



# Latin American Mobile Observatory 2011

Driving Economic and Social Development through Mobile Broadband



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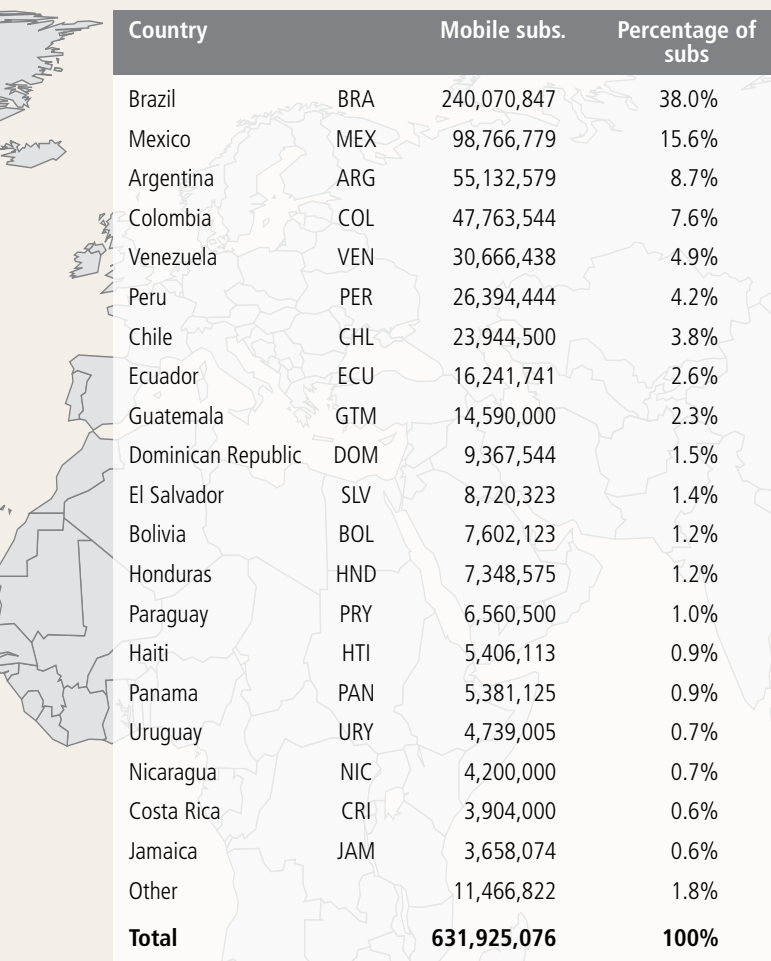
## Geographic Scope of this Study

With 47 countries and territories, 594m people, multiple different cultures, languages and dialects, LatAm is a very diverse region. Including countries that range from the size of Brazil (alone 80% the size of Europe) to tiny Caribbean islands (Bermuda is the 3rd smallest territory in the world) LatAm encompasses huge variety. Referring to LatAm in singular form without considering the intricacies and complexities among and within its countries would ignore its rich diversity.

It would not be possible to profile each of the 47 countries and territories in the detail they deserve. In addition, the availability and reliability of data for many of the smaller territories varies enormously. Therefore, this report will focus on the 20 countries shown below (to be referred to as LatAm 20 throughout the report). These 20 countries accounted for 98% of mobile connections in 2011 and provide a fair representation of the region from an economic, geographic, political and cultural standpoint.

For the purposes of this report, countries outside of the LatAm 20 will be covered through case studies to highlight their unique characteristics, noteworthy market moves and cutting-edge innovations. Where LatAm is referenced in the report, we refer to the entire region.





Country		Mobile subs.	Percentage of subs
Brazil	BRA	240,070,847	38.0%
Mexico	MEX	98,766,779	15.6%
Argentina	ARG	55,132,579	8.7%
Colombia	COL	47,763,544	7.6%
Venezuela	VEN	30,666,438	4.9%
Peru	PER	26,394,444	4.2%
Chile	CHL	23,944,500	3.8%
Ecuador	ECU	16,241,741	2.6%
Guatemala	GTM	14,590,000	2.3%
Dominican Republic	DOM	9,367,544	1.5%
El Salvador	SLV	8,720,323	1.4%
Bolivia	BOL	7,602,123	1.2%
Honduras	HND	7,348,575	1.2%
Paraguay	PRY	6,560,500	1.0%
Haiti	HTI	5,406,113	0.9%
Panama	PAN	5,381,125	0.9%
Uruguay	URY	4,739,005	0.7%
Nicaragua	NIC	4,200,000	0.7%
Costa Rica	CRI	3,904,000	0.6%
Jamaica	JAM	3,658,074	0.6%
Other		11,466,822	1.8%
<b>Total</b>		<b>631,925,076</b>	<b>100%</b>

# 1. Introduction



## Introduction

The Mobile Observatory series began with a report on the European mobile market in 2008 and since then has published reports on the Asia Pacific and African markets as well as updates on the European market.

This is the first LatAm edition of the GSMA Mobile Observatory and provides a comprehensive review of the LatAm mobile communications industry. This Observatory collates the latest statistics and market developments, providing a reference point for participants in the mobile industry, policy makers and other interested stakeholders. It covers the state of the industry, including the evolution of competition, innovation in new products, services and technologies and the industry's contribution to social and economic development in LatAm. These reports underline the industry's commitment to transparency and to engaging with a wide set of stakeholders in planning its future direction.

The report integrates data from a wide range of existing sources to provide a comprehensive picture of the LatAm mobile industry. These include public sources such as the ITU, World Bank and research by National Regulatory Authorities as well as commercial providers such as Wireless Intelligence, Telegeography, Convergencia, Informa, and Gartner. Where appropriate, data from different sources has been combined to show more complete industry trends. The regular geographic scope of this study consists of the LatAm 20 outlined in the "Geographic scope of this study" section.

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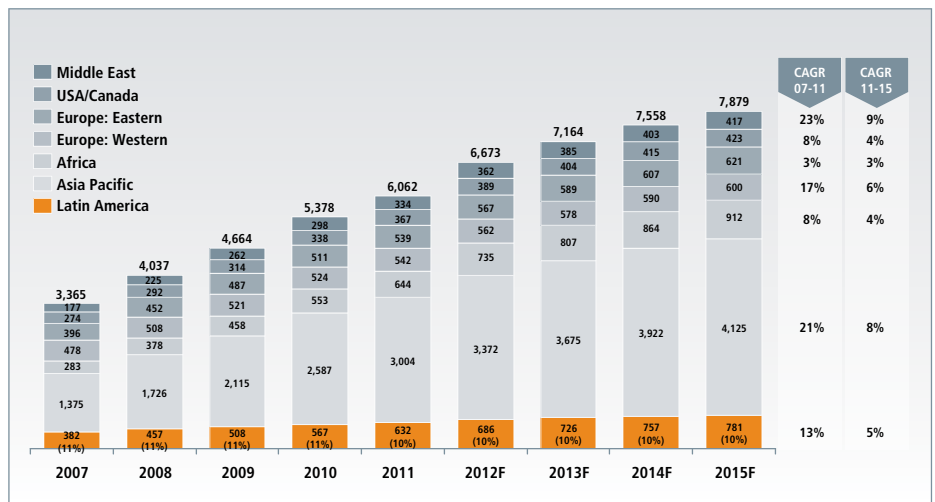


## 2. Executive Summary



**Latin America is the world's third largest mobile market by volume after Asia Pacific and Africa with over 630m connections as of Q4 2011.** Growth over the past 4 years has been rapid at 13% per year, driven by increasing accessibility and affordability of mobile services boosted by the improved prosperity of the region and the relative shortage of the fixed line infrastructure. As the market matures in the next 4 years and penetration across the region exceeds 130%, growth is expected to slow to 5% per year. Taking this into account, the region is expected to have three-quarters of a billion connections by 2015.

**Figure A: Global Mobile Connections<sup>i</sup>**



Source: Wireless Intelligence

**In 2011 Mobile Broadband has overtaken fixed broadband as the first choice to access the Internet in Latin America.** Mobile Broadband subscriptions have grown at 127% per year for the last five years and are predicted to continue growing at 50% per year for the next five years.<sup>ii</sup> By 2015, Latin America is expected to have almost a third of a billion Mobile Broadband connections.

**Mobile Broadband services will drive innovation and growth, as voice services begin to reach saturation.** With clear limitations to the growth of fixed-line broadband, mobile technology is set to play a leading role in fulfilling government objectives of bringing high-speed internet services to Latin Americans.

**Smartphones penetration and LTE.** Smartphone penetration in Latin America is increasing rapidly and is forecast to more than treble from 9% in 2010 to 33% in 2014. By 2013 Latin America is expected to have closed the gap with the global average. Smartphone penetration in Latin America has been tracking the USA's historical trend, suggesting that by 2018 smartphone penetration in Latin America could reach almost 60%. At the end of 2011 there were 35 LTE commitments, 7 LTE trials completed and 4 commercial LTE networks launched.

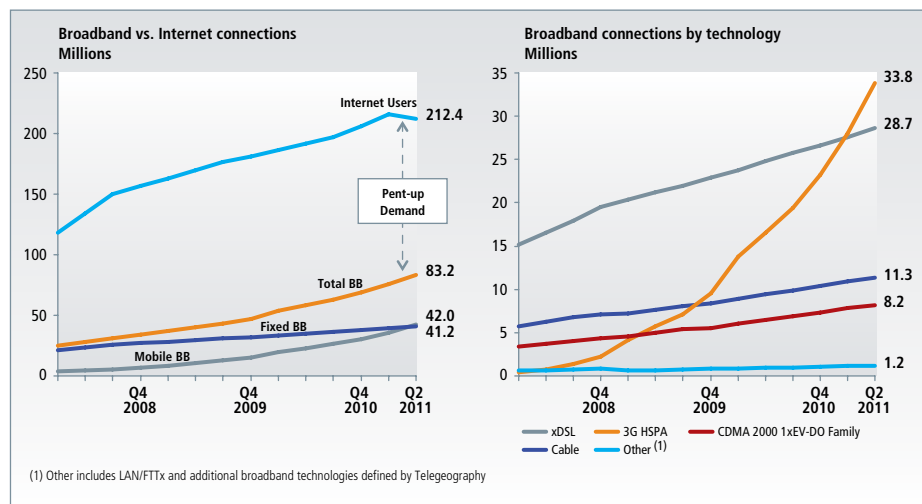
**The demand for broadband is clear.** With over 210m internet users in Latin America, but only 83m combined fixed and Mobile Broadband subscriptions there is clear pent-up demand for broadband services. Whilst the demand for broadband services is common across the region, there are large variations between Latin American states in terms of their Mobile Broadband readiness with some countries approaching maturity whilst others are still in a very nascent state of development.

<sup>i</sup> Technologies included in Total Connections are CDMAOne, CDMA2000 1X, CDMA2000 1xEVDO, CDMA2000 1xEVDO Rev. A, CDMA2000 1xEV-DO Rev. B, GSM, WCDMA, WCDMA HSPA, TD-SCDMA, LTE, TD-LTE, WiMAX, TDMA, PDC, PHS, iDEN, Analog

<sup>ii</sup> Estimates of the number of mobile broadband connections in Latin America vary widely even among reliable sources. This is often a result of differing definitions of mobile broadband. This report considers both W-CDMA HSPA as well as CDMA2000 EV-DO technologies to be "broadband", and also considers both smartphone and datacard/dongle subscriptions



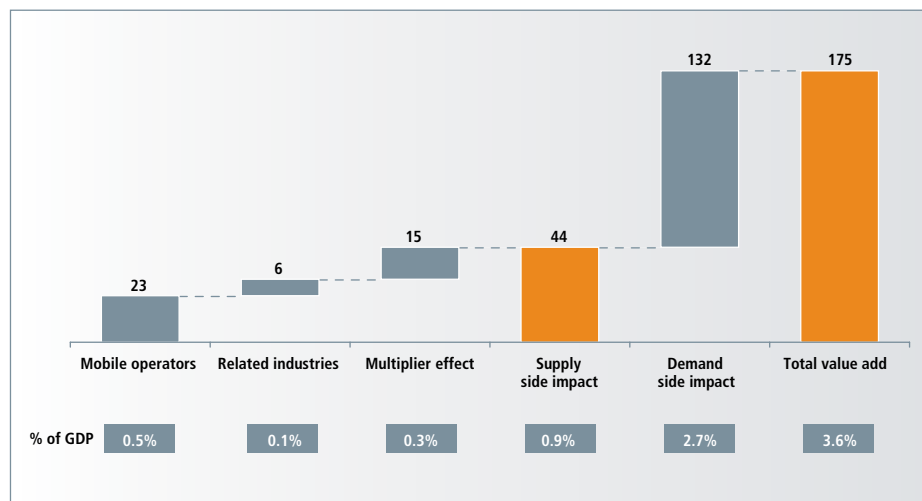
Figure B: Broadband growth in Latin America by Technology



Source: GSMA

**Economically the industry continues to punch above its weight.** Analysis demonstrates that the total mobile ecosystem contributes US\$175 billion to the region's economy, which equates to 3.6% of regional GDP. In terms of contribution to public finances, the mobile sector is estimated to have contributed US\$48 billion during 2010 – generated through corporate taxes, social security, income taxes, net VAT and regulatory fees.

Figure C: Mobile ecosystem value add in LatAm 20 (US\$ bn)



Source: Wireless Intelligence; EIU; Qiang 2008; ML Global Wireless Matrix; KPMG Corporate and Indirect Tax Survey; Annual Reports; Deloitte-Telenor Study; A.T. Kearney research and analysis

**Mobile Broadband technologies are connecting the many unconnected Latin Americans, and acting as a catalyst for further development and innovation across the continent.** With further growth in fixed broadband penetration limited (especially in rural areas), Mobile Broadband offers a way to provide many Latin Americans with their first experience of personal internet access and to bridge the Digital Divide.<sup>iii</sup>

The industry continues to invest in social initiatives that are improving the quality of life for all Latin Americans, especially around improving the delivery of public sector services like natural disaster assistance, mobile education programmes, mobile health and mobile banking. In addition, the mobile industry is playing its part in reducing greenhouse gas emissions by directly improving its own energy-efficiency, and by indirectly supporting reduction of emissions in other sectors through technological innovation.



<sup>iii</sup> The gap between individuals, households, businesses and geographic areas at different socio-economic levels; with regard to their opportunities to access information and communications technologies and to their use of internet for a wide variety of activities

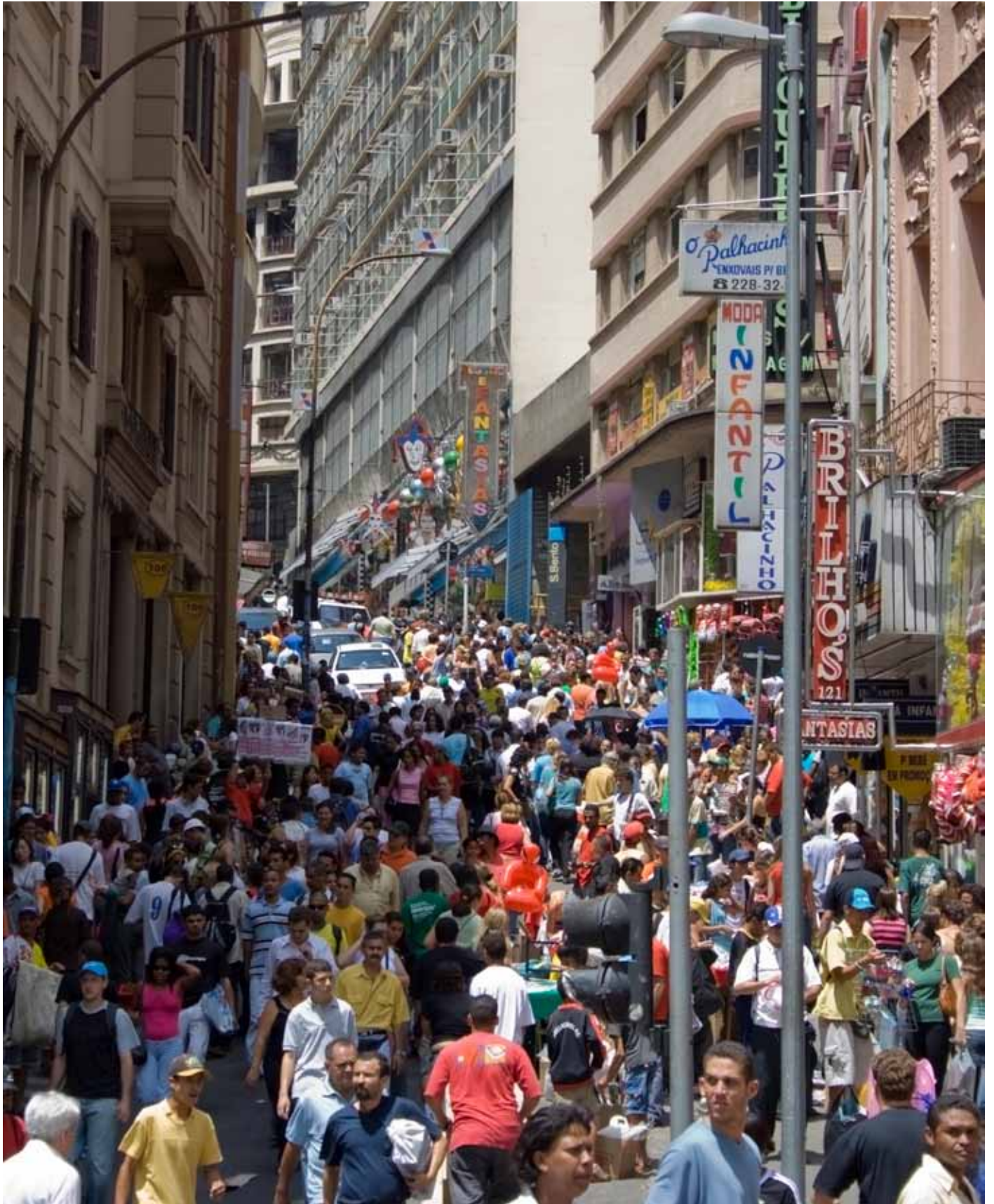


Regulatory policies in Latin America are key to driving sustained growth in the industry. Mobile Broadband will be critical for democratizing internet access and helping governments achieve their ICT development plans. Crucially, if spectrum from the Digital Dividend is used for Mobile Broadband it would allow larger coverage of rural and low population density areas at lower costs, thus contributing to a reduction in the Digital Divide.

The industry must continue to grow in order to meet customer aspirations and thus contribute to further economic and societal change across Latin America. Effective regulatory policy-making is potentially the most important influencer of growth. Discussions with several players within the ecosystem identified four key regulatory themes that need addressing within a Latin American context:

- The need for a transparent, predictable, consultative and aligned regulatory regime;
- Reducing ineffective taxation to enable increased mobile penetration;
- Incentives to drive universal access, rather than universal service obligations/funds;
- The importance of a clear roadmap of spectrum allocation

The GSMA's experience is that progressive regulatory bodies that instigate and shape policy are most effective when they look at the industry through a 'wide angle-lens'. By addressing the wider mobile ecosystem and ensuring fair and appropriate policies, the industry generates value and drives social development and economic growth. The GSMA and its members look forward to such engagement within Latin America and hope that the Observatory provides a useful basis for discussions on how much the industry does and will continue to contribute.



### 3. The LatAm mobile market today

**Key Messages:**

**With over 630m connections in 2011<sup>1</sup>, LatAm is the world's third largest mobile market after Asia and Africa;**

**Growth has been rapid (13% CAGR 2007-2011) and has been driven by increasing accessibility and affordability, as seen by declining ARPUs, and economic development;**

**The shortage of fixed line infrastructure has paved the way for successful adoption of mobile services, with more people having access to a mobile than a fixed line in almost every country and territory in LatAm;**

**As the LatAm markets mature and penetration across the region passes 100%, growth will slow to 5% CAGR from 2011-2015. The region will have three-quarters of a billion connections in 2015 and an average penetration rate of 126%;**

**LatAm mobile markets are increasingly competitive with an average of almost 4 operators in each and the prospect of further competition as regulators open up their markets to MVNOs. EBITDA margins average 34% but with a wide spread across markets.**

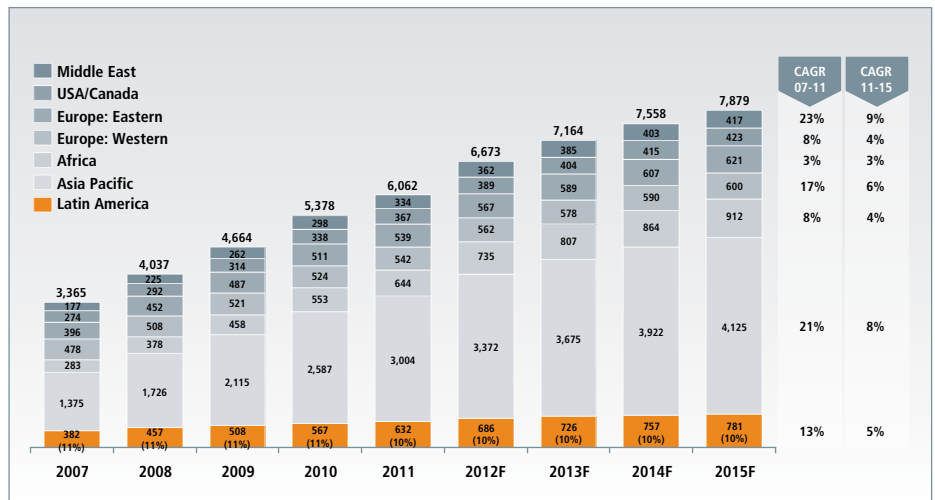
**3.1 The world's 3rd largest mobile market**

As of 2011, the LatAm market remains the world's third largest mobile phone market in terms of number of connections behind Asia Pacific and almost on par with Africa. The growth in the number of connections in the region has been strong over the last six years. Since 2007 the number of connections grew 65% to reach 632m in 2011. 2009 was a landmark year as the region broke through the 500m connection mark.

Even through the global economic slow-down, LatAm mobile markets have continued on double digit growth paths. This has been driven by a number of factors including:

- The introduction of innovative tariffs and reduction of prices across the different services coupled with the increased availability of low-end feature handsets
- Increased mobile coverage giving greater numbers of people access to mobile networks, particularly as operators deploy their networks in rural areas
- Economic development in the region, increasing prosperity and hence affordability of communication services
- The introduction and success of prepaid services enabling customers to manage their spending and access flexible low-cost services (82% of subscriptions are prepaid in LatAm versus 52% in Europe)
- The low penetration and long waiting times for installation of fixed line infrastructure.

**Figure 1: Global Mobile Connections<sup>2</sup>**

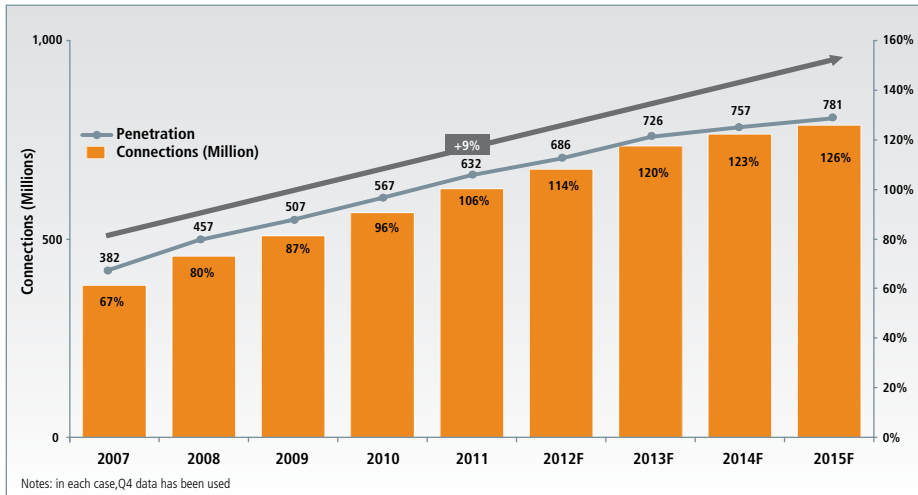


Source: Wireless Intelligence

As a result, mobile penetration rates have more than doubled from 44% in 2005 to 106% in 2011. In part due to the trend to own multiple SIMs in LatAm, penetration rates are likely to achieve levels similar to that experienced by other regions.

