Machina Research

Strategy Report

Internet of Things (IoT) Communications Service Provider Benchmarking 2016 [Extract]

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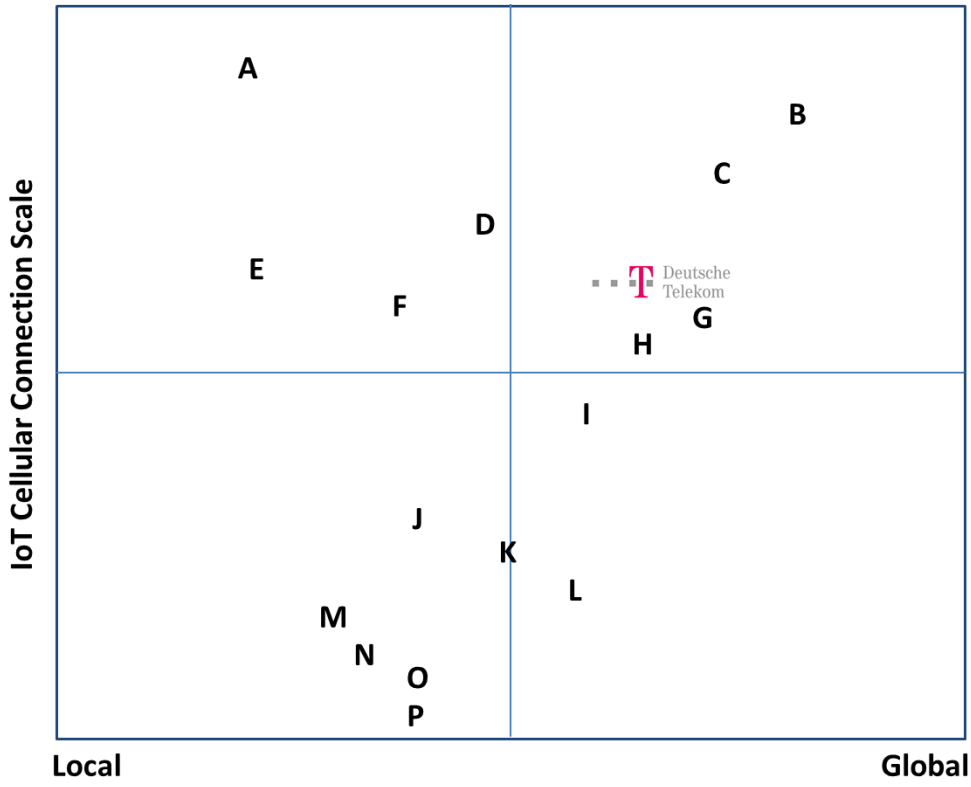
Note: This is an adapted and abridged extract from the Machina Research Report 'Internet of Things (IoT) Communications Service Provider Benchmarking 2016', published in September. This extract was reproduced for Deutsche Telekom, featuring the elements of the report that relate to Deutsche Telekom. Much of the profiling and analysis, including that relating to other CSPs, in the Executive Summary has been adapted, removed or anonymised.

1 Executive Summary

1.1 And the leaders are…

A true global strategy, with real reach and capabilities, is an important factor defining leadership for CSPs in IoT. When this is coupled with attributes such as scale, experience, technology, business velocity, and depth of capabilities, a top tier of CSPs in IoT can be identified. For multinational corporations requiring seamless, large-scale, and effective and leading edge global IoT services and solutions, these are the CSPs they should be conversing with. Overall and as it stands, the group of top tier global CSPs leading the worldwide IoT market – Operator B, Operator C, Operator D, **Deutsche Telekom**, Operator F, Operator G, Operator H, and Operator I – persists and we expect will remain the leaders for years to come (see Figure 1-1).

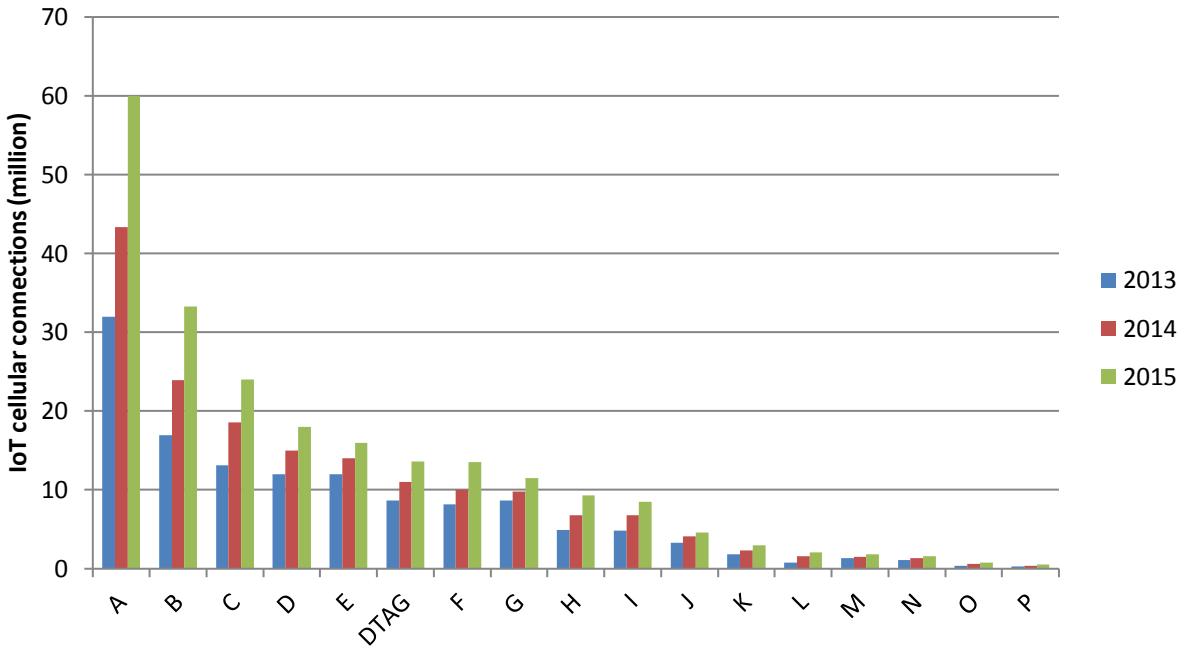
Figure 1-1: IoT cellular connection scale and global strategy and capabilities [Source: operators, Machina Research estimates, 2016]



