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# Towards a sustainable approach for 4G deployment in Latin America

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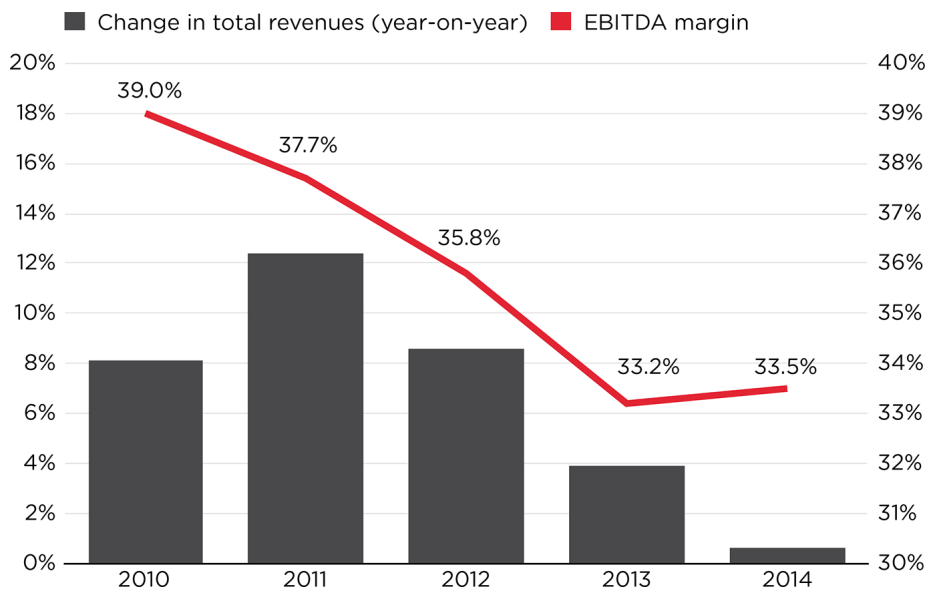
The number of operators with live commercial 4G networks in Latin America doubled during 2014 to reach 39 by the end of Q1 2015, covering 15 countries in the region. At the same time, our estimates show that smartphone prices are declining, with operators acknowledging that LTE smartphones are becoming more affordable.

In light of these market developments, the expansion of 4G services in the region can be expected to accelerate. However, Latin American operators are facing a challenging investment outlook. Operators have invested \$8.5 billion on spectrum licences alone in the last four years, and are planning to invest more in the future to make 4G more widely available. Yet since the launch of the first 4G network in the region in late 2011, 4G adoption has been growing at a slower pace than that of its 3G forebears due to a mix of demand and supply-side factors. A key issue has been the slow allocation in certain countries of spectrum in the lower frequency 'coverage' bands, often due to delays in clearing existing services from those bands, while stringent coverage obligations are also exacerbating difficult market conditions.

If the rate of 4G adoption in the region is to gain pace, regulators and policy makers must acknowledge the financial climate that Latin American operators face, and concentrate on reducing regulatory barriers and lowering the cost of network deployment to facilitate investment in 4G in a more sustainable context. The role that 3G networks can still play in meeting the requirement for widespread mobile broadband access should not be underestimated. GSMA Intelligence estimates that by 2020, 51% of connections in the region will be 3G, with 4G accounting for 28%.

## **Operators in Latin America facing an increasingly difficult investment climate**

Latin American operators are facing an increasingly difficult outlook. Following a number of years of strong growth, during which revenues increased by a CAGR of 7% over the period 2008-13, 2014 saw mobile revenues rise by a mere 0.5% year-on-year. Rising competition levels have impacted revenue growth, with operators in for example Brazil forced to refocus on targeting higher value contract customers in order to improve margins.



**Figure 1:** Revenue growth and EBITDA margin, Latin America, 2010–2014

Source: GSMA Intelligence

However, economic conditions in the region are also a factor, with low GDP growth and high levels of inflation serving to depress disposable income. In spite of the usually positive effect of the football World Cup on economic output, Brazil, host of the 2014 tournament, posted only a marginal rise in GDP during the year, up just 0.1%. Faced with recession, the Brazilian Government is implementing austerity measures aimed at restoring investor confidence, which is further serving to reduce disposable income.

