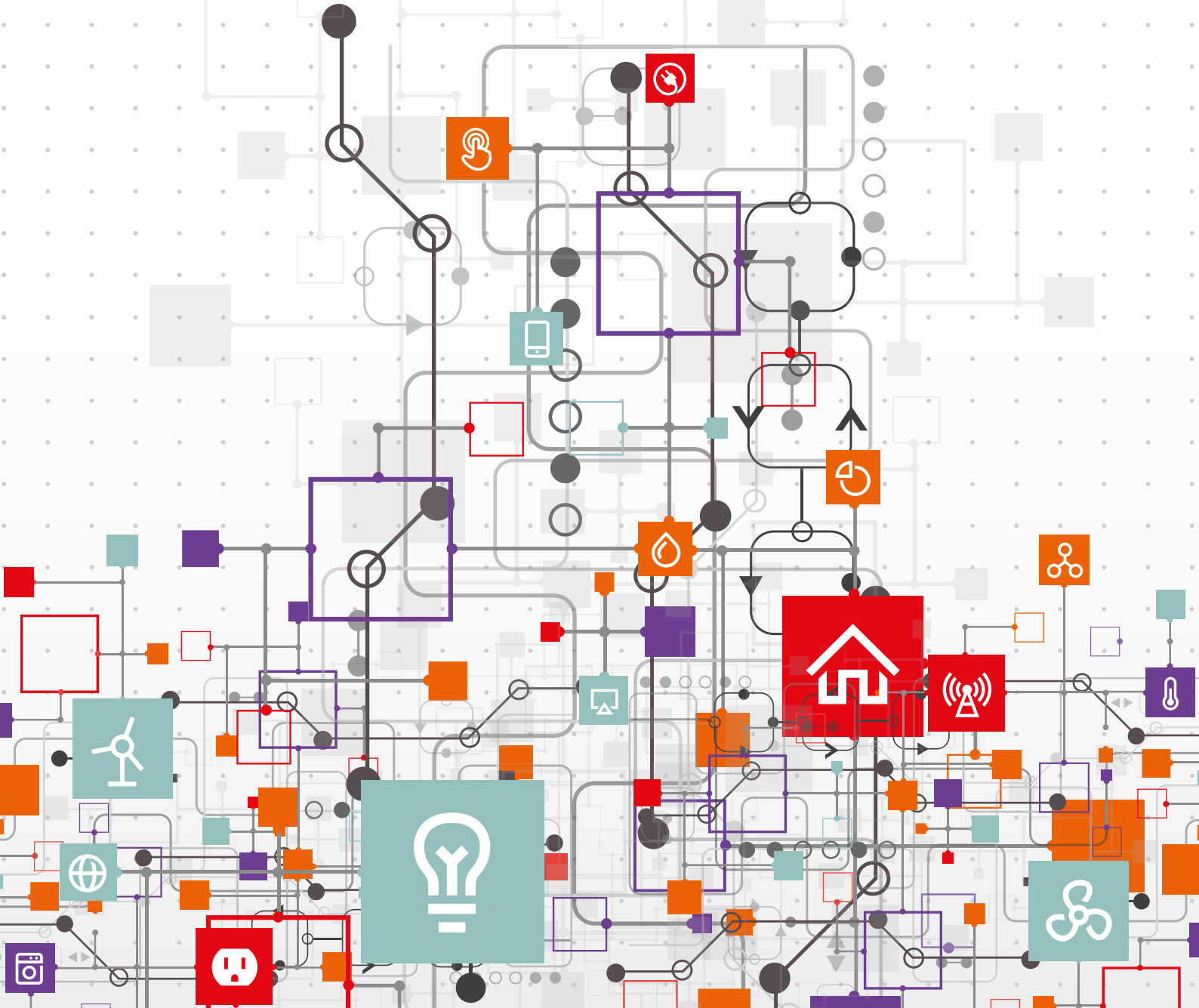
GSMA Connected Living

Mobile Communication Powers Utilities' Adoption of the Internet of Things

October 2015



White Paper

Mobile Communication Powers Utilities' Adoption of the Internet of Things

Sponsored by: GSMA

Roberta Bigliani Jean-François Segalotto

October 2015

IDC ENERGY INSIGHTS OPINION

The Internet of Things (IoT) promises to be a formidable strategic accelerator of utilities' digital and business transformation. Utility companies support the use of IoT to a great extent and across a wide range of use cases, and have plans in place to capitalise on it, through widespread adoption and growing financial commitment.

Mobile networks and services are in a unique position to support utilities as they embrace IoT. Mobile offers cost and deployment advantages over competing technologies. In particular, public mobile solutions allow utilities to take advantage of licensed radio spectrum, scalable networks, mature standards-based technology, embedded security, and wide ecosystem support. It is already widely used to provide utilities with reliable, accurate and secure data.

Based on the findings of the international survey carried out by IDC, utilities recognise that mobile is the best suited communication technology for 12 out of 18 IoT use cases analysed in this paper. This includes some of the most valuable use cases, such as smart metering.

The mobile industry continues to build its ability to support wide scale utility IoT deployments. It has delivered standards and technologies that provide added flexibility and improve the business case of IoT applications, and developed value-add capabilities beyond communication.

- The GSMA Embedded SIM specification has been developed to allow remote management of mobile communication in IoT devices, enabling over the air change of operator subscription without the need for a physical change of SIM.
- The Mobile IoT initiative established by the GSMA has been devised to standardise and accelerate the use of low-power wide-area solutions in licensed spectrum, making smaller wireless sensors cheaper, more secure, and easy to deploy and access with improved mobile coverage.
- Mobile operators have established a pool of common horizontal capabilities supporting IoT applications that span authentication, security, billing, data and device management.
- Utilities agree that emerging mobile IoT technologies will improve the sustainability of many IoT use cases.
- Utilities highly regard mobile operators as experienced IoT technology partners and know that their solutions operate reliably and securely in the field. For instance, many utilities rely on mobile operators to leverage their device management and service provisioning capabilities.

IDC Energy Insights advises utilities embarking on IoT initiatives to:

- ***Leverage a wide partner ecosystem,*** including mobile network operators, equipment manufacturers and IoT vendors to overcome complexity, leverage external capabilities and shorten the time-to-value of IoT applications.

- *Adopt standard technology.* It is critical to invest in technology that offers interoperability and continuous support. This mitigates obsolescence, simplifies future migration and preserves existing investment. Explore technologies like the Embedded SIM that are flexible to allow change and innovation in the long run without sacrificing security and business continuity.
- *Look to mobile operators as value-added partners.* Explore mobile operators' experience beyond communication. For example, leverage it for device management, service provisioning, data management, data analytics, B2C applications, and even their customer relationship to offer an omnichannel experience and interact with customers across any device at any stage of their lifecycle.

IN THIS WHITE PAPER

This paper analyses how the characteristics of mobile technology offer technical and cost advantages that respond to utilities' requirements for IoT communication in multiple deployment scenarios. By looking at 18 IoT use cases, it highlights utilities' adoption and preferences for mobile communication with the objective of sharing compelling use cases and provide suggestions to foster utilities' digital transformation.

The value of mobile communication is further examined in the context of the new capabilities that the mobile industry is bringing to the market to support utility IoT initiatives, including new standard communication technologies and value-added services beyond communication.

The findings presented in the paper are based on a worldwide survey of 43 top technology executives leading distribution, retail or integrated businesses in the electricity, gas, and water sectors across liberalised and non-competitive utility markets.

In this report the IoT is defined as the coordination of multiple machines, devices and appliances connected to the Internet through multiple networks. These devices include everyday objects such as smartphones, tablets and consumer electronics, and other machines such as vehicles, actuators, monitors and sensors equipped with machine-to-machine communications that allow them to send and receive data. The IoT expands the concept of "machines" in the established machine-to-machine (M2M) terminology to more general "things" and adds Internet Protocol-based communication and analytical functionalities.

