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Achieving Universal Service in South Africa: What Next for Regulation?

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Abstract

For developing countries the promotion of universal, affordable access to telecommunications services remains a key social objective of regulation in the ICT sector, even as developed countries move towards the design and implementation of next-generation networks and the consideration of universal access interventions in respect of broadband services.

South Africa, emerging from a racially skewed digital divide wrought by apartheid, has placed universal service and access at the forefront of its communications policy and regulatory interventions over the last decade. It has followed global best practice by imposing universal service obligations on licensees and by establishing a universal access fund, along with an experiment in the awarding of geographically restricted licences in areas of low teledensity. The success and effectiveness of these interventions is open to question, with fixed-line teledensity now falling and with prepaid customers in the mobile sector now accounting for the overwhelming majority of telephony users nationwide.

With a mobile teledensity now in excess of 100%, South Africa is arguably on the cusp on universal service in respect of mobile telephony, and in a position to engage in debates around best practice policy and regulation for universal service and access in relation to Internet services, to broadband and to next-generation networks. Further, the debate and analysis has relevance to other developing countries soon to follow suit.

This paper seeks to engage in the debates relating to appropriate and effective interventions in respect of universal service and access, post the achievement of universal mobile service. First, an overview of South Africa's universal service and access imperative is undertaken, along with an assessment of the value and effectiveness of universal service and access interventions to date. Next the paper examines whether or not South Africa can be said to have achieved universal service in mobile telephony, and in what ways, if any, policy and regulation may have contributed to this. Finally the paper considers what the implications of this are for the future of universal service and access policy, what the prospects are for the inclusion of Internet access and broadband within the umbrella of universal service and access, and suggests possible areas for future regulatory intervention.

Introduction

The development and deployment of next-generation networks and services sits at the forefront of the current international policy and regulatory agenda, having to some extent displaced more traditional issues governing the ongoing rollout of fixed and mobile broadband infrastructure. However, this raises questions for many developing countries, particularly those in Africa, that languish far behind in terms of network rollout and service development.

While Finland proclaims access to a broadband Internet connection a legally enforceable right, Africa still struggles with an average mobile penetration rate of 32,6%, barely half the world average and well below the 48,8% achieved by developing countries worldwide (ITU, 2009, p 4). A new, next-generation digital divide threatens - which has important implications for those still grappling with the promotion of universal, affordable access to

basic fixed and mobile telecommunications services as a key social objective of regulation in the ICT sector.

South Africa presents perhaps a unique case study of a policy and regulatory environment where universal and affordable access to telecommunications services has been a central objective of sector policy. The country has now arguably achieved universal access and, perhaps, universal service in respect of mobile voice telephony - despite, rather than because of, sector policy. As such, it is a developing country uniquely poised to examine questions of universal access and service policy in respect of the future wave of next-generation services, the Internet, broadband, and possibly even the next-generation network (NGN) itself.

This paper examines the track record of South Africa's universal access and service interventions, as the country's market focus moves from a preoccupation with traditional voice telephony towards engagement with next-generation broadband-enabled services. The paper further engages with several dimensions of universal service and access intervention: namely, the policy framework itself, the institutional arrangements affecting its implementation, and, finally, and most importantly, the specific details of each aspect of intervention strategy. Finally, conclusions derived from that analysis are used to form the basis for suggesting a possible future approach as the country turns its attention towards making the Internet and broadband a central policy objective (DoC, 2010c). It is hoped that some of the lessons learned will assist developing country policy-makers confronted with similar questions.

Universal Access

For developed countries, much of the policy and regulatory attention centres on questions related to the deployment of broadband and to incipient next generation networks. For example, in their discussion of the potential role of government in ensuring the rollout of broadband infrastructure, which they characterise as "increasingly the primary mechanism for accessing information" (Kelly, Mulas, Raja, Qiang & Williams 2009, p 3), Kelly et al refer to numerous examples of the development of national broadband strategies by governments in the UK, the USA and other OECD countries. Similarly regulatory research and policy debate on issues related to next-generation IP-enabled networks abounds (see for a few examples: ITU, 2007; Elixmann, Ilic, Neumann & Plückebaum, 2008).

Some of this focus is underpinned by a fairly extensive literature on the economic impact of broadband. Recent World Bank research confirming the economic impacts of ICTs, and of broadband in particular, and suggesting that increases in Internet access and broadband penetration underpin measurable increases in economic growth (Qiang, Rossotto & Kimura, 2009, p 45) is but the most recent.

The promotion of universal, affordable access to telecommunications services remains a key social objective of regulation in the ICT sector, even as developed countries move towards the design and implementation of next-generation networks and the consideration of universal access interventions in respect of broadband services (ITU, 2003; Xavier & Ypsilanti, 2007; EU, 2010). Meanwhile many developing countries, particularly those in Africa, continue to languish on the far side of the digital divide, suffering a critical shortage of fixed-line communications services and levels of mobile penetration that, although burgeoning, are still far short of universal (ITU, 2009; ITU, 2010). This was certainly the situation in South Africa when the country's first democratic elections were held on 27 April 1994, with Telkom still a firmly entrenched fix-line monopoly and two newly-licensed mobile operators still in their infancy.

Access and Democracy

South Africa's transition to democracy in 1994 and the country's subsequent engagement with telecommunications reform took place, on the one hand, against the background of an increasing interest in universal access and service as central sector reform issues, and, on the other, in the context of a racially discriminatory history of systemic and systematic denial of access to telecommunications services for the majority of the country's population[1].

It is therefore no accident that, when dealing with telecommunications, the Reconstruction and Development Programme (RDP) of the African National Congress (ANC), its policy guideline in the run-up to the forthcoming elections which it would win with a handsome majority, begins by emphasising the racial distortions in access under apartheid: "For black people it is estimated that less than 1 line per 100 persons is in place compared with about 60 lines per 100 white persons. Other countries with comparable per capita wealth have 30 lines per 100 persons. The situation is far worse in rural areas." (ANC, 1994). Hence, the RDP goes further: while acknowledging the role of telecommunications as an "indispensable backbone for the development of all other socio-economic sectors", it committed the country to "provide universal affordable access for all as rapidly as possible within a sustainable and viable telecommunications system" (ANC, 1994).

This recognition of a deep and racialised digital divide finds further expression in the White Paper, which emerged from the post-1994 telecommunications reform process,[2] and which describes its central objective thus: "Our particular goal is to balance the provision of basic universal service in telecommunications to disadvantaged rural and urban communities with the delivery of advanced information services capable of meeting the needs of a growing South African economy" (RSA, 1996a, p1). The subsequent Telecommunications Act likewise lists the objective to "promote the universal and affordable provision of telecommunication services" (RSA, 1996b, 2(a)) foremost amongst its 17 objectives. It was only with the passage of the 2005 Electronic Communications Act (RSA, 2005), by which time substantial strides had been made towards securing universal access to telecommunications services for all South Africans, that this overarching goal of universal affordable access was somewhat modified and downgraded: it became the third of 26 objectives, a less strongly formulated commitment to "promote the universal provision of electronic communications networks and electronic communications services and connectivity for all" (RSA 2005 2(c)).

This vision of "universal affordable access for all" in South Africa, as a developing country emerging from a racially skewed digital divide wrought by *apartheid*, ensured universal service and access was therefore placed at the forefront of communications policy and animated subsequent regulatory interventions (Hodge, 2004; Msimang, 2006), certainly over the critical transition years to democracy and a reformed communications environment.

[1] Of course, the principal axes of the racially discriminatory and oppressive policies of *apartheid* were political and economic, impacting on political rights, freedom of association, and employment, residential and educational rights, amongst others.

[2] See Horwitz (2001) for perhaps the definitive account of that telecommunications reform transition, which set up participatory structures and ran an inclusive, consultative Green Paper (to identify policy options) and White Paper (to commit to policy choices) process culminating in the 1996 Telecommunications Act (to give effect to policy through legislation - RSA, 1996b).

Putting Access Policy into Practice

South Africa's policy commitment to access resulted in a number of specific and concrete interventions designed to extend access to telecommunications services, some of which were ground-breaking, but many of can be described as ranging from the less than successful to the abject failure.

One the one hand, South Africa followed global best practice by imposing universal service obligations on licensees and by establishing a universal access fund (ITU, 1998, pp 91,2; Intven, 2000). On the other, the country's establishment of a dedicated agency to deal with universal service and access issues (the then Universal Service Agency), and the subsequent experiment in the awarding of geographically restricted licences to under-serviced-area licensees in areas of low teledensity (Gillwald, 2002), were both, in different ways, ground-breaking.

A brief overview and assessment of each of the universal service and access interventions adopted in South Africa, now follows, viz : universal service and access obligations; the establishment of a universal service fund; the creation of the Universal Service Agency; and geographically-restricted licensing in low-teledensity areas. The discussion that follows reveals strengths and weaknesses with respect to policy, institutional arrangements, and the various implementation strategies.

