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Local Loop Unbundling

A Market Scan within the Context of the Telecommunications Industry in South Africa

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Edited by Alka Sood

Evidence suggests that LLU is of suspect efficacy in bringing about its intended results, chiefly increased access to landline services like broadband internet and lower service costs. This paper proposes that LLU may well be poorly suited in a modern telecommunications landscape, having been conceived at a time when landlines were dominant and mobile telephony and Internet services were in their infancy. Within developing economies, the primary ailment is the unavailability of modern telecommunications due to underdeveloped infrastructure. Consequently, developing countries would derive far greater benefit from additional investment in modern telecommunications infrastructure, thereby increasing access to services and potentially fostering facilities-based competition that would lead to lower prices.

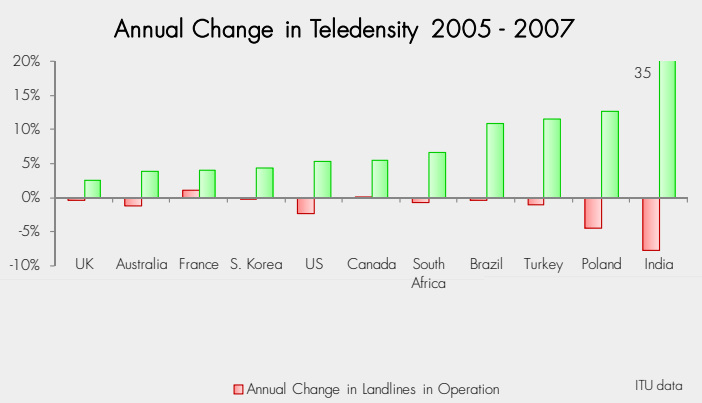
This article seeks to evaluate the likely risks and potential benefits of instituting local loop unbundling (LLU) in emerging economies. Our study looks at twelve jurisdictions where LLU has been adopted or is under consideration. We look at the effect of LLU on market response and whether alternative regulatory tools would be more effective. As well, the study comments on the impact of LLU on development of fixed-line infrastructure, penetration of fixed-line telephony, and broadband internet and fixed-line market structure.

Introduction

Local Loop Unbundling ("LLU") first emerged following widespread privatisation and liberalisation of landline telephone services during the 1980s and 1990s. LLU was initially conceived as a means of introducing competition into markets that were previously dominated by an incumbent operator, usually a state-owned monopoly. The majority of countries that adopted LLU did so at a time when the Internet and mobile telephones were still in their infancy, and landlines were still primarily used for telephony. Landline teledensity was usually extremely high when LLU was implemented (typically over fifty percent or one landline in operation for every two or fewer residents). Since then, the telecommunications landscape has undergone a period of technological change, characterized by rapid growth in mobile telephone usage and Internet subscribership as well as rapid improvements in landline network technology. Following this period of technological upheaval, the number of landlines in operation worldwide has been in steady decline, and the role of landlines has evolved from basic telephony services to the provision of next-generation services like high-speed Internet and on-demand video and television. These and other factors have left LLU a regulatory relic of a bygone era, unsuited to the realities of modern telecommunications.

LLU obliges network operators (most often an incumbent) to grant entrants or competitors access to certain access network elements under regulated conditions. It also carries the obligation for incumbent operators to interconnect with entrants. The rationale for LLU is relatively simple - landline infrastructure is expensive and cannot be easily duplicated; in the absence of regulatory intervention competition in downstream services would become limited or unfeasible. Providing entrants or competitors with regulated access to the incumbent's network, it is hoped, will enable them to compete effectively, thereby promoting fair retail prices and improved service. However, recent advances in telecommunications have created alternatives to landline-based services, calling into question the need for local loop unbundling, which is costly, time-consuming and administratively cumbersome for not only operators, but regulators and consumers as well.

Experience and academic research has shown that LLU can be a risky policy. An incumbent (or unbundled network operator) has no incentive to invest in new or unproven technology because competitors would have access to the same technology at cost without having to bear any financial risk[1]. Likewise, incumbents are likely to wait to invest in network improvements until the passage of time has reduced the cost of investment to the point where a competitor could also afford to invest in the same technology[2]. LLU can also create harmful price distortions with deleterious consequences. Should LLU rates be set too high (above cost), new entrants will be unable to compete with the incumbent. If unbundled local loop rates are set too low, entrants may profit by 'cream skimming' the incumbent's most profitable services, which makes network development unnecessary on the part of entrants and financially unviable for the incumbent, further endangering technological advancement.



There is some evidence that suggests that the unbundling of fixed lines may have been beneficial to nations with highly-developed landline networks that were primarily motivated by a desire to increase competition and/or decrease the cost of associated services. However, in South Africa, increasing access to telephony-based services, especially broadband Internet, is a key regulatory priority, and LLU is not conducive to achieving this objective. Furthermore, LLU may not contribute sufficiently toward increasing quality of service, promoting market competition or lowering cost of service, which are equally important regulatory concerns in South Africa.

In this article we set out to evaluate the likely risks and potential benefits of instituting local loop unbundling in emerging economies with relatively underdeveloped fixed-line infrastructure, South Africa in particular. We assess the effects local loop unbundling has had on a variety of jurisdictions that have either adopted or considered adopting LLU: Australia, Brazil, Canada, France, Hong Kong, India, Poland, South Africa, South Korea, Turkey, the United Kingdom and the United States. Emphasis has been placed on measuring the market response to the institution of local loop unbundling or alternative regulation. The effects of LLU on i)

[1] **Innovation, Investment, and Unbundling**, in *Yale Journal on Regulation*, vol. 17, Jorde, Sidak & Teece. 2000.