THE ADVANTAGES OF MOBILE COMMUNICATION FOR UTILITIES' IOT STRATEGY

The benefits of mobile have been evident to utilities for many years, with each successive standard delivering more economical technology with better performance and efficiency.

Mobile services are already widely used by utilities to provide reliable, accurate and secure data from the field and enable smart grid and customer-facing applications. Utilities across the world use public mobile networks to support their initiatives in many domains including; distribution automation, smart metering, distributed generation management, electric vehicle charging, demand response, energy efficiency programs and smart homes.

With its all-IP protocol stack and added economies of scale, the attractiveness of public mobile for IoT deployments is increasingly clear. The adoption of public mobile solutions allows utilities to take advantage of the following:

With its all-IP protocol stack, licensed spectrum, performance, scale and maturity, public mobile communication is attractive for many utility IoT deployments

- *Licensed Spectrum.* Licensed bands and commercial standards offer better physical characteristics and performance benefits over unlicensed spectrum. These include access to frequencies with better propagation, standards with higher spectral efficiency, and higher power limits enabling wider coverage with less radio infrastructure. In addition, licensed bands are exclusively managed by the mobile operator, reducing interference and providing better performance.
- *Scale.* Widely available and scalable mobile networks can fully cover a utility's service area and already support millions of consumer devices, generating data volume and requiring data rates at higher orders of magnitude than those required by most utility IoT applications.
- *Maturity.* Technology maturity resulting from over 30 years of development provides utilities with a mix of network stability, uptime, security, scalability advantages and broadband performance that are not found elsewhere among communication technologies.
- *Standardisation*. This is probably the most important feature, given the more distant horizon of technology decisions in the utility industry. Commercial mobile networks build on open industry and de facto standards whether they are based on GSM (GPRS, EDGE), UMTS (HSDPA, UMTS/TDD) or LTE. This translates into a predictable and stable ecosystem that ensures reciprocal support, backward compatibility and a clear long-term roadmap easing migration to next-generation technology, mitigating the risk of obsolescence, and offering affordable hardware, rapid software development, and pools of engineering expertise. This ecosystem is supported by a critical mass of financially strong companies.
- *Security.* Enhanced security capabilities offered by mobile operators, coupled with increasingly secure transport protocols and encryption implemented by equipment vendors, and the inherent higher visibility provided by public mobile all-IP communication fabric, provide assurances around data integrity, segregation and privacy.
- *Ecosystem Support.* Sensors and power equipment from multiple vendors natively support mobile communication, including transformers, synchrophasors, line sensors, gateways, smart meters, and others.
- *Pricing*. Providers have competitively priced their solutions to increase the value proposition compared with alternative private network solutions.

Utilities' View on Mobile Communication Benefits for the IoT

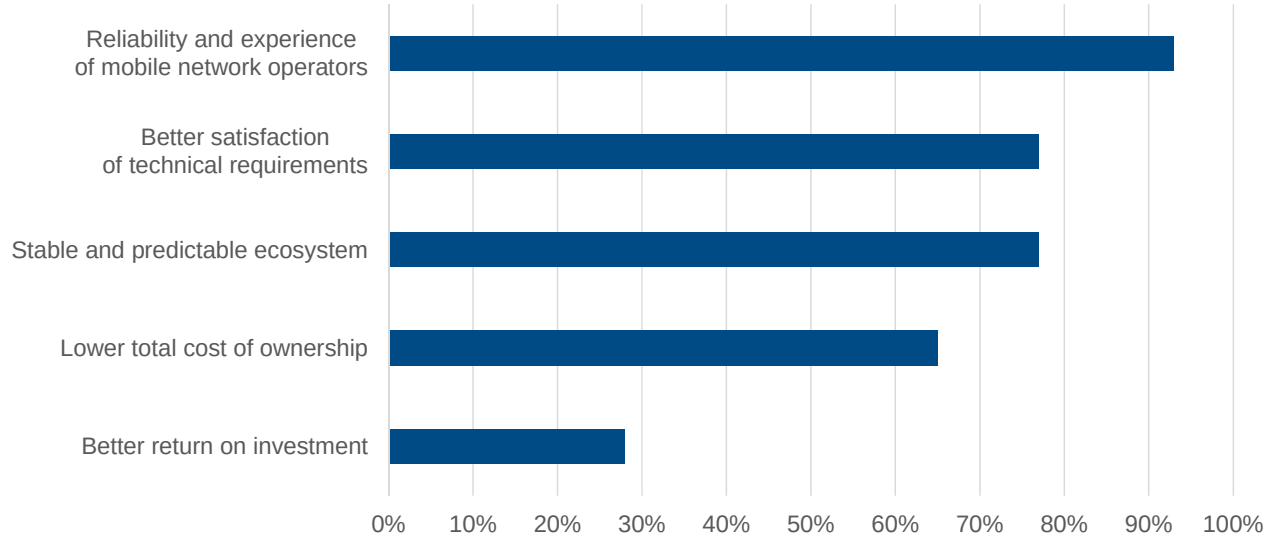
Most utilities recognise mobile solutions' technical superiority, ecosystem stability and lower total cost of ownership.

The benefits associated with mobile communication clearly emerged when interviewing utilities (Figure 1). For over 90% of them, selecting a mobile solution means being able to tap into the technical expertise of mobile operators (e.g., radio planning, engineering, security and software development capabilities) that are regarded as reliable partners. The vast majority of utilities (77%) also acknowledge the technical superiority of mobile solutions and stability of the mobile ecosystem, helping them minimise technology lock-in and yielding lower total cost of ownership compared to competing WAN solutions (65%). Nevertheless, some utilities are still concerned about relinquishing control when critical infrastructures are concerned, and may be uneasy at the idea of being locked into a long-term commercial commitment.

FIGURE 1

Mobile Brings Reliable Partners, Better Technology and Lower Cost to Utility IoT

Q. What are the benefits of using mobile-based public communication for any deployed / planned IoT solution?



Source: IDC Energy Insights, 2015

LEVERAGING MOBILE COMMUNICATION FOR HIGH-VALUE IOT USE CASES

Utilities and the IoT

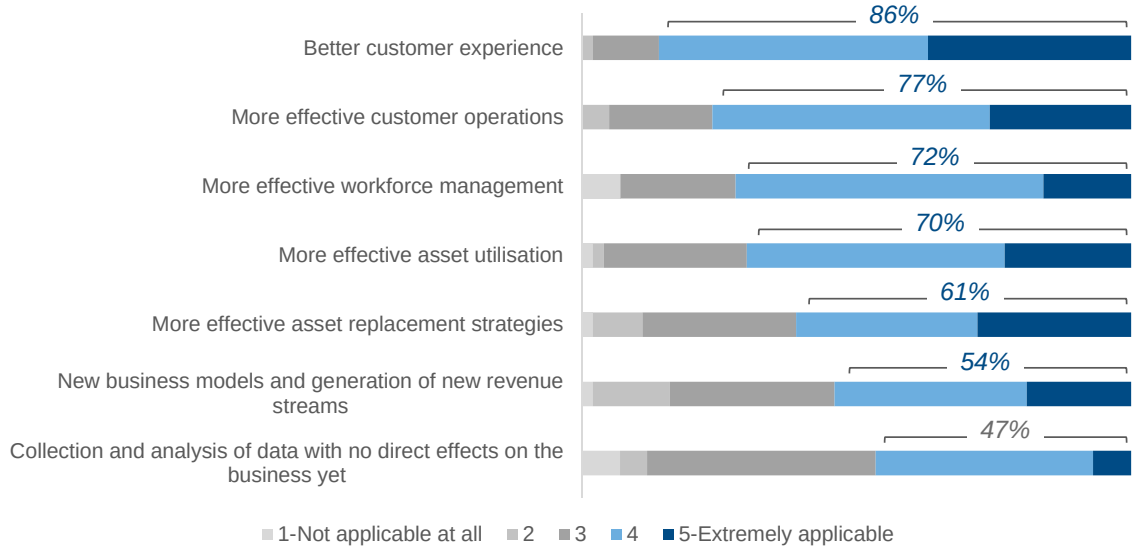
The IoT promises to be a formidable strategic accelerator of the digital and business transformation of utilities. The IDC Energy Insights IoT survey shows that today one in every two utilities acknowledges the transformational value of IoT, and its importance is expected to grow in the next five years. With its push towards ever smarter networks, the industry will increasingly rely on IoT to maximise the use of assets, automate their operation, increase safety, improve field and sales force management, reduce costs and deliver a better service to final consumers. At the same time, the IoT offers utilities the possibility to innovate their business models and introduce new services for customers and prosumers. This is reflected in the findings shown in Figure 2, which describes the drivers of the utilities' IoT strategies.

