



Overview of Telecommunications Policy, Regulatory and Infrastructure Environment vis a vis REN Activities in the UbuntuNet Region¹

1. BACKGROUND

As part of the Master Plan and Strategy development process, UbuntuNet Alliance carried out a situational survey of the telecommunications sector policy and regulatory environments covering 22 countries in its membership region, with specific focus on impact on research and education networking activities. The output informs the Backbone Vision and its implementation strategy in the Policy and Master Plan, and our strategy for planning, along with the NRENs, approaches for working with policy makers and regulators towards more conducive environments and, like sailing against the wind, creating success despite the challenges.

2. BARRIERS TO BROADBAND ACCESS

We found the following to be the key environmental barriers to access to broadband communication:

- Slow reforms in the communication sector
- Inadequate access to backbone infrastructure at affordable prices
- Inadequate policies and regulation with regards to ownership and access to essential infrastructure by universities and research institutions

Slow sector reform

Policies and regulation that govern: access to spectrum; ownership of fiber infrastructure such as dark fiber; and interconnection and tariffs are often unfavourable, and also vary widely. Some governments in the region such as Kenya, South Africa, Tanzania and Uganda have made progress in reforming their telecommunications sector policy, legal and regulatory environments; and have also adopted technology neutral converged regulatory frameworks that promote access to broadband infrastructure. Others like Djibouti, Eritrea, Ethiopia and Swaziland still favour monopoly and restrictive regimes that hamper academic institutions' ownership and operation of broadband fibre and wireless networks.

Access to broadband Infrastructure

A critical aspect of high speed connectivity is ensuring that national and international fiber access is available and affordable. Bandwidth to sub-Saharan Africa still comes through a single submarine cable—the South Atlantic Telephony-3/West African Submarine Cable (SAT-3/WASC, or SAFE) or via satellite connection – inherently poor quality and expensive.

¹ This paper was prepared for the UbuntuNet Alliance by Dr Lishan Adam and Dr F F Tsubira during the second half of 2008.

The price of SAT3 has been kept artificially high because the connection was, until recent limited relaxation, shared by a closed consortium of dominant telephone companies and state monopolies.

The existing backbone infrastructure in the UbuntuNet region is mainly low capacity, wireless-based links designed to carry voice traffic. Submarine cable projects including SEACOM and The East African Marine Systems (TEAMS) that are expected to be in service in 2009 and the East African Submarine cable System (EASSy) that is expected to be launched in 2010 should, provided they maintain the agreed open access principles, address the international connectivity gaps. Additional backbone is however required to connect the inland regions and landlocked countries to the landing points: there is a current real likelihood that international fiber with the potential for much cheaper bandwidth will be neutralised to a large extent by the bottlenecks created by the absence of sufficient backhaul and national backbone capacities.

Countries in the region like Burundi, Rwanda, Kenya, Tanzania and Uganda have initiated studies and rollout programs for national backbones in recent years supported by development agencies and the private sector. Others such as Botswana, Ethiopia, Mozambique, South Africa, Sudan and Zambia are rolling out their national backbone networks through existing operators. Djibouti, Democratic Republic of Congo, Lesotho and Somalia have yet to initiate national backbone projects.

Ownership and access to essential facilities by academic and research institutions

The restriction on academic ownership and operation of network infrastructure is often due to the monopoly of networks by traditional incumbent operators that are regarded as sole owners of the network, including national gateways. In most countries, only the licensed operators and other public utility companies have the Rights of Way, and NRENs would have problems trying to establish their own networks if they so wished. In countries like Eritrea and Ethiopia the restrictions are extreme, with even the use of VSAT and its operation by academic institutions prohibited. In most of the countries NRENs can only purchase fiber capacity from existing licensed providers. This denies them the option to consider ownership models that might be more cost effective or to build networks for special research purposes.

Policies and regulations concerning broadband fiber networks are at early stages in most of the countries, and there are therefore no provisions for NRENs to be operators of networks with equal access to essential facilities. In some countries like Kenya, and more recently South Africa, NRENs have formal licenses.

Table 1 summarizes the state of ICT policy and regulatory environment in the UbuntuNet membership region.

3. CONCLUSION

It is evident that within the next two to three years, there will be sufficient infrastructure opportunities to satisfy the full integration of African research and education institutions into the global research and education community. The key barrier will be policy and regulation that permit this to happen at the lowest cost, underscoring the urgency of addressing environmental change now.

