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# The Mobile Broadband Opportunity in Emerging Markets



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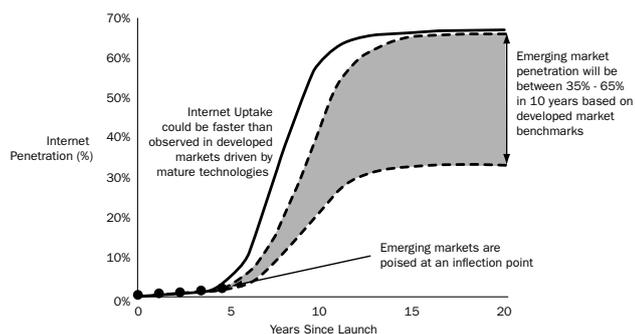
# The Mobile Broadband Opportunity in Emerging Markets

## 1. Introduction: Emerging Markets are the focus area for the Mobile Industry

New themes in telecoms are emerging: Operators in developed and highly penetrated markets are competing on commoditised, cash-cow voice and nascent data services. This has not only driven industry consolidation but also forced operators to rigorously drive cost efficiency throughout their operations. Sophisticated segmentation and complex bundled products have become the order of the day to compete in developed markets. Hopes for growth are fuelled by the mobile internet and data applications, however, the killer application or usage driver has yet to be discovered.

At the same time, other geographies are developing with the pace and trajectory that established mobile industries have enjoyed in the past. In emerging markets mobile penetration is still low, fixed infrastructure has often been neglected and customers are yet to benefit from communication in their daily lives. Therefore, emerging markets have become the new battle ground for operators in pursuit of ambitious and continued growth.

### Exhibit 1 Emerging Markets Internet Evolution



Source: Booz Allen Hamilton

For the purpose of this study, emerging markets are characterised by limited telecommunications infrastructure and a latent demand for communications services. There are a wide variety of countries that can be considered as emerging markets, from low GDP economies such as Nigeria to more established, wealthier nations such as Russia.

## 2. The Emerging Market Internet Opportunity

Consumers in emerging markets will first look to satisfy the most basic communication need – voice. In fact, in some of the African markets basic communication is conducted by ringing a fellow subscriber without him picking up the phone to minimize cost. Yet, as soon as basic needs are satisfied, many subscribers are ready to experience and use data services to ease their lives and obtain valuable, critical or entertaining information.

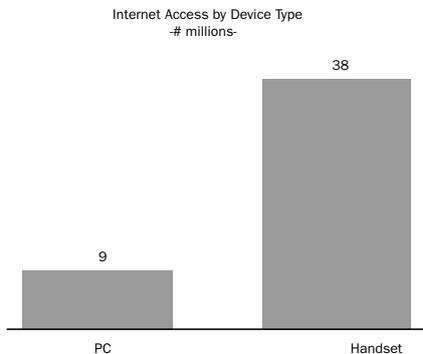
Furthermore, internet use in many emerging markets is still very low today, as a result of limited fixed-line and PC penetration and extremely high data access costs. This has created a situation whereby the internet ecosystem is often underdeveloped with few local servers and few content offerings tailored to local needs.

Even though internet penetration today is low, it seems poised at an inflection point, based on the benchmarked evolution of developed markets, and there is good reason to believe that the development will be faster in emerging markets.

## 3. Wireless Data Use

Fixed line, the internet enabler in developed markets, is very often not a viable proposition to build out the required broadband infrastructure for wide area coverage.

**Exhibit 2**  
**More People in India use Handsets than PC to Access the Internet**



Source: Booz Allen Hamilton

The business case for a greenfield fixed line broadband deployment is weak even in highly developed and penetrated areas. Therefore, developing economies turn to mobile and wireless infrastructure to provide data access.

There are several examples of mobile data usage uptake across the emerging world. In Africa, operators are not only filling in the gaps left by other industries to provide banking and commodity exchange services, but are also stimulating demand by dramatically lowering prices. Looking at India, there are four times as many consumers accessing the web using mobiles as using PCs.

Internet use hinges on the availability of suitable wireless applications. In India, many mobile web pages offer localized news and sports content. In Thailand, mobile TV is being offered over a 2.5G infrastructure. Going forward, emerging markets will benefit from a greater availability of local content and applications.

Wireless broadband in emerging markets can principally enable all communications devices, specifically, also data communications on e.g. laptops, and “standard” mobile voice and data handheld devices. The role of these devices depends on the market development stage and customer preferences.

