

Restricted mobility or restricted competition? Fixed-mobile convergence and universal access in Brazil

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ABSTRACT

The article explores the Brazilian regulation on fixed and mobile phone services and its impacts on efforts to address the deficit of ICT networks and services in low-income and low-density areas. We compare the three most significant cases in Brazil of fixed phone services deployment using GSM technology on a secondary basis and wireless local-loop technology associated with CDMA, investigating the effect of recent regulatory changes that facilitate access to spectrum by fixed phone enterprises. The analysis is based on the ‘microtelco’ model proposed by Galperin and Bar (2006) and demonstrates that a favorable regulatory environment is an essential asset to foster new business models that are able to overcome persistent difficulties in universalizing fixed phone service both in attractive markets as well as in low-income and low-density areas.

Keywords

Restricted mobility, competition, universal service, convergence.

INTRODUCTION

The article explores the Brazilian regulation on fixed and mobile phone services and its impacts on efforts to address the deficit of ICT networks and services in low-income and low-density areas. We compare the three most significant cases in Brazil of fixed phone services deployment using GSM technology on a secondary basis and wireless local-loop technology associated with CDMA, investigating the effect of recent regulatory changes that facilitate access to spectrum by fixed phone enterprises.

In order to clarify these experiences, the article will address recent changes in Brazilian public policy on telecommunication in an environment of increasing difficulties on keeping both services – fixed and mobile – apart. The convergence between fixed and mobile telephone services can be understood by analyzing fixed wireless access (FWA) regulation changes and mobile technologies impacts on new entrants willing to offer telephony service in underserved areas with innovative business models and using new technologies (WLL and GSM/CDMA) that allow them, to some extent, to take advantage of cost and application benefits of mobile networks.

These issues will be addressed in two parts: the first part focuses on (1) how FWA/WLL and GSM networks have been deployed by fixed phone companies in Brazil focusing on three cases – “*Vésper Portátil*”, “*Embratel Livre*” and “*Local or Ruralfone*”. In the second part, the article addresses (2) the regulatory tensions surrounding the definition of fixed and mobile services, especially recent shifts on equipment regulation related to the concept of restricted mobility and other regulatory trends pertaining universal service in low-income and low-density areas.

MOBILITY ON FIXED SERVICES: CASES

Three cases summarize the main issues surrounding mobility on fixed low-bandwidth services in Brazil. They will be here referred to by their commercial names related to FWA/WLL applications or direct use of mobile technologies, namely GSM: *Vésper Portátil*; *Embratel Livre*; and *Local*.

The *Vésper Portátil* case became noteworthy for its unique characteristics: firstly, the expectancy generated by a new entrant use of FWA/WLL for last mile access in the well-established zone of Sao Paulo dominated by the incumbent local exchange carrier *Telefônica*; secondly, the importance of *Vésper* eventual success/failure for the regulatory framework designed to implement competition *pari passu* through asymmetric regulation over incumbents and new entrants; thirdly, the outcome of judicial discussions pertaining *Vésper Portátil*; and finally, *Vésper* ostensive defense of FWA/WLL as part of a new business model to be employed in order to starting Fixed Switched Telephone Services (STFC) local-loop competition. This last reason was then reinforced by a Brazilian Development Bank analysis of the auction for STFC new entrants of 1998, in which FWA/WLL was recognized as an important application to guarantee the fulfillment of new entrants’ coverage goals (Dores, Sardenberg and Castro, 1998).

Bell Canada, Velocom and Qualcomm instituted *Vésper* to provide STFC in the state of Sao Paulo and other 16 states in Brazil, initially competing with two local carriers for fixed phone services: *Telefônica*, in the state of Sao Paulo, correspondent to the area with highest income and population density in Brazil, that is Region III of the General Plan of Concessions (PGO); and *Telemar*, in the area correspondent to Region I of the PGO as shown below.

