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Wires Versus Wireless: The Case for Wireless Broadband Technology in Emerging Markets

Sponsored by: Xiocom Wireless

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IN THIS WHITE PAPER

The mobile communications revolution has been a well-documented phenomenon in emerging or lower-income markets. Since the turn of the millennium, one emerging country after the other has seen mobile penetration exceed fixed-line rates severalfold. It was not unusual for many of these markets to experience record mobile subscription growth while traditional wired telephone subscriptions fell. Availability, rapid provisioning, and declining costs combined to create a mobile service proposition that proved much more compelling than what the traditional wired telephone service could offer. The impact on these economies has been profound. Widespread access to mobile communications has enabled the improved flow of information, helping emerging economies function more efficiently. It has also helped close the communications gap with the developed world. An enormous industry has been created with well over 1 billion mobile devices sold and cellular infrastructure spending amounting to US$50 billion annually.

A significant challenge remains for the communication networks in emerging markets, however. The proliferation of the Internet and the rise of Web 2.0 mean that basic connectivity is no longer sufficient. Effective participation in the global economy requires low-cost and widespread access to broadband services. While mobile penetration exceeds 20% for the majority of emerging markets, broadband penetration is typically 5% or less and often does not even exceed 1%. This is in contrast to developed countries where broadband penetration rates average 20% or more. The risk of a global digital divide today is greatest when measured in terms of broadband Internet connectivity.

The most common solution for broadband service is digital subscriber line (DSL) technology, which accounted for an estimated 66% of broadband connections in 2007. DSL's popularity is a result of the technology's low cost and the fact that it leverages the existing copper network. With DSL equipment priced well below US$100 per subscriber in either a developed or developing market context, it may be surprising that its proliferation has proven slow in emerging markets. The reason is simple: Copper-based communications infrastructure remains extremely limited. At the end of 2007, phone line penetration in emerging markets remained below 20%. In interviews with service providers, it was estimated that as little as 10% of existing installed copper lines were suitable for DSL. The answer to enabling low-cost and widespread broadband connectivity in emerging markets therefore rests not in the wired world but in wireless technologies.

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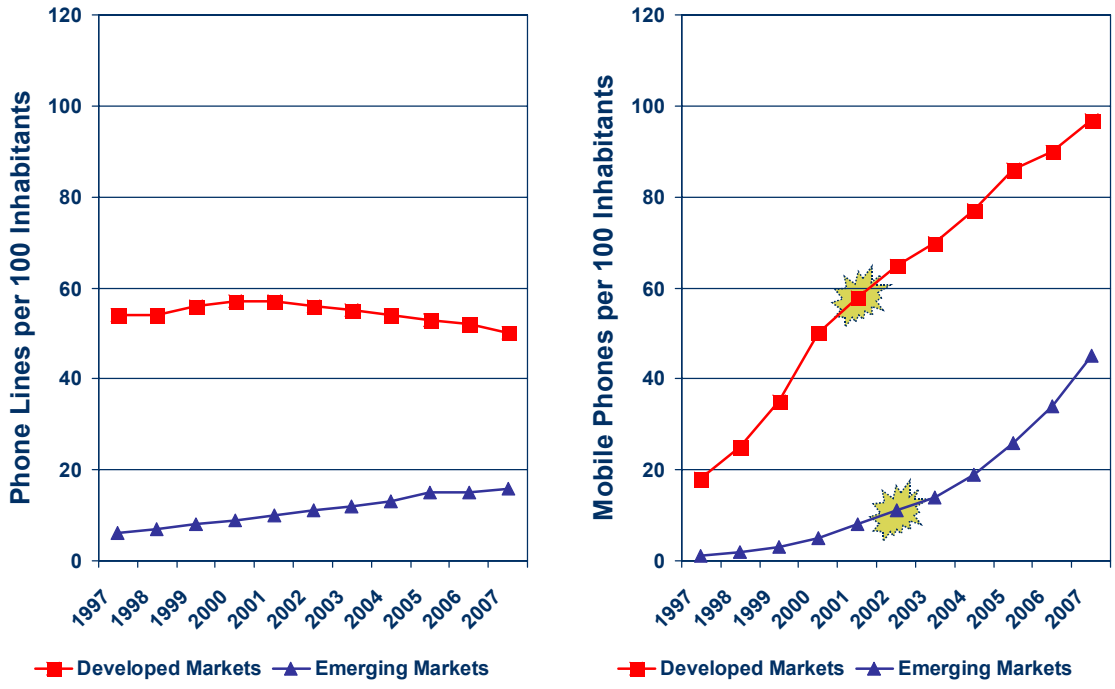
This white paper examines the applicability of broadband wireless technology for delivering cost-effective and wide-scale broadband connectivity in emerging markets.

