African Internet Service Providers Association

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"The Halfway Proposition"

Background paper on reverse subsidy of G8 countries by African ISPs

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THE HALFWAY PROPOSITION

OVERVIEW

1. The Digital Opportunity Task Force (DOT Force), whose effort is complemented by the UN ICT Task Force, has identified several possible actions to achieve sustainable ICT development in poorer economies, and has stressed the necessity to "*improve connectivity, increase* [ICT] *access and lower costs*". The high cost of bandwidth is cited as a key inhibitor of Internet Development in Least Developed Countries (LDCs). There has been a lot of research (www.itu.int/ipdc) into the root causes of these high connectivity costs and associated obstacles to reducing them. However it does not appear to address the subject of the reverse subsidies, nor does it appear to suggest concrete steps for reversing the situation.

2. Incumbent Telcos and Internet operators, extracting maximum return out of their positions in monopoly or partially liberalized markets, characterized bandwidth costs in Africa in the 1990's. During the last few years connectivity costs have reduced substantially due to increased competition resulting from the ongoing tide of liberalization. Today a benchmarking study of liberalised markets in Africa would show that end user prices are broadly speaking similar. There are regional variations and there are some variations resulting from the degree to which the relevant market has been liberalized, but none of these countries differ from the others in orders of magnitude. In all cases the service providers will cite their upstream bandwidth costs as their single biggest cost of doing business, and in all cases the average end user prices would be considered high if benchmarked against end user prices in G8 countries (particularly USA and Europe). So what is the root cause of this differential?

AIM

3. The Aim of the Halfway Proposition is to articulate the root causes of high connectivity costs in Africa and to map out a strategy of how to tackle the problem.

THE PROBLEM

4. Obtaining upstream connectivity requires African Internet Backbones (AISPs) to purchase bandwidth from International Backbone Providers (IBPs), which are largely network operators from within G8 countries. Typically 90% of an AISP's upstream cost is the physical link from them to the IBP's country and 10% is the cost of purchasing IP Bandwidth once they get there. Whether the service is purchased as a bundle or separately the AISP pays 100% of the International carrier to get from Africa to the IBP network and then 100% of the Internet bandwidth cost. This amounts to a reverse subsidy of IBP connectivity costs by AISPs.

5. Both the AISPs and IBPs sell capacity to customers in their country. When an end user in Kenya sends E-Mail to a correspondent in the USA it is the Kenyan ISP who is bearing the cost of the International connectivity from Kenya to the USA. Conversely when an American end user sends E-Mail to Kenya, it is still the Kenyan ISP who is bearing the cost of the International connectivity, and ultimately the Kenyan end user who bears the brunt by paying higher subscriptions. The analogy can be extrapolated to all forms of traffic passing over the Internet. Indeed this unfair distribution of bandwidth cost sharing is actually driving traffic out of AISP backbones and into IBP backbones. Evidenced (for example) by the fact that the UN has a major headquarters in Kenya, and yet hosts all of its web sites in America, or the fact that 50% of Kenyan web sites are hosted overseas. AISPs are subsidizing the connectivity costs for IBPs. This imbalance can never be redressed unless there is a more equitable distribution of the costs of international connectivity between AISPs and IBPs. The challenge is to develop a realistic strategy for redressing the balance.

6. ITU conventions governing interconnection principles for voice traffic, where member countries each pay their own half circuit costs for International traffic, would at first glance seem like a reasonable

starting point for Internet interconnection principles since it would result in an equitable split of the connectivity costs. The reality is that it wouldn't work. Voice interconnection principles have been widely criticized. Monopoly Telcos have in the past used them as a means of keeping prices artificially high, and global liberalisation of the telecom industry has in any case made them redundant. Few International Voice carriers still adhere to the settlement rate system, and where monopolies are still trying to force the system, operators are simply being bypassed using (sometimes illegal) VOIP routes into the countries concerned. The system failed to achieve its aims for voice traffic and would most probably fail to achieve its aims for Internet traffic. More importantly it would be difficult to enforce since an IBP is unlikely to agree to pay half the connectivity costs to interconnect to an AISP.