1.2 IoT delivers scale and sustained growth to top tier CSPs

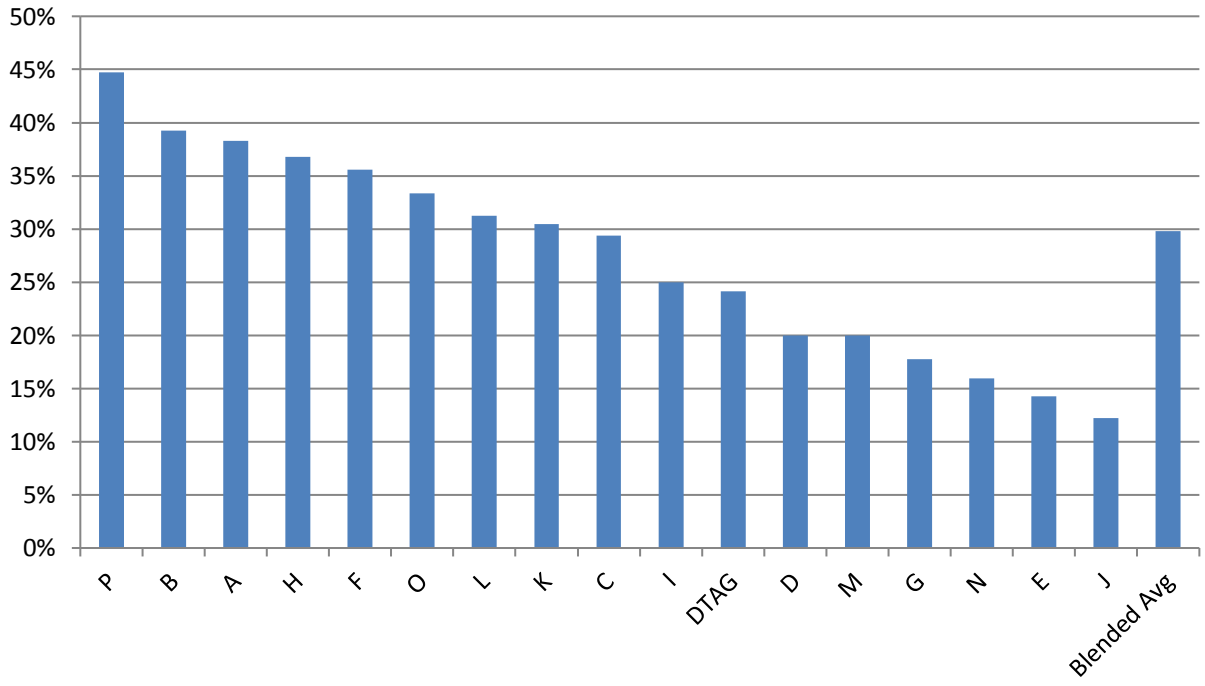
As we have said before, there is no denying that IoT is a business that benefits from scale. Overall, all top tier players have achieved significant scale in their IoT businesses. These statistics are illustrated in Figure 1-2.

Figure 1-2: IoT cellular connections by CSP for selected operators, 2013-15 [Source: operators, Machina Research estimates, 2016]



In terms of growth, as illustrated in Figure 1-3, the weighted average across the 17 CSPs profiled in the report is just under 30%, a little stronger than last year when the average growth rate was 28%. This demonstrates the continuing robust nature of the IoT business whose expansion is well outpacing traditional mobile services (traditional mobile subscription growth for the vast majority of these operators is in single digit percentage terms).

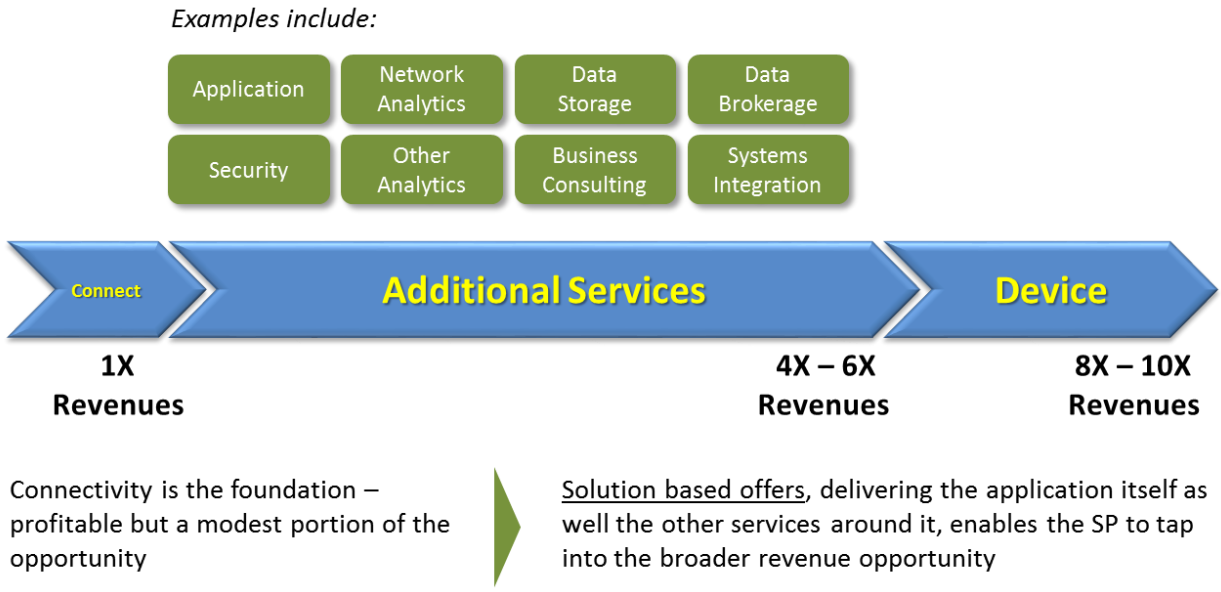
Figure 1-3: IoT cellular connection growth 2014-15 [Source: operators and Machina Research estimates, 2016]*



