact that we are entering a new era of connectivity. The attractions are clear — incremental network traffic for the carrier, improved asset efficiency for businesses, new applications for developers, and systems integration opportunities for IT players. So why has market development historically been so difficult?

The challenges that cellular network operators face today in the marketplace are many, including:

- **Decreasing ARPU:**

Operators are increasingly finding themselves in a situation where declining ARPUs from traditional voice services are challenging their revenue models. This erosion is forcing operators to come up with new growth concepts and business models to compensate. Traditionally MNO's have driven high ARPU levels by offering diversified services to increase revenue and profit. However, the M2M market is all about volume. - Average Revenue Per Unit (ARPU) of M2M devices is often significantly lower for a wireless operator than their traditional handset business. Instead of roughly \$40-\$50 ARPU per month for a handset, they

may be working with an ARPU of \$10 per month for an M2M device. What is the impact on market potential? First a sufficient amount of connections has to be developed, but more importantly, these connections need to be managed very efficiently due to their lower margins. New revenue will be distributed over large numbers of subscriptions making the traditional ARPU measure obsolete.

- **Shifting Business Mix & Market Focus:**

A second factor impacting connected device market potential is the level of mobile phone and laptop penetration in the market. The pick-up of the M2M market is believed to be stronger in regions or countries where the mobile phone market is saturated or near saturation. In these markets the operators have the strongest motivation to look for alternative revenue sources due to declining voice revenues. In developing markets, operators are still focusing on offering basic services, like voice and SMS - these markets are not seen as key for M2M growth.

As a consequence, the M2M market is growing faster in developed countries with high mobile phone saturation.

Dimensioning The M2M Opportunity.....

According to Harbor Research, ICT investment topped 2.4 trillion dollars in 2009 with M2M and smart systems investment already comprising 5% of the ICT market. Further:

- The Global M2M market is projected to grow at a CAGR of over 30% from 2009 to 2014. By 2014, the market is expected to grow to as much as \$350 billion.
- Cellular M2M device shipments are predicted to grow from 40+ million in 2009 to over 150 million in 2014 -- Smart Buildings, Energy, Mobile Healthcare, and Transportation are expected to lead adoption.

- Network & Carrier Services revenues are projected to grow from \$18 billion in 2009 to over \$70 billion in 2014. Associated delivery platform revenue could increase service delivery revenue potential considerably.

- Value-Added "Smart Services" have the potential to grow from \$50 billion in 2009 to over \$200 billion in 2014 in asset management, supply chain and logistics, energy management, and other applications.

M2M will be a huge potential globally and offers many untapped market opportunities for Mobile Operators.





- **Required Device Technology Developments:**

The concept of M2M assumes any device or piece of electronic equipment can be connected to a network. But the reality has been that device form factors have not necessarily been in place in the right format or at the right price points to suit M2M. Take SIM cards as an example: mass-produced SIM cards are made for mobile phones, not appliances or industrial devices; they don't last a decade; and they aren't meant to send low traffic volumes only periodically.

- **Availability of M2M-Enabled Communications Infrastructure:**

Another factor that impacts revenue potential is the communication infrastructure within a country or a region. Widespread availability of 2G and 3G networks including access to wireless packet data connectivity (GPRS, EV-DO, UMTS) encourages the usage and implementation of M2M applications.

- **Requirement For Vertically-Focused Solutions:**

Deployments in the M2M market thus far have tended to be industry-segment-specific. As a consequence, true mass market M2M applications have struggled to emerge, making it harder for players to exploit their true potential.

Cellular network operators, and their counterparts in the IT infrastructure arena, have historically operated within well-established business models that reflected a distinct set of competencies. These models have been honed over many years. Because of this, the question of how each of these traditional categories of players fits into a new end-to-end business model for the M2M arena is still unclear. This has led many participants - particularly the cellular network players - to adopt a passive wait-and-see approach, thereby leaving the potential of M2M relatively underexplored.

The cellular M2M opportunity is rapidly evolving ultimately causing a blurring between these legacy business models forcing carriers and other supplier groups to re-think their strategies.

Evolving Market Roles - Carriers [Need To] Get Serious

Having nearly reached the saturation point with mobile phones, wireless carriers are now turning their attention to non-IT devices capable of being connected to a network. Network operators are taking a number of market- and technology-oriented steps to advance M2M market development, including creating distinct M2M business units, deploying M2M-specific network technology, and beginning to work more directly with partners for M2M applications.