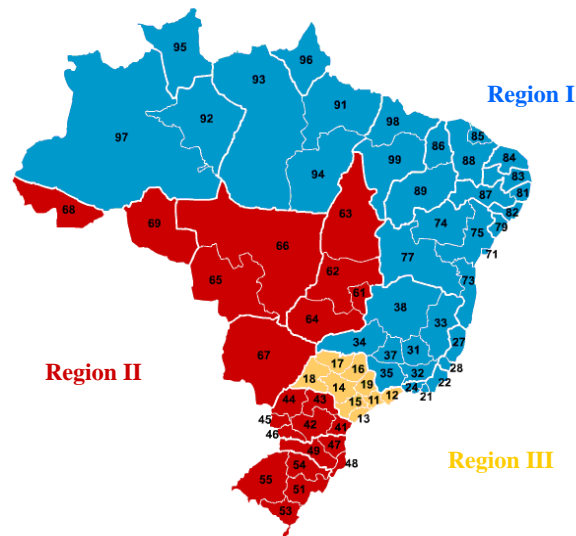


Figure 1. General Plan of Concessions and Regional Area Codes Distribution in Brazil

The expected use of FWA/WLL by *Vésper* network was confirmed in 2001 by ANATEL, which authorized the use of cellular handsets for FWA/WLL applications as a substitute for STFC fixed customer premises equipment. *Vésper* chose a user’s portable terminal equipment with CDMA IS-95 technology and 14.4 kbit/s, which admitted roaming and handoff-handover. *Vésper Portátil* also offered the ability of originating calls in a radius of up to 9 km around customers’ home or office and mobility area of a call in progress equivalent of the city of Sao Paulo area and two nearby cities: Sorocaba and Jundiaí.

The above described characteristics of a certain degree of mobility gave cellular companies enough arguments to blame FWA/WLL from invading the arena reserved by the regulator for SMP systems. In 2001 and 2002, *Telemar* and *Telemig* filed administrative complaints in ANATEL against *Vésper* deployment of FWA/WLL based phone services. In 2002, a

Public Services Bureau decision suspended *Vésper Portátil* deployment, but was later revoked to determine that *Vésper*'s FWA/WLL services should be limited to so-called *portable terminals mobile restricted zones*, preventing any new deployment before ANATEL certifies the accomplishment of the new expected conditions by *Vésper Portátil*. In 2002, cellular companies also filed suit in Rio de Janeiro judiciary branch arguing that *Vésper* was emulating mobile facilities restricted by federal regulation to mobile licenses. On December 18, 2008, the Superior Court of Justice stated that the mere technical possibility of handset mobility beyond the geographic area of the client's home or office does not disrespect STFC commitment to fixed service licenses.

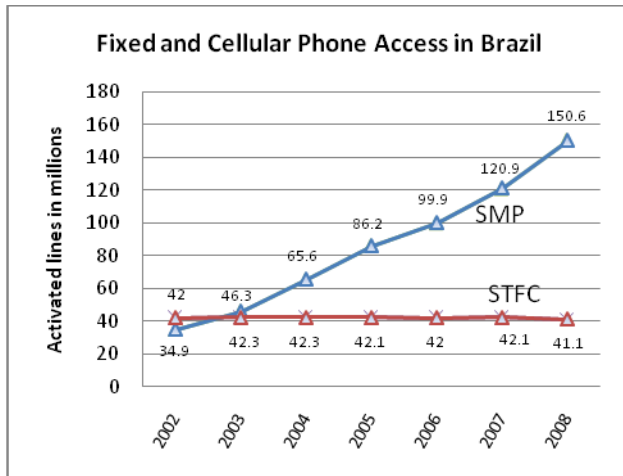
The *Vésper Portátil* case reveals a regulatory landscape in which the regulator struggles to draw the line between fixed and mobile telephone services although reluctant in adopting mobility as SMP exclusiveness. This perspective is embedded in the only specific limit adopted to FWA/WLL deployment in STFC networks: a variable mobility area correspondent to the geographic area of the user's home and office.

The second case of interest is related to *Embratel*'s wireless local loop system. Until 2002, *Embratel* carried out a role in the Brazilian telecommunication scenario very similar to that played by AT&T after the Bell System divestiture, that is as a long-distance exclusive franchisee. *Embratel* initiated its local loop services only on December 2002 competing inside the stronghold of well-established incumbents, such as *Telefônica*, *Telemar* and *Brasil Telecom*. Not surprisingly, *Embratel*'s business model headed toward FWA/WLL facilities, applying them on its local telephony service over fixed-mobile network. This service called *Embratel Livre* is officially referred to as a former FWA/WLL service from *Vésper*, which was acquired by *Embratel* on December 2003, although *Embratel*'s experience with FWA/WLL started earlier, in 2002, as a subscriptionless service (*Embratel*, 2007) in two cities – *Fortaleza* and *Recife*. On May 8, 2002, *Embratel* certified the anticipation of its universalization goals and applied for local STFC permits in the remaining three regions of the General Concessions Plan – Regions I, II and III (Figure 1). On August, 2002, *Embratel* was then authorized to provide local fixed phone services in all regions of the Brazilian territory becoming the first national competitive local exchange carrier after the privatization of the *Telebrás System*.