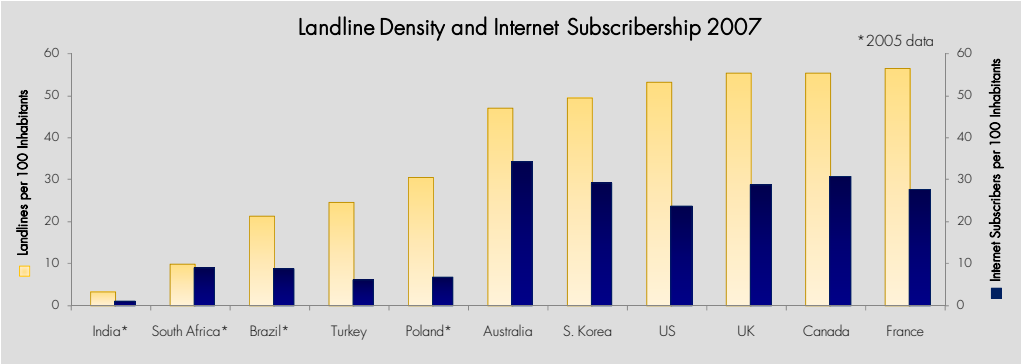
[2] **Do Unbundling Policies Discourage CLEC Facilities-based Competition**, in *Topics in Economic Analysis & Policy*, vol. 4: no.1, article 1, Crandall, Ingram and Singer, 2004.

development of fixed-line infrastructure ii) penetration of fixed-line telephony and broadband internet and iii) fixed-line market structure were of particular interest in our review.

Modern Landline Telecommunications

Basic copper-wire networks, once the foundation of telecommunications infrastructure, have been rapidly outpaced by alternative technologies. Fixed-line telephony has been increasingly displaced by mobile communications, and the provision of next-generation landline services like broadband Internet and high-definition television require network upgrades including fibre-optic cables and links. Traditional fixed-line infrastructure is in decline in throughout most of the world. From 2005 to 2007, the number of landlines in OECD-member nations decreased, on average, by approximately seven percent. Conversely, mobile communications grew rapidly over the same period as cost-saving innovations resulted in explosive uptake of mobile technology in the developing world. This trend is even more apparent in emerging economies such as Turkey, Poland and India.

For policy-makers and regulators, these trends present diverse challenges. In many developed nations, such as the UK, Australia, France, South Korea, US and Canada, with established fixed-line networks, landline operators employ more people and support more pensions than either country's total automotive industry which create socioeconomic challenges related to their decline[3].



To further compound matters, landlines are heavily relied upon to provide universal access and other unprofitable, but socially desirable services. As alternatives to fixed-line telephony take root, high network maintenance and legacy costs must be borne by fewer subscribers, making the classic business model for a fixed-line operator increasingly unviable and creating increased burdens on the state in the form of additional subsidies and/or decreased tax revenues. To some extent, this effect may be mitigated as landline operators upgrade their networks or merge their networks with mobile networks in order to provide so-called 'triple-play' services (fixed and/or mobile telephony, Internet and television) thereby creating new infrastructure, promoting innovation, improving consumer choice and increasing competition, which could help place downward pressure on prices[4].

In emerging economies, telecommunications development has not followed the incremental pattern typical of most developed countries. Low fixed-line density in the developing world has resulted in the widespread adoption of less-expensive mobile telephony as the dominant telecommunications platform. Mobile telecommunications-based alternatives to traditional landline services like online banking are rapidly emerging. Fixed-line density growth in these countries is generally stagnant as operators are reluctant to invest in costly and increasingly obsolescent copper-based networks. Modern fibre optic technology offers impressive capabilities and significant economic benefits. However, fibre optic networks are an extremely expensive investment out of reach of all but the largest network operators – telecoms giants Verizon (US) and NTT (Japan) both spent over $US 60 billion in capital expenditure rolling out fibre networks between 2004 and 2007. As these figures show, large-scale private investment in fibre optic networks is economically unviable in most developing countries in the absence of government assistance.

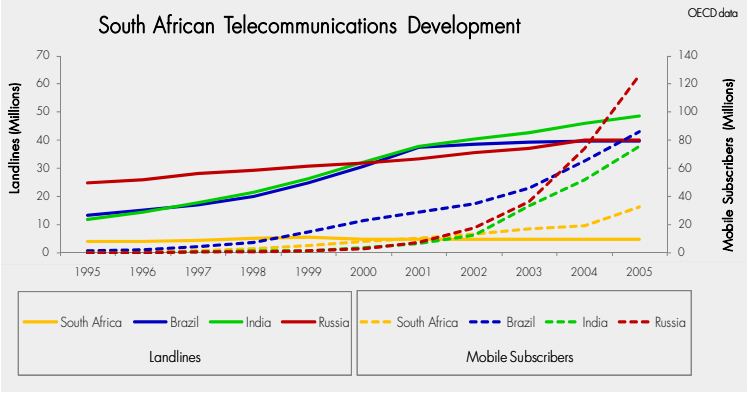
Does Unbundling Increase Broadband Penetration?

In the short-term, the lack of landline infrastructure in developing countries often creates difficulty for regulators in meeting service targets for telephone access and Internet penetration, delivery of which are still largely dependent on landlines. In the long-term, underdeveloped landline networks can even stunt economic growth by depriving a country of the stimulus that has been shown to result

[3] **The Decline of the Landline**, The Economist, August 13th, 2009.

[4] In developed countries, large network operators increasingly offer all four of the primary telecoms services – landline telephone, mobile telephone, Internet and cable/satellite television – blurring the distinction between mobile and landline operators and raising additional regulatory concerns regarding anti-competitive behaviour.

from Internet subscribership and other modern telecoms services. Though there are many factors that determine Internet penetration, analysis of ITU and OECD data revealed a strong correlation between landline development and Internet subscribership. Every country included in our study with 30 or fewer landlines per 100 inhabitants had a dismal Internet penetration rate – below ten percent in all cases. This may be partly explained by the fact that prices for Internet services tend to be higher in countries with low fixed-line densities because the high cost of the network must be recovered by fewer customers. An especially troubling consequence of diminished landline development is reduced broadband (high-speed) Internet penetration. A 2009 study conducted by the World Bank found that a ten percent increase in broadband Internet penetration can stimulate a 1.2 to 1.4 percent increase economic growth in GDP in developing countries[5]. This implies that governments should be mindful to enact policies that do not inhibit network development while giving serious consideration to extending subsidies or other incentives that encourage network roll-out, thereby stimulating both broadband Internet uptake and economic growth.