These steps will enable cellular network operators to provide more robust business and technology support to their partners. This serves to differentiate the network service provider in the marketplace and ultimately increase their revenue opportunity.

But are these maneuvers enough to really drive M2M growth? Probably not. The M2M vendor landscape historically has not been aligned well with cellular network operators; its still extremely fragmented and disjointed. For M2M, the complete ecosystem has yet to fully develop. Consequently, today's solutions are still difficult to design and deploy and have typically been built at a very high cost. In short, while the opportunity may be very large, many network service providers are coming to realize the prevailing telephony model for managing smart devices has to change and while that process has started it is far from complete.

Telcos Awaken To M2M Opportunity.....

The cellular M2M arena has been remarkably active in the past couple of years:

- AT&T announced the opening of the AT&T Control Center through an agreement with Jasper Wireless that aims to speed time to market for connected devices, thus addressing a traditional area of concern for customers/ developers.
- Verizon continued to hone its Open evelopment Initiative (ODI) and also announced nPhase, which is a joint venture with Qualcomm aimed at enabling M2M across a variety of markets. Additionally, nPhase reached an agreement with Verizon Wireless and Vodafone that allows

the company to offer global connectivity, certification, and pricing for M2M solutions.

- Sprint reorganized its legacy M2M business into the Emerging Solutions Group (ESG) to focus on both B2B and B2C opportunities and leverage its 4G services.

International network operators were not quiet either. Vodafone expanded the breath of its M2M service programs, Telefonica established a multinational M2M global unit and Orange established an International M2M Center. Asian carriers China Mobile and China Telecom ramped up service offerings and capabilities for M2M as the country continued heavy investments in IT Infrastructure.



Transportation Sector



04. Key Success Requirements

Cellular operators need to Address M2M challenges head on

What will be required of the technology and services players coming together to serve the M2M opportunity? What are the critical challenges that need to be addressed:

- **Integration Standards:**

M2M solutions will not work if they are a collection of separate hardware, software, and network products from different vendors unless, and until, there are clear standards and protocols that define how each part works with the others. Those standards and protocols for interoperability, security, and performance will need to evolve to foster market development.

- **Enhanced Service Delivery Platforms:**

With more players focusing on the M2M opportunity the competition for customers is heating up. Network operators realize that in order to be profitable it will be necessary to connect large volumes of devices since many M2M applications require just minimal bandwidth, therefore limiting the data/ usage rates that carriers

can charge. In turn, operators are seeking ways to differentiate their services since already low data rates limit the opportunity to compete on price. One emerging area for differentiation centers around Service Delivery Platforms (SDPs).

Connecting and managing networkable devices has traditionally been a problematic area for customers. In the past, it took several months to get a device network certified. Once the device was connected there was often little visibility into how it was performing on the network as well as limited back end control. SDPs have emerged as a critical tool that can help address these areas. SDPs provide configuration services, provisioning, SIM management and reporting, billing, upgrades, and troubleshooting services. Realizing that these services are crucial to end customers, several network operators are developing their own SDPs and/or partnering with third parties in an attempt to customize their services and meet the needs of their constituents.

• **Application Development & Delivery:**

Today, for most users, M2M applications are cumbersome and complex to develop. Whether the application is developed by the company deploying it or a third party, they are very custom in nature and often configured for the environment in which they operate—factory, office, hospital, and elsewhere. Application development for connected devices today entails a very high level of engineering complexity due to disparate data formats, diverse networks, incompatible IP addressing schemes, different operating systems, and so on. The applications must be compatible with different device types, configurations, and operating systems, and must be supported by different wireless networks for the customer to gain real value. M2M platform development, to date, has focused primarily on developing better infrastructure technology for provisioning,

