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Moving IT Forward

4G Wireless Deployments and Effect on IT

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Contents

1 Abstract

The advent of next-generation 4G wireless technologies such as LTE[1] is driving telecom operators to acknowledge the growing diversities of consumer usage behaviours and business models that are currently being used. Operators increasingly need to support multiple devices and create flexible operating models. At the same time they also have to ensure that they make sense out of the ever-increasing amount of customer data that is coming their way. They need to do all these while ensuring that customer experience is not impacted. These multi-faceted challenges have varying impacts on different parts of the telco organization. Nevertheless, their major impact is seen on the telco IT systems and the way these are currently architected. IT systems in a 4G world will need to support multiple business and operating models spanning multi-party services, which will enable customers to have greater control over services consumed and deal with multiple classes of devices. In order to ensure that telcos make the most of the 4G transition and not allow IT to be a limiting factor, they should strive to remove legacy complexity in the system. Telcos should take a long-term view and create systems that can thrive on partnerships. They should focus on effectively managing the transition as a key to successful deployment of 4G wireless technologies.

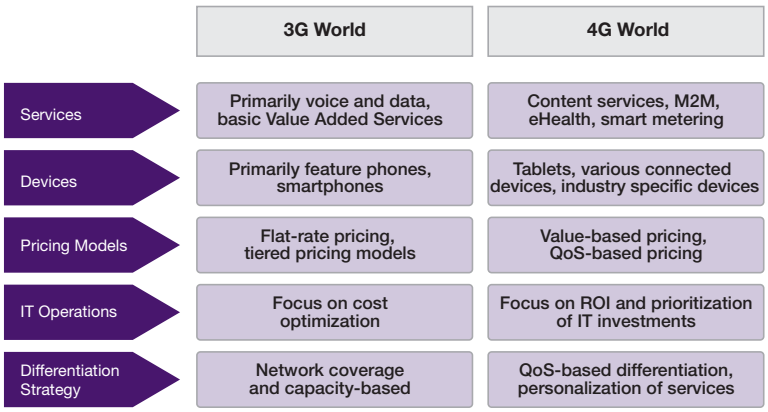
1 Long Term Evolution

2 Introduction

The arrival of 4G technologies will enable the creation of a new generation of content-rich services

Over the years, Telecom operators have ensured that they took advantage of developments in technology while migrating from 2G to 3G and 3.5G networks. As most operators transition to 4G networks, more than ever, the advent of a large number of new products and services is forcing them to keep a close watch on the impact that this is having on their operations and business support systems. The arrival of 4G technologies, with their ability to overcome capacity limitations and heterogeneous nature of 3G networks, is likely to result in enabling the creation of a new generation of content-rich services. These services could potentially span virtual reality, high definition video, augmented reality among others. Beyond services, the differences between 3G and 4G networks span key areas including devices, pricing models and IT operations (see Figure 1).

Figure 1: Key differences in the 3G-4G landscape



Source: Capgemini TME Strategy Lab analysis

As operators progress with 4G deployments, venture into new cloud-based services, and support more partners and resellers, their IT strategies too need to evolve at the same pace. Operators will however have to overcome multiple challenges if they wish to maximize the benefits from opportunities that arise from 4G networks.

In this paper, we explore the challenges involved in the deployment of 4G technologies from an IT-perspective, and their impact on the IT landscape.