SITUATION OVERVIEW

Mobile technology has been widely embraced by emerging markets (defined as low-income countries with annual GDP per capita of $10,000 or less). By 2002, emerging markets as a whole had seen mobile penetration exceed fixed-line penetration (see Figure 1). This was a result of many factors, including the highly competitive mobile environment fostered in many countries, the rapid nature with which mobile infrastructure could be deployed, and the significant decline of networking and device costs. By the end of 2007, numerous emerging markets could boast mobile penetration rates in excess of 20%, with the overall average exceeding 40%. Emerging market mobile penetration more than doubled between 2004 and 2007. This is in contrast to the fixed-line network, which grew marginally during those years. At the end of 2007, average fixed-line penetration in emerging countries totaled less than 19%. In developed markets, fixed-line penetration has well exceeded 50%, though it has been declining steadily since 2001.

FIGURE 1

Telephone and Mobile Phone Penetration Trends, 1997–2007

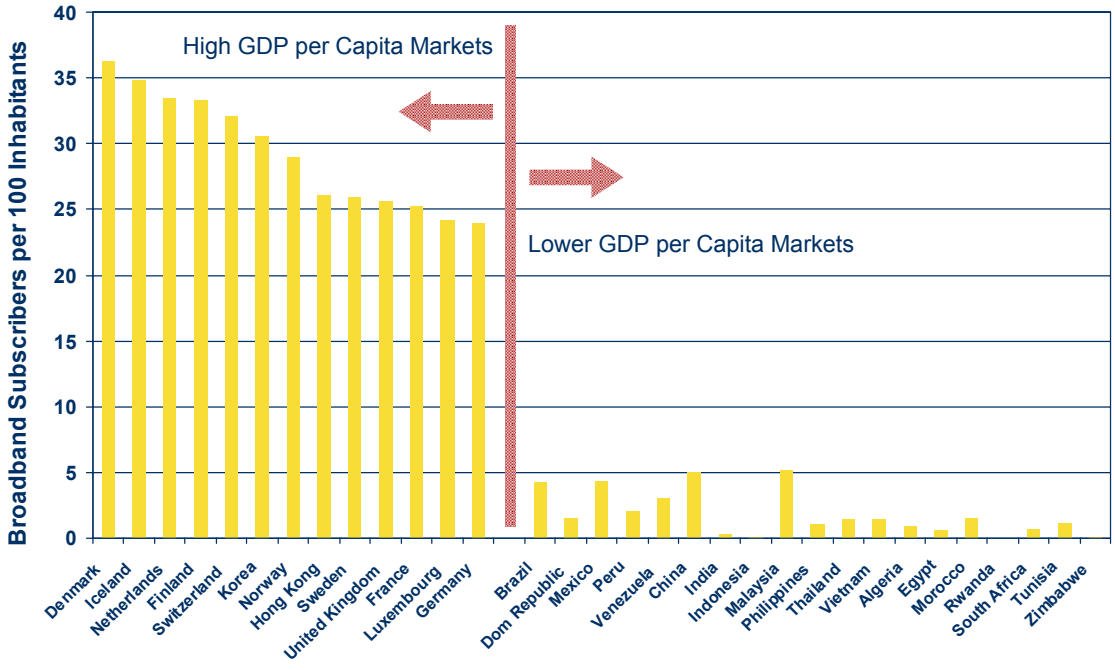


Source: ITU and IDC, 2009

When it comes to broadband connectivity, a clear divide between high GDP (countries with annual GDP per capita greater than $10,000) and lower GDP (countries with annual GDP per capita of less than $10,000) markets exists. While high GDP nations see broadband penetration levels between 15% and 36%, the majority of lower-income countries have penetration levels of 5% or below. In fact, key emerging markets such as China and India boast broadband penetration levels of only 5% and 0.3%, respectively. A significant number of emerging markets had less than 1% broadband penetration levels at the end of 2007 (see Figure 2).