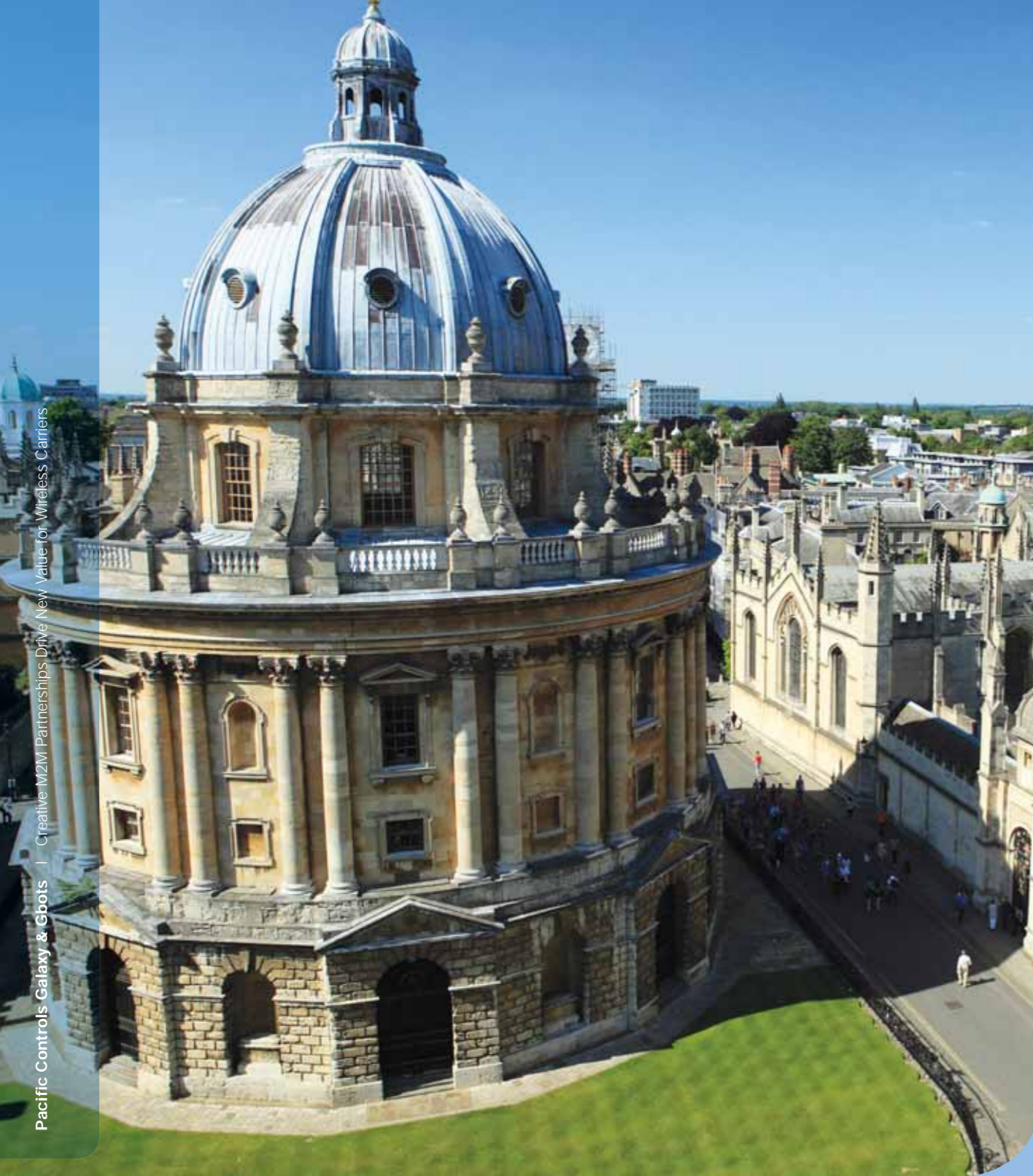
management and billing for connected devices (the above discussion of SDPs) - not for application development and application services delivery.

• **Vertical Expertise:**

Applications will require analysis tools and skills, and the ability to design systems to create awareness of asset status, structure the analysis of this data, define rules and work flow, and identify the right tools to initiate the appropriate actions. Further, for those vendors that pursue a vertical industry strategy, choosing which verticals to go after will be a key success factor. Because application requirements tend to be unique to an industry, crafting the right combination of expertise, system elements and partners to address these challenges requires deep understanding of different industry segments and their unique challenges.



Network Infrastructure



M2M success factors for Wireless Carriers

The M2M opportunity presents multiple challenges for network operators. From the business model, to the supply chain, to vertical applications, to ongoing support challenges, M2M market development represents a very complex set of inter-related elements. Designing an M2M business involves optimizing all of these elements.