Operators across the region also have to contend with the transition from voice to data, and the challenge of doing so in a slow-growth environment. In 2008, service revenue grew 16% year-on-year, with voice comprising 90% of service revenues, and data accounting for a mere 2%. But by 2014 this dynamic had changed considerably, with virtually no growth in service revenue year-on-year, while the share of voice revenues has fallen to 65% and data has grown strongly to reach 22%.

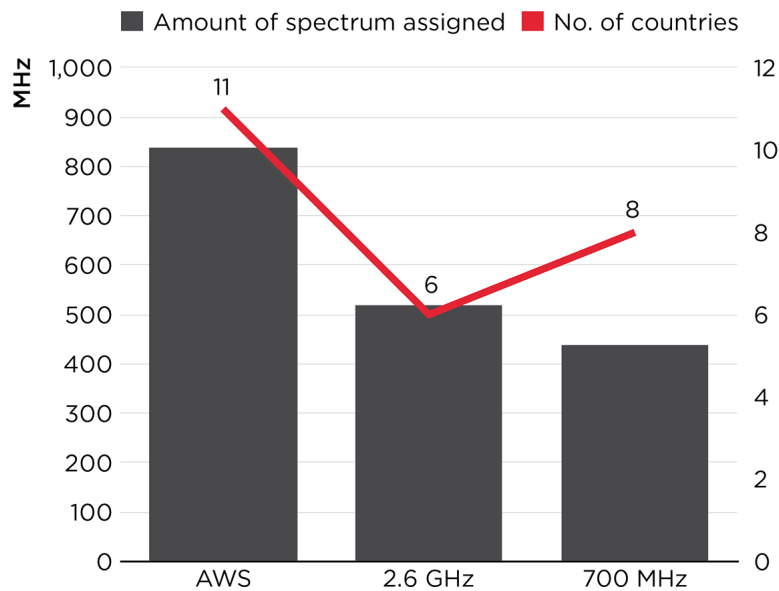
The decline in voice revenue appears to be accelerating, driven by growing competition among mobile operators, MVNOs and internet players, as well as increasing regulatory intervention. This is a trend that the growth in data revenue appears unlikely to offset entirely, and will therefore place further pressure on operator top-lines and margins, which in aggregate are the lowest of any developing region.

This makes it more challenging for operators to fund investments at a time when there is ongoing pressure to improve networks to alleviate capacity constraints (and address quality of service issues) and to increase coverage. Operator capital expenditure totalled more than US\$106 billion in the six years to 2014. Investment levels are likely to increase substantially over the coming years to accommodate data traffic growth, particularly as LTE deployments gather pace, with almost US\$170 billion set to be invested over the six-year period from 2015 to 2020.

### **Coverage obligations linked to 4G spectrum licences are challenging compared to other regions**

Almost half of all spectrum that has been assigned to operators for 4G deployment in Latin America has been in the AWS band, which uses frequencies from 1710 to 1755 MHz for uplink and 2110 to 2155 MHz for downlink. Of the 14 countries in the region (excluding the Caribbean) that have assigned spectrum between 2009 and the present day, all except Brazil, Nicaragua and Panama allocated frequencies in the AWS band. Overall this band made up 47% of all spectrum assigned over the period, while the 2.6 GHz ‘capacity’ band accounted for almost 30% and the 700 MHz ‘coverage’ band a little under a quarter of the total. Currently only eight of the 22 countries in the region - Argentina, Bolivia, Brazil, Chile, Ecuador, Honduras, Nicaragua and Panama - hold 4G spectrum in the 700 MHz band. With the exception of

Nicaragua, all of the 700 MHz spectrum was assigned in 2013 and 2014. The only country currently offering 4G services in this band is Bolivia.