Handsets are used to enable the mobile internet, offering a broadband experience on the move. The advantage of mobile handsets is that they don't rely on permanent supporting infrastructure, as does electricity. Emerging markets have seen several innovative methods to drive down the cost of owning a handset, including developing

**Exhibit 3a**  
**Innovations are Driving Down Costs to Own a Handset**

Phone Charging Service

In Africa, it is common practice to have one shared handset among many households, they then take turns using it by inserting their own sims

Source: Booz Allen Hamilton

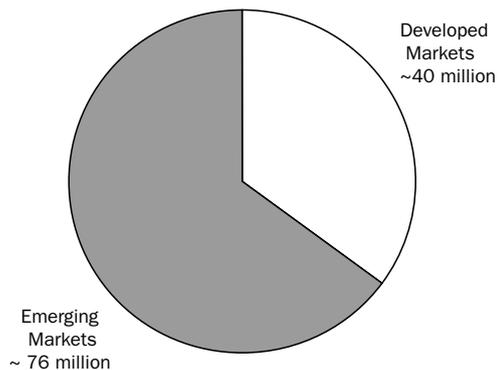
mobile charging booths and sharing handsets amongst several households.

Laptops / PCs offer a richer, yet less personal data experience. They are more suited to non-transactional applications in entertainment and education. Apart from a better infrastructure, they will also require better network coverage due to the much higher degree of indoor usage. In more developed countries, Laptop data access does not replace mobile access, rather, the two access modes complement each other.

Currently, there are a number of major efforts underway to further rollout laptops in emerging countries – the share of laptops used for mobile data broadband access is set to grow. For example, there is already strong demand of mobile broadband-enabled laptops in emerging Asian countries, e.g., Thailand.

**Exhibit 3b**  
**Large Demand for Low Cost Laptops from Developed & Emerging markets**

Projected Demand for mass market notebook  
- # millions-



Source: Pyramid research

With so much focus on mobile infrastructure in developing markets and the associated level of innovation, it is likely that new usage patterns and schemes will emerge. Developed markets may adopt these new uses of mobile broadband as well.

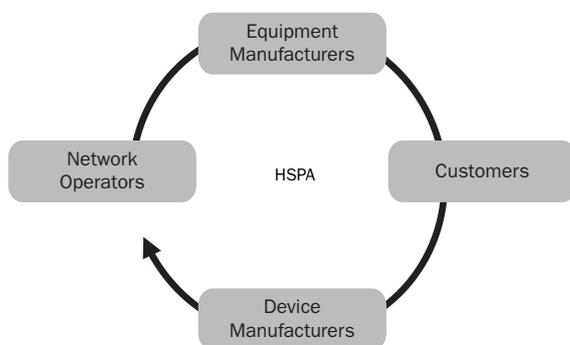
#### 4. Technology Alternatives

With their inherent advantage over fixed-line, wireless systems are more economical for offering mid-band (up to ten Mb/s) broadband access. This is because wireless last mile connectivity is more cost effective: it is more convenient to deploy (due to low cost of civil work), and radio resources can be shared by multiple users.

Moreover, developing countries have their own specific infrastructure issues to consider and overcome, for example: the reliability of power supply, and even the security of fixed line assets – copper is a valuable primary commodity.

Looking at mobile broadband, the likely technology contenders are the WiMAX, 3GPP, and 3GPP2 technology families, now all backed by major vendors and standardization fora. The infrastructure debate is extensively covered elsewhere, with various stakeholders taking their positions. Yet, their success does not only depend on technology performance, but on the readiness of the underlying ecosystem. It is this factor that makes HSPA a key and attractive contender for delivering mobile broadband.

#### Exhibit 4 Wireless Broadband Ecosystem



#### 5. Wireless Broadband Ecosystem

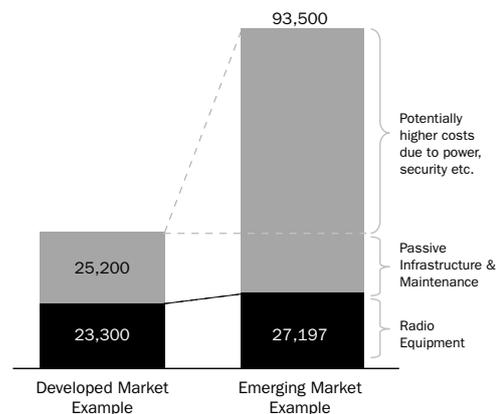
The four major ecosystem constituents which contribute to the success of an infrastructure standard are the operator, equipment manufacturer, device manufacturer,

and last but not least the customer perspective.

