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Viewpoint

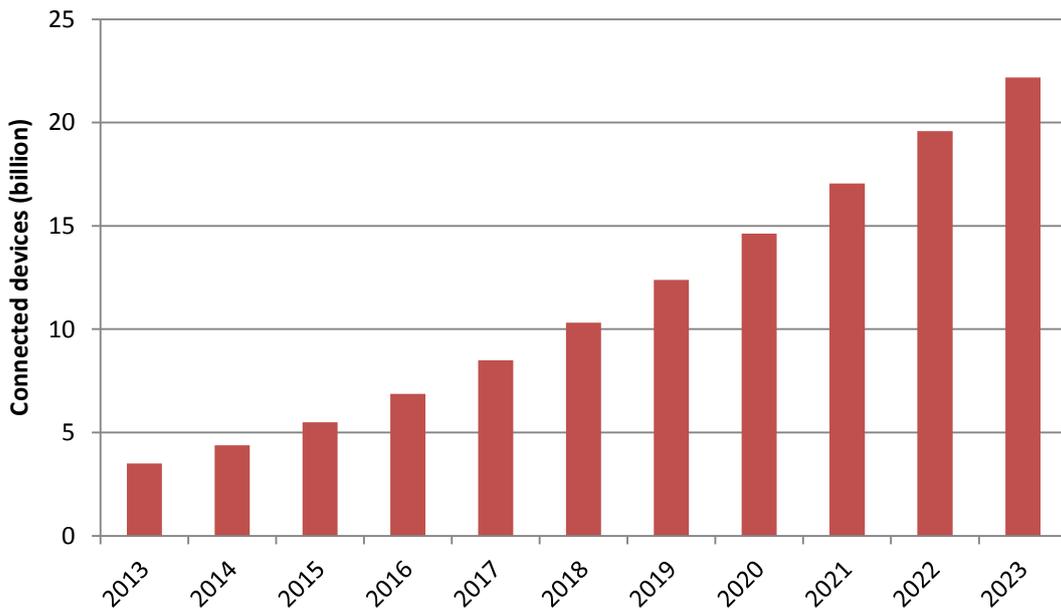
The critical role of connectivity platforms in M2M and IoT application enablement

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Introduction

The growth of connected devices in M2M and the Internet of Things – including sensors, devices, and systems – is set to be pervasive and to extend into all aspects of our society. Machina Research estimates that the number of M2M connected devices will grow from 3.5 billion in 2013 to 22.2 billion by the end of 2023¹, representing more than a six-fold growth in the period, as illustrated in Figure 1.

Figure 1: Global M2M connected devices 2013-2023 [Source: Machina Research, 2014]



This vast estate of sensors, devices and systems will be developed and deployed hand-in-hand with an extensive, diverse and innovative range of M2M and IoT applications including personal healthcare monitoring solutions, construction site surveillance systems, smart meters, connected cars, remote monitoring solutions for manufacturing, and agricultural equipment, to name but a few. Each of these applications will perform specific and detailed tasks as defined by associated business rules and models

The ability to connect to and manage devices in a resilient and scalable way is fundamental to M2M and many IoT solutions, and a range of different kinds of platform have emerged to assist in this endeavour. Device management platforms typically manage M2M devices deployed by single device vendor, ensuring the use of correct drivers to connect through multiple networks, and managing the firmware and software requirements of those connected devices. Meanwhile horizontal service enablement platforms aim to build-in and ‘productise’ as many device drivers and other capabilities as makes economic sense, in a never-ending pursuit of increased functionality in order to better support their users.

¹ Machina Research forecast database 2014

Connectivity support platforms, which are primarily cellular focused platforms at present, enable and manage the tasks of initiating, configuring and activating SIMs. These platforms ensure that connectivity paths are managed and monitored, and provide some additional tools such as real-time connectivity status, reporting, troubleshooting and, in a mobile environment, SIM ordering and profile creation.

As support required by M2M connected devices becomes more standardised, the role of device management platforms becomes increasingly embedded in service enablement platforms. The role of connectivity support platforms is set to become critical as new and alternative connectivity technologies such as low power wide area (LPWA) networks emerge. M2M and IoT solutions bring together complex device, connectivity, application and data management processes. Within each area, new requirements and capabilities are emerging, enabling a dynamic value chain and expanding ecosystem of service providers which will together grow the M2M and IoT market opportunity.

1 A commoditised view of connectivity is a missed opportunity

Connected devices transferring data, and associated applications, are not a new concept. Enterprises have leveraged these technologies for many years, starting with telemetry and telematics, then SCADA systems, and developing more recently towards more widely adopted solutions such as the connected car and the connected home.