"If you (AISP) want service you have to come to me, if you don't want to come to me – that's fine, I'm not paying to come to you….".

THE APPROACH

7. ISPs in the Pacific Rim faced a similar problem in the 90's, and it was compounded when they were hit by a recession which made paying for international circuits in US$ even more problematic. Their approach was to say, "Why do we need to get to the USA anyway? Most of our trade is National or Regional. If we all peer our traffic within our countries and then within our regions we can dramatically reduce our connectivity costs". So the quality of local and regional connectivity increased, the quality of international connectivity decreased and costs came down. In the process IBPs found that the quality of connectivity that they were offering their customers in domestic markets was reducing. The only way for them to maintain the quality was to establish Points-Of-Presence at the national and regional peering points in the Asia Pacific Area. Problem solved. The IBPs, not the Asia Pacific ISPs, bear the International connectivity costs (it is interesting to note that the Korean Internet Exchange Point is today the largest in the world). This is a slight oversimplification of the many changes that took place in Asia but it is essentially correct. More important is to note the approach that was taken: -
    a. The process was driven by commercial imperatives not regulation.
    b. The adjustments took place through commercial negotiations not through imposed dictates.
    c. Connectivity Costs reduced Dramatically.

OBSTACLES TO THIS APPROACH

8. Using the same approach in Africa could yield similar results. That said, there are some specific obstacles that will need to be overcome:

9. Satellite versus Fibre Optic Cables.   The cost of operating Satellite Connectivity is inherently expensive, and in the case of IBPs using it to establish global PoPs, prohibitive. Furthermore even Fibre costs are not necessarily cheap, if there is only a single cable owned by a single operator. Experience in South America (particularly Brazil) is a good illustration of this. When there was only one cable owned (or at least terminated through) the incumbent monopoly, connectivity over fibre was only marginally cheaper than satellite. It wasn't until a second cable operated by a competitor appeared that prices began to tumble. South Africa is another example where they have had a cable for some time but owned by the monopoly telco and therefore expensive. The availability (indeed oversupply) of cheap fibre optic connections from Europe & North America to the Pacific Rim was a key factor in the decision by IBPs to establish PoPs in that region. Furthermore IBPs had the financial resources (thanks largely to the telecom industry bubble at the time) to be able to own the cable infrastructure itself rather than having to purchase lit fibre from third party carriers. Without this prevailing environment, the commercial incentive would have been considerably less.

10. National Policies & Regulation. The Asian telecom industry was relatively liberalized already, which enabled Exchange Points at both National and Regional Levels to appear quickly. Furthermore

Governments were keen to facilitate the process and there were only limited regulatory or infrastructure obstacles to the emergence of regional carriers, who were able to link exchange points in neighbouring countries. The regulatory environment in Africa is far less enabling.

11. Commercial Incentive. Asia is a large market place with GDP several orders of magnitude larger than Africa's. It will be substantially more difficult to make it commercially attractive for IBPs to want to establish PoPs in Africa than it was in Asia. As with everything, volumes drive prices down and the economics of the Internet are no different from any other industry. This is where the development community has a rôle to play.

12. National Policy Of G8 Countries. Prevailing G8 doctrine has globalisation of trade driven by free market forces at its core (scrutinizers of EU and US policies on matters such as agriculture and steel will see the irony here). The Halfway Proposition maintains that the prevailing situation of reverse subsidies is the result of fallout from this doctrine, and is unfair. These two statements lead to the inevitable conclusion that there is an obligation on G8 governments to provide financial assistance to help create telecommunications infrastructure in Africa. To date G8 Governments have researched causes and debated solutions but they have not accepted this obligation and there has been relatively little substantive financial assistance. This policy will need to change if the Halfway Proposition is to succeed.

