APC ISSUE PAPERS

OPEN ACCESS
LOWERING THE COSTS
OF INTERNATIONAL BANDWIDTH IN AFRICA

Mike Jensen

Bandwidth is the life-blood of the world's knowledge economy, but it is scarcest where it is most needed – in the developing nations of Africa which require low-cost communications to accelerate their socio-economic development. Few schools, libraries, universities and research centres on the continent have any internet access. For those that can afford it, their costs are usually thousands of times higher than for their counterparts in the developed world, and even Africa's most well-endowed centres of excellence have less bandwidth than a home broadband user in North America or Europe, and it must be shared amongst hundreds or even thousands of users.

A variety of factors are responsible for this situation, but the biggest cause is the high cost of international connections to the global telecommunication backbones. This is mainly the result of the lack of international optic fibre infrastructure, which is necessary to deliver sufficient volumes of low-cost bandwidth, and the consequent dependency on much more expensive satellite bandwidth. Less than twenty of the 54 African countries have international optic fibre cable connections, and these are currently controlled by inefficient state-owned operators which charge monopoly prices while neglecting to build the national backbones needed to carry local and international traffic. As a result, circuits from Africa to the US or Europe usually cost more than US$5000 a month[1], while cross-Atlantic links between North America and Europe can now be obtained for US$2.5/Mbps/month and for US$16–30/Mpbs/month on international routes in Asia[2].

The only large-scale international fibre link in Africa (SAT-3/WASC/SAFE) connects eight countries on the west coast of the continent to Europe and the Far East. Operating as a cartel of monopoly state-owned telecommunication providers, prices have barely come down since it began operating in 2002. New fibre projects have been proposed which could break this monopoly and add many more African countries to the global grid, but most of these projects are also being developed by state-owned telecom operators. As a result they are following the same high-priced SAT-3 business model. Unless interventions are made to reduce the cost of these

1 See for example - GISPA signs agreement with GT for new, low prices on SAT3. Balancing Act Issue 233 www.balancingact-africa.com/news/back/balancing-act_233.html. and Fibre Optic Cable Systems in the Arab World www.aticm.org.eg/admin/Documents/ArabFiberOptics-Study2.pdf

2 See for example circuits obtained by the research network Canarie, Canada. Note these prices are predicated on 3–5 year contracts for multi-Gbps circuits. Personal communication with bill.st.arnaud@canarie.ca

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existing international fibre links and to ensure that new fibre infrastructure is quickly built, the continent will be prevented from tapping its latent potential and will fall further behind the rest of the world.

This problem is not unique to Africa. Other developing regions suffer from the same problem, but it is at its most extreme in sub-Saharan Africa, which has the lowest teledensity in the world and the highest unmet demand for telecommunication services[3]. Fortunately, African governments and the international community have recently become more aware that action is needed to improve access to communications and to encourage the adoption of alternative business models that can significantly lower the cost of international links. These have centred on what are known as *open access* models, which are cost-based and owned by the public sector (similar to roads and rail lines), rather than being operated by a club of companies aiming to maximise profits.

Most African country telecommunication markets are slowly moving to a more competitive environment which will ultimately address pricing and national imbalances in demand and supply. However the international sector in developing countries is different from developed nations because the majority of countries have markezts that are too small to justify the cost of deploying many competing international fibre cables. With each cable able to carry data at terrabit speeds, only one international connection to a global hub is needed, although a second physically separate link is also required for back-up (redundant connection) purposes. However achieving competitive pricing between just two suppliers is infeasible. Thus, in order to ensure cost-based pricing, a different model of deployment is needed, where the cable and landing points are operated on a non-profit basis, extending the models used by internet service providers for operating national or regional Internet Exchange Points (IXs).

This follows a number of recent studies which have identified public-private partnerships and open access models as a more appropriate solution for fibre deployment[4]. These also build on precedents set by the oil and gas industries when building pipelines, in which the basic approach is to establish a Special Purpose Vehicle (SPV) to operate the facilities. The main objective of the SPV is not to make a profit, but to facilitate profits made elsewhere by the participating companies. The aim is not to exclude incumbent telecom operators from the process, but to allow the participation of others that might bring additional funding or other advantages to the table such as rights of way to build fibre along power or rail routes[5].

The most viable structure for this approach is likely to be a two-part system in which national cable landing points are managed by national associations of bandwidth providers, while the cable itself is owned by a mix of operators and private or public investors. Given that the most appropriate place for the cable landing point is likely to be at the facilities of the national operator, these would most likely be owned by the state, but operated by a management company appointed by the national association of bandwidth providers.

With the cable itself, different models can be adopted. In one scenario any entity would be free to invest, either as an operator, in which case the investment would be tied to guaranteed amounts of bandwidth, or as a non-user shareholder who might invest funds or provide a right of way (e.g. a gas pipeline operator wishing to minimise the cost of operating their pipeline network). Alternatively, ownership of the cable can be defined on a national basis with shares held by the same special purpose companies that operate the landing points.