1.3 Leaders showcase solution based offers and bifurcating IoT strategies

Moving up the value stack to capture more of the revenue opportunity in IoT is a basic and long standing goal for CSPs in IoT. Here, highly focused solution offerings see CSPs deliver an end-to-end service to customers. When the solution is inclusive of the device (i.e. amortized into the solution), this upside can be as much as ten times the typical connectivity revenue (please see Figure 1-4).

Figure 1-4: Moving up the IoT value stack [Source: operators, Machina Research, 2016]



Most interesting in the IoT value stack is therefore the suite of additional services from which a CSP can try to capture revenues (*for this excerpt, we highlight one specific example)*:

- An interesting area of revenue potential and competitive differentiation is **business consulting** and **systems integration**. A CSP such as Deutsche Telekom, because of its respective T-Systems unit, is not surprisingly one that highlights the value they deliver as well as derive from this area. Machina Research believes that this is an important point to make. Our own surveys as well as conversations with enterprises note the critical role systems integration (SI) organizations have in helping them understand and tackle the challenge of implementing IoT. SIs are the kind of organizations enterprises look to for advice on their IoT journey. Consequently, they are also an important source of lead generation for Deutsche Telekom.

It is important to note how these additional services showcase the bifurcation of strategies as CSPs evolve further in their pursuit of IoT. Most CSP's approach to IoT starts as horizontal, based on wholesale, with the occasional dabbling in vertical sectors. Over time we've generally seen the direction of travel as being towards offering more vertical solutions, led by the bigger players. However, what has emerged in the last year is significant divergence from this seemingly linear progression. Some CSPs are choosing to evolve offerings through verticals while others focus on the horizontal connectivity and associated services. The third option is one that is emerging, and more

something to watch than a definite trend, is for the smaller CSPs to effectively surrender some element of control over their IoT roadmap to a third party, either another CSP or an MVNO, rather than try to build additional vertical or horizontal capabilities themselves.

The CSP pursuit of revenues up the value stack in it of itself can also yield diverse horizontal and vertical approaches. For example, while applications may tend to take the CSP on a path towards deep vertical specificity, IoT security services can on the other hand have a decidedly horizontal approach. The challenge will ultimately be in finding the right focused approaches as well as the balance that is most suitable for the specific scenario the CSP faces. When a Deutsche Telekom explains predictive maintenance to customers they are no longer sounding like the traditional telco that could only talk about monthly bundled minutes of use. They become, as Deutsche Telekom itself likes to say, digital transformation agents. At the end of the day, IoT is also about business transformation for the CSP itself. Just how much a CSP seeks to be part of that transformation will determine how deep it should go into IoT.

2 Scope

The purpose of this report is to give Machina Research's view on the likely long-term success of Communication Service Providers in the IoT market in terms of generating profit from IoT services. The focus is squarely on the expectation for future, rather than historic, success (although the latter may be an indicator of a predisposition to the former).

There are two main reasons for examining the IoT capabilities of the CSPs. Firstly it can act as a guide to potential customers on which IoT service providers to shortlist. Enterprises looking to implement IoT will frequently be both implementing a complex solution for which they need expert help and making a long-term commitment. They require a high degree of certainty that they are making the right choice of CSP. Secondly, CSPs are constantly on the look-out for best practice in this developing market. Examining the capabilities of competitors is a good way to highlight areas for improvement.

In this year's report Machina Research has revised the global focus of the report. It includes profiles of 17 CSPs: AT&T, China Mobile, China Unicom, Deutsche Telekom, Etisalat, NTT Docomo, Orange, SingTel, Sprint/Softbank, Tele2, Telefónica, Telekom Austria M2M, Telenor, Telia Company, Telstra, Verizon and Vodafone. Coverage of KPN and Swisscom was removed for this year due to still ongoing organizational restructuring or insufficient activity in general. With these companies we cover the biggest global carriers as well as the most prominent regional IoT players.

Machina Research analysed the CSPs on six criteria:

- **Pedigree** – The experience that the CSP has in addressing the IoT market. This will often be vertical-specific. While historical success is no guarantee of what will happen in the future it does demonstrate a level of experience in delivering IoT services, which is frequently a very different proposition from traditional voice and data services.
- **Platforms** – The software platform(s) that the CSP uses for supporting its IoT connections. Platform choices will often have implications for the efficiency with which a CSP can address the IoT opportunity, in particular in the provisioning and connection management process. Machina Research is planning to publish a Strategy Report focusing specifically on the Platforms space, examining the dynamics of this critical element of IoT.
- **Place** – Where the CSP is well placed to provide services. This includes analysis of geographical footprint as well as horizontal partnerships with other CSPs in non-footprint markets. In the latter case, particular focus is given to the ability to provide an end-to-end service. It should be noted that a CSP's ability to generate profit from an IoT connection will be greater if that connection is supported via its own facilities-based footprint rather than through roaming agreements. Also included as a sub-set of this analysis is the availability of broadband (3G and 4G) wireless networks. With regard to network technology choice, the availability (or lack of it) of broadband networks will affect the ability of a CSP to address the needs of particular applications as efficiently as a rival may. It should be noted that there is a well-defined evolution path for most CSPs from 2G to 3G and LTE. Differences related to network deployment will only be highlighted where it differs substantially from the industry norm.
- **Partnerships** – Partnering is critical for the success of IoT. The focus is on vertical partnering (i.e. tying up with other players in the value chain to provide a solution that meets the specific

needs of the target market). Horizontal partnering (i.e. with other CSPs to provide the broadest footprint possible) is largely covered in the 'Place' category.