The South African telecommunications sector is an interesting case study in this respect. The Information Communications Technology ("ICT") sector is largely reliant on the country's well-developed mobile network, which provides telephone service to over eighty percent of all South Africans. Landline infrastructure is significantly underdeveloped (below ten percent nation-wide) and significantly below the average of thirty-six percent observed in countries included in this study. Unsurprisingly, Internet penetration in South Africa is correspondingly low. There are only nine Internet subscribers in South Africa per 100 residents, compared to thirty or more in most developed countries. Landline development in South Africa has been especially poor when compared to its 'sister' BRICS countries (namely, Brazil, Russia, India and China)[6]. In the ten years from 1995 to 2005 the number of landlines in South Africa increased by only eighteen percent – from four million to just over seven million. Over the same period, the number of landlines in other BRICS countries increased far more substantially, between sixty percent in Russia and almost five hundred percent in India. Consequently, Internet subscribership growth in South Africa lagged that of the other BRICS countries. From 2000 to 2005, Internet subscribership in South Africa grew at an average rate of only eight percent per year, while Internet subscribership in Brazil, Russia, India and China increased thirty-five percent per year on average over the same period.

The South African landline market is dominated by the incumbent operator, Telkom SA Ltd. As of 2007, Telkom controlled almost ninety percent of the fixed lines and over three quarters of all DSL (high-speed) Internet subscribers in South Africa. Despite this, Telkom's share of the overall telecommunication market in South Africa pales in comparison to that of South African mobile operators, who account for over ninety-five percent of total telecommunications revenues in South Africa. Telkom's sole fixed-line competitor, Neotel, entered the market in 2006, offering telephony and high-speed internet services through its converged fixed-to-mobile (FtM) network. Policy-makers and analysts have expressed hope that the introduction of competition will provide increased choice, improved services and lower prices for South African consumers – identified as key priorities in a 2007 Local Loop Unbundling Committee report. However, as of 2010 Neotel's market share remains small and their operations are limited to major urban areas. Given the low fixed-line density and low Internet subscribership rates in South Africa, it would seem in the best interests of both economic growth and the public good to expand landline service coverage and increase broadband uptake. It is not surprising, therefore, that a report issued by the Local Loop Unbundling Committee formed by the South African Ministry of Communication identified the "urgent need" to provide South Africans with increased access to broadband and other ICT services[7].

However, leading research indicates that full-scale local loop unbundling (including upgraded copper or fibre optic networks) offers little or no prospect of increasing network coverage or broadband penetration. In addition to creating the risk of imperilling incumbents' financial viability and creating disincentives for incumbents and/or entrants to develop new landline infrastructure, LLU has been shown to have no discernible effect on

[5] World Bank says Broadband is Key to Economic Progress, *Financial Post*, T. Virki, June 30th, 2009.

[6] The OECD has identified Brazil, Russia, India, China and South Africa (BRICS) as major emerging telecommunications markets.

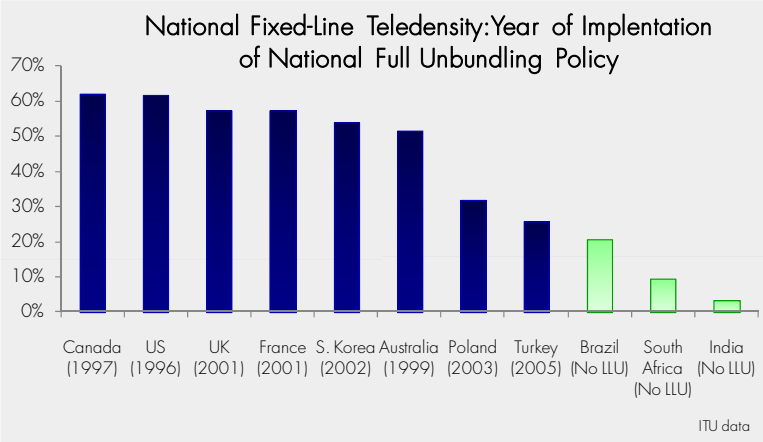
[7] Local Loop Unbundling: A Way Forward for South Africa, *The Local Loop Unbundling Committee*, May 23, 2007.

broadband uptake. A 2002 study of OECD countries found that those countries that had taken an aggressive approach to unbundling experienced negligible growth in broadband penetration relative to countries with no unbundling programme[8].

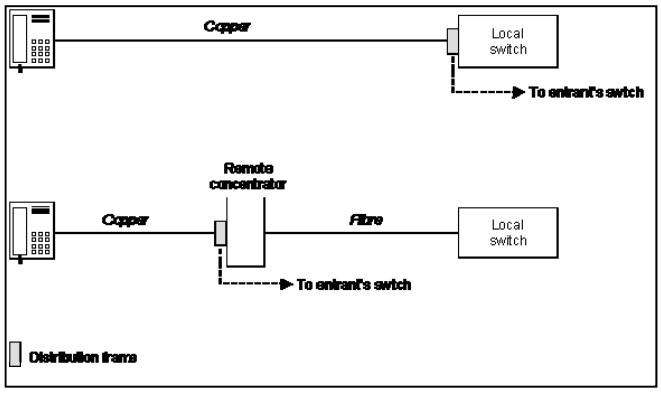
Local Loop Unbundling

Local loop unbundling is intended to provide entrants with a low-cost entry option by allowing them use of the incumbent operators' access network, thereby allowing them to avoid the high cost of building their own access network infrastructure. The anticipated benefits of LLU are increased entry and competition in the provision of voice and/or data services and accelerated adoption of new services (Internet service etc.) Historically, regulators promoted LLU because the local loop was considered a bottleneck service and many incumbent operators in the developed world were once government-owned monopolies that enjoyed distinct advantages over entrants – including access to an extensive landline network that was often built using government funds. Accordingly, expecting entrants to finance the construction of their own access network and then compete effectively with an established incumbent was considered unrealistic. In many jurisdictions, landline network development was at or near saturation when the market was liberalised, making further network expansion unnecessary, redundant or even, in some places, physically impossible. In addition, wireless technology was in its infancy when most LLU regimes were instituted, and no viable alternatives to landlines existed in the provision of either universal telephone access or Internet services.