In either case, sufficient investment is likely to come from the much broader base of operators that would be able to access the bandwidth at cost, and little additional financing would likely be required[6]. However some of the smaller, more remote or less developed countries might require special assistance, and given the general interest by the international community in ensuring more universal access, along with the positive impact on demand for national backbones that would result from affordable international connectivity, donors could provide a demand guarantee that would meet any revenue shortfalls

3 While demand forecasting is heavily dependent on the assumed end-user cost, the billion dollar annual payments for satellite bandwidth across Africa already show that there is sufficient demand for international infrastructure to justify deployment for virtually every country in Africa except perhaps the smallest and most remote nations.

4 See for example the World Bank InfoDev Study: Open Access Models: Options for Improving Backbone Connectivity in Developing Countries www.infodev.org/content/highlights/detail/2568 to undercut pricing.

5 Finding rights of way for cable is a major difficulty in terrestrial projects unless they can be provided by municipalities and parastatals such as railway, pipeline, and electricity grid operators.

6 The potential role for private finance in these projects is also more limited because there is virtually no risk of failure – the demand for international fibre bandwidth from the first two connections is guaranteed, and if services are offered at cost-plus, there is little opportunity to undercut pricing.

in the early years. This may be a risk for donors if the demand was not met over the life of the cable. However, assuming the long-term business case is sound, they might look to recoup the funding when traffic increased at a later point. Donors could also be invited to meet the cost of additional add-drop units on fibre projects to ensure small and remote communities along the way can be reached. The choice of these locations would be a matter for negotiation between the donors and national governments.

Given the interest of governments in supporting the development of their nations such as through improved access to health and education, along with the broader social improvement and enhanced public services which can be provided through better connectivity, there is a growing interest amongst a wide range of stakeholders in ensuring that open access models are adopted.

The initial focus is likely to be on supporting the adoption of open access models for the upcoming East African fibre project (EASSy, see below) which could then be replicated in West and Central Africa. At the same time SAT-3 and other existing international fibre cables may be declared essential facilities serving the public good with regulated pricing. Specific activities are likely to be:

- Increased backing for policy makers and regulatory agencies in Africa to implement policy changes and regulations that allow open access to international fibre
- Support to local associations of bandwidth providers to establish shared international fibre gateways
- Increased backing for international fibre projects which aim to provide equal access to all bandwidth providers.

There is the risk that the entrenched interests of the incumbent operators and their state-owners will be able to resist efforts to change national telecom policy, and that the EASSy project goes ahead as currently planned. Nonetheless, support from a broad range of stakeholders is expected to substantially improve the chances of an alternative strategy being adopted, which could have a major impact on the way international fibre projects in developing countries are being planned in the future.

In summary:

Most of Africa is as yet unconnected to the global fibre backbones.

Optic fibre is the only way to supply sufficient international low-cost bandwidth.

As elsewhere, the limited fibre that has been laid in Africa is not competitively priced, and uses business models developed by cartels of monopoly telecommunication operators.

A cable planned for the East coast of Africa (EASSy) which will have a major impact on bandwidth availability in the region, was being developed as a club of mostly state monopoly operators with high prices and low volumes in mind.

The strategy for the deployment of an open access model for EASSy is in the process of being legislated by policy makers in the region.

The adoption of a low-cost open access model for EASSy would likely have a major impact on the way new fibre projects are planned in other regions in Africa.

1. THE NATURE OF THE PROBLEM

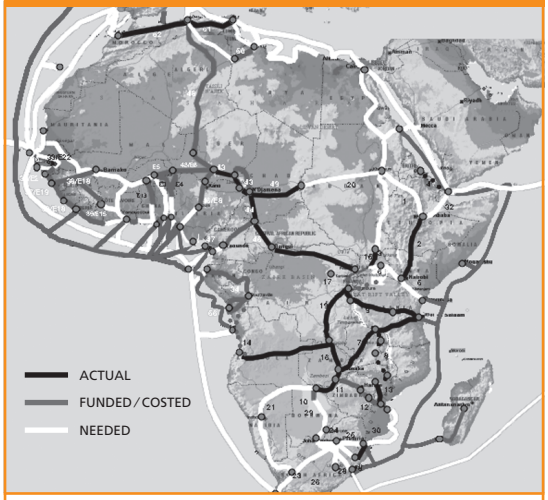
Communication costs in Africa are currently thousands of times higher than in Europe or North America. This particularly affects those with the most limited resources: students, researchers, doctors, scientists, and other public servants, as well as the general public, who are unable to take full advantage of the unprecedented access to knowledge the internet provides. Cheaper bandwidth for African institutions, particularly governments, schools, universities, libraries and hospitals would provide widespread access to the wealth of information available online, facilitate African contributions to the global economy and increase the likelihood of successful solutions to African development problems. So in a nutshell, the constraints on development in Africa caused by the high cost of communications are not being addressed due to inappropriate business models used for deploying international fibre infrastructure.