THE HALF WAY PROPOSITION

13. The Halfway Proposition is a strategy that borrows the experience of Asia and adapts it into a realistic strategy for Africa. The strategy is driven by two underlying philosophies: -

   d. First – The need for Traffic Aggregation. IBSs have no interest in creating National or Regional IP networks in Africa. The size of our individual markets is too small to provide them with any real commercial incentives to do so. Indeed our aim is to strengthen AISPs and build our own infrastructure, not to encourage multinationals to gobble them up. Conversely what would attract IBPs is the ability to establish PoPs at "Key Traffic Aggregation Points" so that they can improve the quality of connectivity between their networks and Africa as a whole. Creating these traffic aggregation points is therefore key and will require two things;
      i. Emergence of National Internet Exchange Points throughout Africa.
      ii. Emergence of Regional Carriers interconnecting these Exchange Points.
   e. Second – The need to create Digital Arteries. Africa requires massive investment into creating fibre optic digital infrastructure to carry traffic cost effectively;
      i. Linking Africa (particularly East Africa which currently has no international maritime fibre) to the rest of the world.
      ii. Linking the major population centres within countries and regionally between neighbouring countries.

NATIONAL PEERING (INTERNET EXCHANGE POINTS)

14. The first step in Traffic Aggregation is the creation of National Internet Exchange Points – IXPs.

15. Without an IXP, ISPs have to pay International bandwidth prices for traffic that is actually destined locally within a particular country. In most cases the traffic travels overseas through two satellite hops before it reaches its destination a few kilometres across a city. With an IXP present within a country, each ISP pays HALF the cost to reach each of the other ISPs, since they all meet at a neutral point in the middle. Statistics in Kenya show that initially between 20% and 30% of upstream traffic is actually local. Local data circuits cost a fraction of what Satellite capacity costs. Implementing an IXP has an immediate impact in reducing costs and improving performance through reduced network latency.

16. South Africa has had two IXPs for some years, although other African countries have been slow to realize the benefits. Kenya's KIXP was the first IXP outside of South Africa and it has sparked similar IXP initiatives to get started in other countries including; Nigeria, Uganda, Mozambique, Ghana, and Tanzania.

17. Creating IXPs is not technically challenging. The challenge is to manage the human dynamics of creating an exchange point. There is a place for commercially run IXPs in more developed markets. However within Africa those IXPs, which have been successfully established and managed are those that are exclusively set up by ISPs for ISPs, and generally through some form of ISP Association (ISPA). The moment that other organizations get involved the whole proposition becomes complex and messy. Donors, Regulators, NGOs, Governments, ISOC Chapters are all major offenders in this regard. The message to these entities is: "Leave it to the Private Sector. Give assistance to IXPs but don't get actively involved in them"

18. Efforts to encourage the creation of IXPs have been gaining momentum. The East Africa Internet Forum held in Nairobi in August 2002 was a landmark in this respect. It brought together many players from across the continent and saw AfrISPA launch its road map for creating IXPs across the continent (www.tespok.co.ke/eaif). There are currently 18 countries with IXPs in the making and more emerging by the day.

REGIONAL PEERING (PAVIX)

19. National IXPs are the first "halfway step", next comes regional peering.

20. Traffic that is not National is by definition International, but this does not mean that the traffic is destined for an IBP's country of origin. Regional neighbours generally represent a large chunk of an African country's international trade. So it follows that regional peering would also divert a large proportion of a country's International Bandwidth requirements away from upstream connections to IBPs and into Regional Exchange Points where the ISPs in each country are effectively paying HALF instead of the arrangement with IBPs where they pay 100%.