Today one in every two utilities acknowledges the transformational value of IoT, and its importance is expected to grow in the next five years.

FIGURE 2

The IoT Impacts all Major Areas of a Utility's Business

Q. Which of the following best describe your company's major drivers for pursuing an IoT strategy?



Source: IDC Energy Insights, 2015

In particular, utilities are focusing their IoT efforts on:

- Enhancing the customer experience – a prime determinant of customer satisfaction and loyalty in competitive markets and sectors (e.g., reducing churn through proactive notifications, usage information, and energy cost savings).
- Achieving more effective customer operations, from automating the meter-to-cash processes to reducing call centre volumes through more informed customer service representatives, thereby improving the cost-to-serve.
- Delivering better asset utilisation, as advancements in smart grid sensors, network control and analytics software support a shift from reactive to preventive and condition-based maintenance, thereby improving return on capital expenditure and increasing asset resiliency (e.g., in the form of reduced inventories, improved uptimes and reducing customer minutes lost).
- Achieving more efficient management of both the field and customer-facing workforces, improving service levels and delivering significant operational cost savings in the form of more efficient field work and increased logistics efficiency.

Widespread Adoption and Growing Investment

Utility companies have plans in place to capitalise on IoT trends. In 2015, utilities will be the second largest industry by expenditure in IoT products and services of the 10 IoT industries that IDC tracks, spending over $82 billion worldwide (the other industries being consumer, government, healthcare, insurance, manufacturing, resources, retail, transportation, and cross-industry solutions). By 2018, this is expected to grow to nearly $113 billion (*Worldwide Internet of Things Spending by Vertical Market 2015-2018 Forecast*, IDC #256255, June 2015). The IoT footprint will grow most visibly in consumer-interfacing devices such as smart meters, thermostats, and appliances. However, the greatest realised value of the IoT to utilities will be through enterprise-class devices ensuring more dynamic and resilient smart grid operations.

Utilities from across the value chain indicate a current adoption rate of almost 40%, with another 30% planning to deploy an IoT solution over the next year. Overall, four out of five utilities worldwide will have adopted IoT somewhere across their operations within 24 months, confirming utilities' position as leading IoT implementers above and beyond what aggregate expenditure indicates.

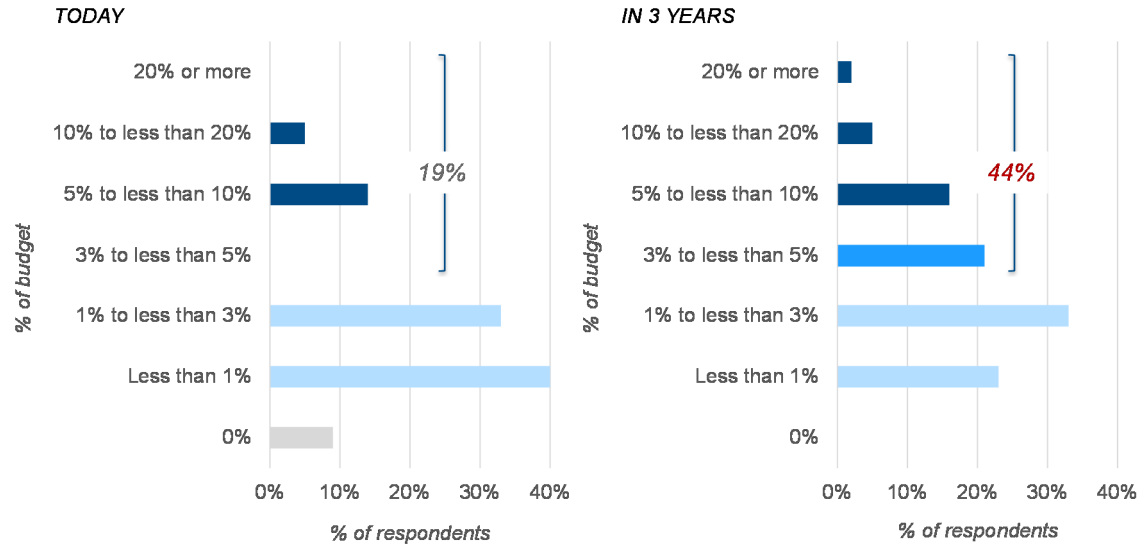
Four out of five utilities worldwide will have adopted IoT somewhere across their operations within 24 months.

The planned adoption and expected impact of IoT on their ability to generate value are reflected in utilities' individual growing financial commitment to this ecosystem. In 2016, 60% of utility companies worldwide have allocated a budget to IoT, in keeping with the significant adoption rate outlined above. As it shifts from being a primarily transformative and experimental initiative to a full-fledged strategy, the IoT will also grow to absorb a significantly bigger portion of a utility's technology budget. The share of utilities planning to invest 3% or more of their entire technology budget on IoT projects will more than double to 44% in just three years (Figure 3).

FIGURE 3

Utilities' Financial Commitment to IoT Is Growing

Q. Please estimate the percentage of your organisation's (IT and line of business) budget on investments that is dedicated to IoT [in 2016 / in three years' time]



Source: IDC Energy Insights, 2015

High-Value Utility IoT Use Cases

To illustrate the pervasive use and the business value of IoT among utilities, 18 use cases have been selected, spanning across customer-, workforce-, and asset-facing applications (Figure 4).

FIGURE 4

The 18 IoT Use Cases

- Building energy management for commercial and industrial customers
- Customer engagement
- Demand management
- Electric vehicle charging station management
- Home energy management
- Revenue protection
- Distributed energy resources management
- Smart metering
- Distribution automation
- Leakage reduction
- Quality control sensors
- Remote asset surveillance
- Sensor-based asset diagnostics and maintenance
- Substation automation
- Weather sensors
- Fleet management
- Remote workforce management
- Sensor-based staff identification