**Figure 2:** 4G spectrum allocations in Latin America by frequency band, 2009–2015

Source: GSMA

Despite the more challenging investment climate and the prevalence of higher frequency spectrum being allocated for 4G deployment, the mandatory coverage obligations that have been attached to 4G licences in many Latin American countries appear onerous compared with those imposed on operators in other regions. This situation is particularly acute in markets where operators are required to participate in lengthy bureaucratic processes with local governments to gain approval for new cell site deployments, such as Brazil and Peru. Given the number of local governments involved when deploying a nationwide network in countries of this size, this issue has prompted concern at the central government level which has recently led to new legislation around deploying infrastructure in both countries.

In Brazil, operators that were successful in the 2012 auction of 2.6 GHz licences are obligated to cover all municipalities with more than 30,000 inhabitants within four and a half years. This poses a significant investment challenge, given that in September 2013 an [Ofcom study](#) estimated that the relative cost of deploying 4G solely in the 2.6 GHz band could be almost double that of deployment in the 1800 MHz band.

Finding it uneconomical to provide coverage in rural areas using the mandated spectrum, in 2014 Claro requested permission to use its 1800 MHz spectrum to meet coverage obligations in cities of between 30,000 and 100,000 inhabitants, offering in return to deploy services three years ahead of schedule. However, the Brazilian regulator Anatel ruled against this proposal. While Anatel has subsequently allowed operators to use spectrum in the 700 MHz band to complement the use of the 2.6 GHz band in ensuring coverage obligations are met, this spectrum will not be available until the analogue-to-digital switchover takes place. This process will begin later this year but will occur gradually over the period to 2018.

Argentina's 4G auction in 2014 included several bands, including AWS and 700 MHz, but also featured stringent coverage obligations; the licences mandated that all main motorways and cities with below 50,000 inhabitants were required to be covered within 27 months, and all localities of more than 500 inhabitants within five years. So far only the AWS spectrum has been assigned to the operators. However, meeting the requirements specified, which are equivalent to covering 98% of the population, will be contingent on also having the 700 MHz portions assigned.

Elsewhere in the region, licences for spectrum in the 2.6 GHz band in Chile (which were allocated through a 'beauty contest' in 2012) had obligations attached that required mobile operators to deploy a nationwide 4G network within 12 months, and gave a maximum of 24 months to connect an additional 181 isolated localities. In Peru, licence obligations for

spectrum in the 1900 MHz band auctioned in 2013 stated that operators were expected to deploy 4G networks and provide coverage to 409 district capitals within 36 months, and to an additional 1,918 localities within 48 months. In addition, licence winners have been mandated to offer broadband services to public schools, health centres and police stations across the country at no charge for ten years, while also being required to provide a 'social tariff' for lower-income users and satellite connectivity for remote areas.

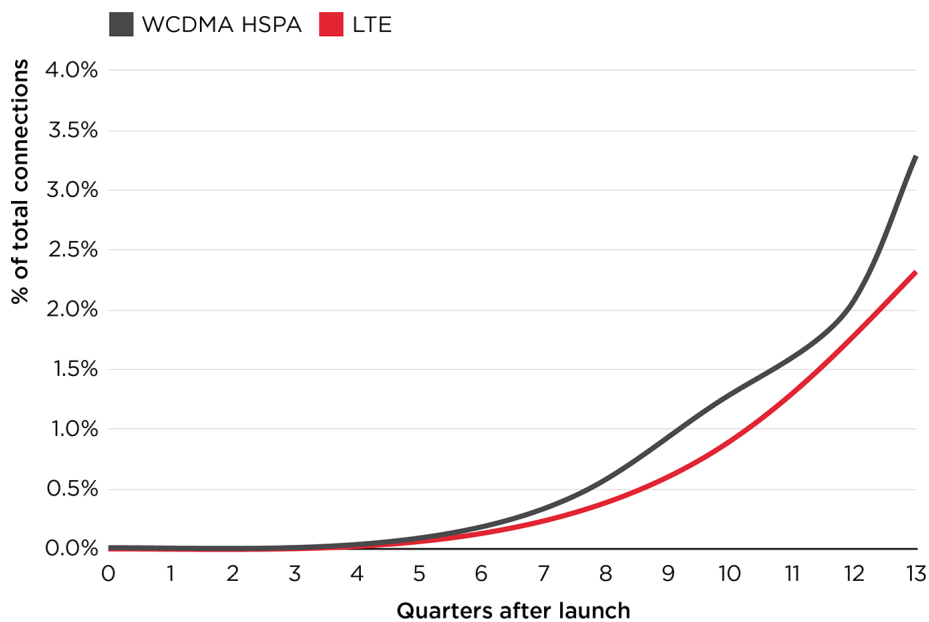
Meanwhile, the Mexican government has taken a different approach to ensuring universal 4G coverage, with the country's recent Telecoms Bill mandating the creation of a shared wholesale 4G network across the whole 700 MHz band – with access granted on a non-discriminatory basis. This model for 4G deployment has been considered before (e.g. in Russia and Kenya) but has not been successfully implemented in any country. Therefore this could present a significant challenge for the Mexican regulator, which will be responsible for ensuring that the necessary investment goes into building-out a new network with national coverage and finding the right model for its sustainability. In particular, the decision to reserve all of the country's available 700 MHz spectrum for the project represents a potential risk to operator business models.