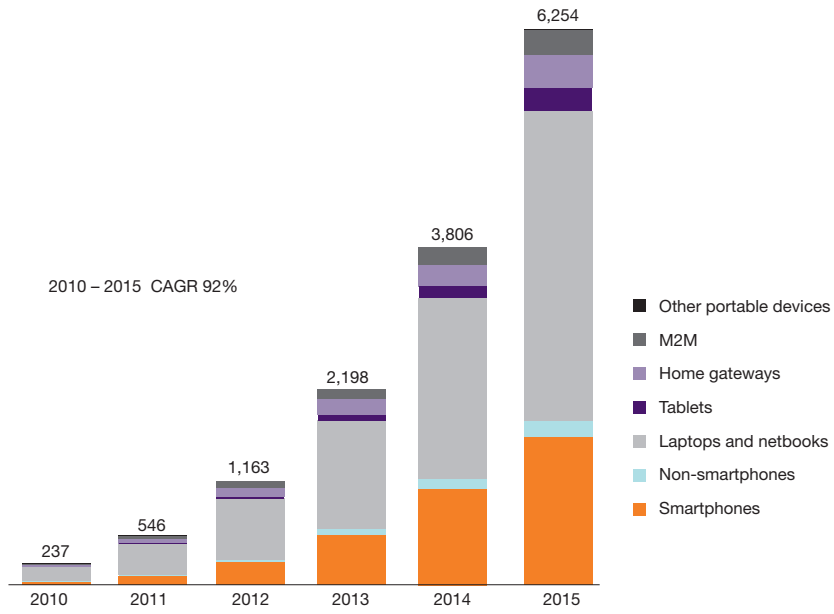
3 IT Challenges in 4G Deployments

The deployment of 4G networks comes with a set of very IT-specific issues. Key among them are the operator need to build and support a wide variety of devices and services, need to manage the ever-growing volume of customer-related data, and the need to be able to develop flexible business and revenue models.

3.1 Need to support growing portfolio of devices and services

Growing penetration of devices such as smartphones, tablets, connected devices and industry-specific machine-to-machine devices are driving the need for a range of charging, provisioning and cloud-based service models. As content consumption increasingly becomes time and place-shifted, these devices will begin to account for a larger proportion of operator data traffic (see Figure 2). This in turn gives rise to a variety of transactions, revenue-sharing arrangements, policy requirements and service-level agreements.

Figure 2: Split of traffic generated from different devices (in Petabytes), 2010-2015, Global



Source: Cisco Visual Networking Index, 2011

Time and place-shifting of content will give rise to a variety of transactions, revenue-sharing arrangements, policy requirements and SLA

As the proportion of these devices increases, operators will face a significant challenge in managing the quality of experience and ensuring that it is kept at a uniformly high level across all device and service categories. Moreover, as high-bandwidth rich-content services take off, they will start posing challenges in maintaining service inventory. As service inventory grows, it becomes challenging for operators to maintain the quality of experience while trying to understand consumer usage trends and service performance.

Operators need to build billing systems that closely track consumer usage patterns

3.2 Need to develop flexible operating models

Operators are witnessing a significant surge in data traffic driven by consumption of content over a variety of devices. For instance, AT&T witnessed over 30x growth in its mobile data volumes in the period between 2007-2010[2]. Consumers are using a variety of devices including smartphones, netbooks, tablets, e-book readers to consume this data. Moreover, with the advent of an increasing variety of pricing plans such as usage-based, time-based, QoS[3]-based plans, operators face the challenge of working with both a growing number of devices, and evolving pricing plans. Consumers are also increasingly getting comfortable with using multiple channels spanning contact centres, retail stores, web and IVR[4]-based channels for interacting with the service provider.

In light of these changes in the marketplace, telcos need to ensure that their billing, mediation and provisioning systems are the latest and up to mark. An inability to build billing systems that closely track consumer usage patterns will lead to operators not being able to properly monetize data services, in a manner commensurate to its growth. Similarly, operators need to ensure that their mediation systems are capable of dealing with inputs from a growing number of sources. Operators not only have the challenge of defining new business models for dealing with such market changes, but also adapting their IT systems to support these models.

3.3 Making sense of growing customer data

Personalization is a key enabler for superior quality of experience for the customer. In order to make personalized offerings, operators need insights on customer purchase and usage patterns. The ability to match experience with expectations is going to be a key differentiator in the highly competitive and maturing European markets. With customers using a large number of services across a variety of devices and networks and from different locations, the amount of data generated is both massive and complex. For instance, T-Mobile USA processes over 17 billion events a day including phone calls, text messages and data that go into a 1.2 Petabyte database[5]. This data needs to be stored and analysed to come up with an accurate customer profile and predict possible purchases in the near future. Moreover operators also need to be sensitive to the customer's privacy concerns and regulations. Collecting, storing, and then doing real-time integration with such amounts of data to deliver actionable insights is one of the key operational challenges which will be faced by operators.