Universal Service Obligations

Universal service and access obligations (USOs) can be characterised as a universal access implementation strategy involving "mandatory service obligations… imposed by licence conditions or other regulatory measures" (Intven, 2000, p 6-3) either on individual operators or on a class of operators. USOs typically take the form of requirements imposed on licensed operators to supply certain types of telecommunications or other ICT services to defined classes of customers. Examples would typically include the connecting of additional customers, the installation of more public payphones, or the provision of network coverage to certain geographic areas or proportions of population in the case of mobile operators (Intven, 2000, p 6-11), but they can also include other obligations such as the carriage of free emergency calls. In essence, they are an enforced cross-subsidy to non-profitable services and areas from more lucrative market segments.

In South Africa, in the fixed-line segment the market, the licence issued to the incumbent fixed-line operator, Telkom, specified a number of USO rollout targets over the period 1997 – 2002. The focus was largely on the provision of additional access lines, mainly in "under-serviced areas" and to "priority customers", which were defined as hospitals, libraries, local authorities or schools - but also dealt with the installation of additional public payphone capacity (Table 1). The licence further included an extensive list of under-serviced areas running to 46 of its 91 pages (RSA, 1997).

South Africa was relatively unusual in including USOs for its mobile operators, something the ITU still continues to urge as best practice today (ITU, 2008, p 36). Along with the more standard imposition of mobile network geographic and population coverage requirements, the access provision requirements of the mobile licensees have focused on "community service telephones" - essentially a public payphone on the mobile network "freely accessible" to the "general public" (ICASA 2002 p 5[3]) - with slightly differential requirements across the three licensees (Table 1).

[3] The original licences are not publicly available. The 2002 reissued licences to Vodacom and MTN are therefore cited, since no amendments to the universal service provisions were made.

The licensing of South Africa's second PSTS operator, now known as NeoTel, was accompanied by the imposition of a hybrid range of USOs, partly because of its choice of CDMA2000 as its infrastructure standard. On the one hand, they include defined coverage rollout targets similar to those imposed on mobile operators, puzzlingly and perhaps controversially according to a "confidential" rollout timetable. On the other, they include the provision of community access in the form of high-speed Internet access to schools and clinics, reflecting ongoing shifts in the communications landscape (Table 1).

Table 1: Universal Service Obligations Imposed on Licensed Operators in SA

Operator	Access lines	Coverage	Payphones / community access points
Telkom (PSTS)	2 690 000 over 5 years - 1 676 000 in under-serviced areas - 20 246 to hospitals, libraries, local authorities, schools - 3 204 to under-serviced area villages	N/A	120 000 public payphones over 5 years
Vodacom (Mobile)	N/A	60% of population within 2 years 70% of population within 4 years Timetable for specified coverage areas	22 000 community service telephones in 70 specified areas over 5 years
MTN (Mobile)	N/A	60% of population within 2 years 70% of population within 4 years Timetable for specified coverage areas	7 500 community service telephones over 5 years
Cell C (Mobile)	N/A	40% of area within 1 year (roaming) 8% of area within 5 years (own network) 80% of population within 1 year (roaming) 60% of population within 5 years (own network)	52 000 community service telephones in under-serviced areas (with less than 10% fixed teledensity)
NeoTel (PSTS)	N/A	60% of population in defined metropoles within 5 years 80% of population within 10 years Subject to "confidential" "Rollout Timetable"	Establish and maintain "high speed Internet connectivity" to: - 2 500 public schools / education institutions - 2 500 public rural clinics Subject to approved implementation plan

Compiled from: RSA, 1997; ICASA, 2001; ICASA, 2002[a]; ICASA, 2002b; ICASA, 2006

Universal Service Agency

The creation of a separate, specialised agency, the Universal Service Agency (USA), with a specific mandate to focus on issues pertaining to universal service and access (RSA 1996b Ch 8) reflects what appears at the time to have been a unique and ground-breaking structural intervention in support of universal service and access (Msimang, 2006, p 225[4]). It was certainly one that reflects the country's fundamental commitment to ensuring

[4] Intelecon (2009, p2) now identifies Pakistan, Ghana and Nigeria as additional countries to have created separate structural entities with specific mandates to administer such funds. These three all appear, from information on their web sites, to have been established several years later than the USA, in the years from 2003 onwards.

universal affordable access to telecommunications for all its citizens, its historically disadvantaged black majority in particular.

The original mandate of the agency[5] dealt with a variety of objectives relating to universal service and access, many of them less than specific. Its terms of reference required the USA to:

> *(a) promote the goal of universal service;*
> *(b) encourage, facilitate and offer guidance in respect of any scheme to provide... universal access or universal service....*
> *(c) foster the adoption and use of new methods of attaining universal access and universal service;*
> (d) *stimulate public awareness of the benefits of telecommunication services.*
>
> (RSA 1996b Section 59 (1))

The USA was further required to assist the Minister of Communications in gazetting formal definitions of what constituted universal access and service, as well as to undertake research, to make investigations, to issue information and to table recommendations relating to universal service and access (RSA 1996b Section 59 (2) & (3)). Finally, the USA was put in charge of the administration of the Universal Service Fund (RSA 1996b Section 65 (4)).

Universal Service Fund

As previously mentioned, the creation of a dedicated universal service fund (USF) to finance interventions to increase access to telecommunications services and to bridge the digital divide has for some time been considered best practice universal access and service policy ((ITU, 1998, pp 91,2; Intven, 2000; ITU, 2003). Conventionally a universal service fund is used to aggregate funding to be applied towards projects designed to promote universal service and access. Funds are usually sourced by levying what is in effect a tax on telecommunications operators, requiring them to contribute a small, defined percentage of revenue. Monies in the fund are then applied by a variety of means towards projects or other interventions targeted at increasing access for disadvantaged groups and in under-serviced areas, thereby providing a more effective and targeted cross-subsidy from revenue-generating services to uneconomic ones (Intven, 2000, p 6-22 ff; Msimang, 2006, p 224).

It is exactly this type of fund which was established in South Africa to finance universal service and access interventions. The 1996 Telecommunications Act provided for the establishment of a Universal Service Fund to be "utilised exclusively for the payment of subsidies... for the assistance of needy persons towards the cost... of telecommunication services" and, in certain circumstances, to subsidise the "extension of [the PSTS] to areas and communities which are not served or not adequately served" (RSA, 1996b, 66 (1) (a) & (b)). This fund was administered by the Universal Service Agency. Contributions to the fund were initially set by Ministerial policy directive and later regulated by ICASA, ranging up to the currently applicable 0,2 % of revenue (ICASA, 2008).

Geographically Restricted Licensing

A fourth, potentially innovative approach to the provision of telecommunications access was not part of the original set of interventions, only being introduced as part of the 2001 package of amendments to the 1996 Telecommunications Act. These introduced a new category of under-serviced area licenses, designed to allow "small businesses" to provide a

[5] The agency was subsequently renamed the Universal Access and Service Agency of South Africa (USAASA) and given a revised and rather narrower mandate by the 2005 Electronic Communications Act (RSA 2005 Ch 14).

range of telecommunication services (including VoIP and "fixed-mobile[6]") in areas "where there is teledensity of less than 5%". It was further intended that "historically disadvantaged groups", including women, would benefit from the award of such licences (RSA, 1996b, Section 40A).

Both Msimang (2006, p 241) and Thornton (2006, p 4) have noted that participation of small business in the provision of telecommunications services was foreseen as far back as the original 1996 White Paper on Telecommunications Policy, but some of the inspiration for this form of licensing may also have derived from the successful experience of telecommunications co-operatives in the US, whose umbrella body, the National Telecommunications Cooperative Association (NTCA), was a lobbyist in the process leading up to the 2001 amendment. The model may also owe something to the experiments in rural payphone licensing undertaken in Chile and other jurisdictions in South America (cf Wellenius, 2002).

Subsequent to this amendment, the Minister specified 27 areas as under-serviced, based on fixed-line teledensity figures, and the regulator ran a series of licensing processes, leading to the initial award of 7 under-serviced area licences in 2004/5 (Figure 1), with additional licences being awarded to a further 7 in 2007, but this time using the licensing categories of the new Electronic Communications Act (Senne, 2008a). To support these new licensees, a contribution of R 5 million per annum over three years was earmarked to be provided from the Universal Service Fund. There were also discussions around providing business development support and instituting regulatory interventions, such as asymmetrical interconnection, to ensure an effective business case.