- **Process** – Examining a variety of processes involved in the supply of IoT services including application development, device certification, troubleshooting, SLAs, project management/systems integration, and client support. All of these enable a CSP to deliver an appealing proposition to potential clients. Furthermore, the more value-add provided by the CSP, for instance in application support or systems integration, the larger its likely share of the revenue accruing from any given IoT connection.
- **People** – Much of the success in IoT will depend on having the right personnel in the right place. This section examines the number of dedicated IoT professionals, the CSP's organisation and the fitness for purpose in addressing the IoT opportunity.

This document is an extract of the full report, which features additional analysis of the overall M2M CSP landscape as well as profiles of seventeen CSPs: AT&T, China Mobile, China Unicom, Deutsche Telekom, Etisalat, NTT Docomo, Orange, SingTel, Sprint/Softbank, Tele2, Telefónica, Telekom Austria M2M, Telenor, Telia Company, Telstra, Verizon and Vodafone. With these companies we cover the biggest global carriers as well as the most prominent regional IoT players. Each CSP is profiled in the same way as DTAG, below. Further analysis of CSPs can also be found in our IoT Strategies and M2M Strategies Streams, as well as in the various Research Notes that are published.

For more information on the full report visit: https://machinaresearch.com/report/internet-of-things-iot-communications-service-provider-benchmarking-2016/

3 Communications Service Provider Profiles

3.1 Deutsche Telekom

Deutsche Telekom (DTAG) is a major global telecom provider that has been allocating significant resources in pursuit of the IoT opportunity. It has forged very strong horizontal (in the form of alliances) and vertical (the Device-to-Cloud initiative) arrangements in this effort. DTAG is also unique among its global peers for the facilities-based presence it has in the key IoT markets of the US and Europe. The CSP has built a strong European IoT business and with its US operation T-Mobile USA starting to look more closely at it, DTAG will be an important company to watch in the global CSP race for IoT leadership in the years to come.

Table 3-1: SWOT for Deutsche Telekom in the IoT market [Source: Machina Research, 2016]

Strengths • Robust in-house built Multi-IoT Service Platform (MISP) combined with Deutsche Telekom assets. • International strategic partnerships in the form of the GMA (now extended to Bridge Alliance) and with major IoT technology players such as Microsoft, SAP, Cisco, GE and Huawei. • The Telekom Security group which comprises some 1,400 security experts serving customers. • In-house systems integration capability that sits within T-Systems as well as digital consulting competencies via Detecon. • Unique facilities-based presence in both the US and Europe. • Strong fixed line capabilities in home market.	**Weaknesses** • T-Mobile USA yet to develop a full approach to IoT and pursue the business opportunity (our understanding is that the DTAG strategy will serve as the model and efforts will ramp up soon). This is important as the US is a dynamic and large IoT market. • Limited facilities-based footprint in Latin America and Asia-Pacific (GMA and Bridge Alliance collaborations naturally help alleviate this).
Opportunities • Build market share in the dynamic US IoT market on the back of greater focus and exclusivity as a committed GSM operator. • Build upon its vision as a platform, connectivity and security service capabilities, including substantially simplifying the application development environment. • Diversification towards a solution-focused and end-to-end IoT service delivery business.	**Threats** • Failure to leverage key advantage of a US facilities-based presence. • Failure to benefit from synergies offered by the GMA and Bridge Alliance in technical and commercial terms. • Greater competitive threat for global business from the likes of AT&T, Orange, Telefónica and Vodafone. • IoT strategy falls under Digital Division versus a dedicated IoT unit. We have yet to see just how effective such an approach will be in enabling cohesion across functions and building the IoT business specifically. We will be monitoring the effectiveness of this approach (may emerge as an asset).

3.1.1 Pedigree

Deutsche Telekom (DTAG) has built a strong pedigree in IoT. At the end of 2012 the CSP started reporting M2M connections and while this does not give a complete picture as only selected numbers were reported, Machina Research believes the broader picture sees the company well within the ranks of the top tier of global operators pursuing IoT. We estimate that at the end of 2015 DTAG as a whole had over 13.6 million M2M connections, up from just under 11 million in 2014. This reflects about 25% annual growth, a robust rate that is in keeping with the pace set by the top tier of global CSP IoT players. It also reveals the now significant base of IoT business the company has, especially in Europe. In the past the US had accounted for a bigger share of DTAG's M2M connections. The concerted effort to build the European business has clearly paid dividends.

DTAG has built its IoT business through a combination of a focused go-to-market approach, unique technology proposition, and solution development process that sees the CSP working hard to deliver services that position it higher along the IoT value stack (and thus capture more of the revenue opportunity). This approach to offer customers a complete and integrated IoT solution relies on what the company describes as its two main guiding pillars:

- As a telecom service provider, DTAG clearly recognizes its role as a connectivity provider. As such, it has a special focus on the access layer as well as the corresponding management platforms enabling horizontal services. In the course of the last year, beyond other activities it has built-up a partnership between GMA and Bridge Alliance to extend the footprint of the Multi-Domestic Service to 77 countries worldwide. In addition DTAG is heavily pushing the definition and introduction of LPWA (based on NB-IoT), LTE Cat-M as well as 5G.
- Value-add growth: DTAG offers IoT as a service package combining Connectivity, Cloud, Security, Data Analytics, Machine Learning as well as sensors and gateways in an end-to-end approach. In this remit DTAG builds on its strong internal capabilities in consulting, access, system integration and application development provided by Detecon, its national operator companies as well as T-Systems complemented by market leading partners which not only bring technology competence but also specific industry know-how and industry access to the table. By doing so, the customers can benefit from state-of-the-art highly scalable and secure end-to-end solutions.