The telecommunications landscape has since changed, and so too has the role of landlines. Landlines have been outpaced in the provision of telephonic services by wireless technology both in terms of affordability (especially in the developing world) and convenience. In 2003 the OECD predicted that then imminent advances in wireless technology would challenge even landlines' dominance in the provision of Internet and other data services, and such advances have already begun to take hold. Instead, landlines are now best suited to enhanced, high-bandwidth services like broadband Internet and digital television. As a result, any country considering an LLU policy must reflect these changes in their assessments of the risks and potential benefits of LLU. The risks associated with an LLU programme include high administrative and regulatory costs and the disincentives it creates for both incumbents and entrants to invest in new infrastructure, which could critically

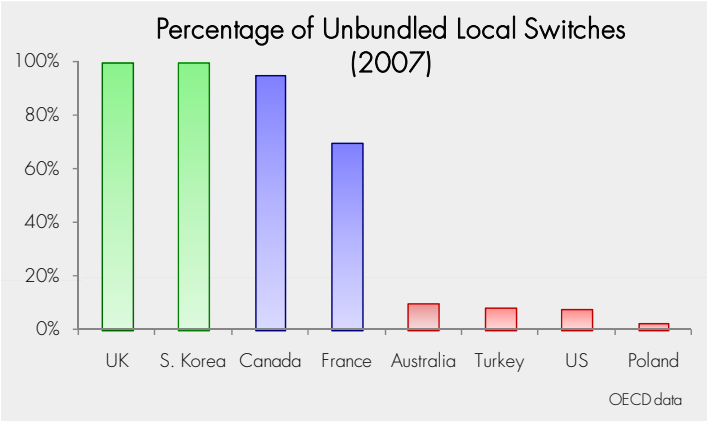


Full Unbundling requires that incumbents provide entrants/competitors with physical access to the local loop and sub-loops via a separate path established at a particular point of interconnection. Theoretically, this point of interconnection could be located anywhere on the incumbent's access network, but in practice co-location occurs at the local switch or at a remote concentrator unit near the local switch.



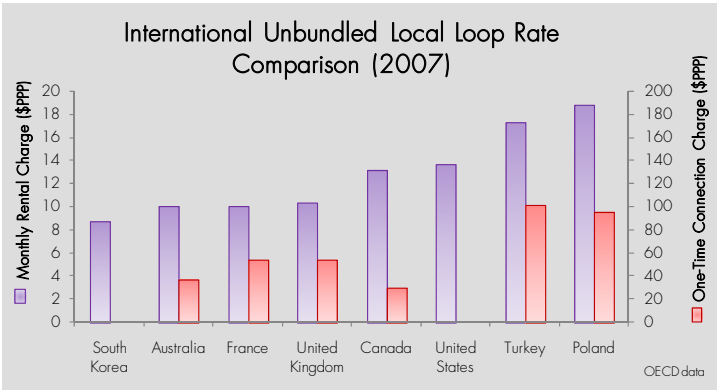
Full unbundling is only possible with copper loops – fibre optic cables are incapable of being physically separated because bandwidth on each physical line is shared among several customers. Likewise, some copper loops may not be able to be unbundled depending on the condition of the copper loops, switching technology employed etc. As noted above, full unbundling requires co-location, which is both expensive and time-consuming and also requires that the incumbent surrender a measure of control over its access network. Conversely, the primary advantages of full unbundling are that it allows market entry into a sector where developing infrastructure is often physically or financially unviable for would-be competitors to an established incumbent.

[8] **Broadband Uptake and Infrastructure Regulation: Evidence from the OECD Countries**, working paper, New Zealand Institute for the Study of Competition and Regulation, Hwell, 2002.



delay the roll-out of next-generation networks and associated services. Regulators have taken a variety of approaches in this arena – some promote full unbundling, others promote line sharing or a combination thereof. (Refer to side bars to understand the differences between full unbundling and line sharing.)

The proportion of local loops that has been fully unbundled worldwide remains relatively small, even in nations with long-established LLU programmes in place and this may be a consequence of the aforementioned time, expense and technical limitations associated with full unbundling. Countries in this study with a full unbundling policy averaged a fifty percent unbundling rate. However, these figures were widely distributed. Only two countries in this study (the UK and South Korea) had unbundled one hundred percent of local switches nationwide as of 2007, while four (Australia, Turkey, the US and Poland) had unbundled ten percent or fewer. Accordingly, in conducting an analysis of the effects of LLU it is necessary to consider not only whether LLU has been formally adopted, but also how many local loops have actually been unbundled to date. In countries like Turkey or Poland, where few very local loops have been unbundled, it is unlikely that



LLU will have as significant an impact on the telecommunications market as it has had in countries like Canada, the UK or US. Korea, where the vast majority of local loops have been unbundled.

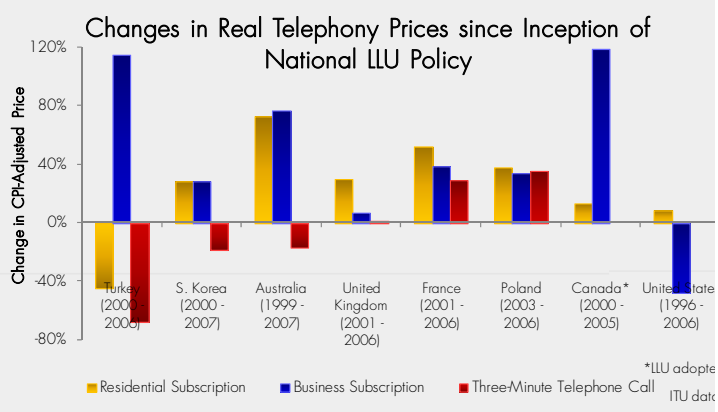
Of the eight countries studied that had full unbundling programmes in place, six (Australia, Canada, France, the UK, the US, Poland, South Korea and Turkey) had a national fixed-line teledensity of over fifty percent at the time of implementation. Conversely, out of the five countries with a national fixed-line teledensity of thirty percent or lower, only two (Poland and Turkey) had full unbundling regimes in place, both of which were the most recently implemented of any in this study (2003 and 2005 respectively).