The developed world is benefiting from the surplus of optical fibre cable laid during the dot-com bubble which has coincided with technology advances that have made speeds of over 1000 Gigabits per second routine on these fibre links. While those in the North reap the benefits of these developments, much of the South, and Africa in particular, has not seen significant deployment of international fibre. This is clearly shown in the diagram on page 5 which depicts improvements in the speed of the internet over the last 10 years as measured by Stanford University in the US. Africa is the region showing the slowest improvements and is actually steadily falling behind the rest of the world.

There is only one intercontinental fibre link to sub-Saharan Africa (SAT-3) which provides connections to Europe and the Far East for eight countries along the west coast of the continent[7] (shown in the map left). Except for some onward links from South Africa to its neighbours, and from Sudan to Egypt and from Senegal to Mali, the remaining 33 African countries are unconnected to the global optical backbones, and depend on the much more limited and high-cost bandwidth from satellite links. Even the few countries that have access to international fibre through SAT-3 are not seeing the benefits because it is operated as a consortium where connections are charged at monopoly prices[8] by the state-owned operators which still predominate in most of Africa, and in many other developing regions.

As a result, institutions in these countries pay thousands of dollars a month for internet connections which a home broadband user in North America would pay US$20 a month for. Aside from the general dampening effect this has had on uptake, unaffordable bandwidth has actually excluded African scientists from gaining access to the services of global research networks which now expect their member countries to have at least 1Gbps on international connections in or-

FIBRE NETWORKS & PLANS

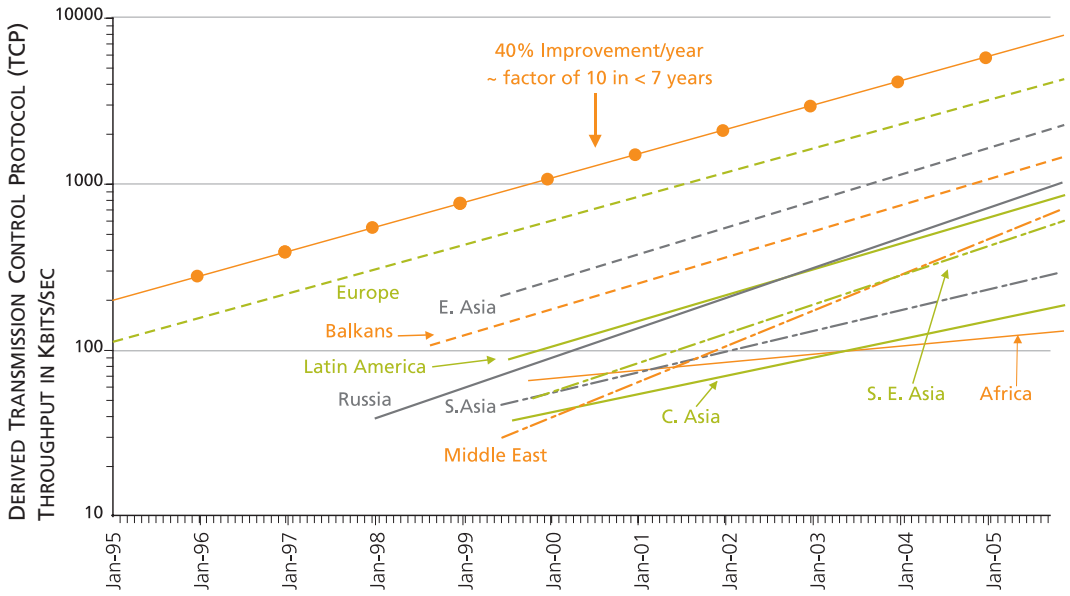


Source: Mike Jensen/NEPAD e-Africa Commission. "Needed" links are defined by the NEPAD e-Africa Commissionas those necessary to support its strategy of establishing redundant fibre links to every capital city in Africa, for which it is now in the process of lobbying operators and investors.

7 As detailed in Annex 2 (*Stakeholders in Telecom Infrastructure Deployments in Africa*). See end note.

8 The International Telecom Users Group (INTUG) observed in January 2005 that "the level of the prices seldom arises from high underlying costs, but instead are imposed by monopoly or dominant operators through the exercise of their market power. Often these operators are shielded from potential competitors by the refusal of their governments to permit any new players to enter the market in international telecommunications".

TCP THROUGHPUT MEASURED FROM NORTH AMERICA TO WORLD REGIONS



Source: Stanford Linear Accelerator Center PingER project
www.slac.stanford.edu/xorg/icfa/icfa-net-paper-jan06/report-jan06_files/image022.jpg

der to access the advanced services and petabit data sets they now provide[9].