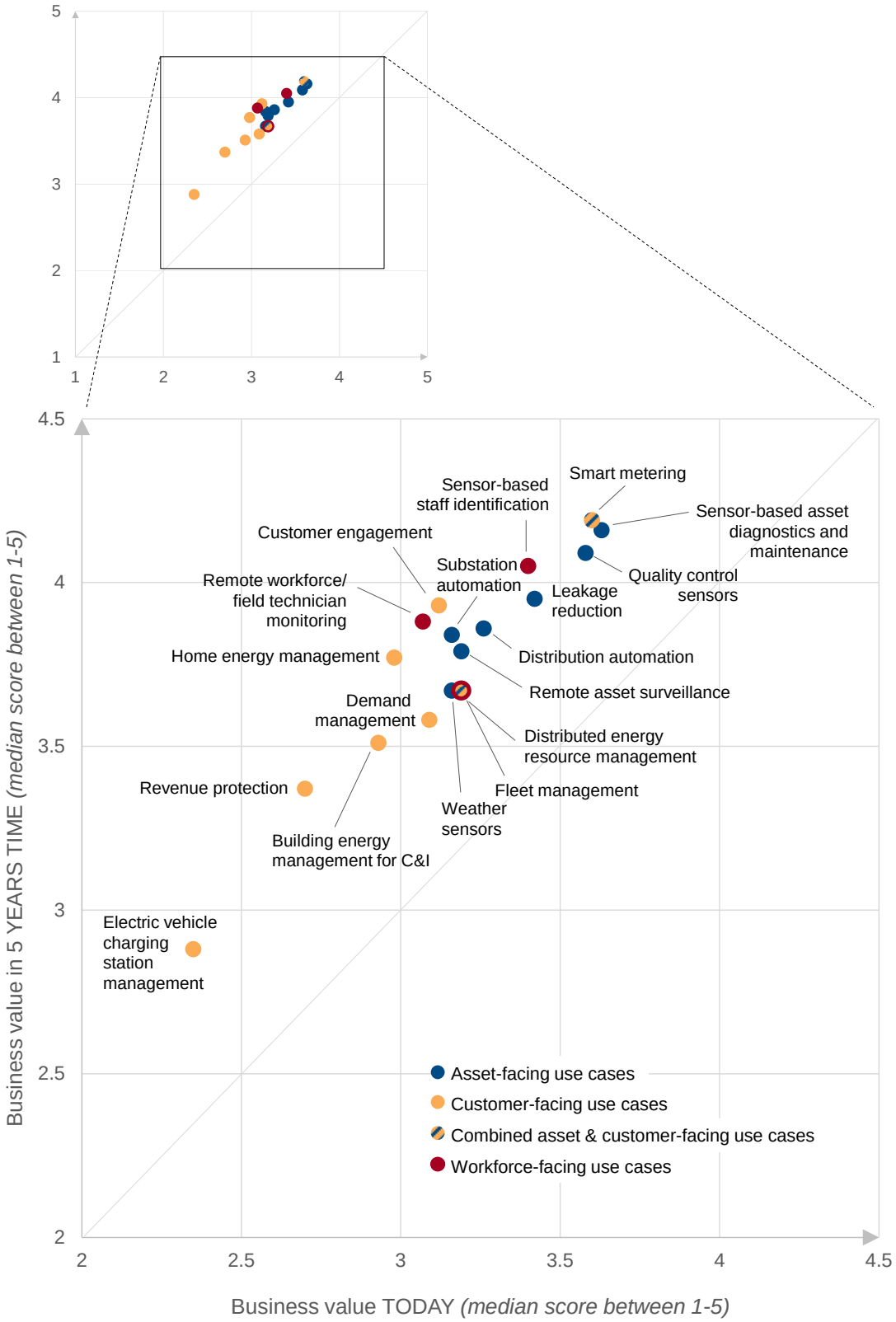
Source: IDC Energy Insights, 2015

As shown in Figure 5 (top chart), the average value attached by utilities to any of the 18 use cases is 3.5 out of 5. In addition, utilities believe that all the IoT use cases analysed here will deliver even more business value in five years' time (i.e., the scatter in Figure 5 is above the diagonal).

FIGURE 5

The IoT is Pervasive and Delivers Growing Business Value to Utilities

Q. For which of the following use cases do you believe the IoT holds the most business value [today / in five years' time]?



Source: IDC Energy Insights, 2015

A closer look at the individual areas where utilities believe the IoT yields the most value (averaging perceived business value today and in five years) unveils a relatively higher preference for asset-facing use cases.

- Two use cases in the top 10 support workforce management (staff identification and remote workforce management) and one is customer-facing (customer engagement).
- Smart metering, an asset- and customer-facing use case, is radically changing both customer operations and network management.
- The remaining six of the 10 most promising use cases for IoT applications are asset-facing. They span sensor-based applications for asset diagnostics and maintenance, quality control and leakage reduction, distribution and substation automation, and asset surveillance.

Utilities Embrace Mobile for Most Use Cases

According to the utilities surveyed, mobile is the best suited communication technology for two-thirds of the IoT use cases analysed, especially for some of the most valuable ones, such as smart metering.

The proliferation of connected smart devices in the hands of workers and consumers, as well as in their homes, makes public mobile communication the mainstream choice for workforce mobility and customer-facing applications. Public mobile communication is preferred for smart metering, customer engagement and home energy management. Critical workforce-facing applications like field worker and fleet management are also recognised as best addressed using public mobile solutions.

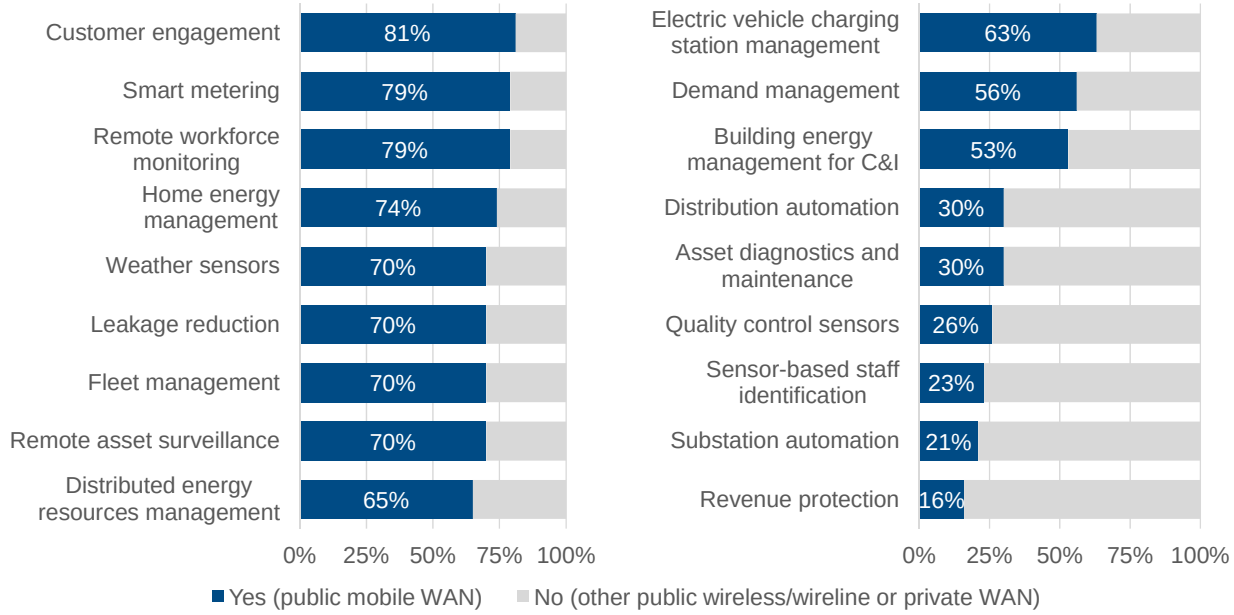
Among asset-facing use cases, the ones best supported by mobile communication seem to be remote asset monitoring, leakage detection and weather sensing. In a small number of use cases, mainly related to critical infrastructure operations, utilities still prefer a private dedicated network.

Preferences are logically translated into adoption or planned adoption. Figure 6 highlights where mobile is the technology of choice.