Full unbundling is typically adopted in countries seeking to lower prices and increase competition, often where an abundance of pre-existing landline networks would make development of additional landline infrastructure redundant. However, in countries with low teledensity or obsolete networks, the benefit of LLU is more difficult to discern. International Telecommunications Union (ITU) research indicates that customers are extremely price insensitive with regard to telephone access, and as a result reduced access prices would be expected to yield only a slight increase in teledensity. However, the same study indicated a strong correlation between higher telephone subscription charges (increased operator revenue) and increased teledensity. As subscription rates rose, operators tended to extend their network to capture additional revenue – one study found that, on average, a US$1 increase in monthly residential subscription rates resulted in a 2.2 percent increase in teledensity. These findings suggest that the social benefits of lower prices associated with LLU could be offset by the economic costs of the consequent suppressed teledensity, including slower uptake of Internet and other services and diminished investment in landline network expansion or improvement.

Local loop charges varied among countries with no uniform pattern, however, LLU rates tended to be highest in countries with the fewest unbundled local loops. The highest monthly rates as of 2007, in PPP terms, were in Poland and Turkey – the two countries that both had the smallest proportion of unbundled local switches and had adopted LLU most recently[9]. In contrast, the lowest rate was in South Korea, which had unbundled one hundred percent of local switches nationwide. This suggests that LLU charges for would-be entrants or competitors are higher when fixed-line teledensity is low – which is likely the result of a higher proportion of shared and common costs for each local loop. High local loop rental charges would restrict the downward pressure on customer prices, which raises further uncertainty as to how effectively a full unbundling

[9] Purchasing power parity (PPP) is an economic monetary unit that reflects the differing purchasing power of currency in different countries. PPP is measured in a uniform (artificial) currency unit that better reflects of the relative affordability of telecommunications services in different countries than do prices expressed nominal currency.

programme would be able to promote competition in a country like South Africa where landline teledensity is significantly lower.

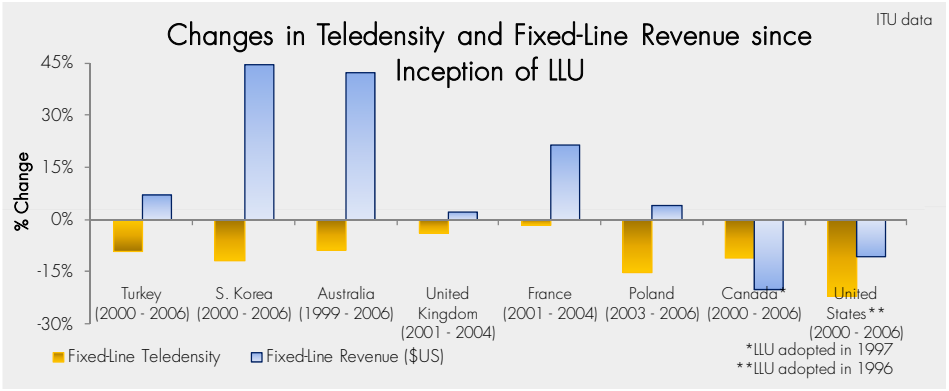


To further assess the impact of LLU on fixed-line telephony prices, our study evaluated the change in the real price (inflation-adjusted price) of telephony services since the inception of each respective national unbundling programme. As would be expected given the considerable differences in both the year of adoption of LLU and the extent to which local loops have been unbundled, the effects of LLU on individual national telecommunications markets was varied. Generally speaking, countries with a full unbundling policy in place experienced reductions in basic telephony prices – on average, the real price (inflation-adjusted price) of a three minute telephone call decreased by a modest six percent since the inception of local loop unbundling. However, the real price of subscription services increased significantly over the same period – residential subscription prices rose by approximately twenty-five percent and business subscription prices rose by forty-six percent.

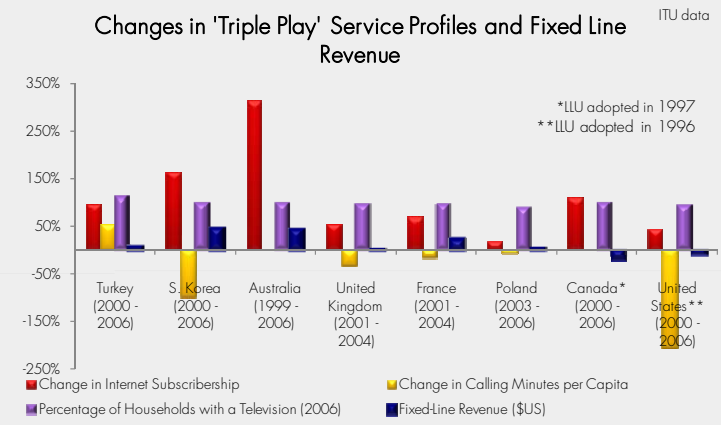
Increased subscription prices may be partly attributable to the inclusion of enhanced services to subscription offerings, but they also suggest a tendency for operators to recover revenue lost from basic telephony prices through subscription services (cross-subsidization), a practice that results in price distortions that can inhibit competition and runs contrary to international best practice. This conclusion seems particularly plausible given the data – in nations where the real price of a three-minute call decreased following full unbundling (Turkey, South Korea and Australia), the real price of subscription services increased sharply over the following five to eight years. Unmetered (unlimited) local calling is included in almost all telephone subscriptions in the United States and Canada, so per-minute prices were unavailable. However, we noted that a similar phenomenon can be observed by the price of public payphones and business subscriptions in Canada. The former did not increase from CAN $0.25 per local call in over 25 years, from 1981 to 2007, but the price of business subscriptions rose nearly one-hundred-twenty percent from 2000 to 2005 alone.