21. Facilitating regional peering is somewhat more complex than peering at the National Level. Experience elsewhere (www.pch.org) suggests that a model where national Exchange Points in neighbouring countries interconnect with each other directly, does not work. There are a multitude of reasons for this but what they boil down to is that the levels of trust that were required between ISPs at the national level begin to break down when this is extended to regional peering. There is a danger that the costs of operating regional exchanges can actually drag the National Exchanges down. Therefore while the concept of a Pan African Virtual Internet Exchange (PAVIX) is an appealing one, the mode of implementing it needs to be thought through very carefully. There are a few options;

   f. PAVIX Inc. PAVIX could be established as a separate "for profit" organization whose sole aim is to link IXPs across the continent. This could be further enhanced by encouraging ISPs to take an equity stake in the organization. Experience elsewhere suggests that so long as the organization doing the regional peering is not directly linked to the national IXP it can work extremely well. That being the case a "for profit" model is more attractive than any attempt at a "not for profit super peering house".

   g. Regional Carriers. Encouraging the emergence of regional carriers who establish interconnection agreements with ISPs in countries that have IXPs and then sell transit traffic to ISPs from different countries may be a more realistic and fruitful approach. This would in effect encourage the creation of African Internet Backbone Providers (AFIBPs) who would in turn have the ability to aggregate sufficient traffic and routes such that the AFIBPs could negotiate with IBPs to provide them with PoPs for transiting traffic into Africa.

DIGITAL ARTERIES (& the danger of VSAT)

22. **Beware of VSAT.**   Satellite communications in general and VSAT in particular have been touted by many (including the donor community) as the Holy Grail to solve the Digital Divide. Many western satellite operators are even being encouraged by their governments under a banner of "helping to bridge the digital divide" to target Africa with their services. Operators are keen to oblige since they are suffering reduced profitability at home due to competition from broadband cable operators. In reality when VSAT operators take traffic directly from end users in Africa to an IBP's network they are actually "de-aggregating" traffic and compounding the problem. That is not to say that VSAT does not have a rôle to play but it must be used for bridging connectivity problems between urban and rural areas within Africa using hubs within Africa. The impact of VSAT used the wrong way has far wider implications. It, for example, reduces hosting of applications within AISP data centres, in favour of hosting applications in IBP data centres.

23. **Digital Arteries**. The creation of Digital Arteries within and out of Africa will be a crucial requirement to allow Intercontinental peering to succeed. The current reliance on satellite communications has a negative impact on both price and quality of international connections. The creation of Fibre Optic Digital arteries in and out of the continent will overcome this. The absence of Digital Fibre Optic Arteries all over Africa is not because of technical obstacles. The problem is that the existing volumes of traffic will not generate sufficient financial return to justify commercial investment into fibre. Overcoming this obstacle an empowering the private sector to invest in fibre optic connectivity is a key part of the Halfway Proposition.

WHO NEEDS TO DO WHAT?

24. **ISPs/AfrISPA.** AfrISPA is now a reality and has a road map for rolling out IXPs throughout the continent. The process is being supported by amongst others DFID, Cisco Systems and Packet Clearinghouse. For those countries that have not started the process of creating National Exchange Points, the time has come for ISPs in those countries to get together and to start doing so.

25. **African Governments & Regulators.** Regional Peering and the Emergence of Regional Carriers can only become a reality if Regulators and Policy makers allow the process to take place. They need to ensure that implementation of cross border connectivity within Africa is not hampered by regulatory obstacles. A policy that has created monopolies or duopolies on provision of International connectivity inevitably makes regional connectivity expensive. Where possible the "**opolies" should be removed completely. As a minimum, Regulators need to distinguish between regional and international connectivity to encourage growth of regional traffic and to drive down costs through competition.

26. **NEPAD/AU/ATU.** The rôle of these various regional geo-political bodies should be to take the agenda of the Halfway Proposition forward. At the domestic level they need to promote the need for regulators and policy makers to pursue policies that will facilitate rather than obstruct the objectives of the Halfway Proposition. At the International level they need to take the Halfway Proposition onto the world stage to influence G8 thinking. G8 countries are actively propagating their policies of globalisation and free markets. They need to be shown that while there may be benefits in some areas to pursuing these policies, there is also some fallout which is directly increasing the digital divide which they so often claim they wish to bridge. If they can do this, they may be able to create sufficient momentum to ensure that G8 countries do come to the negotiating table.