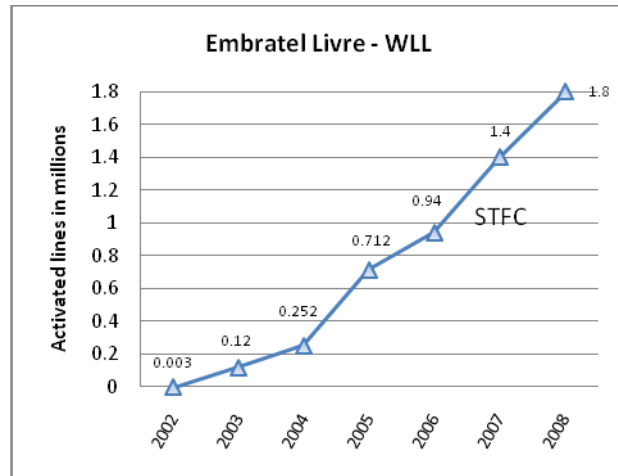
Embratel Livre, *VipLine* and *NetFone* services were designed by *Embratel* to penetrate in the local exchange carrier market, but only *Embratel Livre* aimed at low-income users. This service plan resembled *Vésper Portátil* in many ways such as the ability of originating calls in a radius of up to 3.5 km around customers' home or office (Capella, 2008) and the ability of performing roaming and handoff-handover using CDMA technology. After *Vésper* acquisition by *Embratel* in 2003, their FWA/WLL services were then gathered under the expression *Embratel Livre*, which has been reported as the only *Embratel*'s strategy for increasing penetration of fixed local telephone services among low-income users.

In response to mobile companies administrative complaints of July, 2004, ANATEL required *Embratel* to convey through national press releases that *Embratel Livre* could only be guaranteed inside subscribers' home or office. ANATEL's administrative decisions also prevented *Embratel* from promoting commercials or any advertising that imply to consumers that the fixed phone service called *Embratel Livre* could mimic mobile phone services. It also determined that *Embratel* develop a parameter by which FWA/WLL mobility do not surpass three adjacent radio base stations or alternatively another parameter proposed by *Embratel*. Until the present date (2009), *Embratel Livre* continue its rising penetration on the fixed phone market with plans designed to low-income users, although mainly in high-density high-income areas. *Embratel Livre* covered 101 cities on September, 2008, from which only four of them had less than one hundred thousand inhabitants. From a universe of 101 cities, those with less than 150 thousand inhabitants represented only 2.2% of the total amount of *Embratel Livre* users in Brazil. The city of Sao Paulo alone was responsible for 21% of *Embratel Livre* users in Brazil on September, 2008.

The graphs below show an increasing penetration of *Embratel Livre* since the beginning of its deployment in comparison to the behavior of the Brazilian fixed and mobile telephone subscriber base. It depicts FWA/WLL characteristics of mobility and low cost by mimicking mobile phone behavior and by detaching itself from the stagnation or even downturn trend of the fixed phone subscriber base in Brazil.



Source: ANATEL



Source: Embratel Quarterly Financial Reports of 2006, 2007 and 2008; Embratel Annual Reports of 2003, 2004, 2005, 2006 and 2007; Embratel presentation for the ANATEL's Advisory Council regarding the PGO Public Consultation, of August 22, 2008; Report 2007 – ANATEL 42 years.

Although *Embratel* emphasizes FWA/WLL applications as its new business model for low-income user access, this does not mean that the company proposes the fall of the boundaries between STFC and SMP. The chosen business model – subscriptionless service, low-cost deployment, handset economy of scale, senior end-user profile – is satisfied with the enhanced value produced by a restricted mobility. The main regulation desire for *Embratel* is vividly expressed by its Regulatory and Institutional Affairs Executive Director as “neighborhood mobility” (Capella, 2008).

The last case to be analyzed is called *Local*. It deals with the use of GSM cellular technology over STFC network and combines the appeal of a new entrant (*Vésper Portátil* case) with the success of a well-planned business model (*Embratel Livre*). Nevertheless *Local* goes beyond this mixture by betting on low-income communities located in regions not suitable to new entrants' usual desire for high-density areas. From this perspective, *Local Telecom* fits almost perfectly in the microtelco concept: a small-scale telecom operator that combines local entrepreneurship, innovative business models and low-cost technologies to offer ICT services in areas of little interest to traditional operators (Galperin and Bar, 2006).