Almost exclusively focused on cellular based technologies, connectivity support platforms have made significant contributions to the growth of many M2M and IoT solutions. This is the case particularly where different types of connection are required at different stages of the lifecycle of a cellular connected solution. For example, in the automotive industry, a significant market for cellular connections, the ability to activate and deactivate SIM connections is necessitated as a result of various production, test and launch stages.

In addressing the M2M requirements of industry verticals, designing, developing and building M2M solutions could be compared to complex IT solutions. The use of connectivity support platforms allows enterprises to standardise connectivity management, and extend the functionality within solutions. The current limitation is that in very few cases have connectivity support platforms been designed to be flexible or adaptable with regard to different connection technologies. Once applications have been developed it requires significant time, effort and money to change devices, add connectivity technologies, or adopt and integrate new application requirements with new data models. This generally leads to multiple, specifically designed solutions with limited re-use or integration of connectivity support platform capabilities.

With M2M applications becoming ever more advanced and complex, and with the emergence of the IoT, platforms will need to change. Where previously connectivity support platforms supported

connection to a narrow set of devices and primarily cellular connectivity options, future requirements can be characterised by increasing agility and flexibility.

We have already seen a similar trend in application development where abstraction has become a preferred approach for the emerging range of M2M/IoT Application Platforms². We expect similar developments in the connectivity support platform space, characterised by an ever increasing technology agnosticism. This combination of abstraction and agnosticism allows for the scale and heterogeneity (of devices and protocols) to be managed through fewer platforms, and enables developers to focus more on application development rather than specific communications technologies or device characteristics.

But the simple idea of a ‘technology agnostic’ connectivity support platform belies a complex and challenging task in managing the characteristics of multiple connectivity options. For example M2M solutions such as container freight tracking might require some combination of satellite, cellular and short-range connected devices. Supporting these different connectivity technologies with a single platform solution could be a significant benefit and differentiator for enterprises and operators, system integrators and providers of M2M/IoT Application platforms alike.

Managing different connectivity technologies is a complex task. Providers of multi-technology connectivity platforms face the challenge of working across different protocols, managing multiple billing, real time data and reconciliation functions, and ensuring secure and resilient communications across a range of communications technologies. Each connectivity technology will behave differently when it is ‘working properly’ and may require different actions when there is an error status. Accordingly, the ability to offer a well-defined and managed connectivity solution drawing in multiple connectivity technologies can be a significant competitive differentiator. For enterprises, such a solution removes much of the difficulty of integrating new connectivity options, and opens the door to new tariffing and billing options.

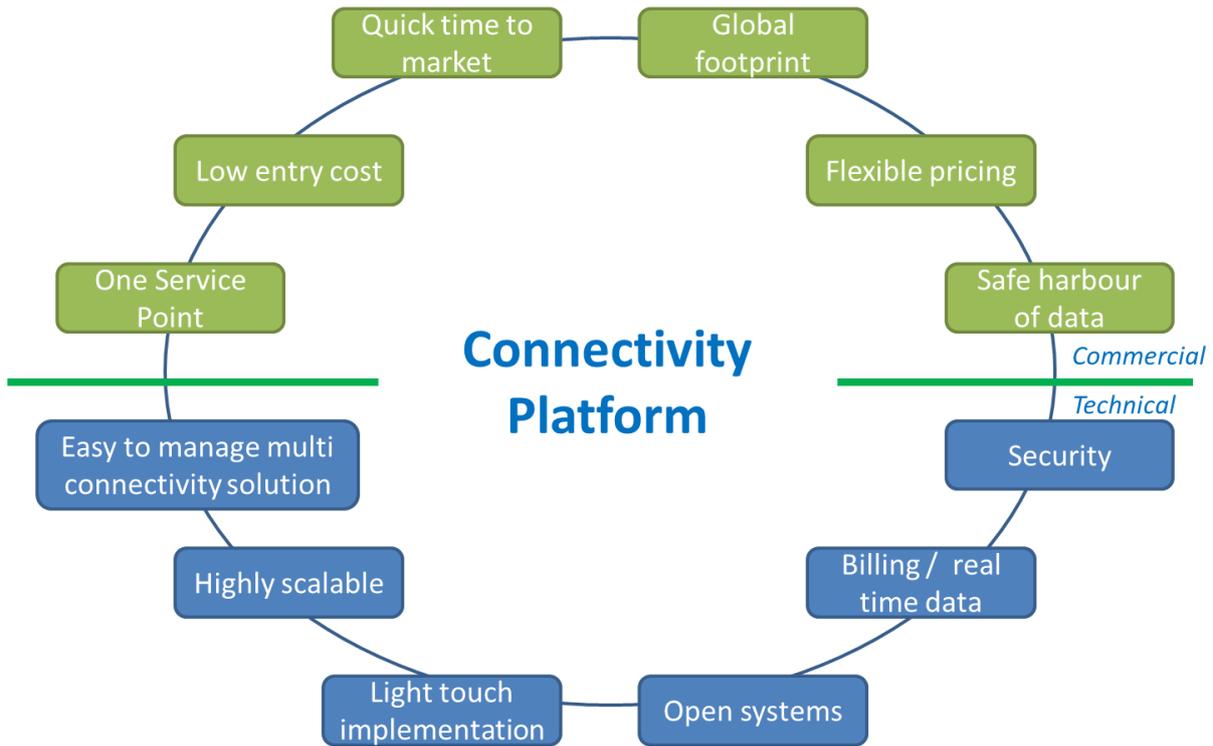
2 Defining ‘best practice’ for connectivity platforms