Table 1: The Policy, Regulatory, and Infrastructure Environment in the UbuntuNet Region Countries with Respect to Research and Education Networking

	COUNTRY	EXTENT OF LIBERALISATION	EXISTING FIBRE OPPORTUNITIES	NATIONAL FIBRE BACKBONE	ABILITY TO OWN INFRASTRUCTURE	ABILITY TO OPERATE INFRASTRUCTURE	ABILITY TO OUT AN INTERNATIONAL GATEWAY
1	ANGOLA	Liberalized market with Angola Telecom in dominant position with regards to fixed line and fiber networks	Fiber from Angola Telecom	Angola Telecom has been deploying national backbone in various phases	No regulatory provisions for NREN' ownership of fiber infrastructure , NRENs can own and operate VSAT	No regulatory provisions for NREN' ownership and operation of fiber infrastructure NRENs can own and operate VSAT	Angola Telecom retains monopoly on international gateway
2	BOTSWANA	Liberalized with BTC the dominant player in fixed and broadband segment	BTC fiber ring and connectivity to neighbouring countries	Government' national fiber ring has been completed	Universities are expected to lease fiber from the BTC, free to use VSAT	NRENs are free to operate their own infrastructure	NRENs can in principle get a gateway license
3	BURUNDI	Partially liberalized with incumbent operator ONATEL the main player in fixed line segment	Optical Fiber network does not exist in Burundi	No national backbone exists, Plans for Burundi Backbone (BB) is underway through funding from the World Bank – study by the World Bank and SWEDTEL	No regulatory provisions for NREN' ownership of fiber infrastructure exists, NRENs can own and operate VSAT	No regulatory provisions for NRENs to own fiber infrastructure NRENs can own and operate VSAT	ONATEL retains monopoly over national gateway
4	Djibouti	Public monopoly of telecommunication by Djibouti Telecom	Djibouti has access to SEA-ME-WE cable and potential for landing of EASSy and SEACOM	National fiber backbone does not exist	No policy and regulatory provision for ownership of fiber infrastructure by academic institutions	No policy and regulatory provision for operation of fiber infrastructure by academic institutions	Monopoly of international gateway
5	DRC	Partially liberalized with fixed line monopoly of the Congolese Post and	Limited fiber links exist from alterative operators such as railway and power	No national backbone exists Study completed by IDRC. World Bank is	No regulatory provisions for NRENs to own fiber infrastructure,	No regulatory provisions for NRENs to operate fiber infrastructure	Monopoly of gateway by Congolese Post and Telecommunicatio

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		Telecommunications Office	companies	also funding a national backbone	NRENs can own and operate VSAT	NRENs can own and operate VSAT	ns Office
6	ERITREA	Public monopoly of telecommunications by Eritel	National fiber link planned	No national backbone exists	Academic institutions are not allowed to own infrastructure. The incumbent operator Eritel is the single entity that owns communication infrastructure	Academic institutions are not allowed to operate their own network. The incumbent operator Eritel is the only entity that owns and operates communication infrastructure in Eritrea	Academic institutions are not allowed to hold gateway license or gateway through
7	ETHIOPIA	Public Monopoly of telecommunications infrastructure by the Ethiopian Telecommunications Corporation (ETC)	National fiber backbone of which over 4000Km is completed, connection to Sudan via fiber exists	A complete fiber backbone over 10,000 KM is being built through vendor financing scheme ZTE-China	Academic institutions are not allowed to own infrastructure. The incumbent operator ETC is the single entity to own infrastructure	Academic institutions are not allowed to operate their own network. The incumbent operator ETC is the only entity to own and operate infrastructure	No gateway licenses can be issued to NREN under the current regulation
8	KENYA	Liberalized with Telkom Kenya having dominant position in fixed line segment	Fiber available from Telkom Kenya, KDN and Kenya Power and Lighting Co, Ltd.	Fiber backbone is being built by Telkom Kenya, KDN, and mobile operators but a comprehensive plan does not exist	NREN is allowed to own infrastructure	NREN is allowed to operate their own infrastructure	The new licensing regime allows for Internet backbone and gateway license
9	LESOTHO	Partially liberalized with Telecom Lesotho the monopoly fixed line operator	Limited amount of Fiber is available from the Telecom Lesotho	National backbone does not exist	No regulatory provision exist to allow NREN to own their own fiber network, NREN can own VSATs	No regulatory provisions for NRENs to operate their own network, except for VSATs	Gateway license is not possible under the current regulatory regime, LTA is studying the possibility of gateway license for NREN and ISPs
10	MADAGASCAR	Partially liberalized with TELMA a	Limited fiber capacity exists from current	National backbone does not exist, the	NREN can ideally own and operate fiber	NREN can ideally own and operate fiber infrastructure	The World Bank Regional