By contrast, in many countries in Europe (which have for a number of years been subject to a deteriorating investment climate) and North America, coverage obligations have tended to be less stringent. For example, operators in Belgium, Denmark and Spain have no obligations for the licences they hold in the 2.6 GHz band, while those in the Czech Republic have to provide coverage to 10% of population within seven years and those in Germany to 50% within four and a half years.

Meanwhile, in the US, as a condition of combining their 2.5 GHz spectrum holdings in 2008, Sprint, Nextel and Clearwire were required to offer services using this spectrum to at least 15 million people by 2010, and an additional 15 million by 2012, equating to less than 10% of the US population. Most interestingly, in Canada's AWS auction that same year, coverage obligations were specified only as indicative targets for new entrants, with the incentive of extending their rights to sharing and roaming with incumbents if they were met. As such, specific coverage obligations were deemed inappropriate, with the regulator indicating that market factors should determine an operator's infrastructure build decisions, and that this would be sufficient in propagating 4G deployment.

### **Low ARPU and contract-tariff penetration are holding back LTE adoption in the region**

Despite the coverage obligations mandated for operators in the region, 4G adoption in Latin America is lagging behind much of the rest of the world. In Q1 2015, some 13 quarters after the launch of the first 4G network in the region, 4G connections made up just 2.4% of total connections; only the Middle East and North Africa (MENA) and Sub-Saharan Africa (SSA) regions have a lower level of 4G connections penetration. Perhaps more significantly, in contrast to the trend observed in many developed markets, the initial rate of adoption of 4G in Latin America has proved to be slower than for its predecessor technology, (WCDMA) HSPA, which had reached 3.4% of total connections after 13 quarters of operation.



**Figure 3:** 3G (WCDMA HSPA) and 4G (LTE) adoption rates from first launch, Latin America

Source: GSMA Intelligence

This can be clearly observed in Brazil, where one year after launch TIM had reached 1.3% 4G connections penetration and Oi 0.7%, compared to 4.1% and 2.3% respectively for HSPA. Similarly, after 18 months of 4G operation Claro reported that 4G made up 1.0% of all connections, yet for HSPA the equivalent figure after the same period was 3.4%. Migrating 3G connections on to 4G networks quickly is paramount in recouping investment in 4G technology, as 4G users tend to use considerably more data than 3G customers; for example, Telefónica reported that in Brazil, Vivo's 4G contract connections generated an ARPU 54% greater than their 3G equivalents in Q4 2014.

On the supply side, the relatively slow adoption of 4G can be explained to a great extent by the lack of spectrum being made available for 4G deployments in the country. Unlike its predecessor (3G HSPA), 4G has required new spectrum bands for deployment, and most of the 4G spectrum held by operators in the region was not assigned until 2012-13, or 2014 in the case of Argentina, Venezuela and Ecuador. Markets with high levels of 4G penetration such as South Korea (where 4G was launched in 2011) and the USA (2010) benefitted from the early allocation of suitable spectrum to deploy nationwide LTE coverage, in the 800/1800 and 700 MHz bands respectively.