Twelve technical and commercial capabilities and features, as illustrated in Figure 2, define the ‘best practice’ elements for connectivity support platforms. Delivering these capabilities and features will ultimately reduce friction in the marketplace, enabling significant growth in connected devices, and providing improved ROI, which in turn open new markets and application development opportunities. In this space technical and commercial capabilities and features are closely related and these capabilities and features work together to bring about a single and comprehensive connectivity proposition.

²² For more detailed information on M2M/IoT Application Platforms read Machina Research Strategy Report on “Competitive Dynamics in the M2M Platform Space,” published in January 2014.

However, it is clear that the ‘best practice’ capabilities and features listed are not the same as those typically cited for cellular connectivity support platforms. Such capabilities would typically include connection provisioning, usage monitoring and some level of support for network fault resolution. By contrast, the best practices listed here typically address higher level commercial, application development, application management and implementation considerations. Ultimately pursuit of best practice for a connectivity support platform results in a repositioning as a ‘Connectivity Platform’: actually providing connectivity, rather than simply supporting it.

Figure 2: ‘Best Practice’ elements of connectivity platforms [Source: Machina Research 2014]



We discuss these ‘best practices’ in more detail in the following tables. Table 1 details the commercial best practices, whilst Table 2 expands on the technical best practices.

Table 1: Six Commercial best practices for connectivity platforms

Best Practice element - Commercial	Description
One Service point	Enterprises may potentially need to manage multiple connectivity technology options to support their M2M and IoT applications. Providing flexibility and opportunity to create and select between multiple service connectivity providers (for example mobile operators in a given geography) and connection technologies (satellite, cellular, low power wide area networks, etc.) through a single connectivity platform delivers an efficient and compelling proposition for enterprises.
Low entry cost	Deployment costs for complex connectivity solutions remain a challenge for many enterprises. Platform providers should ideally deliver solutions that allow for a combination of light touch implementation approach, unit-and/or usage-based charging models, and also allow enterprises differentiated service level options, all to encourage market entry at lower cost levels.
Quick time to market	Reducing time to market for M2M and IoT solutions is a competitive benefit for enterprises. Connectivity platforms will ideally provide the tools and options to support this, enabling quick to launch connected solutions.
Global footprint	More and more enterprises are engaged in multiple geographical markets, and ideally connectivity platforms will provide connectivity solutions with a homogenous global footprint and multiple service provider options per country.
Flexible pricing	Having access to multiple connectivity technologies on one platform enables enterprises to review and select different pricing options from different providers. This function should ideally remain as flexible and easy to use as possible and offer enterprises a competitive range of available services and providers.
Safe harbour of data	Observant of national regulations relating to the management of data, a connectivity platform will ideally be able to deliver and manage safe harbours for data in a way that complies with local regulations.