As previously noted, fixed-line telephony has been in decline worldwide since the advent of the mobile phone. As such, it is difficult to assess the changes in the landline telephone market attributable to full unbundling. On average however, fixed-line teledensity decreased in all countries in this study by approximately ten percent in the years following the adoption of full unbundling to 2005. Landline call volumes declined sharply in most jurisdictions over the same period, as measured in minutes per capita (both local and long-distance). From 2000 to 2005, the steep decline in landline call volumes observed worldwide presents a regulatory challenge for full unbundling regimes. Falling call traffic will result in declining revenues and higher per-unit costs for operators unless offset by growth in new service offerings that require enhanced networks, such as high-speed internet or cable television. As a result, any regulator considering implementing LLU must thoroughly assess the deleterious effects declining landline call volumes will continue to have on landline operators and to what extent the institution of LLU could exacerbate these effects.

Despite declining call volumes, landline revenues increased in most nations since adopting full unbundling, however, gains were typically quite modest – eleven percent on average. One possible explanation is the increase in telephone subscription rates observed in every nation in this study except Turkey. It may be the case that more people own a landline telephone subscription, which increases operator's revenues, yet use their landline less frequently than in the past. This phenomenon is readily explained by the rapid rise in worldwide internet subscribership that occurred from the late 1990's through to the mid 2000's – which also encompassed the period in which LLU was adopted in most countries. Hence, the expansion of the role of landlines to include delivery of internet services helps to explain both the observed increase in landline subscribership rates and landline revenue despite the clear reduction in the use of landline telephony and the



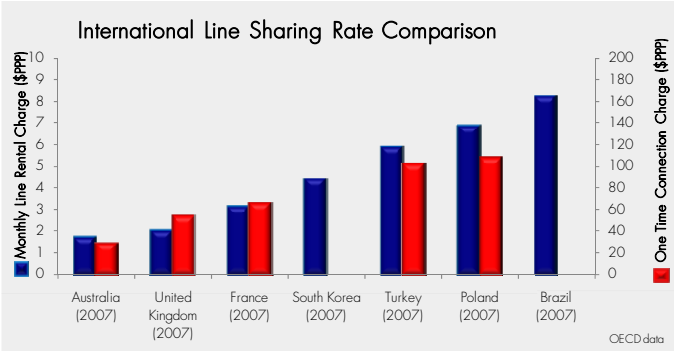
introduction of LLU. Furthermore, advances in landline technologies have enabled operators to deliver television services, and many landline operators are now able to offer all three so-called 'triple play' (telephone, Internet and television) services over the local loop.



The increasingly important role of non-telephony services to modern landline operators is an important consideration in assessing the effects of LLU. Evidence suggests that there is a strong positive correlation between increases in fixed line revenue and increased internet subscribership. The countries with the greatest increase in internet subscribership since adopting full unbundling were Australia and South Korea, and both experienced the greatest increases in fixed-line revenue – over forty percent in both instances. Moreover, a positive correlation between internet subscribership and fixed-line revenues could be observed almost irrespective of changes in landline call volumes. In South Korea, the United Kingdom, France and Poland landline revenues increased despite significant decreases in landline call volumes. One of only two countries that experienced declining landline revenues over the same period was the United States, caused by a precipitous decline in landline call volumes, which fell over two-hundred percent between 2000 and 2006, and comparatively slight increases in internet subscribership, which only increased by forty-three percent. As operators continue to upgrade their networks with fibre optic cables, the relevance and incidence of full unbundling will likely decline, while line sharing policy will likely play an increasingly important role in overall LLU policy.

Line Sharing

Because line sharing typically exists along with full unbundling in most jurisdictions, it is difficult to isolate the effect line sharing has had on individual telecommunications markets. Under mandated line sharing, entrants cannot easily differentiate their services from those of the incumbent and a disincentive is created for incumbents to invest in network upgrades when doing so would also enable competitors to reap the benefits of such upgrades. It follows that line sharing could impede the roll-out of enhanced-network service offerings like high-speed internet and digital television in instances where incumbent networks are not already fully modernised. Likewise, line sharing could impair access to landline services if fixed-line teledensity is low, as operators would not have as great an incentive to roll out additional network if they were required to allow competitors access to the same customers that they are trying to reach.



In PPP terms, shared line rates tend to be inversely proportionate to teledensity. The highest monthly rates observed were in Brazil, Poland and Turkey, the countries with the lowest landline teledensities, while Australia, the United Kingdom and France, the countries with the highest landline teledensities, had line rental charges that were the lowest – less than fifty percent of those in Brazil, Poland or Turkey. This observation is consistent with expectations – per-line costs would normally be higher for operators with smaller networks, as they would be unable to realize the economies of scale achieved by those operating larger networks, like BT or France Télécom.

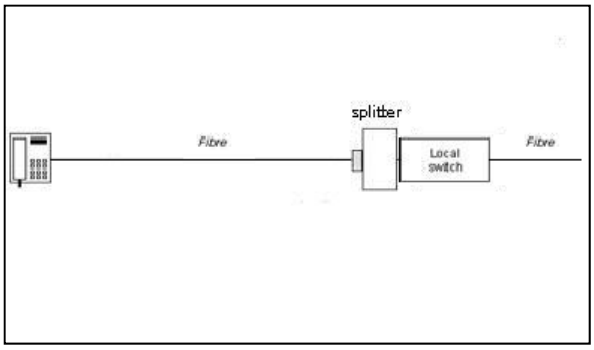
The progression of broadband internet uptake and landline network development in each country were evaluated by observing changes in teledensity, digital main line development and broadband Internet subscribership growth. As observed in countries with full unbundling, the countries in this study (with the exception of Brazil, Turkey and Poland) with a line sharing policy also had very well-developed, modern landline networks at the time when line sharing regulation was passed – teledensity averaged forty-seven main lines per one hundred residents, of which over ninety-seven percent were digital lines. Often, overall landline teledensity subsequently decreased, but the overall proportion of digital main lines increased, suggesting that diminished teledensity was often the result of operators decommissioning obsolete analog lines in favour of higher-capacity digital or fibre optic lines. Many countries, including the United States, Canada and France, also excluded fibre optic lines from mandatory unbundling in the first iterations of regulation. Hence, most of the countries that have adopted line sharing only did so when teledensity was already near saturation, and often excluded fibre networks from mandatory unbundling, which minimised the risk of impeding the roll-out of landline service access or network modernisation programmes.