3.4 Delivering efficient customer care in a partner-driven world

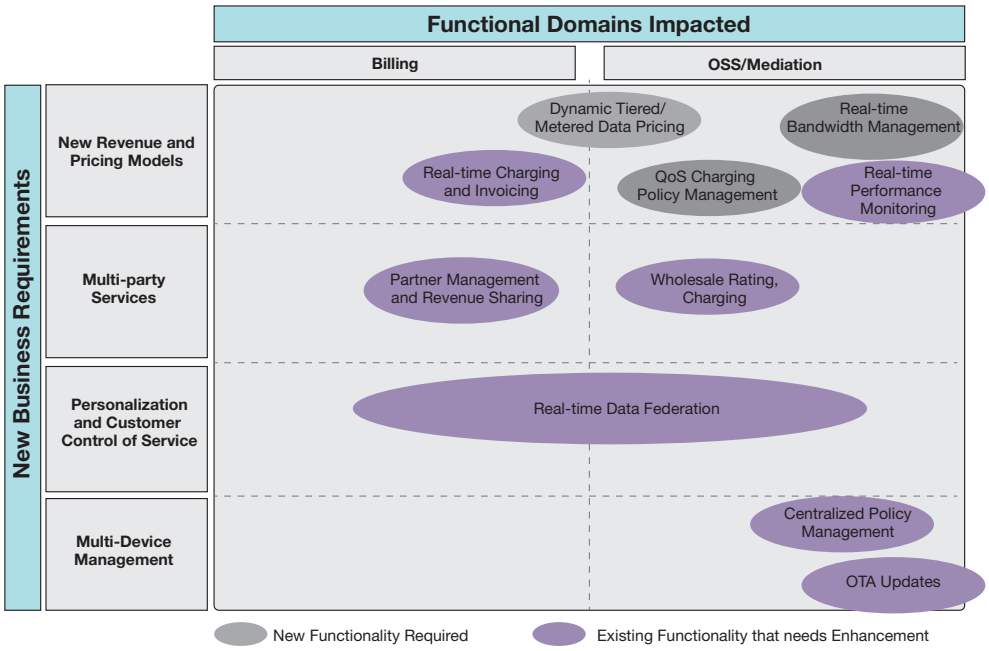
The impact of the new 4G services and the increasing variety and number of devices on customer care is likely to be substantial. For operators, maintaining key metrics such as Average Handle Time and First Call Resolution at a reasonable level is going to be a challenge. One of the main reasons for this challenge is the fact that currently most applications and content stores are typically delivered by third-party developers and are usually a mash-up of service provided by a number of partners. As services become more complex, resulting in an ever-lengthening value chain, identifying and resolving a service problem will be extremely challenging. For instance, resolving consumer issues in accessing mobile applications could potentially result in the operator needing to figure out who among the application provider, handset manufacturer, content aggregator or their own network is to be blamed for the service issue.

2 IT World, "AT&T mobile data growth eases -- to 30x", Nov 2010
3 Quality of Service
4 Interactive Voice Response
5 Connected Planet, "T-Mobile crunching 17 billion transactions a day — what does it do with all that data?", Jun 2011

4 Key Impacts on IT

The operational challenges posed by the deployment of 4G networks and corresponding changes in the business models will have an impact on all aspects of telco business including people, process and infrastructure. The IT infrastructure will also be impacted significantly since the challenges require changes to the way current telco IT systems are modelled. These changes impact both the BSS as well as OSS systems and primarily are a result of new business requirements that arise through the deployment of 4G networks (see Figure 3).