27. **G8 Governments.** The Telecommunications infrastructure in Africa has (for whatever reasons) suffered from massive under investment. Investment at the levels that will be required to achieve results will not be justified by the immediate commercial returns. That being the case there is no incentive for the private sector to make the investment on their own. Since most African governments already have a budget deficit, the only other realistic solution is for G8 donor countries to provide

grant funding that when supplemented with private sector funding will facilitate the required levels of investment into infrastructure. If donor grants and substantial loan guarantees are not forthcoming, then African countries will have no option but to address the matter of reverse subsidies on Internet traffic to Africa through the WTO and the ITU. It would be unfortunate and retrogressive if they were forced into this approach through a lack of donor commitment.

SUMMARY

28. The current burden of paying for International Internet Bandwidth Costs is unfairly weighted onto countries in Africa. The existence of these reverse subsidies is the single largest factor contributing to high bandwidth costs. A cursory look at the figures will show that these reverse subsidies are costing the continent anything between US$ 250 and 500 million per annum.

29. Redressing the balance through regulation by the ITU is not the way forward. It would be far better to allow the process to be driven by the private sector. To do so requires certain obstacles to be overcome, building blocks to be put in place, policies to be changed and donor support to be forthcoming. The Halfway Proposition has articulated these requirements into a cohesive plan involving a few specific steps:
    h. Step 1 – Create Traffic Aggregation within Africa
        i. Through the creation of Internet Exchange Points
        ii. Through the emergence of Regional Carriers facilitating regional peering
    i. Step 2 – Create Digital Arteries to carry the traffic
        i. Regionally. Regional Fibre Optic Infrastructure to reduce the costs of regional peering
        ii. Internationally. International Fibre Optic Infrastructure to reduce the costs for IBSs to establish PoPs at Points Of Aggregation in Africa.

30. This strategy requires the active participation of a number of players: -
    j. ISPs. Through the efforts of AfrISPA, ISPs need to ensure that traffic at the National level is kept that way through cooperating in the creation of effective National IXPs.
    k. National Regulators & Policy Makers. They need to provide the required enabling environment.
    l. ATU/AU/NEPAD. These geopolitical organizations need to ensure that governments are providing the necessary enabling environment to allow National and Regional Peering to evolve quickly. They also need to ensure that the International community is fully sensitised to the existence of these reverse subsidies that Africa is currently paying.
    m. G8 Donor Governments. Donor governments have long lamented about the Digital Divide in Africa without fully acknowledging that its existence is to a large extent the result of fallout from their policies on globalisation and free trade. Reversing the situation will require the financial support of these G8 Donor Governments.

31. There is no doubt that bridging the digital divide between Africa and the rest of the world involves a multitude of issues. However, if we can dramatically reduce connectivity costs we will have gone a long way towards providing the required environment for resolving them. The strategy articulated by the Halfway Proposition **will** achieve this.

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Profile. Richard Bell has been operating an IP Network in Kenya since 1995. His current positions include: -
1. Swift Global (Kenya) Limited (Kenya's second largest IP Network Operator) - Managing Director
2. The Telecommunications Service Providers Association OF Kenya (TESPOK – Kenya's ISP Association) - Secretary
3. The Kenyan Internet Exchange Point (Kenya's IXP) - Managing Director

4. The Kenya Network Information Centre (Kenic - Kenya's ccTLD) - Director
5. AfriNIC (Africa's Emerging Regional Internet Registry) - Director & Eastern Africa Representative
6. The 1st East African Internet Forum - Organizing Chairman
7. Nairobi Stock Exchange - Member Of The High Tech Growth Committee