



What is UbuntuNet Alliance?¹

“Securing affordable broadband connectivity and efficient ICT access and usage for African NRENs and their associated communities of practice”

Introduction

Historically, for various reasons, bandwidth to African Universities used to cost many times what Universities elsewhere paid. Over the last five years, a combination of factors has caused prices to drop from a typical \$4,000 per half-duplex Mbps per month delivered via VSAT to a current \$130 per full-duplex Mbps per month at UbuntuNet Alliance inland points of presence (POPs), delivered via optical fibre. The factors include: the work of the UbuntuNet Alliance in stimulating National Research and Education Network (NREN) activity along with lobbying, with others, for policy and regulatory changes to liberalise markets; economies of scale and increased negotiating ability resulting from consolidation of bandwidth needs in the research and education sector; the roll out of national optical fiber backbones and access to these by NRENs; the bringing of optical fiber owned by utilities on to the market; new procurement approaches brought on board by experienced organisations like DANTE²; and the direct support to NRENs by governments that now appreciate the research development dividend.

Unfortunately, some of the NRENs, particularly those that are land-connected, have not yet benefited from the price drop because of limited competition in backhaul capacity and/or restrictive regulations in their countries or other countries that must be transited. The Alliance will not be satisfied until the prices paid are at par with the rest of the global research and education networking community, with a new target of \$85 per Mbps per second at UbuntuNet Alliance inland POPs by the end of the 2014 – 2018 planning period. The UbuntuNet Alliance is driven by a vision of securing affordable high bandwidth connections (gigabits speeds) that interconnect African National Research and Education Networks (NRENs) regionally and globally, and to the Internet generally. The Alliance seeks equality, not just equity, for researchers and educators in Africa. As penetration and costs go down, the Alliance is giving increasing attention to collaboration with communities of practice and rolling out applications and services.

This pamphlet gives information about the UbuntuNet Alliance as an organisation, describes progress towards achieving the organisational vision, and explains some of the strategies being followed.

NRENs and Regional RENs

In many ways the NRENs of Europe are the role models for collaborative networking among universities and research institutions of Africa. Most European NRENs receive substantial funding from their national governments. A few are governmental bodies, but most are structured as non-governmental associations of member institutions, with government officials participating

¹ “What is UbuntuNet?” may be freely copied and redistributed without change but with due acknowledgement. Visit www.ubuntunet.net.

² Delivering of Advanced Network Technology to Europe – see www.dante.net

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in, but not controlling the governance processes.

NRENs are non-profit organisations characterised by:

- their national character;
- their inclusiveness - i.e. their acceptance of all universities and research institutions in the country (perhaps other than for-profit institutions as may be decided in-country) as members; and
- their primary purpose of taking responsibility for organizing inter-institutional connectivity for their member institutions and providing shared connectivity for these institutions with other NRENs world-wide.

Many NRENs also take responsibility for providing general Internet access (as opposed to inter-NREN connectivity) for their member institutions; and others organize inter-institutional collaborations on capacity development, library matters and advanced services.

Regional RENs exist to provide shared cross-border backbones and shared inter-continental connectivity to the NRENs within regions at the continental or sub-continental level. Well known examples are GÉANT, the European Regional REN; Internet2 and National Lambda Rail in the USA; CLARA in South America; and APAN, the Asia Pacific Academic Network.

Introducing the UbuntuNet Alliance

Origins

In the latter half of 2005 five established and emerging NRENs in Sub-Saharan Africa came together to found a new regional research and education network for eastern and southern Africa: the UbuntuNet Alliance for Research and Education Networking.

Membership and Governance

The UbuntuNet Alliance is incorporated as a not-for-profit association in the Netherlands, and is also registered as a Trust in Malawi. Its head office is in Lilongwe, Malawi. The Trust has full ownership of the not-for-profit association incorporated in the Netherlands.

The Alliance has three types of membership categories:

- a) **NREN Members:** All bona-fide NRENs of countries in eastern and southern Africa are eligible for membership of the Alliance. In addition, the Alliance is keen to support any project team that is working to establish a bona fide NREN and invites any such team to contact the UbuntuNet Alliance Secretariat for support. There are currently fifteen NREN Members in the region as illustrated in the map in **Figure 1:** Eb@le (Democratic Republic of Congo); EthERNET (Ethiopia); iRENALA (Madagascar); KENET (Kenya); MAREN (Malawi); MoRENet (Mozambique); RENU (Uganda); RwEdNet (Rwanda); SomaliREN (Somalia); SudREN (Sudan); TENET (South Africa); TERNET (Tanzania); XNet (Namibia); ZAMREN (Zambia) and BERNET (Burundi).
- b) **Affiliate Members:** these include all not-for-profit transnational organizations, or transnational communities of practice that are formally constituted under a registered umbrella organization, that are involved in education and/or research.
- c) **Industry Members:** these refer to registered transnational companies or organisations, being for-profit, that are engaged in the provision of goods and/or services that have direct relevance to the mission and activities of the Alliance and its NREN Members.