In a chicken-and-egg situation, the constraints on demand resulting from the high tariffs charged by the monopoly operators have contributed to the slow pace of fibre deployment and the severe lack of investment in needed infrastructure. Many of these state-run telecom operators, often mismanaged, inefficient and suffering from much reduced profits caused by the collapse of international settlement rates, do not have the resources to invest the millions of dollars needed to deploy national and international fibre, and neither do their host governments. Understandably, few private investors or donors are interested in financing these moribund organisations that rest on artificially-closed markets. At the same time, continued state-operator control over international gateways and national backbones has meant there are very few opportunities for investment in privately-operated telecommunication infrastructure.

9 Telemedicine and genetic research in particular require high bandwidths for the transfer of images, video and large data sets, other examples include high definition video, super-computing, and physics, and remote sensing data. The ATICS survey of 84 leading tertiary institutions in Africa found 850,000 students and staff with access to a total of only 100Mbps international bandwidth (www.atics.info). By contrast, Australia's tertiary community of 250,000 share 6Gbps of international bandwidth (although even this is still insufficient to meet their needs).

2. THE EXPERIENCE FROM SAT-3/WASC/SAFE

The first large-scale international fibre project in sub-Saharan Africa, SAT-3/WASC's first segment connects Portugal to the Cape in South Africa reaching eight coastal countries along the way: Senegal, Ivory Coast, Ghana, Benin, Nigeria, Cameroon, Gabon and Angola. A second segment, in the Indian Ocean, connects South Africa to Malaysia while passing through Mauritius and India (SAFE). Jointly funded by 36 members[11] and spearheaded by South African Telkom which invested US$85 million for a 13 per cent stake, the project cost about US$650 million dollars. The cable was expected to lead to much reduced international bandwidth costs, but so far this has not occurred due to the business models used to develop the project.

The ownership of the cable was established as a club consortium, which is a confidential shareholder agreement about which little is known[12]. The shareholders appointed Telkom South Africa as the managing agent who runs it on their behalf, taking care of day-to-day performance and maintenance issues. Telkom South Africa also has the largest amount of traffic among consortium members. Consortium members have a monopoly on selling access to the fibre in their own country until April 2007. If the consortium builds more capacity than its members can take up (on which they have first right of refusal), then the "pool" capacity will be sold off as IRUs (Indefeasible Rights of Use).

Being the only international fibre cable available has put the consortium's owners in a relatively unassailable position. Sentech, the South African state-owned broadcasting and telecom provider, argued in parliament last year that Telkom's monopoly over the cable was limiting Sentech's ability to provide affordable, high-speed internet access to consumers. It said that SAT-3/WASC/SAFE was a strategic national asset that was funded by taxpayers. At the time the cable was initiated, Telkom enjoyed a statutory monopoly and was majority-owned by the state.

There are three recurring issues here: the monopoly each national operator has on the landing stations in their country; the monopoly on the sale of capacity; and the fact that shares in the consortium are not tradable. Examples include:

Under pressure from Ghana's ISP association the local incumbent with the landing station, Ghana Telecom, lowered its prices by about a third to US$8,050 a month for an E1 leased circuit from Ghana to Portugal. Previously, E1s had been quoted at between US$12–15,000 a month, but even with the reduction, the price is many times higher than cost. The agreement is again covered by commercial confidentiality.

Landlocked African operators who have tried to purchase international fibre capacity directly from one of the consortium's international members have found themselves being charged as much to reach the SAT-3 landing point as they were charged to get from the landing station to Portugal. Sadly, the high costs have made it cheaper to send the traffic directly by satellite, even for SAT-3 shareholders such as Telecom Namibia, which has no landing point of its own.

Nigeria's SNO, Globacom, realising that to be competitive it would need access to its own international fibre capacity, tried to buy a shareholding in the consortium. It was told that it could not do so, presumably because Nitel would be threatened by its access to capacity. In the meantime, Globacom has announced that Alcatel will build it a fibre between Nigeria and England. The Nigerian government has talked about separating Nitel's SAT3 capacity as an independent operation but this has not yet become public policy while staff at Nitel have objected to the proposed separation saying that this would jeopardise the proposed privatisation of Nitel.

A rough budget for SAT-3 shows that the investment has already been recouped and running costs should drop to US$30 million a year. Taking into account the new upgrade costing US$30–50 million, which will result in a doubling of capacity to 40 gigabits per second, charges could come down to something closer to those found on the North Atlantic but are unlikely to occur in the absence of competition from other new cables.