FIGURE 6

In Two-Thirds of the IoT Use Cases Mobile is the WAN Technology of Choice

Q. Is your company using / planning to use mobile-based public communication for any of the following IoT use cases?



Source: IDC Energy Insights, 2015

GAME-CHANGING MOBILE CAPABILITIES BOOST THE UTILITIES' CASE FOR IOT

Working Together to Overcome Challenges

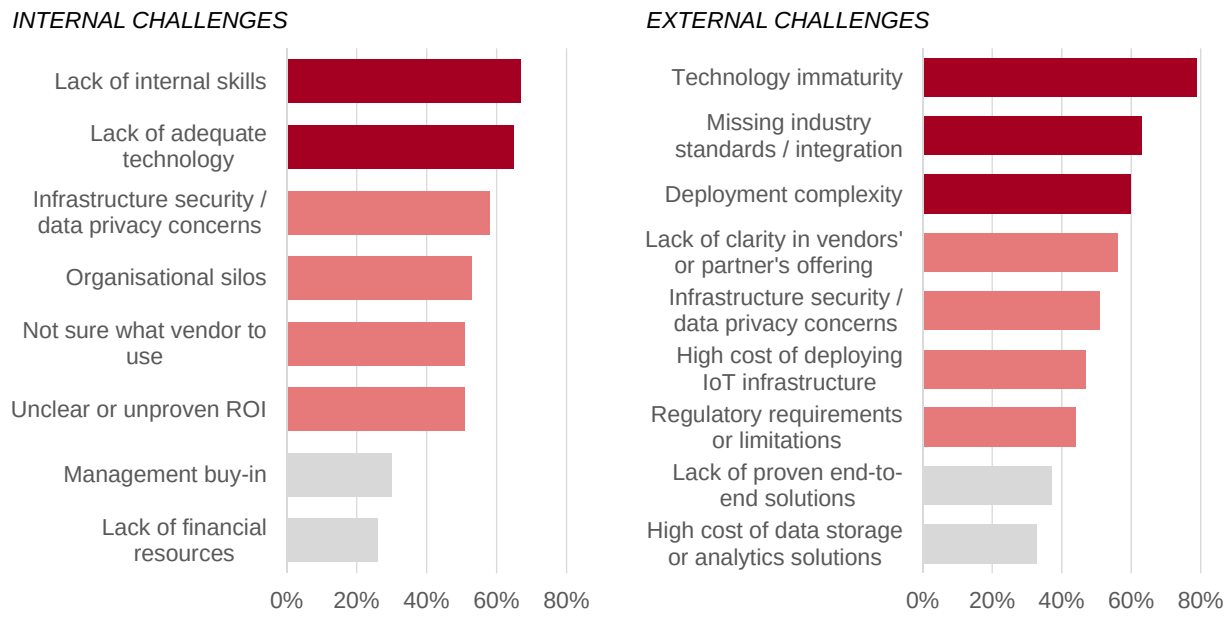
Utilities face a number of challenges in the execution of their IoT initiatives. Internally, utilities believe they lack the technology and skills to adequately address their IoT strategy. This can be exacerbated in more mature markets as falling profitability compresses the investment budgets of energy utilities. Additionally, with the ongoing digital transformation, utilities are faced with obsolescence of internally available skills, while they struggle to win and retain new talent/skills (e.g., data science skills). This is proving especially difficult in the face of growing competition from other data-intensive industries. The ability to build and maintain data privacy and infrastructure security are also a major internal concern for many utility organisations, especially where smart metering is expanding the volume of customer data in a tightening regulatory context.

External barriers mirror internal ones. Eight out of ten utilities feel IoT technology needs to mature more, and around 60% cite the lack of industry standards as a perceived obstacle to IoT adoption, along with the complexity of deployment (Figure 7).

FIGURE 7

Skills, Technology and Complexity are Critical Areas of Utilities' IoT Strategies

Q. What do you perceive as your company's biggest internal and external challenges to implementing its IoT strategy?



Source: IDC Energy Insights, 2015

The mobile industry is developing new capabilities that improve the business case for utility IoT applications

Mobile operators have serviced utilities for almost 30 years with offerings around basic network access, meter data communication for business customers and select remote transmission and distribution devices, moving on to offer services targeting the smart grid around ten years ago.

Over this period, the mobile industry has worked with utilities to address their challenges. In addition to a strong foundation of core capabilities, the mobile industry is developing new technology enablers that provide flexibility and improve the business case for utility IoT applications.

To further enable the wide scale deployment of sensors, standardisation work is underway to make:

- Mobile subscriptions provisioning to field devices effortless. For instance, this is addressed through the GSMA Embedded SIM specification.
- Smaller wireless sensors viable and easy to access with improved mobile coverage through low-power wide-area solutions.

In addition, operators have taken steps to position themselves in support of IoT initiatives as key service providers and trusted partners for their utilities customers by offering value-added services beyond communication.

The GSMA Embedded SIM: Cracking the Business Case for Mobile in IoT

Despite the proven attractiveness of mobile in IoT, there is an issue with the traditional SIM card design in these applications. One of the benefits of the SIM, beyond its secure design, is that customers can easily change the SIM and network operator if they wish. But for IoT applications a

change of SIM is often impractical. It may be inaccessible once in the field, or soldered in to prevent tampering or damage, or geographically dispersed across millions of devices.

Mobile operators have recognised this and have collectively developed the "GSMA Embedded SIM" technology to enable a global distribution model for IoT equipment by agreeing a common technical specification that allows an over the air change of operator. The technology greatly reduces logistical and operational costs, while retaining existing security levels with minimal impact to the mobile operator network infrastructure. This provides a foundation for new business opportunities for both utilities and mobile operators.

The embedded SIM specification was produced by the GSMA to accelerate growth in IoT and provides a standard mechanism for the remote management of mobile operator communication in IoT devices, allowing over-the-air provisioning of an initial operator subscription, and a change to another operator after the ongoing communication contract expiration. The GSMA Embedded SIM provides significant benefits to equipment manufacturers, including late-stage provisioning during manufacture and remote over-the-air provisioning in the field. Additional benefits for the whole supply chain include reduced costs in managing IoT SIM products along with the subsequent integration and testing costs.

The GSMA Embedded SIM specification is typically used in the Embedded Universal Integrated Circuit Card (eUICC), which is delivered as a soldered microchip, or historically as a traditional removable SIM card.

The GSMA has created an Embedded SIM specification that is backed by global operators and SIM suppliers. The specification promotes a common, global and interoperable remote provisioning architecture to deliver technical solutions that reduce costs, maintain security and accelerate the rapidly growing IOT market.

Reducing IoT Deployment Cost and Enhancing Asset Resiliency Through eUICC

The eUICC supports multiple SIM profiles, with each profile being the mobile operator's credentials necessary to provide access to the network, however only one profile is active at any one time. Having multiple profiles enables remote sites to have secondary operator profiles on the eUICC; with policy rules controlling the switch to the secondary profile to provide business continuity in the event of a mobile network outage. This feature, along with remote provisioning, enables rapid and cost-effective deployment of future services. Benefits for utilities include the following.

- Lower IOT device costs through a single common approach to remote provisioning will allow more devices to become connected than ever before.
- The GSMA Embedded SIM technology ensures that utilities can change communication provider following well-defined policy rules ensuring service continuity and contract liability during the life of the asset, reducing the total cost of ownership.
- Cost savings through economies of scale and improvements in the supply chain not just with the eUICC chip but also with the wireless module being smaller and not requiring a physical SIM connector. This also enables smaller form factors where needed.
- The GSMA Embedded SIM provides added resilience and enables business continuity in the event of a mobile network outage by enabling the potential for multiple mobile operator profiles to be used within an IoT device. This supports the use of mobile technology in business-critical applications.
- The Embedded SIM allows for innovation by enabling the mobile operator to remotely provision future services over the air to remote devices without requiring a site visit to each asset.

Low Power Wide Area Networking: Bridging the WAN Technology Gap

Low Power Wide Area (LPWA) networks comprise a range of relatively recent networking technologies designed to connect low cost, low mobility and low power IoT devices. They have emerged to complement or substitute mobile and short-range wireless in contexts where the latter may not be best placed to provide communication, effectively filling the gap between local wireless and existing mobile WAN technologies.