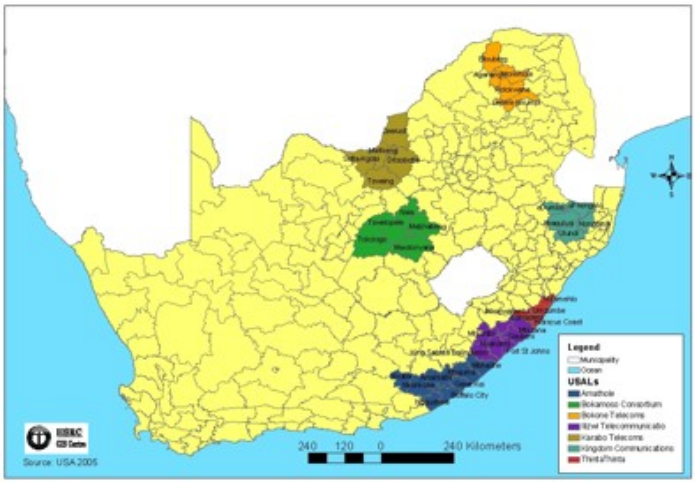

Figure 1: First 7 Under-serviced Area Licensees[7]

Policy Commitment

Taken together, the provisions outlined above demonstrate a substantial level of commitment to give universal service and access a central place in policy implementation and regulatory intervention within South Africa. Given this commitment to the provision of universal and affordable access to telecommunications services for all, it is important to consider the degree to which the various interventions outlined above have been successful in meeting these objectives.

[6] Another innovation, this is defined as call mobility that does not "permit call handover between cells".

[7] Source: Human Sciences Research Council, Cape Town.

It is not only a question of whether the level of access has increased - which it undoubtedly has. But our assessment also needs to consider whether each of these interventions contributed towards that goal, the extent of that contribution, and exactly how it has impacted on access in practice.

At least two of the interventions (USOs and the USD) constitute mainstream ITU thinking. The other two (the USA and under-serviced area licensees) were less conventional, but by no means a far remove from similar interventions elsewhere. An examination of the effectiveness of each may shed some light on the effectiveness of policy implementation, but also provides guidance for policymakers and regulators elsewhere.

Obligations and Access

It seems clear, from the pattern of obligations imposed on the incumbent operator, Telkom, and the first two mobile operators, Vodacom and MTN, when they were initially licensed, that the expectation was that Telkom would shoulder the greatest burden in providing access to under-serviced areas, as we saw from the detailed listing of these in Telkom's licence.

It is probably too early to assess the impact of the obligations imposed on the more recent PSTS licensee, Neotel, but the imposition of fixed-line targets on Telkom has had almost no net effect on fixed-line penetration, at considerable cost and through much wasted effort (Figure 2). In the words of one analyst, it has demonstrated the "failure of the universal service policy" (Hodge, 2004, p 5). Hodge documents the fact that Telkom met the rollout targets by installing 2,67 million lines between 1998 and 2002. However, as he shows, large numbers off these new connections - 2,003 million - were disconnected due to the inability of subscribers to pay for the services they had acquired under the USO rollout (Hodge, 2004).

There is likely to be a complex cluster of reasons for this decline in fixed-line subscriptions, including fixed-mobile substitution as users migrated to the more affordable prepaid mobile packages that were easier to acquire and where expenditure could be more closely managed (cf Hodge, 2005), but the decline cannot but testify to a failure of policy.

These trends are clearly evident in the graph below, showing fixed line subscribers between 1997 and 2008 (Figure 2). There was an initial upsurge in subscriber numbers as Telkom sought to meet its USO rollout targets between 1997 and 2000. However, since 2000 the subscriber base has steadily declined from its peak of 5,5 million to 4,5 million in 2008. In addition the proportion of residential post-paid subscribers has also steadily declined, from 40,1% in 2002 to 32,3% in 2008.

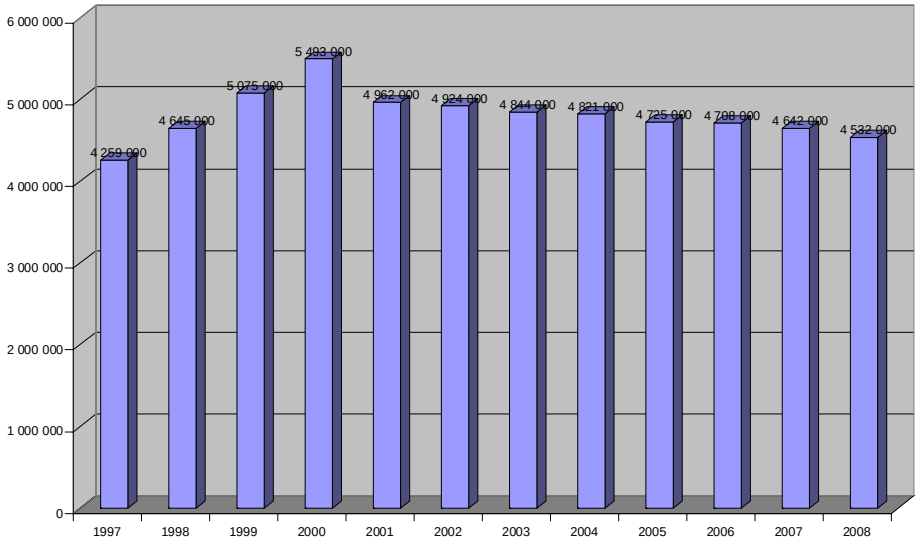

Figure 2: SA: Fixed Lines (1997-2008)[8]

By contrast, the mobile operators, on whom no specific subscriber rollout targets were imposed, have exceeded all expectations, rendering questions in respect of their network coverage superfluous. By 2001 there were already more mobile than fixed subscribers in South Africa, and the market share of mobile continues to grow (Figure 3), reaching a total of 51,4 million in 2009 (although, as we shall discuss later, this figure certainly overstates the actual number of mobile users).

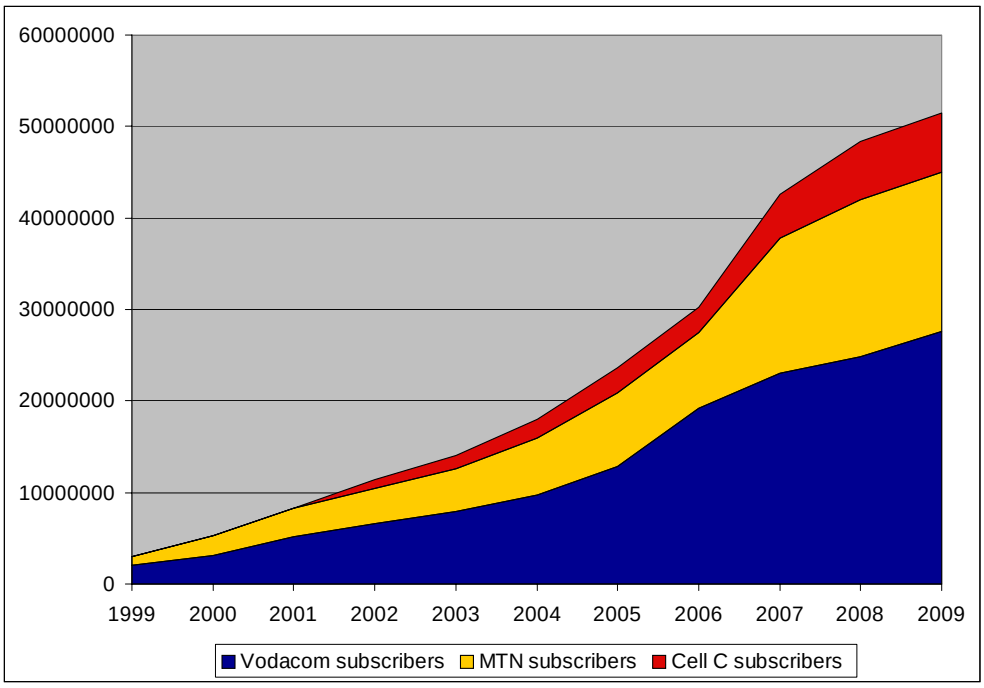

Figure 3: SA: Mobile Subscribers (1999-2009)[9]

The picture in respect of community access is a similarly mixed one. Telkom easily met its payphone target, reaching an installed payphone base of 195 000 in 2002, but the

[8] Source: Telkom Annual Reports.
[9] Source: Author's own data, compiled from annual Reports of MTN and Vodacom, and press statements of Cell C.

payphone numbers since then have also steadily fallen to 135 000 in 2009. This may in part be due to ongoing problems with payphone vandalism and to increased competition from mobile community service telephones (CSTs)[10]. By contrast, the mobile operators have all reported that they have met the CST component of their USO rollout targets (Msimang, 2006, p 235), which were in any event exceptionally low, having been based on an estimated total market of less than a million.

Available data suggests that the CST targets may well have been substantially exceeded. Vodacom, the only operator to specify numbers in its annual results, reports a total of 118 000 CSTs in 2009, and Cell C is reported to have rolled out 100 000 CSTs (Jones 2008). There has, however, been considerable difficulty co-ordinating and verifying the rollout of these services, with each operator proceeding in accordance with its own interpretation of its obligations (Msimang, 2006, p 235). The legal wrangle between mobile operators over CSTs reported by Jones (2008) is in part over the location of this rollout, but also suggests that operators have a pricing incentive to maximise their rollout because of the ability to arbitrage the low termination rates applicable to call traffic from such phones (Jones, 2008).