#### 5.1. Operator Perspective

Today, basic service capability is enabled by multiple wireless access standards. Assuming regulators allow a set of technology / spectrum combinations, and choice is available to the operators, cost is the key decision criterion. In mobile networks – specifically in developing markets – technology cost is driven largely by the number of base station sites. More importantly, two thirds of the cost are dictated by infrastructure investments, e.g. towers, power, air conditioning. Depending on local factors, emerging markets site costs can represent an even greater portion of costs than in mature markets, exacerbated by factors such as additional security and power costs. Of course, labour costs, or site rental costs

#### Exhibit 5 Mobile Operator Annual Network Cash Out per Base Station in 2007 -USD-



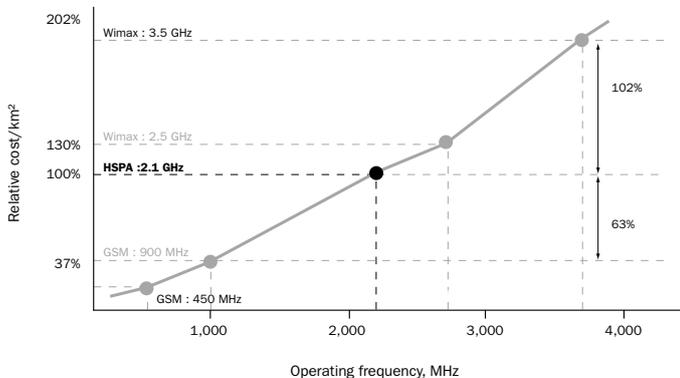
Source: Booz Allen Hamilton

are typically lower. For instance, in Nigeria the four GSM operators generate 25% of the nation's consumed power.

The number of sites deployed is therefore a crucial factor in the cost structure of mobile operators. In fact, it is a more determining factor than the choice of technology! Yet, HSPA has a distinct advantage over competing technologies given that in the majority of emerging countries UMTS / HSPA has been allocated the prime spectrum blocks up to 2100 MHz. Discussions to re-use the GSM spectrum at 900MHz for HSPA and 3G services are well established in Europe and first systems are currently being tested. Today, alternative technologies such as WiMAX are limited to the higher and less cost efficient frequencies above 2100 MHz. This equips HSPA with a structural cost advantage. Should HSPA

1) Soft handover capabilities, power control and signalling

**Exhibit 6**  
**Wireless Cost as a Function of Operating Frequency**



Source: Booz Allen Hamilton analysis, assuming a urban to suburban Morphology Class

and WiMAX operate at the same frequency, with similar technical refinement and maturity<sup>1</sup>, both have similar cost performance characteristics for greenfield scenarios.

An additional benefit, however, is that HSPA can piggy-back on existing 3G passive tower and active core network infrastructure. As a result, deployment speed is foreseen to be much higher than in the case of 3G.

**5.2. Equipment Supplier Perspective**

The more rapid deployment of 3G compared to 2G and the increased number of suppliers (e.g. from China) is driving down the cost of network infrastructure. Successful new entrants challenge the incumbent through

an effective mix of technological innovation, a much lower cost base, and a greater willingness to follow operators' suggestions to shape the product roadmap. There is strong evidence that new players are already challenging price levels and contributing to the price erosion this market is experiencing.

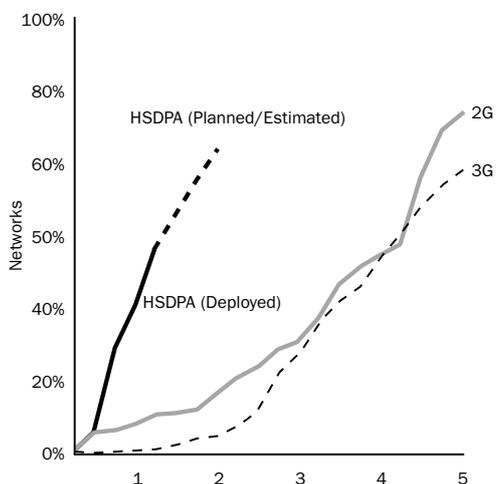
Specifically in less developed countries, equipment players have become more engaged in various forms of services contracts to help deliver the broadband experience. It can be expected that new infrastructure suppliers will be chosen following a thorough evaluation of the service capabilities of suppliers in situ, be it in the form of build-operate-transfer or managed services contracts. In all likelihood, new technology players will struggle more to build out such service capabilities.

**5.3. Device Perspective**

The 3GPP roadmap is garnering increasing support in the device space as more vendors are adopting the UMTS standard and are now offering hundreds of HSPA enabled devices, handsets and data services. The level of competition has doubled in mobile devices since the introduction of UMTS.