11 The SAT-3 shareholders are: Angola Telecom, AT&T Corp (USA), Belgacom SA, Communications Global Network Services Ltd (BT), Cable & Wireless Global Network , Camtel, China Telecom, Chunghwa Telecom Ltd Co, Côte d'Ivoire Telecom, Cyprus Telecommunications Authority, Deutsche Telekom AG, France Telecom, Ghana Telecommunications Co, Global One Communications, Maroc Telecom, Korea Telecom, KPN Royal Dutch Telecom, Marconi (Portugal), Mauritius Telecom, MCI Worldcom International, Nigerian Telecommunications, OPT Benin, OPT Gabon, Reach, Singapore Telecommunications, Societe Nationale des Telecommunications du Senegal (SONATEL), Sprint Communications Co, Swisscom Ltd, Telecom Italia SpA, Telecom Namibia, Telefonica de Espana, Teleglobe (USA), Telekom Malaysia Berhad, Telkom South Africa, The Communications Authority of Thailand, and Videsh Sanchar Nigam Ltd (India).

12 Despite the continued efforts of the South African government to obtain details of the nature of the agreement, the consortium has not released details.

Approaches to opening up access to the cable using competition legislation have been discussed, but currently it appears that only South Africa has the appropriate legislation. There is also lack of clarity regarding lapsing of the monopoly on the landing stations in 2007 and this will still likely require legislative change to allow other shareholders and wholesalers direct access to these international gateways. In the meantime the South African government is discussing declaring the SAT-3 landing point an essential facility ahead of the 2007 date, but is debating whether to do this through legislation or through regulation. ICASA could draft the necessary regulations under sections 44 and 51 of the Telecommunications Act. As an essential service, ICASA would be able to set the prices for access to the cables and regulate these according to Telkom's costs.

But any move by the government to have the cables declared an essential service, or to amend legislation, is likely to be met with strong opposition from Telkom. Telkom says it is a public company and that the cable is its asset. "It would be an unfortunate precedent to nationalise this cable landing, as it would discourage Telkom from any further investments in projects of this nature," it said in a statement. Some observers have echoed this concern and warned against hasty decisions by government, suggesting thhat declaring the cables an essential service could raise concerns among foreign investors that government is interfering unnecessarily in the market. Telkom says access to the capacity in the cable could be classified as an essential facility only if it meets certain characteristics. But, it says, it doesn't meet these characteristics for various reasons, one being that satellite links are available as substitutes.

Thus most observers have concluded that improving access to low-cost international bandwidth is more likely to be achieved through new projects which will also put competitive pressure on the old models, rather than to focus purely on the problematic area of legislating access to existing facilities which were established under different regimes.

3. THE CASE OF THE EAST AFRICAN SUBMARINE SYSTEM (EASSY)

Recent efforts to establish a fibre project serving the countries on the east coast of Africa is one such project, which provides an ideal case study in new models for telecommunication infrastructure provision, while underlining the problems described above. Known as the East African Submarine System (EASSy), the project is being developed by about 25 telecom operators, of which twenty are majority owned by African governments[13] in the region, four are private operators which have recently received international gateway licences (in South Africa, Kenya, Somalia and Tanzania), along with recently expressed interest from international operators including British Telecom, Teleglobe and Etisalat.

With their sole franchise on international links, the state-owned operators have adopted a closed consortium ownership model, similar to that of SAT-3, which raises the spectre of continuing the strategy of selling small quantities of bandwidth at high margins. Currently prices on SAT-3 are up to US$15,000 / Mbps/month, while it is estimated to cost the consortium only about US$300/Mbps/month[14]. With new technologies and a shorter cable, EASSy will be capable of up to 640Gbps and bandwidth should cost the operator less than US$15/Mbps/month to provide[15], while current indications are that pricing will initially be in excess of US$1,000/Mbps/month[16].

13 In early June 2006 Mauritius was included in NEPAD's proposed alternative to the EASSy consortium.

14 The cable is estimated to cost about US$1500 million over its life: (US$600m to lay + US$35m/year x 25years for financing, maintenance, and upgrades) i.e: Assuming only about half the total bandwidth (75Gbps) of the cable is sold over its lifetime, the annual cost of the cable is: US$1500m / 25 years = US$250m/year. Monthly cost /Mbps: US$250m/75 000 Mbps/12months = 280 US$/month per Mbps

15 The cable is estimated to cost US$1030 million over its life: (US$280m to lay + US$30m/year x 25years financing, maintenance, and upgrades) i.e: The annual cost of the cable is: US$1030m / 25 years = US$41m/year. Assuming only half the total bandwidth of the cable is sold over its lifetime, the monthly cost /Mbps: US$41m/300 000Mbps/12months = 11 US$/month per Mb/s. This does not include the cost of upstream bandwidth to gain access to the global backbones from the EASSy termination points, currently planned for South Africa, Djibouti and Sudan

16 The pricing target proposed in June 2006 by a group of DFIs working with the EASSy consortium is for bandwidth to initially be priced at about 30% of current satellite bandwidth prices and then as demand increases, to reduce the tariffs to around US$750/Mbbps/Month by 2012.