<sup>1</sup> Wireless Intelligence, AT Kearney analysis

<sup>2</sup> Technologies included in Total Connections are CDMAOne, CDMA2000 1X, CDMA2000 1xEVDO, CDMA2000 1xEVDO Rev. A, CDMA2000 1xEV-DO Rev. B, GSM, WCDMA, WCDMA HSPA, TD-SCDMA, LTE, TD-LTE, WiMAX, TDMA, PDC, PH5, iDEN, Analog

Figure 2: LatAm Connection and Penetration Rate<sup>3</sup>

Source: Wireless Intelligence, EIU



### 3.2 A very diverse region

With 47 countries, 594m people, multiple different cultures, languages and dialects, LatAm is a very diverse region. Including countries that range from the size of Brazil (alone 80% the size of all of Europe) to tiny Caribbean islands (Bermuda is the 3rd smallest territory in the world), LatAm encompasses huge variety on multiple dimensions:

- **Population:** Brazil 195m to Anguilla <20k
- **Area:** Brazil 8.5m km<sup>2</sup> to Bermuda 54km<sup>2</sup>
- **Literacy rates:** Cuba 99.8% to Haiti 62.1%
- **Population density:** Bermuda 1,226/km<sup>2</sup> to Suriname 3.2/km<sup>2</sup>
- **GDP per capita:** Aruba \$147,100 to Haiti \$1,700
- **Languages:** whilst Spanish is spoken broadly across the region, Portuguese is the dominant language in Brazil which alone has 80 indigenous languages

From a mobile perspective LatAm is equally diverse:

- **Penetration:** 330% in Anguilla to 11% in Cuba
- **Number of countries with 3G network availability:** 27 out of 47<sup>4</sup>
- **Data revenues as a % of total revenues:** 36% in Argentina to 15% in Peru<sup>5</sup>
- **Prepaid connections as a percentage of total connections:** 97% in Jamaica to 17% in Puerto Rico

<sup>3</sup> Technologies included in total connections are CDMAOne, CDMA2000 1X, CDMA2000 1xEVDO, CDMA2000 1xEVDO, Rev. A, CDMA2000 1xEVDO Rev. B, GSM, WCDMA, WCDMA HSPA, TD-SCDMA, LTE, TD-LTE, WiMAX, TDMA, PDC, PHS, IDEN, analogue ,

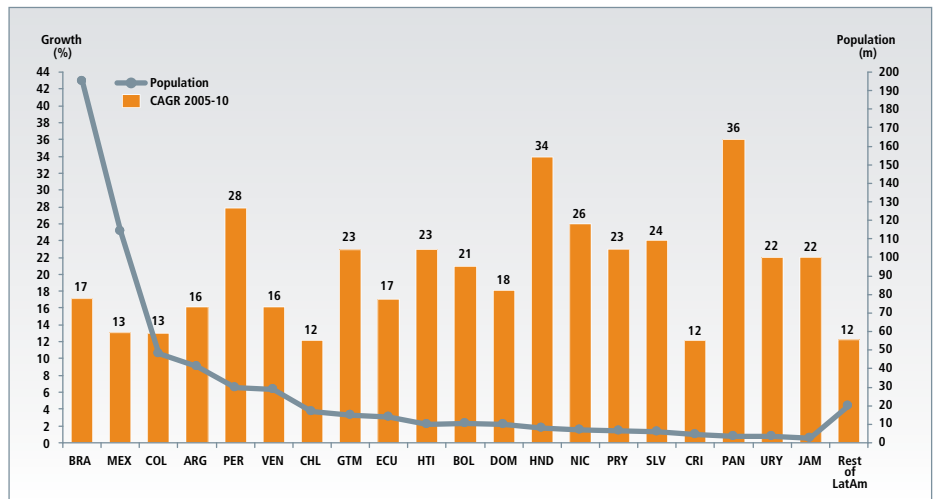
<sup>4</sup> Teleco, 29th June 2011

<sup>5</sup> Informa Telecoms and Media, Bank of America Merrill Lynch, January 2011.  
Note: Data revenues likely includes SMS revenues, according to Bank of America Merrill Lynch description of data revenues

### 3.3 Market dynamics in LatAm

All of the LatAm 20 countries experienced double digit annual growth in mobile connections over the last five years. Peru, Nicaragua, Honduras and Uruguay all experienced particularly strong with growth rates above 25% per year.

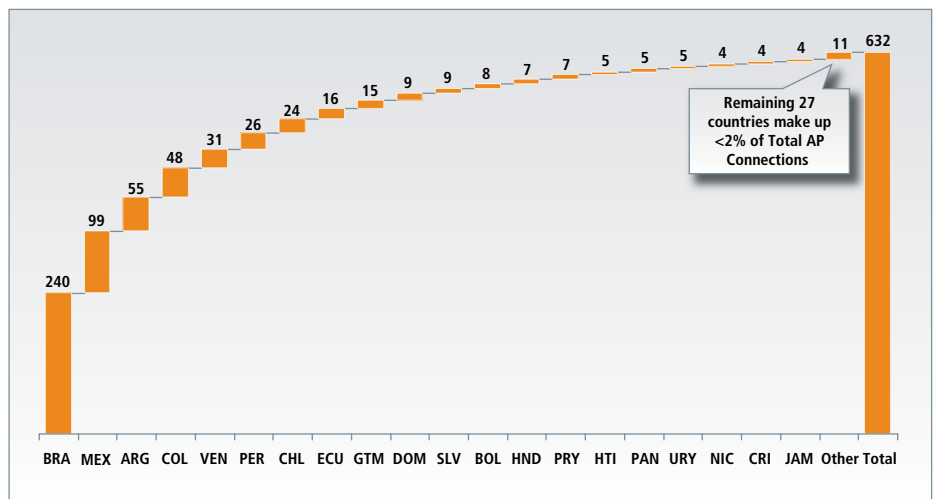
Figure 3: LatAm20 country population and mobile connection growth rates



Source: Miralacx Intellinera; EIU; A. T. Kearney

The 4 largest markets (Brazil, Mexico, Argentina and Colombia) each have over 40m connections and between them account for 70% of total LatAm connections. Brazil and Mexico alone account for over half the total number of connections in the region.

Figure 4: LatAm 20 countries represent >98% of total LatAm connections in Q4 2011

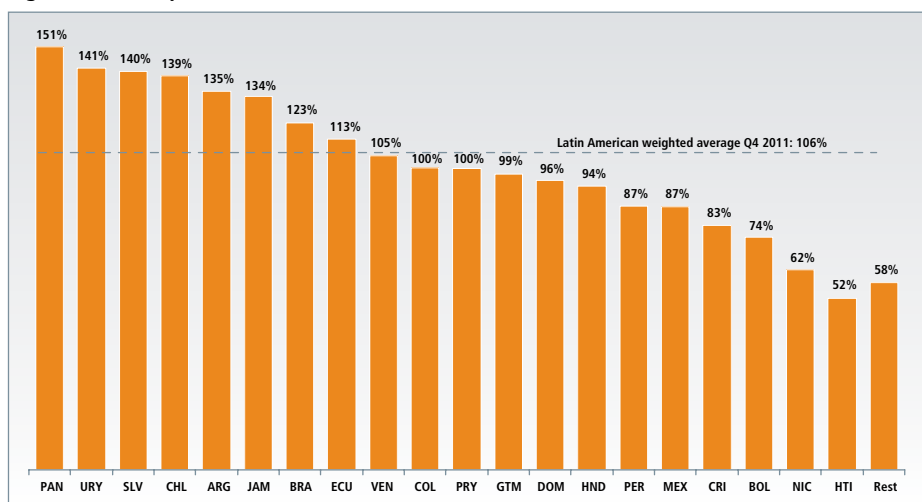


Source: Wireless Intelligence

10 Note: 2G coverage has not been updated since the 2009 European Mobile Observatory Report, but remains close to 100% for both population and geographic coverage

Mobile penetration in the region has reached 106% during 2011, but within individual countries this varies considerably. In LatAm 20, 9 countries have penetration rates above the regional average with Panama, Uruguay and El Salvador topping the list (151%, 141% and 140% respectively). Meanwhile the lowest penetration rates are seen in Haiti (52%) and Nicaragua (62%). Penetration in these countries is expected to increase substantially in the future as the overall market and regulatory environments are liberalised, especially as economic, political and social conditions improve in Haiti. Across the remaining 27 countries and territories (which only account for 3% of the population) the penetration rate is 58%.

**Figure 5: Mobile penetration in LatAm 20 countries**



Source: Wireless Intelligence, EIU, Subtel

Although recent penetration growth rates highlight a huge increase in mobile access, there is still room for improvement. Multiple SIM ownership is common across the continent, which means that penetration rates are likely to overestimate the number of unique mobile phone users. Multiple SIMs are prevalent for a variety of reasons: to take advantage of attractive promotions from operators (including long-distance rates, own-network rates, and product bundles), to split voice and data, and to split home and work communication requirements. Furthermore, in the Caribbean penetration rates are skewed by the number of tourists who buy a local SIM to use only for the duration of their visit. For example, the Cayman Islands have penetration rate of 186%. Recent studies have attempted to identify the number of unique mobile users in LatAm. According to Informa Telecoms & Media<sup>6</sup>, despite many LatAm countries having a penetration rate above 100%, there are still 178m Latin Americans without access to mobile services. In Brazil in Q1 2011 for example, penetration rate was 110% (123% at the end of 2011), but Informa’s analysis estimated that only 72% of the population had their own mobile subscription during this period.



Two key factors need to be considered to understand the impact of multiple SIM usage in LatAm. The first factor is the urban-rural divide, which is significant in many countries. Some urban areas in Brazil have penetration rates above 120% whilst in rural areas penetration rates can be 60% and even as low as 23% in some isolated pockets of the Amazonas, mainly due to lack of coverage. Secondly, even in urban areas there are still segments of the population who, despite prices falling due to competition, cannot yet afford mobile services.

The introduction of prepaid mobile services has been a vital enabler in the proliferation of mobile connections in LatAm. Prepaid SIMs, initially launched to reach low-income and low-credit users, have proved hugely successful. The introduction of 'calling party pays' in the late 1990s<sup>7</sup> helped to establish a prepaid preference. The success of prepaid services has since been driven by a number of factors. Firstly, prepaid services offer consumers with irregular income or low financial stability the flexibility to use mobile services only when they can afford to, rather than signing up for a long term contract with regular monthly payments. Secondly, prepaid pricing options offer mass-market consumers access to mobile services at a lower entry cost than postpaid contracts. Finally, prepaid contracts do not require operators to carry out credit checking and payment collection which would be challenging in countries where not all individuals have access to banking facilities.

It is therefore unsurprising to see that prepaid services dominate the LatAm mobile market. Across the region prepaid accounts for 82% of connections. Looking at the LatAm 20, over 97% of subscribers in Jamaica and Haiti are prepaid. At the other end of the scale, in Costa Rica, this figure is as low as 50%. With the announcement this year that it is liberalising its market and awarding mobile concessions, the prepaid situation in Costa Rica looks set to change. The incumbent mobile provider in Costa Rica, ICE, only introduced a prepaid service targeting the youth, immigrant and low-consumption users in 2010. It is expected that these segments will form the bulk of subscriber growth following liberalisation as new entrants promote attractive prepaid offers.

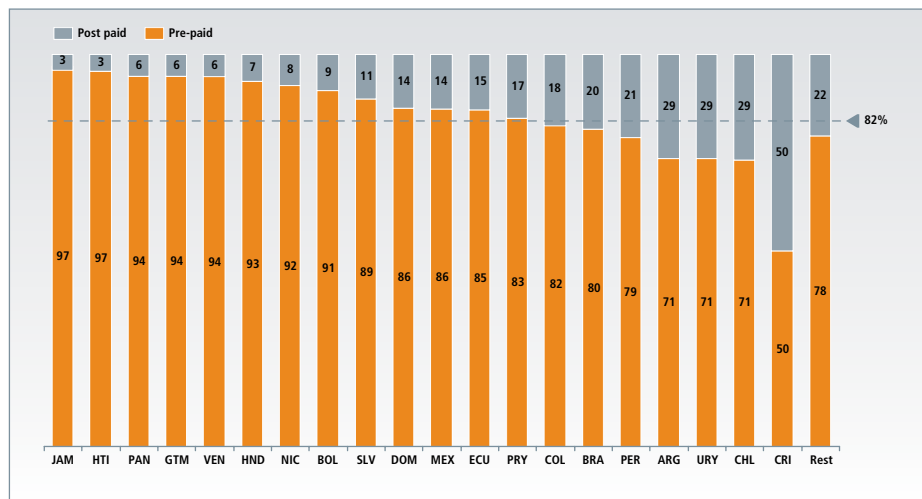
Only in 5 countries across the entire region, French Guiana, Guadeloupe, Martinique, US Virgin Islands and Puerto Rico, is prepaid less than 50% of the subscriber base. As the region continues to grow in affluence and more of the population gain access to banking facilities, postpaid subscriptions are expected to grow more quickly than prepaid (9% increase for postpaid vs. 4% for prepaid by 2014<sup>8</sup>). However, prepaid will remain the dominant subscription type for the foreseeable future.

<sup>7</sup> Latin American, Telecoms, Mobile and Broadband Overview – 9th Edition, Budde Communications 2010

<sup>8</sup> Frost & Sullivan 2010, reported in Market Watch 23rd April 2010



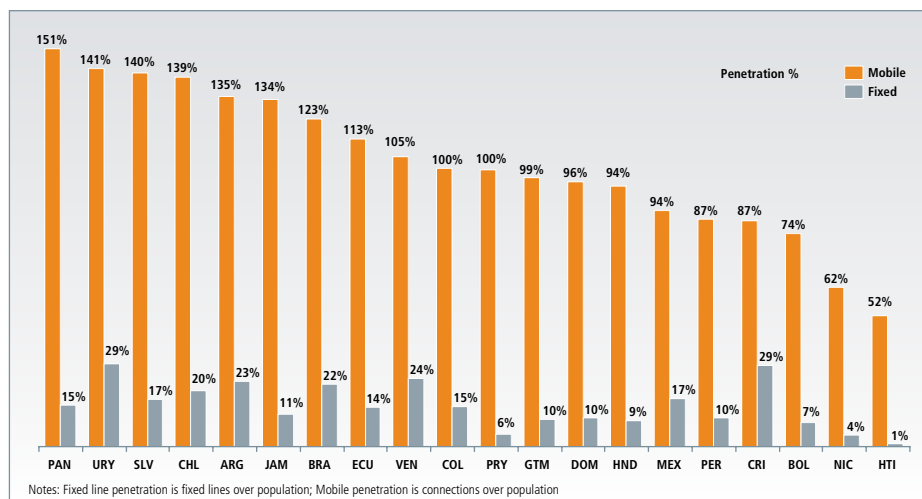
Figure 6: Prepaid and Postpaid split across LatAm



Source: Wireless Intelligence

Whilst fixed line penetration is high in some major cities, access to fixed line facilities in rural areas (where 46% of Latin Americans live) tends to be limited. Fixed line penetration varies across LatAm from 29% in Costa Rica to only 1% in Haiti (see Figure 7). Rural fixed line infrastructure is often basic or non-existent, in part due to geographic factors e.g. the mountainous geography makes it difficult to extend fixed coverage. In fact, fixed line penetration is half that of Europe<sup>9</sup> (19% vs. 41%).<sup>10</sup> Combined with the success of prepaid services in enabling access to those without a steady income or bank account, mobile services have grown to far exceed penetration levels of fixed line services. This trend is expected to continue in the broadband market too.

Figure 7: Fixed and Mobile penetration in LatAm 20 countries



Notes: Fixed line penetration is fixed lines over population; Mobile penetration is connections over population

Source: Wireless Intelligence; EIU; Teleogeography

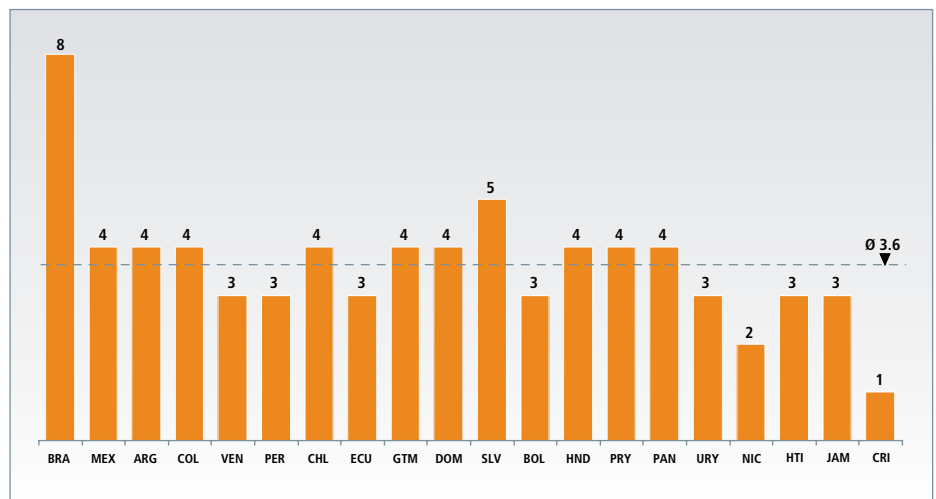
9 The whole of Europe as defined by the ITU

10 ITU, 2010

### 3.4 Competitive intensity

LatAm mobile phone markets are competitive. 11 of the LatAm 20 markets have 4 or more operators, with Brazil having 8 separate operators<sup>11</sup>. Only 2 countries have 2 or fewer operators. Costa Rica remains a monopoly but with the regulator SUTEL awarding mobile concession licences at the beginning of 2011 it is expected that Claro (American Movil) and Telefonica will begin operations by the end of 2011. Nicaragua is a duopoly but the telecommunications market is also showing signs of increased openness. Across the region, competition is expected to increase further as MVNOs enter the market. Currently there are approximately 10 active MVNO operators in LatAm, including recent entrants Nuestro in Argentina – a telecoms cooperative – and UFF Movil in Colombia (both of which launched in 2010). Following on this trend, there is evidence that the number of MVNOs is likely to increase in the near future. For example, Brazilian regulator ANATEL approved MVNOs this year and Virgin, in conjunction with Tribe Mobile, has announced plans to launch services across LatAm in 2012-13.

Figure 8: Number of wireless operators in LatAm 20 countries

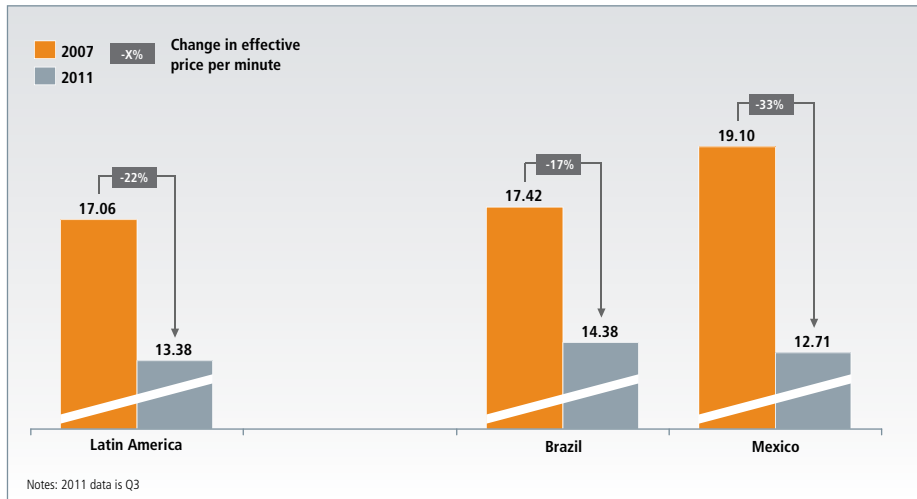


Source: Wireless Intelligence, A.T. Kearney analysis

Evidence of intensifying competition can be seen in declining ARPUs across LatAm. From 2007 to 2011, ARPU's declined by 17% and 33% in Brazil and Mexico respectively. A similar trend can be seen across LatAm, where ARPU decreased on average by 22%. Intensifying competition has driven ARPU down as operators compete with one another through promotions and discount packages. The targeting of lower income customers and the multiple SIM trend also impact ARPU figures. Looking forwards, voice ARPU is expected to decline due to decreasing net average voice tariffs and slowing traffic growth, but this will be partially offset by higher data ARPU as a result of increased revenues from mobile broadband and value add services.

<sup>11</sup> The geographical coverage of the 8 Brazilian operators varies, with 4 of them providing national coverage and the remaining 4 providing coverage across multiple regions in the country

Figure 9: Average revenue per user (US\$) for selected markets

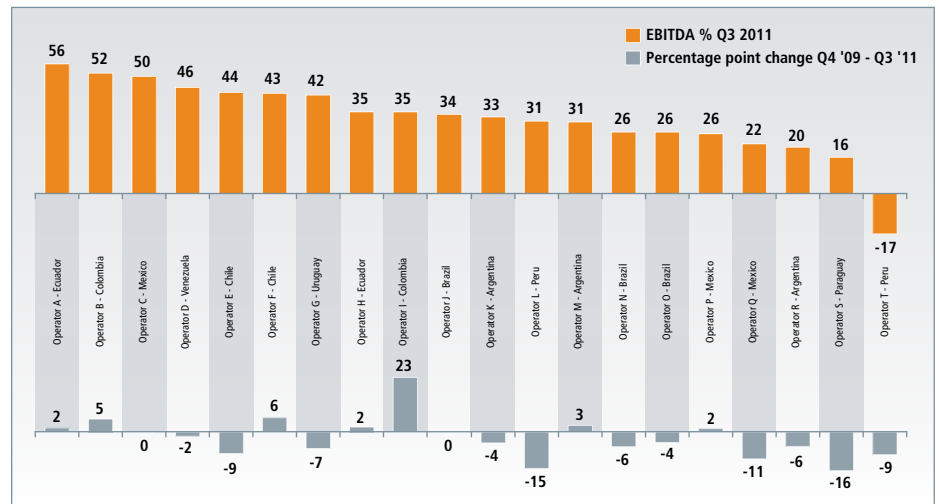


Across LatAm, operators are continuing to invest in their markets to address growing demand and improve service and coverage. In the more mature and competitive markets such as Brazil, Mexico and Chile, capital investment remains high as operators roll out 3G services. For example, Brazilian operator Oi's Q2 2011 capital spend was up 64% on the previous year as the operator increased coverage and capacity of its 3G network infrastructure<sup>12</sup>. Also in Brazil, the operator TIM invested heavily in 2010 with R\$ 2.8 billion and has continued investing an additional R\$719 million in 2Q2011. Capital investment is also being driven by the testing and deployment of LTE services. In Ecuador, Claro (a subsidiary of America Movil) plans to increase its 2011 capital investment by 45% versus 2010 to expand its network and begin testing LTE technology. In Chile, Entel announced it expects the largest part of a planned US\$2bn investment in its operations to go towards expanding its mobile broadband network.

The profitability of mobile operators varies considerably across the region and even within countries. In the last quarter of 2010, for example, three of the four operators in Chile experienced markedly different earnings as EBITDA margins ranged from below 0% to over 40%. In many cases, the market is highly volatile, with some operator's profit margins changing by between +15% and -15% between 2009 and 2010. Although the range in EBITDA is wide in LatAm, the same situation exists in other regions of the world, with later entrants often taking many years to reach steady state profitability.

As the market continues to mature in LatAm, operator profitability is expected to decline as operators are hit by a number of factors: the costs implicit in multi-SIM usage, the entry of MVNOs, and the margin impact of declining ARPU as lower income groups are targeted to sustain growth. Regulation is also playing a role. In Mexico regulators recently lowered the rate that mobile operators can charge to complete incoming calls on their networks from 95 to 39 cents.

Figure 10: EBITDA margins for selected operators



Source: Wireless Intelligence

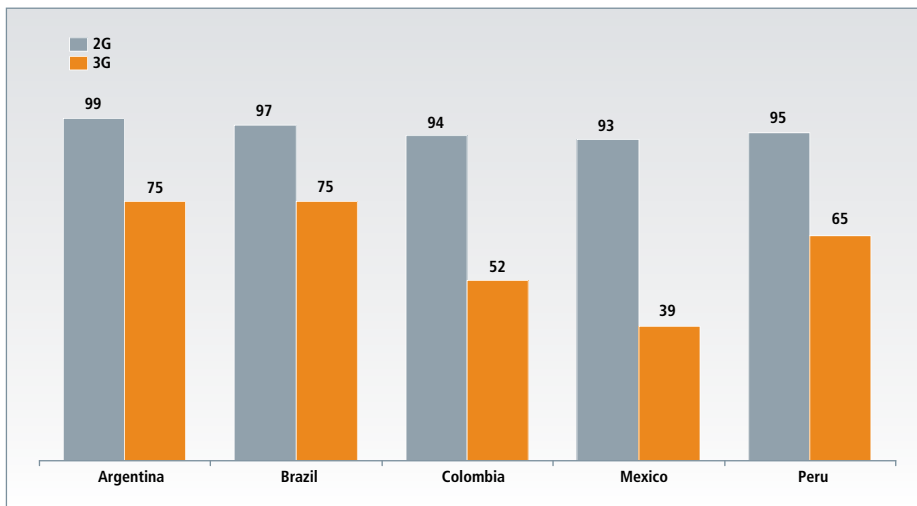
### 3.5 Converging Standards

Mobile services in LatAm began in the early 1990's, with analogue (AMPS) technologies. Migration towards digital (2G) mobile services saw the introduction of TDMA and CDMA technologies in the mid 1990's. For example, the launch of CDMAOne by Telefonica Peru in 1996 was the first CDMA network in LatAm. GSM had a later start and it was not until March 1998 that the first operator, Chile's Entel PCS, launched commercial GSM services. By 2001, mobile connections had overtaken fixed connections across the region and, despite the economic recession, currency devaluation, inflation and high levels of foreign debt, mobile continued to grow through to 2003. During 2004, GSM had overtaken CDMA and TDMA to become the dominant mobile phone technology in LatAm. Shortly after this, at the end of 2005, mobile had overtaken fixed in every country in LatAm with the exception of Cuba. In late 2006, UMTS first reached LatAm and W-CDMA was launched in Chile and Puerto Rico. In 2008, operators launched mobile broadband plans, including innovative and flexible prepaid plans with USB dongles, which initiated the uptake of 3G UMTS services.