The success and effectiveness of South Africa's universal service obligations is, therefore, substantially open to question, with fixed-line teledensity now falling and with prepaid customers in the mobile sector (subject to limited USOs in the first place) now accounting for the overwhelming majority of telephony users and community telephony access points nationwide. Rather than regulatory intervention, it is market forces that have conspired to undermine the fixed-line USOs and to cause the mobile operators to exceed their USOs by orders of magnitude.

Universal Service Agency Assessed

For all its importance as institutional evidence of South Africa's commitment to placing universal access at the forefront of telecommunications policy, the Universal Service Agency has struggled to make an effective impact.

This is in part due to structural issues created by complex lines of reporting and accountability between the agency, the Minister, and the sector regulator, ICASA (see RSA 1996b, Sections 59 and 66 in particular). For example, until very recently, several attempts by the USA to produce definitions of universal service and access had foundered because the Minister rather than the agency is required to gazette them. Statutory appointment procedures place the USA under close control by the Minister, who also tightly directs the agency in the expenditure of the Universal Service Fund. As White comments: "From a regulatory point of view the Agency is very awkwardly positioned and it is not surprising that its track record of meeting its aims is extremely poor. It occupies a bizarre regulatory space, answerable to both ICASA and the Minister" (2004, p 5255). An internal report similarly describes the agency as "weakly embedded in South Africa's regulatory space" (USAASA, 2005, p 20) and points to a legal mandate that has consistently "undermined the independence of the Agency" (USAASA, 2005, p 94).

The USA has been consistently and widely criticised for poor performance and ineffective management. The consultants' report referred to above catalogues a damning number of these failures, including poor "management and accounting practices" coupled with lack of "human resource capacity", a "chronic lack of funding", engagement in "activities [not] consistent with the Agency's mandate", neglect of "core functions, i.e., to monitor and analyze the RSA telecom sector", failure to "prepare, submit or otherwise comply with

[10] Anecdotal accounts suggest the two may be related.

statutory reporting requirements", undertaking project implementation without "mandate or authority" (USA, 2005, pp 93,4).

Despite the structural contradictions and poor track record described above, and in the face of the initial vision of the agency's mandate as transitional and temporary (Msimang, 2006, p 231), the USA was not incorporated within the sector regulator, as some had recommended, in either the 2001 amendments to the 1996 Telecommunications Act or when the new Electronic Communications Act that replaced it in 2005, was passed. In fact, there was very little substantive change to the role and functions of the body, save that its title was changed to make it the Universal Service and Access Agency of South Africa (USAASA), and that it was made more subject to the policy fiat of the Minister (RSA, 2005, Ch 14). The oversight role of a board appointed by the Minister (introduced by the 2001 amendment in order to strengthen governance of the USA) was continued, and agency's administration of the now renamed Universal Service and Access Fund perpetuated, still under direction from the Minister, and subject to many of the same accountability tensions between the agency and the Minister and the regulator (RSA, 2005, sections 87 & 88) described above.

It therefore seems clear that the agency established in ground-breaking fashion to spearhead universal access interventions in South Africa has been ineffectual and has had limited impact.

Funding Universal Access

The Universal Service Fund, closer to mainstream best practice in respect of universal service and access, might be thought likely to have had a better track record.

Certainly contributions were collected and funds were expended. Contribution levels were initially set at 0,16% of operator revenue, and later raised to 0,2%. The fund itself was initially capped at R 20 million (with the contribution by the incumbent not to exceed 50% of this, or R 10 million), but is now uncapped following the 2001 amendment to the 1996 Telecommunications Act (Msimang, 2006, pp 225,6). However, no financial statement in respect of the fund seems ever to have been issued. A recent attempt by ICT sector magazine Brainstorm to ascertain the current balance available in the fund could only resort to a speculated value of R 800 million to R 1 billion (Perry, 2010, p 19). However, an earlier USAASA annual report (apparently overlooked by Perry) suggests that the total contributions to the fund between 1999 and 2008 amounted to R 636 million[11] (USAASA, 2008, p 14) - which suggests that the upper end of Perry's estimate for 2010 is likely, if anything, to be an under-estimate. Whatever the actual balance in the fund, it seems clear that substantial levels of funding towards universal access and service have been available for a number of years.

What is of even greater concern is that the fund has been massively under-utilised, with reported expenditure by 2008 totalling a mere R 227 million (USAASA, 2008, p 14), just over 35% of what was available, leaving an unspent surplus of R 409 million. Not only has expenditure been limited, but it has been ineffective. Initially the fund was used largely to fund the establishment of a series of telecentres, possibly illegally, and certainly in contravention of the formal mandate of the agency. This is borne out by the comment of the agency's own consultants' report: "The Agency, which had not mandate or authority to undertake implementation projects, nonetheless made implementation its core function" (USA, 2005, p 93).

[11] USAASA sources have suggested to the author that the operators challenged USAASA's 2008 figures as substantially understating their contribution.

Worse, the performance of these telecentres can be described as substandard at best. By 2000 only 65 such telecentres had been established, a very poor track record in itself, of which fully 32% were found in 2001 to be no longer operational, with "less than half (47 per cent)… [having] both computers and phones working, though all had been provided with this equipment at the start" (Benjamin, 2003, p5). By 2005, the programme had been downscaled, with only 111 of the original target of 4 000 telecentres having been rolled out, and the focus having shifted towards the rollout of "Cyberlabs[12]", "Community Digital Hubs[13]" and subsidies for under-serviced area licensees[14] (USA, 2005, p 77 ff). A recent USAASA annual report suggests that not a great deal has changed since then, with expenditure being directed "to rehabilitate and equip Community Access Centres, Cyberlabs in schools and Digital Hubs; to enable internet connectivity in FETs[15]; to subsidise USALS; to teach ICT skills to personnel who manage these centres; to conduct research that will inform USAF and for special projects such as Mindset Network and Square Kilometre Array" (USAASA, 2009, p 17).

A summary of income to and expenditure from the fund is shown in Figure 4 below. As the discussion has shown, it seems clear that the fund's track record has been less than illustrious, with expenditure to date having been both inappropriate and ineffective, often wasteful, leaving a massive unspent surplus of nearly two thirds of contributions.

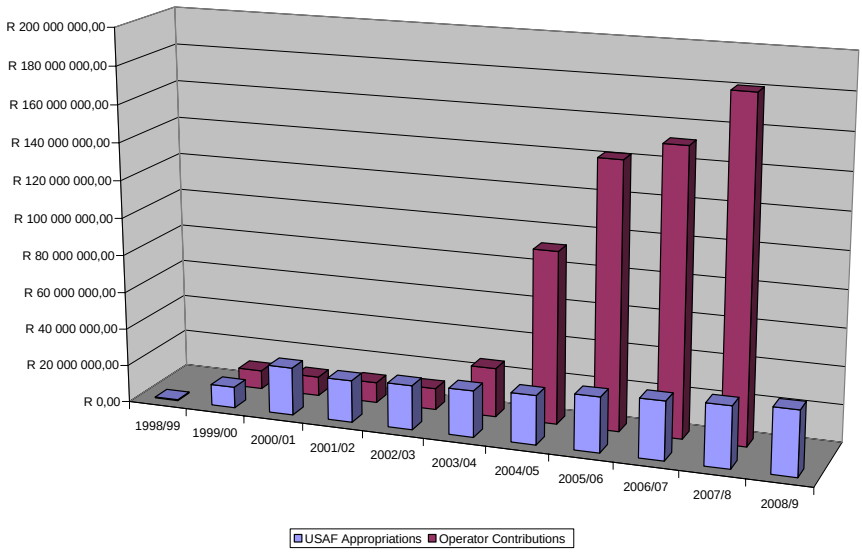

Figure 4: Universal Service Fund: Income & Expenditure (1998-2009)[16]

Under-serviced Area Licensees

The fourth and final pillar of the interventions by South Africa in favour of increasing universal and affordable access the telecommunications services discussed in this paper is that of under-serviced area licences. This model, which appears to fulfil many of the criteria articulated by Dymond and Oestman, including technology neutrality and asymmetrical pricing, has an intuitive attraction: it seeks to leverage market forces, creating an

[12] Effectively, computer laboratories in schools.

[13] No clear definition of what constitutes these is available. It is not entirely clear what distinguishes them from telecentres other than the name, more advanced technology and putatively a greater community focus.

[14] See next section.

[15] Further Education and Training institutions.

[16] Source: USAASA, 2008, updated with information from USAASA, 2009. No figure for contributions for 2008/9 is available.

incentivised licensing regime aimed at addressing the "market efficiency gap" (Dymond & Oestman, 2003). Further, the 27 designated under-serviced areas cover a substantial proportion (47%) of South Africa's population (Gillwald, 2006, p 7), suggesting the potential strategic importance of the intervention. However, this intervention too has been problematic.