Key success requirements for cellular network operators wireless building M2M businesses will include:

- M2M Requires A Distinct Strategy: M2M must be on the road map for cellular operators and requires a distinct strategy. With the M2M market still in an emergent state, carriers need to act now and deliberately.
- M2M Requires New Innovations: Its very hard to foster technology innovation and create new businesses at the same time. Focusing on new values - such as extended communications infrastructure for M2M, new user experiences and connected device component developments (such as new SIM cards formats for M2M) are all examples of innovation that will help the market develop faster.

- M2M Requires "Catalytic" Alliances: Focus on the ecosystem, not simply on technologies or products. The slow evolution of the M2M market has largely been because it is complex and requires several players to perform different roles within it. There are many categories of partners to work with, but determining which potential partners will be key to success.

Developers of M2M businesses face a two-fold challenge: to address the many technical issues across systems and service delivery chains and to ensure the whole solution functions properly and continuously. This is not something any single cellular network operator can do alone - partnerships and collaboration are necessary ingredients for success.

Because the M2M opportunity has evolved slowly and unevenly, the scale, scope and sophistication of M2M solutions players has not progressed very fast or very far. To the casual observer, there doesn't really appear to be significant players in the space that can systematically address the M2M challenges cellular network operators face. At least until now.

Creative M2M Partnerships Drive New Value for Wireless Carriers

05. Pacific Controls Drives M2M Services Delivery Innovation

Designing a new m2m partnership model

Cellular network operators worldwide have seen a steady march to maturity for their core business. This has led to critical introspection of their traditional business model. As a result, many network service providers are racing to develop new opportunities such as "cloud" services. The emergence of new IT and network service offerings - so-called "cloud" or "X as a Service" or "Anything as a Service" or "Everything as a Service offerings are rapidly becoming pervasive (see inset on XaaS). Many carriers think offering on-demand IT services combined with their network resources will differentiate them. But will it?

Carriers moving to expand IT services are also facing competition on multiple fronts. Web application and services players such as Amazon and Google are leveraging their scale and experience to offer low-cost services with the network acting as a "dumb pipe" and, IT infrastructure and services players like IBM and HP are using their systems-integration capabilities and professional services relationships with IT organizations to develop their new offerings.

For cellular network operators, developing M2M capabilities is a prime example of an opportunity to gain share and really differentiate if they are willing to act. The convergence of wireless networks, IT and Smart Devices drives huge opportunities. However, innovation in the design of M2M businesses for the wireless carriers will need

to extend beyond just simple ideas about new product and service extensions. To successfully develop this market, network operators will need to think and act differently. A renewed focus on developing M2M ecosystems and the critical relationships that will drive value are key to success.

As previously stated, the dynamics surrounding the M2M opportunity are incredibly complex. Basic enablement, network connectivity, middleware services, value-added services, and other device management functions are all needs that generally must be addressed when customers seek to connect smart devices. Given all of the aspects that must be addressed from the customer standpoint, alliances between suppliers cellular network operators and a new breed of M2M-fluent solution partners represent the best available means to address these market development challenges. Pacific Controls is at the forefront of partner development with cellular network operators for M2M solutions - the company is pioneering the convergence of information and communication technology (ICT) in M2M applications with cellular network operators. By partnering with Pacific Controls, cellular operators can leverage the significant new capabilities informed by this technology and avoid the significant challenges of trying to offer M2M solutions on their own.



Financial Sector

What Exactly Is XaaS?

XaaS characterizes several cloud services concepts, including "X as a Service" or "Anything as a Service" or "Everything as a Service." XaaS encompasses SaaS (Software as a Service), PaaS (Platform as a Service), IaaS (Infrastructure as a Service), HaaS (Hardware as a Service),

MaaS (Management as a Service), CaaS (Communications as a Service) or DaaS (Data or Database or Desktop as a Service). The acronym refers to services that are delivered either via a Public Cloud (Internet) or Private Cloud (On-Premises). XaaS securely unifies the public and private cloud offerings.