GSM is now clearly the dominant technology across LatAm accounting for 95% of connections with CDMA and iDEN maintaining a 3% and 2% share respectively. As GSM becomes established as the defacto standard for mobile communications, interoperability issues sometimes faced by consumers moving between GSM and CDMA areas will decrease. iDEN appears to have found a successful niche and is expected to maintain steady market share. Nextel Holdings offers iDEN services in Argentina, Brazil, Chile, Mexico and Peru and remains committed to iDEN, as shown by its 2010 agreement to extend Motorola's supply of iDEN infrastructure until 2014.

Coverage of 2G services is now well established across LatAm. 2G population coverage in the 5 most populous countries is over 90%. Whilst 3G coverage has not yet reached similar levels, considerable strides have been made to bring 3G services to the LatAm population<sup>13</sup>. In 2010, Argentina and Brazil led the way in 3G with 75% population coverage, whilst in Mexico coverage was only 39%. Coverage is expected to grow strongly as operators continue to roll out their networks. Mexico, in particular, is expected to see a substantial increase in 3G coverage following commitments by leading operators to expand their 3G networks, and the 2009 wireless spectrum and advanced wireless services auction that allowed for more competition and more capacity. Telcel (a subsidiary of America Movil) announced that it would expand its 3G coverage in both rural and urban areas throughout 2011<sup>14</sup> whilst Telefonica announced that it would double the number of base stations in the country with most of the investment going towards 3G coverage.<sup>15</sup>

Figure 11: 2G and 3G coverage by population, selected countries (2010)



Source: GSMA

At the same time most operators across LatAm continue to invest in 3G infrastructure, some are already working on the evolution to 4G, or LTE. Investment in LTE in LatAm began in 2010 with the first LTE trials. At the end of 2011 there were 35 LTE commitments, 7 LTE trials completed and 4 commercial LTE networks launched.<sup>16</sup> This technology provides mobile speeds much higher than 3G networks and, in combination with the right spectrum, will enable faster mobile broadband services to reach more users at lower prices.



<sup>13</sup> 3G services are provided over CDMA2000 EV-DO and W-CDMA technologies, with W-CDMA accounting for 88% of 3G connections

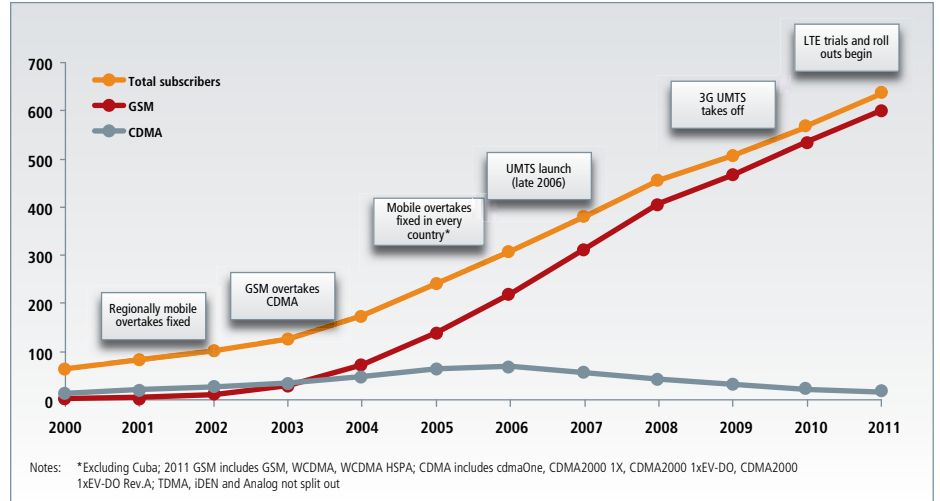
<sup>14</sup> Data Monitor, 12th August 2011

<sup>15</sup> Head for Latin America Operations, quoted Business News Americas 1st August 2011

<sup>16</sup> Wireless Intelligence, January 2012



Figure 12: Key developments in mobile services



Source: Wireless Intelligence; Budde

At the forefront of LTE development in LatAm are Chile, Argentina and Puerto Rico. Chile and Argentina have emerged as front runners due to the combination of a competitive and developed telecoms market and wealthier urban societies with high Internet usage penetration. For example, Entel PCS in Chile and Personal in Argentina are considered regional innovators as both were the first to introduce 3G in December 2006 and January 2007 respectively. In Puerto Rico, a relatively new entrant that somewhat specialises in unlimited internet access without contracts, is forging ahead with launching the first commercial LTE service in LatAm in 2011.

**LTE Network Tracking for LatAm**

Operator	Country	Expected Launch Date	Freq. (MHz)
Claro (América Móvil)	Argentina	Jun-13	850/1900/1700/2100
Movistar (Telefónica)	Argentina	Dec-12	850/1900/1700/2100
Personal (Telecom Argentina)	Argentina	Dec-12	850/1900/1700/2100
BTC (Cable & Wireless)	Bahamas	TBC	TBC
Entel	Bolivia	TBC	TBC
Claro (América Móvil)	Brazil	Dec-13	2600
Oi (Telemar Norte Leste)	Brazil	Dec-13	2600
TIM	Brazil	Dec-13	2600
Vivo (Telefónica)	Brazil	Dec-13	2600
Claro (América Móvil)	Chile	Dec-12	2600
Entel	Chile	Dec-12	2600
Movistar (Telefónica)	Chile	Dec-12	2600
UNE (EPM Telecomunicaciones)	Colombia	Mar-12	2600
ICE	Costa Rica	TBC	TBC
Claro (América Móvil)	Ecuador	Dec-13	800/1900
Movistar (Telefónica)	Ecuador	Dec-13	800/2100
Movistar (Telefónica)	Mexico	Jun-13	800/1900
MVS Comunicaciones	Mexico	TBC	2500
Telcel (América Móvil)	Mexico	Dec-12	2500
Tigo (Millicom)	Paraguay	TBC	TBC
Claro (América Móvil)	Peru	Dec-12	1700/2100
Movistar (Telefónica)	Peru	Dec-12	1700/2100
Claro (América Móvil)	Puerto Rico	Mar-12	700
Open Mobile	Puerto Rico	Jun-12	TBC
Sprint (Sprint Nextel)	Puerto Rico	Dec-12	TBC
Ancel (Antel)	Uruguay	Jun-13	700/2500
Claro (América Móvil)	Uruguay	Dec-13	700/2500
Movistar (Telefónica)	Uruguay	Sep-13	700/2500
Movistar (Telefónica)	Venezuela	Oct-12	

## 4. Mobile broadband as a driving force for development

### Key Messages:

Mobile broadband in LatAm is still embryonic; as of 2011 there were 61m mobile broadband connections in LatAm accounting for over 10% of the region's population;

Mobile broadband has grown by 127% from 2005-2011 and is predicted to grow at 50% per year from 2011-2015 so that by 2015 LatAm will have almost a third of a billion mobile broadband connections;

Mobile data traffic per capita is very low (22 MB per capita per month) but will reach 850 MB per capita by 2015, similar to levels that Middle East and African consumers will reach, and greater than Asia Pacific citizens will reach;

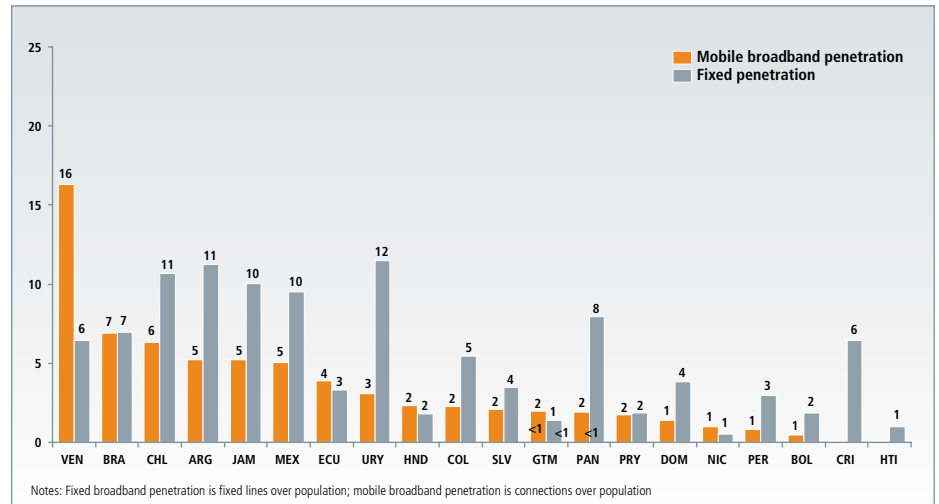
With over 210m internet users in LatAm there is clear pent-up demand for broadband services, and with further roll-out of fixed infrastructure limited, mobile broadband is set to be the primary platform for high-speed internet services for most of the unconnected Latin Americans;

There are large variations between LatAm states in terms of their Mobile Broadband Readiness with some countries approaching maturity (e.g. Chile, Argentina, Brazil) whilst others are still in a very nascent state of development.

### 4.1 Pent-up demand for mobile broadband

The last twenty years have seen a boom in both mobile services and Internet usage. Compared to other regions across the world, LatAm countries have been slow to take up fixed line broadband services. Uruguay has the highest fixed broadband penetration rate in LatAm, at just 12% of the population. There are several factors, unique to national and regional market dynamics, which have impacted the growth of fixed line broadband services in LatAm. The most important contributor has been infrastructure. Limited bandwidth, low PC use, and insufficient fixed-line to carry ADSL have all slowed the adoption of fixed line broadband. Moreover, financial obstacles such as high prices, fixed cost plans and low incomes have also played their part.

Figure 13: Fixed vs. mobile broadband penetration (2010)



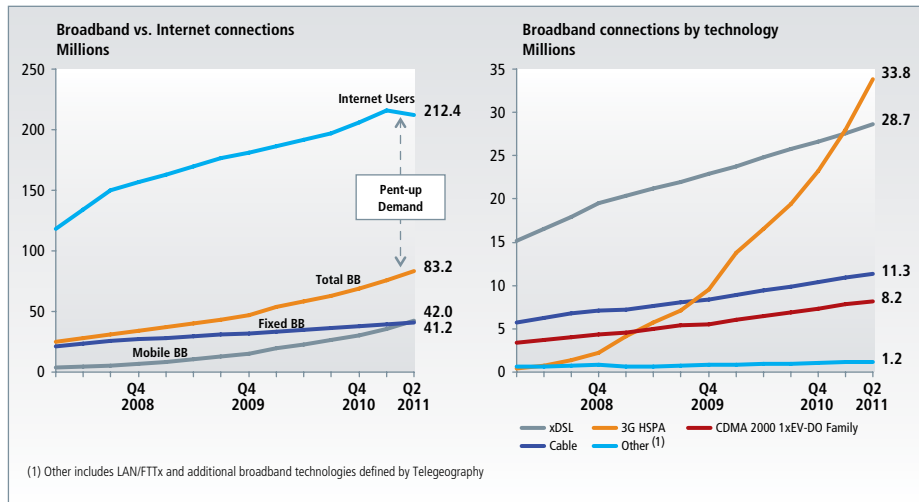
Source: Wireless Intelligence, Convergencia

The lack of easy access to fast, fixed line broadband services has created significant pent-up demand over the last few years – with an estimated 150m internet users at the end of 2008, but only 25m fixed line broadband connection. In November 2006, AT&T in Puerto Rico launched the first commercial 3G network in LatAm. It was not until 2008, with the widespread introduction of 3G networks and subsidised tariffs for netbook and notebook computers, that mobile broadband started to take off across LatAm.

With the introduction of 3G mobile services, Latin Americans had the opportunity to leap frog fixed line broadband whilst not compromising on service quality and speed. As a result, mobile broadband has proceeded to fill the gap created by insufficient fixed line services. This has especially been the case in areas outside main urban centres where often no fixed line infrastructure exists. From as early as 2009, 3G HSPA connections had outgrown the number of cable connections in LatAm. In Q4 2010, 3G HSPA connections also overtook xDSL to become the most utilised broadband technology across LatAm.



Figure 14: Broadband growth in LatAm by technology



Source: GSMA

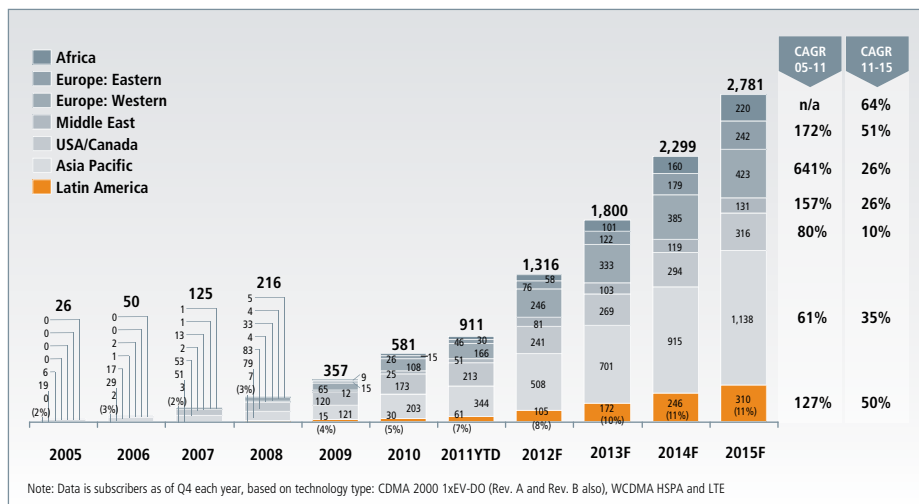


It is clear that the LatAm mobile broadband market is nascent. As of end 2011, LatAm had 61m mobile broadband connections, accounting for over 10% of the population<sup>17</sup>. At the same time, there are over 210 million internet users throughout the region, indicating that a clear pent-up demand for mobile data services exists today (See Figure 14).

4.2 Distinctive characteristics in the LatAm 20 mobile broadband market

Between 2005 and 2011, the mobile broadband market grew at a dramatic 127% per year, similar to growth rates for the uptake of mobile broadband in Europe. The LatAm 20 countries accounted for 99% of the region’s mobile broadband connections in 2011. Outside of LatAm 20, only the Central American and Caribbean markets of Aruba, Belize, Bermuda, Martinique, Netherlands Antilles and Puerto Rico currently offer mobile broadband services. As with mobile voice services, the most populous countries dominate, with Brazil and Mexico alone accounting for 67% of mobile broadband connections.

Figure 15: Mobile broadband connections

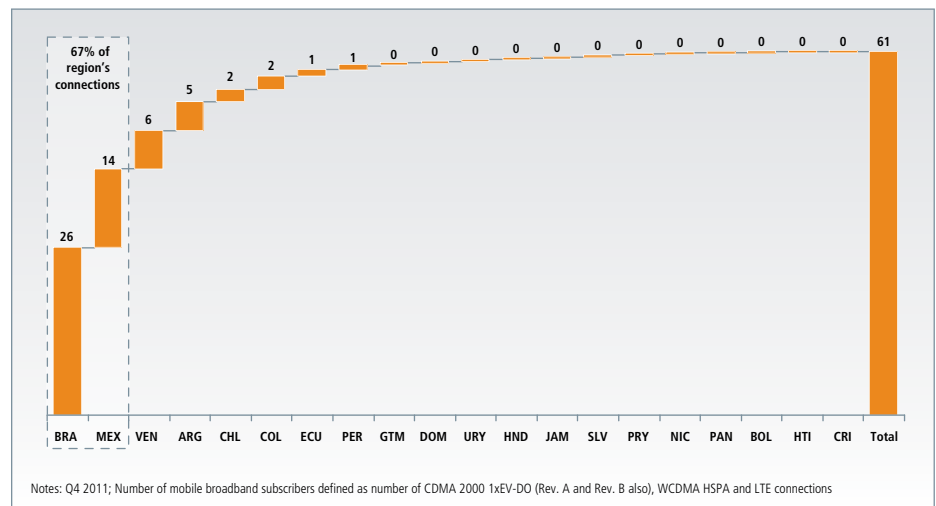


Source: Wireless Intelligence

17 Estimates of the number of mobile broadband connections in LatAm vary widely even among reliable sources. This is often a result of differing definitions of mobile broadband. This report considers both W-CDMA HSPA as well as CDMA2000 EV-DO technologies to be “broadband”, and also considers both smartphone and datacard/dongle subscriptions

Although mobile broadband has outpaced the main fixed broadband technologies, penetration of mobile and fixed broadband varies substantially across markets and is still limited in comparison to other regions. Venezuela is an example of how national market characteristics can result in successful mobile broadband services over fixed line equivalents. It has the highest mobile broadband penetration rate at 16%. This is mainly due to regulatory dynamics at play in the telecommunications market. The state-owned incumbent CANTV has a monopoly over the provision of ADSL, which means that there is no wholesale market for broadband in Venezuela and no ISPs that can act as resellers of its ADSL service. As a result, Venezuela's fixed broadband service is expensive and slow (its mean download speed is the 11th slowest in the world),<sup>18</sup> encouraging consumers to use mobile broadband as an alternative way to access the internet.

**Figure 16: 2011 Breakdown of mobile broadband connections in LatAm 20**



Source: Wireless Intelligence

As the number of broadband subscribers grows, the share of operator revenue derived from data services is also expected to grow. Movistar Chile expects data revenue to grow from 12% of mobile revenue in 2010 to 22-25% in the coming years<sup>19</sup>. A report by Deutsche Bank market research<sup>20</sup> in January 2012 highlights that data already represents 25% of wireless service revenues in the largest Latin economies and continues reporting strong growth 24% yoy as of Q3 2011. Research carried out by Informa suggests that, within LatAm, Argentina leads the way with 36% of total revenues coming from data services, with Venezuela close behind at 33%.

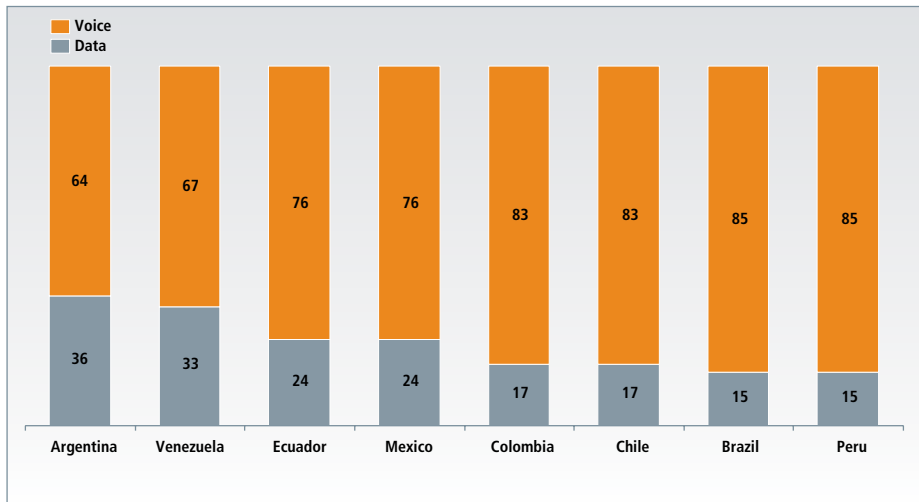
Whilst SMS still accounts for the majority of data revenues, mobile internet and broadband are expected to close the gap and, in the more developed markets, overtake SMS. This is already happening in Brazil, where Vivo's Q2 2010 results showed that internet accounted for 53% of data revenue and SMS and MMS only 35%. Other countries are expected to follow suit: Pyramid Research expects mobile broadband and infotainment services to represent more than 50% of Colombian total data revenue in 2016.

<sup>18</sup> Budde Communications

<sup>19</sup> CEO Telefonica Moviles Chile, [www.nokiasiemensnetworks.com](http://www.nokiasiemensnetworks.com)

<sup>20</sup> Deutsche Bank Market Research, LatAm Telecom and Media, 5th January 2012

Figure 17: Data as a % of total service revenues



Source: Q3 2010 data from Informa Telecoms & Media, Merrill Lynch; GSA



### 4.3 Mobile broadband evolution and the data explosion

Mobile operators are starting to fill the gap between internet demand and broadband provision. For example, a survey of Brazilians<sup>21</sup> showed that 52% of respondents (all of which were broadband users) access the internet exclusively through mobile, compared to just 20% in the USA and 17% in the UK.

In addition to increasing rural coverage, mobile operators are enabling the uptake of mobile broadband services through the introduction of low-cost price plans. For example, Brazilian operator Oi already offers competitive plans of US\$9.31 for 50MB and US\$49.9 for 1GB – the equivalent of US\$0.05/MB. A study done by Galperin benchmarking 24 countries of the region showed that, on average, mobile broadband services are 25% cheaper than comparable fixed broadband services. Moreover, when it compares the segment of the cheapest plans available, mobile broadband ones are 32% cheaper than fixed broadband ones.<sup>22</sup>

At the same time, operators are offering low rates for customers who want to use data services while travelling around the region. For example, Claro Argentina offers customers travelling to neighbouring Uruguay and Paraguay reduced rates of \$1.50/MB. In general, operators have made good progress in making roaming services affordable in order to facilitate commerce and tourism.

21 Study carried out by Convergencia Research for Acision, Mobile Broadband, Quality of Life & Marketplace Virtualization. Mobile Value Added Services Monitor 2011

22 Las tarifas de banda ancha en América Latina y el Caribe: Benchmarking y tendencias, Hernan Galperin, Universidad de San Andrés (Argentina), October 2011, DIRSI, available at [www.dirsi.net](http://www.dirsi.net)



As mobile operators further reduce prices for 3G services and enhance their offers, for example by offering heavy usage and other flexible data bundles, mobile broadband take-up is expected to grow rapidly. As voice services reach maturity, offers that bundle voice with mobile broadband will also encourage uptake of mobile broadband. Similarly, innovative offers that are developing in some countries, such as quad-play packages from converged operators, will attract consumers in the next few years.

**Figure 18: Broadband offers available in the market**

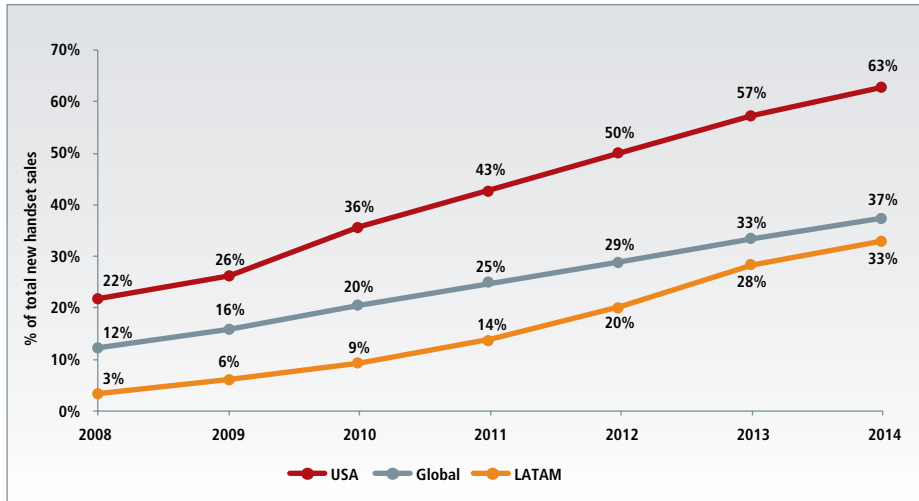
Broadband offers			
Established	Developing		Nascent
Mobile broadband only	MBB bundled with voice	MBB bundled with fixed	MBB bundled with WiFi
<p>Majority of offers remain centred around mobile broadband only via USB modems/dongles. SIM offers for tablet computers are also coming to market</p> <p>e.g. Claro has postpaid mobile broadband plans aimed at non-handset based mobile broadband users and in Brazil offers a micro SIM plan for the iPad 2</p>	<p>Bundling of mobile broadband with other mobile services, particularly voice, is becoming increasingly popular</p> <p>e.g. in Argentina, America Movil has prepaid and postpaid plans which bundle voice with mobile broadband</p>	<p>Convergent operators have started to include bundles in a multi service offering</p> <p>e.g. in Brazil quad play offers have been introduced by Brazil Telecom, Telemar and Oi</p>	<p>Offers are expected to become available in places where an operator has public WiFi infrastructure already in place in populated areas</p>

Source: Operator websites, A.T. Kearney analysis

Looking to the future, LatAm is expected to grow the number of mobile broadband connections at the same rate as Eastern Europe. Between 2011 and 2015 the market is expected to grow at 50% per year - a growth rate only bettered by Africa which is starting from a lower usage base. This will drive the number of mobile broadband connections to increase circa 5 fold from 61m in 2011 to over a third of a billion in 2015. By 2015, broadband is expected to account for almost 40% of all mobile connections in LatAm.

A number of factors are expected to drive strong growth in LatAm mobile broadband. Firstly, smartphone penetration in LatAm is increasing rapidly and is forecast to more than treble from 9% in 2010 to 33% in 2014. By 2013 LatAm is expected to have closed the gap to the global average. Smartphone penetration in LatAm has been tracking the USA's historical trend, suggesting that by 2018 smartphone penetration in LatAm could reach almost 60%.