Conclusion

As noted in the introduction, internet subscribership has grown rapidly worldwide in recent years. Much of this increase in internet subscribership was in the provision of broadband, increased access to which is a key rationale for establishing line sharing. Of the countries in our study, on average, over eighty-five percent of all internet subscribers in 2007 were broadband subscribers, compared with only thirty-eight percent at the time of the establishment of line sharing. Like total internet penetration, broadband internet uptake was shown to be closely correlated with landline teledensity[10]. The countries with the lowest observed broadband penetration rates were Brazil, Turkey and Poland, which had both the three lowest fixed line teledensities and, as mentioned earlier, also the highest line rental charges in PPP terms. Also of note was how the correlation of increased teledensity on broadband uptake appeared to display increased returns to scale. For example, in 2007, Brazil, Turkey and Poland had an average fixed-line teledensity of twenty-four percent, while Australia, South Korea, Canada, France, the UK and the US averaged just over twice that. Yet, in the latter six countries broadband penetration was nearly five times greater, averaging over twenty-five percent, while Brazil, Turkey and Poland averaged less than six percent. This indicates that, in developing countries, an increase in teledensity may yield a much larger corresponding increase in broadband subscribership – possibly as a result of greater network externality benefits to consumers or price reductions resulting from operators achieving greater economies of scale.

Broadband subscribership tended to mirror GDP per capita, as Brazil, Turkey and Poland had the lowest GDP per capita (in PPP terms) as well as the lowest incidence of broadband subscribership, which suggests that the ability of the population to afford broadband internet service is also a significant determinant of its

Line Sharing provides entrants/competitors with access to frequencies or bandwidth on the incumbent's network using the same physical line. To achieve this, a splitter is employed which allows the entrant/competitor the use of designated frequencies over the incumbent's line – usually the higher frequencies used for data services (as opposed to lower frequencies, which are used for voice services). Unlike full unbundling, line sharing does not require physical separation, allowing it to be enacted regardless of the network technology employed by the incumbent. As such, line sharing is most commonly applied to fibre optic and other networks that cannot be physically unbundled. The primary advantage of line sharing is that it doesn't require physical separation, because reserving bandwidth requires lower set-up and administration costs than physical unbundling does while allowing the incumbent to retain control over the entirety of their access network.

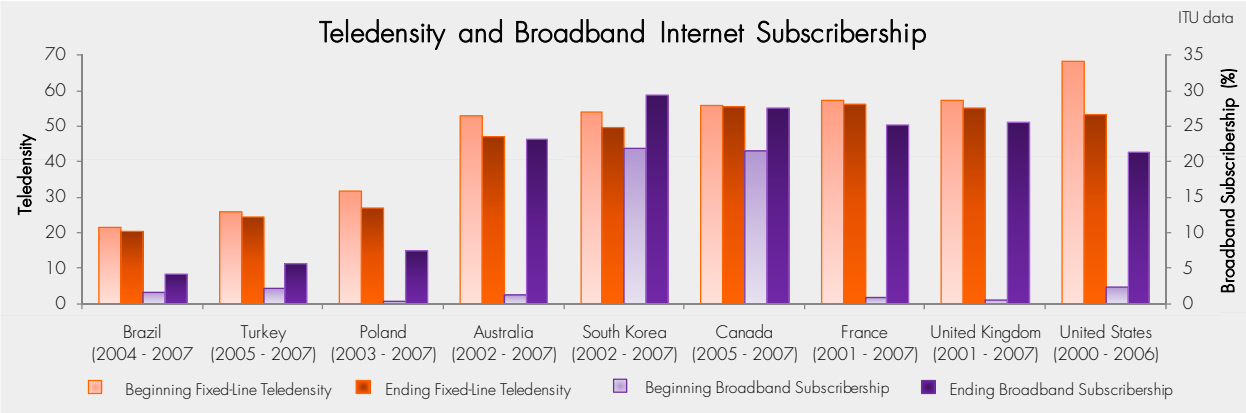


Similarly, line sharing typically exists as part of a greater LLU regime that includes full unbundling, often because fibre optic cables cannot be fully unbundled and hence line sharing is the only method of unbundling next-generation fibre-based networks. In this study, only Brazil and the United States have a line sharing policy that exists in the absence of a full unbundling regime. As a result, it is difficult to isolate the past effects on national telecommunications markets that are directly attributable to line sharing. However, as uptake of fibre-to-the-home (FTTH) networks increases, line sharing will become an increasingly important facet of the regulation of landline networks.

[10] See Appendix B

uptake. Promoting network modernisation, adequate landline teledensity and overall economic prosperity may be more effective than LLU in stimulating broadband uptake in developing countries, particularly where the infrastructure to provide widespread access to services such as broadband Internet does not exist. LLU acts as a deterrent to investment in network improvements, which could actually impede service roll-out, thereby harming consumers.

Recent technological advances have cast further doubt on the debate surrounding LLU. In 2003, an OECD report on LLU stated that emergent alternatives to landlines could potentially render LLU irrelevant in the future[11]. The OECD also identified the role of landlines in modern telecommunications as an instrument in developing a 'broadband society' through modern, advanced network technologies like DSL and fibre. This conclusion mirrors the reasoning underlying the landmark decision made the following year by the Office of the Telecommunications Authority (OFTA) in Hong Kong to withdraw their unbundling policy, called 'Type II Interconnection'. Hong Kong thus became, in 2004, the first developed country to eliminate their LLU policy. The Secretary for Commerce stated that the decision would "encourage investment in building new infrastructure and upgrading existing infrastructure...consumers will benefit from greater choice of telecommunications services delivered through advanced telecommunications infrastructure"[12]. To date, this strategy has proven largely successful. As of 2008, the ITU ranked Hong Kong fifteenth among all countries in fixed broadband penetration – one spot ahead of the United States.