The pillars are complemented with go-to-market efforts focused on the automotive, healthcare, energy, smart cities, industrial, and smart home segments.

Among the priority segments, the connected car has been a particularly robust business and holds several of the CSP's more notable customers such as BMW and Daimler. For Daimler specifically, it has set up and delivered telematics and value add services (Command Online) for over 2.5 million connected cars in the EU, NAFTA, China and Asia. Overall, DTAG offers global automotive services in the European Union, North America, China, Japan and Korea. Currently, the CSP is in talks with three top German automotive manufacturers as they look for a data aggregator like DTAG to aid in their autonomous vehicle initiatives.

When it comes to healthcare, DTAG sees the opportunity in terms of an "uncontrolled" and "controlled" healthcare markets. In the uncontrolled markets, DTAG will cooperate with the likes of Google, Apple and other device manufacturers as they relate to driving standardisation initiatives. In

the "controlled" market, such as healthcare, DTAG sees a highly fragmented market and as such seeks to bring its advantage of being a global communications provider, with the required regulatory approvals, to bring connected healthcare solutions to market. It has the open eHealth Composite Platform which connects patient records with patient devices so that the combined data can be easily integrated into IoT applications and services being built. The platform is unique to healthcare because it complies with international healthcare standards such as IHE (Integrating the Healthcare Enterprise) and HL7 (Health Level Seven International). DTAG is also an active member of important associations on global eHealth standards, such as the Continua Health Alliance (CHA). Some solutions DTAG has developed on top of its healthcare platform include services designed for in the field heart-failure monitoring, telenursing, and telepathology use cases. DTAG has also won a contract for the secure and real-time transmission of a patient's cardio data (customer name has not been made public yet). It also bought Brightone (now called Deutsche Telekom Clinical Solutions GmbH), a company that provides healthcare information systems (HIS) to over 200 clients. Today it supports in excess of 100,000 users in Germany. This builds the foundation for DTAG's own HIS service and works to strengthen overall solution offers in the healthcare sector.

DTAG also sees an important IoT play in energy. In 2015, the company entered into a strategic partnership with General Electric (GE) to bring GE´s segment expertise on smart meters with DTAG´s expertise in communications and messaging, security (e.g. DTAG is running its own Trust Center for security certificates in Germany) and data processing. Extending from this effort in the energy segment is DTAG's effort in the smart city. The CSP notes that it already has public sector customers in countries such as Germany, Belgium, and Austria. Some of the smart city solutions in its portfolio include parking and mobility management, lighting, and traffic information systems that incorporate analytics features and capabilities. According to DTAG, it has implemented these types of solutions for cities such as Dubrovnik in Hungary, Bucharest in Romania and Trencin in Slovakia.

Another key market for DTAG is industrial automation and enterprise trends around Industrie 4.0. The CSP has launched (or is actively in the process of launching) with partners IoT solutions around use cases such as mobile asset management, condition monitoring and tracking, and predictive maintenance. Delivering solutions to a broad set of customers is an important aspect of the strategy and is demonstrated by efforts such as the "Cloud of Things" package. This package is well-formed for the developer community as it incorporates hardware, connectivity and access costs into one pricing strategy. This removes the per megabyte pricing complexity out of an IoT solution, simplifying and allowing for a truly off-the-shelf solution offering. Just recently DTAG also launched a starter-kit for predictive maintenance solutions that include connectivity, hardware (not only the module, but also sensors) as well as the cloud based IoT service platform. These are examples of DTAG's effort to deliver more complex end-to-end IoT solutions rather than simple connectivity services. Key here is the company leveraging capabilities that span the digital consulting, integration, applications, cloud, connectivity and device realms. It partners with an international ecosystem of IoT players along the value chain, including firms such as Microsoft, SAP, Cisco, GE, Ericsson and Huawei for IT, platforms and devices. Such capabilities and approach to the market allow the CSP to capture a larger portion of the overall IoT opportunity.

DTAG is also actively pursuing the 'Connected Home' market for applications such as home energy management, security and home monitoring. The CSP utilizes the Qivicon, a smart home platform developed in Germany by a consortium of industrial and technology companies looking to accelerated

connected home solutions. Some 30 companies have signed up to the platform, including EnBW, Bitron Home, eQ-3 and major international brands such as Sonos, D-Link, Samsung and Philips (there have been few additions to the list of platform participants in the last twelve months however). Distribution is via DTAG channels (shops and online) as well as partners such as EnBW and Cyberport. DTAG also hopes that numerous innovative developers will build applications on it and that it can export Qivicon beyond Germany, and eventually outside its footprint markets. Given the pace the smart home market is evolving, Machina Research sees as more of a medium-term, versus near-term, effort.

3.1.2 Platforms

Deutsche Telekom has an in-house developed connectivity support and service enablement platform with all the associated pros and cons that come with it. The company maintains this stance and continues to develop the platform. It firmly believes that being able to control and manage the ecosystem, via the platform, allows it to differentiate. Machina Research also sees the merits associated with being able to control the feature roadmap of a platform. It gives a CSP the utmost flexibility in being able to respond to RFPs that in many cases have specific feature requirements and demands.

The platform view notwithstanding, DTAG acknowledges that multi-platform strategies have emerged as some customers are strongly tied to the existing platforms they use. Several years ago Machina Research predicted that given the close relationship between DTAG, Orange and Telia Company that we would expect some form of common platform to emerge. Given the emerging multi-platform phenomena, we still maintain this view. In fact, following this strategy, DTAG's Multi-IoT Service Platform (MISP) looks to combine the benefits of the leading IoT platform providers under one solution (a platform for IoT platforms of sorts). According to the CSP, the MISP starts with the implementation of Microsoft Azure, with each customer then provided with the platform that best suits their IoT project. This ensures customers have the utmost flexibility in choosing the solutions that offer the best possible technology and support for their current or planned approaches to IoT.