Figure 3: IT Impacts due to 4G Business Requirements



Source: Capgemini TME Strategy Lab analysis

4.1 Ability to create new revenue and pricing models

The emergence of new business models to support adoption of data services is necessitating a significant transformation of business support systems. In order to effectively monetize the growing data consumption, operators have started offering innovative new pricing models. For instance, AT&T and Verizon have introduced tiered pricing plans while Sprint Nextel has launched daily / weekly / monthly plans in 4G-enabled cities. Similarly, TeliaSonera has taken a value-based approach, which involves the customer paying a premium on content and fees for network resources used.

Traditionally operators' billing systems have been designed to handle CDR[6]-based metered pricing for voice and simple flat-rate pricing for data. However, the future billing systems need to be equipped to offer dynamic data pricing plans based on volume, time-of-the-day, bandwidth and QoS or a combination of these factors. CRM systems will need to have real-time pricing, charging and invoicing capability for supporting the upfront premiums on content and finite subscriptions such as a daily / weekly / monthly pass. For QoS-based pricing scenarios, the billing / mediation systems need to develop capabilities for policy management determining the exact pricing based on the content consumed and QoS requirements (defined by policy or demanded online by the customer). The billing systems should also be capable of giving discounts in real-time in case the QoS falls below agreed threshold.

Effective utilisation of spare resources is the key to ensure optimum return on CapEx. Therefore, operators need to target segments of customers by cell site density and differentiated, real-time pricing, which will ensure effective utilisation of spare capacity. For this, operators need real-time network information at their fingertips that will enable dynamic pricing based on spare capacity while ensuring a good quality of experience.

4.2 Ability to support multi-party services

Operators need to support multiple new services over 4G networks. They will need to do so by upgrading their BSS systems to handle multimedia and application services offered in collaboration with third-party developers and content providers. The dynamic nature of the ecosystems of third-party partners will require operators to have a comprehensive partner settlement system coupled with their billing engine. Systems to support third-party services will need to be closely aligned to the CRM, OSS and BSS of both the third-party vendor as well as the operator. In order to do so, operators need to enhance their wholesale charging, rating and settlement capabilities to ensure they can accurately identify the partners providing the service and enable a fair revenue sharing practice. Moreover, the billing system has to take care of a multitude of factors including managing on- and off-portal relationships, offers and promotions management, and minimize potential losses from fraud.

Future billing systems need to offer dynamic data pricing plans based on volume, time-of-day, bandwidth, QoS or a combination of these factors

4.3 Ability to offer higher personalization and customer control

With advent of next-generation high-speed 4G services, a key differentiator for customer's quality of experience will be the extent of their control over the services that they consume. For instance, customers need to be given real-time access to information about key service parameters and service billing. In order to provide correct solution to customer query / problem, data will have to be collated from multiple internal and external sources and a 360° view of the customer including all the service and billing information will have to be created. For operators real-time customer information is imperative in order to effectively up-sell / cross-sell their services based on parameters such as current location. Operators will have to build standard B2B portals allowing real-time data collection and sophisticated analytics systems capable of real-time processing. Operators will have to extend their current customer centricity initiatives beyond CRM and billing domains and will have to integrate the service and network data with the BSS data for a complete 360° view of the customer. New techniques such as real-time data federation will have to be explored to achieve this.

6 Call Detail Record

Operators need to refresh their wholesale charging, rating and settlement capabilities to ensure precise revenue sharing with partners

Operators will need to ensure that they remain customer-centric in a world where they deal with multiple services on multiple network platforms. This requires them to break traditional silos and implement concepts such as Master Data Management (MDM) and customer Data Integration (CDI) in order to provide a 360° view of the customer to sales as well as customer care agents.