Creative Combinations Will Drive M2M Growth And Value

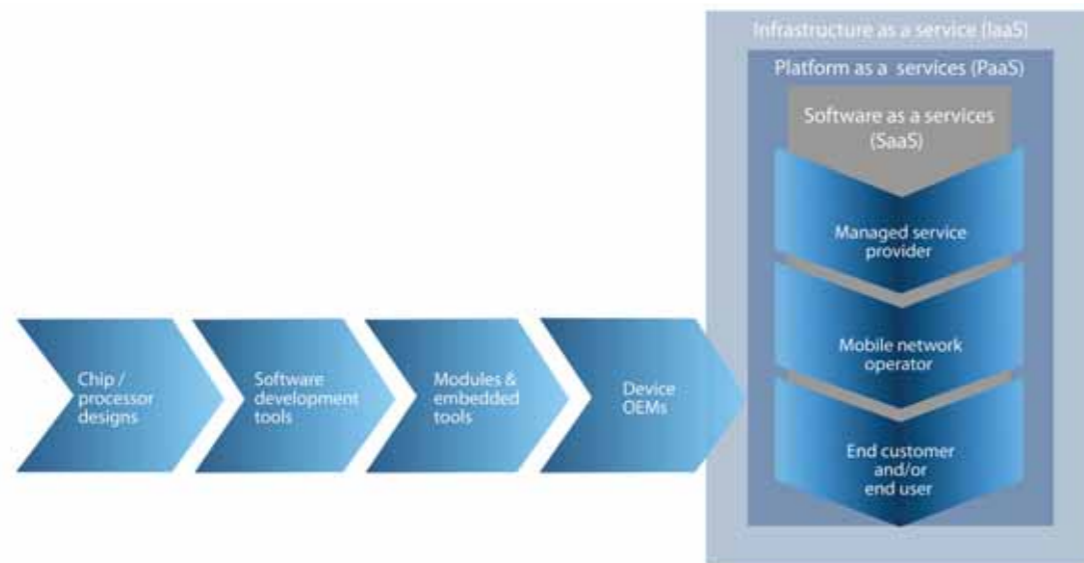
The intersection of application platforms, new IT "cloud" services and wireless network infrastructure creates value at disparate points across the business spectrum. Application platforms will increasingly drive value creation in M2M markets - applications are a critical element as companies want to connect and manage consumer and industrial products as small as location tracking devices, as commonplace as electricity meters and automobiles, and as large as farming equipment and airplanes.

The intersection of these three disciplines creates an opportunity for network operators to evolve their offerings and drive a differentiated business model by cleverly combining their potential.

They need to be interwoven and mutually supportive, and increasingly, success in each discipline will go to the players that effectively utilize their combined potential.

Pacific Controls is helping cellular network operators around the world realize this combined potential through strategic partnerships. The business strategy is to leverage wireless networks and infrastructure to deliver integrated M2M applications and IT services to customers. Pacific Controls, with its proven track record in managed services, IT infrastructure and M2M applications is already proving to be a valuable partner to several wireless carriers today.

Figure 4: Pacific Controls Infrastructure As A Service (IaaS) Opportunity



Pacific Controls new platform – Galaxy

As lower cost, easier to apply technologies continue to move into the market new services models are required to deliver their value. Technology advancements need to engender new system elements and new services. Correctly balanced, technology and new service delivery modes can help customers reach their goals of increased operating efficiency, reduced costs, automated system upgrades, and more efficient operations. Achieving this critical balance is the challenge that Pacific Controls' Galaxy managed services and enterprise delivery platform is aimed squarely at solving.

Galaxy is an end to end platform for managed services that proactively monitors assets, providing transparency into how critical "real world" systems are performing (buildings, smart grid assets, etc.), where critical faults lie, and where opportunities exist to significantly reduce operational expenses.

Galaxy is also a "Platform of Platforms." It is intended to reduce a significant percentage of the complexities of application and IT services delivery for wireless carriers. The challenges

of networking smart devices, developing M2M applications, integrating complex IT systems and unifying services delivery in a coherent and cost-effective manner have been big hurdles to adoption. Capturing the real value of smart connected devices goes much further than providing connectivity, databasing, and some XML-based transport scheme. For example, real pervasive managed services will allow networked, embedded devices to execute remote applications as if those applications were part of the internal operating system. Devices will need to host intelligent software components that communicate to other devices directly (peer-to-peer) or to logical collections of devices (peer-to-group) in any programming language, over any network and do so autonomously.

Effectively combining these elements has not been addressed by the existing players in the marketplace. The inability of today's popular enterprise IT services to interoperate and perform well with distributed smart device environments is an obstacle that integrated delivery platforms like Pacific Control's Galaxy are finally overcoming.