FIGURE 2

Broadband Penetration Trends, 2007



Source: ITU, CIA Factbook, and IDC, 2009

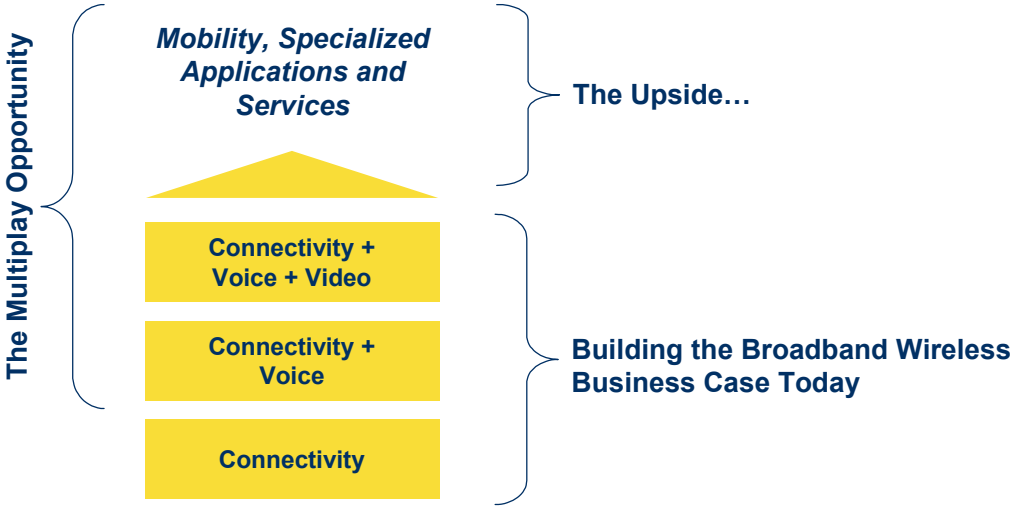
In the same manner that mobile technology has helped to reduce the voice connectivity gap among developed and emerging nations, broadband wireless standards such as WiFi, WiMAX, 3G cellular, and other proprietary wireless systems present technologies that pose the best potential for narrowing the gap in broadband access.

Building the Business Case for Broadband Service

The business case for broadband service relies upon the inherent value of providing high-speed connectivity to the Internet. The Internet and the World Wide Web have spawned new ways of exchanging information and conducting commerce. As a consequence, the utility of the Internet has grown exponentially over the past decade. The rise of Web 2.0 and multimedia applications has added bandwidth as an important dimension to that connectivity. Developing business models also seek to layer voice and video services on top of the connectivity value proposition — in an effort to further strengthen the overall business case. In a wireless environment, specialized applications and services leveraging the mobility function can also be implemented. Mobility is, in and of itself, an important value-add (see Figure 3).

FIGURE 3

Building the Business Case for Broadband Services



Source: IDC, 2009

Interviews with broadband service providers conducted for this white paper found that the majority of business cases were built solely on connectivity as the value proposition. A handful of carriers sought to layer voice as an additional revenue stream, while even fewer were building a triple-play strategy with video service. The majority simply saw voice and video as attractive upsides and not the basis upon which they were justifying their investments in broadband infrastructure. This result speaks to the nascent nature of broadband services in emerging countries. While North American and Western European markets see an emphasis on triple- and quadruple-play service strategies, emerging country carriers remain focused on simply improving service access and availability.

Technologies to Deliver Broadband Service

The primary technology delivering broadband service today is DSL. IDC estimates that the technology accounted for approximately 66% of global broadband subscribers at the end of 2007. With the exception of the United States, markets with the highest broadband penetration (refer back to Figure 2) have relied heavily upon this technology. Readily available copper infrastructure in high GDP countries, with traditional telephone line penetration peaking at approximately 57%, meant that the developed world could provide DSL-based broadband service with minimal investments to the network. Other wire-based technologies include CATV and optical infrastructure. Wireless technologies accounted for less than 2% of the global total.

In emerging markets, traditional telephone line penetration levels are much lower. Delivering broadband service via minimal investments to an existing copper infrastructure is therefore a significantly smaller opportunity. CATV and optical networks are similarly underdeveloped. Consequently, delivering broadband service often requires consideration of wireless infrastructure.