While most of the EASSy project members have a monopoly on international links in their own countries, even where there is more than one EASSy member in the same country, it is possible that the state operators could leverage their position in both the wholesale and retail markets at the expense of the other bandwidth retailers without international gateways, thus increasing the costs to the end-user. In addition, their sole rights to the sale of international bandwidth allows the operators to integrate the wholesale and retail chains, giving them an unassailable position in the market, making it more difficult for new private players to gain market entry.

The French consulting group, Axiom, which carried out the Detailed Feasibility Study[17] for the EASSy project, admit in their report that: "It is usually difficult to find a Consortium's majority ready to agree on attractive or even fair capacity pricing policy for sale to non-Consortium members." Axiom did discuss an alternative Special Purpose Vehicle (SPV) model with a more diversified shareholding, including national operators, but they concluded that their model for an SPV had problems because international gateway operators would be in competition with the other investors, and because of the unclear regulatory environment for an SPV[18].

Currently the EASSy consortium has raised pledges for the bulk of the funds from within the group of operators, but it has been delayed in finalising the project because an additional US$60m-$140m in financing is still needed. Many of the smaller EASSy participants were expecting to obtain soft finance for their stake in the project from multilateral and bilateral development finance institutions (DFIs) such as the World Bank and the European Union.

Globally, telecom infrastructure provisioning strategies are still under debate[19], and recently, the models for financing the EASSy cable have come under scrutiny by governments in the region as well as the DFIs, who are also keen to see lower charges on network infrastructure. Culminating in the highlighting of African bandwidth issues at the World Summit on the Information Society (WSIS) in Tunis in 2005[20], national policy makers in Africa are now aware that traditional strategies to telecommunications backbone deployment have not worked and that a new approach needs to be adopted. At the same time the DFIs made it known that they would not finance the EASSy consortium if it continued as a closed club.

While the EASSy consortium continued to push ahead with its strategy, the seeds of an alternative initiative were laid at the November 2005 meeting of Southern African ICT policy makers in Botswana which requested its representative body, the NEPAD e-Africa Commission, to develop an open access non-discriminatory model to build the necessary fibre infrastructure in the region[21]. The meeting proposed that SPVs, consisting of public-private partnerships, be used to operate the infrastructure. Following through on these recommendations, studies on regulatory and business models for SPVs were conducted on behalf of NEPAD by the DFIs, the Commonwealth Telecommunications Organisation (CTO) and the South African parastatal investment agency, the Industrial Development Corporation (IDC).

After a series of subsequent meetings earlier this year, involving the East and Southern African policy makers, regulators, DFIs, NGOs, and a few of the EASSy consortium members, an intergovernmental working committee (IWC) was established at the April 2006 meeting of policy makers and regulators convened by NEPAD. The IWC was chaired by RITA (the national ICT promotion agency of Rwanda), and comprised regulators and policy makers representing Botswana (as deputy, also representing NEPAD), Kenya, Lesotho, South Africa and the East African Community (EAC). The IWC was charged to:

- Make recommendations on the viability and functions of a proposed Inter Governmental Assembly (IGA) which would have oversight over international fibre infrastructure in the region through a 'golden share' investment in the SPV
- Make recommendations on the functions and scope of the SPV
- Conclude the dialogue with the DFIs and the EASSy consortium membership
- Take actions needed to move the project forward, including defining the process for registering the SPV

17 Along with the other reports it is available on the E-Africa Commission site http://www.eafricacommission.org

18 To be fair, at the time of the EASSy project conception the regulatory environment encouraged a closed club model as national telecom policies precluded anyone but the licenced international operators to provide international infrastructure. While this is still the case, following the June 2006 meeting the communication ministers of the region have adopted in principle a modified regulatory environment which would allow the provision of wholesale services by an SPV.

19 See Annex 7 – *Teletopia: A New Regulatory Agenda for America*

20 Such as the World Bank's ATICS and Open Access Model studies, NEPAD e-Africa Commission studies and IDRC's PAREN programme.

21 See Annex 3 for the Declaration of the Policy Makers

- Raise the interim funding to continue the work of the IWC
- Produce a report for the planned Ministers' meeting.

At the same time, a group of regulators lead by Kenya was tasked with responding to the CTO report on the proposed regulatory model.

The recommendations emanating from these two groups were subsequently incorporated in a draft regional protocol[22] and associated declarations that were hammered out in an intensive three-day meeting convened by the NEPAD e-Africa Commission in early June and attended by most of the Permanent Secretaries and Director Generals from the relevant ICT ministries in the Southern and Eastern African countries.

The protocol covered the establishment of the SPV along open access principles, an Intergovernmental Authority to govern it and the changes needed to the national regulatory environment to accommodate the SPV. The protocol was then presented to the June meeting of Communication Ministers in Johannesburg[23] which agreed to house the SPV in Rwanda[24], include Mauritius in the project[25], and to adopt the draft protocol as a working document which would be taken home for further review and then formal signing and ratification at a meeting to be convened in August 2006 under the auspices of the African Union. The e-Africa Commission was also requested by the Ministers to convene a meeting in the interim with the EASSy consortium members to ensure they are on board with the new strategy and to work out the modalities for taking over the work that has already been done by the consortium members. This meeting was scheduled for the first week of July.