**Figure 19: Smartphone penetration, by region and globally**

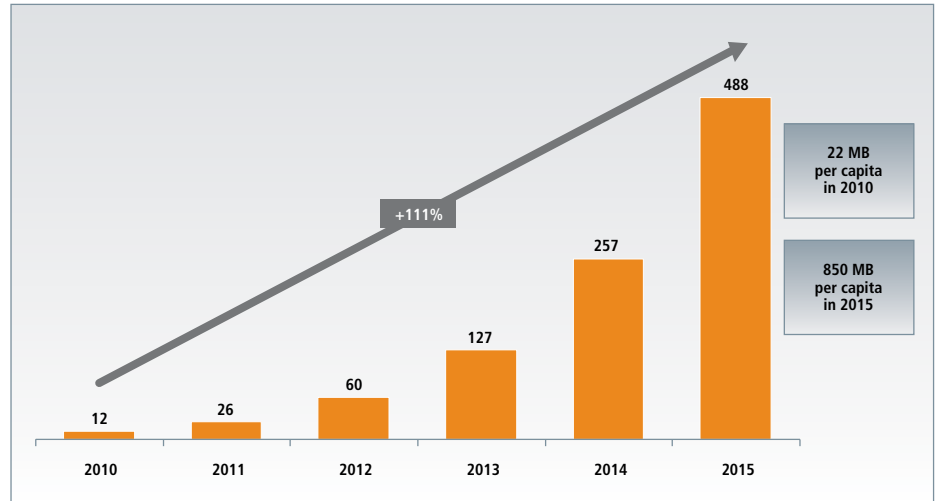


Source: Pyramid Research Handset Forecast Q1 2010

In addition to consumer applications, mobile broadband services are increasingly finding applications supporting some of the region’s most important commercial infrastructure. Telcel in Mexico has provided a secondary data network to one of Mexico’s leading banks using 3G data modems. The service has been installed in more than 1000 branches across Mexico to provide a secondary internet and data transfer medium. The new system allows the bank to avoid the high cost of using the MPLS network for lower priority tasks, and provides the security of a secondary connection in case of a failure of the primary network. The systems also stores information online, providing real-time performance reports for each of the bank branches.

As the number of data devices (both datacards / dongles and smartphones) and mobile broadband connections increase, the volume of data traffic passing through mobile networks has grown at an impressive rate. According to CISCO, growth in LatAm mobile data traffic is expected to continue strongly and is estimated to increase by 111% per year for the next four years, the second fastest growth rate for any region globally. On a per capita basis Latin Americans will consume over 800MB each month by 2015, a similar level to Middle Eastern and African customers (933MB per month) and ahead of consumers in Asia Pacific (652 MB per month).<sup>23</sup>

**Figure 20: Mobile data traffic in LatAm and per capita, in Petabytes per month**



Delivering this boom in data traffic represents a significant challenge, and opportunity, for LatAm mobile operators. As intense competition and saturation on voice has driven down margins, many operators will be looking to mobile data for the next wave of revenue growth. Data and value added services revenues comprise a growing share of total service revenues for mobile operators, although there remains a wide variation between countries and operators. As mentioned previously, Argentina's mobile data revenues account for more than a third of their total service revenues, which is a larger proportion than found in many developed countries.

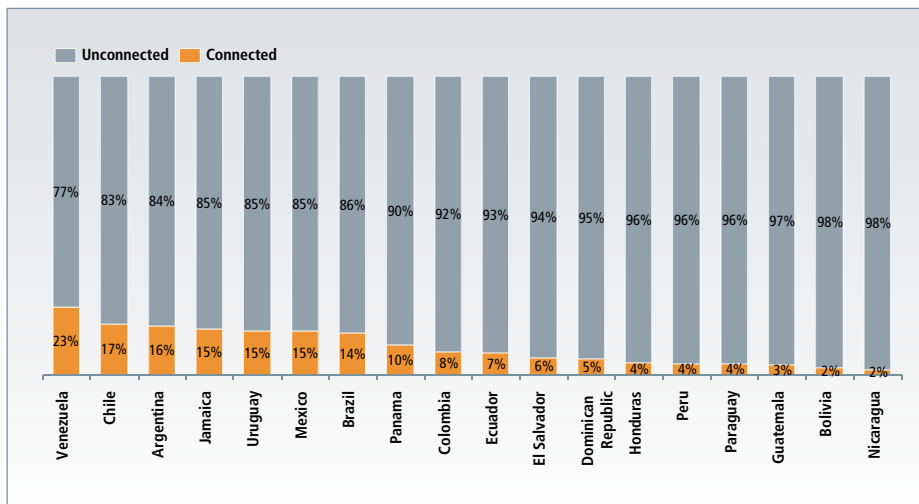
Growth in mobile data has and will continue to be driven by investment and innovation from players across the entire mobile ecosystem. Operators in particular have a big role to play. The rollout of 3G and the commercial launch of 4G services with increased quality, speed and capacity will be paramount to the uptake and continued use of data services (provided that the necessary backhaul and backbone infrastructure is in place). In addition, progression in hardware and supporting platforms by equipment and device manufacturers in the broader mobile ecosystem will also encourage use, as will innovative content and service offerings that have already developed into a mass market elsewhere in the world.

#### 4.4 The importance of mobile broadband to connect the unconnected

The mobile industry has been successful in making communications much more accessible and affordable to all Latin Americans by offering a lower entry cost with minimal or no monthly spend commitments. Prepaid services have been hugely successful in LatAm allowing previously marginalised groups to access communication technology where the need for a fixed address, a bank account and a credit history may have excluded access to fixed line services.

Mobile broadband now offers a way to provide many Latin Americans with their first experience of personal internet access and thus to bridge the Digital Divide<sup>24</sup>. The increasing availability of 3G mobile devices allows mobile to provide a lower entry cost option versus fixed broadband for the low income and “bottom-of-the-pyramid”<sup>25</sup> customer segments.

Figure 21: Total broadband (fixed and mobile) connected vs. unconnected in selected countries<sup>26</sup>



Source: Wireless Intelligence, Convergencia

Low disposable income and unreliable cash-flow make affordability the biggest barrier for the bottom of the pyramid to take up broadband services. Whilst initial, mobile broadband offers were predominantly postpaid as operators looked to attract high-value, lower cost customers, prepaid offers now proliferate. As with prepaid voice services, growth of prepaid mobile broadband is bringing mobile data services to the bottom of the pyramid and enabling ad hoc access without making a long-term commitment to a monthly charge. For example, TIM in Brazil and Personal of Argentina have launched interesting and successful prepaid mobile broadband offers, offering US\$0.30 per day for access; it has since launched hourly plans enabling prepaid customers complete flexibility for internet access.



24 The gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard to their opportunities to access information and communications technologies and to their use of internet for a wide variety of activities

25 The largest but poorest socio-economic group, defined by those living on less than \$2 per day

26 The proportion of the population connected to mobile broadband is conservative since some people will have more than one mobile broadband activated SIM and some people will have both fixed and mobile broadband subscriptions



In Rio de Janeiro, more than 1.3m people (22% of the city's population) face daily problems of violence, poor sanitation, poor education and access to information. As a result of the poor infrastructure in disadvantaged areas, access to telephones – both fixed and mobile is low. TIM has been focussed on bringing mobile communication technology to disadvantaged people since 2007 – even before the Rio de Janeiro Police had pacified the area. The strategy was dependent upon the operator being actively involved in the lives of the people living in the slums – supporting local events and social activities, advertising on local vehicles and local radio, and recruiting local residents to encourage the growth of small businesses. As a result of this strategy, TIM was able to add 600,000 new customers from disadvantaged areas in Rio within the first 6 months and bring the benefits of mobile communications to all socio-economic groups.

#### 4.5 How mobile broadband can help governments achieve their ICT development goals

A considerable base of academic research has substantiated the economic impact of broadband connectivity, the benefits of which (summarised by Katz<sup>27</sup>) are shown below:

- **Economic growth:** strengthening of industries with high transaction costs, consumer surplus, saving of transportation time;
- **Employment:** generated by development of ICT industries, enhancement of the self-employed workforce, and enhancement of the radius of telecommuting – allowing additional labour pools to be tapped and new firms/services to be created;
- **Productivity:** labour productivity in both ICT intensive and non-intensive industries, in supply chain and distribution functions;
- **Firm relocation:** in search of labour pools, resulting from value chain decomposition, enhancement of quality of life attracting an educated labour force.

As a result, it is unsurprising that many government ICT development goals have focussed on the provision of broadband. Peru has declared that broadband access is a fundamental right whilst Brazil's National Broadband Plan launched in May 2010, aims to get 11.9m households online by 2014. Meanwhile, in Colombia, the Vive Digital initiative aims to quadruple the number of broadband connections in the country to 8.8m by 2014.

As previously discussed, there are a number of infrastructure limitations that make fixed line services unlikely to enable governments to meet their broadband targets<sup>28</sup>. Existing copper infrastructure is often built in an inefficient structure (long loops, multiple joints) and faces deterioration due to copper theft. Additional roll-outs of fixed networks can be difficult and expensive<sup>29</sup>, requiring physical digging, resolution of right-of-way issues and maintenance. Meanwhile, there are a number of advantages to mobile broadband that make it more suitable to deploy in pursuit of government ICT objectives: lower construction cost, shorter roll-out times and therefore lower costs for end users.

<sup>27</sup> Raul Katz, Estimating broadband demand and its economic impact in Latin America; Proceedings of the 3rd ACORN-REDECOM Conference Mexico City May 22-23rd 2009

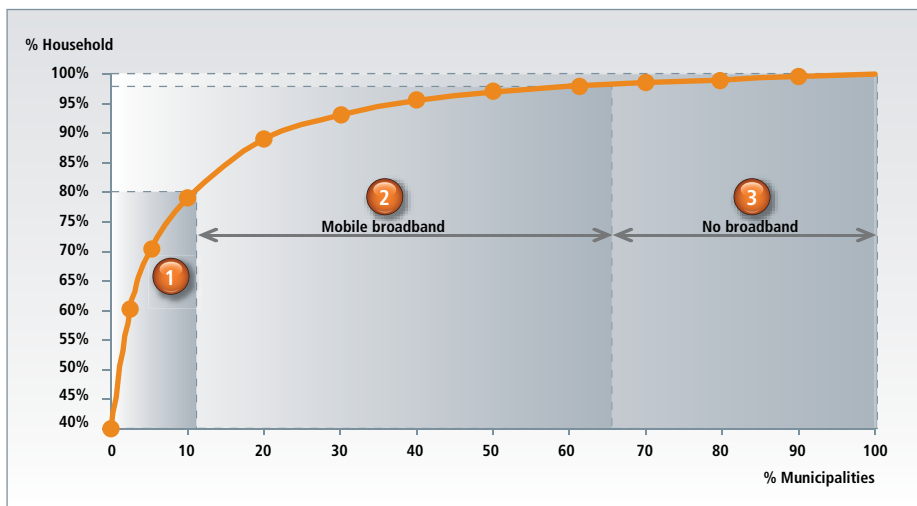
<sup>28</sup> Mobile broadband for the masses: Regulatory levers to make it happen, McKinsey & Company, February 2009

<sup>29</sup> Fixed line roll out, estimated on average – US \$50/person or US \$ 4,000/km in 'Towards a Connected World, Socio Economic Impact of Internet in Emerging Economies, 16th September 2009, BCG



Research by the Inter-American Development Bank<sup>30</sup> (IDB) highlights the significant role that mobile broadband has to play in meeting the growing demand and enabling government goals to be achieved. In the top ~11% of municipalities where population density is highest and 80% of households are located (Area “1” in Figure 22 below) both fixed and mobile can compete to provide broadband services. However, as governments look to extend access to the remaining 20% of households, mobile infrastructure becomes essential. The IDB argues that to approach universal coverage (Area “1 and 2” in Figure 22) mobile infrastructure is the best technological option for data services. As long as governments remove regulatory and infrastructure barriers – such as ensuring the availability of the necessary spectrum, land and base station permits – then competition between mobile networks will drive penetration on a purely commercial basis. The IDB argue that to reach the last 2% of households and achieve true universal access (Area “3” in Figure 22), the mobile industry is likely to require more direct financial support from governments.

Figure 22: Household densities by municipality across LatAm



Source: Infrastructure Challenges and Issues, February 2011, IDB

A key issue to drive coverage and connect the unconnected in Latin America will be on how governments utilise the 700MHz Digital Dividend spectrum. The use of the 700 MHz for mobile broadband allows a larger coverage of the territory. In fact, signal propagation in 700 MHz allows for a 10 kilometre radius (or higher), compared to 5Km in other bands<sup>31</sup>. Therefore, the fundamental value of the reallocation of the 700 MHz spectrum is embodied in the possibility of significantly increasing profitably in the deployment of mobile broadband, promoting a more suitable technology to foster adoption.

According to TAS<sup>32</sup>, by allocating digital dividend spectrum for Mobile Broadband technologies, such as HSPA and LTE, the disparity between the connected and disconnected, commonly known as the digital divide, can be lessened. Through the re-allocation of digital dividend spectrum, Mobile Broadband coverage could increase from 75% to approximately 95% of population in Argentina, 75% to 95% in Brazil, 53% to 90% in Colombia, 39% to 94% in Mexico and 65% to 89% in Peru. Thus, mobile broadband coverage with the use of the 700 MHz band would reach an estimated total of 92.7% of the population of Latin America, increasing the reach of networks by 31.5 percentage points.

30 Infrastructure Challenges and Issues, February 2011, IDB

31 Source: FCC, “The broadband availability gap”, OBI Technical Paper No.1, April 2010

32 Economic Benefits of the Digital Dividend in Latin America, Dr. Raul Katz and Dr. Ernesto Flores-Roux, Telecom Advisory Services (TAS), September 2011



Additionally, TAS estimated the use of the 700 MHz band for mobile services will allow covering approximately 20.1 million people (or 4.8% of the population) in Latin America living today in isolated areas, which today do not have access to mobile telephony.

These results and prospects of new technology investments make it clear that to achieve the continent's ICT development goals, governments and the mobile industry must continue to work together in partnership to bring the benefits of communication technology to all the people of Latin America and the Caribbean.

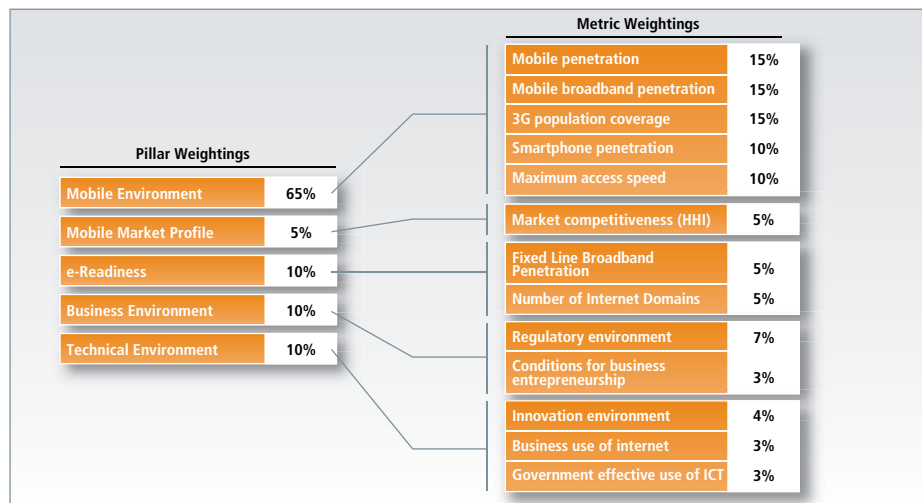
#### **4.6 The Mobile Broadband Readiness Index (MBRI)**

Whilst mobile broadband is currently only utilized by a small percentage of the population, its subscriber base has been growing rapidly. However, it is evident that not all countries across LatAm are at the same stage of evolution. Prior to this report there had not been any authoritative tracking and modeling of the mobile broadband adoption cycle, nor had there been any classification on the progress of countries along this adoption cycle.

Different stages of evolution require different strategies to ensure that mobile broadband growth can be sustained. The MBRI enables a comparison of the "readiness" of LatAm countries for mobile broadband growth, and identifies means to sustain the growth from a market, regulatory policy and corporate strategy perspective. Countries that rank highly are considered further along the adoption cycle, and hence lessons can be learned from their progress for countries that are further down the ranking. The purpose is not to identify winners or losers within the region, but rather to learn how various success factors, specific to the region, can be leveraged to further drive mobile broadband adoption at a national level. It is important to note that the index is a relative comparison of LatAm countries; a country may have made significant progress on the index metrics between 2008 and 2010, but if this is less than that of its peers then its position in the index may still fall. Similarly, these scores cannot be readily compared across regions.

The MBRI is comprised of 13 metrics, as listed in Figure 23. Each country has been scored on all 13 metrics on a scale of 0-100, relative to the performance of its LatAm peers. The ranking each country receives is based on a weighted average score out of 100. The definitions for each of the metrics used and scoring methodology is provided in the Appendix to this report.

Figure 23: MBRI Metrics and Weightings



Source: A. T. Kearney's Mobile Broadband Readiness Index, 2010



In 2010, Chile was at the top of the index, followed by Brazil. Chile's leading position is due to a number of factors. Its mobile environment is promising, with the highest downlink speeds and the second highest smartphone penetration. Its e-readiness is also high, with the second highest fixed line broadband penetration rate at 10%. The supportive regulatory body enables good conditions for businesses to flourish. At the same time, its technology environment is the most advantageous in the region. The combination of a nation that utilizes the internet in business, effective government use of ICT investment, and a pro-innovation environment creates a strong foundation for future investment and rapid growth in mobile data usage in Chile.

Figure 24: MBRI Results 2010 vs. 2008

	2010	2008	Change
Chile	1	2	+1
Argentina	2	3	+1
Brazil	3	1	-2
Uruguay	4	4	0
Venezuela	5	5	0
Mexico	6	6	0
Panama	7	11	+4
Columbia	8	7	-1
Jamaica	9	9	0
El Salvador	10	10	0
Peru	11	17	+6
Ecuador	12	8	-4
Dominican Republic	13	15	+2
Costa Rica	14	18	+4
Honduras	15	16	+1
Guatemala	16	12	-2
Bolivia	17	14	-3
Paraguay	18	13	-5
Nicaragua	19	19	0
Haiti	20	20	0

Source: A.T. Kearney Mobile Broadband Readiness Index, 2010



Brazil was the top-ranked country in the index in 2008 but ceded this position to Chile in 2010. This was mainly due to significant increase in maximum access speeds in Chile, beyond those in Brazil. Argentina rose to second from third place, showing strong mobile broadband adoption, mobile penetration and high access speeds.

The biggest mover overall between 2008 and 2010 was Peru, which rose from 17th to 11th in the index. Peru's mobile environment advanced considerably in that period, with 3G population coverage surging from 0% to 65% and maximum access speeds increasing from 3.6 Mbps in 2008 to 14.4 Mbps in 2010. Claro launched the first 3G network in 2008 with Movistar following suit in 2009. The resulting increase in access speeds and launch of mobile broadband services has also stimulated growth in smartphone adoption, leading to an environment ready for the uptake of mobile data services. In tandem, Peru's regulatory and innovation environments have also improved since 2008.

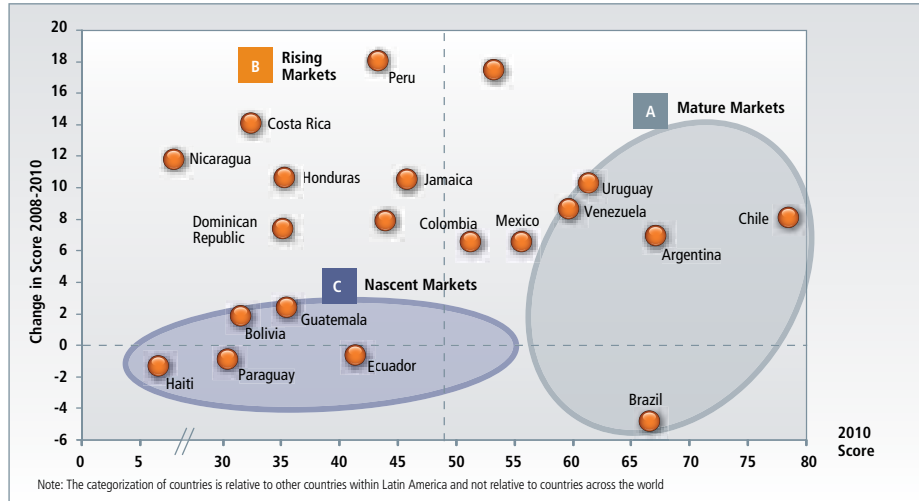
The biggest faller in the index was Paraguay. It has fallen behind on access speeds, 3G population coverage and overall business environment. While it was ahead of or on par with most other emerging markets with respect to access speeds in 2008, other countries such as Venezuela and Panama have since overtaken it. The same holds for 3G adoption: one of the leaders in terms of 3G population coverage in 2008, Paraguay failed to make progress in this area. In addition, three of Paraguay business and technology environment metrics were ranked lower in 2010 than in 2008: the business conditions for entrepreneurs, business use of the Internet and government use of ICT. Overall the combination of a relative deterioration of the business and technology environment and delays to 3G expansion have led to stagnation while most of Paraguay's peers have made progress on both fronts.

Comparing the two largest markets in the region, Brazil has maintained its position above Mexico in the 2010 index. The gap, however, has significantly decreased. Mobile broadband penetration rates and access speeds are higher in Brazil and Brazil is also more business-friendly, but Mexico is catching up. The underlying differences between the countries, the challenges faced by both and the regulatory requirements to drive future growth are detailed further in Chapter 7.

The two lowest-ranked countries, Nicaragua and Haiti, are unchanged between 2008 and 2010. They rank amongst the bottom five countries for 8 of the 13 metrics, including four out of the five mobile environment metrics. Having said this, both countries have shown growth across many of the areas. For example, Nicaragua's mobile penetration rose 16% and 3G population coverage by 49% between 2008 and 2010 while Haiti has increased mobile Internet access speeds. Addressing the regulatory priorities highlighted in Chapter 6 of this report is likely to help stimulate improvement across all of the key factors for mobile broadband readiness.

When bringing together the relative weighted scores that underpin our index, together with the change in scores between 2008 and 2010, three distinct groups of countries emerge. Cluster A is comprised of the maturing markets that scored highly in both years. Cluster B is made up of lower-scoring countries that showed improvement between 2008 and 2010, indicating that they are closing their mobile data-readiness gap to the countries in Cluster A. Cluster C are those countries that scored relatively low in both 2008 and 2010, with three of these actually scoring lower in 2010 than in 2008, indicating a widening gap between them and their peers. From a public policy and corporate strategy perspective, the future approach needs to differ by cluster.

Figure 25: MBRI Score and Change in Score for 2008-2010



Source: A. T. Kearney's Mobile Broadband Readiness Index, 2010

**Maturing Markets** face the challenge of large data traffic volumes and growing diversity in their traffic profile, for example an emerging demand for M2M traffic. Regulators need to ensure that operators are able to differentiate on the quality of service provided and manage traffic to avoid potentially damaging levels of congestion. Additionally it is essential that regulators ensure that sufficient spectrum is made available, for example through the digital dividend release of analogue television spectrum. Finally, telecom regulators should be considering how to take regional leadership to the global stage. This can be done through constructive policies on innovation and stimulation of the SME sector around the mobile sector, for example by creating economic and sector clusters, providing fiscal incentives and acting as a bridge between business, academic and public sector organizations.

**Rising Markets** face the challenge of massive increases in the volume of data traffic passing through networks that were in many cases designed with voice traffic in mind. Large-scale network upgrades are required. It is also essential that regulators ensure that sufficient spectrum is made available here. In addition, to realise the full potential of these countries, network rollout to underserved rural areas is necessary. In order to facilitate these requirements, regulators need to ensure that operators are able to build, own and share network infrastructure as required. Additional incentives, potentially from monies collected in universal service funds, should be used to ensure that this expansion is viable for operators. Finally, governments can play a key role in driving the adoption of mobile broadband and mobile data services in leading by example and driving innovative public sector service provision over mobile platforms, as is the case in more advanced markets.

**Nascent Markets** need to concentrate first and foremost on driving growth in mobile penetration and the accelerated rollout of 3G networks. This should be by ensuring that 3G (and in future 4G) licenses and spectrum are distributed in a timely, fair and transparent manner, and at a price that does not restrict the ability of the operators to invest in network infrastructure and coverage. In addition it is essential that telecom-specific taxes are removed, as they act as a barrier to adoption by pushing the cost of connectivity, devices and data services beyond the reach of the mass market.

## 5. The Economic Contribution of the Mobile Industry<sup>33</sup>

### Key Messages:

**Mobile operators in LatAm contributed US\$82 billion to aggregate GDP in 2010, or 1.7% of the total output of the region;**

**The total value add of the mobile ecosystem in LatAm is US\$175 billion, or 3.6% of GDP;**

**The mobile ecosystem makes a substantial contribution to employment, generating an estimated 573,000 jobs and supporting almost 1 million more;**

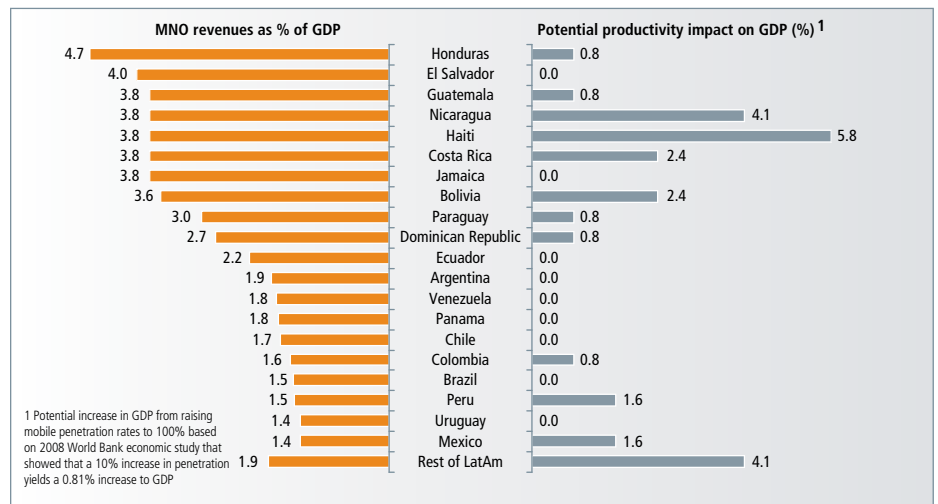
**The mobile ecosystem is a major contributor to public funding with US\$48 billion generated through corporate taxes, social security, income taxes, indirect taxes and regulatory fees.**

### 5.1 The contribution of mobile to GDP

Mobile technology makes communications services significantly more accessible, offering The rapid take-up of mobile communication in LatAm has driven revenues for mobile operators in LatAm to \$82 billion in 2010. This represents a direct contribution to the LatAm GDP of 1.7%. At a country level, mobile revenues as a percentage of GDP were relatively evenly distributed. Honduran operators contributed the most to their national GDP at 4.7% and Uruguayan operators the least at 1.4%.