Several commentators recognised the need for under-serviced area licensing to be supported by a range of policy and regulatory measures for it to succeed. Writing at a time when draft ITAs[17] had recently been issued, Gillwald identified several critical success factors required to ensure viability and "sustainability" of the under-serviced area licensees (USALs), including a "funding framework… an asymmetrical interconnection regime that will allow for cost-based termination rates on the substantially higher cost USAL networks to build a business case for investors; a flexible low-cost regulatory regime; and a licensing process that is kept as simple as possible" (2002, p 1).

In the event, only the funding framework for USALs was put in place. But funding was pegged at an unreasonably low figure of R 5 million per annum, over three years and subject to performance reporting (compared to start-up capital requirements in the order of $5 to $20 million suggested by Gillwald (2006, p 10)). A consultants' review of the first seven licensed USALs that had signed contracts with the USA found this amount to be woefully inadequate and recommended that it be "increased substantially… and that operating expenditure and capital expenditure be availed and administered separately" (Thornton, 2006, p 2). It is thus clear that the USALs received insufficient support for their success, even though abundant financial resources were available for the purpose.

But there were a complex range of other factors mitigating against the viability of the USALs, a few of which will be dealt with here. Consistent with Dymond and Oestman (2003), both Thornton (2006) and Gillwald (2006) have argued in favour of cost-based termination rates, with the latter specifically suggesting that without "cost-based asymmetrical termination charges… that [recognise] the asymmetrical cost of terminating calls in… low-density, high cost rural areas… a sustainable business case cannot be made for USALs" (Gillwald, 2006, pp 11,2). No such interconnection regime was ever implemented.

There were also inbuilt structural disadvantages in the ownership structures that were foisted on the USALs. The fact that they were required to be small business operations, and that participation and ownership by historically disadvantaged groups including women was a requirement, put them at a significant disadvantage in terms of both technical expertise and managerial skills. The limitation on foreign ownership to a maximum of 25% further mitigated against their ability to attract investment finance (cf Gillwald 2006). None of these requirements is problematic on its own, and several align with important and noble national policy objectives, but, in combination, they created a set of structural constraints that almost guaranteed technical and commercial failure. Suggestions that a comprehensive capacity-building programme be put in place to answer and overcome some of these deficiencies were never implemented.

There were also issues related to market structure and environment that mitigated against the viability of the USALs. One of the problems they faced was that the determination of the 27 under-serviced areas was based on fixed-line teledensity data from the 1996 census (Gillwald, 2006 p 7) without any reference to mobile penetration, which, by 2004, when the

[17] Invitations to Apply.

first licences were issued, had long surpassed fixed-line teledensity. This put the USALs in a position where they were competing for shares in a market of unknown saturation, rather than for the entire market as had been the case in the analogous Chilean experiment (Wellenius, 2002). Further, the fact that the USALs were licensed to provide limited mobility made the problem of competition with fully mobile services a potential challenge. In addition, the subsequent Ministerial determinations that liberalised the VoIP market, permitted resale and opened the door to self-provisioning, further cut the ground from under the feet of the USAL business case (DoC, 2004).

The eventual fate of the unfortunate USALs is not clear. A number of them effectively became resellers of mobile connectivity, mostly that of the largest of the mobile incumbents, Vodacom (Lowman, 2005). A consultants' report commissioned by USAASA concluded that "without significant intervention… most if not all of the USALs will not survive" (Thornton, 2006, pp 1,2). By early 2008 USAASA was noting that none of the original seven licensees was yet operational, and concluded that only three remained viable (Senne, 2008b). Yet, barely 4 months earlier the then Minister of Communications, while issuing a series of policy directions with respect to the new Electronic Communications Act, including an injunction to ICASA "where there is more than one licence in a province, [to] merge the licences and issue one Provincial Under-Serviced Area Network Operator (PUSANO) licence" (DoC, 2007, p 9). This would have forced two of the remaining potentially viable operators to merge with another, less viable licensee. No subsequent progress seems to have been made with these enforced mergers. What was probably the final death knell for USALs was sounded by the incoming Minister of Communications in 2009 when he conceded that the "concept and the possible remedy had not worked" (Vecchiatto, 2009) and scrapped the decision to merge USALs into PUSANOs (DoC, 2009a).

The under-serviced area licensees seem to have become an unfortunate and unpleasant footnote to the history of telecommunications access in South Africa. They were never provided with the enabling regulatory and business environment essential for their success, and were overtaken by events as telecommunications policy moved on, taking a series of decisions that vitiated the model. It is regrettable that an experiment so innovative was doomed to fail so dismally.

Taken together, the package of interventions analysed above - USOs that were overtaken by developments in the mobile market, the creation of a universal access agency that was bedevilled by poor institutional arrangements, the establishment of a universal service fund that was massively underspent and the interventions of which were ineffective, and an experiment in licensing universal service operators that has nothing to show for its efforts - can hardly be construed as successful. In the light of this apparent implementation failure, it is thus worth examining what the current status of South Africa is in respect of access to telecommunications services.

Universal Mobile Service?

South Africa is now 16 years on from the clarion call of the RDP to "provide universal affordable access for all as rapidly as possible" (ANC, 2004). To what extent can the country be said to have achieved universal access to telecommunications services at affordable prices?

Figure 5 below shows telephony uptake in South Africa over the period 1999 - 2009. What is clear from the graph is that it is under the umbrella of mobile telephony that significantly increased levels of access have taken place. Fixed-line telephony experienced an initial increase under the impetus of the universal service obligations described above to a peak of

5,5 million[18] subscribers in 2000, giving the country at that stage a fixed-line teledensity of 12,8%. Since then, however, access to fixed-line telecommunications has been on a steady downward path and had slid to 4,5 million or a teledensity rate of 9,0% by early 2009.

Access to mobile telephony by contrast has burgeoned from a subscriber base of 5,2 million or mobile teledensity of 12,1% at the time when fixed-line penetration was at its peak. By the end of 2009, South Africa could boast a total of 52 million mobile subscribers - more than the country's total population - giving a mobile teledensity of 105,4%[19].

These trends are not unique to South Africa. In Africa, fixed-line penetration has stagnated with an average teledensity of 1,5% reported at the end of 2008 - well below the world average of 19% - whereas mobile access has continued to soar, reaching an average teledensity across the continent of 32,6% (ITU, 2009, p 1,2). This trend is a worldwide one with mobile access showing similar growth trends to a world average mobile teledensity of 59,3% (ITU, 2009, p 4).

It seems clear, therefore, that the growth area for access to telecommunications worldwide is in mobile, possibly for different reasons in differing regions - as a complement to existing high levels of fixed access in developed countries, and as a substitute to low levels of fixed-line availability in developing regions.

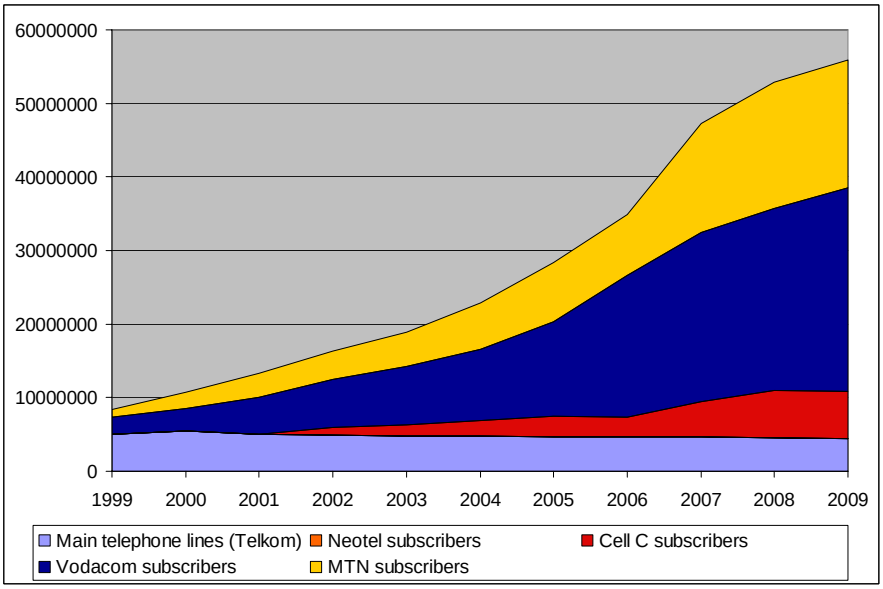

Figure 5: South Africa's Telephony Rollout (1999-2009)[20]

Impact of Policy and Regulatory Interventions

The analysis set out above suggests that the main planks of South Africa's universal service and access policy, as described above, have contributed little or nothing to the country's upsurge in mobile access. South Africa's fixed-line universal service obligations have clearly been ineffective in increasing access. It may be argued that the USOs in respect of population and geographic coverage for mobile were a contributing enabler, but it was after

[18] Figures from author's own spreadsheet, compiled in turn from annual reports and press statements of operators.