Figure 1: Alliance Membership Map

The Alliance is governed by a nine-member Board of Trustees, with seven of these elected by the Annual General Meeting. The seven elected members serve two-year overlapping terms. The other two members of the Board are ex-officio: the Chairperson, appointed for a three-year term through a process run by the Association of African Universities; and the CEO, appointed on contract by the Board of Trustees. The elected Board members do not represent particular stakeholders and are expected to think and act solely in the interests of the UbuntuNet Alliance. This structure reflects the ownership of the Alliance as being imbedded deeply in the research and education networks, universities and research institutions of the region.

Role of UbuntuNet Alliance

As a regional research and education network, the UbuntuNet Alliance works primarily with NRENs, seeking to extend the capacity and resilience of the broadband research and education backbone network – UbuntuNet – that interconnects them and provides them, via gateways on the backbone, with high speed connections to NRENs worldwide and the Internet generally.

The Alliance also focuses on: pushing for conducive policy and regulatory environments in the region to enable the growth and development exploitation of research and education networking; helping to nurture NRENs where they do not exist; and promoting communities of practice and applications that exploit the opportunities of high speed regional and global connectivity.

Global access through GÉANT

Because of the vision and commitment of the European Commission in building the GÉANT network and in establishing high-speed inter-continental links between the GÉANT network in Europe and research and education networks (RENs) all over the World, GÉANT is the de facto central hub of the inter-connected RENs of the World. The GÉANT Policy Committee approved the Alliance's requests for a 20 Gbps connection to GÉANT and for GÉANT to provide full REN transit – interconnectivity via GÉANT to the other NRENs of the World.

The Alliance Network Vision

Developed during 2008, the Alliance Network Vision shown in **Figure 2** has guided the implementation of the data network, UbuntuNet. Implementation strategy has changed as new opportunities emerge, but the Vision has not changed. The use of the wet backbone was aimed at by-passing the barrier of cross-border connectivity that is still a challenge in many parts of the region.

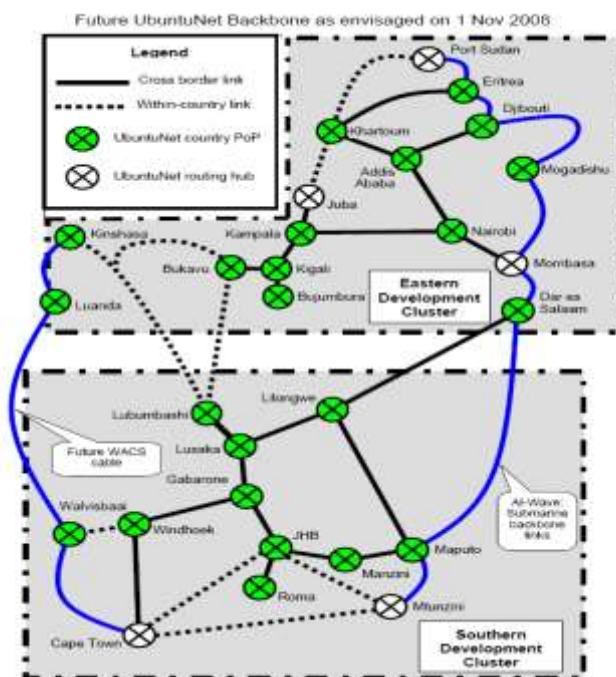


Figure 2: The vision for the UbuntuNet Backbone (2008)

UbuntuNet Today

Figure 3 portrays UbuntuNet, the data network of the Alliance, as at the date of publication of this document.

The UbuntuNet network now consists of:

- Two Points of Presence (PoPs) in Europe – one located in Telecity where the London Internet Exchange has presence, and a second one at NIKhef, the same location that houses the Amsterdam Internet Exchange;
- Eight PoPs in Africa procured under the AfricaConnect project;
- A “wet backbone” on the eastern seaboard, consisting of 2xSTM-4 links between Alliance PoP in Nairobi and the Alliance PoP in Mtunzini. One of the links provides a direct path between the two PoPs while the second “touches” the Alliance PoPs in Maputo and Dar es Salaam;
- Spur links from Nairobi to Kigali via Kampala and from Dar es salaam to Lusaka (STM4)
- 2xSTM-4 link from the Alliance PoP in Nairobi to UbuntuNet Alliance PoP in Amsterdam
- 2xSTM-1 capacity between Mtunzini and London on TENET infrastructure and WACS procured through TENET;
- A 10 Gbps link between the London PoP and the Amsterdam PoP;
- (Two POPs at planned to be established in Blantyre (Malawi) and Moanda (DRC)).