To this end, the technologies most relevant to delivering broadband service in emerging markets are DSL and broadband wireless. Each represents distinct economic and operational considerations.

For DSL, the economics revolve around:

- **Revenue:** This is derived from monthly subscriptions as well as connection and other usage-based fees. On average, DSL service providers in emerging markets have reported average revenue per user (ARPU) of between US$15 and US$60.

- **Operational costs:** These comprise recurring expenses such as transmission, support, maintenance, and utilities. Additionally, sales and marketing (i.e., customer acquisition) and service provisioning (i.e., installation, preparation) are also included as nonrecurring operational expenditures.

- **Capital costs:** These normally include the cost of the DSL access multiplexer (DSLAM), the broadband remote access server (BRAS), and the customer premises equipment (CPE). The business case typically assumes that there is suitable existing copper infrastructure (requiring only minimal upgrades and conditioning). Under this assumption, service providers have reported that the average cost to serve each subscriber amounts to between US$40 and US$70. These costs reflect the tremendous decline DSL infrastructure pricing has experienced in recent years.

Similarly, wireless broadband faces the following economic considerations:

- **Revenue:** Just like DSL, broadband wireless services derive revenue from monthly subscriptions as well as connection and other usage-based fees. On average, interviewed service providers from emerging markets noted ARPU of between US$20 and US$60. In instances where the infrastructure is deployed by a competing carrier, additional revenue can be and is derived from voice over IP services.

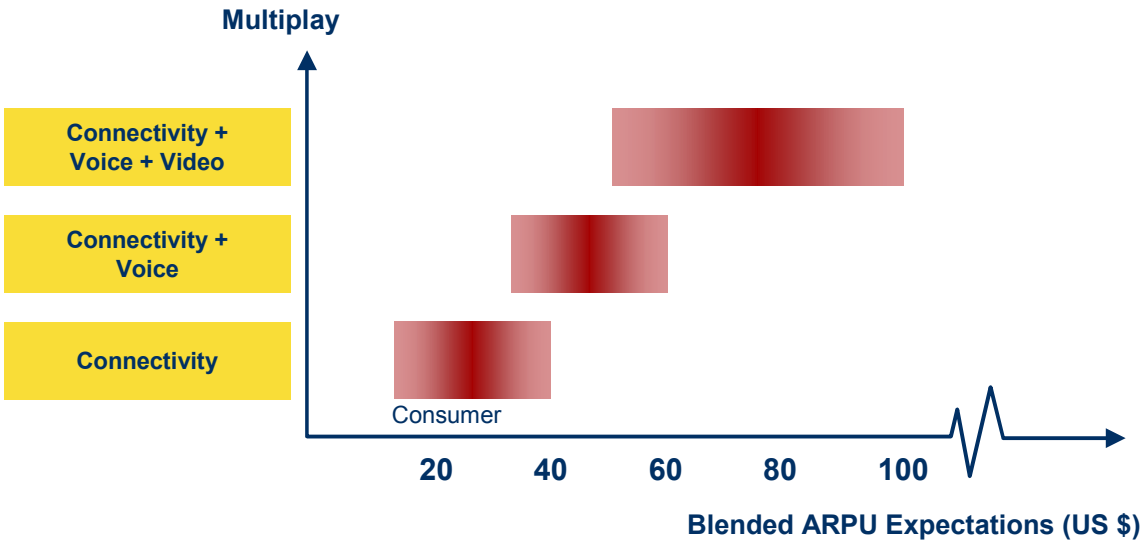
- **Operational costs:** These comprise recurring expenses such as transmission costs, support, maintenance, and utilities. Additionally, sales and marketing as well as service provisioning (i.e., installation, preparation) are also included as nonrecurring operational expenditures.

- **Capital costs:** These include the cost of the base station and core infrastructure, as well as the physical plant supporting the wireless equipment (towers, shelters, etc.). Wireless broadband infrastructure costs have dropped precipitously in the past decade. This is the result of the industry moving from proprietary to increasingly open and standardized systems such as WiFi and WiMAX. CPE costs, however, remain relatively high, bringing typical per-user costs to between US$300 and US$700.