The characteristics of LPWA were developed to make them particularly well-suited in IoT applications requiring long range, low data volume and low data rate communication, and in deployment scenarios featuring fixed-location, long-battery life sensors that need to operate unattended for very long periods of time. Specifically, LPWA features:

- Low power consumption that enables device lifecycles of up to ten years on a single standard battery.
- Optimisation for transferring intermittent, low throughput, small blocks of data (often consisting of just 100 or so bytes) over long or short distances.
- Low cost communication modules that enable WAN communication to be added to a device for less than $5 in materials cost.
- Base stations offering extended range and indoor penetration compared to existing mobile technologies.
- Easy installation of the network.
- Dedicated network authentication.

For utilities, this increases the device types and deployment scenarios where communication is technically and economically feasible. In addition it lowers the total cost of ownership compared to other technologies involving mesh infrastructures or cabling. It also provides the scale needed for IoT applications to leverage the rich data generated by large and dispersed sensor platforms.

LPWA can serve a very diverse range of uses in both asset and customer operations, some of which are already being trialled by utilities or demonstrated by technology providers. In particular, gas and water utilities have a strong interest in LPWA. These technologies can address their needs in terms of battery life, coverage, underground penetration and cost, particularly in contexts where a power supply is not available or unsafe. A non-exhaustive list of applications for which LPWA is expected to be suitable includes:

- Gas leakage detection and water leakage reduction, drinking water quality monitoring, network pressure control, weather sensing and other applications involving state monitoring through widely dispersed, low bitrate and often battery-operated IoT sensors.
- Sensor-based asset monitoring and diagnostics, and quality control applications where the technical and safety requirements are not as rigid as in business-critical ones. The wider smart city application area (e.g., street lighting, building surveillance, wastewater and domestic waste management) is a prime example.
- Smart gas and water metering, distributed energy resource management and beyond-the-meter applications in home and building energy management and demand management. These applications can be offered in wider smart home solutions along with fire alarm, and people detection, leveraging a single rooftop LPWA base station.

Reducing Complexity and Enhancing Security through LPWA in Licensed Spectrum

While proprietary low power solutions are already commercially available for M2M applications, some utilities are concerned that relying on non-standardised technologies operating in unlicensed bands can generate a service availability risk, a security risk, vendor lock-in and an ongoing maintenance expense. Not all existing LPWA technologies support security at the transport level, leaving the implementation of application-level security entirely in the hands of service providers. By contrast, for many utility IoT applications security is fundamental and needs to be implemented on multiple layers.

The Mobile IoT Initiative launched by GSMA is designed to address the use of LPWA solutions in licensed spectrum, with a view to have the first commercial solutions available on the market as early as 2016.

Using standardised solutions in licensed mobile spectrum, on the other hand, has the potential to enhance the business and technical case around some utility IoT applications. LPWA technologies are largely complementary to the existing mobile networks and their implementation within the mobile operator infrastructure has a number of advantages, including:

- Simplified, cost-effective deployment, while maintaining specific user requirements.
- Enhanced security of the IoT application using LPWA in licensed spectrum.
- Economies of scale for equipment and device manufacturers, as well as more efficient use of existing mobile radio spectrum.
- Scope and scale economies for complimentary mobile operator services, such as device management, authentication, security, billing, and data analytics.

To this end, the mobile industry has set up an ecosystem-wide initiative to accelerate the time to market of IoT solutions based on LPWA technologies in licensed spectrum. Launched by the GSMA earlier this year, the "Mobile IoT Initiative" is focusing on a family of complementary technologies that will be standardised in 3GPP in early 2016 as part of Release 13 (LTE MTC, EC-GSM and NB-IoT technologies), which will provide options to address the widest spectrum of use cases.

The initiative aims to complete the initial specifications for LPWA solutions by the end of 2015, with a view to having a first implementation in early 2016 and full commercial mobile IoT solutions available on the market later in the same year. It will do so by facilitating demonstrations and proof of concept trials, as well as providing analysis and feedback to assist 3GPP in the standardisation process.

The initiative is backed by a broad ecosystem of mobile operators, equipment manufacturers, and IoT vendors that are collaborating to develop the technical standards including Alcatel-Lucent, AT&T, Bell Canada, China Mobile, China Telecom, China Unicom, Deutsche Telekom, Ericsson, Etisalat, Gemalto, Huawei, Intel, KDDI, Nokia Networks, NTT DoCoMo, Ooredo, Orange, Qualcomm Incorporated, Sierra Wireless, Singtel, Telecom Italia, Telefonica, Telenor, Telstra, u-blox, Verizon and Vodafone.

Utilities Hopeful for Emerging Mobile IoT Technologies

Technologies that reduce complexity, lower total cost of ownership and enhance the security of IoT solutions effectively boost the attractiveness of mobile communication for several utility use cases. This is particularly true for applications that require utilities to manage a plethora of dispersed field sensors, mobile assets or consumer devices (e.g., smart metering, home energy management, fleet management, weather sensing). But it also strengthens the utilities' propensity to adopt mobile for more business-critical and value-generating use cases supporting asset operations and maintenance, including asset diagnostics and automation, leakage reduction and quality control.

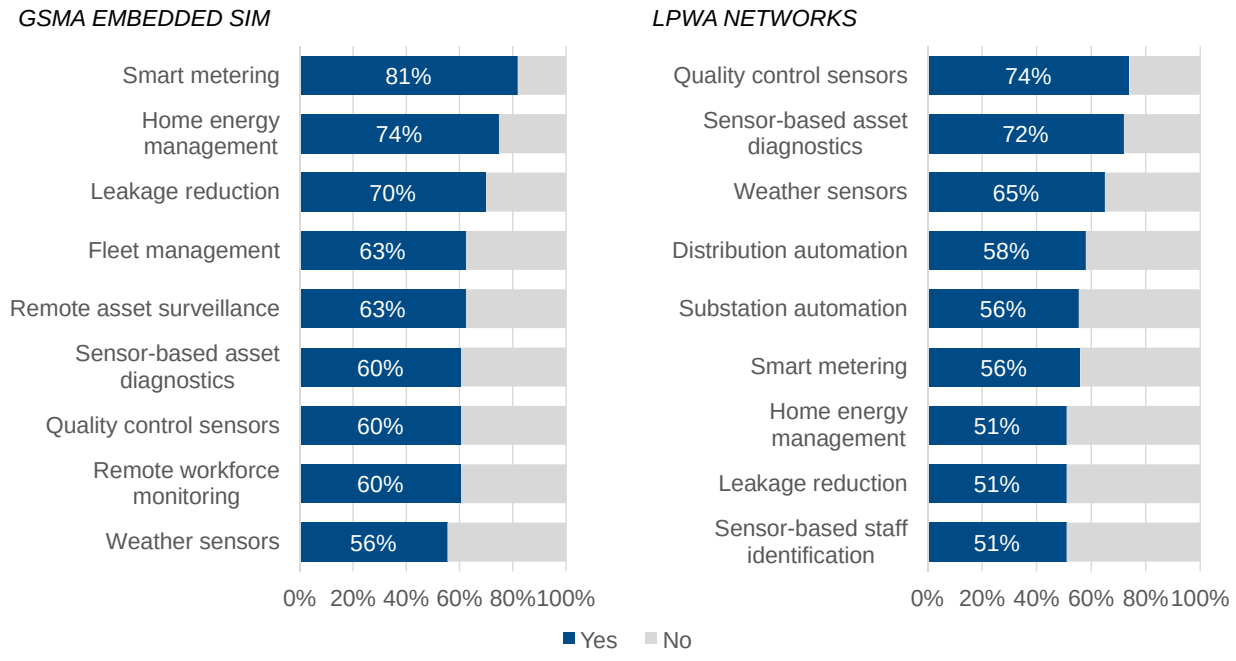
Utilities think emerging mobile IoT technologies will improve the sustainability of several IoT use cases.

Although some utilities may not yet be aware of the very latest developments, most companies in IDC Energy Insights' survey regard these emerging mobile IoT technologies with interest. In fact, the vast majority think they will improve the economic viability and/or technical performance of mobile communication for several IoT use cases in the future (Figure 8).