[19] The reasons behind such high levels of mobile teledensity, and just what the figures reveal and what they conceal will be discussed below.

[20] Sources: Annual Reports of Telkom, MTN, Vodacom; press statements of NeoTel, Cell C. The figure for NeoTel is almost certainly understated as it appears to include only residential customers.

the innovative introduction of mobile prepaid services by MTN in 1996 that the market began to grow, with pre-paid mobile subscribers making up 83,8% of South Africa's mobile users by 2007[21].

The establishment of the Universal Service Agency (now USAASA) and the creation of the Universal Service Fund have also clearly not been contributing factors in the upsurge of mobile access. This is due to the ineffectual role of the former body and the focus of the latter on ineffective attempts to fund a variety of forms of Internet rather than telephony access[22]. Likewise, the failure of the under-serviced area licensing experiment can be said to have contributed little. South Africa can therefore be said to have increased universal access despite, rather than because of, policy and regulatory interventions, and through the play of market forces alone.

If South Africa remains far off from achieving universal service in respect of fixed line telephony, can the country be said to have achieved universal service in mobile telecommunications, give mobile teledensity of 105,4%? On the face of it, the answer would seem to be a simple 'yes', but it is worth interrogating such optimistic figures that suggest that every person in the country has at least one mobile phone.

Firstly, it is worth noting that South Africa is not alone in reporting mobile penetration rates of over 100%. The ITU suggests that both Europe and the Commonwealth of Independent States, with average figures of 116,1% and 106,6% respectively as at 2008, also have more subscriptions than inhabitants (ITU, 2009, p 4). Similarly Sutherland gives a mobile teledensity level in Bulgaria of 132,8% (2008, p 7).

One of the challenges in estimating rates of mobile penetration is that what is being counted is numbers of 'active' SIM cards, which overstates user levels for a variety of reasons over and above the fact that most operators classify a SIM as 'active' for some 90 days after it last made or received a phone call.

Sutherland accounts for the discrepancy in Bulgaria between the high overall mobile teledensity and a much lower figure of around 53% reported in a 2006 household survey by suggesting that multiple SIM card ownership and cross border movements through tourism and economic migration have artificially inflated SIM card numbers, before going on to estimate that global over-reporting may inflate the user base by 17% (2008, p 10).

Similarly, Goldstuck has looked at inflated SIM card numbers in South Africa, suggesting the subscriber numbers over-report the user base by 20% - 30%. He suggests a number of practices that account for multiple active SIM cards per user, including:

- what he refers to as "recharge arbitrage" or the practice of using starter packs for the free airtime before discarding them, which means they remain 'active' for a further 90 days[23];

[21] Source: Author's own data, compiled from annual Reports of MTN and Vodacom, and press statements of Cell C.

[22] The critique here is twofold. In the first place, it is the view of this author that telephony access should have been prioritised over Internet access, certainly in the early years of operation of the fund. Secondly, the various Internet access projects, telecentres in particular, were poorly conceived and badly operationalised.

[23] This period may be even longer in some cases. Vodacom, for example, counts SIMs as active on the basis of any revenue-generating activity, which may include receiving a voice-mail that is never picked up or an SMS that is never read.

- users holding more than one contract, for example to separate personal and business usage, which he suggests accounts for around 13% of upper income subscribers;
- normal churn, in other words, customers switching networks without making use of number portability, thereby leaving their old SIMs active for 90 days.

(Goldstuck 2009).

The matter is further complicated by the use of SIM cards in a variety of devices and applications that do not translate into individual telephony usage, not all of which are factored into Goldstuck's analysis. These include 3G broadband access, vehicle tracking and similar devices, PABX Least-Cost Routers (LCRs), and SIM farms.

Goldstuck concludes that the SIM count overstates the user base by 32% (2009). Extrapolating these figures nationally, this would give South Africa a 35,3 million mobile users, or a mobile teledensity rate of 71,6 %. This is still a very high figure, given that segment of South Africa's population under the age of 15 years, many of whom are too young to use mobile phones, makes up 32% of the total (RSA, 2009, p 3). Such high mobile usage and penetration figures would, one ventures to suggest, point to South Africa having either already achieved universal service in respect of mobile telephony, or being on the cusp of doing so.

Future of Universal Access?

Where, in turn, does this leave the imperative of providing universal access to the majority of the country's population? This question has to some extent already been answered in the countries of the developed world. For example, the ITU has already begun to look at the implications for universal service of next-generation IP-based networks (Xavier, 2006). The European Union has recently completed a formal consultation on the future of universal service in a digital era, examining the future meaning of the concept of universal access policy, how to achieve broadband access for all EU citizens, and how to finance and co-ordinate interventions (EU, 2010, p 2).

It is therefore appropriate that South Africa as a developing country begin to consider similar options, both in the context of its own national environment, and as an exemplar for other African and developing countries whose own burgeoning mobile markets will before long put them in a similar position. South Africa has already begun to do this implicitly through the focus on funding from the Universal Service and Access Fund of the rollout of, inter alia, cyberlabs and digital hubs, and more recently the work of USAASA leading up to a recent Ministerial determination on universal access, which now includes data and broadband within its ambit (DoC, 2010a, p 2).

From Mobile to Broadband

On the estimation that South Africa is nearing universal service in respect of mobile telephony, and given that the fixed-line telephony market is a dwindling one, what then are the prospects for the inclusion of Internet access and broadband within the umbrella of universal service and access?

On the one hand, South Africa's universal service and access interventions in South Africa in respect of voice telephony, based as they were upon a wholly incorrect estimation of market trends, have been an abject failure, leading to a dwindling fixed-line subscriber base wholly overshadowed by a mobile market now in full bloom. On the other, mobile has effectively delivered universal service in respect of telephony services to the overwhelming majority of the country's citizens - despite almost no universal service and access interventions in its

favour save a few hundred thousand community service telephone kiosks. One wonders whether policy and regulatory interventions to secure universal service and access in respect of more advanced, next generation services like the Internet, broadband and the NGN are likely to enjoy any greater measure of success.

South Africa has a robust Internet market with an estimated 5,3 million users in 2009, of which 1,1 million are broadband users, either via ADSL or 3G mobile or both (Goldstuck, 2010). While the Internet market in South Africa has continued to grow, it has - with the exception of high rates of growth in broadband access - lagged considerably the growth rates seen in the mobile sector. There are likely to be affordability and pricing issues underpinning the lower rates of growth in these sectors: it is no accident that the recent uptick in subscriber numbers comes on the heels of increased bandwidth availability and lower pricing following the inauguration of the Seacom undersea cable (van der Merwe, 2009). Similar trends but at lower levels of performance are found across the rest of Africa: the ITU notes that Africa's Internet growth rate is the lowest of any region (2009, p 6) and that broadband uptake, especially fixed broadband, lags the rest of the world dramatically (ITU, 2009, p 9).

Despite these low levels of uptake, there are important reasons why countries like South Africa should ensure the rollout and uptake of Internet access and broadband - as there were historically for telecommunications or telephony access. Examining the literature on the impact of broadband, Qiang, Rossotto, and Kimura conclude that broadband improves the "competitiveness" of both individuals and communities, and increases productivity and efficiency in firms, along with providing essential enabling infrastructure for growth in "GDP, employment, and exports" (Qiang et al, 2009). But, their analysis goes further, using regression techniques to quantify the impact of various ICTs on economic growth to show that a 10% increase in Internet penetration is likely to lead to 1,12% improvement in economic growth and that a 10% increase in broadband penetration is likely to lead to 1,38% improvement in economic growth[24] (Qiang et al, 2009, p 45). The analysis is a persuasive one, suggesting that ensuring widespread access to Internet and broadband services should be a key policy objective.

Possible Areas for Intervention

It is therefore important that we now look at the scope and possibilities in respect of the future of policy and regulatory interventions designed to increase access to more advanced services, the Internet and broadband in particular.

Two forms of intervention may be distinguished, those underpinned by market forces and those requiring some form of external funding. Following the now fairly well-established ITU gap model (Navas-Sabater, Dymond & Juntunen, 2002; Dymond & Oestman, 2003; Stern, Townsend & Monedero, 2006; Infodev, 2009), the primary priority of policy and regulation is to ensure that the market is structured and incentivised in such a way as to overcome the 'Market Efficiency Gap', in other words, to ensure the widest possible provision of services to the poor and needy and to those in remote communities and areas by commercial service providers. Secondarily or subsequently, policy-makers and regulators should intervene by way of 'smart subsidies', one-off interventions to overcome initial market-entry barriers so that a far greater range of poor and remote communities become viable for commercial operators. This ensures a minimum requirement of ongoing subsidy to ensure access for the poorest and most remote.

[24] The impact is slightly lesser for developed countries at 0,77% and 1,21% respectively, and the statistical significance of the broadband figures is far lower than for the Internet numbers.