Before developing countries like South Africa invest the considerable expense and effort into an LLU regime, they should carefully consider whether LLU reflects their telecommunications market, and, more broadly, whether LLU is even relevant in the modern telecommunications landscape. South Africa already lacks the landline infrastructure needed to provide the economic and societal benefits of the 'broadband society' outlined by the World Bank and OECD. The disincentive to investment in infrastructure created by LLU presents too great a danger of exacerbating this problem. As such, LLU is a poor option for South Africa. However there are a number of alternatives to LLU that have emerged in recent years, not just in developed countries like Hong Kong but also in emerging economies like India and Brazil. These alternatives to LLU hold more promise for countries like South Africa, and will be examined in greater detail in the second part of this report.

[11] **'Developments in Local Loop Unbundling'**, *OECD Working Party on Telecommunications and Information Services Policies*, September 10th, 2003.

[12] **Type II Interconnection to be Withdrawn'**, Press release issued by the Commerce, Industry and Technology Bureau, OFTA, July 6, 2004.

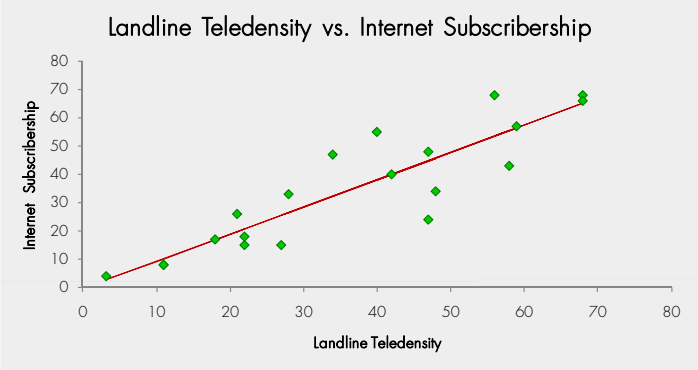
Appendix A: National Unbundling Policies and Telecommunications Market Profiles

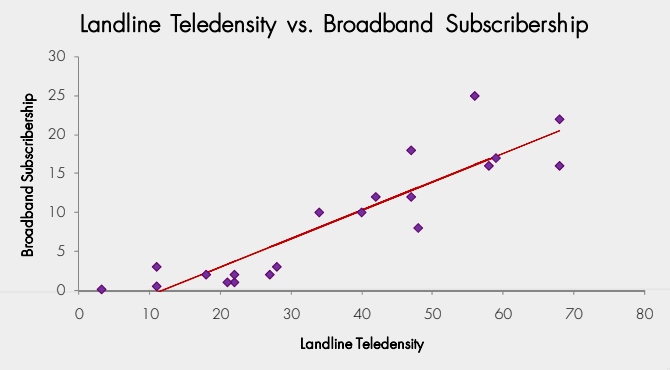
Country	Year LLU Adopted	Synopsis	Landline Teledensity	Mobile Teledensity	Broadband Internet Penetration	Cable Television Penetration
Australia	1999	LLU prices are based on total service long-run incremental costs (TSLRIC). LLU charges vary according to both the geographic 'band' in which the local loop is located and by the switching technology deployed.	47%	103%	23%	-
Canada	1997	Network elements that cannot be economically duplicated are subject to mandatory unbundling. Pricing is based on 'actual' incremental costs, varying by geographic region, and are subject to a 25% mark-up to encourage facilities-based competition.	56%	62%	28%	25%
France	2001	LLU in France is part of a comprehensive regulatory strategy to promote market entry that also includes quality of service guarantees and incentives to expand network coverage to rural areas. French LLU charges are among the lowest in Europe.	57%	90%	25%	6%
Hong Kong	1995-2004	LLU was implemented in 1995 and withdrawn in 2004 (subject to a two-year phase-out period). Hong Kong discontinued LLU in favour of a policy of facilities-based competition intended to promote network modernisation.	54%	146%	26%	22%
Poland	2003	LLU is mandatory for operators who are deemed to have significant market power (SMP). Poland's LLU policy was revised in 2008, which included significant reductions in LLU charges.	27%	109%	8%	12%
South Korea	2002	Korean LLU charges are LRIC-based. As of 2004, Incumbents are allowed to 'reserve' (exclude from unbundling) 8% of their lines. LLU charges were reduced 25% in 2004 and a further 28% in 2007.	50%	90%	29%	25%
Turkey	2005	LLU was implemented in 2005, but the first reference unbundling offer between the incumbent and an entrant was not signed until 2007.	25%	83%	6%	2%
United States	1996	LLU in the United States is limited to full unbundling of copper local loops – there is no line sharing policy. This policy is intended to protect operators' investment in fibre networks and to promote further investment in fibre networks.	53%	84%	22%	22%
United Kingdom	2000	LLU charges in the UK are LRIC-based and geographically averaged. Price controls for LLU were first determined in 2002 and have been revised 14 times since.	55%	119%	26%	6%

Appendix B: Correlation between Landline Density and Internet Penetration

Both intuition and perfunctory analysis of the data used in this report suggest a correlation between landline teledensity and Internet penetration. However, to validate this conclusion, a regression analysis was performed to test the correlation between landline density and Internet subscribership across twenty countries of varying stages economic development and telecommunications infrastructure (including the countries referenced in this report). The results of the regression analysis confirmed a strong correlation exists between landline teledensity and Internet subscribership, the correlation coefficient was +0.89 (very high) and the coefficient of determination was 0.8, which indicates that approximately 80% of the variation in Internet subscribership rates between the countries is attributable to the differences in landline teledensities (the remaining 20% would likely include economic, demographic and geographic considerations).

It is worth noting that the trend established by the regression analysis indicated that, on average, increased landline density resulted in a near identical increase in Internet penetration – every 1% increase in teledensity corresponded to a 0.962% increase in Internet penetration. Similar results were obtained in comparing landline teledensity to broadband Internet penetration – regression analysis revealed a correlation coefficient of 0.9 with a coefficient of determination of 0.8. However, increased landline teledensity resulted in a smaller corresponding increase in broadband Internet subscribership. Trending analysis indicated that, on average, a 1% increase in landline teledensity resulted in only a 0.36% increase in broadband subscribership.





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