While licences for the 2.6 GHz 'capacity' band were auctioned in Brazil and Chile in 2012, operators had to wait until 2014 to purchase the lower-frequency 700 MHz spectrum that will allow them to extend 4G coverage to wide areas. Furthermore, in both cases they will have to wait further to actually use it; in Brazil, allocation of the spectrum has been delayed while the bands are cleared of existing broadcasting services, while in Chile, the process has been held up by court injunctions – but could potentially resume during 2015.

In terms of barriers to adoption on the demand side, many of the challenges that operators face are similar to those that were present in the early days of 3G. At \$9.23 in Q3 2014, ARPU for Latin America as a whole was 14% below the global average of \$10.75, due partly to the high level of prepaid connections in the region; four out of every five connections in Latin America are currently on prepaid tariffs, compared to fewer than half in Europe and one in four in North America. The transition of the mass market from prepaid to higher ARPU contract connections being witnessed in Europe is slow to be replicated in Latin America – while contract as a share of total connections increased by 3 percentage points in Europe between Q1 2013 and Q1 2015, the equivalent rise in Latin America was 1.5 percentage points.

Handset pricing and its effect on the level of smartphone penetration is another key factor in the adoption of mobile broadband technologies. Although smartphone adoption in the region increased by 10 percentage points over the year to Q1 2015, it still lags behind all other global regions except MENA and SSA. Telefónica reported in Q4 2014 that while smartphone

penetration across the group averaged 35%, the average for its Latin American operations was 26%. While the latter figure is a 6 percentage point rise on 2013, this was down from the 8 percentage point rise the previous year, likely due to the continuing decline in subsidies being offered on 3G handsets in Latin American countries. For example, the difference between handset revenue and subscriber acquisition costs for Personal in Argentina increased from a deficit of ARS106 million (\$12 million) in Q1 2013 to a surplus of ARS116 million (\$13 million) in Q1 2014, prior to the operator's 4G launch later that year. Meanwhile, regulators in Mexico and Colombia are discouraging the use of handset subsidies, which is in turn slowing smartphone adoption.

## **Addressing the barriers to sustainable mobile broadband deployment**

The cost of handsets has been a particularly acute issue for 4G operators in developing regions, as LTE handsets have typically been priced at a considerable premium to 3G devices. Yet the [price of LTE devices](#) is now falling rapidly in many markets, in line with the wider trend in smartphone pricing. In our [report from December 2014](#), we estimate that the ASP for smartphones in Latin America fell by 25% between 2008 and 2013, with manufacturers such as Xiaomi and Micromax looking to replicate success in their domestic markets of China and India respectively by targeting other developing regions. At the same time, as has been witnessed in markets such as China, we expect Latin American operators to focus their handset subsidies around 4G devices, eventually removing 3G device subsidies entirely. Indeed, América Móvil CEO Daniel Hajj said in the group's Q1 2015 earnings call that now "We have much more affordable handsets in 4G, so the prices are much more affordable for all the people in Latin America".

Continuing declines in the price of 4G-compatible handsets will do much to boost 4G take-up in the region, however the macroeconomic climate in Latin America means that this alone will not be sufficient to drive mass adoption of the technology. A potentially more sustainable approach to meeting the requirement for universal mobile broadband coverage would be a combination of 3G and 4G networks, dependent on where demand exists for certain types of services. As of 2014, 3G makes up more than two in every five connections in Latin America, and we forecast that 3G networks will cover more than 90% of the region's population by mid-2015. Thus operators in the region should focus on demonstrating to regulators the benefits that 3G can still offer to many consumers, allowing them to make the most sustainable use of their existing infrastructure at a time when investment is being hampered by economic conditions.

Looking forward, policymakers in all regions should carefully consider the economics of network deployments when setting coverage obligations that are attached to spectrum licences, notably if the spectrum allocated to operators is not sufficient to reach demand in rural areas. The adoption of market-based coverage incentives such as those employed in the AWS-1 spectrum auction in Canada could also offer a more sustainable framework for infrastructure investment.