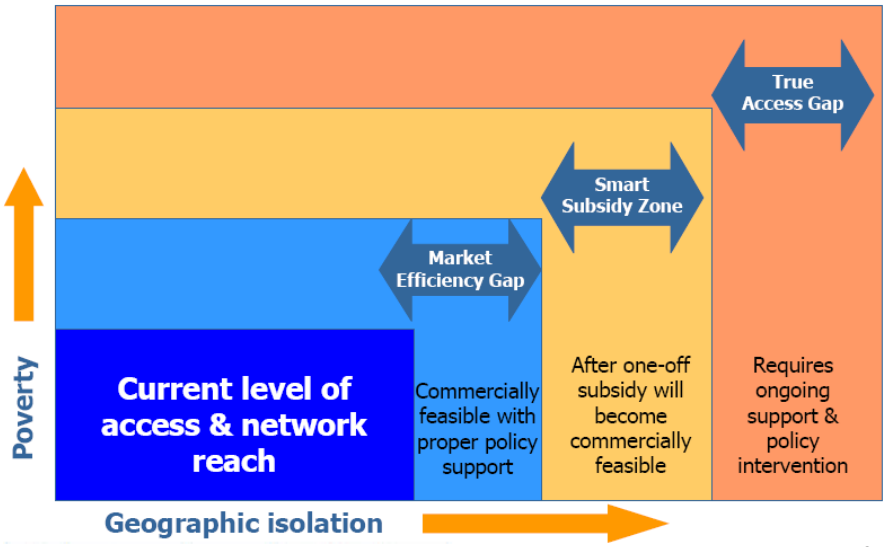

Figure 6: Typology of Universal Access and Service Interventions[25]

Given the failure of fixed-line to deliver universal access in South Africa, and the fact that it has been supplanted by mobile access to voice telephony, the first question to address is what is required to secure the completion of mobile universal service in the voice telephony market. It is precisely this question that is currently being looked at by the Africa Infrastructure Country Diagnostic (AICD) project of the World Bank[26]. Their estimates are that South Africa already has 100% population coverage by mobile (in other words 0% of the population live in areas that it is unprofitable for operators to serve), and that a further investment of a mere USD 3,4 million per annum is required to provide universal access to mobile voice telephony (Williams, 2010[27]).

On the basis of these projections, we therefore suggest that no further policy or regulatory interventions are required to ensure universal access and service in respect of (mobile) voice telephony in South Africa, and that intervention can more profitably address the Internet and broadband.

Despite the fact that South Africa's Internet user base has continued to climb, growth rates have been languishing in the single digit levels, only clawing back to 12% and 15% for 2008 and 2009 respectively, and putting the country, with an estimated 5,3 million users, at an estimated Internet density of 10,9% and well off universal access targets (figures from Goldstuck, 2010, p 136). Similarly, South Africa's broadband subscriber base, although continuing to show exponential rates of growth (mostly at the expense of dial-up subscriptions), is still a paltry 2,1 million (Goldstuck, 2010, p 97). South Africa is perhaps alone in sub-Saharan Africa, with its 4,6 million fixed phone lines, in having ADSL as viable broadband growth path, but even there mobile broadband access (largely via 3G) in 2007 overtook ADSL, which only grew at 12,9% in 2009, as opposed to 88,2% for mobile (Goldstuck, 2010, p 99). Although AICD puts the broadband coverage gap for South Africa at only 1%, they estimate the costs of providing universal coverage in respect of broadband services at a costly USD 165 million per annum (Williams, 2010).

[25] Derived from: Navas-Sabater, Dymond & Juntunen, 2002; Dymond & Oestman, 2003; Stern, Townsend & Monedero, 2006; Infodev, 2009.

[26] See http://www.infrastructureafrica.org/aicd/.

[27] The estimate is based on an econometric model developed as part of the project, and will be written up formally in a forthcoming book. Interestingly, they estimate that only as little as 8% of the entire population of sub-Saharan Africa lives outside areas that it would be profitable for operators to serve (Williams, 2010).

Several conclusions can be drawn from the discussion above. Firstly, it seems clear that ongoing policy and regulatory interventions will be required to increase substantially access to the Internet and broadband in South Africa. Secondly, it seems likely that the route to wider broadband access in South Africa, as on the rest of the continent, will be a mobile one, probably via 3G. Further, it seems clear that there is an access gap in respect of the Internet and broadband in South Africa, and that policy and regulatory interventions, either in the form of one-off, 'smart' interventions or through ongoing support will be required. It is to the requisite policies and regulatory processes that we now turn.

Policies to Promote Access

There are a number of supply-side policy interventions that can be undertaken to increase the availability of bandwidth and to reduce prices. Many of these are related to the liberalisation of Internet and broadband market structures and the associated ready availability of licences.

Securing access to an abundance of international bandwidth through encouraging the landing of a multiplicity of undersea cables is clearly one important area of supply-side intervention, and one in respect of which South Africa is already securely on track, with earlier ministerial attempts to block cable landings and to impose local ownership quotas now firmly in the past following an unprecedented joint rebuff by all five major operators (see Telkom, Vodacom, MTN, Neotel & Cell-C, 2008). Following the 2009 arrival of the Seacom undersea cable in South Africa, which itself increased the availability of international bandwidth by more than an order of magnitude to 1,7 terabits per second, the supply of bandwidth is expected to rise by a further order of magnitude to 17,3 terabits a second by 2013 (Goldstuck, 2010, p 47). While the impact of the availability of bandwidth on pricing is not necessarily immediate and direct, prices have already fallen, even ahead of the landing of the Seacom cable, and are expected to fall further (van der Merwe, 2009; Goldstuck, 2010, p 23; Muller, 2010).

However, the availability of international bandwidth at affordable prices is not enough on its own, without a competitive and well supplied domestic bandwidth market, along with a plethora of suppliers of both Internet and broadband access and a wide range of value-added and consumer-oriented services. Again the signs in South Africa are encouraging, perhaps more de facto than by design. Following a landmark high court judgement in August 2008 (Vecchiatto, 2008a), and the subsequent final capitulation to its import and impact by the then Minister (Vecchiatto, 2008c), South Africa's infrastructure market has effectively become fully liberalised with the licensing of over 400 new 'electronic communications network service' (infrastructure) providers. This not only allows operators to self-provide their own infrastructure, but has opened new domestic markets in the provision of bandwidth, with the arrival of companies like Dark Fibre Africa and Africa.Inx (Southwood, 2009), and with companies like telecomms licensee Neotel talking of the provision of fibre top the home (Vecchiatto, 2008b). This form of what is sometimes referred to as "platform competition" has elsewhere been shown to have a significant impact on broadband uptake (Lee & Brown, 2008).

Although some of these developments are more involuntary than by design, and dictated by the pressures of the market, South Africa has now drafted and promulgated a national broadband policy (DoC 2009b & 2010c). This policy recognises the role, importance and impact of broadband in respect of both economic development and growth and social benefit, noting that broadband penetration in South Africa is worrying low and that intervention is required. It commits the country to a vision of "universal access to Broadband by 2019 by ensuring that South Africans are able to access Broadband either

individually, or as a household, subscribe to a Broadband service, or are able to access a Broadband service directly or indirectly at a private or public access point" (DoC, 2010c, p7). The policy further identifies a number of key priority areas to be addressed, including ensuring widespread access, ensuring the provision of spectrum, promoting affordability, encouraging infrastructure sharing, and stimulating uptake and usage (DoC, 2010c, pp 12 - 15).

Despite the document's noble vision, it is worryingly and woefully light on implementation measures, consigning ICASA and USAASA to a section dealing with "state owned enterprises" and setting up a "Broadband Inter-Governmental Implementation Committee" with no explicit representation from either of these key regulatory bodies or from the private sector (DoC, 2010c, p 18). The document further recognises the potential regulatory role of ICASA in promoting broadband access and uptake, while being silent on any specific detail. It does, however, envisage that universal service obligations will continue to be imposed on licensees by the regulator to ensure they "contribute towards bridging the digital divide", and that the Universal Service and Access Fund will continue "allocating funding to various projects" (DoC, 2010c, p 18). Elsewhere USAASA is expected to develop "options for the construction, operation and maintenance of networks in under-serviced areas" (DoC, 2010c, p 8), but no longer has any role in defining targets which are set for 2019 as broadband penetration at a household level of 15%, and a "public ICT access point within two kilometres radius of any person in a sparsely populated area", along with "connectivity" to all municipalities (DoC, 2010c, p 20),. Effectively this suggests business as usual for both the two key agencies, with little interrogation of the appropriateness or effectiveness of historical interventions towards universal access and service in respect of telephony.

Policy formulation in support of universal access to broadband is also proceeding along other fronts. For example, South Africa's most populous province and its economic powerhouse, Gauteng, is actively engaged in developing policy and strategy in relation to what it refers to as "e-governance" (Abrahams, Burke, Hero & Elliot, forthcoming 2010). Analysing this work, Abrahams et al argue for policy formulation and implementation to achieve "universal household broadband service", both in order to reduce "social exclusion" and to enable "households to become units of production in a services oriented economy" (Abrahams et al, forthcoming 2010).