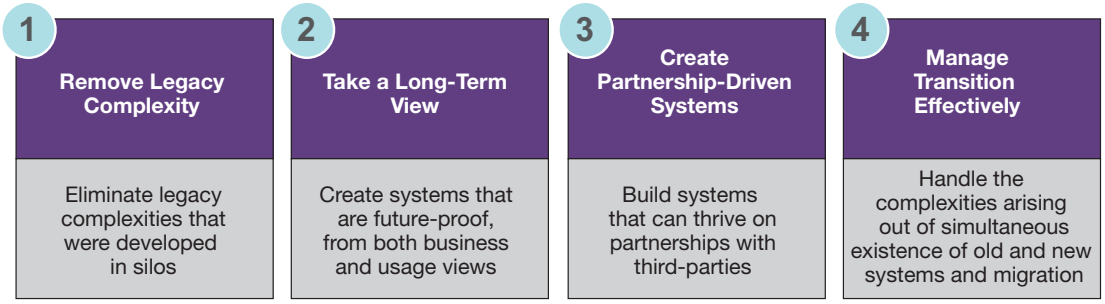
4.4 Ability to manage multiple classes of devices

Growing number of devices in the telecom ecosystem creates complex problems in handling end-user experience. Increasingly, device categories capable of accessing mobile networks span smartphones, netbooks, tablets, e-book readers among others. With such a wide variation in the type of devices that have come up, it becomes imperative that operators have advanced remote device management features. These include centralised policy management, over–the–air updates, seamless and remote mass upgrades and remote monitoring of every device to understand the device health.

5 The Road Ahead for Telcos

Deployment of 4G networks comes with its share of challenges and has varying impact on both the BSS and OSS systems. As telcos transition, they should firstly eliminate legacy complexity in the system, take a clear long-term view when designing next generation systems, create architectures that can easily welcome partners aboard and finally effectively manage the transition from current networks to 4G (see Figure 4).

Figure 4: Indicative Roadmap



Source: Capgemini TME Strategy Lab analysis

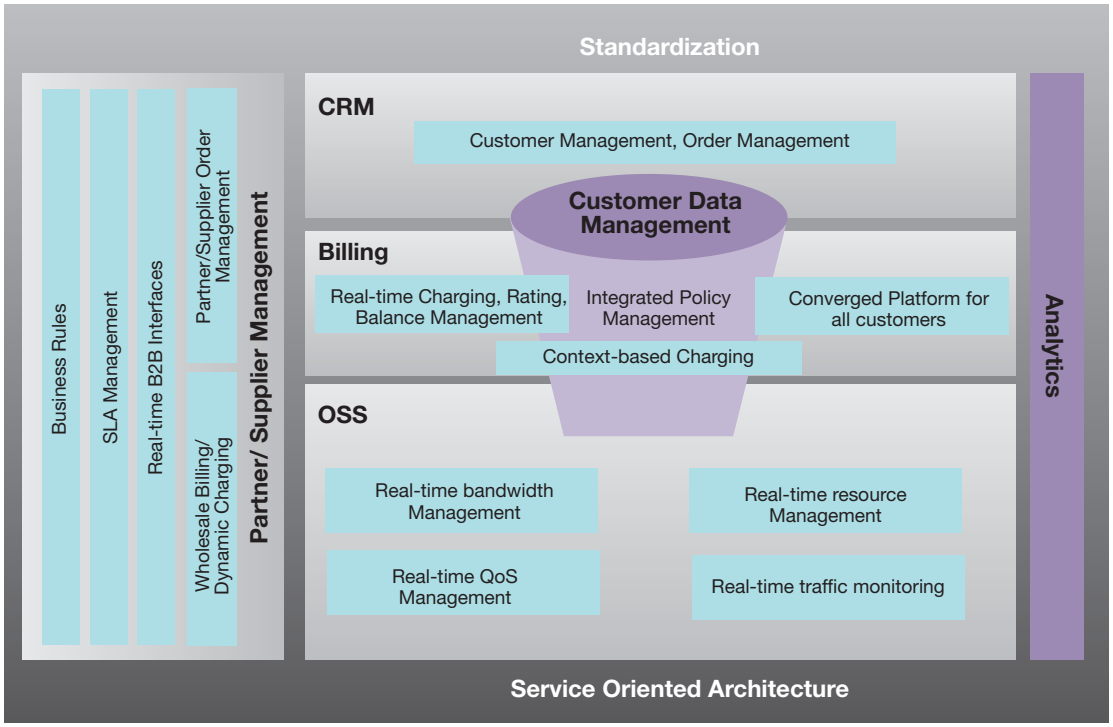
5.1 Remove legacy complexity from system