Automating Services Delivery for Smart Connected things

Of all the new capabilities that Pacific Controls' technology enables is the ability of systems to automatically learn from history; learning to detect hard-to-discern patterns from in-stalled equipment data that supports the development of algorithms that automates equipment repair and support. This is where "Gbots" comes into play.

Galaxy Gbots are a family of system management and customer support software tools

autonomous software agents which observe and act upon device, equipment and systems behavior. Gbots are enabled by "self-learning" software agents installed in devices and equipment and implemented as a managed service. These agents or "bots" are able to sense conditions (e.g. electrical system overload protection), understand customer/user preferences (e.g. is the temperature too high) and ultimately identify issues within a system to repair or initiate actions to optimize its performance.

Galaxy Gbots are not about technological drama or "futurism." It's about matching feasible

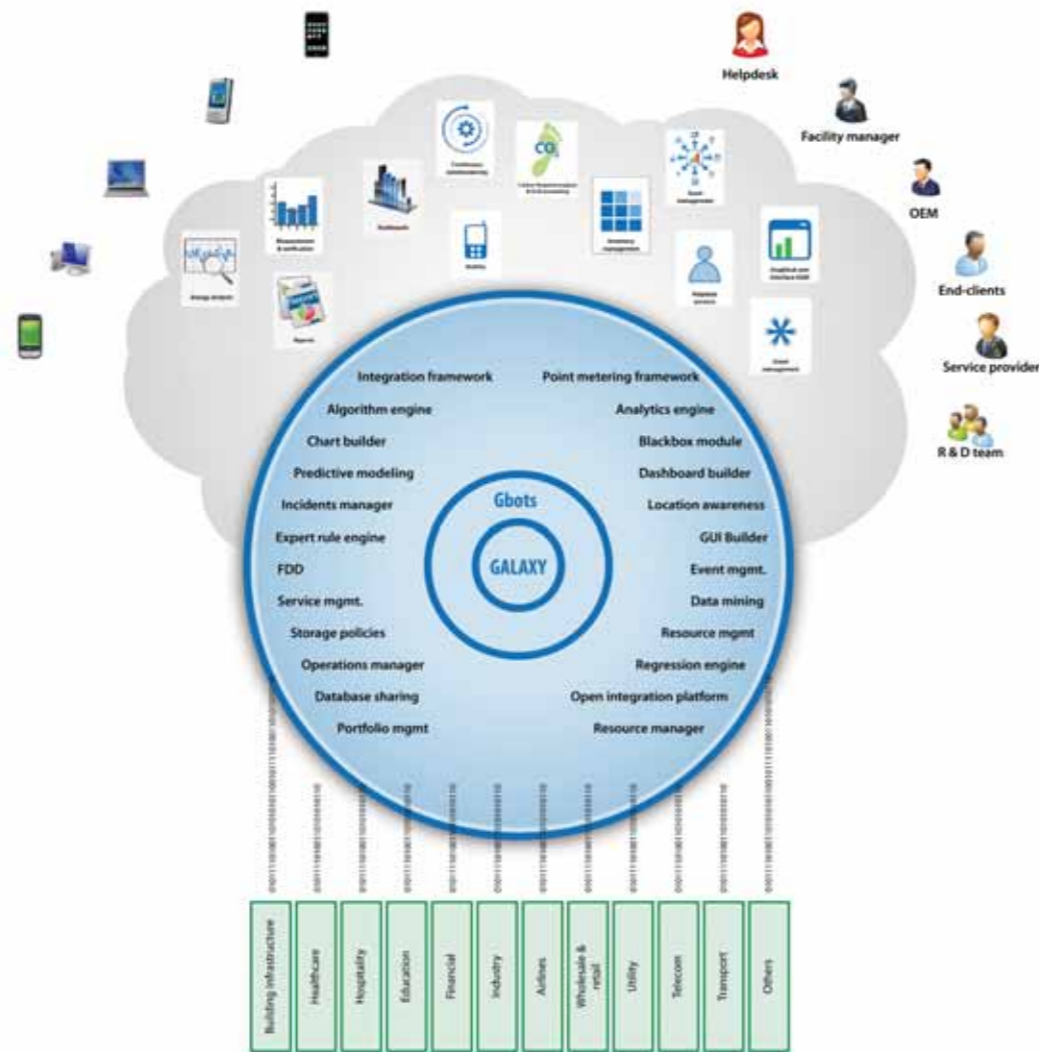
technology to real customer needs and delivering it in a manner that aligns with the industry's behavior and needs. GBots are a significant step-function change in the way systems will be designed, deployed, managed and supported in the future.