The key features of the open access model and associated strategies that were adopted in principle by policy makers at the June meeting is that:

1) An SPV would be established in Rwanda to implement, own and manage the cable with a cost-based tariff regime, a regulated rate of return on investment and ultimate control which rests with the governments of the region. The establishment of the SPV to operate the cable in this way is aimed at what is seen as the key deficiency with the consortium model, which is that the dominant bandwidth retailer in each country and the wholesaler (the consortium) are not separated and thus the consortium member retailers are able exploit vertical integration in their markets to the detriment of other service providers which do not have this advantage. Thus, ensuring that the wholesaler (the SPV) is fully separated from the retailers and being licenced in each country effectively spells the end of international gateway monopolies and allows the retailers to concentrate on their core business while profiting from the lowest possible international bandwidth costs. The model also accommodates the variety in national policy environments, so that local retailers are free to charge what they like for international bandwidth, with the expectation that competition will drive down prices and in countries where there is still a restricted number of retailers in the market, there will be increased incentives to open the market to benefit from low prices.

2) The SPV will have equal shareholding from each country in the region to underline the common ownership of the infrastructure by all the nations of the region and to ensure that small nations are not at a disadvantage from larger nations. Currently it has not been decided if the same SPV will operate the terrestrial backhaul infrastructure, or if a separate SPV will be established to carry out this function.

3) Each country can elect how it will allocate its shares to the local operators and can allow any new operator to invest in the SPV at any time. This principle was adopted to eliminate one of the main objections to the consortium model, namely that the region is undergoing a major process of liberalisation and that the many operators that are expected to be licensed in the near future would not have the opportunity to invest in or directly benefit from the cable. Notwithstanding the benefits of having a say in how the SPV is managed, this deficiency is also addressed by the additional provision that there will

22 Officially known as the Draft Final Protocol on Policy and Regulatory Framework for NEPAD ICT Broadband Infrastructure Network for East and Southern Africa. The countries party to the protocol are: Angola, Botswana, Burundi, DRC, Djibouti, Eritrea, Ethiopia, Kenya, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Rwanda, Somalia, South Africa, Sudan, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe.

23 Officially known as the Draft Resolutions of the Ministers responsible for ICTs and / or Telecommunications in Eastern and Southern Africa, 2–3 June 2006.

24 The housing of the institution to manage the submarine cable in the landlocked country of Rwanda was adopted as a sign of commitment that the cable project was aimed at benefitting the region as a whole and not just the coastal countries, as had been the case with SAT-3.

25 Although Mauritius had been involved in the early discussions of EASSy, it had not participated in the consortium meetings and thus was left out of the Axiom feasibility study. Given that Mauritius already has access to SAT-3, its interest in EASSy is indicative of the problems countries are experiencing in obtaining affordable bandwith from the SAT-3 consortium.

be one price for bandwidth, regardless of whether or not the purchaser is an investor in the SPV. This addresses the other key limitation of the consortium model, being that only the licenced international operators investing in the cable at the time the of finalising the financing of the project would benefit from lower cost bandwidth.

4) There will be one price for bandwidth on the cable regardless of distance. This may seem to run counter to basic business principles, but the issue was debated extensively at the policy meetings and it was ultimately agreed that this would be the best strategy to further the interests of regional integration, so as to not penalise the more remote and isolated nations. However the impact of this policy on the backhaul terrestrial links to the submarine cable has yet to be examined and there may be some need to reconsider the policy for these links. The reason for this is that in contrast to the submarine cable, which has only one landing point in each country and can therefore only be used for international traffic, the terrestrial links could have add-drop points all along the route and could be used by bandwidth retailers to carry domestic traffic as well as international traffic. Clearly if this occurs, then tariffs should not be uniform across the network, otherwise domestic charges will effectively subsidise international traffic.