Putting the DSL and wireless infrastructure costs in further perspective are the revenue expectations associated with broadband service and the applications that may be layered upon it. Service providers interviewed reported a variety of experienced and anticipated monthly revenue performance per consumer. These revenues ranged from a prepaid broadband service delivering around 256kbps downlink service that was generating revenue of less than US$10 per month to a megabit-level service with monthly revenue exceeding US$40. Layering additional services, in particular voice and video, provided the potential to boost expectations to as high as US$100 per month (see Figure 4).

FIGURE 4

Monthly ARPU Expectations



Source: IDC, 2009

The Case for Broadband Wireless Technologies

The case for utilizing wireless technology in delivering broadband service in emerging markets is fundamentally premised on the lack of an existing copper network. Service providers interviewed noted that, without an existing network, it was a "no-brainer" to opt for wireless technologies such as WiFi or WiMAX. Greenfield implementation of a copper network was estimated to cost between three times and five times more in terms of capex per subscriber than a wireless system. Opex costs, on the other hand, were deemed to be equal to if not slightly lower. Additional challenges to the maintenance of a wired network, as noted by respondents, included:

- **Propensity for theft:** It is a well-known fact that high copper commodity prices have made communication wires attractive to thieves. Incidences of theft and vandalism have been and remain high in emerging markets. Securing copper wiring, preventing theft, and replacing stolen telephone lines continue to be high-cost items for service providers.

- **Unpredictable costs:** Service providers in emerging markets face lower site acquisition costs and less regulation than their peers in developed countries. Low labor costs further add to the ability to accelerate network deployment. In the case of wired infrastructure, however, additional elements add to the unpredictable nature of costs. In one example, a service provider delivering broadband access to urban areas in India noted that the cost for obtaining rights of way for copper line installation in a square kilometer service area could escalate to as much as US$150,000. Site acquisition costs for a base station, on the other hand, were typically less than one-tenth of that amount.

- **Time to market and business risk:** A wireless network can be up and running within a matter of weeks. In cases where WiFi mesh technology is utilized, networks can be provisioned in a matter of days. Deployment of wired infrastructure, while requiring similar levels of careful planning, logistics, and resource management as a wireless network, demands significantly greater human resources and is subject to higher business risk. According to service providers, the best case deployment of copper infrastructure is measured in terms of months and not weeks. Another issue is the matter of business risk. One strategy employed to accelerate wired infrastructure rollout is the execution of agreements with real estate developers in the preconstruction phase of development projects. Common in emerging markets and one that particularly proliferated during the Asian currency crisis of the late 1990s was the experience of deploying copper lines to real estate developments that failed to see actual completion. Whereas WiMAX base stations and WiFi nodes can easily be relocated and reprovisioned, wired infrastructure essentially becomes a sunk cost once it is installed.

CHALLENGES

While the case for broadband wireless technologies in emerging markets is strong, challenges remain that hinder the technologies' ability to fully proliferate. These challenges include:

- **Spectrum allocation:** A fundamental barrier to any wireless technology is the availability of clear and sufficient spectrum. WiFi in the unlicensed frequency bands (i.e., 2.4GHz and 5.8GHz) provides a means to circumvent this. For other technologies to proliferate, however, the effective management and allocation of spectrum assets will be critical.

- **Low ARPU:** There is no getting away from the reality that low income levels in emerging markets create a challenging environment for the broadband service business case. Still, economic growth coupled with the increasing utility of the Internet means that prospects are likely to grow in the years ahead. Service providers also noted increasing public policy recognition of the positive impact of broadband connectivity on economic development and participation in the global economy. This means new policy measures are likely to be implemented that will promote the development of broadband services.