Local refers to a fixed telephone service in Brazil provided by a subsidiary of an American enterprise instituted in 2002 called *Ruralfone Incorporated*. ANATEL granted *Local* with a license, in 2004, to provide STFC in the regions 85 to 88 of the General Plan of National Codes correspondent to the states of *Ceará*, *Pernambuco* and northern *Piauí*, a low-income low-density region located in the northeastern of Brazil (see Figure 1).

This local telephone service was launched on May, 2005, in the city of *Quixadá*, then with approximately 74,000 inhabitants, in the state of *Ceará* (Figure 1: Code 88), with a GDP of less than 1/3 of the national average (IBGE, 2008) in a region characterized by low GDP and low population density (Macêdo, 2008). After three years in operation, *Local* surpassed the incumbent local exchange carrier *Telemar* in number of subscribers: 2,600 *Local* subscribers and 2,500 *Telemar* subscribers as opposed to approximately 3,000 *Telemar* subscribers in the beginning of *Local*'s operation, raising *Quixadá*'s teledensity 70% in this period¹ and reaching an average of 400 minutes of use per month, in July 2008, as opposed to 261 minutes of fixed phone national average use and 73 minutes of mobile phone national average use. From 2005 to 2008, *Local* expanded its network to three more hinterland cities. The initial plan of reaching 17 cities by the end of 2008 was not possible due to difficulties of obtaining the necessary financial support, but *Local* accomplishments caught the attention of the World Bank. In 2008, the International Finance Corporation (IFC) granted *Local Telecom* with a three million US dollars loan betting in it as a testing field for this low cost telecommunication model to be replicated in other emerging countries in America, Africa and Asia. With this new support, by the end of 2009, *Local* plans to expand its system to an additional 10 small hinterland cities in the states of *Ceará* and *Pernambuco*. This successful approach of *Local* even in one of the most difficult places to business start-up in Brazil (World Bank, 2006) is mainly due to four factors: (1) small-scale local-entrepreneurship-oriented company; (2) low prices; (3) low costs; (4) and finally the usually overlooked important role played by an appropriate

¹From May 2005 to November 2008, the fixed phone average national teledensity declined from 21.54 to 21.29. At the same period, the average teledensity of the state of *Ceará* also declined from 9.89 to 8.86.

regulatory environment that builds the foundation for these previous three factors, especially rules concerning spectrum availability for new technologies, incumbents interconnection duties and cellular frequency bands assignment to STFC usage on a secondary basis.

In addition to these microtelco characteristics, the Brazilian peculiar regulatory framework must be pointed out as an important factor, since it was then hospitable to innovative use of new wireless technologies for STFC deployment through certain measures including the following: regulated interconnection fees in order to prevent incumbents local exchange carriers and long-distance carriers from suffocating new entrants; a changing legal landscape from quarantined exclusive franchises to regulatory incentives towards competition in the last mile; and last, but not least, cellular frequency assignment for STFC usage on a secondary basis.

The combination of new and low-cost technologies, micro and small enterprises providing locally tailored value-added services, and supportive public policy such as spectrum license exemptions have been portrayed as critical innovations for the desired wireless revolution in rural and under-served communities (Best, 2003). Local case not only confirms the viability of this recipe for individual fixed-line phone deployment towards universal service (Msimang, 2003), but reminds us of an innovative public policy that transfers the benefits created by a large-scale wireless product – GSM handsets – to new entrants in fixed service markets, which are granted with spectrum license exemption – SMP frequency use on a secondary basis – in frequency bands primarily assigned to cellular services. These two characteristics deserve to figure among Michael Best's supportive public policy critical innovations. It is true however that this Brazilian public policy was not depicted initially to serve as a competitive policy tool, but rather as an incentive to STFC incumbents for fulfilling their universal access duties through low-cost wireless local-loop infrastructure, an issue that will be addressed in the following section.

REGULATORY TENSIONS ON THE FIXED-MOBILE FRONTIER

Vésper and Embratel cases, along with the appearance of new technological advances on restricted radiation devices, such as Wi-Fi coverage improvement and WIMAX mobility, produced a whole new kind of rules designed to reinforce the limits between mobile and fixed services that were enacted from 2005 to 2008 in Brazil.