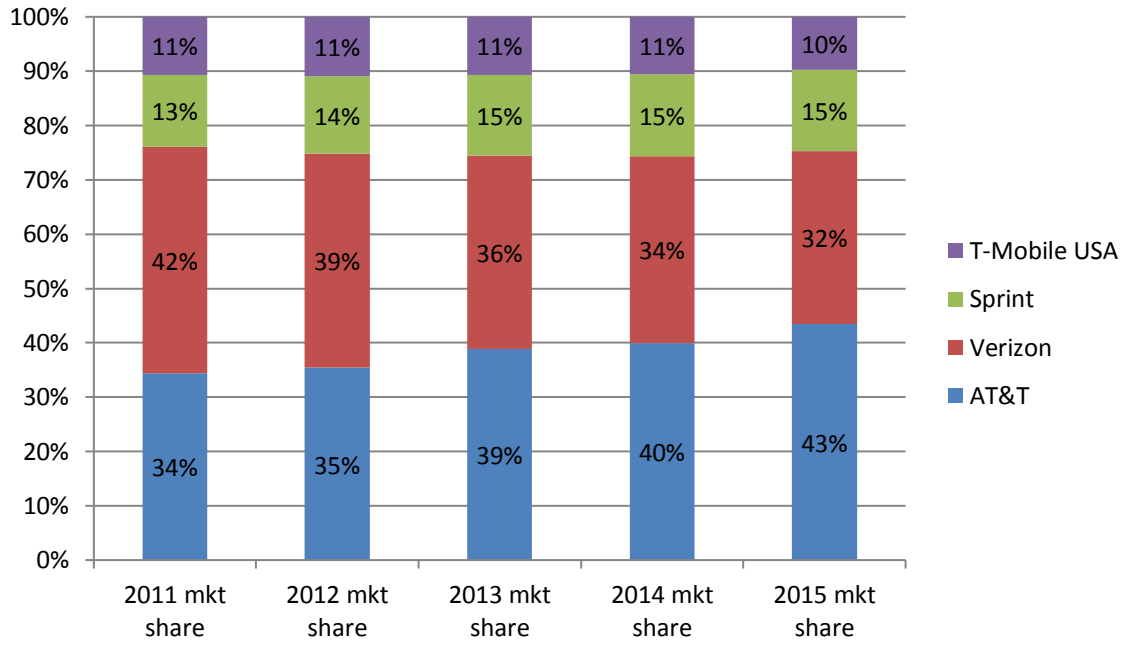
When it comes to the network infrastructure, one important consideration for DTAG is LPWA. It had been exploring customer projects with SigFox in Prague in the past but with the clear path now set in 3GPP (something the CSP had clamored for), trials are now underway (initial customers are still under NDA) and Machina Research expects the company to announce a path in this direction sometime in 2017. It should be worth noting that this would be for a European rollout. In the US, near-term emphasis has been on the 4G/LTE network upgrade and expansion. The LPWA path in the US market is more likely to evolve later in 2017 or early in 2018.

3.1.3 Place

Deutsche Telekom is unique for being the only global CSP to span Europe and the US with facilities-based capabilities. While there have been questions over the possible sale of T-Mobile USA for several years now, it appears that the status quo will remain for the US business. In fact, Machina Research anticipates the US IoT effort, which has been largely focused on serving the wholesale business, will going forward be invigorated and see much greater focus.

Given AT&T's re-farming of its 2G network next year, T-Mobile will be the only significant GSM operator in the US. To be sure, T-Mobile USA has yet to capitalize on this. According to Machina Research's estimates, the US CSP has seen its market share staying relatively static at between 10% - 11% (see Figure 3-1) the past couple of years. The winner continues to be AT&T, which as has, via its near domination of the US connected car market, been steadily increasing its market share.

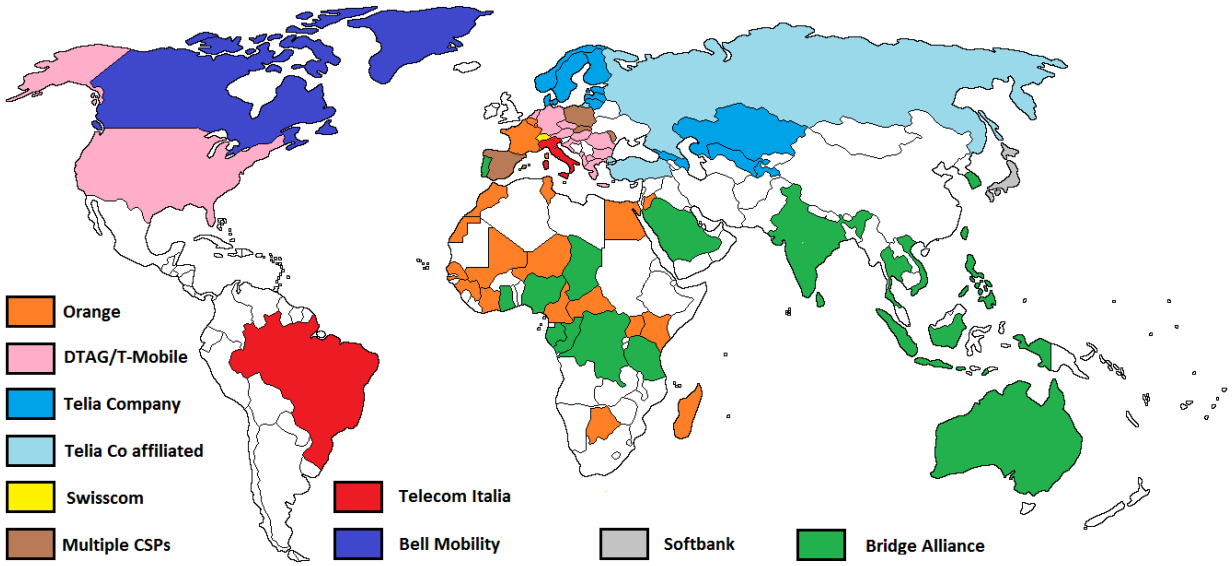
Figure 3-1: Share of US M2M market share 2011-2015 [Source: Machina Research, 2016]