It is therefore clear that developing countries like South Africa require policy frameworks like those we have just discussed, at both national and other levels, in order to promote widespread access to broadband and the Internet. It is equally clear that these need to be as inclusive and consultative as possible, not only to secure maximum stakeholder support, but also to ensure they are comprehensive and multi-faceted. The policy approach should also broadly aim to secure and abundant supply of bandwidth, both international and domestic, and to promote a liberalised market with an open licensing regime that offers a multiplicity of services and services provides to stimulate uptake. It is a complex terrain upon which some academic discussion has already begun to engage (cf Bauer 2009).

The Institutional Landscape

From the preceding analysis of the respective roles and functions of South Africa's independent regulator, ICASA, and the agency charged with specific attention to universal access and service, USAASA, it seems clear that complex structural arrangements with competing co-jurisdiction produce outcomes that are at best sub-optimal. Structural arrangement that are simple, that are publicly accountable and transparent, and that are independent in their interpretation and application of national policy, are likely to work best.

If South Africa remains committed to the ideal of universal service and access, and wishes to ensure this is carried forward from voice telephony into the next generation of services via the Internet and by means of broadband, it would be better to merge USAASA into the independent regulator. This could be achieved by the creation of a statutory responsibility and sub-structure with a specific mandate, defined functions and clear reporting lines, along the lines of the current Complaints and Compliance Committee (RSA 2000 section 17). It would simplify lines of accountability, promote cohesion in the application of policy and strengthen the hand of regulatory intervention in support of universal access to the Internet and to broadband.

In this regard, the lack of clear interface between the "Broadband Inter-Governmental Implementation Committee" envisaged above in terms of the country's broadband policy (DoC, 2010c, p 18) and the independent regulator is clearly problematic and would need to be addressed in order to ensure policy and implementation cohesion.

Equally worrying is the current attempt by the Minister to undermine the independence of the regulator. Amendments currently proposed to the enabling legislation of the regulator (DoC, 2010b) have been described as "fundamentally undermining [to] regulatory independence" and as turning ICASA "into a simple transmission belt for the will of the Minister and the Department" (LINK, 2010, pp 1,2). An analysis of the proposed amendment is outside the scope of this paper: suffice it to say that independent and streamlined regulatory structures are necessary to underpin effective intervention in support of universal access and service.

Interventions for the Internet and Broadband

What specific universal access interventions would then be required in respect of the Internet and broadband, both from a broad regulatory perspective, and more narrowly and specifically in respect of specific access interventions?

There are a wide slew of regulations that potentially serve to increase access to the Internet and broadband. These are likely to include regulating broadband prices and enforcing local loop unbundling. The impact of the former, for instance, is likely to be complex, with lower prices incentivising consumer uptake but disincentivising investment and network rollout by service provides (Götz 2009). Unbundling the local loop, on the other hand, has been shown to increase broadband uptake (Lee & Brown, 2008), but may become increasingly less relevant as wireless access paths predominate. However, regulating to increase access to the Internet and broadband, important though it is, lies outside the scope of this paper, and will not be discussed further here.

The imposition of universal service rollout obligations upon licensees is the one possible exception to this caveat, and does merit consideration as a specific form of intervention to increase access to the Internet and broadband[28]. The previous analysis of universal service obligations in South Africa has, however, suggested that they are an ineffective intervention. On the one hand, quantifying them has proven to be highly problematic, as this depends on market forecasts that have been shown to be wildly inaccurate. Although this could potentially be addressed by specifying obligations proportional to market penetration, they are also problematic because they enforce specific technology and rollout model choices. For example, requiring licensees to install cyber-labs in schools may seem useful at the time the obligation is imposed, but may be bypassed and rendered irrelevant

[28] Whilst others (cf Xavier & Ypsilanti, 2007) have considered the future of universal service obligations in relation to next generation networks, much of the discussion has centred on issues such as quality of service, directory enquiries and access to emergency services rather than rollout obligations.

within a few years by substantial, unpredictable shifts in either the educational or the Internet environment. Finally, as the number of licensees increases, the choice of which licensees to encumber with such obligations becomes a debatable judgement call, and the challenge of tracking and co-ordinating the full range of obligations becomes increasingly difficult.

It therefore seems clear that the future of universal service obligations is limited. Accordingly, they should be dropped from the repertoire of universal access interventions rather than mutated into forms more appropriate to next generation broadband and Internet services.

Nevertheless it is equally clear from the preceding analysis that significant funding will be required to support universal access to the Internet and to broadband. Firstly, smart subsidy interventions will be required to establish appropriate market segments or to bring poor and geographically remote individuals and communities within the ambit of the market. Secondly, long-term, ongoing intervention will be required to sustain the most needy within the market. In both cases, funding will be required.

Despite the problems with the existing Universal Service and Access Fund catalogued above - the failure to spend the funds already accumulated, and expenditure on projects of dubious value - it remains the most likely candidate for aggregating and expending the funding required. Its retention, suitably strengthened, is therefore to be recommended.

It will firstly be necessary to calculate the funding deficit required to achieve universal access in respect of the Internet and broadband. This will require refinement of the econometric model set up by the AICD project (Williams 2010) or the development of an improved model. The current percentage contribution to the fund by licensees in South Africa, which is limited by legislation to a maximum of 1% of operator turnover (RSA, 2005, Section 89) and currently set through regulation at 0,2% (ICASA, 2008), may also need to be reviewed and revised, depending on what the funding deficit is calculated to be vis a vis current contributions to the fund. There may even be a need to consider innovative options and avenues for securing sufficient revenue, as has been suggested by some commentators (Xavier & Ypsilanti, 2007, p 27), but securing public support for these and carrying through the necessary changes is likely to prove challenging.

Certainly the modus operandi of the fund will need to be significantly improved to ensure that funds are spent in the first place, that the choice of target projects and interventions for that expenditure is more appropriate leading to more effective intervention, and finally that funds are expended more efficiently in the sense of obtaining maximum leverage and impact from minimum expenditure. Again, although a detailed analysis of how to achieve these goals is beyond the scope of this paper, there is a considerable literature examining performance and identifying best practice paradigms (Wellenius 2002; Intelecon, 2005; Wallsten, 2008).

Conclusion

The analysis presented in this paper has sought to trace a trajectory for universal access and service in respect of telecommunications service in South Africa, but it is a trajectory that is common to many developing countries and applicable across sub-Saharan Africa.

At one level it is a story of telecommunications technologies, a common migration from fixed-line telecommunications, through a burgeoning mobile telephony environment, towards the promise of services enabled Internet access and the bounteous bandwidth of

broadband - with the NGN perhaps a looming shape on the horizon. The various countries of Africa may be at different stages in the journey, but for almost all of them universal access to telephony services by means of mobile is the current and central preoccupation of universal access and service policy, and correctly so.

However, several are on the same cusp that South Africa currently straddles, where universal service in respect of mobile telephony is a present reality - and many more will reach that point in the near future, given current rates of growth in the mobile sector. It is therefore essential that South Africa looks forward to the next wave of services that require universal service and access intervention. Other African countries too can benefit from looking forward towards the next generation of services.

The analysis presented here has examined several themes that are central to universal access and service in the telecommunications environment, in particular those of policy, institutional structures and arrangements, and the effectiveness of concrete interventions.

The formulation of appropriate policy based on an accurate research-driven assessment of current realities in the sector is essential, as is its implementation. We have examined the policy vision that needs to animate and inform efforts to increase access to telecommunications services, whether basic fixed-line voice or those of the next-generation broadband-enabled future. Not only that, but policy needs to find concrete manifestation in legislation, in enabling institutional arrangements and in practical interventions targeted at universal access and service. South Africa, and indeed other African countries, can increase the effectiveness of their efforts towards universal access and service by ensuring tighter coherence and greater integration of policy, underpinned by more transparent policy processes with full public participation.

Appropriate institutional arrangements and structures are also an essential precondition for universal service and access arrangements that work. This requires an institutional landscape that is relatively simple, without structural conflict and tension, and structures that have clear policy and legislative mandates and the level of independence necessary to fulfil those mandates.

Finally, and perhaps most importantly, the concrete universal access and service interventions themselves form a key component of the landscape. They comprise a smorgasbord of possible measures, of varying degrees of effectiveness, that require ongoing monitoring and assessment in relation to their utility and impact. It is essential that African countries continually evaluate them in relation to policy objectives, be these universal access to mobile telephony or the rollout and uptake of broadband services, and that the necessary changes to implementation strategy are made on an ongoing basis.

As we have shown, with a mobile teledensity now in excess of 100%, South Africa is arguably on the cusp on universal service in respect of mobile telephony, and conceivably one of the few developing countries in a position to engage in debates around best practice policy and regulation for universal service and access in relation to Internet services, to broadband and to next-generation networks. Hopefully, this paper makes a small contribution towards opening up that debate.

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