Fixed Switched Telephone Service (STFC) and the convergent Multimedia Communication Service (SCM) providers have been required by recent ANATEL's resolutions of 2005 and 2006 to employ equipment with restricted mobility (*mobilidade restrita*) in the frequency bands of 2.1 GHz (2170 MHz to 2182 MHz), 2.5 GHz (2500 MHz to 2690 MHz), and 3.5 GHz. The exact meaning of restricted mobility though was postponed to a future regulation enacted only in 2008. Meanwhile, the frequency band assigned for STFC fixed wireless access applications, namely 1880 MHz to 1885 MHz, 1895 MHz to 1910 MHz, 1910 MHz to 1920 MHz and 1975 MHz to 1990 MHz, as well as the certification of fixed service radio systems for frequency bands above 1 GHz, remained untouched until 2008.

In 2007, ANATEL carried out a public consultation proposing to incorporate the terms mobility feature (*função de mobilidade*) and restricted mobility feature (*função de mobilidade restrita*) in the text of the Resolution 368/04 pertaining digital transmitters and transceivers for fixed service in point-multipoint applications in the frequency bands above 1 GHz. By prohibiting these devices from activating their mobile capabilities, ANATEL aimed at preventing mobile broadband new technologies from being used by fixed services, especially the mobile version of WIMAX technology, which is on the SMP providers wish list. Limits imposed over roaming and handoff-handover capabilities of transmitters and transceivers operating above 1 GHz also affects FWA/WLL devices, but since they were not the regulatory main target, in practical terms, these limits have been enforced mainly for WIMAX frequency bands of 2.5 GHz, due to a dispute between MMDS providers – who historically use 2.5 GHz frequency band in Brazil for crescent market share in voice and broadband services (Teletime, 2008, pp. 146-147) – and SMP providers anxious to use mobile WIMAX as an IMT-2000 standard for their 3G networks on the WIMAX nowadays most efficient frequency band (Shaikh, Shaikh and Mirza, 2009) at least below 3GB monthly data usage per subscriber (Motorola, 2007). This dispute concerning WIMAX is important here to clarify ANATEL's focus on broadband fixed-mobile frontier, which allowed FWA/WLL mobility to be treated as a marginal regulatory issue, in which mobile boundaries can be addressed on a case by case basis as soon as they do not affect the mobile companies rate of return expected for their investments (Santoyo, 2008). The main message of latest ANATEL's regulation is apparent: even when new wireless local loop technologies allow a certain area of mobility for fixed telephone services, these services must abstain from mimicking mobile services core characteristics.

These tensions on the mobility limits of fixed phone services also reached the most important official document pertaining telecommunication public policy in Brazil: the General Concessions Plan (PGO). This document specifies which telecommunication services are bound to public regime, among other competitive issues related to these services. The first PGO was enacted on April 3, 1998 and attributed public regime to the Fixed Switched Telephone Service (STFC) provided by the previous dominant state owned *Telebrás System*. In doing so, the PGO defined STFC by enumerating its basic

characteristics as “voice and signals transmission”, “communication between specified fixed points” and “use of telephony process”. As part of the process of substituting the 1998 PGO for the present 2008 PGO, ANATEL launched a public consultation, in which *Embratel* suggested the elimination of the word “fixed” from PGO definition of STFC as a service between “specified fixed points”. The final text approved by ANATEL’s Board of Directors showed the agency’s intention to make STFC fixed dimension more flexible, but the contributions that followed from ANATEL’s Advisory Council and the Ministry of Communication reestablished the original STFC concept finally approved. Therefore, 2008 PGO still defines STFC as a service that provides transmission of voice and signals between specified fixed points through a telephony process. Although both 1998 PGO and 2008 PGO had never specified the meaning of telephony process or fixed points, the presence of these characteristics in a presidential decree put more obstacles of an eventual regulatory movement towards universalization through mobility on FWA/WLL systems.

There are also regulatory tensions in the SMP frequency use on a secondary basis by STFC networks. The *Local* case is a successful example exactly because it has been deployed in regions characterized by low-density and no SMP competition in the same GSM frequency band. Otherwise, *Local*’s STFC systems would have to operate in an environment in which STFC connections must accept harmful interference from any SMP new entrant. As a matter of fact, ANATEL’s present regulation on secondary use of SMP frequency bands by STFC network was not depicted as a permanent policy strategy. It was designed by ANATEL’s Board of Directors to help STFC incumbents in anticipating their universalization obligations scheduled to 2003 and was predicted to be deployed by STFC operator of the same group of the correspondent SMP operator in order to facilitate frequency coordination and therefore prevent harmful interference between STFC wireless systems and SMP network. Although the primary reasons to SMP frequency bands assignment to STFC use no longer exist, this assignment lingered on as a regulatory tool in order to increase the efficiency of spectrum use by taking advantage of the natural difference of frequency bands demanded by SMP carriers in high-density areas (2 x 15 MHz) and low-density areas, where 2 x 5 MHz frequency bands suffice for deploying STFC GSM networks (Pereira Filho, 2008).