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		dominant fixed line operator	operators –TELMA (fixed operator), Celtel and Organge (mobile operators)	government has received financing from World Bank to support rollout a national backbone through hybrid ppp arrangement	infrastructure when it is available	when it is available	Infrastructure Programme promotes open access to the network.
11	MALAWI	Partially liberalized with Malawi Telecom Limited the dominant fixed line operator	Fiber from Malawi Telecommunications Ltd.	Planned national backbone by Malawi Telecommunications Ltd.	NRENs can own their own network	NRENs can operate their own network	NREN has a gateway license
12	MOZAMBIQUE	Partially liberalized with TDM having dominant position in fixed line and fiber segment	TDM submarine cable connecting Maputo and Beira, EDM fiber in southern Mozambique	Backbone is being built gradually by TDM and EDM, no full fledged national backbone plan exists	Policy and regulation allow any entity to own and operate a network, including an international gateway, for data communication purposes	Policy and regulation allow any entity to own and operate a network, including an international gateway, for data communication purposes	NREN has a gateway license
13	NAMIBIA	Partially liberalized with Telecom Namibia the monopoly fixed line operator	Fiber is available through Telecom Namibia national backbone	Telecom Namibia is building a national backbone	NRENs are not allowed to own fiber infrastructure except for VSAT, but there are opportunities with “next generation regulation” proposed by Namibian Communications Commission) for NREN to own fiber network	NRENs are not allowed to self provide and operate fiber networks Opportunities exist with “next generation regulation” proposed by Namibian Communications Commission)	No provision for gateway license exist under the current licensing regime
14	RWANDA	Partial liberalization with RwandaTel the	Fiber available from Terracom Rwanda stretching 300Km,	National Backbone study is being finalized – sponsored by USTDA	Regulatory framework allows for NREN to lease	Regulatory framework allows for NREN to operate a private	Regulatory framework allows for connection to

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		main fixed line operator	others Kisirimbi and ElectroGaz have dark fiber		dark fibre to build a private network and connect to international gateways	network	international gateways
15	SWAZILAND	Monopoly by Swazi Post and Telecommunications Corporation	Fiber cable exist between Swaziland and South Africa from Swazi Telecom	Fiber cable exists between Swaziland and South Africa, no comprehensive national backbone plan	NERN cannot own and operate their own infrastructure under the current regulatory regime	NERN cannot own and operate their own infrastructure under the current regulatory regime	International gateway is a monopoly of SPTC
16	SOMALIA	Competitive telecommunications infrastructure but absence of any fiber network	Fiber network does not exist	No national fiber backbone	NREN can own and operate their own infrastructure, but the fiber network does not exist	NRENs can operate their own infrastructure, but the fiber network does not exist	No international gateway license is required
17	SOUTH AFRICA	Liberalized with dominant player Telkom South Africa in broadband and fixed line segment	Fiber available from Telkom, Neotel building its own backbone	Telkom has a national Backbone Neotel bthe SNO is building a national backbone	NRENs cannot self provide and own fiber infrastructure	NRENs can operate their own fiber infrastructure Network after leasing from the Telkom	No gateway through provision exists under the current licensing regime
18	SUDAN	Partially liberalized with Sudatel the largest operator	Fiber network from Sudatel	Extended fiber link exists but not the whole country is covered	NRENs can not own fiber infrastructure	NRENs cannot operate their own infrastructure	NRENs are not allowed to operate their own gateway, need to pass Sudatel
19	TANZANIA	Fully liberalized	There are a few Optical Fiber Cable Infrastructure from TZARA, TRC, TANESCO, TTCL scattered throughout the country (3535 Km 1*24 core, 815 Km 1*12	Tanzania national Optical Backbone study of 2005 with advanced negotiation for implementation	Academic institutions in principle can own fiber infrastructure and lease dark fiber under the converged regulatory framework	Academic institutions in principle can operate their own infrastructure under the converged licensing framework	NREN can apply for a gateway through license

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			core, 202 Km 1*6, 254km 1*8)				
20	UGANDA	Fully liberalised	Fiber is available from telecom operators (Uganda Telecom, MTN) and power company (Uganda Electric Transmission Company Limited - UETCL)	National backbone being implemented by government; offer of dark fibre pair made to NREN by government, but not formalised	Network ownership is permitted under the new policy and regulatory regime provided that there is no switching of traffic for any other group	NREN is permitted to operate their own network under new policy and regulatory regime	Gateway through and gateway license is permitted under the new policy and regulatory regime
21	ZAMBIA	Partially liberalized with Zamtel in dominant position	Fiber is available from Zamtel Dark Fiber is owned by Zambia Electric Supply Company (ZESCO) – 200 Km fiber & Copperbelt Energy Company (CEC), 24-Core 520 Km fiber	Zamtel Backbone connects nationwide and neighbouring countries ZESCO has plans to expand its network locally and to neighbouring countries in three phases	Regulations are not clear with regards NREN ownership of fiber infrastructure- NREN can own and operate VSAT NREN require infrastructure and ISP license to operate their own network	NREN can own and operate VSAT with ISP license An ISP license will not entitle academic institutions to own and operate their fiber networks, however the regulator is open to possibilities for leasing dark fiber from ZESCO and CEC by academic institutions	International gateway license is quite expensive (US\$12,000,000). Direct satellite access is allowed although this has not been the optimal solution
22	ZIMBABWE	Partially liberalized with one fixed line operator (TelOne)	Fiber available from powerTel and fixed line operator	Partial connection, Comprehensive national backbone does not exist	The regulation does not permit for network ownership by NREN	The regulation does not permit for ownership and operation of fiber network by academic institutions	Monopoly over national gateway. NREN is not allowed to gateway through or to have a gateway license