Figure 3: The present UbuntuNet Map

Intercontinental point-to-point Circuits

Within Telecity and Nikhef, UbuntuNet and GÉANT interconnect via two 10 Gbps circuits at each location. One of these carries the normal IPv4 and IPv6 route announcements and routed traffic. The other 10 Gbps interconnects UbuntuNet and the "GÉANT+" point-to-point network and enables non-routed, point-to-point transport circuits to be set up between two endpoints - one in Africa and one in Europe - within member institutions of member NRENS.

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One such point-to-point circuit has been established to date and is in regular use. This is a 2 Gbps point-to-point circuit between the Hartebeesthoek Radio Astronomy Observatory (HartRAO), which is some 70 Km west of Pretoria in South Africa, and the Joint Institute for Very Long Baseline Interferometry in Europe (JIVE) in "D"wingeloo, Holland. HartRAO connects to the South African NREN, TENET, via circuits provided by the South African National Research network, SANReN.

Commodity peering and transit interconnections

UbuntuNet has settlement-free peering inter-connections with more than three hundred networks at major Internet Exchanges in Amsterdam and London (AMS-IX and LINX respectively), while commodity Internet transit is purchased from major Internet providers in both London and Amsterdam.

NREN connections

Six Member NRENs connect to and receive UbuntuNet's global REN and commodity connectivity services.

KENET connects from its hub at Nairobi to both the Amsterdam and London Hubs. KENET's aggregate connection capacity to UbuntuNet is slightly above 4 Gbps, comprising two STM-4 circuits on the TEAMS submarine cable and an STM-1 circuit on the SEACOM cable, all terminating in London. KENET also has an STM-16 link terminating at the Amsterdam hub and a 155Mbps terminating at the UbuntuNet Nairobi hub.

MoRENet and TERNET connect from their hubs in Maputo and Dar es Salaam respectively to London at 155 Mbps via STM-1 circuits within the SEACOM submarine cable.

ZAMREN connects at 622Mbps to UbuntuNet's newly established PoP in Lusaka and onwards to the Internet via the Alliance's Dar es Salaam PoP. The Alliance is in the process of procuring a second link to Lusaka from Cape Town to give ZAMREN an alternative path to the Internet

TENET connects at 10 Gbps to UbuntuNet's Mtunzini, London and Amsterdam Hubs.

RENU, the Ugandan NREN, connects to UbuntuNet at 370Mbps at the Alliance Kampala PoP.

Operations

The Alliance has contracted TENET to operate the entire UbuntuNet network and manage the interconnection arrangements with other networks. Aggregate inbound traffic volume through the Alliance's London and Amsterdam hubs is growing rapidly and at the time of writing peaks on working days at around 7 Gbps. The Alliance is also gradually establishing its own network operations center with a view to transitioning into operating UbuntuNet directly within two years.

Interconnections with African ISPs

The Alliance is keen to establish settlement-free peering interconnections with local Internet Service Providers in every city that hosts an UbuntuNet hub. The Alliance will seek the assistance of its Member NRENs in setting up peering interconnections at local Internet exchanges and elsewhere.

Collaboration with WACREN and ASREN

UbuntuNet Alliance has been working closely with the Association of African Universities Research and Education Networking Unit to support the development of the West and Central African Research and Education Network (WACREN) along the same lines as the Alliance. UbuntuNet Alliance and WACREN have concluded a collaboration agreement that allows each to make use of the other's network capacity outside of Africa.

UbuntuNet Alliance is working to the same end with the Arab States Network (ASREN). Through collaboration with WACREN and ASREN, the whole of Africa will be covered by an interconnection research and educational network by 2018.

Support for the UbuntuNet Alliance

The Alliance works in collaboration with the Association of African Universities. The Alliance has also received direct financial support from the International Development Research Centre (IDRC) of Canada; the Swedish Programme for ICT in Developing Regions, SPIDER; the Andrew W. Mellon Foundation (through the programme Fostering Research and Education Networking in Africa that was managed by TENET); the Open Society Institute (OSI); the Open Society Initiative for Southern Africa (OSISA); the United States Agency for International Development (USAID); the European Union; and Cisco Systems. Major support from the European Union Commission has been critical in the implementation of the UbuntuNet regional network and expansion of its global capacity. The Alliance has participated and continues to participate in several EU FP7 projects that promote the use and uptake of e-Infrastructures and their applications.

The critical need to develop the capacity of engineers is addressed on a continuing basis in collaboration with three major partners: the AfricaConnect Project funded by EUC (funding); the International Network for the Availability of Scientific Papers – INASP (funding); the Network Startup Resource Center of the University of Oregon (funding, training, and direct engineering support); and the Internet Society (training).

Contact the UbuntuNet Alliance

Interested persons may contact the Alliance at info@ubuntunet.net.