In addition to the direct contribution, mobile communications enable significant productivity growth in other sectors which leads to further GDP growth. A 2008 World Bank study showed that for every 10% increase in mobile penetration, GDP increases by 0.81% in emerging countries and by 0.60% in developed countries. Raising mobile penetration rates in LatAm countries to 100% could result in a GDP increase of US\$36 billion, an aggregate of 0.6% of LatAm GDP. It must be noted that this is theoretical and in reality would take many years to accomplish. However, the effect of increasing mobile penetration rates illustrates the powerful impact that could be achieved if governments, regulators and operators work together to enable wider mobile access.

Figure 26: The direct and potential indirect contribution of mobile operators to GDP<sup>34</sup>



Source: Wireless Intelligence; EIU; Qiang 2008; A.T. Kearney research and analysis

### 5.2 The value-add of the mobile ecosystem

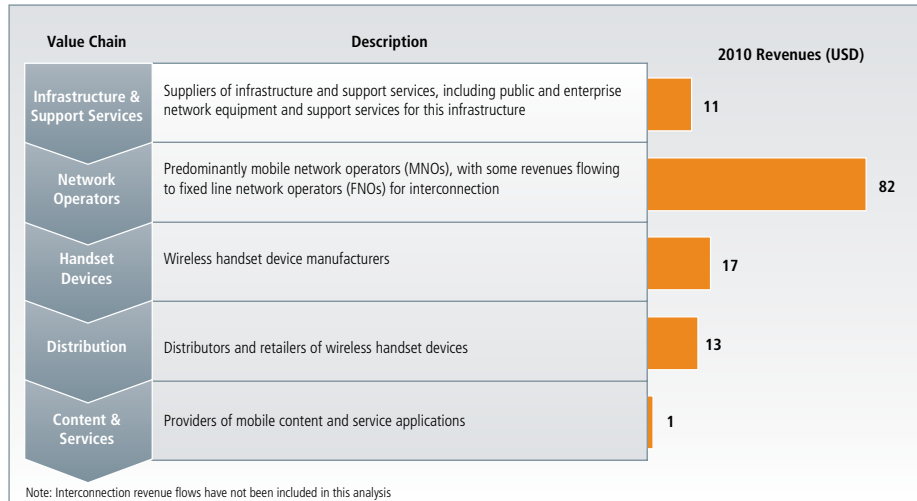
The economic contribution of the mobile industry reaches far beyond its direct contribution to GDP. Mobile operators work within a larger ecosystem to deliver mobile communications to society. As such, it is necessary to consider the entire ecosystem's economic contribution.

Based on current market dynamics, we have defined the mobile ecosystem value chain as consisting of the following five segments: infrastructure and support services, network operators, mobile devices, distributors, and content & service providers. Analysis of 2010 revenues suggests that mobile operators make up 66% of the ecosystem's total revenues.

<sup>33</sup> This section focuses on the contribution of LatAm as a region. All calculations are done for the LatAm 20 countries, which represent 96% of the region's GDP. All values are then extrapolated to obtain regional values

<sup>34</sup> Note: Mobile operator revenues are service revenues only, i.e. not inclusive of revenues obtained from mobile devices and accessories

**Figure 27: Description of mobile ecosystem in LatAm**



Source: Wireless Intelligence; ML Global Wireless Matrix; EIU; Factiva; A.T. Kearney research and analysis



The mobile industry's economic contribution can be measured in terms of supply and demand. A structured framework was used that considers the following elements:

#### Supply-side Effects

- The direct contribution from mobile network operators
- The direct contribution from the adjacent industries in the ecosystem's value chain
- The indirect impact on the wider economy (the 'multiplier effect')

#### Demand-side Impact

- Productivity gain from workers using mobile technologies for work (this covers a range of individuals whose job is impacted by having access to mobile communications technology)

It is particularly important to consider the mobile industry's contribution to productivity gains in developing countries where alternative fixed-line communication systems are less prevalent.

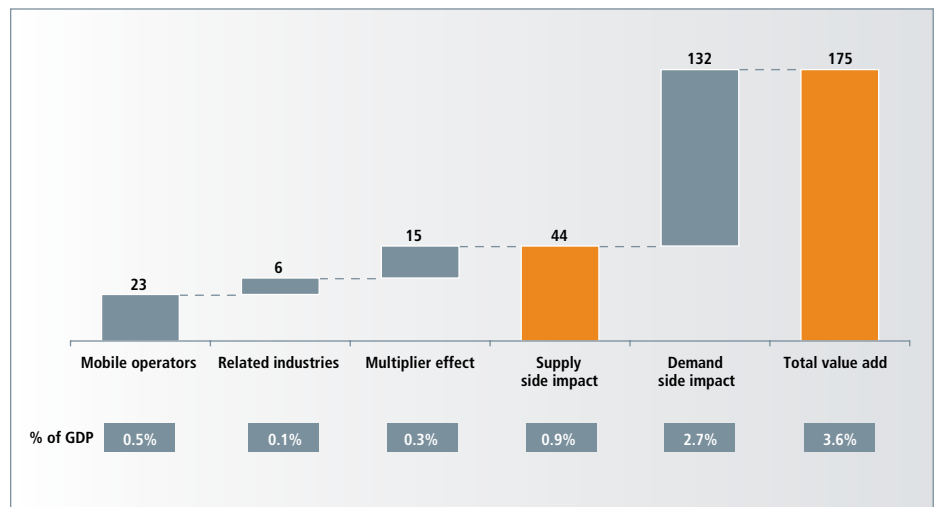
To determine the mobile ecosystem’s direct contribution to the economy, the economic value add<sup>35</sup> of MNOs and adjacent industries was estimated based on a sample of LatAm 20 companies from across the value chain, and then extrapolated to a regional level. A multiplier<sup>36</sup> was then applied to the direct contribution of the mobile ecosystem to estimate the indirect impact on the wider economy. The resulting supply-side impact from the LatAm n mobile ecosystem was estimated at US\$44 billion, or 0.9% of GDP.<sup>37</sup> Of this, around one third is attributable to the multiplier effect, indicating the strong positive ripple effect that mobile communications have throughout the overall economy.

The economic impact extends beyond the supply side effects. By providing easy access to telecoms on the move, mobile services have allowed companies to use their employees’ time more efficiently, respond more quickly to unforeseen events and minimise unnecessary travel. For large numbers of travelling workers, ranging from technicians to chief executives, mobile has made it much easier to coordinate activities, allocate resources effectively and reduce wasted travel and time. Mobile has also allowed the creation of new business models in the service sector, such as one-person and small businesses which would not be viable if they had to rely on fixed-line communications from a single site.

To evaluate the economic impact resulting from productivity gains enjoyed through mobility, for each of the LatAm 20 countries the average GDP contribution per worker was estimated by dividing total GDP by total workforce at a country level. The percentage of mobile workers per workforce<sup>38</sup> was then multiplied by the average GDP contribution per worker to get an estimated total mobility contribution. This value was then extrapolated to a regional level. An expected productivity gain from mobile usage of 7.6% was multiplied by total contribution to get an overall demand-side impact to economic contribution. Overall, workforce mobility and connectivity accounts for US\$132 billion value add across the wider economy, or 2.7% of regional GDP.

In total, the direct and indirect economic contribution of the mobile ecosystem amounted to an estimated US\$175 billion, or 3.6% of regional GDP.<sup>39</sup> The direct contribution of mobile operators has a significant impact across the greater economy: the overall contribution of the mobile ecosystem is 2 times greater than the direct contribution of the mobile operators.

**Figure 28: Mobile ecosystem value add in LatAm 20 (US\$ bn)**



Source: Wireless Intelligence; EIU; Qiang 2008; ML Global Wireless Matrix; KPMG Corporate and Indirect Tax Survey; Annual Reports; Deloitte-Telenor Study; A.T. Kearney research and analysis

35 Value add was used rather than revenues in order to avoid double counting of revenue flows within the value chain. Value add = EBIT + Wages – CAPEX + Depreciation (or approximately Revenues – Cost of Sales)

36 A multiplier of 1.5 was used based on an average of multipliers in previous studies that ranged from 1.1. to 2

37 This figure is lower than mobile operator revenues (which equate to 1.8% of aggregate GDP in the region) due to operator costs associated with non-mobile ecosystem industries (e.g. rent and power), and value add generated by ecosystem players outside LatAm (e.g. costs paid to equipment vendors with R&D/manufacturing outside LatAm)

38 To assess the percentage of mobile workers in the economy, various studies were leveraged including studies conducted for Telenor ASA and IDC. To determine the % of mobile workforce across LatAm 20 the correlation between the GDP per capita (at PPP) to the % of mobile workers for selected countries was established. Subsequently, linear interpolations were used to determine the data missing for certain countries. While it can be argued that GDP per capita and mobile worker % may be partially interdependent, we do not believe they are fully dependent on one another

39 A.T. Kearney analysis

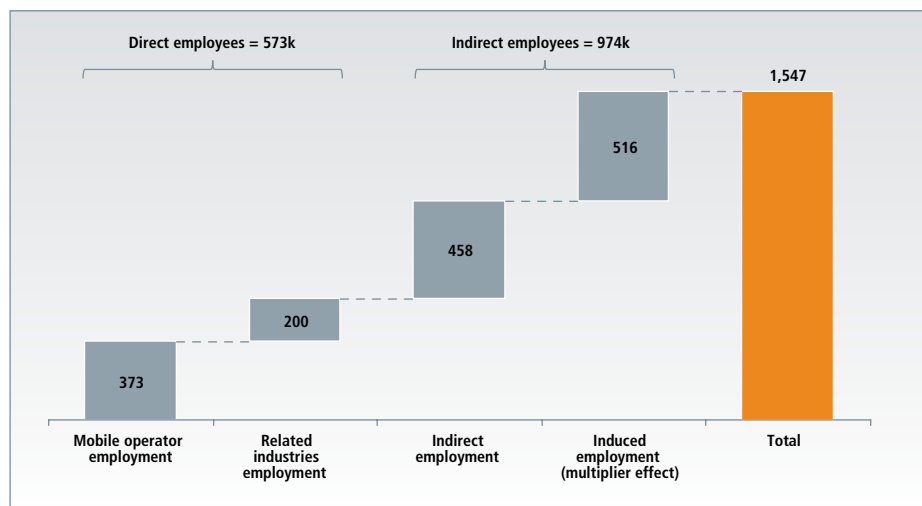


### 5.3 Contribution to employment

The mobile ecosystem plays a pivotal role in contributing to employment in LatAm. In 2010, over 1.5 million people were employed in the mobile ecosystem:

- 573,000 employed directly by mobile operators and their suppliers, of which 373,000 were directly employed by mobile operators
- 458,000 employed indirectly through support service companies and the ecosystem’s contribution to public funding
- 516,000 jobs from direct and indirect employee spending (derived using the multiplier effect)

Figure 29: Mobile ecosystem contribution to employment



Source: Payscale; EIU; A.T. Kearney research and analysis



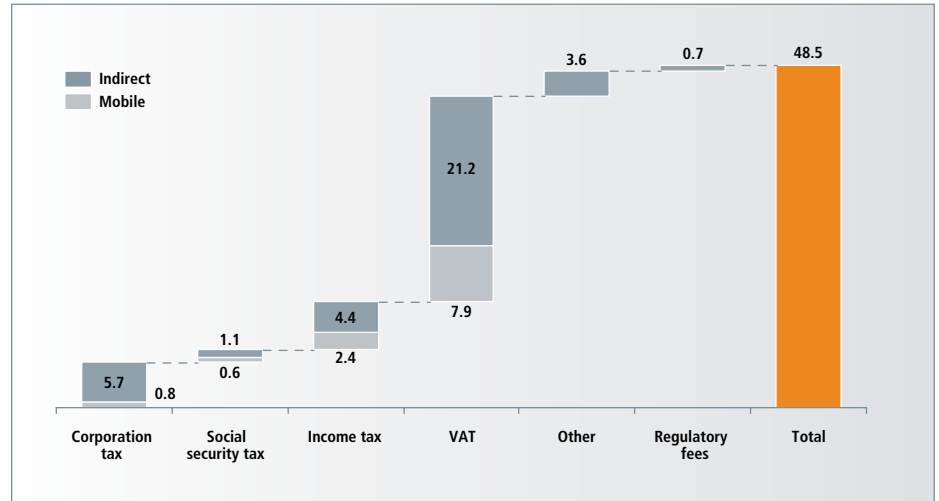
### 5.4 Contribution to public funding

The mobile ecosystem makes a major contribution to LatAm public finances through various levers including VAT/indirect tax, corporate tax on profits, social security taxes of direct and indirect employees, income taxes and regulatory fees (defined here as universal service fees).

It is estimated that the mobile ecosystem’s total contribution to public funding in 2010 amounted to approximately US\$48 billion. Of this, mobile operators directly generated approximated three quarters (US\$40 billion). Beyond mobile the remainder of the contribution reflects taxation of economic activity induced by the mobile industry. Over sixty per cent of the total contribution to public funding (US\$29 billion) was from net VAT contribution, with another US\$8 billion from social security and corporation tax.



Figure 30: Mobile ecosystem contribution to public funding (US\$ bn)<sup>40</sup>



Source: Wireless Intelligence; EIU; KPMG Corporate and Indirect Tax Survey; A.T. Kearney analysis

In addition, mobile operators contributed significantly to public finances through periodic spectrum licence fees, although this varies by country. By far the largest beneficiary was the Brazilian government, whose public finances received a US\$3 billion boost as a result of its 3G 2100Mhz auction in 2007. Mexican auction of PCS and AWS spectrum in 2010 collected US\$2.5 billion of which US\$ 20 million per MHz per would come in the form of annual payments.

### 5.5 The role of mobiles in developing local industries and driving innovation

The mobile sector plays a key role in stimulating entrepreneurship and competition, particularly amongst small-to-medium enterprises (SMEs), a fragmented space that is difficult to analyse in its entirety, but which warrants attention for contribution to the domestic mobile ecosystem.

The increasing demand for mobile content is creating opportunities for locally based SMEs to service this demand and driving innovation to this end. An example of where local players have set up to provide content and services unique to the LatAm market is Naranya.<sup>41</sup> Naranya provides content including a fantasy football and mobile social dating network and also offers mobile marketing and app development services.

<sup>40</sup> Note: VAT as defined for each country by KPMG's Corporate and Indirect Tax Survey 2010. Regulatory fees only include USF fees from Brazil, Argentina, Colombia, Venezuela, Peru, Dominican Republic, and Nicaragua.

<sup>41</sup> Naranya operates across all the LatAm countries

Another company is Movable, which was created out of the merger of two Brazilian mobile product and services companies. Its Ultramob portal offers games, music, entertainment, and news. Moreover, in November 2010, it announced the introduction of Mozca, the largest platform in LatAm for virtual goods micro-payment via mobile phone.

Other companies are springing up to meet the demand for advisory services. For example, MuniWireless offers business development and advisory services to wireless and other technology companies that want to expand their businesses in LatAm. In addition, international companies are establishing offices in LatAm, providing employment opportunities for the local population. Mobile Streams, a global mobile content retailer has established offices in Argentina, Brazil and Colombia to develop content for the LatAm market. Demand for their content, which includes music, games, sports, news, fashion, and horoscopes, has exploded, with their subscriber base increasing six fold in a year to reach 750,000 in April 2011.

It is evident that the mobile industry is a major contributor to the economic development of LatAm. Beyond its direct contribution, the mobile industry has a powerful spillover effect on other industries within and beyond the mobile ecosystem. It generates significant economic value add to the economy, drives considerable direct and indirect employment, and contributes greatly to public funding, enabling governments to achieve their national development agendas. As governments consider levers to further develop their economies, it will become increasingly important to consider the mobile industry as an enabler of development. Investing in and creating the conditions for greater investment in the mobile industry will drive economic development far beyond its immediate reach.



## 6. Corporate sustainability: The environmental and social impact

### Key Messages:

**The mobile industry is playing an increasing role in mitigating the effects of climate change by reducing CO<sub>2</sub> emissions by:**

- Improving the energy efficiency of its networks, deploying base stations powered by renewable energy, implementing infrastructure sharing and network optimisation, and reducing mobile device lifecycle emissions through recycling and reuse;
- Acting as a catalyst for the reduction of the carbon footprint of other industries through the development of smart solutions;

**The mobile industry has a profound effect on social development in LatAm. Mobiles are being used to provide access to healthcare information, learning opportunities and money services;**

**Mobile operators are leveraging their services and resources to save lives by providing early warning systems for potential natural disasters and enabling effective disaster relief.**

The previous chapter has highlighted the major contribution made by the mobile industry to economic development, job creation and government funding in LatAm countries. This chapter completes the discussion of the mobile industry's contribution by turning to look at its wider social impact.

### 6.1 The environmental impact of the mobile industry

Mitigating climate change is a challenge where consumers, companies, NGOs and governments each have an important role to play. While the mobile industry is not a heavily polluting industry, it is nonetheless taking an increasing role in mitigating the effects of climate change. This is being done in two ways: improving its own energy efficiency and acting as a catalyst to enable reduction of emissions in other industries.

#### Improving the energy efficiency of the mobile industry

The mobile industry has made significant efforts to reduce its carbon emissions in recent years. Mobile operators and their suppliers have launched numerous initiatives to increase energy efficiency and reduce the greenhouse gas emissions resulting from the operation of mobile networks as well as the usage of mobile devices. Improving the industry's energy efficiency is being achieved through efforts in four key areas:

- Reducing the energy required by the network to power base stations
- Deploying base stations powered by renewable energy (e.g. solar)
- Implementing infrastructure optimization and sharing
- Reducing mobile device lifecycle emissions through better design and recycling

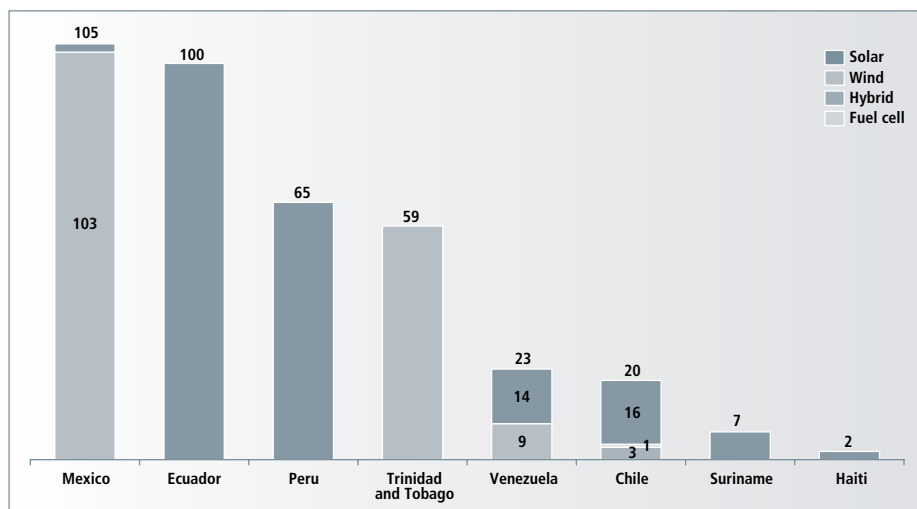
With 86% of a mobile operators' total energy consumed by the network<sup>42</sup> increasing the energy efficiency and consolidating the number of base stations can generate appreciable energy savings. For example, in Panama, America Movil adopted Huawei's Single RAN solution which by using technologies such as high-efficiency power amplifiers, multi-carrier RAN cards, modularization and temperature control reduced power consumption by over 60%. Reducing the energy required by the network can also be achieved by lowering the number of base stations necessary. If regulators make spectrum in lower frequency bands available for mobile broadband the number of base stations required to cover rural areas can be reduced by a third, generating significant energy savings.

<sup>42</sup> "Energy Solutions now enriched with Managed Services", Press Release, Nokia-Siemens Networks, February 7th 2011

With electrification in rural areas limited, renewable-powered base stations can further help operators by reducing their reliance on diesel. The GSMA Green Power for Mobile programme estimated that if all the existing off-grid base stations in developing countries as well as those planned until 2012 used renewable energy sources such as solar, wind or sustainable biofuels, 2.5 billion litres of diesel could be saved each year, and annual carbon emissions could be cut by 6.8m tonnes. In LatAm, GSMA data monitoring the number of “green” base stations deployed shows that Mexico and Ecuador lead the way (see Figure 32).



Figure 31: Number of renewable base stations, by technology



Source: GSMA Green Power Deployments Tracker

Infrastructure optimization and network sharing represent attractive propositions for most operators, as they combine reduction of carbon emissions with substantial cost savings. Nonetheless, implementation is complex and in some countries there are regulatory and anti-trust restrictions. In LatAm network sharing (discussed in more detail later) is still embryonic.

Design and recycling are playing their part in reducing mobile lifecycle emissions. In 2009, Digicel and ZTE teamed up to provide a low-cost solar-powered mobile phone, the Coral 200 Solar, which reduces the need for mains electricity to recharge. Meanwhile leading mobile operators and manufacturers in partnership with the GSMA have committed to implementing a cross industry standard for a Universal Charging Solution for new mobile phones. The standard aims to reduce the use of energy when the device is not connected or when it is fully charged. It will also reduce the need for multiple charger accessories by adopting a single industry wide micro USB interface. It is estimated that the adoption of the Universal Charger will lead to a 50% reduction in standby energy consumption and will eliminate up to 51,000 tons of chargers every year<sup>43</sup>.

Finally, recycling is playing an important role. Initiatives to recycle handsets have been adopted throughout the industry with recycling points in stores for old mobile phones, buy-back campaigns and discounts on “new for old” swaps. At the same time, manufacturers are increasingly using recyclable materials in the manufacture of mobile devices.

<sup>43</sup> GSMA analysis from UNEP, Gartner, European Commission Integrated Product Policy Pilot on Mobile Phones, University of Southern Queensland data

### Enabling emissions reductions in other industries

In addition to reducing its own energy consumption, the industry also acts as a catalyst for the reduction of the carbon footprint of other industries. Indeed the GSMA's 'Mobile's Green Manifesto'<sup>44</sup>, launched in November 2009, demonstrates the key role that mobile communications can play in this respect. The induced reduction in CO2 emissions for other industries has been estimated as equivalent to 5 times that of the telecoms industry.

The use of machine-to-machine (M2M) mobile technologies to deliver 'smart solutions' is one way that mobile can enable carbon reduction in other industries. Smart solutions enabling energy efficiency through the use of mobile technology can be categorized into 4 types:

- Smart logistics solutions including fleet tracking systems and load optimization
- Smart transportation systems including synchronized traffic and notification systems, onboard telematics to encourage eco-driving, congestion management, routing and journey management optimization, and road pricing
- Smart grid and smart meter solutions including electricity network monitoring, and remote utility meter reading
- Smart buildings which use mobile and ICT technologies to deliver highly energy efficient, low-emissions buildings both for new and existing building stock

The market for smart solutions in LatAm is nascent but growing strongly; the market for M2M communications is expected to triple in the next 5 years<sup>45</sup>. In terms of smart logistics, it is estimated that one million vehicles are equipped with GPS fleet management solutions. Brazil and Mexico lead LatAm in smart logistics solutions with circa 60% of the region's fleet managed vehicles<sup>46</sup>.

Brazil is also leading the region in terms of smart grids and metering owing to its smart grid regulatory framework (its plan for smart metering calls for the conversion of all existing meters to smart meters over the next 10 years). Migration to smart grids will bring benefits to both consumers and energy companies: helping Brazilian consumers manage their energy consumption and costs, while reducing the burden of meter reading on energy companies and enabling them to match supply and demand more accurately. Whilst a number of communication technologies are being deployed throughout Brazil's smart meter network, mobile technologies have an important part to play in enabling cost-effective deployment to many Brazilians.

44 Mobile's Green Manifesto, GSMA, November 2009  
 "SMART 2020: Enabling the low carbon economy in the information age",  
 The Climate Group and GeSI, 2008

45 ABI Research

46 C.J. Driscoll & Associates

## 6.2 The social impact of the mobile industry

Mobile phones are playing an increasing role in addressing development issues across LatAm. Mobiles are being used to provide access to health information, learning opportunities and banking services. They are facilitating gender equality, agricultural development, and improving government services.

### Mobile Health

Due to the sparse provision of healthcare in some developing LatAm countries, especially in rural areas, the mobile industry has emerged as a potentially important enabler to extend healthcare services to a larger number of Latin Americans. Across the region, m-health initiatives are taking off; uses include the collection of public health data, aiding drug compliance, and providing remote care services.