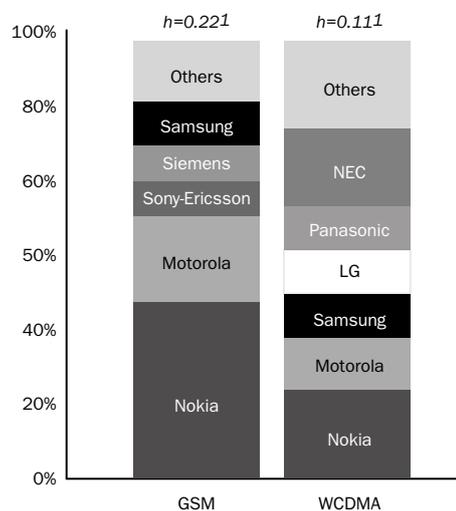
This level of competition is crucial to achieve a broad product portfolio with cost effective devices at all price points. In fact, the range of devices needed in emerging markets is higher than developed markets and ranges from high-end, differentiated devices to low-cost, mass

**Exhibit 7**  
**HSDPA 3 years quicker than 2G & 3G**



Source: Booz Allen Analysis, RAN economic model

**Exhibit 8**  
**Competitive Device Markets**



(1) h: Herfindahl-Index  
 Source: Booz Allen Analysis, IDC 2007

market handsets.

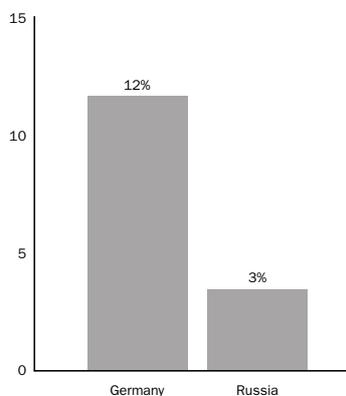
For successful device portfolios, both breadth and maturity count. A technology which has been refined over multiple generations of chipsets and other hardware components, will typically also be more mature in terms of the quality offered and the power efficiency achieved. First generation devices typically cover the full standard functionality, with only power and quality optimization left to next chipset generations.

#### 5.4. Customer Perspective

There are a number of emerging market types, with differing needs, which contain a multitude of user segments. The ecosystem that exists around HSPA / UMTS has many attributes that appeal to end-users: access to data services, low cost voice communications, and roaming.

#### Exhibit 10

##### Mobile as Differentiator - 3G Handset Penetration -



Source: Client example Russia, 2007

The two most relevant features are a fully developed handset portfolio, and higher usability of the device.

The mobile device portfolio embraces very low cost handsets as well as high-end devices with broadband connectivity. Emerging economies like India, for example, already have a significant market share of high-end handsets. In Russia, high-end 3G devices have captured 3% of the market. But there is no 3G network in Russia – users in these two economies, for example, are eager to use the mobile device as a differentiating, yet affordable status symbol.

Clearly, roaming capabilities and international services are a less relevant factor in low-income economies, but in emerging markets with their strong economic global links, this is a very important feature. In many developing countries with limited international links and travel, a widespread technology standard will enable in-country roaming and cross-operator use of services. It will also enable an enhanced service experience – mobile broadband services can fall back to e.g. GPRS in regions which are less extensively covered.

#### 6. Outlook

The GSM / 3G / HSPA system with its established roadmap and proven capabilities forms an appealing ecosystem and is well positioned to succeed in mobile broadband markets. Yet, competition from other standards will help in accelerating mobile penetration and technological progress. For example, alternative technologies like WiMAX will help to price underlying 3G intellectual property rights at market levels assuming they are positioned to disrupt the established ecosystem. These new technologies will also help to open up the technical silo delivering the mobile experience. As such, this competition will help to build out services using a network agnostic, for example IP-based, interface. It will also help to push forward the development of more flexible, multi-mode, and ultimately software-defined devices.

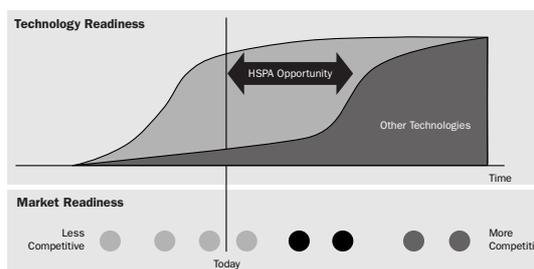
As a result, operators will have greater choice in mobile broadband infrastructure in the mid term and the mobile ecosystem will become more open. The alternative perspective – mobile infrastructure becoming a commodity as e.g., electrical power, appears less likely today.

#### 7. Conclusions

For existing wireless operators wanting to deploy

#### Exhibit 11

##### Technology / Ecosystem Readiness



Source: Booz Allen Hamilton

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broadband services today, UMTS / HSPA represents the most effective option, given the maturity of the ecosystem.

Longer-term other technology ecosystems may gain a similar size and market traction given a favourable regulatory environment for spectrum allocation.

Given the different types of emerging markets that exist, success will ultimately be determined by the eco-system that stimulates local innovation. Thereby allowing end-users to derive greater utility from mobile technology, while encouraging the development of sustainable business opportunities and models for inhabitants.





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