Table 2: Six Technical best practices for connectivity platforms

Best Practice element – Technical	Description
Easy to manage multi connectivity platform	The platform should ideally be easy to manage and able to support multiple connectivity technologies. This will involve managing and initiating different communication protocols based on rules and policies, managing a variety of billing, real time data and reconciliation structures, and providing secure and resilient networks. This capability should also include key elements of connection provisioning, usage monitoring and fault resolution.
Highly scalable	The platform will need to be highly scalable to include additional connectivity technology options, and meet increasing requirements of applications both in terms of scale and functionality. The platform will most likely be structured around an abstracted approach to connectivity management, and increasing the number of connectivity options should ideally be a core capability of the platform.
Light touch implementation	The platform will need to enable a quicker and less complex integration process through APIs and providing modular software components to design customized dashboards.
Open systems	Closely linked to the capability of managing scalability, software environments should remain as open as possible, allowing for extensibility and further development where required by enterprises. In markets where an increasing number of connections and applications are predicted, highly proprietary solutions would be a significant limitation.
Billing / real time data	Being able to manage different billing models and forms (such as retail, wholesale and agency), and enabling a wide range of reporting and traffic and usage analysis tools is key.
Security	Delivering and embedding security throughout the M2M or IoT solution will emerge as a critical factor in a range of solutions, and connectivity platforms will need to be able to address these security requirements across the various connectivity technologies and form part of a seamless end-to-end security solution.

Each of these ‘Best Practice’ capabilities and features address particular requirements that often emerge in M2M and IoT solutions. Existing connectivity support platforms have been instrumental in supporting and enabling such solutions to date. However connected markets have been undergoing significant changes in approaches to software solutions. The characteristics of these changes are captured in three crucial software development areas: scalability, heterogeneity and agility.

We touched on the scale of the challenge in Section 1 of this document. The forecast increase in connected sensors and devices will drive exponential growth in applications and data, requiring platforms to be able to manage significant increases in scale without deteriorations in performance due to slower processing times, inability to manage the concurrency, or throttling. Connectivity platforms will need to be scalable to meet the requirements of enterprises in the future.

Scalability is also not just about numbers but needs to address the dimension of heterogeneity. In M2M and the IoT, solutions will become more and more pervasive and diversified. Existing connections will face increased traffic loads and events, and perhaps more challenging, connected estates of devices may be spread across an increasing range of communications technologies including cellular but also satellite, low power wide area, various fixed and an array of short range networks. Managing this diversity of connectivity technologies will ideally require enhanced connectivity platform capability.

Driven partly by scale and heterogeneity but also by the innovations of enterprises, agility and flexibility in platforms will be crucial, and connectivity platforms will ideally need to deliver such capabilities and features. This agility will relate to such areas as innovative billing, real time data and reconciliation solutions, or implementing new quality of service policies.

Some of the identified best practice capabilities and features are intrinsically linked – a light touch implementation approach enables a quicker time to market solution. Supporting different billing and real time data systems enables flexible pricing options. And fundamentally, the requirement for scalability is not only driven by market conditions but is synonymous with the single connectivity platform approach.

Finally, it is clear that the provision of connectivity for M2M and the IoT is likely to be a low margin business, delivering slow ROIs per unit. In such a business environment, the ability to deploy connectivity platform capabilities with low entry costs can drive significant benefits for potential providers of connectivity by minimizing business risk.

3 Connectivity platforms will remove friction from the market

The key challenge for M2M and IoT platforms is to remove the friction that exists in today's market. This friction is generated by a wide range of factors including high entry costs, lack of scale in specific segments, limited skills and awareness, different and varying market conditions between countries and geographies, and regulatory policies.

By providing technical capabilities as outlined in section 2 (i.e. featuring multi-connectivity, scalability, light touch implementation, open systems, billing, real time data and reconciliation, and security), platform providers will help service providers to meet the challenges that lie in M2M and IoT markets.

This new kind of connectivity platform should be easier to implement, easier to scale, and assist users to securely manage multiple connectivity technologies. In addition, these new platforms should be based on open systems, allowing for future growth and developments, and should support service providers in managing and creating the new billing, real time data and reconciliation features.

In leveraging the technical framework outlined, enterprises will be able to enter and address M2M and IoT markets more quickly and at lower costs, and to expand their market opportunities not only in terms of connectivity technologies but, equally importantly, their access to a global footprint including features around safe harbours for data and flexible pricing models.

4 Keeping a focus on enterprise benefits

The combination of new technical and commercial capabilities and features in connectivity platforms should help remove some of the friction in the market but are there additional benefits that enterprises enjoy from new-style connectivity platforms?

Two specific areas are worth exploring in more detail: leveraging a global network of operators, and accessing real-time data to manage connections.

Leveraging a global network of operators

Connectivity support platforms limited to a few or a handful of mobile operators will enable basic connectivity management requirements of enterprises but exploring new markets and opportunities will require connectivity platforms that offer substantially more technology options.

As enterprises grow and as their multi-regional requirements evolve, platforms will need to meet these new requirements. Roaming agreements will address some of the needs, but connectivity platforms will need to remain flexible and adaptable to the solutions required by enterprises. This may mean selecting between local operators in a given country, or working with a regional operator, or in other cases, exploring how to combine cellular connectivity options with satellite and other solutions.