Years of development and management of products in silos has resulted in great complexity within the telcos' IT landscape. The complexity in the existing landscape has been further driving the creation of new silos. Telcos have managed to survive with this complexity for years albeit with a cost. However, challenges associated with 4G deployment will make continuing with *status quo* a non-option. Operators will need to address the growing pressure for driving revenues through a more simplified architecture that has a lower cost of ownership. In doing so, it is imperative that operators remove legacy architectures that have historically been developed in silos, and look towards open architecture based systems as they transition to 4G.

5.2 Long-term view is critical when undertaking transformation

In order to ensure that operators make a smooth transition, it is imperative that they stay on top of understanding evolving operating and business models, particularly where third-party partners are going to be playing a critical role. For instance, the advent of pre-paid VoIP could potentially lead to rapid decline in popularity of current usage-based subscription models. Consequently, a lot of the current billing functionality may become irrelevant while current CRM systems will likely have to accept greater responsibility (see Figure 5).

Figure 5: Indicative Functional Diagram of Interaction between Billing, CRM and Analytics



Source: Capgemini TME Strategy Lab analysis

Operators should invest in initiatives that help them be ready for innovative business models of the future as opposed to enhancing current systems in isolation

Moreover, the present structure of the telecom industry and the way operators have designed their BSS/OSS systems limits their flexibility to incorporate new business models and in turn, limits their ability to innovate. As operators increasingly look to enter new industry sectors such as healthcare, smart energy and financial services, it is all the more important that their systems do not become the limiting point.

Given this situation, it will be more prudent for operators to invest in initiatives that will help them take a measured view of future potential models, than invest in measures that enhance current systems in isolation.

5.3 Creating systems that can thrive on partnership and not ownership

The increasing popularity of content-based services and mobile entertainment presents a significant monetization opportunity for operators. Operators will increasingly rely on partnerships around entertainment, applications, gaming, payments and e-learning services. In delivering these services, they will have to utilize their billing and settlement capabilities. A key pre-requisite for doing so would be to focus on creating standardized platforms enabling seamless provisioning, service control and rights management across organizational boundaries thus creating a multi-partner-driven eco-system. To ensure this, operators should come out of the traditional mindset of owning or controlling everything they sell, and instead focus on customer intimacy, services and flexible revenue models that can make them more relevant in the transactions/content heavy 4G landscape.

5.4 Effective transition management is key to successful deployments

From an operator's perspective, the transition period from 3G/3.5G to 4G is crucial as the choices made now by operators will have a strong bearing on their capabilities in the future. Operators should also make an attempt to move their existing customer base onto the new systems before launching 4G services. Effective transition is a function of how well operators have pre-planned their integration efforts and the kind of governance structures that they have established in going ahead with the transition. Operators should not under-estimate the potential for run-time issues particularly when undertaking such large migrations as in the case of 4G. Similarly, a successful transition is always contingent on all stakeholders participating collaboratively and creating effective program governance structures. While operators have so far managed to launch new products and services inspite of the complexity of their IT platforms, this complexity might become a major roadblock in the transition to 4G.

In conclusion, the 4G era is set to bring a significant shift in the traditional service provider business models, operations and their IT landscape. The device agnostic 4G-world promises to address most operator concerns with regards to capacity, latency and speed, thereby enabling them to create a multitude of new revenue opportunities. In order to stay ahead on the curve, operators will have to let go of the legacy complexity of systems and the mindset to rewrite organizational DNA, and instead take a holistic view of transformations to better align IT with strategic goals.

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