Healthcare providers in Peru use mobile devices to provide real time collection and transmission of information on the effects of drugs. Both healthcare workers and patients report that the system leads to much earlier and more complete reporting of adverse effects. This initiative aims to enable more accurate drug prescription and quicker responses to patients experiencing adverse effects.

In Nicaragua, a conditional transfer scheme was trialed to increase drug compliance and reduce the need for daily health monitoring. Patients were offered free minutes in return for carrying out their own tests and sending the result via SMS to the doctor. This led to higher compliance in patients taking their prescribed medicines.

In Brazil, the UN Foundation and Vodafone Foundation are working with local healthcare organisations to analyse the opportunities for m-health programmes to support the delivery of health information and services to indigenous communities far removed from central health clinics and providers.

Project Zumbido, an m-health project for HIV / AIDS patients in Mexico, leveraged the anonymity provided by mobile phones to build virtual support groups (using SMS and group messaging software) for men and women struggling with the social isolation of their disease. Participants of the programme felt particularly empowered and reported greatly improved emotional states and better compliance with their drug regimes. Project Zumbido is a demonstration of how mobile phones can empower women by reducing distances between people in need of community.



A number of LatAm countries are also making use of telemedicine applications as shown in the table below<sup>47</sup>.

Type of medicine	Country	Institutions / Service providers	Stage
Cardiology / Electrocardiography	Colombia	Fundación Cardiovascular de Colombia	Established
	Mexico	Servicios Estatales de Salud y Universidades	Established
	Paraguay	Instituto Nacional de Investigación en Ciencias de la Salud - Universidad Nacional de Asunción	Pilot
	Peru	ITMS Perú (Telemedicina de Perú S.A.)	Established
		Instituto Nacional de Investigación y Capacitación de Telecomunicaciones - Ministerio de Salud	Pilot
Consultation	Panama	Ministerio de Salud	Established
Mammography	Mexico	Servicios Estatales de Salud y Universidades	Established
Patient monitoring	Colombia	Universidad Nacional de Colombia	
Scintillography	Paraguay	Instituto de Investigaciones en Ciencias de la Salud	Pilot
Ultrasonography	Mexico	Servicios Estatales de Salud y Universidades	Established
	Paraguay	Instituto Nacional de Investigación en Ciencias de la Salud - Universidad Nacional de Asunción	Pilot

In addition to providing specific healthcare applications, mobile phones are facilitating access to the growing number of health hotlines in the region. Health hotlines are medical call centres that provide health-related information, advice, referrals and sometimes prescriptions to individual callers over the phone. Healthcare hotlines have been established in Colombia, Mexico, and the Dominican Republic<sup>48</sup>. The service provides quality healthcare (advice and prescription) to the many people who previously had poor access, saving them both time and money. The success of these services can be seen in the number of users - Mexico's Medical Home hotline alone receives 10,000 calls per day.

### **m-Learning**

The mobile industry actively contributes to improving and spreading education in LatAm both by enabling learning through mobile devices and by supporting mobile and internet access in schools.

Across LatAm, Nokia and Telefonica are providing educational content to remote schools delivered via mobile technology. The EducaRed scheme promotes the usage of ICT in education by offering training programs for teachers, parents and children. Active across Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela it has organised on-site educational activities, forums and debates with 32.4m direct participants and its website has over 60m hits each year.

In Mexico, Telcel mobile broadband is supporting educational technology platforms for teachers of primary education. By providing teachers with mobile broadband (through laptops equipped with 3G cards), they can gain access to up-to-date information and e-learning tools for students. To date, 67,500 teachers in Mexico use the service, which is benefitting the intellectual development of children across the country.

<sup>47</sup> World Health Organisation

<sup>48</sup> A Doctor in your pocket: Health Hotlines in Developing Countries, GSMA Development Fund and Signal Point Partners



In Colombia, Tigo has been donating fully equipped computer rooms and providing internet services to educational institutions in economically depressed areas, benefiting over 3,000 children. Meanwhile, at Gabriel Rene Moreno University in Bolivia, where 74% of first year university students fail their maths module, Tigo runs a numeracy programme to help low income university students improve their maths skills. It has equipped 16 institutions with dedicated IT suites and internet connectivity to allow students to use online interactive maths tools.



### **m-Money**

Access to financial services, particularly somewhere safe to save, greatly improves the lives of the lowest income segments of society by increasing their ability to manage day-to-day risk, alleviating the effects of financial shocks and enabling further investment into livelihood. Financial inclusion is a particularly important tool to combat the high inequality and pockets of deep poverty in LatAm.

Within LatAm, there remain significant gaps in the ability of lower income segments to access the financial services they need to manage their lives. In the last five years, progressive financial regulators have aimed to reduce these gaps in financial infrastructure, especially in rural areas, through smaller retail points that facilitate financial transactions on behalf of the bank. As mobile operators have the potential to provide affordable financial services to the poor by leveraging their own distribution networks and existing financial infrastructure, LatAm is now turning towards mobile money as a solution to connect lower income and remote customers to banking services.

Already there are 13 mobile money deployments in LatAm and an estimated 22 new deployments planned for 2012. When considering that almost 70% of the adult population in LatAm does not have a bank account but the average mobile penetration rate is over 100%, it is clear that mobile money represents a significant opportunity for this region LatAm.<sup>49</sup> In fact, America Movil and Citi recently launched "Transfer", a US\$50m joint venture, and MasterCard and Telefonica announced a similar joint venture in 2011 that is to launch in the 12 markets they operate in. Mobile banking has already gained acceptance with an estimated 18 million users in 2010, and is expected to grow strongly to reach 140 million by 2015.<sup>50</sup>

In Paraguay, the two largest operators, Tigo and Personal, have launched mobile money services which are regularly used by over 60,000 people. 'Giros Tigo' focuses on domestic money transfers using an over-the-counter (OTC) model. The sender visits a Tigo agent who will take the funds to be transferred. The recipient of the transfer receives a notification via SMS and can then go to another local Tigo agent to receive the transferred funds using his/her security PIN. Due to the success of the Giros Tigo OTC model in Paraguay, it has been further rolled out in Guatemala and Honduras. Personal's 'Billetera Personal' expands on this approach to allow users to make money transfers, merchant payments and bill payments. It operates over a linked "no-frills" bank account, provided by Personal's partners Banco Atlas and Banco Continental.

In support of these specific initiatives, the GSMA launched the Mobile Money for the Unbanked (MMU) programme in 2009, which aimed at accelerating the provision of money services to those living on less than US\$2 per day. The MMU aides mobile operators in launching mobile money services and seeks to address any major challenges impeding growth of mobile money by contributing best practice knowledge and facilitating the development of mobile money regulation. Supported by a grant from the Bill & Melinda Gates Foundation, the MMU has the goal of reaching 20 million people globally by 2012, ultimately to making mobile money a mainstream business.

49 Mobile Money for the Unbanked, Latin America and Caribbean 2012 Strategy, GSMA, 2011

50 Pyramid Research



### **m-Agriculture**

Mobile phone technology is being deployed in some parts of LatAm to aid economic development in rural areas by providing better information to farmers. The Ministry of Agriculture of Peru launched the “Agromensajes” programme in 2008. This text messaging service provides farm workers with simple and immediate access to product prices from the major agricultural wholesale markets in the Peruvian capital, Lima. The country’s two main mobile operators, Claro and Movistar, have both supported the system such that for the cost of a standard SMS, farmers can request the minimum, maximum and average price for a given product traded in Lima.

It is hoped that this system will better enable farmers to get a fair price for their produce and foster economic development in rural areas.

### **m-Government**

Although not as widely used as in other regions of the world, mobile networks are improving the efficiency of government services in LatAm. Mobile operators help governments by providing them with unified communications. An example of this can be found in Mexico, where the government has outsourced communications services to Telcel. The resulting multi managed service platform integrates fixed and mobile communications, including video and data services, voice mailboxes, instant messaging and conferencing, to ensure operational continuity of services for government officials. It also enables the government to reduce costs whilst retaining network service quality, gain faster access to new technologies, and align their communication services with industry best practices and international standards.

Mobile operators can also help governments improve the safety of their communications services. The Federal District government’s Ministry of Public Security in Mexico uses Telcel’s network to link its Centre of Communications, Computing, Control and Command (C4) to police officers – on foot or on patrol. Data services for all devices, such as handhelds, vehicle trackers, and laptops, are connected through a private data network. This ensures that data services are provided securely and efficiently to police in order to protect and safeguard the public, even in times of crisis when other networks can become congested.

### Protection of children

There are multiple national and regional initiatives in the region to protect children from the online threats. In October 2011, the GSMA, the Dominican Institute of Telecommunications (INDOTEL) and the Dominican's National Commission for Information Society and Knowledge (CNSIC) held a policy debate on the ongoing initiatives surrounding the cyber security of children and adolescents in the Dominican Republic. Similarly, the First Ladies of the America's Initiative for Online Safety (FLIOS), an initiative supported by the non-profit organisation Family Online Safety Institute, is working across the region to make the internet safer for children and their families. FLIOS promotes safe and responsible online use through a combination of tools, rules and schools, and informs governments in their educational, legislative and regulatory policies related to the topic.

Mobile operators are also leveraging their services and resources in the development and protection of their communities and citizens. An example of this is the "Term of Mutual Cooperation Against Paedophilia", which Oi Brazil signed with SaferNet Brazil, government agencies, and other communications agencies. The Term was created to meet the need to increase the effectiveness of tracing the origin of internet connections through which crimes are committed and to engage more entities in actions of education and prevention. To this end, Oi has also adopted several other initiatives, including communicating with customers via the telephone bills of the "Oi Fixo" product and providing information on the website, to alert parents, children and adolescents of the dangers.



### Contribution to safety

Mobile operators across LatAm are also working to highlight the dangers of using mobile phones whilst driving without hands-free accessories. AT&T's "Texting & Driving...It Can Wait" campaign in LatAm is designed to raise public awareness about the risks of operating a mobile device behind the wheel. AT&T has expanded the outreach of their message by creating public service announcements, available on popular websites such as YouTube, offering support to other safety-oriented organizations, and using social networking sites such as Facebook as a platform to reach younger people. In addition, their websites has safety advice and resources that people can use to share with their families and friends.

In Honduras and Bolivia, Tigo has run high profile awareness campaigns about the dangers of phone use on the road. Digicel is raising awareness across its markets by helping drivers to make an informed choice about when, where and how to use their mobile responsibly through a five-point plan.



### Tackling handset theft

With the widespread use of mobiles in public places, and increasingly valuable handsets, users have unfortunately experienced significant levels of theft, sometimes involving the threat of, or actual, assault or death. Mobile operators have taken an active lead to deter theft, by preventing the reuse of stolen mobile phones. In the event of theft, operators will block calls from the account, bar the SIM card and disable the phone. The GSMA maintains a database of the international mobile equipment identity (IMEI) serial numbers for all GSM devices. The GSMA also has facilitated the sharing of stolen IMEIs between operators since 1996 when it established the Central Equipment Identity Register (CEIR), now known as the IMEI Database. This is “blacklist” of IMEIs that have been reported lost or stolen, and which should be denied service on mobile networks. This allows networks to share their individual blacklists of blocked handsets, ensuring that devices blocked by one network will not work on other networks, even if the SIM card has been changed.

Governments are taking additional measures to reduce handset theft rates and to stop the activation of stolen mobile devices. For example, the Colombian government launched a strategy in April 2011 to address the legal, technological and security issues surrounding handset theft. One initiative aims to reform the penal code in order to dissuade the manipulation and reprogramming of stolen devices. At the same time, the Colombian government has signed an agreement with Ecuador to stop the theft cell phones in one country and the activation in another. Colombia is signing similar agreements with Mexico, Brazil and Venezuela and promoted a recent recommendation issued at PCC I of CITEL to create a “Regional Front to Combat Theft of Mobile Terminal Devices” (PCCI Doc 2311, 1 September 2011).

Although bilateral agreements are effective in reducing handset theft rates, the borderless nature of the problem requires regional and international initiatives to effectively curb handset theft and delinquency. Therefore, the GSMA contributed to this discussion working with Colombia and presenting an information document submitted to CITEL<sup>51</sup> in which offers its knowledge and its current tools and available initiatives to tackle the problem. A coherent regional policy is required in markets where handset theft and IMEI reprogramming is an issue to collectively and effectively address these challenges.

GSMA is committed to support the efforts of all stakeholders and can make a positive contribution in the following ways:

- Provide relevant and timely information to encourage increased use of IMEI blocking and the IMEI Database
- Work with network operators to agree and establish stolen handset data sharing rules in the form of a memorandum of understanding to ensure consistency of implementation within and across markets
- Encourage handset manufacturers to continue to innovate in the area of IMEI security and lobby additional handset manufacturers to join the security initiatives
- Monitor and enhance IMEI Database functionality required by members and national authorities to facilitate the international sharing of handset data
- Progress work with various stakeholders on complementary activities to disrupt the black market
- Continue collaborative approach with manufacturers, law enforcement agencies and governments

GSMA is willing to engage and dialogue with regulators, manufacturers and network operators to find solutions to the handset theft problem that can be universally applied. It is important that any measures to combat handset theft must be effective, efficient and cost effective to deploy.

<sup>51</sup> PCCI Document 2405: GSMA Resources and Position to Support Regional Front To Combat The Theft Of Mobile Terminal Equipment, September 2011.

### 6.3 Role of mobile in disasters

Mobile operators and their services have been instrumental in enabling NGOs and governments to provide disaster relief as well as communicating early warning of potential disasters to communities at risk. In addition to aiding the provision of emergency relief (food, shelter, fuel, financial support etc.), mobile operators ensure that communities in affected areas are able to communicate with relatives (and other parties) immediately after natural disasters.

In the wake of the Haitian earthquake, a partnership was formed between mobile operators, the US State Department, Thomson Reuters and NGOs to allow communication between disaster-affected individuals and communities in real time. Within 4 days of the earthquake, Haitians were able to text their location and urgent needs to a specified number for free. Up-to-date, reliable and actionable information was then sent to individuals, wherever they were in Haiti, helping them to reach shelter, aid and loved ones. The service also aggregated information sent by Haitians allowing this information to be made available to agencies, emergency teams and local media. Operators were also involved in the redevelopment of Haiti once the search and rescue phase was over. For example, Digicel appealed to its users to contribute donations via calls and texts.

For at risk countries and regions, operators are involved in providing early warning services. Operating out of the Caribbean, Digicel has teamed up with the Caribbean Disaster Emergency Response Agency to offer support during hurricane season through the facilitation of SMS alerts, tracking maps, donation of phones and airtime, supplies and public safety information. Following floods in the Ecuadorian coastal region in 2008 which killed 60 people and resulted in the loss of 63m hectares of productive land causing economic losses of US\$115m<sup>52</sup>, Telefonica signed an alliance with two institutions involved in monitoring the impact of El Niño to develop an early warning system. This has resulted in the development of a Mobile Information System of Climate Alerts which warns regional inhabitants of climate disasters by using messages sent to their mobile phone. During the Chilean earthquake in February 2010, Entel provided prepaid customers in affected communities with free voice and SMS traffic, free communal mobile phone charging stations, and allowed national long distance calls free of charge from fixed lines. In addition, mobile services were reactivated for customers with unpaid invoices, and a website was created – “Ayuda Chile” – to aid the transfer of news of people from affected zones. Another example is TIM’s contribution to the Rio de Janeiro floods in January 2011. The operator provided BRL 30 free credit to prepaid users as well as it distributed 1,500 prepaid phones in the affected areas. The operator also used its technology to encourage its customers to donations and help the population in the affected areas.

After the earthquake, Entel and other telecommunications companies teamed up with the government and regional authorities to create a Technical Emergency Group. In order to regulate the availability of networks in times of national crisis, the Group proposed government funding to ensure communications are operable in crises and a series of best practices be followed: assurance of natural energy resources to power base stations, fuel reservations at critical points, and a minimum availability of strategic network points along the country.

The initiatives and case studies highlighted in this chapter are far from exhaustive, but they do serve to illustrate the depth and breadth of activities that mobile operators are involved in to support the environment and the societies in which they operate. The cases highlight the commitment that the mobile industry has towards acting responsibly and sustainably. These initiatives also highlight the pivotal role that the mobile industry plays in enabling and facilitating the environmental and social contributions of other industries.



## 7. Regulatory Enablers to Spur Further Growth

### Key Messages:

**Effective regulatory policies in LatAm are critical to drive sustained growth in the industry;**

**Four key regulatory themes have cross-regional relevance in LatAm;**

- **The need for a transparent, predictable and consultative regulatory regime;**
- **Reducing ineffective taxation to drive penetration;**
- **Incentives to drive universal access, rather than universal service obligations/funds;**
- **The importance of a clear roadmap of spectrum allocation particularly in relation to mobile broadband;**

**Regulatory policy in these four areas can be an influential means to benefit consumers, reduce prices and generate industry value.**

There is no questioning the importance of the role that regulators play in the communications sector, and the impact that their actions have on all market participants and customers.

There are several examples of regulatory policies playing a pivotal enabling role in driving regulatory goals of coverage, affordability and quality in mobile communications, with all the positive economic and social benefits that this brings to a country. However, there is always more to do. Forward-thinking regulators who view the mobile industry as a fundamental driver of the economy and society can positively drive growth and draw further investment by enacting progressive policies.

This chapter will focus on regulatory policy issues that have relevance across LatAm and discuss how governments and regulators can create an environment that allows the mobile industry to further innovate and create value for consumers.

### 7.1 The need for transparent, predictable, consultative and aligned regulatory regimes

A chief concern of operators is the need for a more transparent, predictable and consultative regulatory regime. Issues cited include a lack of transparency in decision making, unfair practices that favour certain companies or technologies, opaque foreign ownership rules, unclear (or a lack of) industry development plans, and the inability to enact or enforce contracts.

To attract both national and foreign investment, regulatory regimes must be transparent and predictable. Decisions made by regulatory bodies can potentially change the business case for long-term investment at short notice. Currently, mobile operators are considering investing significant funds into LTE licenses and infrastructure. In deciding where and how much to invest, the level of transparency and predictability in the regulatory regime are clearly important decision criteria.

There needs to be a lot of care and attention when designing regional and national policies for telecommunication markets. Certain policies are not conducive to a flourishing mobile market: overregulation, inefficient political frameworks, poor educational and research systems, and low priority given to ICT on government agendas. Focussed attention to improving these areas would help improve the overall ICT environment that mobile companies operate in.

The stability and consultative nature of the political and regulatory environment is also important for the mobile industry. First, the lack of consistency, transparency and industry inclusion in regulator decisions can reduce the level of trust and confidence among stakeholders. Second, uncertainty in the regulatory regime and lack of a clear long-term path for the industry's development increases the risk profile and worsens the overall investment climate. Third, opaque and ineffective legal practices and processes make it difficult to enforce business contracts, with the risk ultimately being transferred to consumers. All of these factors reduce industry investment, stifle competition and constrain affordable access for consumers.



In order to ensure a thriving telecoms sector, policy makers should adopt the following principles and practices:

- Major regulatory decisions (such as spectrum issuance and licensing frameworks) should be made in a transparent, inclusive and consultative process drawing inputs and feedback from all industry stakeholders;
- Regulatory policy should be based on sound and efficient laws that enable timely contract enforcement, adequate appeal processes and effective implementation procedures;
- Regulatory frameworks should be clear and long-term in nature as well as neutral from both a technology standpoint and a company standpoint (e.g. incumbents vs. new entrants);
- Specified procedures for base station permits that align at a national and municipal level in order to facilitate the development of infrastructure.



The regulatory regime should also take into account the regional and indeed international telecommunications agenda. CEPAL, the economic commission for LatAm, recently proposed a region-wide definition for broadband consisting of 3 parameters: minimum download and upload speeds, and the assurance of a permanent connection for the user. At the same time, ANATEL (the Brazilian regulator) has set quality standards for fixed and mobile broadband that require a certain proportion of measured connections to adhere to contracted speeds. These policies are not necessarily in line with one another and are likely to cause confusion for the industry and consumers alike. Moving forward, it is critical that policies at a municipal, national and regional level are aligned and also conform to international best practice.

## 7.2 Reducing ineffective taxation to drive penetration

Although mobile telecommunications are providing an important engine for economic growth, further stimulation will require further liberalisation and reform to telecoms taxation policies in many countries in LatAm.

The global economic downturn resulted in an overall decline in tax revenues, creating a challenge for governments. There is a temptation to impose disproportionately high taxes on the mobile sector. However, mobile operators already face a number of charges such as licence fees, spectrum usage charges, service taxes, and universal service fees. In addition, a number of countries also apply mobile specific charges that directly impact end customers e.g. specific excise duties (“luxury taxes”) on mobile handsets/ devices, taxes on mobile usage/airtime, taxes on ICT equipment, SIM activation charges and surtaxes on international incoming traffic – to name but a few.

Brazil is a good example of a heavy taxation system. Brazil’s telecommunication taxation policies are both complex and punitive. Taxes include VAT (set by states, and as it is calculated on revenues, it ranges from 22-54% of internationally understood VAT<sup>53</sup>), social integration tax (PIS, 0.65%), contribution for the financing of social security (Cofins, 3%), universal service contribution (1%), contribution to the technology fund (0.5%), Fistel tax (Telecommunications Inspection Fund where operators have to pay BRL 26.83 per mobile line activated and BRL 13.42 per subscription per line in service), FTI (Installation Inspection Tax), and TFF (Functioning Inspection Tax).<sup>54</sup> As a result, for every dollar a consumer pays for telecommunications services, 65 cents goes to the government.<sup>55</sup>

In the last years, taxes have been increased for some mobile services – for example, in Mexico (4%, known as IEPS), or additional rates on VAT have been imposed to support other sectors of the economy – for example, the additional 4-percentage points in VAT in Colombia that mobile users pay to support Pan-American Olympic Games participation (a similar one of 1% is charged in Argentina).

<sup>53</sup> The mobile taxation system in Brazil is very complex and unusually high. The basic structure comprises an internal VAT (ICMS), which is calculated over revenues and is set by the states. It ranges from 18% to 35%, and thus, is equivalent to 22% to 54% of an internationally understood VAT. Source: The impact of taxation on the development of the mobile broadband sector, GSMA and the Telecom Advisory Services, LLC

<sup>54</sup> The Impact of Taxation on the Development of the Mobile Broadband Sector by R. Katz, J. Mariscal and E. Flores-Roux (Telecom Advisory Services – TAS), 2010

<sup>55</sup> R. Katz, J. Mariscal and E. Flores-Roux op. cit, 2010



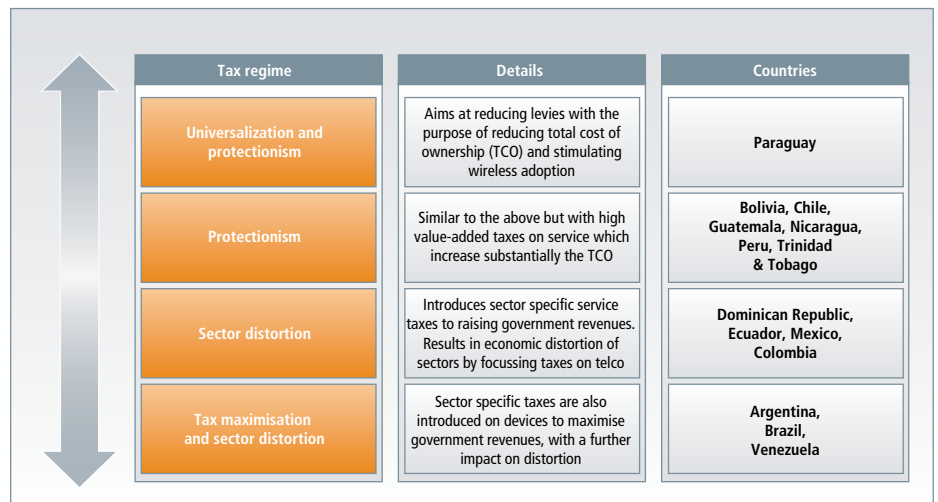
Telecom specific taxes raise barriers to adoption by driving end-user prices upwards and thus negatively impacting affordability. As a result, taxes can push mobile access beyond the reach of the low-income and marginalised segments of society who often need mobile access the most. Future growth in mobile services will likely come from segments such as these (many of which are in rural areas). However, the cost of providing services is higher in these cases and the per capita income is significantly lower than the national average. Taxation reform could act as a driver to improving the accessibility of mobile services to all parts of society by lowering prices and breaking down barriers to adoption.

The costs, and therefore end-user prices, associated with mobile broadband (in particular spectrum license fees and network roll outs) are typically more expensive than those associated with voice services. As a result, the impact of additional tax burdens has an even greater effect on mobile broadband penetration levels. It is therefore necessary to ensure coherence between a government’s commitment to bridging the digital divide to tap the economic and social benefits of mobile broadband,<sup>56</sup> and its taxation policies. For example, several studies have shown that a 10% increase in broadband penetration could lead to a 1.3% increase in GDP, which translates to a 1.5% increase in a country’s labour productivity.

A report commissioned by the GSMA into the impact of taxation<sup>57</sup> assessed the taxation strategies employed by countries across the world in relation to mobile and mobile broadband. The report (summarised below in Figure 33) found that a mixture of strategies are being employed across LatAm: from strategies aimed at reducing levies with the purpose of reducing TCO (total cost of ownership) and stimulating wireless adoption, to the introduction of sector specific taxes to maximise government revenues. Paraguay’s taxation policy came out particularly well in the analysis with its focus on reducing levies to reduce TCO and stimulate wireless adoption. Some of the largest developing countries in LatAm such as Brazil (highlighted earlier), Argentina and Venezuela all currently adopt revenue maximisation approaches.