In offering multiple connectivity options and technologies through one platform, connectivity platform providers can address both the immediate connectivity needs of an enterprise and enable future growth and strategic reach.

It is also worth noting that smaller mobile network operators (and other players) will be able to use global connectivity platforms to meet both the local requirements of their clients and also to extend the reach of their services to other markets, potentially delivering a significant competitive benefit to their clients.

Accessing real-time data to manage connections

A significant benefit to an enterprise utilizing an enhanced connectivity platform is the potential to access and work with real-time data from connected devices.

Currently enterprises can make use of data from CDRs (call data records) or network reporting or other usage data, and in some cases, connectivity support platforms will provide the tools to monitor and manage fault resolution through the platform. Providing enterprises with the opportunity to access and manage real-time data from a range of (multi-technology) connections provides not only valuable opportunities and insights for enterprises to query how their processes are performing but also opens a host of opportunities for the enterprise to develop its relations with its customers.

5 The advent of the IoT continues to change platforms

Connectivity support platforms play a critical role in M2M and IoT application enablement. To date connectivity support platforms have primarily focused on supporting cellular connectivity. In the growing markets of M2M and the IoT, this basic management and monitoring capability will need to be extended with the range of capabilities and features discussed above. As enterprises have started to understand and explore changes and opportunities presented by M2M and the IoT, enabling technologies are needed to assist them in achieving their goals.

With the emerging requirements of enterprises seeking to benefit from M2M and the IoT, Machina Research recommends that connectivity support platform providers:

- ***Continue their efforts in minimizing points of friction to M2M and IoT market growth and development*** by developing and building platforms that enable enterprises to create, build and deploy agile, scalable and flexible solutions to manage devices and connectivity, and develop and manage applications and data
- ***Create open and integrated systems*** which encourage and enable enterprises to deploy and manage end-to-end M2M and IoT solutions
- ***Remain aware of the evolving requirements of enterprises***, and continue to explore how platforms can enable the strategic growth of enterprises into new markets and opportunities

Finally, as connectivity support platforms become more technology agnostic, market perception may be that they become commodities but in reality, with the twelve capabilities and features outlined in the 'best practice' model, this new model of connectivity platforms will become significant enablers of change in the market.

These changes and benefits to M2M and IoT markets include:

- ***'Rescuing' mobile operators*** from becoming highly commoditized connectivity providers, and facilitating the extension of their reach into added service areas and additional shares of client revenues
- ***Enabling enterprises to extend their strategic reach*** and address multiple markets without having to heavily invest in different platforms and integrations in each local market
- ***Providing developers and M2M/IoT Application Platform service providers with a single solution*** that enables a wide range of connectivity technologies to be managed through a single interface that delivers the connectivity element that is critical for all M2M and IoT solutions
- ***Facilitating new collaborations between network providers and new connectivity platform providers*** as different providers of wireless technologies evolve towards a technology agnostic approach and management of these multiple technologies in the one platform becomes key

With connectivity support platforms evolving towards the best practices identified above, and ultimately becoming 'connectivity platforms', friction in the market and potentially unnecessary costs will be reduced, in turn accelerating and driving the growth of M2M and the Internet of Things.

About Machina Research

Machina Research is the world's leading provider of market intelligence and strategic advice on emerging opportunities in M2M, the IoT and Big Data.

We support our blue-chip client base with an annual Advisory Service which consists of the following elements:

- **Forecast Database** – On-going access to this constantly updated forecast of the M2M and mobile broadband opportunity worldwide.
- **Strategy Reports** – Six full-length reports per year focusing on the key themes in M2M/IoT such as operator best practice, software/middleware platforms, devices, value chain, channels to market or data analytics.
- **Sector Updates** – Every year we publish a series of updates on each of the 60 applications in our 13 vertical sectors (e.g. automotive, healthcare and utilities).
- **Research Notes** – 3 shorter reports per month examining key issues in the world of M2M.
- **Strategy Sessions** – On site presentations or webinars.
- **Analyst Inquiry** – Direct access to our analyst team.
- **Previous publications** – Clients enjoy full access to our library of past publications.

In addition to our Advisory Service, Machina Research frequently engages in custom research projects for our clients. This custom research includes such services as market opportunity assessments, M2M procurement assistance, and business case development and due diligence.

We are staffed by mobile industry veterans with the knowledge and understanding of these new market opportunities to help your company, whatever its requirements in this space.

For more information and contact details, please visit our website on www.machinaresearch.com.