In finalising the details of the SPV and determining the strategy going forward there are still a number of outstanding issues that will be need to be addressed before the cable is built. The chief issues are:

- The need to re-examine the traffic forecasts on which the business model is based. Currently the model adopted projects the existing slow growth in high-priced international bandwidth and only expects to provide for the low capacities that the monopoly operators expect to carry. i.e only 20Gbps by 2016. Regionally, the academic institutions alone currently need about 20Gbps (1Gbps per country) to participate in the global research and education networks, and the international community is ready to fund it if it can be purchased at a reasonable price[26]. But the current model assumes that in total only 20Gbps will be carried on the cable by 2016. Clearly if so little bandwidth is sold, the high prices envisaged by the consortium would be justified to cover the cost, but this does not take into account the tremendous latent demand which which expand substantially if affordable pricing is available. In the case of Uganda for example, the Axiom report estimates that by 2010 only about 1Gbps will be needed by the whole country for international bandwidth, whereas the research and academic network alone is likely to need this amount, and the current rollout of infrastructure by the private mobile, fixed wireless operators and ISPs in the country will shortly result in much greater public demand if bandwidth is affordably priced. In many respects this is a true chicken-and-egg situation – continue the current high pricing and bandwidth demand will most likely increase very slowly. However it will take a leap of faith to price the bandwidth ten times more cheaply and assume that the uptake will be ten times greater. It has been pointed out that alternative competing cables may emerge in the future to reduce demand for bandwidth on EASSy, however if the bandwidth on the EASSy cable is priced at cost-based tariffs, there will be no business case for a competing cable.

- As the legislation envisaged will effectively level the playing field and dispense with international gateway franchises, such legislation is likely to be resisted by the incumbent state operators and the few others with international licenses. In many cases these operators have been given or purchased licenses contingent on periods of exclusivity which would need to be ended. Negotiations between government and the international gateway licensees to bring forward the end of their periods of exclusivity will likely be needed. This could entail a negotiated settlement for the affected operators based on estimates of their loss of revenues, with funds provided by government and/or backed by the international community. This process would probably need to precede the establishment of the SPV.

- The need to ensure that the governance and equity structures for the SPV maximises African ownership, but minimises the cost of finance by leveraging the best mix of equity and debt from the different players. The financing models provided by the DFIs and the IDC will need to be considered for their ability to balance the national interests with the funds available in such a wide range of country sizes, regulatory environments and levels of economic development, which results in diverse levels of demand, sources of supply and costs of finance.

- Apart from the decision to look at the modalities for adding Mauritius to the network, there is a more general need to re-examine the landing points for the EASSy cable and the plans for backhaul network. Insufficient attention has been paid to the costs of getting from EASSy to the

26 Developed by a group of national research networks known as the Ubuntunet Alliance.

global backbones, partly because the cash-strapped state operators were focusing on reducing their investment needs by limiting the length of the cable. As currently envisaged, the cable would terminate in South Africa on SAT-3 in the south and in Djibouti and Sudan on SEA-ME-WE-3 and Falcon in the north. The additional transit costs that must be paid to the operators of these cables for onward links to the global fibre hubs in Europe, Asia and North America could reduce much of the cost-saving potential of the EASSy cable. Also, potentially cheaper alternative terrestrial routes for transcontinental traffic, such as via Sudan, Ethiopia[27] and Egypt, have not been considered, and the strategy for linking the land locked countries is currently undefined. Similarly to SAT-3, which only lands in eight of the twenty countries along the west coast, the EASSy consortium model has not aimed for completeness in its coverage of countries within the region, and membership simply reflects the individual operator's interest in participating in the project. Once the cable is designed, the addition of new landing points at a later stages is usually not an option with marine fibre as these projects need to be designed as an integrated system.

- Considerable work will need to be done to develop a strategy for the terrestrial backhaul network. In addition to the terrestrial transmission networks of incumbent fixed-line operators, a number of other providers also own and operate telecom transmission networks for their own purposes. These include cellular operators, electricity operators, pipeline operators, road and railway operators. In one or two cases these organisations have obtained licences to provide wholesale services to other licenced operators, and in a few other cases they are leasing long-haul transmission capacity to telecom operators. In several key places where gaps exist in the regional network, this alternative infrastructure offers substantial capacity which is currently unused. In many countries in the region mobile operators have built the most extensive national fibre backbones. Thus cellular operators may lease capacity on the backbone of incumbent operators where it is cost-effective but in many cases have had to construct their own transmission networks in order to carry traffic between base stations and switches. In total, cellular operators such as Celtel, MTN and Vodacom have invested in the region of over US$500m on the construction of these networks within the last five years. Furthermore, some of the cellular operators such as Celtel are active in a number of countries with contiguous borders and are in a good position to provide international backbones across these countries. As a result representatives from the national retailers would likely need to be brought together to rethink the strategy for the terrestrial network.

- The EASSy consortium members have recently said that the urgent need to implement the project means that the region cannot wait for the restructuring that an SPV would require. Whether an SPV would take much longer to constitute is open to question, but the Axiom Detailed Feasibility Study has pointed out that due to weather conditions, the most appropriate time to build the cable is between December and May. So there is actually still adequate time to make the necessary preparations for an SPV to initiate laying the cable in December 2006. In any event the end-user would certainly be prepared to wait a few months longer if it meant much better long-term prices. ■

27 Which has now joined its fibre network to Sudan and Djibouti.

The paper, which was finalised in late June 2006, contains annexes available online: http://rights.apc.org/documents/fibre_bandwidth_annexes_EN.pdf

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