The GSMA encourages countries with sector distorting, tax maximisation policies to re-examine their approaches to ensure the progress of overarching ICT goals are not hampered. If taxation policies are not revised, there is a danger that universal service adoption and other ICT goals will not be achievable.

**Figure 32: LatAm taxation approach by country**



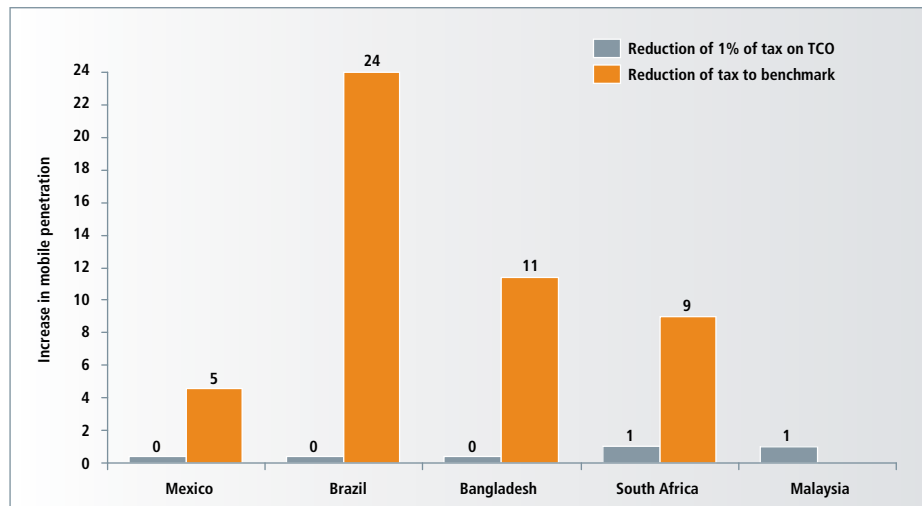
Source: GSMA: The impact of taxation on the development of mobile broadband

<sup>56</sup> Qiang, 2009, highlighted that a 10% increase in broadband penetration can boost GDP by 1.3% and translates into a 1.5% increase in a country’s labour productivity.

<sup>57</sup> R. Katz, J. Mariscal and E. Flores-Roux op. cit, 2010

At the same time, the report highlights the significant benefits that can be achieved by changing mobile taxation policies. Its analysis into the impact of lowering taxation to a benchmark level provides reassurance that any loss in taxation revenues would be minimal and more than offset by the net positive effect of increased mobile penetration. In LatAm, Brazil and Mexico’s taxation approaches were analysed and it was shown that if taxation were reduced to the benchmark level, penetration rates could be increased by 24% and 5% respectively. Moreover, the study indicates that for every dollar reduced in taxes, additional GDP of between US\$1.4 to \$12.6 would be generated, and the loss foregone on taxes would be partially if not fully compensated for by the taxes collected on an increased level of GDP.

**Figure 33: Estimated % change in mobile broadband penetration from changes in taxation levels<sup>58</sup>**



Source: GSMA: The Impact of Taxation on the Development of the Mobile Broadband Sector

<sup>58</sup> Malaysia assumed to be benchmark at 6.1%. Globally, 17.4% of mobile TCO is from consumer and import taxes

### 7.3 Incentives to drive universal access

Universal Access/Service regimes have a commendable agenda; to spread access of communications to all citizens. This is a vision shared across governments, regulators and citizens as well as mobile operators and the wider mobile ecosystem. However, the means to achieve these goals is often disputed.

Across LatAm regulators have introduced Universal Service Funds (USFs) in order to subsidise increased access. USFs typically work on a 'pay or play' model where levies are collected from operators (mostly as a percentage of adjusted gross revenue) and, in theory, redistributed as one-time subsidies in auctions to interested operators to fulfil the 'financial gap' required to make network rollouts commercially viable. At least 13 countries in LatAm currently have USF levies in place. Colombia's, at 5%, is amongst the highest in the world.

**Figure 34: Selection of USF operator levies in LatAm**

Country	Operator levy
Argentina	1% of gross revenue or proof installing service in under served areas
Bolivia	Spectrum user & frequency allocation fees, fines, proceeds from tenders
Brazil	1% gross operational revenues
Colombia	5% gross revenues
Dominican Republic	2% of levy on users telephone and cable TV bills
Ecuador	1% on fixed line operators
Guatemala	Transfer from gov and 70% amount from spectrum auctions in 2003
Jamaica	USD 0.02 levy on all incoming international traffic terminating in a mobile network
Nicaragua	2% revenues
Paraguay	20% operators corporate taxes
Peru	1% gross revenues
Venezuela	1% revenues

USF = Universal Service Fund  
Source: INTELECON UASF Funds 2009 update

The benefit of these funds is often limited for several reasons. First, according to a 2007 study commissioned by the GSMA which reviewed USFs in 15 developing countries, most of the monies (74%) that had been collected had not been distributed. This implies that either levies are higher than required or that an effective funds distribution strategy does not exist.

Second, there are issues around disbursement strategy. The study highlighted that funds were being unfairly distributed to fixed-line operators rather than mobile operators. Mobile operators, although having contributed approximately one third of USF monies, had received less than 5% of the distributed funds. Worse still, in the USA, the Federal Communications Commission estimated that 23% of funds paid out in 2007/8 were paid out erroneously.

Third, universal funds can be eaten up by overheads. The Technology Policy institute analysed the performance of the universal service program in the USA from 1998-2008 and found that for each dollar distributed to recipient firms, 59% went on general and administrative expenses. The GSMA believes that this phenomenon also applies to multiple LatAm countries.

To improve the impact of USF's, governments and regulators should employ best practices, especially when dealing with funds that have not yet been distributed. Governments and regulators are urged to consider the following:

- USFs should have clear goals, targets, timelines and processes for both the collection and distribution of funds to ensure transparency and ease of measurement;
- USFs should be independently audited and the results of the audit published;
- USFs should be reviewed on a regular basis and should be removed upon the achievement of the original goals;
- Funds collected should be distributed in an open and consultative process involving all industry stakeholders;
- USF allocation policy should be on a least-cost technology basis that drives the highest population connectivity at the lowest cost;
- USFs should be spent on infrastructure that could be shared among multiple players (such as towers and backhaul) to achieve greater efficiency of funds.



It is key to increase transparency on USF policy. It would be very useful if precise details of what has been delivered or what level of coverage has been provided should be published in paper and on-line so that the fund administrators and users of the fund can be held publicly accountable. By doing this, the public would be able to verify whether or not what is claimed to have been done with the fund has actually been done.

Whilst Universal Access is an ICT goal that should be pursued, USFs (especially when poorly managed) may not be the best way to achieve this. Regulatory stakeholders can positively influence mobile and fixed line access by other, equally impactful measures such as reducing telecom-specific taxes (as previously mentioned) or introducing innovative licensing frameworks with attached coverage requirements for undeserved areas to new coveted spectrum/licenses issuing – a policy carried out successfully in the Philippines.



#### 7.4 Limitations to expanding infrastructure and sharing

Although few deals have been signed as of late 2011, demand for network sharing arrangements across LatAm is growing. This growth is driven by the need for operators to reduce the high costs of rolling out and operating networks, especially when rolling out to more isolated areas, making it possible to lower subscriber prices.

There are several types of network sharing possibilities, from network sharing via national roaming agreements to infrastructure sharing for different parts of the network (e.g. RAN, base stations) and passive sharing (e.g. where base station sites are shared). Some of the LatAm markets have been working on network sharing agreements, for example LIME and Claro signed a deal to share base stations across Jamaica in 2009, the long-term contract required each company to provide a matching number of cell towers across the island allowing them both to expand their coverage and reduce environmental impact. Network sharing is also being considered in Brazil. In 2009, it was reported that Oi and Claro were examining options to share network infrastructure to allow them to increase their coverage. Moreover, network sharing can be interesting as establishing network coverage from scratch and reaching currently unconnected rural areas would require vast investments in network infrastructure and costs. As an example, Wireless Intelligence estimated initial investment for Vivendi's potential entry to the Brazilian market, without network sharing, to be US\$2.0 billion to US\$2.7 billion<sup>59</sup>, including spectrum and build out.<sup>60</sup> Network sharing agreements can give operators the opportunity to optimise costs although for some types of network sharing some capacity constraints might prevent this. According to the GSMA, passive network sharing can provide cost savings of up to 50%.<sup>61</sup>

Managed service deals, another way of reducing the cost of mobile infrastructure, are still in their infancy. However, Nokia-Siemens Networks signed a deal with NII Holdings (which operates as Nextel in LatAm) to manage its networks across Argentina, Brazil, Chile, Mexico and Peru. Under the agreement, Nokia-Siemens Networks takes responsibility for day-to-day services, provisioning and maintenance whilst NII maintains full ownership and continues to make key decisions related to strategy, investment, technology and vendor selections.

In LatAm there is an infrastructure deficit, in part due to network roll-out delays from difficulties in obtaining permits. To facilitate the development of infrastructure, regulators are encouraged to define the procedures required for base station permits and ensure these align at a national and municipal level. For instance, Argentinean regulator, SECOM, took an interesting approach in 2009 promoting municipalities to sign an agreement of "Good Practices for Antennas Installation" so as to align requirements. Finally, the GSMA encourages regulators remove any regulatory constraints and ensure different models of network sharing can co-exist in the region.

59 1€=1.3525

60 Wireless Intelligence, "Brazil's big four operators prepare for fresh competition", March 2010

61 GSMA internal research

### 7.5 Importance of a clear roadmap for spectrum allocation

Spectrum management is one of the most important issues for the mobile industry globally. Spectrum is a valuable and limited social 'asset' - a scarce natural resource – that governments control and need to best utilise to maximise economic and social benefits for their citizens. As previous chapters have shown, mobile technologies are the primary source of communication for much of the population in LatAm and mobile broadband is expected to be the critical technology to bridge the digital divide and connect the unconnected. However, for ubiquitous and seamless mobile communication and broadband to flourish, it is important that governments and regulators lay out clear roadmaps for making spectrum available to mobile operators. In doing this they need to consider their impact on the mobile industry's ability to deliver affordable and high-quality access. This can be achieved by considering 5 key factors: access to the right frequency bands, access to sufficient spectrum, sufficient spectrum allocation per operator, spectrum award procedures and spectrum pricing.

#### Access to the right frequency bands

The type of spectrum released, or the frequency band where the spectrum is allocated, greatly affects mobile operators' ability to achieve population coverage in a cost-effective manner – particularly in rural areas.

Considered selection of the right bands to be released will help to drive universal access to mobile broadband. Of particular importance for mobile broadband services is having a clear plan of what to do with the digital dividend, the spectrum currently used for analogue television (698-806MHz). The switch-off of analogue services will allow rearrangement of the UHF band (which stretches from 470-862 MHz) and partial reallocation to mobile operators. If spectrum from the digital dividend is used for mobile broadband it would allow greater coverage of rural and low population density areas at significantly lower costs.

The capital investment required to deploy mobile services in the 700 MHz band is 70% less than that of the 2100 MHz band (used for UMTS).<sup>62</sup> This is because the propagation characteristics of the UHF band enable signals from a base station to travel around ten kilometres, compared to the AWS band's five kilometre radius. As operators using the 700 MHz band need to build fewer base stations to achieve the same coverage, deployment costs for mobile broadband can be reduced by up to 30% – especially in less populated (rural) areas. A different approach is needed for densely populated areas which, with their high levels of traffic, would need bands such as 2.5-2.69 GHz and 1.7/2.1 GHz (AWS) where they can have wider contiguous blocks of spectrum and therefore achieve greater capacity.

Higher bands are better-suited to providing the capacity necessary to meet demand for high-data rates from large numbers of users in urban areas, airports and other heavily-visited locations. The efficient operation of the latest wireless technologies, such as LTE and WiMAX, identified by the ITU as IMT-Advanced, requires significantly larger spectrum channels than the preceding (3G or IMT) wireless systems. Unlike their predecessors, these advanced technologies use an Orthogonal Frequency Division Multiple Access (OFDMA) radio interface that requires larger and contiguous blocks of spectrum to be able to operate efficiently.





Users are demanding anytime, anywhere access to broadband multimedia services. In such areas, LTE, with its ability to leverage wider bandwidths, can be employed to significantly increase data capacity, effectively augmenting existing 3G networks. LTE's OFDMA technology excels in leveraging wider bandwidths to provide very high data rates and thereby an excellent user experience, making it best suited for new spectrum with bandwidth of 10 MHz or more. With a wide channel, a licensee can offer high-quality mobile broadband services, and be able to take full advantage of future enhancements to LTE technology, while gaining even greater spectral efficiency. LTE supports bandwidths up to 20 MHz as well as both frequency division duplex (FDD) and time division duplex (TDD) modes, allowing operators to utilize all available spectrum resources.

A GSMA study of LatAm countries assessed the economic impact of allocating the 700 MHz band (the digital dividend) to mobile broadband versus keeping it for broadcasting purposes.<sup>63</sup> It was estimated that the economic contribution to the LatAm economies of the mobile industry in deploying services within the new band would be US\$14.8 billion, taking into account the cost of acquisition of spectrum, new productive assets (base station sites, etc.), operational services (such as maintenance and repairs, distribution, logistics), and commercial services (advertising, commercial systems integration). In addition to this, the on-going economic and social benefits to the region were estimated to be over three times greater than if the digital dividend spectrum was retained for broadcasting. This included contribution to GDP of US\$3.6 billion, direct and indirect job creation worth US\$5.2 billion, tax collection of US\$3.4 billion, and consumer surplus of US\$5.2 billion.

Regulators should also make sure that they look at the regional and global picture when considering spectrum allocation. Harmonization is a key factor in promoting adoption and can bring other benefits such as cost effective roll-out of networks and devices, a reduction in cross-border interference and ease of international roaming. There are significant economies of scale in the production of radio equipment and devices as harmonisation of technical specifications can result in up to a 50% reduction in the cost of terminal manufacturing.<sup>64</sup> If harmonization is not achieved it could have adverse effects on the technical and economic efficiency of any rollout.

<sup>63</sup> Economic Benefits of the Digital Dividend in Latin America, Dr. Raul Katz and Dr. Ernesto Flores-Roux, Telecom Advisory Services, September 2011.

<sup>64</sup> [http://www.gsmworld.com/our-work/public-policy/spectrum/digital-dividend/frequency\\_harmonisation.htm](http://www.gsmworld.com/our-work/public-policy/spectrum/digital-dividend/frequency_harmonisation.htm)



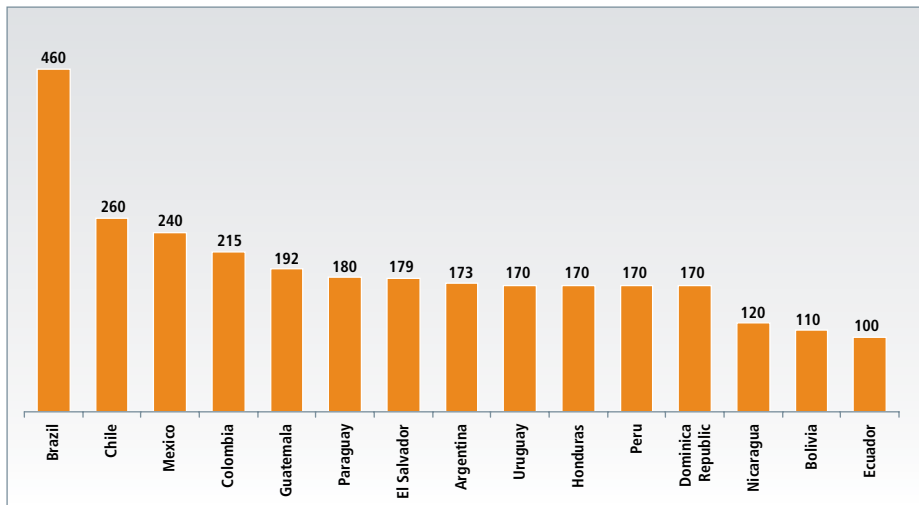
**Access to sufficient bandwidth (amount of spectrum)**

The amount of spectrum (bandwidth) released determines mobile operators’ ability to deliver high quality services to consumers and manage the bandwidth required to handle increasing mobile data traffic volumes.

Compared with Europe and America, less spectrum has been released to mobile in LatAm. In many countries, including 3 of the 4 largest mobile markets (Mexico, Argentina and Colombia) less than 250 MHz of spectrum has been released to mobile. Only in Chile and Brazil has more than 400 MHz been released. In Ecuador only 100 MHz of spectrum is licensed for mobile services, a figure which has remained unchanged for the last 5 years while the number of subscribers has doubled.

Licensing of sufficient spectrum is particularly important in LatAm as mobile broadband services will have to play a large role in connecting society due to inadequate fixed line infrastructure.<sup>65</sup> Greater capacity and spectrum is needed for mobile broadband because the attractiveness of applications, access to information and on-demand services along with the number of connections growing daily means data traffic is doubling every year. Unless substantial additional spectrum is allocated for the deployment of new mobile broadband networks, mobile broadband services could be inhibited as networks will face growing congestion.

**Figure 35: Spectrum licensed per country in LatAm, MHz**

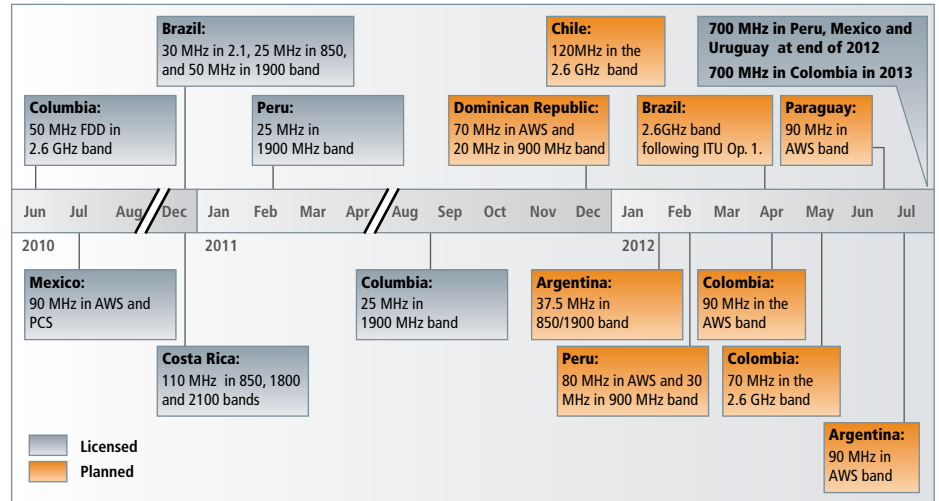


Source: GSMA

Regulators have realised this and are increasingly allocating more spectrum in order to meet the demand for mobile broadband. Across LatAm, around 300 MHz of spectrum was licensed at country level in 2010 and it is expected that around 600 MHz will be licensed in 2011 and 2012.

<sup>65</sup> Spectrum for Mobile Broadband in the Americas: Policy Issues for Growth and Competition, Dr Martyn Roetter on behalf of the GSMA, January 2011

Figure 37: LatAm spectrum plans



Source: GSMA

Considered decisions regarding the use of digital dividend spectrum are vital. Widespread economic and social benefits can be generated from mobile broadband, which are significantly greater if this 700MHz spectrum is allocated for other uses like TV broadcasting.<sup>66</sup> Due to its propagation characteristics (greater than any of current bands in use) and its relative availability in the region (the band is mostly underutilised), this spectrum would be a key resource for governments. Meeting the ambitious targets detailed in national broadband plans requires access to spectrum under 1GHz, and the 700MHz in Latin America would be key for democratising the universalization of broadband, reaching the rural areas and connecting the ones still unconnected.

It is important to highlight that in Latin America's analogue to digital transition of TV services in most country cases is an issue that should be detached of national digital TV implementation plans that have very long term analogue switch over dates. Because the 700MHz is almost free in most of the countries of the region, there is really a need to make key decisions now about its allocation, without waiting analogue switch over, in order to put this spectrum to produce all the benefits it can bring to society and national economies.

66 See TAS study on "Economic and Social Benefits of the Digital Dividend in Latin America", September 2011 available at [www.gsmala.com](http://www.gsmala.com)

### Spectrum caps: the question of bandwidth per operator

Many regulators in LatAm advocate spectrum caps as a means to implement competition policy in mobile markets. The use of caps is usually controversial and it is key to think about them balancing the objectives of ensuring competition and enabling large operators to improve network speed and capacity for the benefit of their users. In addition, if spectrum caps are to be defined, they should be set according to the total mobile spectrum on offer, considering current and future technology availability, and expected customer demand.

For example, for LTE, consumers can experience mobile broadband internet speeds that are up to four times faster if operators deploy in a 20 MHz carrier instead of a 10 MHz carrier, which requires 2x20 MHz of contiguous bandwidth. Regulators across Europe are ensuring operators gain access to contiguous bandwidth for the rollout of their LTE networks. In Germany, the spectrum auction in 2010 placed a 20 MHz cap on the 800 MHz band, but no cap on the 2.6 GHz band. Similarly, the 2007 Norwegian 2.6 GHz band auction implemented a cap of 90 MHz per bidder, and the 2010 Danish 2.6 GHz band auction cap was set to 65 MHz per bidder.

A study by Arthur D. Little has highlighted a number of risks with spectrum caps, in particular in relation to mobile broadband.<sup>67</sup> The study evaluates how the ability of operators to deploy new services can be impaired if they are subject to rigid caps. These might not allow them to acquire sufficient spectrum to exploit the efficiencies of new technologies and offer a wide portfolio of services to their customers. This was the case in Chile when its regulator SUBTEL (now SUBTED) conducted its 3G spectrum beauty contest of the 1.7 / 2.1 GHz AWS band in July 2009 using a 60 MHz cap. The contest included three 30 MHz blocks which, due to imposed caps, the incumbent operators Entel, Movistar and Claro were unable to bid for this and the band all went to new entrants.

There are several spectrum licensing cases in the region in which the establishment of very stringent caps ended up with blocks un awarded because incumbent operators were impeded to bid. This was the case Mexican auction of the 1.7/2.1GHz AWS band in 2010, where a 80MHz cap was applied for all spectrum holdings didn't allow incumbents to buy any of the two national blocks of 2x15MHz available and one ended up un awarded. If the cap would have been fixed at 90MHz there would actually have been more competition in all the bidding for this band, and the entire spectrum available would be put to use for the benefit of consumers. The radio spectrum is a renewable resource, so if it is un-used (or under-utilised) really brings no (very limited) benefits to society in general, government or companies willing to invest.

Spectrum caps could also result in an increase in operators beyond an economically sustainable number. This could cause in weaker operators either launching networks late or not at all, effectively tying up spectrum that other operators could better utilise to serve the national population. Very restrictive spectrum caps increases spectrum scarcity in an artificial way that ends up affecting normal service provision and development plans (i.e. investments) of existing operators. If applied, caps needs to be flexible and tailored to current industry conditions and growth prospects rather than applying an across-the-board cap that may affect some carriers more than others.



<sup>67</sup> Mobile broadband, competition and spectrum caps, prepared by Arthur D. Little for the GSMA, January 2009



Regulators across the world are not only assessing market competitiveness based on the number of players, but are taking a more complex approach that looks at the technology pipeline and implications to end-users. To this end, there is increasing recognition that spectrum caps cannot be set as a static instrument for promoting competition, but rather reassessed or removed in line with market dynamics.<sup>68</sup> Instead of spectrum caps, there are a number of alternative measures which have proved successful in some markets in addressing legitimate competition concerns and achieving universal service goals. One such measure is increasing the technology and service neutrality of spectrum use to allow operators more flexibility in the services they offer. Other practices employed to stimulate and sustain competition are promoting spectrum trading and more traditional measures, such as issuance of new licences, rollout or coverage obligations.

### Spectrum award procedures

Governments should design and implement spectrum award procedures in an efficient and transparent manner to keep participant costs low and deliver economic benefits as quickly as possible. A lack of clarity around spectrum award procedures can send mixed and even negative signals about the investment climate in a country.

Government policies should aim to develop a technology neutral environment, while ensuring interference is managed and allowing the deployment of internationally harmonised spectrum band allocations. To facilitate innovation and a smooth technology development curve, governments should relax restrictions on the specific technology deployed. Allowing operators to follow a natural upgrade path ensures that they will deploy the most cost-effective and spectrally-efficient solutions.

Investments in the mobile industry have long lead times and thus require a high level of certainty. Governments can promote investment by clarifying the regulatory framework, the future spectrum availability, key technical and operational terms and conditions, as well as by publicly committing to international harmonised band plans. The GSMA defines the stages of awarding spectrum around four dimensions:

- Deciding objectives: several parameters need to be considered when deciding the objectives of an auction, such as maximizing revenue collection vs. an economically efficient outcome, promoting competition, technology flexibility upgrades and innovation, relevance of geographic coverage obligations vs. promoting coverage via a favourable regulatory framework;
- Defining what to sell: designing licenses according to the economics, technological pipeline and legal system of the country in question. Licenses should focus on defining the spectral, geographic, time, and technical dimension to ensure certainty and predictability for operators partaking in the auctions;
- Designing the award procedure: fairness is important and implementing policies that aim to give one player the advantage of going to market well before the others should obviously be avoided if the aim is to create a level playing field for competition;
- Implementing and executing the award: preparing for spectrum awards and implementing and accomplishing award procedures should be carried out transparently, and preparations should include public consultations with all relevant stakeholders. This is especially important where demand for bandwidth exceeds supply.