Outside of the US, DTAG's international footprint is bolstered by its membership of the Global M2M Association (GMA) that was officially launched in 2012. The grouping consisted initially of Deutsche Telekom, Orange and Telia Company[1]. They were quickly joined by TIM, Softbank and Bell Canada. The most recent addition was Swisscom in 2015. The combined coverage of the GMA parties (as illustrated in Figure 3-2) is exceptionally good in Europe, Japan and the US but was comparatively weak elsewhere. This has been addressed with the Bridge Alliance partnership announced in early 2016.

[1] See Research Note "The Global M2M Association (GMA) is announced with little fanfare" (September 2012) for more details

Figure 3-2: Global M2M Association (including DTAG) with the Bridge Alliance [Source: Machina Research, 2016]*



**Telia is in the process of divesting from Turkey and Spain with other markets in Eurasia expected to follow*

There are substantial opportunities from multi-operator alliances. For instance joint bidding for projects or the implementation of central billing is an attractive proposition to customers. Furthermore one of the repeated stated aims is to create a "seamless network", with greater cross-network transparency for troubleshooting and managing M2M connections, which will also help with providing a superior quality of service for end customers. Alliance partners work hard to establish standardised end-to-end troubleshooting and other operational processes across all member operators. To this end, the GMA announced the multi-domestic service (MDS) offering at Mobile World Congress 2015. The go-to-market for the MDS focused on the automotive and consumer segments, offering potential customers a more seamless and one-stop-shopping experience for their connectivity needs. In terms of the approach to RFPs itself, a lead operator is chosen on a case by case basis. Other aspects of the alliance, such as device certification and roaming management capabilities were put in place the prior year. Platform integration remains the unresolved technical item. Halfway into 2016 however, the GMA has yet to announce a specific contract win stemming from the alliances efforts.

As well as its facilities-based footprint, DTAG has a strong global presence, particularly through systems integrator T-Systems (see Section 3.1.5), which is present in 50 countries around the world and gives Deutsche Telekom some access to out-of-footprint opportunities.

3.1.4 Partnerships

One of them more important horizontal partnerships for Deutsche Telekom is with the other members of the GMA, as noted in Section 3.1.3 above, which has now been extended to the Bride Alliance members. In terms of vertical partnerships notable is the accelerator initiative called "Challenge Up", in collaboration with Cisco and Intel. The developer ecosystem is critical to IoT success and with Challenge Up the hope is to encourage and discover innovative startups DTAG could potentially work with. Another important initiative is Industry 4.0, an industrial automation standardization effort with

collaborating companies such as Siemens and SAP. CSP IoT activities often center on the transport segment (where most of the business is today) – participation in Industry 4.0 allows DTAG to expand the carrier role in a vertical that has typically been less served by CSPs and certainly one that has been identified by DTAG as a segment with meaningful potential.

Other partnership activities are found in the burgeoning industrial IoT opportunity with DTAG announcing a collaboration with GE Digital early in 2016 around the industrial giant's Predix cloud platform. The CSP is also working with Microsoft to leverage the Azure suite of cloud services. On the networking side, Ericsson and Huawei are important partners.

3.1.5 Process

One major advantage that Deutsche Telekom has over its rivals is an in-house digital consulting capability in the form of Detecon and a systems integration capability in the form of T-Systems. Systems integration capabilities are critical for complex IoT implementations. Of course other CSPs are capable of partnering with SIs, but in so doing they miss out on a lot of the value of IoT solutions. DTAG's new Digital Division fits within T-Systems, functioning as an overlay unit to address the wider move to digitalisation. According to DTAG, the unit can call on any resource within the company to build, deliver and manage a solution for a customer. To be sure, the digital unit is not solely focused on IoT projects, but IoT will naturally be a significant part of its playbook. DTAG's Digital Division will look to leverage T-Systems' existing business relationships, specifically the access to enterprise customers' executives and decisions-makers to push DTAG's overall IoT agenda forward. While this is a huge positive, it is also worth noting that with various IoT responsibilities also falling to the various subsidiaries (which are also a varying stages of evolution, for example T-Mobile USA is just now in the process of jump starting IoT efforts), the lack of an overall structure for IoT does create the challenge of cohesion for the organization as a whole.

As part of the GMA and now with the Bridge Alliance (see 3.1.3, above), the companies undertake joint module certification and have joint SLAs. DT has also been working with G&D and Gemalto to ensure the availability of eUICC IMSI swapping capabilities.

The other major development that DTAG is anticipating is the continued provisioning of more horizontal elements for application development. At Embedded World in February 2014, DTAG announced its Device-to-Cloud (D2C) initiative which simplifies the process of managing IoT data and devices. It also provides device certification and a free test environment. This is part of a concerted effort to provide more standardized tools and APIs for developers, allowing DTAG to become a one-stop-shop for developers providing a managed service comprising connectivity and hardware.

Through its Cloud of Things, DTAG is also helping application developers via SDKs, toolkits and general support. DTAG is increasingly turning its attention to how to monetize the data analytics element of IoT. It believes that it is well positioned to do so courtesy of its IoT, cloud services and IT capabilities (particularly through T-Systems). The focus is on moving it out of silos and horizontalising it to provide greater scale.