The future of secondary frequency use for universalizing fixed phone services in low-income low-density areas therefore depends upon regulatory measures of promoting efficient use of spectrum, which can be performed by a pool of approaches, some of them already suggested in other studies: (1) assignment of secondary use of frequency bands in small and medium cities; (2) creation of administrative proceedings of Additional Licensed Uses in order to allow new competitive players to point out inefficient frequency use by a service currently provided on a primary basis (NEXTEL, 2008); (3) recognition that SMP providers in low-density areas have the burden to prove the need of the same frequency band assigned for providers in high-density cities (Pereira Filho, 2008); (4) acceptance of new methodologies of promoting spectrum efficiency, such as spectrum pooling, designed to allow the use of frequency bands on a secondary basis without interfering in the primary use of it (Capar, Martoyo, Weiss and Jondral, 2003); (5) elimination of barriers to the development of secondary markets for spectrum use, in spite of the fact that spectrum trading activity may be of less importance in areas where scarcity of frequency is low (Xavier, 2005).

CONCLUSION

So far, the conjunction of an enabling regulatory environment with innovative business models, wireless technologies applied to STFC networks, along with user satisfaction with mobility restrictions – from a mobile service perspective –, or expansion of mobility capabilities – from a fixed service perspective –, resulted in crescent deployment of FWA and GSM systems as fixed telephone services in Brazil.

This broader picture however hides an unusual plexus of regulatory tensions, frequency sharing issues, presence of small-scale and national-scale new entrants, mobile technologies usage (WLL/CDMA and GSM) and high-density senior user areas *versus* underserved low-income areas.

The cases described show that different strategies were used for different purposes and conditions. On high-density high-income areas, in which *Vésper Portátil* and *Embratel Livre* provide STFC, FWA/WLL application has proved to be an important tool to reverse STFC deployment stagnation as part of a bigger business model of powerful new entrants capable of using FWA/WLL as a market-oriented service among other broadband or VIP corporative plans. In this case, FWA/WLL functions as a successful business model oriented towards low-income senior populations satisfied with subscriptionless low-cost telephony services restricted to neighborhood mobility. Previously referred limits on mobility experienced in the *Embratel*’s case show that a service unified license would facilitate the implementation of such approach. *Local* case, in turn, applies GSM mobile technology and focuses on low-density low-income areas providing low-price services through two simple service plans as a small-scale operator present in the local community life. In sum, *Local* case fits in the microtelco model and adds to it SMP frequency bands assignment to STFC platform on a secondary basis as a regulatory principle

designed to improve: (1) spectrum efficiency in low-density areas characterized by low competition; (2) competitive low-cost fixed services; and (3) mobile handsets economy of scale benefits.

Both successful cases rely on regulatory issues presently under discussion in the Brazilian independent authority of telecommunications and, at some level, under peril. The Brazilian rules enacted from 2005 to 2008 were designed to reinforce the limits between mobile and fixed broadband services, which kept FWA/WLL out of the bull's-eye of ANATEL main disputes, but the failed 2008 proposition of relaxing the boundaries between fixed and mobile telephone services along with administrative and judicial disputes show that FWA/WLL issue has kept the attention of the sector. The microtelco business model applied in the *Local* case described in section 2 relied mostly on the secondary use of SMP frequency bands with future obstacles unsolved by present regulation, such as the fragile situation of a fixed phone company using SMP frequencies if a new entrant demands the same frequency bands currently in use by the small-scale fixed phone company. Similar problems with secondary use of cellular frequency bands occur in an eventual scenario of competitive players concurring for the same SMP frequency bands on a secondary basis. For all these reasons, the future of microtelco-style enterprises for low-income low-density areas relies, in Brazil, on telecommunication policies to be done in order to fill the regulatory gap by pondering principles of universal access, spectrum efficiency and fair competition, preserving such endangered initiatives of universal service deployment. Without a public policy oriented to preserve an asymmetric regulation towards restricted mobility on FWA/WLL systems designed to reverse STFC stagnation trend in high-density high-income regions, on one side, and a public policy oriented to preserve the benefits of STFC usage of cellular technologies (GSM) in SMP frequency bands on a secondary basis for low-income low-density regions, on the other side, the future of these innovative ways of increasing universal services will remain uncertain.

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