FIGURE 8

GSMA Embedded SIM and LPWA Enhance the Case for Mobile in IoT

Q. Will the future availability of devices based on the GSMA Embedded SIM and LPWA make mobile-based public communication more appealing for the following IoT use cases?



Source: IDC Energy Insights, 2015

Mobile Operators' Ability to Reduce Complexity and Fill the Skill Void

Building and expanding on the existing smart grid communication offerings, mobile operators have developed a pool of common horizontal capabilities for IoT applications that span security, authentication, authorisation, trust and privacy management, billing, data and device management.

Security is one major area where mobile operators are applying their expertise and sharing good practice as security and privacy concerns continue to permeate industry conversations. The emergence of the IoT amplifies security risks as expanding networks increase the "surface area" for external attacks and more devices — particularly when physically accessible — act as attack surfaces.

Mobile operators are well positioned to address a number of end-to-end security challenges within IoT implementations

Mobile operators have enhanced security features and capabilities over the years, such as encryption, remote tunnelling, point-to-point data protection, intrusion detection, and data access, leveraging the capabilities of the network to provide VPNs and using the secure execution environment of the SIM. Mobile operators offer managed security services, which are rigorously tested and deployed in diverse customer locations and applications, and utilise network management features to gain deeper visibility into the devices and their data communication paths. In addition, mobile operators have already addressed many of the technical requirements and best practices needed to create secure IoT devices by repurposing documentation created for mobile handsets, cloud services and management.

Mobile operators provide device management capabilities that extend above and beyond security

Mobile operators provide device management capabilities that extend above and beyond security. These include device identification, service discovery, device authentication and authorisation, remote provisioning, configuration and upgrade, in addition to fault and performance management. In particular, authentication capabilities extend to non-GSM (SIM-less) devices and short-range technologies, which is particularly relevant to IoT environments, where resource-constrained edge sensors or plug-and-play end-user devices require alternative management technology. On the consumer market, mobile operators can leverage already developed standards-based authentication solutions (e.g., Mobile Connect) as well as ownership of on-premises equipment required for the secure management of non-GSM devices such as gateways and routers.

In billing, utilities probably have more experience than any other industry. However, with new business models and more complex customer relations, the IoT will require more sophisticated billing, settlement and fund clearance requirements than those to which utilities have been accustomed. For customer-facing IoT use cases, utilities can leverage a wide array of mobile operator capabilities, in addition to existing financial, billing and marketing relationships with end users as full-fledged business partners. These include account management, customer care and billing, settlement, collection and fund clearance, and management of multiple revenue streams.

Overall, mobile operators' capabilities beyond the provision of communication place them in a very strong position to support utility IoT deployments end-to-end, especially as their commitment to the industry grows to match the criteria that are critical to utilities in IoT partner selection, including:

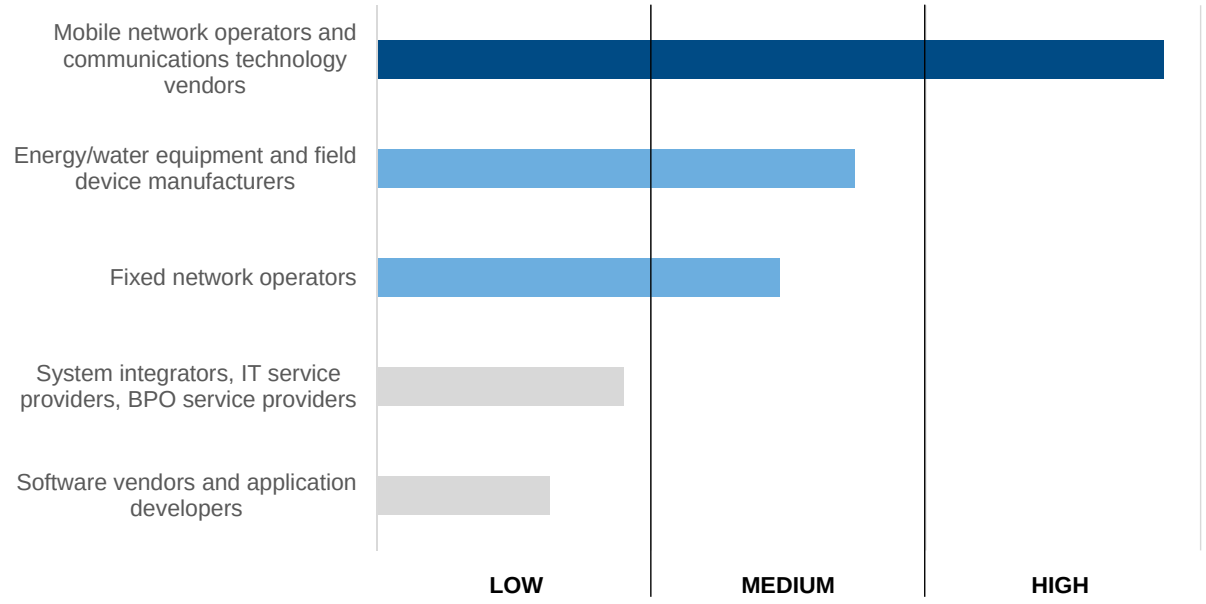
- Portfolios of best-of-breed IoT products
- Existing IoT deployments and reference cases
- Broad IoT ecosystem of partners
- Better ROI/lower total cost of ownership
- Adoption across the industry's value chain
- Vertical industry solutions and capabilities

This potential translates into utilities holding mobile operators in high regards as IoT partners. As shown in Figure 8, utilities are far more likely to work with mobile operators and communications technology vendors than with any other technology partner. Mobile operators fare better in this ranking than utility equipment manufacturers and field device vendors, and way above competing wireline network operators, or system integrators and IT service providers.

FIGURE 9

Mobile Operators Top the League of Utilities' IoT Partners

Q. In your opinion, how likely is it that your company will work with the following types of vendors/service providers on IoT projects?



Source: IDC Energy Insights, 2015

This reflects the utilities' view that communication is a key ingredient in a successful IoT application. At the same time it emphasises the importance of having a partner that can make IoT technology (sensors, embedded systems, control software, etc.) operate reliably and securely in the field.

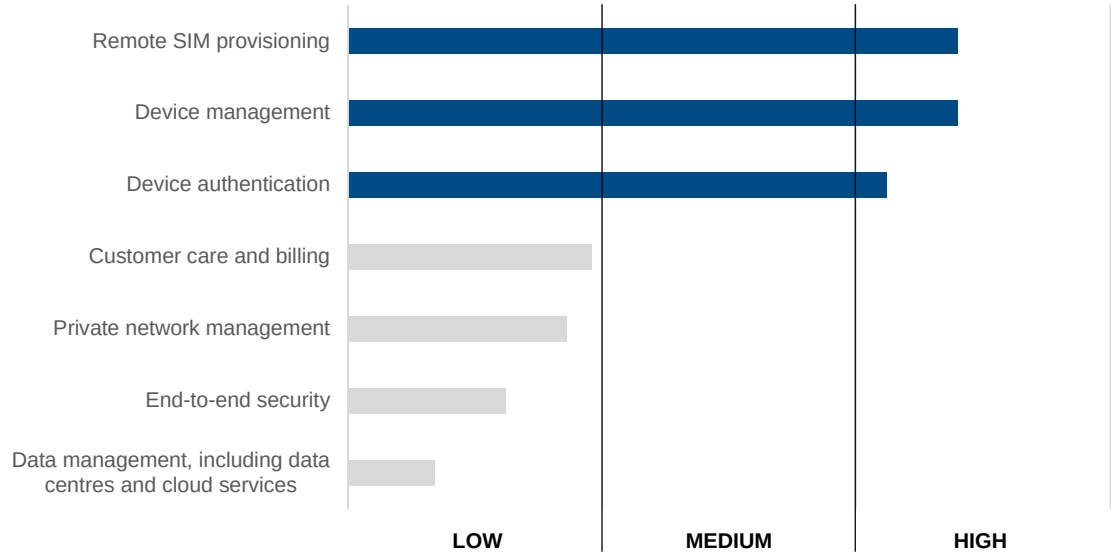
A history of managing millions of devices and proven reliability in large-scale deployments means that, more than anything else, utilities will rely on mobile operators to leverage their device management and service provisioning capabilities. Results in Figure 10 show that device authentication and other device management services are the most likely to be contracted by utilities from mobile operators. It also shows that remote SIM provisioning enabled by the Embedded SIM attracted the attention of utilities as a game changer for the IoT, significantly easing the risk of communication provider lock-in.