3.1.6 People

The team at Deutsche Telekom directly supporting IoT numbers nearly 700 employees. These include sales, solution design, and build and run staff for IoT services across the globe. National operating

companies, who can garner support from the overlay team, function as a complement and have independence to adapt approaches to local market requirements. Overall, the IoT strategy is driven by the Digital Division. The division has group-wide business responsibility and a coordinating role for DTAG identified strategic growth areas that include IoT as well as cloud and new data driven business models. The unit comprises over 800 digitization specialists.

4 About Machina Research

Machina Research is the world's leading provider of market intelligence and strategic insight on the rapidly emerging Internet of Things, Machine-to-Machine (M2M), and Big Data opportunities. We provide market intelligence and strategic insight to help our clients maximise opportunities from these rapidly emerging markets. If your company is a mobile network operator, device vendor, infrastructure vendor, service provider or potential end user in the IoT, M2M, or Big Data space, we can help.

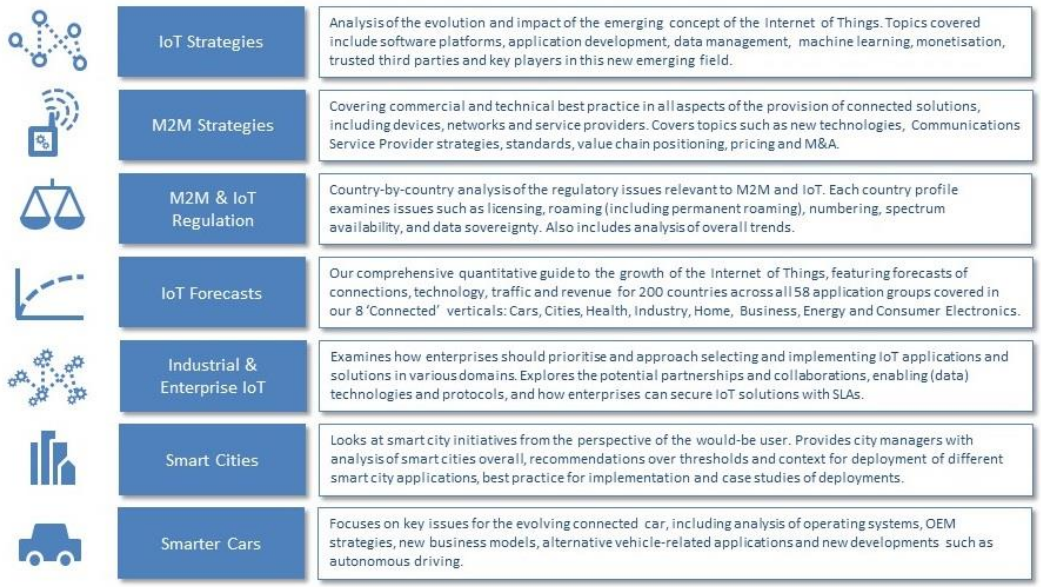
We work in two ways:

- Our **Advisory Service** consists of a set of Research Streams covering all aspects of IoT and M2M. Subscriptions to these multi-client services comprise Reports, Research Notes, Forecasts, Strategy Briefings and Analyst Enquiry.
- Our **Custom Research and Consulting** team is available to meet your specific research requirements. This might include business case analysis, go-to-market strategies, sales support or marketing/white papers.

4.1 The Advisory Service

Machina Research's Advisory Service provides comprehensive support for any organisation interested in the Internet of Things (IoT) or Machine-to-Machine (M2M) market opportunity. The Advisory Service consists of seven Research Streams (as illustrated in the graphic below), each focused on a different aspect of IoT or M2M. They each provide a mixture of quantitative and qualitative research targeted at that specific sector and supported by leading industry analysts.

Advisory Service Research Streams [Source: Machina Research, 2016]



For more detail on each of the Research Streams, please see the 'Machina Research Advisory Service – Guide to Research Streams' document.

4.1.1 Reports and other published content

Our research content consists of a number of broad categories of deliverable:

- **Strategy Reports** – Extensive and in-depth reports focusing on specific key major themes in IoT and M2M.
- **Research Notes** – Shorter reports examining key issues and developments in the world of M2M and IoT.
- **Application Spotlights** – Regularly updated profiles of each M2M application. Each Application Spotlight comprises Definitions, Drivers & Barriers, Market Analysis, Forecast and Conclusions & Recommendations sections.
- **Forecasts** – Many of our Research Streams include extensive market forecasts. These are available through our online Forecast tool.
- **Research Stream-specific content** – Some of the Research Streams have specific content types, for instance the Regulatory Profiles in the IoT & M2M Regulation Research Stream.
- **Previous publications** – Clients enjoy full access to our library of past publications from the Research Stream.

Each of the Research Streams includes a varying blend of the above. For details of the specific contents of each of the Research Streams, please refer to the 'Machina Research Advisory Service – Guide to Research Streams' document.

4.1.2 Strategy Briefings

An opportunity for direct face-to-face interaction between the client and the Machina Research analysts. Typically a Strategy Briefing will involve a presentation at the client's premises on a theme agreed with the client within (or closely related to) the scope of existing research.

There are no Strategy Briefings bundled as standard with any of our Research Streams. These need to be included as separate items in the subscription.

Relevant travel costs will apply.

4.1.3 Analyst Enquiry

All clients also get direct access to our analysts in the form of enquiries about the published materials and topics with the Research Streams to which you subscribe.

You may want to request clarification on something within the report, ask for a brief update or pick our brains on any issue.

We provide clients with unlimited access to our analysts, up to a maximum of one hour per enquiry. We are happy to undertake more substantial enquiries as custom research.

4.2 Custom Research & Consulting

Machina Research's analysts have a wealth of experience in client-specific consultancy and custom research. Typical work for clients may involve custom market sizing, competitor benchmarking, advice on market entry strategy, sales support, marketing/promotional activity, white papers or due diligence. Subscription clients are eligible to purchase our custom research and consulting services at discounted daily rates.

For more information on Machina Research, visit our website at http://machinaresearch.com.