<sup>68</sup> Reassessment of spectrum caps can be prompted by new releases of spectrum for mobile by governments, technological developments that require increased and contiguous bandwidth, technology standardization and other technological requirements that require new licenses to be issued in accordance with international technical harmonization guideline and more technology neutral regulations.

The amounts and distributions of spectrum by band have a significant impact on the costs and capabilities of mobile broadband networks. Operators and regulators in the Americas should ensure coordination of spectrum planning and optimization across multiple available bands, both existing and new, taking account of each operator's individual circumstances and goals.<sup>69</sup> National regulators are encouraged to publish a spectrum roadmap outlining the timing and availability of spectrum and critical terms and conditions to help operators plan their network investments and to better understand the demand and supply of spectrum in the country.

### Spectrum pricing

The demand for, and limited supply of spectrum may sometimes tempt governments to drive spectrum prices high under the guise of maximising a public good. However, care needs to be taken in adopting this strategy. Reducing supply and driving up the price per MHz for spectrum can have a negative impact. Governments can find themselves eroding their net licence fees if they restrict the amount of bandwidth released, even though the price per MHz is kept high. More importantly, the value of spectrum to society should not be measured solely in terms of fees per MHz because its real value comes from the economic welfare improvements that stem from using the available spectrum to deliver mobile services. As operators must need to treat the price of spectrum as a recoverable cost in their business cases, high spectrum prices will ultimately be passed onto consumers. This could inhibit penetration and country growth and the real value derived from the spectrum.

In short, the spectrum policies that governments and regional regulators undertake should ensure that:<sup>70</sup>

- Delay to spectrum assignments is minimised;
- Spectrum is harmonised across the region (especially the digital dividend) to exploit economies of scale in equipment and devices;
- Competition in spectrum award procedures is encouraged, as is competition in the wider market;
- Spectrum planning is clear-cut, and is optimised across multiple available bands.

LatAm regulatory authorities and policy makers have tremendous influence on the effectiveness and profile of investment and long-term development of the mobile industry. The quality of institutions and regulations, the skill set of the population, and the physical infrastructure of the country are crucial to the success of mobile services. With adequate economic and ICT policies in place, governments can take advantage of mobile services for development purposes, such as helping countries realise productivity gains from the mobile industry. To accomplish this, regulators need to carefully balance the potential short term objectives of regulation with those of longer-term growth as they reach key decisions, for instance on spectrum allocation. The mobile industry is committed to a constructive dialogue with regulatory stakeholders to ensure that mobile services continue grow and act as an enabler for development in the wider economy.

69 Dr Martyn Roetter, op. cit. 2011.

70 Dr Martyn Roetter, op. cit. 2011.

## 8. Glossary

Acronym	Description
3G	3rd Generation Mobile Telecommunications
4G	4th Generation Mobile Telecommunications
ADSL	Asymmetric Digital Subscriber Line, a digital data transmission technology
ARPU	Average Revenue per User
AWS	Advanced Wireless Services, a spectrum band used for mobile phones
CAGR	Compound Annual Growth Rate
CDMA	Code Division Multiple Access, a channel access method
CDMA2000	A "third generation" extension of CDMAOne
CDMAOne	A digital cellular standard based on CDMA
DSL	Digital subscriber line, a digital data transmission technology
EBITDA	Earnings Before Interest, Tax, Depreciation and Amortisation
EV-DO	Evolution-Data Optimized, a wireless telecom standard
GDP	Gross Domestic Product
GSM	Global System for Mobile Communications, second generation standard for networks
HSPA	High Speed Packet Access, a mobile broadband technology
ICT	Information and Communications Technologies
IDB	Inter-American Development Bank
iDEN	Integrated Digital Enhanced Network, a mobile telecommunications technology
ISP	Internet Service Provider
LTE	Long Term Evolution, "4th generation" standard for wireless communications technology
M2M	Machine-to-Machine transmission
MBRI	Mobile Broadband Readiness Index
MMS	Multimedia Messaging Service
MNO	Mobile Network Operator
MPLS	Multiprotocol Label Switching, a high-performance network mechanism
MVNO	Mobile Virtual Network Operator
NGO	Non-Governmental Organisation
NNI	Network-to-Network Interface
SME	Small and Medium-sized Enterprises
TCO	Total Cost of Ownership
TDMA	Time Division Multiple Access, a channel access method
UHF	Ultra High Frequency
UMTS	Third generation mobile cellular technology
USF	Universal Service Fund
VAT	Value Added Tax
W-CDMA	Wideband Code Division Multiple Access, a "third generation" telecommunications standard

## 9. Appendix: Mobile Broadband Readiness Index Methodology

### 9.1 Summary of Metrics Used<sup>71</sup>

	Weight	Pillar	Sub-Weight	Metrics
1	65%	Mobile Environment	15%	Mobile penetration
2			10%	Smartphone penetration
3			15%	Mobile broadband penetration
4			15%	3G population coverage
5			10%	Maximum access speed
6	10%	E-Readiness	5%	Fixed line broadband penetration
7			5%	Internet domains by country
8	5%	Market Profile	5%	Market competitiveness (HHI)
9	10%	Business Environment	7%	Regulatory environment
10			3%	Conditions for business - entrepreneurship
11	10%	Technology Environment	4%	Innovation environment
12			3%	Business use of internet
13			3%	Government effective use of ICT

### 9.2 Scoring Methodology

Scoring for each the metrics was determined by using linear proportionality where the maximum value for any given metric gets a score of '100', the minimum value gets a score of '0', and all remaining values are scored linearly relative to the maximum and minimum scores.

### 9.3 Index Scores by Metric

Country	Overall Ranking			
	2010 Ranking	2008 Ranking	2010 Score	2008 Score
Chile	1	2	78.58	70.33
Argentina	2	3	67.40	60.33
Brazil	3	1	66.78	71.80
Uruguay	4	4	61.50	50.99
Venezuela	5	5	59.60	50.69
Mexico	6	6	55.92	49.21
Panama	7	11	53.32	35.92
Colombia	8	7	51.30	44.71
Jamaica	9	9	51.01	39.25
El Salvador	10	10	44.11	36.06
Peru	11	17	43.42	25.33
Ecuador	12	8	41.59	42.16
Dominican Republic	13	15	37.11	29.27
Costa Rica	14	18	36.26	20.58
Honduras	15	16	35.67	26.38
Guatemala	16	12	35.67	33.17
Bolivia	17	14	32.52	29.47
Paraguay	18	13	30.83	31.66
Nicaragua	19	19	25.98	14.13
Haiti	20	20	7.92	9.99

Mobile penetration				
Country	2010 Ranking	2008 Ranking	2010 Score	2008 Score
Panama	1	1	100.00	100.00
Uruguay	2	2	96.96	97.81
Argentina	3	3	94.18	97.01
El Salvador	4	4	92.83	91.12
Jamaica	5	5	91.13	88.95
Chile	6	6	89.64	88.80
Brazil	7	7	70.11	72.74
Ecuador	8	8	68.91	71.98
Venezuela	9	9	67.02	66.70
Colombia	10	10	57.94	54.40
Dominican Republic	11	11	56.99	53.26
Paraguay	12	12	56.09	52.71
Guatemala	13	13	53.18	52.49
Honduras	14	14	53.15	50.57
Mexico	15	15	43.70	42.32
Peru	16	16	43.18	37.01
Bolivia	17	17	34.72	34.52
Costa Rica	18	18	30.88	12.93
Nicaragua	19	19	18.30	4.02
Haiti	20	20	0.00	0.00

Smartphone penetration				
Country	2010 Ranking	2008 Ranking	2010 Score	2008 Score
Mexico	1	1	100.00	100.00
Chile	2	2	98.76	98.42
Venezuela	3	3	97.44	96.74
Argentina	4	4	82.30	77.45
Colombia	5	5	75.72	69.06
Brazil	6	6	72.49	64.95
Ecuador	7	7	35.23	17.49
El Salvador	8	8	34.90	17.06
Uruguay	9	9	27.96	0.00
Peru	10	9	25.68	0.00
Panama	11	9	25.19	0.00
Honduras	12	9	24.60	0.00
Guatemala	13	9	24.22	0.00
Paraguay	14	9	23.06	0.00
Bolivia	15	9	18.83	0.00
Nicaragua	16	9	17.48	0.00
Dominican Republic	17	9	0.00	0.00



Mobile broadband penetration				
Country	2010 Ranking	2008 Ranking	2010 Score	2008 Score
Venezuela	1	1	100.00	100.00
Argentina	2	4	62.48	18.98
Brazil	3	5	51.36	18.24
Ecuador	4	2	42.15	59.06
Mexico	5	3	40.59	29.78
Jamaica	6	10	36.94	12.78
Chile	7	9	35.19	12.90
Colombia	8	7	26.75	14.89
Costa Rica	9	19	26.41	0.00
El Salvador	10	13	24.71	9.06
Honduras	11	11	23.49	9.68
Guatemala	12	6	22.95	17.12
Uruguay	13	8	22.22	13.28
Peru	14	15	21.93	4.71
Panama	15	18	16.23	0.62
Paraguay	15	14	16.23	7.32
Nicaragua	17	16	13.26	4.59
Dominican Republic	18	12	11.60	9.43
Bolivia	19	17	5.51	1.24
Haiti	20	19	0.00	0.00

3G population coverage				
Country	2010 Ranking	2008 Ranking	2010 Score	2008 Score
Uruguay	1	3	100.00	70.57
Chile	2	1	76.50	100.00
Venezuela	2	10	76.50	0.00
Brazil	4	2	75.38	98.53
Argentina	5	9	75.00	20.57
Mexico	6	8	70.00	25.24
Peru	7	10	65.00	0.00
Colombia	8	6	63.00	50.26
Honduras	9	10	53.00	0.00
Bolivia	10	4	52.77	68.98
Jamaica	11	10	51.30	0.00
Panama	11	10	51.30	0.00
Dominican Republic	13	10	50.00	0.00
Ecuador	14	10	49.50	0.00
Nicaragua	15	10	48.60	0.00
Costa Rica	16	10	45.00	0.00
Paraguay	17	5	41.04	53.65
Guatemala	18	7	32.00	33.52
El Salvador	19	10	28.00	0.00
Haiti	20	10	0.00	0.00

Maximum access speed				
Country	2010 Ranking	2008 Ranking	2010 Score	2008 Score
Chile	1	5	100.00	24.21
Bolivia	2	5	48.78	24.21
Panama	2	16	48.78	11.58
Argentina	4	1	32.68	100.00
Brazil	4	1	32.68	100.00
Ecuador	4	1	32.68	100.00
Peru	4	5	32.68	24.21
Dominican Republic	8	5	15.12	24.21
Uruguay	8	4	15.12	49.48
Venezuela	10	13	14.63	15.79
El Salvador	11	5	6.34	24.21
Guatemala	11	13	6.34	15.79
Honduras	11	5	6.34	24.21
Jamaica	11	16	6.34	11.58
Paraguay	11	5	6.34	24.21
Mexico	16	12	5.12	20.71
Haiti	17	20	3.41	0.00
Colombia	18	15	2.44	12.99
Nicaragua	19	16	1.95	11.58
Costa Rica	20	19	0.00	1.58

Fixed line broadband penetration				
Country	2010 Ranking	2008 Ranking	2010 Score	2008 Score
Uruguay	1	3	100.00	80.07
Chile	2	1	91.93	100.00
Mexico	3	4	87.84	79.42
Argentina	4	2	84.08	94.39
Panama	5	5	68.95	67.78
Brazil	6	6	63.57	63.15
Costa Rica	7	11	54.43	27.95
Colombia	8	9	49.82	38.52
Venezuela	9	7	47.25	55.80
Jamaica	10	8	37.45	42.10
Peru	11	10	27.58	30.00
El Salvador	12	12	24.90	23.71
Guatemala	13	16	15.83	8.12
Ecuador	14	14	12.00	13.06
Honduras	15	18	8.80	0.00
Bolivia	16	15	8.50	9.70
Nicaragua	17	17	7.23	7.53
Paraguay	18	13	5.34	16.80
Haiti	19	18	0.00	0.00

Domains				
Country	2010 Ranking	2008 Ranking	2010 Score	2008 Score
Brazil	1	1	100.00	100.00
Mexico	2	2	41.10	37.06
Argentina	3	3	30.87	34.83
Colombia	4	6	10.32	7.84
Peru	5	4	10.13	10.95
Venezuela	6	5	7.36	8.53
Chile	7	7	4.69	5.03
Panama	8	8	4.20	3.99
Costa Rica	9	12	3.53	1.68
Ecuador	10	9	2.60	2.71
Uruguay	11	11	2.46	1.89
Guatemala	12	16	1.22	0.49
El Salvador	13	13	1.04	0.89
Dominican Republic	14	15	0.82	0.59
Bolivia	15	14	0.70	0.68
Paraguay	16	10	0.67	2.03
Jamaica	17	17	0.39	0.34
Honduras	18	-	0.15	-
Nicaragua	19	18	0.11	0.00
Haiti	20	-	0.00	-

Market competitiveness (HHI)				
Country	2010 Ranking	2008 Ranking	2010 Score	2008 Score
Brazil	1	1	100.00	100.00
El Salvador	2	2	97.33	94.12
Argentina	3	3	90.12	88.76
Bolivia	4	4	86.48	85.63
Chile	5	8	86.30	83.09
Venezuela	6	7	83.79	83.30
Uruguay	7	6	82.94	84.38
Panama	8	13	82.87	66.54
Guatemala	9	5	81.82	85.04
Dominican Republic	10	9	79.76	79.86
Jamaica	11	15	75.81	62.79
Haiti	12	11	75.00	71.13
Paraguay	13	10	74.97	78.59
Honduras	14	16	72.34	60.14
Peru	15	12	71.28	67.63
Colombia	16	14	64.93	63.20
Nicaragua	17	17	62.77	59.08
Mexico	18	18	60.03	56.89
Ecuador	19	19	57.31	55.91
Costa Rica	20	20	0.00	0.00

Regulatory environment				
Country	2010 Ranking	2008 Ranking	2010 Score	2008 Score
Chile	1	1	100.00	100.00
Uruguay	2	4	79.99	70.64
Jamaica	3	2	70.49	72.45
Colombia	4	5	69.63	60.39
Costa Rica	5	3	67.91	70.99
El Salvador	6	6	56.53	57.63
Brazil	7	8	54.15	49.31
Peru	8	13	53.15	42.89
Dominican Republic	9	7	51.84	49.46
Mexico	10	9	50.68	47.32
Argentina	11	16	48.78	38.10
Nicaragua	12	10	46.42	47.20
Guatemala	13	12	45.68	45.07
Panama	14	11	44.95	46.43
Haiti	15	14	39.95	39.19
Honduras	16	15	32.72	38.35
Paraguay	17	17	30.79	27.46
Ecuador	18	18	27.10	21.30
Bolivia	19	19	12.58	12.77
Venezuela	20	20	0.00	0.00

Conditions for business - entrepreneurship				
Country	2010 Ranking	2008 Ranking	2010 Score	2008 Score
Jamaica	1	1	100.00	100.00
Panama	2	3	98.52	98.53
Colombia	3	5	96.69	97.15
Chile	4	2	96.32	98.74
Dominican Republic	5	4	96.18	97.82
Argentina	6	6	91.51	95.88
Peru	7	8	91.10	94.56
El Salvador	8	19	89.11	35.70
Costa Rica	9	7	88.35	94.71
Paraguay	10	9	87.29	94.36
Mexico	11	10	85.30	92.34
Uruguay	12	20	84.40	0.00
Brazil	13	13	79.48	90.33
Nicaragua	14	11	78.20	91.77
Bolivia	15	15	74.51	88.41
Venezuela	16	14	73.07	90.07
Ecuador	17	12	69.66	91.36
Honduras	18	17	67.60	81.78
Guatemala	19	16	56.24	83.48
Haiti	20	18	0.00	63.08

Innovation environment				
Country	2010 Ranking	2008 Ranking	2010 Score	2008 Score
Chile	1	1	100.00	100.00
Panama	2	2	79.89	73.63
Costa Rica	3	3	78.77	73.08
Brazil	4	5	77.09	67.58
Uruguay	5	7	74.30	62.64
Mexico	6	3	72.07	73.08
Colombia	7	6	69.27	63.19
Peru	8	10	67.60	57.69
Guatemala	9	11	63.69	57.14
El Salvador	10	8	60.89	59.89
Argentina	11	13	58.66	53.30
Honduras	12	9	55.31	59.34
Jamaica	13	12	53.07	54.40
Dominican Republic	14	14	45.81	45.05
Ecuador	15	15	41.90	37.36
Bolivia	16	17	41.34	28.57
Nicaragua	17	18	37.43	28.02
Paraguay	18	19	32.96	27.47
Venezuela	19	16	32.40	36.26
Haiti	20	20	0.00	0.00

Business use of internet				
Country	2010 Ranking	2008 Ranking	2010 Score	2008 Score
Chile	1	1	100.00	100.00
Panama	1	4	100.00	87.88
Brazil	3	2	87.23	90.91
Costa Rica	4	5	85.11	87.88
Guatemala	5	6	80.85	84.85
Dominican Republic	6	7	72.34	71.21
Uruguay	7	8	68.09	65.15
Peru	8	11	65.96	57.58
Jamaica	9	3	61.70	87.88
Mexico	10	9	57.45	62.12
El Salvador	11	12	55.32	51.52
Colombia	12	14	51.06	48.48
Honduras	13	10	48.94	62.12
Argentina	14	13	27.66	50.00
Venezuela	15	15	10.64	43.94
Ecuador	16	18	8.51	13.64
Paraguay	17	17	2.13	18.18
Nicaragua	18	16	0.00	24.24

Government effective use of ICT				
Country	2010 Ranking	2008 Ranking	2010 Score	2008 Score
Colombia	1	4	100.00	65.78
Chile	2	10	82.24	48.13
Mexico	3	1	69.93	100.00
Uruguay	4	13	63.22	35.81
Brazil	5	2	55.95	70.85
Guatemala	6	16	53.15	31.71
Argentina	7	3	52.31	67.67
Peru	8	11	49.51	44.94
Nicaragua	9	19	47.14	14.71
Dominican Republic	10	7	46.85	54.06
Bolivia	11	6	42.80	61.67
Costa Rica	11	9	42.80	52.49
El Salvador	13	5	42.10	64.17
Ecuador	14	14	40.14	34.48
Venezuela	15	8	37.77	52.79
Honduras	16	12	35.67	40.72
Jamaica	17	18	26.02	25.45
Panama	18	15	23.22	32.28
Paraguay	19	17	22.80	30.68
Haiti	20	20	0.00	0.00

#### 9.4 Sources and Definitions

Mobile Environment	
<b>1. Mobile Penetration</b>	
Description	The number of active mobile phone numbers relative to a country's population
Source	Wireless Intelligence
<b>2. Smartphone Penetration</b>	
Description	The number of Smartphone devices being used relative to a country's population
Source	Gartner
<b>3. Mobile Broadband Penetration</b>	
Description	Mobile cellular subscriptions with access to data communications at broadband speeds, i.e. >1mbps
Source	Wireless Intelligence
<b>4. 3G Population Coverage</b>	
Description	The percentage of the population within coverage of a 3G network (or networks of equivalent or greater speeds)
Source	Wireless Intelligence, A.T. Kearney Analysis
<b>5. Maximum Access Speed</b>	
Description	A mobile network's maximum connection speed to the internet as measured in bits per second
Source	Wireless Intelligence, A.T. Kearney Analysis

**E-Readiness****6. Fixed Line Broadband Penetration**

Description The number of fixed line broadband subscriptions relative to a country's population to indicate the country's experience in consuming high-bandwidth content

Source ITU

**7. # of Domains**

Description Total number of domains specific to a particular country that is accessible through the web as an indicator of the volume of local content available online

Source Webhosting.info

**Market Profile****8. Market Competitiveness (HHI)**

Description A measure of market concentration calculated by squaring the market share of each firm competing in a market, and then summing the resulting numbers – known as the Herfindahl-Hirschman Index. When converting the HHI score into a MBRI score of 100, a higher MBRI score indicates higher market competitiveness, which is a driver of innovation in the quality of mobile broadband connectivity and service delivery

Source Wireless Intelligence

**Business Environment****9. Regulatory Environment****9.1 Regulatory Quality**

Description Index that captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private-sector development, which stimulates transparency and promotes long-term thinking and investment by players in the mobile ecosystem.

Source World Bank, World Governance Indicators

**9.2 Rule of Law Index**

Description Index that captures perceptions of the extent to which agents have confidence in, and abide by, the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence, which provides essential market stability.

Source World Bank, World Governance Indicators

**9.3 Rigidity of Employment**

Description Average of 3 sub-indices: a difficulty of hiring index, a rigidity of hours index and a difficulty of redundancy index, which together facilitate operational flexibility, especially for SMEs that are particularly active in the development of mobile data services

Source World Bank, Doing Business 2009; World Economic Forum, Global Competitiveness Report 2010-2011

## 10. Conditions for Business – Entrepreneurship

### 10.1 Time to Start a Business

**Description** Measure that captures the median duration that incorporation lawyers indicate is necessary to complete a procedure with minimum follow-up with government agencies and no extra payments, which contributes to the speed of SME sector growth.

**Source** World Bank, Doing Business 2009 and 2011

### 10.2 Cost to Start a Business

**Description** Cost is recorded as a percentage of the economy's income per capita. It includes all official fees and fees for legal or professional services if such services are required by law. Fees for purchasing and legalizing company books are included if these transactions are required by law. The company law, the commercial code and specific regulations and fee schedules are used as sources for calculating costs. In the absence of fee schedules, a government officer's estimate is taken as an official source. In the absence of a government officer's estimate, estimates of incorporation lawyers are used. If several incorporation lawyers provide different estimates, the median reported value is applied. In all cases the cost excludes bribes. This cost is a contributing factor to the ease of starting a business.

**Source** World Bank, Doing Business 2009 and 2011

### 10.3 Minimum Capital (% of income per capita)

**Description** The paid-in minimum capital requirement reflects the amount that the entrepreneur needs to deposit in a bank or with a notary before registration and up to 3 months following incorporation and is recorded as a percentage of the economy's income per capita. This can act as an enabler or a barrier to entrepreneurs in the mobile sector.

**Source** World Bank, Doing Business 2009 and 2011

## Technology Environment

### 11. Innovation Environment

**Description** Based on the 12th pillar of the World Economic Forum's Global Competitiveness Index, this metric takes into account (a) Capacity for innovation (b) Quality of scientific research institutions (c) Company spending on R&D (d) University-industry collaboration in R&D (e) Government procurement of advanced technology products (f) Availability of scientists and engineers and (g) Utility patents.

**Source** World Economic Forum, Global Competitiveness Index 2008-2009 and 2010-2011

### 12. Business Use of Internet

#### 12.1 Availability of Latest Technology

**Description** The extent to which the latest technologies are available in a country

**Source** World Economic Forum, Global Competitiveness Index 2008-2009 and 2010-2011

#### 12.2 Firm-Level Technology Absorption

**Description** The extent to which businesses in a country have absorbed new technology, which provides a sound platform for mobile broadband and data growth

**Source** World Economic Forum, Global Competitiveness Index 2008-2009 and 2010-2011

#### 12.3 FDI and Technology Transfer

**Description** The extent to which foreign direct investment (FDI) brings new technology into a country

**Source** World Economic Forum, Global Competitiveness Index 2008-2009 and 2010-2011



### 13. Government use of ICT

#### 13.1 Governments Online Service

**Description** A composite measurement of the capacity and willingness of countries to use e-government for ICT-led development. E-Government Development Index is a composite index comprising the Web measure index, the Telecommunication Infrastructure index and the Human Capital index. E-government is defined as the use of ICT and its application by the government for the provision of information and public services to the people. High Government adoption of technology, including mobile platforms, to deliver services provides can be a key driver for wider adoption by consumers and businesses.

**Source** United Nations Public Administration Network, e-Government Development Database (UNeGovDD) (<http://www2.unpan.org/egovkb/>)

#### 13.2 Online Participation

**Description** The United Nations E-Participation Index is based on the survey used for the UN Online Service Index. The survey measures the quality and usefulness of information and services provided by a country for the purpose of engaging its citizens in public policy making through the use of e-government programs. More specifically, the index measures G2C on 3 levels: (a) e-information sharing with citizens (b) e-consultation with citizens for deliberate and participatory processes, and (c) e-decision making on citizen input in decision-making

**Source** United Nations Public Administration Network, e-Government Development Database (UNeGovDD) (<http://www2.unpan.org/egovkb/>)

## 10. About the Authors

The first LatAm Mobile Observatory was a joint research study between the GSMA, A.T. Kearney and Wireless Intelligence.

Any questions on the content of this document can be directed to the authors of the study.



### About the GSMA

The GSMA represents the interests of mobile operators worldwide. Spanning more than 220 countries, the GSMA unites nearly 800 of the world's mobile operators, as well as more than 200 companies in the broader mobile ecosystem, including handset makers, software companies, equipment providers, Internet companies, and media and entertainment organisations. The GSMA also produces industry-leading events such as the Mobile World Congress and Mobile Asia Expo.

For more information, please visit the GSMA corporate website at [www.gsma.com](http://www.gsma.com) or Mobile World Live, the online portal for the mobile communications industry, at [www.mobileworldlive.com](http://www.mobileworldlive.com)

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