On the other hand, mobile operator-provided security, billing and data management services look less appealing to utilities. This shows that mobile operators are still in the early stages of communicating their IoT service capabilities outside communication. But it also reflects the utilities' relatively higher expertise in these processes as well as regulation requiring that many of them are kept within the utility organisation's perimeter (e.g., billing, data management).

FIGURE 10

Mobile Operators as Value-Added Service Providers

Q. How likely is it that your company will contract / will consider contracting the following services from a mobile network operator?



Source: IDC Energy Insights, 2015

CONCLUSIONS AND ACTIONS TO CONSIDER

Mobile networks and services are in a unique position to support utilities as they adopt IoT to automate greater portions of their networks, drive operational efficiencies and unlock new business models. Mobile offers cost and deployment advantages over competing technologies thanks to widely available and scalable networks, mature standardised technology and enhanced security. Utilities are already well aware of the potential benefits of collaborating with mobile operators and are adopting mobile communication in a wide range of IoT use cases.

Over the last few years, the mobile industry has built its ability to support wide scale utility IoT even further. It has delivered standard technologies that provide added flexibility and improve the business case of IoT applications, and developed horizontal value-add capabilities beyond communication. Among others, standardisation work is underway to make the provisioning of mobile service subscriptions to field devices an effortless process, and smaller wireless sensors viable and easy to access through low-power wide-area solutions in licensed mobile spectrum.

IDC Energy Insights advises utilities embarking in IoT initiatives to:

- ***Leverage a wide partner ecosystem*** including mobile network operators, equipment manufacturers and IoT vendors to overcome complexity, leverage external capabilities and shorten the time-to-value of IoT applications.
- ***Adopt standard technology.*** It is critical to invest in technology that offers interoperability and continuous support. This mitigates obsolescence, simplifies future migration and preserves existing investment. Explore technologies like the Embedded SIM that are flexible to allow change and innovation in the long run without sacrificing security and business continuity.
- ***Look to mobile operators as value-added partners***. Explore mobile operators' experience beyond communication. For example, leverage it for device management, service provisioning, data management, data analytics, B2C applications, and even their customer relationship to offer an omnichannel experience and interact with customers across any device at any stage of their lifecycle.

About IDC

International Data Corporation (IDC) is the premier global provider of market intelligence, advisory services, and events for the information technology, telecommunications and consumer technology markets. IDC helps IT professionals, business executives, and the investment community make fact-based decisions on technology purchases and business strategy. More than 1,100 IDC analysts provide global, regional, and local expertise on technology and industry opportunities and trends in over 110 countries worldwide. For 50 years, IDC has provided strategic insights to help our clients achieve their key business objectives. IDC is a subsidiary of IDG, the world's leading technology media, research, and events company.

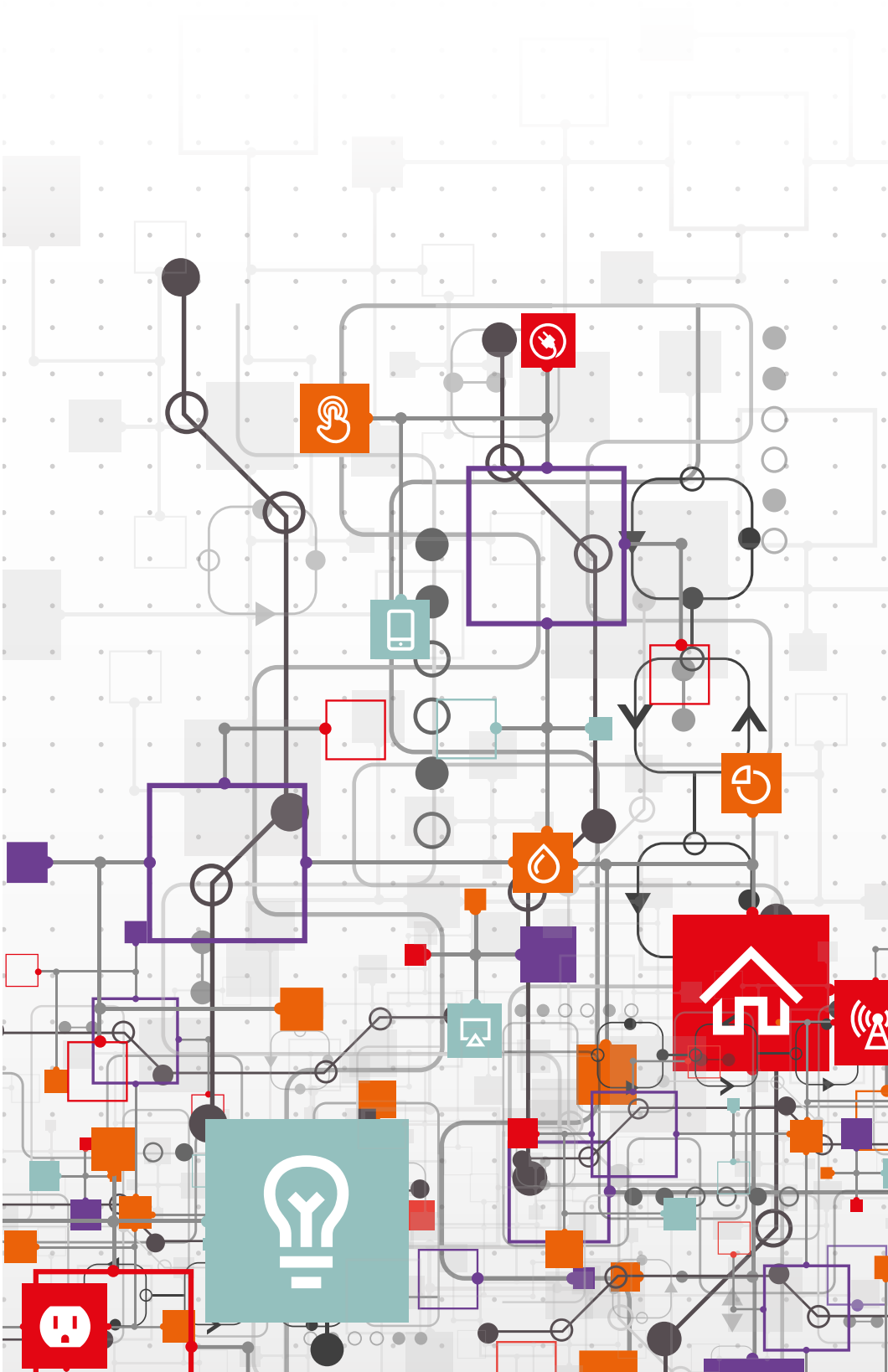
Global Headquarters

5 Speen Street
Framingham, MA 01701
USA
508.935.4400
Twitter: @IDC
idc-insights-community.com
www.idc.com

Connected Living

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

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 IoT in the longer term. For more information please visit **www.gsma.com/connectedliving**



Floor 2, The Walbrook Building
25 Walbrook, London EC4N 8AF UK
Tel: +44 (0)207 356 0600

connectedliving@gsma.com
www.gsma.com