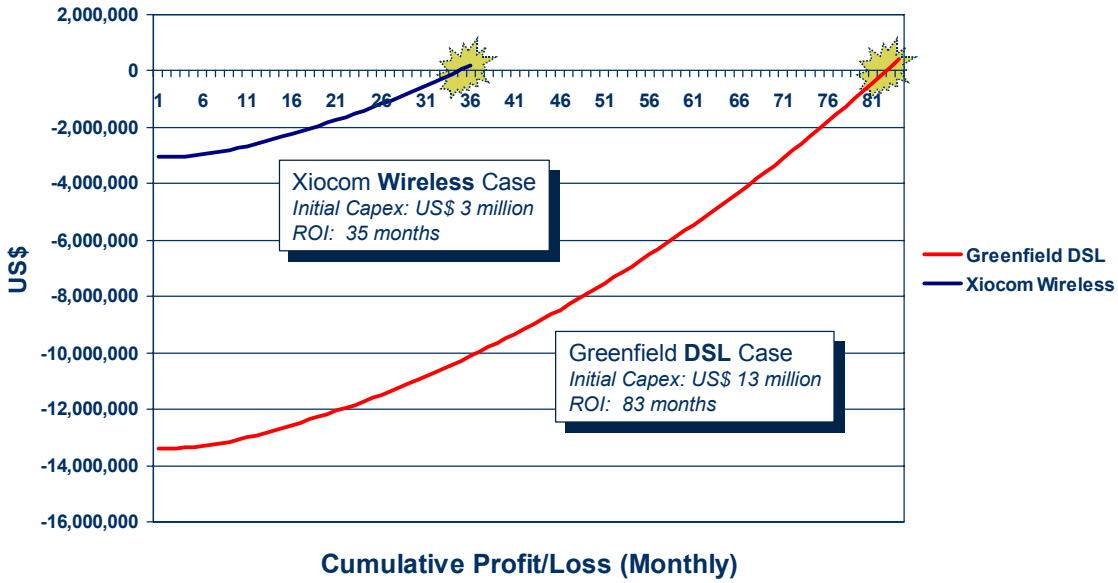
- **Technical knowledge and capabilities:** The lack of local wireless engineering and operational knowledge represents another challenge to the proliferation of broadband wireless technology. The complexity associated with RF planning and design, construction engineering, and network operation and optimization demands highly educated, skilled, and experienced professionals. These individuals are in short supply even in the more developed markets of North America and Western Europe; therefore, significant investment will be required from both private and public organizations in emerging markets.

OPPORTUNITIES AND CHALLENGES FOR XIOCOM WIRELESS

The tremendous unmet demand for broadband connectivity in emerging markets represents an enormous opportunity for a company such as Xiocom. Amid maturing fixed and mobile voice networks, broadband access represents a segment that is still poised for strong growth — especially in emerging markets. Xiocom has the potential, with proper market prioritization and effective execution, to build its operations and base of customers in emerging markets rapidly. Ultimately, the company benefits from the fundamental advantage its wireless infrastructure solution brings vis-à-vis a traditional greenfield DSL network. As noted by service providers interviewed, going wireless was a "no-brainer" because of its significantly lower capital expenditure requirements. Lower requirements translate to a more rapid return on investment (ROI). Service providers had noted that a positive ROI could be achieved in as little as less than half the amount of time it would typically take for a copper-based solution. In a cursory comparison of the Xiocom wireless model with a greenfield DSL case, the ROI period for Xiocom was nearly 60% shorter (see Figure 5).

FIGURE 5

Greenfield DSL Versus the Xiocom Wireless Solution



Key assumptions: Market context – Urban; Population covered – 200,000; Business – 2,000; Services – Basic connectivity (voice services can be layered on both network cases, but were left out to simplify the comparison); Blended ARPU – $18; Other considerations include CPE pricing, take-up rates, maintenance and support, no spectrum costs (Xiocom utilizes WiFi-based technology), etc.

Source: IDC, 2009

The challenges, on the other hand, rest with scale and brand recognition. While the company is well-resourced financially, its current base of fewer than 100 employees means that it will have to manage growth and expansion carefully. It will be important to prioritize markets and deploy resources efficiently. Because Xiocom is a relatively new company, its brand also remains relatively unknown, especially to the emerging market telecom industry it is targeting.

CONCLUSION

Emerging markets have worked well to close the gap with the developed world when it comes to basic voice connectivity. They have accomplished this through the effective implementation of mobile technology. Today, nearly half of the population in emerging markets has access to basic mobile voice communications, a rate that is 45-fold greater than what it was only a decade ago. A significant gap, however, remains when it comes to broadband access. While the developed world has embraced technologies such as DSL to bring widespread access to broadband services, emerging markets do not have the luxury of leveraging an existing and ubiquitous copper-based network to deliver similar services. Instead, closing the

broadband access gap will require taking a path similar to that of the voice world — that of the use of wireless-based technologies. Over the next decade, the prospects for the growth of the broadband wireless infrastructure in emerging markets, of a growth level similar to that experienced by its mobile sector in the past decade, are not far from real.