The value of this type of capability is probably best exemplified by Amazon and Google. Amazon's ability to recommend various books and publications to users based on profiling patterns and Google's indexing of web and related content to drive advertising revenue underscore the new economic value of smart systems. Amazon stopped being a "store" and started being an intelligent entity that, to some very real degree, understood who you were and what you cared about. Google quickly transcended being a search engine and reached for an understanding of what the population found interesting and designed targeted advertising as an entirely new business model. In Pacific Controls' case, this translates into system optimization, extraordinary customer intimacy about end product usage patterns, and "enterprise automation."

In the long run, “invisible” machine-to-machine (M2M) applications will be much more important to customer support than traditional “break-fix” and intrusive services that require human attention to deliver full value. Gbots are the beginning of a new

generation of smart systems technology that will provide customers with elegant and unobtrusive—sometimes even invisible—portals into networked customer support services.

Figure 5: Pacific Controls Software As A Service (SaaS)



The future of Smart Systems

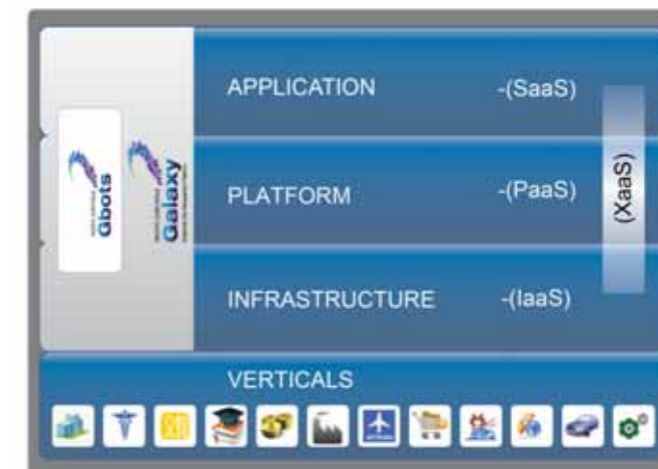
Combining device communication infrastructure from the carriers with cloud services and managed application software will help bridge many gaps in today's systems and drive new value across many vertical industries. But given the unique needs and requirements of individual vertical segments how will this be possible?

M2M applications, while they appear to users to be very “vertical” in nature are, for the most part, made up of features and functions that are very horizontal and applicable across diverse industries. For example, “asset management” is an application that incorporates a number of different functions and complex software - monitoring functions for usage tracking; diagnostic functions for equipment health; location services for maintenance; scheduling software for resource allocation. Each of these “state-based” foundation functions are built from software code that can be

re-used in many instances and configured into very tailored solutions.

These foundation platform functions are, in fact, very horizontal in nature. In its most basic and practical form, Pacific Control's concept of M2M applications is really a collection of software tools and cloud services that will evolve to be “80/20” re-useable across diverse environments -- how devices are modeled, how data is secured, how data is transported and, ultimately, how data is utilized in applications will evolve to be very repeatable. Enterprise customers will be able to manage their portfolio of wirelessly connected devices either through pre-configured web portals or existing back office systems. Application Programming Interfaces (APIs) will enable straight forward device applications matched to unique client needs.

Figure 6: Pacific Controls “Everything As A Service” (XaaS)





06. Conclusion

We are on the cusp of a transformation in the M2M marketplace. Over the next five years we will see a dramatic breakthrough in M2M applications as organizations recognize the potential it represents for reducing operating and maintenance costs, for revenue generation and for improved customer satisfaction.

Global M2M applications are highly specialized. Embedding connectivity into the next generation of devices, ensuring they are deployed profitably and that new applications can expand across multiple countries, are challenging tasks. M2M programs

require expert application knowledge as well as of general systems development skills. Choosing the right partner, one that fully understands the different elements involved and that is financially stable, and correctly aligned with delivery infrastructure partners will be critical to successful deployments. Working with an M2M solution provider that has a deep rooted understanding of the complexities of large global deployments will ensure that the solution successfully delivered. A new chapter in the story of M2M partnerships has begun.



Creative M2M Partnerships Drive New Value for Wireless Carriers





CREATIVE M2M PARTNERSHIPS
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